November 1988 $3.00

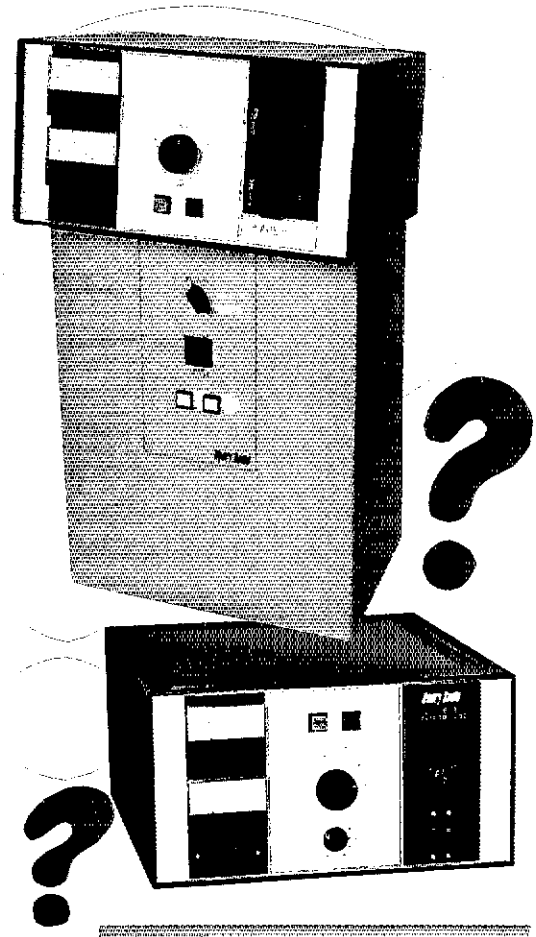
QST

devoted entirely to Amateur Radio

Field Day 1988!

0 843655 9

THE CHOICE IS SIMPLE



Pick a band. . .pick a power level . . .pick a price! Picking the right brand is even easier. Henry Radio is the power amplifier specialist.

Every one of our 13 models offer superb value, experienced engineering (25 years!) and top quality components.

Since we offer the broadest selection of power amplifiers of any manufacturer, we feel that you should find exactly what you need on the following list:

2K CLASSIC console_____a true workhorse HF linear. Loafs along at full legal power. All amateur bands, 80 through 15 meters. 2K & 3K export models include 10 meters.

2K CLASSIC X console___we can't think of any way to make this magnificent 2000 watt HF amplifier better. Rugged and dependable. . . the last amplifier you may ever need to buy. 80 through 15 meters.

2KD CLASSIC ____a desk model designed to operate at 2000 watts input effortlessly, using two Eimac 3-500Z glass envelope triodes, Pi-L plate circuit and a rotary silver plated tank coil. 80 through 15 meters. 3.5-30 MHz.

3K CLASSIC Mk II_____uses the Eimac 3CX1200A7 tube. More than 13 db gain. We believe the 3K console to be one of the finest amateur HF linears available. 80 through 15 meters. 3.5-30 MHz.

3K PREMIER console___all of the time tested reliability of the 3K Classic Mk II plus QSK and the 160 meter band. All amateur bands, 160 through 15 meters. 1.8-30 MHz.

3KD PREMIER desk model___the same RF deck as the console, but in a smaller and lighter configuration. Full legal power plus QSK. All amateur bands, 160 through 15 meters. 1.8-30 MHz.

5K CLASSIC console ___a rugged and reliable 5,000 watt HF linear amplifier. Not available for amateur use in the U.S. 3.5-30 MHz.

2002-A desk model___a superb VHF amplifier. Operates CW, FM, SSB, AM or pulse applications. Uses an Eimac 3CX800A7 ceramic triode for smooth, dependable power. Frequency range 144 to 148 MHz. Commercial models in the 100 to 300 MHz range also available.

2002-A___the same as above, but operating in the 220 to 225 MHz frequency range. These VHF units have proven themselves in the field through thousands of hours of use.

2006-A_____offers the same specifications, the same reliability as the 2002-A, but operates in the 50 to 54 MHz. Commercial models in the 30 to 100 MHz range available.

3002-A console___full legal power provided by an Eimac 8877 ceramic triode mated to a heavy duty power supply. Rugged and reliable. Perfect for amateur, commercial, industrial and scientific operations. 144 to 148 MHz. Commercial models in the 100 to 300 MHz range available.

3006-A console___the same rugged construction and the same dependability as the 3002-A, but for operation in the 50 to 54 MHz frequency range. Commercial models in the 30 to 100 MHz range available.

2004-A desk model____a unique UHF linear amplifier for working 440 MHz frequency range. Designed for dependability. . .built to last.

We realize that these descriptions are much too short. For complete descriptions, specs and prices please call or write.
If you have a requirement for a special purpose amplifier please call Ted Shannon, Meredith Henry or Ted Henry at our Los Angeles office.

HENRY RADIO 61 YEARS OF SERVICE

Henry Radio

2050 S. Bundy Dr., Los Angeles, CA 90025 (213) 820-1234
Butler, Missouri 64730 (816) 679-3127

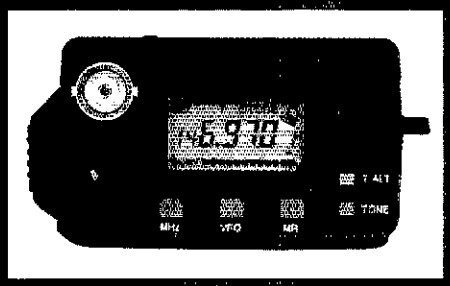
Toll free order number: (800) 877-7979 TELEX: 67-3625(Henradio) FAX (213) 826-7790

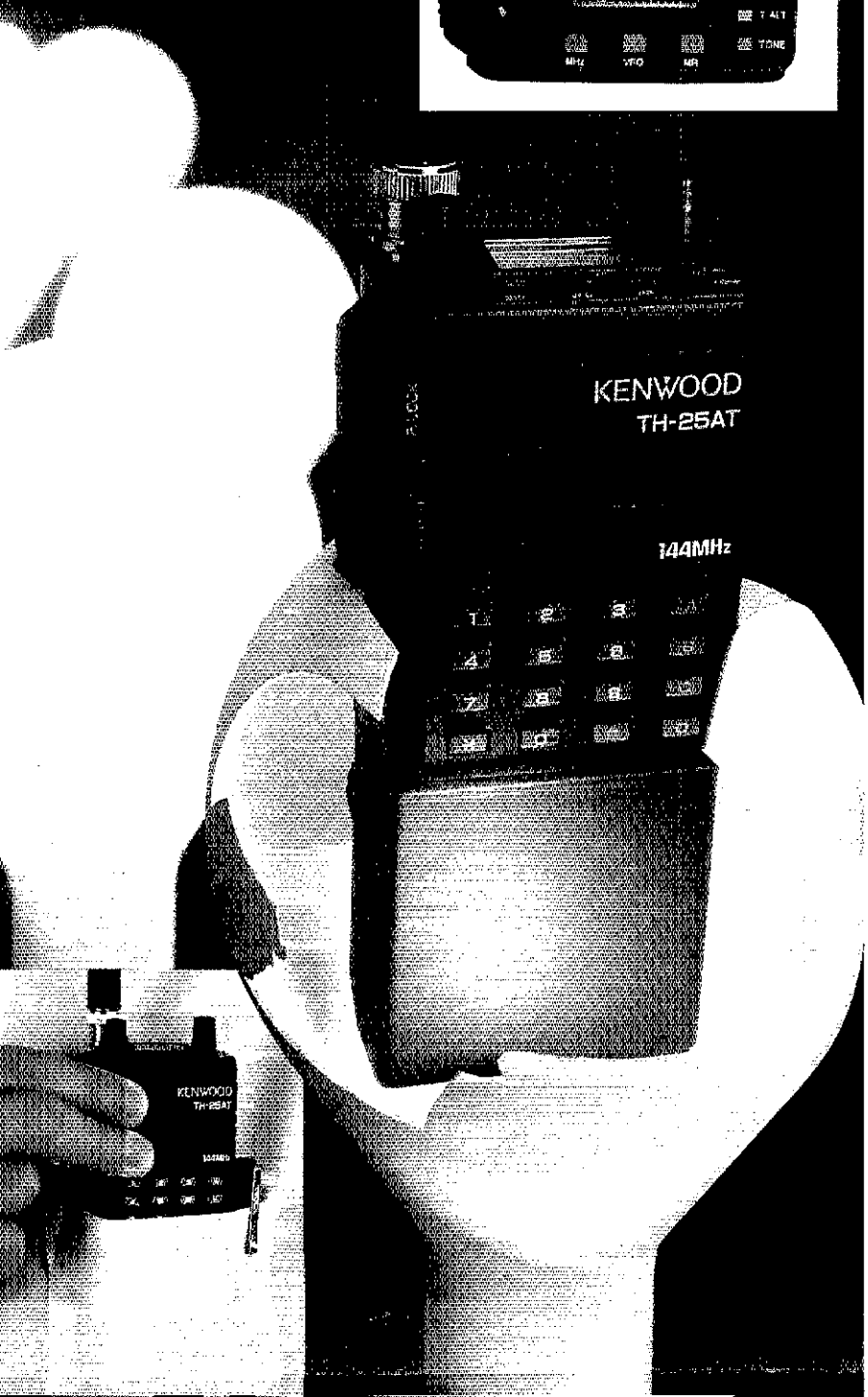
KENWOOD

...pacesetter in Amateur Radio

TH-55AT 1200 MHz Here Now!

Compact Breakthrough!



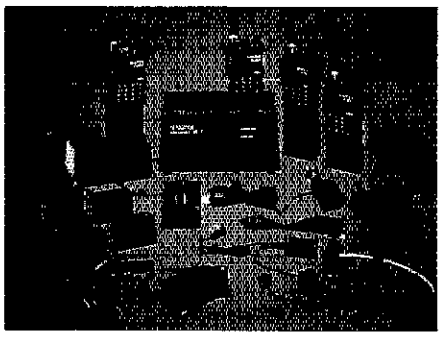


TH-25AT/45AT

New Pocket Portable Transceivers

The all-new TH-25 Series of pocket transceivers is here! Wide-band frequency coverage, LCD display, 5 watt option, plus...

- Frequency coverage: **TH-25AT:** 141-163 MHz (Rx); 144-148 MHz (Tx). (Modifiable for MARS/CAP. Permits required.)
  TH-45AT: 438-450 MHz.
- Automatic Power Control (APC) circuit for reliable RF output and final protection.
- 14 memories; two for **any** "odd split" (5 kHz steps).
- Automatic offset selection (TH-25AT).
- 5 Watts from 12 VDC or PB-8 battery pack.
- Large multi-function LCD display.
- Rotary dial selects memory, frequency, CTCSS and scan direction.
- T-ALERT for quiet monitoring. Tone Alert beeps when squelch is opened.
- Band scan and memory scan.
- Automatic "power off" circuit.
- Water resistant.
- CTCSS encoder/decoder optional (TSU-6).
- **Supplied accessories:** StubbyDuk, PB-6 battery pack for 2.5 watts output, wall charger, belt hook, wrist strap, water resistant dust caps.



Optional accessories:

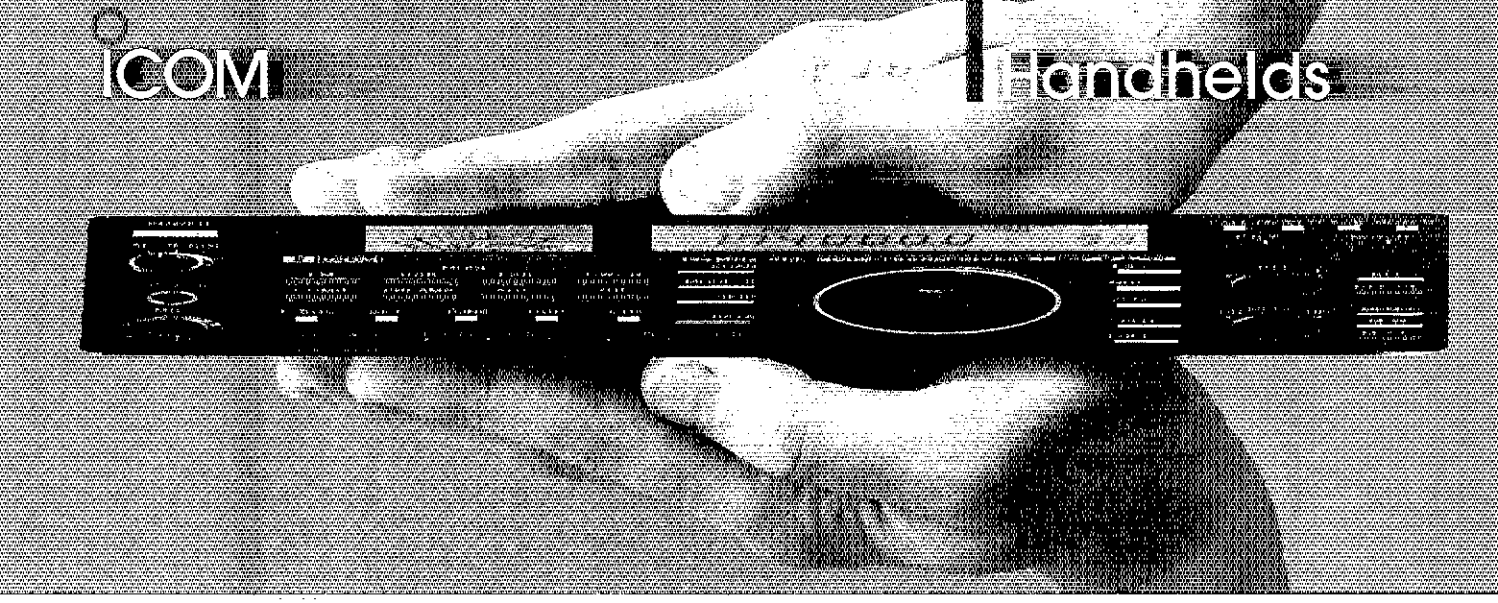
• **PB-5** 7.2 V, 200 mAh NiCd pack for 2.5 W output • **PB-6** 7.2 V, 600 mAh NiCd pack • **PB-7** 7.2 V, 1100 mAh NiCd pack • **PB-8** 12 V, 600 mAh NiCd for 5 W output • **PB-9** 7.2 V, 600 mAh NiCd with built-in charger • **BC-10** Compact charger • **BC-11** Rapid charger • **BT-6** AAA battery case • **DC-1/PG-2V** DC adapter • **HMC-2** Headset with VOX and PTT • **SC-14, 15, 16** Soft cases • **SMC-30/31** Speaker mics. • **TSU-6** CTCSS decode unit • **WR-1** Water resistant bag

KENWOOD

KENWOOD U.S.A. CORPORATION
2201 E. Dominguez St., Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745

ICOM

Handhelds



HOW DO YOU PACK 7 WATTS, 20 MEMORIES AND SCANNING INTO A HANDHELD?

IC-2GAT: 7 Watts Rx 138-174MHz; Tx 140-150MHz
IC-4GAT: 6 Watts 440-450MHz
IC-32AT: 5 Watts Rx 138-174MHz/440-450MHz; Tx 140-150MHz/440-450MHz

A New Generation of Powerful, Versatile Handhelds.

Select a new "G Series" or dual band ICOM transceiver and enjoy full base station luxury in a portable unit designed especially for you!

- **Maximum Frequency Coverage.** The IC-2GAT receives 138-174MHz, including NOAA, and transmits 140-150MHz to include CAP and MARS frequencies. The IC-4GAT operates 440-450MHz, and the IC-32AT receives 138-174MHz and operates 140-150MHz/ 440-450MHz.
- **Most Powerful Handheld!** The IC-2GAT delivers seven watts! The IC-4GAT is six watts and the IC-32AT is five watts! One watt level selectable for local QSO's.
- **20 Memories.** Store any frequency, Tx offset and subaudible tone in any memory. Total flexibility!
- **Programmable Scanning** of band and memories plus easy lockout and instant memory recall.
- **Additional Features.** Battery saver, call channel, all subaudible tones, multi-function LCD readout and DTMF pad.
- **Compatible Accessories.** All ICOM IC-2AT/02AT series battery packs, headsets and speaker mics are interchangeable.
- **Optional UT-40 Beeper** silently monitors a busy channel for your calls. When the pre-programmed subaudible tone is received, the unit beeps and the LCD flashes.

IC-32AT 2 Meters and 440MHz
IC-2GAT 2 Meters
IC-4GAT 440MHz

ICOM
First in Communications

ICOM America, Inc., 2380-116th Ave. N.E., Bellevue, WA 98004
Customer Service Hotline (206) 454-7619
3150 Premier Drive, Suite 126, Irving, TX 75063
1777 Phoenix Parkway, Suite 201, Atlanta, GA 30349
ICOM CANADA, A Division of ICOM America, Inc., 3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4 Canada

QST

QST (ISSN: 0033-4812) is published monthly as its official journal by the American Radio Relay League, Newington, CT USA. Official organ of the Canadian Radio Relay League.

Offices
225 Main St, Newington, CT 06111 USA
Telephone: 203-666-1541
Telex: 650215-5052 MCI
FAX: 203-665-7531 (24-hour direct line)

Subscription rate: $25 per year postpaid in the US and Possessions and $36 elsewhere. All payments must be in US funds. Foreign remittances should be by international postal or express money order or bank draft negotiable in the US and for an equivalent amount in US funds. Individuals may apply for membership at the rates shown. Canadians apply to CRRL Headquarters, address on page 9. Licensed Amateur Radio operators over 65—$20 US, $31 elsewhere, plus proof of age. Persons age 17 or under may qualify for special rates. Write for application. Membership and *QST* cannot be separated. Fifty percent of dues is allocated to *QST*, the balance for membership. Single copies $3.00.

Second-class postage paid at Hartford, CT and at additional mailing offices. Postmaster: Form 3579 requested.

QST is available to blind and physically handicapped individuals on flexible discs from the Library of Congress, National Library Service for the Blind & Physically Handicapped, Washington, DC 20542.

Indexed by Applied Science and Technology Index, Library of Congress Catalog Card No: 21-9421.

OUR COVER

The Bartlesville Amateur Radio Club Field Day position basks in an Oklahoma sunset. Stories, photos and scores begin on page 79. *(Photo courtesy of Dave Christie, WB5KFP; W1AW photo by W2ABE)*

CONTENTS

November 1988
Volume LXXII Number 11

TECHNICAL

NEWS AND FEATURES

OPERATING

DEPARTMENTS

R4
Maximum Performance, Minimum Space

If you are like our friend on the island, living with limited space, R4 is for you.

That's right, you can forget about towers and rotators. Put away your spade, wire and insulators because you won't need a ground radial system. Cushcraft engineers have performed a miracle by developing a new half wave vertical for 10, 12, 15 and 20 meters that provides great performance using a simple counterpoise ground of four 48" stainless steel rods.

The new R4 has broadband impedance matching giving full coverage and automatic frequency selection of all four bands. All of this with an 18' high, 8 lb. vertical that will handle 1800 watts of power!

With R4 you get quick assembly, easy installation and top gun performance. Whatever your space, large or small, R4 will make ham radio more fun.

Buy R4 and talk to your friends around the world today!

cushcraft CORPORATION

Available through dealers worldwide

48 Perimeter Road, Manchester, NH 03108 USA
603-627-7877 Telex 4949472
Fax 603-627-1764

KENWOOD

...pacesetter in Amateur Radio

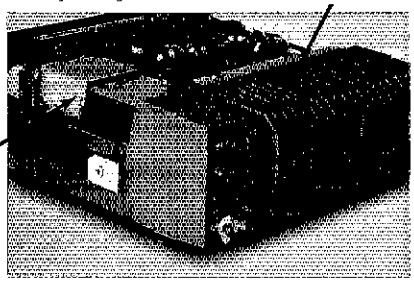
All New Compact HF!

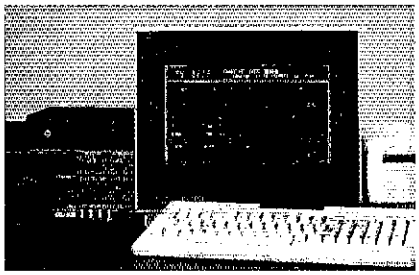
"DX-citing!"

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

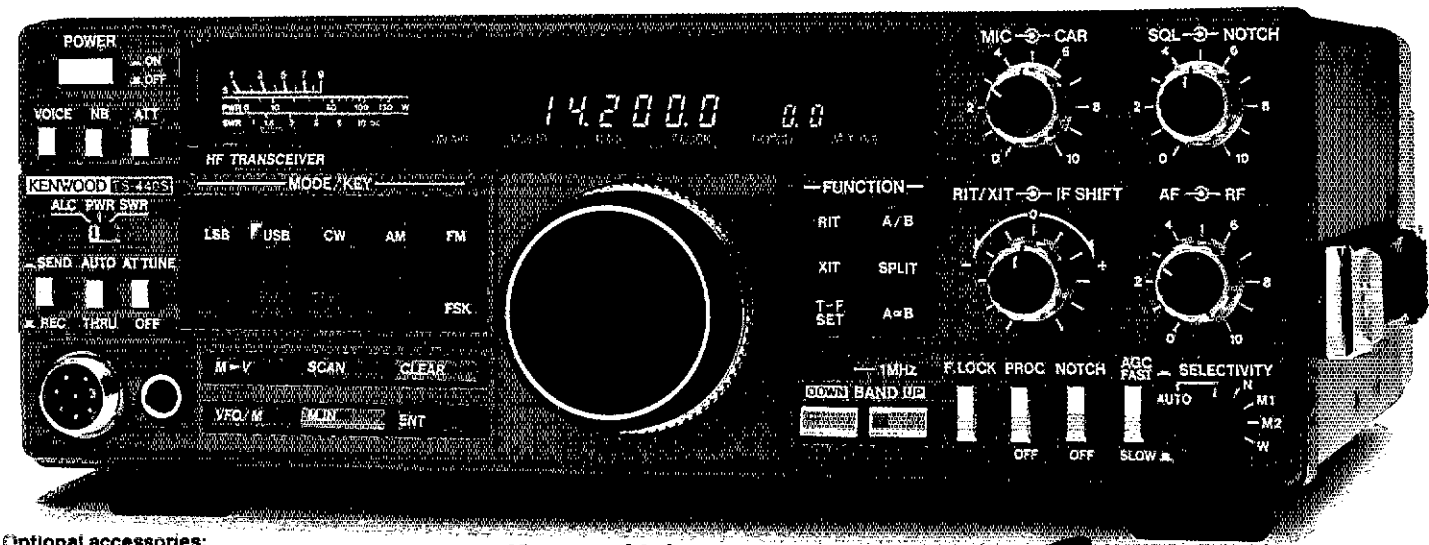
Kenwood's advanced digital know-how brings Amateurs world-wide "big-rig" performance in a compact package. We call it "Digital DX-citement"—that special feeling you get every time you turn the power on!

- **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.)



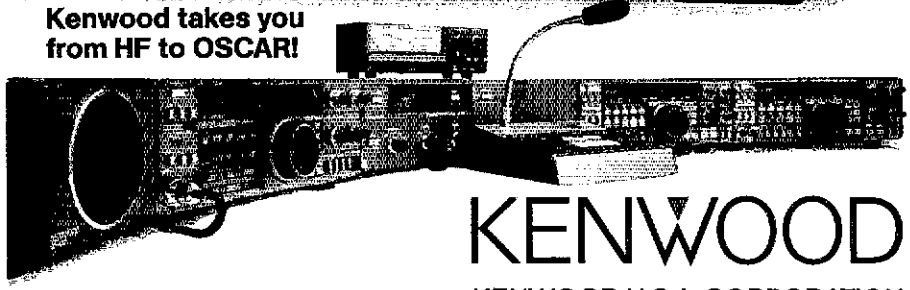


- **Adjustable dial torque**
- **100 memory channels**
  Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.
- **TU-8 CTCSS unit (optional)**
- **Superb interference reduction**
  IF shift, tuneable notch filter, noise 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!



KENWOOD

KENWOOD U.S.A. CORPORATION
2201 E. Dominguez St., Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745

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

KENWOOD

...pacesetter in Amateur Radio

70 W/45 W/25 W 3 Choices

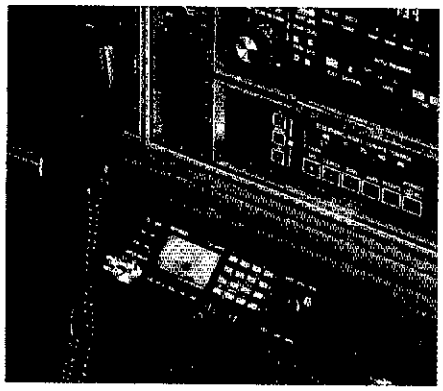
Three Choices for 2m!

TM-2570A/2550A/2530A

Feature-packed 2m FM transceivers

The all-new "25-Series" gives you three RF power choices for 2m FM operation: 70 W, 45 W, and 25 W. Here's what you get:

- Telephone number memory and autodialer (up to 15 seven-digit phone numbers). **A Kenwood exclusive!**
- High performance GaAs FET front end receiver
- 23 channel memory stores offset, frequency, and subtone. Two pairs may be used for odd split operation
- 16-key DTMF pad with audible monitor
- Extended frequency coverage for MARS and CAP (142-149 MHz; 141-151 MHz modifiable)
- Center-stop tuning—**a Kenwood exclusive!**

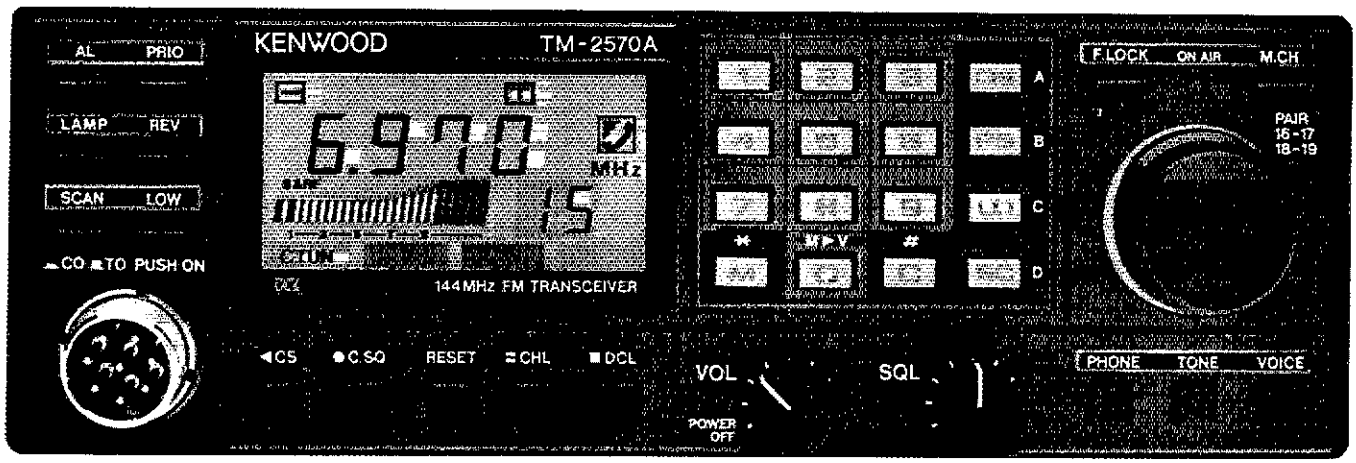


- New 5-way adjustable mounting system
- Automatic repeater offset selection—**another Kenwood exclusive!**
- Direct keyboard frequency entry
- Front panel programmable 38-tone CTCSS encoder **includes** 97.4 Hz (optional)
- Big multi-color LCD and back-lit controls for excellent visibility
- The TM-3530A is a 25 watt version covering 220-225 MHz. The first full featured 220 MHz rig!

DCL Introducing... Digital Channel Link

Compatible with Kenwood's DCS (Digital Code Squelch), the DCL system enables your rig to **automatically** QSY to an open channel. Now you can automatically switch over to a simplex channel after repeater contact! Here's how it works:

The DCL system searches for an open channel, remembers it, returns to the original frequency and transmits control information to another DCL-equipped station that switches **both** radios to the open channel. Microprocessor control assures fast and reliable operation. The whole process happens in an instant!



Actual size front panel

Optional Accessories

- **TU-7** 38-tone CTCSS encoder
- **MU-1** DCL modem unit
- **VS-1** voice synthesizer
- **PG-2N** extra DC cable
- **PG-3B** DC line noise filter
- **MB-10** extra mobile bracket
- **CD-10** call sign display
- **PS-430** DC power supply for TM-2550A/2530A/3530A
- **PS-50** DC power supply for TM-2570A
- **MC-60A/MC-80/MC-85** desk mics.
- **MC-48B** extra DTMF mic. with UP/DWN switch
- **MC-43S** UP/DWN mic.
- **MC-55** (8-pin) mobile mic. with time-out timer
- **SP-40** compact mobile speaker
- **SP-50B** mobile speaker
- **SW-200A/SW-200B** SWR/power meters
- **SW-100A/SW-100B** compact SWR/power meters
- **SWT-1** 2m antenna tuner

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

KENWOOD

KENWOOD U.S.A. CORPORATION
2201 E. Dominguez St., Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745

Directors

Atlantic Division
HUGH A. TURNBULL, W3ABC, 6903 Rhode Island Ave, College Park, MD 20740 (301-927-1797)
Vice Director: James M. Mozley, W2BCH, 126 Windcrest Dr, Camillus, NY 13031 (315-488-9051)

Central Division
EDMOND A. METZGER, W9PRN, 1520 South Fourth St, Springfield, IL 62703 (217-523-5861)
Vice Director: Howard S. Huntington, K9KM 65 South Burr Oak Dr, Lake Zurich, IL 60047

Dakota Division
HOWARD MARK, W0OZC, 11702 River Hills Dr Burnsville, MN 55337 (612-890-9114)
Vice Director: Bruce L. Meyer, W0HZR, 9410 Blaisdell Ave S, Bloomington, MN 55420 (612-881-2909)

Delta Division
JOEL M. HARRISON, SR, WB5IGF, Rte 1-Box 219B Judsonia, AR 72081 (501-729-3301)
Vice Director: Joseph A. Butler, K5OS, 242 Woodland Circle, Ocean Springs, MS 39564 (601-875-8934)

Great Lakes Division
LEONARD M. NATHANSON,* W8RC, 20833 Southfield Rd, Suite 240, Southfield, MI 48075
Vice Director: Allan L. Severson, AB8P, 1275 Ethel Ave, Lakewood, OH 44107 (216-521-1565)

Hudson Division
STEPHEN A. MENDELSOHN, WA2DHF, 318 New Milford Ave, Dumont, NJ 07628 (201-384-0570/0680)
Vice Director: Paul Vydareny, WB2VUK 259 N Washington St, N Tarrytown, NY 10591-2314 (914-631-7424)

Midwest Division
PAUL GRAUER,* W0FIR, Box 190, Wilson, KS 67490 (913-658-2155)
Vice Director: L. C. "Chuck" Miller, WA0KUH 7000 North East 120, Kansas City, MO 64166 (816-781-7313)

New England Division
TOM FRENAYE,* K1KI, 23 Pinehurst Rd Box 62, Unionville, CT 06085 (203-673-5429)
Vice Director: Robert Weinstock, KN1K, PO Box 331 Cambridge, MA 02238

Northwestern Division
RUSH S. DRAKE, W7RM, Rte 2, Box 372 AC La Center, WA 98629 (206-263-3048)
Vice Director: William R. Shrader, W7QMU 2042 Jasmine Ave, Medford, OR 97501 (503-773-8624)

Pacific Division
RODNEY J. STAFFORD,* KB6ZV, 5155 Shadow Estates, San Jose, CA 95135 (408-274-0492)
Vice Director: James Knochenhauer, K6ITL 133 Sylvan Ave, San Mateo, CA 94403 (415-345-9511)

Roanoke Division
GAY E. MILIUS, JR, W4UG 1416 Rutland Dr, Virginia Beach, VA 23454 (804-481-5095)
Vice Director: John C. Kanode, N4MM RFD 1, Box 73-A, Boyce, VA 22620 (703-837-1340)

Rocky Mountain Division
MARSHALL QUIAT, AG0X, 1660 Wynkoop, Suite 850 Denver, CO 80202 (303-333-0819)
Vice Director: Hugh Winter, W5HD, Box 14904 Albuquerque, NM 87191 (505-293-5735)

Southeastern Division
FRANK M. BUTLER JR, W4RH 323 Elliott Rd, SE, Fort Walton Beach, FL 32548 (904-244-5425)
Vice Director: Mrs. Evelyn Gauzens, W4WYR 2780 NW 3rd St, Miami, FL 33125 (305-642-4139)

Southwestern Division
FRIED HEYN, WA6WZO, 962 Cheyenne St Costa Mesa, CA 92626 (714-549-8516)
Vice Director: Wayne Overbeck, N6NB 14021 Howland, Tustin, CA 92680 (714-731-6178)

West Gulf Division
JIM HAYNIE, WB5JBP, 3226 Newcastle Dr Dallas, TX 75220 (214-352-6180) home; 4515 Prentice St, Suite 112, Dallas, TX 75206 (214-368-7710) business
Vice Director: Thomas W. Comstock, N5TC 1700 Dominik, College Station, TX 77840 (409-693-1181)

*Executive Committee Member

Section Managers of the ARRL

Reports Invited: The ARRL Board of Directors (see list at left) determines the policies of ARRL. The 15 divisions of the League are further arranged into 68 administrative "sections," each headed by an elected Section Manager. Your SM welcomes reports of club and individual activity. ARRL Field Organization appointments are available covering a wide range of Amateur Radio volunteer interests. Whatever your license class, your SM has an appointment available. Check with your SM (below) for further information.

Atlantic Division
Delaware — Robert J. Pegritz, KC3TI, PO Box 7921, Newark 19714 (302-737-7236)
Eastern Pennsylvania — Kay C. Craigie, KC3LM, 128 Berkeley Rd, Devon 19333 (215-688-5045)
Maryland-DC — Philip E. Battey, W3FZV, 3330 Jones Bridge Ct, Chevy Chase, MD 20815 (301-656-559
Southern New Jersey — Richard Baier, WA2HEB, 1226 Audubon Dr, Toms River 08753 (201-270-9292)
Western New York — William Thompson, W2MTA, RD 1—Rock Rd, Newark Valley 13811 (607-642-8930)
Western Pennsylvania — Otto Schuler, K3SMB, 3732 Colby St, Pittsburgh 15214 (412-231-6890)

Central Division
Illinois — David Carlson, AA9D, PO Box 123, South Elgin 60177
Indiana — Bruce Woodward, W9UMH, 6208 Bramshaw Rd, Indianapolis 46220 (317-251-5606)
Wisconsin — Richard R. Regent, K9GDF, 5003 South 26th St, Milwaukee 53221 (414-282-0312)

Dakota Division
Minnesota — George E. Frederickson, KC0T, RR #2—Box 352, South Haven 55382 (612-558-6312)
North Dakota — Roger "Bill" Kurtti, WC0M, Rural Route—Box 34, Rock Lake 58365 (701-266-5646)
South Dakota — Roland Cory, W0YMB, 1010 7th St, W, Mobridge 57601 (605-845-2400)

Delta Division
Arkansas — Bob Harmon, W5SEP, Rt 1, Box 219, Winslow 72959
Louisiana — John M. Wondergem, K5KR, 600 Smith Dr, Metairie 70005 (504-837-1485)
Mississippi — James N. Davis, KK5Z, PO Box 332, Senatobia 38668 (601-562-6051)
Tennessee — Harry Simpson, W4MI, 1830 Macaulay Ave, Memphis 38127 (901-357-8148)

Great Lakes Division
Kentucky — John A. Thernes, WM4T, 60 Locust Ave, Covington 41017 (606-331-0331)
Michigan — George E. Race, WB8BGY, 3865 Gibbs Rd, Albion 49224 (517-531-4758)
Ohio — John P. Haungs, WA8STX, 10615 Thornview Dr, Evendale 45241

Hudson Division
Eastern New York — Paul S. Vydareny, WB2VUK, 259 N Washington, North Tarrytown 10591 (914-631-7424
NYC-Long Island — Walter M. Wenzel, KA2RGI, 373 Fifteenth St, West Babylon 11704 (516-957-5726)
Northern New Jersey — Robert R. Anderson, K2BJG, 69 Page Dr, Oakland 07436 (201-337-9644)

Midwest Division
Iowa — Robert W. Walstrom, W0EJ, 7431 Macon Dr NE, Cedar Rapids 52402 (319-393-8982)
Kansas — Robert M. Summers, K0BXF, 3045 North 72nd, Kansas City 66109 (913-299-1128)
Missouri — Benton C. Smith, K0PCK, 3301 Sinclair, Rte 3, Box 196-A, Columbia 65203 (314-443-516
Nebraska — Vern J. Wirka, WB0GQM, 3106 Vinton, Omaha 68105 (402-341-4572)

New England Division
Connecticut — Caesar Rondina, N1DCS, 5 Bailey Dr, West Haven 06516
Eastern Massachusetts — Barry Porter, KB1PA, 47 Erin Rd, Stoughton 02072 (617-341-2639)
Maine — Bill Mann, W1KX, PO Box 377, Pittsfield 04967-0377 (207-487-2737)
New Hampshire — William Burden, WB1BRE, 11 Briand, Nashua 03063 (603-882-0021)
Rhode Island — William Foss, KA1JXH, 70 Mayfair Rd, Cumberland 02864 (401-334-3058)
Vermont — John Maguire, N1CQE, RFD 1 Box 7500, Poker Hill Rd, Underhill 05489
Western Massachusetts — William C. Voedisch, W1UD, 240 Main St, Leominster 01453 (617-534-6256)

Northwestern Division
Alaska — Dianne Lee Marshall, AL7FG, One Dog Path, Ester 99725
Idaho — Don Clower, KA7T, 5103 W. Cherry Ln, Meridian 83642 (208-888-7020)
Montana — Kenneth G. Kopp, K0PP, Box 848, Anaconda 59711 (406-797-3340)
Oregon — Randy Stimson, KZ7T, 9890 SW Inglewood St, Portland 97225 (503-297-1175)
Washington — Brad Wells, KR7L, 1290 Puget Dr, E, Port Orchard 98366 (206-871-6546)

Pacific Division
East Bay — Bob Vallio, W6RGG, 18655 Sheffield Rd, Castro Valley, CA 94546 (415-537-6704)
Nevada — Joseph D. Lambert, W8IXD, PO Box 1201, Boulder City 89005 (702-294-0505)
Pacific — Wayne Jones, NH6GJ, PO Box 794, Wahiawa, HI 96786 (808-621-5916)
Sacramento Valley — Robert H. Watson, W6IEW, 10994 Clinton Bar Rd, Pine Grove, CA 95665 (209-223-010
San Francisco — Robert Odell Smith, NA6T, 320 Park St—PO Box 1425, Fort Bragg, CA 95437 (707-964-4931)
San Joaquin Valley — Charles P. McConnell, W6DPD, 1658 W Mesa Ave, Fresno, CA 93711 (209-431-2038)
Santa Clara Valley — Glenn Thomas, WB6W, 554 Simas Dr, Milpitas, CA 95035 (408-263-9450)

Roanoke Division
North Carolina — W. Reed Whitten, AB4W, 1208 Oxford Place, Cary 27511 (919-467-7464)
South Carolina — James G. Walker, WD4HLZ, Rte 1, Box 5395, Marion 29571 (803-423-3645)
Virginia — Mark Witt, NN4I, 113 Par Dr, Salem 24153 (703-387-3623)
West Virginia — Karl S. Thompson, K8KT, 5303 Pioneer Dr, Charleston 25313 (304-776-4352)

Rocky Mountain Division
Colorado — William "Bill" Sheffield, KQ0J, 1444 Roslyn St, Denver 80220 (303-355-2488)
New Mexico — Joe Knight, W5PDY, 10408 Snow Heights Blvd, NE, Albuquerque 87112 (505-299-4581
Utah — James R. Brown, NA7G, 865 Manchester Rd, Kaysville 84037 (w—801-533-5271) (h—801-544-0056)
Wyoming — James E. Raisler, N7GVV, 1102 East 9th St, Gillette 82716 (307-686-0794)

Southeastern Division
Alabama — James M. Spann, Jr, WO4W, PO Drawer X, Demopolis 36732 (205-289-1400)
Georgia — Edmund J. Kosobucki, K4JNL, 5525 Perry Ave, Columbus 31909 (404-322-2856)
Northern Florida — Royal V. Mackey, N4ADI, 161 Shell Point W, Maitland 32751 (407-644-5905)
Southern Florida — Richard D. Hill, WA4PFK, 12380 NW 30 St, Sunrise 33323 (305-572-3172)
Puerto Rico — Jose A. "Tony" Purcell, KP4IG, Urb Tomas Carrion, Calle 2, #95, Juana Diaz, PR 006 (809-837-2975)
Virgin Islands — Ronald Hall, Sr, KP2N, PO Box 3987, St Thomas 00801

Southwestern Division
Arizona — James E. Swafford, W7FF, 5906 W Miramar Dr, Tucson 85715 (602-298-7793)
Los Angeles — Phineas J. Icenbice, Jr, W6BF, 19323 Halsted St, Northridge, CA 91324 (818-349-3186
Orange — Joe H. Brown, W6UBQ, 5444 La Sierra, Riverside, CA 92505 (714-687-8394)
San Diego — Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego, CA 92117 (619-273-1120)
Santa Barbara — Thomas I. Geiger, W2KVA, 428 E Grant St, Santa Maria, CA 93454 (805-868-1359)

West Gulf Division
North Texas — Phil Clements, K5PC, 1313 Applegate La, Lewisville 75067 (214-221-8873)
Oklahoma — Joseph Lynch, N6CL, PO Box 73, Oklahoma City 73101
South Texas — Arthur R. Ross, W5KR, 132 Salty La, Brownsville 78521 (512-831-4458)
West Texas — Amelia "Milly" Wise, W5OVH, 8516 Mt Scott, El Paso 79904 (915-751-4160)

THE AMERICAN RADIO RELAY LEAGUE, INC

The American Radio Relay League, Inc, is a noncommercial association of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communications in the event of disasters or other emergencies, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

ARRL is an incorporated association without capital stock chartered under the laws of the State of Connecticut, and is an exempt organization under Section 501(c)(3) of the Internal Revenue Code of 1986. Its affairs are governed by a Board of Directors, whose voting members are elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial, and no one who could gain financially from the shaping of its affairs is eligible for membership on its Board.

"Of, by, and for the radio amateur," ARRL numbers within its ranks the vast majority of active amateurs in the nation and has a proud history of achievement as the standard-bearer in amateur affairs.

A bona fide interest in Amateur Radio is the only essential qualification of membership; an Amateur Radio license is not a prerequisite, although full voting membership is granted only to licensed amateurs in the US.

Membership inquiries and general correspondence should be addressed to the administrative headquarters at 225 Main Street, Newington, CT 06111 USA.
Telephone: 203-666-1541 Telex: 650215-5052 MCI.
MCI MAIL (electronic mail system) ID: 215-5052
FAX: 203-665-7531 (24-hour direct line)

Canadian membership inquiries and correspondence should be directed to CRRL Headquarters, Box 7009, Station E, London, ON N5Y 4J9, tel 519-660-1200.

"It Seems to Us . . ."

Hurricane Gilbert

No sooner had the curtain come down on a top-notch ARRL National Convention in Portland, Oregon, than our attention was shifted to the other side of the continent—to the Caribbean, where a ferocious Hurricane Gilbert was bearing down on Jamaica and its neighboring islands. Amateur Radio was destined to play a lifesaving role in the days that followed.

In the event of a hurricane, the first task for Amateur Radio is to assist in monitoring its progress. Even in these days of weather satellites, Hurricane Hunter aircraft must fly right into the storm to obtain needed meteorological information. Their observations are supplemented by amateurs on land and sea, and fed to the National Hurricane Center through the Hurricane Watch Net on 14.325 MHz. The information heard on the net is as good as any available, and people likely to be in the path of the storm rely on it in making their own survival preparations. Even before the storm makes landfall, amateurs may find themselves providing a link for mariners caught in its fury.

Once a major hurricane hits a populated area, chances are that regular communications with the affected area will be interrupted at least briefly and we'll be called upon to fill the gap. Called upon by whom? Well, these days the media are often first in line. This is both understandable and commendable; it's their job to find out and to report what's going on, and when human suffering on the scale that was (and is) being experienced in Jamaica and the Yucatan is involved, it's important that the rest of the world know about it. Within hours of Gilbert's striking Jamaica, hundreds of amateurs across the country had been contacted by television, radio and newspaper reporters for some word on the status of the island. This gave us our first test of the guidelines for media contact adopted by the ARRL Board last July (September *QST*, pp 58-59). The result was a lot of favorable news coverage for Amateur Radio, although interest in our part of the story subsided quickly once on-site sources could be reached by other means.

While the public's attitude toward Amateur Radio is influenced by the media, the attitude of government and disaster relief officials is formed in an entirely different way. Do we provide them with the communications they need, calmly and efficiently and without adding to the chaos? If so, in their eyes we've done a good job; if not, then we'd better improve if we want to retain their confidence and support. It's too soon for a full-blown postmortem on Hurricane Gilbert, but it looks as if we have some work to do in this regard. Some initial observations from the Office of US Foreign Disaster Assistance, Agency for International Development, should keep our press clippings from going to our heads:

- Communications channels in support of damage assessment and disaster relief agencies were slow to be established, and in some cases had to be established outside the amateur bands. (Incredibly, some stations even followed these officially designated stations outside the bands, without authorization!)

- Preoccupation with welfare inquiry traffic got in the way of higher-priority communication. The Red Cross placed a moratorium on inquiries to Jamaica for several days; this provided time for outbound welfare messages to be sent, each of which could potentially head off at least one, and perhaps many, inquiries. Accepting inquiry traffic before there is any way to handle it raises false hopes and clogs the system.

- In a disaster, control belongs in the affected area; they are in the best position to know the priorities. Those of us who are fortunate enough to be outside the disaster area are there to support them, not the other way around.

- In providing information to the media, we must make sure that what is being passed along is authentic, and not unsubstantiated hearsay.

On the plus side, the ARRL Field Organization in South Texas was well prepared for any eventuality arising from Gilbert. Thankfully, the Texas coast was spared its full impact; but had it been otherwise, Lone Star amateurs were ready.

In short, Amateur Radio must provide a more disciplined response to disasters if we're to continue to deserve our hard-earned reputation as a disaster communications service. The ARRL National Emergency Response Committee (ANERCOM) will be looking at how to do this in the months to come.

To those who helped, including those who kept silent so that important traffic could be passed, thank you. There is every reason for radio amateurs to be proud. But we can and will do better.

—*David Sumner, K1ZZ*

A Vote of Confidence

Earlier this year, in accordance with the Rules and Regulations of the ARRL Field Organization and the ARRL Bylaws, a group of members in Montana petitioned for the recall of their Section Manager, Ken Kopp, KØPP. By signing the recall petition, the members indicated that they were so dissatisfied with their elected official's performance that they didn't want to wait until next year's scheduled election to turn him out of office. Accordingly, the ARRL Executive Committee ordered that the 501 Full Members in Montana be sent ballots to determine whether they wished the SM to be recalled.

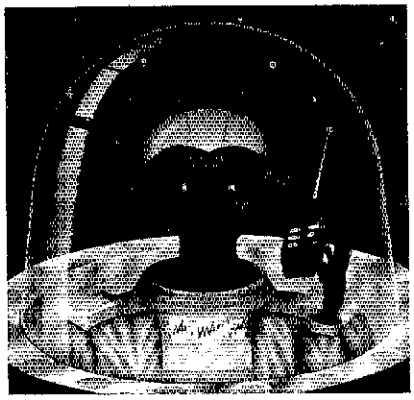
The results speak for themselves. There were 72 votes for recall, and 295 against. This means that more than 73% of the eligible voters went to the trouble and expense of marking and returning ballots! Of those who voted, 80% opposed the recall initiative. A majority of the total section membership—59% in all—voted to oppose recall.

Thus, Ken Kopp has been given a tremendous vote of confidence by the members in the Montana Section, and to Ken go our hearty congratulations. But we think the vote means even more than that. The sheer size of the turnout represents a vote of confidence in the Field Organization itself. Clearly, League members in Montana see the Field Organization as an important, relevant part of Amateur Radio; something worthy of their interest and participation.

There may still be League members who look upon themselves primarily as *QST* magazine subscribers—but not, apparently, in Montana.

—*David Sumner, K1ZZ*

Yaesu's FT-736R. Because you never know who's listening.



Why just dream of talking beyond earth?

With Yaesu's new FT-736R VHF/UHF base station, you can discover some of the best DX happening in ham radio. Via moonbounce. Tropo. Aurora. Meteor scatter. Or satellites.

You see, the FT-736R is the most complete, feature-packed rig ever designed for the serious VHF/UHF operator. But you'd expect this of the successor to our legendary FT-726R.

For starters, the FT-736R comes factory-equipped for SSB, CW and FM operation on 2 meters and 70 cm (430-450 MHz!), with two additional slots for optional 50-MHz, 220-MHz, or 1.2-GHz modules.

Crossband full duplex capability is built into every FT-736R for satellite work. And the satellite tracking function (normal *and* reverse modes) keeps you on target through a transponder.

The FT-736R delivers 25 watts RF output on 2 meters, 220 MHz, and 70 cm. And 10 watts on 6 meters and 1.2 GHz. Store frequency, mode, PL frequency, and repeater shift in each of the 100 memories.

For serious VHF/UHF work, use the RF speech processor. IF shift. IF notch filter. CW and FM wide/narrow IF filters. VOX. Noise blanker. Three-position AGC selection. Preamp switch for activating your tower-mount preamplifier. Even an offset display for measuring observed Doppler shift on DX links.

And to custom design your FT-736R station, choose from these popular optional accessories: Iambic keyer module. FTS-8 CTCSS encode/decode unit. FVS-1 voice synthesizer. FMP-1 AQS digital message display unit. 1.2-GHz ATV module. MD-1B8 desk microphone. E-736 DC cable. And CAT (Computer Aided Transceiver) system software.

Discover the FT-736R at your Yaesu dealer today. But first make plenty of room for exotic QSL cards. Because you *never* know who's listening.

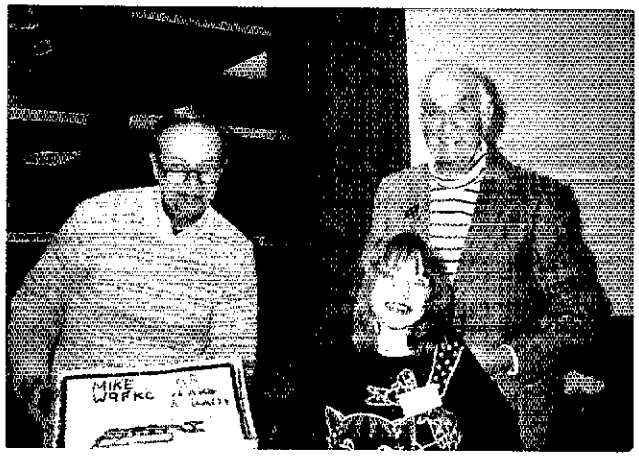
YAESU

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. Repair Service: (213) 404-4884. Parts: (213) 404-4847

Prices and specifications subject to change without notice. P.L. is a registered trademark of Motorola, Inc. FT-736R shown with 220 MHz option installed.

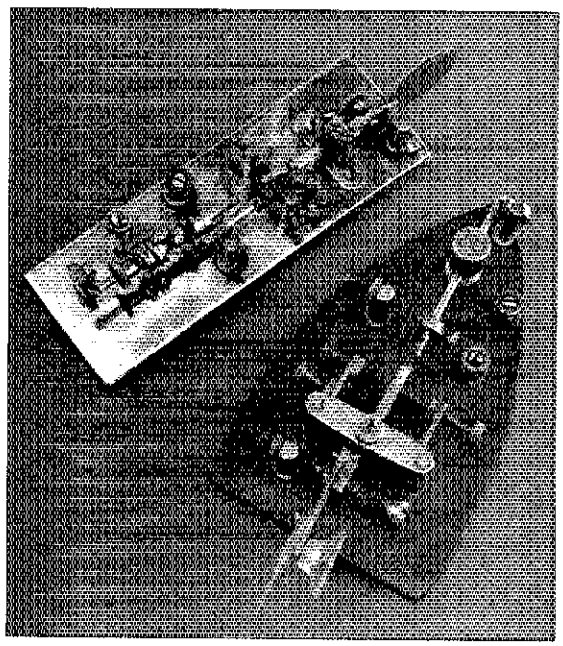
UP FRONT in QST

Media mecca: HQ and W1AW became a center of news attention in mid-September as Hurricane Gilbert devastated parts of the Caribbean, Mexico and the US. The Field Services Department was particularly busy responding to telephone inquiries regarding health and welfare traffic into the affected areas. Mike Riley, KX1B, handled inquiries from the press, which included ABC, CBS, AP, UPI, Reuters, the New York desk of the BBC, the Canadian Broadcasting Corporation, more than a dozen radio stations and a dozen newspapers. Here, Dave Sumner, K1ZZ (l), is interviewed about the role amateurs played by a CBS News television crew who had just flown in from New York. In the background, "Pip" Sager, WB4FDT, monitors emergency frequencies. *(photo courtesy N1EOZ)*



And many more to come: Sixty-five years as a ham was cause for celebration for Myron "Mike" Hexter, W9FKC right, of Highland Park, Illinois. At the monthly meeting of the North Shore Radio Club (Chicago), he received a cake decorated by Bill Ross, KY9M (l), and Bill's 9-year-old daughter, Katie, KB9ADX. Mike remembers attending the first Pacific Division ARRL meeting in Modesto, California in 1924. Mike, who prefers CW, is a DXCC Honor Roll member, with 361 countries confirmed. *(photo courtesy KY9M)*

Getting connected: Packet activity in Taiwan received a boost recently when Tim Chen, BV2A (center), of Taipei, Taiwan, was presented with a Heathkit HK-232 multimode TNC by the Heath Company. Dave Altwies, VS6UY (l), Vice President of Far East Operations for Heath, and Denton Bramwell, K7OWJ (r), Director of Heath Instruments, presented Tim with the TNC in Taipei. Denton and Wayne Wilson, WB8TSO, operated from Tim's shack in October. *(photo courtesy K7OWJ)*

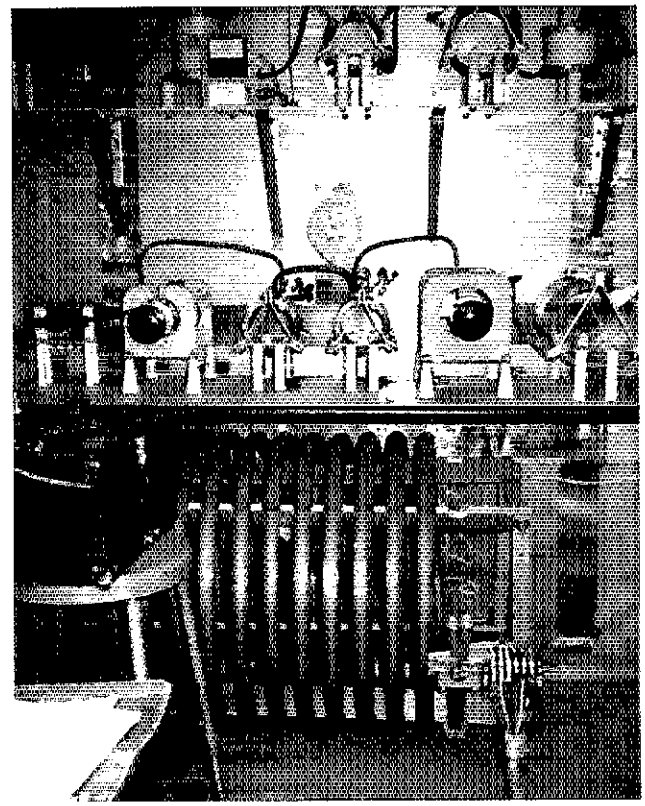


Bitten by the bug: The first bug (l) built by T. Hunter Wood, W4ANK, of North Charleston, South Carolina, back in 1930, was made using a binding post, parts from a headset band, and a brass jewelry case filled with lead. Years later, he built another fine bug (r) from a discarded electric iron and parts of a telephone relay, and painted it with Chevrolet metallic maroon auto enamel. It took first prize in the home-brew contest at the 1973 Charleston (SC) Hamfest. *(photo courtesy W4ANK)*

WA1LOU honored: During a recent visit to HQ, Stan Horzepa, WA1LOU (l), of Wolcott, Connecticut, was presented with a framed and matted copy of the cover of his popular book, *Your Gateway to Packet Radio*, by ARRL Executive Vice President Dave Sumner, K1ZZ. The second printing of the book may be purchased from the ARRL or Amateur Radio dealers. (*photo courtesy K8CH*)

The Doctor Will See You Now

Is there a psychological disorder related to the recent technological advances in digital information transfer by Amateur Radio? What stage are you in? Is there hope? Find out on page 46.

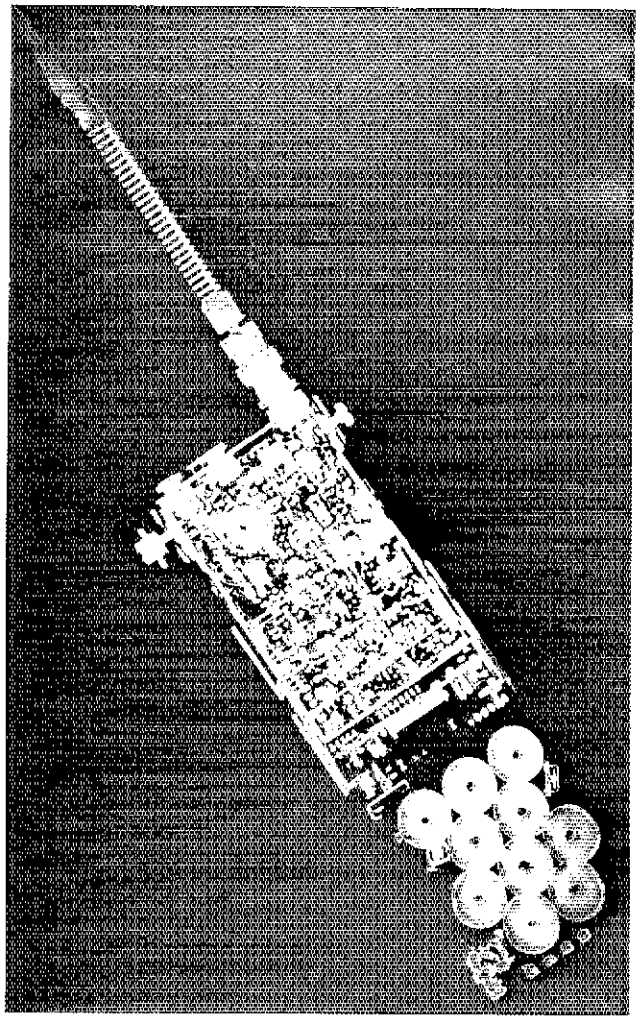


Common ground: When Peter Kodis, N1EXA, of North Dartmouth, Massachusetts, was hired as an engineer at WNBH-AM (New Bedford), he thought his Amateur Radio skills would come in handy. One of his first jobs was inspecting the transmitter; when he looked at the tower, he thought it would make a nice 80-meter setup. When he opened the door to the transmitter and saw the antenna tuner, he concluded that ham radio is just a small version of broadcast radio. Pete reports, "Those finals glow like the sun." (*photo courtesy N1EXA*)

Packet, Baudot, AMTOR, ASCII

The League announces a new contest—*The First ARRL RTTY Roundup*—to encourage digital communications and activity. The rules are on page 88.

Something old, something new: Niel Wiegand, WA5VLZ, of Austin, Texas, recently built two *QST* projects. On the left is Niel's version of the two-tube receiver described in the December 1930 issue of *QST*; at right is the two-IC Neophyte receiver described in February 1988 *QST*. WA5VLZ's modifications include the substitution of band-set and band-spread capacitors for the National drum dial on the two-tube receiver (but they are vintage Pilot capacitors), and the addition of an L network to the Neophyte receiver to improve performance when used with short antennas. He gives the Neophyte better marks for performance, but says the type 24 and 27 filaments on the two-tube receiver warm the cockles of his heart. Niel reports that he is not ready to part with either receiver. (*photo courtesy WA5VLZ*)



The inside story: In what is perhaps a novel use of technology, Neil Halin, WA3RPG of Philadelphia, came up with this inside look at his Yaesu FT-209RH. Neil, a radiology resident, used a technique call xeroradiography to get this unique perspective on a piece of Amateur Radio equipment. It may never catch on as a diagnostic tool for radios, but it does produce interesting results. *(photo courtesy WA3RPG)*

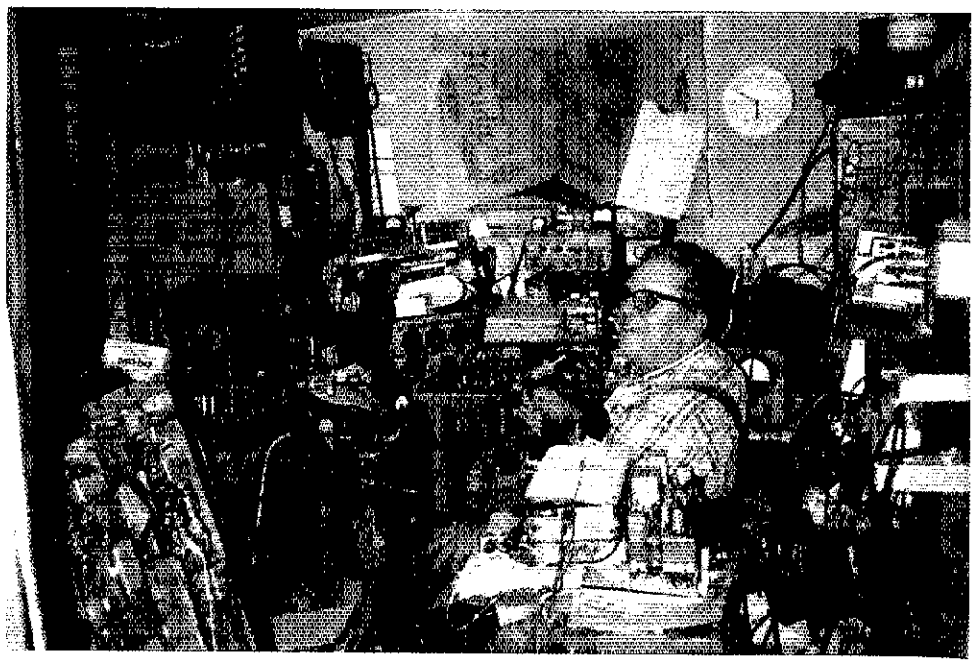
We're in the Search Mode for Novice/ Family Articles

HQ is looking for Novice articles—maybe yours is just what we're looking for! Maybe you would like to tell others about your on-the-air experiences as a Novice. If you have some photos, send them along. Perhaps you have some pointers for Novice Roundup or the ARRL 10-Meter Contest, or hints for Novices on earning operating or contest awards.

Is your family active in Amateur Radio? Then tell us how they became interested and about their ham activities. If you're a YL, tell others how you got started in Amateur Radio and what you have enjoyed about it.

If you have a story, send it to HQ for possible use in *QST* or another League publication. Send stories or inquiries to ARRL, Attn Editorial Supervisor, 225 Main St, Newington, CT 06111.

Now where's that capacitor? Dean Plimmer, WA4NIJ, of Jacksonville, Florida, is a first class pack rat, according to Bob Bricker, K4CSV. Bob reports that in addition to what Dean has in his shack, Dean also has equipment stashed in buildings all over town. Sounds like Jacksonville may have to start annexing to keep up with Dean. *(photo courtesy K4CSV)*



League Lines

Were you blessed with a fantastic Amateur Radio licensing class instructor(s)? Did the instructor have a way of making the most complicated section of the amateur rules, or a detailed schematic, appear simple? Want a way to thank him/her? Nominate your instructor for the ***1988 Instructor of the Year awards.*** Just send the names and a brief explanation of why you are nominating them to your Section Manager (p 8 of any *QST*). See October 1988 *QST*, page 48, for details.

The ***DXCC Annual Listing*** will appear in January *QST*, instead of the December issue.

ARRL Repeater Directory: Yes, it's that time of year again. The next edition of the *Repeater Directory* is now well underway. It is recommended that repeater owners/trustees be sure that their area frequency coordinator/spectrum management group has up-to-date information on file regarding the operation of your repeater. Remember, *Repeater Directory* listings must be submitted by your coordinator. No frequency coordinator in your area? Then send your update directly to ARRL HQ.

Attention, ***"We the People" 200 club call sign fans:*** Applications for the 200 endorsement sticker for your Bicentennial of the US Constitution Worked All States certificate are available as of November 1. The endorsement will be offered at the conclusion of the calendar year, after each state has had an opportunity to sport their club 200 call signs. Working 50 of the 51 entities, with the District of Columbia available as a "wild card," will qualify. Send application requests with an SASE and one unit of postage to: "We the People" 200 Endorsement, ARRL, 225 Main St, Newington, CT 06111.

We're taking a survey, and to make it useful, we need your input. This month's ***FM/RPT column*** features a short questionnaire that will help us improve the column. Please take a few minutes to let us know what you like—or don't like—about the FM/RPT column. Thanks!

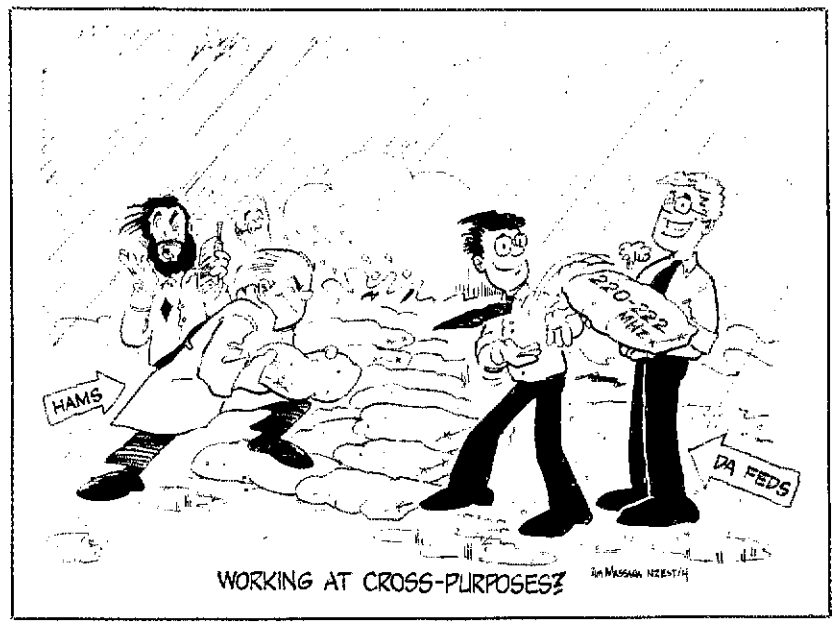
An opening exists in the Technical Department at HQ for an Assistant Technical Editor. We are looking for a licensed (and experienced) amateur with a Bachelor's degree in science or engineering, or equivalent experience. The successful candidate for this job must have a good grasp of electronic fundamentals, be able to do library research and be able to write effectively. The ideal candidate would have experience in preparing material for publication, operating personal computers and speaking before groups of people. Starting salary is $25,012. Contact Mark Wilson, AA2Z, or Chuck Hutchinson, K8CH, at HQ.

Want a copy of an amateur-related FCC public notice, proposal or rule making? Such documents are available from HQ upon request from the Regulatory Information Branch at HQ. Be sure to include the FCC docket or RM number if known and a large SASE with three units of first-class postage.

During the holiday season, the dedicated traffic handlers of the ***ARRL's National Traffic System*** are often swamped with overloads of messages generated by individuals, message booths at shopping malls and military personnel overseas. Take the time now to familiarize yourself with formal NTS traffic procedures. Better yet, check into your local or Section net or Packet Bulletin Board to determine the traffic loading in your area before the deluge hits. Contact your Section Manager or Luck Hurder, KY1T, or Steve Ewald, WA4CMS, at HQ for further details on traffic handling in your area.

The ***Hiram Percy Maxim Memorial Award*** has been awarded to 13-year-old Stacey L. Garner, KA9WDE. She is the first woman recipient of the award (the late Vic Clark, W4KFC, was the first HPM Award winner in 1936). The ARRL International Humanitarian Award has been awarded to Fr Michael Mullen, WB2GQW, President of the International Mission Radio Association, Inc (IMRA). For further details, see this month's Happenings column.

CQ SS! CQ SS! Sweepstakes! It's time again for this popular ARRL Contest. CW SS will be held November 5-6, and Phone SS will be held November 19-20. Send an SASE with 45 cents postage to HQ for Sweepstakes forms. For further details, see the Sweepstakes announcement on p 106 of October *QST*.



Getting from Here to There on 2304 MHz

Interested in doings above 1296 MHz? Here's a guide to propagation on the highest amateur UHF band.

By Emil Pocock, W3EP
RR 3, Box 70 (Route 207)
Lebanon, CT 06249

Contrary to popular belief, propagation on the 13-cm band is *not* limited to line-of-sight distances! With more and more stations making the move to 2304 MHz, day-to-day contacts of 100 miles have become routine, and contacts of several hundred miles are also fairly common. The current world distance record of 1170 miles (made in Australia during February 1978) and the current North American record of 940 miles (a Texas-to-Michigan QSO made in November 1986) provide a gauge of the potential of this band.

High power, exotic equipment and large antennas are not necessary to achieve good results on 2304 MHz. The North American distance record, for example, was set by Lew Munford, W8YIO, running 50 W to two loop Yagis[1] at 20 feet, and Dave Hallidy, KD5RO, who ran just 0.5 W to a 5-foot dish! Commercially made transverters, power amplifiers and antennas make it possible for almost anyone to get on 2304 MHz. With over 50 MHz of spectrum available on the band, 2304 MHz is wide open for a variety of modes and uses.[2]

Propagation on 2304 MHz, the highest UHF amateur band, is considerably different than that on 432 MHz and the VHF bands. Ionospheric effects are essentially absent at 2304 MHz. There is no possibility of E-layer skip, meteor scatter or other exotic ionospheric propagation modes, as far as we know. Very-high-power military radar stations have recorded auroral echoes at frequencies as high as 3000 MHz, but similar feats are probably not achievable at amateur power levels. (No amateur aurora contacts have been reported on 1296 MHz either, although this may be technically possible.) Virtually all long-haul 2304-MHz propagation falls into two broad areas: tropospheric phenomena and various kinds of reflections.

[1]Notes appear on page 16.

High power, exotic equipment and large antennas are not necessary to achieve good results on 2304 MHz.

Tropospheric Propagation Modes

A small portion of 2304-MHz energy passing through the troposphere—the lowest six miles of the atmosphere—is scattered back toward the earth. This allows over-the-horizon communication. Tropospheric scatter provides the means for most beyond-the-horizon contacts at 2304 MHz. Scatter losses increase with frequency, so normal working distances at 2304 MHz are somewhat less than those at 432 or 1296 MHz. With a modest 2304-MHz station (using 10 W and four loop-Yagi antennas, for example) you can expect to work over 100-mile paths with similarly equipped stations under normal conditions. This compares well with the 200-mile radius over which an average 432-MHz station (using 100 W and a single Yagi) can work under average conditions.

Virtually all long-haul 2304-MHz propagation falls into two broad categories: tropospheric phenomena and various kinds of reflections.

Table 1 provides an approximate guide to normal working ranges for various stations, assuming the stations on both ends of the path are similarly equipped. Distances will be greater if one station is significantly better equipped. Use of FM results in shorter ranges than given in Table 1 because of increased bandwidth requirements; video and data-mode bandwidths are generally greater still—working distances will be no more than half those given, even for well-equipped stations. The calculations used to create Table 1 assume a receiver noise figure of 2 dB, and 3 dB of feed-line loss, except for the EME-grade station, which is assumed to have a 1-dB receiver noise figure and a nearly loss-free feed line.

Atmospheric effects on propagation increase with frequency, making propagation on 2304 MHz much more weather dependent than on any lower-frequency band. Low-pressure conditions and unsettled weather are generally detrimental to

Table 1

Expected Station Performance at 2304 MHz Under Average Conditions

Power output (watts)	*Antenna*	*Bandwidth (Hz)/Mode*	*Maximum distance (miles)*
2	1 loop Yagi	1800/SSB	30
10	4 loop Yagis	500/CW	100
100	6-foot dish	100/CW	300
200	12-foot dish	100/CW	EME capable

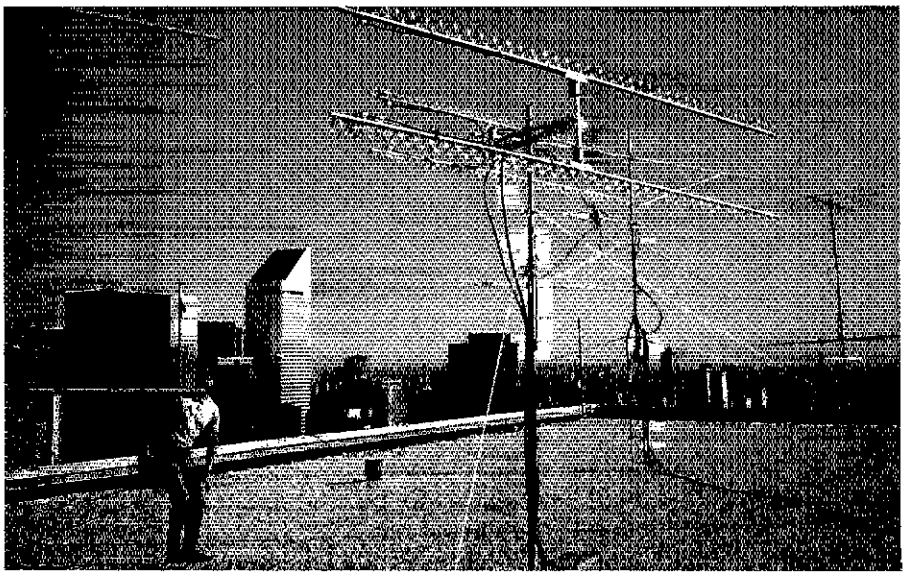


Fig 1—Loop-Yagi antennas for the 2304-MHz band are small enough to carry almost anywhere. This photo shows a pair of 45-element, 81-inch-boom 2304-MHz loop Yagis mounted (on the same mast and frame) behind a pair of 45-element, 12-foot-boom 1296-MHz loop Yagis. The entire assembly, including feed lines and power dividers, weighs only a few pounds, and can be turned by a lightweight TV rotator. This antenna system was used at United Nations Headquarters station 4U1UN, New York City, during the 1988 ARRL June VHF QSO Party. CW contacts of over 200 miles were made on 2304 MHz using 9 W and this antenna system. (*W1XX photo*)

UHF propagation; above-average propagation usually occurs when calm air, clear skies and high pressure are predominant. Summer provides marginally better conditions than winter; early morning and evening are generally better than midday. Weather conditions must be considered when accounting for distances worked.

When atmospheric conditions are especially favorable, tropospheric ducting may allow 2304-MHz signals to propagate 200 miles—and much farther—with very little path loss. Large, sluggish high-pressure systems of late summer and similar weather conditions are most conducive to duct formation. Nearly all 2304-MHz contacts of more than 400 miles can be attributed to some form of troposopheric ducting.

Reflections

Working distances at 2304 MHz may be extended by reflections from solid objects ranging in size from relatively small metal signs to natural features such as mountains and even the moon! The best reflectors of 2304-MHz signals are flat metal objects at least several wavelengths across. (Ten wavelengths is just 50 inches at 2304 MHz! See Fig 1 for an idea of the size of 2304-MHz antennas.) Steel buildings, water tanks, signs and specially designed reflectors all work well and are worth investigating, especially when these objects are situated on hilltops. Hills and mountains themselves may make good reflectors, but their effects are not always predictable. High-flying airplanes are also good reflectors, and can extend routine working distances to 200 or 300 miles for well-equipped stations.

The ultimate reflector is the moon: EME contacts have been made on 2304 MHz. Minimum station requirements include at least 200 W output, a 12-foot dish antenna, a good receiver (with a 100-Hz receiving bandwidth), and minimal feed-line loss. EME activity on 2304 MHz is still in its infancy, but it promises to become more popular in the future because of the band's relatively modest antenna-size requirements.

Losses

Free-space and atmospheric losses at 2304 MHz are somewhat higher than on lower-frequency bands, so direct signal paths experience somewhat more attenuation for comparable stations than on the lower bands. Unlike the bands at 10 GHz and above, where line-of-sight paths are important, 2304-MHz propagation is little affected by rain, snow, fog, humidity or losses resulting from atmospheric gases. Path losses caused by precipitation, for example, amount to less than 0.01 dB per mile in an average rain, and are still insignificant even in the heaviest storms. Snow and hail losses are similarly small. Attenuation from fog is also low, amounting to just 0.03 dB per mile, even when visibility is less than 100 feet. A 2304-MHz path that lies across 100 miles of dense fog would have only 3 dB more loss than a clear path of the same length.

Absorption losses in solid objects, such as wooden buildings and trees, are significant at 2304 MHz. Because of this, antennas must be completely clear of obstructions. Absorption in trees may be as high as 0.2 dB *per foot*—even a small stand of trees can absorb half the power of the transmitted signal! ***Caution: High effective-radiated-power levels at 2304 MHz are dangerous. Care must be taken to keep people and animals out of the radiation paths of UHF antennas.*** Protection from most radiation hazards consists of using common sense: Don't look into waveguides, don't work on or get near an antenna while power is applied, and so on. For more information on RF safety, see Chapter 1 of *The ARRL Antenna Book* (15th edition) and *The ARRL Handbook*.

Additional information about UHF propagation can be found in *The ARRL Handbook*, The New Frontier column in *QST* and in other amateur publications. Bibliographies accompanying these materials contain sources of detailed discussions of various aspects of UHF propagation. If you're looking for a new challenge, try your hand at 2304-MHz operation!

Notes

[1]A loop Yagi is simply a Yagi with circular loop elements instead of linear elements. For more information on loop Yagis, see *The 1988 ARRL Handbook*, pp 32-54 to 32-56.

[2]The ARRL proposed 13-cm band plan appears in Apr 1988 *QST*, p 73.

Strays

MOVING, CHANGING YOUR CALL?

☐ When you change your address or call sign, be sure to notify the Circulation Department at ARRL HQ. Enclose a recent address label from a *QST* wrapper if at all possible. Address your letter to Circulation Department, ARRL, 225 Main St, Newington, CT 06111. Please allow six weeks for the change to take effect. Once we have the information, we'll make sure your records are up-to-date so you'll receive *QST* without interruption. If you're writing to HQ about something else, please use a separate piece of paper for each request.

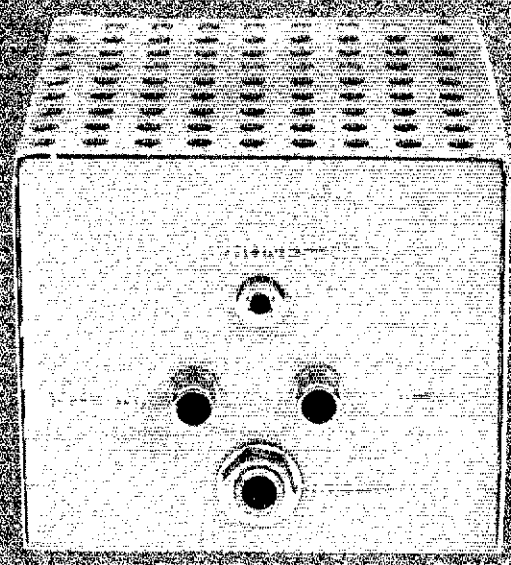
I would like to get in touch with...

☐ any JST100 transceiver owner interested in exchanging servicing ideas and modifications. Homer Foerster, WB7URR, PO Box 67, Clinton, WA 98236.

☐ anyone who served aboard the *USS San Jacinto* (CVL 30) during WW II. Charles F. Carroll, Jr, MD, WA4SSM, 282 Beverly Dr NE, Concord, NC 28025.

A Three-Channel CW Emergency Transceiver

Part 2: Here are the details for the crystal-controlled DC receiver to mate with the transmitter of Part 1 of this article.[2] Simplicity and good sensitivity are the design high points.



By Doug DeMaw, W1FB
ARRL Contributing Editor
PO Box 250
Luther, MI 49656

A block diagram that shows the receiver and transmitter portions of the emergency transceiver was presented in Part 1. This month we will concentrate on the receiver circuit and how to construct it. A direct conversion (DC) receiver is used in order to utilize the transmitter oscillator as the beat-frequency oscillator (BFO) for the receiver product detector.

Understanding DC Receiver Performance

If you have never used a direct conversion receiver, you should become familiar with some of the good and bad points. This type of receiver is also called a *synchrodyne* circuit. Unlike a superheterodyne receiver, the DC receiver responds to an incoming signal on *both* sides of zero beat. The superhet having adequate selectivity offers what is called *single-signal* reception. This greatly reduces potential QRM by suppressing the energy that is present on the side of zero beat that is of no interest. You may think of this as an SSB receiver that responds to the upper or lower sideband, but not to both sidebands at one time. You can understand the difference between the two types of receiver by imagining yourself listening to a CW signal with a superhet receiver. You will plainly hear the desired response (usually the upper sideband mode) at 700-800 Hz, but if another signal is present on the opposite side of the filter response curve (lower sideband), you will not hear it. This is not true of a DC receiver. If you are listening to a CW or SSB signal when another signal is present on the opposite side of zero beat (opposite sideband), it will appear as QRM in the receiver output. Although this can be a problem at times, you will find many frequencies where there are no adjacent signals that will interfere with reception of the desired one. It is a trade-off for circuit simplicity.

DC receivers are at times affected by unwanted hum that is heard in the phones. This is seldom a problem when battery power is used. It is most likely to take place when you are using an ac-operated power supply. This malady is known as *common-mode hum*. Stray RF energy from the DC receiver oscillator gets into the power-supply rectifiers and is then modulated by 60-Hz hum. The signal is reradiated at the incoming signal frequency. The receiver detects it, and a loud hum is superimposed on the signal you are copying. This ailment can be eliminated by using an effective earth ground on the QRP equipment, by using coaxial-fed antennas rather than end-fed wires, and by installing a decoupling choke (bifilar winding) at the power supply positive and negative output terminals. The bifilar choke is wound on a high permeability toroid or balun core. The negative power supply lead is routed through one of the parallel windings, and the positive lead is routed through the other winding. The choke prevents stray RF energy from reaching the power supply diodes via the dc power leads.

DC receivers tend to be microphonic, especially as the operating frequency is increased. If you tap the receiver case you will hear mechanical clanks and clinks in the audio output. This is because DC receivers require 80-100 dB of audio amplification after the detector (not true of superhets). Therefore, any small electromechanical disturbance in the receiver front end is amplified many times before it reaches the phones or speaker.

A final shortcoming of DC receivers is unwanted AM detection if the product detector is not a doubly balanced type (four diodes in a ring, or a doubly balanced active IC detector). Singly balanced detectors, such as the one in Fig 7, provide acceptable performance most of the time. However, very strong in-band and out-of-band commercial AM signals (not tunable) can blanket the receiver. This may be minimized or eliminated by reducing the signal level *ahead* of the detector. A 500-Ω potentiometer may be used as an attenuator at the antenna input of the receiver. It will clear up the blanketing from most AM detection, with a small reduction in receiver sensitivity.

Selectivity for a DC receiver is accomplished at audio frequency. IF filters are used for this purpose in superhet receivers. Coil-capacitor (passive) audio filters are sometimes used, or the designer may include a resistance-capacitance (RC) active

[2]Notes appear on page 20.

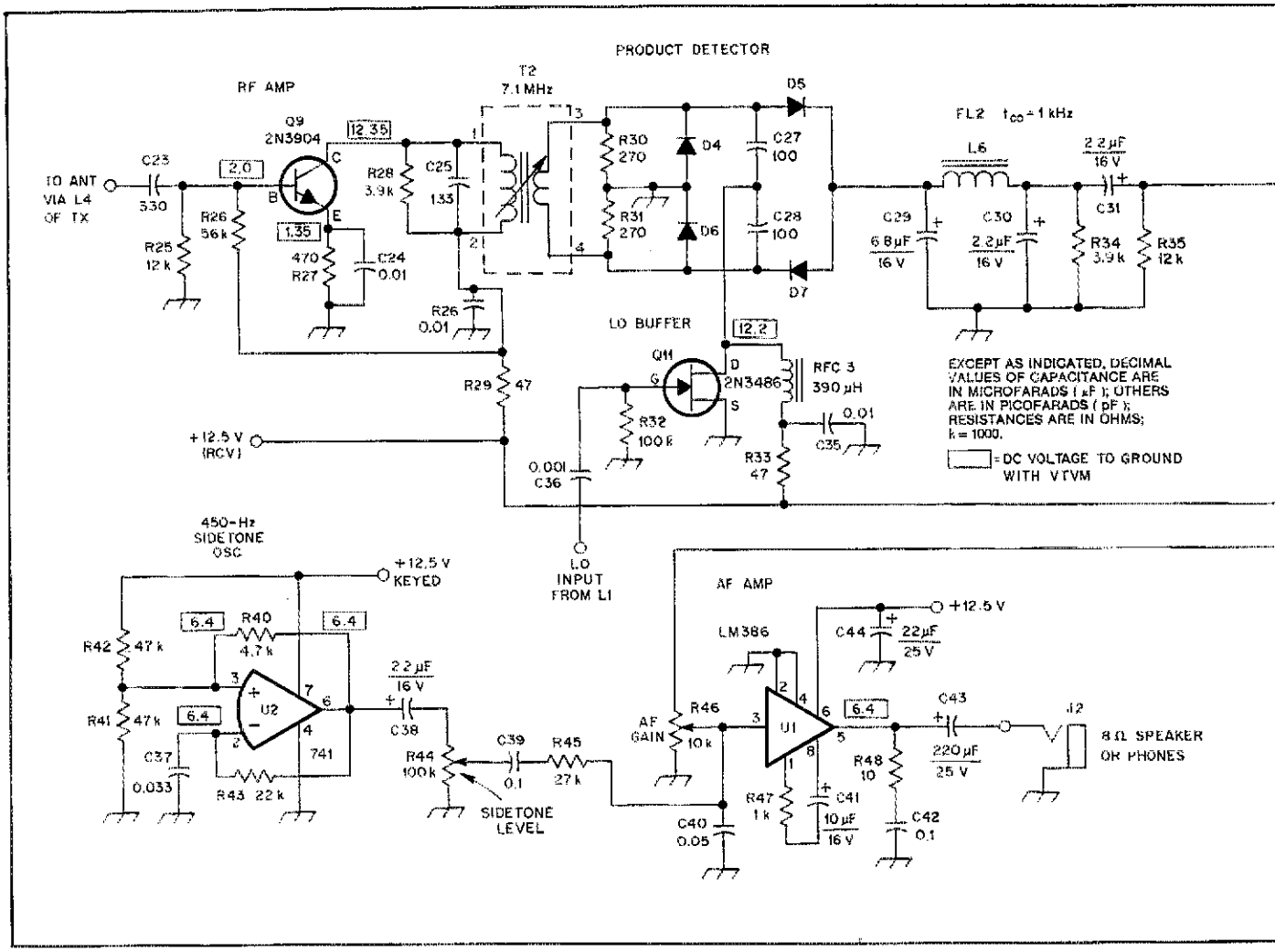


Fig 7—Schematic diagram of the direct conversion (DC) receiver. Capacitors are disk ceramic except those with polarity marked, which are tantalum or electrolytic. Fixed value resistors are ¼-W carbon composition.

C29, C30—Tantalum capacitors required.
D1-D4, incl—1N914 or equiv, matched for forward resistance.
J2—Miniature phone jack.
L6—Pot core inductor, 86 turns of no. 30 or small Litz wire on an Amidon Associates PC-1408-77 pot core bobbin.[6] Inductance is 14.33 mH.
R44—Linear taper PC control.
R46—Linear taper carbon-composition control, panel mount.
RFC4—Miniature 220, 390, or 500-µH RF choke (not critical).
T2—Shielded transformer, 21 turns of no. 30 enam or Litz wire on bobbin for an Amidon L-43-2 assembly. Secondary has 7 turns. Primary inductance (nominal) is 4 µH.
U1, U2—Integrated circuit in 8-pin, low-profile IC socket. ICs available from Radio Shack.

filter that uses one or more ICs. A passive low-pass filter is shown in Fig 7.

A Practical DC Receiver

I chose a simple circuit for this project. The schematic diagram may be seen in Fig 7. Q9 is an RF amplifier. It uses the filter of the transmitter output circuit as the input network, thereby eliminating a number of parts. The Q9 collector is broadly tuned to 7.050 MHz by virtue of T2. A four-diode, singly balanced product detector follows the RF amplifier. Injection voltage is supplied to Q11 from the oscillator chain of the transmitter. The Q11 JFET isolates the product detector from the sampled stage of the transmitter. This minimizes unwanted loading of the transmitter tuned circuit, which would lower the drive to the transmitter PA. Q11 also amplifies the injection signal.

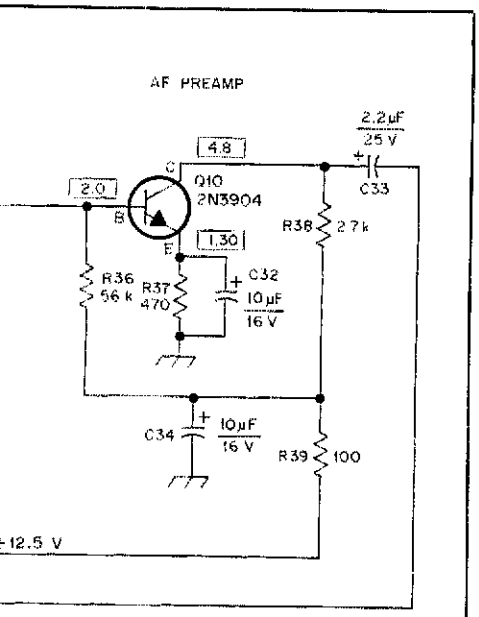
Audio filtering is provided by the pi-network low-pass filter, FL2. It is designed to roll off the frequencies above 1 kHz. The response is down 6 dB at 1200 Hz, 12 dB at 1500 Hz, and 20 dB at 2000 Hz. This helps to prevent high-pitched QRM from spoiling reception. The filter is designed for a loaded Q (Q_L) of 7. It matches the detector output (50 Ω) to the AF preamp input impedance (600 Ω).

Q10 is a low-noise audio preamplifier. Output from this stage is routed to audio amplifier U1. You may use a speaker or low-impedance phones at the output of the receiver.

You may think that U2 is a pointless appendage, since the receiver has been described as complete. The purpose of U2 is to provide a sidetone note during transmit. This enables you to monitor your sending. Output from the 450-Hz sidetone oscillator is supplied to audio amplifier U1. The latter IC operates at all times. R44 is adjusted to allow a comfortable listening level for the sidetone signal. R46 is the receiver audio gain control. It does not affect the level of the sidetone signal.

Maximum current taken by the receiver is 180 mA. This occurs when a speaker is used, a strong signal is present, and when R42 is set for maximum gain. Comfortable headphone level for the same signal results in a current drain of only 30 mA. It is wise, therefore, to use headphones when batteries are used to power the transceiver. I prefer lightweight hi-fi phones (8 ohms) with my transceiver. The stereo feature is disabled by shorting the two related rings on the phone plug or jack.

You may change the frequency of the sidetone oscillator by altering the value of C37. I prefer to listen to a 400-500 Hz note,



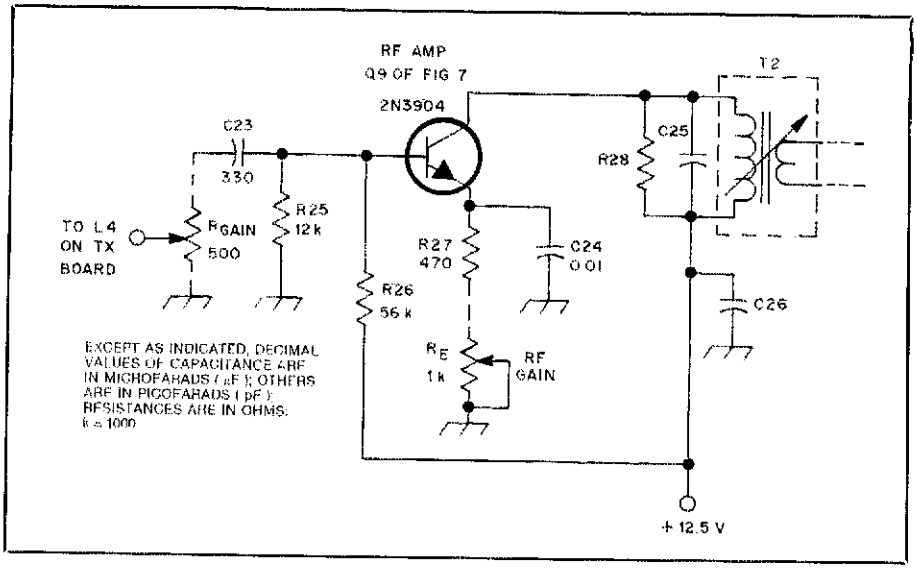
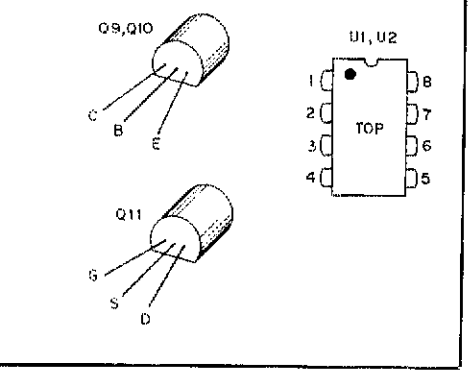


Fig 9—Schematic diagram of the receiver RF amplifier, showing two places for installing an RF gain control. Such a control minimizes AM detection, should that be a problem. See text.



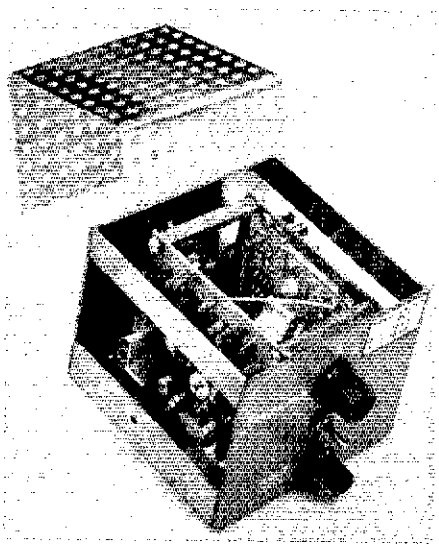


Fig 8—This photo shows the method of housing the 1-watt emergency transceiver. Circuit board material is used for the enclosure. The construction technique is discussed in Part 1. A 0.1-µV signal at the antenna terminals is audible in the headphones.

and hence my choice of values at U2. The frequency may be increased by using a lower capacitance value at C37.

Construction Notes

Please refer to the title photo and Fig 4 of Part 1. These photos show interior and exterior views of the transceiver. The title photo this month shows the layout of the rear panel. Dimensions for the transmitter and receiver PC boards are identical. This was done to permit stacking the modules with spacers. PC boards for this project are available.[3]

Packaging is a matter of personal preference. You may prefer a low-profile transceiver, in which case you can place the PC boards side by side. Alternatively, you may want to stack the modules one atop the other, or stack them side by side vertically as shown in Fig 8. The choice is yours to make!

Receiver Checkout

Connect Q11 to the appropriate takeoff point on the transmitter PC board. Likewise with the antenna connection for Q9 in Fig 7. Attach a speaker or phones at J2. Connect a signal generator or antenna to J3 of the transmitter. Now apply operating voltage to both units. Listen for a weak signal on one of the three operating channels, then adjust the slug in T2 for maximum signal, as heard in the phones or speaker. L4 on the transmitter board may now be adjusted for maximum signal response.

The next step is to key the transmitter and listen to the sidetone signal. Adjust R44 for a comfortable listening level while keying the transmitter.

You will need to adjust the oscillator offset trimmer in accordance with the instructions in Part 1 of the article (C14 on the transmitter board). The receive frequency must be 700-800 Hz *higher* than the transmit frequency in order to match the typical offset of commercial transceivers.

Unwanted AM detection may vary with the geographic location. Should you experience this problem frequently, you will want to install the 500-Ω RF gain control mentioned earlier. Another way to deal with this problem is to lift R27 (receiver board) from ground and insert a 1-kΩ control in series with R27 to ground. This will provide control of the Q9 gain, which will in turn minimize the effects of AM detection. See Fig 9. An ideal DC receiver would have a doubly balanced detector, such as a Mini-Circuits SBL-1 or similar.[4] This type of detector virtually eliminates AM detection. If you are designing your own PC board for the receiver, you may want to change the circuit for a doubly balanced diode detector. Homemade doubly balanced mixers and detectors are described in *Solid State Design*.[5]

Receiver sensitivity is good. I used my URM-25 signal generator for a signal source during checkout. With the generator connected to J3, the antenna jack of the transceiver, I was able to plainly hear a 0.1-µV signal. A 1-µV signal was quite loud in the headphones.

In Conclusion

Details for the PC board are provided in Figs 10 and 11. A scale etching template is presented in Fig 10 and a parts placement guide in Fig 11.

For emergency applications you may want to consider a ¼-wavelength wire radiator (no. 22 enamel wire for lightweight carrying). One or two ¼-wavelength radials may be made from the same wire gauge to keep the weight and bulk minimized. Fig 12 shows a matching network for this type of antenna. The radiator is cut to 50 feet (short of resonance) to permit the use of L1 as a resonating/matching coil. The coaxial cable is tapped

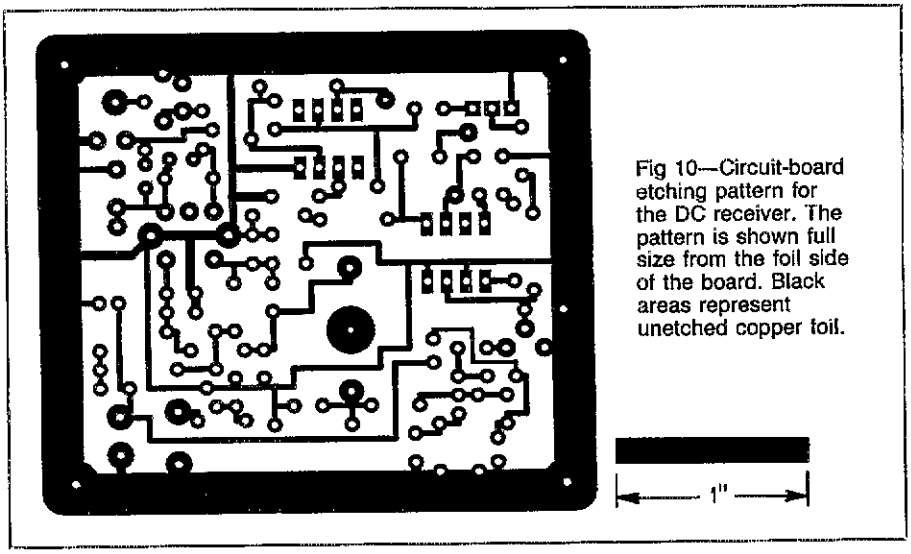


Fig 10—Circuit-board etching pattern for the DC receiver. The pattern is shown full size from the foil side of the board. Black areas represent unetched copper foil.

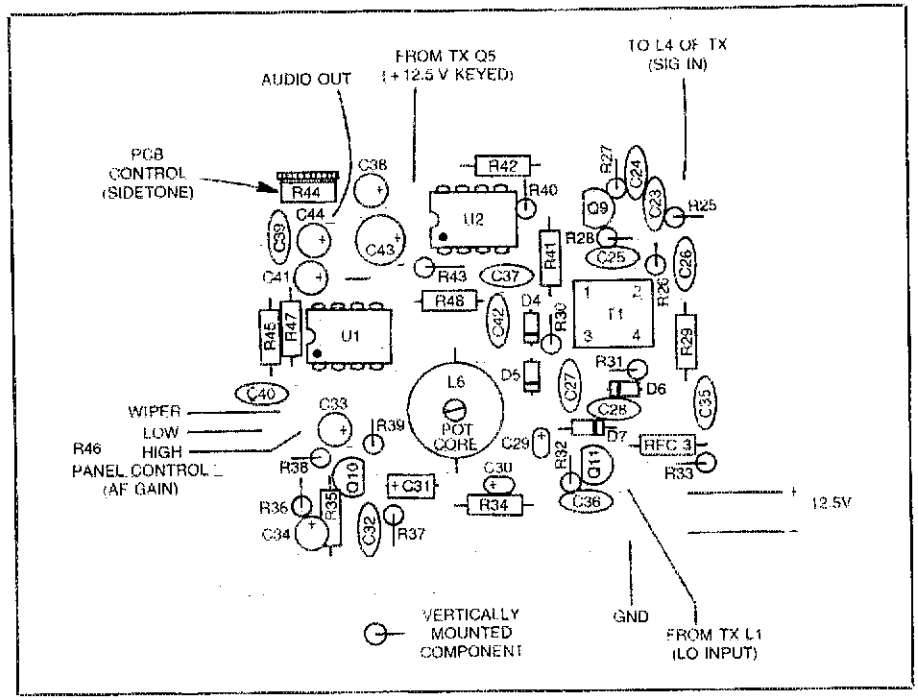


Fig 11—Parts-placement guide for the DC receiver; not to scale. Parts are placed on the nonfoil side of the board; the shaded area represents an X-ray view of the copper pattern. Component outlines are not necessarily representative of the shapes of the actual parts used.

on L1, from the grounded end upward, to obtain an SWR of 1. Before you do the matching adjustment, select the total turns for L1 that resonates the antenna. A dip meter may be used for this check.

As an alternative to the simple ¼-wavelength antenna, you may prefer to carry a dipole antenna made from small diameter wire. The feed line can be made from miniature RG-174 coaxial cable. This type of line is very lossy per 100 feet, even at 40 meters. Therefore, try to keep the feeder length to a minimum.

A further reduction to the bulk of the emergency package can be realized by using a single earphone of the type that is supplied with pocket-size AM receivers—the variety that you insert into your ear.

Eight size D cells can be used as a short-term power supply for the transceiver. The transmitter draws 210 mA key down, so keep this in mind. A rechargeable NiCd pack (12 V) and a small solar electric panel are worth considering for long treks into the wilderness. Boaters and pilots may use the on-board battery when it provides 12 V. Likewise with ATVs and other vehicles that contain batteries.

I'm sure you will have no difficulty overcoming the temporary psychological barrier presented by the crystal controlled receiver. I designed this rig for portable use, but I've had a lot of fun using it at home as a QRP transceiver. If one channel is in use, I switch to one that is open. I have seldom found all three frequencies occupied. There is no reason why you can't build a small outboard 7-MHz VFO for the receiver, should you want to tune all of the band while camping or vacationing. A switch can be added to disable the injection source from the transmitter when an external VFO is plugged in.

Notes

[2]Part 1 appeared in October 1988 *QST*.
[3]See note 1 in Part 1.
[4]Mini-Circuits, PO Box 166, Brooklyn, NY 11235, tel 212-934-4500.
[5]W. Hayward and D. DeMaw, *Solid State Design for the Radio Amateur* (Newington: ARRL, 1977).
[6]Amidon Associates, 12033 Otsego St, North Hollywood, CA 91608.

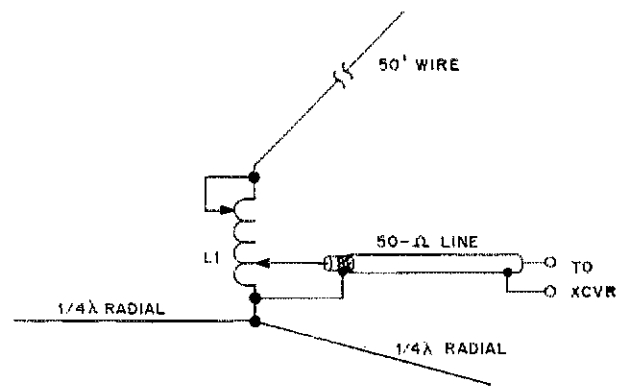
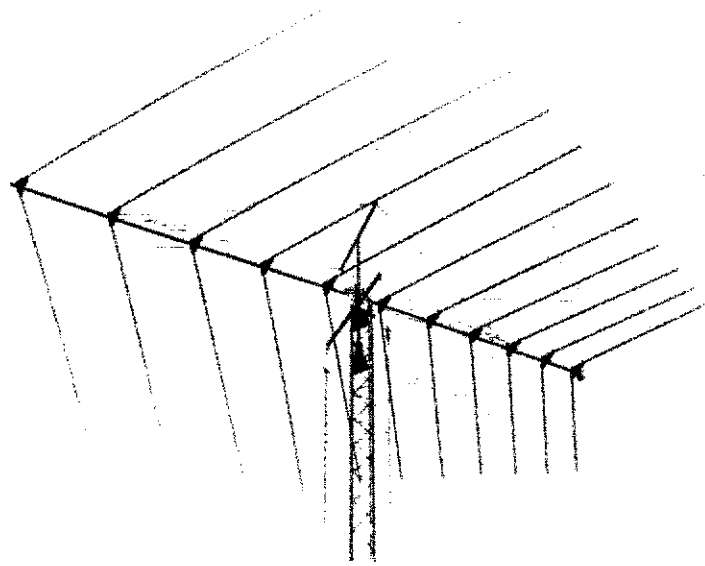


Fig 12—Matching method for the emergency ¼-wavelength antenna. L1 has 20 turns of bare copper or tinned no. 18 wire on a 3- × 1-inch OD coil form (4 μH). Space the turns to occupy 2½ inches, then cement them in place by running two strips of epoxy cement 180° apart. Adjust total turns for antenna resonance with a dip meter. Set the lower tap for an SWR of 1 for a 50-Ω feeder.

Log-Periodic Dipole Arrays for the Upper HF Bands



Tribanders are fine—for three bands. Here's how to build an LPDA "continuous bander" capable of good beam-antenna performance over an *unbroken* frequency range.

By Asa E. Collins, K6VV
6271 Lake Shore Dr
San Diego, CA 92119

The acquisition of the 18- and 24-MHz amateur bands[1] has made the LPDA an attractive antenna for use on the upper end of the HF spectrum. The frequency-independent nature of an LPDA (2:1 frequency coverage ratio) gives coverage of *all* of the amateur bands from 14 through 28 MHz—with a single antenna!

The LPDA has no traps, is easy to construct and does not require tuning adjustments after assembly. Reasonable care in measuring the element lengths and spacings is all that's required to build an efficient antenna system. I have received many requests for information on the antennas described in this article, so I thought that a description of the system, along with dimensions for several frequency ranges, would be of interest to *QST* readers.

I calculated dimensions for 7, 9 and 11-element LPDA antennas (see Tables 1, 2 and 3) using a BASIC program I wrote based on equations in *The ARRL Antenna Book*.[2] The tables also give the design constants I used for the antennas. The 7-element LPDA covers 20 to 30 MHz, the 9-element system covers 17.5 to 30 MHz, and the 11-element antenna covers 13.5 to 30 MHz. The antenna design is based upon standard lengths of aluminum tubing to make construction easier. I verified the antenna dimensions using the MiniNEC antenna analysis program.

The LPDA elements are insulated in the center, and each element (all are driven) is fed 180° out of phase with the adjacent elements. Fig 1 shows a simplified schematic of an LPDA. In the 11-element design shown in the title photo, the ele-

[1]Notes appear on p 28.

Table 1

Seven-Element LPDA Dimensions for 20 to 30 MHz

Element number	*Element length (feet)*	*Spacing (feet)*
1	24.53	2.45
2	22.08	2.21
3	19.87	1.99
4	17.89	1.79
5	16.10	1.61
6	14.49	1.45
7	13.04	N/A

Boom length: 12 feet
Shorting strap length: 7¾ in.
Average impedance: 93.6 Ω

Design Information

Design constant: 0.9
Spacing constant: 0.05
B_{AR}: 1.41 (bandwidth of the active region)
R_O: 64 Ω (input resistance)
Z_A: 390 Ω (average characteristic impedance)

Table 2

Nine-Element LPDA Dimensions for 17.5 to 30 MHz

Element number	*Element length (feet)*	*Spacing (feet)*
1	28.94	2.78
2	26.05	2.50
3	23.44	2.25
4	21.10	2.03
5	19.00	1.82
6	17.09	1.64
7	15.38	1.48
8	13.84	1.33
9	12.46	N/A

Boom length: 16 feet
Shorting strap length: 8⅓ in.
Average impedance: 96 Ω

Design Information

Design constant: 0.9
Spacing constant: 0.049
B_{AR}: 1.41 (bandwidth of the active region)
R_O: 64 Ω (input resistance)
Z_A: 380 Ω (average characteristic impedance)

Table 3

Eleven-Element LPDA Dimensions for 13.5 to 30 MHz

Element number	*Element length (feet)*	*Spacing (feet)*
1	36.44	3.64
2	32.80	3.28
3	29.52	2.95
4	26.57	2.71
5	23.91	2.66
6	21.52	2.39
7	19.37	2.15
8	17.43	1.94
9	15.69	1.74
10	14.12	1.57
11	12.71	N/A

Boom length: 25 feet
Shorting strap length: 10 ½ in.
Average impedance: 93.6 Ω

Design Information

Design constant: 0.9
Spacing constant: 0.05
B_{AR}: 1.41 (bandwidth of the active region)
R_O: 64 Ω (input resistance)
Z_A: 390 Ω (average characteristic impedance)

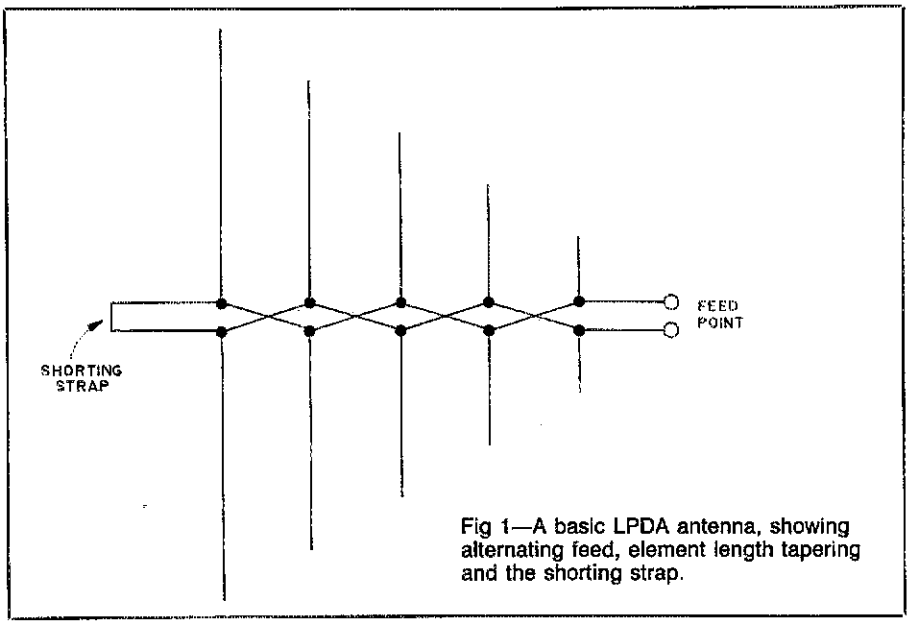
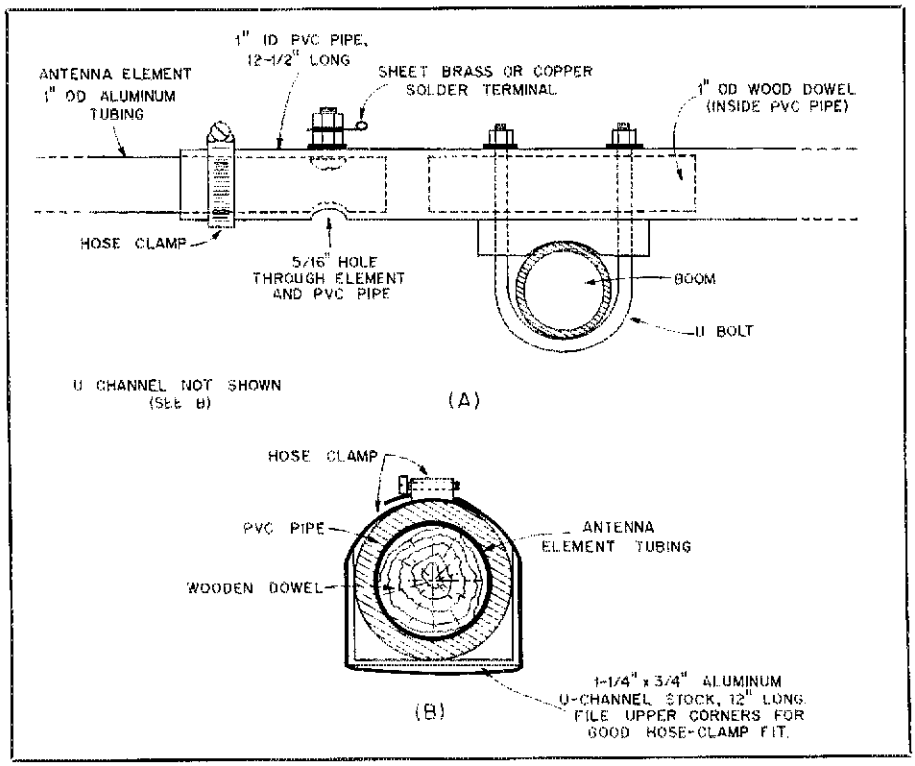


Fig 1—A basic LPDA antenna, showing alternating feed, element length tapering and the shorting strap.



ments are angled 30° forward (the element ends are more forward than their respective element-to-boom attachment points). This technique gives some additional gain, and provides more uniform gain distribution over the antenna's frequency range. The antennas described here can be built with the elements perpendicular to the boom or swept forward. The assembly of the swept-element versions is somewhat more complicated than the straight-element versions, however.

All of the antenna elements are made of 6061-T6 aluminum tubing. Each element uses tubing of three outer diameters: Center sections, 1 inch; middle sections, 7/8 inch; outer sections, ¾ inch. The insulating material used between the element halves is 1-inch ID Schedule 40 PVC pipe.

I used 1-inch OD wooden dowels inside the PVC pipe sections at the points where the U bolts attach the elements to the boom. The wooden plugs keep the pipe from collapsing under the pressure exerted on it by the hardware. The 7- and 9-element antennas (with straight elements) use 1-inch ID PVC pipe as element-center insulators (see Fig 2). The element supports for the 11-element LPDA are constructed of 1/8-inch aluminum sheet, with 1-inch ID PVC pipe used as insulators (see Fig 3).

Construction

The elements are assembled first, beginning with the element-to-boom attachment points. The 1-inch OD 6061-T6 aluminum element-center tubing sections and the PVC insulators for each element are assembled as shown in Figs 2 and 3 (depending on the element-mounting technique you choose). Install the U bolts to hold the wooden plugs in place. Leave the U bolts loose enough to allow the elements to be slid onto the

← Fig 2—The method of mounting straight LPDA elements is shown at A. At B, a cross-sectional view of this mounting technique is shown. A piece of aluminum U-channel stock is used to reinforce the assembly, but is omitted at A for clarity. Be sure to use all-stainless-steel hose clamps when assembling the LPDAs.

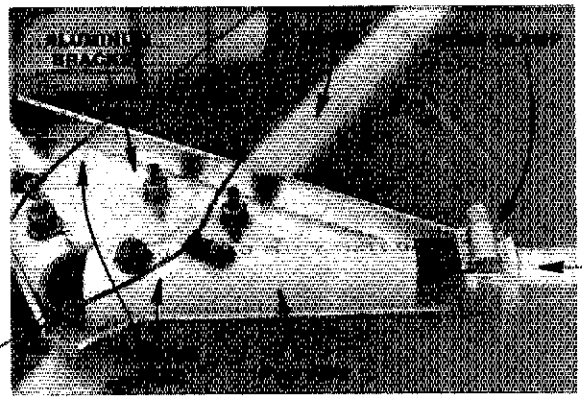


Fig 3—Element-to-boom attachment scheme for swept-forward element mounting. The aluminum bracket is made of 1/8-inch sheet aluminum that is bent to support the element.

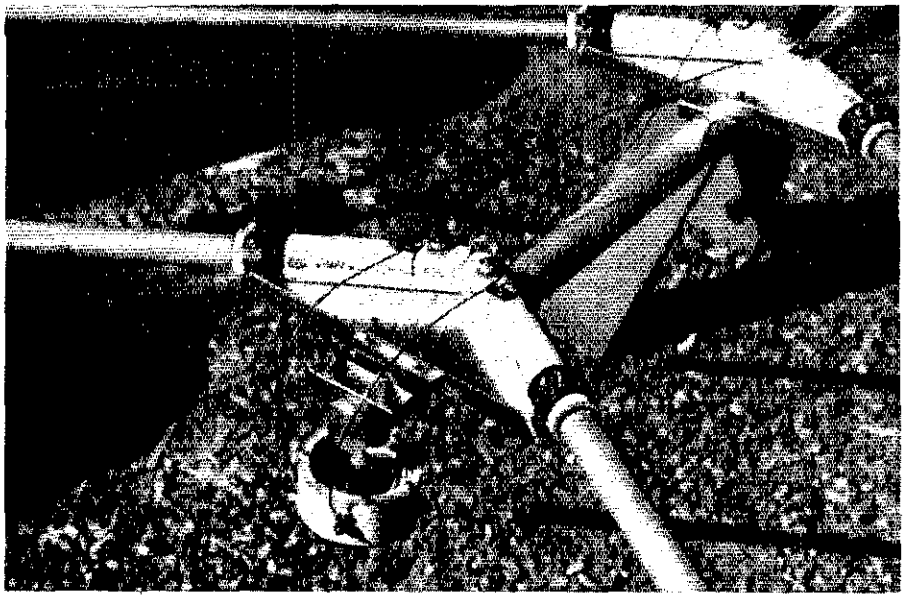


Fig 4—Photograph showing the feed-point end of a swept-forward-element LPDA. The antenna shown is an 11-element version, with the balun mounted just below the boom and in front of the shortest element.

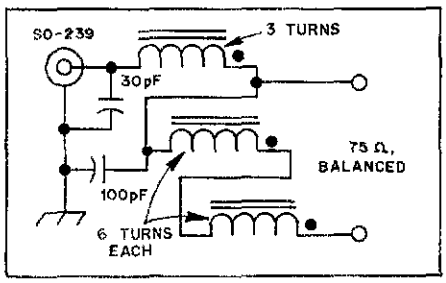


Fig 5—Schematic of the balun used on the 11-element version of the LPDA. The balun inductor is wound on a T-200-2 powdered-iron toroidal core. The entire assembly should be enclosed in a weatherproof enclosure at the feed point, as shown in Fig 4.

boom. Carefully measure and mark the location of each element on the boom, using Table 1, 2 or 3, depending on the antenna version you are building.

I assembled my 7-element antenna on the ground. I used two 12-foot-long 2 × 4s as a jig to help in element alignment. To do this, place the 2 × 4s on level ground, six inches apart and parallel to each other, with the boom between them. Slide all of the elements to their respective locations on the boom. Place the assembly on the 2 × 4s with the element insulators resting on the edges of the jig and the boom hanging between the 2 × 4s. Make the final spacing adjustments and tighten the U bolts. Be sure to double check the element spacings before continuing.

Starting with the longest element, insert the ¾-inch element section into the 1-inch center section. Measure the length, and tighten the hose clamp. Do the same with the shortest array element. Then, without moving the boom, place a chalk line or straightedge from the tip of the longest to the tip of the shortest array element and adjust the tips of the remaining elements so that their ends are on the chalk line, and tighten the element clamps. This procedure eliminates a lot of tedious measuring.

Find the balance point of the array on the boom by lifting the antenna by the boom and holding it loosely until it balances. Attach the boom-to-mast mounting plate at the balance point. The 7, 9 and 11-element antennas all use ¼-inch-thick aluminum mounting plates, 8 inches square.

Attaching the Feed Wires

After element assembly is completed, the element feed wires are attached. I used solid copper insulated no. 12 house wire for the feed wire. A continuous length of wire (twice as long as the boom, plus four feet) makes up the feed wire. The 7-element array, for example, has a 12-foot boom. The feed for this antenna requires (12 × 2) + 4, or 28 feet, of wire. Fig 1 shows the feed-system arrangement for the LPDAs.

Bend the feed wire at the halfway point (the ends are connected last—they are wired to the balun, which is located on the boom underneath the shortest element). The looped end makes up the shorting strap, and is the first wiring connection made—at the center of the longest element. Beginning with the looped end, find the center of the total wire length. Mark the length of the shorting strap (given in the tables—half the length should be on each side of the center of the wire). Remove ½ inch of insulation at the marks and solder the wires to the two feed-point lugs on the longest element.

The feed wires are spaced 4 inches apart for their entire length along the boom. The spreaders that maintain the 4-inch spacing between the feed wires can be made of 3/8-inch OD, 5-inch long pieces of wooden dowel sprayed with several coats of clear Krylon® or other waterproofing material. The spreaders can also be made of plastic, as shown in the upper right of Fig 4. Holes are drilled ½ inch in from each end of the spreaders. The holes should be small enough to provide a tight fit when the feed wire is passed through.

After attaching the feed wires to the longest element, thread a spacer onto the two feed wires to a point halfway between the two longest elements. Pull the wires taut and rotate them so that the spacer is perpendicular to the boom. Rotate the wires another 90° and attach them to the next element by removing ½ inch of insulation from the wire and soldering it to the feed-point lugs of the element. Connect the feed wire to the remaining elements in the same way. After the feed wire is connected to the shortest element, connect the balun as shown in the foreground of Fig 4.

The balun is attached to the underside of the boom at the shortest element. House it in a small plastic container to protect it from the weather. If a coaxial balun is used, it can be attached to the boom with cable ties. Coat any exposed feed connections with silicone sealant.

The balun used on the 11-element antenna (Fig 5) is housed in a 3-inch-long, 2½-inch ID piece of PVC pipe. The ends of the pipe are covered with ¼-inch-thick clear plastic. This housing holds the two capacitors, the balun coil, connections for the antenna feed, and the SO-239 coax connector.

The Boom Truss

A boom truss is required on the 11-element array to reduce boom stress caused by the element weight. The 7- and 9-element antennas do not require trusses. The truss is made in the form of a T, as shown in Fig 6 and the title photo. The truss is constructed from 1-inch angle iron and welded at the junction of the T. The T is 4½ feet high with a 4-foot-long cross bar. Stainless steel boom-support wires pass through holes in the ends of the cross bar, and are attached to eye bolts mounted through the boom, 6 feet in from each end. Use 3/16-inch or larger guy wire for the boom truss wire.

Feed Line

Coaxial feed line is used on all the LPDAs. The 11-element system uses 52-Ω line with a toroidal balun (see Figs 4 and 5). The 7- and 9-element systems use 75-Ω line and baluns made of 10 turns of 75-Ω coax wound into 6-inch-diameter coils. The turns of cable are fastened with cable ties.

The feed-point and element impedances are complex, and are not constant over the entire frequency range of the antenna. Feed-line impedances of 75 to 100 Ω will provide SWRs under 2:1. An antenna tuner

(continued on page 28)

Automatic TR Switching For the Kenwood SM-220 Monitor Scope

Let a relay do the scope's TR switching! This simple modification provides you with "hands off" monitoring of received or transmitted signal patterns.

By Wade A. Calvert, WA9EZY
21114 - 94 Ave North
Port Byron, IL 61275

The Kenwood SM-220 Station Monitor scope is a popular, high quality accessory found in many ham shacks. (I received mine—along with a BS-8 panadaptor—from Santa in 1986.) The SM-220 is designed to visually display received and transmitted signals. The scope has a built-in, two-tone test oscillator, and can also be used—to some degree—as a general-purpose troubleshooting scope.

I use the SM-220 with a Kenwood TS-940S transceiver. Initially, my applications of the scope were quite limited. First, I simply connected the transceiver's IF-1 jack to the IF INPUT jack on the SM-220 and used it as a panadaptor to monitor band activity. Then I found that if I connected the output of the transceiver's IF-2 jack to the scope's vertical input (V. INPUT) BNC connector and placed the FUNCTION switch in the OSC/RTTY position, I could obtain a sideways "Christmas-tree" (trapezoidal) pattern on received signals. Of course, I was also able to obtain the trapezoidal pattern on transmit by moving the FUNCTION switch to the MONI/TRAP position.

After my initial fascination with the new scope wore off, I used it only to monitor the transmitter output. That was because I'd have to *manually* move the FUNCTION switch between the BAND SCOPE, MONI/TRAP and OSC/RTTY positions each time I went from transmit to receive, and vice versa. Because of this required manual switching, the '220 acted as a *part-time* monitor. The thought occurred to me that the scope would be twice as useful if it could *automatically* switch from transmit to receive along with the station transceiver. Wouldn't it be nifty—I thought—if I could *automatically* move between the BAND SCOPE (panadaptor) or the OSC/RTTY (received-signal envelope) displays to the MONI/TRAP position (to monitor the transmitter output) without having to physically move the FUNCTION switch? Some sort of TR relay seemed to be in order here.

What's Needed?

Fig 1 shows a portion of the SM-220 schematic diagram in the area of the FUNCTION switch (S2) as it is originally wired. After some investigation of the circuit, I realized that a small, low-current, 3PDT relay ought to perform the required switching functions nicely.[1] Conveniently, there's a source of 12 V dc available inside the SM-220 with which to power the relay. Fig 2 shows the modifications to the SM-220.

A search of my "junk box" turned up a Potter & Brumfield KHS17D12—a small, 12 V dc, 4PDT, hermetically sealed relay that draws about 60 mA. The type of relay you use is not too critical. However, the relay you select should have at least three double-throw poles and—if the relay energizing current is to be stolen from the SM-220—ensure the relay coil's current requirement is 60 mA or less.

In addition to the relay, you should have some red and white wire handy; no. 22 will do. (Color-coded wire makes wire tracing easier.) You'll also need three single-hole-mount phono connectors.

Modifying the SM-220

First, remove the top cover of the scope. Loosen the set screws at the switch-shaft ends of the couplers connecting the FUNCTION and RF ATT shafts to the switches contained in the shield case (see p 7 of the SM-220 service manual). The shield case is the small metal box fastened to the rear panel at the top rear of the scope and above the power transformer. Slide the switch shafts out through the front panel as far as they will go so that they will be out of your way while you're working. Remove the shield case from the inside of the rear panel by removing the two screws located between the two pairs of SO-239 coaxial connectors on the rear panel. Carefully remove the socket from the CRT to allow more slack in the wires.

Loosen the rear cover of the shield case by removing four screws, two on each side of the box. Unsolder the 560-Ω, 3-W resistor from the SO-239 connector labeled RF INPUT, and unsolder the large, white wire from the connector labeled DRIVE OUTPUT; then remove the rear cover. Remove the inner metal panel from the case

[1]Multipole, double-throw relays contain contact sets that employ a movable center contact—the operating arm—and two stationary contacts known as the normally open (NO) and normally closed (NC) contacts. A three-pole, double-throw relay (3PDT) contains three such sets. On each set, the NO contact is open when the relay is de-energized, and the NC contact is closed.

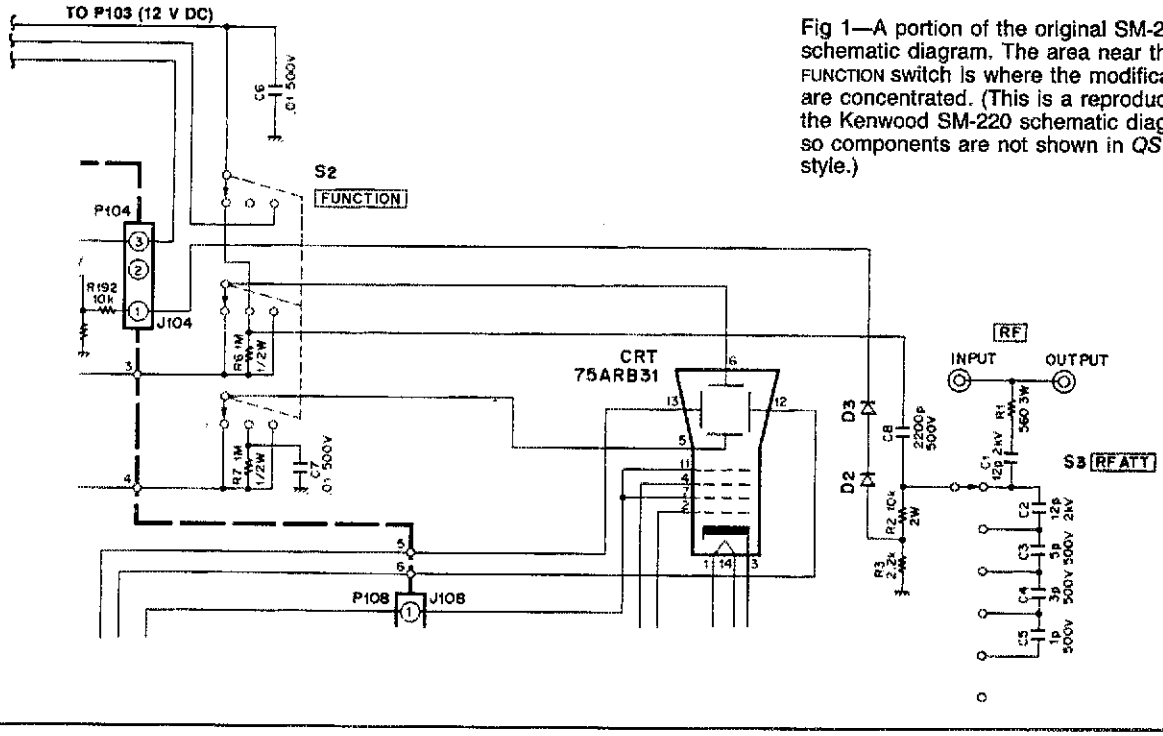


Fig 1—A portion of the original SM-220 schematic diagram. The area near the FUNCTION switch is where the modifications are concentrated. (This is a reproduction of the Kenwood SM-220 schematic diagram, so components are not shown in *QST* style.)

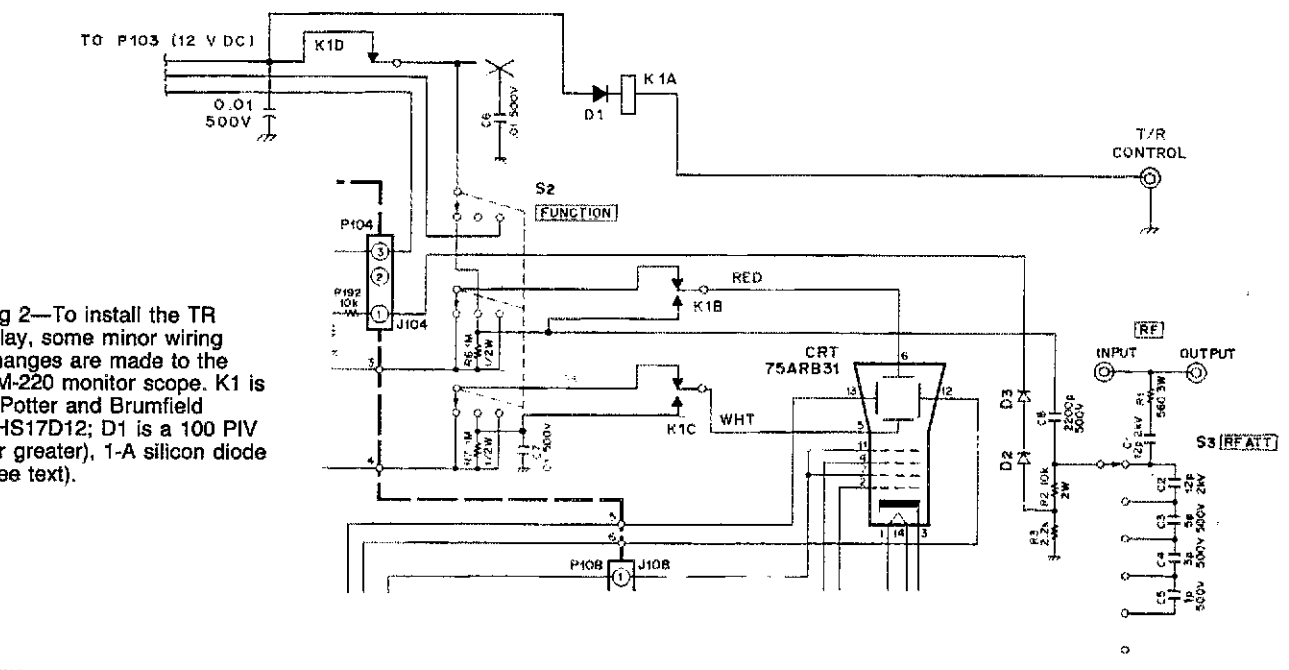


Fig 2—To install the TR relay, some minor wiring changes are made to the SM-220 monitor scope. K1 is a Potter and Brumfield KHS17D12; D1 is a 100 PIV (or greater), 1-A silicon diode (see text).

by removing the single screw in the top, near the center. The two wafer switches inside the case will now be plainly visible.

At the CRT socket, unsolder the red lead from terminal 6, and unsolder the white lead from terminal 5. Solder these two leads to two NC-contact terminals on the relay (K1B and K1C, respectively). Solder a length of red hookup wire from CRT socket terminal 6 to the operating-arm terminal of the relay contact set to which the red wire from the wafer switch was just connected (K1B). Similarly, solder a length of white hook-up wire from CRT socket terminal 5 to the operating-arm terminal of the relay contact set to which the white wire from the wafer switch was just connected (K1C).

A sketch of the rear view of the two wafer switches is shown in Fig 3. The FUNCTION switch is the one on the right. Number the terminals as indicated in Fig 3. Connect a length of red wire from FUNCTION switch terminal 3 to the NO contact terminal of the relay contact set at which the red wires are already connected (K1B). Likewise, connect a length of white wire from FUNCTION switch terminal 7 to the NO contact terminal of the contact set to which the white wires are connected (K1C). (The new red and white wires from the FUNCTION switch wafer are routed through the bottom of the shield case via the rubber grommet). A 0.01-μF disc-ceramic capacitor and a brown wire are connected to the FUNCTION switch at ter-

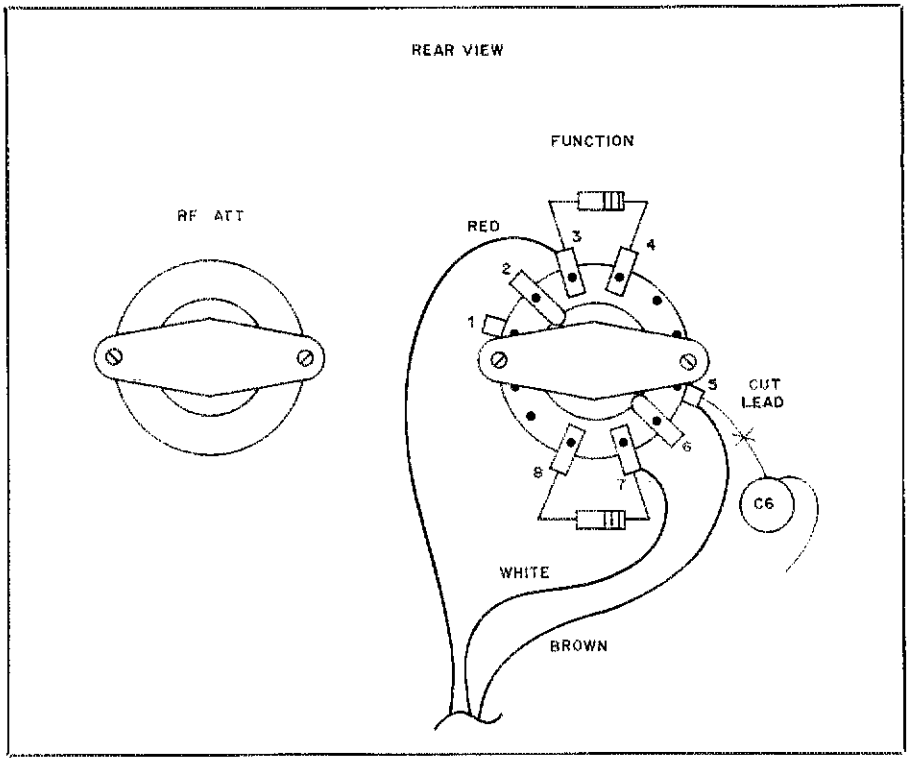


Fig 3—Sketch showing rear view of wafer switches. The FUNCTION switch is on the right.

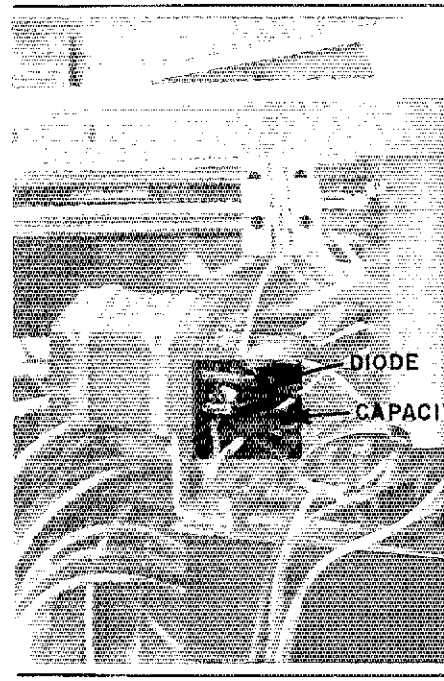


Fig 4—In this photo, you can see the homemade aluminum bracket and ground lug fastened under one locknut of the power transformer. Note the 0.01-μF disc-ceramic capacitor connected between the relay coil terminal and the ground lug. The relay is secured by tie wraps to the aluminum bracket.

minal 5. Disconnect the capacitor from the switch terminal by clipping the lead; leave the brown wire attached to the terminal.

Replace the metal panel inside the shield case, being careful not to pinch the large white wire or the 560-Ω resistor. Resolder the large white wire and the resistor to their respective SO-239 connectors. Fasten the rear cover to the shield case and reattach the case to the rear panel of the SM-220.

Find a place to mount the relay close to the shield case in order to keep lead lengths to a minimum. Fig 4 shows how I mounted my relay. I attached it to a homemade aluminum bracket secured beneath a locknut on the power transformer frame. (Note: Place a ground lug under the locknut for use later on.)

Locate the brown wire that runs from plug P103, terminal 2, into the underside of the shield case. Cut this brown wire at a point that will allow both ends to reach a third contact set on the relay. (It may be necessary to add a length of hook-up wire to the existing brown wire depending on your choice of relay location). Connect the two cut ends of the brown lead to a third NC contact pair, K1D (ie, one brown lead to the NC contact terminal, and the other brown lead to the operating-arm terminal). This connection should provide continuity through the brown lead to the FUNCTION switch when the relay is de-energized, but break the continuity when the relay is energized.

The brown lead that originates at P103, terminal 2, is connected to the 12 V dc source that will be used to power the relay. Connect one lead of a 0.01-μF, 500-V disc capacitor and the anode lead of a silicon diode (I used a 200-V/1-A diode) to the relay terminal that is attached to the P103-leg of the brown wire (see Fig 4). Connect the cathode of the diode to one of the relay coil (K1A) terminals. The other lead of the capacitor is soldered to the ground lug under the transformer locknut used to mount the relay. I installed the diode to the relay coil on my unit to offer some isolation and to reduce the coil voltage slightly.

Mount the three phono jacks (T/R, H-INP, V-INP) on the rear panel of the SM-220 as shown in Fig 5. Connect a piece of wire from the remaining relay coil terminal to the center contact of the T/R jack. This completes the wiring of the TR relay.

Run two lengths of small coaxial cable (RG-174) from the H.INPUT/EXT.SYNC and V.INPUT connectors on the SM-220 front panel to the H-INP and V-INP jacks on the rear panel. These jacks allow you to make cable connections at the rear panel, leaving the front panel of the SM-220 clean and uncluttered when interconnected to other equipment.

Reattach the control shafts to the shaft couplers and retighten the set screws. Be careful to align the knob pointer lines on the front panel for proper indication when the switches are rotated. Replace the top cover of the scope.

Operation

The TR relay in the SM-220 is actuated by grounding the center conductor of the T/R jack. The TR contact in your radio must connect the center conductor to ground (and must be capable of carrying the current required by the TR relay); otherwise, some type of interface relay will be needed. If you're going to use an amplifier, you'll have to parallel the amplifier's relay control line with the SM-220 control line. The transceiver's TR contact then offers a ground on transmit to both the amplifier and the scope. Check your owner's manual for the current and voltage limitations of your transceiver's control-relay contacts.

Make all the necessary cable connections between the transceiver and the scope. Connect the RF output from your transceiver to the RF INPUT connector on the scope, and connect your antenna lead to the RF OUTPUT connector. Then turn on the scope.

The displayed pattern size of the transmitted signal is controlled by the RF ATT control at the upper right on the SM-220's front panel. The size of the displayed pattern of the received signal is controlled by the V. ATT control at the lower left of the SM-220 front panel. Tune in a signal and display either the trapezoidal receive pattern (FUNCTION switch in the OSC/RTTY position), or the panoramic spectrum (FUNCTION switch in the BAND SCOPE position and panadaptor installed). Adjust the controls to obtain a display approximately two divisions high. Center and

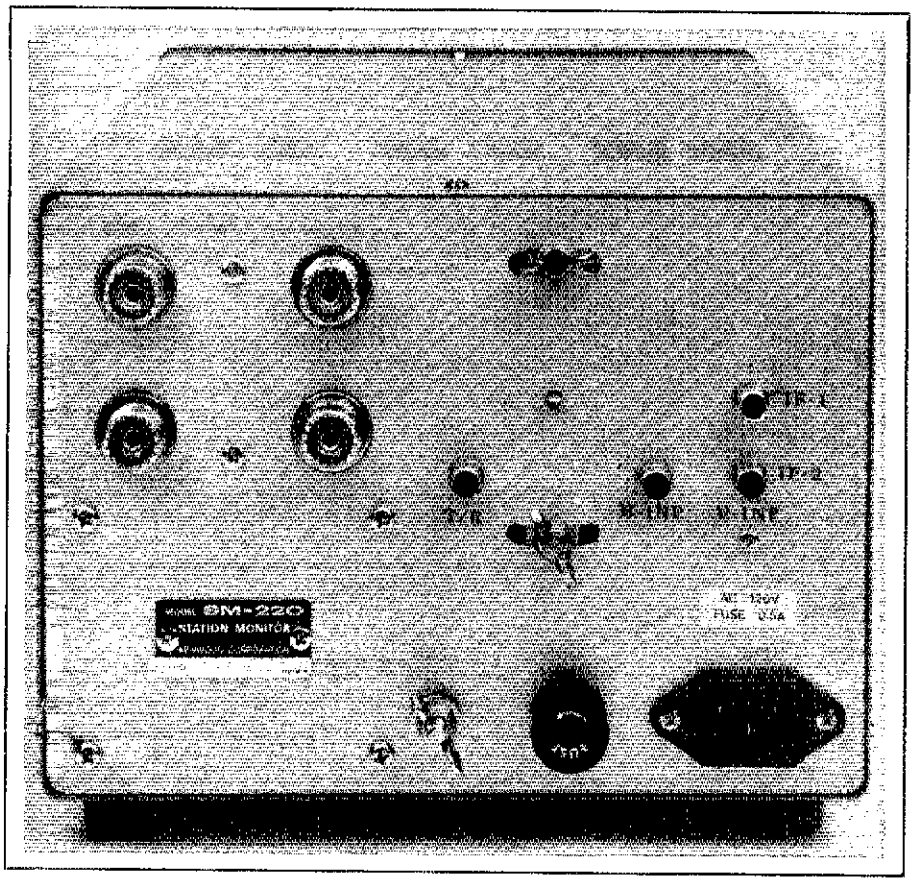


Fig 5—A view of the rear panel of the modified SM-220. Three phono jacks have been added to the rear panel. The T/R relay control jack is near center of the panel. The horizontal (H. INP) and vertical (V. INP) inputs (which are connected in parallel with the corresponding front-panel BNC connectors) are directly to the right and below the original IF INPUT jack. The IF INPUT jack is also labeled IF-1, and the V. INP jack is labeled IF-2 to identify the TS-940 transceiver jacks to which they are connected. The installation of the additional phono jacks permits all connections to be made at the rear of the scope, leaving the front panel uncluttered.

"left-justify" the trace. The SWEEP RANGE control should be in the 10-100 position.

With a dummy load connected to the SM-220 RF OUTPUT connector, place the transceiver in the SSB transmit position and speak into the microphone. Listen for the operation of your newly installed relay; it should operate in conjunction with your transceiver's TR relay. Adjust the width of the displayed transmit signal using the SWEEP VARI/EXT GAIN control. This control also affects the monitored received-signal level, but a good compromise can be reached by switching back and forth from transmit to receive and adjusting this control. Adjust the RF ATT switch for a transmitted pattern height similar to that of the received-signal pattern.

Now, the SM-220's FUNCTION switch can be left in either the OSC/RTTY or BAND SCOPE position. The SM-220's TR relay will automatically switch to the MONI/TRAP position each time you transmit, and switch back to the OSC/RTTY or BAND SCOPE during receive.

Additional Notes

I'd noticed that the scope pattern on transmit would exhibit a tendency to shrink horizontally on voice peaks; the stronger the signal, the more noticeable this effect became. A friend informed me that the shrinkage can be diminished by operating the scope with the SYNC/MKR push button closed. Although I have not taken the time to determine why, the fix works well.

One other thought: It should be possible to build a simple, low current, transistorized circuit to switch the scope's TR relay by sensing the presence of RF at the scope's SO-239 connectors. This would eliminate the need for a connection to the radio's TR relay and, thus, any incompatibility of the modified scope with some rigs.

Summary

I completed this modification in one afternoon. Prior to that, a couple of evenings were spent reviewing the schematic while parked on the couch in front of the TV set. (Remember: Any modifications to equipment still under warranty, including this one, may void the scope warranty. To be on the safe side, wait until the warranty period has expired.) Sit back and enjoy your SM-220 *full-time* monitor 'scope!

Wade Calvert was licensed as WA9EZY in 1962. He's always had an avid interest in home-brewing Amateur Radio gear. Wade's other Amateur Radio pursuits include ragchewing, chasing DX and collecting parts at hamfests.

Wade received his BSEE from the University of Iowa in 1971. He's presently employed by the Iowa-Illinois Gas and Electric Company of Rock Island, Illinois, as the Superintendent of Distribution Engineering. Wade also owns and operates a multitrack recording studio and is an aspiring songwriter. In 1979, he designed and constructed his first multitrack recording console. Wade has done considerable work in the design and development of simple, high-quality, low-level audio circuitry.

Strays

***QST* congratulates...**

☐ the following radio amateur on 50 years as an ARRL member:

- Joseph H. NeCamp, W4JBQ, of Fort Wright, Kentucky

☐ William C. Willmot, K4TF, of Merritt Island, Florida, on being named president of the Society of Wireless Pioneers.

☐ Donald R. Van Meter, N4OHN, of Eminence, Kentucky, on being selected Soil Conservationist of the Year in the Governor's Conservation Achievement Awards, presented by the League of Kentucky Sportsmen and the Kentucky Wildlife Federation Foundation for 1988.

 (continued from page 23)

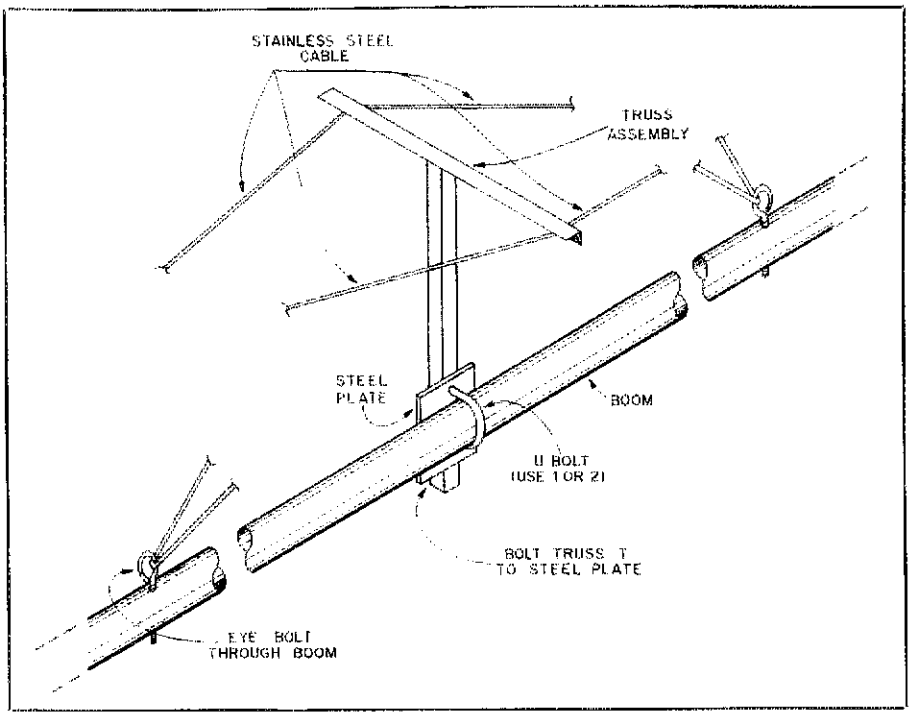


Fig 6—Details of the boom truss needed on the 11-element LPDA. The steel T bracket can be attached to the boom directly (with a U bolt) or via a steel or aluminum plate. The truss must be secured to the boom so that it cannot twist with respect to the boom.

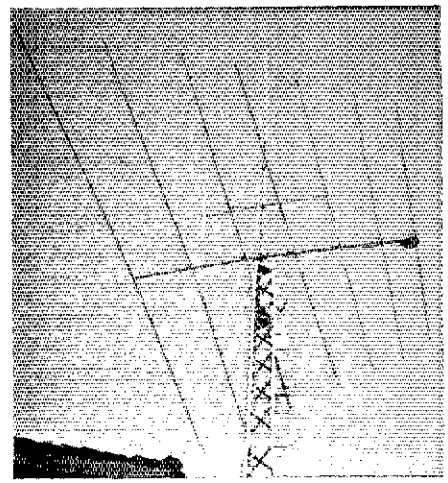


Fig 7—Photo of K6VV's 7-element LPDA antenna mounted below a 2-meter FM Yagi.

should be used at the transmitter to keep any spurious radiation out of the antenna passband.

Results

The antennas shown in the title photo and Fig 7 have been in operation for over two years. My 7-element version performs better than the three-element monoband Yagis that it replaced.

An LPDA is not an inexpensive antenna to build. The time and expense involved in construction have been worthwhile, however, considering that I now have *one* antenna that covers four bands. Working DX on all modes is easy using the LPDA. The improvement in performance is so great, in fact, that I've disassembled the old monoband Yagis and used their aluminum in other projects!

Thanks to Fred Schulz, K6UK, for his assistance with the measurements; Bob Crawford, WO6I, for help with the manuscript; Chet Knoll, NKØO, for building and testing the 11-element LPDA; and Maurice Harp, KF7L, for designing the toroidal balun used with the 11-element array.

Notes

[1]US radio amateurs are to gain access to the 18-MHz band no later than July 1989.

[2]J. Hall, ed, *The ARRL Antenna Book* (Newington: ARRL, 1988), pp 10-1 through 10-7.

References

J. Hall, ed, *The ARRL Antenna Book* (Newington: ARRL, 1988).

W. Orr and S. Cowan, *The Beam Antenna Handbook* (Wilton, CT: Radio Publications Inc, 1976).

E. D. Isbell, "Log Periodic Dipole Arrays," *IRE Transactions on Antennas and Propagation*, Vol. AP-8, no. 3, 1960, Fig 3.

Asa ("Ace") Collins was first licensed in 1938 as W6QVS, and held that call for 36 years. He served in the Navy (in communications) for four years during World War II. After his Navy stint, Ace returned to college, working in broadcast radio to pay tuition. Upon graduation in 1947, he went to work for the telephone company, where he worked until retiring in 1982 as Engineering Manager of a Central Office Design Engineering Group.

Ace returned to college in the 1970s and earned a BBA degree. He's a member of the Antennas and Propagation Society of the IEEE, and is presently an engineering design consultant. Ace has been interested in antenna design for many years, and has written several articles on the subject, including one called "A Multiband Vertical Radiator," QST, Apr 1977.

Strays

SAFETY FIRST

☐ There are reasons for accidents involving radio gear, but never *good* reasons. Take no chances with electricity. Even a low-voltage shock can be serious—sometimes fatal.

Heed the ARRL safety code: While there's no reason for you to be involved in a ham-related accident, that possibility always exists if you are not thinking safety. Following the ARRL safety code will make your ham experience more enjoyable. Read it and practice it.

1) Kill all power circuits completely before touching anything behind the panel or inside the chassis or the enclosure.

2) Never allow anyone else to switch the power on and off for you while you're working on equipment.

3) Don't troubleshoot gear when you're tired or sleepy.

4) Never adjust internal components by hand. Use special care when checking energized circuits.

5) Avoid bodily contact with grounded metal (racks, radiators) or damp floors when working on the transmitter.

6) Never wear headphones while working on gear.

7) Follow the rule of keeping one hand in your pocket.

8) Instruct members of your household how to turn the power off and how to apply artificial respiration. (Instruction sheets on the latest approved method can be obtained from your local Red Cross office.)

9) If you must climb a tower to adjust an antenna, use a safety harness. Never work alone.

10) Do not install antennas at levels that permit humans or animals to come in contact with them. Not only might the victim sustain a serious RF burn, he or she could run into the antenna and be injured.

11) Do not operate high-power UHF or microwave gear that has inadequate shielding against radiation. Similarly, do not look into or stand near microwave antennas when transmitter power is being fed to them.

12) Do not install antennas near electrical power lines.

13) Don't drink alcoholic beverages when working on equipment or installing antennas.

Take time to be careful. Death is permanent.

The Mobile Roof-Rack Antenna

Looking for a low-profile mobile antenna? Take a directional discontinuity ring radiator on the road—disguised as a roof rack!

By Peter Dodd, G3LDO
37 The Ridings
East Preston
West Sussex BN16 2TW
Great Britain

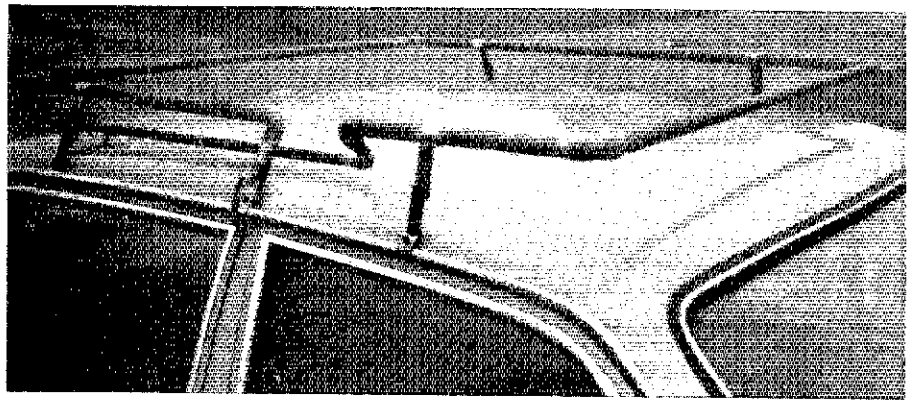


Fig 1—The G3LDO Mark I DDRR antenna. Note the plastic tuning block located at the front of the element (the ungrounded end of the antenna element).

My old automobile was fitted with metal fenders that provided solid mechanical support and grounding for a conventional mobile antenna system. The plastic fenders of my new auto are not suitable for this purpose, so a different type of antenna or antenna mounting was required. Antennas mounted on a roof rack worked fine, but were high enough to be obtrusive. Searching through the *ARRL Antenna Book*, I found the description of an antenna called the directional discontinuity ring radiator (DDRR).[1] (See the sidebar "What's a DDRR?") The original DDRR design was ground mounted; it used automobile exhaust tubing as the radiating element and chicken wire netting as a ground screen. I decided to build a mobile DDRR in which the auto roof would serve as a ground plane.

Mark I DDRR Mobile Antenna

My Mark I DDRR antenna was constructed out of 22-mm (7/8-inch) diameter copper tubing. I substituted copper tubing and fittings for the exhaust-system tubing because they are readily available and highly conductive. The Mark I is shown in Fig 1.

The Mark I Mobile DDRR followed the original DDRR design as closely as possible, because I didn't know how the antenna worked. (The rather imposing name of directional discontinuity ring radiator made me think it was some sort of slot antenna.) My major departure from the original design was to use a square, instead of a circular, configuration; the tube-bending equipment necessary to make the circular configuration was not available. I also reasoned that a square shape would give the antenna a roof-rack appearance and be less obtrusive. My square design used 90° joints at the corners.

In my case, the average height of the antenna element was 6 inches above ground (the roof of the automobile). I flattened the feed end of the element so that it could sit in, and attach to, the roof gutter with a clamp. The overall length of the Mark I element was greater than that in the original design, because I used a tuning capacitor with less capacitance than that in the original.

This antenna appeared to perform well. Using a Kenwood TS-120V transceiver running 10 watts output (SSB and CW), I worked about 30 countries over three months. Only two transatlantic QSOs were made.

The Mark II DDRR Mobile Antenna

After reading a mathematical analysis of the DDRR antenna by Robert Dome, W2WAM,[2] I decided to modify my design. Dome's analysis gave the original DDRR antenna an efficiency of 2.75%, mainly because of low radiation resistance; conductor resistance consumed much of the available power. Dome suggested that by increasing the height of the antenna above ground to 20 inches and using highly conductive materials (copper tubing for the element and copper sheet for the ground plane), the DDRR's efficiency could be raised to 25.8%—an increase of 9.8 dB when compared with the original design. I regarded a roof rack 20 inches high as being a bit conspicuous, so the Mark II DDRR design represents a compromise: its average height above the auto roof is over 10 inches.

Construction

The antenna is fixed to the automobile by a bar roof rack—the sort used to trans-

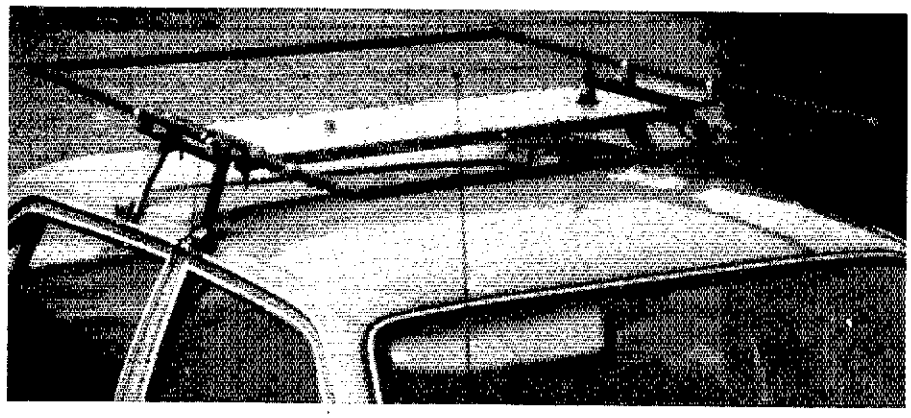


Fig 2—The G3LDO Mark II antenna. Mechanical support and roof clearance are provided by a car roof rack.

[1]Notes appear on page 32.

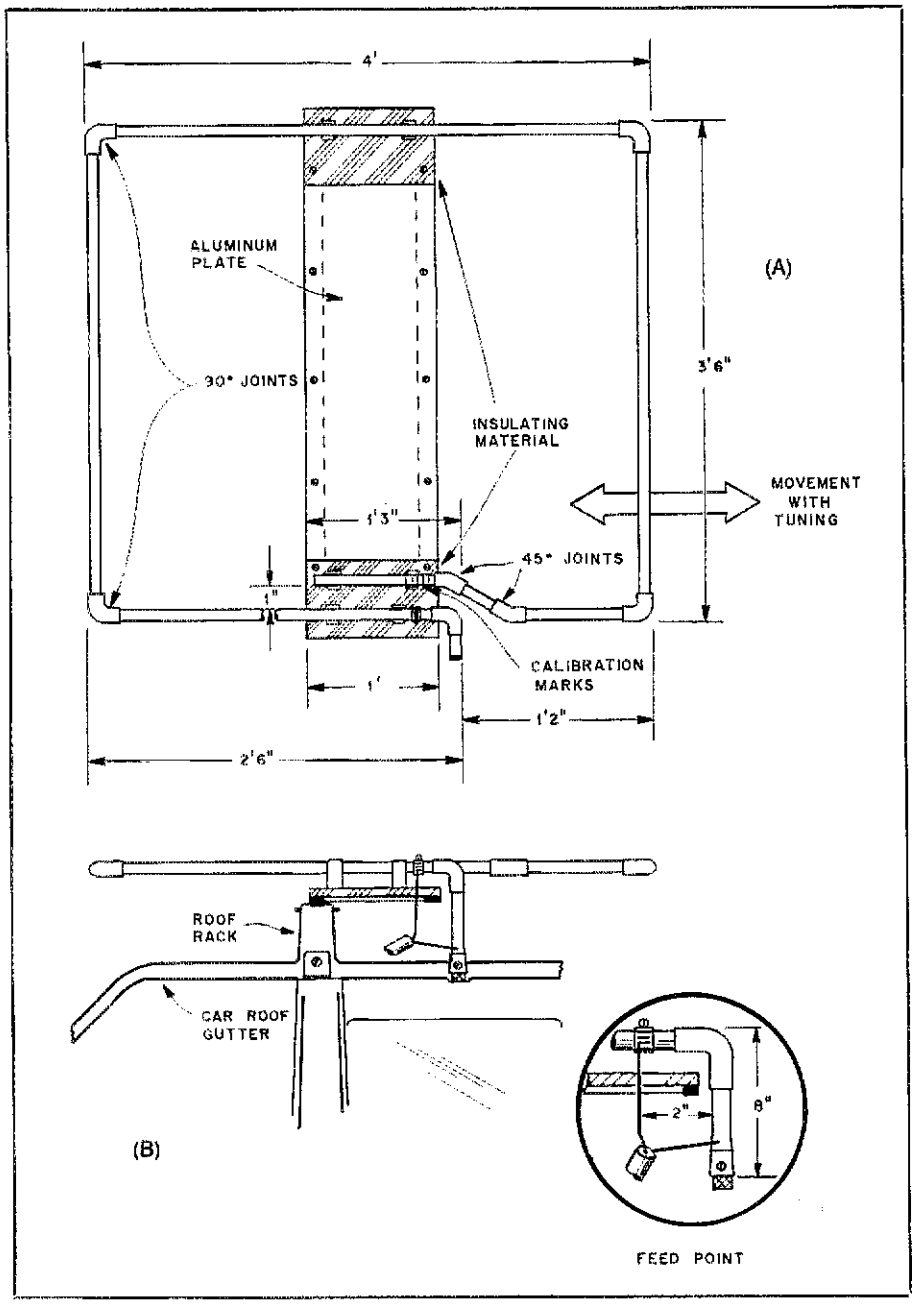


Fig 3—Top (A) and side (B) views of the DDRR mobile antenna. The top view shows how the elements are insulated from the roof rack. The antenna is tuned by moving the element along the roof on its insulating block. Dimensions are approximate. The side view shows feed-line and construction details. See text.

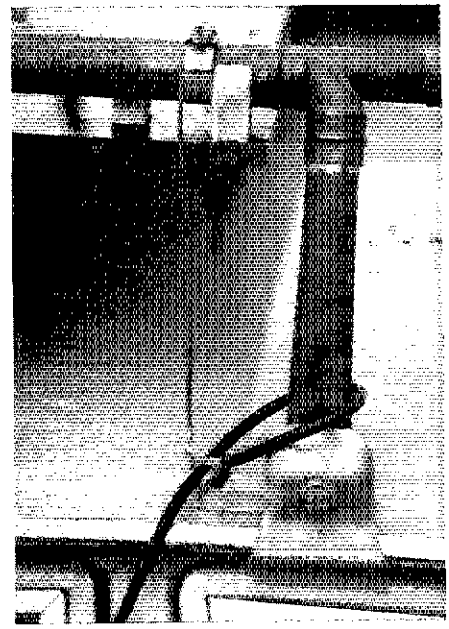


Fig 4—This photograph shows how G3LDO attached the DDRR mobile antenna to his car's rain gutter. Feed-line connection details are also shown. The base of the element has been flattened to fit the gutter. See text.

port ladders or lumber—and is illustrated in Fig 2. As well as providing a support for the DDRR antenna, this rack also provides facilities to mount more conventional antennas for other bands or comparative tests, and so on. Set the bars about 12 inches apart and bolt a sheet of aluminum to them. Remove the roof-rack support leg nearest to the element ground leg that connects to the car body. (This reduces RF absorption from by the element ground leg.)

Two pieces of Bakelite (or any other suitable insulating material) are fitted to the ends of the rack for mounting the element. As in the Mark I antenna, the Mark II DDRR element is made of 22-mm copper tubing. (English plumbing fittings are now metric; 7/8- or 1-inch-diameter tubing is suitable.) 90° copper joints form the corners. Cut the element sections with a pipe cutter to ensure a snug fit between the element sections and corner fittings. Construct the element to the dimensions in Fig 3. It might be wise to add an extra 3 inches to the ungrounded end of the element. This will allow you enough material to prune the element to resonance.

The design shown in Fig 3 is for right-hand-drive autos; the DDRR tuning-adjustment capacitor is on the right-hand side, above the driver's door.[3] (If the top view of Fig 3 is inverted, this will put the capacitor on the left-hand side, suitable for a left-hand-drive auto.)

Mount the element to the insulated roof-rack sections with plastic tube-to-wall fittings. I put the element-to-roof rack bolts right through the element, plastic tube-to-wall fittings and roof-rack end insulator, but not the capacitive overlap section. Note: This mounting procedure is only necessary if you require the antenna to double as an actual roof rack.

The feed end of the element is flattened to sit in the roof gutter. Attach it to the auto top using the leg clamp from the removed roof-rack leg (See Fig 4). Additional electrical contact with the car is provided by soldering braid to the base of the element and attaching the braid to the door post with a self-tapping screw. (Note: Place this ground screw such that it is covered by the closed car door.)

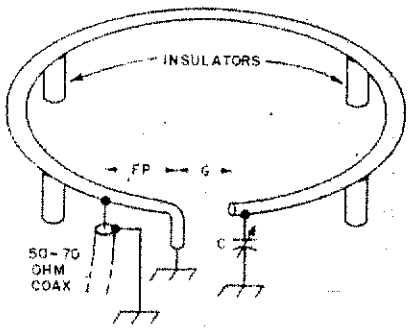
A thick piece of wire is also soldered to the ground end of the element to facilitate connecting the feed-line shield to the ground plane (car top) when the antenna is installed.

Feeding the Roof-Rack Antenna

The mobile DDRR is shunt fed by tapping the feed-line center conductor up from the ground end of the element. The feed-line tap is made by clamping a piece of hard-drawn copper wire fixed to the element by a jubilee clip (hose clamp) so

What's a DDRR?

The *directional discontinuity ring radiator* (DDRR) can be thought of as a short grounded vertical antenna with a horizontal extension that provides quarter-wave resonance. Factors in DDRR resonance include (1) the ring diameter (length of the element); (2) height of the horizontal element section above ground; (3) length of the gap (G) between the element ends; and (4) the value of tuning capacitor C. (*Some* form of tuning is usually necessary because of the DDRR's narrow bandwidth.)



DDRR efficiency is affected by the diameter of the ring, the height of the horizontal portion above ground and the value of C. Generally, DDRR efficiency increases with (1) increasing ring diameter; (2) increasing element height above ground and (3) decreasing capacitance at C. (Because the DDRR operates as a short vertical antenna, a highly conductive ground—preferably a metal plate or screen—is also important to the efficiency of the DDRR.) The DDRR can be matched to coaxial feed line by tapping the line center conductor up from the element's grounded end (FP).

The Mobile Roof-Rack Antenna is a DDRR variation that does not use a tuning capacitor. Instead, the antenna is tuned by adjusting the gap between the ends of the DDRR element. This is a worthwhile modification: According to Dome's analysis (see note 2 of the main text), radiation from C's leads tends to cancel radiation from the element's vertical portion in the far field.† Thus, Peter Dodd's "no C" tuning technique may be worth trying in your next DDRR project.—*David Newkirk, AK7M*

†Peter Dodd cites Rudge, Oliver, Milne and Knight (*Handbook of Antenna Design, Vol 2* [publisher unknown], p 10-7) as indicating that, as C increases, the DDRR changes from an essentially vertically polarized radiator to a half-wave loop of nearly constant current, and its elevation-plane pattern changes.

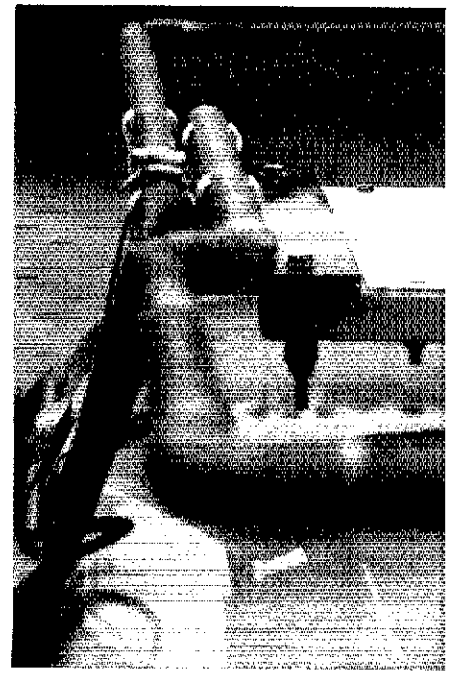


Fig 5—Tuning capacitor details. Note the insulating material (the dark material between the roof rack and antenna element). The antenna is tuned by moving the element in the plastic clips. See text.

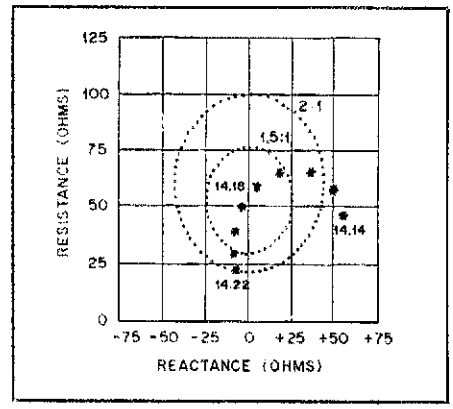


Fig 6—An impedance plot of the DDRR Mobile antenna built by G3LDO. The circles indicate SWR, and the stars indicate frequency in MHz. The method used to determine and graphically display antenna impedance was described in November 1987 *QEX* by the author and Tom Lloyd, G3TML.

that it can be adjusted for the correct feedpoint impedance. Solder the center conductor of the feed line to the other end of the gamma rod, as shown in Figs 3 and 4.

The Mark II DDRR does not use a capacitor to cancel inductive reactance. I assume that one has not been necessary because the antenna's radiation resistance is so low that the 50-Ω feed point is only a few inches up the element from the grounded end. This keeps the connecting rod short and of low inductance.

Capacitive Tuning

To keep the radiation resistance as high as possible, the tuning capacitor should only be large enough to tune the band. This capacitance is provided by overlapping the ends of the element, and is adjusted by sliding the ungrounded end of the element into the plastic tube-to-wall fittings. (See Fig 5.) These fittings offer just the right amount of friction to retain the elements at the desired position. Element positions for your favorite band frequencies can be marked allowing you to quickly retune.

The 45° pipe couplings shown in Fig 3 are not required if the front longitudinal section of the element is shortened by 1½ inches, although the capacitive section may need to be extended slightly to compensate.

Adjustment

CAUTION: *All antenna adjustments must be carried out with the transmitter off. High voltage exists at the end of the element—even with low power.*

The ideal method of setting the antenna to resonance is to use a dip meter. As I mentioned previously, the element should be constructed so that the ungrounded end of the element is too long. Prune the element (about ½ inch at a time) until the antenna resonates at the desired frequency. An SWR of 1:1 can be easily achieved when this antenna is set up properly.

Fig 6 shows the antenna characteristics with the tuning rod set for an SWR of 1:1. In my case, this occurred when the feedwire tap point was 3 inches from the vertical section (see feed-line attachment details of Figs 3 and 5). These measurements were obtained using a ½-λ length of 50-Ω coaxial cable and the method described in the November 1987 issue of *QEX*.[4] As you can see in Fig 6, the DDRR antenna appears to have very narrow bandwidth characteristics and exhibits only a single resonance—unlike dipoles and monopole antennas, which have higher-order resonances.

The DDRR is very sensitive to tuning capacitance changes. Even opening the driver's door can affect the SWR. Placing a hand 6 inches from the element end also detunes it, resulting in a SWR change from 1:1 to 3:1. This change causes a solid-state transmitter with high-SWR protection to shut down. I tested this built-in safety factor by touching the free end of the ele-

DDRR Design History

The DDRR was designed by J. M. Boyer for shipboard operation at very low frequencies. Basically, the DDRR is a ¼-λ, end-fed antenna, grounded at one end and shaped as a single-turn coil. (Mr. Boyer described his antenna design in the January 1963 issue of *Electronics* as a "hula-hoop" antenna.) The DDRR requires a counterpoise (ground plane) for effective operation.

The antenna was described to Amateur Radio operators in the June 1970 issue of *73* magazine by W. E. English, W6WYQ. This article illustrated the problems confronted in building an HF version of the DDRR and how these problems were overcome. After numerous requests for a ground-mounted version, English wrote an article for the December 1971 issue of *QST*, in which he described a 40-meter DDRR as "an apartment dweller's dream." There are some costs, however: The antenna is very inefficient and difficult to build. The *QST* version of the DDRR is described in the 15th edition of *The ARRL Antenna Book*.

The *QST* DDRR antenna construction article attracted the interest of R. B. Dome, W2WAM, who wrote an elegant mathematical description of how the DDRR antenna works for the July 1972 issue of *QST*. This analysis detailed the shortcomings of the DDRR precisely and without mincing words. At the same time, however, Dome suggested ways to increase the antenna efficiency and concluded that "increasing the vertical height could improve the efficiency very appreciably," which is precisely what W6WYQ found in his first experiments.
—*Tom Francis, NM1Q*

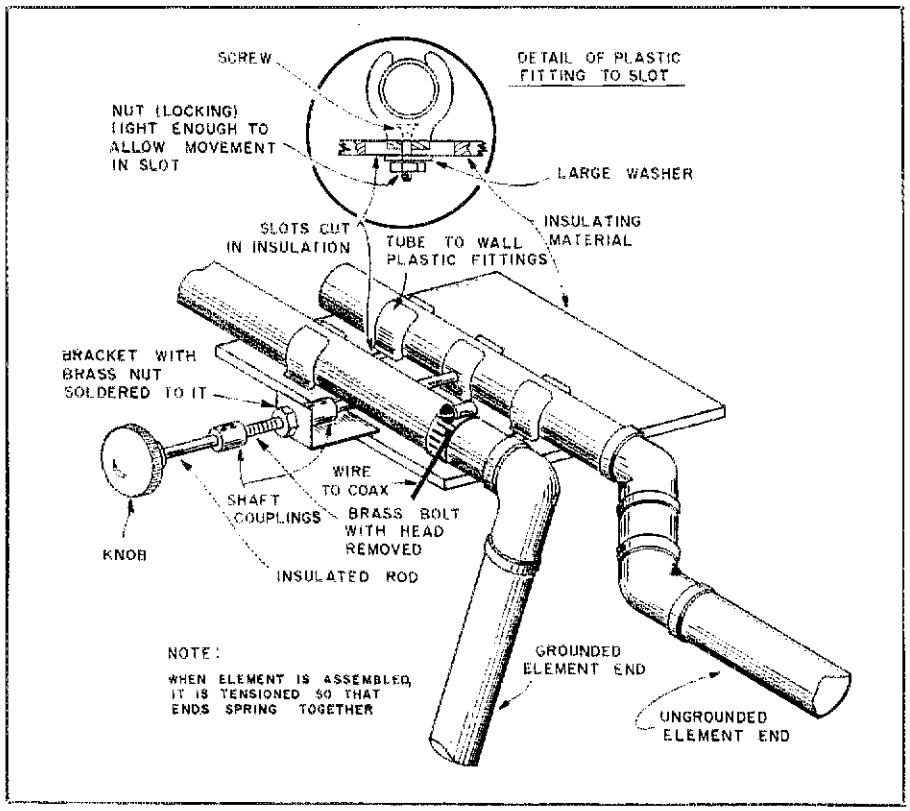


Fig 7— An improved method for tuning the DDRR mobile antenna. This method allows antenna tuning without having to leave the driver's seat.

ment with a large insulated-handle screwdriver with the TS-120V in transmit. How this works in practice depends on the efficiency of the transmitter's SWR protection circuitry.

Suggested Modifications

There is one problem with the Mark II's tuning method. Because the insulator supporting the ungrounded element end is horizontal, it tends to collect water in wet weather, detuning the antenna. This problem can be alleviated by coating the insulator with silicone grease. This causes the water to bead and have less of an effect on the antenna tuning. Also, beaded water flows off the insulator more easily when the car is moving.

If a tuning capacitor is added, the antenna can be tuned to the 10- and 7-MHz bands. I use a 100-pF wide-spaced transmitting capacitor for 40-meter work. The capacitor frame is fixed to the antenna support and a lead from the fixed plates of the capacitor is attached to the ungrounded end of the element. I have had several QSOs with other European stations with this arrangement, but with my QRP rig, the signal reports are not very good. I have not tried the antenna on 10 MHz.

The original DDRR design called for a remotely controlled tuning capacitor. Making a waterproof motorized capacitor is a challenge, particularly if the antenna is to be used with a high-power transmitter. Fig 7 shows one way of solving this problem. The insulated support section is vertical, reducing the effect of detuning when the antenna is used in wet weather. The rotor plates of the capacitor are adjusted by a screw mechanism that can be operated from the driver's seat. When using a solid-state-PA rig like the TS-120V, the best method is to tune the antenna for maximum RF output while transmitting a carrier.

Results

My roof-rack antenna has been in use for about 18 months. During this time, it has been used only with a TS-120V running 10 W CW or SSB. The transatlantic QSO count has increased dramatically—to about two QSOs per week. (I operate for half an hour in the middle of the day during weekdays.) The best DX has been a two-way SSB contact with Australia as I drove along England's M3 motorway at 70 mi/h!

Notes

[1]J. Hall, ed., *ARRL Antenna Book*, 15th edition (Newington: ARRL, 1988), p 6-9.
[2]Robert B. Dome, "A Study of the DDRR Antenna," *QST*, Jul 1972, pp 27-31, 36.
[3]The width of the support, and possibly the element, may also have to be altered to suit different autos, but the total length of the element should remain the same (approximately 150 inches).
[4]P. Dodd and T. Lloyd, "Measurement of Antenna Impedance," *QEX*, Nov 1987, pp 6-9.
[5]See note 2.

Strays

I would like to get in touch with...

☐ anyone who may have a QSL from my deceased father, K5ROB, circa 1957-66. Charles Stokes, N5GFX, 8803 Sparkling Dr, Austin TX 78729, tel 512-250-8005.

☐ anyone who has a pre-1930 QSL from Canadian 3XN. It's needed for a local display. Dave Noon, VE3IAE, 19 Honeysuckle Cir, London, ON N5Y 4P3 Canada.

☐ members of the Naval Communication Reserve who were on active duty before and during World War II. Capt Frank M. Dukat, USNR Ret, K6NL, 573 Pinecrest Dr, Los Altos, CA 94021.

Conducted By Mark Wilson, AA2Z
Senior Assistant Technical Editor

ICOM IC-575A 50- and 28-MHz Multimode Transceiver

Reviewed by Mark Gamble, N1FOZ, and Kirk Kleinschmidt, NTØZ

With the introduction of the IC-575A, ICOM has filled an important niche in its latest series of compact, VHF all-mode transceivers. Among its features are AM, FM, SSB, and CW operation, full 10- and 6-meter coverage (plus receive coverage of almost everything in between), built in ac-operated power supply (rear panel dc supply connectors are also provided), a fast (5 ms) TR turnaround DATA mode, memories and scanning, passband tuning and notch filter, and full-break-in CW operation. The operating features and functions of the IC-575A are essentially identical to those of the 144-MHz IC-275A, reviewed in October 1987 *QST*, and the 220-MHz IC-375A, reviewed in March 1988 *QST*. Refer to those reviews for a detailed description of the radio's many controls and connections.

Frequency Control

Like the other radios in the series, the IC-575A features VFO A/B selection, 99 programmable memories, RIT and the ability to enter any frequency split (necessary for repeater work) from 1 kHz to 9.999 MHz. In DUPlex mode, the LCD displays both the transmit and receive frequencies.

Receiver

The '575A's receiver covers 26 to 56 MHz. In addition to amateur frequencies, you can listen to CB radio, maritime mobile and cordless telephones. For serious 6-meter operators, it's handy to be able to listen to the spectrum between 6 and 10 meters to hear rising MUF in anticipation of a band opening.

The receiver has excellent sensitivity, but the built-in preamp (activated by a front panel push-button switch) is helpful for digging out weak signals. The main tuning knob feels exceptionally smooth, and sliding up and down the band is a breeze.

The only complaint we have about the receiver is its noise blanker. According to the ICOM instruction manual, "This operation effectively reduces unwanted pulse-type noise from outside sources such as ignition noise from vehicles." And, "The noise blanker may not work as well ... when the noise is continuous rather than pulse-type." This is certainly true: The noise blanker proved totally ineffective against power-line noise at several locations. We ran across several other IC-575A owners who voiced similar complaints. If you live near a noisy power line, make arrangements to test the rig at your QTH.

The passband tuning and notch filter work well. In fact, when the PBT is used to slice away adjacent-frequency QRM, the desired signal remains intelligible—even when the control is turned "deep" into its range. The selectable-rate AGC control is another nice touch.

Receiver performance is good. Lab tests indicate that it has adequate sensitivity, and the dynamic range approaches that found in mid-priced HF transceivers.

Transmitter

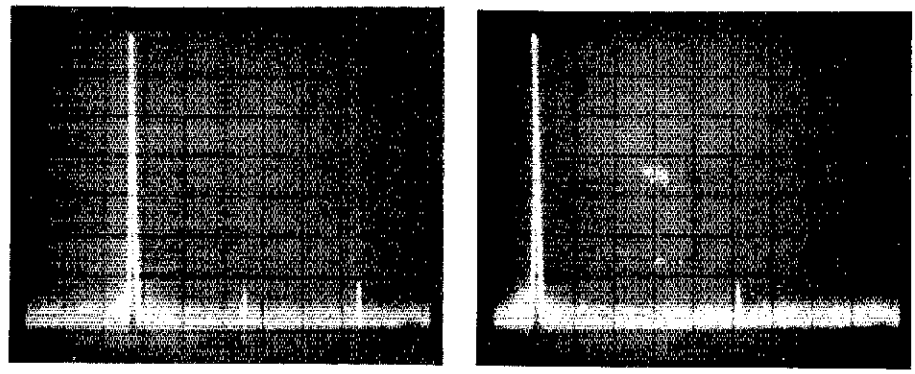
Unlike the 25-W-output IC-275A (2 meters) and IC-375A (1¼ meters), the IC-575A's output power is only 10 watts. The output level is continuously adjustable from a front panel control. Tuneup is easy. Simply set the mic gain to provide the proper ALC level, and adjust the drive control for the desired power output. On-air signal reports included favorable comments on the rig's SSB audio quality with the speech processor on or off.

The built-in SWR meter is a nice feature, but to use it you have to move a slide switch located on the rear panel (it's down near the bottom, underneath another connector). This isn't a big deal for most fixed operations, but in the field it's often necessary to check the SWR more frequently.

The full-break-in CW operates smoothly and silently. There are no annoying clicks or pops between characters. That's probably to be expected in a rig that's designed for a 5-ms turnaround time!

Manual

The manual that comes with the IC-575A is well written and easy to read. It not only explains the operating procedures and functional options in a straightforward manner, but also depicts them graphically. That's a far cry from the manuals that used to



(A) (B)

Fig 1—Worst-case spectral display of the ICOM IC-575A. Horizontal divisions are each 10 MHz; vertical divisions are each 10 dB. In the photo at A, output power is approximately 10 W at 28 MHz. All harmonics and spurious emissions are at least 60 dB below peak fundamental output. In the photo at B, output power is 10 W at 50.2 MHz. All harmonics and spurious emissions are at least 62 dB below peak fundamental output. The IC-575A complies with current FCC specifications for spectral purity.

Table 1

ICOM IC-575A 28- and 50-MHz Multimode Transceiver, Serial no. 01012

Manufacturer's Claimed Specifications	***Measured in the ARRL Lab***
Frequency coverage: Receiver, 26 to 56 MHz; transmitter, 28 to 29.7 and 50 to 54 MHz.	Receiver, as specified. Transmitter, 28.0 to 30.0 and 50.0 to 54.0 MHz.
Modes of operation: AM, FM, USB, LSB, CW.	As specified.
Frequency display: 6-digit LCD, black on an orange background, 3/8-inch high digits.	As specified
Frequency resolution: Not specified.	100 Hz.
Power requirement: 13.8 V dc (±15%) at 5.2 A max.	As specified.
Transmitter	*Transmitter Dynamic Testing*
Transmitter output power: FM, SSB, CW, 1 to 10 W adjustable; AM, 1 to 4 W adjustable	28 MHz: FM, SSB, CW, 1 to 10.4 W, AM 1 to 4.6 W; 50 MHz: FM, SSB, CW, 1 to 12.3 W, AM, 1 to 4.6 W.
Spurious signal and harmonic suppression: Greater than 60 dB below peak power output.	See Fig 1.
Third-order intermodulation distortion products: Not specified.	See Fig 2.
Keying waveform: Not specified.	See Fig 3.
Transmit-receive turnaround time (PTT release to 90% audio output with an S9 signal): Not specified.	3 ms.
Receiver	*Receiver Dynamic Testing*
Receiver sensitivity: SSB and CW: less than 0.13 μV for 10 dB S/N (preamp on).	Minimum discernible signal (noise floor) with 2.3 kHz filter: Preamp off 28 MHz: −131 dBm 50 MHz: −132 dBm Preamp on 28 MHz: −136 dBm 50 MHz: −137 dBm
FM: less than 0.25 μV for 12 dB SINAD; less than 0.35 μV for 20 dB quieting (preamp on).	Preamp on 28 MHz: 0.17 μV for 12 dB SINAD; 0.26 μV for 20 dB quieting. 50 MHz: 0.16 μV for 12 dB SINAD; 0.2 μV for 20 dB quieting.
AM: less than 1.0 μV for 10 dB S/N (preamp on).	For 10 dB (S + N)/N, test signal 30% modulated with a 1-kHz tone, preamp on: 28 MHz: 0.15 μV 50 MHz: 0.15 μV
Receiver dynamic range: Not specified.	Blocking dynamic range†: Preamp off 28 MHz: 123 dB 50 MHz: 127 dB Preamp on 28 MHz: 128 dB 50 MHz: 126 dB Two-tone, third-order intermodulation distortion dynamic range†: Preamp off 28 MHz: 90 dB 50 MHz: 89 dB Preamp on 28 MHz: 88 dB 50 MHz: 87 dB Third-order input intercept: Preamp off 28 MHz: 4 dBm 50 MHz: 1.5 dBm Preamp on 28 MHz: −4 dBm 50 MHz: −6.5 dBm
S-meter sensitivity (μV for S9 reading): Not specified.	Preamp off: 29 MHz, 16; 52 MHz, 13.
Squelch sensitivity: FM: less than 0.1 μV; AM/SSB: less than 0.7 μV (preamp on).	FM: 0.08 μV min, 0.3 μV max; AM/SSB: 0.5 μV min, >1 mV max.
Receiver audio output at 10% THD: More than 2 W.	2.0 W.
Color: Black.	
Size (height, width, depth): 4.25 × 9.6 × 11.6 inches.	
Weight: 13.4 lbs.	

†Blocking dynamic range and two-tone, third-order IMD dynamic range measurements were made at the ARRL Lab standard signal spacing of 20 kHz.

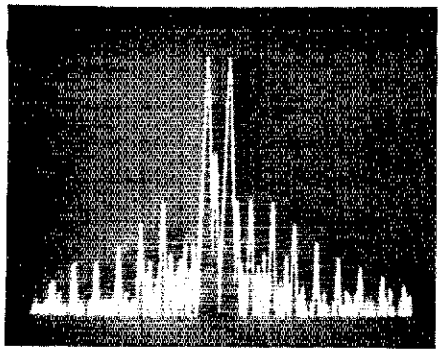


Fig 2—Spectral display of the ICOM IC-575A during two-tone intermodulation distortion (IMD) testing. Vertical divisions are each 10 dB; horizontal divisions are each 2 kHz. The transceiver is being operated at 10 W PEP output on 50 MHz. Third-order products are approximately 44 dB below PEP output, and fifth-order products are approximately 45 dB down.

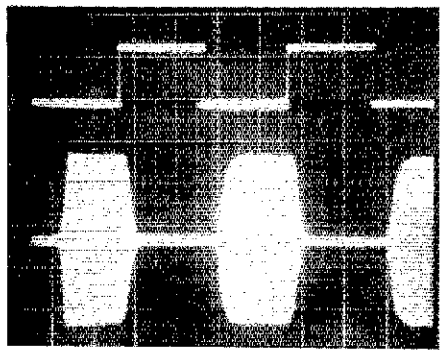


Fig 3—CW keying waveform for the ICOM IC-575A, with the transceiver in the semi-break-in mode. The lower trace is the RF envelope; the upper trace is the actual key closure. Each horizontal division is 10 ms.

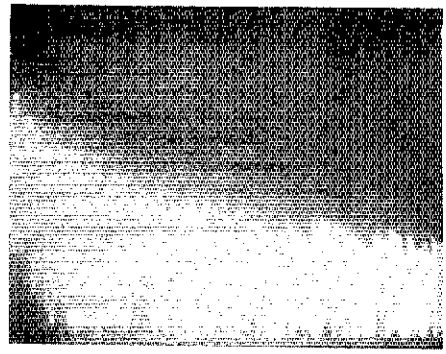


Fig 4—Spectral display of the ICOM IC-575A transmitter output during phase-noise testing. Power output is 10 W at 28 MHz. Each vertical division is 10 dB; each horizontal division is 2 kHz. The scale on the spectrum analyzer on which this photo was taken is calibrated so that the log reference level (the top horizontal line on the scale in the photo) represents −60 dBc/Hz and the baseline is −140 dBc/Hz. Phase-noise levels between −60 and −140 dBc/Hz may be read directly from the photograph. The carrier, which would be at the left edge of the photograph, is not shown. This photograph shows phase noise at frequencies 2 to 20 kHz offset from the carrier.

come with many older Japanese-made rigs! Also included is a large-size schematic diagram (you won't need a magnifying glass for this one).

Operation

Taking the ICOM-575A on a field test was simple. Its compact size was a real advantage for N1FOZ's portable operation to grid square FN51 (Cape Cod) during the June VHF QSO Party. Using a marine battery and a three-element quad, Mark was easily able to hear anything on the band—although an amplifier would have been nice for working them from a 10-feet-above-sea-level location.

We really enjoyed using the memory channels during the contest (and at home during band openings). It's easy to program several stations up and down the band into different memory channels and quickly flip back and forth between them.

Bart Jahnke, KB9NM, another HQ staffer, used the review transceiver and shared his thoughts. Bart has used an IC-551D—the '575A's predecessor—for many years. Bart found the newest ICOM to be more convenient for repeater operation on both 6 and 10 meters, and he noted that the memory channels make short work out of monitoring several beacon frequencies (one of the rig's SCAN modes allows rapid access to any or all programmed memory frequencies). (The '551D has no memories.) The selectable tuning rate makes large excursions up and down the band much easier (the '551D has only one tuning rate—slow). Bart's impression is that the receiver is good—better than the '551D—with a couple of exceptions. The preamp is susceptible to overloading from very strong adjacent-channel signals, and the preamp was unusable during periods of strong and frequent power line noise. Bart also noted that the noise blanker is ineffective against some types of noise.

The IC-575A is a well-designed, top-notch rig. It also carries a top-dollar price tag. If the price is within your budget, however, and the lack of an effective noise blanker is not a problem, you won't be disappointed. The rig is decked out for any and all operating modes, including the popular and not-so-popular digital modes. It has connections for every conceivable outboard accessory.

Manufacturer: ICOM America, 2380-116th Ave NE, Bellevue, WA 98004, tel 206-454-7619. Price class, $1400.

A&A ENGINEERING DELUXE MEMORY KEYER KIT

Reviewed by Bruce S. Hale, KB1MW

The A&A Engineering memory keyer kit is based on a design presented in Chapter 29 of *The ARRL Handbook* by Tom Miller, NK1P. A full description of the project can be found in the *Handbook*, so I'll briefly discuss the keyer's features and talk mostly about the A&A Engineering kit version.

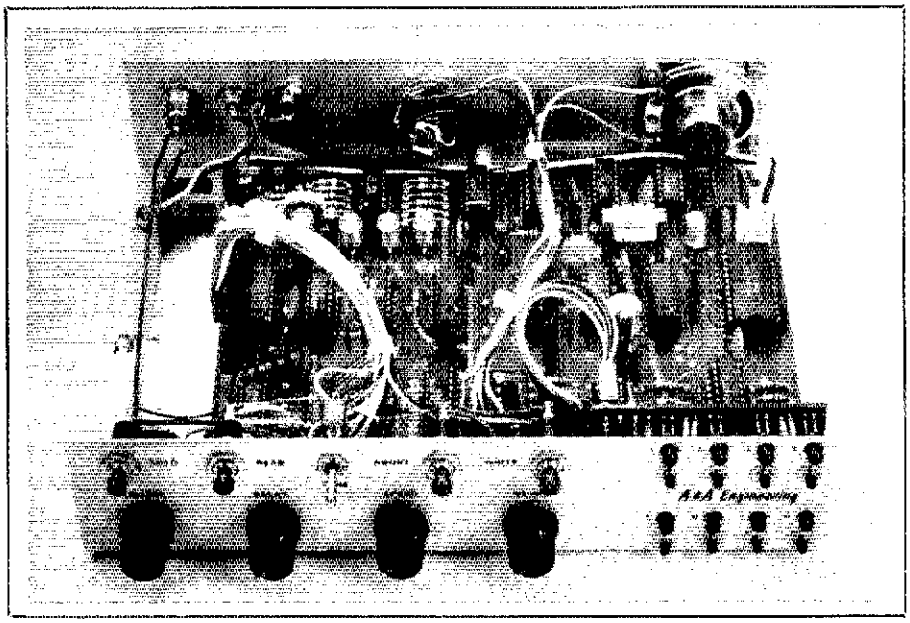
This keyer features eight memories, a sidetone, MOSFET keying transistors and a nonvolatile memory. Basic keyer functions are excellent, thanks to the use of a Curtis 8044 keyer chip. The keyer has an internal 5-V regulator and can be powered from the supplied wall transformer or from any 7.5- to 15-V dc source. You'll have no trouble finding a spot for this keyer on your operating table—it measures only 2 × 8.25 × 6.25 inches (height, width, depth).

The Kit Version

The A&A Engineering kit consists of a complete set of parts, two PC boards (the main board and a smaller one for memory push buttons) and a cabinet. The PC boards and all parts are of excellent quality.

Front-panel controls are arranged in two rows. The top row includes these switches: AUTO (automatic message repeat), memory READ, transmitter TUNE, message ABORT and memory WRITE. The bottom row includes potentiometers for sidetone VOLUME, DELAY (between message repetition in the AUTO mode), keyer SPEED and character WEIGHTing. Memory selection push buttons are at the right-hand side of the front panel (more on this later). Rear-panel connections include a three-circuit ¼-inch phone jack for your keyer paddle, phono jacks for + and − keying outputs and a power jack. The sidetone speaker also mounts on the rear panel.

A&A's kit varies slightly from the *ARRL Handbook* version. The *ARRL Handbook*



version uses battery-backed-up RAM (random-access memory) to store information. The A&A version uses an EEPROM (electronically erasable programmable read-only memory) for this function. The EEPROM retains contents when power is turned off, so no battery backup board is offered (the *Handbook* version shows NiCd battery power as an option).

Assembly

I started assembly with the main PC board. It took me about an hour to stuff and solder all the components on the board. There are no step-by-step assembly instructions like a Heathkit®, but A&A supplies a detailed parts list and parts-placement diagram. With a little common sense applied to the sequence of part installation, the whole process goes very smoothly. I installed the IC sockets first so I could be sure they were all seated flat on the board, then the resistors and diodes, followed by the connector headers and finally the capacitors. The only problem I had was making the two-pin power connector fit into the PC board mounting holes. The pins on the connector were spaced a bit narrower than the mounting holes, but I was able to persuade the pins to fit the PC-board spacing with a pair of needle-nose pliers.

The second PC board holds the memory push-button switches, a few ICs and LEDs that are used to show which memory is in use. Called the "mouse" board (similar to a computer mouse), it's mounted behind the keyer's front panel. For an additional $10, you can order the remote mouse option. The remote mouse option mounts the small PC board in a separate enclosure to place at a convenient spot on your operating bench. For this review, I assembled one keyer with a "remote mouse" and one with a "local mouse."

The mouse PC board went together very smoothly. There are eight LEDs on this board, and they must be mounted up off the board so that they stick through the front panel. Mounting the push-button switches first allows you to turn the board upside down to rest the tops of the LEDs even with the switches when you solder them in. Again, a little common sense is required, but the process is not difficult. This assembly took about 15 minutes.

The keyer is supplied with an unpainted, undrilled aluminum cabinet. A&A also supplies a drilling template that you can cut out and tape to the front and back panels. There is a detailed drawing showing the correct diameter for each hole. With all this information, it was easy for me to drill the cabinet. I used a drill press and a complete set of bits in the ARRL Lab; it might be a bit more difficult for someone with only a hand drill and a few bits. The key to ending up with all the holes the right size and in the right place is to start with center-punched holes and work your way up to the final hole size with smaller bits. Drilling and deburring the cabinet took me about an hour.

As I said, the cabinet is supplied unpainted. I don't like painting cabinets, but I also don't like how careful I have to be not to scratch a factory-painted cabinet when I drill it. I guess there just is no easy way to end up with a nicely drilled and painted cabinet. I used light blue paint for the top and a cream color for the front and back. I painted the cabinet right after I drilled it and put on a few coats of paint while I assembled the PC boards. I left everything to dry overnight before I finished the assembly.

Panel labeling is another task I really don't enjoy. A&A makes this relatively painless by providing clear Scotchcal® panel lettering. Once the cabinet is painted, you cut the Scotchcal to fit the panel and line up the markings on the Scotchcal with the holes in the panel. It's a bit difficult to apply the Scotchcal and get all the bubbles out from under it, but the result looks pretty good. This is *much* easier than trying to get dry-transfer letters applied correctly.

After the cabinet is drilled, painted and labeled, you can start the final assembly. Again, A&A has made this a lot easier by providing a front-panel wiring diagram. There are four potentiometers to wire on the front panel, and I've always found that if there is a 50/50 chance of wiring a potentiometer wrong, it *always* comes out wrong! (This must be one of Murphy's Corollaries.) The wiring diagram takes all the guesswork out of the assembly and ensures that Murphy stays home. With the cabinet drilled according to the drilling guides, the potentiometers, switches and connectors fit nicely around the PC board and the whole assembly process goes very smoothly. Assembly takes a little while, because there are several connectors to wire and each connector requires several wires, each with a pin connector soldered on at least one end. It took me about two and a half hours to complete the assembly.

I assembled two kits. One board worked from power up with no problems, but the memory did not work on the other board. The keyer functions worked correctly, but I could not load or play the memory. I tried replacing the memory chip with no success, so I started troubleshooting with an oscilloscope. Since it was a memory problem, I checked all the signals at the memory chip. The WRITE signal was not making it to the memory chip from one of the gates elsewhere on the board. I traced the problem to a bad solder connection on a header connector. Once this problem was fixed, the board worked correctly. This was *not* a problem with the kit itself; any time you assemble a piece of equipment from components to finished unit, there is a chance that some debugging will be required before the unit functions correctly.

The A&A deluxe memory keyer is a pretty simple kit to assemble. Although the keyer itself is fairly complex, the kit goes together well and A&A provides enough aids to make it *much* easier to assemble the kit than it would be to build the keyer from a bare PC board. I estimate the total assembly time for the keyer at about six hours, not including the time it takes the paint to dry on your cabinet.

You won't be disappointed with your finished keyer. The unit is compact and attractive, and it performs well. With up to eight memories to choose from, you can store a *lot* of information. The output keying transistors allow easy connection to virtually any transmitter.

Manufacturer: A&A Engineering, 2521 W LaPalma Ave, Unit K, Anaheim, CA 92801, tel 714-952-2114. Price class: model 217 (local mouse), $150; model 223 (remote mouse), $160.

Hints and Kinks

Conducted By David Newkirk, AK7M
Assistant Technical Editor

USING THE DRAKE TR-7 AND TR-7A TRANSCEIVERS WITH FULL-BREAK-IN AMPLIFIERS

☐ The Drake TR-7 exhibits a characteristic that makes it difficult to use with several full-break-in (QSK) amplifiers on the market (ETO models Alpha 77, 78 and 86, and the Ten Tec 425). The problem is that there is RF at the TR-7/7A's ANTENNA jack before the transceiver's VOX relay has closed. This condition activates the amplifier's "hot-switch protect" circuitry, causing the amplifier not to amplify the first dot or, in the case of the Alpha 86, to trip the protection latch and not amplify at all. In SSB VOX operation, a similar condition exists, but is less pronounced.

The Drake's VOX relay, which takes approximately 10 ms to close, is the cause of this problem. The solution is to add a transistor switch (Fig 1) to the TR-7—a switch that closes immediately on the generation of a transmit command from the key, PTT or VOX. Once this is done, the transistor switch, *not* the TR-7's VOX relay, keys the amplifier. The circuit is easy to build and can be installed by a reasonably competent technician in less than 15 minutes. No familiarity with the inner workings of the Drake is required.

Refer to Fig 1. Circuit operation is simple: The +10T line goes from zero to +10 V when the TR-7 goes from receive to transmit, regardless of the position of the transceiver's MODE switch. This turns on Q1, which keys the amplifier.

Drake has graciously placed a spare phono jack on the transceiver's rear panel; we'll use this jack for the new amplifier-control output. Once you've collected the parts listed in the Fig 1 caption, proceed as follows:

1) Remove the TR-7's cover (slot-head screws) and bottom plate (Phillips-head screws).

2) Remove the six screws that hold the rear center panel. This allows access to the spare phono jack's solder terminals.

3) Solder one end of the 5-inch wire to the center pin of the spare phono jack and route the wire toward the bottom of the panel.

4) Replace the rear panel and its six screws.

5) Turn the TR-7 over and locate the +10T trace on the large circuit board (the motherboard; see Fig 2).

6) Solder the emitter lead of the transistor to the ground pad of the coaxial cable closest to the rear center of the board.

7) Solder the free end of the wire from the QSK jack to the collector lead of the transistor.

8) Solder the 4.7-kΩ resistor between the +10T trace and the transistor base lead. Be careful that the leads of the transistor do not short any traces on the board.

9) Label the new jack QSK with tape or a stick-on label.

10) Check your work. Replace the TR-7's bottom cover (Phillips-head screws) and top cover (slot-head screws).

To use the TR-7 with the amplifier, connect the new QSK jack to the RELAY or KEY IN jack on the amplifier. No other control connections are required.—*Dick Frey, K4XU, 4138 Maine St, Quincy, IL 62301*

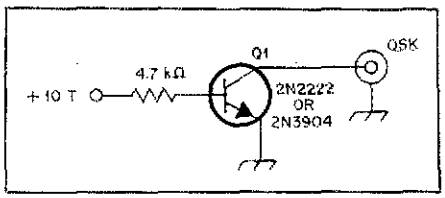


Fig 1—Dick Frey added QSK compatibility to his Drake TR-7 transceiver by adding a 4.7-kΩ resistor, NPN transistor (2N3904 or 2N2222), 5-inch piece of wire and panel label to the rig. The QSK jack is a spare phono connector already installed on the TR-7/7A back panel by Drake. See text and Fig 2.

IMPROVEMENTS TO "A REAL TURN-ON"

☐ I read George Murphy's "A Real Turn On" with great interest.[1] It was the first time I'd seen a ladder diagram in *QST*. One thing that bothers me about George's circuit is that if the first control circuit is de-energized, all of the following circuits are de-energized. Fig 3 shows a redesign that allows each circuit to be controlled independently after startup. This modified circuit requires that K2 (a DPDT relay in George's circuit) be changed to a 4PDT unit, three poles of which are used.

Modified as shown in Fig 3, the Turn-On works as follows: When power is applied, DS1 (OFF 1), DS3 (OFF 2) and DS5 (OFF 3) come on. Pressing momentary push-button S2, START 1, energizes solenoid K1A. The NO contacts of K1B close to shunt S2 and send 12 V dc to output 1 and DS2 (ON 1); the NC contacts of K1B open, turning off DS1. The closure of K1C's NO contacts arm the second control circuit.

[1]G. Murphy, "A Real Turn-On," *QST*, Nov 1987, pp 23-27.

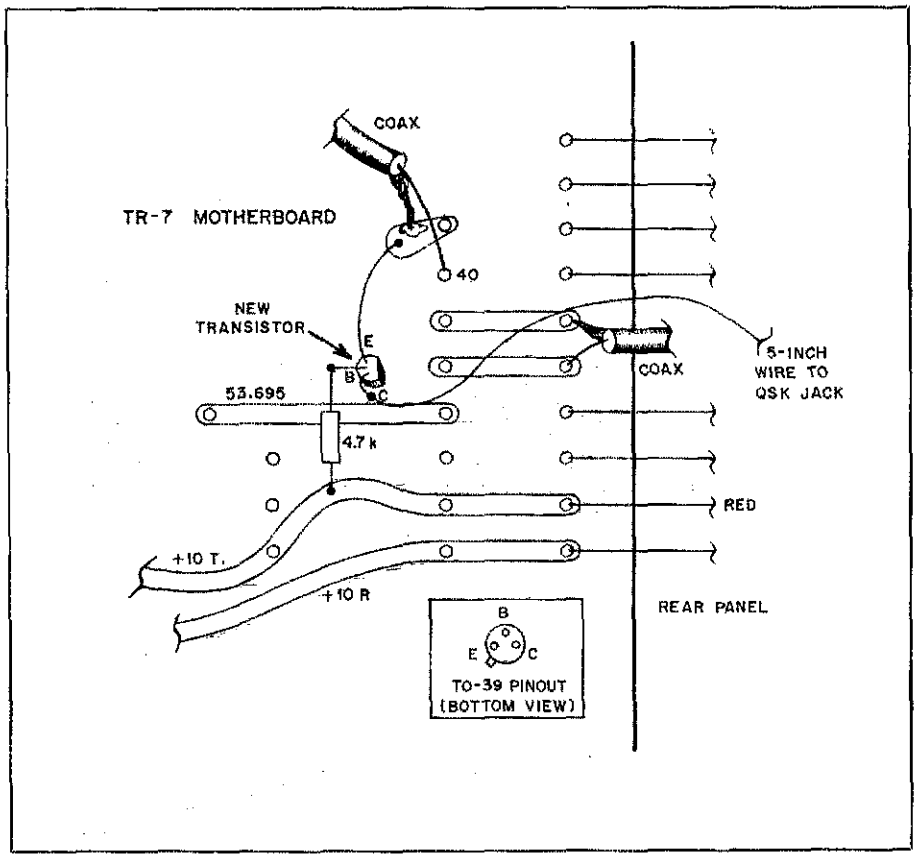


Fig 2—The 4.7-kΩ resistor and transistor are connected to the TR-7/7A motherboard as shown at A. If you use a 2N2222 in a metal can (TO-39, pinout at inset), be sure that the can does not touch other components.

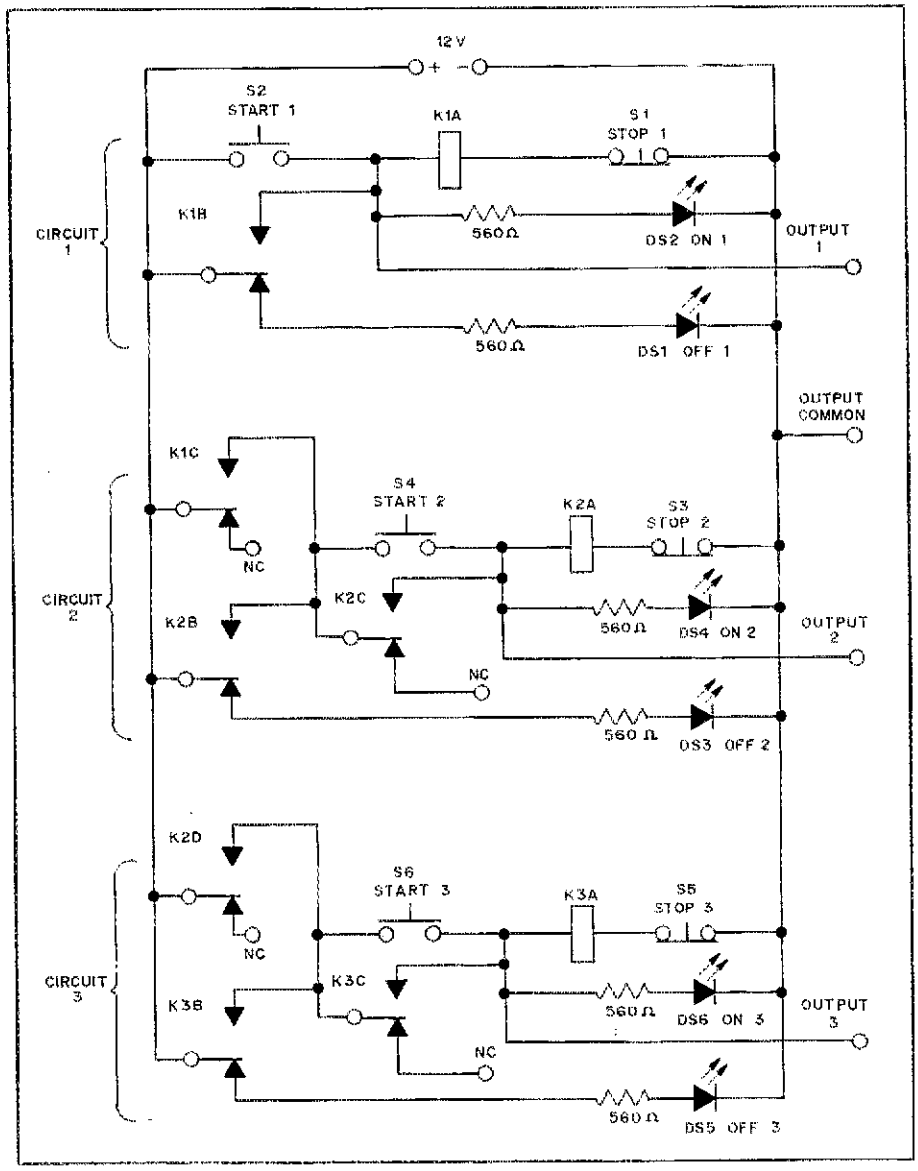


Fig 3—Eugene Hecker's modified Turn-On allows the various control circuits to be turned off independently once they've been powered up in 1-2-3 order. Note, however, that the ability to turn earlier circuits on and off independently can allow other than a 1-2-3 startup sequence if turned off circuits 1 and/or 2 are turned back on without restarting the entire ladder. (See text.) The remainder of George Murphy's circuit (see the article cited in note 1) is used without modification.

K1, K3—DPDT relay, 12 V dc solenoid (Radio Shack® 275-249 or equiv).
K2—4PDT relay, 12 V dc solenoid (three poles used; RS 275-214 or equiv).
DS1, DS3, DS5—Green LED.
DS2, DS4, DS6—Red LED.
Resistors are ¼-watt carbon film.

Circuit 2 operates when S4, START 2, is pressed. Pressing S4 actuates K2A; the NO contacts of K2B shunt K1C; K2C shunts S4 and turns on DS4 (ON 2). At the same time, the NC contacts of K2B open, turning off DS3. Circuit 3 is identical to circuit 2.

As in George Murphy's circuit, the START switches are shunted by relay contacts once their respective circuits turn on. My circuit differs from George's in that the relay contacts that arm circuits 2 and 3 (K1C and K2D) respectively, are themselves shunted by relay contacts (K2B and K3B, respectively). K2B and K3B act as "arm-latch" contacts, allowing circuits higher on the ladder to be turned off without affecting circuits lower on the ladder. This preserves the 1-2-3 cold-start sequence. *—Eugene Hecker, WB5CCF, PO Box 940, Magdalena, NM 87825*

UNPOWERED COMPUTER GENERATES RFI

☐ Reception from 160 through 10 meters at my location was marred by severe splatter from a "broadcast band" station located 1½ miles away. The interference wasn't continuous, though; it came and went for no apparent reason. After putting up with this for several weeks, I went to work tracking down the interference source. The interference appeared to be emanating from a 30-foot shielded RS-232-C data cable connected to my unpowered computer. Disconnecting the cable from the computer made the interference go away. Problem solved?

No! Attaching a new cable brought the interference back! Further investigation revealed a poorly soldered joint at pin 1 (equipment ground) on the computer's RS-232-C DB25 connector. Evidently, this solder joint was acting as an effective frequency multiplier. So, when hunting for sources of frustrating RFI, consider checking equipment that's not turned on —it *may* just be the culprit!*—David Barker, 38486 Cheldon, Mt Clemens, MI 48044-2312*

Turned-off electronic equipment can generate such interference even *without* faulty wiring. Investigating interference similar to David's—pops, sizzles and crackles that occurred by day on all medium and high frequencies—I discovered that my unpowered, solid-state general-coverage receiver was generating the junk in step with the modulation peaks of a medium-wave broadcaster 1¼ miles away. Hunch: The interference is caused by the unpowered receiver's unbiased input-network switching diodes and/or RF-amplifier MOSFET. (Further hunch: The interference occurs only during the day because the station changes its antenna pattern at night, resulting in a considerably weaker RF field at my location.) Evidence: Turning the receiver on makes the problem disappear. Solution: Disconnect the antenna from the receiver when the receiver is not in use.*—AK7M*

A SIMPLE CURRENT LIMITER FOR EQUIPMENT TESTING

☐ Many years ago, when I was installing and servicing electron microscopes as a field representative for RCA, one of the most important items in my tool kit was a rubber pigtail socket equipped with alligator clips and a 100-W, 120-V lamp. This gadget was really useful for locating fuse-blowing faults in power supplies and associated equipment. Since then, I've gone a step further and added switches and a fuse as shown in Fig 4. The result is a compact current-limiting unit that can be used to check transformers and other equipment for short circuits.

The 100-W lamp, DS, serves as a current limiting resistor. The device under test is plugged into J, and P is connected to a 120 V ac source. S2, LIMIT, is a SPDT (on, center-off, momentary-on) toggle switch. With S2 set to LIMIT ON, DS is in series with the device under test across the ac line. Full line voltage appears at J only if the device under test draws no current. The more current drawn by the device under test, the lower the voltage at J when S2 is set to LIMIT ON.

When S1 is turned on, the brightness of DS indicates the absence or presence of a short-circuit fault in the device under test. If the lamp burns at full brilliance, a short circuit exists. If the lamp burns at partial brilliance, the device under test is probably sound. S2 can be set to LIMIT OFF to apply

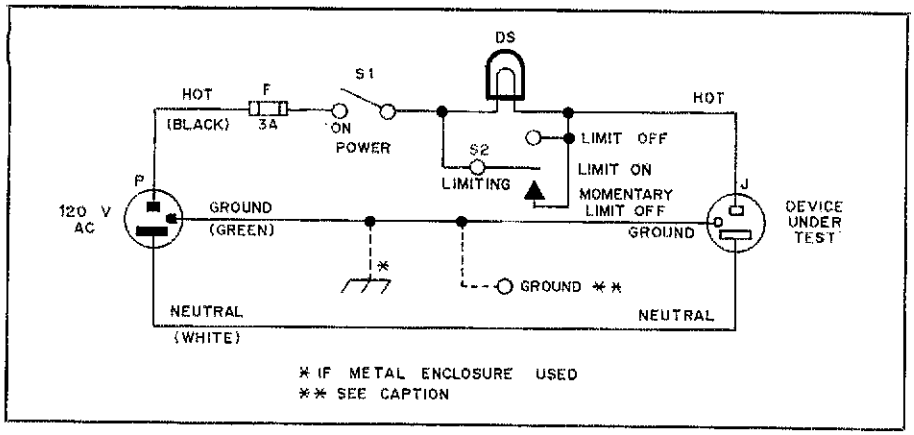


Fig 4—Lew Howard's current limiter uses an incandescent lamp to prevent serious equipment damage should a short circuit occur in the device under test. If you build the current limiter into a metal enclosure, be sure to connect the mains ground wire (green) to the enclosure. It's also a good idea to add a GROUND binding post (connected to the mains ground wire) to the current limiter for use with equipment having two-wire ac cords. This allows the chassis of the device under test to be connected to the ac mains ground for safety. Speaking of safety: Contact with the ac mains can kill you. *Be careful* when constructing and using this circuit.

DS—100-W, 120-V incandescent lamp in ceramic socket. Other wattages may be useful; see text.
F—3-A, 250-V fuse in panel-mounted holder.
J—120 V ac jack.
P—120 V ac cord set with plug.
S1—SPST toggle rated 3 A (or more) at 120 V ac.
S2—SPDT on, center-off, momentary-on toggle rated 3 A (or more) at 120 V ac.

120 V ac to the device under test if all appears well; pushing S2 to MOMENTARY LIMIT OFF does likewise as long as the switch is kept in this position. Should the device under test fail with full mains voltage applied, the fuse, F, provides much better protection than the 15-A fuses or breakers that are standard in house wiring.

Of course, this device is nothing new and is certainly not an invention of mine. After listening to many woebegone on-the-air discussions related to troubleshooting, though, I felt compelled to share this bit of knowledge—it may help save a lot of fuses and expensive gear!—*Lewis N. Howard, W4LHH, 4132 Creek Stone Ct, Stone Mountain, GA 30083*

Properly applied, this circuit can also be used as an aid to restoring vintage or long-unused equipment—especially transformer-operated equipment that has been stored under humid conditions. ("Firing up" such gear cold may *literally* result in fire because of moisture-induced short circuits in transformer windings.) Page 26-28 of the 1988 *ARRL Handbook* discusses safe procedures for burning in vintage gear with the help of a variable-voltage autotransformer. Lew Howard's current limiter can serve as a cheap-and-dirty substitute for a variable-voltage transformer in this application if a suitable selection of incandescent lamps is available. (The lower a lamp's wattage, the higher its resistance. Use the lamp current limiter to power up vintage equipment in steps by starting with a low-wattage lamp—say, 40 W or less—and working up in lamp wattage until even a high-wattage lamp—200 W or so—is not lit to full brilliance by the current drain of the device under test.)

You can also use a light-bulb current limiter to reduce the heat of a soldering iron. Plug the iron into J and try lamps of different wattages until the iron's temperature is where you want it.—*AK7M*

A DOORBELL ALERT ALARM

☐ Have you ever missed hearing your doorbell or chime when you were deeply engrossed in operating your station? The solution to this problem is simple: Run a length of thin, two-conductor speaker wire from the terminals of the existing bell or chime to an appropriate location in your shack and complete the circuit with an electromechanical buzzer. There's a much more pleasant-sounding and sophisticated method, however: Use a piezoelectric buzzer instead! (Radio Shack sells several suitable types.) The dc drive necessary to operate these devices can be obtained using the circuit shown in Fig 5.

Since installing these alerting devices in the shack, attic, basement and back porch, I haven't missed answering a ring—and my family is pleased with the alerter's melodious sound.—*Maurice Sasson, MD, W2JAJ, 3021 Middletown Rd, Bronx, NY 10461*

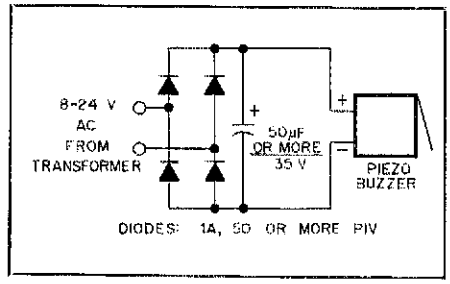


Fig 5—Maurice Sasson uses piezoelectric buzzers to extend the coverage of his doorbell. The filter capacitor, C, smooths the pulsating dc output of the bridge for purer buzzer tones. If the bell transformer voltage is too high for the alerter circuit, add a dropping resistor in series with one of the FROM TRANSFORMER lines.

RECEIVE-ONLY UP/DOWN OPERATION WITH THE KENWOOD TW-4000A TRANSCEIVER AND MC-48 MICROPHONE

☐ Kenwood's MC-48 microphone includes UP and DWN buttons that allow frequency and scanning control in transceivers capable of providing this useful feature. Using the MC-48 with my TW-4000A transceiver, however, I'd often inadvertently push one of these buttons while transmitting. Each time, I discovered the resultant frequency change only after I returned the rig to receive mode.

To avoid this problem, rewire the MC-48 microphone as follows:

1) Open the microphone case and locate the PTT switch.

2) Disconnect the red wire from the C terminal of the PTT switch and disconnect the two black wires from the NO terminal.

3) Solder the red wire to the NO terminal.

4) Separate the two black wires and identify the one that goes to the UP and DWN switches.

5) Solder this wire to the PTT switch NC terminal.

6) Solder the other black wire to PTT switch NO terminal.

7) Reassemble the microphone.

This modification disconnects the MC-48's up/down switching circuit in transmit but maintains normal up/down operation during receive. It may be applicable to other microphones that have unused normally closed PTT-switch contacts. —*Stanley P. Sears, W2PQG, 188 Concord Dr, Paramus, NJ 07652*

NOISE BRIDGE AIDS TRANSMITTER OUTPUT NETWORK ADJUSTMENT

☐ The anode matching network in a grounded-cathode or grounded-grid RF amplifier circuit must provide a proper load resistance to the amplifier tube(s) for maximum power transfer. Matching-network design formulas can provide the appropriate component values necessary for this condition, but adjustment of the network is often necessary after the amplifier is built—especially if the exact values of the components used are unknown. Here is the technique I use to make output-network adjustment quicker and easier. The method depends on the use of a resistance-reactance (RX) noise bridge.

Remove all voltages but filament or heater from the amplifier tube(s). Determine the proper load resistance for the tubes from the appropriate formulas and shunt a noninductive resistor of this value from the tube anode(s) to ground (across the input of the output matching network).

Put the amplifier into its transmit mode, or temporarily rewire the amplifier's TR relay to connect the amplifier output to its load. Connect the noise bridge's UNKNOWN port to the amplifier's OUTPUT connector with a *short* piece of coaxial cable. Adjust the bridge to read zero reactance and a resistance equal to that for which the amplifier is designed (usually 50 ohms).

With a receiver connected to the appropriate noise-bridge port and tuned to the frequency at which the output network is to be adjusted, attempt to obtain a noise-bridge null by adjusting the amplifier output network. If you obtain a null, no further adjustments are necessary. If you cannot obtain a null, add or remove inductance in the amplifier output network until you achieve a null at zero reactance and 50 ohms resistance. (If you like, you can adjust the bridge for a null before changing network component values. The reactance and resistance values necessary for the noise-bridge null can help you decide whether to add or remove output-network inductance for a 50-ohm match.)

Once you've gotten your output network into proper adjustment, don't forget to remove the noninductive load resistor between anode(s) and ground!

This noise-bridge method sheds some light on what is otherwise often pure guesswork. Two amplifiers that I adjusted in this way both operate at near optimum efficiency. Although I've used this procedure only on pi networks, it should be equally applicable to other network configurations.—*I. Dean Elkins, K4ADJ, 212 Old Orchard Ln, Henderson, KY 42420*

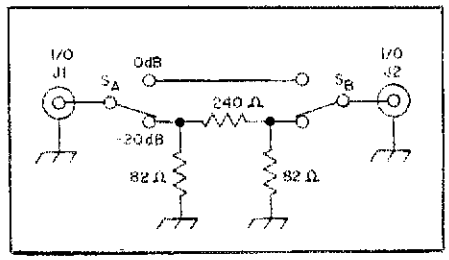


Fig 6—Earle Grandison took advantage of the IC-745's inclusion of RECEIVER INPUT and RECEIVE ANTENNA OUTPUT jacks to add this switchable 20-dB RF attenuator. The circuit is built in a small aluminum box; phono-plug-equipped coaxial cables connect the box to the IC-745. The resistors are carbon-film or -composition units. J1 and J2, phono jacks, are labeled I/O because the attenuator is *bilateral*—either jack can serve as input or output.

TWO NOTES ON THE ICOM IC-745 TRANSCEIVER

A Switchable 20-dB RF Attenuator

☐ The IC-745 does not include an RF attenuator, but one can be added easily. The rear panel of the '745 holds connectors for numerous accessory functions. These include an SO-239 ANTENNA socket and phono jacks for RECEIVER INPUT and RECEIVER ANTENNA OUTPUT. The IC-745's TR relay switches the SO-239 between the transmitter output (inside the radio) and the RECEIVER ANTENNA OUTPUT jack (on the rear panel). Normally, a shielded jumper cable connects the RECEIVER INPUT and RECEIVER ANTENNA OUTPUT jacks for single-antenna, transceive operation. This jumper offers the perfect access point to install an RF attenuator without defacing the transceiver.

To construct a 20-dB attenuator, wire and install the circuit shown in Fig 6. This simple addition allows selection of 0- and 20-dB attenuation values at the flip of a switch.

If Your IC-745 Seems to Be Lacking in Receiver Gain...

☐ My IC-745 transceiver suffered from sporadic, slight changes in overall receiver gain. Moving the radio and tapping its components affected the problem but did not reveal its cause, and no *repeatable* effects were found. I did notice, however, that prodding the wiring around the '745's Main and IF circuit boards had the most effect.

I discovered the cause of the problem by accident. While realigning the receiver, I found that R2, the '745's 22-kΩ TOTAL GAIN trimmer potentiometer, had been set almost to its "no gain" point. Very slight readjustment of R2 during realignment solved the gain-variation problem, and no further abnormal gain shifts have occurred.—*Earle Grandison, K6WS, 11657 Gladstone Cir, Fountain Valley, CA 92708*

New Products

WD4BUM M-300 SERIES MOBILE ANTENNAS

☐ The Lakeview Company of Anderson, South Carolina, has introduced a new series of ¼-λ magnetic-mount mobile antennas. The M-300 (144 MHz), M-301 (220 MHz) and M-302 (440 MHz) antennas feature a stainless steel whip, chrome-plated 2-inch magnet and 15 feet of RG-58 coaxial cable with PL-259 connector (a BNC connector is available for an additional $2). The M-300 antenna is also available pretuned from 100 MHz through 500 MHz on a special-order basis. Price class for the M-300 series antennas is $13. To order, or for more information, contact Lakeview Company, PO Box 5906, Anderson, SC 29623, tel 800-226-6990. —*Tom Francis, NM1Q*

NEW HAM IV ROTATOR BRAKE WEDGE

☐ Craig's Antenna and Tower Service (C.A.T.S.) has introduced the Super Wedge, an improved rotator brake wedge for Ham III and IV series antenna rotators. The Super Wedge is designed to hold antennas with boom lengths of up to 40 feet. Ham M and Ham II rotators can also be modified with the Super Wedge, but require a rotator housing change. Price class: $15. To order, or for more information, contact C.A.T.S., 7368 SR 105, Pemberville, OH 34350, tel 419-352-4465.—*Tom Francis, NM1Q*

NEW CES AUTOPATCH

☐ The model 510SA-II telephone autopatch for Amateur Radio fixed-station or repeater operation is available from Communications Electronics Specialties, Inc. The 510SA-II controls automatic telephone interconnections using a microprocessor that can be configured to operate in simplex sampling mode for amateur VHF/UHF fixed stations, or half or full duplex for repeater operations. Additional 510SA-II features include multidigit DTMF connect codes, activity and time-of-day timers, CW ID, toll restrict and disconnect overrides. Special security codes allow for remote control via telephone lines or a fixed station. For more information, contact Communications Electronics Specialties, Inc, 931 S Semoran Blvd, Ste 218, Winter Park, FL 32792, tel 800-327-9956.—*Tom Francis, NM1Q*

Technical Correspondence

Conducted By Paul K. Pagel, N1FB
Senior Assistant Technical Editor

SEMICONDUCTOR DEVICES CATALOG ON DISK

☐ If you're an experimenter—and you've got an IBM® PC or compatible with at least 384 kbytes of RAM—you may be interested in Motorola's semiconductor devices catalog on disk. Contained on a 5¼ inch floppy disk, the "Motorola DATA DISK: Discrete Semiconductor Version" is a data base containing technical information on more than 624 RF devices. The data base contains more than 6600 device parameters and over 2300 cross-references for RF bipolar transistors, RF MOSFETs and RF amplifiers. In addition, the data base offers parametric data for power transistors, small-signal devices, thyristors, sensors, Zener diodes and optoelectronic devices.

An interesting feature of this data base is that the information is available to you in five languages! You can select from English, German, French, Italian or Spanish.

The next version of the disk (the present is REV 1), will include data on over 30,000 Motorola Semiconductor products—ICs as well as discrete components. Motorola plans to update the data base at least once a year.

Each disk costs $2. For your copy, contact the Motorola Semiconductor Literature Distribution Center, PO Box 20912, Phoenix, AZ 85036, tel 602-994-6561, and request DK101/D REV 1. According to Motorola, you can also obtain the disk from your local Motorola Semiconductor sales office. —*Paul K. Pagel, N1FB, ARRL HQ*

MORE ON THE SNAKE ANTENNA

☐ It is unfortunate that my article about on-ground receiving antennas appeared in the April issue of *QST*![1] I have answered numerous letters and phone calls from amateurs who were *convinced* that the article was the annual April Fool offering! The presentation is definitely *not* a leg-pull.

Since the paper was published, I have received some interesting and helpful information about coaxial snake antennas. Among the things I learned from correspondents is that W2AHZ is the station at which this type of antenna was deployed quite some time ago. Two correspondents referred to it as "The W2AHZ Snake Antenna." I apologize for not having given a reference to W2AHZ; I was unaware of the background in the matter.

[1]D. DeMaw, "On-Ground Low-Noise Receiving Antennas," *QST*, Apr 1988, pp 30-32.

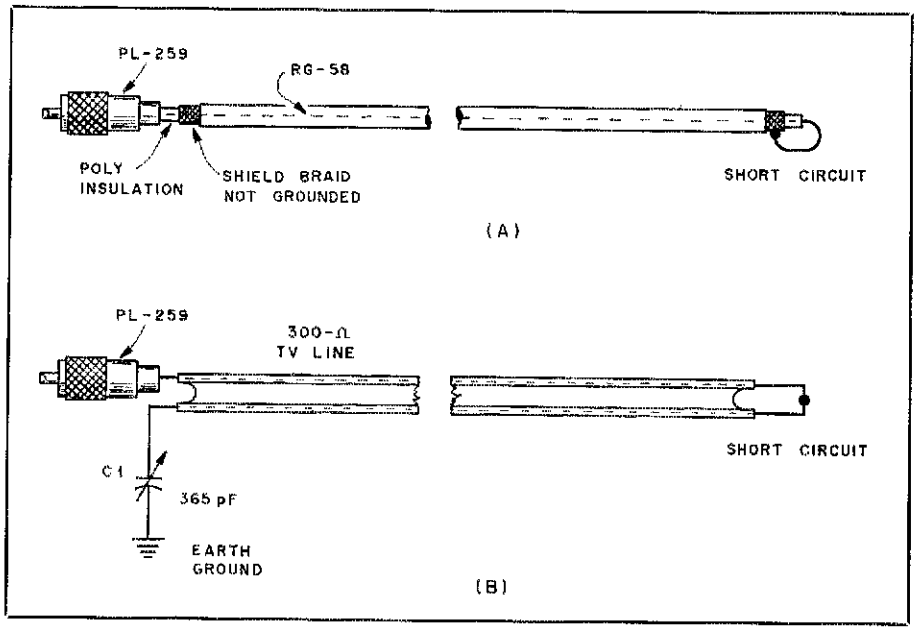


Fig 1—Examples of the snake antennas used at W1HXU. At A, the W2AHZ coaxial snake antenna. The far end is short-circuited, but the shield braid "floats" at the receiver end. The illustration at B shows the W1HXU "Tapeworm Antenna." It is made of 300-ohm TV ribbon line. The far end is short-circuited. One conductor is connected to the receiver at the opposite end of the line, and the remaining conductor at the receiver end is grounded through C1. Either antenna may consist of a random length of transmission line, but the longer the line, the better.

Some of the amateurs who contacted me mentioned improved antenna performance if the scheme shown in Fig 1A is used. The shield braid of the coaxial antenna is *not* grounded at the receiver end. Rather, only the center conductor of the cable is attached to the receiver input port. The far end of the coaxial antenna is short-circuited. I have not compared this method to the resistor-terminated version I worked with.

John Tyskewicz, W1HXU, reports good results with the arrangement of Fig 1A. He stated that he has a 100-foot snake antenna that is buried in the ground. He worked a VE3 on 30 meters while using the antenna for transmitting! John has also worked stations on 80 and 40 meters while using his snake antenna for transmitting. I did not attempt to use mine for this purpose.

Fig 1B illustrates a variation of the snake antenna that is used at W1HXU. The on-ground receiving antenna consists of a length of 300-ohm TV ribbon line. The far end of the line is short-circuited. At the receiving end of the antenna, John connects *one* of the ribbon conductors to ground through a variable capacitor, and the remaining conductor goes to the input port of the receiver. (Although John provided no value for the capacitor, it is presumably a 365- or 400-pF unit, because John said he obtained his capacitor from an old AM broadcast-band receiver.) John says that he adjusts the variable capacitor for optimum signal-to-noise ratio on receive. He refers to the system in Fig 1B as his "Tapeworm Antenna."

This new information about on-ground, low-noise receiving antennas should be of interest to those of you who are experimenting with snake antennas. I want to thank those amateurs who took the time to contact me about this type of antenna. Many interesting performance reports were given. I feel obligated to pass these gleanings along to you.—*Doug DeMaw, W1FB, PO Box 250, Luther, MI 49656*

BORN-AGAIN ALKALINES

☐ George Schleicher's comment on resurrecting NiCd cells[2] reminded me of a technique I use. This tip may be of interest

[2]G. Schleicher, "Resurrecting NiCd Cells," Technical Correspondence, *QST*, May 1988. See also G. Schleicher, "Zapping Life Back into a Nickel-Cadmium Cell," *QST*, Feb 1980, p 35.

to others, allowing them to squeeze a bit more life from alkaline cells. I discovered this method at a wedding I attended, when I desperately needed a bit more life from my electronic flash.

If you heat the batteries *safely*—under hot water, for example, they'll recover somewhat and can be returned to service. The heating obviously causes some chemical rejuvenation, and is recommended only as a last-ditch resort. The technique, however, has worked for me many times. *—Michael Neidich, K2ENN, 145 East 15 St, Suite 6A, New York, NY 10003*

NETWORK TRANSFORMER EXPOSED!

☐ Do you need a good transformer for your next phone patch—or phone line to almost anything? Chances are good you have several such transformers lying around the shack now. Almost every telephone made contains a Network 425 transformer. Few people, however, know of its inner connections. The lowdown is shown in Fig 2.—*Steve Kimber, W7VEW, PO Box 669, Washington, UT 84780*

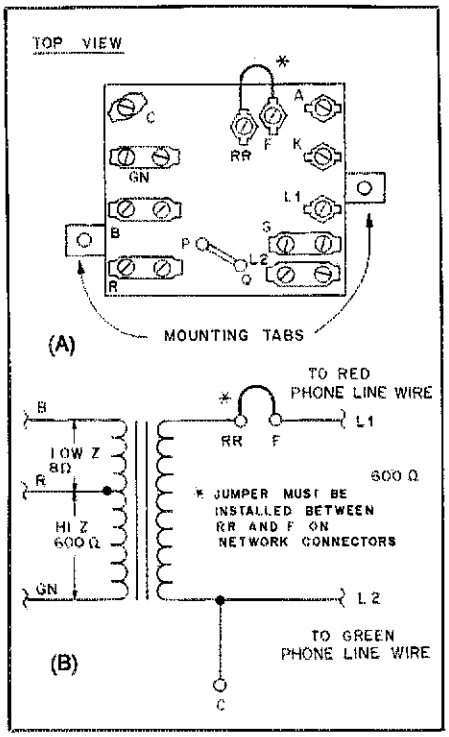


Fig 2—At A, the drawing of a top view of a Network 425 transformer. The schematic at B shows how you can put one of these transformers to use in a phone patch or other circuit.

DAILY SMOKE REPORT

☐ Although my principal field of operating interest lies at the opposite end of the spectrum, I would like to pass along a tip for predicting temperature inversions to those amateurs who use VHF. The information may prove useful in predicting when tropospheric openings may occur.

In some areas of the country, the National Weather Service (NWS) includes a "smoke management report" in its radio broadcasts. This report is not broadcast by *all* NOAA stations, but appears to be used principally in rural areas where controlled burning of forests and brushy areas is common.

The smoke management report includes much information that is not useful for hams. But, the report *does* include a daily prediction on whether or not a temperature inversion is anticipated, and at what hours the inversion should occur. Although the report does not specifically state the altitude of the expected inversion, it does predict a "mixing altitude," which could be used to determine roughly at which height the inversion is expected. Other items included in the smoke-management report that may be of interest to the radio amateur are the mid-level wind speed and direction reports.—*Drayton Cooper, N4LBJ, PO Box 5, Bowling Green, SC 29703*

[A check with the Connecticut NOAA office confirms that the broadcast of smoke reports is determined locally. Such reports are not given in this area.—Ed.]

811A TUBE REPLACEMENTS

☐ I'd like to offer some information on the nature and replacement of 811A power triodes. Especially for those amateurs who were raised on transistors and ICs, and have had limited dealings with filament-type vacuum tubes such as the 811A, this information should prove quite valuable.

In amplifiers such as the popular Collins 30L-1, four 811A tubes are mounted horizontally. The tube sockets are oriented so as to place the tube filaments (pins 1 and 4) in the *vertical* plane. [Manufacturer's data sheets specified that pins 1 and 4 should be in the vertical plane if the tube is mounted horizontally (see Fig 3).—Ed.]

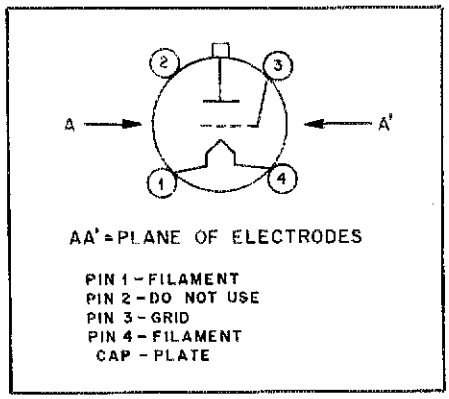


Fig 3—For proper operation of the 811A tube in a horizontal position, pins 1 and 4 should be in a vertical plane. See text.

If horizontally positioned 811As are used with the filaments in the *horizontal* plane, the filaments can sag, causing the filament to short to the grid. The end result: a destroyed tube(s), grid resistor(s), fuses, and a thorough application of *Murphy's Law* to the remainder of the amplifier.

In the not-too-distant past, this problem would not have occurred because of the tight mechanical specifications adhered to by the US tube manufacturers. Not so today! There are 811As being offered by at least two American companies (RCA and Westinghouse) that have the tube elements rotated to a position anywhere from 45 to 90 degrees from the electrode plane of the earlier design. The Westinghouse tubes are made in West Germany, and the RCA tubes are made in the USSR. It's quite possible that these tubes are being offered under other names as well.

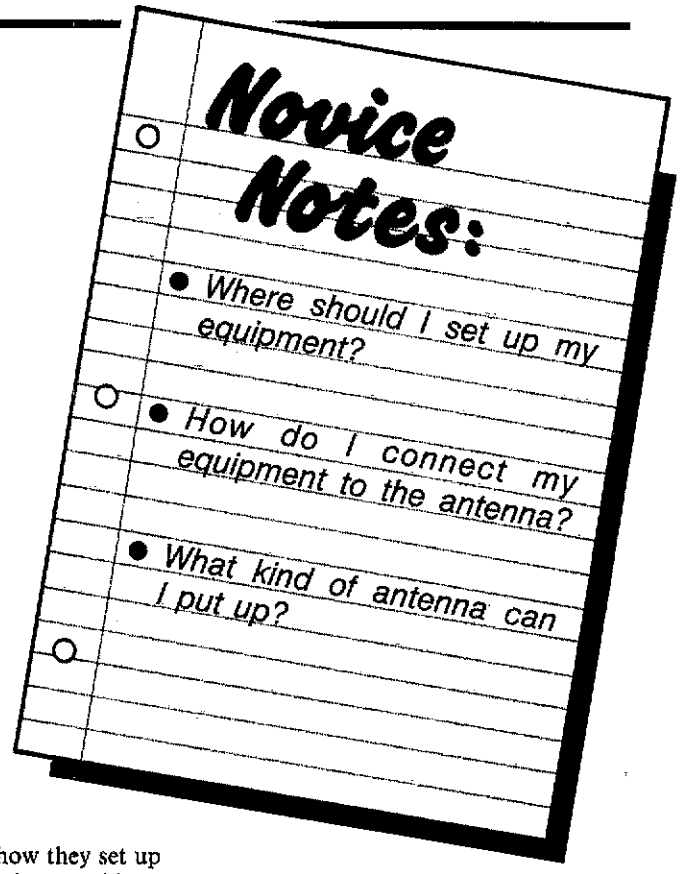
There appears to be no problem with the quality of these irregular tubes, and they will work fine in a *base-down* position. But if you must use them in a horizontal position, *don't*! At some point, you *will* have a problem. Look for US-made replacements.—*Pat H. Walton, W5RES, 10300 Delta Ct NW, Albuquerque, NM 87114*

Note: All correspondence addressed to this column should bear the name, call sign and complete address of the sender. Please include a daytime telephone number at which you may be reached if necessary.

Feedback

☐ Doug McBride, N1DPK, found these errors in "Professional Quality DTMF Decoder and SELCALL System," *QST*, Feb 1988, pp 19-22. On p 22, in the first column, in the 10th line from the bottom, the text should read: "...appropriate clock occurs, AND gates U9B and U9C toggle..." In the first column, starting with the second line from the bottom, and continuing into the second column, correct the text to read: "...sequence is met at either AND gate (U9B or U9C), a latch is set (U6A for an individual code, U6B for a group code). These latches turn on a corresponding LED (DS1-DS2) and relay driver (Q1, Q2). They also turn on Q6, driving K1 and connecting a speaker, LS1, to the radio." Also, see the Feedback item in *QST*, Apr 1988, p 47.

Before Your Ticket Arrives



Can't wait to get your ticket in the mail and get on the air? Here's what to do so you'll be all set when the postman makes your day.

By Henry Wyatt, KA2ZKD
245 Scotch Plains Ave
Westfield, NJ 07090

Every new radio amateur faces this problem: You've studied long and hard and you've just passed your Novice test. The first obstacle on the road to ham radio is behind you and you feel like a million bucks. Now you're passing time waiting for your license to come in the mail and as the weeks go by, the frustration is mounting. Until that ticket arrives, you're not a ham.

But there are things you can do—*must* do—to ward off that frustrated feeling and, at the same time, ensure that your first QSO will be all that you have imagined. You cannot get on the air yet, but you can get ready. The time between your Novice test and the arrival of your license can be one of the most valuable times in your ham career, *if* you use it wisely. Instead of getting more and more frustrated, direct your efforts toward preparing your shack and yourself.

Don't Stop Learning

It's very important to keep studying. All the work you did to pass your Novice test is only the beginning of a lifetime learning process in radio. Keep reviewing your Novice study material—the information you've learned so far is vital to proper operation of an Amateur Radio station and your enjoyment of the hobby. Even more important—go out and obtain the study materials for your next upgrade and get to work immediately. I made it a practice to do just that after I upgraded each time, and that helped me go from SWL to Extra Class.

Don't think that you're confined to *studying* radio because your ticket hasn't arrived yet. You'll get lots of practical knowledge by getting to know the hams in your area. Tell them who you are and your situation. If you have an Elmer, he'll be glad to have you in his shack. Visit as many hams as you can and see how they set up their shacks and solved various problems and how they operate their stations. Every minute you spend in someone's shack may mean hours of problems you avoid by picking up practical information.

Most hams you meet will be happy to have you as a guest in their shack. They'll give you the benefit of their experience, and a lot of things they teach you cannot be found in books. Real-life experience is a necessary complement to written study material. And there's another benefit: The opportunity to establish friendships that are deep and lifelong.

Get Your Shack Ready

Fine business. You're studying hard, keeping all that hard-won knowledge in your head and maybe preparing for your next upgrade. You've also met some local hams; visiting their shacks and seeing their equipment gives you some direction toward setting up your own shack and buying your first rig. Perhaps you have joined a club, whose members can provide you with a font of lore, both theoretical and practical.

Before purchasing a rig, there are two things you should do:

1. Prepare your operating position.
2. Put up an antenna.

Getting your operating position ready is as important as buying your first rig. A shack requires careful planning and now is the time to do it, while you're waiting for your license to arrive. It would be presumptuous to offer specific advice, as every ham faces different problems in setting up and operating a station. Still, a few observations are in order.

The shack and the antenna location should be considered as a single problem. It does little good if you erect an antenna in a place which makes it impossible, or very difficult, to run the feed line to your shack. If you are feeding your antenna with coax and a very long run is needed, much of your signal will be dissipated in feed-line losses, especially on 10 and 15 meters.

On the other hand, if your antenna is too close to your shack, you and your equipment will be saturated with RF, to the detriment of your operating. Your shack must be located so that you can provide your station with a very short run of wire for the station ground, or, failing that, so that counterpoise wires can be routed outside your shack (see the sidebar, "What is a Counterpoise?"). This is why most hams prefer to have their shacks on the ground floor or in the basement.

If you must operate from an apartment or condominium, you may have grounding problems, especially if you live on an upper floor. Ground leads, even when there is a ground available, may approach a quarter-wavelength or longer, particularly on the higher-frequency bands. In addition, you may face antenna restrictions and other legal impediments to operating your station.

Don't despair. There are solutions to every problem, and there may be several hams among those you have been meeting who have faced the very same problems. They can tell you how to make an effective ground system, how to install an

What is a Counterpoise?

A good *RF* ground is often necessary to ensure that your rig isn't too hot to handle (if you've ever been bitten by stray RF energy on a piece of gear, you know what I mean!).

Your equipment (*all* of it) should always be connected to a good electrical ground—you want to be around to enjoy Amateur Radio for a while—but what serves well as a 60-Hz ground may not function as an effective RF ground. As the operating frequency is increased, the conductor between your equipment and your ground may approach a quarter wavelength (a quarter wavelength on 10 meters is just a little over eight feet!). Unless your ground lead is substantially shorter than this, you may have problems with stray RF getting into your equipment, resulting in RF bites and even erratic operation or malfunction of equipment.

A quarter-wavelength conductor may not serve as a good RF ground because it acts as an *impedance transformer*. When you connect one end of a quarter-wavelength conductor to a low-impedance object (ground, for instance), its ungrounded end exhibits a *high* impedance. "Grounding" your equipment to such a high-impedance point is like not grounding it at all—*for frequencies at and near which the wire is a quarter-wavelength, or an odd multiple of a quarter-wavelength, long*. Under some conditions, such an "RF ground" may be worse than no ground at all!

If you experience this problem—or if you simply don't have a good ground available—don't give up! You can make the impedance-transformation characteristic of a quarter-wavelength conductor work *for* you instead of against you by using that quarter-wavelength wire as a form of *counterpoise*. (A counterpoise is a wire or group of wires, insulated from ground, that serves the same purpose as a low-impedance path to ground.) Making a quarter-wavelength counterpoise is easy: Cut a piece of wire that is a quarter-wavelength long at the band you intend to operate on. Attach one end of the wire to your equipment ground *terminal(s) and don't attach the other end to anything. Because there is nothing* attached to the free end of the wires and because of the impedance-transformation characteristic of a quarter-wavelength wire, the equipment end of the wire will substitute for an RF ground for any band on which the wire is a quarter-wavelength (or odd multiple thereof) long.

One precaution that *must* be observed is to route the free end of the counterpoise where no persons or animals can come in contact with it—there can be enough RF on the wire to cause a nasty burn.

It is not necessary to use a heavy wire for the counterpoise. When installing a true ground, however, always use as large a conductor as possible (the shield braid from RG-8 coax works nicely).

Depending on the availability of a ground and the length of conductor needed to reach it, you may not need to install a counterpoise. For example, if you have a good ground available only 16 feet away, you won't need a counterpoise while operating on 40 or 80 meters—a 16-foot wire between your station and ground will work fine.

The use of a counterpoise to replace a true RF ground should be regarded as a single-band solution. Attaching more than one counterpoise will result in mutual coupling between the counterpoise wires, which will detune each wire enough to make it ineffective. If you must use more than one counterpoise wire, the one(s) not in use must be disconnected from the equipment *and* removed from the vicinity of the wire currently in use.

Table 1 shows the lengths of wire necessary to make a counterpoise for the 80, 40, 15 and 10-meter bands. Note that the 40-meter counterpoise will also serve as a counterpoise on 15 meters *(but not vice versa!).—Jeff Kilgore, N1FGB*

Table 1

Counterpoise Lengths for the 80, 40, 15 and 10-Meter Bands

Band	*Center Frequency (kHz)*	*Length*†
80	3725	66'5"
40	7125	34'9"
15	21150	11'8"
10	28300	8'9"

†Lengths are computed for the center of the Novice subband, but each should work well over the entire band.

antenna that is invisible or inconspicuous, and how to filter your station so as to avoid arousing the ire of your neighbors. Your studying will also pay off, as you will learn other possible solutions to your problems.

Operating from a house presents less severe problems, but still requires careful consideration. If you plan to put an antenna in your backyard, your shack should be close enough that your feed line can be as short as possible, especially if you are using coax. Again, your shack should be as close to the ground as possible, in the interest of having the shortest ground lead possible. In some respects, basements are ideal for shacks, but beware: Most basements are humid, and many are susceptible to flooding from time to time. In addition to the danger of electric shock, water and humidity are very bad for your equipment. Waterproofing and dehumidifiers are a must. So is good ventilation. Your rig needs good air flow to keep its finals cool.

Ideally, your operating position will have a window facing the yard, which will facilitate the routing of feed lines and ground leads. Now is the time to get out the tools and round up a friendly ham to help drill all those holes and seal them against the elements. Install copper ground rods in moist, electrically conductive soil a few feet from the house foundation. These mundane chores, necessary to prepare your station, are best done before your ticket arrives.

Your Operating Position

Even though you may not have bought your rig yet, you should consider the desk which will hold it and all the other wonderful gear you're planning to buy. At a minimum, your station will probably include a transceiver, a power supply, a microphone and a key. In addition, you will have a log, some paper, a call book, and some other publications. Not only must your desk hold all this stuff, it must be large enough for you to rest your forearm while keying and there must be enough open room for you to write. Make sure you get a desk big enough to comfortably accommodate both you and your station. Drawers are handy for keeping small tools, extra paper and pencils, and so forth. Since you will be spending many hours there, don't forget good lighting and a comfortable chair, preferably one that swivels.

Preparing your operating position before your ticket arrives means you can spend more time on the air after it arrives. The same can be said for installing your antenna—now is the best time to do it.

What Kind of Antenna?

There is perhaps no subject that elicits such excited—even partisan—discussion among hams as antennas. One thing is certain: You do not need a beam and a kilowatt to work the world. However, careful study and planning is necessary. At this point in your Amateur Radio career, even before the arrival of your license, your library of antenna publications should be expanding. *The ARRL Antenna Book* contains a wealth of theoretical and practical information. For additional practical information on antenna construction, your library should include two books by Doug DeMaw, W1FB: the *Antenna Notebook* and the *Novice Antenna Notebook*.

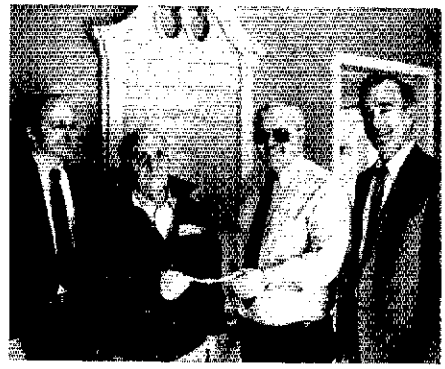
The type of antenna you choose will often be dictated by your QTH. Apartment and condo dwellers must usually make do with antennas whose primary characteris-

(continued on page 48)

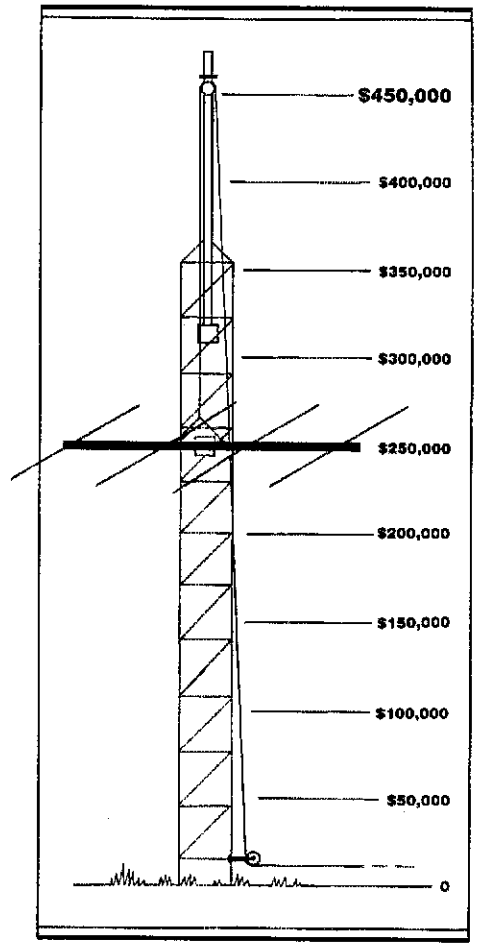
W1AW Fund-Drive Bandwagon Rolls On!

Kilowatt Club Contributors

Walter E. Anderson, W9NIE
Morgan Aukongak, NL7OQ
James L. Cothran, N4IQR
Leo C. Cunniff, W2OEH
Ginny Jaikins, KA8CPS
Hirokazu Karasawa, JR1TNO
David H. Knight, W4ZJY
John R. Larrabee, WB1ADO
Henry S. Magnuski, KA6M
Leo I. Meyerson, WØGFQ
Kenneth W. Miller, N4LTU
James M. Mozley, W2BCH
Newington Amateur Radio League
Edward H. Parkhurst, KA6KSO
Jan Perkins, N6AW (in memory of Don C. Wallace, W6AM)
Earl E. Pittman, W6VHU
Malcolm M. Preston, W2IRZ
James C. Rautio, AJ3K
Fernando Semiao, NE2E
John H. Thatcher, W7AAJ
Wenoca Radio Club, WB4KIF



Howard Pomeroy, stalwart League supporter and active member of the Hampden County (MA) Amateur Radio Association, presents his W1AW Kilowatt Club check to ARRL Controller Larry Shima, WØPAN, at W1AW. Looking on are ARRL Executive Vice President Dave Sumner, K1ZZ (l), and John Lindholm, W1XX (r), Trustee of W1AW. Howard has a long-time love of Amateur Radio and is working on getting his ticket. (*photo courtesy of KU7G*)



How to Contribute to the W1AW Renovation Drive

W1AW has served the Amateur Radio public nonstop through daily code practice transmissions, amateur news bulletin service and general on-the-air operating for the past 50 years. Today, the W1AW installation needs to be completely refurbished, inside and out, so that these services can continue to be provided into the year 2000 and beyond. As indicated in April *QST* and succeeding issues, we need your support to make it happen for a new dedication scheduled for 1989. Here's how to contribute to the W1AW Fund Drive:

- **By Mail:** Address all contributions to W1AW Fund Drive, 225 Main St, Newington CT 06111. Please make your check or money order payable to W1AW Renovation Fund.
- **By Phone:** For your convenience, credit-card contributions can be made by calling Jennifer at ARRL HQ, tel 203-666-1541, between 8 AM and 4 PM Eastern Time, weekdays.

All contributions are tax deductible to the extent allowed by law, as ARRL is a 501(c)(3) tax-exempt organization. Does your employer have a match-contribution program? Some major employers will match your contribution. Check with your personnel department to see if this type of program is available to you. Please be as generous as you can to help W1AW maintain its leadership on the frontlines of Amateur Radio technology. Thank you.

Recognition

Contributors to the W1AW Fund Drive will be recognized as follows:

- *W1AW Kilowatt Club:* Those contributing $1000 or more.
- *Hiram Percy Maxim Club:* Contributions of $500-$999
- *W1AW Century Club:* Contributions of $100-$499
- *W1AW Booster Club:* Contributions of up to $100

All contributors will receive a handsome certificate, suitable for framing. Members of the *Hiram Percy Maxim* and *Kilowatt Clubs* will, in addition, have their name and call sign inscribed on a special plaque that will be on permanent display in the renovated W1AW Building. Members of the *Kilowatt Club* will receive a specially inscribed personalized plaque, which you'll be proud to display in your ham shack. In addition, special recognition will be given to those who donate substantially more than $1000.

The Packeteer Addictive Syndrome

Been spending more and more time on packet radio? Heed this warning before it's too late!

By Mike Bailey, KB6LSO
2483 N 11th Ave
Hanford, CA 93230

As a psychiatrist who is also an active ham, I have used Amateur Radio as an escape from the pressures of a busy practice. Until recently, there had been very little overlap between these two aspects of my life. Over the past year however, I have become increasingly aware of what I believe to be a new psychiatric disorder worthy of further study.

As you well know, over the last several years packet radio has revolutionized information transfer by radio. A significant proportion of hams have embraced this new technology and used it to further enhance their enjoyment of their radio hobby.

Let the User Beware!

However, some psychiatric casualties have occurred. I have observed individuals for whom packet radio no longer is a pastime, but an obsession similar to some psychiatric disorders. There is a pattern to the symptoms of these individuals that initially resembles a depression, but, for reasons that will become apparent, should be classified as an addictive disorder. I have therefore named the syndrome the *Packeteer Addictive Syndrome* (*PAS*).

PAS Stages

The first stage of PAS is marked by an increase in energy and a heightened mood. During this stage, the ham has expressed an interest in packet radio, talked with other hams about it, read available literature, and perhaps ordered equipment. Although they may appear preoccupied at times, they maintain their usual level of social and occupational functioning. The affected individual may even appear better than usual, as his mood is elevated in anticipation of receiving his equipment. He may become elated or euphoric and may display a significant increase in energy level as he connects the equipment and programs in the software.

Unfortunately, the individual soon becomes extremely frustrated and discouraged as he finds that modifications to his equipment and/or software are necessary to get on the air. Due to the myriad of radios and computers, it is inevitable that modifications will be required, and as this is a new technology, documentation to cover all possibilities does not exist.

Thus, the ham contacts other hams (packeteers) feverishly in an attempt to obtain information on how to get his rig operational. They may work themselves into a state of exhaustion as they try different software parameters and pin connections for hours at a time. They become obsessed and may neglect social and family obligations. Depression and irritability are hallmarks of this stage. Although suicidal thoughts have not as yet been observed in this second stage, this possibility may exist. Despite the depressed mood, the energy level remains high, distinguishing this from other types of depression seen by psychiatrists.

The syndrome enters the third, and chronic, stage as the packeteer begins to spend increasing amounts of time at his computer and radio. If there is only one computer that is used by the entire family, then arguments may erupt as the affected individual monopolizes it. As the packeteer compulsively connects with others, searches out new nodes and explores bulletin board services, he becomes obsessed, further ignoring his social and family obligations. He is heard less and less on the local ham radio nets, ignores the HF bands completely and forgets his Morse code as he picks up a new vocabulary punctuated by "digipeater," "CTEXT," "PACLEN," etc.

Soon he may have excluded nearly all of his former friends and family and communicates only with other packeteers. As the syndrome progresses, he may spend all of his spare time hunched over his video screen, his eyes chronically inflamed as his "hobby" monopolizes his life. In spite of marked impairment in his social and family involvement, occupational functioning usually remains adequate, perhaps to ensure sufficient income for antennas, transmitters, etc.

At this stage, if equipment fails, every effort is made as the packeteer frantically attempts to get back on the air. If unable to do so, he may appear distant, depressed and listless, resembling someone who has a severe organic or endogenous depression. Sometimes spontaneous remissions have been observed at this stage if family members and friends are able to coax him back into his former lifestyle.

No Cure Yet

Currently, there is no known cure for PAS. Further research into treatment modalities will need to be undertaken, for as packet radio becomes more popular, it is anticipated that the number of individuals afflicted with Packeteer Addictive Syndrome will increase. However, self-help groups (Packeteers Anonymous) may be useful in controlling the progression of this syndrome until a cure is found. Perhaps the ARRL could take the lead by appointing a task force to look into the problem. I would also encourage a healthy dialogue about this disorder in the pages of *QST* and invite any "recovered" packeteers to tell their stories as an inspiration to others.

Michael J. Bailey, MD, is a Diplomate on the American Board of Psychiatry and Neurology.

• *At the Foundation*

The Bill Bennett, W7PHO Story

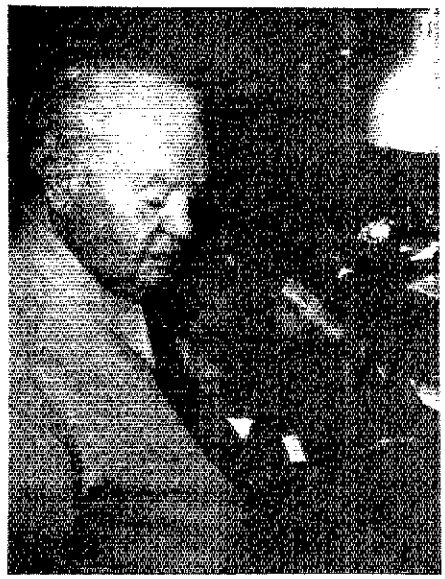
Western Washington DX Club establishes a scholarship fund to honor the memory of the well-loved DXer and creator of the W7PHO Family Hour Net.

By Mary Schetgen, N7IAL
Assistant Secretary
The ARRL Foundation

For even the most inactive ham the idea of working DX inspires a mental image of an against-all-odds, exotic-adventure-type of effort to snag an elusive quarry—a rare station (with its confirming QSL). While the challenges of working DX have changed dramatically since the early days of Amateur Radio operations, DXers continue to find new ways to make the chase for a prized country or DXpedition station as exciting (and challenging!) as ever. Progress in radio technology and the realities of world politics/geography provide an ever-changing combination of DXing options for the enthusiast.

The late Bill Bennett, W7PHO, appreciated the thrill of DXing so much that the majority of his hamming career was devoted to introducing fellow hams to this exciting aspect of Amateur Radio. The best known vehicle for his goal was the daily *W7PHO Family Hour Net*, familiar to many hams at its General sub-band location of 14.227 MHz. Bill's assistance helped thousands of DXers gain rare Pacific and Oceania contacts. The professionalism with which Bill's nets were conducted kept pileups to a minimum and allowed the "rare ones" to be worked in an orderly fashion. Enlisting the aid of several W7-area friends, Bill founded the Western Washington DX Club in 1952 and coordinated gatherings that brought many Pacific-Northwest DXers together on the net as active check-ins and alternate net controls.

The late Bill Bennett, W7PHO, and his wife, Ruth, at a 1987 luncheon with ham friends. A Seattle eatery, The Dog House, has a special room devoted to the local ham crowd, with Bill and other WWDXC members frequent patrons!



W7PHO, as fondly remembered by many DXers who participated in the *W7PHO Family Hour Net.*

Having spent a part of his working career as a public-school teacher and coach in Oregon, Bill never lost his interest in the training and education of youth. As generous to the neophyte DXer as to the experienced big gun, Bill's on-the-air instruction gave encouragement to many nervous Novices. After a long and rewarding Amateur Radio career, Bill became a Silent Key in December of 1987 at the age of 69.

With the goal of awarding a scholarship in Bill's memory in 1989, the Western Washington DX Club has established a scholarship fund with The ARRL Foundation. Contributions should be sent to: *The Bill Bennett, W7PHO Scholarship Fund, c/o The ARRL Foundation, 225 Main St, Newington, CT 06111.*

New Scholarship Established for Radio-sciences Studies

On receipt of a generous bequest by the estate of the late Charles N. Fisher, W6FFN, of Covina, California, The ARRL Foundation has established a scholarship in Mr. Fisher's name, with the first scholarship award to be made in 1989. Students majoring in the radio-science fields are encouraged to apply for this new scholarship. Send for information and applications to The ARRL Foundation, 225 Main St, Newington, CT 06111

Contributor's Corner

We wish to thank the following for their generous contributions to:

The Jesse Bieberman Meritorious Membership Fund

Jane Bieberman DeNuzzo, W3OVV, and Family

The Victor C. Clark Youth Incentive Program

Tom Frenaye, K1KI

The General Fund

Ken Gilbert
Donald W. Hanson, N4NIQ
George Heath, WA8NIB
Ken Luchini, KB6AEK
Maurice "Doc" Kogen, KE6YV
Masaaki Masuda, KH6AK
M. Ratynski, K1MSS
Harry Lamourt, NP4ND
William J. Campanelli, W2LRU
The Family of Allan Sonin, WA6URG
V. Kudravcev
Charles R. Russell, W5VSU
Joseph C. Hopkins, Jr, W4WFZ

Herbert Jalens, WB2KGA
Robert S. Stull, W3WVL
Rolf J. Klingler, HB9AYH
L. B. Loudermilk, WB1EKW
Steven Ravich, K1SCJ
La Verne W. Baker, W7UGK
Edgar A. Potter, W6GXC
Shido Takahashi, WH6BUV
Paul H. Davis, Jr, W9DIU
Marvin M. Meek, W7RDJ
Francis Y. Kelson, K2KSY
F. J. Pharo, W4DA
First Sergeant Thomas L. Wilkins, NM5T
William E. Riker, III
Myrvan R. Morley, W7CFF
Fred A. Faist
David R. Anderson, WA3WZX
Barry S. Altman, N2HUT
Donald E. Nutter, WB1DGR
Marcel Blais, WA2KFP
Edward Newdorf
Frank J. Fournier, WD9EKU
Frank F. Bateman, N4HRP
Francesco E. Filice, K2EHR
James Hudson, NE3D
John Candea, N8FYO
Dr Marcos Raijer
The Rev Kenneth A. Anderson
in memory of Robert E. Queen, W9LD
Edward F. Schilling, W6SJJ
Bruce W. Butler, W6OSP
B. E. Tennyson, WD5JFG
John Burningham, WB8PUF
Tom C. Bonsett, WB9GQB
Raymond C. Humphrey, W3PHG
Frank B. Falknor, AD4L
Raymond M. Bendett, K2EZ
Henry W. Wilson, Sr, WB5HMZ
Jerald Lertzman, KG6CJ

As received and acknowledged during the month of **August.**

Before Your Ticket Arrives

(continued from page 44)

tic is that they are inconspicuous. Even if you operate from your own house, your choice will be influenced by the dimensions of your property, the locations of supports such as trees, and the locations of power lines. Once again, before confusion and despondency set in, make some phone calls and enlist the help of friendly hams with antenna experience. They will give you ideas that may not be found in antenna publications, and will probably be glad to help you install your first antenna.

In studying for your Novice exam, you learned enough antenna theory to design a dipole for one resonant frequency. You probably know that, with a good antenna tuner, you can make such an antenna work on several bands. Nonetheless, I strongly suggest that you put up a true multiband antenna. My brief experience as a Volunteer Examiner has taught me that the new crop of Novices are upgrading very quickly, and many an applicant walks into a test session with no ticket and emerges with a Technician or General. There is little point in putting up an antenna that you may soon outgrow. There are a number of antennas that cover all the HF bands. Many antenna manufacturers advertise in *QST*—write them for more information and then study and compare to determine what is best for your situation. Other hams who have used various antennas are also an excellent source of information.

However, you can make your own all-band wire antenna. There is no project as inexpensive and satisfying as making and installing a wire antenna. If you have simple soldering skills and a few tools, you can make an antenna for a few dollars from materials obtained at your local hardware store, and this same antenna will continue to serve you as you upgrade.

A simple antenna that will work on all bands from 80-10 meters is the G5RV. It is 102 feet long, center fed with 32 feet of 300-Ω twin-lead. Fifty-two-Ω coax can be attached to the twin-lead and routed to your antenna tuner (which you *must* use with this antenna!).

There are many antennas to choose from, but there is much to be said for starting with a multiband antenna so that you can easily take advantage of your new privileges as you upgrade.

Get With It

Hopefully I've given you some ideas. We've all been in your situation. Don't waste this time—use it to get ready so that when your ticket does arrive, you can get on the air right away and start enjoying your station. If you have a problem (as we all do at times), don't be afraid to ask for help. Most hams will agree—there's no better way to pay back the hobby than to help a new ham.

Strays

TV GUIDE SCREENS ATV

☐ Amateur Television scored a major publicity coup in a 4-page article in the August 27 edition of *TV Guide* magazine. "Look! Down in the Basement! It's Captain Video of the East Coast Tuning His Ham TV!" is the title of the piece by *Guide* staff writer Joanmarie Kalter, which investigates the A5 mode in layman's terms.

The article, which prominently features "vidiot" Ron Cohen, K3ZKO, in a large illustration and throughout a majority of the text, leads the reader though Ron's basement shack, explaining the difference between fast- and slow-scan television, equipment costs and how one can get involved in ATV. It refers to comical ATV episodes in a fun-to-read style. But that's not all. It goes on to explain several aspects of the hobby including repeaters, bouncing signals off the Southern California smog and transmitters mounted in helium balloons, planes and race cars. It even adds a paragraph on how hams use ATV for public-service purposes. The story wraps up by looking at repeater networking, a fast-scan system on a shuttle mission and a satellite featuring A5—the future of ATV. In general, *TV Guide's* treatment of ATV puts this aspect of Amateur Radio in a positive light. It's likely to produce new recruits into Amateur Television out of the *Guide's* 17 million subscribers and buyers.

Ham Radio Remembered

A ham digs up his old QSL cards and writes to his contacts of 25 years ago...

By Wendell Morrill, NV7Y
1222 Cherry Dr
Bozeman, MT 59715

1962 was a time of 4-cent stamps, no ZIP codes, and the arrival of my hard-earned Novice ticket. That Novice ticket opened the doors of ham radio, and after 25 years of enjoying a great hobby, 1987 was a time to celebrate by doing something special. That "something special" was to write to some of the hams in my Novice log. Would they still remember?

First, I copied about 50 call signs from old QSL cards. Then I checked the calls in a current *Callbook*, and I obtained current addresses for about half of them. Of course, calls which were completely changed during upgrading could not be located.

I sent each ham a copy of his old QSL card, a copy of my Novice card, photos of my Novice and current station and a personal letter. The letters included: "Perhaps you will recognize the photocopy of the QSL card which you sent to WNØCRJ in 1962 ... It would really be great if you would write back and share some of the nostalgic moments of your early radio days. Are you still active? Has your interest in ham radio affected your life and career?"

The letter also described my Novice station, a "Command" military surplus receiver and a Globe Chief transmitter. The antenna was a longwire from the shack to the top of a windmill. Nothing was grounded, but TVI was no problem, because the nearest TV was a mile away.

Writing letters, buying prints and photocopying the cards took some time and a few bucks, but each response made it all worthwhile. Some of the comments received were:

"Thank you for the nice photo and the copy of my old QSL. A lot has changed in the past 25 years since we had our Novice tickets. The gear maybe wasn't as good and reliable, but I think it may have been simpler to operate."—*WAØCQA*

"I notice that today is 25 years to the day. Our first contact was November 27, 1962 ... It sure has been nice to hear from you. Hope we can meet again. Thanks for being my South Dakota contact in 1962."—*WA5EVW*

"I was surprised and delighted to receive your letter. Funny how some things become imprinted on one's memory—when the photocopy of your card came out of the envelope, I immediately recalled the red ink it had been printed in. I'd love to send you back a copy of your original card—unfortunately, it is in my archive of Novice cards, currently located at the folk's place in Minnesota. One day I'll visit again and return the favor ... Ah nostalgia—I believe that the station at the time of our QSO must have consisted of an EICO 720 transmitter (which nearly burned the hair off another local Novice the following year when a B+ bypass capacitor shorted) and my venerable old Knight Kit R-100 receiver (built with agonizing care, and requiring realignment on an almost-weekly basis). The antenna was either a base-loaded vertical at the corner of the house, or one of the inverted Vs strung from my parents' fringe area TV tower (70 feet or so, and officially forbidden territory). I was forbidden to climb it to erect new antennas, even to take down the ones I sneaked up. I'd climb it anyway, of course, and my older sister would take pictures of me up there with her Brownie camera and blackmail me with them... Ham radio has been very good to me, a constant comfort and refuge, at times, from chaotic and exhausting vocational pursuits. Ham radio is, in the final analysis, the fellowship of those who have shared the trip over the last quarter century or so...and the company's been good. Thanks, Wendell, for the letter, and for the memories."—*WAØDIM*

"I read your letter to the guys on the air and all of them thought it was very nice of you...let's have a lot of QSOs in the years to come."—*WA6ZSW*

"I very much enjoyed receiving your letter and photos.... I thought you might enjoy the copy of the card which you sent to me in '62. I distinctly remembered your card when I opened your letter as I still have every card I ever received and look through them every few years... Ham radio has proven to be an enduring interest for me, and I look forward to much more activity over the next few years.... I greatly appreciate your prodding of my memory of many terrific years in ham radio. I certainly hope that we have the opportunity to QSO again and that you have a lifetime of pleasure from being a ham."—*WAØDVQ*

"You are right, it's a great hobby, and we meet the best people on the air."—*KØWKT*

"You know that really meant a lot to me to see a copy of my old QSL card come back after 25 years. It really had a sentimental value to it.... And, thank you for being there in 1962, Wendell."—*WAØAXM*

Many other interesting comments about early experiences were received. Descriptions of home-brew and makeshift gear were great. It's amazing that we were actually able to communicate, considering the stations we were using. But now, the glow of tubes and the solid feel of the old rigs is sometimes missed. I wonder where that old NC-173 is now.

So, thanks to everyone who wrote back. And to the ex-Novices who were heard from that shack located in an unheated South Dakota farmhouse attic, you are remembered, too. WNØDJE, WN9EKX, WN8FUY, WNØFLJ, WN5EEG, WN9DPD and all of the rest, where are you now?

Writing to these hams was like greeting a long-lost friend on the street... At first you are afraid that he may not remember you, but when he does, you wouldn't trade the moment for a pot of gold.

The Brief Flight of the *Eclipse*

By Steven Ford, WB8IMY
12 Foxbridge Village Rd
Branford, CT 06405

The flight of the *Eclipse*, all 45 seconds of it, occurred on a chilly day in Dayton, Ohio in the autumn of 1982. The *Eclipse* was a unique flying machine on a unique mission. Dave Patterson, WB8ISZ, pioneered its design while I assembled the electronics. Together we shared equal responsibility for the outcome!

The Rocket

The *Eclipse* was a single stage, multi-engine model rocket designed for one purpose: To carry a 2-meter FM transmitter to 1000 feet, a moderately high altitude for a model rocket. It was to be the first of many flights, each one increasing the sophistication of the electronics package as well as the altitude achieved. The *Eclipse* was to be the vehicle for experiments that would blend the hobbies of Amateur Radio and model rocketry in an unusual way.

The operational version of the *Eclipse* rocket stood over 3 feet and weighed slightly under 2 pounds when fully loaded. By model rocketry standards, it was a monster. Power was provided by a centerline Estes® D14-5 solid fuel engine along with two pod-mounted Estes B14-5 engines. These three engines together would provide the necessary thrust to carry the rocket to the desired altitude. Like many model rockets, the bulkhead sections were made of specially reinforced paper tubing to minimize weight. The large payload section was painted fluorescent orange to aid in recovery while the booster was painted black for easier tracking. Fully assembled and standing upright, the Eclipse was an awesome sight.

The Electronics

At the heart of the electronics package was a VHF Engineering TX-144B 2-meter FM transmitter strip. We chose the TX-144B due to its small size and sheer ruggedness. It could provide slightly over 1 watt of reliable output on a continuous basis for up to ten minutes without completely draining the AA NiCd cell pack that we had designed for it. This was crucial in case the payload landed in dense undergrowth. If what had started as a model rocket launch turned into a transmitter hunt, we would need every minute we could get.

For the maiden flight, we decided to keep the electronics simple. The primary goal of the first launch was to test reception at the launch site itself and at distant points. At first we considered sending up the transmitter with just a basic CW identifier, but when I managed to produce a tiny microphone element, we included it as well. It would be interesting, we thought, to get a feeling of what it might be like to ride along in the *Eclipse's* payload section. Our chosen frequency was 146.52 MHz.

At the instant of ignition, three individual tongues of flame are visible at the base of the *Eclipse*.

The TX-144B utilized a 19-inch, ¼-wave whip antenna that was fastened along the length of the rocket body. In keeping with our basic design, we used a Kenwood TR-7830 2-meter mobile transceiver on the receiving end, working into a ¼-wave trunk-mounted antenna. In addition, a cassette tape recorder was wired to the TR-7830 auxiliary speaker jack. While this system might seem simple, it fulfilled our desire to have an Amateur Radio/model rocket package that could be transported to any launch site with ease.

The Way It Was *Supposed* To Work

According to WB8ISZ's calculations, the rocket would climb swiftly to an altitude of about 800 feet (at speeds of up to 400 mi/h) before the engines shut down. At that point the *Eclipse* would begin its coasting phase, emitting a smoke trail while climbing an additional 200 feet. By the end of the coast cycle, the rocket would have surrendered to gravity and "nosed over" into a headlong dive. A small explosive charge in the main engine would fire at the point of nose-over, ejecting the payload section (connected to the main fuselage by a flexible "shock cord") and deploying a large, brightly colored parachute. The pod engines would eject at about the same time and free-fall to the ground. If winds aloft were calm, the rest of the assembly would drift downward, soft-landing approximately three minutes later...we hoped.

The Moment of Truth

We chose a huge farm field on the southeast side of the city to be our launch site. The corn had just been harvested, leaving little more than broken stalks. On a slightly overcast Saturday morning, we drove into the field and began to set up our equipment.

A thin steel rod was driven into the soil and carefully aligned. The rod would hold the *Eclipse* upright prior to launch and provide an extra measure of guidance in the critical fractions of a second following ignition. Most model rockets utilize portable launch pads for this purpose, but our behemoth was too heavy and tall. It would have to take off directly from ground level.

As any model rocketeer will tell you, part of the trick in launching a multi-engine rocket is to get all the engines to fire at the same time. Lift-off with only two engines would have meant immediate disaster. Therefore, we utilized heavy duty model rocket "igniter" wires and employed an automobile battery as our power source. Our best bet was to supply a surge of high current to the igniters in the hope of a simultaneous firing.

As launch time approached, WB8ISZ took his position about 100 yards away from the rocket. Despite his earlier confidence, seeing it wired and ready to fire had placed a few doubts in his mind. "I'll need a head start if something goes wrong," he said as he took a few more steps backward. Unfortunately, there would be no head start for me. I had to launch it, crouched behind a car door at a distance of only 15 feet. This dubious arrangement seemed a bit odd to me, but there was no time to question it. Preparations had been underway for months and egos were on the line. The *Eclipse* had to launch *today*.

At 11:15 AM, I removed the nose cone and threw the switch that would supply power to the transmitter. Replacing the nose

cone, I made one last check of the rocket to be absolutely certain that everything was in place. As I took my position I saw all the S-meter LEDs aglow on the TR-7830. The TX-144B was working perfectly. WB8ISZ had alerted our local monitoring stations on .52 and now he quickly informed our distant monitors via the local repeater. "Let her rip," he said. "She's all yours." I inserted the safety key into the launch system switch and turned it. The LED glowed brightly, indicating that the system was armed and ready. By now my mouth was dry and my stomach was in knots. This was it. I shouted out the brief countdown. (This was later audible on the tape.) "Five...four...three...two... one... ZERO!" I held my breath and pressed my thumb down on the launch button.

To our utter amazement, all three engines exploded into life and the *Eclipse* roared off the ground in a shower of loose soil and gravel. It climbed into the sky on a broad column of white smoke, rotating slowly like a graceful ballet dancer. WB8ISZ and I must have looked like lunatics as we waved our fists in the air together screaming, "Go! Go! Go!" We soon lost sight of it as it entered the coasting phase and streaked up toward its peak altitude. That's when we heard the pop.

"It's too soon," Dave muttered. "I think the ejection charge fired too soon." "Are you certain?" I asked.

"I don't know," he replied as he scanned the sky with his binoculars. "Wait. I see it."

"Is it okay?"

"Yeah. I think the parachute is out. Maybe it's alright. No! The parachute is damaged. The rocket is free-falling!"

WB8ISZ was right. The parachute, or what was left of it, was flapping in the wind like a tattered flag. The payload section and the main fuselage attached to it were tumbling wildly as they fell. This tumbling action turned out to be its saving grace. The rapid tumbling of the body fins created just enough drag to slow the fall substantially. Had the rocket simply fallen like a stone, the destruction might have been total. In my panic I didn't notice that the Kenwood was still getting a full-quieting signal from the rocket. Instead, I watched in silent despair as the rocket struck the ground with a loud thud. Grabbing my hand-held, I began running toward the crash site. "You won't believe this," WB8ISZ shouted after me. "The TX-144B is still transmitting!"

It was hard to believe, especially when I saw the wreckage. The body of the *Eclipse* had buried itself into the soft soil like a dart. Wisps of smoke curled upward from the main engine nozzle. The payload section was lying on its side with a crack that extended about 5 inches along its length. The nose cone had broken off on impact and the TX-144B had spilled almost halfway out of the ruptured payload tube. Still, it continued to transmit. This gave a new meaning to the old advertising phrase, "Takes a licking and keeps on ticking!" I reached down and pulled the battered power switch from the soil. With a single flick of the switch, the flight of the *Eclipse* ended.

Sixty seconds after impact—the black booster section had buried itself 2 inches into the soft earth. The damaged payload tube with the partially ejected transmitter strip can be seen on the right.

The Final Analysis

WB8ISZ and I had declared the experiment to be a total failure—until we listened to the tape! To our surprise, the audio quality of the rocket-to-ground link was far better than we had ever expected. Even within the confines of the relatively narrow audio bandwidth, we could hear a rich chorus of sound. It didn't take much imagination to become a miniature passenger on the doomed flight.

First, there was the incredible sound of lift-off. It was a long, unbroken roar combined with the rushing of air. Then, abruptly, the roaring ceased. The only sound was the eerie whistling of the wind. The *Eclipse* was coasting now. Two seconds later there was a loud bang which confirmed WB8ISZ's theory: The ejection charge *had* fired several seconds too soon. We clearly heard the parachute tearing in the slipstream that Dave had estimated to be over 100 mi/h. (In a normal flight it would have deployed when the rocket was at virtually zero airspeed.) The whip antenna had also torn away from the main body and was now creating a rhythmic "twang" as it slapped the side of the payload with each gyration. The sound of impact was jarring to say the least! It reminded me of the sound a hollow steel drum makes when dropped on a cement floor. Finally, the microphone picked up my approaching footsteps as well as my comments as I surveyed the wreckage.

Monitoring stations as far as 50 miles away had heard the same incredible transmission. I was on the telephone and the radio most of that night discussing the results. It was clear that the D14-5 main engine had malfunctioned, ejecting the payload and deploying the chute before all the in-flight stress factors were at minimum and the speed was low. Such a failure was rare in an Estes "D" engine and we were never able to determine what caused it. Even so, we reversed our earlier defeat and declared victory. While the rocket itself had been destroyed, the electronics had worked flawlessly. The idea was still sound and, with a good working rocket, the potential seemed almost unlimited.

The cassette tape stole the show at several club meetings and I still treasure it to this day. We considered building another Eclipse, but our professional careers, and later our domestic lives, always seemed to get in the way. Now, six years later, WB8ISZ and I still talk about it. Every once in a while one of us will conjure up some harebrained scheme to revive the *Eclipse* with larger engines and more elaborate electronics. (A tiny on-board ATV system was proposed once.) Despite our past experience, the challenge of placing Amateur Radio technology aboard model rockets is still very hard to resist. No doubt some hams have far exceeded our meager "triumph" already, but the question for us remains: Will the *Eclipse* ever fly again? Well, let me tell you about this idea I have...

Epilogue

This was the first and last flight of the *Eclipse*. The reason we did not attempt another flight was that WB8ISZ was transferred to another city shortly after the launch. Without his expertise in rocket design, I was reluctant to continue. When we were finally together again a couple of years later, we were both married and our wives took an understandably dim view of placing costly electronics in potentially untrustworthy rockets. Another frustrating problem has always been the limited lifting power of the commonly available model rocket engines. The kind of engines we would really prefer are the type presently in use at NASA!

Happenings

Conducted By Phillip Sager, WB4FDT
Manager, Regulatory Information Branch, ARRL

FCC Issues Report and Order in 87-14

On September 6, the FCC released its long-awaited Report and Order in Docket 87-14, which reallocates 220-222 MHz to the Land Mobile Service. The Report and Order gives details of the reasoning behind the FCC decision.

FCC begins by giving a selective history of the 220-MHz band. The Commission said when it made the proposal last year it felt the public interest would be best served by providing dedicated spectrum for the development of narrowband technologies. The FCC noted that it did not maintain a listing of amateur operations in the 220-MHz band, and felt *The ARRL Repeater Directory* "provided an accurate representation of amateur repeater activity ...because the number of repeaters was light in comparison with other amateur bands, it appeared that displaced amateur 220-222 MHz operations could be reaccommodated above 222 MHz."

The FCC noted that in response to its notice of Proposed Rulemaking (NPRM), it had received a large number of comments with "most of the comments...filed by amateur licensees." The Commission also said that it had received a large number of letters from Congress concerning the reallocation.

According to the FCC, in their comments amateurs said there was already adequate spectrum allocated to the land mobile service, or that 216-220 MHz should be considered instead. Amateurs also argued that ACSB technology was flawed, or that there was not a market for narrowband equipment. The Commission responded by saying that spectrum-efficient technologies will be essential for future land mobile requirements. "We are convinced that in order for narrowband land mobile technology to flourish, it must be afforded a reasonable opportunity to gain full acceptance in the market place. We do not believe this can be accomplished by the existing provisions for narrowband operations in the 150-MHz land mobile band." The Commission noted that any reallocation of the present land mobile 150-MHz band would displace thousands of existing licensees and could have a negative impact on safety services, such as fire and police, whereas amateurs had the technical ability to convert their transmitters from 220-222 MHz to above 222 MHz.

The FCC said it had considered allowing mobile-dispatch type operations in the 216-220 MHz band, but had decided it would be premature to permit additional services in the 216-220 MHz band before its new Automated Maritime Telecommunications Systems (AMTS) service had a chance to develop. The Commission was also worried about possible interference to TV channel 13, adjacent to the 216-MHz band.

The FCC noted that the ARRL had argued that the 30-50 MHz land mobile band could be used for narrowband technologies. The FCC rejected the idea, saying that "skip" interference, increased antenna lengths, and increases in man-made radio interference at those frequencies presented too many obstacles to the development of narrowband technologies in this band.

In their comments, amateurs argued that 220-222 MHz was heavily used and that 222-225 MHz could not reaccommodate 220-222 MHz users. Amateurs also argued that the band was needed for packet operations. The FCC responded by noting that the 1988-89 edition of the *Repeater Directory* lists 1279 repeater stations on 222-225 MHz or only a little more than 23 repeater operations nationally per channel pair.

In the 220-222 MHz band, the FCC noted: "ARRL's comments list 773 fixed operations. This is less than eleven fixed operations per channel on a nationwide basis. This leaves an extremely large number of unused channels throughout much of the country. In fact, we find only three states, California, New York and Texas, that even have enough operations to require sharing of frequencies...the 144-148 MHz amateur band has four times as many repeater operations per channel as the 222-225 MHz band."

The Commission noted that only nine percent of the packet listings in the *Repeater Directory* were in the 220-222 MHz band and said that few packet operations would therefore be affected by the reallocation.

Amateurs argued that 220-222 MHz was needed to support amateur communications during emergencies, but the Commission said that it "had examined this issue closely and have concluded that allocating the 220-222 MHz band to the land mobile service will not impair amateurs' abilities to provide emergency communications."

In conclusion, the Commission said that amateur use of the 220-222 MHz band is light, and it appeared to the FCC that the existing users of this band can be reaccommodated in the 222-225 MHz band. "We note in particular that, with the exception of 400 kilohertz of spectrum allotted for experimental and control links, all of the amateur activities in the amateur band plan for the 220-222 MHz band have exact duplicate provisions above 222 MHz... Further, it appears that control links and packet radio can be located above 222 MHz with no difficulty in most areas of the country and with some coordination in a few areas of high density use. At the same time we conclude that there is sufficient spectrum available in the 222-225 MHz band to accommodate growth well into the future."

Finally, the Commission believes that the reallocation will help Amateur Radio. "...as amateurs readily admit in their comments, a cloud has long hung over the amateur allocation in the 220 MHz band. This prompted numerous requests and petitions over the years for reallocation of frequencies in the 220 MHz band. We believe this had discouraged amateurs from pursuing operations in this band and manufacturers from building equipment for this band. We also believe that greater use of this band by amateurs will be encouraged by resolving the allocation issues and providing a primary exclusive allocation of the 222-225 MHz band for the amateur service."

Amateurs may continue to use the 220-222 MHz band until private land mobile and government users are allowed access, which is not expected for some months. The Commission also asked amateurs to suggest any changes to the amateur service rules that it finds desirable in preparation of the removal of 220-222 MHz.

An abridged version of this Order was printed in the *Federal Register* September 19 on page 36287. This date is very important since amateurs have 30 days after the publication of an Order in the *Federal Register* in which to file petitions for reconsideration. This means that the FCC accepted such petitions until October 19. In a news release dated September 23, the FCC noted that a number of petitions for reconsideration had already been filed.

The ARRL continues to fight the FCC decision and will file a petition for reconsideration.

FCC DENIES "POLICE BOX" PETITION

The Commission has denied a petition by William R. Gardner, W8WG, requesting that amateur stations be permitted to engage in direct emergency communications with local police and state patrol officers. Gardner proposed a system whereby amateurs would transmit emergency messages to be designated as "National Police Box Frequencies." The transmissions would be monitored by local police, and amateurs would monitor the police frequencies.

Gardner supported his petition by drawing a comparison to the "call box" system that many large city police departments employed in years past allowing direct links to police headquarters.

In denying the petition, the FCC noted the type of communications Gardner proposes are prohibited by FCC Rules and stated, "The communications the petitioner asks us to authorize are normally conducted on public telephone systems and in the Police Radio Service... the Commission has determined that the Amateur Service should not be used as an alternative to other radio services... further the petitioner has not demonstrated that the Amateur Service is an effective means of providing such supplemental communications."

The Commission further noted that most amateur repeaters provide some form of interconnection with the public telephone network via autopatch devices, a more appropriate means of communications with police departments. The Commission also said that routine interception and divulgence of police communications could violate privacy statutes.

FCC UPHOLDS STANDARDS FOR RF LIGHTING DEVICES

The FCC has denied a petition by Linear Corporation, requesting the Commission to reconsider its decision with respect to existing technical standards for RF lighting devices (Docket 83-806). The ARRL's position on Docket 83-806 is that the FCC require labeling of such devices warning consumers of the potential for interference to radio receivers. The label would also be a source of information concerning remedies to specific interference problems.

In their petition, Linear contended that the FCC's decision to retain existing standards failed to promote the use of radio services in accordance with the Communications Act of 1934; specifically, Linear disagreed with the Commission's decision with respect to such issues as interference to Part 15 devices and labeling requirements.

In denying the petition, the FCC concluded that equipment used under the provisions of Part 15 should continue to be required to accept harmful interference from other devices, including RF lighting devices. The Commission noted that this proceeding was initiated to study the interference potential of RF lighting devices, and any change in the basic policy of Part 15 should be addressed in a separate proceeding.

The Commission also concluded that existing emission limits for RF lighting devices are adequate to protect authorized services and are the same applied to computing equipment. Two sets of limits are applied—one for industrial applications, the other for residential, the latter being more restrictive due to the higher probability of finding equipment susceptible to radio noise and the need to protect equipment such as broadcast receivers.

FCC-Issued Call Signs Update

The following is the list of "just issued" call signs as of September 1.

District	"A" Extra	"B" Advanced	"C" Tech/Gen	"D" Novice
Ø	WNØD	KEØXQ	NØJSE	KBØDFB
1	NT1J	KC1KY	N1FYG	KA1SOD
2	WJ2P	KE2IO	N2INY	KB2GIC
3	NR3Q	KD3JK	N3GMG	KA3TOV
4	AB4KD	KM4GS	N4TTD	KC4GTN
5	AA5HP	KG5MX	N5NBU	KB5HHH
6	AA6KI	KJ6LK	N6TCA	KB6ZWO
7	WS7M	KF7NM	N7LPU	KB7FTQ
8	WJ8P	KE8TW	N8JWS	KB8FLL
9	WC9M	KE9MJ	N9HTE	KB9BLV
Alaska	**	AL7KH	NL7OT	WL7BSD
Hawaii	**	AH6JD	NH6QR	WH6CAD
Puerto Rico	**	KP4PP	WP4QU	WP4IEJ
Virgin Islands	NP2C	KP2BN	NP2CR	WP2AGB

**All 2 × 1 calls have been issued in the district.

The FCC found that Linear didn't present any information in its petition that had not previously been considered, nor did it bring up any new arguments or evidence to warrant a policy change regarding Part 15 devices.

NEW SECRETARY OF FCC NAMED

Donna R. Searcy has been named Secretary of the FCC. As Secretary, she supervises the publication of Commission actions and decisions, and is responsible for Commission meetings and agenda.

Searcy joined the FCC in 1975, serving as Special Confidential Assistant to the Bureau Chief. Since 1983, she has been Information Specialist to the Chief of the Mass Media Bureau. In that capacity, she served as Bureau liaison with Congress, private industry and the general public.

In 1986, she served with the US delegation to the Regional Administrative Radio Conference in Geneva, Switzerland. She is a Summa Cum Laude graduate of Northern Virginia Community College.

MONTANA SM RECALL FAILS

The Committee of Tellers met September 16 to count ballots in the election for recall of the Montana Section Manager. This was the first recall election of a Section Manager in ARRL history. The Committee found 72 votes in favor of recall and 295 opposed to recall. Accordingly, Ken Kopp, KØPP, continues to serve as Section Manager for the duration of his present term.

QST CLASSIC FICTION AUTHOR W4VT SK

A few sharp-eyed readers noticed the call of John C. Flippin, W4VT, in the October 1988 Silent Keys column. Flippin was well known for his three classic fiction articles in *QST* during the 1930s. The first, "Jim," published in April 1935 and reprinted in May 1966 *QST*, concerned a teenaged boy named Jim and his first QSO at a university ham station. The second, "To a Lady With Red Hair," printed in April 1936, told of Jug, the chief operator at the college station, and his need to send a message to his girlfriend. The third, "Freshman Marlow," printed in September 1938, told of a ghostly incident by the tower of the college station. It's well worth your time to try to locate these three stories, considered by many to be some of the best fiction ever published in *QST*. Flippin, 84, lived in Memphis, Tennessee.

17 METERS ONE STEP CLOSER TO REALITY

The FCC has proposed to open up the 17-meter band (18.068-18.168 MHz) to radio amateurs by July 1, 1989 in Docket 88-467.

In the FCC proposal, the 17-meter band would be available to General, Advanced and Amateur Extra Class licensees, with the power limitations which generally govern the Amateur Service. The Commission proposed a CW/digital subband on the bottom 42 kHz (18.068-18.110 MHz) and a phone (including CW, television and FAX) subband on the remaining 58 kHz (18.110-18.168 MHz).

The 1979 World Administrative Radio Conference (WARC) allocated the 17-meter band to the Amateur and Amateur-Satellite Services. Normally a two-step process follows domestically after an international allocation like this: First is to add 17 meters as an Amateur Radio Service allocation; this step has already been taken by the FCC. The second step must be for the FCC to adopt new rules in the Amateur Service for use of this spectrum. This is what the FCC has begun with this proposal. The FCC has delayed proposing these new rules until now, since certain government fixed operations will continue on the band until July 1, 1989.

EXTENSION GRANTED IN PART 97 REWRITE

The FCC has announced that it has granted the ARRL's request for a 90-day

extension for filing comments in Docket 88-139, the FCC proposal to rewrite the amateur rules (Part 97). Comments are now due November 29, 1988, and reply comments are due by January 31, 1989. Copies of the FCC proposal are available from the Regulatory Information Branch at HQ upon receipt of an 8- × 10-inch SASE with 85 cents postage.

There appear to be many problems in the proposed rewrite, and they are being painstakingly identified by the ARRL committee studying this proposal. The Committee met in August and again in September to make a detailed comparison between the present rules and the proposed rewrite. For background on this important FCC proposal, see June *QST*, p 53 and July *QST*, p 61.

GOLDWATER RECEIVES AMATEUR AMBASSADOR AWARD

Former Senator Barry M. Goldwater, K7UGA, has been selected as the recipient of the 3rd annual Amateur Electronic Applications (AEA) Amateur Ambassador Award. Goldwater was chosen from over 100 nominees of amateurs possessing the qualities of "ambassador" for the Amateur Radio Service. Nominations were judged on the criteria of dedication to Amateur Radio, positive influence on those outside of Amateur Radio and initiation of special projects or programs promoting the hobby.

The award was presented to K7UGA at the 1988 ARRL National Convention in Portland, Oregon on September 10 by Mike Lamb, N7ML, President of AEA.

The award came with a $1,000 check from AEA, which Barry turned over to the ARRL. Citing K7UGA's long record of support for Amateur Radio, ARRL President Larry Price, W4RA, announced that the contribution would be deposited in the Fund for the Defense of Amateur Radio Frequencies.

FCC DENIES PETITIONS

The FCC has denied a petition by Wolfgang Kaiser, ND1O, who proposed to lower the General class code speed requirement to 10 WPM and raise the Advanced class code speed requirement to 15 WPM. This would result in a telegraphy skill ladder of 5-WPM steps. The FCC, in denying the petition, said that increasing the requirement to 15 WPM for Advanced class would make it more difficult to upgrade to that class. Also, adoption of the proposal would increase the burden upon Volunteer Examiners because it would require them to prepare and administer another examination element. The Commission concluded that the petition provided no significant benefits for the amateur service or the public and denied the petition on August 4.

On the same day, the FCC also denied a petition filed by Bentley Adams, Jr, K7LR. The petition proposed to define information bulletins as a brief, one-way transmission of timely news or important announcements, considered to be of current interest. In support of his petition, Adams noted that some one-way broadcasts last for 45 minutes, five times a day and are simulcast on several frequencies five times a day. Adams said that a significant percentage of the programs consist of rambling interviews, editorials, the reading of listeners' letters, recitation of signal reports received and organizational membership solicitation.

The FCC said that the definition proposed by Adams "allows for a subjective determination by each amateur operator as to what is a brief, timely announcement and whether the news to be conveyed is of outstanding importance or current interest. There would be no way to enforce compliance with such a requirement. Further, the flexibility that has been enjoyed by those stations that currently transmit information bulletins would be endangered." The FCC also said Adams failed to show that the amateur service is being seriously disrupted by the transmission of information bulletins, and concluded that new restrictions on information bulletins were not warranted at this time.

ARRL "LAUNCHES" NEW PUBLICATION

The ARRL's new *Satellite Anthology* book is now available. This publication is the collected best of the Amateur Satellite Communications column, as well as articles from 31 issues of *QST* written by experts in the field. You'll find the latest information on OSCARs 9 through 13 as well as the RS satellites. Operation on Phase 3 satellites (OSCAR 10 and OSCAR 13) is covered in detail. A previously unpublished article gives a profile of the UoSAT OSCAR-11 satellite, and the popular four-part series, "Adventures in Satellite DXing" and "Working OSCAR-the Basics" are also included. The price of *Satellite Anthology* is $5 (plus $2.50 shipping if ordered from HQ).

ARRL AWARD WINNERS ANNOUNCED

The Hiram Percy Maxim Memorial Award has been awarded to 13-year-old Stacey L. Garner, KA9WDE, the first female recipient of the HPM Award. (The late Vic Clark, W4KFC, was the first HPM Award winner in 1936.)

Stacey is an active CW operator and installs and maintains (with her father's assistance) her own equipment and antennas. She assists with teaching Novice classes and hopes to one day teach one of her own in Minocqua, Wisconsin. Stacey plans a career in communications with special interest in teaching children with learning disabilities, possibly through the use of Amateur Radio equipment.

The ARRL International Humanitarian Award has been awarded to Fr Michael Mullen, WB2GQW, President of the International Mission Radio Association, Inc. IMRA is a group of concerned amateur operators, both Stateside and abroad, who conduct message handling nets for American missionaries and their families. "Father Mike" is IMRA's best-known net control.

Fr Mullen was ordained in 1941 and holds several graduate degrees, including a doctorate in theology. He taught for 44 years at St John's University in New York, where he continues to reside.

IMRA and Fr Mullen have been cited by numerous governments for providing communications during times of natural disaster.

HALPRIN LEAVES HQ

Robert J. Halprin, K1XA, Deputy Manager, Membership Communications Services, brought to a close a distinguished 13-year career at ARRL HQ on September 9. An active CW contester, Bob has always been identified with the operating side of League activities. Perhaps his greatest legacy is the current edition of *The ARRL Operating Manual*, which established a new standard for nontechnical Amateur Radio books. Among his many responsibilities, he was also the conductor of *QST*'s Public Service column from 1975 to 1984. More recently, he has been playing a significant role in supporting the Working Group that is framing the League's response to the FCC's Part 97 Rewrite proposal.

A May 1987 graduate of the University of Connecticut School of Law, Bob will be practicing law in Waterbury, Connecticut, and will be joining the roster of those ham-attorneys who are in the League's Volunteer Counsel Program.

WESTLINK YOUNG HAM OF THE YEAR WINNER ANNOUNCED

A Washington, DC, area teenager has been named as the *Westlink Report* Young Ham of the Year. Eighteen-year-old Jonathan Binstock, NK3D, of Potomac, Maryland, is the recipient of this year's award. Jonathan progressed from Novice to Extra Class license in less than four months and has been very active in Amateur Radio public service. This activity has earned him the position of Public Service Chairman of the 250-member

(continued on page 61)

Moved and Seconded ...

MINUTES OF EXECUTIVE COMMITTEE
Meeting No. 431
Kansas City, Missouri
August 27, 1988

AGENDA

1. Approval of minutes of May 14, 1988, Executive Committee Meeting
2. FCC Matters:
   2.1. Review of status of 18 MHz amateur allocation
   2.2. Review of status of PRB-3, FCC call sign privatization inquiry
   2.3. Review of FCC policies in RFI cases which place unwarranted restrictions on amateur operating
   2.4. Review of status of PR Docket Number 88-139, Rewrite of Part 97
   2.5. Review of status of ARRL opposition to FCC action in General Docket Number 87-14, reallocation of 220-222 MHz
   2.6. Other FCC matters
3. Local Antenna/RFI matters
4. Report on affinity credit cards for League members
5. Report on W1AW renovation program
6. Review of draft petition for changes in sub-bands for automatically controlled VHF/UHF beacons
7. Discussion of repeater coordination matters arising from Minutes 53 and 61, 1988 Second Meeting of the Board
8. Review of methods used to record Board meeting proceedings
9. Review of progress on Board directives:
   9.1. By the vice presidents and/or chairmen for the Committees
   9.2. By the Executive Vice President, on behalf of Headquarters
10. Recognition of new Life Members
11. Affiliation of clubs
12. Convention matters:
   12.1. Approval of division, state, section or specialty conventions
   12.2. National Convention matters
13. Certification of candidates for Director and Vice Director, and review of candidates' statements
14. Announcement of appointment of Committees of Tellers
15. Other business
16. Date and place of next Executive Committee meeting

Pursuant to due notice, the Executive Committee of the American Radio Relay League met at 8:35 AM Central Daylight Time, August 27, 1988, at the Kansas City (Missouri) Airport Marriott Hotel. Present were President Larry E. Price, W4RA, in the Chair; First Vice President Jay A. Holladay, W6EJJ; Executive Vice President David Sumner, K1ZZ; and Directors Tom Frenaye, K1KI, Paul Grauer, WØFIR, and Rodney J. Stafford, KB6ZV. Also present were Secretary Perry Williams, W1UED; Directors Frank Butler, W4RH, Edmond A. Metzger, W9PRN, and Hugh A. Turnbull, W3ABC; and Counsel Christopher D. Imlay, N3AKD.

1. On motion of Mr. Stafford the Minutes of the May 14, 1988 meeting were adopted as printed.
2. FCC matters:

2.1. Without objection, discussion of the item which had been listed as 2.1 on the draft agenda, dealing with Docket 87-14, was deferred so that Mr. Nathanson, who was expected shortly, and other Board members present in the hotel for another meeting, could join the discussion. Counsel Imlay then reviewed the status of the future amateur band at 18 MHz, on which a Notice of Proposed Rule Making is expected to be issued by the Federal Communications Commission within a short time. On motion of Mr. Frenaye, Counsel was directed to file a petition with FCC again seeking early entry into the 18.068-18.168 MHz band.

2.2. Counsel Imlay reported that there has been no further action by FCC with respect to PRB-3, FCC inquiry into privatization of call signs. Counsel and staff will continue to follow-up in pursuit of League objectives.

2.3. There followed a review of FCC policies in RFI cases in which unwarranted restrictions are placed on operation by amateurs. On motion of Mr. Stafford, Counsel was asked to seek a declaratory ruling from the Federal Communications Commission that, under the provisions of the Communications Act of 1934 as amended and the existing FCC Regulations, hearings are required before any normal privileges of amateur operators are altered or suspended. During the course of the above, Executive Committee member Leonard M. Nathanson, W8RC, entered the meeting at 9:19 AM.

2.4. With respect to PR Docket Number 88-139, Rewrite of Part 97 Rules for the Amateur Radio Service, Counsel Imlay reported that the ARRL request for an extension of time had been granted. The new dates are November 29 for comments, and January 31, 1989 for reply comments. A draft ARRL position in the matter, being prepared by a Working Group, will be reviewed by the Executive Committee at its November meeting. During the course of the above, the Committee was in recess from 10:00 to 10:10 AM at which time Vice President George S. Wilson, III, W4OYI, Directors Stephen A. Mendelsohn, WA2DHF and Marshall Quiat, AGØX, and Publications Manager Paul L. Rinaldo, W4RI, joined the meeting.

2.5. The group then discussed the unfavorable decision of the Federal Communications Commission in Docket 87-14. On August 4, 1988, the Commission adopted an order reallocating 220-222 MHz from the Amateur Service to the Land Mobile Service despite overwhelming public opposition to the FCC proposal. It was moved by Mr. Nathanson that the League should immediately hire trial counsel and seek an injunction in Federal Court. But there was no second, so the motion was lost. On motion of Mr. Grauer, the following statement was adopted:

> The ARRL strongly affirms its outrage at the FCC decision. The League will continue to pursue every available administrative, judicial and legislative remedy to insure that Radio Amateurs retain access to the spectrum they need to serve the public. Judicial initiatives will include protecting our options to file in the United States Court of Appeals for the District of Columbia Circuit.

The group was in recess from 11:05 to 11:15 AM, after which Messrs. Wilson, Mendelsohn, Quiat and Rinaldo departed from the Executive Committee meeting to resume their tasks as the Working Group on Rewrite of Part 97.

2.6. Counsel Imlay reported on the filing of comments in Docket 88-138, FCC's inquiry into cable carriage of local broadcast signals. While the Docket is not, on its face, of interest to Amateur Radio as such, it provided an opportunity for ARRL to place on the record a study by Dr. Wayne Overbeck, N6NB, showing that covenants running with residential property are so nearly universal that they constitute *de facto* regulation of Amateur Radio antennas.

3. Counsel Imlay reported briefly on local antenna/RFI matters, notably those involving Boulder County, Colorado and Burlingame, California.

4. Following up on Minute 71, 1988 Second Meeting of the Board of Directors, Executive Vice President Sumner reported that negotiations were proceeding with appropriate companies which would be able to issue affinity credit cards to those ARRL members desiring them, with half of any royalties derived being reserved for the Fund for the Defense of Amateur Radio Frequencies.

5. Mr. Sumner reported on progress in the W1AW Renovation Program, both as pertains to the fund raising process and to preparation of blue-prints, and selection of material and equipment to be used in the refurbished building. At this time, $217,000 has been raised. Plans for building renovations are essentially complete. The Executive Committee was in recess for lunch from 12:30 to 12:57 PM, and reconvened with Messrs. Wilson, Mendelsohn, Quiat and Rinaldo again in attendance.

6. The Executive Committee reviewed the draft petition prepared by Counsel in response to Minute 13, 1988 Second Meeting of the Board, seeking changes in subbands for automatically controlled VHF/UHF beacons. On motion of Mr. Grauer, Counsel was instructed to file.

7. The group then discussed Repeater Coordination matters arising from Minutes 53 and 61, 1988 Second Meeting of the Board. Membership reaction generally has been very favorable to these actions by the Directors. Discussion revealed, on the other hand, that there was a question as to whether the Minute as printed reflected in every detail the action of the Board. The Secretary reported that this matter would be taken up with other technical corrections to the Minutes in an erratum planned for publication in the October issue of *QST*. At this point, 1:55 PM, the members of the Working Group departed from the Executive Committee Meeting to resume consideration of the Part 97 rewrite.

8. On motion of Mr. Stafford, a certified stenographic reporter will be hired to record and transcribe the 1989 Annual Meeting of the Board.

9. Review of progress on Board directives:

9.1. Mr. Turnbull, as Chairman, reported briefly for the RFI Task Group concerning increased participation in the work of an Ad Hoc Industry Group studying electromagnetic compatibility.

9.2. Mr. Sumner presented a chart reporting the status of Board directives from the 1988 Second Meeting.

10. On motion of Mr. Frenaye, the names of 43 newly elected Life Members were recognized, and the Executive Vice President was directed to list their names in *QST*.

11. Affiliation of clubs:

11.1. On motion of Mr. Stafford, the following clubs were declared affiliated:

Category 1

Air Capitol TEC-NE-CHAT Amateur Radio Club, Inc., Wichita, Kansas
Bell Tower Pioneer Radio Club, Jacksonville, Florida
Central California Amateur Communications, Inc., Fresno, California
Christian County Amateur Radio Club, Taylorville, Illinois
Englewood Amateur Radio Society, Englewood, Florida
Massanutten Amateur Radio Association, Harrisonburg, Virginia
Montcalm Area Amateur Radio Club, Gowen, Michigan
Nostalgia Amateur Radio Club, Ackerman, Mississippi
Pioneer Radio Operators Society, East Aurora, New York
Telephone Employees (TEL-EM) Amateur Radio Club, Des Peres, Missouri
TRIAC, Parkesburg, Pennsylvania
Western Reserve Amateur Radio Group, Hudson, Ohio

Category 3

Temple University Amateur Radio Club, Philadelphia, Pennsylvania

Category 4

Florida Gulf Coast Amateur Radio Council, Inc., Clearwater, Florida

11.2. The Secretary reported the election by mail vote of the following Societies:

Category 1

Allegan County Amateur Radio Club, Allegan, Michigan
Baldwin Hills Amateur Radio Club, Los Angeles, California
High Point Amateur Radio Club, High Point, North Carolina
Ladies Amateur Radio Association of Orange County, Anaheim, California
Mountaintop Amateur Radio Club, Fairfield Glade, Tennessee

Category 3
Ransom Middle School Amateur Radio Club, Cantonment, Florida
South Fork School Amateur Radio Club, Weldon, California

Mr. Frenaye requested that his opposition to the affiliation of one of the clubs be noted, on the grounds that its constitution bans males from membership.

With the election of these clubs, the League has 1,766 clubs in Category 1, 21 in Category 2, 135 in Category 3 and 4 in Category 4. During the course of the above, Messrs. Butler and Metzger departed from the meeting, at 3:40 and 3:30 PM respectively.

12. Convention matters:

12.1. On motion of Mr. Stafford, the following conventions were approved:

Florida State
February 4-5, 1989
Miami, Florida

Atlantic Division/New York State
May 19-21, 1989
Rochester, New York

West Gulf Division
July 28-30, 1989
Oklahoma City, Oklahoma

Mr. Frenaye observed that a conflict in dates had developed between the New England Division Convention and the ARRL Amateur Radio Computer Networking Conference, on October 1, and expressed the hope that in the future, approval for such Conferences would not be granted until the date was certain.

12.2. Mr. Sumner reported briefly on plans for Headquarters participation in the ARRL National Convention at Portland, Oregon. The Committee was in recess from 4:05 to 4:15 PM.

13. Election matters:

13.1 On motion of Mr. Frenaye, the policy was established that the candidates' statements of unopposed candidates will not be mailed with ballots for the other office in the division.

13.2. The Executive Committee then proceeded to examine candidates' statements and questionnaires in the current elections for ARRL director and vice director. More than one candidate was found eligible for each office listed below. Except in the Rocky Mountain Division, each vote was unanimous; Mr. Nathanson requested to be recorded as voting that Mr. Quiat was ineligible. The candidates' names were ordered placed on ballots sent to Full Members of the respective Divisions, accompanied by the candidates' statements of no more than 300 words.

CENTRAL—for Vice Director:
Kenneth A. Ebneter, K9EN
Howard S. Huntington, K9KM

HUDSON—for Director:
Vincent J. Biancomano, WB2EZG
Stephen A. Mendelsohn, WA2DHF

NEW ENGLAND—for Director:
Tom Frenaye, K1KI
Albert W. Hamilton, AG1F
—for Vice Director:
William A. Burden, WB1BRE
Clevis O. "Cliff" Laverty, W1RWG

NORTHWESTERN—for Director:
Rush S. Drake, W7RM
Mary E. Lewis, W7QGP

ROANOKE—for Director:
Claude E. Feigley, W3ATQ
John C. Kanode, N4MM
(Gay Milius, Jr., W4UG, was lawfully nominated, but withdrew his name.)

ROCKY MOUNTAIN—for Director:
Laurence A. Eichel, K2NA
Marshall Quiat, AG0X
—for Vice Director:
William M. Sheffield, KQ0J
Hugh Winter, W5HD

SOUTHWESTERN—for Vice Director:
Wayne E. Overbeck, N6NB
Karl V. Pagel, N6BVU
(James E. Swafford, W7FF, was lawfully nominated, but withdrew his name.)

WEST GULF—for Director:
Thomas W. Comstock, N5TC
Jim Haynie, WB5JBP

13.3. The eligible candidates listed below were the only candidates for the office shown. On motion of Mr. Grauer, they were declared elected without membership balloting, for a two-year term beginning January 1, 1989:

CENTRAL—for Director:
Edmond A. Metzger, W9PRN

SOUTHWESTERN—for Director:
Fried Heyn, WA6WZO

HUDSON—for Vice Director:
Paul Vydareny, WB2VUK

NORTHWESTERN—for Vice Director:
William R. Shrader, W7QMU

ROANOKE—for Vice Director:
James G. Walker, WD4HLZ

WEST GULF—for Vice Director:
Sam C. Sitton, KV5X

During the course of the above, Mr. Nathanson departed from the meeting at 5:16 PM; there was a recess from 5:47 to 5:53 PM.

14. Announcement of appointment of Committees of Tellers:

14.1. Without dissent, the following were appointed as a Committee of Tellers for the current Director/Vice Director elections: Mr. Metzger, Mr. Turnbull, Mr. Grauer; Mr. Williams, alternate.

14.2. Without dissent, the following were appointed as a Committee of Tellers in the special election for recall of the Section Manager in Montana: Mr. Frenaye, Mr. Sumner, Mr. Williams.

15. Other business:

15.1. On motion of Mr. Grauer, the following resolution was adopted:

> The Treasurer and Controller of this Corporation, and each of them signing individually, be and hereby are authorized on behalf of this Corporation to enter into an agreement, in substantially the form previously presented to the Board of Directors, with Shawmut Bank of Boston, N.A. for the transfer of funds of, or for the account of, this Corporation in response to telephonic, telegraphic, oral, written or other requests.

15.2. On motion of Mr. Sumner, Mary Basch, Accounting Manager, is added to the checking account at Connecticut Bank and Trust Company as an authorized signer on behalf of the Treasurer, subject to the previous policy with respect to number of signatures and limitation on authority.

15.3. On motion of Mr. Grauer, the Executive Committee directs the Administration & Finance Committee to study League policy with respect to the selection of depository banks for League funds.

15.4. On motion of Mr. Grauer, a clarification of the "Terms and Conditions Governing the Availability of Mailing Lists from Headquarters" was adopted; to wit, the "convention" and "hamfest" labels decribed in Category I as being available free of charge do not include lists prepared from the FCC database, such labels to be available at cost.

15.5. On motion of Mr. Frenaye, the following resolution was adopted:

> The League endorses and supports in principle the ongoing efforts of the Western Washington DX Club to enhance international goodwill through joint activities with counterpart organizations in the Union of Soviet Socialist Republics.

16. The next meeting of the Executive Committee will be held at the call of the President in accordance with Article 6, with either November 12 or November 19 being a likely date.

There being no further business, on motion of Mr. Stafford the meeting adjourned at 7:37 PM.

Respectfully submitted:
Perry Williams, W1UED
Secretary

Strays

I would like to get in touch with...

☐ anyone with a manual and/or schematic for a World Radio Laboratories Duobander-84 transceiver. Jerry Edgarton, 7315 E 11th St, Indianapolis, IN 46219.

☐ anyone who has a service manual and/or schematic for a Lafayette HA 350 receiver. Leo Siekierski, K3IEZ, 737 S Linwood Ave, Baltimore, MD 21224.

☐ anyone with technical documentation for the Hallicrafters Sky Champion S 20R HF receiver. Jim Belles, NH6CN, 160 Hamilton Ct, Vallejo, CA 94589.

☐ former members of the Civilian Technical Corps who served in England during WW II. Stan Togala, W3GFT, 6209 Hudson Bend Rd, Austin, TX 78734.

☐ anyone who has a schematic and/or manual for a model 390 Lafayette Starflite transmitter. Roy Kenna, W7NLR, 332 W Maple, Winslow, AZ 86047.

☐ any Radiomen who served in WW II aboard the *USS Ancon*, AGC-4, from 1943-45. Also, does anyone have info about CW nets for retired postal workers? Marvin Swihart, 433 S 8th St, Upper Sandusky, OH 43351.

STRAY HINTS

☐ Strays are those interesting fillers used when space allows in *QST*. Think you have an item with Stray potential? Here are some hints to help your submission become one. (1) Be sure the information will be of interest to most *QST* readers. (2) Any photographs you send should be good-quality black-and-white glossy prints. Items submitted are normally acknowledged, but that doesn't necessarily mean that your item will be appearing in *QST*. Strays are used on a space-available basis, and we receive far more material than we can find room for in each issue. Follow the above hints and maybe your Stray will find a home in *QST*.—*Sheldon Ball, N1EOZ*

TRAVELING ABROAD?

☐ ARRL HQ is equipped to assist members in obtaining operating permits for most places in the world. In addition, we can provide you with information on Amateur Radio societies and repeaters in foreign countries. Instructions and information are available from the Regulatory Information Branch. Please enclose a business-size SASE, and don't forget to indicate which country you plan on visiting.

How's DX?

Conducted By Ellen White, W1YL/4
19620 SW 234 St, Homestead, FL 33031

Turkey-USA on 160 Meters

March 20, 1988, 0143Z appears to have set the scene for the first-ever contact between the US and Turkey on 160 (W1FZ-TA1E). The excitement this event created was conveyed to this writer in a telephone call from W1FZ and reinforced by reading Jim's correspondence with Aziz, TA1E and Kamil, TA2CF (ex-KB6JCX). Share with me the thrill of that evening, in these quotes from their correspondence.

"I cannot describe how happy we were after the QSO. We couldn't believe it when we first heard you. Thinking that we were most probably being called by a UA1, we checked several times. We knew it should be a good time for the USA, but we still couldn't believe it. Amateur Radio was legalized (in Turkey) in 1984. Before 1984, there were no regulations. We had a law dated 1937 which was highly restrictive. It didn't make Amateur Radio impossible, but not mentioning the service by name made it practically impossible. Our society, existing since 1962, made several attempts to change it, but failed. Some activity was going on which was tolerated to a certain extent. The few actives were keeping a low profile, mainly operating the higher bands. The huge dimensions of a good antenna on top band would have attracted too much attention. Thus, I don't believe that there was any 160-meter contact between the US and TA before this contact. First or not, it was thrilling! Our first 160-meter try was made during CQWW CW. Only Europe was worked, with great problems on the receiving end. Our next step was putting up the Beverage antenna."

(L-r) TA2CF, TA1E at the TRAC HQ contest station in Istanbul, TA2KC.

Here is the story by KB6JCX (now returned home as TA2CF). "When I returned from the states I brought a TS-520S. After an unsuccessful try in the CQ 160-meter contest, TA1E and I made a Beverage antenna 1500 feet west/east, 1500 feet north/south, only 5 feet above the ground, so that keeps the QRM away. The transmitting antenna is a top-loaded vertical (modified from an RSGB design). The night of the contact, Aziz told me to 'play with the key a bit.' It was our first try using the Beverage. It was 11:30 PM local time, and freezing cold. I made a few contacts and then a US station called. I did not believe it, and asked for confirmation. I thought it was a U. Then, Jim, you hit us with W1FZ. I still did not believe it. I asked Aziz: Is this W1FZ, or am I dreaming? Could you listen again. Then when you confirmed that you were W1FZ, I just screamed yeah! Aziz and I hugged each other and started dancing up and down. It was a very emotional, historical and a very happy time for us. After that there was a tremendous pile-up. I had no intention of staying late, but I stayed at the rig till 6:30 AM local time, a total of 7- and-a-half hours on, nonstop. We worked over 200 stations." Aziz continues, "We have not quite a good setup for top band at my QTH. I'll be quite active the next season with TA1E/2, and during major contests we will be operating with TA2KC or YM2KC." [The enthusiasm of Aziz, Kamil and the other active TA stations should keep Turkey very workable in the seasons ahead—Ed.]

W1FZ

Our lead this month partially involves that persistent and consistent New Hampshire DXer, W1FZ. Jim has seen the entire breadth of DXing, evolving from a rotary spark gap rig to a Corsair II. En route he achieved the DXCC Honor Roll, 5BDXCC, DXCC on 160 and RTTY, WAZ and a host of other awards and honors.

W1FZ

AFRICA NEWS

At this writing, Tom Gregory, N4NW/9Q5NW, was gearing up for a DXpedition to Brazzaville, Congo Republic, as TN4NW. Tom planned a 5-10 day operation with future visits to Brazzaville as his personal commitments permit. On CW check 25 kHz up from the band bottom; SSB spots include 3.750, 7.043, 14.145/14.180, 21.250 and 28.490 MHz (no authorization for 160). Card requests go to manager Tom Harrell, AL7EL, Box 368, Stockbridge, GA 30281-0368 (or via AL7EL at his home 1988 *Callbook* address). To speed processing, please place your own call on the bottom front of envelopes addressed to the manager.

Tom also notes that 9Q5DA closed his Zaire operation mid-summer, returning to England before moving on to the Far East (QSL via KC4NC). YL TL8DN is anticipating installation of a tower and quad, and enhancement of her signal from Bangui. (QSL via N2AU.) 5NØRE has left Lagos for his new assignment in Cairo, hoping to get operating permission.

HOW DO YOU SEND THAT?

Continuing on this theme of *CW Into Foreign Languages* (CW Publications, Box 2571, Station A, London, ON N6A 4G9, Canada; $7 Canadian, postpaid), let's add a few more common phrases:

English/Russian (italicized letters are sent together, without normal letter spacing)
My name is/Men*aa* zowut
Thank you for the new country/Spasibo za nowu*ew* stranu
It is sunny today/Segodn*aa* solnce
Good DX/Hor*ootego* DX

If you like this feature, and would like me to continue it, please let me know!

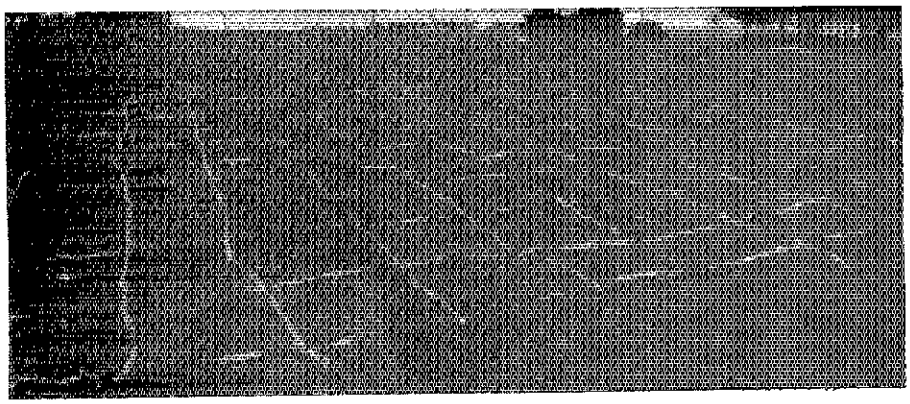
THE CIRCUIT

☐ **P40V:** Aruba Oct 29-30. All contacts will be confirmed via the bureau. Certificates will be sent for 4-or-more banders.

☐ **LA5HE:** Re Rag's Commandments to QSL Managers (August issue): It goes almost without saying that the commandment for the manager to provide a card is contingent on the contact having taken place! (Thanks W1YRC.)

☐ **VK9LU:** Dave, NZ9E operated on

(L-r) VK9LU, KA9UCK, VK9LU/NZ9E (see Circuit).



TA2KC radials, 1 meter by 1 meter. TX antenna is a top-loaded vertical, RX a 500-meter-long unterminated Beverage.

Norfolk, using VK9ND's well-equipped station. Cards to Dave under his former call K9POX (SASE, please).

☐ **ZF2KY/KZ:** OH2BJW/OH1ZAA, etc note that it saves half the work to leave some equipment with the locals when leaving a DX spot, their tip for all expeditions. Jan and Arja promise speedier cards in the future now that they've become computerized!

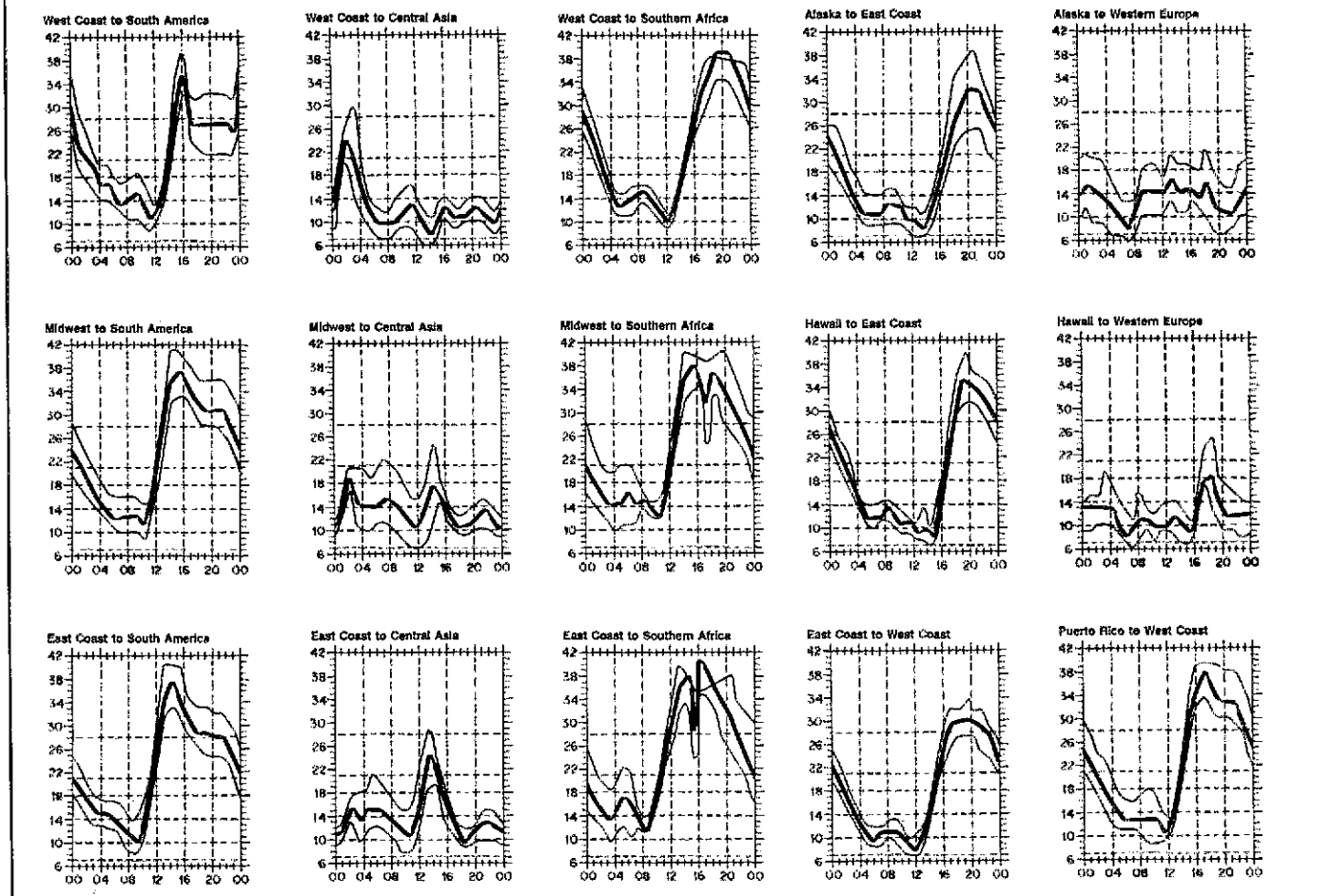
☐ **VP2MW:** Montserrat during CQWW CW by AA5DX, KM5R and WQ5W, 160-10 meters. Before/after attention will be focused on low bands for 5BDXCC purposes. VP2MW only goes via KM5R. Others as will be indicated.

☐ **PJ2MI:** Jose Cintje, PJ2MI/PJ7JC, was recently knighted by the Queen of the Netherlands for service to his country. (Thanks QSL Mgr K2PEQ.)

☐ **HI3UD/4:** The Union of Dominican Radio Amateurs, Santiago section, activated Tuna Key late September. QSL to Luis P. Caamano, HI8LC, Box 88, Santo Domingo, Dominican Republic.

☐ **Routings:** 4C2JTW, via AA5B.

☐ **Clubs:** New officers: Redwood Empire DX Assn—Pres W6OSP, VP K6BWX,



When are the bands open? These charts predict this month's average propagation predictions for high-frequency circuits between the US and various overseas points. One chart showing East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or HPF). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or MUF). On 90 percent of the days of the month, it will be at least as high as the lowest curve (optimum traffic frequency, or FOT). The horizontal axis shows Coordinated

Secy/Treas VP2ML; Long Island DX Assn—Pres W2JGR, VP KB2HK, Secy K2MFY, Treas WA2BGE; Northern California DX Foundation—Pres W6OAT, VP K6UD, Secy W6DU, Treas WB6UOM.

☐ **IOTA:** Late last month Cat Island, IOTA NA-82, was activated by K5MK with WB5PPG, N5FG, WN5IJZ (SASE, or 2 IRCs, please); IOTA AF-42, Alboran Island, EH91A-EE91A or ED91A, was manned by Union de Radioaficionados Espanoles operators mid-September. QSL via Antonio Diestro, EA7BUD, Box 1123, 29080 Malaga, Spain.

☐ **XE:** The Radio Club de Nuevo Leon, offers a beautiful award for working 3 club members July 1988-July 1989. Info from Gino Decanini, XE2GGD, Box 441, Monterrey, NL 64000, Mexico.

☐ **JT:** The Central Radio Club of Mongolia offers an award for working five continents June 1, 1988-June 1, 1989 (Asia has to be Mongolia). No cards, certified list with 3 IRCs to Award Manager, Central Radio Club, Box 639, Ulan Bator 13, Mongolia.

☐ **WA4WTG:** Kappy handles cards for FY7AE K7NJ/4X TJ1BF V2AK ZF2IB/4X ZF2GE ZP5KS 4Z4DX 4Z4HF 4Z4LF 4X4NJ 4X4UF 4X4VB 4X2BYB 4X6BYB 5Z4RH 6Y5MC 6Y5RL 8P6AH 8P6BN 8P6IB 8P8A P29RY. QSL to his new QTH as no mail is being forwarded: Kappy Kaplan, WA4WTG, 718 SE 3rd Ln, Dania, FL 33004.

☐ **LU1MPM:** Sergio is now managing cards for LU4MEE AZ4M LU1MFK CE2/LU4MEE LU1MPU LU4M (contests only) and LU1MKC. Write Sergio Grinberg, LU1MPM, PO Box 382, 5500—Mendoza, Argentina.

QSL Corner

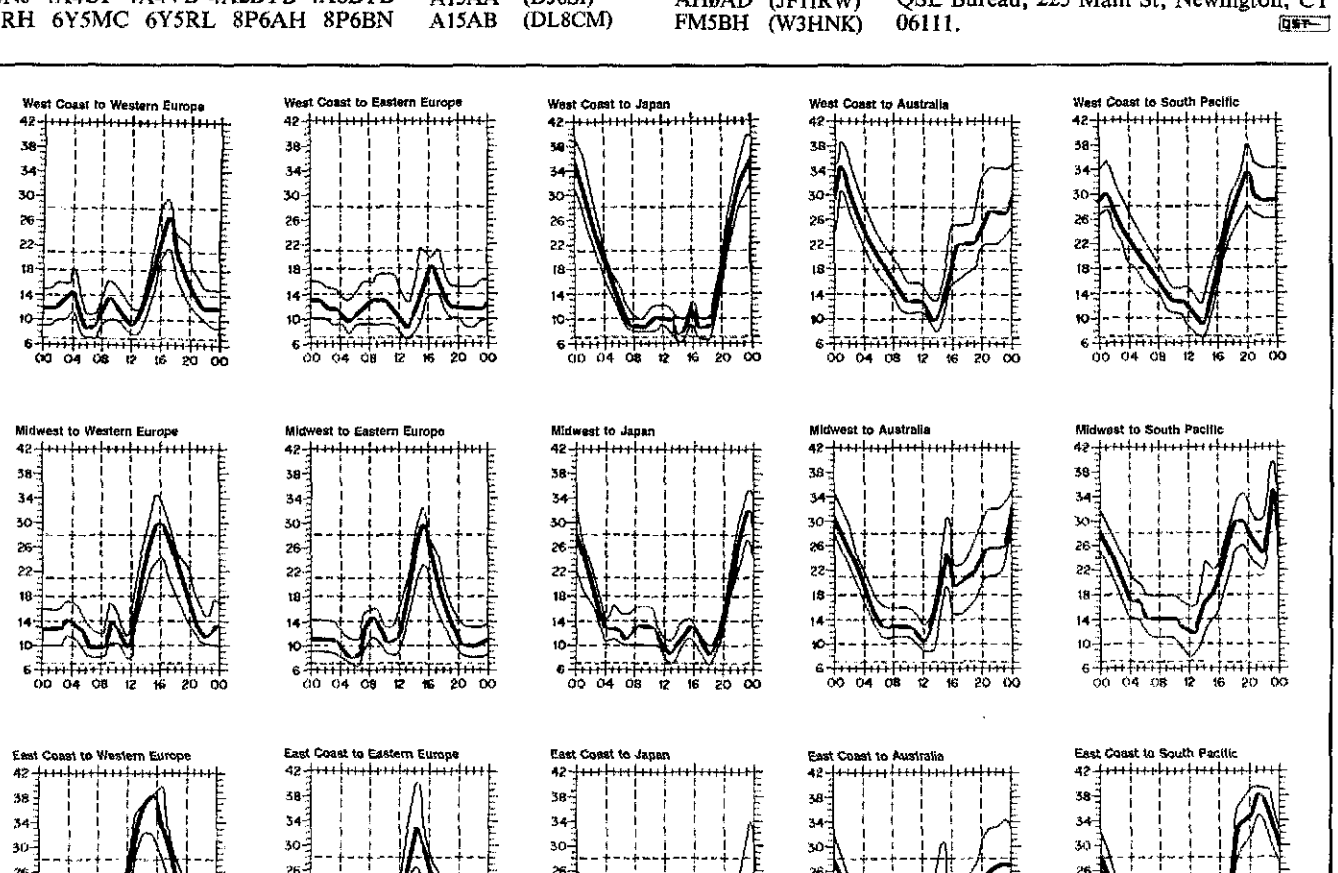
Administered By Joanna Hushin, KA1IFO

Here is some information for those of you who would like to QSL a QSL manager or direct to the station location. It is passed along as we receive it and, therefore, may not be accurate. The call sign in parentheses is the QSL manager.

A15AA (DJ6SI)
A15AB (DL8CM)
AH0AD (JF1IRW)
FM5BH (W3HNK)
FT5ZB (F6ESH)
F2DX/PJ6 (F6BFH)
HD8GZ (HC2DZ)
HL9JZ (KA1OXO)
J52US (WA8JOC)
KG4CL (KC3CL)
KC3RE/TA3 (SM5CAK)
TA1E/2 (KA1DE)
TU4CU Box 12 BP 54, F-99326 Abidjan, Ivory Coast, Africa
T5GG (I2MQP)
VP2EQ (KV4AM)
VP5Y (N6EK)
VR6MW (NZ9E)
WY5L/KH3 (N5DAS)
XE2GBD (N6EK)
XT2BR (F6FNU)
YN3EO (Y32KE)
VP5CPU (VE3CPU)
1Z9B (KA6V)
3C1CW (F2CW)
3X0A/A (I8YGZ)
4S7NMR (KZ8Y)
5R8JD (F6FNU)
5T5CJ (W4BAA)
5T5DX (W4JVU)
5T5RA (W4JVU)
7X4BL (DF9EP)
8P6G (KZ8Y)
8Q7AZ (KZ8Y)
9Q5DX (KQ3S)
9Q5NW (AL7EL)

☐ QSL Manager Volunteer: W5UIP

☐ QSL Corner, June 1988, *QST*, p 72, contains information and addresses for the ARRL Incoming Bureau. QSL Corner, September 1988 *QST*, p 59, contains information on the operations of the ARRL Outgoing Service. For additional information on bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St, Newington, CT 06111.



Universal Time (UTC); the vertical axis, frequency in MHz. See April 1983 *QST*, pp 63-64, for a more-detailed explanation. The 3rd edition of *The ARRL Operating Manual* contains similar charts for a range of sunspot numbers and times of the year. Data provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for October 16 to November 15, 1988, assume a sunspot number of 134, which corresponds to a 2800-MHz solar flux of 177.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmation for contacts with 100 or more countries on the official DXCC Countries List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300, and 5-country increments above 300. The totals shown below are exact credits given to DXCC members from July 12 to August 14, 1988. An SASE will bring you the rules and application forms for participation in the DXCC program.

New Members

Mixed

CO7KR/110 JA1DJO/110 PA3DGN/109 XE1MN/174 KA1HFL/107 KA2FEP/109 N3CFA/103 WA4AEI/106 NR8Z/110
DL2AAW/116 JG1BSB/108 SM6JWW/122 XE1TU/190 KA1LMR/100 KC2OL/100 KA4CVL/106 WA4BEU/125 AI9Y/100
DL2LY/115 JG1PII/208 SP2GKQ/113 XE1XFP/102 KC1BG/104 NF2X/107 KJ4CS/101 KA5YCM/262 ND9X/118
EA1DOD/168 JH3BGG/272 SP5ES/258 XE1XRC/151 N1EJF/101 W2JEK/106 N4IF/176 N5KAE/105 KD0RT/104
F8PD/102 JA0DMV/255 SP5PB/273 XE1Z/105 NJ1T/151 WC2B/102 N4PZF/137 KJ6GC/150 N0ICI/107
HB9DJC/109 LA7AFA/187 VE7FOP/102 YU4EKK/115 NM1K/105 K3ANS/109 N4SKE/106 KA7LPP/103 W0YZS/281
I3MDU/107 LU2CC/293 VK2ESG/110 K1BR/114 K2ANC/103 K3IMC/105 W4WAW/109 N8AGU/109 WD0ALE/107
JA1BGX/109 OH1BV/157 XE1AMS/188 K1RH/FP/100

Phone

CP5GC/104 I7XGL/288 LU1BAB/125 XE1MN/173 KA1LMR/100 KD4MM/151 WA4OBZ/104 KJ6GC/148 WA7QQI/101
DL2DBH/107 IK7FPV/266 OZ1HLZ/109 XE1TU/190 NG1J/137 KF4KJ/175 WD4RHC/126 W6SWV/100 KE8NU/110
EA4CVP/287 JA1DJO/110 SP5ES/204 XE1XFP/101 KC2OL/100 N4BLO/107 KA5YCM/255 WA6GYD/106 N8FUM/107
HK6GBJ/153 JG1PII/203 VE6EJ/107 XE1XRC/151 W2SIS/104 N4IF/146 N5IQL/104 WB6Q/189 NR8Z/100
I5BG/225 JE2GMO/108 XE1AMS/188 XE1Z/105 K3WUW/120 N4PZF/137 K6ICS/108 WN6L/105 W0YZS/212
I7KXG/302 JA0DMV/213

CW

DL9LBR/110 HB9DJC/105 JH3BGG/261 LA7AFA/169 SM6JWW/122 ZL1LS/105 W2JEK/104 WA4BEU/100 NW9G/104
HB9DED/116 JA1CLW/119 JR8NTR/111 OZ1IDL/109 SP5PB/212 NA1I/119 WB2AMU/100 W8JBI/292 K0TLM/164
HB9DGZ/125 JF1PHJ/102 KL7J/104 PA3DUA/133 UT5RH/102 NF2X/103 N4RNR/102

RTTY

CT1AUR/106 I2TZK/108 KD6PY/100 AG9S/105

160 Meters

NN3Q/104

Satellite

DL1CF/104

5BDXCC

SP5DRH N2DL I3ZKD SP5ES JA7YAA V31AB W6WMV F2YT W6KON
K9BJ ND6U K4PR SP5PB WD4BTF I3ZRL N4TG AA4NC

New Honor Roll Members

Mixed

311
OZ1CTK/316
K9MFI/318

310
K4IBP/315
K7ZBV/314

Phone

313
W2RGU/329

311
K6EV/340

310
I4WZK/316
W0JMZ/321
WB0CIW/317

CW

308
OZ1CTK/312

Endorsements

Mixed

DF3CB/289 JA5ELM/305 XE1HTT/184 WB1ATZ/209 W2TS/289 W3ZBF/252 K5HKX/125 W6SQP/359 K9NB/319
DJ7EE/127 JA7FS/330 XE1OX/315 AF2C/304 W2YY/352 WA3DMH/293 K5JUC/313 W6SWM/314 K9RA/336
DK5JI/289 LA3WV/258 XE2MX/291 K2AGJ/330 WA2MID/312 AA4TV/226 K5NV/280 WK6E/317 K9RHY/311
DL1BS/335 LA4DM/310 YB5AQC/236 K2AIO/311 WA2PJI/127 K4DRL/147 K5OS/333 WM6P/180 K9TN/317
DL1KB/364 LU6DHR/302 YU4BM/283 K2FB/351 WA2TMP/280 K4HQI/200 K5RPC/251 K7OXB/328 KQ9L/163
DL1LD/335 OE2EGL/336 YV5KKG/127 K2LQ/323 WB2CEI/314 K4LR/315 KC5M/310 K7RLS/324 N9RF/316
DL3NBL/251 OH2FS/325 ZL1AMO/338 K2UFM/327 WB2FTK/258 K4OQK/266 KF5EA/227 KA7GXO/150 NF9V/255
DL3ZA/336 OH2NB/365 ZL4BO/349 K2UO/320 WB2HJW/225 K4SV/290 KR5D/294 N7UT/312 NJ9K/152
DL6DK/250 OH5OZ/281 ZS6RM/355 K2UPD/206 WB2LNR/135 K4XG/336 N5CB/290 NX7K/303 W9HR/205
DL0FU/184 OZ1FAO/294 AD1C/290 KA2NRR/176 WE2L/292 KB4HU/309 N5TC/311 W7CG/360 W9LNQ/339
EA3RF/237 OZ2E/291 K1CWG/132 KI2P/257 AI3Q/311 KB4NJ/187 NK5Z/256 W7FP/320 W9NNE/319
F2NB/321 PA3ABH/207 K1RM/338 KS2O/251 K3QMR/220 KC4XA/133 NN5O/267 W7GB/280 W9RY/328
F5II/338 PA0OI/251 K1VJH/315 N2AP/329 K3RY/125 KE4UC/250 W5KWK/283 W7LR/318 WA9WJE/329
F6HKD/177 PY4DD/299 K1WJB/305 N2JD/304 K3TUP/333 KF4YH/257 W5VSZ/312 W7MI/334 WD9DGA/184
F6IFE/278 SK4EA/201 K1YHM/286 N2KW/318 K3WUW/149 KI4HL/250 WA5IGD/315 K8ICE/287 K0AXU/261
G2FFO/321 SM6AOU/346 KA1MPA/136 NA2G/290 KB3X/300 KN4F/291 WA5KBH/175 K8IP/339 K0TLM/295
G3KDB/332 SM6DYK/320 KB1HY/273 NA2K/298 KQ3E/160 N4GE/312 WZ5I/204 K8ZO/313 K0TVY/199
G4GIR/302 SM7ABL/225 KE1F/307 NK2H/292 KV3J/227 N4TG/261 K6BWX/248 N8AVK/294 KD0JL/255
HB9CEY/207 SM7CMY/305 N1AFC/290 W2FP/336 N3AKD/287 N4ZQ/164 K6EV/350 N8ZA/330 KG6C/306
HB9NL/314 VE1KG/336 N1CIX/229 W2FR/331 N3CSL/179 NF4A/330 K6ICS/128 ND8D/133 ND0F/291
HB9PL/353 VE3DMC/310 N1XX/343 W2GA/329 NM3C/201 NI4Y/290 KE6OT/264 W8DWP/290 W0EU/260
HB0NL/168 VE3GMT/336 NA1I/283 W2HZ/340 W3CDG/330 NX4Y/290 KF6A/300 W8JQ/344 W0FF/318
IK2FCZ/250 VE3LDT/312 NF1G/212 W2IOT/331 W3EKN/338 W4BFR/352 KI6AN/176 W8LZV/303 W0GAX/306
I4FGG/225 VE3NE/339 NG1J/200 W2JB/328 W3HVM/235 W4DHZ/349 KI6BN/199 WB8EUN/334 W0IZV/149
JA1CLW/260 VE3OIT/250 W1DQH/335 W2LPE/361 W3KYN/179 W4FDA/336 KI6LE/320 WB8HIW/190 W02JCB/308
JK1TLP/202 VE7EW/134 W1GG/339 W2LZX/321 W3LB/333 W4ZMC/320 KI6WF/205 WB8ZRL/306 W0JM/287
JR1BVU/294 VK6HD/335 W1QUS/315 W2MIG/325 W3LDD/300 WB4PUD/306 W6CSI/271 WD8RTW/152 W0JMZ/323
JA2AYH/299 XE1CI/306 W1WLW/337 W2OOJ/210 W3PLI/251 WT4T/310 W6HDP/124 K9FD/318 W0JS/316
JE2GMO/152 XE1F/218 WA1UDH/280 W2PSU/328 W3XM/341 K5BLV/319 W6PN/345 K9KA/336 WB0RSH/228
JA3DWT/306 XE1GBM/315

Phone

CP5TC/162 I2SLA/328 SM6AOU/303 YV5KKG/126 K2UO/319 KB3X/294 N4ZQ/159 WB5FXT/155 K8ZO/313
CT1NQ/201 IK2AWT/227 SM7ABL/210 YV6CAX/220 KC2BW/298 KD3CR/132 NF4A/300 KE6OT/239 KE8OW/140
CX7BV/179 IK2FCZ/250 TI2HP/366 ZL2AQK/127 KC2FC/279 N3AKD/264 W4BFR/330 KI6BU/226 W8JQ/321
DF3CB/241 IN3QCI/228 VE3GMT/336 ZL4BO/328 KG2U/309 N3DYW/145 W4FPS/326 KI6LE/296 WB8EUN/331
DK9KX/321 IV3TRS/170 VE3LDT/292 ZP5JCY/288 KI2P/224 W3CDG/317 W4NYN/341 KI6WF/205 WB8ZRL/300
DL1BS/284 IV3YRN/314 VE3NE/338 ZS6RM/351 N2ERN/255 W3EKN/315 W4ZMC/271 N6DJY/279 WD8MQJ/249
DL1KB/355 I5KQA/222 VE4JK/310 K1CWG/131 N2KW/315 W3NQA/229 WA4GKT/303 W6BCZ/125 AI9U/295
DL0FU/170 IK8GCS/277 VE7EW/126 K1MIZ/306 NA2K/288 W3XM/340 WA4MXD/152 W6MND/282 K9MFI/305
EA1DZA/146 IK0FEW/241 VK6HD/333 K1YHM/276 NK2H/292 W3ZBF/203 WB4TIN/316 WD6EKR/285 K9ZXG/225
EA3AAY/165 JA1CLW/245 VP2MO/302 K1YR/282 W2FP/332 AA4DO/228 WT4I/209 WK6E/213 KA9PJZ/254
EA4CPK/282 JA2AYH/285 XE1CI/305 KA1HBV/231 W2GA/323 AA4JO/205 WT4T/305 K7ICW/311 KS9R/300
EA4DPK/291 JA7FS/275 XE1GBM/315 KA1ORB/127 W2HZ/339 K4LR/311 K5OS/332 K7OXB/321 NJ9K/152
EA7CWC/229 KP4GY/150 XE1HTT/183 N1API/293 W2IOT/329 K4ONF/300 K5RPC/250 K7RLS/307 W9LNQ/320
F3DJ/349 LU2AH/321 XE1MD/285 N1CIX/206 W2LZX/318 K4UAS/319 KA5WOO/213 K7ZBV/313 W9NNE/306
F3EJ/155 LU2CC/293 XE1MDX/307 NF1G/212 W2MIG/324 K4XG/330 KC5ZA/261 NS7J/320 W9RY/325
F5II/338 LU3AJW/318 XE1OX/315 W1GG/285 W2PSU/325 KB4HU/309 KR5D/250 NX7K/296 K0TLM/289
F6IFE/277 LU4DXU/212 XE1XF/280 W1NBE/201 W2YY/347 KB4NJ/176 N5ITG/232 W7DSZ/311 K0TVY/199
G4GIR/293 LU4MEE/306 XE1XM/293 W1WLW/301 WA2KDC/127 KF4YH/256 NK5Z/204 W7FP/320 KA0NNF/290
G4JCO/140 LU5HN/305 XE1XYY/125 AF2C/290 WA2MID/312 KI4UJ/180 NO5B/213 WD6EKR/285 W0FF/293
GM4PVC/151 OE2EGL/336 YB5AQC/225 K2AGJ/319 WB2HJW/183 KN4F/264 NT5C/228 K8CFU/350 W0GAX/277
GM4VWV/186 OH2FS/256 YB5QZ/255 K2HWE/314 WE2L/292 N4BHJ/273 W5KWK/283 K8IP/278 W0JCB/296
HK6DOS/225 PY2DSC/329 YV2EMR/139 K2SHE/325 AI3Q/310 N4JOS/202 W5UXR/154 K8WWA/280 W0JM/276
I2LPA/330 SK4EA/178 YV5AJK/349 K2UFM/326 K3DH/282 N4ONI/260 W5VSZ/302 K8YVI/217 W0RGN/150

CW

DF3CB/256	G2FFO/236	OZ5UR/205	W1GG/255	KI2P/184	KV3J/191	N5DEE/264	N7UT/288	K9ZXG/125
DL1BS/282	G3KDB/283	SM6DYK/298	W1WLW/301	N2KW/312	N3AKD/220	N5TC/272	NS7J/304	W9HR/176
DL1LD/250	G4GIR/275	SM6OLL/202	AF2C/220	NA2K/165	W3BBL/270	W5LVD/304	NX7K/162	W9LNQ/294
DL3RK/290	HB9CEY/183	SP2BKF/208	K2AGJ/299	W2FP/316	W3EKN/305	K6EID/249	W7LR/313	W9NNE/161
DL5YBU/204	HK3YH/270	VE3LDT/284	K2AIO/229	W2LZX/302	W3PLI/236	KE6OT/153	K8IP/266	W9RY/299
EA7BZN/134	OH2FS/256	XE1MD/199	K2IJ/303	W2MIG/312	AA4DO/207	W6ENZ/256	K8NA/300	W9ZM/316
FE2VV/177	OH5OZ/250	XE1MDX/127	K2OWE/290	W2YY/305	K4XG/301	W6SZ/198	WB8ZRL/270	WØBW/311
F6HBI/258	OX3OA/130	AD1C/280	K2QIL/250	AF3E/203	KA4YAE/153	K7NN/273	K9KA/201	WØGAX/263
F6HKD/176	OZ1FAO/280	AI1N/150	K2UFM/293	AI3Q/285	NF4A/254	KY7M/249	K9MFI/305	WØJM/233
F9QI/172	OZ2E/272	N1CYA/225	K2UO/316	KQ3E/155	KR5D/283	N7HUS/165		

RTTY

I5FLN/270	W1FZ/125	W6GC/183

160 Meters

DJ6RX/137	W2BXA/180	W2JB/170	W2LZX/110	K3UA/150	W4DHZ/121	W7AWA/125	W8UVZ/150	WØZV/206
KH6CC/130	W2FP/145	W2LPE/161						

DXCC Notes

The DXCC Annual Listing will appear in the January 1989 issue of *QST*.

Happenings

(continued from page 54)

Montgomery County Amateur Radio Club. He is responsible for the amateur coordination of over 20 Washington-area events throughout the year.

As the winner of the Young Ham of the Year Award, Jonathan received an expense-paid trip to the ARRL Southwestern Division Convention (HamCon '88) held at Anaheim, California, September 2-4, where he was presented with a plaque and a Yaesu rig at the convention Grand Banquet. Westlink established the Young Ham of the Year award to highlight the accomplishments of the nation's many young radio hobbyists and to encourage other young people to join the exciting and rewarding hobby of Amateur Radio.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Arizona, Arkansas, Iowa, Kentucky, Montana, Mississippi, North Texas, Orange and Wyoming Sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page 8 of this issue.

A petition, to be valid, must contain the signatures of five or more Full ARRL members residing in the Section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition*. It is advisable to have a few more than five signatures on each petition.

Petition forms (FSD-129) are available on request from ARRL Headquarters but are not required. The following wording is suggested:

(Place and date)
Field Services Manager, ARRL
225 Main Street, Newington, CT 06111

We, the undersigned Full members of the...ARRL Section of the...Division, hereby nominate...as candidate for Section Manager for this Section for the next two-year term of office. (Signature...Call...City...ZIP).

Any candidate for the office of Section Manager must be a resident of the Section, a licensed amateur of Technician class or higher, and a Full Member of the League for a continuous term of at least two years immediately preceding receipt of a petition for nomination. Petitions must be received at Headquarters on or before 4:00 PM Eastern Standard Time December 9, 1988.

Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before January 2, 1989. Returns will be counted February 21, 1989. SMs elected as a result of the above procedure will take office April 1, 1989.

If only one valid petition is received for a Section, that nominee shall be declared elected without opposition for a two-year term beginning April 1, 1989.

If no petitions are received for a Section by the specified closing date, such Section will be resolicited in April *QST*. An SM elected through the resolicitation will serve a term of 18 months.

Vacancies in any SM office between elections are filled by the Field Services Manager.

You are urged to take the initiative and file a nomination petition immediately.

Richard K. Palm, K1CE
Field Services Manager

REPEAT NOMINATING SOLICITATION

Since no petitions were received for the Puerto Rico Section by the petition deadline of June 10, 1988, as a result of Notices placed in April and May *QST*, nominating petitions are herewith resolicited. See the above notice for details on how to nominate.

Strays

NINE MINUS ONE

☐ There were a few years in the '50s when I had to put ham radio on hold due to establishing a family and building a home. When things leveled off, I decided to get something on the air. The old SX-16 was still working fine, so I dug out my home-brew CW rig which I had built shortly after WW II. It had an 811 final with a series feed to the plate. I never quite got around to shielding the exposed parts. After a few parts were replaced, I found that I could load up to about 100 W input without any fireworks.

One afternoon, I was tuning up on 40 meters out in my workshop/ham shack, when the family pet, a large tomcat known as "Old Kitty," wandered in. He rubbed around on my ankles, purring happily. All of a sudden, though, he leaped up and came smack down on the tank coil with 1000 volts —and RF too.

The subsequent events were rather blurred. Old Kitty rose rapidly amidst a slight frying sound, and he appeared to be half flying as he went out the door. When I followed him outside, he was nowhere to be seen. About dusk, I heard a plaintive meowing. It was Old Kitty out at the end of the driveway. He had to be carried into the house. No injuries were visible, but he was still very nervous. Well, Old Kitty lived for a number of years after that, but as far as I can remember, he never entered the shack again.—*Tom H. Thomas, W5ITK*

ARRL COMPUTER NETWORKING CONFERENCE

☐ Special thanks go to Don Bennett, K4NGC, registration chairman for the 7th ARRL Networking Conference held in Columbia, Maryland on October 1. Attendance was approximately 150 people. The papers and talks were excellent. Copies of the proceedings are available from ARRL HQ at $12 per copy plus $2.50 shipping and handling ($3.50 for non USPS delivery).

Correspondence

Conducted By John Hennessee, KJ4KB
Regulatory Information Assistant, ARRL

CW—OBSOLETE?

☐ The use of Morse code as a means of communication in WW I was a necessity, not an achievement. The same is true for WW II. It truly was "state of the art" in those times. The use of Morse code in future conflicts as a principal means of communication is unthinkable. To suggest such a thing could be an invitation to ridicule. Those amateurs who continue to praise the merits of CW and quote the axiom of "CW forever" indeed speak truly. It takes "forever" to manage information using this mode, even without the great need to be "correct."

The new digital, electronic methods of communications available today are engineering marvels. It could be around the use of this equipment that the first "no code" license be issued. Perhaps this approach would lessen the traditional opposition.—*W. A. Swanson, N8IKW, Dearborn, Michigan*

AMATEUR RADIO—EQUIPMENT OR OPERATOR?

☐ The ultimate demise of Amateur Radio may be just around the corner, according to a piece by Brad Wells, KR7L, in September 1988 *QST*. Mr Wells has unfortunately missed the point: The strength of Amateur Radio lies in the personal interaction among amateurs. Hearing a person's voice for 10 years before ever meeting the individual, listening to an operator's fist and knowing who the operator is before he gives his call sign—this is the power and attraction of Amateur Radio. Take away the personal interaction, and Amateur Radio as we know it will be destroyed. Is our hobby destined to be destroyed rather than enhanced by the space age?

In reading his article entitled "Future Shock in the NTS," one would come to believe that Amateur Radio and the National Traffic System (NTS) are made up only by equipment-related items and not by the operators! I feel strongly that if the operators see the need to make the shift to packet-based traffic handling, it then will occur as evolution. If these so-called entrenched NTS operators who have been the backbone of the system for years do not decide to go that way, then, as Mr Wells suggests, NTS will cease to exist. My only hope is that if this occurs, that a system as organized as the current NTS system, based upon packet, will replace it. For the moment, no formal plan exists. At present, no expertise is required to operate or put a packet bulletin board on the air; packet ops don't even acknowledge "ARRL format" as the official format for traffic. So, because of the freelancing which occurs, each BBS is different and has its own set of rules. This freelancing cannot exist if packet is to replace the NTS, so someone has got their hands full to turn this system around before the NTS has a whole lot to worry about!

In closing, there are some wholesale truths in the article written by Mr Wells, but until many of the so-called bugs "go away" from packet, I hope this "demise" in Amateur Radio will be slow in coming. Can the whirr of a TNC replace the voice inflection or fist of friends who grew up with Amateur Radio? Hopefully, this "future shock" will not be as dramatic as proposed by Mr Wells. It seems that, at the moment, the only persons doing better because of packet radio are the folks selling the equipment.—*Herb Dye, NC3V, Frostburg, Maryland*

TUBE VS TRANSISTOR

☐ I was breezing through some old *QST*s and found a short article on the transistor. It was very interesting to see how the state of the art has changed in 40 years. What was really interesting was the last paragraph [of an article on] page 48 of October 1948 *QST* which stated:

> . . . It doesn't appear that there will be much use made of transistors in amateur work, unless it is in portable and/or compact audio amplifiers. The noise figure is said to be poor, compared to that obtainable with vacuum tubes, and this fact may limit the usefulness in some amateur applications. These clever little devices are well worth keeping an eye on. . .

Amen! This was certainly true.—*Dale E. Mecomber, N2DM, Skaneateles Falls, New York*

COMMUNICATIONS SURVIVABILITY AND EMP

☐ [I enjoyed] the excellent article on the National Communications System (August 1988 *QST*). Communications survivability is an important issue for both radio amateurs and commercial communications networks.

However, Amateur Radio participation in the Shared Resources (SHARES) High Frequency Program would be more effective if ham stations were protected against electomagnetic pulse (EMP). As the NCS pointed out two years ago (August-November 1986 *QST*), amateur stations can be protected from EMP, so why don't we hams pull together and shield our stations against EMP? Our emergency plans should include EMP events and possible pulse war scenarios.—*Nickolaus E. Leggett, N3NL, Washington, DC*

10-METER COMPRESSION!

☐ Through the years, we've all heard [the term] "use the whole 10-meter band, not just the first 500 kHz." Before Novice Enhancement, it seemed that most amateurs [in the sideband segment of the band] were using 28.5-28.8 MHz.

Now we have Novices and Technicians operating SSB on 28.3-28.5 MHz. This is great, tremendous, but I think the ARRL and the FCC have created a new "problem"—I now hear most SSB operations "compressed" into the 28.3-28.5 segment. All of us "old" guys QSY to talk to the new guys on 28.3-28.5 MHz. As a result, there are few signals above 28.5 MHz.

The rebuttal I hear is that no matter where Novices [and Technicians] are put [in their new subbands], everyone would "compress there." Don't you believe it! Why didn't the FCC say that 29.0-29.2 MHz be used rather than the present Novice subband? . . . Wouldn't this seem logical and beneficial to spread out activity on 10 meters rather than concentrating it in one small area?—*Joel Tenenbaum, K1JIY, Brockton, Massachusetts*

[Novice and Technician operators were also given the CW/digital subband of 28.1-28.3 MHz and the two other VHF/UHF bands so that these new operators could be put in the mainstream of Amateur Radio activity.—Ed.]

MICROPHONE TECHNIQUE

☐ There are many comments on the poor CW operator. However, I haven't heard a lot of comment about the ham who shouts into his mike or who holds the mike so close to his mouth that you can hear his tonsils rattle! He usually is the one guilty of flat-topping and causing interference to others. Let the audio amplifier do its job!—*Ray Schaub, W8ATO, Lake Leelanau, Michigan*

HXG

☐ I agree with what Bob Weinstock, KN1K, says [in his article entitled "A Public Service Opinion"] in the Public Service column of August 1988 *QST*. In my opinion, a message should not be serviced back to the originator unless: (1) the content of the radiogram violates some FCC rule; or (2) it cannot be delivered either by hand, telephone or US Mail.

The cost of an occasional toll call or postage stamp is minimal, and Amateur Radio deserves this much dedication from anyone who would call himself or herself an NTS traffic handler.—*Robert C. Becker, N3FM, Oil City, Pennsylvania*

[HXG will be familiar to amateurs involved in traffic handling. Used in the preamble (heading) of messages, it means "Delivery by mail or landline toll not required..."—Ed.]

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716-2702
CompuServe ID no. 70645,247

Heathkit HV-2000 YAPPs About Packet Radio

In the December 1987 issue of *QST* (page 39), I noted a product review of the Heathkit HV-2000 voice synthesizer, a plug-in card for the IBM® family of personal computers. The review was written by Bruce Hale, KB1MW. I found Bruce's review to be accurate. He said the board is a simple project and can be built in less than two hours. I agree!

I purchased the HV-2000 for "talking packet radio." Although I cannot put myself in the place of a person with impaired vision, I think the following information may be useful to such a person or, if you are like me and are interested in new technology, the following should interest you, too.

The HV-2000 uses hardware to perform the actual voice synthesis. However, Heathkit includes a disk containing a file called VOICE.SYS, a device driver that interfaces the HV-2000 hardware to other software running on the computer. Heathkit also includes a file called SPEAK.COM, which contains a "bare bones" terminal program. I wanted to use YAPP Version 2.0 with the HV-2000 (YAPP, or "Yet Another Packet Program," is a popular split-screen packet-radio terminal program written for MS-DOS® computers by Jeff Jacobsen, WA7MBL). Unfortunately, the HV-2000 will not work with YAPP.

The HV-2000 will work with AEA's PC-PAKRATT, and with PTP Packet, a public-domain program by Carl Moreschi, N4PY. With these programs, you just set the program to receive an ASCII file, sometimes referred to as "capture mode," and name the file "HV." HV is the token name used by Heathkit to invoke the device driver that, in turn, communicates with the HV-2000 hardware. All data will be routed to HV and the unit will vocalize the packets as they are received. To stop the voice synthesizer, you simply close the capture file as if you were stopping a file capture.

The Problem

Unlike PC-PAKRATT and PTP, when you ask YAPP to capture a file and enter a file name, the program checks to see if that file already exists. If it does, YAPP asks if you wish to erase the duplicate file. If you say no, you are prompted for a different file name.

The problem is that the token name HV is permanently installed by the device driver VOICE.SYS. When you ask YAPP to capture a file with the file name HV, the program says that the file already exists. If you try and erase it, the computer crashes and displays an error message. Attempting to reload YAPP or any other program without first rebooting causes the computer to lock up.

The Solution

The answer to the riddle is to lock out the portion of the YAPP code that asks if you wish to erase a duplicate file name. At first glance, this may seem like a simple task, but without access to the YAPP source code, it took me 30 hours to trace through the code with a sophisticated debugger called "AT86," which, among other things, allowed me to disassemble parts of the YAPP code and examine it.

The changes necessary to lock out the erase prompt are listed in the accompanying sidebar. For clarity, I have listed both the disassembled code as a list file and also as it would appear with a simple debugger like DEBUG that is supplied with MS-DOS. Although I used AT86 to make the necessary changes, you should have no trouble making the changes with DEBUG as well.—*Richard Tashner, N2EO (163-34 21 Rd, Whitestone, NY 11357)*

YAPP Version 2.0 Code After Modification

Note: All changes are enclosed within dashed lines.

```
2098:78A6  E91201   JMP   79BB
2098:78A9  B97200   MOV   CX,72
2098:78AC  E82297   CALL  0FD1
2098:78AF  4C       DEC   SP
2098:78B0  8D7EDF   LEA   DI,[BP-21]
2098:78B3  16       PUSH  SS
2098:78B4  E81599   CALL  11CC
2098:78B7  B11E     MOV   CL,1E
2098:78B9  E88199   CALL  123D
= = = = = = = = = = = = = =
2098:78BC  E8E800   CALL  79A7
2098:78BF  90       NOP
2098:78C0  90       NOP
2098:78C1  90       NOP
2098:78C2  90       NOP
2098:78C3  90       NOP
= = = = = = = = = = = = = =
2098:78C4  B95800   MOV   CX,58
2098:78C7  E80797   CALL  0FD1
2098:78CA  4C       DEC   SP
2098:78CB  8D7EDF   LEA   DI,[BP-21]
2098:78CE  16       PUSH  SS
2098:78CF  E8FA98   CALL  11CC
2098:78D2  E81099   CALL  11E5
```

```
                                                    = = = = = = = =
78B0  8D  7E  DF  16  E8  15  99  B1-1E  E8  81  99  E8  E8  00  90
          = = = = = = =                             = = = = = = = =
78C0  90  90  90  90  B9  58  00  E8-07  97  4C  8D  7E  DF  16  E8
          = = = = = = =
```

BASIC PROPAGATION TOOLS

The QRPer's BASIC Propagation Tool Kit is a 42-page booklet written by Robert R. Brown, NM7M. The booklet is described as "a tool kit for those QRPers interested in propagation. . .who have a modest acquaintance with BASIC programming." My only objection to this is that QRP operators are not the only ones who will be interested in this booklet (unless your definition of QRP is anything less than the legal limit).

The booklet provides you with the tools for predicting radio propagation using the BASIC programming language. The booklet also contains software modules that you use to build your own customized propagation prediction software. Using the modules, you learn what is involved to make the program run, rather than simply how to plug solar flux values into a program and type RUN. The booklet is available from the QRP ARCI Candy Store in care of Bob Spidell, W6SKQ, 45020 N Camolin Ave, Lancaster, CA 93534.

NOVICE PACKET-RADIO HOT SPOTS

The following is a compilation of Novice packet-radio activity centers throughout the United States. If you are aware of one that is not listed, let me know and I will include it next time.

Arizona, Phoenix: 223.56 MHz: Phoenix area network node

California, Southern: 223.42 MHz: access to WESTNET PBBSs: Torrance AJ6F-11, Chatsworth K6IYK-14, Rialto KB6GVT-1, Riverside KD4SQ-2; digipeaters: Hollywood Hills KB6CUN, Riverside KD6SQ-4, Huntington Beach N6PWD; NET/ROM nodes: Hollywood Hills K6IYK-13, San Bernardino Mountains W6TJ-2, Palos Verdes W6VPZ-11

California, Sunnyvale: 223.54 MHz: KB6OWT-1 PBBS port

Connecticut, Central: 223.40 MHz: KC1J and K1TKP PBBSs/KA-Nodes

Indiana, Indianapolis: 223.40 MHz: N2BVJ gateway to 145.09 MHz

Maryland: 223.40 MHz: W3VPR PBBS port

New England: 223.58 MHz: designated Novice packet-radio frequency by the New England Spectrum Management Council

New Hampshire, Nashua: 223.54 MHz: WA1OMM PBBS port/145.01-MHz gateway

New Jersey, Northern (Alpine): 223.42 MHz: W2LWB-4 PBBS and NET/ROM node

New York, Albany (Valatie): 223.58 MHz: WA2WNI digipeater/PBBS port

New York, Syracuse (Skaneateles): 223.58 MHz: KC3BQ PBBS port

New York, Watkins Glen (Alpine): 223.58 MHz: N2EZG PBBS port

New York, Woodside: 223.42 MHz: WA2EXE-4 PBBS port

The New Frontier

Conducted By Bob Atkins, KA1GT
103 Division Ave, Millington, NJ 07946

10-GHz EME First

On August 27, 1988, at 0935 UTC, the first 10-GHz EME contact was made—between Texas and Arizona. On the Texas end were Kent Britain, WA5VJB, and Greg Raven, KF5N. James Vogler, WA7CJO, and Dave Chase, KY7B, were located in Arizona. Contact was made after six unsuccessful schedules over the preceding eight days. The equipment used in Texas by WA5VJB and KF5N was a highly modified SSB transverter feeding a TWT amplifier delivering 55 W output to a 12-foot dish. The system noise figure on receive was 2.1 dB. In Arizona, WA7CJO and KY7B used a 4.8-meter dish fed with 90 W and a receive system with a 1.5-dB noise figure. "O" reports (full call signs and reports copied in one transmit period) were exchanged. Kent, WA5VJB, commented that the signals were Doppler smeared to a width of about 1 kHz. Instead of copying a pure note, it was more like copying "CW white noise"—the signal was often quite distinct, but very difficult to copy. Antenna aiming was accomplished by first peaking the dish for maximum moon noise (0.3 to 0.6 dB above sky noise), then optically tracking the moon with an antenna-mounted bore sight or CCTV camera. I hope to have more information and equipment photographs for next month's column.

NEW USA 3456-MHz DX RECORD

After two attempts, a new 3456-MHz record of 454 miles was set at 10:58 AM MDT on August 7, 1988. The contact was made between Dan Osborne, WB5AFY, in Vernon, Texas and Lauren Libby, KXØO, located on Pikes Peak, Colorado (see Fig 1). Two previous attempts were made on July 16 and August 6, but poor conditions made contact impossible.

KXØO, as well as Aubrie Goobie, NYØT and James Scarlett, KD7Q, traveled to Pikes Peak on July 16 for the first attempt at the record. Path conditions on the Pikes Peak end were good, but conditions in Texas were not favorable for a try at the record. KXØO/Ø was able to salvage the record attempt by completing his 3456-MHz VUCC, working James Starkey, WØKJY, Keith Ericson, KØKE, and Bill McCaa, KØRZ (mobile), for the final three grid squares. KØRZ/M was running 1 watt to a 32-inch dish antenna. When working KXØO/Ø, KØRZ/M never dropped below S9 + 20 dB.

On August 6, KXØO and KD7O climbed Pikes Peak again, operating on 432, 903 and 3456 MHz. WB5AFY had strong signals on 432 MHz, but the attempt to establish contact on 3456 MHz fell short; weak signals were heard from WB5AFY, but no signals from KXØO/Ø. KXØO/Ø did work Al Ward, WB5LUA, located in McKinney, Texas, on 902.1-MHz at a distance of 625.2 miles. This contact was six miles short of breaking the US DX record for 902 MHz.

Another station worked on 903 MHz on August 6 was Dean Lewis, WAØTKJ, in Salina, Kansas, a distance of 390 miles. WAØTKJ ran 35 W to a single 33-element loop Yagi.

WB5AFY and KXØO/Ø tried the path again on August 7. A liaison frequency on 432 MHz was established to coordinate beam headings and identify propagation peaks. (It is interesting to note that 3456-MHz propagation peaked after 432-MHz signals would peak; an almost inverse relationship seemed to exist between signal peaks on the two bands.)

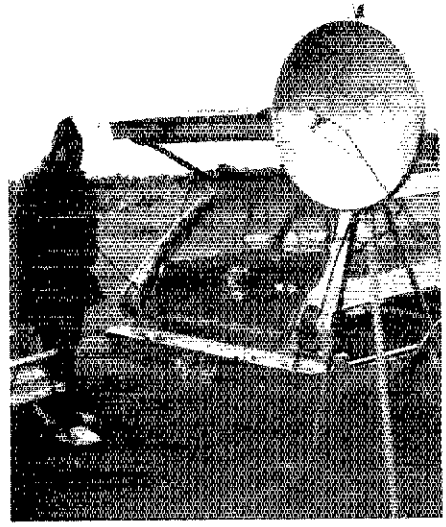


Fig 1—Lauren Libby, KXØO, stands poised to set a new 3456-MHz DX record—454 miles—at Pikes Peak, Colorado. Dan Osborne, WB5AFY, did the honors at the other end of the path in Vernon, Texas.

At 10:58 AM MDT, KXØO/Ø completed 3456-MHz contact with WB5AFY, peaking 8 dB above the noise at WB5AFY and WB5AFY peaking 12 dB above the noise on Pikes Peak. Because of the higher power used on the Texas end, KXØO/Ø had solid copy on WB5AFY for almost 40 minutes before the record two-way contact was finally made. (WB5AFY and KXØO observed that all signals peaked at approximately 5-minute intervals and the 3456-MHz signals experienced extremely rapid QSB on both ends of the path.)

The equipment used at WB5AFY included a 6-foot dish with a soup-can feed and 275 W from a TWT amplifier. KXØO/Ø used a transverter with 1296-MHz IF, 13.5 W and a 32-inch dish with a soup-can feed. Both receiving systems had 1-dB noise figures.

Weather conditions on Pikes Peak exhibited temperatures in the high 30s, with humidity near 50%. The geographic center of the 3456-MHz record contact signal path was the Texas panhandle where the temperature was 90° and humidity was nearly 60%. At the WB5AFY end of the contact, temperatures were in the low 90s, with humidity near 60%. Many thanks to KD7O, NYØT, KØRZ, KDØGT, WØMXY and NKØP for their valuable assistance in the project.

EAST COAST 10-GHz DX

Ed, W2TTM, has sent along details of a recent 10-GHz DXpedition to Cape Cod. On the morning of August 9, W2TTM worked Victor, W2VC at Mt Mitchel (near Sandy Hook), New Jersey, at a distance of 227 miles. Signal strength started at the noise level and peaked to S9 + 10 dB over a 45-minute period. W2TTM also worked Tony, W2GUM, over the same path. Later that evening, Fred, KG2K, was contacted over the same path, but the signals had dropped to S5. Ed noted that weather conditions were worse during the evening contact, with high winds almost blowing his dish over! All stations were using similar equipment: SSB transverters running about 200 mW out, a 3-dB noise figure on receive and 3-foot dishes. (Warren, WB2ONA, traveled to Duck, North Carolina in the hope of extending the path, but he did not hear any 10-GHz signals. Weather in North Carolina was poor during the schedule periods.) On his journey back to New Jersey, W2TTM stopped at Pt Judith, Rhode Island, and worked W2VC and W2GUM again (both on Mt Mitchel) over a 147-mile path.

CSVHFS ANTENNA AND NOISE FIGURE MEASUREMENT RESULTS

Tables 1 and 2 show the antenna and noise-figure measurement results obtained at the 22nd annual Central States VHF Society conference held in Lincoln, Nebraska on July 22, 1988. In Table 1, all antenna-range results are expressed in dBi (dB over an isotropic source). A few words of caution: Antenna gains are notoriously hard to measure with absolute accuracy. Relative gain between two antennas, measured on the same range, at the same time, *may* be measurable to 0.1 dB, but the gain of any one antenna *measured on separate occasions, on different ranges, may differ by a dB or more*, depending on the nature (length, height and so on) of the range.

The antenna class abbreviations are: C = commercial, HB = home-brew, REF = reference. Table 2 details the results of the noise-figure measurements for the listed devices. The device classes were: C = commercial, HB = home brew, 2st = two stage and XVTR = transverter. Device manufacturers are MGF = Mitsubishi; NE = NEC; ATF = Avantek and DXL = Dexel.

Table 1

Antenna Gains

1296 MHz

Operator	Class	Antenna	Gain (dBi)
KBØHH	HB	68" dish	21.8
K9VGE	C	KLM 44-el Yagi	21.5
W7GBI	HB	67-el DL7QY	21.1
W3HQT	C	2345LY loop Yagi	20.2
KBØHH	HB	44" dish	20.1
W9DNT	HB	44-el Yagi	19.3
WA8TVK	HB	22-el Yagi	18.3
WØOHP	HB	15-el Quagi	17.5
WØUC	HB	21-el F9FT fiberglass boom	16.3
NE8I	HB	22-el loop Yagi	16.3
WBØTEM	REF	11-el Yagi	14.5
W9DNT	HB	6-el end fire	12.6
WA9HCZ	HB	Alford slot	12.0
WB5ZDP	HB	Can feed	8.3

2304 MHz

Operator	Class	Antenna	Gain (dBi)
KBØHH	HB	44" dish	24.5
KBØHH	HB	44" dish choke feed	22.3
W7GBI	HB	DL7YC Yagi	22.2
W4ODW	HB	79-el loop Yagi	20.3
W4ODW	HB	51-el loop Yagi	19.7
NE8I	HB	44-el loop Yagi	19.0
WA8VTK	HB	28-el Yagi	18.4

3456 MHz

Operator	Class	Antenna	Gain (dBi)
WA5VJB	HB	59-el loop Yagi	21.4
WA5VJB	HB	48-el loop Yagi	20.6
WA5VJB	REF	12 × 9 × 12" horn	17.5
WA5VJB	HB	21-el loop Yagi	16.5
KØKE	HB	TVRO horn	9.2
WB5LUA	HB	Soup can	7.8

5760 MHz

Operator	Class	Antenna	Gain (dBi)
WA5VJB	REF	10 × 8 × 18" horn	21.4
WA3TTS	HB	8 × 5 × 12" horn	20.3

10 GHz

Operator	Class	Antenna	Gain (dBi)
KØNG	HB	25" dish	29.2
WA5VJB	HB	18" dish	27.3
WA5VJB	HB	7 × 5.5 × 15" horn	22.7
WA3TTS	HB	7.5 × 5.25 × 13" horn	22.1
WA5YOU	C	5.25 × 4.75 × 10" horn	19.6
WA5VJB	HB	5 × 8" collinear	18.3
WA5VJB	REF	5 × 8 × 6" horn	17.7
NE8I	C	2.75 × 2 × 1.4" horn	12.0

24 GHz

Operator	Class	Antenna	Gain (dBi)
WA5VJB	HB	4.25 × 3.5 × 12" horn	25.0
WA5VJB	HB	2 × 2 × 4" horn	20.0
WA5VJB	REF	1.5 × 1 × 2" horn	16.5

Table 2

Noise Figures

1296 MHz

Operator	Class	Device	Noise Figure	Gain (dB)
WB8BKC	C	MGF1412	0.47	18.14
VE4MA	2st	NE71084	0.49	32.23
WD5AGO	HB	MGF1412	0.56	16.87
WA8EUU	C	MGF1302	0.58	16.82
WA8EUU	C	MGF1302	0.60	17.83
WD5AGO	HB	MGF1302	0.62	16.95
WB5LUA	HB	ATF10135	0.64	13.46
WA7CJO	HB	NE72084	0.68	13.94
W3HQT	C	MGF1302	0.70	11.12
KØFQA	HB	MGF1412	0.71	16.53
KØTLM	HB	MGF1402	0.96	14.10
WD5AGO	XVTR	MGF1202	1.26	22.06
WA5VJB	C	TWT	5.88	19.20

2304 MHz

Operator	Class	Device	Noise Figure	Gain (dB)
WB5LUA	HB	ATF10135	0.57	13.25
WB5LUA	HB	ATF10135	0.61	13.98
WB8BKC	C	MGF1402	0.71	14.30
WA5VJB	HB	ATF10135	0.75	10.60
VE4MA	HB	MGF1412	0.80	30.40
WA5VJB	HB	ATF10135	0.90	10.04
WB5LUA	XVTR	DXL1503	2.70	25.40

3456 MHz

Operator	Class	Device	Noise Figure	Gain (dB)
WB5LUA	HB	ATF10135	0.78	23.80
WB8BKC	C	MGF1402	1.85	8.40
WB5LUA	XVTR	ATF10135	3.53	25.80

5760 MHz

Operator	Class	Device	Noise Figure	Gain (dB)
WB5LUA	HB	ATF10135	0.94	18.94
W5UGO	HB	ATF10153	1.09	7.96
W5UGO	HB	ATF10135	1.20	16.80
K5PJR	HB	MGF1302	1.55	24.00
WB5LUA	XVTR	ATF10135	1.80	28.93
WA5VJB	HB	MGF1302	2.66	19.17
W5UGO	HB	NEC694	3.74	15.28
WA3TTS	HB	MAR-8	5.75	7.25

10368 MHz

Operator	Class	Device	Noise Figure	Gain (dB)
WB5LUA	HB	ATF13135	1.24	8.32
WB5LUA	HB	ATF13135	1.32	7.22
WB5LUA	HB	ATF13135	1.52	15.51
WA5VJB	HB	ATF13135	1.90	16.49
WA5VJB	HB	ATF13135	1.95	8.46
WA7CJO	HB	ATF13135	2.15	16.12
WA5VJB	HB	ATF13135	2.25	20.16
WA5VJB	HB	MGF1303	2.30	12.35
WA5VJB	XVTR	MGF1403	3.30	32.12
WB5LUA	XVTR	ATF13135	3.35	22.30

Strays

I would like to get in touch with...

☐ anyone with info on replacement parts for a TET triband antenna model HB34D. Lee Brink, N1FSE, 25 Phelps Rd, Marlborough, CT 06447, tel 203-295-9063.

☐ anyone with a manual for a Tektronix oscilloscope model 561A. Dick Dawson, N8JDA, 1307 Georgia Ave, Marysville, MI 48040.

☐ anyone with a manual and a noise blanker circuit for a Stoner Pro 80-10 mobile SSB transceiver. Ross Stambler, K6DLH, 8420 La Bajada Ave, Whittier, CA 90605.

The World Above 50 MHz

Conducted By Bill Tynan, W3XO
Send reports to PO Box 117, Burtonsville, MD 20866,
or call 301-384-6736 to record late-breaking information.

Activity Nights—An Idea Whose Time Has Come and Stayed

Activity nights have been discussed in The World Above 50 MHz on several occasions over the years. But, as we come to the end of another season of high VHF activity and enter the cold winter months, it seems like a good time to look for ways to maintain activity on our bands. Concentrating activity during certain prescribed periods can be crucial in finding someone to QSO. Many localities have their own peculiar activity periods but the ones most used are those that follow the Spring and Fall Sprints. (The Fall series of Sprints is presently running. See October 1988 *QST*, page 107, for specifics.) These most common activity periods are at 2100 local time, with 2 meters on Monday, 1¼ meters—Tuesday, 70 cm—Wednesday, 23 cm—Thursday and 33 cm—Friday. In many areas where there is activity on the band, 13-cm devotees usually meet in conjunction with the Thursday evening 23-cm period. With its greater general level of activity, there is no specific meeting time for 6 meters, but many nets meet in various localities. There are also a number of 2-meter nets; many run under the auspices of Sidewinders-on-Two (SWOT).

Whatever the activity pattern is in your area, it pays, during the coming low-activity months, to try and get on the air at those times. It's a good way to keep the VHF gear dusted off.

I will be happy to publicize activity periods or nets in various parts of the country. Please drop me a line with the details.

ON THE BANDS

6 Meters—All signs point to quite widespread F2, probably by the time you read this. Already, some of the more propagation-blessed parts of the world are experiencing openings. On September 8, I listened on 28.885 while LU7DZ (transmitting on both bands simultaneously) worked eight Gs on 6 meters and an Italian via crossband. The Gs were still in here on 10 meters at 2130Z which should be something of a harbinger of things to come on 50 MHz. W5FF adds that they had a good South American opening the same day, with several LUs plus HC2CG/HC8 in with strong signals in the Albuquerque area. Fred also noted that the contest was somewhat enlivened in his area with a few South American signals. This was while the northern part of the country was experiencing a strong aurora. I am sure that there will be more about this buzz session next month. By the way, the contest operators seemed to be pretty much adhering to the 50.100 to 50.125 DX window at least here in the mid-Atlantic states—until the aurora hit and then most of the bars came down. Remember, it is exactly at such times when we need a place to listen for weak DX stations who are most likely to be around 50.110.

Sporadic-E lingered into mid and late August. CO2KK put in an appearance on the 14th, working about 20 stations with his old AM rig. QSLs for CO2KK should go to W4OO. (SASE please!) Possibly aided by E_s was an opening from Ohio and Indiana to South America. WB8YFE/9 Indianapolis reports working LU9AEA and CX1DOO on August 28 at 2200Z. Ray says that although signals were strong, the opening lasted only about 5 to 10 minutes.

Despite the rise of F2, the 6-meter EME contingent continues to add contacts. The latest this conductor has heard about is W6JKV's September 8 QSO with ZL1BGJ. Jim says that the New Zealander is using a rhombic, so his moon time is quite limited. This represents a new 6-meter EME record and apparently the first contact involving a non-US station.

2 Meters and 1¼ Meters—News of these bands is dominated by tropo this month. In mid August, many mid-western stations reported an excellent opening stretching up to about one thousand miles. NØLL Smith Center, KS says that it was the best tropo opening they have had in his part of the country in three years. Larry filled six log pages of contacts on 6 meters, 2 meters and 70 cm. His best DX was W2DRZ FNØ2, who he worked on both 2 meters and 70 cm. WBØYZN chimes in with his report of 91 2-meter contacts in 7 states with the best DX as WA3BGJ in western Pennsylvania FMØ9. One station he worked was running a dipole and 4 W. The opening reached as far west as Colorado. The husband-and-wife team of NØEOQ and KAØNNO report working 79 stations in 17 grids and 7 states with the most easterly contact being with WA8BHX in Michigan EN74. Another notable tropo opening occurred in the East in early September. K5UR in Arkansas seemed to be in a particularly good position to take advantage of it. Through W3ZZ, Rick reports that he concentrated on 1¼ meters and 70 cm with the strategy paying off very well for him. On 1¼ meters, Rick worked a large number of 8s plus WA3NZL and W3ZZ FM19 near Washington, also VE2DUB and K1WHS—the latter a distance of about 1289 miles and possibly a new North American tropo record for the band. W3ZZ is very enthused with the 220- to 225-MHz band, having been on only since mid-May. In that short time, Gene has worked 21 states and 45 grids. His station isn't what you would call "big," consisting of an FT-736R to an RF Concepts amplifier and a Cushcraft 225WB. Not all the VHF DX is worked on CW and SSB. W5LDH New Orleans reports a FB extended QSO of 500 miles with KA4OPM Umatilla, FL on 224.14 MHz FM.

The Higher Bands—The August *432 and Above EME News* put out by K2UYH notes that this past summer has been an unusual one for moonbounce activity on 70 cm and higher bands. Normally, Al writes, the summer months have not been considered exactly "prime time" for moonbounce. First there was the June 11 operation from 4U1UN by NC1I. Although it was not the full-blown EME operation that Frank had envisioned, it was a start in terms of that mode being used from the United Nations. Using only two Yagis, he was able to QSO DL9KR and OE5JFL on the rising moon. Another UN EME operation occurred in August. I'll try to provide a report on this one next month. July brought what the *432 and Above EME News* says "may be the most successful EME expedition in history." F6HKA assisted by F1EHN, F1GPL and F6DZK put Andorra on as C3ØBVA. Over the weekend of July 9 and 10 they reportedly worked over 40 70-cm stations using an array of sixteen 21-element Yagis. This was followed by KL7WE's operations from Missouri July 14 and 15 and Nebraska the next two days. Tim's efforts certainly held the attention of 70-cm state chasers during these fast-paced operations. It is reported that his "portable" array of twelve 11-element Yagis was successful in working his home station from both states as well as most of his sked stations. As if to top it off, word comes that the Space Observatory at Onsola (25-meter dish) will be on 13 cm the weekend of October 22 and 23. I'll try to have a report on this next month. Meanwhile, further details can be obtained on the 70 cm and Above EME Net Saturdays and Sundays at 1600Z on 14.345. The 2-meter EME Net follows this one at 1700Z. Also, Al's September newsletter notes that K6MYC, during his late summer stay in Hawaii, worked 15 stations on 70 cm including K4QIF for Rusty's 50th state. He's been at it a long time and deserves it. Mike is reportedly leaving his 8-Yagi array and kW final with KH6FOO, so Hawaii should be on 70-cm EME quite regularly.

Also in the moonbounce department, word comes from K7ICW that WA9FWD conducted a short 70-cm EME DXpedition to Nevada the weekend of August 26. He was aided by equipment loaned by K1FO and NC1I and assisted in the operation by W7HP and K7ICW. The station was set up in a shed in the backyard of W7HP. After a number of problems, mainly heavy rain, lightning and wet palm trees in the path getting rain in the final amplifier, they did manage to work K1FO for Steve's final state. He is another who has worked very hard at achieving 70-cm WAS. Others snagging the hard-to-get state were: KU4F, WØSD, N4GJV and NC1I.

Moonbounce at 10 GHz has long been the

50-MHz DX Standings

DXCC countries are based on information received as of September 9, 1988. Space limitations dictate that continental US and lower-tier Canadian stations with fewer than 15 countries (except those who claim WAC) not be listed. Countries are those listed in the latest ARRL Countries List and deleted countries worked prior to their deletion. Credit has not been granted for contacts with stations known not to have been authorized 6-meter operation at the time of the contact. Unless noted, totals are those worked by individual or club stations operating from a single location or multiple locations within a radius of 150 miles. The next update will be published in June 1989. In order to be included in that update, reports must arrive at this conductor's address (as listed at the top of each World Above 50 MHz column) by April 1, 1989. Reports need not be on the special forms, but use of these forms is helpful. Forms are available by sending an SASE to the column address. Whether or not reporting forms are used, reports must list each country, one station worked in that country, an indication as to whether the contact was two-way on 6 meters or cross-band, the date of the contact and whether or not the contact has been confirmed by receipt of a QSL. Stations located in countries where 6-meter operation is not generally permitted are listed in a separate crossband list.

6-Meter Two-Way Contacts

VE1YX*	86	86	WA6JRA*	55	19	KØTLM*	45	41	JH3WXB	36	32	C5AEH*	29	—	KA5FLE*	22	14	VK9YT	14	12
W2CAP/1*	81	79	W1QXX	54	54	CX8BE*	45	35	K3HCE	36	31	KCØJ*	28	27	KA1GIY	22	12	GW3LDH	14	10
JA4MBM*	81	79	JE1TGN*	54	54	K4QXX	44	43	WB8PAT*	35	35	N5JM	28	25	JE3YIA	22	12	V2ADX	14	4
K8WKZ*	81	78	WA6BYA*	54	53	K6QXY	44	43	WA9ETW*	35	34	N5DDS*	28	25	HC1MD/HC5	22	—	KL7JAJ	13	13
W2IDZ*	#80	79	WB4RUA	54	52	W1AIM*	44	42	K1LPS	35	32	W9TC	28	25	WDØFOY	21	21	VK2EEC	13	12
K1TOL*	80	79	WA3DMF	54	51	K1MNS*	44	42	KØUDZ*	35	32	N7AQM*	28	22	KD6PY	21	21	VK3ZZX	13	12
K5FF*	77	77	N6AJ*	54	51	JA2GHT	44	42	KC2TX/5	35	32	WA5QCP	27	27	KB6OX	21	21	VK6HK	13	8
VE1BNN	77	74	W2RTW	54	50	AE3T*	43	43	K8TGC	35	31	N9ANO*	27	27	VK2BNN	21	20	EI2W	13	—
W4CKD/8*	#77	73	K1GPJ*	54	48	N9CEX*	43	42	N6AMG	35	26	W7FIV	27	26	KA4CRT	21	20	WAØLHK*	12	12
W5VY*	76	72	K5CM*	54	—	WB8KAY*	43	42	W2VO*	35	26	VK2VC	27	26	WØJRP*	21	20	VP9WB	12	11
W5FF*	75	75	W7KMA*	53	52	K2OVS	43	39	N7DB	34	34	KQØJ*	27	25	WB4WXE	21	20	W1QXX/KP4	12	10
WB4OSN*	75	73	KS2T	53	52	WB4NMA	43	—	W2CNS*	34	33	N6AMD	27	25	WB6CTQ	21	19	G4BPY	11	11
W3XO*	75	63	K8EFS*	53	51	VK8GB	42	42	K1DAT	34	33	KA5CAW	27	23	K6ZMW	21	18	AL7FH	11	11
W4OO*	74	74	WA5HNK*	53	51	ZL1MQ	42	42	W8IJR*	34	33	K9SM*	27	21	VK3AUI	21	17	AL7C	11	11
WB2CZB*	74	73	K5GE*	53	51	KAØAYN*	42	41	WA6CRA/4	34	31	YV4UY	27	20	VK9XT	21	17	J6LOV	11	9
KH6IAA	74	72	KØGJX*	53	50	KA1DHO	42	40	KAØETE*	34	31	N2ASC	26	26	NI6E	21	16	JN1DQO	11	5
WA1OUB	74	71	JA2ODM*	53	48	KG6JDX*	42	38	WA1ZUB	34	30	WA9DYV*	26	26	K1HTV/3	21	15	GJ3YHU	11	3
KA1PE*	74	70	W5UWB*	53	42	KH6FLD	42	35	WD2AFH	34	28	VK2QF	26	26	9Y4JW	21	12	VK6OX	10	10
N3AHI/4*	#73	71	WB8BKC*	52	52	N5BBO*	41	41	K1SC/7	34	28	VK2DDG	26	25	VK4ALM	20	20	KL7WE	10	10
JA1RJU*	72	72	JAØAGA*	52	52	K1FWF*	41	40	VP2MJ	34	26	VE5LY	26	25	WA8LLY/6	20	20	KL7JJH	10	10
W8CMS	72	68	WA1AY8	52	51	W5KRH*	41	39	K6JYO*	34	22	VK3OT	26	25	WD8OXK	20	19	KL7IKV	10	10
W4WHK	72	64	WØSF*	51	51	WB7SLY*	41	38	W2LT	34	20	K9XY*	26	22	K9LCR	20	19	ZD7BW	10	10
ZD8TC*	71	71	W1EJ*	51	50	WB5CHW*	41	37	K6JZK	33	33	WA9DYT	26	22	JG3JLC	20	19	FK8EB	10	10
JA3EGE*	70	70	N5KW*	51	48	JG3AOD*	41	37	WA7GCS	33	33	KØSE*	26	21	VK3XQ	20	19	VK4KHZ	10	8
W3JO	70	68	WA7EPU*	#50	50	W5HN*	41	35	W2RLV	33	31	NP2AE	26	21	VK7JG	20	18	SZ2DH	10	—
K4CKS*	70	66	W3BWU	50	49	K7ICW	41	34	KA4AOK	33	30	KA1CDZ	26	13	K2JF	20	17	XE2BC	10	—
WA4QWC*	69	69	WB2PMP/4*	50	49	WAØCSL*	41	15	N6RZ	33	24	WA2YWP	26	13	VE1BUF	20	15	VK6RO	9	9
W3IWU*	#69	67	WBØPKN*	50	49	VP2VGR*	41	—	AE9M*	33	23	N7EIJ	25	25	G3COJ	20	12	WB4WXE/KL7	9	8
LU3EX*	69	67	N4TL	50	48	K4VPK*	40	39	W3ZZ	33	23	KAØCDN	25	25	KB6OK	20	—	G5KW*	#9	4
WA5IYX*	69	60	W6SMS*	50	48	N5WM*	40	39	K6GSS	32	32	WA5OLT	25	22	VK4TL	19	19	K6KLY/8P6	9	3
W5HUQ/4*	#68	64	PY2XB*	50	47	K6KLY	40	39	K5VVV*	32	31	JF3TDC	25	22	ZB2BL	19	18	VP2VDL	8	6
JA1VOK*	66	66	WB7TOV*	50	47	KB4CRT	40	38	AD1C	32	31	WØRGU*	25	21	VE5XU	19	18	GI3ZSC	8	—
WD4IYS*	65	65	N6CT*	50	44	N4VC	40	38	KS4J*	32	31	VE5JQ	25	20	PY2DJC*	19	15	8P6MH	6	6
WB2MAI	65	65	WA9AHZ*	48	48	WB6BMB*	40	38	N6VI	32	31	W9NAW	25	20	NA4I	19	12	G4JCC	6	4
JA2DDN*	65	65	JA2TTO	48	48	VP2MO	40	34	N7ARC*	32	31	N8AXA*	25	19	W9OEH	19	—	G4GLT	6	—
W1JR*	65	63	WB8YFE/9*	48	47	WB6KBZ*	40	29	WS4F	32	30	XE1FE*	25	17	VE6CX	18	18	G3PWK	6	—
WA7JTM*	65	61	K2QWD*	48	46	K1FJM/4*	39	39	K6QAX	32	29	9Y4LL	25	13	WØLSD	18	18	GW3LDH	6	—
WA4UAS*	64	63	K8UNV*	48	46	K4GOK	39	37	K1ZKR	32	29	WB4SLM	25	13	W7IDZ	18	17	WB4YLR	5	5
WA2BPE*	64	62	W2MPK*	48	44	JA1NVG	38	38	KD9JQ	#32	29	W8NE/4*	24	24	NØAJU	18	16	GU2HML	5	—
N4EJW	#64	60	K1SF	48	42	WA7UJH*	38	37	WB2OLP/4	32	26	WA4TJW	24	24	WA4TNV/KL7	18	15	G4HUP	5	—
K4KUZ*	63	63	JA6YBR*	48	—	WA5VJB	38	35	W5NKG	32	25	KØSFH*	24	23	GW3MHW	18	15	G4JLH	5	—
WB8IGY*	63	56	JF3KQA	47	47	WB5JAR*	38	34	K4LFF*	32	22	W7HAH	24	23	WAØOFO	18	14	G2AOK	4	—
K2YOF	61	59	WA1UQC*	47	45	N7AKB*	38	34	K6PHE	31	31	WBØRJR	24	22	KC4KK	18	14	G4BAO	4	—
K3QMX*	60	58	WA6PEV*	47	44	VE3ASO*	38	31	WA2EQK	31	30	KD4HP	24	21	VK3AMK	17	17	ZS6WB	3	3
WA8LXJ*	60	55	KG6DX	47	42	N4MM	37	37	VE4AS*	31	30	W8QOI	24	21	VK4ZAL	17	17	GM4FZH	3	—
K5SW*	59	59	WB8GEX*	46	44	WA1CRE	37	36	WB6NMT	31	26	JM1LCW	24	17	WB9OPD	17	16	VK2ZDI	2	2
K5ZMS*	59	58	K2QIE*	46	43	JA7QVI	37	35	VE1RC	31	26	KJ3F	23	23	KB7Q	17	16	**Crossband**		
JA5HTP*	59	58	W5NZS*	46	43	W1GXT	37	34	W2BN	31	24	HK4EB	23	23	VK3NM	17	16			
W6XJ	59	—	LU8BF	46	42	WA2QCE	37	34	LU6DLB	31	16	W7ABX	23	22	N2AVR	17	15	SM6PU	23	10
WB7OHF*	58	58	WA5UFH*	46	41	K3ICH/4	37	32	VK2BA	30	30	VK2KAY	23	21	VK4AYX	17	14	DJ2RE	14	9
W3WFM	58	57	W3OTC	46	39	WA6HXM	37	29	VK4ZJB	30	30	W7JXU	23	20	KA4CRT/5	17	14	DK6JL	11	4
NØLL*	57	56	K1ICM*	45	45	K7GGJ	37	28	N4CD	30	27	HC8VHF*	23	—	WØPVL*	16	16	SV1DH	10	—
W6BJI*	57	56	JA9DUR*	45	45	KØUS*	37	23	VE3EVW	30	22	OA8V	23	—	KØCJ	16	15	SM7BAE	6	3
LU9AEA	57	56	KA1A	45	45	WBØZKG*	37	20	JG3RGG*	30	22	W7KNT	22	22	VK4ZSH	16	15	CT2EE	5	2
LU7DZ*	57	55	WB8GEW*	45	44	VE3DSS*	36	36	KC3EP	30	22	WB6AAG	22	22	VK2ZRU	16	15	OZ9QV	5	1
W5DZF/4*	56	54	W4NVW/3	45	44	WD2AKA	36	34	VK2DDG	29	28	KA6ING	22	22	KL7GLL/4	16	14	I5CTE	4	0
N5DDB*	56	52	WD4FAB	45	43	HC2FG	36	34	K4ROM	29	27	VK3AWY	22	22	WØPKN	16	12	F6EMT	3	2
K1ZFE*	55	55	WB2WSV*	45	42	WA6THT	36	34	WAØNOK	29	27	VK5LP	22	21	W8SMD	16	11	HA6NP	3	—
LU3DCA	55	55	XE1GE	45	42	WAØSBZ*	36	33	K8RZB*	29	26	WB2QLP	22	18	OA8CW	16	—	HB9QQ	2	2
KA1BRD*	55	55	WA8ONQ*	45	41	W6ABN*	36	32	VE3FDP	29	25	KA1YQ	22	17	KØWM	15	15	OE1HGW	2	1
									WB2TMD	29	25	K7NV	22	16	VK3AQR	15	14	OZ7IS	2	—
									WA8OGS*	29	25	KB7N	22	16	N5BOG	15	13			
									8P6KX	29	24	PY2TTV*	22	15	8P6CX	15	11			

*6 meter two-ways claimed with all continents.
#Some contacts made from locations more than 150 miles apart.

dream when EMEers let their imaginations run wild. It is a dream no longer, thanks to the pioneering work of WA5VJB, KF5N, WA7CJO and KY7B. According to reports, on August 27 the four managed a contact between a station setup at WA5VJB's QTH near Dallas and that of WA7CJO in the Phoenix area. The New Frontier for this month will have further details on the equipment at the two stations.

Congratulations are certainly in order to this group for a difficult job well done.

The West Coast, long a bastion of microwave activity, is not resting on its laurels. N6XQ writes that, as part of the San Diego group's participation in the VHF WPX Contest, they mounted a 10-GHz wideband effort from XE2GDK near San Quint in DM20. Using a 15-mw Gunnplexer into a 4-foot dish, they worked NN6W/6 near Santa Barbara a distance of 358 miles and nearby N6CA/6 at 356 miles, WB6NOA 176 miles, W6KGS 216 miles, W6CPL 280 miles and W6JOY 80 miles. NN6W was using a similar rig into a 19-inch dish, while WB6NOA, operating at sea level and using a horn antenna, nevertheless had strong signals. On 70 cm the group worked as far as K6QXY near Santa Rosa, a distance of over 700 miles. Those participating in the XE2GDK operation included N6CW, K9VV, WA5LIG, K6JYO and N6XQ.

Not to be outdone, the Midwest comes up with some exceptional microwave work of its own. It is reported that, during the Microwave Contest, KXØO near Colorado Springs and WB5AFY near Vernon, TX exchanged reports on 3456 MHz over a 445 mile terrestrial path.

CENTRAL STATES VHF CONFERENCE

This year's Central States VHF Society Conference was held in Lincoln, NE, and a fine affair it was, with Roger WBØDGF and his able crew assisting. The Chambers award this year went to Al Ward, WB5LUA for his many excellent technical talks and papers presented over the years. The Wilson Award recipient is VE7BQH for his tireless efforts in conducting the 2-meter EME net. Next year's conference will be held in the Chicago area the last weekend in July. More later.

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716-2702
CompuServe ID no. 70645,247

FM/RPT Column Survey

FM/RPT will be celebrating its 10th birthday shortly. Although the column is still a young pup, this writer is a lot grayer than he was when he started the column and it is time to shake out some of the cobwebs upstairs and find out if FM/RPT is what the FM and repeater world wants today. A reader survey, like those conducted in other *QST* columns, follows. Your responses to the survey will assist the Headquarters staff and me in determining the future content of this column and this magazine. Please send your responses to FM/RPT Survey, c/o Stan Horzepa, WA1LOU, 75 Kreger Dr, Wolcott, CT 06716-2702.

Photocopies or answers on a separate sheet of paper are acceptable. For the following responses, either answer or circle all the appropriate letters that apply.

1. What is your location? (state, province or country)

2. What is your license class?
   a. Novice
   b. Technician
   c. General
   d. Advanced
   e. Extra
   f. foreign
   g. unlicensed

3. Which bands do you use in the FM and repeater mode?
   a. 29 MHz
   b. 52-54 MHz
   c. 144-148 MHz
   d. 220-225 MHz
   e. 420-450 MHz
   f. 902-928 MHz
   g. 1240 MHz and/or Above

4. Which band do you use most often in the FM and repeater mode? (circle one)
   a. 29 MHz
   b. 52-54 MHz
   c. 144-148 MHz
   d. 220-225 MHz
   e. 420-450 MHz
   f. 902-928 MHz
   g. 1240 MHz and/or Above

5. How many repeaters do you use on a regular basis?
   a. 0
   b. 1
   c. 2
   d. 3
   e. 4
   f. 5 or more

6. Are you a repeater owner?
   a. Yes
   b. No

7. How do you rate FM/RPT's coverage of the FM and repeater world?
   a. Very complete coverage of all facets.
   b. Would like greater coverage of one or more of the following:
      1. 29 MHz ☐
      2. 52-54 MHz ☐
      3. 144-148 MHz ☐
      4. 220-225 MHz ☐
      5. 420-450 MHz ☐
      6. 902-928 MHz ☐
      7. 1240 MHz and Above ☐
      8. ATV ☐
      9. packet radio ☐
      10. RTTY ☐
      11. autopatching ☐
      12. DX information exchanging ☐
      13. emergency communications ☐
      14. experimentation ☐
      15. mobile communications ☐
      16. ragchewing ☐
      17. traffic handling ☐
      18. nets ☐
      19. simplex operation ☐
      20. new products ☐
      21. new techniques ☐
      22. controversial matters ☐
      23. frequency coordination matters ☐
      24. FCC matters ☐
      25. ARRL VHF Repeater Advisory Committee matters ☐

8. Briefly, what topic(s) would you like to read about in this column that has/have not already been listed in Question 7?

9. Do you believe that the subjects chosen for the lead story of FM/RPT are:
   a. To the point and appropriately varied?
   b. Slanted too much toward a few subjects (If so, please specify)?
   c. Too long?
   d. Not long enough to present subject properly?
   e. Even-handed and fair in treating controversial subjects?
   f. One-sided and biased in treating controversial subjects?
   g. Too technical?
   h. Not technical enough?

10. How often do you read FM/RPT?
   a. Every month
   b. Every other month
   c. Occasionally
   d. Never

11. Do you believe that FM/RPT is:
   a. About the right length to cover the various aspects of the FM and repeater world?
   b. Requires more page space? If so, how much more?
   c. Takes up too much *QST* space

12. If answer to Question 11 is C, would you like to see an abbreviated or eliminated FM/RPT?
   a. Yes
   b. No

13. Do you feel that the **Repeater Log** section is:
   a. Very useful and interesting
   b. Is of little interest

14. (optional) Please include your name, call sign and number of years licensed.
   a. Name _____
   b. Call sign _____
   c. Years licensed _____

ARRL *REPEATER DIRECTORY*

Yes, it's that time of year again. Compilation of listings for the next edition of the *Directory* is now well underway. So that your repeater is listed accurately in the ARRL *Repeater Directory*, be sure your area frequency coordinator/spectrum management group has on file up-to-date information regarding the operation of your repeater. Remember, *Repeater Directory* listings must be submitted by your coordinator. If no coordinator exists in your area, then send your update directly to ARRL HQ.

REPEATER LOG

According to July 1988 reports received, repeaters were involved in the following public-service events: 644 vehicular emergencies, 27 fire emergencies, 20 weather emergencies, 17 public-safety events, 12 medical emergencies, 12 drills/alerts, 12 power failures, 5 criminal activities, and 1 search and rescue.

The following repeaters were involved (followed by the number of events): K1UN/K1ISR/WA1UCO 5, W2KB 16, NK2W 30, WB2WPA 10, WA2ZWP 9, WA3BXW 7, W3LIF 8, WA4SWF 4, W5FC 54, K5OS 7, WB5PCY 1, WA6BJY 7, WD6DIH 98, KA6EEK 109, W6FNO 244, N6ME 119, K9LSB 22.

Public Service

Conducted By Luck Hurder, KY1T
Deputy Manager, Field Services Department, ARRL

The History of the National Traffic System—*Part 1*

By J. A. (Doc) Gmelin, W6ZRJ, Honorary Vice President, ARRL

In 1989, the ARRL National Traffic System will be 40 years old. During that 40-year period, it has grown from the original concept as outlined by George Hart, W1NJM, in the September 1949 issue of *QST*, with nets that were almost exclusively on CW, to include operation on phone, RTTY, AMTOR and packet as well as on the old reliable CW. There is now a daytime system as well as the original system of evening operation, and the system is integrated with the Amateur Radio Emergency Service.

How well is the system working today? Have we achieved the goals outlined in the original organizational article? How has the system changed and why? What problems do we have and how are we going about solving these problems? What is the future of the NTS if indeed such a system is needed?

This series of articles will attempt to answer some of the questions above through first a review of the history of the NTS, then a look at the system today, and finally a discussion of what might be done in the future.

It should be pointed out that, as has been said before, those who fail to study history are bound to make the same mistakes as those who came before them. Or as a well known radio commentator once said, "The trouble with this generation is that they have failed to read the minutes of the previous meeting."

Here then are those minutes.

Nearly all the members of the ARRL know that the letters of our organization stand for the American Radio Relay League and almost all of these members know that the League was started by Hiram Percy Maxim, W1AW, who wanted to relay messages beyond the limited range of his simple spark type transmitting station.

From these early radio relays by Maxim and the other amateurs who set up the ARRL, the "trunk lines" of the early League were organized. By the start of World War II, the ARRL was a highly organized national society involved with all aspects of Amateur Radio of that day.

At the end of the war, Amateur Radio returned to the air and the previously existing trunk lines were reactivated and new ones were organized.

But by 1948, there were obvious problems with the trunk line system. In the early days, the relaying of messages was certainly a necessity, since transmitting distances were still somewhat limited. However, by the early 1930s, traffic could be transmitted across the country in one hop on 20 meters.

After the war, new radio communications equipment made such transmissions relatively easy at almost any time of day. As a result, the trunk lines were slowly turning into large wide area nets instead of the relay lines that they were in the early days.

Another problem was the fact that there was only a loose organization for local delivery of traffic. In most cases, the local nets had evolved into wide area nets often covering as much area as short trunk lines.

These independent local nets were not officially connected with the ARRL trunk lines and thus delivery of traffic that had come across the country so rapidly was often haphazard.

It was true that some sections had organized section nets, but in many cases these nets overlapped. There was no integrated traffic plan set up on a nationwide basis to coordinate section traffic activity.

In 1948, Al Hayes, W1IIN, ARRL Emergency Coordinator, George Hart, W1NJM, Communications Assistant for CW, and Joe Moskey, W1JMY, ARRL Deputy Communications Manager, started discussing traffic organization and from these early conferences, there evolved a "National Traffic Plan," which later became the present National Traffic System.

The basic design of the proposed system was the brainchild of Hart, who had worked in the US Army Communications System. In fact, most of the suggestions for the system came from Hart, who laid out the basic structure of sections, regions and areas as the framework for the new "Plan."

Announcement of the proposed plan came in an article that appeared in the September 1949 issue of *QST*. Hart, who had become National Emergency Coordinator, authored the original article. He had been assigned the task of organizing the new system by Ed Handy, W1BDI, then the Communications Manager at Headquarters.

The plan called for local section nets in each of the ARRL sections. Then, traffic would be relayed between sections on regional nets.

Traffic between regions would be exchanged on area nets, and originally traffic between areas was handled by special area net liaison stations.

The original plan called for four area nets and 13 regional nets. Regional nets would be established in each of the four areas. The area nets were to be established on the basis of time zones: Eastern, Central, Mountain and Pacific.

The Plan called for an integrated time schedule that would move traffic within sections, between sections, between regions and between area nets, all following a smooth time pattern. Traffic would move from east to west in one night and from west to east in a two-day cycle.

The system was also designed to encourage participation by a large number of operators, and at the section level, little experience was needed to check in and originate or deliver local traffic.

After some discussion, the Plan went into effect in December of 1949, with the organization of several regional and area nets. In some cases, already organized nets simply shifted over and became part of the NTS by fulfilling a specific function. Some sections already had operating "section nets" which simply became part of the "system," sometimes simply by changing the times the net sessions were held.

However, in many cases, particularly with regional and area nets, whole new nets had to be organized, and this sometimes proved to be difficult.

But that winter, NTS nets held their first sessions and took the tentative step to the organization it is today. There were many problems to be solved, and in our next article we will look at the early problems of NTS in its formative first few years.

Amateur communications assists Red Cross—Ev Chitester, WA8EYF, a member of the Cuyahoga Amateur Radio Society and long-time Red Cross volunteer, was on the scene during a fire at Mineral Met Inc on May 12, 1988. Chitester provided vital communications on the amateur bands for the Greater Cleveland Chapter of the American Red Cross. On the scene along with Chitester were over 100 fire fighters, 40 policeman, 40 media personnel and 18 Red Cross Disaster Service volunteers. *(photo courtesy of Greater Cleveland Chapter of the American Red Cross)*

SPOTLIGHT ON SERVICE

The View from the Peak

Two Amateur Radio operators were piloting a single-engine aircraft for the Colorado Civil Air Patrol at Kenosha Pass on the Continental Divide west of Denver on the evening of July 18. They were Milt Bonham, KYØE, and Bruce Bevers, KAØCPI.

They were on a CAP training mission and, because of engine trouble, were forced into an emergency landing against a mountain. Miraculously, neither was injured. The plane flipped upside down, destroying the avionics antennas and knocking out all radios, including the ELT (emergency locator transmitter). At first it seemed the two were stranded without communications in the rugged mountain country for the night.

But, they had brought a 2-meter handheld along. The next move: try to access a repeater. Fortunately, they accessed the Colorado Repeater Association 2-meter system on 147.225 MHz (WDØFVV/R). West of Denver in the Fort Range, it provides coverage north and south into the mountains for 100 miles in each direction.

Several stations were using the repeater at the time; all traffic was immediately halted and Doug Lomax, KAØYAU took the downed plane report. The CAP was contacted, an emergency net commenced, and a time was set with the downed fliers for another contact so as to conserve the battery of the handheld.

Three amateurs, Bob Ragain, WB4ETT, Greg Burnett, KØELM, and Warren Gretz, NØFVG, had put their skills at direction finding to work using the plane's ELT, which the pilots had been able to activate. As a result, they were able to ascertain that the downed aircraft was on the west side of the Continental Divide rather than on the east side as had been thought before. In doing so, they were all ahead of the CAP searchers and valuable information was relayed resulting in much time being saved.

The Civil Air Patrol used the amateur repeater to confirm the search area, then a TV station helicopter arrived and made a visual sighting of the crash. In the meantime, special mountain search and rescue personnel from the Denver area were en route to the scene to effect a night rescue.

Six hours from the time the craft crashed into the mountainside, the pilots were transported to waiting rescue vehicles for the trip down the mountains and into Denver. It was only then that the ham repeater was returned to normal service.—*George Hinds, N8CIX*

Airplane Lands with Help of Amateur Radio

Lorraine Pershing, N3ERN, of Greensburg, Pennsylvania, was monitoring 146.52 simplex so she could contact her husband Jim, NM3Z, when she became the vital link to an airplane pilot and the control tower. "It was Friday, July 8, shortly before 2:30 PM," Lorraine explained. "Our Foothills repeater was down at the time, so I had [the radio] on simplex, so I could talk to my husband when he was mobile. I heard a call on frequency, but I didn't pay much attention at first. Then the caller said it was an emergency and was asking for someone to respond.

The radio amateur who was calling was a pilot who had lost his transmitting ability on his aircraft radio and couldn't contact the airport. He needed the airport to contact him since, at that time, his receiver still worked. So Lorraine called 911 and informed the operator of the situation. The 911 operator contacted Greater Pittsburgh International Airport control tower and relayed the message.

The pilot, Jay Ryno, AD8C, from Ohio, was originally headed for Philadelphia when his aircraft developed electrical problems and had to land in Pittsburgh. He had no radio communication in the plane except his 2-meter handheld—just something he took with him.

"Jay came back on frequency a few minutes later and said that his radio was now out all together; he could neither transmit nor receive," Lorraine said. "He was not familiar with the Pittsburgh area, and when contacted, he said 'I'm over a river in Pittsburgh.' (I'm thinking—there are three rivers in Pittsburgh!) That, however, was all he knew, and he wanted the airport contacted so that he could be put down at the nearest airport. He had no idea what heading to go."

Lorraine called 911 for the second time, and they took her phone number and called Greater Pittsburgh International Airport. The tower called Lorraine by phone. "The first thing the tower had me ask Jay to do was to put his transponder onto a certain squawk frequency. This puts out a beacon signal, and then they picked him up. The tower wanted to confirm it, so they had Jay do a turn to make sure that it was him."

Lorraine relayed heading directions to Jay via Amateur Radio while the tower at Pittsburgh's airport was in contact with the control tower at Allegheny County Airport, the closest airport to Jay's location.

"Jay had problems getting his landing gear down due to the electrical system failure. He asked me to ask the tower if his landing gear was down. The control tower said it was not. Jay could use a foot pump to put the gear down, but he had no verification on his own to know if it was down. Now low on fuel, Jay passed the tower three times and the gear was still not down. Finally, on the fourth pass, the landing gear was down!"

After landing safely, Jay called Lorraine to thank her. The Amateur Radio community is proud of you, Lorraine, for what you've done. It is a part of being a ham and responding when needed.—*Robert V. Ferrey, Jr, N3DOK, Public Information Officer, Western Pennsylvania*

Fame and Glory: Your Traffic Total, PSHR Report, and Traffic Awards and Appointments

Even if you handle only one message in a month's time, you should send a message to your ARRL Section Traffic Manager (STM) reporting your activity. Your report should include your total originations, messages received, messages sent and deliveries.

An *origination* is any message obtained from a third party for sending from your station. If you send a message to Uncle Filbert on his birthday, you don't get an origination. However, if your mom or your neighbor wants you to send him one with her signature, it qualifies (it counts as one originated and one sent). The origination category is essentially an "extra" credit for an off-the-air function. This is because of the critical value of contact with the general public and to motivate traffickers to be somewhat more aggressive in making their message-handling services known to the general public.

Any formal piece of traffic you get via Amateur Radio counts as a message *received.* Any message you send via Amateur Radio, even if you originated it, counts as a message *sent.* Therefore, any time you relay a message, you get two points: one received and one sent.

Any time you take a message and give it to the party it's addressed to, on a mode other than Amateur Radio, you are credited with *a delivery.* (It's okay if the addressee is a ham.) As long as you deliver it off the air (eg, telephone, mail, in person), you get a delivery point.

Your monthly report to your STM, if sent in radiogram *format,* should look something like this:

NR 629 R KY1T 14 NEWINGTON CT NOV 2
BETSEY DOANE K1EIC
STM CT
SHELTON CT 06484

OCTOBER TRAFFIC ORIG 20 RCVD 60 SENT 109 DLVD 10
TOTAL 199 X 73
LUCK KY1T

If you have a traffic total of 500 or more in any month, or have over 100 originations-plus-deliveries in a month, you are eligible for the Brass Pounders League (BPL) certificate, even if you did all that traffic on packet! If you make BPL three times, you receive a handsome medallion for your shack.

Another mark of distinction is the Public Service Honor Roll (PSHR). You don't have to handle a single message to get PSHR, so it's a favorite among traffickers in rural areas. The categories have traditionally been listed in the Public Service column of *QST,* and they include checking in CW and phone nets, acting as net control, handling an emergency message, and so on. See the Public Service column for particulars.

Almost any station, with regular participation, can get an ARRL Net Certificate through the Net Manager. Once you have participated regularly in a net for three months, you are eligible. If you are a League member, you can also become eligible for an Official Relay Station appointment in the ARRL Field Organization. Either certificate makes a handsome addition to your shack.

Field Organization Reports August 1988

ARRL Section Emergency Coordinator Reports

Twenty-nine SEC reports were received, denoting a total ARES membership of 18,214. Sections reporting were: AK, EPA, GA, IA, IN, MI, MN, MO, MS, NH, NNJ, NFL, NM, NTX, OH, OK, PAC, SCV, SD, SDG, STX, UT, VA, VT, WA, WNY, WPA, WTX, WV.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	112	90.00	485	972
TCC Central				
TCC Pacific	117	91.10	568	1077
Summary	229	90.55	1053	2049
Cycle Three				
TCC Eastern	62	100.00	40	80
Cycle Four				
TCC Eastern	119	96.00	479	970
TCC Central	65	82.30	276	589
TCC Pacific	111	91.74	435	832
Summary	295	90.01	1190	2391

TCC Roster

Eastern Area Cycle 2: KW1U Director. K1EIC WA1FCD KA1MDM KT1Q W1QYY KW1U WA2FJJ W2FR NN2H W2MTA N2XJ N3AZW N3EMD KK3F KQ3T NC3V NJ3V AA4AT WD4FTK N4GHI NJ4L WB4PNY N4SS WD8LDY W8PMJ NJ8S WB8YDZ VE3ORN.

Eastern Area, Cycle 3 and 4: KN1K Director. KB1AF W1CE W1EFW WA1FCD KN1K W1NJM W1QYY KW1U W2FR W2GKZ NN2H NO2H KB2HM W2LWB W2RQ WA2SPL N2XJ N3COY N3EMD N3FM WB3GZU W3OKN W3PQ KQ3T NC3V AA4AT N4GHI KB4N N4SS N4TE K4ZK W8BO W8PMJ NJ8S K8TPF N8XX KA8WNO VE3FAS VE3GSQ.

Central Area, Cycle 4: K5GM Director. WB5J AJ5K K5MXQ WZ5N N5TC K5TL W5TNT KB5W W9CBE WB9UYU AI0O KS0U.

Pacific Area, Cycle 2: ND5T, Director. W5JOV KU6D N6LHE K6UYK WF6O WA7CBN KF7R W7TGU W7IGC N0HFZ N0IA VE6CHK

Pacific Area, Cycle 4: K0DJ Director. N2IC ND5T W5QVK K6LL W6EOT W6INH W6VZT KN7B KA7CPT NR7E W7GHT W7EP W7LG W7VSE K7GXZ K0EZ K0TER KC0D KJ0G

National Traffic System

Net	Sess	Tfc	Avg	Rate	% Rep	% Rep to Area
Cycle Two						
Area Nets						
EAN	31	820	26.50	.698	91.9	
CAN	31	575	18.55	.508	100.0	
PAN*	55	343	6.23	.421	82.7	
Region Nets						
1RN						100.0
2RN	59	250	4.23	.345	88.8	93.6
3RN	31	170	5.48	.480	93.5	93.6
4RN	61	372	6.09	.310	72.5	100.0
RN5	62	635	10.24	.421	86.0	
RN6	48	141	3.37	.281		89.0
RN7						98.1
8RN	62	349	5.62	.266	94.0	96.8
9RN	62	224	3.60	.267	87.7	
TEN	72	680	9.40	.412	82.0	
TWN	62	300	4.83	.250	83.2	92.7
ECN						67.7
Cycle Three						
Area Net						
EAN	30	172	5.73	.450	73.2	
Region Net						
1RN						76.6
2RN	29	93	3.20	.282	97.8	76.6
3RN	28	18	0.64	.106	90.5	78.5
4RN						66.6
8RN						60.0
ECN						76.6
Cycle Four						
Area Nets						
EAN	31	918	29.61	.943	95.8	
CAN	31	720	23.23	.858	100.0	
PAN	31	697	22.46	.779	99.4	
Region Nets						
1RN						100.0
2RN	44	133	3.02	.333	70.0	93.5
3RN	62	193	3.11	.279	98.4	100.0
4RN	62	402	6.48	.282	97.4	93.5
RN5	62	530	8.39	.580	79.4	100.0
RN6	62	464	7.48	.760	98.0	100.0
RN7	62	310	5.00	.647	94.6	100.0
8RN	61	255	4.18	.318	88.0	93.5
9RN	62	334	5.38	.410	92.7	100.0
TEN	61	387	6.34	.539	74.2	100.0
TWN	56	223	3.98	.398	97.8	98.3
ECN						100.0
ARN	31	154	4.96	.135	100.0	93.5

*PAN operates both cycles one and two.

ARRL Section Traffic Managers reporting: AL, AR, AZ, CT, DE, EMA, ENY, EPA, GA, IA, ID, IL, IN, KS, MDC, ME, MI, MN, NC, NFL, NLI, NH, NTX, OH, OK, OR, ORG, RI, SB, SC, SCV, SD, SFL, TN, UT, VA, VT, WA, WMA, WNY, WPA, WTX, WVA.

Public Service Honor Roll

This listing is available to amateurs whose public-service performance during the month indicated qualifies for 60 or more total points in the following nine categories (as reported to their SM). Please note maximum points for each category: (1) Checking into CW nets, 1 point each, max 30; (2) Checking into phone/RTTY nets, 1 point each, max 30; (3) NCS CW nets, 3 points each, max 12; (4) NCS phone/RTTY nets, 3 points each, max 12; (5) Performing assigned NTS liaison, 3 points each, max 12; (6) Delivering a formal message to a third party, 1 point each, no max; (7) Handling an emergency message, 5 points each, no max; (8) Serving as Emergency Coordinator or net manager for the entire month, 5 points max; (9) Participating in a public service event, 5 points, no max. This listing is available to Novices and Technicians who achieve a total of 40 or more points. Stations that qualify for the Public Service Honor Roll 12 consecutive months, or 18 months out of a 24-month period, upon sending written notification to ARRL Public Service Branch, will be awarded a special PSHR certificate from HQ. This certificate is a one-time award, ie, it is not issued more than once.

364
N7ELF
359
KC9CJ
218
KA7EEE
183
W7VSE
WB7VSN
151
WD8V
147
WA2SPL
138
WA4QXT
WB4DVZ
129
KA0EPY
WB2OWO
127
W4RWB
126
WX4H
123
WB7WOW
122
W2MTA
121
K2YQK
K7IVQ
120
N4GHI
NG1A
119
N2EIA
WA9VLC
118
WD4COL
117
KW1U
KA3DLY
116
W2QNL
113
WD6DOB
112
N9BDL
K4NLK
WI2G
WA4JDH
K9CNP
111
WA4PFK
KF5BL

109
W9YCV
107
WD6BZQ
N1CPX
WB1HIH
KA2F
NM1K
106
K4ZK
105
WB1GXZ
W2RRX
104
KA7AID
AA4TE
K4MTX
N4EXQ
WF6Ø
103
KT1Q
102
N0FOO
K5MXQ
K2YAI
W4ANK
WE2G
101
WA2ERT
KI4YV
KZ8Q
K8TVG
WA2JBO
100
W7LNE
WB4WII
N6NLW
99
W4PIM
98
WA9VND
WB2VUK
WD8KQC
N2XJ
97
KD8HB
96
K0ERM
WA6WJZ
K5UPN
WA2FJJ
W3FA
W4CKS
N3EMD
N5AMK
95
KV7F

94
ND0N
W7LRB
KJ4VT
N4SMB
W6INH
92
KA1IFC
WA1FCD
91
KD7ME
AA4ZV
KA1GWE
90
W0KK
KA2INE
89
KT9I
W9CBE
88
W7GHT
K2ZVI
KA1FVY
87
W7LBK
N4MEJ
WB4ZTR
86
NB2D
W4TZC
KB4WT
85
WB8R
KA9RII
WA0HTN
N2JMP
WA3YLO
KA9RNY
84
WB4WQL
83
WA4EIC
W5YQZ
KA7SYG
KB1A
KA1JXH
WB2UVB
82
KJ3E
KQ3T
WA1JVV
81
WA3WIY
WG0S
W1KK
WA1TBY
WB6QBZ

K2VX
80
W1KX
K6UYK
NO3M
79
KB9LT
KA2QOO
AA4AT
N3AZW
78
AA4HT
N7BGW
N8CEI
NB1A
77
KA0KPY
KD8WX
KC3Y
W0OYH
76
KC5NG
KA1JXH
WA3UNX
N3COY
75
WD0GUF
KB4LB
N2AKZ
NC3V
74
KD0NH
N6EQZ
WA6QCA
WB2QMP
73
N8EBF
W6VOM
72
WD4KBW
K9ZBM
KA0ARP
71
WA0TFC
WC4D
KA2ZNZ/T
NJ3V
KJ9J
70
KA4HHE
KN1K
69
KA4FZI
ND2S
N8GPU/T
K8JDI
KI6ZH

68
K4IWW
KJ4NK
67
W4JLS
N2EVG/T
N8FWA/T
NC9T
66
W2FR
WB8KWC
N3EGF
KA6TNO
65
WA4RUE
N8HSC
NO0A
WZ5N
AI0O
N2HLZ

KD8KU
64
N0DPF
K3JL
N5KCL
N2ABA/T
WB1BTJ
W4HON
N3DRM
WB2FTX
63
KD0YL
NS9Q
WD8KBW
KA3JJN
WB0ZNY
62
KA8CPS
WB3AVZ
K4BGZ

K3GHH
WB9PFZ
61
WA8DHB
W1PEX
N7APC
KI4BR
60
N8HWD
N4JAQ
WB0WNJ
W0OUD
KA2UBD
K2TWZ
W9UMH
N1DHT
N2DXP
58
KB2EPU/T

56
N4ORZ/T
KA9CTW/T
50
KA2CQX/T
48
KA1HPO/T
KA2JMA/T
45
KB2BNW
46
W1YOL/T
41
KA1NOI/T
N8HRM/T
40
KA1QFV
KA2UIU/T

The following stations qualified for PSHR during the month of July, but not were listed in last month's column. WB1HIH W1KK KA1IFC KA1QFV N2AKZ KB2BKE NB2D WI2G N2HLZ KA2UIU KA2JMA K2YQK WB3AVZ AA4HT N4JAQ KB4LB KJ4NK WA4QXT KL7IVQ/KH6 K9CNP KA9CTW/T KB9LT N0HWD KT9I WA9VLC NC9T KA0ARP N0FOO WD8GUF K0QBE WA0TFC WB0WNJ.

Brass Pounders League

The BPL is open to all amateurs in the United States, Canada and US possessions who report to their SM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in the standard ARRL form.

The Brass Pounders League Medallion is available to individual operators who achieve BPL and are listed in the BPL column for the third time. This medallion is a one-time-only award, ie, it is not issued more than once. It is not necessary that the three months involved be consecutive. Any three months will qualify an operator. Stations that qualify for the BPL medallion, upon written notification of the qualifying months to the ARRL Public Service Branch, will be awarded the callsign-engraved BPL medallion.

Call	Orig	Rcvd	Sent	Dlvd	Total
W3CUL	690	701	1179	92	2662
WB9YPY	0	1120	79	762	1961
W1PEX	109	1107	461	7	1684
WA1FHB	1	491	489	2	983
WB0WNJ	220	90	650	1	961
N3AZW	---	---	---	---	848
W3VR	344	177	234	44	799
WA4JDH	2	369	389	11	771
KD6SQ	0	374	374	0	748
W4CKS	---	---	---	---	695
WA9VND	2	295	315	14	625
K1TQY	206	285	90	20	601
WF6O	2	293	295	8	598
KC9CJ	7	354	48	187	596
KA9VII	118	189	269	8	538
WX4H	0	289	290	2	581
N4GHI	62	248	250	19	579
WD4COL	17	301	241	12	571
NM1K	16	258	240	25	539
W2MTA	8	304	217	1	530

BPL for 100 or more originations plus deliveries:

WD6BZQ	193
WB2QMP	144
NR9K	143
W5TNT	120

The following stations qualified for BPL during the month of July but were not listed in last month's issue: WB0WNJ 958, KT9I 746, KA1IFC 621.

Independent Nets

Net Name	Sess	Tfc	Check-Ins
Amateur Radio Telegraph Society	27	181	247
Central Gulf Coast Hurricane Net	31	129	3228
Clearing House Net	31	381	344
Early Bird Net	31	601	248
Empire Slow Speed Net	31	55	334
Golden Bear Amateur Radio Net	31	215	1593
Great Lakes Emergency & Traffic Net	31	66	972
Hit and Bounce Net	31	185	561
IMRA	27	692	1568
Mission Trail Net	31	93	878
NYSPTEN	31	54	442
Southwest Traffic Net	31	357	1616
West Coast Slow Speed Net	31	484	148
20ISSBN	27	808	379
75 Meter Interstate SB Net	31	600	1155
7290 Traffic Net	50	361	3319

Amateur Satellite Communications

Conducted By
Vern "Rip" Riportella, WA2LQQ
PO Box 177, Warwick, NY 10990

Getting On the New OSCAR

Part 3: Basic Satellite AO-13 Operations (updates based on operating experience)

AMSAT OSCAR 13 has now been in orbit for almost four months and its transponders have been in operation for three months. In this column, I'll review and update basic AO-13 station requirements in light of actual operating experience instead of prelaunch estimates.[1]

As previously discussed, among the most important things to know about AO-13 are its operating frequencies. After a few months of operation, these frequencies have been carefully measured. The measured values (see Table 1) differ somewhat from the prelaunch estimates. These values include corrections for Doppler shift and are believed to be accurate to within 1 kHz.

Based on current operating experience, I reviewed the "Minimum Station Requirements" in Tables 5A and 5B of the June article.[2] It is important to emphasize that these tables present *minimum* requirements. Stated another way, the station equipment specified will provide satisfactory results under ideal or near-ideal conditions. Thus, the wise station outfitter will pack in a few extra decibels of uplink power for operation under less-than-ideal conditions.

For example, factors increasing uplink power requirements include polarization losses (there's a 3-dB penalty for running linear polarization instead of right hand circular polarization), squint angle (see Fig 1),[3] increased path losses, increased absorption at low elevation angles, heavy transponder loading, local obstructions (trees, houses), and so on.

Extensive on-air tests proved that the recommended minimum values for Modes J and L given in the June article remain valid. But, as mentioned earlier, uplink reserve power is most helpful. The more reserve power you have available, the "deeper" into poor conditions you can work. So, although the recommended minimum Mode B uplink power of 21.5 dBW EIRP (141 W) can—and indeed has—provided satisfactory results under good conditions, having another 6 to 10 dB of reserve power available is prudent. An uplink of 21.5 dBW can be attained by feeding a 12-dBic gain antenna with 10 W.

Adding a 50-W "brick" (a solid-state amplifier) to your 10-W exciter adds 7.5 dB to your uplink power. That extra 7.5 dB would provide up to 29 dBW EIRP (792 W) for use *only* when poor or marginal conditions prevail. A 100-W brick adds 10 dB to the 10-W exciter and results in an EIRP of

Table 1

Measured AO-13 Translation Frequencies

Mode	*Sum of Up and Downlink Frequencies*	*Uplink Mid-Band Frequency*	*Downlink Mid-Band Frequency*
B	581.398 MHz	435.508 MHz	145.890 MHz
J	580.413 MHz	144.448 MHz	435.965 MHz
L	1705.356 MHz	1269.496 MHz	435.860 MHz

Notes

A) Please refer to June 1988 *QST*, p 22, for complete frequency tables that form the frame of reference for the frequency discussions in this column.

B) A correlation between J and L uplinks and the JL downlink has now been confirmed. The JL downlink sub-band center is 435.965 MHz; the corresponding L uplink is 1269.391 MHz and the corresponding J uplink is 144.448 MHz. Thus, stations transmitting on 1269.391 and 144.448 MHz should appear on the same downlink frequency in the absence of Doppler shift.

C) The Mode B uplink frequency is 3 kHz higher than previously announced, the Mode J uplink frequency is 2 kHz lower than previously announced and the Mode L uplink frequency is 21 kHz higher than previously announced. When using the frequency tables on p 23 of the June 1988 *QST* article, these changes should be made to the Uplink side of the table only.

D) When making frequency measurements, pay careful attention to Doppler shift. All beacon frequencies appear to be very close to the previously announced values (within 1 kHz). See the June 1988 *QST* article for complete frequency charts.

To use Table 1, look at the second column. It gives the sum of the uplink and downlink frequencies. For example, for Mode B, the sum is 581.398 MHz. If you want your downlink to appear at mid-band, 145.890 MHz, subtract that value from the sum frequency to get 435.508 MHz. Conversely, if you intend to transmit on 435.508 MHz and want to know where your downlink will appear before beginning your transmission, subtract 435.508 from 581.398. In the absence of Doppler shift, your downlink will appear at 145.890 MHz. An analogous computation can be made for any frequencies within the passband of any of the three modes shown in this table and on p 23 of the June 1988 *QST* article. Be sure to take the Doppler shift into account. On Mode B and J, Doppler shift can amount to a few (less than 5) kilohertz. Mode L will be up to three times higher.

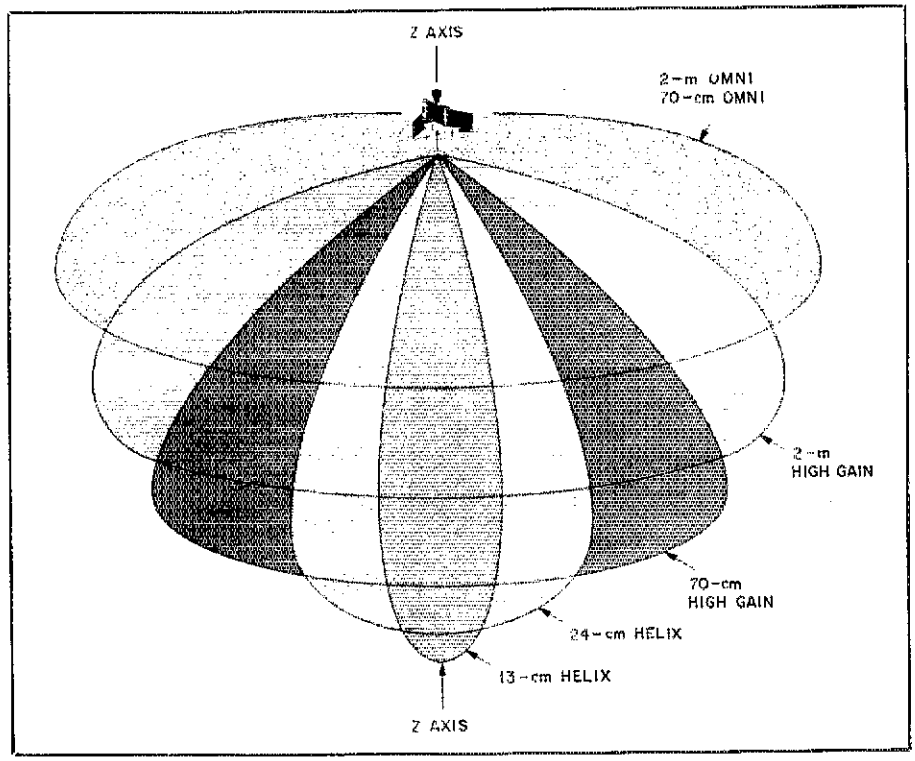


Fig 1—AO-13 antenna radiation patterns. Relative beamwidths and gain are symbolically illustrated.

32 dBW (1585 W) when used in conjunction with a 12-dBic antenna. Employing as much as 32 dBW EIRP should be a rare practice indeed. There are few occasions where power levels in this range are truly justified.

The problem in specifying how much power to have available for use is simply that station receive capabilities vary widely. What sounds "loud" to a station that hears well may be inaudible to a station with a poor or defective receive system. The station that doesn't hear well will inevitably run much more power than is necessary and prudent for QSOs. If he can't hear his own downlink, he figures he's not running enough power, so he "turns up the wick." This reduces the power available to *all* other transponder users and is universally frowned upon. So when we say a 100-W brick might be required occasionally, chances are the station with a receiving problem will not only employ the 100-W brick to its full capacity under poor conditions (when it might be justified), but also under good conditions, when its use is totally unjustified.[4]

Moreover, some users have the unfortunate choice of running either the exciter alone (at perhaps 10 W)—which often can be too little power—or driving an amplifier that yields perhaps 100 watts or more, which is most often too much power. It's wise to have a range of intermediate power settings available. Some UHF exciters do not have power-level adjustments, but you can reduce the drive to the brick by simply inserting different lengths of lossy 50-ohm coaxial cable between the exciter and the brick. RG-58 cable is a marvelous attenuator at 435 MHz. Ten feet of RG-58 coax will provide 3-dB of attenuation at 435 MHz and cut the output of your 100-W brick to 50 W when you don't require full power.

A receiver preamp is *essential* for all AO-13 modes. Operating without a preamp is a prescription for failure. Instead of straining to hear signals, use a good preamp (preferably mounted at the antenna); it'll make receiving all the modes (especially L) a pleasant experience.

Mode L operation recommendations for ground-station transmitter power need to be revised upwards for several reasons. First, there appears to have been a specification error in the Mode L values published by AMSAT-DL, which designed and built the AO-13 transponders. Those erroneous values were incorporated in the calculations and went undetected until after we went to press with the June *QST* article.

Second, Mode L operation places an additional requirement on users of that mode, a requirement that was not fully appreciated prior to launch. Users of Mode L must correctly reckon where the satellite's 24-cm Mode L uplink antenna is pointed. Although this is easily done with available computer programs, the fact remains that operating outside the Mode L uplink antenna's main lobe imposes a stiff uplink power requirement for the user. Thus, for operating under a wide range of conditions

For more information on getting started on OSCAR and information on AMSAT membership and membership benefits, call AMSAT, 301-589-6062 or write: AMSAT, PO Box 27, Washington, DC 20044. Please include a business-size SASE.

and access angles, reserve power is required on Mode L, too. This also affects our station-equipment recommendations.

Recent tests have suggested that under ideal conditions, a Mode L uplink of 29 dBW EIRP (about 800 W) will produce about a 10-dB signal-to-noise ratio in a 2.4-kHz channel when received on a typically "good" Mode L receive system.[5] Based on these tests, it now appears 33 dBW EIRP (2 kW) is the lowest *practical* level with which Mode L SSB users should expect to be regularly successful. For higher reliability—that is, for your ability to work well when combining penalty factors as described previously—another 5 dB or more of reserve power should be available. Based on these tests then, 38 dBW EIRP (6.3 kW) can be expected to produce good SSB results under *most* (but definitely *not all*) operating conditions. Obviously, if you want to work under the most adverse conditions with large, compound penalty factors, much more power is needed.

The 38-dBW level seems, however, to be a reasonable compromise between performance, reliability, cost and physical demands. For example, 30 W applied to the feed of a pair of 20-dBi loop Yagis will produce about 37.3 dBW EIRP (5.4 kW) including losses; sufficient for good SSB QSOs under most conditions and excellent for CW under most conditions.

Comparing AO-13 Mode L and AO-10 Mode L, it now appears the actual measured performance of AO-13 Mode L exceeds the expected performance of AO-10 Mode L by 1 to 2 dB. (Of course, AO-10 Mode L fell short of its potential performance by a factor of at least 10 dB). By contrast, AO-13 Mode L is coming close to its corrected specs.

Next month, we'll take another step with AO-13 by looking at specific operating practices on the various modes.

Notes

[1] The values presented herein (and in "OSCAR 13 Report Card," *QST*, Oct 1988, p 48) update those published in prior Amateur Satellite Communications columns and those given on p 22 of my June 1988 *QST* article, "Introducing Phase 3C: A New, More Versatile OSCAR."

[2] At this writing, Mode S had not yet been activated, so no validation of Table 5C in the June article could be made.

[3] The angle between the satellite antennas' boresight and your location is called the "squint angle." In other words, it's the angle between the line from satellite to your station and the line representing the center of the main lobe of the satellite's antennas (see Fig 1).

[4] In fact, it is just this circumstance which helps to create poor conditions in the first place. This "power escalation scenario" begins with a few "alligators" running too much power because they don't hear well. Because they consume more than their fair share of power, they reduce power to other transponder users' downlinks. Therefore, those running reasonable levels of uplink power feel obliged to increase their uplink power, further reducing the power to all on the passband. This loop seems to act very quickly until nearly everyone is running at full power with no reserve at all. This makes it very difficult to recommend specific equipment that will serve the individual user well, and maintain conservative use of uplink power by most users. Until we have a uniform station equipment suite constantly maintained and operated by a well-trained community of OSCAR users, uplink power levels employed will vary sharply. This will, in turn, perpetuate the need to specify station equipment suites with multiple caveats attached!

[5] A "good" Mode L receive (435-MHz) system has an approximate 50 Kelvin system noise temperature. A 50 K, 435-MHz receive system might consist of a 0.6-dB noise figure preamp behind a 15-dBic RHCP antenna and a modern UHF SSB receiver. QST

Mini Directory

As a convenience to our readers, here is a list of items of particular interest and when they most recently appeared in *QST*.

Advisory Committee Members	May 1988, p 55
Club Contest Rules	Jan 1988, p 86
Considerate Operator's Frequency Guide	Jan 1988, p 13
Constitution Bicentennial WAS	Sep 1987, p 14
DXCC Annual Listing	Dec 1987, p 58
Element 2 Question Pool, New and Revised Questions, Answers	Apr 1987, p 23
Frequency/Mode Allocations	Jan 1988, p 77
Hamfest Calendar Rules	Apr 1988, p 73
License-Renewal Information	Jan 1988, p 77
Major ARRL Operating Events and Conventions—1988	Jan 1988, p 78
Packet-Radio Frequency Recommendations:	
Below 225 MHz	Sep 1987, p 54
Above 225 MHz	Mar 1988, p 51
QSL Bureaus	
Incoming	Jun 1988, p 72
Outgoing	Sep 1988, p 71
Reciprocal-Operating Agreements	Oct 1988, p 63
Rules, ARRL 10-Meter Contest	This issue p 89
Rules, ARRL 160-Meter Contest	This issue, p 90
Rules, ARRL International EME Competition	Sep 1988, p 96
55th November Sweepstakes Announcement	Oct 1988, p 106
First ARRL RTTY Roundup Announcement	This issue, p 88
Tech and General Written Exams	Apr 1987, p 29
Third-Party-Traffic Agreements	Oct 1988, p 63
VUCC Annual Listing	Dec 1987, p 68
What is Amateur Radio?	Sep 1988, p 90

IARU News

Conducted By Richard L. Baldwin, W1RU
HC 60, Box 60, Waldoboro, ME 04572

Amateur Radio Direction-Finding Championships

The Fourth International Amateur Radio Direction-Finding (ARDF) Championships were held in Beatenberg, Switzerland, September 7-11. Conducted under rules developed by the IARU Region 1 organization, and hosted by the Union Schweizerischer Kurzwellen-Amateure (USKA), the championships were held in superb weather in a locale of breathtaking beauty. Indeed, a contestant could look from the administrative site of the championships and see a panorama of the Alps, including that infamous North Wall of the Eiger which has been such a challenge to mountain climbers.

ARDF is highly popular sport throughout Europe and is gaining in popularity in Asia. On this occasion, there were 19 teams present, representing Yugoslavia, the Soviet Union, Poland, Czechoslovakia, Hungary, Bulgaria, West Germany, Norway, Austria, Sweden, Switzerland, China, North Korea, France, Belgium, Japan, Holland, Italy and Luxembourg. At the last minute, for a variety of reasons, teams from South Korea, Romania and East Germany had to cancel their planned attendance.

As usual, there were a number of questions as to why there were no competitors from North or South America. Well, what can one say, again, except, "C'est la vie."

In case you noncompetitors don't know it, ARDF, or foxhunting, is a radio sport wherein the competitors run over hill and vale looking for hidden transmitters. Separate competitions are held on both 80 and 2 meters. Generally, there are five hidden transmitters and the winner is that competitor who finds all five in the shortest elapsed time. The sport requires skill in DFing and orienteering, and a healthy physique.

In countries where there is a minimum age requirement to hold an amateur license, ARDF can be a way of encouraging an initial enthusiasm for Amateur Radio among those too young to become licensed. Youths are encouraged to take part, but not all of the competitors are young. What is common to all of the competitors, however, is a great spirit of camaraderie. There were about 200 competitors and team officials at Beatenberg, and a fine lot of people they were.

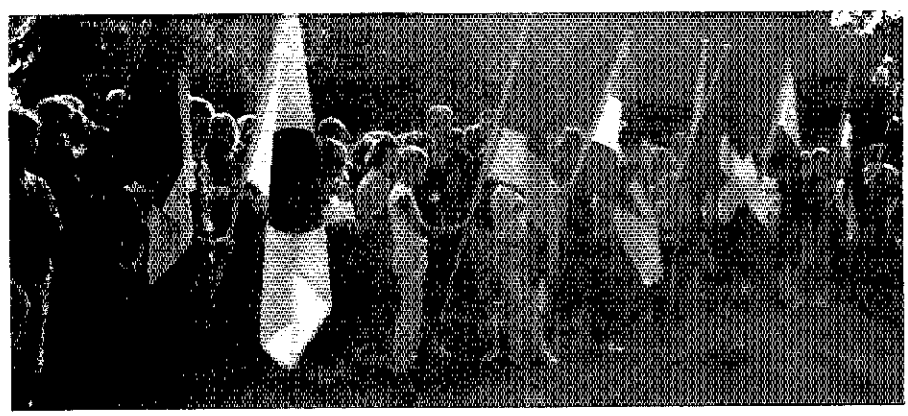
The opening ceremonies included presentations by Dr Peter Erni, HB9BWN, president of the championship committee of USKA, by Max Cescatti, HB9IN, president of USKA, and by the mayor of Beatenberg. The guest of honor was to have been Mr Jean Jipguep, deputy secretary-general of the International Telecommunication Union, but last-minute pressures of the WARC-ORB (more about that conference in next month's column) being held at the same time in Geneva prevented him from attending. Mr Jipguep's prepared remarks were read by his good friend W1RU, IARU president, who added a few comments of his own.

W1RU addresses the opening ceremony, bringing greetings from ITU Deputy Secretary-General Jean Jipguep.

In the foreground, PAØLOU, chairman of IARU Region 1, and John Allaway, G3FKM, secretary of IARU Region 1. To the left rear, Max Cescatti, HB9IN, president of USKA.

USKA and its Championship Committee, which included Dr Peter Erni, HB9BWN; Hans Endras, HB9QH; Annelies Staedeli, HB9CEW; Paul Rudolf, HB9IR; Alice Rudolf, HB9BIR; Walter Staedeli, HB9CGP; Walter Schmutz, HB9AGA; and Peter Waldner, HB9MMM, are to be congratulated for their excellent organization of this event. All eyes are on the competitors at one of these championships, but behind the scenes the organizing committee has a great deal of work to do. Also somewhat behind the scenes is the International Jury, which oversees the competition itself. The perennial international jury chairman in Region 1 is Krzysztof Slomczynski, SP5HS, who is always present, always helpful.

Also present, on behalf of IARU, were Louis v.d. Nadort, PAØLOU, chairman of IARU Region 1; Wojciech Nietyksza, SP5FM, vice chairman of IARU Region 1; Dr John Allaway, G3FKM, secretary of IARU Region 1; and Mirko Mandrino, YT7MM, member of the Region 1 Executive Committee.



At the opening ceremonies, competitors line up behind their national flags.

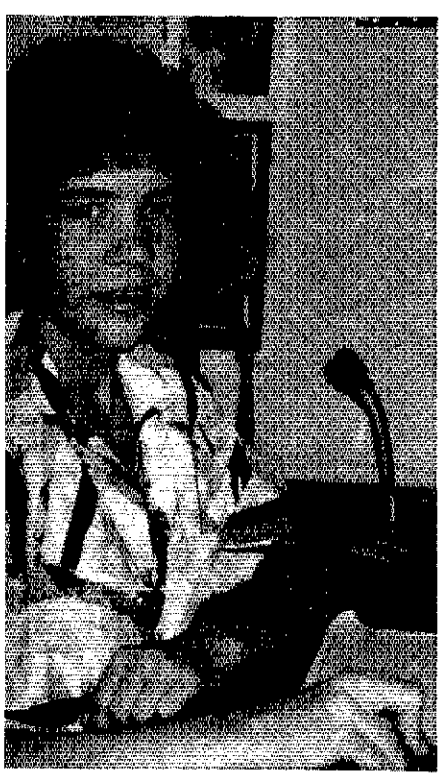
YL News and Views

Conducted By Joan Gibson, KG1F
RR 1, Box 1465, Waterbury, VT 05676

KG5CS Carries On a Family Tradition of Achievement

Meet Diane Magen, KG5CS (daughter of WD5FQX and WD5HIL), who in anyone's book might be called a mini whirlwind of accomplishment. Diane received her Novice license on Valentine's Day in 1987. Given that many Novices are so nervous and apprehensive about their first QSO, many of us were happy to get our feet wet by working our Elmer across town on 80 meters! Not so with Diane. Her first QSO was with Kari, VR6KY, from Pitcairn Island. Three weeks later she had worked all continents and she upgraded to Technician on March 21st—the same day her mother, WD5FQX, upgraded to Extra. By her 14th birthday in August, Diane had passed the 13-WPM code test and claimed an Advanced Class status. A few days later she had confirmed all states on CW.

Diane is an honor student at Lakeside Junior High School in Hot Springs, Arkansas, plays the trumpet in the band and is the featured baton twirler during the football and parade seasons. She is secretary of the school's science club and Spanish club and a member of the National Junior Honor Society. Her talent for baton twirling and gymnastics has brought her many national and local awards. She has been a member of the Arkansas All Region Band for two years and has received plaques for Most Outstanding Auxiliary in Band and Most Outstanding Brass Player. Diane was recently chosen, along with 21 other students, for the Gifted and Talented Pool sponsored by the Washington Workshops. This group of outstanding young people spent a week in Washington to study our governmental system. Diane also attended the Space Academy in Huntsville, Alabama in March and in June traveled to Ecuador, the country of her birth. To mark this special occasion, Diane passed her 20-WPM code test in Ecuador during special testing sessions for US amateurs. Upon returning to the US, she finished the theory requirements for the Extra Class license before she repacked her bags for a 30-day cruise to exotic Asian ports!



Yes, KG5CS is actually sitting, a rare posture for such an active and talented amateur. *(photo WD5FQX)*

The Saga of Diane's Mom, WD5FQX, Continues

Vigilant amateurs who monitored the air waves during 1971 and 1972 may remember the nomadic signal of Darleen, radio's famous YL who toured the world on a magnificent DXpedition and then returned home to tell the rest of us about it in her book *Globetrotting Via Amateur Radio*. Today Darleen Magen, WD5FQX, resides in Hot Springs, Arkansas with OM Joe, WD5HIL, and daughter Diane, KG5CS.

Those who have read her book might wonder if there could be any more travels for this amazing YL. Ah yes! Even though her book ends in 1977 when she and Joe left Guayaquil, Ecuador and returned to the States, a year later they took a trip around the world. One of their first stops was DXPO where they met 9N1MM and other prominent DXers. While the Magens were in Japan, Darleen was invited to speak at the Tokyo Hamfest, and while there, JLRS held a dinner in her honor. After a barbecue in her honor in Hawaii, Darleen returned home and hosted the 1979 YLISSB Convention in Hot Springs.

In 1980 she upgraded to Advanced, a year later took a mobile tour of Vancouver and then boarded a cruise ship for Alaska. Since then there have been cruises to China and Japan, another to Scandinavian countries with a stop in Leningrad where Vlad, UA1CK, took her on an extensive tour of the Hermitage Museum. In 1985, Darleen spoke at the YLRL Convention in Las Vegas; a month later she and Diane flew to Australia for visits to many VK amateurs as well as a tour of the Great Barrier Reef, and stops in New Zealand and Fiji. Between 1984 and 1988, Darleen served YLRL as its DX Membership Chairperson and increased the DX membership from 170 to 265. When she is not on the road or high seas, Darleen is an active radio operator who not only participates in many contests but wins them! Her most recent acquisition is the 1987 YLAP SSB gold cup and 1st place with her OM in the 1987 YLISSB CW QSO Party.

Globetrotting Mother and Daughter—Diane (l), KG5CS, and Darlene (r), WD5FQX, take time out of their busy schedule for a photograph on the grounds of the Royal Grand Palace in Bangkok, Thailand.

For more information about *Globetrotting Via Amateur Radio* by WD5FQX, contact her at her *Callbook* address.

Strays

I would like to get in touch with...

☐ hams who were members of a US armed force unit and who participated in the D-Day landing, June 6, 1944 (or very shortly thereafter) on Utah Beach. The purpose is to join the ARAM club of St Lo, France on the air in a special 45th anniversary commemoration on June 6, 1989. Please reply with an SASE and include unit identification and date of landing. Don Wagner, W2QFC, 308 Parkdale Ave, East Aurora, NY 14052.

Silent Keys

Administered by Nancy A. Slipski

It is with deep regret that we record the passing of these amateurs:

K1BBP, Herbert F. Stenman, Sharon, CT
K1BGK, Harold R. Blackford, Rowley, MA
W1BYK, Donald R. Dean, Auburn, ME
N1CZV, John C. Duksta, Jr, Block Island, RI
W1DIZ, Leland F. Wheeler, Shelburne Falls, MA
WA1DPX, Raymond G. Dick, St Joseph, MI
W1DUX, Stanley H. Pickford, Webster, MA
W1EFN, Walter A. Peck, Pittsfield, MA
W1GLF, Vernon B. Cushman, Kingston, MA
W1GR, Richard S. Morse, Wellesley, MA
W1HZ, Howard H. Ferris, Concord, MA
W1IHI, Reginald G. Hindon, Worcester, MA
W1KKB, Louis J. Martucci, Exeter, NH
KA1PFW, Sara Frances Mayo, Windsor, ME
W1UIR, George R. Chamberlain, Bath, ME
W2AJB, Michael S. Polgar, Jr, Oceanport, NJ
W2BQY, Walter A. Wilson, Garden City, NY
W2CRW, Irving J. Gallagher, Sun City Center, FL
W2IBR, Frank Belina, Elizabeth, NJ
W2JPE, Robert C. House, East Aurora, NY
W2NSH, Murray Halfon, North Thoms River, NJ
WA2OPC, Russell F. Wilson, Gouverneur, NY
K2ROP, Edward J. Blair, Palm Harbor, FL
W2SEF, Douglas V. Keller, Tully, NY
K3CJD, George R. Clayborn, Feasterville, PA
W3CV, Lawrence P. Flavin, Butler, PA
K3CXR, Patrick W. Di Guardi, Morgantown, PA
K3GVV, John J. Allabaugh, Dallas, PA
WA3JKW, Robert W. McKinney, Green Valley, AZ
WA3TOB, Henry N. Porter, Washington, PA
KI4AC, David R. Boggs, Mt Airy, NC
W4BAO, Leroy Knight, Memphis, TN
*W4BMN, John T. Bowman, Safety Harbor, FL
N4CPF, Carl H. Schultz, Nicholasville, KY
K4FDW, Gerald C. Porter, Manchester, TN
K4FRG, Leroy G. Stibbs, Largo, FL
N4GSR, Walter Cooke, Elizabethtown, PA
WA4IIT, Ernest E. Endicott, St Petersburg, FL
W4JMU, Wayne D. Carpenter, Deland, FL
WD4LDY, George O. Takahashi, Gainesville, FL
KA4LGZ, Roy Duvall, Cecilia, KY
WA4LLK, Franklin L. De Prato, Ferguson, KY
N4MIT, Willard W. Hackleman, Memphis, TN
N4OUC, John E. Glover, Memphis, TN
W4PEY, J. Gray McAllister, Jr, Chapel Hill, NC
W4PRJ, William C. Cassell, Roanoke, VA
K4RHU, Jeanne J. Hunting, Columbus, GA
K4RKY, Ralph A. Peters, Largo, FL
K4VHI, Warren Mollenhauer, Helutes, TX
W4VOU, John H. Brewer, East Point, GA
KA4VRH, Seth B. Willets, Port Richey, FL
KF4XJ, Robert D. Greene, Orange Park, FL
KB5BDL, James C. Wright, Leakey, TX
N5IJN, Henry Purvis, Meridian, MS
W5THG, Guynn J. McCabe, Dallas, TX
WA5VEX, Joe Henslee, Fort Worth, TX
WA5YKU, Malcolm Curtis Nelson, Dallas, TX
W6AUN, Elmer C. Bennett, Sacramento, CA
W6CCW, Manuel A. Navalhas, San Jose, CA
*KH6CZ, Fred J. Elser, Martinez, GA
WA6DZD, George F. Burnley, Alameda, CA
K6EOX, Leland W. Harris, San Diego, CA
KB6FRB, Fred S. Allday, Placentia, CA
KA6HDD, Harry F. Farmer, Sun City, CA
KF6HG, David N. Winslett, Yreka, CA
NK6H, William E. Webb, Monterey, CA
N6HS, William E. Cunningham, San Bruno, CA
KZ6J, Howard I. McGill, Sonoma, CA
W6KD, Ray E. Jacobs, San Diego, CA
KB6KIS, Wayne Craig, Baldwin Park, CA
W6LNH, Frederick Gately, Los Angeles, CA
KE6ME, Delmar D. Ellis, Honolulu, HI
W6MJB, Paul L. Van Brunt, Costa Mesa, CA
W6OHC, Robert F. Walsh, Montgomery, AL
W6OHM, Harold W. Hasbrouck, Carson City, NV
W6OIN, Jack B. Scanlon, Modesto, CA
W6QFR, Theodore F. Brix, Fresno, CA
N6SK, Robert L. Hyder, Carpinteria, CA
KY6S, William Snyder, Palo Alto, CA
W6THZ Mel N. Orenstein, Omaha, NE
KA6VDP, John N. Thomas, San Francisco, CA
WA6YOG, John W. Sinclair, Aptos, CA
W6ZZC, Earl D. Rouse, Visalia, CA
W7ANK, Walter S. Hanowell, Nooksack, WA
K7CMJ, Andrew H. Lessenden, Laramie, WY
N7CM, Charles A. Mendenhall, Scottsdale, AZ
AE7D, Will T. Neill, Jr, Issaquah, WA
N7EJY, Burton W. Depue, Wickenburg, AZ
W7FFT, Frank Fortino, Portland, OR
W7IRN, John F. Bracken, Sun City, AZ
K7KWA, V. A. Nedderman, Portland, OR
W7QNO, Tom Allison, Phoenix, AZ
KA7VRG, Eugene J. Hipp, Sweet Home, OR
W7XW, George S. Jelinek, Fremont, NE
W7ZT, George B. Criteser, Carson City, NV
K8APU, Earl J. Knaggs, Southgate, MI
WA8ARP, Robert E. Snitchler, Lincoln Park, MI
W8DQG, Henry P. Hewit, Cleveland, OH
W8DT, Albert Pochelon, Auburn Hills, MI
WB8KGO, Ellis D. Brubaker, New Carlisle, OH
K8MLJ, John F. Maziarz, Lorain, OH
*W8SS, Kenneth E. Stecker, Dearborn, MI
*W9BPW, Charles W. Tinsley, Naperville, IL
W9CRY, Charles Parker, Plainfield, IL
K9DYN, Earl William Leady, Godfrey, IL
KA9GUB, Earl M. Crane, Mt Clemens, MI
*W9NLO, Wendell P. Munro, Aiea, HI
W9QA, Melvin M. Layman, Waunakee, WI
W9SYQ, Kenneth W. Altic, Frankfort, IN
K9TGQ, D. E. Brunn, Peoria, IL
W9UMO, Casper J. Wallner, West Bend, WI
W9YYH, Franklin W. Shrack, Indianapolis, IN
WØASM, Hewitt D. Grotewohl, Hartley, IA
WØCIA, Wilbur H. Patton, Springfield, MO
NØCSO, Mark Wegwerth, St Paul, MN
WØCUV, Hugh I. Fink, Davenport, IA
NØEGP, Orlan C. Cotton, Independence, MO
WAØJBK, James G. Whiting, Lake Shore, MN
KØQPM, T. E. Mundhenk, Grand Junction, CO
WØWTQ, Paul C. Pinkerton, Lakewood, CO
WØXA, Lynn B. Fellison, Kansas City, MO
WØZWL, Martha Shirley, Rapid City, SD
DJ7AA, Karl Dereser, Andechs, West Germany
IØZQ, Elvio Pizzo, Rome,, Italy
OK1CC, Jaromir Pavlicek, Prague, Czechoslovakia
JA3MP, Y. Taniguchi, Osaka, Japan

*Life Member, ARRL

Notes: All Silent Key reports sent to HQ must include the name, address and call sign of the *reporter* as well as the name, address and call of the Silent Key in order to be listed in the column. Please allow several months for the listing to appear in *QST*.

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys are confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from HQ. Canadian reports should be sent to the CRRL HQ address on page 9.

Many hams have remembered a Silent Key with a memorial contribution to the ARRL Foundation. Should you wish to make a contribution in a friend or relative's memory, you might designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund or for the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation, Inc, 225 Main St, Newington, CT 06111.

50 Years Ago

November, 1938

☐ A triple calamity—hurricane, tidal wave and flood—struck Long Island and New England in late September; once again amateur radio rose to the task of providing disaster communication when all power was out and most telephone lines down. Both individuals and organized club groups participated in the humanitarian effort, though still some 600 lives were lost.

☐ Another tragedy was the sudden death, by electrocution, of the brilliant Australian-born amateur Ross Hull, editor of both *QST* and the *Handbook*. Ross had been experimenting with television, surprising N.B.C. engineers by his reception of signals from New York City over a 100-mile path to his home in northeast Connecticut; a careless gesture near a 4,000-volt pole transformer he had modified for the picture tube caused the end.

☐ Just what *is* an antenna? W1LJI helps the beginner over some rough spots of radiating fundamentals, including dope on transmission lines.

☐ We have new regulations effective December 1st. New bands are 112-118 and 224-230 Mc. No more modulated oscillators on 5 meters. Better frequency monitoring required, plus accurate measurement of any power input over 900 watts. No more music transmissions under the guise of "testing." Plus a number of minor items, with details next month.

☐ W1TS has produced a neat little three-tube transmitter of about 50 watts power. It is crystal-controlled, so you can add W2AOE's electron-coupled oscillator unit to provide frequency flexibility and still maintain stability.

☐ Virginia must be the ideal location for DX; three (W3EMM, W3EVT, W3CHE) of the six top scores in the 1938 DX competition were located in that state. W2UK took top national honors.

☐ The "greatest ham gathering of all time" took place in Chicago in September—the first national convention of the League in many years. Over 2,000 attended.

☐ W1XAL in Boston is resuming its "modern radio course" programs on short-wave, which have instructed and entertained many amateurs and would-be amateurs during the past four years.

☐ If you have an all-wave b.c. receiver and want to copy c.w., try Fred Schor's (Hallicrafters) neat and simple circuit for a combined beat oscillator and i.f. amplifier. You can plug the little unit right in.

25 Years Ago

November, 1963

☐ Acting to strengthen our license structure by providing more incentives, the Board of Directors of the League is requesting the Federal Communications Commission to reinstate the Advanced Class license and require it (or an Extra Class) for operation on our basic voice bands. No additional code test would be required, and the effective date would be several years hence to allow adequate time for existing amateurs to qualify for the new class of license.

☐ Three pages of "correspondence" are filled with member comments on the subject of incentive licensing. The general tone indicates a substantial trend in favor of the principle compared with the initial angry reaction in many quarters.

☐ A "Skew-planar" antenna, mobile? W1IJD and W1FVY find considerable success on two meters with four "wheel" elements, each skewed at an angle of 45 degrees, resulting in nearly uniform response to signals of any polarization.

☐ Official Observers provide a most useful service for us amateurs, often catching a malfunction in our rigs before it grows big enough to warrant an FCC citation. Communications Manager Handy, W1BDI, outlines the functions of an OO and the frequency-measuring tests an applicant must pass before appointment is made, to ensure high-accuracy results.

☐ Neon bulbs and dial lamps make inexpensive substitutes for elaborate test instruments, a subject which W1ICP covers this month in detail. A code-practice oscillator with a neon bulb is also featured.

☐ VE3KF converted a standard v.o.m. to Braille for sightless amateurs by substituting a transistor comparator and audio amplifier for the microammeter normally used.

☐ It is simpler to buy an r.f. choke than construct one, but W1HDQ points out that, particularly at v.h.f., a homemade job can be tailored to the specific need and thus be much more efficient.

☐ The Quarter Century Wireless Association is now 16 years old, and co-founder W2FX relates some of its history and growth to a membership of more than 3,000.

☐ FCC denied 17 petitions, including the League's, for rehearing on the question of license fees and thus will put them in effect next January 1st.

☐ League officials W6ZH, W3PS, W1LVQ and W6MLZ testified before the communications subcommittee of the Senate in support of reciprocal operating privileges in the bill introduced by Senator Barry Goldwater, K7UGA, and 25 others.

☐ A mockup of the first Oscar satellite was presented to the Smithsonian Institution by K6LFH for the Project Oscar Association.—*WIRW*

Coming Conventions

SOUTH TEXAS SECTION CONVENTION

November 11-13, 1988, Houston

The 1988 South Texas Section Convention will be sponsored by the Houston Ham Convention, Inc. It will be held at the Sheraton Crown Hotel/Intercontinental Airport from 7 AM-6 PM. Admission will be $5 in advance and $7 at the door. Features will include seminars, flea market, transmitter hunt, ARRL activities, banquet, QCWA breakfast, auction, nonham activities and VE exams. Talk-in will be on 147.68/08, 147.92/32, 146.52, 147.60/00 and 222.5/4.1. For further information write to Houston Ham Convention, PO Box 800128, Houston, TX 77280-0128 or tel 409-297-8656.

SOUTHEASTERN DIVISION CONVENTION

November 19-20, 1988, Tampa, FL

The Southeastern Division Convention will be sponsored by the Florida Gulf Coast Amateur Radio Council, Inc. It will be held at the Curtis Hixon Convention Center, 600 Ashley Dr. Doors will be open on Saturday from 9 AM-5 PM, and on Sunday from 9 AM-3 PM. Admission will be $6 for both days. Tables will be $15 for both days. Features will include ARRL forums, packet, DX, Public Service, MARS, AMSAT meetings, VE exams Saturday at 1 PM and Sunday at 10 AM (walk-ins welcome). Talk-in will be on 147.705/105, 224.74/3.14, 449.4/444.4 (PL tone 103.5 Hz). For further information write to the ticket chairman at 1556 56th Ave, N St Petersburg, FL 33703.

November 11-13
South Texas Section, Houston

November 19-20
Southeastern Division, Tampa, FL

ARRL NATIONAL CONVENTIONS

June 2-4, 1989—Dallas/Fort Worth, Texas
June 8-10, 1990—Kansas City, Missouri

Attention Hamfest and Convention Sponsors
ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You are encouraged to register your event with HQ as far in advance as your planning permits. Note that the hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register: Registering dates with ARRL HQ does not constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned hamfests and conventions. For hamfests, this must be done by your Division Director. For conventions, approval must be made by your Director and, additionally, by the Executive Committee. Application forms can be obtained by writing to or calling the ARRL Convention Program Manager, tel 203-666-1541 ext. 283.

Note: Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance. QST

Hamfest Calendar

Administered By Bernice Dunn, KA1KXQ
Convention Program Manager

Attention: The deadline for receipt of items for this column is the 5th of the second month preceding publication date. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in *QST* of prizes of any kind and games of chance such as bingo.

Alabama (Montgomery)—November 19. *Sponsor:* Montgomery ARC. *Time:* dealers setup 6 AM, public 8 AM-3 PM. Place: Garrett Coliseum. *Features:* free parking, overnight RV parking with hook-up ($5/night), flea market, VE exams (Novice through Extra Class beginning at 9 AM, bring copy of current license for upgrades). *Talk-in:* 146.24/84, W4AP/RPT, 147.78/18, 444.50/9.50 and 146.32/92 with autopatch. *Admission:* free. *Tables:* $7 each. *Contact:* Montgomery Hamfest, PO Box 3141, Montgomery, AL 36109, or tel Al, W4CNQ, 205-272-9130. For table reservations tel Jiggs, K4JZA, 205-365-0380 or Fred, K8AJX, 205-263-9557. For dealer information tel Randy, N4LZK 205-832-4598.

†**Arizona (Apache Junction)—December 3-4.** *Sponsor:* Superstition ARC. Place: held at the corner of Brown Rd and Meridian, take I-10 to southeast Phoenix, AZ 360 Freeway, east through Tempe and Mesa to Power Rd (last exit), north on Power 3½ miles to Brown, then east on Brown 6 miles. *Features:* free camping on grounds (no hookups), swap shop, refreshments. Talk-in: 147.72/12, 144.81/145.41, 223.82. *Admission:* advance $1, door $3. *Contact:* Bill Glaze, KA7SUF, tel 602-832-3955 or Larry Kuck, WB7CRK, 602-986-2298.

Illinois (Grayslake)—October 30. *Sponsor:* Waukegan CAP. *Time:* 7 AM-5 PM. *Place:* Lake County Fairgrounds, Rtes 120 and 45. *Features:* large indoor flea market, refreshments, free parking. *Admission:* $3. Tables: $5. *Contact:* send SASE to CAP, 637 Emerald St, Mundelein, IL 60060.

Indiana (Fort Wayne)—November 13. *Sponsor:* Allen Co Amateur Radio Technical Society. *Time:* dealer setup begins 5 AM, public 8 AM-4 PM. *Place:* Allen County Memorial Coliseum on Coliseum Blvd (US 30). *Features:* parking, forums and women's activities. *Talk-in:* 146.28/88. *Admission:* advance $3.50, door $4. *Tables:* $10 each (ac power extra), tables along the wall and free ac power $25 each. *Contact:* for reservations write to AC-ARTS Hamfest, PO Box 10342, Ft Wayne, IN 46851. For general information contact Becky Glaser, KA9GWE, tel 219-432-6951, 6 PM-10 PM.

†**Massachusetts (Concord)—November 5.** *Sponsor:* New England DXCC Banquet. *Time:* Afternoon program 1-5:30 PM, evening program 6-10 PM. *Place:* Masonic Lodge, Monument Square. *Features:* DXCC news and DXpedition presentations including NO1Z/KH1, 4J1FS, WØRLX/KH5K, 9M6ZR, XF4DX and W3AZD. *Admission:* Afternoon $5 with coffee, soda and snacks, evening $18 with catered dinner, reservations required. *Contact:* Steve Tolf, K1ST, RFD 1 Box 176A, Exeter, NH 03833, 603-772-6131 (nights).

Michigan (Hazel Park)—December 4. *Sponsor:* Hazel Park ARC. *Place:* Hazel Park High School, 23400 Hughes, north of 9-Mile and west of Dequindre. *Features:* free parking. *Talk-in:* 146.04/64. *Admission:* advance $2, door $3, children under 11 free. *Tables:* $1 per foot. *Contact:* for tickets and table reservations, write to Hazel Park ARC, PO Box 368, Hazel Park, MI 48030.

†**New York (Selden)—November 13.** *Sponsor:* Radio Central ARC. *Time:* 9 AM-3 PM. *Place:* Suffolk Co Community College, follow signs to exit 62 on Long Island Expy. *Features:* exhibits, lectures and VE exams. *Talk-in:* 145.150, (PL 4Z) and 444.525/9.525, (PL 2A). *Admission:* $4. *Contact:* Andy Feldman, WB2FXN, tel 516-928-3863, or John Mark, KB2QQ, tel 516-689-6336.

North Carolina (Greensboro)—November 26-27. *Sponsor:* Mark 4 Radio Club. *Time:* Saturday 9 AM-5 PM, Sunday 9 AM-3 PM. *Place:* National Guard Armory, Franklin Blvd. *Features:* VE exams, exhibitors. *Talk-in:* 147.63/03, 146.52. *Admission:* advance $4, door $5. *Tables:* inside $12 per 6-ft table, good both days; outside paved tailgate and flea market area for price of ticket and $2 for unlimited space. *Contact:* information and registration Fred Redmon, N4GGD, 3109 Goodall Dr, Greensboro, NC 27407, tel 919-852-9244 between 9 PM-11 PM only; tickets, Henry Hughes, KA4LPA, 2811 Gwaltney Rd, tel 919-292-0633; exams TEARC, Jim Williamson, NQ4T, 3504 Stonehurst Pl, High Point, NC 27260, tel 919-869-6637.

Ohio (Massillon)—November 20. *Sponsor:* Massillon ARC. *Time:* sellers setup at 7 AM, public 8 AM-5 PM. *Place:* Massillon K of C Hall on Cherry Rd, off Rte 21. Features: refreshments, free parking, auction (starts at 11 AM). *Talk-in:* 147.78/18. *Admission:* advance $3.50, door $4. Tables: $7 per 8-ft space. *Contact:* Massillon ARC, PO Box 73, Massillon, OH 44648.

South Carolina (Sumter)—November 19. *Sponsor:* Sumter ARA. *Time:* 8:30 AM-4:30 PM. *Place:* South Carolina National Guard Armory, North Pike Rd. *Features:* VE exams (bring photocopy of license), flea market, ATV seminar, refreshments, handicap access. *Talk-in:* 147.615/015 WA4UMU/R. *Admission:* advance $3, door $4. *Contact:* write to SARA, PO Box 193, Sumter, SC 29151-0193, or tel George Mudd, KK4QZ, 803-773-5053, or Hap Griffin, WA4UMU, 803-469-6381.

Wisconsin (Milwaukee)—November 12. *Sponsor:* Milwaukee Repeater Club. *Time:* sellers 7 AM, public 8 AM-1 PM. *Place:* Serb Hall, 51st and Oklahoma Ave. *Features:* swapfest, VE exams. *Talk-in:* 146.31/91 and 146.52. *Admission:* advance $2, door $3. *Tables:* advance $3, door $4. *Contact:* send SASE to Milwaukee Repeater Club, PO Box 2123, Milwaukee, WI 53201, or tel 414-444-4589. QST

†ARRL Hamfest

Club Spectrum

Conducted By Rick Palm, K1CE
Field Services, Manager, ARRL

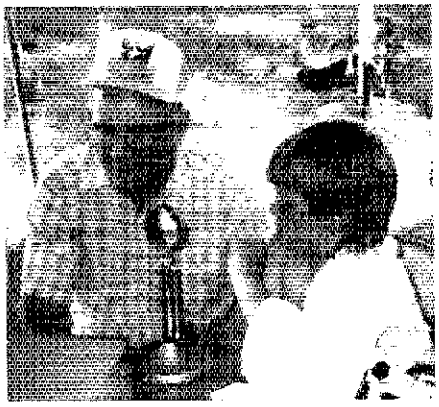
North Dakota Camporall Features Scout to Scout Contacts

Story and photos by Warren J. Tobin, WFØV

The Forx Amateur Radio Club, Grand Forks, North Dakota, knows the special appeal Amateur Radio can hold for young scouts. On June 4, the club operated North Dakota Centennial Camporall special-event station WAØJXT at Camp Grafton to introduce Amateur Radio to more than 800 scouts from North Dakota, Minnesota, South Dakota, Montana, Manitoba and Saskatchewan. Operating with emergency power and temporary makeshift antennas, the station made contacts with amateurs from 16 states and 3 Canadian provinces. Many scouts participated in the QSOs. In one QSO, the scouts communicated directly with Illinois scouts participating in the N9BAT Camporall activity at Brookfield, IL.

Jim, N1ENF, demonstrates packet radio to Mike Belton (l), Minot AFB, North Dakota, and Darcy Olmstead (r), Weyburn, Saskatchewan.

John, KAØSLI, and Parky, KØTMH, fine tune the generator for the day's activities.



Parky, KØTMH, and Dominic Solberg are busy looking for 20-meter contacts.

Jesse, KBØCAW, is busy logging a 15-meter contact while Eric Trembath (l) and Stewart Leen (r) of East Grand Forks, Minnesota look on.

In addition to the voice and packet demonstrations, the club showed the League's *Tune In The World With Ham Radio* package, played code tapes, displayed QSL cards from around the world and demonstrated a code oscillator. The Devils Lake ARC provided equipment.

WANTED: ACTION PHOTOS, STORIES

All clubs: Get *QST* recognition for your good work! Send your stories and photos of club activities and programs to Rick Palm, K1CE, ARRL Headquarters, 225 Main St, Newington, CT 06111. Thanks!

New Pubs for Clubs

To help radio amateurs plan special event stations, public exhibits and demonstrations such as the North Dakota Camporall activity, the ARRL has just released a new publication *The Special Events Communications Manual*, a 100-page book featuring practical tips, suggestions, and examples.

The book is liberally spiced with reprints of *QST* articles describing amateur communications efforts in various events including marathons, mall displays, museum exhibits, Boy Scout Jamborees and more.

Amateurs may order copies by sending $5 plus $2.50 shipping/handling to the ARRL Publication Sales Department, 225 Main St, Newington, CT 06111.

To help club presidents plan an active club year, the League has just published *The 1988-1989 ARRL Club President's Workbook*, a set of planning calendars with suggestions for club programs and activities. The book also contains the ARRL's audiovisual library catalog, an overview of the ARRL Club Program and the role of the Affiliated Club Coordinator, and tips on working with club members.

Copies have been sent to all ARRL Club Presidents, Section Managers and Affiliated Club Coordinators. For your copy, send $5 plus $2.50 shipping/handling to the ARRL Publications Sales Department (address above).

F13135 1.52 15.51

Field Day 1988

Lightning, Hail, Rain and Heat . . . . . Field Day!

By Billy Lunt, KR1R and Mark Gamble, N1FOZ
Contest Manager, ARRL Assistant Contest Manager, ARRL

June brings Field Day, the premier operating event of the year. Amateur Radio's true spirit comes forth on this occasion, because most participants build a station from the ground up. The station must be built within the 24 hours prior to or at the start of FD, depending on whether you or your club wish to have 24 or 27 hours of available operating time. To the first-time Novice, FD is a learning experience, but for the old-timer it is a time of innovation. Everything from antenna designs to power sources are experimented with. The FD spirit not only abounds in the experimenter, it is also alive in the contesters and traffic handlers. These two groups work hard in optimizing their abilities, by increasing operator speed, organizing the station set up and improving signal gain. All of this is performed under field conditions. Field Day is more than this! It has become a time for the family to go out and participate as a group in something very meaningful to the community. Others find it to be a perfect opportunity to enjoy the company of their peers.

When a club, group or individual participate in Field Day, they are honing their skills (and usually having fun while doing so), for that time when "just in case" happens. Setting up temporary stations with skill and enthusiasm, FD participants simulate emergency conditions within a competitive atmosphere. One of the primary functions of the hobby is voluntary service to the community through emergency communications, but who says you can't enjoy the simulation.

This year's Field Day weekend ran hot, in more ways than one! For example, an operator from the W0EQU FD team reports that temperatures were well above the 100 degree mark and that QSOs on 50 MHz were just as hot! Other operators commented on how 15 meters never stopped yielding QSOs, while others swore that 40 was their bread and butter.

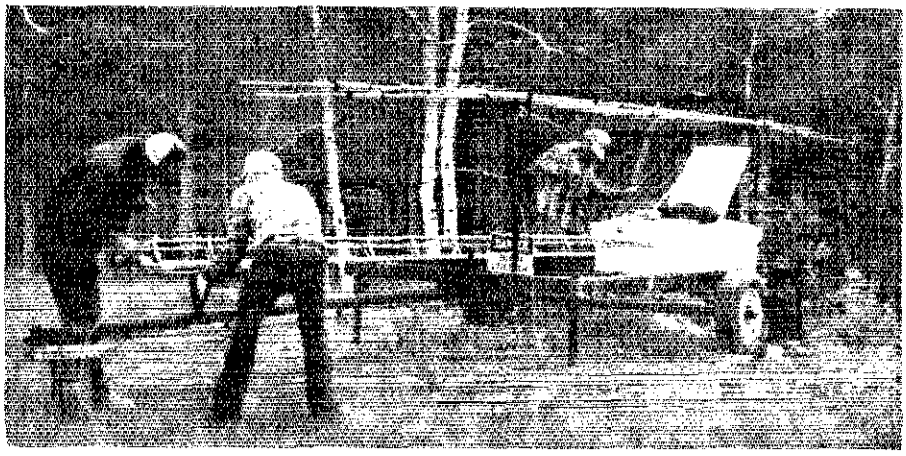
There were the typical battles with Murphy this year. Broken rigs, antennas and generators, but never once a broken spirit (let us note that spirit and heart are not the same, as many of you complained of the latter). Besides Murphy, there were weather difficulties in some areas of the US and Canada (other than the summer heat). Jeff, WB4UIE, and Steve, WA4YGG, the operators of WA4YGG, reported lightning strikes, hail, and the ever threatening "rain and hail falling sideways." Yes, all of their equipment was saved. Another concern this year was Moe Skito and his compadres. It seems Moe did a job on quite a few of this year's FD participants. In any case the final statistics show that FD '88 was a complete success, even with the usual inconveniences.

On June 27, 1988, a reported 27,471 persons took to the fields of Canada and the US, setting up 1758 stations. These stations worked a staggering 1,332,710 QSOs in the FD time allotment. SSB amassed 891k contacts, while CW QSOs amounted to 442k. The bonus points earned by all stations eligible were 808k.

This year the most popular category was 2A. This category turned up 542 participants. 1A and 3A also showed some strong competitive gumption with 235 and 310 entries respectively. In all, the A (club or non-club portable) category had the largest

Entries Per FD Class

1A—235	11A— 3	2C— 3
2A—542	12A— 1	4C— 1
3A—310	15A— 3	1D—104
4A—123	18A— 1	2D— 12
5A— 58	22A— 1	3D— 8
6A— 33	1B1— 79	4D— 3
7A— 20	1B2— 66	1E— 55
8A— 12	2B1— 2	2E— 15
9A— 6	2B2— 22	3E— 3
10A— 4	1C— 22	4E— 1



The NN7T FD gang start off with setting up their portable antenna.

Assembling the satellite antenna is the crew of the Stewart Lake ARC, WD7X.

Canadian "QST" Stations

Call	QSOs	Power Indicator	Number of Participants	Final Score	Entry Class
VE1QST	636	-2	-2	-1,912	-2B2
VE2QST	63	-2	-2	-676	-1B1
VE3QST	1262	-2	-15	-4,502	-6A
VE5QST	1021	-2	-30	-3,408	-2A
VE7QST	1061	-2	-25	-3,676	-3A

turnout, 1352 in all. In the B (one or two person portable) category, the largest population turned out to be the 1B 1 operators, followed by the 1B 2 operators. The final tally in this category was 168 participants.

For the 1988 FD there was a chance to earn special bonus points for working any of the Canadian Radio Relay League's eleven official bulletin stations ending with a "QST" suffix. Five of the "QST" stations sent logs in and are listed in the boxes.

The Contest Branch would like to extend a special thanks to Mark R. Burke, KA1MIS, for his help in preparing these results.

Comments from several different groups are listed below in Soapbox. If you're looking for some interesting ideas as to how others set up and operated this year's Field Day, the following should help, if not amuse you. See you next June 24-25 for FD 1989.

One of the N8MC ops tuning for QSOs.

SOAPBOX

W2DMC, 8A

This year our club had two major objectives: To achieve 10k or higher and to have all stations operational 2 hours prior to the beginning of Field Day. This Field Day was the best in the Crystal Radio Club's history, as both objectives were met.

Plans for Field Day started early. First, we decided to have two 20-meter stations in operation at all times. Since we only owned one 20-meter beam, which was designated for SSB, it was decided that a purchase of another 20-meter beam for the 20-CW station was in order. Since the Dayton Hamvention was right around the corner, we decided to see what we could find there. Not only did we find our 20-meter antenna but we also found a great deal on a 15-meter beam which was used to replace our aging home-brew.

Our 20-meter stations brought in the most QSOs on any single band, 1278 SSB and 429 CW. Our 40-meter effort produced the second largest QSO count with 619 on SSB and 330 on CW.

All was not perfect, however; Murphy struck a severe blow to our 80-meter effort by removing our chief operator and hence his equipment. Fortunately, we were able to fill the gap by the time Field Day rolled around. As for next year, who knows? Propagation and Murphy willing, maybe 13k.

AA5EQ, 2B, 2 operators

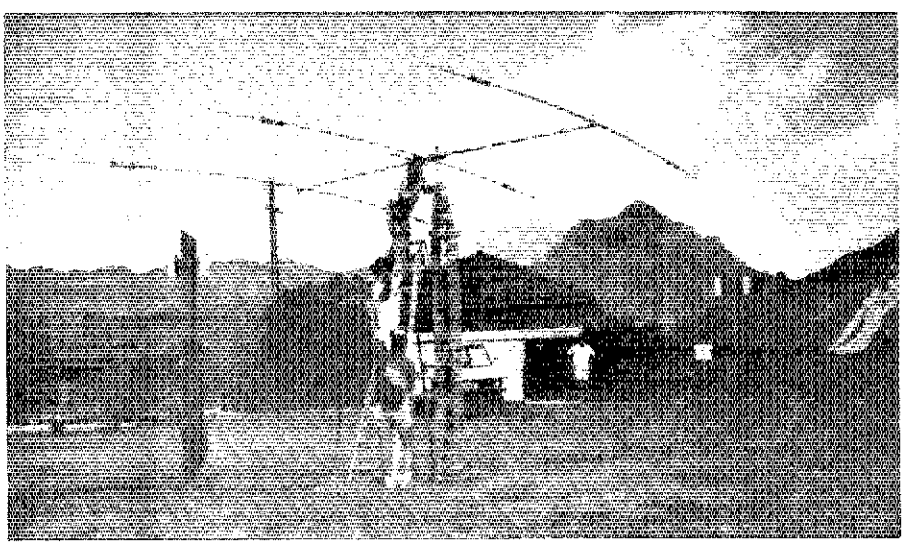
Field Day 1988 looked grim for Alan, KB5CUS, and me. We had several plans for good sites, but they kind of fell apart. At the last minute, Alan found a primo site, located on a hilltop north of Ft Worth, TX, with a windmill. Al and I set out late Saturday morning and arrived at our FD location just as things were starting. We easily hung a G5RV to the top of the windmill and were almost set at FD start. The ground rod was a different matter; it took 46 minutes to pound the 6 foot rod into the hard dirt. Once all was set up, though, QSOs flowed freely on both 10 and 20 meters. The Kenwood 440S played like a violin! We generated multiple pile-ups and played king-of-the-hill on both bands from time to time. We were doing well into the wee hours of the morning, when suddenly we got hit by a bad storm. The lightning was crashing around us when we decided to abandon the site and move to lower (and hopefully safer) terrain. After dismantling everything, we withdrew a few hundred yards down-slope and waited about three hours. We snatched some sleep during this period and went back up the hill as soon as the bad stuff had ceased. Unfortunately, the coax and end connector were found buried in the mud, it took a while to clean it up. Alan tried to make an RS-10/11 contact, but we were so whipped that we couldn't read the computer printout. I played "natural power" QRP for the needed bonus contacts. No luck. Alan returned and hit RS-10/11 for 3 contacts. I was amazed and rather upset. Al not only made 3 contacts on one pass, but the fool also engaged in a ragchew session on his second contact! I kept yelling ... "OK, you got him now move on!", but Alan knew the guy and had to discuss the finer points of satellite work. After this I was shamed into making my "natural" QRP contacts, which I did after no small amount of effort.

We both passed out on lawn chairs only to be aroused a few hours later by Alan's wife Debbie. She brought a Coleman stove out to the site and proceeded to cook us a hot breakfast. After an "FB" meal we hit the airwaves again and hashed up the contacts. We stayed on the air about 18 hours in all.

The big surprise came after the end of FD for the guys who set up early. The QSOs became real easy and "laid back." We did well in not starting to set up prior to FD start! Those last few hours were fun, honest to God, fun! The heavies had dropped out and we had a chance to "play" radio. It really made up for all the earlier grief and hassle. All in all, I'd have to say FD '88 was a blast for us. It kind of gave us a standard for future FD efforts.

AA4NP, 2A

The perfect Field Day operation ... almost. All of the volunteers arrived on site at 1300Z as scheduled. Radios, antennas, cables, and accessories were there, even the ever-necessary sun-shade and rain cover tarpaulins with their supports arrived on time. One of the club members decided to bring his 20-foot camper trailer, which made the inevitable necessity very close at hand for the duration of operations. It was an event too good to be true. The sunshades went up, followed by the two verticals and the forty-foot telescoping mast, which supported the great dipole. For the first time in the history of our Field Day plans and operations, there was no need to run for a single missing item ... even down to the food and drink brought by each participant, all was there. The 3500 W generator arrived at 1700Z, everything was in readiness for the 1800Z hour. But where were the two Novice



Untangling the coax from the guy wires, these members of the KH6WO FD crew lay the finishing touches on the tribander.

The CW crew at W8MAA is ready for FD.

operators?! Alas ... a search found one to be AWOL and the other indisposed. A perfect Field Day ... almost.

W2RKC, 3A

Originally, we weren't going to use our allocated W2RKC call for FD, but decided to anyway. What a mistake! At least 15% of the stations we worked thought we were bootlegging. It seems that they had never heard of the Bicentennial call signs! I guess some people sleep all year to get ready for FD!

W1TRB, 1C

Last year, during Field Day, I was on vacation, driving the Alaska Highway. I had the privilege to operate mobile VY1 and KL7 during that FD. I did lose several contacts while QRX, I had to take photos of a grizzly bear.

This year I was driving the northern peninsula of Newfoundland mobile VO1. And again, I lost several contacts while QRX, this year it was to take photos of moose. I made nearly 100 QSOs on 40 through 10, but most were made on 20. There were a lot of big signals heard from all states.

VE6FD, 1B 2 operators

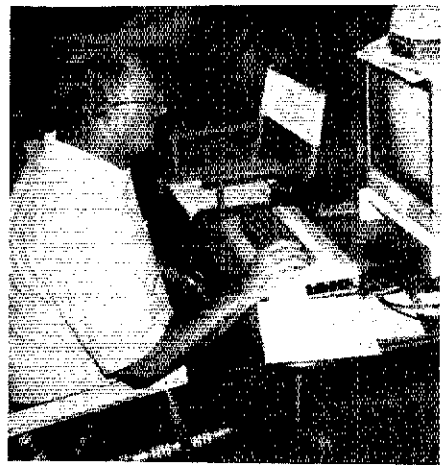
The Pembina River Flying Dinosaurs lumbered onto the Field Day airwaves in fine style, with Murphy close behind. He made sure that the rotator motor was burnt out, the packet rig was stuck in "transmit," and 20 minutes of HF phone CQs were sent while still in CW/TUNE mode. The resulting wildly profane catharsis when this was discovered prompted a visitor to say that we really should try to find a more relaxing hobby, or else change our phonetics "Fairly Disgusting." For an encore, Murphy arranged a light rain of several million gallons per square foot for most of Sunday. The only good part of this was the sight of VE6BOA slithering out of his station wagon after several slothful hours of snoozing and stuffing his feet into his jumping boots left outside Saturday night. He jumped, but not as high as VE6FD did when a mouse stuck its head out between the rig and tuner to see what was going on.

Regardless of what the official position says, Field Day isn't really about operating, it's about eating. Hot chili, mild chili, hamburgers, rhubarb pie, ice cream, poppyseed cake, cold beer, bacon and eggs—the logistics of the culinary department boggles the mind. It was really a trial to go back to radio while groaning under the weight of our stomachs, which is probably why there are several large gaps in our logbook at times.

Lastly, thanks to that W7 station who, when told he was speaking to VE6 Flying Dinosaur, remarked, "well I guess that your generator's got a Pterodactyl in its tank."

KQ1X, 1B 1 Operator Battery

I have operated many Field Days in the past, but this one had to be the most enjoyable. It was the first time I operated using battery power with only 5 watts out. At first, I didn't think anyone would hear me through all the QRM, but I was pleasantly surprised!



The packet setup at the Varian ARC's K6TM Field Day site.

My wife and I set up camp at Canal Camp ground in Sandy Hook, MD, some 200 feet above the Potomac and C & O canal and just across the river from historic Harpers Ferry, WV. My station consisted of a Ten-Tec Century 22 and an MFJ-949B antenna tuner which fed a 120-foot wire slung through the trees at about 20 feet. My power source was an old 12-volt car battery that had been used to start my pick-up truck. I actually operated Field Day and could hear the wind through the trees and crickets at night! That sure beats the deafening roar of gas generators that have to be fed every few hours! QRP and battery power from now on!

K9NG, 2A Battery

We ran two stations with a maximum output of one watt each. Both stations consisted of Argonauts, powered by batteries and solar panels. We used two very long wires (one didn't function very well; the other was used for 24 hours!) and a Butternut vertical.

We had much more grandiose plans for experimenting with antennas, but the heat was a strength-sapping 100 degrees as we set up. It settled to about body temperature with very warm winds during the afternoon. We didn't set up tents, choosing instead to conserve our energy and drink cold fluids. Early in the evening the temperature dropped 15 degrees in 15 minutes and kept going. One station was off for several intervals while CW operators tried to warm up their fists!

We were visited by a Cub Scout den and their fathers, the latter showing a lot of interest. W9ZSJ was pretty glad he could work Nevada on SSB and Oklahoma on CW for a demo, but the kids were more interested in trying to get cool. Too bad they didn't stick around!

Several local hams also dropped in, some with neighbors, for a visit. One, N9ESH, came at a time when we were short of operators. He operated SSB at some length despite his unfamiliarity with our gear. When one of us checked up on him later, it was noted that the contacts weren't coming as quickly on 40 SSB now. A check showed that the wattmeter wasn't getting off the peg ... but he *was* still getting QSOs. Maybe next year we'll run a MILLI-watt station or two!

K6VE, 4A

Field Day, 1988 is an event that the members of the Mountain Repeater Association may never forget. I hadn't participated in Field Day in more years than I'd care to remember. The reason was most likely because my birthday and FD occur at approximately the same time, every year. This year was no exception, but I decided to participate anyhow, birthday or not. At 8:00 Saturday evening, it was time for me to leave the Field Day site, which was no easy chore. A mile of rather bumpy road connected our location to civilization. I no sooner reached the main boulevard that bordered our site, when I spotted a television Electronic News Gathering vehicle. Could they be looking for us? Sure, we sent a press release for the bonus points offered in the contest, but surely the media wouldn't act on it ... would they? The truck was headed in the wrong direction, and besides that, the driver appeared to be lost. I turned my car around, and gave chase.

When I pulled along side, I asked if they were looking for the "hams." "We sure are," the driver replied, "where are they?" "Follow me," I said. The rest is a matter of record. Los Angeles television station, KABC-TV, was planning to report about FD on the 11:00 news, and we were going to be the lead story! What a way to return to the FD site, in a VW rabbit followed by a fully equipped ENG truck, topped with a 2-GHz microwave dish and telescoping pole. When we arrived at the site, the reporter and two engineers proceeded to set up their camera and gather the story from all who were there. After a few interviews, some pictures, and dinner at the Bar-B-Que, the story was finished, and ready to be transmitted back to the studio. There was one problem, however, the television ENG vehicle was parked right under our long-wire antenna. Since at least part of the story was going nationwide, this could be the most serious TVI problem ever! We decided to stop transmitting, so that the story could be sent back to the studio by way of the 2-GHz microwave equipment, without TVI! We were very happy later, because the minute and a half story did appear on the 11:00 news. The 2-GHz transmitter that we didn't count on having at the Field Day site had done its job very well, and we were glad that it had.

Scores

Class A stations are clubs or groups operating with more than two operators. Score listings are grouped according to the number of transmitters in simultaneous operation. The listings show club or group name, call(s) used, total number of QSOs, number indicating power output used (5 is less than 5 W; 2 is less than 150 W; 1 is more than 150 W), number of participants and total score including bonus points. Scores are listed from highest to lowest in each class. Non-club groups are identified by the letters "NCG." Class B stations are portables manned by one or two operators. These may have one or two transmitters in simultaneous operation. Class 1B stations manned by one operator are listed first, followed by those with two operators, followed by Class 2B stations. When there are two operators, the other operator's call is listed in parentheses, if it is known. Numbers following the calls indicate QSOs, power and final score. Class C stations are mobiles. They are listed by call, QSOs, power, number of operators and final score. Class D stations are home stations using commercial power. Line scores are the same as Class C. Class E stations are home stations using emergency power. Line scores are the same as Class C.

b/Non-Club Portable

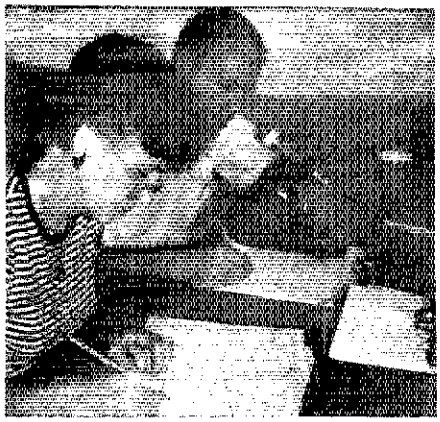
Battery			
ama City ARC			
YZ	1226-5-	15-	9,490
away ARL			
M	747-5-	11-	8,080
iden ARC			
NRG	618-5-	15-	6,880
G			
J	731-5-	3-	6,510

VI ARC AND BVIRL			
KP2A	568-5-	9-	6,445
Central NC DX Chasers			
N4DAZ	689-5-	6-	5,805
MJ FD Party			
W1MJ	510-5-	7-	5,565
RCA ARC			
N9RJ	923-5-	14-	5,370
Eastern Iowa QRPers			
NC0C	489-5-	7-	5,190

Dinosaur Valley FD Group			
K5MW	618-5-	9-	4,860
IITRI FDG			
W3MR	503-5-	6-	4,780
Hiawatha, KS/Falls City, NE ARC			
WA0W	444-5-	24-	4,245
Lightning Arrestor QRP Group			
KC5ZT	383-5-	6-	4,130
Country Western Boys SDXA			
NM8K	420-5-	6-	4,045

Overlookers			
NR9R	446-5-	9-	3,860
Tidelands ARS			
K5BS	328-5-	13-	3,780
University ARC			
NQ7Q	492-5-	35-	3,750
HERO			
KD8IE	365-5-	15-	2,975
Three Mousketeers ARC			
VE7ZAP	302-5-	3-	2,915

Imperial Valley ARA			
NR7O	297-5-	8-	2,860
Union Metropolitaine			
VE2UMS	230-5-	30-	2,700
Saskatoon ARC			
VE5AA	304-5-	25-	2,450
Lookout Mountain QRPers			
KA4LKH	380-5-	6-	2,305
El Paso QRP Group			
NK5V	222-5-	6-	2,295



Teamwork was part of the plan at WK4S.

From Fort Lauderdale Beach, the members of the South Florida Ham-sters operate and congregate among the palms.

Roswell QRP Assn
K5WK 191-5- 3- 2,210
Diamond Bar RAC
W6HCP 392-5- 9- 2,160
Plattekill Irregulars
K2CW 310-5- 4- 1,785
Smurfs
K2RS 219-5- 3- 1,665
NCG
VE3FQX 123-5- 3- 1,430
Juicy Kielbasa FDG
K9JK 136-5- 6- 1,325
Egyptian RC
NZ0P 75-5- 8- 1,055
The Funnies ARG
WB3QFU 77-5- 3- 940
Capital City ARC
N7ICC 94-5- 10- 720
North Texas HF Assn
NQ5X 97-5- 6- 655
Parklawn ARC
K3TKS 23-5- 5- 430

1A

SCUM
AG9A 1323-2- 7- 6,102
Skybuddies
AL7H 1459-2- 3- 5,630
Lone Star DX Assn
NA5U 1538-2- 11- 5,430
Treaty City ARA
W8UMD 1418-2- 20- 5,370
Fist and Mouth Contest Company
W5EW 1323-2- 6- 4,882
HDL ARC
K3TM 1193-2- 6- 4,884
Bozo & the Lids
W9TG 1013-2- 5- 4,566
Whiskey Lakers
KI3L 1188-2- 3- 4,244
MR ARC
W7MR 1150-2- 10- 3,910
Hannibal ARC CW Group
KI0W 934-2- 5- 3,852
Eight Ops of the Apocaloops
N4WA 790-2- 8- 3,660
York Co ARS
K4YTZ 945-2- 23- 3,670
DR Loomis Memorial Jr Mechanics League
N4YE 953-2- 9- 3,556
Gunnison Co ARC
W9GYV 1518-2- 10- 3,548
Reeve's Hill Group
NG1I 1054-2- 5- 3,348
Collins ARC
K5CQ 1173-2- 12- 3,320
Beacon RA
W3AA 737-2- 8- 3,300
Thibodaux ARC
W5YL 910-2- 20- 3,264
Scotland Mountain ARC
W2FCR 669-2- 6- 3,144
Merry Meeting ARA
N1MA 1225-2- 20- 3,122
Maui ARC
KH6RS 809-2- 25- 3,110
NCG
WI5K 1158-2- 10- 2,938
Randallstown ARC
N3IC 859-2- 6- 2,924
The Motley Crew ARC
KK9H 815-2- 20- 2,920
Arrowhead RAC
W9GKP 1076-2- 10- 2,918
Idaho Falls Mavericks
W7RH 790-2- 4- 2,900
Radio Amateur Megacycle Society
W9DY 843-2- 6- 2,898
Case ARC
W8EDU 597-2- 3- 2,888
Trailer Buddies
K7SF 778-2- 4- 2,854
St Mary ARTS
NA5G 607-2- 43- 2,812
UT ARC
W7SP 914-2- 25- 2,792
Piscataway ARC
KO2K 1085-2- 10- 2,770
Goose River AC
W0KZU 1032-2- 6- 2,682
Magnetic Storm Troopers
K7SS 658-2- 5- 2,658
Edisto ARC
AD4U 876-2- 30- 2,630
South Carroll ARG
W3FCR 660-2- 7- 2,584
NW St Louis ARC
K0AXU 1169-2- 2- 2,538
NCG
N0GNG 1060-2- 5- 2,530
Straub FD Team
KZ2S/3 751-2- 4- 2,506
Philpott Lakers
AB4EM 1042-2- 12- 2,484
North Augusta-Belvedere RC
K4FR 558-2- 25- 2,476
North Coast Contest Club
AL7JP 945-2- 5- 2,454
Baltimore ARC
W3FT 588-2- 20- 2,452
First State ARC
K3QBD 687-2- 15- 2,416
South Lyon ARC
N8AR 837-2- 6- 2,378
Ramsey Co ARC
WD0FFQ 917-2- 15- 2,344
CUBS ARS of Sedro Woolley HS
WI7V 882-2- 20- 2,300
TI Hams
NZ5K 1044-2- 10- 2,288
Tamaqua X-mitting Soc
W3TI 508-2- 5- 2,274
Southern PA Comm Group
N2EY/3 600-2- 5- 2,274
Federation of Radio Transmitters
WB9ZAJ 564-2- 6- 2,242
Norwood ARC
K1JMR 474-2- 10- 2,238
Cumberland ERG
VE3CER 908-2- 12- 2,216
Saratoga Co RACES
WA2UMX 733-2- 7- 2,194
Hilltoppers
WA5CMI 930-2- 5- 2,148
Denver RC
KB0ADG 646-2- 10- 2,144
GA Tech ARC
W4AQL 730-2- 8- 2,130
Midwillamette ARC
W7AEP 680-2- 13- 2,120
Mt Nebo Mesquito Swatters FD Organization
AF7Z 866-2- 7- 2,110
Nanaimo ARA
VE7NA 449-2- 13- 2,068
Flagstaff Lightning Rods
KX0N 774-2- 3- 2,038
Rainbow Canyons ARC
NN7T 926-2- 30- 2,020
Socially Slow FD Junta
NA9D 1659-1- 8- 2,014
Denton Co ARC
W5NGU 497-2- 10- 2,006
Ontario FD Assn
VE3LPM 603-2- 4- 1,962
Pioneer ARC
VE3NA 526-2- 15- 1,962
Sussex ARA
K3JL 576-2- 21- 1,960
Butte ARC
W7FO 1374-1- 21- 1,952
Syosset HS Alumni
K2PV 744-2- 5- 1,938
IBM ARC
WA2IBM 592-2- 16- 1,936
Davis Co ARC
AC7H 433-2- 45- 1,888
Centerville ARS
K8XY 695-2- 15- 1,876
Microtel ARC
VE7MAC 584-2- 7- 1,862
ONEACtives
W9OO 621-2- 11- 1,860
ARES Dist 24
NY6D 849-2- 12- 1,858
Murphy's Revenge
N6JF 551-2- 5- 1,846
West Alabama ARS
KC4GS 710-2- 20- 1,840
Novi Area RC
W8RS 516-2- 14- 1,812
UT Co ARES/Signetics ARC
NR7P 742-2- 3- 1,806
University of British Columbia
VE7UBC 530-2- 10- 1,792
Oshkosh ARC
KD9BC 673-2- 7- 1,772
USAF MARS Affiliates
KH6W 363-2- 12- 1,748
Hollister Hams
WR6U 453-2- 18- 1,728
North Shore ARC
VE7QQ 420-2- 20- 1,714
Kennydale Key Klicks
W7JIE 350-2- 3- 1,706
Turkey Island DX Club
K8JQH 620-2- 5- 1,686
Merced Co RACES/ITUN
KI6UP 507-2- 8- 1,686
Butt Mountain Surfers
KB4NT 475-2- 3- 1,632
Huber Heights ARC
N8TD 387-2- 8- 1,632
NCG
W8YHE 573-2- 3- 1,814
South Florida Ham-sters
N4FL 567-2- 25- 1,814
Shalamma
N6ESV 363-2- 6- 1,592
CRA Sorel-Tracy
VE2CBS 783-1- 10- 1,583
Midway Monitors
W5VMY 643-2- 4- 1,580
1A Hard Way
KG8W 433-2- 3- 1,566
Just For Fun Contesters
NI9E 557-2- 8- 1,552
Worldradio Staff ARC
N6WR 520-2- 8- 1,538
Ledyard Extras
KY1F 267-2- 4- 1,536
Fond Du Lac ARC
K9NC 618-2- 7- 1,532
VA ACA
WB4YVE 406-2- 10- 1,524
Anaconda ARC
W7VNE 541-2- 30- 1,482
NCG
NU9T 1364-1- 8- 1,464
NCG
KD2A 504-2- 4- 1,464
Lake Co ARC
NF5T 570-2- 20- 1,440
Kauai ARC
KH6LG 839-1- 33- 1,440
Issequah ARC
W7BI 392-2- 22- 1,416
Two Sparks and a Gap
KL7ED 402-2- 3- 1,414
Confluence FDG
N9DBL 606-2- 4- 1,414
Great River ARC
W9UST 396-2- 22- 1,412
CRA Sud-Ouest
VE2CEV 278-2- 10- 1,412
Lockheed ERC ARC
W6LS 278-2- 12- 1,404
East of the River DX Assn
VE4XX 451-2- 13- 1,402
Hillsborough ARS
WA4GJJ 517-2- 10- 1,398
Eastern OH AWA & Northern Panhandle ARC
W8ZQ 403-2- 22- 1,386
Hellgate ARC
NZ7M 420-2- 23- 1,382
South Huron ARC
VE3LRD 418-2- 6- 1,362
Hays ARC
NV0Y 498-2- 4- 1,342
Ogden ARC
KE7WI 464-2- 47- 1,338
Olathe ARG
K0KS 512-2- 16- 1,330
Vanisle ARC
VE7VCC 398-2- 20- 1,306
NCG
WA7GQO 442-2- 3- 1,300
Mill Pond Multitude
K8TK 1089-1- 3- 1,289
Kaiser Ridge RC
WA3SEE 429-2- 10- 1,270
Theodore Roosevelt ARC
K0ND 430-2- 14- 1,264
Rich-Famous lOOK
WB8NSL 545-1- 6- 1,239
Woodchucks
N8DKQ 508-2- 8- 1,216
Hastings ARC
W0WWV 382-2- 10- 1,200
Lancaster Co ARC
AK4N 447-2- 12- 1,194
Los Alamos/Northern NM ARCs
AG5S 432-2- 10- 1,178
Kerr Lake Campers
N4SW 435-2- 3- 1,170
D-CAT
WA5WCY 254-2- 7- 1,158
Marshall Co ARC
NN8N 395-2- 8- 1,090
Golden Crescent ARC
W5DUQ 192-2- 15- 1,068
NCG
AA4AA 310-2- 6- 1,072
Central Illinois RC
W9AML 382-2- 43- 1,068
Sam Houston ARK
N5KWN 330-2- 12- 1,062
North Fulton ARL
NC4E 428-2- 10- 1,056
Blue Mt Crew
N8LF 412-2- 7- 1,056
Sankhead ARC
N4GKE 323-2- 6- 1,046
Magic Valley Chapter ISRA
N7GUC 313-2- 12- 1,026
SRO/CFMC
W9EJ 344-2- 41- 1,024
Medina Two-Meter Group
K8TV 223-2- 6- 1,022
SPARK
WG8F 297-2- 6- 994
Perkins Pirates
KS8O 348-2- 5- 990
Winona ARC
W6NE 176-2- 10- 978
Zamora Temple Ham Radio Unit
WU4Y 284-2- 10- 968
Last Mountain RC
VE5LM 259-2- 11- 964
High Plains ARC
KF7BR 478-2- 15- 956
Upper Crabcreek Good Old Boys
WC7C 331-2- 4- 944
Detroit Metropolitan RC
W8LXE 272-2- 5- 944
Great Bend ARC
K0WRZ 386-2- 10- 936
River Heights Group
WD8PNL 243-2- 6- 936
Egyptian RC
W9AIU 305-2- 3- 932
ICARES
W8LCU 159-2- 3- 914
Central MO RA
WA0R 306-2- 10- 912
Relay RC
KE6PE 301-2- 28- 902
Central Carolina ARS
WR4E 270-2- 12- 872
Lima Area ARC
W8EQ 286-2- 9- 862
South Towns ARS
WB2ELW 230-2- 34- 860
FM38 RC
N9GMT 315-2- 3- 848
Lehigh Valley ARC
W3OI 215-2- 16-
Antigonish NS ARC
VE1EMA 188-2- 12-
Winnipeg ARC
VE4BB 220-2- 9-
Prince Rupert ARC
VE7EEE 293-2- 10-
Owatonna Steele Co ARC
K0HNY 254-2- 30-
Novatel ARC
VE8NOV 202-2- 8-
Last Resort CC
WD2AHD 291-2- 3-
Hannibal MO ARC
W0KEM 214-2- 7-
Coon Valley ARC
KV0N 318-2- 20-
Fort Armstrong Wireless
K3JVJ 232-2- 7-
Truro ARC
VE1AO 300-2- 14-
Kankakee Valley ARC
KY9U 311-2- 26-
Oxford Co ARC
VE3OH 126-2- 8-
Nevada ARA
W7YN 240-2- 4-
Matauska ARA
AL7FI 103-2- 12-
Coast Guard ARC OF Kodiak
KL7HKX 288-1- 12-
3M Club-Austin
K8MBB 254-2- 3-
ARA of SW Florida
K4FA 137-2- 14-
Granby ARC
VE2CRG 76-2- 19-
Enterprise ARS
WD4ROJ 79-2- 10-
225 Group
WC8D 226-2- 4-
Yellowknife ARS
VE8YK 139-2- 7-
OTHER
N7CTM 132-2- 6-
Dills Landing WS
KA2VEE 131-2- 8-
Morgan Family
W7VLG 76-2- 11-
Univ of Rochester ARC
K2ZWI 121-2- 8-
Cherokee ARC
W0DIT 167-2- 10-
Colquitt Co Ham RS
WD4KOW 107-2- 5-
Plainfield Emergency Management
WA2YCL 125-2- 6-
Cascade Radio Group
N7CFO 168-2- 6-
Mason Co RC
K8DXF 101-2- 9-
Koolau ARC
KH6OS 35-2- 40-
Athens RC
AA4AI 100-2- 10-
Boy Scout Troop 44
N4IPH 35-2- 15-
NCG
WA8YBB 73-2- 9-
Ketchikan ARC
NL7MS 19-2- 11-
Zephyrhills ARC
K4VLD 54-2- 4-

1A Commercial

Indiana Lakeshore Amateurs
NF9G 1339-1- 18- 1
Katy ARS
N8AI/5 293-2- 9-
Hardin Co AC
W8VMV 104-2- 3-

2A Battery

Arapahoe RC
K8NA (+KA8YAA) 2266-5- 28- 17

lltrock ARA
2U (+ N2IFF) 1283-5- 10- 11,875
uthern Humboldt ARC
3JTI (+ KB6IVA) 1212-5- 9- 9,935
go ARC
IECH (+ KA1MWT) 1382-5- 9- 9,240
assilion ARC
NP (+ N8IVJ) 952-5- 28- 7,850
) Mobileers
C3F 825-5- 12- 7,530
affee-Lake RA
3LSD 1138-5- 11- 7,490
rs QRPers
ECQ (+ KA2EUM) 797-5- 12- 6,530
lton RA
2LZ 597-5- 12- 6,430
ornington ARC
ONX (+ KA9IPQ) 693-5- 18- 5,995
pex Employees' ARC
QEZ 531-5- 9- 5,810
st Park Radiops
VM (+ KA8YQL) 722-5- 26- 5,455
ddard ARC
A3NAN 622-5- 9- 5,095
scatine Ham RG
IBX 533-5- 15- 4,915
rper Air Hawks
NG 538-5- 8- 4,735
umb ARC
AX 492-5- 8- 4,555
Frog
EEE 473-5- 12- 4,450
Tamazoo RC
36J 533-5- 4- 4,355
rry's Mountain ARC
TS 471-5- 6- 4,240
rley Temple Solar Soc
A8OJR (+ KA8RYE) 291-5- 6- 2,730
apter Oak Wireless Soc
CH 247-5- 3- 2,700
uth West Ohio QRP Group
8W 265-5- 10- 1,685
rthwoods ARC
BDL 136-5- 28- 1,275
chigan QRP Club
JRO 85-5- 10- 1,050
em Area ARA
8PK (+ KB8EDJ) 84-5- 15- 930

uquerque DX Assn
RR (+ N5GFR) 4218-2- 10- 14,060
t City (NY) DX Assn
FR (+ KA2YEN) 3504-2- 20- 10,678
RC
EJK (+ KA5IIS) 3900-2- 20- 8,832
I-DX Group
SG (+ KB2CAT) 2617-2- 8- 8,470
con Jct RC
/T (+ KA1NRR) 2888-2- 14- 8,450
esville ARC
5M (+ WD5CJM) 2688-2- 12- 8,378
ensboro
HY (+ N4PHW) 2602-2- 30- 7,778
rls ARC
KS (+ N4RGO) 2688-2- 64- 7,676
ns Assn of Mosquito
5M (+ KB5AIO) 2284-2- 30- 7,444
art of America RC
RR (+ KA8REN) 1978-2- 21- 7,350
stern Massachusetts YCCC
1H (+ KA1OKF) 2190-2- 12- 7,262
chester (NY) DX Assn
TZ (+ KB2CHC) 2157-2- 14- 7,228
e Flags ARA
UC (+ KC4CTV) 2224-2- 27- 7,164
dio Amateur Technical Soc
RW 2493-2- 9- 6,930
ington ARC
5LD (+ N5MAB) 2459-2- 63- 6,844
untaineer ARA
SP (+ KA8RHJ) 1961-2- 22- 6,804
aware ARA
QLS (+ KB8EOE) 1658-2- 30- 6,768
tor City RC
MRM (+ KB8BBB) 2022-2- 72- 6,732
e Fear ARS
MN (+ KC4FOI) 2178-2- 27- 6,698
Missouri ARC
EBE (+ N8IRN) 2332-2- 32- 6,556
ncle ACS
MA (+ W9CSI) 1894-2- 20- 6,504
C of OH State University
LT 1461-2- 5- 6,502
ter Co ARC
RD (+ N9GGA) 2074-2- 55- 6,464
ke ARC & Emergency Service
CF (+ N8BPE) 2012-2- 33- 6,430
DX Group
AA 1469-2- 7- 6,296
thwest ARS
FD (+ KB5GET) 1766-2- 65- 6,196
las ARC
FC (+ KA5TXL) 1739-2- 10- 6,184
Wayne RC
T6 (+ KA9ZBA) 2328-2- 25- 6,162
VARF
PXP (+ KA5SDI) 1642-2- 30- 6,124
Boca Raton ARC
L (+ N4PYB) 1703-2- 25- 6,110
ollite ARC
AB (+ KB8KZL) 1942-2- 25- 5,984
arleston ARS
4USN 1863-2- 21- 5,910
G
4J (+ WA4TCC) 1784-2- 30- 5,824
lon Co ARC
4S (+ N4QIN) 1720-2- 35- 5,786

Kingsport ARC
W4TRC (+ N4MGN) 1756-2- 36- 5,786
SCAN & McDonnell Douglas Astro ARC
W6VLD (+ N6KOA) 3060-2- 12- 5,672
Big Bend ARC
K5FD (+ KB5DSD) 1926-2- 17- 5,666
Anderson ARC
W4FX (+ WD4BUH) 1626-2- 12- 5,514
Lake Co RACES
K9SA (+ KA9MCX) 1644-2- 20- 5,506
Western KY DX Assn
WA4QQV (+ N4HID) 1756-2- 9- 5,410
Double Cheese No Onion
W8MRE 1313-2- 7- 5,404
W/K ARC of Greater Milwaukee
N9AW (+ KA9TEP) 1561-2- 12- 5,386
Halifax ARC
VE1FO (+ VE1VCU) 1620-2- 35- 5,348
Northern Ohio DX Assn
WB8K (+ N8DMM) 1691-2- 25- 5,346
Escondido ARS
N6WB (+ KB6YJT) 1615-2- 15- 5,338
Northwest ARC
W9LM 1520-2- 20- 5,304
San Angelo ARC
W5QX (+ N5MMQ) 1582-2- 30- 5,262
St Louis ARC
KØLIR (+ KAØMLA) 1526-2- 17- 5,254
Campbell Co ARC
WC7M (+ KB7AOM) 1674-2- 9- 5,208
Blue Ridge ARS
N4IQ (+ KC4DYK) 1410-2- 21- 5,146
Humboldt ARK
KØGP (+ NØGME) 1580-2- 19- 5,098
Elgin ARC
W9IKN (+ KA9RVN) 1385-2- 15- 5,076
Fremont Co ARS
K7MM (+ N7HYF) 1392-2- 9- 5,074
Daytona Beach ARA
K4BV (+ KB4MBB) 1584-2- 25- 5,068
Granite State Hill-Toppers
AF1T 1735-2- 5- 5,026
PCARS
AF4Z (+ KA4ZPM) 1479-2- 30- 5,018
Ozarks ARS
KEØW (+ NØING) 1627-2- 24- 4,976
Arinc ARC
W3ZH (+ WB2TNL) 1507-2- 16- 4,958
Worldlink ARC
KS2T (+ KB2DLL) 1689-2- 8- 4,856
Freestate ARC
K3IVO (+ N2GTE) 1375-2- 24- 4,852
Louisville ARTS
W4CN (+ KB4WEW) 1388-2- 35- 4,848
NWARES
K9NO 1240-2- 15- 4,824
Oak Ridge RC
K4PJ (+ KB4ZVH) 1543-2- 28- 4,820
Blackstone Valley ARC
W1DDD (+ WA1POX) 1817-2- 17- 4,816
Trident ARC
N4EE (+ KB4LAU) 1549-2- 125- 4,778
AR Caravan Club
W5HD (+ N5JUQ) 1354-2- 30- 4,770
Inland Empire ARC
WA6ZEF (+ KB6TST) 1520-2- 11- 4,770
San Jose State Univ ARC
W6YL (+ WD8EEY) 1392-2- 12- 4,754
N Arkansas ARS
KE5DX (+ N5LZL) 1487-2- 18- 4,644
Boulder Bunch
K2NA (+ KB4SWK) 1679-2- 10- 4,624
Mid-Mo ARC
NØSS (+ WBØTPN) 1144-2- 20- 4,596
Cedar Valley ARC
WØGQ (+ N8JCL) 1297-2- 25- 4,582
Brazosport ARC
KE5W (+ KA5COA) 1288-2- 40- 4,570
Beaches ARS
W4DU (+ KC4CSE) 1253-2- 30- 4,556
Lewis & Clark RC
K9DZY (+ WD9GMO) 1608-2- 30- 4,532
Southern Maryland ARC
W3PT (+ KA3SXW) 1517-2- 42- 4,522
South Baldwin ARC
N4RT (+ KB4UNS) 1174-2- 9- 4,414
Ski Country ARC
ND8E (+ KBØAHR) 1843-2- 18- 4,402
Tucson IBM ARC
WO7F (+ KB7FDI) 1268-2- 22- 4,398
NW AR ARC
W5XH 1210-2- 40- 4,326
Limestone ARES
WA4AUX (+ KC4FJH) 1577-2- 12- 4,324
Bryan ARC
N5TC (+ N5INV) 1337-2- 25- 4,318
Central Michigan ARC
W8MAA (+ KB8DGC) 1245-2- 17- 4,316
Southern Appalachian WS
NV8O 1787-2- 10- 4,302
Fort Smith Area ARC
W5ANR (+ KA5ROW) 1557-2- 40- 4,300
MATPARC
W4QO (+ K4VJM) 1297-2- 23- 4,298
Independence ARC
KØPUX (+ NØHSM) 1274-2- 20- 4,282
Oklahoma City Autopatch Assn
K5OK (+ N5KLN) 1282-2- 18- 4,276
Kanawha ARC
W8GK (+ KB8EBE) 1275-2- 12- 4,272
Coconino ARC
NG7S (+ KB7FEL) 1381-2- 21- 4,270
Tampa ARC
W4DUG (+ KB4FFI) 1311-2- 30- 4,218
CRA Valley du Richelieu
VE2CVR 1061-2- 12- 4,208
Rotm Organization for Amateur Radio
K6XS 1061-2- 20- 4,198

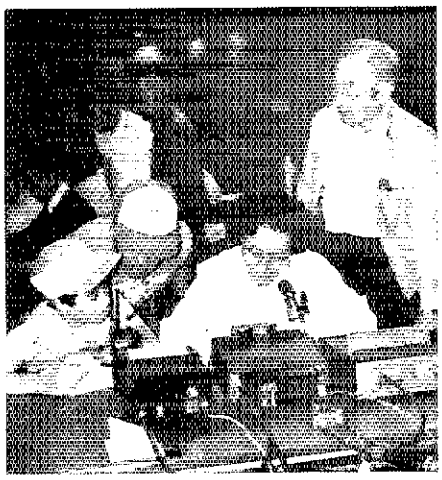
Calumet ARES
KN9P 1081-2- 5- 4,196
Tuscaloosa ARC
W4XI 1181-2- 35- 4,178
Lodi ARC
W6REC (+ N6LRB) 1377-2- 20- 4,170
RC OF St Louis MO
W8DCW (+ KA8WCH) 1402-2- 50- 4,162
West Texas ARC
KB5MM 1474-2- 30- 4,092
VARA/MARA
WX4C (+ N4JEG) 1369-2- 55- 4,070
Green Mountain WS
NN1D (+ KA1KJE) 2772-1- 30- 4,057
Spartanburg ARC
K4II (+ N4OEG) 1039-2- 20- 3,994
HCARC with Tradewater and Dawson Springs ARCs
AA4SB (+ KC4FRA) 1086-2- 35- 3,982
Faulkner Co ARC
W5LL (+ KA5UPH) 1211-2- 16- 3,940
Tamaqua Area ARA
W3VA 949-2- 25- 3,934
CRA de Quebec
VE2CQ 856-2- 22- 3,934
West Haven ARA
K1RH (+ N1EDX) 1334-2- 14- 3,918
Findley RC
W8FT (+ KA8ZMY) 1031-2- 25- 3,886
Reading RC
W3BN (+ KA3JHZ) 1203-2- 20- 3,878
North Chautauqua ARC
W2SB (+ N2HTE) 1154-2- 15- 3,872
Arlington Civil Defense
N1IR 1285-2- 9- 3,866
Associated RA of Southern New England
W1AQ 1103-2- 16- 3,850
Wake Tech College ARC
WB4TOP (+ N4PSJ) 840-2- 14- 3,838
Sussex Co ARC
N2WM (+ KA2PCO) 1148-2- 15- 3,796
Pioneer ARC
AA4HF 1046-2- 15- 3,794
Farmington ARC
W8RC 1244-2- 30- 3,774
Stonewall Jackson ARA
NR8X (+ KB8EUN) 1345-2- 12- 3,772
Decatur ARC
W4ATD (+ KC4FLR) 1266-2- 30- 3,724
Prov RA
W1OP (+ KA1RSH) 1430-2- 14- 3,692
Wilderness Trail ARC
KI4B (+ KA4OKG) 928-2- 25- 3,688
Rockwell Autonetics RC
KI6X (+ KB6EID) 1002-2- 18- 3,662
Radio Free Southampton
NR2I (+ WB2KID) 944-2- 15- 3,658
Twin City Hams
W5EA (+ KB5FTJ) 1300-2- 25- 3,656
PEARL
K2AV (+ N2EPT) 1102-2- 30- 3,656
Mecklenburg ARS
W4BFB (+ KA4WYC) 1227-2- 50- 3,638
Carroll Co ARC
K3PZN (+ KA3KDG) 1230-2- 19- 3,624
Canton ARC
W8AL 980-2- 104- 3,546
Loveland Rpt Assn
WØDZ 981-2- 15- 3,538
SCARS
AE8L 1060-2- 20- 3,534
Radio Trekkies
W2JU 948-2- 3- 3,530
Acadiana DX Assn
WO5G (+ KB5DZY) 1190-2- 15- 3,520
Milford ARC
W8SDL (+ N8JIV) 1015-2- 15- 3,520
Utica ARC
K2IQ 1025-2- 15- 3,500
Central WA ARC
W7GB 935-2- 5- 3,470
Old Fruitville ARTS
K8CS/4 (+ KC4BZS) 958-2- 17- 3,430
Twin City FM Club
KØAD (+ KAØVYB) 919-2- 16- 3,416
Regina ARA
VE5QST 1021-2- 30- 3,408
Tragic 511 Redneck Group
NR4A (+ KC4BFX) 1220-2- 9- 3,396
TRAC
KE6N (+ N6SFO) 823-2- 17- 3,386
Forsyth ARC
W4NC (+ WD4FCM) 1174-2- 35- 3,378
MSU ARC & Gallatin HRC
W7YB (+ N7KGC) 1092-2- 15- 3,374
Metropolitan ARC
AF5M 957-2- 24- 3,358
Sheboygan Co ARC
W9RF (+ KA9YOU) 1193-2- 22- 3,312
St Clair ARC
K9GXU 936-2- 15- 3,306
Bullitt ARS
N4NCN (+ KA4TEV) 1371-2- 67- 3,298
SCARS
W5OU 1266-2- 62- 3,288
Falmouth ARA
K1AK (+ KA1QYI) 1174-2- 35- 3,280
Fort Myers ARC
W4LX (+ KC4EIU) 803-2- 30- 3,266
ATT Cres ARC
WAZPF 1095-2- 19- 3,266
Radio Oregon
K7RO 1067-2- 6- 3,254
Lynchburg ARC
K4HEX (+ KA4YNO) 844-2- 18- 3,248
Pecos Valley ARC
K5LWV (+ N5ECE) 898-2- 12- 3,238
Valley Forge Mt FD Gang
N3KZ 1185-2- 15- 3,234

NBS BRASS
K3AA 961-2- 16- 3,206
Rideau ARC
VE3BPC 911-2- 13- 3,188
Williamson Co ARC
W5XD 981-2- 7- 3,178
Gower Gulch Gang
N6LL (+ N6SDX) 1081-2- 20- 3,174
Stillings Farm Exposition
W9RVP (+ KA9KBU) 849-2- 4- 3,172
McHenry Co WA
KB9I (+ KA9VNV) 1275-2- 21- 3,162
Edison/Tin Lizzy ARG
K8VA 939-2- 38- 3,158
Synton ARC
W9YH (+ KA9NGH) 1039-2- 12- 3,130
Cherryland ARC
NF8T (+ N8JEH) 861-2- 14- 3,116
St Paul RC
KØAGF 980-2- 16- 3,108
Onslow ARC
WD4FVO (+ KB4EJK) 1114-2- 20- 3,108
Racine Megacycle Club
W9UDU 984-2- 25- 3,098
Great South Bay ARC
K2TV (+ N2FIM) 893-2- 25- 3,084
Foothill ARS/Electronics Museum ARC
K6YA (+ N6GAL) 912-2- 25- 3,074
Ports Mouth ARC
W4POX 858-2- 20- 3,050
Northwest Illinois ARC
W9AF (+ KA9JAX) 929-2- 12- 3,040
WV AR
WC8S (+ N8HIH) 852-2- 21- 3,040
Independent ARC
NB8H 765-2- 9- 3,030
East Pasco ARS
AA4RU 819-2- 10- 3,028
Tri-State ARS
W9OG (+ KB9AGS) 733-2- 32- 3,008
Gonzaga Prep HRC and Alumni
KC7FJ 1103-2- 15- 3,006
Estero ARC
W6JU 907-2- 10- 3,002
Algoma ARC
VE3SCO 704-2- 18- 2,974
Lake Co ARC
W9LJ (+ KA9UOK) 833-2- 30- 2,956
Mountain ARC
W8JAW (+ N8IKF) 869-2- 18- 2,954
Simi Setters ARC
WM8P (+ N8SFZ) 1179-2- 22- 2,950
Watertown ARC
N9HR 903-2- 13- 2,944
Gadsden ARC
K4JMC (+ KC4ANB) 865-2- 45- 2,942
ARC of Savannah
W4HBB (+ WD4FIH) 1009-2- 35- 2,938
Mitre-Washington HAMS
AA4VN (+ KA3TGY) 851-2- 6- 2,928
Quinte ARC
VE3RL 740-2- 29- 2,912
East Bay ARC
W6CUS (+ KB6JZM) 728-2- 47- 2,910
Fresno ARC
W8TO (+ KA8GQK) 757-2- 78- 2,870
Calhoun Co ARA
WX4O (+ N4RBJ) 898-2- 35- 2,850
Shy WY ARC
W7NE (+ KB7EUX) 895-2- 18- 2,850
Chris Belt Amateur Radio
K6IG (+ KB6ONG) 754-2- 35- 2,842
Flathead Valley ARC
K7LYY 684-2- 22- 2,826
Mt Baker ARC
K7SKW (+ KB7EVZ) 873-2- 35- 2,810
Ote Virginia Hams ARC
N4FS (+ KB4RKL) 857-2- 27- 2,810
Beaumont ARC
W5RIN (+ N5LAV) 759-2- 15- 2,790
VSPARC
K4AAB 1190-2- 9- 2,780
Ausable Valley ARC
KB8TS (+ N8ISC) 763-2- 12- 2,778
Muncie Area ARC
NV9A (+ KA9TBO) 730-2- 24- 2,774
Great Falls Area ARC
K7ABV 780-2- 39- 2,772
Jupiter Tequesta RG
K4ZRP (+ KB4CWF) 1268-2- 15- 2,744
Middlesex FD Club
K3GT 885-2- 7- 2,738
Iowa-Illinois ARC
WØLAC (+ KBØCGT) 665-2- 12- 2,730
Grand Island ARS
WØCUO (+ KBØBTL) 873-2- 27- 2,714
Niagara Peninsula ARC
VE3VM (+ VE3TFC) 908-2- 46- 2,710
Captain and Crew
K1DII 1005-2- 12- 2,702
SIARS
N9CLB (+ KB9ANL) 837-2- 13- 2,694
Hewlett-Packard Lake Stevens ARC
NN7N 677-2- 9- 2,682
ZOT ARS
WB6RXE 763-2- 3- 2,676
Pilgrim AWA
K1BL (+ N1ELF) 1018-2- 25- 2,668
Nappanee ARC
NR9M (+ N9EWN) 1184-2- 35- 2,668
Canadian Police College ARC
VE3CPC (+ VE3PYO) 863-2- 15- 2,638
Pike and Lincoln Co ARES
KEØAJ (+ NØJCP) 703-2- 30- 2,632
Texins ARS
K4RWP 1115-2- 8- 2,630
Loudon Co ARC
W4WVJ 1009-2- 20- 2,628

McKean Co ARC
W3VV (+ KA3TES) 758-2- 16- 2,612
Clinton Co ARC
W9PC 741-2- 9- 2,604
ICOM Employees ARS
WM7X (+ KB7DON) 758-2- 12- 2,598
ARA of Bloomington
NMØP (+ KAØETE) 816-2- 22- 2,592
Northern Kentucky ARC
K4CO (+ KC4AUP) 927-2- 26- 2,568
Huntington Co ARS
W9EI (+ WB9FIC) 931-2- 17- 2,568
Emerson Electric ARC
WØPEV 787-2- 10- 2,564
Central Iowa Technical Society
W6RPK 864-2- 10- 2,538
Tahoe Truckee RAS
N6GX 763-2- 8- 2,536
Des Moines RAA
W8AK (+ KB8CFO) 663-2- 25- 2,528
Western Colorado ARC
W6RR2 (+ KBØCMR) 842-2- 14- 2,524
Motorola ARC
WA4LZR (+ N8DMT) 723-2- 15- 2,500
Parsons Area ARC
NBØV 721-2- 10- 2,486
Barnstable RC
K1PBO (+ KA1RAQ) 638-2- 18- 2,484
Lake of the Ozarks ARC
NIØV (+ KBØAEZ) 595-2- 12- 2,484
Carolina ARL
K5AS (+ KB4LLC) 648-2- 12- 2,476
Carnegie Tech RC
W3VC (+ KA3SUM) 556-2- 10- 2,470
St Peters ARC
KBØV 704-2- 24- 2,448
Anniston Area ERC
WW4Q (+ N4QLB) 817-2- 18- 2,444
PARK
KD3HT (+ KA3RBJ) 590-2- 18- 2,414
Cameron Co ARC
KA3MMM (+ KA3MMN) 632-2- 6- 2,396
Johnson Co RAC
WØERH (+ KBØCFI) 809-2- 31- 2,394
Mad Scientists
KF6VB (+ KB6LJF) 644-2- 9- 2,388
Aroostook ARA
KA1B (+ KA1QNK) 745-2- 37- 2,378
Aurora RA
KØWIQ (+ KA8VOY) 718-2- 30- 2,360
Sutter Buttes Tule-Tigers
W6RFB 605-2- 10- 2,354
Ogdensburg ARC
NR2B (+ KA2CCU) 596-2- 25- 2,352
Ye Old Isacomm ARC
KF4CI 770-2- 6- 2,350
KY Colonel ARC
WA4IGS 565-2- 22- 2,340
New Ulm ARC
WE8I (+ WBØTYZ) 713-2- 16- 2,338
Garland ARC
K5QHD (+ N5LDD) 847-2- 30- 2,320
Northern Alberta RC
VE8NC 800-2- 25- 2,318
NCG
NM3B 773-2- 3- 2,298
Suncoast ARC
WA4T 806-2- 10- 2,288
Cowichan Valley ARC
VE7CVA 587-2- 18- 2,286
Grand Rapids ARA
W8DC (+ WD8KXA) 644-2- 22- 2,284
ARA de La Mauricie
VE2MO 532-2- 19- 2,282
Mammoth Cave ARC
KD4SS 503-2- 14- 2,276
Gulf Coast ARC
WC4D 580-2- 15- 2,272
Corry Station ARC
NB2K 791-2- 8- 2,272
Twin State RC
W1FN 648-2- 15- 2,272
Dr Bob and his Riverdale Rascals
WI4R (+ N4RKZ) 815-2- 18- 2,270
CLARA
W6FZZ (+ N6LLK) 599-2- 10- 2,270
Central Kentucky ARC
WA4UXJ 750-2- 9- 2,268
Xerox ARC
KE2T (+ KB2FFN) 555-2- 27- 2,250
Laurel ARC
W3GFS (+ KA3QPU) 722-2- 30- 2,238
Mahaska ARC
NRØC 968-2- 11- 2,236
Douglas Co ARA
K4PI (+ KB4WFJ) 678-2- 17- 2,230
Upper Valley ARC
W8LH 1015-2- 16- 2,230
MI Radio Boys
NK8X 635-2- 3- 2,230
Billy The Kid Chapter
WZ5R (+ N5IAC) 724-2- 15- 2,228
Ephrata Area RS
N3RJ 719-2- 7- 2,226
Juneau ARC
KL7AW 576-2- 10- 2,224
Intercity ARC
W8WE 553-2- 31- 2,220
Fulton ARC
NT2F 689-2- 34- 2,220
Mobridge Area ARC
KØERM 447-2- 10- 2,216
Gainsville ARS
K4DPZ 672-2- 27- 2,216
Horizontal Engineers
NE1A (+ KA1QNW) 604-2- 25- 2,216
Florence ARC
W4ULH 905-2- 12- 2,210

Under the careful eye of the coach, Jim, WØUO, and Tim, KAØYAA; Debi, KBØAOQ and Alex operate the Novice station at the KØNA Field Day effort.

Denise, KB7CNL, runs them in true contest style.



Members of the Japanese American Amateur Radio Society, W6AN, operate from the local mall. Pictured here is the Novice station.

Kings Bay ARC			
W1MT/4	620-2-	8-	2,206
Nittany ARC			
W3YA	725-2-	12-	2,199
Rockport RG			
W8NI	543-2-	12-	2,192
MARC/MAR/ARES			
K4GG (+WB4CLG)	777-2-	24-	2,192
Plano ARK			
KI5R (+N5DBI)	555-2-	10-	2,162
Concordia ARC			
VE2CUA	762-2-	13-	2,162
LAMARS			
W9HOQ (+KA9UNQ)	653-2-	14-	2,162
Cabarrus ARS			
W4DSU (+KC4AIJ)	688-2-	16-	2,146
Clarksville ATS			
KF4L	829-2-	24-	2,132
Cape May Co ARC			
K2CGD	625-2-	18-	2,132
Garden State ARA			
W2GSA (+KB2ERX)	458-2-	35-	2,130
Fort Madison ARC			
NWØX	762-2-	30-	2,130
WB6W et al			
WB6ZQZ	424-2-	8-	2,128
North SASK ARC			
VE5EEE	515-2-	26-	2,120
Penny Pines Brass Pounders			
N8CW (+KB8VUE)	609-2-	6-	2,116
145.110 RG			
KN9G (+N9EDK)	647-2-	28-	2,114
Lake View ARC and SC ARC and CRRL ARC			
NG9U (+KA9GZU)	698-2-	15-	2,114
15-Meter Ragchewers Group			
KD8NJ (+KA8CGP)	729-2-	10-	2,108
Almonte RRL			
VE3AAT	466-2-	4-	2,102
Butler Co VHF Assn			
W8CCI (+N8JFW)	703-2-	12-	2,084
Explorer Post 599			
WB7BXB (+KB7CUJ)	854-2-	22-	2,076
Pennyroyal ARS			
KE4KE (+KC4ERO)	557-2-	12-	2,058
Franklin ARC			
AB4R (+KC4AOP)	531-2-	30-	2,054
Hartford Co Civil Defense			
N3DVK	737-2-	8-	2,054
Sumner Sity ARA			
K4DZR (+WB4ENC)	538-2-	16-	2,054
Tuscola and Leper Co EDG			
K8DU	484-2-	11-	2,054
Hot Springs ARC			
WX5F	568-2-	62-	2,042
NCARC/WARS			
NY9L (+KA9TTH)	690-2-	20-	2,042
ARA of Bremerton			
W7VE (+KB7BMC)	378-2-	9-	2,040
Motorola ARC			
NR4P (+WA4BZJ)	642-2-	15-	2,034
Lanierland ARC			
W4IKR	837-2-	30-	2,032
Yucaipa Valley ARC			
W6CV (+KB6UWC)	664-2-	10-	2,024
Fork ARC			
KE8A	481-2-	23-	2,024
HARC & DXers			
KB6FIW (+KA6ULG)	586-2-	8-	2,018
American Red Cross ECS			
N2MH	594-2-	15-	2,012
Southwestern Dallas Co ARC			
K5HJ (+KB5ETO)	804-2-	50-	2,008
Sharon ARA			
K1JNG (+KA1HTO)	614-2-	7-	1,996
East Valley Emergency Radio			
KBRIQ	694-2-	6-	1,994
Greenwood ARC			
VE1WN	637-2-	14-	1,980
Wantagh ARC			
W2VA	706-2-	15-	1,974
Port Lavaca ARC			
WO5O	431-2-	17-	1,960
Nemo ARC			
WØCBL	484-2-	10-	1,954
GBARC			
W1VW (+KA1QQJ)	605-2-	17-	1,948
NCG			
NF9Z (+KA9TJY)	735-2-	6-	1,936
Lower Yellowstone ARS			
N7AQQ	488-2-	20-	1,930
Ascension ARC			
WB5KKM	537-2-	30-	1,924
White Water Hills ARC			
NS4V	544-2-	14-	1,922
Boone ARK			
K8CY	513-2-	7-	1,920
Penticton ARC			
VE7PRC	390-2-	10-	1,918
Neshoba ARC			
WG5I	601-2-	14-	1,894
Kansas Nebraska RC			
W9TQ	421-2-	15-	1,890
Charlottetown ARC			
VE1CRC	1254-1-	21-	1,889
Metuchen ARC			
K2YNT	584-2-	20-	1,886
East Bay AWA			
N1RI	607-2-	11-	1,878
Temple ARC			
W5LM (+KA5IIA)	518-2-	40-	1,874
ARESET			
W2VY (+N2IDS)	465-2-	10-	1,872
Patrick AFB MARS Team			
WA4A	601-2-	12-	1,870
Pearl River Co ARC			
W5UO	444-2-	20-	1,870
Rappahonnock ARA			
AA4HQ (+KC4EWY)	603-2-	22-	1,860
Middle Peninsula ARC			
NB4P (+KC4DYZ)	715-2-	17-	1,854
Boone Co ARC			
NX9Q (+N9HKR)	625-2-	10-	1,854
NCG			
K2GO (+KB2BJJ)	816-2-	30-	1,848
KRV ARC			
W6TN (+N6PXR)	475-2-	23-	1,848
North Peninsula			
W6PMK	387-2-	14-	1,846
Santa Clarita ARC			
W6JW (+N6QDP)	439-2-	25-	1,836
Framingham ARA			
W1FY (+KA1RLT)	497-2-	20-	1,834
Wiregrass ARC			
NS4U	668-2-	25-	1,830
Centralina ARC			
N4QR	416-2-	23-	1,828
Audrain ARC			
NU6H	446-2-	8-	1,816
North Kitsap ARC			
WO7B (+N7ILT)	470-2-	17-	1,814
Falls ARC			
K9RHH	503-2-	10-	1,796
Keno ARC			
WO7K	449-2-	12-	1,792
Quad City ARC			
W9YCR (+N9DNY)	643-2-	12-	1,778
Bay Area ARS			
KM3I	524-2-	12-	1,774
Lee's Summit Emergency ARC			
WØIE	626-2-	10-	1,770
Southern Valley ARC			
NN1M (+WB1HBW)	482-2-	11-	1,766
Straits Area ARC			
W8GQN (+KB8ELO)	498-2-	21-	1,766
Lorain Co ARA			
N8AM	450-2-	39-	1,732
Nashville ARC			
K4CPO (+W4IMX)	499-2-	18-	1,720
MO Valley ARC			
W9NH (+KB8AEC)	495-2-	27-	1,720
West Georgia ARS			
W4FWD	501-2-	20-	1,718
Kings ARC			
NW6K (+KB6TSQ)	567-2-	45-	1,718
UNISYS ARC			
KB3UU	494-2-	21-	1,710
Athens ARC			
W5CR (+KB5GEO)	522-2-	15-	1,700
Bay Area Med Cent			
W8PIE	394-2-	2-	1,696
Varian ARC			
K6TM	495-2-	11-	1,680
Better Luck Next Year ARG			
KB7KY	618-2-	11-	1,660
Los Angeles ARC			
N6YA (+KA6KQM)	562-2-	24-	1,654
S Platte ARS			
NEØX	614-2-	16-	1,646
Northrop B-2 Division RC			
AA6CR (+WB6YNP)	397-2-	18-	1,642
Midstate RA			
W9DQA (+N9GAF)	483-2-	30-	1,642
Stanislaus ARA			
WD6EJF	842-2-	15-	1,640
Lake Co ARS			
W6QXN (+KB6WUW)	396-2-	29-	1,636
McDonnell Douglas ARC			
WA6CGV	351-2-	11-	1,628
Stewart Lake ARC			
WD7X (+KB7CXI)	411-2-	15-	1,612
Borderline ARC			
NV7Z	705-2-	32-	1,610
North Eastern Indian ARC			
K9ZBM (+KA9RVH)	440-2-	21-	1,606
Grand Strand ARC			
WD4JMT	580-2-	5-	1,596
HTTY-AMSAT Houston			
WA5ZIB	465-2-	13-	1,576
Rip Van Winkle ARS			
W2FSL (+KA2QYG)	430-2-	25-	1,570
West Morris WS			
NX2P (+KB2BBT)	441-2-	20-	1,564
Sabine Valley ARA			
WF5C	464-2-	19-	1,556
Muscle Shoals ARC			
W4JNB (+WB4ZVH)	574-2-	10-	1,556
Champlain Valley ARC			
W2UXC	496-2-	15-	1,550
North Providence ARC			
KY1G (+KA1JRJ)	411-2-	16-	1,536
Mid-OH Valley ARC			
WF8U (+WD8RGZ)	497-2-	20-	1,526
Sandy River ARC			
KI1B (+KA1JGE)	366-2-	24-	1,524
Hastings ARC			
NØFKC	359-2-	12-	1,520
Amateur Radio and Youth			
N8GQC (+KA8AXD)	506-2-	40-	1,516
Jayhawk ARS			
WØLB (+N9GAB)	378-2-	22-	1,504
Marshall Co ARC			
KB9V	530-2-	25-	1,502
Sterling Park ARC			
W4RW	413-2-	15-	1,500
Hampton RD RA			
N4SD	412-2-	10-	1,498
Monterey Boatanchor Assn			
K6DYX	344-2-	4-	1,496
NCG			
VE5PRC	389-2-	10-	1,496
Gratiot Co ARA			
W8AWE	566-2-	7-	1,482
Harlan Co AR			
KB4EES	506-2-	7-	1,478
Lake Cumberland ARA			
AJ4O	633-2-	15-	1,468
Charlotte ARS			
KC4K (+WA3DUX)	364-2-	16-	1,464
El Paso ARC			
W5ES (+N5HRD)	497-2-	37-	1,462
Illinois Navy/Marine Corps MARS			
KI9H	678-2-	6-	1,456
Sun City ARC			
K5WPH	450-2-	25-	1,456
Ponca City Area			
WN5J	436-2-	13-	1,442
Texins ARC			
WB5NVM (+KB5GNP)	451-2-	10-	1,422
St Cloud ARC			
W6SV	432-2-	15-	1,410
PRARC			
KP4ID	375-2-	8-	1,404
Liberty Co ECARC			
KF4UM (+KB4ZRK)	347-2-	11-	1,402
HAREM			
W3LDD (+KA3PUH)	495-2-	6-	1,380
South Bay ARA			
N6BFO	414-2-	10-	1,382
White River Valley ARS			
N8DST	426-2-	10-	1,364
Ray Clay ARC			
KØEET (+KBØCVI)	464-2-	40-	1,362
Waldo Co ARC & Pen Bay ARC			
KB1OF	429-2-	15-	1,338
Southern Catskill ARS			
WC2E	448-2-	10-	1,338
Martuni Group			
KU7K	348-2-	4-	1,326
Miami Co ARC			
K9ZEV	374-2-	6-	1,324
Schoodic RG			
N1FCE	299-2-	9-	1,310
Sand Hills ARC			
WØMI	439-2-	18-	1,302
Hoffman Estates ESDA			
W9NIC (+WB9TZC)	449-2-	13-	1,298
Bay Area ARC			
N8BBR (+KB8DXE)	496-2-	8-	1,292
Voice of Alabama			
W4IAX	386-2-	12-	1,286
South Brevard ARC			
AA4NP (+KB4SPA)	346-2-	10-	1,284
Hermiston ARC			
WI7Z (+KB7CKJ)	378-2-	37-	1,276
Three Generation's Group			
W6BIV	298-2-	3-	1,272
Santa Ynez Valley Hams			
N6JNS	325-2-	21-	1,266
Hamilton Co ARA			
KØKWO	380-2-	10-	1,260
West Seattle ARC			
W7AW	394-2-	7-	1,252
Bellbrook ARC			
AB8U	507-2-	8-	1,236
Ellis Co ARC			
N5KFC	491-2-	18-	1,232
Pike Co ARC			
W9CZH	209-2-	11-	1,224
Rochester ARA			
K3JD (+KA2PJN)	298-2-	15-	1,210
Cape Ann ARA			
W1RK (+N1FMX)	223-2-	50-	1,198
Glynn ARA			
K4TVE (+KC4DNI)	228-2-	10-	1,192
Michigan City/LaPorte ARC			
W9CSF	190-2-	30-	1,190
Conneaut ARES			
W8SD	426-2-	12-	1,188
Pigua ARC			
W8SWS	335-2-	50-	1,184
Northwest ARA/EA Assn			
NOØG	257-2-	13-	1,182
Pahrump Valley ARC			
K7NV (+KB7EYI)	390-2-	7-	1,1
Renss Co RACES/ARES			
K2RBR (+KB2FOW)	279-2-	14-	1,1
McMairy ARS			
KF4VM (+KB5EHG)	470-2-	30-	1,1
River Cities ARA			
KZ4G	378-2-	20-	1,1
NCG			
VE7RAR (+VE7LO)	308-2-	20-	1,1
Yellowhead ARC			
VE6YAC	254-2-	6-	1,1
Fair Lawn ARC			
NY2G (+KB2FUN)	213-2-	15-	1,1
Nutley ARS			
W2GLQ	335-2-	10-	1,0
Minneapolis RC			
WØCKF	278-2-	10-	1,0
Gaston Co ARS			
KK4T	302-2-	10-	1,0
Tippecanoe ARA			
W9REG (+N9GWN)	525-2-	13-	1,0
Lakes Area ARC			
WB9PZH (+KA9TVD)	307-2-	12-	1,0
Chesco ARA			
K3BKG	348-2-	15-	1,0
Sheridan RAL			
W7GUX	277-2-	5-	1,0
Kern Valley Repeater Group			
KI6OJ	374-2-	14-	1,0
Bluff ARC			
WD8AXV	262-2-	8-	1,0
CAL POLY ARC			
W6BHZ	279-2-	6-	1,0
Island ARA			
KB4GY	335-2-	9-	1,0
Clackamas ARC			
NW7Y (+KB7BOY)	296-2-	20-	1,0
Apple Valley ARC			
KN8S (+KA8QQB)	460-2-	17-	1,0
Monroe Co RCA			
WA8MTX	270-2-	10-	1,0
Southeast Louisiana ARC			
WB5NET	222-2-	17-	1,0
Polk CDACS			
W4TJM	341-2-	9-	9
Flint Hills ARC			
WØHT	326-2-	8-	9
BWD and Hot Dog Club			
WW5M (+KA5NSA)	327-2-	15-	9
Lamars ARC			
W4MH	347-1-	12-	9
Grays Harbor ARC			
W7ZA	333-2-	6-	9
RAGS			
N2FZS (+KB2ERJ)	284-2-	8-	9
Navarro ARC			
WW5J	942-1-	42-	9
Dillingham ARA			
KL7N (+WL7BPF)	435-1-	11-	9
Fort Dodge ARC			
WØUL	302-2-	11-	9
NCG			
KC9NG (+N9GZT)	286-2-	3-	9
IL Valley ARC			
NN9M	184-2-	45-	8
St Peter ARC			
WBØVFW	191-2-	11-	8
Delaware Co ARA			
W3UER (+KA3SXB)	171-2-	10-	9
Columbus ARC			
W9SIO	183-2-	15-	9
RCA ARC			
NG2R (+N2HSU)	288-2-	12-	9
Kings Co RC			
W2RAK	180-2-	53-	8
Washington Co ARC			
N9DER	396-2-	18-	8

nboldt ARC			
P	579-1-	11-	887
tune ARC			
T (+WB2TZJ)	182-2-	13-	886
thern Counties ARA			
R	256-2-	10-	882
g			
WD	337-2-	10-	874
rie Dog ARC			
OX (+N5HUY)	177-2-	20-	854
oky Valley ARC			
S (+KA0SJL)	221-2-	5-	842
e Success RC			
YKQ	220-2-	10-	840
ntern Quebec VHF/UHF ARC			
RM	388-1-	5-	817
rican Cablevision ARC			
L	306-2-	7-	816
g			
JI	208-2-	18-	816
sapeake Bay RA			
8SFJ	255-2-	11-	810
reat WI RA			
NN	196-2-	26-	772
isville ARC			
TA	173-2-	4-	766
Post ARS			
OC	263-2-	7-	748
Juma DX and Experimenters Soc			
EGE	242-2-	7-	710
ey Brats			
ACM	123-2-	4-	698
ison ARC			
F	218-2-	6-	694
heast ARC			
MY	178-2-	8-	680
RRO			
Y	186-2-	10-	678
abi Wireless Assn			
S	82-2-	16-	644
h Bay ARC			
TT (+KB6IHD)	236-1-	7-	637
boa ARC			
T	60-2-	10-	636
ericks			
CLV	111-2-	3-	624
. Laval Laurentides	208-2-	5-	616
CFA	247-2-	25-	608
nango Valley ARA			
	60-2-	6-	596
iwack ARC			
AFA	124-2-	14-	548
erick ARC			
RM	115-2-	8-	530
lla Peak FDG			
GB	314-1-	7-	523
orer Post 73			
AP	145-2-	4-	490
CAX	112-2-	3-	424
y Co ARC			
	97-2-	9-	418
K			
B	81-2-	2-	380
n Co EM			
PQ	84-2-	4-	368
YO	112-2-	3-	224
NK Radio Network			
E	2-1-	4-	202

Commercial

s Hams ARC			
V (+N4RNV)	1833-2-	7-	5,342
ter Fairfield ARA			
R (+KA1FUY)	1155-2-	40-	4,420
alachian RA			
CNN (+KB8COH)	1782-2-	11-	3,974
town ART			
(+N3GBY)	1033-2-	15-	3,412
ter ARA			
UMU (+N4IVU)	1298-2-	20-	3,240
d Owls of NY			
V	2062-1-	12-	2,792
in Bedroom RC			
EX	752-2-	5-	2,286
ahoochee Chatters ARC			
TH	678-2-	8-	1,852
a Shore RC			
O	423-2-	10-	1,042
e Dog ARC			
JY	431-2-	12-	988
and Co AR			
R	348-2-	18-	970
n ARS			
XU	372-2-	8-	938
way Nighthawks			
SP	201-2-	12-	842
River RC			
CH (+KA9YUZ)	208-1-	10-	469
tor ARC			
AU	133-2-	7-	256
water ARC			
VZL	16-2-	7-	244
Creek Scout Camp			
U	63-2-	8-	126

Battery

t ARA			
(+N3ECR)	2055-5-	25-	13,390
Arundel RC			
PR (+KA3TDD)	1120-5-	34-	9,280
n			
RW	698-5-	10-	7,480
Windfarmers			
H	748-5-	12-	6,770
n Coast ARC			
A (+N8IAA)	749-5-	25-	5,060
Portland ARC			
W7KYC (+N7HSX)	590-5-	19-	5,045
Columbiana Co ARC			
NN8B (+N8HGN)	523-5-	11-	4,880
NCG			
WB8HKK (+KB8AHQ)	377-5-	10-	2,795
Rason QRP			
N1DAT (+N1FHR)	255-5-	6-	1,885
NCG			
K16RN (+N8PLT)	39-5-	4-	680

3A

Ashtabula Co ARC			
W8CY (+KA8LTE)	3902-2-	20-	12,560
Hughes Fullerton Emp Assn ARC			
K8QEH (+KB8DXF)	3513-2-	50-	11,360
Poughkeepsie ARC			
N2YL (+KB2FTZ)	3583-2-	40-	10,804
Hebron AWG			
K1GX (+KA1QKE)	3310-2-	11-	10,370
Selden RG			
NQ2D (+N2HOM)	2682-2-	25-	8,758
Red Ryder Contest Club			
W8VS (+KA8BFF)	3187-2-	12-	8,660
Acton-Boxborough ARC			
W1UC (+KA2DJH)	2566-2-	35-	8,508
MADRAS			
K3NA (+N3FTU)	2847-2-	16-	8,398
Southern Peninsula ARK			
W4PRO (+N4IIC)	2859-2-	60-	8,112
Shanktooth ARC			
N6NW	2163-2-	10-	7,968
Conoway RC			
K1BU (+KA1BBU)	2373-2-	12-	7,806
DDXA			
KQ3V (+N3FTI)	2583-2-	20-	7,654
Waterbury ARC			
K1EB (+KA1RRG)	2882-2-	30-	7,568
Shreveport ARA			
W5AU (+KB5AUK)	2675-2-	45-	7,518
North FL ARS			
W4IZ (+N4TBII	2971-2-	55-	7,410
JPL ARC			
W8VIO (+KB8VPO)	2295-2-	35-	7,376
Williamsburg Area ARC			
K4RC (+WD4JYQ)	2175-2-	25-	7,320
Radio Central ARC			
NY2A (+KB2FUR)	2339-2-	60-	7,262
Tri Co ARA			
KS9O	2210-2-	11-	7,258
Paso Robles ARC			
W6LKF (+N6JQE)	2666-2-	37-	7,152
Riverland ARC			
KV9U (+N9FDE)	1979-2-	15-	7,006
CAREN			
KE9I (+KA9ZFG)	2279-2-	14-	6,834
Delaware-Lehigh ARC			
W3OK	2231-2-	40-	6,646
Ramapo Mt ARC			
NN2T (+KA2HNQ)	1958-2-	10-	6,414
VA Beach ARC			
K4IX (+KB4UED)	2065-2-	40-	6,310
Ozaukee RC			
K9CAN (+KA9DDN)	1655-2-	27-	6,212
General Dynamics RC			
W5IU (+KA5VRT)	2461-2-	67-	6,022
North Shore RA			
W1ND (+N1EVH)	1855-2-	35-	6,002
Mississippi Coast ARA			
K5OS	1762-2-	30-	5,664
San Mateo RC			
W6LMN (+KB6NYZ)	1608-2-	32-	5,572
Parkersburg ARK			
K8UC (+KA8VGV)	1509-2-	10-	5,534
Shelby Co ARC			
AC4T (+KA4VCA)	1325-2-	36-	5,504
Santa Barbara ARC			
K6TZ (+KA6EPF)	1765-2-	56-	5,460
Joliet ARS			
W9OFR (+KB9ACJ)	1439-2-	22-	5,398
Redwood Empire DX Assn			
WW6D	1716-2-	12-	5,368
Springhill ARC			
N5II	1742-2-	12-	5,276
Goz's Gang			
K2SA (+N2HKA)	1342-2-	16-	5,192
Band Dit-Dah			
K2MP	1425-2-	14-	5,122
RA of Erie			
W3GV	1391-2-	12-	5,062
Paduca ARA			
W4NJA (+KC4ENA)	1588-2-	12-	4,956
CFB Gagetown ARC			
VE1JO	1484-2-	10-	4,832
Twin City RC			
W7LA (+KB7EMM)	1535-2-	27-	4,804
Chattanooga ARC			
W4AM (+N4NTX)	1827-2-	45-	4,732
Tri Town RAC			
W9VT (+N9FUW)	1416-2-	25-	4,712
Davenport RAC			
W6BXR (+KA6ZBB)	1529-2-	150-	4,576
Palo Alto ARA			
W6OTX	1386-2-	31-	4,514
Tyler ARC			
AA5AA (+N5LVN)	1512-2-	31-	4,488
Orange Co ARC			
W6ZE (+WA6PFA)	1494-2-	36-	4,362
Codex Corp ARC			
KR1B	1303-2-	10-	4,358
South Georgia ARC			
WX4T	1417-2-	12-	4,328
Jones Co ARC			
W0GN	1127-2-	9-	4,298
New Providence ARC			
NA2R (+KB2BBP)	1311-2-	25-	4,282
Brightleaf ARC			
W4AMC (+WD4JPQ)	1286-2-	23-	4,278
Huntingdon County ARC			
W3VI (+N3ELE)	1111-2-	25-	4,278
Yuba-Sutter ARC			
K8AAW (+KB8NMY)	1360-2-	22-	4,276
Black River ARC			
KM8E (+KB8CRR)	1650-2-	18-	4,232
Mount Vernon ARC			
K8EEN (+KB8EWB)	1182-2-	13-	4,224
Lower Columbia ARA			
W7DG (+KA7NWQ)	869-2-	35-	4,220
Shenandoah Valley RC			
W2RRKC (+N4SLR)	1285-2-	25-	4,172
Saline Co ARC			
K5NE (+N5JVB)	1188-2-	20-	4,170
Kankakee Area RS			
W9AZ	1075-2-	15-	4,076
Austin ARC			
W5KA (+N5JGX)	1136-2-	30-	4,070
Smoky Mountain ARC			
W4OLB (+N4BYR)	1228-2-	20-	4,046
San Lorenzo Valley RC			
N6RZ (+N6NLT)	2427-1-	25-	4,022
Arizona ARC			
W7IO (+N7JQY)	1493-2-	25-	4,012
Echo Repeater Assn			
WD9HCR (+KA9WBT)	1189-2-	32-	3,992
Kent Co ARC			
W3HZW (+KA3MIY)	1322-2-	38-	3,990
Sunset Empire ARC			
W7BU (+N7KZT)	1102-2-	20-	3,890
Livermore ARK			
WW6I (+KB6YWY)	1230-2-	45-	3,876
San Fernando Valley ARC			
W6SD (+KB6KCY)	1006-2-	50-	3,856
Port City ARC			
W1WQM (+WA1TOL)	1301-2-	43-	3,818
Club de Radio Sherham			
VE2WJ	870-2-	20-	3,762
Kaw Valley ARC			
W0CET (+KA0EPE)	1381-2-	50-	3,728
Candlewood ARA			
W1QI	1236-2-	25-	3,720
Surrey ARC			
VE7QST	1061-2-	25-	3,676
NRRA			
K8JK (+WB8ZZG)	951-2-	20-	3,638
Argonne ARC			
W9QVE (+KA9PVD)	927-2-	16-	3,614
Clark Co ARC			
W9WWI (+N4RJT)	1094-2-	17-	3,554
Lincoln Trail ARC			
AA4OR (+KA4BGQ)	905-2-	30-	3,554
West Allis RAC			
W9FK (+WD9AYD)	2339-1-	17-	3,544
Antelope Valley ARC			
K6OX (+N6IJU)	1096-2-	24-	3,530
Clifty ARS			
W9EFU (+KB9AZL)	1097-2-	15-	3,516
Albany ARA			
K2CT	1162-2-	27-	3,460
Twin Cities RC			
W8BU	1017-2-	12-	3,444
QCEN			
W8VVL (+KB8DVI)	851-2-	25-	3,432
NCG			
WM7L	1224-2-	9-	3,420
Elkhart Red Cross ARC			
AE9T	1030-2-	10-	3,408
Oregon Tanalatin Valley ARC			
WN7W (+KB7DNK)	1103-2-	63-	3,400
Schaumburg ARC			
KK9K (+KA9ZOO)	1066-2-	28-	3,354
Cumberland Co RS			
NE3H	1201-2-	4-	3,344
White Lake Area ARA			
W8FH	2257-1-	17-	3,320
Morris RC			
W2OYH	1037-2-	21-	3,318
Palisades ARC			
NK9Y (+KA9ZKT)	905-2-	12-	3,308
AT&T ARC			
KU9C	943-2-	18-	3,240
Tri-State ARC			
AK3M (+KA3QKU)	957-2-	31-	3,202
3M ARC			
W8MR (+N8AIK)	948-2-	16-	3,198
Hiawatha ARC			
KO8U	887-2-	33-	3,154
Great Bay RA			
WB1CAG (+KA1LLP)	1085-2-	27-	3,122
Peel ARC			
VE3XR	926-2-	18-	3,116
Spa ARA			
KE5QT	1282-2-	42-	3,114
NCG			
KA0VEL	1268-2-	20-	3,104
Frontier ARS			
NW7O	846-2-	10-	3,090
Downey ARC			
W6TOI (+N6OPR)	788-2-	67-	3,082
Pikes Peak RAA			
WA6VTU	961-2-	35-	3,072
DuPage ARC			
W9DUP	1810-1-	30-	3,042
Bill Gremillion Memorial RC			
K4SEX (+N4NKT)	1207-2-	28-	3,024
Contoocook Valley RC			
K1BKE (+KA1RXE)	981-2-	15-	2,996
Six-Meter Lovers Using Radio Propagation			
KC8PR	790-2-	12-	2,996
Midstate ARC			
N9DLN (+KA9ZPA)	999-2-	10-	2,988
Night Owls of Rhode Island			
N1ZE (+KA1OEI)	788-2-	10-	2,984
Tri-Co ARC			
KA3T (+KA3HGB)	973-2-	25-	2,954
Rappahannock Valley RC			
W2GGLNT (+KC4AUV)	976-2-	18-	2,950
Coastside ARC			
WA6TOW	923-2-	14-	2,912
Montgomery ARC			
N3BE (+N3ESR)	929-2-	40-	2,906
Moreno Valley ARA			
WR6G (+KB6WSH)	890-2-	65-	2,900
Hamilton Co ARES/RACES			
KN9K	819-2-	12-	2,886
Ottawa ARC			
VE3RC	763-2-	30-	2,884
Rock Creek ARA			
W3RCN	906-2-	15-	2,876
Harrison ARC			
KM9E	745-2-	29-	2,852
Stockton-Delta ARC			
W6SF (+KB6YWP)	812-2-	15-	2,850
Staten Island ARA			
W2CWW (+N2GPW)	786-2-	15-	2,850
Honeywell ARA			
AA5FP (+WA2DIQ)	1019-2-	12-	2,848
Algonquin ARC			
KB1WW (+N1FFX)	891-2-	15-	2,828
Portage ARC			
N8KW (+KB8EWQ)	765-2-	10-	2,828
Boulder ARC			
W0DK	849-2-	14-	2,788
Larkfield ARC			
WA2PNU (+KB2FVF)	795-2-	10-	2,778
NCG			
K6PD	676-2-	4-	2,776
York RC			
W9PCS	860-2-	27-	2,766
Coastal Area RS			
AB4B (+KC4CJQ)	747-2-	15-	2,758
Sangamon Valley RC			
W8DUA	749-2-	8-	2,758
Opequon RS			
WA8FSE (+K8SDG)	809-2-	17-	2,718
SCCARA			
W8UW (+KB6UFP)	790-2-	45-	2,680
Jersey Shore ARS			
W2DOR	843-2-	18-	2,676
Allegany Highlands ARC			
W2SAM	707-2-	15-	2,670
Clinton ARC			
W8CS	1080-2-	8-	2,660
West Island ARC			
VE2CWI	846-2-	20-	2,654
Silvercreek ARA			
WD8PNF (+KB8DMU)	738-2-	30-	2,652
Laurel ARC			
WV5D (+KB5GJA)	870-2-	30-	2,646
Marshall Co ARC			
WG4U (+N4SEI)	704-2-	15-	2,642
Clinton Co ARC			
WD8LRF	807-2-	10-	2,638
PhD ARA			
WA8UGU (+KA8WZZ)	831-2-	20-	2,634
Salem ARC			
W7SAA (+N7IBV)	924-2-	17-	2,622
Hebron Hot Shots			
N4YX (+KA8QMK)	853-2-	6-	2,604
Ocean/Monmouth ARC			
KC2Q	706-2-	25-	2,602
IBM Owego ARC			
W2VDX	748-2-	18-	2,586
North Hills ARC			
W3XX	705-2-	24-	2,576
Johnson Co ARC			
NS5N (+KB5GDI)	776-2-	22-	2,574
STARS			
KI4JU	987-2-	20-	2,574
Garden City ARC			
W8WT	816-2-	25-	2,566
Casper ARC			
W7VNJ	1000-2-	15-	2,548
Shiawasee ARA			
W8QQO (+KA8YVW)	870-2-	10-	2,512
Kennahoochee ARC			
AA4VE (+N4POK)	800-2-	15-	2,498
Kendall ARS			
WK5O (+KA5WJY)	652-2-	24-	2,494
Western Piedmont ARC			
K4VLY	796-2-	25-	2,458
Victor Valley ARC			
K8QWR (+KB8WHT)	903-2-	24-	2,444
Oakville ARC			
VE3HB	818-2-	15-	2,414
UNM ARC Alumni			
WV5G (+N5LQO)	737-2-	10-	2,398
YF-22A Group			
W6SRP	874-2-	4-	2,378
Fullerton RC			
W6ULI (+K6PHE)	790-2-	28-	2,378
Iroquois/Ford ARS			
WB9TAH	857-2-	8-	2,366
Tri-Co ARC			
NA4T	805-2-	10-	2,352
PART of Westford			
AB1A	693-2-	10-	2,352
Westark ARC			
WE5L	1023-2-	15-	2,346
Marshall RC			
W8BMJ	807-2-	15-	2,324
Zanesville ARC			
WE8G	763-2-	49-	2,322
RATS/WATS			
W4AY (+N4TDI)	630-2-	20-	2,284
223.760 FDG			
KD8SX (+N8ITF)	938-2-	12-	2,276
Auburn ARA			
WA2L	705-2-	15-	2,276
Willmar Area EAR			
W9SW	750-2-	10-	2,242
Susquehana Co ARC			
KM3E (+KA3NAX)	580-2-	15-	2,234
Brazos Valley ARC			
AK5G (+N5GZW)	621-2-	100-	2,232
Mound ARA			
W8DYY (+W8RJY)	661-2-	47-	2,228
Holland ARC			
K8DAA	888-2-	35-	2,212
Dalton ARC			
KK4LL (+N4SLJ)	700-2-	26-	2,208
Pawnee ARC			
AF0N	606-2-	25-	2,198
NCG			
NY9D	877-2-	15-	2,184
Mancorad Club			
W9DK (+KA9ZTG)	521-2-	13-	2,178
TRIAC-ARC			
NJ3A (+KA3THW)	748-2-	9-	2,170
Bloomfield ARC			
W1CWA	662-2-	8-	2,170
Mich-a-con ARC			
N8LT (+KB8EYF)	620-2-	12-	2,146
Weasel's Weirdos			
KW4M	568-2-	5-	2,142
Mt State Transmitters			
K8VNQ	505-2-	12-	2,130
Boonville ARC			
NC2O (+KA2SJG)	531-2-	7-	2,078
Sky High ARC			
KB2AR (+KC4EKV)	533-2-	8-	2,078
FORCE			
AF8M	580-2-	25-	2,064
MGI Group			
VE3TCA	805-2-	10-	2,052
Indian Hills RC			
W8ICS	489-2-	15-	2,032
Umpaua Valley ARC			
WJ7E	402-2-	13-	2,008
Young Amateurs of Colorado			
WD0C (+KA0NND)	569-2-	18-	1,986
Tri-Co Ham RC			
N8CG (+KA8ZMF)	577-2-	14-	1,980
Ancorage ARC			
KL7AA (+NL7NN)	411-2-	10-	1,972
Nebraska Radio Development Soc			
NU0C	829-2-	17-	1,964
Top of MI RA			
WB8REH	613-2-	12-	1,960
Spring Hill ARC			
N4US	333-2-	39-	1,946
Titusville ARC			
K4ZS	631-2-	12-	1,920
CCARES & EARA			
W2ZJ	377-2-	16-	1,916
AMEARC			
VE7ECC	551-2-	10-	1,910
Top of Panhandle ARC & Dust Bowl ARC			
KY5C	651-2-	17-	1,904
Central Texas & Heart of Texas ARCs			
W5ZDN	449-2-	21-	1,870
Post 73			
AA5GI (+KA5EBT)	489-2-	25-	1,860
Albany Co RACES			
KN2I	366-2-	8-	1,852
Pine State ARC			
K1AG (+N1DYM)	422-2-	12-	1,844
Kinston ARS			
W4OIX (+KB4BGE)	635-2-	10-	1,844
Sleepy Hollow Badgers			
W8URM	415-2-	8-	1,842
Rantout ARA			
W9ZK	543-2-	7-	1,798
Highland ARA			
NF8G (+N8INT)	617-2-	12-	1,790
Newark ARA			
W8SG	551-2-	30-	1,786
Beloit ARC			
K9EP	629-2-	5-	1,758
Austin ARC			
WA0RPS	303-2-	12-	1,746
Granite State ARA			
K1RD	446-2-	43-	1,716
Raritan Bay RA			
K2GE	468-2-	15-	1,716
Wichita ARC			
W0SOE (+KA8ZZU)	588-2-	22-	1,712
Sub Club ARA			
KF6TG (+KA6NOO)	502-2-	12-	1,702
Burnaby ARC			
VE7BAR	429-2-	30-	1,702
Raritan Valley RC			
W2QW	665-2-	9-	1,696
Adams Co ARC			
K9UR (+W9ETT)	470-2-	25-	1,680
Transylvania Co ARC			
WA5DJJ (+KC4BQD)	355-2-	12-	1,670
Tri Co ARC			
W9MQB	373-2-	5-	1,650
Hub City ARC			
KA9FIF (+KA9ZEE)	338-2-	25-	1,618
Muscatine ARC			
KD0MB	488-2-	21-	1,608
Cedar Creek ARC			
NN5J	472-2-	30-	1,598
Johnston ARS			
AK4H	503-2-	11-	1,580
Branch Co ARC			
WB8R	413-2-	21-	1,574
Olympia ARS			
WM7V	382-2-	55-	1,560
Cumberland ARC			
K3IEC	519-2-	13-	1,550
Jamestown ARC			
W6FX	401-2-	15-	1,534
Southern Alberta ARC			
VE6CAM	322-2-	20-	1,530
Lake Area RK			
WA0NSY	358-2-	30-	1,526
Fort Pierce ARC			
KJ4YF (+WB4NOZ)	375-2-	12-	1,526
Norfolk RG			
VE3VT	402-2-	13-	1,524
JAARS			
W6AN (+N6PVA)	389-2-	20-	1,522

Lambton Co RC
VE3IG 513-2- 18- 1,522
ESL Irregulars
KA6ASV (+KA6RDX) 211-2- 29- 1,520
RF Rascals
K9TJM 487-2- 6- 1,512
CARC/CARS
NT9F (+N8JFH) 382-2- 27- 1,498
SW La Amateur Repeater Club
W5BII 439-2- 20- 1,490
Emergency ARC
KH6BI (+KH6KL) 215-2- 35- 1,466
Del Val Omik Elec Comm Assn
K3X 463-2- 12- 1,452
Hartford Co ARC
W1NEM 558-2- 12- 1,416
Dixie ARC
WI7J 325-2- 30- 1,416
Portland AWA
W1KVI (+KA1RZU) 483-2- 20- 1,408
Moultrie ARK
W9BIL 437-2- 9- 1,398
Newport City RC
W1SYE 310-2- 12- 1,396
Sterling Rock Falls ARS
W8MEP 497-2- 35- 1,394
Nevada Co ARC
W6DD 387-2- 12- 1,392
Skyline ARC
NW2X 382-2- 18- 1,382
North Shore ARC
VE3NSR 367-2- 26- 1,348
Mine Creek ARC
KE8CG (+N8OIR) 319-2- 17- 1,338
Cascade RC
W7EK 412-2- 10- 1,322
Bethel Educational ARS
KA1KPT 260-2- 12- 1,320
Iredell Co
NG4X 410-2- 21- 1,320
RA of Greater Elbridge
N2DM 693-1- 9- 1,318
Milwaukee RAC
W9RH 456-2- 19- 1,312
Metrocrest ARS
KB5A (+N5LJK) 424-2- 23- 1,306
American Airlines RC
KR5P 354-2- 15- 1,298
Thunder Bay ARC
K8CHS 486-2- 10- 1,272
NCG
WA6SLA 516-2- 5- 1,242
St Augustine ARS
W4WSB 412-2- 15- 1,224
Wedgie ARC
WB4MZO (+WD4NIT) 333-2- 7- 1,222
Irving ARC
KX5G (+N5MFI) 327-2- 26- 1,210
Tioga Co ARC
NO3O (+KA3TIN) 381-2- 23- 1,182
Elgin RC
WD9CVP 430-2- 6- 1,180
Welland Co ARC
VE3WCA 251-2- 10- 1,144
Santa Cruz Co ARC
K6BJ (+KB6VOQ) 232-2- 14- 1,144
Westcum ARC
VE1WRC 214-2- 10- 1,128
Geraldton ARC
VE3NHZ 363-2- 4- 1,126
Whitman ARC
WA1NPO 306-2- 18- 1,114
Kings Co Rpt Assn
AG2Z 351-2- 3- 1,056
Redwood ARC
N6AFT 276-2- 10- 1,050
Copper Co RAA
W8CDZ 314-2- 15- 1,040
Clark Co ARA
W8OG 318-2- 11- 1,036
National Trail ARC
K9UXZ 274-2- 18- 982
Yellow Thunder ARC
WB9FDZ (+KB9ANB) 212-2- 7- 956
Tri-City RAC
W8VQN 325-2- 14- 950
Southwest ARC
KF6TK 199-2- 18- 936
Golden Empire ARS
W6RHC 118-2- 9- 928
Chehalis Valley ARS
WA7UHD (+WB7BIE) 224-2- 9- 902
Coastline ARA
NC1D 294-2- 30- 888
High Plains ARC
W6GGP 239-2- 6- 876
Sierra Foothills ARC
KJ6CA 119-2- 9- 860
Cambria ARC
W6SCR 146-2- 11- 842
Laredo ARC
KF5RM 208-2- 11- 832
Whitewater Valley RC
K9KY 180-2- 12- 826
Omik Electronic Assn ARC
W8CEV (+KB8EBX) 187-2- 12- 824
Crawford ARS
W3MIE 342-2- 10- 822
Central IA RAS
N8DKG 254-2- 9- 708
Crete ARC
K8JOQ 130-2- 12- 686
Long Wire Ranch RC
VE4TI 327-2- 4- 666
Mount Prospect ARC
N9DZN (+KA9ZDT) 98-2- 7- 596
Marianas ARC
KH2D (+KH2CY) 70-2- 10- 576

Oneida ARC
K9HGX 141-1- 6- 567
Leward Coast AC
KH6MOP 28-2- 10- 458
Communications Vancouver
VE7VCH 58-2- 6- 416

3A Commercial

GRAM
W2RCX (+KB2FRB) 1493-2- 30- 3,540
Virginia ARA
W4FEG 805-2- 30- 2,618
Lawton-Ft Sill ARC
W5KS (+N5MFP) 473-2- 36- 1,610
San Francisco ARC
W6PW 386-2- 20- 1,378
Eastern Illinois Hamateur Club
W9GWF 284-2- 20- 716
DeForest ARC
KB4MVF/8 165-2- 10- 330
Telephone ARC of Manhatten
W2FWG 58-2- 10- 124

4A Battery

Suffolk Co RC
W2DQ (+N2HII) 870-5- 30- 7,530
Mason Dixon ARC
K8HS (+N8JAG) 636-5- 24- 4,505
St Louis QRP Soc
N8ZZ (+N8UFZ) 507-5- 13- 4,410
Central Organ RA
NR7Y (+N7JZI) 442-5- 6- 3,525

4A

Kettle Moraine RA
N9KS 3400-2- 45- 10,882
Scottsdale ARC
K7TR (+KB7CGB) 3029-2- 40- 9,842
Eastern Connecticut ARA
K1MUJ (+KA1HTX) 2967-2- 21- 9,612
Cary ARC
N4NC (+KC4BDV) 2509-2- 28- 9,022
Sturdy Memorial Hospital ARC & Foxboro Co ARC
K1ZZJ (+N1DZJ) 2549-2- 40- 8,740
Pentagon ARC
K4AF (+N4PVC) 2790-2- 20- 8,508
Westchester ECA
K2ZM (+KB2APX) 2456-2- 35- 8,262
L'anse Creuse ARC
K8RO 2505-2- 25- 8,224
Columbus ARA
W8TO (+KA8WRC) 2507-2- 30- 7,946
Columbia ARC
AA4V (+N4QOG) 2782-2- 44- 7,726
Wayne ARTS
WD8LLD (+KB8CMK) 2049-2- 14- 7,138
Cherryville Rpt Assn II
NR2R (+KB2EEN) 2710-2- 15- 6,782
Riverside County ARA
W6TJ (+KB6UNK) 2059-2- 42- 5,700
OH-KY-IN ARS
K8SGH (+KB8GPT) 2009-2- 35- 5,832
Ft Worth Kilocycle Club
K5LP (+N5KEQ) 1872-2- 20- 5,596
West Palm Beach ARC
W4HAW (+N3CNK) 1941-2- 50- 5,524
Reservoir ARA
K8QYL 1863-2- 25- 5,448
Tuscarora ARA
KI3D (+KA3TIO) 1985-2- 27- 5,394
Alamance ARC
K4EG 1672-2- 25- 5,286
Montgomery ARC
W4AP 1461-2- 29- 5,180
Sioux Empire ARC
W8ZWY (+N8IHG) 1393-2- 30- 4,792
Griffiss ARC
WA2ZXS (+KB2FBE) 1579-2- 12- 4,748
San Andreas Faultline Survivors
NZ6N 1471-2- 38- 4,720
Greater Lawrence AR Fellowship
W1FW 1430-2- 20- 4,648
Ararat AR Shrine Club
AB9L 1360-2- 23- 4,636
CRANOQ
VE2WZ 1598-2- 16- 4,530
Catalina RC
N7WS 1424-2- 19- 4,438
Burlington Co RC
K2KED 1205-2- 30- 4,110
United RAC
K6AA (+KB6WQD) 1215-2- 40- 4,086
Anaheim ARA
K6SYU 1119-2- 10- 4,044
Ripley Co RA & Laughery Valley ARC
N9DOK 1570-2- 22- 3,968
Van Wert ARC
W8FY (+KA8WEP) 1380-2- 25- 3,914
Rochester ARC
W8MXW (+KA9YKQ) 2077-1- 26- 3,847
Muskegon Area ARC
W8ZHO (+N8JMM) 1374-2- 31- 3,840
ARES Dist 32
N8AUS (+KA9YNJ) 1041-2- 24- 3,670
Mid-South ARA
W4EM (+KB4LQL) 1074-2- 30- 3,660
Steel City ARC
W3KWH 975-2- 20- 3,572
Carthage ARS
W8LF 887-2- 18- 3,540
Mid-Atlantic ARC
W3SA (+KA3SQX) 937-2- 45- 3,426
Intermountain ARC
W6LKV (+KB6YUA) 1051-2- 43- 3,420
SVARA
K8DAC (+N8JAZ) 822-2- 14- 3,250

Everglades ARC
W4SVI 710-2- 22- 3,224
ARA of the Tonawandas & ARES
W2SEX 681-2- 16- 3,196
Hazleton ARC
W3SJI 818-2- 25- 3,162
Discrete Components of 955
K3WJV 903-2- 21- 3,142
Keesler ARA
K5TYP 688-2- 10- 3,126
San Gabriel Valley RC
W6QFK (+KB6PBR) 799-2- 40- 3,114
Alliance ARC
WC8F (+N8HHV) 952-2- 26- 3,096
Parker Co RC
WC8P 876-2- 20- 3,088
St Charles ARC
N8GL (+N8HDL) 913-2- 48- 3,064
Harrisburg RAC
W3UU 842-2- 15- 3,048
Temiskaming ARC
VE3CTT 1061-2- 11- 3,030
Pionesettia ARC
N6SR (+N6OPB) 811-2- 26- 2,900
KWARC
VE3IC 906-2- 12- 2,870
Southington ARA
W1ECV 808-2- 35- 2,846
CAREC
K1ZKM 748-2- 4- 2,760
Malibu DCS
N6ZH (+N6QXH) 681-2- 100- 2,680
North Shores ARC
K6HAI 787-2- 26- 2,648
Antietam Radio Assn
W3CWC 839-2- 15- 2,638
Pasadena RC
W6KA (+KB6TYY) 852-2- 40- 2,562
Natchaug ARA
N1EBY (+KA1RMC) 1009-2- 21- 2,526
Hazel Park ARC
W8JXU (+KB8CRM) 945-2- 30- 2,488
Marin ARC
W6SG (+N6RJV) 812-2- 37- 2,472
York Region ARC
VE3YRA 743-2- 25- 2,464
Shore Points ARC
NR2Q 548-2- 25- 2,458
Central NH ARC
N1LT 663-2- 18- 2,454
Warren ARA
W8VTD 675-2- 15- 2,360
Alamogordo ARC
KJ8W 587-2- 12- 2,302
Dual Banders
KD2IX (+KB2EGG) 922-2- 10- 2,300
Delaware ARC
W3SL 579-2- 7- 2,282
Kalamazoo ARC
W8VY (+KB8ESO) 813-2- 25- 2,270
NCG
N3FQB 663-2- 7- 2,190
Honolulu ARC
KH6WO 808-1- 58- 2,181
Central VT ARC
W1BD 721-2- 16- 2,142
Beach Cities WS
K6MJ 480-2- 18- 2,134
BRATS
KC3DO (+N3GDF) 758-2- 25- 2,126
Lincoln ARC
K8KKV 582-2- 10- 2,086
Kokomo ARC
KK9I 465-2- 37- 2,048
Mountain Repeater Assn
K8VE (+KB8MRN) 851-2- 14- 2,012
Blue Ridge ARC
KK4YK 527-2- 14- 1,950
Midland ARC
W8KEA 539-2- 38- 1,898
Crawford-Rosommon ARC
WF8R 435-2- 10- 1,876
Shoreline ARC
W1BCG 542-2- 13- 1,870
Sierra ARC
WA6YBN 556-2- 11- 1,824
Susquehanna Valley ARC
K3ARR 586-2- 20- 1,774
Skywide ARC
VE3ATD 567-2- 8- 1,768
Massasoit ARA
WB1FLD 551-2- 9- 1,744
Mankato ARC
W0WCL (+KA0EEK) 790-1- 14- 1,740
Clallam Co ARC
W7FEL 425-2- 16- 1,674
Bill Hoehl Memorial FDG
W4UOT 473-2- 15- 1,662
Panoramaland ARC
W7JTR 463-2- 8- 1,626
Oakland Co ARS
W8TNO (+KB8CGC) 499-2- 10- 1,548
Kimberling ARC
NC0G (+KB0CUT) 319-2- 9- 1,522
Evergreen ARS
W7ZX 366-2- 8- 1,516
Mid Michigan ARC
N8ARI 554-2- 10- 1,508
Albert Lea ARC
WA0RAX 441-2- 6- 1,442
Palma RC
K8UZW 421-2- 20- 1,422
Houston Echo Soc
WD5JLT (+KA5VBK) 395-2- 11- 1,412
Wilson ARC
WA4MFI (+N4SCT) 302-2- 13- 1,410
Crescenta Valley ARC
KI6JL 271-2- 10- 1,406

Gladwin ARC
KD8NC 405-2- 7- 1,330
Mountaintop ARC & Plateau ARC
W4EX 409-2- 12- 1,318
Hams Amateur Mobil Service
WA7LAW 181-2- 22- 1,230
Catskill Mountain ARC
KC2H (+KB2FEP) 312-2- 12- 1,182
Northwest OH ARC
WB8ULC 340-2- 12- 1,180
Country Cousins
K3KW (+KA3SYS) 252-2- 5- 1,086
Quad Co ARC
NA3Y 182-2- 30- 1,050
Marietta ARC
W8HH 284-2- 7- 1,002
Adrian ARC
W8TQE 444-1- 30- 994
Keowee Toxaway ARC
K4PYM 113-2- 20- 970
Botsford ARC
KC8GP 282-2- 12- 964
Fayette ARA
WD8PHL 249-2- 10- 898
Ebonaire ARS
NF2N (+K2TWZ) 249-2- 25- 772
NCG
WG7X (+N7HNX) 119-2- 4- 738
Dunnville ARC
VE3HNR 94-2- 13- 708
Bedford Co ARS
K3NQT 205-2- 12- 510

4A Commercial

RA of Western New York
W2PE 925-2- 20- 2,686
Southern Sierra ARS
K6RL 450-2- 12- 1,574
Somerset Co ARC
NI3D 392-2- 26- 896

5A Battery

Zuni Loop Mt Expeditionary
W6SKQ 992-5- 12- 8,795
Benicia ARC
NR6E 729-5- 25- 8,110

5A

Texas DX Society
K5DX (+N5IZA) 7151-2- 27- 19,836
Birmingham ARC
W4CUE (+N4AOJ) 4832-2- 100- 13,542
Huntsville ARC
K4BFT (+WA4SCS) 4694-2- 30- 13,352
Western ARA
N6ME (+N6EIV) 4118-2- 55- 13,188
Lake Co ARA
K8BL (+KB8DTY) 3822-2- 30- 11,036
Hugh Aircraft Co Hesea ARC
K6ZT (+KB6KSD) 2979-2- 30- 10,320
Hamfesters RC
W9AA (+KA9STV) 3334-2- 50- 9,572
Atlanta RC
W4DOC 2896-2- 10- 8,852
Schenectady ARA
K2AE (+N2GXH) 2720-2- 45- 8,494
LARK
KW8G (+KB8BOU) 2179-2- 24- 7,300
Bergen ARA
K2ZO (+KB2CEO) 1981-2- 23- 6,970
Palomar ARC
W6NWG (+KB6RRV) 2302-2- 34- 6,812
Old Barney ARC
N2OO (+KB2AJU) 2066-2- 48- 6,498
Utica-Shelby ECA
WA8Z (+N8JIZ) 1875-2- 50- 6,458
Astro ARC
W2DU (+KB2FXV) 2053-2- 25- 6,380
Two Rivers ARC
W3UST (+N3EOP) 1674-2- 30- 6,208
Grumman ARC
WA2LQO (+N2GCW) 1477-2- 48- 5,488
Armadillo Gang
K5UDU 1834-2- 30- 5,402
Mt Diablo ARC
W6CX 1924-2- 27- 5,388
Champaign/Logan ARC
W8EBG 696-5- 20- 5,156
Arlington & Alexandria RCs
W2BBWVP (+N4HCP) 1201-2- 25- 4,744
West Branch ARA
W3AVK (+KA3RJT) 1287-2- 51- 4,484
Cuyahoga Falls ARC
W8VPV (+KB8BKJ) 1338-2- 30- 4,412
TRW Air Force Group
N4ARO/6 1218-2- 15- 4,108
Lincoln County ARC
K7FD (+WB7SXH) 1273-2- 21- 4,052
AR Fellowship
N8MC (+N8ICE) 1107-2- 19- 4,046
Empire RC
N8HFZ 960-2- 10- 4,018
ARC of Augusta GA
W4DV (+KC4FPE) 1326-2- 25- 3,892
Southern California ATS
WB6LRU (+KA6ZOC) 1332-2- 18- 3,668
Brantford ARC
VE3BA 1069-2- 20- 3,572
Clear Lake ARC
W5RRR (+KB5GNA) 1000-2- 53- 3,330
Spokane RA
W7NBR 850-2- 17- 3,196
Turlock ARC
W6BXN 892-2- 40- 3,110
Valley RC of Eugene
W7PXL 929-2- 15- 3,008
Grant Co ARC
W9EBN 963-2- 10- 2,872

Warren Co RACES
NV8Y 908-2- 43- 2,820
Gabilan ARC
KB6GV 850-2- 37- 2,642
Milford ARC
W8YDK 823-2- 14- 2,616
Field Day's Finest
N9DD 592-2- 10- 2,420
Toledo Mobile RA
W8HHF (+KB8EEN) 534-2- 18- 2,256
Mount Tom ARA
NA1V 910-2- 20- 2,144
Monterey Park ARC
K8GIP 651-2- 19- 2,132
Allegan Co ARC
K8CJQ 651-2- 14- 2,112
WACOM
AD3T 717-2- 18- 2,104
Scoland ARA
KBAAR 649-2- 25- 2,052
Lakehead ARC
VE3FW 873-1- 12- 1,944
Clark Co ARC
W7AIA 850-1- 25- 1,875
ARC Silverton
KD7X 833-2- 24- 1,840
Chicago ARC
W9CAF 426-2- 40- 1,776
Genesee Co ARC
W8ACW (+KA8TMQ) 479-2- 8- 1,666
Mobile Sixers RC
W3AWA 344-2- 19- 1,548
Missionary Radio Network
KA6NLY 358-2- 20- 1,332
Jefferson Barracks ARC
KBZFK 802-1- 23- 1,300
Palestine/Anderson Co ARC
W5ORW 92-2- 30- 900
Yakima ARC
W7AQ 58-2- 8- 716

5A Commercial

Greene Co ARC
W5BJR 277-2- 13- 756

6A

Orlando ARC
AI4U (+WA3SGZ) 2983-2- 113- 9,844
South Pickering ARC
VE3SPC (+VE3AIO) 2708-2- 44- 9,152
Northrop RC AND Palos Verdes ARC
W6CN (+KB6OJC) 2687-2- 46- 7,844
Hoodview ARC
WB7GIW (+N7JQO) 2578-2- 44- 7,688
Colonial Wireless and Billerica ARS
N1AU (+KA1QCL) 1755-2- 10- 5,988
Bolingbrook ARS
NW9K 1789-2- 37- 5,886
Twin City ARC
K9CW (+KA9QZO) 1787-2- 50- 5,744
Raleigh ARS
W4DW 1451-2- 30- 5,516
Triple States RAC
K8AN (+N8FQN) 1435-2- 50- 5,468
Monongalia WA
K8LG 1606-2- 30- 5,292
Peninsula ROS
N3FQS 1604-2- 28- 5,184
Hamilton ARC
VE3DC 1803-2- 85- 5,104
Central MA ARA
W1BIM 1817-2- 45- 4,884
London ARC
VE3QST 1282-2- 15- 4,506
Quannapowitt RA
W1EKT 1050-2- 33- 3,744
Windsor ARC
VE3CW 1338-2- 70- 3,432
Pymatuning ARC
NM3C (+KA3SEF) 1172-2- 12- 3,384
LIMARC
W2VL (+KB2FOW) 1565-1- 64- 3,228
New Bern ARC
WD4JMS (+N4PPD) 1097-2- 35- 3,204
Bristol TN/VA ARC
WB4DKI (+KB4VGH) 812-2- 25- 2,934
Southern MI ARS
W8DF (+KB8EJD) 740-2- 34- 2,916
Old Pueblo RC
W7GV 782-2- 21- 2,772
Motley Crew
W6TB 776-2- 12- 2,568
South Hills Brass Pounders
W3PIQ 697-2- 39- 2,478
20/9 ARC
W8BOO (+KA8TZX) 629-2- 25- 2,334
Island Co ARC
W7PN 405-2- 12- 2,112
Metropolitan ARC
K8NOW 516-2- 12- 2,076
North Hills RC
K6IS 494-2- 22- 1,956
Mayflower ARC
NC1K (+KA1RTD) 434-2- 21- 1,908
Bellevue ARC
W8WYV (+N8IMD) 491-2- 12- 1,836
Amador Co ARC
N6KD 366-2- 28- 1,776
AR Exp Alliance & Markham ESDA
W9HG 315-2- 15- 1,440
Butler Co ARA
W3UDX (+WB3GNP) 572-1- 14- 1,430

7A

Penn Wireless Assn
W3SK (+KA3CVP) 3888-2- 38- 12,168
Hampden Co RA
W1NY (+N1DPM) 3969-2- 47- 11,754

& Key ARC
D (+KA7SEH) 3608-2- 97- 11,378
ARC
RW (+KB8LSE) 3149-2- 41- 9,600
River RL
EQ (+N9GDX) 2662-2- 65- 9,312
a Area ARC
VI (+KA9FHK) 2481-2- 60- 8,204
as ARC
L 2747-2- 38- 7,744
Lakes ARC
(+KA9PNT) 1840-2- 35- 5,918
AR-PEN ARC
2U (+KBØBWG) 1472-2- 58- 4,958
s
A (+KC4CDX) 1333-2- 75- 4,392
a Lake ARA
R 928-2- 19- 3,694
ge Co ARC
V 925-2- 18- 3,448
ana ARC
(+KB9BBK) 831-2- 25- 3,294
vin Hills ARC
(+N8RMJ) 1109-2- 30- 3,276
Co ARS
M (+KB4RBB) 732-2- 24- 3,000
e Parish ARC
A 816-2- 14- 2,834
eForest RC
712-2- 40- 2,698
od Rock RC
KS 589-2- 14- 2,488
ald ARS
QD 255-2- 25- 1,518

Commercial

Point ARC
950-2- 31- 2,478

Battery

da CO RC
(+N8NFB) 1089-5- 30- 8,510

l RC
EC 4082-2- 31- 11,920
U ARC
2566-2- 20- 9,876
Tacoma
(+N7KLX) 2505-2- 35- 7,842
A ARA
1294-2- 60- 4,376
f Long Beach
1257-2- 47- 4,022
1117-2- 69- 3,968
orough ARC
E 1233-2- 40- 3,964
ndo ARC
S (+KB6YKY) 1133-2- 30- 3,518
ing Valley ARA
Y (+KA6TZX) 779-2- 20- 3,106
enango Mike & Key Club
588-2- 20- 2,778
ley ARS
Z 702-2- 36- 2,734

a Co RA
(+N6ONZ) 1834-2- 30- 6,300
ke Valley ARC
CA (+KA4YUY) 1665-2- 45- 5,774
s Co AR FD
G 1207-2- 84- 3,986
Coast ARC
1045-2- 45- 3,804
n Ontario ARC
U 1039-2- 20- 3,720
on West HS ARC
480-2- 14- 2,464

nster ARC
(+KA3FWV) 3308-2- 55- 10,600
ster Co ARC
ID 2901-2- 45- 9,534
d ARS
(+KB5BIM) 1176-2- 80- 4,988
e Park ARC
(+N4OOF) 858-2- 30- 3,886

Jersey RA
4528-2- 40- 13,082
o/Central Valley ARC
822-2- 24- 3,058
ado Co ARC
416-2- 12- 2,552

ridge Wireless
+KC4FUE) 4791-2- 55- 13,646

Battery

Valley ARC
2920-5- 34- 21,015

a ARC
(+KA1NBW) 4794-2- 85- 14,210
n ARC
R 2195-2- 26- 6,946

Springs RC
2502-2- 36- 8,642

22A Commercial

Englewood ARA
K2ND 94-2- 10- 606

One or Two Person Portable

1B-1 op Battery

NU7B	408-5-		4,585
N6EK/1	323-5-		3,630
AA4YZ	399-5-		3,390
WB2MBM/3	330-5-		3,050
K4EJQ	300-5-		3,000
WA8OWR	261-5-		2,910
KT5D	269-5-		2,775
AA1O	233-5-		2,530
K5ER	212-5-		2,485
NW7U	218-5-		2,285
NM7N	198-5-		2,280
K4RDU	157-5-		1,770
WA2DFI/5	132-5-		1,720
K7BFL	144-5-		1,455
N4UJ	154-5-		1,405
W9PNE	125-5-		1,350
K8ERL/6	240-5-		1,200
KA2KMU	71-5-		1,110
WA9STI/6	135-5-		1,090
KQ1X	98-5-		1,080
K6LMN	171-5-		1,055
N6SBE	77-5-		970
WB5PAY	84-5-		940
KC6XR	67-5-		770
W8WEJ	105-5-		625
WB9HRO/6	47-5-		570
WB2DLA	22-5-		420
KA7BCD	32-5-		420
KE5VA	30-5-		400
K5BDZ	24-5-		340
N6DDX	43-5-		315
NR1A	14-5-		240
WD5DTK	10-5-		200
W6MHS	3-5-		130
KF6MU	12-5-		120
KS6Q	23-5-		115
W4/VE3EWK	3-5-		115

1B-1 op

W4NW/8	834-2-		3,436
K3MD/1	700-2-		3,210
NG8F	549-2-		2,706
KT8Y	558-2-		2,412
WA5OYU	794-2-		2,140
K2TB	398-2-		1,798
AG5C	306-2-		1,534
W1NJM	356-2-		1,524
KA9EWN	240-2-		1,248
WA6UYB	237-2-		1,228
W7GKF	484-2-		1,168
KM4AK	353-2-		1,006
N9HKD	333-2-		858
W6CBA	149-2-		850
K8CWW	239-2-		778
VE2QST	676-2-		676
W6NA	166-2-		664
W8MGH	419-1-		619
WA4GNR	154-2-		616
NQ8T	205-2-		610
WB5IUG	148-2-		608
WF2Z (WA2QIC,op)	99-2-		596
N4QNF	145-2-		490
KD7RX	189-2-		478
W0CEM	232-2-		464
KK4QE	180-2-		460
KE8SJ	168-2-		436
WB8LUJ	154-2-		408
W8SG	100-2-		400
WB5IKP	131-2-		382
KA9KKV	30-5-		300
K6WX	44-2-		286
WA3TTI	123-2-		246
N3DXJ	43-2-		192
WD4CBZ	40-2-		188
KØHYG	68-2-		136

1B-1 op Commercial

WD5V	186-2-		422
N4RNJ	126-2-		356
KD9AC	148-2-		296
WA1UMA	51-2-		194
WB8ULZ	45-2-		180
WB4KSL	119-1-		178

1B-2 ops Battery

NC7B (+ND7A)	473-5-		4,670
N9ACD (+WB9AMI)	620-5-		4,570
W7EL (+KØED)	388-5-		4,090
WA6FSF/Ø (+WB6JJE)	338-5-		3,620
NI1L(+WB2AMU)	321-5-		3,240
NZ7Q (+N7JUP)	291-5-		3,210
KØYL (+N9FVN)	378-5-		2,945
NK1I (+N1FJ)	271-5-		2,920
AH6V	269-5-		2,790
K7VYY (+N7KCP)	242-5-		2,715
KØAF (+KBØBMK)	322-5-		2,635
NR5A (+WBØWQS)	239-5-		2,520
K7IJ (+WB6APL)	339-5-		2,225
KB4GID (+N4LDZ)	182-5-		2,200
N5AE (+KF5QE)	218-5-		1,635
N5JPX (+AL7GQ)	215-5-		1,615
W7LG (+KA7RCL)	82-5-		1,215
VE3HIE (+VE3OBS)	86-5-		1,160
KJ6AK (+KU6N)	130-5-		1,050
VE1AGZ (+VE1BXI)	92-5-		1,020
NN9H (+KA9MQU)	69-5-		890
AA5AC (+KB5DBJ)	98-5-		780
NØDET (+N5HSG)	37-5-		470

1B-2 ops

W8TK (+WD8AUB)	1107-2-		5,000
N7AZ (+WB7SRC)	1394-2-		4,382
W9LNQ (+N9ALC)	843-2-		2,740
WA4CEI (+KB4BVC)	1000-2-		2,410
W8DL	493-2-		2,394
K5TMS (+K5FNI)	1327-1-		1,943
AD7L (+KA7WDM)	420-2-		1,940
WE2Y (+WB2GWA)	515-2-		1,900
K8RYU (+KA8YZT)	556-2-		1,764
NM8X	595-2-		1,718
N6MZH (+N6OLZ)	557-2-		1,614
KI6YX (+KB6SMK)	657-2-		1,558
ABØY (+KP4DRE)	358-2-		1,524
WT5U (+WN5TEN)	336-2-		1,290
KA1OXO (+N1EYO)	235-2-		1,240
W1HBP (+WB1FAW)	396-2-		1,200
WA4YGG (+WB4UIE)	491-2-		1,192
WA7OKD (+W7LTN)	962-1-		1,162
KØBP (+WBØOLZ)	509-2-		1,118
N8PLK (+N8AZD)	399-2-		1,108
VE6FD (+VE6BOA)	575-1-		1,009
KB4PLH (+WB8LGH)	427-2-		960
N6KFS (+W6KWE)	286-2-		940
AA5EQ (+KB5CUS)	335-2-		896
AB4GB (+N4QBR)	391-2-		882
AH6CD (+NH6GC)	389-2-		878
KA6NEJ (+KA7CMP)	164-2-		844
N5LFH (+N5LWS)	356-2-		812
N5KCI (+WW5N)	158-2-		612
WB8U (+WB9MBD)	123-2-		582
WA8YRS (+WA8CNN)	222-2-		544
KD9JB (+WB9NQD)	171-2-		542
W7DHS (+N7EDK)	111-2-		516
W3LPQ (+KA3ITW)	178-2-		452
KB8CPC/9 (+KB8CPD)	121-2-		342
AA4QA (+WB9IVR)	58-2-		342
KB2XP (+KB2ALL)	51-2-		302
N1EBT (+W1AIM)	58-2-		216
K5PA (+N5KRW)	57-2-		214
KC4UX (+KA5B)	55-2-		210
WB6IXT (+KA7RZW)	11-2-		122

1B-2 ops Commercial

NJ9C (+AA9Q)	618-2-		2,190
N4OHW (+KB4QNR)	387-2-		684

2B-1 op

WA6RND	155-2-		1,110
KA3PMK	113-2-		684

2B-2 ops Battery

N3AE (+WA2SOC)	738-5-		5,810
W8UY (+KØWRY)	448-5-		3,635
NC6B (+WB6VRN)	548-5-		3,130
N6MBY (+KB6MEP)	282-5-		2,225
VE2ABO (+VE2ALG)	37-5-		870
WD6CLZ (+K6ZYU)	57-5-		485
KA8NRC (+KA8ODP)	45-5-		455

2B-2 ops

W2GD (+K2NJ)	2560-2-		8,814
K8GIV (+K8SQI)	1096-2-		3,846
W2AVZ/3 (K2RMY,K2UKM,ops)	640-2-		2,484
K6BXI/7 (+W1EJI)	369-2-		1,614
KC4DHS (+KC4EOG)	523-2-		1,450
NT8R/8 (+KE8ND)	377-2-		1,324
KJ6FD (+KB6NLO)	311-2-		1,126
WB5OAP (+WB5OAO)	262-2-		936
KO9S (+KØAM)	165-2-		718
NØETR (+KA6IJJ)	187-2-		634
N4OLD (+N4GBK)	74-2-		482
K6OBS (+WB6AXW)	36-2-		274
KA8CBQ (+WD8CXB)	31-2-		172

2B-2 ops Commercial

KJ8I (+KB8DRR)	556-2-		2,046
VE1QST (VE1s BQO,GA,ops)	636-2-		1,912

Mobile Stations

1C

K4MF	525-5-	2-	4,620
N6FL	450-5-	2-	4,205
K3KMO	370-5-	1-	3,560
NN5O	320-5-	3-	3,080
W6JI	725-2-	3-	2,624
WD5N	203-5-	1-	1,940
K4VFY	166-5-	2-	1,660
KB7NV	175-5-	2-	1,210
VE8NWC	488-2-	1-	976
AB4FX	277-2-	2-	554
N6IGI	241-2-	1-	482
N7ICV	214-2-	1-	436
W3FG	45-2-	1-	180
WA1TXJ	81-2-	2-	162
KB6UUA	61-2-	10-	122
KB2C/4	47-2-	1-	94
KA7FEF	23-2-	1-	92
W2MTA (+W2BCH)	39-2-	2-	78
K9OCU	38-2-	1-	76
KA7FEE	18-2-	1-	72
N1EWB/5	34-2-	1-	68
N5MAX	16-2-	1-	32

2C

KR4M	749-2-	4-	2,900
W2UB	180-2-	8-	562
VE3JW	218-2-	6-	448

4C

N9BAC	18-2-	2-	36

Home Station Commercial Power

1D

KV4FZ	1342-2-	2-	4,210
W5LTR	1540-2-	3-	3,420
W3GG	1776-1-	4-	2,685
K8CCV	709-2-	1-	2,570
K5ZD/3	1898-1-	1-	2,348
KK4QX	1101-2-	1-	2,202
KV3D	755-2-	18-	1,842
K9ZO	1706-1-	1-	1,771
K4OAQ	418-2-	1-	1,672
WD4AHZ	459-2-	1-	1,554
WB6TFM	418-2-	1-	1,494
KS7T	380-2-	1-	1,440
WA3RGH	693-2-	3-	1,386
WA2LBT	440-2-	1-	1,332
NT8A	413-2-	2-	1,324
ND4Y	464-2-	1-	1,100
NØFFZ	247-2-	1-	988
KF4GW	467-2-	2-	934
WB2FGZ	200-2-	1-	800
VE2CMV	523-1-	1-	704
KB4DCG	343-2-	1-	688
NJ1Q	275-2-	1-	688
NW4G	191-2-	1-	686
KA9VNH	290-2-	1-	650
KJ4YS	314-2-	1-	628
N5GW	158-2-	1-	624
N1DJX	287-2-	1-	574
NF3I	223-2-	1-	562
WB2NRK	317-1-	1-	507
KBØBFA	242-2-	4-	486
KB6PJU	177-2-	1-	480
W4HMV	140-2-	1-	470
W3BUC	228-2-	1-	456
NG2J	131-2-	2-	456
NT2V	224-2-	2-	448
W6SX	245-1-	1-	444
AB1U	215-2-	1-	430
KD2HE	108-2-	1-	408
KD5XH	401-1-	1-	401
WB8EJN	110-2-	1-	368
WB3BRF	106-2-	1-	366
KE9S	179-2-	1-	358
W8YNY	92-2-	1-	358
WA5IYX	179-2-	1-	358
KA4DBZ	128-2-	1-	332
KB2R	146-2-	2-	320
W8DSG	110-2-	1-	302
KA5VZG	149-2-	1-	298
W6DNY	145-1-	1-	290
N4MNA	141-2-	1-	282
K8NI	218-1-	1-	280
KK3Q	135-2-	1-	270
N9GMM	127-2-	1-	258
K6LMD	128-2-	2-	256
N4SQZ	254-1-	1-	254
KA4MAP	123-2-	2-	250
K5EIS	112-2-	2-	242
WD5CWZ	117-2-	1-	234
WB2JTE	109-2-	1-	218
WA6HRK	108-2-	1-	216
KA3LCF	105-2-	1-	214
AB6I/4	105-1-	1-	210
WB4DVN	103-2-	1-	206
KB7DWA	86-2-	1-	202
KB4XE	66-2-	1-	190
W7LNG	47-2-	1-	178
WA3SQU	44-2-	1-	176
KK4RV	48-2-	1-	168
K4IJK	78-2-	1-	156
KA1DSQ	148-1-	1-	148
N8IZZ	74-2-	1-	148
AA2L	146-1-	1-	146
W8IZV	36-2-	1-	144
KB5EYC	70-2-	10-	144
WBØYEA	71-2-	1-	142
N8HSC	52-2-	1-	140
KB9PA	62-2-	1-	126
WB9NPW	59-2-	1-	124
N9GGE	41-2-	2-	122
K2HVN	60-2-	1-	120
W4LEP	55-2-	1-	110
AA8V	25-2-	1-	100
KI7F/6	47-2-	1-	94
VE2CMC	46-2-	1-	92
KA8QEK	79-1-	1-	79
VE3NCK	38-2-	1-	76
W5JUV	32-2-	1-	64
KB4ZHZ	29-2-	1-	58
K8VSR	28-2-	1-	56
VE4ATC	53-1-	1-	53
KA3GXP	24-1-	1-	48
KV4FR	23-2-	1-	48
KC5BH	23-2-	1-	46
K9BAD	17-2-	1-	34
W4KM	18-1-	1-	33
NY9O	7-2-	1-	24
WB4WXD	10-2-	1-	20
KA1VW	18-1-	2-	16
KA5WJZ	7-2-	1-	14
N2HTT	6-2-	1-	12
WA4WEN	6-2-	1-	12
K5HIM	10-1-	1-	10
NOØY	3-2-	1-	6
WA1ZXX	2-2-	1-	4

2D

NQ2F	487-2-	14-	1,568
KI8S	506-2-	18-	1,272
NM8N	474-2-	2-	964
KM3D	329-2-	7-	850
W6DTV	315-2-	7-	830
WD6DJY	287-2-	3-	576
WB9SVK	275-2-	8-	568
KA1ST	205-2-	5-	410
W8BAP	171-2-	8-	342
KØSUR	99-2-	7-	198
NØEDV	51-2-	2-	102
N7ELF	47-1-	11-	47

3D

W9XX	1483-2-	12-	4,816
W8SUN	1300-2-	3-	3,254
KB6N	353-2-	3-	1,000
AK7L	470-2-	10-	968
W1AW	742-1-	4-	936
K5OZ	359-2-	10-	768
WB2KQG	40-2-	1-	80
NN3SI	14-2-	1-	36

4D

KO4J	1165-2-	14-	2,482
NX9I	579-2-	12-	1,158
WB6KQY	283-2-	8-	548

Home Station Emergency Power

1E

KRØB	1525-5-	3-	11,490
N5TR	1348-5-	3-	10,835
KV8I	1548-2-	1-	4,080
N4IV	372-5-	2-	3,720
KK4O	462-5-	6-	2,895
WA5E	1331-2-	5-	2,662
K2ZR	262-5-	1-	2,620
KB8S	1812-1-	3-	2,560
K8CV	242-5-	1-	2,415
W5ORM	239-5-	1-	2,390
K8LL/7	1872-1-	32-	2,311
W3LIF	764-2-	9-	2,298
N4HWL	441-5-	1-	2,205
VE2FOT	884-2-	3-	1,964
KD7E	489-2-	1-	1,722
W4WKQ	430-2-	1-	1,324
WA2DHF	612-2-	1-	1,292
KE8UI	151-5-	1-	1,285
W8RT	113-5-	1-	1,130
W2WOE	280-2-	1-	1,120
N5GFX	105-5-	1-	1,050
K5DP	95-5-	1-	950
W2DW	252-2-	1-	942
W6PRI	284-2-	1-	940
NZ5V	230-2-	1-	920
N2HIF	228-2-	1-	910
N1CC	83-5-	1-	890
VE2DZS	869-1-	1-	869
KH6IJS	85-5-	1-	850
WB4FDK	341-2-	1-	630
KØRW	203-2-	1-	812
N8GL	173-2-	1-	692
N1ES	61-5-	1-	610
WB2UEY	295-2-	1-	600
WN7Y	84-5-	2-	535
N6NF	173-2-	1-	526
KI4VY	98-5-	2-	505
KK4OK	248-2-	1-	496
W2CVW	60-5-	1-	495
W4GOG	116-2-	1-	464
KDØJM	142-2-	2-	458
K1TW	186-2-	2-	446
WAØQBC	184-2-	8-	386
VE7FB	147-2-	2-	294
W6YVK	50-5-	1-	280
W1TS	117-2-	1-	256
WA2IFZ	41-5-	1-	235
K5SDF	103-2-	2-	206
WB6YYZ	93-2-	1-	200
W7DFO	28-5-	1-	190
W1SE	83-2-	2-	166
NL7HT	71-2-	1-	142
N4MUH	11-5-	2-	110
WB4CKY	50-2-	1-	100
WA6GFR	18-5-	1-	80

2E

WB6JBM	1419-5-	4-	11,080
WK4D	3064-2-	6-	6,212
N6MI	1062-2-	2-	3,162
WF7B	2845-1-	3-	2,887
KC9OH	252-5-	4-	2,520
W5NS	711-2-	29-	2,340
WX6M	2120-1-	15-	2,170
W3AD	541-2-	10-	1,966
WD4IIO	419-2-	9-	1,408
KB8LF	353-2-	2-	1,356
K5QHK	259-2-	14-	598
KA9MOM	236-2-	3-	482
KB6TR	192-2-	10-	422
K9ONA	165-2-	3-	354
K9YHB	123-2-	5-	250

3E

W1XN	1100-2-	3-	3,286
KD6SA	378-2-	8-	756
K6EAG	154-2-	11-	374

4E

W1EO	619-2-	9-	2,420

Checklogs

KA1OFC, N2FZS, K4ZRH, WB6ITM, VE3AWE/W8, W7LQU, KR8L, W8VUV, NZØF, VE8CM

First ARRL RTTY Roundup Announcement

Packet—Baudot—AMTOR—ASCII

Many digital communication choices await participants in this year's *NEW* RTTY Roundup. This is the *FIRST* annual all-digital contest sponsored by the ARRL.

The object of the RTTY Roundup is to work as many digital stations as you can worldwide on any of the allowed digital modes within the allotted time period. QSO point totals are multiplied by the total number of different states + VE provinces + DXCC countries worked. So, it pays to try different bands to work into different areas. Remember, multipliers count only once (*not* once per band), but you can rework the same station on a different band for additional QSO points. You may operate more than one digital mode during the contest, but QSOs and multipliers may only be counted once regardless of mode.

One of the most exciting twists of this contest is packet radio. Packet stations are reminded that contacts for contest credit may *not* be made using digipeaters.

In addition to the competitive aspects of a digital-only contest, it is also a great chance to work new states, provinces and countries for awards.

Even if you've never operated an SSB or CW contest before, jump in—it's fun! You can read all about contesting and digital operation in *The ARRL Operating Manual* or *ARRL Handbook*, available from your local dealer or direct from ARRL HQ.

Getting Ready

Okay, you want to give the ARRL RTTY Roundup a try. What next?

1) For starters, carefully read the rules published here.

2) Get the proper paperwork. ARRL offers a package of forms to help you organize your contest entry. You wouldn't dream of doing your tax return on a sheet of notebook paper, right? Here's what you'll need:

- *Log sheets* for keeping track of your contest contacts. These special log sheets have spaces for all of the information that you need to record for each QSO.
- *Dupe sheets* to help you organize, in alphanumeric order, the call signs of stations contacted. If you fill out the dupe sheet as you operate, you can tell at a glance whether or not you've contacted a station before. You'll need one per band.
- *Summary sheet* to help you figure out your final score. The summary sheet is very important because it also helps us get your score listed correctly in *QST*.

You can get your package by sending a no. 10 (business size) SASE (with two units of First Class postage) to ARRL RTTY Roundup Forms, 225 Main St, Newington, CT 06111. Each package includes one summary sheet, one dupe sheet and three log sheets. Each log sheet has room for 200 contacts. Feel free to make photocopies as necessary. Send for your forms package now so you'll have it in time for the contest.

Recommended HF Digital Operating Frequencies (kHz)

North and South America	*Europe/Africa*
3590 RTTY DX 3605-3645	3580-3620
7040 RTTY DX 7080-7100	7035-7045
14,070-14,099.5	14,080-14,100
21,070-21,100	21,080-21,120
28,070-28,150	28,050-28,150

Recommended Novice Digital Operating Frequencies (kHz)

10 meters: 28100-28150* suggested simplex packet-radio frequencies: 28,102.3 28,104.3

*Authorized power output 200-watts maximum for Novices/Techs *only* on the 10-meter Novice subband.

Starting/Ending Time Conversion

	UTC	*EST*	*CST*	*MST*	*PST*
Starts Saturday, January 7, 1989	1800	1 PM	12 PM	11 AM	10 AM
Ends Sunday, January 8, 1989	2400	7 PM	6 PM	5 PM	4 PM

Canadian Multipliers

Prefix	*Province*	*Prefix*	*Province*
VO1/VO2	NFLD/LAB	VE4	MB
VE1	NB	VE5	SK
VE1	NS	VE6	AB
VE1	PEI	VE7	BC
VE2	PQ	VE8	NWT
VE3	ON	VY1	YUKON

Rules

1) **Object:** Contact and exchange QSO information with as many stations as possible on digital modes. **Any station may work any other station.**

2) **Contest Period:** First full weekend of January. Begins 1800 UTC Saturday, January 7, and ends 2400 UTC Sunday, January 8, 1989. Operate no more than 24 hours. Two rest periods (for a combined total of 6 hours) must be taken in two single blocks of time, clearly marked in the log.

3) **Modes:** Amateurs may use the following modes: Baudot RTTY, ASCII, AMTOR and Packet (attended operation only!)

4) **Bands:** All amateur bands 3.5 to 30 MHz (excluding 10, 18 and 24 MHz).

5) **Entry categories**

(A) **Single Operator, multi band**—One person performs all operating and logging functions. Use of spotting nets (operating arrangements involving assistance through DX-alerting nets, etc) is not permitted. Single-operator stations are allowed only one transmitted signal at any given time.

1. less than 150 W output
2. 150 W output or more

(B) **Multioperator, single transmitter only**—More than one person operates, checks for duplicates, keeps the log, etc. Once the station has begun operation on a given band, it must remain on that band for at least 10 minutes; listening time counts as operating time. Multioperator stations are allowed only one transmitted signal at any given time.

6) **Exchange**

For United States: Signal report and State.

For Canada: Signal report and Province.

For DX: Signal report and serial number, starting with 001.

Note: Both stations must receive and acknowledge the complete exchange for the contact to count.

7) **Scoring**

(A) QSO Points: Count one point for each completed QSO (anyone can work anyone). A station may be worked once **per band** for QSO credit (but not for additional multipliers).

(B) Multiplier: Count only once (not once per band), each US state (except KH6 and KL7), each VE province (plus VE8 and VY1) and each DXCC country. KH6 and KL7 count only as separate DXCC countries. The US or Canada do not count as DXCC countries.

8) **Miscellaneous:** Crossband and crossmode contacts are not permitted. Packet radio contacts made through digipeaters or gateways are not permitted.

9) **Reporting:** Contest forms (log sheets, summary sheet, dupe sheet) are available from ARRL HQ for an SASE with two units of First Class postage. Official forms are recommended. Any entry making more than 200 total QSOs must submit duplicate check sheets (an alphabetical listing of stations worked). Incomplete or late entries will be classified as check logs and are not eligible for competition or awards. Logs should indicate dates, QSO times, on and off times, call signs of stations worked, complete exchange sent and received for each contact, and band. Postmark your entry within 30 days after the contest ends (by February 8, 1989). Send entries to: ARRL Contest Branch, 225 Main St, Newington, CT 06111.

10) **Awards:** Distinctive certificates will be awarded to: Top high-power and low-power Single-operator and Multi-operator scorers in each ARRL/CRRL Section; Top high-power and low-power Single-operator and Multi-operator scorers in each DXCC country (other than W/VE); each Novice and Technician entrant; each entrant making at least 50 QSOs.

11) **Conditions of Entry**

(A) Each entrant agrees to be bound by the provisions as well as the intent of this announcement, the regulations of his/her licensing authority and the decisions of the ARRL Awards Committee.

Rules, ARRL 10-Meter Contest

Rules

1) **Object:** For amateurs worldwide to exchange QSO information with as many stations as possible on 28 MHz.

2) **Contest Period:** Second full weekend of December (December 10-11, 1988). Starts 0000 UTC Saturday; ends 2400 UTC Sunday. All stations operate no more than 36 hours out of the 48-hour period. Listening time counts as operating time.

3) **Categories**

(A) *Single operator:* One person performs all operating and logging functions. Use of spotting nets (operator arrangements involving assistance though DX-alerting nets, etc) is not permitted.

(1) Mixed mode (phone and CW)
(2) Phone only
(3) CW only

(B) *Multioperator:* Single transmitter, mixed mode only. Those obtaining any form of assistance, such as relief operators, loggers or use of spotting nets.

4) **Contest Exchange**

(A) W/VE stations (including KH6/KL7) send signal report and state or province (District of Columbia is a separate multiplier). Novice and Technician stations sign /N or /T.

(B) DX stations (including KH2/KP4, etc) transmit signal report and serial number starting with 001.

(C) Maritime or aeronautical mobile stations send signal report and ITU Region (1, 2 or 3).

5) **Scoring**

(A) *QSO points:* Count two points for each complete two-way phone QSO. Count four points for each two-way CW QSO. Count eight points for CW QSOs with US Novice or Technician stations signing /N or /T (28.1 to 28.3 MHz only).

(B) *Multipliers:* Fifty US states (plus District of Columbia), Canadian call areas (VE1-8, VY1, VO1-2), DXCC countries (except the US and Canada), ITU regions (maritime and aeronautical mobiles only) per mode (phone and CW).

(C) *Final Score:* Multiply QSO points by total multipliers (the sum of states/VE call areas/DXCC countries/ITU regions per mode). Example: W1XX works 2245 stations including 1305 phone QSOs, 930 non-Novice CW QSOs, 10 Novice CW QSOs, for a total of 6410 QSO points. He works 49 states, 10 Canadian call areas, 23 DXCC countries and a maritime mobile station in Region 2 on phone and 30 states, 8 Canadian call areas, and 19 DXCC countries on CW for a total multiplier of 140. Final score = 6410 (QSO points) × 140 (multiplier) = 897,400 points.

6) **Miscellaneous**

(A) Call signs and exchange information must be received by each station for a complete QSO.

(B) No cross-mode contacts; CW QSOs must be made below 28.3 MHz.

(C) Single-operator mixed-mode and multioperator stations may work stations once on CW and once on SSB

(D) Your call sign must indicate your DXCC country (K6LL in Arizona need not send K6LL/7, but K1JD in Hawaii must send K1JD/KH6).

(E) One operator may not use more than one call sign from any given location during the contest period.

(F) All entrants may transmit only one signal on the air at any given time.

(G) The use of non-Amateur Radio means of communication (eg, telephone) for the purpose of soliciting a contact (or contacts) during the contest period is inconsistent with the spirit and intent of this announcement.

(H) A transmitter used to contact one or more stations may not subsequently be used under any other call during the contest period (with the exception of family stations where more than one call is assigned by FCC/Comm Canada [ex DOC]).

7) **Reporting**

(A) Official forms are recommended (available from ARRL HQ for an SASE with two units of first class postage or 4 IRCs).

(B) Logs must indicate time in UTC, mode, call and exchange for each QSO. Multipliers should be clearly marked in the log the first time worked. Entries with more than 500 QSOs must include cross-checking sheets (dupe sheets).

(C) Postmark your entry by January 11, 1989.

8) **Awards:** A certificate will be awarded to the highest-scoring single-operator station (in each category) from each ARRL Section and DXCC country. The top scoring Novice/Technician station (in each category) in each ARRL Section will be awarded certificates. Top multioperator entries in each ARRL Division and each continent will receive certificates. Additional certificates will be awarded as participation warrants.

9) **Condition of Entry**

(A) Each entrant agrees to be bound by the provisions, as well as the intent, of this announcement, the regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

(B) **Disqualifications:** Excess duplicates and call sign/exchange errors. See January 1988 *QST* for complete details.

Sample 10-Meter Contest Exchanges

Phone

CQ Contest CQ Contest
From Kilo-Alfa-Five-Whiskey-Mike-Juliet
KA5WMJ

→ November-Seven-India-Papa-Golf

N7IPG Thank you
You're 59 Texas

→ Roger, you're 59 Utah
N7IPG

QSL, QRZed
KA5-Whiskey-Mike-Juliet

CW

CQ Test CQ Test
DE KA5WMJ KA5WMJ/N

→ DE N7IPG/T

N7IPG/T
599 TX

→ R 599 UT N7IPG/T

R TU KA5WMJ/N QRZ

Strays

SOUTHEAST ASIA NETWORK CONVENTION

☐ The Radio Amateur Society of Thailand (RAST) invites all amateurs to the 16th Annual Southeast Asia Network Convention (SEANET 88) to be held at the Ambassador Hotel in Bangkok November 11-13. The main purpose of the convention is to give SEANET participants a chance for eyeball QSOs. There will be lectures, discussions and commercial exhibits. Special events include Thai classical dancing, a grand banquet, buffet luncheon and a RAST station at the Hotel. RAST will offer arrangements for shopping and sightseeing tours. For more information contact: RAST Secretary, PO Box 2008, Bangkok, Thailand.

Rules, ARRL 160-Meter Contest

Rules

1) Object: For amateurs worldwide to exchange information with W/VE amateurs on 1.8-MHz CW only. DX-to-DX QSOs are not permitted for contest credit.

2) Contest Period: 2200 UTC December 2 until 1600 UTC December 4. Forty-two-hour period with no time limitation.

3) **Categories**

(A) *Single operator:* One person performs all transmitting, receiving, spotting and logging functions.

(B) *Multioperator:* Single transmitter only. Those obtaining any form of assistance, such as relief operators, loggers or use of spotting nets.

4) **Contest Exchange**

(A) W/VE: Signal report and ARRL Section.

(B) DX: Signal report. Country name is obvious from the prefix. Send ITU Region if maritime or aeronautical mobile.

5) **Scoring**

(A) *QSO Points:* Two points for QSOs with amateurs in an ARRL Section. W/VE stations count five points for DX QSOs.

(B) *Multipliers:* ARRL Sections plus VE8/VY1 (maximum of 76) and DXCC countries (W/VE participants only).

(C) *Final Score:* Multiply QSO points by multiplier. Example: K1MM works 357 stations, including 13 DX stations, and has a multiplier of 67. His score would be 753 QSO points [(344 × 2) + (13 × 5)] multiplied by 67 for 50,451 points.

6) **Miscellaneous**

(A) Participants are reminded that the segment 1.830 to 1.850 should be used for intercontinental QSOs only, in conformance with ARRL band plan.

(B) The use of non-Amateur Radio means of communication (eg, telephone) for the purpose of soliciting a contact (or contacts) during the contest period is inconsistent with the spirit and intent of this announcement.

7) **Reporting**

(A) Official forms are recommended (available from ARRL HQ for an SASE or two IRCs).

(B) Logs must indicate time in UTC, call and full exchange. Multipliers should be clearly marked in the log the first time worked. Entries with more than 200 QSOs must include cross-check sheets (dupe sheets).

(C) Postmark your entry by January 4, 1989.

8) **Awards:** A certificate will be awarded to the top-scoring single-operator station in each ARRL Section and DXCC country, and to the top-scoring multioperator stations in each ARRL Division and continent.

9) **Condition of Entry**

(A) Each entrant agrees to be bound by the provisions, as well as the intent, of this announcement, the regulations of his of her licensing authority and the decisions of the ARRL Awards Committee.

(B) **Disqualifications:** Excess duplicates and call sign/exchange errors. See January 1988 *QST* for complete details.

W1AW Schedule

October 30, 1988—April 2, 1989 MTWThFSSn = Days of Week Dy = Daily

W1AW code practice and bulletin transmissions are sent on the following schedule:

UTC	Slow Code Practice	MWF: 0300, 1400; TThS: 0000; TThSSn: 2100; Sn: 0300
	Fast Code Practice	MWF: 0000, 2100; TTh: 0300, 1400; S: 0300: Sn: 0000
	CW Bulletins	Dy: 0100, 0400, 2200; MTWThF: 1500
	Teleprinter Bulletins	Dy: 0200, 0500, 2300; MTWThF: 1600
	Voice Bulletins	Dy: 0230, 0530
EST	Slow Code Practice	MWF: 9 AM, 7 PM; TThSSn: 4 PM, 10 PM
	Fast Code Practice	MWF: 4 PM, 10 PM; TTh: 9 AM; TThSSn: 7 PM
	CW Bulletins	Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM
	Teleprinter Bulletins	Dy: 6 PM, 9 PM, 12 PM; MTWThF: 11 AM
	Voice Bulletins	Dy: 9:30 PM, 12:30 AM
CST	Slow Code Practice	MWF: 8 AM, 6 PM; TThSSn: 3 PM, 9 PM
	Fast Code Practice	MWF: 3 PM, 9 PM; TTh: 8 AM; TThSSn: 6 PM
	CW Bulletins	Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM
	Teleprinter Bulletins	Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM
	Voice Bulletins	Dy: 8:30 PM, 11:30 PM
MST	Slow Code Practice	MWF: 7 AM, 5 PM; TThSSn: 2 PM, 8 PM
	Fast Code Practice	MWF: 2 PM, 8 PM; TTh: 7 AM; TThSSn: 5 PM
	CW Bulletins	Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM
	Teleprinter Bulletins	Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM
	Voice Bulletins	Dy: 7:30 PM, 10:30 PM
PST	Slow Code Practice	MWF: 6 AM, 4 PM; TThSSn: 1 PM, 7 PM
	Fast Code Practice	MWF: 1 PM, 7 PM; TTh: 6 AM; TThSSn: 4 PM
	CW Bulletins	Dy: 2 PM, 5 PM, 8 PM; MTWThF: 7 AM
	Teleprinter Bulletins	Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM
	Voice Bulletins	Dy: 6:30 PM, 9:30 PM

Code practice, Qualifying Run and CW bulletin frequencies: 1.818, 3.58, 7.08, 14.07, 21.08, 28.08, 50.08, 147.555 MHz.
Teleprinter bulletin frequencies: 3.625, 7.095, 14.095, 21.095, 28.095, 147.555 MHz.
Voice bulletin frequencies: 1.89, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

On Monday, Wednesday and Friday, 1400 through 2200 UTC, transmissions are beamed to Europe on 14, 21 and 28 MHz.

Slow code practice is at 5, 7½, 10, 13 and 15 WPM.
Fast code practice is at 35, 30, 25, 20, 15, 13 and 10 WPM.

Code practice texts are from *QST*, and the source of each practice is given at the beginning of each practice and at the beginning of alternate speeds. For example, "Text is from July 1988 *QST*, pages 9 and 87," indicates that the main text is from the article on page 9 and the mixed number/letter groups at the end of each speed are from the contest scores on page 87.

On Fridays, UTC, a DX bulletin replaces the regular bulletin transmissions.

On Tuesdays and Saturdays at 2330 UTC, Keplerian Elements for active amateur satellites will be sent on the regular teleprinter frequencies.

Teleprinter bulletins are 45.45-baud Baudot, 110-baud ASCII and 100-baud AMTOR, FEC mode. Baudot, ASCII and AMTOR (in that order) are sent during all 1600 UTC transmissions, and 2300 UTC on WThFSn. During other transmission times, AMTOR is sent only as time permits.

CW bulletins are sent at 18 WPM.

W1AW is open for visitors Monday through Friday from 8 AM to 1 AM EST and on Saturday and Sunday from 3:30 PM to 1 AM EST. If you desire to operate W1AW, be sure to bring a copy of your license with you. W1AW is available for operation by visitors between 1 and 4 PM Monday through Friday.

In a communications emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

W1AW will be closed on November 24 and 25, December 25 and 26, January 1 and 2, February 20 and March 24.

Major reconstruction at W1AW is expected to begin soon. Some or all of the scheduled transmissions and visitor operating periods *may* be preempted at times. Check W1AW bulletins for up-to-date information.

Strays

THE ARRL PROGRAM FOR THE DISABLED

☐ Scenario: Your Novice class has a blind student who is unable to use print study materials. Sure, you could read appropriate passages of the textbooks aloud in class, but how can the student study at home? Answer: Get these materials in other-than-printed forms. The ARRL Program for the Disabled publishes a guide that lists organizations and companies that produce books such as *The ARRL Handbook*, the *License Manuals* and others in Braille, cassette or flexible-disc form. The guide has a wealth of other information of interest to the handicapped amateur community: lists of on-the-air nets for hams with disabilities, sources of specially adapted operating aids and devices, relevant *QST* reprints and organizations that have an interest in Amateur Radio and the handicapped. Basic information for the aspiring Novice is also provided. For more information and a copy of the program guide, write to the ARRL Program for the Disabled, 225 Main St, Newington, CT 06111, or contact your regional National Library Service for an audio version of the guide. *QST* is also available from the NLS on flexible disks.

Contest Corral

Conducted By Mark Gamble, N1FOZ
Assistant Contest Manager, ARRL

NOVEMBER

2

West Coast Qualifying Run, 10-35 WPM, at 0500Z Nov 3 (9 PM PST Nov 2). W6OWP prime, W6ZRJ alternate. Frequency is approximately 3.590 MHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL HQ for grading. Please include your full name, call sign (if any) and complete mailing address. A large SASE will help expedite your award or endorsement.

3

CRRL Fall Sprints, 1296 MHz, see Oct *QST*, p 107.

5-6

ARRL November Sweepstakes, CW, see Oct *QST*, p 106.

QST QSO Award Party, phone, see Oct *QST*, p 108.

Ten-Ten International Net, see Oct *QST*, p 108.

IPA-Radio Club Contest, sponsored by the International Police ARC, from 0600Z-1000Z and 1400Z-1800Z (CW) Nov 5; 0600Z-1000Z and 1400Z-1800Z (PH) Nov 6. Frequencies: (CW) 3.575 7.025 14.075 21.075 28.075, (PH) 3.650 7.075 14.275 21.275 28.575, (DX) 3.775-3.800 7.075-7.100. Non-IPA members work IPA members only. Exchange signal report and serial number. US stations also send state. IPA members send IPA as part of exchange. Work stations once per mode on each band. Count 1 point per QSO with non-IPA members and 5 points per QSO with IPA members. Multiply by sum of IPA countries/states worked per band. Mail entries by Dec 31 to Thomas Jenkins, WA8VDC, 4828 Elm, Newport, MI 48166. For further information send SASE to WA8VDC at the same address.

9

W1AW Qualifying Run, 10-35 WPM, at 0300Z Nov 10 (10 PM EST Nov 9). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Nov 2 listing for further details.

CRRL Fall Sprints, 2304 MHz, see Oct *QST*, p 107.

11-13

Japan International DX Contest, phone, see Oct *QST*, p 108.

12

ALARA Contest, sponsored by the Australian Ladies' ARA from 0001Z to 2359Z Nov 12. Open to all licensed operators as well as SWLs throughout the world. YLs work YLs and OMs. OMs work YLs only. YLs call CQ ALARA Contest and OMs call CQ YL. Each contact may be counted twice on each band for credit—once for phone and once for CW. No net, list or crossmode operations allowed. ALARA members send RS(T), serial number, ALARA member and name. YL nonmember or OMs send RS(T), serial number and name. Score 5 points for ALARA members, 4 points for YL nonmembers, and 3 points for OMs. All logs must indicate date/time UTC, band, mode, call worked, reports and serial number, name of op worked, and points. Send logs to Mrs Marlene Perry, VK3JAW, 218 Ninth St, Mildura 3500, Victoria, Australia.

12-13

European DX Contest, RTTY, see Oct *QST*, p 108.

QST QSO Award Party, CW, see Oct *QST*, p 108.

Tennessee QSO Party, sponsored by the Dickson ART, from 1400Z Nov 13 to 2359Z Nov 14. Tennessee stations give report and county. Out-of-state stations give report and state/province/country. 2 points for CW contacts and 1 point for phone. Novice/Technicians count as 4 points on CW and 2 points on phone. Novice/Technicians must indicate their class by signing /N or /T. Out-of-state stations multiply score by number of Tennessee counties worked, and Tennessee stations must multiply by the following: states, Tennessee counties, and VE provinces worked. DX countries count for points not multipliers. Portable and mobile stations add 500 points to score for each county worked in. A minimum of 10 contacts must be made per county. Add 10 points to score for working DART member. Only the initial DART contact counts for this bonus. Plaques and awards. Logs must be submitted prior to Dec 31. Mail log to: Tennessee QSO Party, PO Box 74, Burns, TN 37029-0074.

19-20

ARRL November Sweepstakes, phone, see Oct *QST*, p 106.

22

W1AW Qualifying Run, 10-35 WPM, at 2100Z Nov 22 (4 PM EST Nov 22). See Nov 2 for further details.

26-27

CQ World Wide DX Contest, CW.

DECEMBER

2-3

ARRL 160 Meter Contest, this issue, p 90.

3-4

Texas State QSO Party, sponsored by the San Benito ARC from 0001Z Dec 3 to 2359Z Dec 4. Texas stations may contact any stations; non-Texas stations contact Texas stations only. All amateur bands except WARC bands may be used. Three contacts per station per band are permitted (1 each; CW, RTTY, SSB). Suggested frequencies: 40 kHz up from band edges on CW, and 1.890 3.885 7.285 14.285 21.360 and 28.405 on phone. Texas stations send RS(T) and county. Other stations send RS(T) and QTH. Mobile stations may be worked for points in each new Texas county they are in. All stations count 1 point for SSB; 2 points for CW and 3 points for each Novice contact. Add 100 points to your score for QRP operations and 100 points for contacting club stations N5GNK or WA2VJL. Texas stations multiply QSO points by sum of Texas counties, states, provinces and countries worked. Texas mobile stations multiply QSOs by the sum of multipliers earned in each county of operation. All other stations multiply by the total counties worked. All logs must be mailed by Dec 31 to San Benito ARC, PO Box 1382, San Benito, TX 78586-1382.

7

West Coast Qualifying Run, 10-35 WPM, at 0500Z Dec 7 (9 PM PST Dec 6). See Nov 2 listing for further details.

8

W1AW Qualifying Run, 10-35 WPM, at 0300Z Dec 9 (10 PM EST Dec 8). See Nov 2 listing for further details.

10-11

ARRL 10 Meter Contest, this issue, p 89.

11

QRP ARCI Holiday Spirits Home-brew CW Sprint, sponsored by QRP ARC International, from 2000Z to 2400Z Dec 11. Home-brew receiver, transmitter or transceiver must be used on each band worked. Commercial-gear-only entries will be checklogs. CW only. Single band or all band. Work stations once per band. Exchange signal report, HB (home-brew) or C (commercial), state/province/country and QRP number if member. Nonmembers send power output. Suggested frequencies: 1.810 3.560 3.710 7.040 7.110 14.060 21.060 21.110 28.060 28.110 50.060. Count 5 points for QSO with ARCI member. Others count 2 points for same continent and 4 points for different continent. If station worked is using home-brew, add 5 points per QSO. Bonus points for using home-brew equipment (HB): Add 200 points for each band an HB transmitter is used; add 300 points for each band an HB receiver is used; add 500 points for each band an HB transceiver is used. Multiply QSO points by states/provinces/countries worked per band by power multiplier (4-5 W output ×2; 3-4 W output ×4; 2-3 W output ×6; 1-2 W output ×8; 0-1 W output ×10. More than 5 W output counts as checklog. If 100% natural power, multiply final score by 2; if 100% battery, by 1.5. Include description of home-brew equipment and antennas used and indicate which equipment was used on which bands. Awards. Mail entry (SASE for results) before 30 days after the contest to QRP ARCI Contest Chairman, Eugene Smith, KA5NLY, PO Box 55010, Little Rock, AR 72225-0010.

18

Canada Day Contest, sponsored by the Canadian Amateur Radio Federation, from 0000Z to 2400Z, Dec 18. Everyone works everyone. 160-6 meters, phone and CW. Entry classes: Single op; all band mixed mode (phone and CW), all band CW, all band SSB, and single band mixed mode. There are two multiop classes: single transmitter and multi-transmitter. Work stations once per mode on each band. No crossmode QSOs allowed. Exchange name, RS(T), serial number (starting with 001) and province/state/country. VE1 stations must also send province. Multi-multi stations use separate serial numbers for each band. Count 10 points per VE QSO, 4 points for other countries. 20 point bonus for working any CARF station using TCA or VCA suffix. Multiply by total VE provinces worked per band on each mode (VO1/VO2 VE1-PEI VE1-NS VE2-8 VE0 VY1). Suggested frequencies: 1.810/1.840 3.525/3.775 7.025/7.070/7.155 14.025/14.150 21.025/21.250 28.025/28.500 and 50.040/50.110. Mail logs within 30 days of contest end (include SASE or SAE/IRC for results) to CARF Contest c/o Mr J. Parsons, VE6CB, Acton Corners Rd, Oxford Mills, ON K0G 1S0, Canada.

27

W1AW Qualifying Run, 10-35 WPM at 1400Z Dec 27 (9 AM EST Dec 27). See Nov 2 listing for further details.

Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by **December 1** to make the **February** issue. Please include name of contest, dates, times (Z) and complete rules. Send to Contest Corral, 225 Main St, Newington, CT 06111.

Strays

I would like to get in touch with...

☐ anyone with a manual for a Collins 51S-1 receiver. Eric Snyder, N4OVU, 709 Monte Alto NE, Albuquerque, NM 87123.

☐ anyone who has a schematic for a Dumont Fairchild dual trace oscilloscope model 757. Reid Whipple, 2120 N 86th St, Wauwatosa, WI 53226.

Special Events

Conducted By Mark Gamble, N1FOZ
Assistant Contest Manager, ARRL

Knokke, Belgium: Special event station ON4CLM will be operated **Nov 1** and **Nov 2** to commemorate the Canadian troops who fought a long and exhausting battle in the Belgium coast area on November 1, 1944. Suggested frequencies (phone) 3.685 7.045 14.145 21.245 and 28.545; (CW) 3.515 7.012 14.020 21.020 and 28.020. For QSLs and additional information on receiving awards write to Radio Station ON4CLM, PO Box 110, 8300 B-Knokke Heist, Belgium.

North Boston Suburbs, Massachusetts: Sponsored by the Quannapowitt RA, from 0000Z **Nov 1** to 2400Z **Nov 20.** Work at least one QRA member on any band and mode as permitted by the participant's license. QRA members will identify themselves by sending QRA. To claim the QRA 40th Anniversary Certificate send your QSL and a large SASE to Jim Chetwynd, W1UZK, 124 Forest St, Melrose, MA 02176. QSLs must be received by Feb 28, 1989.

Conway, Arkansas: The Royal Ambassadors of the Second Baptist Church will operate WA5RRM from 2400Z **Nov 4** until 1400Z **Nov 5** to call attention to world hunger. Members of the church will give a donation to help fight world hunger in relation to the number of contacts made. Your QSO is needed! Suggested frequencies: 7.245 14.285 21.365. For a certificate send QSL and large SASE to Royal Ambassadors, Conway Second Baptist Church, Conway, AR 72032.

Halifax, Nova Scotia: The Halifax ARC will operate VEØMMA from 1500Z **Nov 5** to 1500Z **Nov 6** to celebrate the 75th anniversary of the CSS Acadia. The station will operate from 80 to 10 meters in the phone and CW portions of the band. A QSL will be sent to all contacts. A commemorative certificate will be issued to any station that makes a QSO with VEØMMA on three of the five bands operated. Send QSL to Halifax ARC, VE1FO, PO Box 663, Halifax, NS B3J 2T3, Canada.

Lafayette, Indiana: The Tippecanoe ARA will operate a special-event station from 1200Z **Nov 5** to 0200Z **Nov 6** to celebrate the battle of Tippecanoe. Suggested frequencies: 3.870 7.260 14.290 21.375 28.400. For a certificate, send a QSL and large SASE to W9REG, 111 S Seventh St, Lafayette, IN 47901.

Hoquiam, Washington: The Gray Harbor ARC will operate W7ZA from 1600Z **Nov 5** to 0200Z **Nov 6** to commemorate the 100th birthday of Aberdeen. Operations will be on the lower 25 kHz of the General phone bands, 80 through 15 meters, and on the Novice phone portion of the 10-meter band. For a QSL and fact sheet send a no. 10 SASE and a QSL to Joe Ledesma, KA7AIR, 516 Sixth St, Hoquiam, WA 98550.

St Mary Parish, Louisiana: The St Mary ARTS will operate KA5LMZ from **Nov 6 to Nov 12** to celebrate Tourist Awareness Week. Operations will take place on 80 through 10 meters at various times during the week. All contacts will be sent a QSL and tourist information.

Vet's Day Special, sponsored by the Armored Force Network, from 0000Z **Nov 11** to 2400Z **Nov 13** to honor those Veterans who have departed. Work any of the 285 members to receive a certificate. Suggested frequencies: (phone) 3.920 7.283 21.375 14.250 28.640 and Novice 28.450; (CW) 7.065 7.125. Send a no. 10 SASE to P. Kohanski, WB1DWR, 16 Berkley Cir, Newington, CT 06111

Nitro, West Virginia: The Tri-County Ham Club will operate W8WVA from 1500Z **Nov 11** to 2200Z **Nov 12** to commemorate the "Living Memorial to World War I." All operations will take place 25 kHz up from bottom of the General bands on 80, 40 and 20 meters and in the Novice portion of 10 meters. For a certificate send a QSL and SASE to W8WVA, 103 Cleveland Ave, Nitro, WV 25143.

Turkey, North Carolina: The Onslow ARC will operate WD4FVO from 1400Z to 2300Z on **Nov 19** to commemorate the Thanksgiving Turkey Talk. Suggested frequencies: 3.900 7.245 14.250 21.350 28.440. For a Turkey Talk certificate send a QSL and large SASE to the Onslow ARC, PO Box 841, Jacksonville, NC 28541-0841.

Gettysburg, Pennsylvania: The Penn-Mar RC will operate W3MUM on **Nov 19** during daylight hours to commemorate the 125th anniversary of President Lincoln's Gettysburg Address. Operations will be on all phone bands from 80 through 15 meters, 25 kHz up from the bottom of the General bands and on the Novice phone portion of 10-meters. For a certificate send a 9- × 12-inch SASE and a QSL to The Penn-Mar RC, PO Box 763, Hanover, PA 17331.

Granite City, Illinois: The Egyptian RC will operate W9AIU starting 1800Z **Nov 19** through **Nov 20.** The club will go in search of the Great Piasa bird. Help them by contacting W9AIU up 50 kHz from the bottom of the bands on CW and on the lower portion of the General phone bands 80 through 15 meters. Operations will also be located on the Novice phone portion of 10 meters. For a certificate send a large SASE to W9AIU, PO Box 562, Granite City, IL 62040.

Scotland: The Mid Lanark ARS will operate GB8SA on **Nov 30** to commemorate St Andrew's (the Patron Saint of Scotland) Day. For a certificate send 4 IRCs and an SAE to Paddy, GM3MTH, or Danny, GM4LDU.

Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by Dec 1 to make the Feb issue. Please include the name of the sponsoring organization, the call sign of the special-event station, the city location, dates and times (Z), suggested frequencies and QSL information. Requests for donations will not be published.

QSLing Special-Event Stations: To get your QSL or certificate from any of the special-event stations listed here, follow these simple guidelines. (1) After working the station, carefully fill out a QSL card for the QSO. Show the date and time accurately using UTC. (2) Prepare a self-addressed, stamped envelope. If sending for a certificate, use a 9- × 12-inch envelope if you want an unfolded certificate, or a no. 10 envelope if folds are okay. Include enough postage for return of your envelope. (3) Mail both your QSL and your SASE to the address listed, or to the address given on the air by the station you QSO. Be patient. Special-event stations will often print their cards and/or certificates after the operation is over so they will know how many to order.

Strays

HAM HELPS CATCH SPIES DURING WW II "SILENT PERIOD"

☐ You wouldn't believe it, but during WW II, I helped catch some German spies and saved many tons of Allied shipping leaving New York Harbor. Some of you remember that during WW II, hams were off the air by government decree. One day, Marilyn and I went looking for where her brother had moved, someplace on Strong Street in the Bronx, New York. We found the building but needed the apartment number. I went down to the super's apartment to ask. As I passed the bank of electric meters, dots and dashes came to me in a funny sounding way. I stopped at the meters, and sure enough the meter for apartment 4L had its little wheel spinning crazily sending code. The characters were in five-letter code groups and were indecipherable to me. I copied some of it, went to the super, learned my brother-in-law's apartment number and went out front to the lobby. The mailbox for 4L showed two names—Bauer and Schmidt. At my brother-in-law's apartment, I telephoned my friend, Arthur Batchelder, the radio inspector for the 2nd call area, and reported what I had found. It didn't take half an hour before a few cars of FBI men drove up and the apartment was raided. Three men and a woman were arrested. Arthur later told me that they had a kilowatt buried in the upholstery of the couch and the key was in one of the couch's arms. The spies had motored to Shore Road in Brooklyn, used field glasses to see what was being loaded on the Allied freighters, picked out the more important cargoes, then went back to the Bronx to radio information the German U-boats lying off New York Harbor. The CW kilowatt drew so much electricity that when they stepped on the key the meter wheel jumped and sizzled.—*Jonathan Pomeranz, K4AU,* Editor of *Bugjuice,* the Palmetto (FL) Amateur Radio Club Newsletter, where this article originally appeared.

Exam Info

NEW EXTRA CLASS EXAMS

For exams given on or after November 1, 1988, all VECs must use the new Element 4B question pool that was released to the public earlier this year to design their Extra class exams. This question pool will be in effect for the next three years.[1] (Study manuals for the new material have already been available from various publishers for several weeks.)

Remember, though, that although there is a new question pool taking effect, many of the questions from the expiring pool have been carried over to the new pool. (Changes to a question pool are made only when necessary, not simply because the pool is due for revision.) Therefore, you will likely see some questions on your test that have been in use for a few years. Good luck!—*Jim Clary, WB9IHH, Manager, ARRL/VEC*

[1]More information on the question pool revision schedule can be found on p 42-44, October 1987 *QST.*

Section News

Administered by Steven Ewald, WA4CMS

The ARRL Field Organization Forum

ATLANTIC DIVISION

DELAWARE: SM, Bob Pegritz, KC3TI—October was a busy month with the high point of hosting Father Marshall Moran, 9N1MM, recent recipient of the ARRL Humanitarian of the Year award. We were all captured by this living legend. A big welcome to Carl Shulak, KA3NBX, our new SEC and a great deal of thanks to Mike Witkowski, N3FDL. Do you have a report from our recent Simulated Emergency Test (SET)? Please send them in ASAP. Our one and only Delaware Hamfest was a smashing success and may be relocated to a more central place next year! Many thanks to ARRL support from W3ABC and KC3LM (Hands Across the Sections). Sussex county is gearing up for winter ARES activities to support local EOC. From all of the Section Staff of the First State, "HAPPY THANKSGIVING and as always, good DX!" DTN stations 302, tfc 32 in 23 sessns. DEPN stns 63 tfc 13 in 4 sessns. SEN stns 63 tfc 1 in 5 sessns. Traffic: W3QQ 60, WB3DUG 39, K3YBW 38, KA3GRQ 24, W3FEG 17, WA3WIY 13, K3JL 12, KC3TI 6.

EASTERN PENNSYLVANIA: SM, Kay Craigie, KC3LM—ASM: WA3PZO, KA3A, KO3B, K3ZFD. SEC: KB3YS. ACC: KC3QB. OOC: W3IS. SGL: WA3IAO. STM, BM: KB3UD. PIO: W3ZXV. TC: W3FAF. Two newly-affiliated clubs are welcomed to the EPA family this fall: Temple University ARC, whose faculty sponsor is WB2LGJ, and TRIAC, a new club meeting in northern Chester County whose president is NJ3A. This pushes our Section club roster well past the 60 mark. The ARRL Field Organization includes programs in the following areas: Amateur Radio Emergency Service, National Traffic System, Official Observers, state government relations, bulletin service, public information, technical assistance, and Affiliated Club relations. Many appointments are open to qualified Novices. To find out more about the Field Organization, write to the Section Manager (see page 8 for address). All Field Organization volunteers are reminded that current ARRL membership is necessary to maintain your appointment.

EPA	3610 kHz	Daily 7 & 10 PM	AA3B, Mgr.
EPAEPTN	3917 kHz	Daily 6 PM	WA3EHD, Mgr.
PTTN	3610 kHz	Daily 6:30 PM	WB3EPU, Mgr.

Pocono ARK's fall picnic welcomed visiting traffic handlers from EPAEPTN. Special thanks to N3EFW for setting that up. WB3IQJ, EC Juniata, reports a successful 1988 Tuscarora ARA Novice class; several grads have since upgraded. NO3O is now an Assistant EC in Juniata. By the time you read this, new ECs in Berks and Perry Counties should be in place. EPA is full of winners, and we start 'em young. Consider N3CXB, KA3FXX, and NK3M. N3CXB and KA3FXX are 1988 winners of scholarships administered by the Foundation for Amateur Radio. N3CXB and NK3M were awarded scholarships by the ARRL Foundation. It's interesting that all 3 guys come from multi-ham families and are already Extras. Also in the winner's circle is WB3KTX, who was top EPA Novice/Tech tone op in the 1987 ARRL 10m contest. Scheduled for introduction this fall is an Atlantic Division bulletin from our Director W3ABC. Circulated via packet radio, it is also to be mailed to newsletter editors not on packet. Warminster's ARRL Night is on this month's sked, always a great evening. Hope the fellows from Tamaqua Transmitting caught lots of fish on their trip to Canada. Has your group ever visited W1AW? The RF Hill club trip to the Maxim Memorial Station was a great success. Think about it for 1989. Traffic (August): N3AZW 848, N3COY 188, N3DRM 166, N3CD 120, KA3DLY 89, W3JKX 77, W3KAG 53, KD3AO 52, WB8KPE 52, W3IPX 46, AA3B 34, WA3CKA 28, W3DP 23, N3EFW 23, KU3R 22, W3AQN 21, K3TX 20, K3WPI 13, KA3RGF 9, W3ADE 8, W3VA 6, W3FAF 4, W3HK 4. Nets (QNI/QTC): EPA/467/146, EPAEPTN/488/178, PTTN/234/72, D6ARES/69/20, SEPATN/94/32, D5ESN/79/10, MARCTN/163/43, MARCARES/70/13, D8ARES/55/1. PBBS: K3RLI/193 WA3TSW/175 AG3F/116 KB3UD/345.

MARYLAND-D.C.: SM, Philip Battey, W3FZV—To all MDC readers: In order to write this column, I need YOUR input. There are a few of you who send data nearly every month, but most do not. I put the column together largely from info gleaned from various club bulls, but would greatly appreciate news direct from YOU. Another thing: If you hold an appointment and cannot meet its obligations, then please notify the SM! Maybe I can find someone else to do the job. Thanks to Director Turnbull, W3ABC, for his work in coordinating the FAR (Foundation for Amateur Radio) scholarship program. It's a real service to new hams. Al, W3YVQ, has been busy coordinating the RACES work with the State Government. ARES/RACES members provided communications for the Montgomery Co. Road Runners Club in the recent Rockville Runfest. The SM has received requests for information about upcoming VEC exams. Thanks to the periodic lists, compiled by Nancy, NK4U, of exams throughout the VA-MD-DC area, he could answer the queries. Many clubs have information about training classes. Mike, WA1QAA, participates in RACES exercises. Dan, WB3BJM, spawned by MSN, is now regular on MDD. N3GJB is none other than Byron, KA3QNT, with a new call. Herb, NC3V, is up on Amateur Radio, in particular, traditional key and fone men. Hams at Leisure World, near Wash., DC, are trying to get on the air from a new club station. Ethel, K4LMB, recently spoke to the RCARA about YLs in early radio work, and Jim, W3CY, showed a tape of the Mayor of Rockville naming one week in June as AR week. The AARC gave a nice contribution to the W1AW Renovation Fund. The MD Free State Six-Meter SB Net meets every Sunday at 1900Z on 50.125 MHz. The Chaverim Club also has a net (via the NIH Club repeater), on 145.29 MHz Thurs. at 8 PM. Don't forget the CQ WW SSB and CW contests in late Oct. and Nov. respectively. WITH THE NETS: NET/MGR QND/QTC/QNI: MSN/KC3Y 31/43/361, MDD/W3FA 62/209/557, MEPN/K2EB 31/101/802, HOCARES/WA1QAA 2/5/14. (TOP BRASS K3GHH/98, W3FA/95, WA3YLO/87, KC3Y/81), HOCARES/WA1QAA 2/0/11. PSHR:W3FA 96, WA3YLO 85, KJ3E 82, KC3Y 77, NC3V 75, N3EGF 66, KA3JJN 63, K3GHH 62. Traffic: W3IWI 339, NC3V 214, K3GHH 158, KJ3E 110, W3LDD 98, W3FA 96, KK3F 88, WA3YLO 88, WB3BJM 80, KC3Y 75, K3NNI 60, N3EGF 51, NB3P 42, K2EB 32, W3FZV 25, WB3BFK 24, NF3X 21, W3DQI 19, NC3Z 16, WA3GYW 11, WA1QAA 7.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB—ASM: N2CER. SEC: K2QIJ. STM: WB2UVB. ACC: K2IXE. TC: N2BQT. PIO: VACANT. SGL: VACANT. BM: WB2UVB. OOC: WA2HEB. ATC's: K2JF, KA2RJA, and WB2MNF. VE testing this month: Thursday, Nov. 17 in Bellmawr. See June, 1988 QST SNJ column for further info. DVRA VE session is scheduled for Nov. 19 at 12:30 PM. See May, 1988 QST Section News for the particulars. The Gloucester County ARC is offering many awards for working their members. Contact the GCARC at P.O. Box 370, Pitman, NJ 08071 for the rules. Awards include: Novice/Technician, RTTY, Extra, Mixed, CW, Packet, VHF/UHF SSB, UHF VHF/UHF Mixed and VHF/UHF RTTY. Your QST should have arrived before the Astro ARC commemorates the 50th anniversary of the famous Orson Welles broadcast of the "Martian Landing." The "landing" site was in Grover's Mill in West Windsor. WB2JQR will operate a special event station on Oct. 30 from 10 AM to 10 PM. I'd like to welcome our Section's newest ECs: Gary Wilson, WB2BOO in Mercer County, Roland Stubbs, N2HVH in Ocean County and Mike Cagel, KG5IL in Salem County. With the addition of these three gentlemen, every county in our section has an EC. Please help support their efforts. Until next month, 73. Traffic: WB2UVB 88, WA2HEB 10, KA2CQX 6.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA—ACC: N2EH. BM: K2KWK. OOC: W2AET. PIO: WA2PUU. SEC: NN2H. SGL: WB3CUF. STM: W2GLH. TC: K2QR. Get acquainted with the folks above, they are appointed to help you and your club serve the public and amateur radio. What do they do? Get a copy of the brochure FSD-300 "The ARRL Field Organization" to find out, or contact them to REALLY find out! New appointment: OO) N2FIZ. Sorry to report that the "RED ROUGH MOUSTACHE" K2RRM is a Silent Key. Doc was a true leader in New York State and performed outstanding public services, while also going "great guns" in VHF contests and guiding the Windsor School System. PSHR: N2ABA N2EIA N2EVG WA2FJJ W2FR W2MTA WB2OWO KA2QOO ND2S KA2UBD NJ3V K2YAI KA2ZNZ. August BPL: W2MTA

NET NAME	QNI/QSP/NO	NET NAME	QNI/QSP/NO	NET NAME	QNI/QSP/NO
NYSEMO	075/007/04	Q NET	319/008/29	VHF THIN	042/001/05
NYSR	013/003/04	OCTENE/*	674/127/31	BRVSN	325/018/31
NYS/M*	284/170/31	STAR*	251/040/31	QRTN	033/003/05
WDNVM*	341/081/31	WDN/E*	440/102/31	ONYTN*	251/077/31
NYPON*	484/288/31	NYS/E*	326/69/30	OCTSNL*	277/062/31
ESS	334/055/31	BLUELINE	/ /	WDN/L*	437/085/31
NYSPTEN	442/054/31	TIGARDS	046/004/05	NYS/L*	271/158/30
LCARES	040/000/04	JCRACN	/ /	*NTS Nets	

Packet Node Station reports: WB2ACV 49 (July), 47 (August). Support for NYS Assembly Bill 8801 re one-time fee for call-sign plates running high; keep an eye out for them blasted "aesthetic" bills in the NY Senate— write to YOUR State Legislators and strongly support YOUR position on State Legislation. Village of Homer is re-visiting proposed restrictive antenna legislation, thanks to input from concerned local hams in Cortland County AND their County Emergency Office Director. Club Annual Reports: Binghamton, Chautauqua, Rochester DXA—thanks. Now how about those 6 delinquents, including one SSC, C'MON! Also, maybe some of the following former affiliated clubs would like to rejoin ARRL affiliates: Clarkson College, Elmira ARA, Gleason, N. Franklin, Rochester Institute of Technology, Rookies ARC, Schoharie, Tioga Amateur Repeater, U of Rochester; WATSAY? Contact SM W2MTA or ARRL headquarters. WELCOME new affiliate Pioneer Radio Operators Society. Club Officers: ARATS W8RIK W2VCI WA2BYN; CVARA KI2Y N2GVB KA2AOT W2RME: CVARC WA2JPM KA2MLQ KA2MOO; KLARA WB2ZPC N2GXX KB2BYP N2HCQ KV2W; LARC N2HYN K2QCX N2HYM W2GLN NQ2R; Rome W4BNY N2GNH KA2JXA KA2UPH. Champlain Valley area stirrings: Essex/Clinton/Franklin Counties ARES/RACES Net 0900 Sat. 3995 kHz and Simulated Em.Net 0930 Sun. 147.15 MHz CVARC cookbook guaranteed publicity by K1CE in ARRL pubs, provided good membership involvement. WB2AAR, now 90, voted lifetime member of CVARC—Champlain Valley. CONGRATS: WA2PUU honored for outstanding contributions to community betterment thru disaster preparedness in Onondaga County. HAPPY THANKSGIVING! Remember to keep your LOYALTY tuned up! Traffic (Aug.): W2MTA 530, NJ3V 471, WA2FJJ 351, WB2OWO 275, K2YAI 274, N2EIA 267, KA2ZNZ 140, KA2UBD 139, WB2IJH 127, N2ABA 121, KA2QOO 112, NN2H 95, WB2QIX 82, ND2S 71, W2FR 66, KA2DBD 46, KC2JW 37, KG2D 31, WB2OEV 27, K2QR 27, N2EVG 23, AF2K 15, KE2EA 10, WA2OEP 6, KA2TWY 4. OCTOBER 15-16 is the SIMULATED EMERGENCY TEST "contest!"

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB—SEC: WA3UFN. STM: N3EMD. BM: KC3ET. TC: N3EFN. OOC: KX3V. ACC: AK3J. SGL: KA3OEM. PIO & ASM: N3DOK.

NET	QNI	QTC	SESS	KHz	T/D	MANAGER
WPACW	197	106	31	3585	7:00 P/D	WA3UNX
WPAPTN	268	62	31	3983	6:00 P/D	WA3HLN
KFN	162	93	31	3983	1:00 P/D	KA3OEM
PFN	181	152	31	3958	5:00 P/D	WA3THT
WPA2MTN	238	53	31	46.28/88		KA3BGC
NWPA2MTN	20	18	29	44.53/45.13	9:00 P/D	KC3NY

Allegheny County has a new EC. He is W3HID, Bob Schlesinger. Does your county have an EC or a plan for any emergency that could occur? If you do, please send a copy for my files and to aid others looking for ideas. If you desire to help, contact WA3UFN and tell him what you can do to assist. We are going to be asked to provide communications for various activities in the section. Please send me any info about your activities in your area. I am most interested in club activities. Please consider having your club appoint an Asst. PIO, Asst. OOs, ATCs, check with the section level appointees for their needs. We need OES's, ORS, etc. Please check with N3EMD for areas in dire need of traffic handlers. We have many locations that do not have any outlets for traffic. We can mail them, but this can get a little expensive or service them back to the originating station. This does not make a good impression for Amateur Radio. For some reason our traffic totals are down this month. Perhaps the extreme heat had much to do with it. August traffic: N3EMD 332, KQ3T 255, N3OKN 206, N3FM 156, N3AES 107, WA3UNX 104, NO3M 74, KC3YE 71, K3SMB 55, W3NGO 33, KA3EGE 12, WA3NVZ 9, N3COR K3LTV 5, KA3GXP.

CENTRAL DIVISION

ILLINOIS: SM, Dave Carlson, AA9D—SEC: W9QBH. STM: K9CNP. OOC: W9TT. BM: K9EUI. SGL: K9IDQ. PIO: N9EWA. ACC: WB9SFT. TC: N9RF. DEC: WD9EBQ. Illinois Section Sets

NET	FREQ	TIMES (LOCAL ILLINOIS)
ISN	3905	1800 DAILY
ILN	3690	1830 & 220 DAILY
ITN	3705	1900 DAILY
CTN	149.69/09	2100 DAILY
ILARES	3905	1630 1ST & 3RD SUNDAYS

Illinois Independent Nets

IEN	3940	0900 SUNDAYS
ILPN	3855	1645 M-F; 0830 SUNDAY
NCPN	3915	0700 MONDAY-SATURDAY
NCPN	7270	1215 MONDAY-SATURDAY

The Southern Illinois SKYWARN System Data Circuit has recently changed from 60 WPM Baudot to 300 baud ASCII. Special thanks are in order to those who have helped keep the circuit going for the past 7 years, including WD9EBQ, W9QBH, K9ZDN, W9LLF, N9CNQ, WB9UEA, and KA9EWN. The new circuit uses software developed by WA9V. The Tri-Town Radio Amateur Club, W9VT, is setting up a club station in cooperation with the Village of Hazel Crest. The membership level of the Egyptian Radio Club, W9AIU, just reached the 150 mark! CONGRATULATIONS! The Chicago Traffic Net is always looking for more check-ins. They meet daily on the NORA repeater, 147.09 (+600 input), at 9 PM local time. It's an easy way to get introduced to traffic handling. If your club publishes a newsletter, I'd appreciate being added to your mailing list. It's the only way for me to know what's going on in your area, and to publicize your activities. Please use my address as printed on page 8 of QST. Traffic: WA9VLC 200, K9QEW 124, K9CNP 118, W9HLX 118, KA9FEZ 105, W9HOT 85, NN9M 66, WB9TVD 50, NC9T 42, W9KR 41, W9LWH 40, W9OBU 32, WB9JTK 18, WB8RFB 18, W9WMP 16, KA9CTW/T 15, K9EHP 10, WD9EBQ 8, W9LNQ 8, KA9BBK 7, WB9R 7, WA9RUM 7, W9VEY 7, WD9CIR 5, WA9AXL 2. (July) K9CNP 103, W9HLX 97, W9HOT 91, K9QEW 81, WB9TVD 57, W9KR 38, W9OBU 22, WD9CIR 14, W9LNQ 10, W9VEY 8.

INDIANA: SM, Bruce Woodward, W9UMH—SEC: WD9AVQ. STM: NX9I. ACC: K9ZBM. TC: WA9JWL. SGL: WA9VQO. BM: W9OCL. PIO: KA9WXT. OOC: KJ9G. Net Managers: ITN KA9EIV, QIN KJ9J, ICN KD9ER, VHF W9PMT, IWN KA9ERC. August Net Reports:

NET	FREQ	TIME	DAILY	UTC	QNI	QTC	QTR	SES
ITN	3910	1330	2130	2300	3188	352	2253	93
QIN	3656	1430	0000	0300	376	159	1029	60
ICN	3705	2315			141	48	641	30
IWN	3910	1310			1182		308	31
IWN VHF BLOOMINGTON					829		217	31
IWN VHF KOKOMO					896		205	31
IWN VHF LIGONIER					710		215	31
HOOSIER VHF NETS(12)					2653	148	5158	156

D9RN for August 224 QTC 82 ses. 82% K9CGS, W9UEM, N9DWU. CAND 575 OTC in 31 ses. D9RN 94% W9JUJ and N9DWU. Appointments: ORS Benton Mullins, NX9I, John Wallace, WA9OHX. DEC District 2 Jay Maple N9FDS, EC Washington Co. Dennis P. Miller, N9GYO, EC White Co. Paul Bailey, WB9SOY, EC LaGrange Co. Jay Maple N9FDS, EC Carroll Co. Richard Curts, K9EFY. OBS Mary Konefsky N9GGC, Ray Townsend, N9EER, Walter Dowell, KA9QME, Lucy Schendera, N9DTG, Dan Ceasar, NI9Y. PIA Joe Kremer, NV9V. ATC Al Viduka, SR NR9F. Art Hopkins WA9VQO has resigned as OOC and Woody Booher, KJ9G has been appointed OOC. Silent Keys, Elbert Zen, N9EFI, Gerald Kihl, KA9CWN, Richard Kuonen, K9PHJ, and Audrene Crim, WB9KDA. Emergency Communications Commendations have been awarded to the following DeKalb Co. hams: W9QWI (EC), WB9RWF, (CD DIRECTOR), K9ZBM, KA9ZEE, K9VMP, WB9HWD, KA9HVJ, K9KAL, WA9KWO, and WB9VDK. A Certificate of Merit has been awarded to David E. Thomas, N9FOZ for his assistance to the Public via the Indianapolis 146.10/70 repeater. N9FOZ reported over 30 problems during his 456 hours of monitoring during August. I would appreciate reports of other repeater groups who actively monitor their repeater for trouble. Public Service activity should be reported

(continued on page 98)

on FSD-157. Al Shipe (NW8) presented National Weather Service Certificates to Tom Bowen, KA9ERC and Barbara Miller, KD9DU for their outstanding service to the Indiana Wet Net, a valuable tool in providing flood warnings. I attended the Porter Co and Lafayette Hamfests and spoke on the ARRL Field Organization to the Michiana ARC of South Bend this month. EC reports: WB9FNR, W9BTZ, N9FMO, W9QWI, KD9HB, N9FQA, N9DTG, KA8MRI, KA9OZM, KA9VNK, KD9ZN, N9FDS, W9SIO, NG9Y, W9VP, KA9OWC, KA9QME, WB9NCE, KA9SHM, AND KA9FDF. OBS REPORTS: W9OCL, KA8MRI, NI9Y, N9DOP, K9SBW, W9PMT, N9BS, WA9OHX, WB9TFD, AND KD9QB. OO REPORTS: WA9VLK, WA9JWL, WA9VQO, KA9QYK, KA9DZM, K9FW, KA9PCT, KA9BYN. Traffic: NR9K 344, KD9QB 275, KJ9J 148, W9UMH 108, W9UEM 104, WA9QCF 92, W9ZGC 66, N9BS 65, K9SBW 59, WA9OHX 57, KA8MRI 48, WB9IHR 37, K9FEI 35, WB9PFZ 29, KD9ER 28, NX9U 27, W9OCL 26, KA9RNY 20, N9DOP 20, WB9OZZ 15, W9PMT 12, WB9TFD 10, N9DTG 9, W9BTZ 9, KW9C 9, WD9DWD 8, N9FMO 8, KD9CC 6, WD9CIV 5, K9OUP 3, W9KMY 3, AB9A 3, WA9JNC 2.

WISCONSIN: SM, Richard R. Regent, K9GDF—SEC: W9ZAG. STM: K9UTQ. ACC: KA9FOZ. BM: WB9JSW. OOC: NC9G. PIO: K9ZZ. TC: K9GDF. At the Wisconsin Nets Association Annual Picnic, members presented the 1987 traffic handling plaque to Les Peterson, W9YCV, with 3,024 points; endorsement tags for their previously awarded plaques were given to WB9YPY (17,092 points), KC9CJ (6,768 points), and KA9RII (4,898 points). Congratulations to new Official Observer KJ9I monitoring in Oconomowoc. Active hot-air balloonist WB9ZRE is operating two meters; not much of an antenna, but a lot of height. November 12th, the Milwaukee Repeater Club will hold the 6.91 Friendly Fest open at 8:00 AM, 7:00 AM for sellers, inside Serb Hall, 51st and Oklahoma in Milwaukee with free parking, contact K9IZV for more information. The Friendly Fest will have on-site exams given by the Milwaukee RAC VEC starting at 9:00 AM. See you at the friendly ARRL table. November 12th, exams at Credit Union Office Building, Menomonie, contact KD9TT for info; and at Nicolet College Science Center, Rhinelander, reservations with K9RMN. November 19th at 1 PM, Milwaukee area exams by Badger Examiners, 5353 North Green Bay Avenue, registration with WA9UJK. Sorry to report Silent Key WB9TCW. Remember to write your club name on your log for the November phone or CW ARRL Sweepstakes contest. Don't delay your antenna work any longer, winter is coming. Happy Thanksgiving to all. Traffic: WB9YPY 1961, KC9CJ 596, KA9VII 538, W9CBE 246, W9YCV 191, KA9RII 123, W9UW 119, N9BDL 107, WA9WYS 89, K9AKG 77, W9LKN 75, K9UTQ 71, W9NGP 65, W9IEM 60, KA9KLZ 57, AG9G 53, W9UCL 53, N9BCX 44, WB9ICH 38, K9FHI 33, K9BED 27, W9ODV 27, NZ9Z 14, W9PVD 4, N9BYS 2, KC9CJ 2.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, KCØT— A time of changes this past month. First, Cal, NRØS of Rochester is now the Net Manager for MSN/1, the 6:30 PM CW Net. Congratulations to Cal who promises to carry on in the best tradition of MSN/1. And, a big thanks to Jack, WØUCE, the previous manager who decided to give it up due to his current physical problem. Best wishes, Jack, for a speedy recovery, and we miss you. Then we have Kenny KDØCI who is now the Net Manager of the Minnesota Weather Net. He is taking over from Lou Guerre. KØOGI, who decided to take a sabbatical. So, again thanks to Lou for all his great work and our best to Kenny, KDØCI who has taken on this new responsibility. Of course, KDØCI is no newcomer to such having been STM for several years. This net resumed operation September 6. Good Luck, Kenny. So, we are headed into the "busy" season with all Nets in good shape with excellent leadership. Topping that, of course, we look to George Frederickson, KCØT, who was re-elected, without opposition, as our Section Manager for another term. Congratulations George — just great! Now we can all breath easier. On a sad note we note two Silent Keys this past month. Audrey Kimpe, KDØKL of Mankato became a Silent Key August 12th and Ted Heikkila, WØEBX, August 30th. Our condolences to their families, friends, and the many hams that knew them so well. Congratulations to George Knapper, WAØKMR of Virginia who is the August Amateur of the Month. Thanks George, and it will be interesting to know who will walk away with the $100 prize from the Hamfest Minnesota CW contest. Last year it was John, WDØCEP — who will it be this year? I'm glad to see this event incorporated into a Hamfest — just great! And Lou, KØOGI of Wahkon, says it's not too early to make plans to participate with communications for the February, 1989 "Vasaloppet" cross country Ski Race in Mora. Lots of opportunity for 2-meter mobiles. So, for information contact Lou, KØOGI. That is, assuming he survived the October 1/2 POW/MIA Walk Around Mille Lacs Lake. The September 2 W1AW DX Bulletin was the longest one for quite some time. The list of Stations Heard and worked would excite anyone and the upgrading of band conditions bodes well for Traffic Handlers as well. That's it for this time. Jim Swisher, KAØEPY, STM. MN EMERGENCY FREQUENCY 3860 kHz BULLETINS 3860 kHz.

NET	FREQ	TIME	QNI/QTC/SESS	NETMGR
MSN/1	3685	6:30P	291/102/31	NRØS
MSN/2	3685	10:00P	279/48/31	KDØNH
MSPN/N	3860	12:05P	374/181/31	WBØWNJ
MSPN/E	3860	5:30P	691/193/31	KCØT
MSSN	3710	6:00P	264/25/31	KAØSBY
PAW	3925	9:00A	2990/258/125	WDØBAC

Traffic: WBØWNJ 961, KT9I 392, WAØTFC 328, KAØEPY 321, WØGFW 194, KAØARP 165, NØFOO 152, KAØSBY 92, KDØNH 77, KAØPDM 65, KCØT 40, KDØCI 25, WGØS 23, WDØGUF 22, NØJP 20, WØKYG 9, NØHWD 9, KØOGI 7.

NORTH DAKOTA: SM, Bill Kurtti, WCØM—New technical developments have been the story in ND this summer with the superlink going into operation it is possible to talk on 2 meter between Bismarck, Carrington, Jamestown, Devels Lake & Fargo. Many tnx to WBØVHW for taking over the technical leadership in this project after WBØTEE, who lost his life in an accident and started the project, and the many others that put much time into it. Also the Packet radio network has made large steps in providing messages. Bulletins etc to the amateurs in our section. With the addition of nodes at Coopers-town, Wing, Bismarck, Minot & Kildeer mtn. Almost all the state is covered. BBS service is provided by WØLHS, Fargo; WAØLRE Grafton; KDØEM Devils Lake; NØCKB; Minot; Congratulations to NØHUY for upgrading to Extra. Don

AMERITRON

SYMBOL OF ENGINEERING INTEGRITY. . .QUALITY WORKMANSHIP. . .RELIABLE LONG-LIFE PERFORMANCE

AL-80A LINEAR AMPLIFIER

The AL-80A will provide a signal output that is within 1/2 "S" unit of the signal output of the most expensive amplifier on the market—and at much lower cost.

The Ameritron AL-80A combines the economical 3-500Z with a heavy duty tank circuit to achieve nearly 70% efficiency from 160 to 15 meters. It has wide frequency coverage for MARS and other authorized services. Typical drive is 85 watts to give over 1000 watts PEP SSB and 850 watts CW RF output. A new Pi-L output circuit for 80 and 160 gives full band coverage and exceptionally smooth tuning.

Size: 15½"D. x 14"W. x 8"H. Wgt. 52 lbs.

AL-1200 LINEAR AMPLIFIER

WITH EIMAC 3CX1200 TUBE

Full legal output with 100 watts drive.

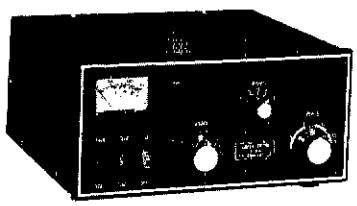
AL-1500 LINEAR AMPLIFIER

WITH EIMAC 8877 TUBE

Full legal output with 65 watts drive.

The cooling system in both amplifiers keeps the tube safely below the manufacturers ratings even when operating at 1500 watts output with a steady carrier. The filament supply has inrush current limiting to insure maximum tube life.

Size: 18½"D. x 17"W. x 10"H. Wgt. 77 lbs.



AL-84 LINEAR AMPLIFIER

The **Ameritron AL-84** is an economical amplifier using four 6MJ6 tubes to develop 400 watts output on CW and 600 watts PEP on SSB from 160 through 15 meters. Drive required is 70 w typical, 100 w max. The passive input network presents a low SWR input to the exciter. Power input is 900 watts. The AL-84 is an excellent back-up, portable or beginner's amplifier.

Size: 11½"W x 6"H. x 12½"D. Wgt. 24 lbs.

ATR-15 TUNER

The **Ameritron ATR-15** is a 1500 watt "T" network tuner that covers 1.8 through 30 MHz in 10 dedicated bands. Handles full legal power on all amateur bands above 1.8 MHz.

Five outputs are selected from a heavy duty antenna switch allowing the rapid choice of three coaxial lines, one single terminal feed or a balanced output. An internal balun provides 1:1 or 4:1 ratios (user selectable) on the balanced output terminals.

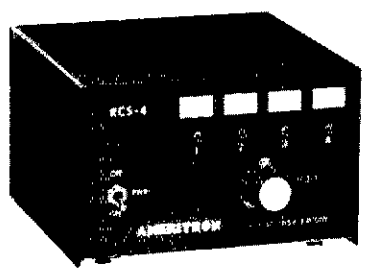
A peak reading wattmeter and SWR bridge is standard in the ATR-15. It accurately reads envelope powers up to 2KW.

Size: 6"H x 13¼"W. x 16"D. Wgt. 14 lbs.

Remote COAX Switches

RCS-4 FOR CONVENIENT INSTALLATION

No control cable required.
Selects one of four antennas.
VSWR: under 1.1 to 1 from 1.8 to 30 MHz.
Impedance: 50 ohms.
Power capability: 1500 watts average, 2500 watts PEP maximum



RCS-8V FOR SPECIAL APPLICATIONS

Selects up to five antennas.
Loss at 150 MHz: less than .1 dB.
VSWR: under 1.2 to 1 DC to 250 MHz.
Impedance: 50 ohms.
Power capability: 5 kW below 30 MHz, 1 kW at 150 MHz.

Available at your dealer. Send for a catalog of the complete AMERITRON line.

AMERITRON
9805 Walford Avenue • Cleveland, Ohio 44102
For more information: (601) 323-9715 • **Technical inquiries:** (216) 651-1740

Bachmier, Larry Halton Advanced; Myron Root, General; Guy Praska, Arta Leno, Keven Knutson Technician. Really missed having a division convention this fall. Hopefully next year.

NET	FREQ	TIME	SESS/QNI/QTC	MGR
GOOSE RIVER	1.990kHz	9:30AMSUN	5/114/3	WØCDO
DATA	3.885kHz	6:30DA	27/667/12	KAØFSM

SOUTH DAKOTA: SM, R.L. Cory, WØYMB—Asst. SM: NØABE, WAØFPR. SEC: KAØKPY. STM: KDØYL. Sioux Empire ARC at Sioux Falls and Prairie Dog ARC at Yankton furnished two meter communications for the MS Bikeathon from Sioux Falls at Yankton and return on the sixth and seventh of August. South Dakota hams are sorry to learn of the Death of Milt, WAØVRD, on August 31. Milt will be missed by all of us. The Black Hills ARC will operate their Special call sign, W200BLK, from Mt. Rushmore, Oct. 28 to Nov. 4. Six Radio Amateurs were pallbearers at the funeral of Martha Shirley, WØZWL. Two Meter activity has returned to the State TV site near Pierpont operating on 147.33/93. Mobridge ARC committee headed by KCØLJ has installed a Digi on Sherwood hill west of Mobridge. Total traffic reported for August was 436. Traffic: NØDPF 181, KØEERM 119, KAØAIE 113, WØMZI 43, KAØKPY 29, WBØOMF 27, WØYMB 12, KDØYL 12.

DELTA DIVISION

ARKANSAS: SM, Bob Harmon, W5SEP—I would like to personally thank Dale Temple, W5RXU, who recently resigned as SM due to pressing business responsibilities. Dale has been great as SM and has pledged to continue to be of assistance wherever needed. Next month we hope to have a round up of the Packet activity throughout the State. Packet is the largest growing segment of activity in Arkansas and several bulletin boards are up and running. As soon as I can start getting input from the various clubs in the state, I intend to start a quarterly newsletter to go to each ARRL member in the state. The purpose is to share information about activities throughout the state. I should also have some information about the Mena Hamfest that is scheduled for the weekend of September 9, 10, and 11 which we are going to put on our QST program at the banquet. Aug Nets: Ark. Phone Net: 573 stations, Traffic: 73, Time: 1453 minutes, 27 sessions de W5QFU. CAND 575 stations, 31 sessions, RN5 represented 100% by KF5YV de WB5YYD. DRN5 rpt: 635 msg in 62 sessions, Ark represented by KF5YV, W5QFU, WA5YDO de WB5UDO. Message handling: W5QFU, rcvd 79, relayed 53, del 18. W9OK: rcvd 51, sent 51, del 2.

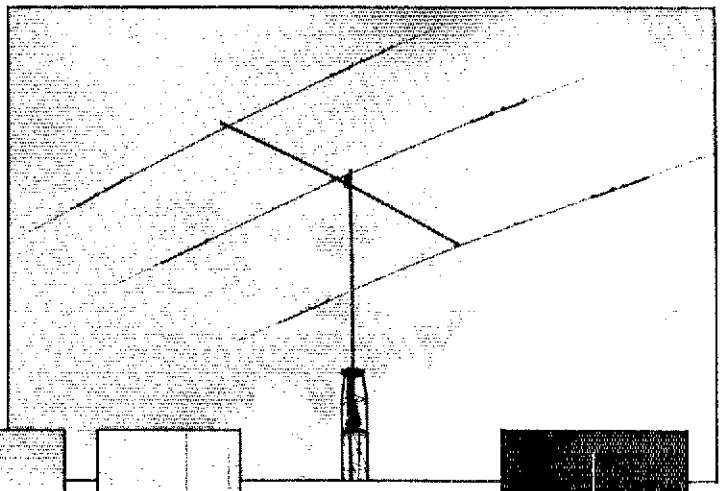
LOUISIANA: SM, John "Wondy" Wondergem, K5KR—ASM: KB5CX. SEC: N5ADF. ACC: K5DPG, SGL: KD5SL. TC: W5RWF. OOC: KE5QK. Packet: NE5S. Hats off to the Shreveport Amateur Radio Association on their 10th anniversary and for their recent outstanding Ark-La-Tex Hamfest. What a combination-with their large active club of 178 members, an ideal spacious civic center facility and a perfect tri-state location. They are obviously doing things right and drawing the out-of-towners in as I chatted with many hams from southern Louisiana which is over 300 miles as the not-so-straight crow flies. There were plenty of new dealers with loads of equipment and rows of swap tables. Another indicator of a real fine hamfest were the many standing room only forums. Jack, KA5RIP SARA President presided at their large hamfest banquet and presented 10 attractive plaques to some of the many deserving. The SARA "Golden Key Award" was presented to John Harris, NS5Y, for being the member that did the most for the club. The "Golden Mike Award" was presented to Bobby Matthews, KF5XV, in recognition of the member that contributed the most to Amateur Radio. Joel Harrison, Sr., WB5IGF, ARRL Delta Division Director and Rick Roderick, K5UR, our ARRL Delta Division DXAC representative, added to the hamfest with their forums and personal contacts. Traffic: DRN-5 Aug 88 635 msg in 62 sessions with La. represented 100%. LTN report Aug 88 63 msg 368 minutes 265 checkins in 31 sessions. 73 & GL de "Wondy," K5KR.

MISSISSIPPI: Jim Davis, KK5Z—ASM: W5TRD, SEC: KA4PKA. SGL: KA5WRS. PIO: WN5M. STM: KB5W. BM: W5EPW. TC: KF5DE. OOC: KK5K. ACC: NC5Y. VHF/UHF Coord: N5DWU. Packet Mgr WA5DVV. DRN5 (WB5YDD) Sess 62, QTC 635, Miss Rep 95% by N5AMK, KT5Z, WB7CQQ, W5HKW, KB5W and N5HGN. GCSBN (WD5JXT) Sess 31, QNI 1131, QTC 8. MTN (KB5W) Sess 31, QNI 173, QTC 58. Magnolia Sec Net (W5YRX) Sess 31, QNI 173, QTC 5. Miss/Lou Emerg Net (N5EZX) Sess 4, QNI 73. MSBN (KF5DE) Sess 31, QNI 1813, QTC 54. Neshoba ARC (N5EPP) Sess 4, QNI 39. ARRL Info Net (KK5Z) Sess 1, QNI 13. Traffic: KT5Z, S-69, R-61, Total 130. W5JDF, S-63, R-53, O-9, Total 125. KB5W, R-176, R-206, D-3, O-1, Total 386. KK5Z, R-16, D-2, Total 18. Mni tnx to the clubs sending newsletters each month. Much of the news for this Miss. section news is derived from those letters. Am very grateful to the Miss section staff who have been friends in need with their assistance and support. When anyone passes away, we all lose to an extent. When a fellow ham becomes an SK, it hurts a little more and we all suffer a little more. Such a friend was N5AMK, Joe Teaster. Joe seldom earned less than 100 points for the PSHR. It was my pleasure to request ARRL HQ to issue Joe a PSHR certificate in April. This award is earned by amassing not less than 60 points per month for 12 months. In June, N5AMK, earned the BPL certificate. A few years back, he earned the coveted and prestigious A-1 op designation, an honor for those hams who show "the right stuff" in traffic handling and overall operation procedure. Joe was one of the best traffic handlers that I ever had the pleasure to know. I'm sure that Joe would like to be remembered as a ham who took great pride in helping his fellow human beings, especially during the many emergencies in which many of us have participated. If such a thing exists, N5AMK was a "professional" Amateur Radio operator in all respects. Rest in peace, old friend, we'll miss you. de KK5Z.

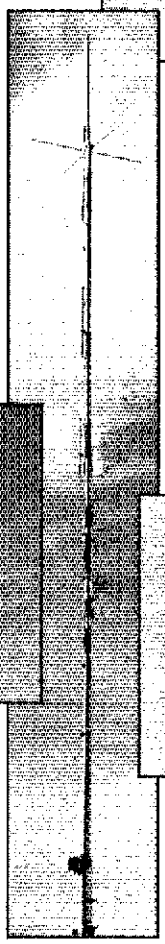
TENNESSEE: SM, Harry Simpson, W4MI—Eastern Assistant SM and PIO W4TYU, Central Assistant SM WA4GLS, Western Assistant SM and ACC K4CXY, STM: NG4J. SEC: K4UVH, OOC: K4LSP. SGL: N4PQY. TC: W4HHK. The TN Phone Net is on 3980 kHz with early sessions at 6:40 AM Eastern, regular sessions at 7:45 AM Eastern Monday thru Friday, at 9 AM Eastern on Saturdays, Sundays and Holidays. Evening sessions are Monday thru Saturday at 7:30 PM Eastern. CW Net Sessions are on 3635 kHz at 8 PM Eastern, Monday thru Friday. There are many other nets for your convenience, including several on two meters. W4TYU reports on the 88 DX Net, serving the Knoxville-Oak Ridge area Thursdays at 8 PM, utilizing the W4SKH repeater; the East TN Hospital Net Tues-

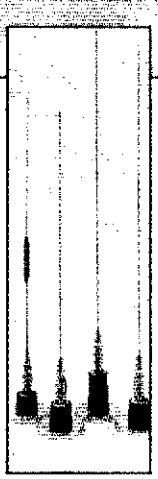
Tuned In To Amateur Radio

From Novice to Extra Class Cushcraft has the antenna you need.



Cushcraft offers high performance antennas to make every phase of your ham radio activity more satisfying. We have been creating innovative and exciting new products for more than 35 years. Call or write for a free copy of our full line antenna and accessory catalog or see your local dealer.

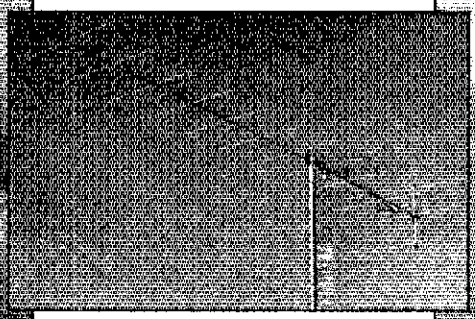


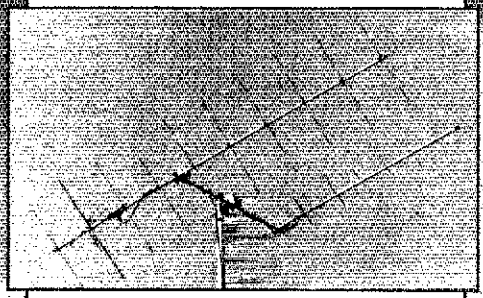


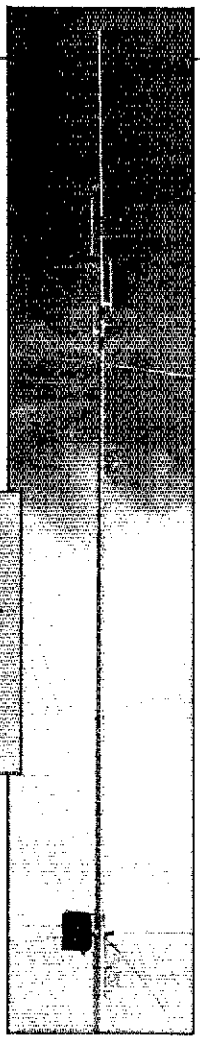
HF TRIBAND BEAM. *A3.* The most popular compact 10,15, 20 meter beam. *A4S.* A high performance 18' long wideband beam with all stainless steel hardware. 40 meter add on kits for each

CUSHCRAFT / SIGNALS MOBILES *"The choice of professionals"* can improve your mobile performance. Models for 70 cm, 2 and 6 meters.

AP8 VERTICAL. Covering 10,12, 15, 17, 20, 30, 40, 80 Meters. Great choice for Novice to Extra class.







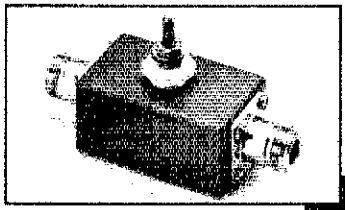
BOOMERS. The contest winners and distance record holders. Computer enhanced design for better gain, pattern and strength. There are VHF and UHF models for SSB, FM and other activities.

RINGO RANGER II. Still the world's favorite 2 meter, 70 cm or 220 MHz omni antenna, with more gain. A must for your FM or packet station.

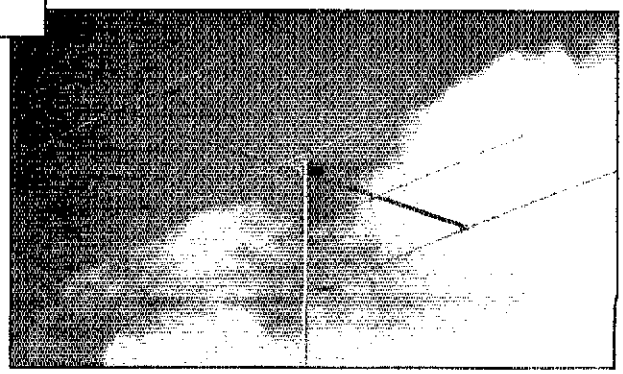
OSCAR PACK. A complete antenna system for satellite users. Includes 70 cm uplink, 2 meter downlink antennas and mounting kit.

R4 HALFWAVE 10, 12, 15, 20 METER VERTICAL. Amazing performance in a small space without ground radials. Automatic broadband operation.

FAST ACTION GAS TUBE LIGHTNING ARRESTERS. Protect your valuable radio equipment. High and low power models with SO-239 or N connectors.



SKYWALKER MONOBAND. 10, 12, 15 and 20 meter yagis for more contacts, less waiting and a better signal. Preferred by contesters and DX-Peditions.



cushcraft CORPORATION

THE ANTENNA COMPANY

P.O. Box 4680, 48 Perimeter Road, Manchester, NH 03108 USA
Telephone: 603-627-7877 / Telex: 4949472 / FAX 603-627-1764

AVAILABLE THROUGH DEALERS WORLDWIDE

days at 8 PM Eastern time, on the WB4IOB 13/73 repeater; the Anderson County ARES Net Mondays at 8 PM Eastern; the Westlink/Middle East Tennessee Emergency, and scores of others. This last net deserves more than a listing—it could be a model for others to follow. Operating on the W4BBB 90/30 repeater, and linked two meter and 220 MHz systems, it broadcasts the Westlink Amateur News Service, followed by a call-up of the emergency net. It averages 30 checkins, and perhaps 60 from a 75-mile radius during a weather emergency. I'll tell you about the Memphis 22/88 Weather Net when space permits—they have perhaps 100 checkins nightly from a three-state area! A word about hamfests: the Huntsville affair was bigger than ever, and I saw at least one hundred hams from Tennessee! Dealers were separated from the flea market by several hundred yards and a bunch of steps. That will probably change next year. It was a super occasion. Then came the Cedars of Lebanon Hamfest in the State Park of the same name! I have never before attended a mile-long, fifty-foot wide Hamfest! The friendship was a mile long, fifty feet wide and a mile high! Congratulations to the Short Mountain Repeater Club for a splendid event. Traffic: W9FZW 174, WA4FMR 140, W4DDK 79, KA5KDB 40, W4TYJ 37, W4MI 30, WB4LAL 22, W4PFP 18, NG4J 14, K4CXY 12, KE4LS 10, WA4HKU 8, W4PSN 4.

GREAT LAKES DIVISION

KENTUCKY: SM, John Thernes, WM4T—Asst. SM: KC4WN. SEC: WB4NHO. STM: KA4MTX. PIO: WA4SWF. (August) I have decided to run for another two year term as Section Manager. If more than one candidate petition is received at ARRL, you will be receiving a ballot. As one of your duties as an ARRL member, I urge you to vote for the candidate of your choice. BARS had another fine hamfest with its usual good flea market. The ARRL Forum was well attended and a lot of ideas were discussed. By the time you read this, contest season will be upon us. Best of luck in the November Sweepstakes. A large group of hams from BARS turned out to help with the local Shriners parade.

NET	QNI	QTC	SESS	MGR
MKPN	1375	179	31	WD4RWU
KTN	711	54	31	WD4RWU
KYN (E/L)	333	140	62	K4AVX/KZ8Q
TSTMN	433	34	31	KZ8Q
KNTN	282	99	39	WA4EBN

Traffic (Aug.): WD4RWU 161, K4VHF 152, WA4EBN 61, KI4QH 44, N4GNL 42, K4AVX 36, KC4WN 27, KA4MTX 27, KB4UJA 24, WB4AUN 18, WA4NOG 13, N4PEK 11, WD4OOF 8, K4HOE 6, KU4A 5. PSHR: N4GNL 84, KI4QH 83, K4AVX 78, KA4MTX 74.

MICHIGAN: SM, George E. Race, WB8BGY, (@N8FTY)—ASM: WA1LRL (@ WA1LRL). STM: WD8KQC (@ NT8R). SEC: N8AYQ. SGL: N8CNY. TC: W8YZ. OOC: WA2AJQ. New EC appointments from N8AYQ, MI SEC; N8HRN- Allegan, WB8CTU-Charlevoix, WD8RTH-Delta, KA8YWV-Oscoda, WA8HDG- Muskegon, N8ERF-Midland, N8GNF-North Ottawa. Congratulations and welcome to the MI team! We still have 21 Counties without ECs as of Sept. 1st. Contact Jim, N8AYQ, if you are interested in becoming EC and RACES officer for your County. The MI ARRL Convention was a great success. The 5 County Group did an outstanding job with all of the many arrangements. My thanks to Division and Section Staff for the many excellent presentations made throughout the day. A special thanks to John Bloom, from ARRL HQ, for his technical presentation. Also to Irby Tallant Jr, Engineer in Charge of the FCC Detroit office, for his update on the role of the FCC. I had the honor of presenting awards honoring Congressman William Schuette and Congressman Bob Traxler for their co-sponsorship of House Concurrent Resolution 317. Joe, W8SCW, has retired as the Early QMN Net Manager. Your many years of service to MI Traffic Handling has not gone unnoticed. Well done, Joe, from all of the MI Section Hams. Will, W8EOI has been named the new Early QMN Net Manager by QMN Manager Larry, WB8R. Our thanks to Will for stepping in to fill the position. Congratulations to Vince, NB8R, for working all 3,076 counties. W8EOI has been named Ham Of The Year for the U.P. Net. The Garden City ARC gets my vote for the most professionally prepared Newsletter of 1988. Judging by the content, this group has to be one of the best informed AR groups in MI. Welcome to two new ARRL Affiliated Clubs, the Allegan County ARC and the Montcalm Area ARC. Maybe one of these days you will join the ranks of the ARRL Special Service Clubs as well. We have 6 SSCs in MI. SSC status indicates a sincere dedication to Amateur Radio. If your club does not have the resources and personnel to meet the overall goals of the SSC, several smaller clubs can ban together to form a Council of Clubs and be granted SSC status. Check the SSC Manual for details. I am still looking for an Affiliated Club Coordinator. This would be a good position for someone who has a few evenings a month to attend club meetings around the State. If you are interested, please let me know. Novice classes are in full swing around the state. Please let me know if there are any League materials that I can supply for your classes. This is the time of year that Amateur Radio takes a back seat to the Holidays and family get togethers. Hope you all have a very pleasant Thanksgiving.

NET	FREQ	TIME/DAY	QNI	QSP	SESS	MGR
UPN*	3921	5:00PM DY	1051	44	35	WA8DHB
MACS*	3953	11:00AM M-SA	403	75	31	K8OCP
MITN	3953	7:00PM DY	530	189	30	WD8EIB
QMN*	3663	6:00PM DY	331	77	44	WB8R
SEMTN	145.33	10:15PM DY	490	76	30	N8HSC
GLETN	3932	9:00PM DY	572	56	31	KA8EIZ
WSSBN	3935	7:00PM DY				W8NDI
VHF ACTIVITY REPORT			601	11	39	NO8Q

*QMN Fast-6:30PM Dy; QMN Late-10PM Dy; MACS-1PM Sun; UPN-12PM Sun. Traffic for August: KA8CPS 414, N8HHH 139, WD8KQC 134, N8FTY/BBS 85, NW8M 82, K8GXV 71, WB8R 66, WA8DHB 49, N8HSC 48, K8ZJU 44, WB8YDZ 41, W8EOI 40, K8UPE 34, WD8MJB 32, W8YIQ 30, K8OCP 28, W7LVB 28, KI8Q 22, N8CNY 21, W8IHX 20, KD8LZ 20, N8JAT/BBS 18, W8RNQ 16, N8FPN 16, WD8EIB 14, W8URM 13, K6HAP 12, NY8W 11, N8GGO 7, WB8SYA 7, W8BEZ 7, KA8PWM 7, N8EXS 7, W8VIZ 6, WA8MVH 5, KA8QVH 4, W8YZ 3, W8CUP 2, NX8S 1, (WB8YDZ 74, June), WB8YDZ 44, July).

OHIO: SM, Jeffrey Meass, K8ND (@ W8CQK). ASM: David Kersten, N8AUH (@ KB8CI) Phone: (216) 221-6740; SEC: WD8MPV (@ KB8CI); STM: KF8J (@ W8HHF); BM: W8ZM (@ N8NN); ACC: KJ3O (@ KB8CI); TC: KB8MU; OOC:

CALL C•COMM

VISA

MasterCard

800-426-6528 TOLL FREE

Including Alaska and Hawaii

CONVENIENCE
Free Ups Ground Service on All Transceivers and Related Accessories
George K7HBN

SPEED
Same Day Shipment of Items in Stock
Dale W7GAB

AVAILABILITY
Large Selection and Competitive Pricing
Frank K7DS

SERVICE
Complete Repair Facility
Joe NY7X

SATISFACTION
Friendly and Experienced Sales Staff
Scott NW7U

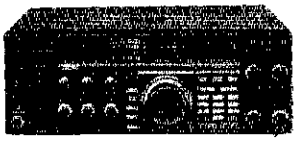
C•COMM
6115 15th NW
Seattle, WA 98107
(206) 784-7337

STORE HOURS:
Mon.-Fri.
9:00am - 5:30pm
Saturday
10:00am - 4:30pm

CELEBRATING 12 YEARS OF SERVICE

ICOM

IC-781 The Ultimate
- Panoramic frequency display standard
- High performance receiver
- 150 watt output transmitter



IC-761 Competition Grade
- Excellent receiver
- 500Hz cw filters and built in keyer standard

IC-735 Compact
- Great for portable/mobile operation
- Popular for marine mobile operation with AH2A automatic tuner

SPECIAL
Purchase any ICOM handheld radio and receive a spare wall charger **FREE.**

ICOM

IC-900 Remote Control
- Fiber optic cable for flexibility in installation
- Band units for 10 meters through 1.2 GHz

IC-228A/H Compact Mobile
- 2 meter transceiver with extended receiver coverage
- Flexible programming
- 25w and 45w versions

HANDHELDS

IC 32 AT
- Dual band
- 2 meter and 440 MHz

IC 2 GAT
- 2 meter
- 7 W

KENWOOD

TS 440S/AT
- Built in automatic tuner
- Direct frequency entry
- 100 memories

TS 140S/680S
- Affordable HF transceiver
- General coverage receiver
- TS680S includes 6 meters

TM 221A/321A/421A
- Small enough for almost any mobile installation
- Built in subtone encoder

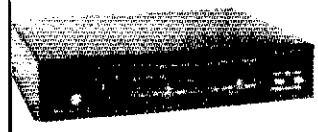
HANDHELDS/ TH 25 AT
- New pocket-size transceiver
- 10 memories with auto scan
- Extended receiver range 140-163MHz

KENWOOD

DUAL BANDERS
TM 621A/721A
- 144/220 MHz or 144/440 Mhz
- Crossband repeater operation
- Extended VHF receiver coverage

R 5000
- Deluxe shortwave receiver
- 1-30 MHz coverage
- VHF converter available

AEA



AEA PK 232
- Six digital modes
- including weather FAX

AEA PK 232 SOFTWARE
- PC-PAKRATT™/FAX
- COM-PAKRATT™/FAX

PK-232 Terminal programs

PRICES, SPECIFICATIONS AND AVAILABILITY SUBJECT TO CHANGE WITHOUT NOTICE OR OBLIGATION

WB8ZCE; SGL: N8CVK.

NET	QNI	QTC	SESS	TIME(LOCAL)	FREQ	MGR
BN(E)	252	102	31	1845	3.577	WD8C
BN(L)	196	97	31	2200	3.577	K8TVG
BNR	185	80	31	1800	3.605	W8EK
BSSN	185	102	30	1900	3.873	KD8FW
QNN	147	21	30			WD8KBW
QSN	241	81	31	1810	3.708	N8AEH
QSSBN	1903	931	93	1030,1615,1830	3.9725	KA8CGF
QSSN	176	103	31	0645 M-F,0800 S-SN	3.577	KA8GJV
OHIO SECTION ARES NET				1700 SUN	3.875	WD8MPV

Hamfests in November and December: None! Contact Affiliated Club Coordinator KJ3O to list your hamfest on the Section's schedule: it's not too early for 1989! Amateur Radio Examinations: Columbus 11/12; Maumee 11/12; Canton 11/26; Columbus 12/3; North Olmsted 12/10; Dayton 12/10; Ravenna 12/10; Maumee 12/10; Zanesville 12/10; Cincinnati 12/17. Contact me or Assistant Section Manager N8AUH (phone number above) for details on any session listed above: we can provide names and phone numbers for VE session contact persons. In addition, the list gathered and maintained by K3RC may be found on any of the many packet radio BBS systems around the Section. Long-time Official Bulletin Station W8RG has decided to give up that grind to allow more time to concentrate on NTS activities and other areas of Amateur Radio: thanks for the years of service, Bob! Congratulations to the members of the Western Reserve Amateur Radio Group, the newest of Ohio's ARRL Affiliated Clubs! Congratulations to Stan Cohen, WD8QDQ, of Cincy, who participated in the coordination of the delivery of needed medicine from Childrens' Hospital in Cincy to a very-ill child in Argentina. Stan's efforts were covered in detail on WKRC-TV, with interview and shots of Stan's station. I first saw an account as a result of an Associated Press story in the Columbus Dispatch. Thanks to W4RHZ for forwarding additional details! Charlie Cotterman, KA8OQF, was en route to a Dayton ARA committee meeting when he say a man on a highway overpass preparing to jump. He autopatched the police, and assisted in traffic control as requested after they arrived until the man was talked down 90 minutes later. Public service IS Amateur Radio! As you all know by now, John Haungs, WA8STX, will be taking the reigns from me and will serve as your ARRL Ohio Section Manager for the next two years. I wish John the best in his new endeavor (I hope that he knows what he got himself in to!), and I trust that you will all show him the sides of the Ohio Section that have always impressed me: the skill, the dedication, the innovation, and the excitement! It's one thing to be the biggest ARRL Section, as Ohio is; it's quite another to be the best, as Ohio is as well. I wish that I had as much time to devote as this Section deserves from its SM! I expect to remain alert and active, holding several appointments, and I hope to catch up on some of my other interests in Amateur Radio. I will be writing one more of these columns, in which I will try to summarize the past four years. (Club newsletter editors: this would be a good time to replace me on your mailing list with John!) The stations listed below have practiced their traffic handling skills in preparation for disaster during August 1988: K8TVG 360, KD8HB 306, KD8KU 303, W8PMJ 250, W8BO 209, W8SKP 196, K8JDI 170, N8AUH 169, W8EK 144, W8QZK 133, W8ZOL 129, N8IIP 127, KC8YV 121, WD8KFN 121, WA8EYQ 116, WB8JGW 113, KA8CGF 109, WD8QXT 102, N8GEC 99, WD8MIO 94, K8DHD 91, W8CXM 85, WD8IKC 81, N8EFB 79, NE8X 78, N8AUG 77, K8IOW 77, WA8SSI 72, WA8HED 71, K8ALV 67, N8FWA 62, N8CEI 60, KA8GJV 55, W8LDU 52, WD8KBW 52, K8CMR 50, KA8DRR 49, WB8KWC 43, KE8CV 40, KA8SOM 37, WD8RIB 36, N8GPU 34, N8CJS 33, KA8TXA 32, KB8ABO 31, N8HJB 30, WB8HHZ 26, N8GOB 26, NW8E 25, W8JLW 23, WD8JAW 22, KA8SON 20, N8CW 19, KC8JV 19, KD8XL 18, KB8EIW 18, N8FPH 18, WB8KWD 17, WB8DPZ 16, N8AJU 16, WA8ZID 13, KE8DQ 13, NF8B 12, K8DXZ 12, KA8BNQ 12, WD8JYE 12, KA8RIX 12, K8VOY 11, K8WZX 11, NC8Q 9, WB8VNV 8, K8CKY 7, N8HSE 7, N8GZX 7, KA8VYT 6, W8GDQ 6, W8RG 6, N8HRW 6, W9SWM 6, WD8PWG 5, KD8IC 5, N8HBF 5, KG8H 4, W8ZM 4, WD8CTX 3, W8SHL 3, W8XT 3, N8JDH 3, KA8UVU 3, WA8EZN 2, WD8CSP 1.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK— ASM & STM: K2ZM. SEC: WA2ZYM. BM: WB2IXR. PIO: KB2TM. OOC: N2DVQ. ATC: WA2VGM. SGL: KB2HQ. ACC: KV2A. ASM & NWSLTR ED: WB2NHC. NET REPORTS FOR AUGUST (ONI/QSP): AESN 27/0 CDN 611/73 EBS 334/55 HVN 277/47 NYPON 484/288 NYS/E 326/160 NYS/L 271/158 NYS/M 284/170 SDN 293/131. CLUB NEWS: Albany ARA will have KA2WGQ talk on "The Light that never Fails"—the LED at their Sept. meeting. They report that F.D. was a great success as was the 200 operation with 7629 QSOs! They welcome N2IDY and KB2FTM, new members. Communications Club of N.R. is working to get all its members to write to Congress concerning 220 MHz. Crystal Radio Club will be discussing the upcoming VHF contest. PEARL congratulates the following upgrades, KB2FPA, KB2EGV and KB2FPH. Also Novice grads KB2FPD and KB2FPE. Overlook Mtn ARC had a fox hunt in August and will hold a Quiz Bowl in September. Saratoga RACES was busy during the summer with Field Day and the 200 operation. WA2DHF, Hudson Division Director and I attended their third annual Hamfest on Sep. 10th. The weather and the hamfest were both great! West. ARA heard WA2DHF talk about the loss of 2 MHz of 220. Those in attendance filled out cards at the meeting to their congressmen. WECA had a successful Field Day and heard WB2QJA talk about the latest in packet at the Sept. meeting. Please note: the time is NOW to write to your Congressmen to enlist their aid in returning the 220-222 portion of 220 MHz to the amateur allocation. Everyone's help is needed in order to be successful. DO NOT LET SOMEONE ELSE DO IT! August PSHR: WE2G WA2JBO WB2VUK K2ZVI WB1BTJ KB2EPU. August TFC: WB2VUK 165, K2ZVI 140, K2ZM 69, KB2EPU 69, N2FTR 53, WA2GYY 51, N2HIF 38, WA2JBO 25, WB1BTJ 25, WE2G 25, W2CJO 13.

NEW YORK CITY-LONG ISLAND: SM/SEC, Walter M. Wenzel, KA2RGI— ASM: N2GQR. ASM VE: W2NL. ACC: KA2WIJ. STM: K2MT. OOC: NB2T. TC: WA2YNH. BM: W2JUP. PIO: KA2LCC. The following are traffic nets in and around the section that handle NLI messages with the August report figures:

(continued on page 108)

Delaware Amateur Supply

71 MEADOW ROAD, NEW CASTLE, DELAWARE 19720

(302) 328-7728

Dear Amateur Radio Operator,

You are cordially invited to attend the Delaware Amateur Supply manufacturers representatives' weekend to be held November 18, 19, and 20. We are celebrating 11 years of service to amateur radio operators.

We have invited factory representatives from all equipment manufacturers we represent to display and demonstrate their products. Don't miss this opportunity to hear the latest product news direct from the manufacturer.

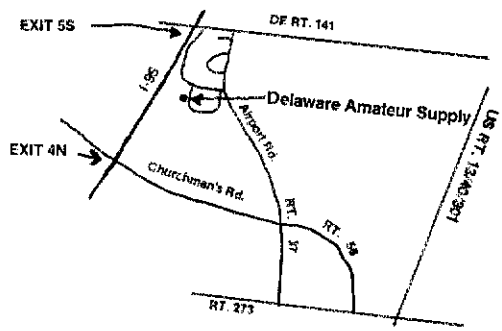
Visit our store and register for hourly prize drawings and two grand prizes. One on Saturday and one on Sunday. No purchase is necessary but you must be present to win. Must be 16 years or older to win unless valid amateur license holder.

Delaware Amateur Supply has built a reputation of providing the best equipment at a fair price. We are going to celebrate our eleventh anniversary by proving our reputation is well deserved. Make sure you can be here to take advantage of special pricing on selected items throughout the store. If you can't visit in person, call 800-441-7008 for pricing and ordering information. We hope to see you in the store. Service department will be closed during the sale.

Special Sale Hours
Friday, November 18, 9:00 a.m. 'til 8:00 p.m.
Saturday, November 19, 9:00 a.m. 'til 4:00 p.m.
Sunday, November 20, 9:00 a.m. 'til 3:00 p.m.

Prize Drawing Each Hour
Grand Prize Drawings Saturday and Sunday

Come in and Register to Win
Must be Present to Win



800-441-7008
New Equipment Order & Pricing
No Sales Tax in Delaware!

Service, Used Gear Info: 302-328-7728

NET	FREQ	TIME	DAY	MGR	SES	QNI	QTC	QSP
BAVHF	145.350/R	2000	DLY	K2YQK	31	518	133	133
NCVHF	146.745/R	1930	M-F	KB2BKE	31	...	N/A	...
SCVHF	145.370/R	2000	S-F	KA2JMA	26	...	N/A	...
NYPON	3.913	1700	DLY	KA2UBD	31	...	N/A	...
NYS/M	3.677	1000	DLY	N2EJA	31	284	199	170
NYS/E	3.677	1900	DLY	KU2N	31	...	N/A	...
NYS/L	3.677	2200	DLY	KU2N	31	...	N/A	...
NLT	28.450	2100	WED	KB2BKE	4	...	N/A	...
ESS*	3.590	1600	DLY	W2WSS	30	...	N/A	...
PNS	145.01	24 hr	DLY	AI2Q-4				N/A
PNS(alt)	145.03	24 hr	DLY	WB2IBO-4				N/A

*Independent Net, recognized by NTS, all times are local.

EXAM SESSIONS: LIMARC—9:00 AM every second Saturday of each month at Salten Hall, Rm. 2, NY Inst. of Technology, Old Westbury, NY— contact Joe, W2NL 516-541-2450; SUFFOLK COUNTY VE TEAM—9:00 AM second Saturday of each month at the Islip Arts Bldg., Rm. 106, Suffolk County Community College, Selden, NY—contact George, WA2VNV 516-751-0894; GRUMMAN ARC—5:00 PM second Saturday every month at Bethpage High School, Bethpage, NY—contact Howard W2QUV 516-354-6861; GREAT SOUTH BAY ARC—12 Noon fourth Sunday every month at Babylon Town Hall Annex, Rm. 2, North Babylon, NY—contact Walt KA2RGI 516-957-5726. If you are wondering why your group's last or next volunteer exam session has not been shown here, it is because either you sent it to me too late or it was never sent to me or the ARRL with a minimum two (2)-month lead time to allow for printing here in QST. I want to have all of the sessions listed here, but I need your assistance to be able to do this. Please do not forget Radio Central will be holding their HAMEXPO '88 on Sunday, November 13, at the Suffolk County Community College in Selden, NY. For further information, contact Andy Feldman, WB2FXN or John Mark, KB2QQ. If anyone out there is using a desktop publishing program for the printing of their newsletter and can import .PCX files I have most of the League emblems scanned and ready for your use, just contact me and we can talk about getting copies of the disks to you. Please let me know if you have an XT or an AT and which disk drives you have, 5 1/4 360K, 5 1/4 1.2M, or 3 1/2 720K. I need to hear more about your events and what is happening. Please send me the schedules you have for upcoming classes so we can get the information out. Keep the beginning of December open for the next NYC/LI Club Presidents Meeting; more details will be following in the mail. As the holiday season approaches, please remember to take care and stay well. Traffic (August): N2AKZ 248, K2YQK 180, N2IMP 170, NB2D 96, N2HLZ 86, WI2G 84, W2GKZ 43, K2TWZ 29, KA2UIU 24, N2GNQ 20, WB2ZIE 17, WA2UKM 16, KA2JMA 15, K2MT 3.

NORTHERN NEW JERSEY: SM, Robert R. Anderson, K2BJG—ASM's: N2CXX (SE), N2WM (NW), WB2NQV (SW), N2XJ (CEN AND VE), SEC: N2BMN, STM: KA2F, OO/AAC: KA2BZS, ACC: WB2HBZ, SGL: W2KB, TC: K2BLA, BM: WA2UPK and PIO: N2WL. I am sorry to have to report the resignation due to poor health of ACC Ken Hampton Jr., KY2S. Ken has served the NNJ section well in this position since March 1986 and had previously represented the previous ACC in the southern area of the section. As to his replacement I am pleased to announce the section-level leadership appointment effective 09/88 of James Dockery, WB2HBZ as Affiliate Club Coordinator (ACC). New traffic appointments effective 09/88 are: N2DXP NM of NJTTTN, WA2OPY NM of NJN/L and WA2OPY ORS. Bergen ARA celebrated its 25th anniversary by operating special-event station NK2K from the USS Ling (SS297) at Hackensack. Congratulations to the following who were newly licensed or upgraded during August sessions conducted by: Raritan Bay ARC (11/5), Northeast NJ Testing Assoc. (7/3), NNJ VE Board (16/10), and Ramapo Mountain ARC (33/17). The Ramapo session held at their Hamfest was the first conducted by NENJTA as a service to another organization. This relieved the Ramapo VE team so they could support other requirements at their Hamfest. Novice (4): M Mintz, R Glatt, M Hora and S Elder. Technician (16): KB2FZJ, W Schell, F Jaeger, KB2GAU, KB2GER, KB2GFT, KB2CXS, KB2FCV, KB2FZB, KB2FZD, KB2GBS, KB2GDR, KB2GGG, KA1CVH, and KA1RJR. General (4): N2HIA, N2ILD, KB2FRQ, and KB2EMB. Advanced (8): N2HPZ, N2HVZ, N2KED, KA2NYW, N2CUY, WA2DAX, K2EII, and N2HQH. Extra (3): N2HYV, KL7HIR and WA1YCF. Total applicants (67). Total new or upgrade (35). 52.2%. At the December NJ Traffic Handlers Confab three annual awards will honor traffic excellence — The W2SUE award and the W2UEZ award will be complemented by the new K22SE / Edwin Solov award for outstanding traffic work on NJ local VHF nets. Traffic Nets and Statistics for July 1988:

NET	MGR	FREQ	TIME	SESS	SES	QSP	QNI
NJM	WB2ZJF	3695	1000	DY	31	93	219
NJPN	W2CC	3950	1800	DY	36	73	279
NJN/E	OPEN	3695	1900	DY/P			
NJN/L	WA2OPY	3695	2200	DY/P	31	38	88
NJSN	KA2INE	3735	1830	DY	31	31	143
OBTTN	KA2F	147.12	2000	DY	31	90	240
NJTTTN	N2DXP	223.88	2100	DY			
NJVN/E	WB2FTX	146.895	1930	DY/P	31	76	430
NJVN/L	N2FGC	146.49	2230	DY/P			
NNJ/PL	W2QNL	145.01	24HR	VIA WA2SNA-1			

Packet NTS activity for August, 1988: Total 134. WA2SNA-1 auto forward (35) plus liaison (99) by NZ2T (9), N2HQQ (2), W2KB (3), W2QNL (49), WB2FTX (36). SAR/PHSR for July: W2RRX 81/97, W2QNL 156/116, K2VX 94/81, KB2BNW 32/50, W2XD 13/-, W2CC 21/-, N2XJ 83/76, N2DXP 121/63, KB4CYC 9/54, KA2INE 68/89, WB2FTX 64/60, KA2F 115/106, WB2QMP -/64, ND2K 18/-, NR2N 26/-.

MIDWEST DIVISION

IOWA: SM, Wade Walstrom, WØEJ—ASM, WBØAVW. SEC: KDØBG. STM: KCØXL. ACC: NUØP. OOC: WAØQMU. BM: KØIIR. TC: KØDAS. PIO: WEØM. The Cedar Rapids Hamfest was a success in both attendance and receipts. License upgrades at Cedar Rapids include WBØFQH and KAØLES to Extra, KAØYPN, KBØATA, WDØAQC, WDØHTD, KA6ESR, and KAØBLT to Advanced, KBØDAR and KAØZRO to General, and KAØHZZ, KA9POK, KBØCZC, KA9TEA, and KA6SFF to Technician plus two who went from unlicensed to Technician and two more who became Novices. WBØUBL is the VE Team Coordinator in Cedar Rapids. KBØDAE is a new Novice in Fort Dodge and WA7UWG is now NØJKE. NUØP has a new QTH and now sports a new tower. WBØAVW is now on packet. WAØWYW is the new packet bulletin board in Des Moines. A special congratulations to KEØAS who is the 1988 recipient of the John W. Gore Memorial Scholarship. Remember that the Iowa 75 Meter Evening Net time will change to 5:30 PM with the change to Standard time on the last weekend of October. NØGKX recently reported a two car personal injury accident north of Denison via 2 meters to KØCNM, who then alerted authorities. Well done, Tim and Jack! Regretfully, WBØURA, KDØYV, WØUPX, W4JL, KØICM, and WAØYCF all became Silent Keys recently. Traffic: WØSS 148, KØIPT 142, KAØADF 116, WØYLS 89, KØGP 67, WBØMCX 40, WBØAVW 34, KCØXL 20, KAØVBA 18, WØOMV 14, WBØOKA 11, KØKQJ 10, KEØWO 4, KØEVC 4, WBØFNA 4.

KANSAS: SM, Robert M. Summers, KØBXF—SEC: NØBLD. STM: WØOYH. Net Manager KSBN/KPN, WØFRC. Net Mgr QKS, WBØZNY. Ks RTTY Mgr, open. District Emergency Coordinators are WØOAG, WBØYJT, WØEB, WØFRC, NKØV, WBØMDF. STATE Govt. Liaison: NØBLD. Tech Coord: open. Bulletin Mgr: KØJDD. ACC: KØBXF. PIO: WBØWSG. Manager of QKS-SS is WØMYM. Wx Net Manager, WBØYWZ. Always sorry to hear of another SILENT KEY, N7PM, KAØCHQ and WØGLC. KØKU, the club station at Kansas University, Lawrence is interested in starting a college net on HF. If anyone at the other colleges are interested, contact Nate @ KØKU-9, on packet. Welcome back to WDØFIT as NCS, QKS-SS after a long illness. NØBLD reports that TZ6VV (KBØVV) has returned to the states and is now living in Dallas, Tx. It must be the middle of summer, traffic counts are down. Stations reporting are less and info for the column short. How about it gang, let's all try to report something each month. Please reference your own activity. Net activity for July KSBN QNI 1244, QTC 104. KPN 410/17. KMWN 695/589. KWN 856/634. QKS 216/65. QKS-SS 45/7. Still looking for a RTTY net manager. Someone tell me who in KS is active RTTY wise! Haven't heard much on PACKET from western Kansas, anyone like to fill me in? PLEASE DO SO. Traffic: KØBXF 203, WØFRC 141, NZØM 34, WØOYH 62, NBØZ 62, WBØZNY 54, WØQMT 48, WAØYXK 24, WØMYM 16, WØCHJ 11, NØBLD 10, WØRBO 8.

MISSOURI: SM, Ben Smith, KØPCK—Congratulations to the Heart of America Club on receiving Special Service Club status. Amateurs from the St. Charles ARC helped with communications after a train derailment in Ellsberry, MO, August 6. Amateurs involved were KAØUOJ KEØCJ and NØIAB. Amateurs in the Kansas City area provided communications for two triathlons. A group assisted with the Indian Trails Mini-Triathlon. Helping with the project were WBØTIN KØORB NKØB WØAIB and WBØROQ who was Net Control. Another group took part in the Johnson County MS Triathlon. Those were NJØX WØOCT NKØB WBØTIN NØHOB KØORB WØAIB and WBØROQ as NCS. New Field Appointments for the month: WDØW, OO and PIA, NQØG, PIA and ORS, KØPHI, OES and KEØKI OBS. Silent Key report: WØXA.

NET	SES	QNI	QTC	DAY	TIME(PM)	FREQ	MGR
MON	62	227	122	D	7/9:45	3.585	AIØO
MOSSB	31	630	73	D	6:00	3.963	KØORB
MEOW	31	581	35	D	5:30	3.983	WDØELL
HBN	23	335	23	M-FR	12:05	3.680	KØDSQ
PHD	5	139	11	M	9:00	143.43	WAØKUH
CMEN	5	82	11	W	9:00	146.76	KØPCK
HARC(Jul)	4	73	9	-	-	-	KAØSXY
(Aug)	4	76	8	-	-	-	-
SWMSW	5	162	5	-	-	-	KØXC
SLARES	5	314	4	M	8:00	146.91	KØWEX
RRABN	30	272	1	D	9:00	147.79	KBØANP
MOFO	5	16	1	W	8:15	224.02	AIØO
KCARES	4	57	0	-	-	-	KØUAA
MCARES	4	48	0	-	-	-	-
MXARES	4	46	0	TH	9	147.255	KAØTGL
SEDARES	4	32	0	-		-147.030	WØENW
CARL	4	24	0	W	5:30	146.46	WBØWLU

Traffic: NQØG 403, NDØN 157, WAØYJX 141, AIØO 130, KØORB 84, WAØHTN 50, WØOUD 39, KØPCK 16, WØRL 15, WAØKUH 9, WD200DVG 6, KDØAJ 3, W200RR 2.

NEBRASKA: SM, Vern Wirka, WBØGQM—STM: Jerry Kohn, WDØEGK. Some stations have reported difficulty in passing traffic on various Nebraska section nets. It is understandable that, at times, a station in the particular community or area that has traffic is not on the net. However, the traffic could still be picked up by some station on the net for later relay to its destination. This is important especially when a liaison station has traffic for a Nebraska location, which has been picked up on some other National Traffic System (NTS) net. The liaison station should not be expected to keep checking into various section nets hoping to find somebody to take the traffic. It takes a great deal of cooperation to get a piece of traffic to its final destination. The handling of routine traffic is the source of the practice that is needed to assure trained Amateur Radio operators are available when emergency communication situations arise. Perhaps we need to do a better job of education and training for traffic handling in our section as far as the National Traffic System works. Our STM, Jerry Kohn, WDØEGK, of Lincoln, will be glad to explain how the system works. Jerry also has a program on traffic handling, which he has offered to clubs to help answer questions. Contact WDØEGK for further information. Our Section Emergency Coordinator, Michael Ruhrdanz, NØFER, of Lincoln, is suggesting that more amateurs consider leaving their packet stations on 24 hours a day. NØFER says there are many stations that do have their stations available around the clock but more are needed to assure better section packet coverage in order to provide emergency communications when needed. The Pioneer Radio Club of Fremont handled public-service type communications in conjunction with the 2nd Annual "John C. Fremont Days" during August. The AK-SAR-BEN club of Omaha is now sponsoring an Explorer post of the Boy Scouts of America. The post will meet prior to the regular, second Friday of the month, meetings. More information can be obtained from Kandi Haggstrom, 402-333-8756. If you need any type of information or assistance concerning the Field Organization in Nebraska, contact your Section Manager. Your Section Manager tries to check into the evening storm net about three times per week and the Saturday Cornhusker Net. Radiograms are always welcome or just send a message via packet to the KØBOY BBS in Omaha or connect direct to the packet station which is on 24 hours a day. Traffic: KØDKM 180, WØKK 82, KAØBCB 22, WAØBOK 15, WBØGQM 5, NØDA 3, WCØO 1.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Caesar Rondina, N1DCS—ASM: Dick Pechie, KB1H. STM: K1EIC. SEC: N4GAA. OOC: NA1I. ACC: NK1J. PIO: WA1CFM. TC: W1HAD. SGL: K1AH. First off, thanks to KB1H for accepting the position of Asst. SM. Also congrats to N4GAA, Jay Ferron is our new SEC. His home number is 934-3933, work number is 847-5847, and hey computer buffs, he has a BBS at 932-8222. I will be looking forward to working with the remainder of the Conn. SEC Officials. Should you wish any information printed here about your club's activities, send it to N1DCS, 5 Bailey Dr., West Haven, Ct 06516. I can be reached at home at 934-2477 or at work, 937-8232. My digi is always up and running should you wish to leave me a message direct, on 145.05. ECARA had an information booth and station at the Woodstock Fair and passed over 150 pieces of traffic in three days. Way to go. Tri-City ARC knows how to keep 'em busy. Their club project is to convert older radios to 10 meters. Nice club project. For the third consecutive year, WHARA provided emergency communications for the National Disaster Medical Service. In addition, WHARA also provided an informational booth and passed traffic at the calling all counties event sponsored by the South Central GSA at the Durham Fairgrounds. Nice job N1DTI. Once again the Conn. section had 100% representation to both regional traffic nets. Job well done to all traffic handlers. And by the way, let's not forget all those unmentioned hams who spend a lot of their time passing traffic to other hams. Without them where would we be? Thank you. One last thought, we are your voice, talk to us, give us your input.

NET	NM	TIME	FREQ.(MHz)	SESS	QNI	QTC
CN	WB1GXZ	7 & 10 PM Daily	3.640	61	410	188
CPN	NK1J	6 PM M-Sat 10 AM Sun	3.965	31	356	103
NVTN	NM1K	9:30 PM Daily	146.880	31	652	237
WESCONN	NQ1P	8:30 PM Daily	147.180	31	486	130
RASON	KY1F	9:00 PM Daily	146.730	31	224	51
CSTN	K1CE	24 Hour BBS	145.010			200
CSN	WBIGXZ	7:30 PM M-F	3.720	23	151	60
TMRCN	NM1K		4	78	6	

Traffic: NM1K 539, N1DMV 349, W1EFW 256, WB1GXZ 243, KY1T 205, KA1JAN 130, KA1GWE 99, KY1F 76, KA1KP 62, N1FJW 57, KB1ZC 51, W1YOL 46, W1WP 41, KA1FVY 40, NK1N 28, WA1NLD 24, WA1RVI 17, N1BOW 15, NK1J 12, WB2SGI 9, W1BDN 8, W1CUH 7, W1QV 5, K1CE 4, WB1EFJ 4.

EASTERN MASSACHUSETTS: SM/SEC, Barry Porter, KB1PA— STM: KW1U. PIO: K1HLZ. BM: KB1AF. OO/AA: AG1F. SGL: K3HI. TC: KA1IU. ACC: Open. EMass Hotline: 437-0111 Westlink: 449-2226

Net	Mgr	Freq	Time(EDT)	Day	Sess	QTC	QNI
EMRI	N1AJJ	3658	1900/2200	DY	50	113	132
EMRIPN	WA1FCD	3880	1730	DY	27	60	90
EM2MN	KA1MDM	63/23	2000	DY	27	70	288
NEEPN	K1BZD	3945	0830	SUN	4	4	31
HHTN	NG1A	04/64	2230	DY	31	173	291
EMRISS	N1CVE	3715	1600/2030	DY	36	28	86
CITN	KB1AF	745/045	1930	DY	31	75	411

Total packet liaison traffic: 122. When this is published, the New England Division Convention will be history for another 2 years. I hope to see many of you there. The club season is in full swing and the HF bands are wide open. Many clubs will be having classes and exams sessions. There are now many opportunities to get a ham ticket. What we need to improve on is follow up. Does any club have an on-going Elmer program?? Has any club adopted a local school?? There will be some type of SET activity at the end of October or early November. The details will be worked out at the Boxboro convention. I appreciate getting the newsletters from the various clubs, it keeps me abreast of the various activities in the section. The Wellesley Club Newsletter is sporting a new look. Seems like someone got a desktop publishing system. Not too much else for this month. Traffic: KW1U 479, KB1AF 262, WA1TBY 235, WA1FCD 211, NG1A 198, K1GGS 143, N1CVE 76, KA1NOI 69, KA1MDM 67, N1AJJ 64, W1CE 63, K1ABO 52, WA1FNM 33, N1BNG 28, KA1LIH 26, N1EGN 22, K1LCQ 21, WA1CRE 20, W1TC 20, KA1EDY 6, KA1KCU 3. N1BGG Packet BBS: 128 QTC.

MAINE: SM, Bill Mann, W1KX—SEC: KA8UVQ. STM: WA2ERT. ASM: (PACKET) N1AHH. BM: W1JTH. SGL: K1NIT. TC: KQ1L. ACC: W1RWG. August saw successful ham gatherings at St. Albans (Aug. 12-14) and the 15th Annual Bangor Hamband (Aug. 26-28). The Augusta Emergency Amateur Radio Unit has become Incorporated and the name changed to Augusta Amateur Radio Association. The Pen Bay ARC provided communications for the second Bike Trek held by New Hope for Women. Helping were: N2LE, KX1I, W1CET, K1EHO, W1BDL, WA1ZDH, N1DEI, K1ALX, KA1HEH, WB1COP, KC1CG and K1VEB. K1WWT is again teaching Amateur Radio classes Weds. evenings at Cony High in Augusta. Code practice is provided on WA1ZDA/R on Tues. at 9:00 PM and 9:30 PM. Several Maine newsletters reported the passing of W1BYK, attesting to Don's stature as a mainstay in Amateur Radio for many years. Silent Keys: K1SRE and W1TAM. Help wanted: We need a Public Information Officer for Maine to provide leadership in public information and public relations matters. Also needed: Public Information Assistants. Contact W1KX. VE Exams: Nov. 12, Rockland, 8:30 AM (KX1I); Nov. 12. South Portland (SMVTI), 9 AM (KD2EU); Nov. 26, Bangor (EMVTI), 9 AM (K1AG). Maine's 7 OBSs transmitted 16 ARRL Bulletins and 3 Maine Bulletins during Aug.

NET	SESS	TRAFFIC	QNI	MGR
AROOSTOOK EMERG NET	5	3	110	WA1YNZ
CENTRAL ME EMERG NET	9	5	170	N1EUK
CUMBERLAND CO ARES	5	0	78	KA1ODT
HANCOCK CO NET	4	5	48	WA2ERT
KENNEBEC ARES/RACES	4	0	73	KA1LPW
ME PUBLIC SERVICE NET	4	0	31	KA8UVQ
PINE TREE NET	31	64	273	WA2ERT
SEAGULL NET	27	159	836	K1GUP

Traffic: KA1JOJ 80, WA2ERT 61, W1JTH 52, W1VEH 51, W1KX 46, AK1W 43, N1BJW 34, N1BCF 27, W1RWG 26,

(continued on page 114)

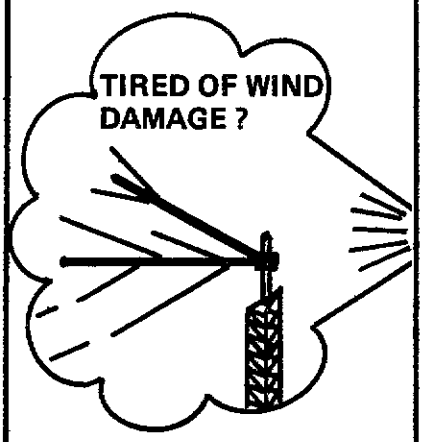
NOW FACTORY DIRECT!!!

STEP UP TO TELREX

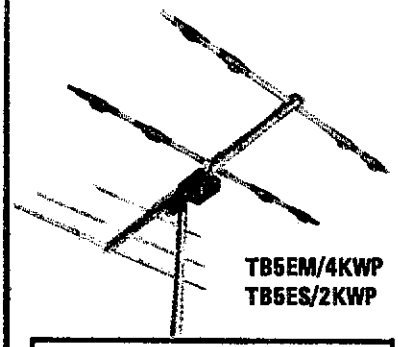
ANTENNAS
ANTENNA SYSTEMS

"INVEST" in a Telrex antenna!

Why gamble with shoddy antenna construction when Telrex makes available a professionally designed quality product.



Antennas that last "Decades" (not months)



TB5EM/4KWP
TB5ES/2KWP

Some of the WORLD'S finest.

TB4EC 10, 15, 20 Mtr.	$335.00
TB5ES 10, 15, 20 Mtr.	$500.00
TB5EM 10, 15, 20 Mtr.	$580.00
TB6EM 10, 15, 20 Mtr.	$695.00
20M326 3 elem. 20 Mtr.	$430.00
20M536 5 elem. 20 Mtr.	$745.00
20M646 6 elem. 20 Mtr.	$1125.00
15M532 5 elem. 15 Mtr.	$565.00
15M845 8 elem. 15 Mtr.	$1065.00
10M523 5 elem. 10 Mtr.	$385.00
10M636 6 elem. 10 Mtr.	$785.00
2MVS814, 2 Mtr. phased	$305.00

F.O.B. New Jersey

Prices subject to change.

VISA MasterCard

For data on the complete line of Telrex antennas phone (anytime) and leave your call sign, or write.

Phone: 201-775-7252

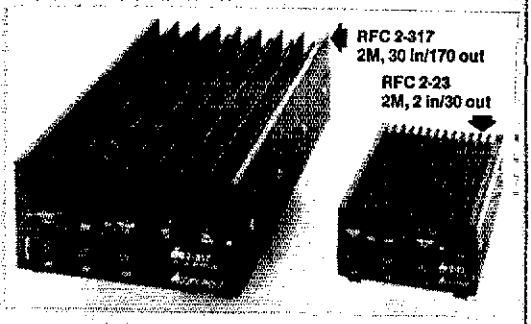
Write: Telrex P.O. Box 879
Asbury Park, N.J. 07712

---

rconcepts

NEW! NEW! NEW!

Model RFC 8-RC repeater controller is a control system that handles all the requirements of large multiple interconnected systems as well as a simple repeater. All command codes are remotely programmable as are the various timers, tone pitches and ID messages.



All data is stored in non-volatile Eprom so battery backup is not required to maintain operating parameters in case of power failure. The RFC8-RC is very affordable; suggested list is **$395.00** for the basic board.

144 MHz Amps
RFC 2-23, 2W in = 30 out
RFC 2-217, 2W in = 170 out
RFC 2-117, 10W in = 170 out
RFC 2-317, 30W in = 170 out
RFC 2-417, 45W in = 170 out

220 MHz Amps
RFC 3-22, 2W in = 20 out
RFC 3-211, 2W in = 110 out
RFC 3-112, 10W in = 120 out
RFC 3-312, 30W in = 120 out

440 MHz Amps
RFC 4-32, 3W in = 20 out
RFC 4-310, 30W in = 100 out
RFC 4-110, 10W in = 100 out

All amplifiers have GaAsFET receiver pre-amps and high SWR shutdown protection. All HT amplifiers will accept up to 5 watts input. 5 year warranty on parts and labor, 6 months on final transistors.

rconcepts

CALL YOUR FAVORITE DEALER FOR UPDATES
INQUIRIES: 2000 HUMBOLDT ST., RENO, NV 89509/(702) 827-0133
FACTORY: 8911-A MURRAY AVE., GILROY, CA 95020/(408) 847-7373

CB-TO-10 METERS

We specialize in CB radio modification plans and hardware. Frequency and FM conversion kits, repair books, plans, high-performance accessories. Over 12 years of satisfied customers! Catalog $2.

CBC INTERNATIONAL
P.O. BOX 31500AA, PHOENIX, AZ 85046

For Your Quality QSL Cards!

Rusprint

Parchment Mike & Key
Plastic Card Holders
Old Glory
State Outlines
Cartoon
Others

Rt 1, Box 363QST-Spring Hill, KS 66083
Addressed Stamped Envelope for Samples

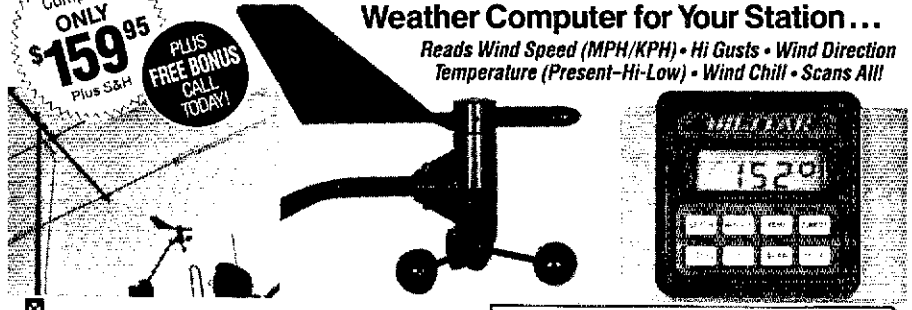
NEW! AZIMUTH WEATHER STAR

A Power-Packed Micro Weather Computer for Your Station... by DIGITAR

Reads Wind Speed (MPH/KPH) • Hi Gusts • Wind Direction
Temperature (Present-Hi-Low) • Wind Chill • Scans All!

Complete ONLY $159.95 Plus S&H

PLUS FREE BONUS CALL TODAY!



Protect Your Antenna & Home!

A must in every shack. Now you can scan...heavy Wind Gust...Wind Direction... Temp Hi/Lo and more! Get your own computerized weather station at an incredibly low, affordable price.

The New Azimuth Weather Star by Digitar is a high quality, power-packed weather computer, just loaded with features. Gives you accurate weather data...right in your shack...at the touch of a finger. Created with the latest CMOS micro-chip technology.

You Get All These Exciting **FUNCTIONS & FEATURES** with the TW2...

HANDY, COMPACT SIZE: 2½" x 2½" x 1½"
LARGE, EASY TO READ LCD READOUT Gives you Wind Speed • Records High Wind Gusts • Wind Direction • Wind Chill Factor • Outside Present Temperature (Remote sensor included) • Records High/Low Temperature • Reads in Fahrenheit, Celsius, Miles/Hour, or KM/Hr • Programmable Scant • Operates on DC (Batteries Not Included) or AC with Optional adaptor.

Your **TW2 SYSTEM COMES COMPLETE WITH** • TW2 Weather Computer • Anemometer & Wind Vane made of high impact, UV resistant plastic, with stainless bearings & shaft for years of trouble free service • 40 Feet of Cable lead-in with connectors • Outside Temperature Sensor • & Mounting Hardware •

And it's MADE IN AMERICA! YOUR SATISFACTION GUARANTEED! Or return in 10 days for a complete refund!

1 YEAR Limited WARRANTY from Manufacturer!

Your SPECIAL **FREE BONUS** *Order TODAY!*

Get the famous Azimuth World Time, Dual-Zone 24-Hour Station Clock. Displays Local & Intl. in 15 Cities/Zones **Retail Value $29.95**

ACT NOW! SEND TODAY!

AVAILABLE OPTIONS:
• Stainless Desk Stand (DSK22) @ $9.95 • Rechargeable Ni-Cad Battery Pack (BP3) @ $7.95 • 40 Ft. Extension Control Cable (EC40) @ 14.95 (Requires 2) • AC Power Adaptor (PS12) @ $9.95 • Please add $3.95 for Shipping & Handling of TW2. For each option add $1.00.

CREDIT CARD ORDERS ONLY
CALL TOLL-FREE 1-800-882-7388 TODAY!
Other Service Call 213-473-1332
(9AM to 6PM PST) Ca. Res. add sales tax.

VISA MasterCard

AZIMUTH WEATHER STAR
11845 W. Olympic Bl. Suite 1100, Los Angeles, CA 90064 USA (Dept. A8)

ALSO AVAILABLE AT HENRY RADIO & ALL HAM RADIO OUTLETS!

WB2RBA 24, ND1A 16, WA1YNZ 13, W1BMX, KA1DAX 10, KA1ODT 8, W1OTQ 5, WA1JCN 5.

NEW HAMPSHIRE: SM, Bill Burden, WB1BRE—SEC: K1ACL. BM: K1OSM. As clubs moved back into high gear after the long, hot summer, we saw a sample of the range of possibilities in our hobby! On Aug 5, a chemical discharge incident occurred at the W.R. Grace Co. in Nashua. EC KA1GOZ reported that the ARES group was activated and supported Red Cross shelters and the Emergency Control Ctr with communications. Mobile and fixed operators in the area helped track the movement of the cloud. Evacuation of 3000 people in the area was accomplished with no casualties and the discharge was soon under control. In another emergency, Dave W1FYZ, EC was notified of a comm emergency in Portsmouth and the ARES group manned the fire dispatch office and nursing homes throughout the city. Helping in this effort were WA1PEL, KA1JUL, KA1LLP, K1ACL, W1OQG, and N1EDU. More from the seacoast-W1GGA is working on putting an Amateur station aboard the U.S.S. Albacore, a submarine in permanent "dry-dock" in a local park. He is looking for equipment and help in setting up the station. N1DOU, WA3LVH and W1UBG announced the official startup of the Seacoast FM Packet Radio Net. The net meets on Wed at 20:30 local on 145.090. Thanks to the efforts of Butch WB1GXM and others, the NHARA state organization has a supply of Amateur radio bookmarks available for clubs or groups that are running classes. We hope to distribute these bookmarks to schools and libraries to promote the hobby. And in New London, Roger NS1O reported that their annual Hospital Day parade was coordinated by a group of area Hams including N1FSR, N1CIR, N1DRE, KA1PVX, W5ASD, W1GUA, KB1DL, KB4NSA, W1GUX, KB1QY. Congrats to the new MAPRA officers—Pres: W1JY, VP: KY1V, Sec/Treas: WB1GXM. MAPRA maintains packet digi's on 145.01 on Mt Ascutney and in Concord. CNHARC has made a donation to the ARRL building fund to support the upgrade of W1AW. Club member K1NYS was recognized for his QSO's with hams in Plymouth, England to commemorate the 400th anniversary of the defeat of the Spanish Armada. On the lighter side, IRS members enjoyed an outing at the beach in Newcastle with lobsters and breakfast prepared by WB1HBB and club pres KA1OU. NARC members and families enjoyed a long weekend at the Vermont home of KA1LDS and WB1BRE on their 6th Podunk weekend. Highlights included star gazing with a 15" telescope thanks to Ed, NM1N, and watching a house burning on a fire dept training session! And then John, KB1HE sent me a note indicating that he got into AMTOR recently and can't get out! He has an experimental system running and is looking for contacts for software ideas. On the traffic front, we had 90% representation on 1RN/3 this month and continued heavy activity among the traffic handlers as the report indicates. Nets: GSPN 127, GSFM 123, NHN 30, NHNTN 28, W1PEX 1684, WA1FHB 983, K1TQY 601, N1CPX 275, W1FYR 172, KB4N 152, W1ALE 83, WB1HBB 73, KA1GOZ 56, N1ALM 43, WA1YZN 38, KA1OU AND NE1J 36, KK1E 23, KA1HPO 10, KA1ROH AND KA1PFS 9, KA1NXT 8, KA1JOU AND K1TM 7, W1TN 1. BPL: W1PEX, WA1FHB, K1TQY. PSHR: KA1HPO, W1PEX, N1CPX.

RHODE ISLAND: SM, William M. Foss, KA1JXH—E. Bay & NPRA provided comm. for the 100 mile bike race. Starting in Tiverton on Sept. 11. OSARG next VE session is Nov. 19 at the Red Cross in Apponaug-no walkins. The 70 computer net is 5 yrs old & had its last net on Sep. 5th. OSARG Xmas party is Dec. 3rd. Have you tried the 145.17 rptr in Cranston lately? BVARC had a packet demo Sept. 26. Anyone want to join BVARC contact KV1O. Ham talk/Elmer program 2nd & 4th Wednesday at the Red Cross in Apponaug from 7-9 PM. OSARG has 315 members. If you want to learn about traffic handling call Jim KA1KML at 487-8113. Jim would also like to thank all the tfc handlers for a job well done. Hope everyone has a nice Tnx-giving. Traffic W1EOF 319, KA1KML 238, PSHR: 83, KA1JXH 131, PSHR 76.

VERMONT: SM, Jonathan P. Maguire, N1CQE—ASM (RFI): W1CTM. SGL/SEC: W1KRV. STM: KT1Q. It is with regret that I report that Peter, AE1T, has resigned as SM. Peter has taken a position as a teacher at Plymouth State College, Plymouth, New Hampshire. I wish Peter all the best in his new endeavor, and we will all miss him. He will be set up and on the air shortly, so that we can stay in touch. Good luck, Peter! The annual BARC Hamfest was held at the Champlain Valley Fairgrounds in Essex Junction, Vermont, on August 13. NB1A reports over 700 enthusiastic attendees! Some of the many activities were the Famous Flea Market, ARES and Packet meetings and some great contests. Winner of the high speed (45 WPM) contest was K1RR, with honorable mention to WA2SPL. KA1QZD won the Novice/Tech session at 17.5 WPM, VE3SIR won the QSL contest, and KA1RZF was the youngest ham at age 10! Many thanks to the numerous volunteers who made the Hamfest a success. W1AIM reports that the Worked All Vermont award is available to any amateur who works a verified 13 of 14 Vermont counties. Contact Chip, W1AIM, for details. K1HKI and W1AIM have received certificates for working the USSR/Canadian Skitrek expedition. New on packet: N1FHI, Dave, CVARC VP. CVARC is planning on VE sessions in January, April and September. CVARC has become a Stocked ARRL VE group—the only one in VT. Contact K1HKI for more info on the sessions. Upcoming Burlington area VT sessions are scheduled for 12/17, 2/25/89 (tentative) and 4/21/89. Contact WB2JSJ for more information. WA2SPL and KT1Q have earned BPL awards —congratulations! Vermont has also had 97% participation in 1RN/2 and 1RN/3—keep up the good work! WA2SPL, KT1Q, WA2JVV, NB1A, N1DHT have all earned Public Service Honor Roll awards. BARC's W1KOO 01/61 repeater is running an ACC RC-850 controller. August traffic: WA2SPL 1227, KT1Q 521, WA1JVV 108, W3QQ 60, N1DHT 59, KC1KI 54, WA1VXW 38, NB1A 37, AE1T 25, W1KRV 20. Net reports: VTN 31/132/113, VPN 4/60/4, GMN 27/430/28, CN 27/562/47, CVFMN 4/65/3, SEN 4/44/0, TwinSFMEN 4/46/1, TriSFM 5/75/3.

WESTERN MASSACHUSETTS: SM, Bill Voedisch, W1UD—OO/RFI: N1CM. PIO/ACC: K1BE. SEC/SGL: WB1HIH. TC: KA1JJM. STM: W1KK. Have you received a notice lately that you have QSL cards in the bureau? At least one hundred of these notices have been sent by KA1KRJ for the past three months. A great job of originating traffic. KA1IFC has been awarded the BPL Medallion and KA1KRJ has one on the way. One of these days the ultimate may arrive—the A1 Operators Club award. It can only be received by recommendation of three A1 Club members sending in their recommendation for the award. I was surprised many years ago when I opened that envelope and found my membership certificate. The HCRA (Zero Beat) has an article on their new toy. They have an automatic keyer/logger. KA1KPH said, "If we had this for the sweeps, we would be dangerous." I've been trying to find out what is inside that little gem. I'll keep you posted. This is the month that most clubs hold their first meeting. Next month I should have more news about the planned activities in the section. The WMPN meets Monday through Saturday at 6:00 PM on 3.937, and the WM (CW) net meets each evening at 7:00 PM on 3.562 MHz. The Western Mass Emergency Net meets each Sunday morning at 8:00 AM on 3.937 MHz. Now that you know where these nets meet, give them a try. Traffic: KA1IFC 780, KA1EXJ 34, WB1HIH 22, KB1TH 20, WA1YYK 55, K1JHC 20, W1SJV 10, WA1OPN 6, W1GQP 1, KA1MPG (June) 220, (July) 209.

NORTHWESTERN DIVISION

ALASKA: SM, Dianne Marshall, AL7FG—SEC: KL7AF. DEC: NL7HI, Interior. DEC: KL7JBV, Kodiak. STM: KL7VY. OBS: NL7IY, Kodiak. On September 2 about 4:30 PM N8HLC came on the Fairbanks 28/88 repeater looking for the local DEC, NL7HI. A tour bus of 42 people had rolled at a remote location about 23 miles south of Eagle on the Taylor Highway. Two known dead and 15 critical. KL7HPR stood by with AL7JJ and his airplane ready to fly to Eagle with communication. The emergency room doctor requested that hams be sent to the site. Arrangements were made by Marge, KL7VY, to mobilize hams into the area. Quickly, equipment was offered by KL7VY, KL7SW and AL7FQ to accompany Dr. N8HLC and KH6AP to the site via army helicopter. The emergency net was activated on 3.920. KL7VK was mobile with the Director of interior region EMS, monitoring the net. Others that helped were, NL7DW, NL7MY, KL7XO and AL7HT. Thank-you all for the instant response to this emergency and to all of those who stoodby on 3920.

IDAHO: SM, Don Clower, KA7T—ASM: K7REX. STM: W7GHT. OOC: WB7CYO. ACC: N7BI. In spite of the smoke and fires in Yellowstone, the WIMU Hamfest was a solid success. The Utah group did a super job and Macks Inn provided an excellent banquet and service. Some of us learned what "up the creek without a paddle" means. Our riverboat tour ended up with our Captain jumping overboard with a rope and tying us to the bank when the paddlewheel broke. All and all it was a super Hamfest. Next year WIMU will return to Jackson Hole, WY. I am searching for a SEC for Idaho. If you would like to help organize Idaho's emergency services please give me a call. Traffic: W7GHT 124.

MONTANA: SM, Ken Kopp, K0PP—At column deadline many are manning comm stns for Yellowstone Park fires. RACES activated by State DES with N7GXP as NCS. Others helping with fires in western Montana. Extreme fire danger cancelled annual guided geology tour by KE7LH. Worst fire season in history. Valley ARC (Glascow) is section's newest club. BARC (Butte) demo'd at shopping center & GFAARC (Great Falls) at State Fair. AARC (Anaconda) will host WIMU at Jackson Hole's Virginia Motel next year. KA7MMY now WR7S. YL KA7KBD is SK. When does your club's license expire? Traffic: WB7WVD 74 (PSHR).

IMN	30	348	143	KA7EEE
MSN	3	51	0	K0PP
MTN	31	1421	68	KF7R

OREGON: SM, Randy Stimson, KZ7T—ASM: KM7R. STM: W7VSE. SEC: W7FBP. PIO: KC7YN. SGL: KA7KSK. ACC: WF7Q. RFI: AK7T. OO: WN7W. STC: N7ENI. I am going to get on my soap box. This is my opinion only. I am very upset, as a lot of you are, over the loss of 220 to 222 MHz. I feel that apathy and the "let the other guy do it" syndrome are the reasons that we lost that portion. Surely it 450,000 hams had written to their Senator, Congressman and the FCC, a different decision would have resulted. Today the 220 band, what is coming tomorrow? I talked to a lot of hams about the problem, and I could feel that they didn't care as they didn't use that part of the band. Well maybe, if we don't pull together, the next segment of our frequency taken from us will be something that the unconcerned hams are using. Off the soap box. The one Public Service event that takes the most time and mileage is the Hood to Coast relay race. It is the largest relay race in the country starting at Timberline Lodge on Mt. Hood and 168 miles later finishing at Pacific City on the coast. There are 580 teams of 11 people each and every team has 2 vans transporting the runners. This translates into a huge traffic jam for 168 miles. The race starts at 6:00 PM Friday and ends Midnight Saturday. The hams work Start, Finish and the Exchange Points for emergencies that the runners might have. We had 44 hams who helped. They worked 575 hours and drove 3575 miles. Great job. Traffic (P) Packet W7VSE 323, N7BGW 242, WB7VSN 224, N7ELF 207, KA7EEE 167, W7LRB 136, W7LNE 83, WB7SZM 71P, N7APC 70, N7CPA 69P, WJ7E 60, W7XI 56P, KA7BYG 54, KF7BX 47, K7IFG 38P, KV7F 31, KZ7T 31P, KA7AID 19, N7DRP 18, WB7EMO 14, KD7YJ 14P. (July) N7DRP 28.

WASHINGTON: SM, Brad Wells, KR7L. STM: KD7ME. SEC: KA7INX. TC: W7BUN. OOC: N7DVR. SGL: KD7AC. BM: N7CAK. PIO: N7FKV. ACC/ASM: KC7PH. ASM: KD7G. ASM: KA7CSP. ASM: W7UOF. ASM: K7CLL. Three big contests this month, the ARRL Sweepstakes on the first and third weekends and the CQWW on the fourth weekend. These contests always generate a lot of interest and offer an unexcelled chance to pick up new states, new countries and new prefixes on any of the HF bands. Even if you're not into contesting, take a couple of hours on these weekends to help out those trying to set new records. They will certainly appreciate your time and effort. The latest news on DX and DXing may be found on the 2 Meter DX Info Net which meets each Thursday at 8:00 PM local time on the 147.00 repeater. Everyone is encouraged to check-in. The QRP bug attacked K7ZR again and he's busy working DX with milliwatts, not kilowatts. Each of the Affiliated and Special Service Clubs in the Section received a copy of the new ARRL Special Service Club Manual. It's packed with information and ideas on how to become an SSC. The many advantages of Special Service Club status are fully outlined in this publication. However, there MUST be at least one PIA, OES, ORS, or OBS appointment held by a club member. Clubs are encouraged to have all four

(continued on page 118)

rf enterprises

• We Specialize In Antennas & Towers. • We Ship Worldwide.

ANTENNAS

KLM

World Class Antennas for the Serious Amateur!

KT34A.....$395.00 KT34XA.....$585.00

Monobanders: 80-10 Meters!
High Performance VHF & UHF antennas.

hy-gain

Tribanders

TH7DXS — TH5Mk2S
Explorer-14 — TH3JrS

Monobanders

204BAS — 205BAS
155 BAS — 105BAS
103 BAS

VHF, OSCAR & VERTICAL ANTENNAS!
NEW! High Performance 144 & 432 MHz Antennas.
Call For Prices!

cushcraft

The "A4 S" - The A4 tribander with all stainless steel hardware
Add 30 or 40 meters with stainless hardware - The "A744S"

A3/A3SK Stainless Kit.....
AT43 Add-on Kit .....
A3SK & A4SK Stainless Kits.....
AV3 & AV5 Verticals .....
AP8 & APR 18.....
40-2CD 2-el. 40 Mtr. Beam.....

CALL

Monobanders For 10, 15, & 20 in Stock!

617-6B 6 Mtr BOOMER.....
A50-5, A50-6.....
A147-11, A147-20T.....
215WB & 230WB 15 & 30 el 2 Mtr.....
AOP-1 Satellite System.....
4218XL & 3219 for 144-146 MHz.....
220B, 424B BOOMERS.....

CALL

Large Inventory Of Other Antennas & Accessories

BUTTERNUT

HF6V ..... CALL — HF2V..... CALL
RMK II Kit..... — STR II Kit.....
TBR-160S Coil..... — SC-3000 Antenna...
HF5B ..... CALL

ALPHA DELTA

DX-A.....$46.95 DX-DD..64.95 DX-KT....27.50
NEW! DX-CC All band dipole.....$79.95
Full line Alpha Delta switches & Transi-traps!

HUSTLER

6BTV .....$134.95 5BTV $124.95
G6-144B..... 86.95 G7-144 ..... 114.95
G7-220..... 114.95

Complete HF Mobile Systems. CALL!

MOSLEY

TA-33 — CLASSIC 33
TA-34 — PRO-67

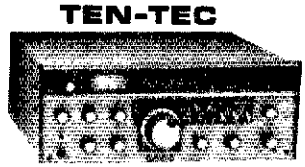
TONNA

ANTENNA SPECIALISTS

ROTORS

TELEX		YAESU	
HDR-300	CALL	G400/400RC	CALL
T2X	CALL	G600RC	CALL
HAM IV	CALL	KR2000RC	CALL
CD45 II	CALL	G5400B	CALL
AR-40	CALL		
ALLIANCE		**DAIWA**	
HD-73	CALL	MR 750 PE	CALL

TEN-TEC



MODEL 561 CORSAIR II

OTHER TEN-TEC PRODUCTS:
Model 585 Paragon
Model 425 Titan Linear Amplifier
Model 229A 2KW Antenna Tuner
Model 2510 Satellite Station

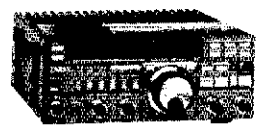
Full line of filters, power supplies, mobile antennas, and accessories in stock.

ASTRON POWER SUPPLIES

Rack mount and speaker models in stock!

RS-4A . . . $37.95	RS-7A 49.95	RS-12A . . . 69.95
RS-20A . . . 88.95	RS-35A . . 135.95	RS-50A . . 193.95
RS-20M . . 106.95	RS-35M . . 153.95	RS-50M . . 216.95
VS-20M . . 124.95	VS-35M . . 171.95	VS-50M . . 232.95

YAESU



FT-757 GXII All Mode Transceiver

AMPLIFIERS & TUNERS

MIRAGE — AMERITRON — MFJ

RFC 2-317

dconcepts — AMP SUPPLY — TEN-TEC

NYE-VIKING
MB-V-A

MAGNUS SOLID STATE HF LINEAR AMPS

MFJ

CLOCKS — KEYERS — ACCESSORIES — TUNERS

Model 989B
Antenna Tuner

SSB ELECTRONIC & MICROWAVE MODULES TRANSVERTERS, PREAMPS, & ACCESSORIES. CALL!

TOWERS

HY-GAIN

Crank-up, self-supporting, galvanized steel towers. SS rated at 9 ft; HD at 16 ft.

HG-37SS, HG-54HD — CALL FOR PRICES — HG-52SS, HG-70HD

ROHN

Self-supporting: Ratings: HDBX at 18 ft, HBX at 10 ft, BX at 6 ft.

HBX 40	$225.00	HDBX 40	282.00
HBX 48	305.00	HDBX 48	380.00
HBX 56	389.00	BX 64	429.00

Galvanized steel with base and rotor plate. Today's best buy. Freight additional but you save with our volume shipper's discount!

GUYED TOWER SECTIONS:

25G $55.00
45G 132.00
55G 165.00

Sections and All Accessories Call for current prices.

FOLD-OVER TOWERS:

FK2548..... — FK4544.....
FK2558..... — FK4554.....
FK2568..... — FK4564.....

CALL — CALL

Prices 10% higher in western states.

ROOF TOWERS & CLIMBING BELTS..... Call!

TOWER HARDWARE

Guywire: 3/16EHS / ¼ EHS, per ft.....$0.15/0.18
CCM Cable Clamps: 3/16 / ¼.....0.39/0.49
Turnbuckles: 3/8" E & E/E & J.....6.95/7.95
½" E & E/E & J.....12.95/13.95
Thimbles: ¼" (3/16 & ¼" cable).....0.39
Earth Anchor: 4 ft. Screw-in.....13.95
Preformed "Big Grips": 3/16 & ¼.....2.49/2.99
Guy Insulators: 500 D/502.....1.69/2.99

PHILLYSTRAN GUY SYSTEMS

HPTG-2100/-4000/-6700 Cable.....0.30/.50/.70
Cable Ends: 9901LD/9902LD.....8.95/10.95
Socketfast Potting Cmpd.....15.95

WIRE & CABLE

BELDEN COAX

9913 low loss.	$0.45/ft	RG-8X(9258)	0.20
RG-213/U(8267)	0.46	RG-11A/U(8261)	0.41
RG-8/U(8237)	0.36	RG-58A/U(8259)	0.15
RG-8/U(8214)	0.40	RG-59/U(8241)	0.16

RG-214/U(8268) $2.25/ft.

450 Ohm Ladder Line.....0.10

RG-213/U (Economy cable as good as any at this price).....0.32/ft.

COPPERWELD ANTENNA WIRE

Solid: 12 ga.....0.10 14 ga.....0.08
Stranded 14 ga.....0.10

Plus Wide Selection Baluns, Insulators, Accessories

ROTOR CABLE

Std (6-22, 2-18).....0.19 Hvy (6-18, 2-16)...0.36
Others in stock.

AMPHENOL CONNECTORS

PL-259: std/silver/teflon.....0.89/1.25/1.45
UG-21B (8261) Type N Male.....2.95
T's, angles, adaptors, jacks, & BNC in stock!

COAX AVAILABLE IN PRECUT LENGTHS WITH CONNECTORS ATTACHED.

• • COAXIAL SWITCHES • •

ANDREW HELIAX & CONNECTORS

½" LDF4-50A..... CALL 7/8" LDF5-50A..... CALL

ALINCO • AMERITRON • AMP SUPPLY • ANTENNA SPECIALISTS • ASTATIC • BENCHER • B & W • CREATE • DAIWA • KANTRONICS • LARSEN • MFJ • MOSLEY • NYE-VIKING • PALOMAR • SANTEC • SHURE • TONNA • WELZ & MORE

RETURNS REQUIRE AUTHORIZATION & SUBJECT TO RESTOCKING CHARGE

Prices subject to change without notice. Minnesota residents add 6% tax. Shipping additional except as noted.

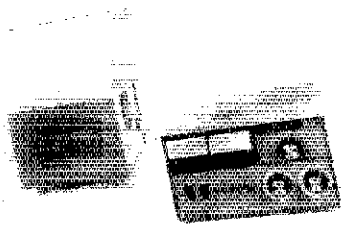
ORDER ONLY
1-800-233-2482
INFORMATION, TECHNICAL, MINNESOTA & DX:
218-765-3254
TELEX **4953032 RFE UI** FAX 218-765-3308

rf enterprises
HCR Box 43
Merrifield, MN 56465
(Located at Junction of 3 & 18)

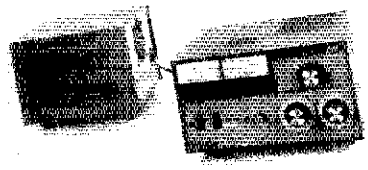
WORLD CLASS RF POWER FOR EVERY BUDGET FROM AMP INTERNATIONAL!

LOOKING FOR THE RIGHT HF AMPLIFIER AT THE RIGHT PRICE, AND JUST CAN'T FIND IT?

LEGAL LIMIT PLUS!



THREE 3-500Z TUBES!
LK550 **$1995** LK550-NT **$2250**



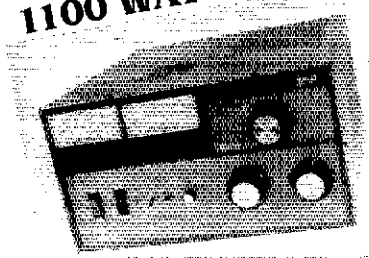
THREE 3CX800A7 TUBES!
LK800-A **$2995** LK800-NT **$3250**

1500 WATTS PEP!

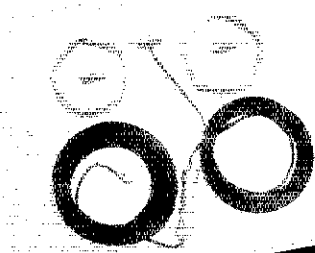
TWO 3-500Z TUBES!
LK500-ZC **$1495** LK500-NTC **$1650**

INTERIOR LK550

1100 WATTS PEP!



SINGLE 3-500Z TUBE!
LK450 **$999.50** LK450-NT **$1149.50**



G5RV
ONLY **$59.50**

We've got what you need at AMP INTERNATIONAL!!

We have the most comprehensive line of HF amps, with all the features and versatility you demand, **AND** at the right price for your budget! We're no newcomers to RF Power. As Amp Supply Company, we've sold over 20,000 amplifiers through the years, all over the world. That's why we say . . .

NOW, we're **AMP INTERNATIONAL!**

Just look at this lineup of great features!

- Vacuum-Relay QSK!
- Full-wave bridge P/S!
- Heavy-duty Centralab Bandswitches!
- ALC Lockout protects tubes!
- NEW! Step-Start for P/S protection!
- Two-Year Warranty!
- Peter Dahl Hypersil Transformers!
- Computer-Grade Filter Capacitors!
- Silver-Plated Tank Coils!
- Tuned Input for a perfect match!
- Modern Styling Complements Your Rig!
- Rugged EIMAC tubes!

Each amplifier is available in a NO-TUNE version, too! Great for contests and DXing when every second counts! All you do is QSY and GO!! Order NT version.

Are you looking for a **great** all-round antenna? Get our famous G5RV Signal Injector™, now with an improved matching transformer! This fully-assembled antenna handles legal limit power and operates on 80-10 meters.

CALL TOLL-FREE
(ORDERS ONLY) 1-800-346-5701 (ORDERS ONLY)
Add $10 S/H on amplifiers, $4 on antennas for UPS Brown.
APO/FPO addresses inquire for rates. • NC residents add 5% tax.

Amp
INTERNATIONAL
RF Power Products

6307 Chapel Hill Road / Raleigh, NC 27607
(919) 851-7388 FAX (919) 851-8139 TELEX 980131 WDMR

"The '850 Found a New Friend"

The industry standard RC-850 Repeater Controller can now talk with your computer.

And there's so much for them to say!

The '850 computer interface improves the management of your voice repeater system. It allows you to command and program interactively from your terminal or personal computer using a MODEM or packet TNC. Even preview and edit repeater messages by typing words from the controller's vocabulary directly into message slots.

Retrieve and catalog data relating to your site measurements, equipment status, and repeater and command activity. Download and print out the information programmed into your controller. And view your system "front panel" on your computer screen.

You'll find the RC-850 controller on the leading voice repeaters around the world. ACC pioneered remote programming of repeaters - and continues to pioneer with remote computer access. While the rest of the world just talks about catching up, ACC continues to lead the way in advanced repeater technology.

Now, with its computer interface, the '850 can be best friends with your computer.

acc advanced computer controls, inc.

2356 Walsh Avenue, Santa Clara, CA 95051 (408) 727-3330

ATV CONVERTERS • HF LINEAR AMPLIFIERS

DISCOVER THE WORLD OF FAST SCAN TELEVISION

AMATEUR TELEVISION CONVERTERS
ATV2 420–450 ..... $ 44.95 Kit
ATV3 420–450 (GaAs–FET) ..... $ 49.95 Kit
ATV4 902–928 (GaAs–FET) ..... $ 59.95 Kit

AUDIO SQUELCH CONTROL for ATV
SIL ..... $ 39.95 Kit

2 METER VHF AMPLIFIERS
35 Watt Model 335A ..... $ 79.95 Kit
75 Watt Model 875A ..... $119.95 Kit
Available in kit or wired and tested

HF AMPLIFIERS per MOTOROLA BULLETINS

Complete Parts List for HF Amplifiers Described in the MOTOROLA Bulletins

AN758 30W	$160.70	EB63 140W	$ 88.65
AN762 140W	$ 93.25	EB27A 300W	$139.20
AN779 20W	$ 83.79	EB104 600W	$448.15

NEW!! 300 WATT 10–150 MHz Amplifier

POWER SPLITTERS and COMBINERS
(2–30MHz)

600 Watt	2–Port	$ 59.95
1200 Watt	4–Port	$ 69.95

100W 420–450 MHz PUSH–PULL LINEAR AMPLIFIER – SSB–FM–ATV

KEB67–PK (Kit)	$129.95
KEB67– PCB (PC Board)	$ 18.00
KEB67–I (Manual)	$ 5.00

For detailed information and prices call or write for our free catalog

FERROXCUBE DEVICES

VK200–20/4B RF Choke	$ 1.20
56–590–65–3B Ferrite Bead	$ .20

HEAT SINK MATERIAL

Model 99 Heat Sink(6.5x12x1.6)	$ 22.00
CHS–6 Copper Spreader(6x6x1/4)	$ 18.00

Add $2.00 additional shipping.

We also stock Hard–to–Find parts

CHIP CAPACITORS
METALCLAD MICA CAPACITORS
RF POWER TRANSISTORS

MRF141G	$209.20
MRF151G	$186.80

MINI–CIRCUIT MIXERS

SBL–1	$ 6.50
SBL–1X	$ 7.95

ARCO TRIMMER CAPACITORS

Add $ 2.00 for shipping and handling.

VISA

CCI Communication Concepts Inc.

121 Brown Street • Dayton, Ohio 45402 • (513) 220–9677

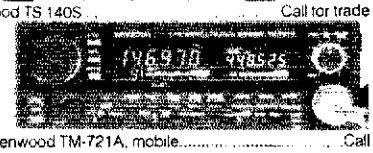
master charge

MADISON SHOPPER

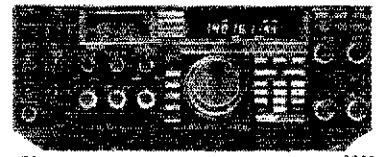
CALL FOR ORDERS
1 (800) 231-3057
1-713-520-7300 OR 1-713-520-0550
TEXAS ORDERS CALL COLLECT
FAX 1-713-771-7759
ALL ITEMS ARE GUARANTEED OR SALES PRICE REFUNDED

New Icom IC 781 ..... Trades wanted
Kenwood TH215A, TH25AT ..... Trade in your old HT
New Kenwood TM-621A, 144/220 MHz FM ..... Call

Kenwood TS 140S ..... Call for trade



New Kenwood TM-721A, mobile ..... Call
ICOM 28H/TTM 410.00



Icom 761	2300.00
Shure 444D	56.95
HEIL BM10 Boom Mike, wired 8 pin	69.00
HEIL HM5 Desk Mike	62.00
Cushcraft 124-WB (146 MHz)	39.00
Butternut HF6VX, 80-10 vertical	125.00
Hustler G7-144	129.00
Larsen 2-meter on glass	49.95
Anteco 2M, 5/8, Mag. Mount Comp	25.00
Van Gordon G5RV	44.00
Valor AB5 mobile	79.00
Thousands of panel meters	3.95 up CALL
Aerovox 1000 pf/500 V feedthrough caps	1.95
Transformer 120 V Pri 1050 V/1A (Sec #18 Wire)	50.00
100 mfd/450V Axial Cap	2.20
120 mfd/450V Axial Cap	3.00
Arista SWR Bridge 3-30 MHz	19.95
831SP PL259 Silverplate (Amphenol)	1.50
82-61 N Male (Amphenol)	3.50
82-202-1006 N Male (9913)	3.50
Double Female UHF	1.00
UG176 RG8X	each .40
Receiving tubes 50-90% off list price	
Santec Boom Mike/Headset (fits ICOM)	20.00
Rohn SA 25G 67 (67 inside arm)	each 125.00

IC 781 ..... Call

USED EQUIPMENT
All equipment, used, clean, with 90 day warranty and 30 day trial. Six months full trade against new equipment. Sale price refunded if not satisfied.
Call for latest used gear
(800) 231-3057

GNU PROD
TE Systems 2m Amp 30-160 watts GaAs fet $229.00

POLICIES
Minimum order $10.00. Mastercard, VISA, or C.O.D. All prices FOB Houston, except as noted. Prices subject to change without notice. Items subject to prior sale. Call anytime to check the status of your order. Texas residents add sales tax. All items full factory warranty plus Madison warranty.
Bird and Belden products in stock. Call today.

MADISON Electronics Supply

3621 FANNIN
HOUSTON, TEXAS 77004

appointments filled by their membership. Currently, there are no PIA appointments in this Section. There are 21 ORS, 11 OBS, and 8 OES appointments. The names and call signs of club members holding these appointments are an integral part of the original application or renewal form. If your club is lacking in one or more of these appointments, contact the appropriate staff member for specific information and application form: PIA—Public Information Officer: John Teale, N7FKV; POB 2675; Silverdale, 98383; ORS—Section Traffic Manager: Phil Dunn, KD7ME; 9104 113th Street SE; Tacoma, 98498; OBS—Bulletin Manager: Pat Morgan, N7CAK; 3410 South 356th Street; Auburn, 98001; OES—Section Emergency Coordinator: Ed Holloway, KA7INX; 3561 East Spokane; Tacoma, 98404. Additional information and help with SSC application or renewal can be had from the Section Affiliated Club Coordinator: Tom Plaisance, KC7PH; 101 North 37th Ave; Yakima 98902. Another ARRL program which traditionally receives little publicity is the Official Observer corps. Since government deregulation and reductions in the annual budget of the FCC, the Amateur Radio service has become virtually self-regulating. It is now the Official Observer who provides monitoring services and facilities for the FCC and amateur community. The OO is concerned with amateur-to-amateur interference and with the unauthorized use of our frequencies by other radio services. To become an OO, you must have at least a Technician ticket, have been a ham for a minimum of 4 years, and pass a written examination. If you're interested in participating in this important program, contact the Section Official Observer Coordinator: Dan Rooks, N7DVR; POB 566; Kingston, 98346. The Special Service Club, Lower Columbia ARA, has appointed K7WF as HF Awards Manager and WB7UUP as VHF Awards Manager. Another Special Service Club, Issaquah ARC, has appointed KA7MCX as VHF Awards Manager. These people can certify your QSL cards for a number of ARRL operating awards. KC7FA has resigned as DEC Peninsula after many years of service in ARES. YL's interested in attending the YLRL 50th anniversary convention at Kauai, Hawaii in June 1989 should contact K1IIF for travel & convention information. PUBLIC SERVICE HOURS: Benton 68; Franklin 60; King 828; Kitsap 1320; San Juan 8; Thurston 112. Traffic: K7AJT 31, WA7CBN 12, KE7EO 10, N6EQZ 87, KR7F 42, KF7FF 26, W7GB 87, N7GGJ 31, K7GXZ 165, W7IEU 8, W7IGC 232, W7LBK 31, W7LG 123, KA7PMD 18, W1PRT 16, K7SUX 96, KA7TTY 19, K7UQH 82, WB7WOW 295, WA7YEN 83, KD7ME KR7L. PSHR: N6EQZ, W7LBK, KD7ME, WB7WOW.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG—ASMs: W6ZF, WB3FCV. SEC: W6LKE. STM: K6APW. OOC: NY6Z. TC: N6AMG. MDARC's ATV Group has their ATV repeater fully operational, with plans to add 1.2 and 2.4 GHz outputs as well as translators to increase coverage. Present freqs are input/1264 MHz and output/427.25 MHz. The club welcomes new members KJ6CS and N6OSK, and congratulates N6SPT, N6SPX & N6OSK on upgrading to Tech. BARC's FD crew, with coordinator KJ6FY and group leaders KG6LV & KE6IA presiding, made 729 contacts and a total score of 6110. EBARC enjoyed a program by the EB section's dynamic duo of DXpeditioners, Lloyd & Iris Colvin - W6KG & W6QL. Their members approved a dues increase by unanimous vote! LARK's FD score is estimated to be 3900. They welcome new members AA6GI & KB6ZFB. HRC's 10 meter net (Wednesdays at 8 PM on 28.350) is getting check-ins from Canada and Hawaii. They welcome new member N6SQC. I was invited, along with ASM WB3FCV, to attend VVRC's special breakfast meeting at which they received their ARRL affiliated club certificate. It was a pleasure to meet many of their members and to see that they had invited representatives from many of the adjacent clubs. I hope this concept spreads through all clubs. The CCCC welcomed new members KB6UL, W6EFD & KA6ERF. Aug traffic: WB6DOB 191, W6VOM 101.

NEVADA: SM, Joe Lambert, W8IXD—ASM: Curly Silva, K7HRW. The Hamfest in Reno was a big success. Hope everyone had a good time. Plans are underway for a repeat next year. Also, hope everyone enjoyed the Pacificon Convention in San Jose. There has been a major effort to save the 220 band by Nevada hams. Since the decision was issued August 4, many of us have written letters to our congressmen and the FCC. Special thanks to N7HDC and WI7D. NW7O has been traveling through Northern Nevada, Alaska and Hawaii giving many people grid squares on several bands from 6 meters through 10 Gc. LVARC is planning a much more flexible controller for the 146.94 repeater. SIERA had a ham station set up at the Alpine County Fair which drew considerable interest. They are also providing communications for the Genoa Candy Dance. TARA provided emergency communications for the world's toughest Triathlon at South Lake Tahoe. TARA's East Peak repeaters now have battery back up. Remember, when renewing your ARRL membership, to renew through your club. The ARRL gives a bonus for each new membership or renewal made through an ARRL affiliated club. Please send your items to W8IXD for this column before the first of the month.

PACIFIC: SM, Wayne Jones, NH6GJ—Greetings to all from the land of Aloha! A recap of Section appointments: ASM Hawaii—AH6J; ASM Maui—KH6H ASM Guam—WH2AEN; STM: KL7IVQ/KH6; SEC: NH6GJ; OOC: AH6GR; TC: AH6P. PIO: KH6IJ. BM: KH6H. DEC's: KH6S, KH6H, WH2AEN. Other appointments will be announced soon. Congratulations to the following upgrades: WH6BZX, WH6BYX, WH6BRS, KA3FSB/KH6, NH6PR, KH6RF. KL7IVQ, NH6KW, WH6BLC, AH9AD, NH6PO, NH6NG, AH6IX. Route packet traffic to Maui via KH6GPI BBS. WH6C has closed down. W1YRM, KH2CC, KH2GG, KH2CU, WH2AEN supported the "Hornet-Raleigh" bike race. KG2RN has retired from Guam Superior Court and moved to Washington DC. He will be missed on Guam! Give these new nets a try: 10 meter MM. 28.480; 0300Z daily. Hawaii Any Speed CW Net: 7.126 MHz; 0600 Z daily. Traffic: KH6S 63, KL7IVQ 52, KH6GMP 23, KH6H 35. Aloha from all of us to all of you!

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—Our hard working Section Emergency Coodinator, Deane, NR6A, has persuaded Cass, NX6Z to take on the responsibility as District Emergency Coordinator for the Metropolitan Sacramento District. All DEC positions are again filled. Congratulations to the recent upgrades including Amy, KB6ODA; Seth, KB6UZW; Sherry, KB6TBV and Cynthia, KB6YPE to Technician and Wayne, N6MII and Fred (formerly KB6BOJ) to General. Fred also has a new call (N6SVZ) that many people, including Fred himself, are having trouble getting used to. The Sierra ARCs newest member John Mattingley has a new ticket with the call KB6ZOO and one of the graduates of their Novice class, another John (Bauman), upgraded to Tech. Bobby, WZ6Y is no longer the only Extra Class female in the Amador County ARC - she has been joined by Nancy, KI6XF who had passed the theory exam easily, months ago, and finally conquered the code. The two are now plotting improvements in the way the next VE exams will be given in Jackson November 12. I was saddened to learn that an old friend, Fred Lathe, W6DAC, became a Silent Key last spring. However, ham radio goes on at Fred's QTH with a new operator. Seems that John Waayers, K6MAU from southern California wanted to move up here, heard that Fred's place with tower and all was available and now keeps up the tradition - even has the same phone number. Traffic: WD6BZQ 427, WA6WJZ 348, N6LUY 290, K6SRF 97. WA6ZUD 84, W6RFF 24, WB6SRQ 12. (July) WA6WJZ 203, N6LUY 188, K6SRF 91, WD6BZQ 56, WA6ZUD 44, W6RFF 30.

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD—SEC: WC6U. STM: N6AWH. TC: WA6EXV. ACC: W6DPD. Asst. SMs: W6TRP and K6YK. WA6VPW and W6OIN are SILENT KEYS. Amateurs from Tuolumne and Calaveras counties provided communications for the Cal. Div. of Forestry during the 1988 summer fires. K6LHR was the liaison between the CDF and the Amateurs. The Sierra ARS furnished communications for the Mountain Festival. Congrats to W6REC and N6NQD on their recent nupitals. The following are new calls in the Lemoore area: KB6YOD, KB6YOE, KB6YOF, KB6YOG, KB6YOH, and KB6YOJ. KB6ZNU and KB6ZNV are active in Lodi. K6URI operated from the United Kingdom, Germany and Ireland. WB6VGH, KJ6CJ, and WB6QVO are Extra. KB6QYS and N6RTU are Advanced. WB6KCE, KB6FEK, KB6VBX, and N6NML are General. KB6YBH is Tech. KB6MEE is N6SDD. N6PZS is KJ6JE. KI6ZZ is AA6IZ. W6YO won a 2 m handheld. W6JPU has a KWM-2A. The gremlins ate the June Section News. Many SJV Amateurs attended the Reno Hamfest this year. Happy Thanksgiving to all. Traffic: WA6YAB 16, K6PMG 5, N6MXG 2, WB6ITM 1.

ROANOKE DIVISION

NORTH CAROLINA: SM, W. Reed Whitten, AB4W— ASM: AB4S. SEC: N4MYB. STM: K4NLK. BM: K4IWW. ACC: WC4T. TC: K4ITL. SGL: KE4ML. PIO: AB4FW. Rudy Friedrich, AB4FW, is PIO & our section staff's newest appointee. Rudy lives in Minnesott Beach and is a member of the New Bern ARC. He was an Army high speed radio op., is a noted military historian of the Congressional Medal of Honor, a published author, & sailing enthusiast. In September he was honored as "Big Brother of the Year" for NC, SC, VA & WV. Rudy would like to hear from ALL clubs & also Amateurs who are interested in Public Information Assistant appointments. He will provide assistance and guidance in contacting media & getting coverage for emergency operations, special events, exams, & club meeting highlights (special guest speakers, etc.). This is IMPORTANT! Let's take advantage of Rudy's talents. Start with SET in October [BT] SEC N4MYB suggests SET involve local & long distance telephone outage 0800-1200 ÷ Sat, Oct 15. Cause of outages to be determined locally. All participants should send and receive formal traffic. ECs should contact and involve all served agencies & set up liaison with NTS nets and adjacent counties. Packet involvement should be encouraged and new packet station at State EOC will be operational. [BT] Questions about packet radio and traffic come up from time to time. Current situation: All NC packet traffic is considered to be part of an NTS net called NCPKT. AB4S is NC Packet Manager (as well as ASM). The PM coordinates packet radio traffic for NTS in NC. Reports sent to AB4S from BBS operators will be included in his NCPKT Net Report sent to STM K4NLK at the end of each month. ALL BBS SYSOPS: Please send Ed a count of your "T messages" originated, received, sent, and delivered at the end of each month. Also please forward a Station Activity Report to SM AB4W and they will be included in the North Carolina activity report (below). See YOUR call sign in QST!! [BT] New packet group, NC Packet Radio Council will meet at State EOC on Sat, Nov 12. All are invited. [BT] ALL CLUBS: Please add SM, ASM, ACC, & PIO to your newsletter mailing list. [BT] Mark 4 ARC sponsored Greensboro Hamfest scheduled for November 24-25 [BT] Silent Keys: WA4FQJ, WB4MJH & Sandra Hampton (K4ITL XYL). [BT] August traffic: K4NLK 367, AA4TE 280, K4IWW 144, WD4HTE 128, KI4YV 102, N9CGD 97, WD4RMQ-1 62, WB4N 52, WB4WII 51, KA4OJN-0 47, AA4ZV 46, W4LWZ 38, N4JRE 37, WD4MRD 35, N4UE 34, AB4EO 32, W4EHF 31, KA4KGZ 27, WA2EDN 25, WA4MNR 19, AB4W 14, N4CJJ 11, NT4K 7, AJ5F 7, N4TCH 3, WB4UOU-1 2, K4FKF 1.

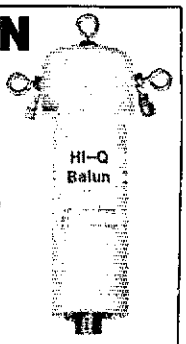
SOUTH CAROLINA: SM, Jimmy Walker, WD4HLZ—As you know, I was appointed SCM 5/3/82 and was elected by you to serve as SM for 6 years. Prior to that time I served as SEC. The past 10 years have been exciting for me because I enjoyed serving you and presenting Amateur Radio to South Carolina officials. The task was an easy one for me because of YOU. If it were not for the time and effort each of you gave in support of these programs, we could not have projected such a positive and professional image of Amateur Radio. I THANK YOU! On January 1, a new SM will step forward bringing fresh ideas and programs. Give your new SM the same support as you gave me and Amateur Radio will shine in our section. KEEP UP THE GOOD WORK! And for each of you with the question in your eye—I will become Roanoke Division Vice Director January 1. Nets: SCSSB 795/49, York 1002/105, Greater Pee Dee 549/66, Lancaster 138/17. Traffic: W4ANK 123, N4MEJ 64, W4DRF 52, KA4LRM 32.

VIRGINIA: SM, Mark Witt, NN4I—SGL: W4UMC. PIO: AA4VP. TC: WX4C. STM: KB4WT. SEC: N4EXQ. ACC: NT4S. OOC: W4HU. BM: AB4U.

VTN	1 PM	3907	KB4NGO
VSBN	6 PM	3947	KI4BR
VSN	6:30 PM	3680	N4KSO
VN (EARLY)	7 PM	3680	N4GHI
VN (LATE)	10 PM	3680	WB4KSG
VLN	10:15 PM	3947	W4JLS
SVEN	7:15 PM	146.82	NT4S
STARES	9 PM	146.97	KJ4VT
DEC/EC	9:45 PM (3rd Wed)	3910	KA4NWK

As we swing into the fall season the bands are jumping and folks are getting back into the swing of autumn. As the holiday season approaches we can look forward to the increase of activity in traffic. Glynn Coates, STM, expects a large influx

HI-Q BALUN



- For dipoles, yagis, inverted vees and doublets
- Replaces center insulator
- Puts power in antenna
- Broadbanded 3-40 MHz.
- Small, lightweight and weatherproof
- 1:1 Impedance ratio
- For full legal power and more
- Helps eliminate TVI
- With SO 239 connector
- Built-in DC ground helps protect against lightning

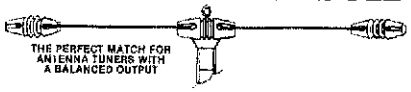
Only $14.95

HI-Q ANTENNA CENTER INSULATOR

- Small, rugged, light-weight, weatherproof
- Replaces center insulator
- Handles full legal power and more
- With SO 239 connector

$6.95

THE ALL-BANDER DIPOLE



- Completely factory assembled ready to use
- Heavy 14 (7/22) gauge stranded copper antenna wire to survive those severe storms
- Center fed with 100 feet of low loss PVC covered 450 ohm balanced transmission line
- Includes center insulator with an eye hook for center support
- Includes custom molded insulators molded of top quality material with high dielectric qualities and excellent weatherability
- Complete installation instructions included
- Overall length 135 feet, less when erected as an inverted vee or sloper
- Handles 2 kw PEP & covers 160 through 10 meters
- May be trimmed to fit small city lots

Only $29.95

DIPOLES

MODEL	BANDS	LENGTH	PRICE
Dipoles			
D-80	80/75	130'	$31.95
D-40	40/15	66'	28.95
D-20	20	33'	27.95
D-15	15	22'	26.95
D-10	10	16'	25.95
Shortened dipoles			
SD-80	80/75	90'	35.95
SD-40	40	45'	33.95
Parallel dipoles			
PD-8010	80,40,20,10/15	130'	43.95
PD-4010	40,20,10/15	66'	37.95
PD-8040	80,40/15	130'	39.95
PD-4020	40,20/15	66'	33.95
Dipole shorteners — only, same as included in SD models			
S-80	80/75		$13.95/pr.
S-40	40		12.95/pr.

All antennas are complete with a HI-Q Balun, No. 14 antenna wire, insulators, 100' nylon antenna support rope (SD models only 50'), rated for full legal power. Antennas may be used as an inverted V, and may also be used by MARS or SWLs.

Antenna accessories — available with antenna orders	
Nylon guy rope, 450 lb. test, 100 feet	$4.49
Molded Dogbone Type antenna insulators	1.00/pr.
SO-239 coax connectors	.55
No. 14 7/22 Stranded hard drawn copper antenna wire	.08/ft.

ALL PRICES ARE UPS PAID CONTINENTAL USA

Available at your favorite dealer or order direct from

Van Gorden Engineering

P.O. Box 21305 • South Euclid, Ohio 44121

Dealer Inquiries Invited

BATTERIES

Nickel-Cadmium, Alkaline, Lithium, Etc.

INDUSTRIAL QUALITY

YOU NEED BATTERIES?
WE'VE GOT BATTERIES!

CALL US FOR FREE CATALOG

E.H.YOST & CO.

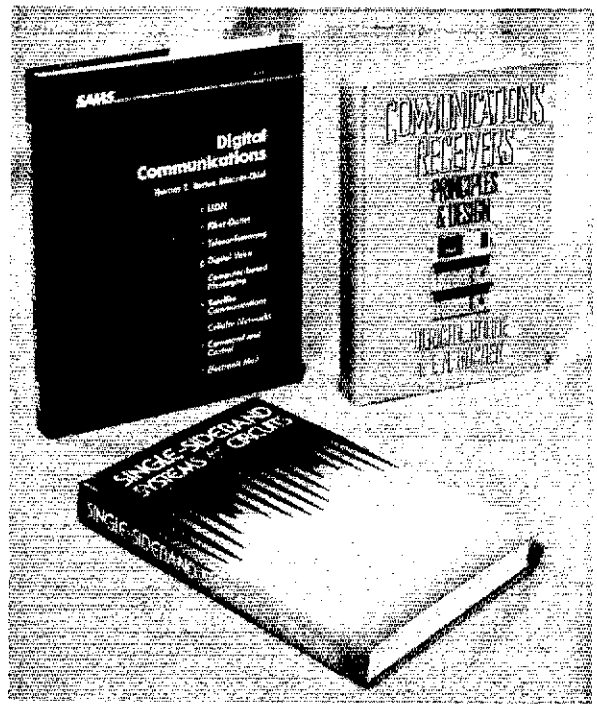
EVERETT H. YOST KB9X1

7344 TETIVA RD.

SAUK CITY, WI 53583

ASK FOR FREE CATALOG

(608) 643-3194



Save on these Technical Publications!

Single-Sideband Systems and Circuits by William E. Sabin, WØIYH and Edgar O. Schoenike, has long been considered an invaluable reference for the circuit design professional and amateur with a technical background. The book was written by the staff of Collins Defense Communications division of Rockwell International many of whom are licensed amateurs. In 594 pages it covers, IF Filter, Frequency Standard, Receiver, Transceiver, Exciter, and Synthesizer Design; Solid-State, Ultra-Low Distortion and High Power Amplifiers. Two important chapters on subjects which are finding serious applications today's amateur equipment are: Digital Signal Processing and Digital Control. You will also find information on Receiver Measurement Techniques and Antenna Matching. For more information see the review on page 24 of December, 1987 **QST**. Published by McGraw-Hill in hard cover, copyright 1987. Regular Price $49.95. ARRL Price $42.00 plus postage and handling.

Communications Receivers: Principles and Design by Dr. Ulrich L. Rohde, DJ2LR and Dr. T.T.N. Bucher. DJ2LR has published numerous articles on the design of high-performance receivers and the co-author designs receiving systems at RCA. In 608 pages, this book covers: Basic Design, Receiver Characteristics (such as gain, dynamic range, etc.) System Planning, Antennas and Antenna Coupling, Amplifiers, Mixers, Frequency Control including synthesizer principles, Frequency Control, Demodulation, Other Circuits, and Design Trends including digital techniques and spread spectrum. For more information see the review in August, 1988 **QST**. Copyright 1988 by McGraw-Hill. Regular Price: $59.50, ARRL Price $50.00 plus postage and handling.

Digital Communications, edited by Thomas C. Bartee covers recent advances in communications technology. In 406 pages, this professional reference presents such topics as Integrated Services Digital Networks (ISDN), written by Eric Scace, K3NA: Electronic Mail Systems; Digital Coding of Speech, Challenges in Communications for Command and Control Systems; Cellular Networks; Satellite Communications; Fiber Optics; Computer Based Messaging and Video Teleconferencing. Published in hardcover by Howard W. Sams & Company. Regular price $44.95. ARRL Price $38.00 plus postage and handling.

Add $2.50 ($3.50 UPS) for postage and handling

THE AMERICAN RADIO RELAY LEAGUE, INC.

225 MAIN STREET

NEWINGTON, CT 06111

of traffic. Much of it will be on packet so be sure to ask for LT (list traffic) on your boards, then be sure to kill it when you have taken it off. We will also need additional liaison stations to higher nets to keep a smoothly operating system. If you can be available for nets even occasionally it will help move traffic in the state. Look over the procedures for booking traffic and use it when you can. Welcome to NB3O and WA4PGI as Assistant Technical Coordinators. We now have the state fairly well covered with eight ATCs. Welcome to N4SMB, an active trafficker who has taken on the job of EC in Hampton. Traffic: N4GHI 579, K4MTX 293, N4EXQ 287, K4DOR 262, AA4AT 210, W3ATQ 177, WD4FTK 127, WB4PNY 121, KJ4VT 109, KB4WT 103, W4JL8 93, W4TZC 85, WD4MIS 82, KK8L 72, AA4GL 67, KI4BR 66, KK4FV 65, WB4ZNB 54, N4SMB 50, K4BGZ 50, K4JM 46, N6ANQ 41, KB4NGO 41, WB4UHC 35, K4MLC 34, WB4EDB 33, W4HU 28, WB4TZR 27, NT4S 26, KI4W 26, K4GR 23, N4KSO 15, W4HDW 12, KI4VU 10, N4TJT 10, WA4TVS 8, WA4CCK 8, WB4KIT 8, N4FNT 5, W4YE 3.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT—SEC: K8QEW. STM: N8FXH. ACC: WA8CTO. SGL: K8BS. TC: K8LG. Rept. Coordinator WB8GDY. WVAR State Packet Radio Mtg was held 8/28 at Sutton to begin formulation of Statewide packet plan. Also a Mtg was held on 9/24. Contact WD8SEN. KA3KQK is now N8JVS, nice to have Gregg officially in 8 land. WD8V is back active on nets after surgery, hang in there Ollie, we're pulling for you.

NET	FREQ	TIME	QNI	QTC	SESS	NM
WVFN	3865	6:00	852	139	31	WD8DHC
WVN	3567	7:00	238	75	31	KZ8Q
WVMD	7235	11:45	834	53	31	WD8V
WVRN	3640	6:30	144	19	31	K8LG
Hillbilly	14290	Noon Su	150	20	4	W8YP

Traffic: K8QEW 213, WD8V 188, KZ8Q 172, W8FZP 160, W8YP 160, WD8DHC 120, KA8WNO 107, WD8LDY 90, KA8ZXP 87, KD8WX 64, KE8FI 59, N8FXH 48, K8KT 31, N8JBR 11, NC8G 7.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Bill Sheffield, KQ0J—ASM: KA0MQA. SEC: WB0TUB. STM: KB0Z. ACC: WB0DUV. OOC: KA0CDN, W0IJR, TC W0LJF, SGL: WB0FOB. PIO: N0DZA. TC: W0LJF. A Court Ruling that could affect your Amateur Radio hobby occurred on July 29 when a federal judge in Denver issued a ruling that an amateur in Boulder County is limited to 35 feet tower elevation. The ruling is a direct contradiction to PRB-1. This case must be appealed or it could affect all communities not only in Colorado but also the nation. A tremendous sum of money must be raised to appeal this case in federal district court. We need the help of all Colorado amateurs. Please drop me a line for more information on the Amateur Radio Legal Defense Fund and how you can join in the fight that so drastically affects Boulder County and Colorado. Thanks to the many amateurs who worked with ARES in Jefferson & Boulder Counties during two severe forest fires. Congrats also to K0UEM who coordinated amateurs communications during the Burro Races in Leadville. A reminder to all ECs & NMs to send your SET reports to the SEC & STM. Wishing you all a Happy Thanksgiving. 73. KQ0J. NETS: CWN: QNI 52, QTC 45, QNF 300, 25 sess. COL: QNI 1818 QTC 1117-601, 31 sess. HNN: QNI 995, QTC 49-99 QNF 932, 30 sess. NCTN QNI 239 QTC 84, QNF 384 31 sess. SCTN QNI 308, QTC 30, QNF 314, 29 sess. Traffic: N0HFZ 401, K0HOA 184, WB0FFV 88, KB0Z 84, KE0WC 99, KA0WIE 60, K0INI 37, KE0BI 34.

NEW MEXICO: SM: Joe T. Knight, W5PDY—ASM: K5BIS. SEC: K6YEJ. DEC: WD5HCB. STM: ND5T. NMs: WA5UNO, KA5NNG, W5QNR. TC: W8GY. ACC: KA5BEM. Southwest Net meets daily, 3583 @ 0230 UTC, handled 62 msgs with 137 checkins. NM Roadrunner Net meets daily 3939 @ 0100 UTC, handled 65 msgs with 1052 checkins. NM Breakfast Club meets daily, 3939 @ 6:30 AM, handled 199 msgs with 958 checkins. Yucca 2-mtr net, 78/18 handled 22 msgs with 308 checkins. Caravan Club 2-mtr Net, 66/06 with 132 checkins. SCAT Net, 66/06 handled 5 msgs with 513 checkins. Info Net 12/72, with 86 checkins. Alamogordo Hamfest was a great success with record attendance. Good to have AG0X, RM Div. Dir. and W5HD RM Vice Dir. Congrats again to WA5UNO and all his valuable crew for putting on such a nice convention, and to Lee, WA5BLI, for a fine after-dinner address...Also many thanks to K5BIS, WA5UNO, W5VFQ and others for picking up net control on RR net during my trips. Much appreciated...Traffic: W5DAD 96. Sunday Noon ZIA Packet net, 80 checkins.

UTAH: SM, Jim Brown, NA7G—SEC: Rich Fisher, NS7K. STM: John Sampson, W7OCX. Kevin, N7IUN, is holding monthly UCN breakfasts on the first Saturday of each month. QNI UCN for more info. WIMU, which was held at Mack's Inn, ID. this year, was a success. Clayton, AC7O conducted a very successful exercise in Cache County, and effectively used packet for hard copy traffic. AG0X visited a UARC meeting in SLC, talked about lightning and 220 and the Part 97 rewrite. NA7G talked about lightning and EMP protection at the same meeting. Laura. WJ7M, won an award and plaque from UARC for being "Utah Contester of the Year." Traffic: N7JLC 87, WA7KHE 72, WA7MEL 40, N7IE 39, NS7K 23, NA7G 21, W7OCX 10.

WYOMING: SM, Jim Raisler, N7GVV—ASM: Steve Cochrane, WA7H. SEC: Jim Anderson, W7TVK. STM: Dan Ransom, K7MM. Thanks, WA7H, for representing the WY Section at WIMU. Traffic and net reports for July and August follow: NN7H 543, W7TZK 482, W7SQT 244, K7SLM 11. Nets: Cowboy held 46 sessions with 1302 QNI and 15 QTC; Pony Express 9 ses, 334 QNI, 8 QTC; Albany ARES 4 ses, 28 QNI; Area 5 ARES 4 ses. 51 QNI. Wx Net which meets Monday thru Friday at 6:30 to 7:00 AM on 3923 had 207 QNI in July with 195 QTC. Dale, WC7S, would like to see more participation on this net. Dale would also like to remind you DXers to make sure when working split with stations outside the US to take care to check your transmitter VFO. His OO report shows several hams transmitting out of band. 73 till next month.

SOUTHEASTERN DIVISION

ALABAMA: SM, James Spann, WO4W—ASM: W4XI. SEC: KB4GDN. STM: N4RT. ACC: AA4BL. PIO: KB4KCH. SGL: N4FRQ. OOC: KF4VS. TC: N4QII. BM: KA4ZXL. With the holiday season nearing, the traffic load on our NTS nets will be getting heavier and more help will be needed. When was the last time you checked into AENB, AEND, or the ATNM? The East Alabama ARC has earned ARRL Special Service Club status. Congrats to KA4PKB and crew. New packet nodes at Demopolis - DEM2 on 145.01 and DEM4 on 443.8 MHz. Birmingham ARC provides valuable service on the W4CUE PBBS with weather information on request. A data circuit from the National Weather Service is routed into the BBS system and by using product headers, you can call up about any possible weather information. WB4FAY heads the group that developed this service. By the time you read this, our hearing before the Alabama PSC on autopatch rates will be over. Look for late news on this on our section news update, available around the 20th of each month on all packet BBS systems, written by PIO KB4KCH. Thanks to all clubs in the state who send me their club bulletin - we have lots of amateur activity in the section! PSHR: WA4JDH, W4PIM, W4CKS. BPL: WA4JDH, W4CKS. Traffic: WA4JDH 771, W4CKS 695, W4PIM 217, WA4ZPZ 14, WO4W 9, W4DGH 8, WB4TVY 2.

GEORGIA: SM, Eddy Kosobucki, K4JNL—ACC & ASM: WA4ABY. SEC: NC4E. STM: WB4WQL. Asst STM: (PACKET) W4QO. BM: WB4ZOJ. OOC: W4TG. PIO: WB4DEB. SGL: WB4UVW. TC: WD4PAH. Georgia's last HAMFEST-COMPUTER FESTIVAL is scheduled for Nov. 5 & 6 at Lawrenceville, same place as last year. This is always a gud one, cu there? I have only one SILENT KEY TO REPORT this mo, KA4ENY, George Carrier III of Douglasville. Our sympathies to his loved ones. AMSAT 6th Space Symposium will be held on Nov. 11 thru 13 at the Airport Marriott Hotel. Programs are to be great. GA TECH elected NR4E as Pres, WD4DWN VP, Treas: N4JQD, RPT MAN, WD4FSU. At the annual GA SSB ASSO meeting in Macon KK4OJ elected Pres, VP: KF4FG, S/T: W4HON, Dir: WA4EPK & WB4ZMH. K4OUB was GA AMATEUR OF THE YEAR. I presented Certificates of Merit to K4OUB, WB4ZTM & KF4FG. On behalf of the sponsors of the RE-ENACTMENT OF THE BATTLE OF CHICKAMAUGA we want to thank all who took time to furnish the communications to make things run smoothly. Once agn tnx to a job well done. Valdosta ARC is led by Pres: W4HYK, VP: KB0Y, Treas: N4ELN, Sec: KC4BEB. Atlanta ARC new officers are: Pres: W4BTZ, VP: N4MAQ, Sec: N4MNR, Treas: KI4Y, Act: WA4CUG. Aug PSHR nominees are: WB4DVZ, W4RWB, WD4COL, WB4WQL, KA4HHE, KJ4NK (also in July) & W4HON. I hope that by now u have had the opportunity to talk to ur Ga Legislators regarding the GA AMATEUR RADIO TAGS. As of this writing it doesn't look gud but big numbers can do lots of things. It's not too late so pse do it now. HAMS are marrying HAMS, recently K4JGK & WD4RXH tied the KNOT. CONGRATS. MALARC elected K4JGK as their leader, VP: KC4FJF, Sec: N4DTC & Treas: KB4SSS. Don't know what this Winter will bring, but as always I know that this section is prepared for anything. My staff & all of u FB GA Hams make my job easy. Many TNX. Once agn get on the fone or write a letter to ur GA representative & inform him that the least thing the State of Ga can do for us is to let us keep our TAGS. Traffic: WD4COL 571, WB4DVZ 184, KA4HHE 62, WB4WQL 50, W4RWB 43, KJ4NK 28, K4ZUY 22, KC4BHX 18, N4MWR 18, W4HON 12, WB4UIH 6.

NORTHERN FLORIDA: SM, Roy Mackey, N4ADI—ASM: KB4LB. ACC: WD4RIQ. SEC: WA4PUP. This is a partial list, to be continued next month. New Club Newsletter has been received from TARS, the Printed Circuit. DBARA's Groundwave is a regular as well as many others. If you are not sending a copy of your club newsletter, please add N4ADI to the list. Affiliated Club activity is evident by the receipt of 1988 Club reports and several new applications are in process. The Bell Tower Polneer Radio Club, Jacksonville is one, and the Ransom Middle School, Cantonment is another. We look forward to having them join the 40 or so in NFL. Reports received recently include NOFARS, SHARC from Pensacola, BARS and Univ. of Central Florida. If your 1988 report has not been sent, get it in the mail so we can have our records up to date! If your club is not affiliated with ARRL write to Vicky Armentano at HQ, or to WD4RIQ, Giff in Ocala for forms and info. Has your club appointed an Assistant Technical Coordinator? If not contact Ed Cox, W0RAO in Casselberry for the info. We're also still looking for new members to join the Amateur Auxiliary of the FOB and to aid the Local Interference Comms. John, AB6I would like to hear from you about that. Action is in the works for greater help by and with the FCC offices in Florida thru efforts by W4TAH in SFL section. There are three FOB's in Florida, all in SFL but we need to work with them, too, so if you are willing to listen and report contact AB6I. We're all volunteers and need your help too! Traffic: WX4H 581, KB4LB 404, WA4QXT 338, K4CY 337, AA4HT 246, WD4IIO 240, N4SS 220, W7YWF 203, N4GMU 170, KB9LT 126, WC4D 124, KC4FL 70, W4UEA 66, N4JAQ 65, WB3AVZ 59, KB4FIY 52, W4KIX 49, KI4LQ 42, N2AOX 40, NL7GV 34, AA4QC 33, WA4EYU 32, N4UF 32, WB4TZR 31, WA4STZ 29, N4DY 29, KA4KAH 27, NF4O 25, WA4PUP 24, WB4FJY 21, W4DTV 20, N4QYS 19, AA4FG 14, WA4SXW 13, W8IM 10, KJ4HS 7, W4AT 6, N4OZD 4, KI4NN 4, KV4HI 2.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—SEC: W4SS. STM: K4ZK. TC: KI4T. BM: WD4KBW. PIO: N4PBF. SGL: KC4N. OOC: W4TAH. ACC: K4EUK. WD4KBW reports 64 bulletins received and 102 sent by AA4BN 19, WA4EIC 68, WT4F 27, K4IEK 26 and WD4KBW 26. Congrats to KL7QH who has passed his Amateur Auxiliary exam—he also had the distinction of being one of only two people of the last 127 who took a particular version of the exam to correctly answer a certain question. The brand-new ARRL Special Service Club Manual is out and has been sent to all Special Service clubs as well as active affiliated clubs. Also received was a copy of project Suncoast Seniors, Guidebook for Volunteers—this was developed as an aid for the recruitment project underway in the Tampa/St. Pete area. Newsletters received this month were South Florida FM Assoc.; the Amplifier, Sarasota ARS reported a letter from Sahib Temple thanking the club for the donation to their building fund—they did appreciate having Field Day on the Temple grounds; QRM, the Voice of the Tampa ARC; The South Brevard ARC Spark; The Martin County ARA Common Emitter reports W4LLA is still active running patches for the research vessel Knorr three times a week. KA4FZI has started an Amateur Radio class at Caloosa Middle School in Cape Coral. The seventh and eighth graders will use Tune in the World as their text and aim for Novice

(continued on page 124)

KENWOOD

...pacesetter in Amateur Radio

NOW Four to choose!

Four to Go!

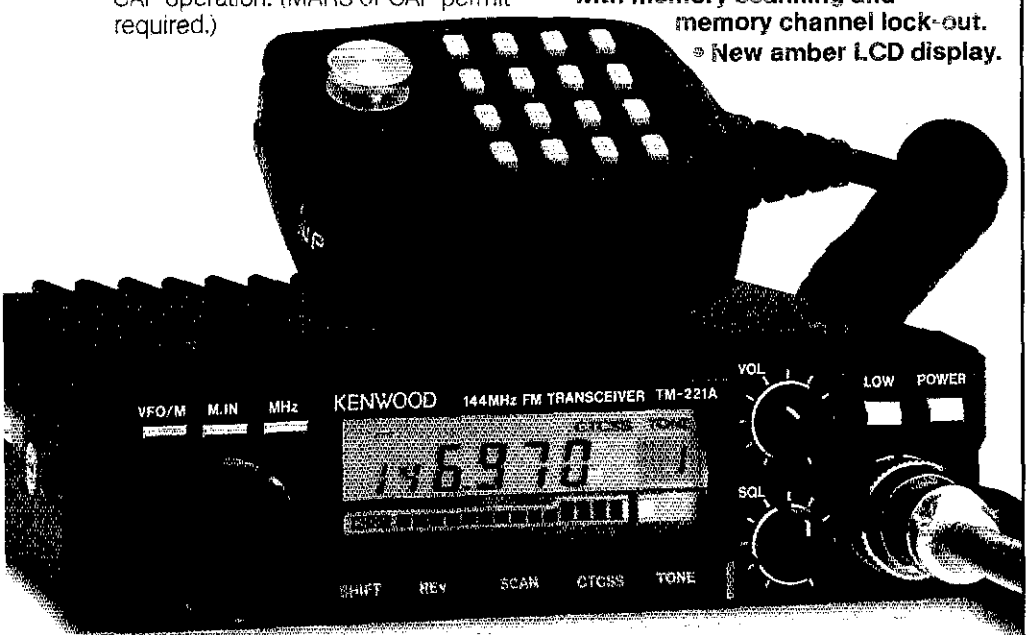
TM-221A/321A/421A/521A

144/220/450/1300 MHz

The Hottest Selling Compact FM Mobile Transceivers

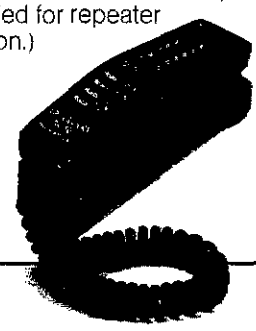
The all-new TM-221A, TM-321A, TM-421A and TM-521A FM transceivers represent the "New Generation" in Amateur radio equipment. The superior Kenwood GaAs FET front end receiver; reliable and clean RF amplifier circuits, and new features all add up to an outstanding value for mobile FM stations! The optional RC-10 handset/control unit is an exciting new accessory that will increase your mobile operating enjoyment!

- **TM-221A receives from 138-173.995 MHz.** ***This includes the weather channels!*** Transmit range is 144-148 MHz. Modifiable for MARS and CAP operation. (MARS or CAP permit required.)
- **TM-321A covers 220-224.995 MHz, TM-421A covers 438-449.995 MHz, and the TM-521A covers 1240-1300 MHz.** (Specifications guaranteed for Amateur band use only.)
- **Built-in front panel selection of 38 CTCSS tones.** TSU-5 programmable decoder optional.
- **Simplified front panel controls** — makes operating a snap!
- **16 key DTMF hand mic., mic. hook, mounting bracket, and DC power cable included.**
- **Selectable frequency steps** for quick and easy QSY.
- **TM-221A provides 45 W. TM-321A 25 W, TM-421A 35 W, and TM-521A 10 W.** All models have adjustable low power.
- **Packet radio compatible!**
- **Programmable band scanning with memory scanning and memory channel lock-out.**
- **New amber LCD display.**
- **Kenwood non-volatile operating system.** All functions remain intact even when lithium battery back-up fails. (Lithium cell memory back-up, est. life 5 yrs.)
- **14 full-function memory** channels store frequency, repeater offset, sub-tone frequencies, and repeater reverse information. **Repeater offset on 2 m is automatically selected.** There are **two channels** for "odd split" operation.
- **Super compact:** approx. 1-1/2"Hx5-1/2"Wx7"D.
- **Microphone test function on low power.**
- **High quality, top-mounted speaker.**
- **Rugged die-cast chassis and heat sink.**



RC-10 Remote Controller

For TM-221A/321A/421A/521A. Optional telephone-style handset remote controller RC-10 is specially designed for mobile convenience and safety. All front panel controls (except DC power and RF output selection) are controllable from the RC-10. One RC-10 can be attached to **a combination of two transceivers** with the optional PG-4G cable. When two transceivers are connected to the RC-10, **cross band, full duplex repeater** operation is possible. (A control operator is needed for repeater operation.)



Optional Accessories:

- **RC-10** Multi-function handset remote controller
- **PG-4G** Extra control cable for second transceiver
- **PS-50/PS-430** DC power supplies • **TSU-5** Programmable CTCSS decoder • **SW-100A** Compact SWR/power/volt meter (1.8-150 MHz)
- **SW-100B** Compact SWR/power/volt meter (140-450 MHz) • **SW-200A** SWR/power meter (1.8-150 MHz) • **SW-200B** SWR/power meter (140-450 MHz) • **SWT-1** Compact 2 m antenna tuner (200 W PEP) • **SWT-2** Compact 70 cm antenna tuner (200 W PEP) • **SWC-4** 1200 MHz Directional coupler • **SP-40** Compact mobile speaker
- **SP-50B** Mobile speaker • **PG-2N** Extra DC cable
- **PG-3B** DC line noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MC-55** (8-pin) Mobile mic. with gooseneck and time-out timer • **MA-4000** 2 m/70 cm dual band antenna with duplexer (mount not supplied) • **MB-201** Extra mobile mount

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

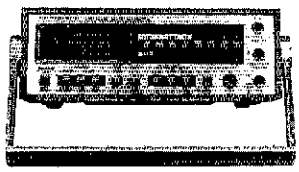
KENWOOD

KENWOOD U.S.A. CORPORATION
2201 E. Dominguez St., Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745

Radio Shack®–The Technology Store™

IMPROVE YOUR STATION WITH OUR QUALITY ACCESSORIES

LCD Digital VOM



99.95

Our Best-Ever Multitester

Autoranging/manual with big digital readout and an analog bargraph. Built-in transistor gain checker, continuity buzzer and more. Compare! #22-195

Super Calculator

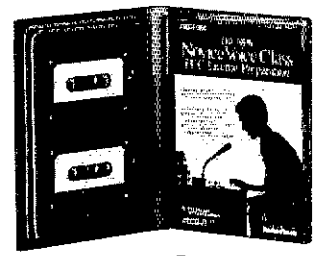
39.95

Built-In Electronic Engineering Functions

EC-4035 makes ticket-upgrade math a snap. Displays electrical units—V, A, mA, mW, Ω—along with the answer. Trig and base conversion—110 functions in all. With case, batteries. #65-983

Novice and General Exam Study Guides

- Complete! Prepared by Gordon West, WB6NOA
- Include Two Self-Paced Code Cassettes
- Sample Test Questions And Answers
- Durable Molded Binders
- FCC Form 610 Included
- Clubs—Ask About Discounts On Quantities of 6-Up



19.95 Each

Novice Exam Study Package. #62-2402
General Exam Study Package. #62-2404

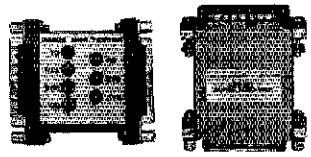
Antenna Rotator

59.95 Why Pay More?

Our famous Archer TV rotator is just right for many VHF and small HF beams. Built to last! UL listed AC. #15-1225

100' 3-Cond. Cable. #15-1150 . . 7.95

RS-232 Helpers



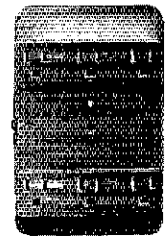
14.95 **16.95**

Inline Tester. LEDs show status of seven data lines. #276-1401
Inline Spike Protector. Stops voltage spikes cold. #276-1402

Filtered 6-Outlet

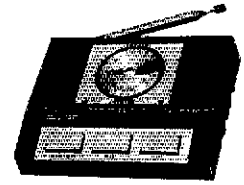
24.95

Protect Your Rig



Converts one grounded outlet to six with noise filter, breaker and spike protector. 13A at 120VAC. UL listed AC. #61-2786

WWV/WX Radio



39.95 Great Gift

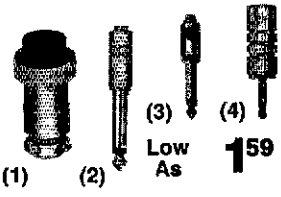
Crystal controlled! Receives WWV time on 5, 10 or 15 MHz plus VHF weather stations up to 50 miles away. #12-148

Gas-Powered Iron

29.95 Solder Anywhere

There's nothing better for antenna building and repair. Up to one hour per charge and refills in seconds with ordinary butane lighter fuel. Adjustable temperature equivalent—10 to 60 watts. #64-2160

Hookup Helpers



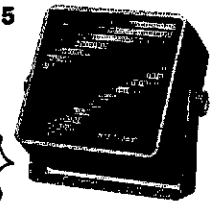
Low As **1.59**

(1) 8-Pin Mike Plug. #274-025 . . . 2.19
(2) 'Phone Adapter. Stereo 1/8" to mono 1/4". #274-348 . . . . . 1.99
(3) Mono Adapter. Adapts 1/8" plug to 1/4". #274-325 . . . . . 1.59
(4) H-T Adapter. 1/8" stereo to 3/32" mono. #274-381 . . . . . 1.99

Add-On Speaker

13.95

With Cord



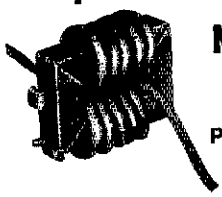
Really improves audio from mobiles, HTs and compact rigs. Five-watt 4" speaker in an extra-durable enclosure. Prewired 10-ft. cord, 1/8" plug. Adjustable metal bracket. #21-549

Keep It Cool

(1) (2) (3)

(1) 3" 12VDC Fan. Low noise. 27 CFM. #273-243 . . . 14.95
(2) 3" 120VAC Fan. Whisper quiet, 32 CFM output. 11 watts. #273-342 . . . . . 15.95
(3) Heavy-Duty MOV. Spike protection! #276-568 . . . 1.99

"Snap" Toroid Core



NEW!

6.95

Pkg. of 2

Easy-to-install and effective RFI eliminator. Simply wind cable through core and snap together—no need to remove plugs from AC cords, coax or phone cables. Opening: 7/8 × 3/8". With data. #273-104

RF Connectors

Fig.	Item	Cat. No.	Price
1	PL-259	278-205	2/1.99
2	UG176/U	278-204	2/.99
—	UG175/U	278-206	2/.99
3	M-358 "T"	278-198	3.49
4	PL-258	278-1369	1.69

High-Grade Coax

Low As **18¢** Per Foot

New Improved Shielding!

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

SWR/FS Meter

18.95

Handles Up to 1 kW

Reads SWR and doubles as a portable field strength meter. Covers 3 to 30 MHz. #21-525

Over 1000 items in stock! Binding Posts, Books, Breadboards, Buzzers, Capacitors, Chokes, Clips, Coax, Connectors, Fuses, Hardware, ICs, Jacks, Knobs, Lamps, Multitesters, PC Boards, Plugs, Rectifiers, Resistors, Switches, Tools, Transformers, Transistors, Wire, Zeners, More!

Prices apply at participating Radio Shack stores and dealers

Radio Shack®
The Technology Store™
A DIVISION OF TANDY CORPORATION

KENWOOD

...pacesetter in Amateur Radio

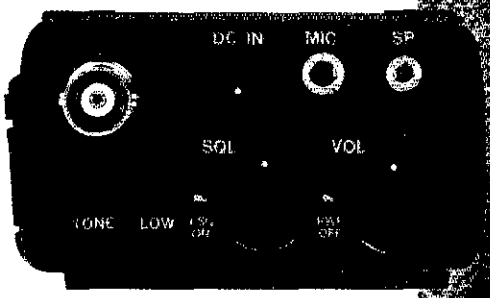
220 MHz TH-315A Here Now!

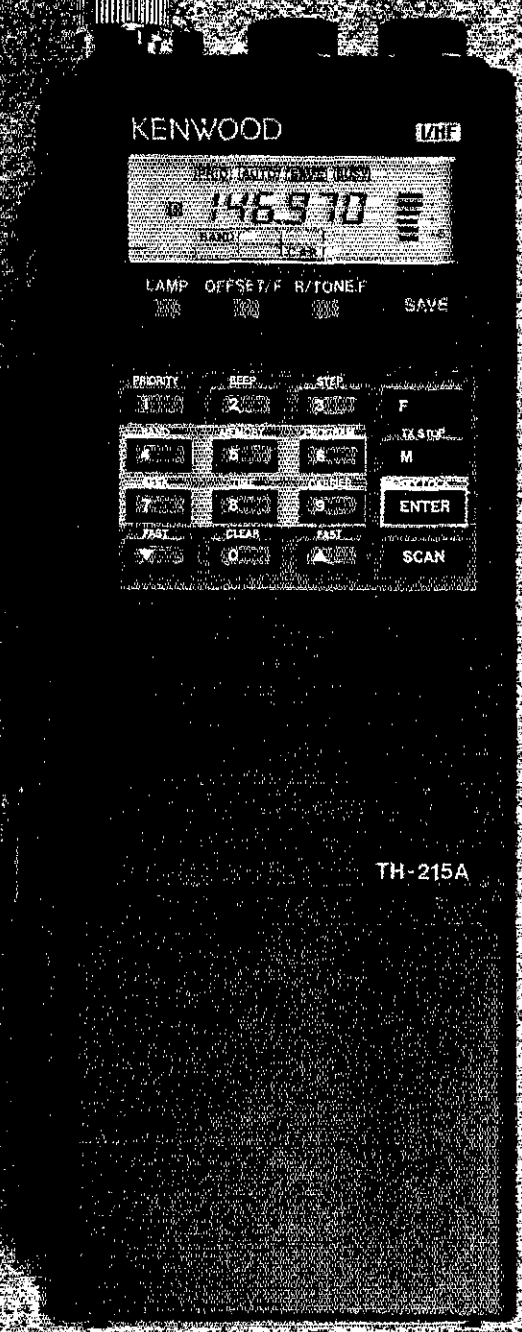
This HT Has it All!

TH-215A/315A/415A

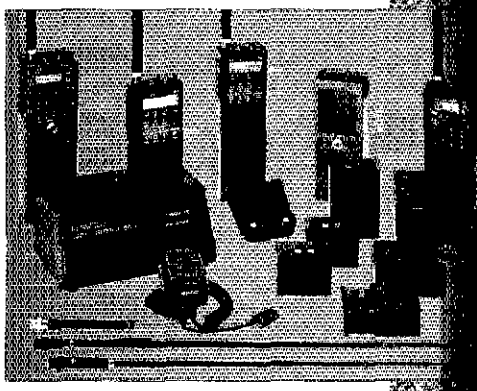
Full-featured Hand-held Transceivers

Kenwood brings you the greatest hand-held transceiver ever! More than just "big rig performance," the new TH-215A for 2 m, TH-315A for 220 MHz, and TH-415A for 70 cm pack the most features and the best performance in a handy size. And our full line of accessories will let you go from hamshack to portable to mobile with the greatest of ease!





- **Wide receiver frequency range.** Receives from 141-163 MHz. Includes the weather channels! Transmit from 144-148 MHz. Modifiable to cover 141-151 MHz (MARS or CAP permit required).
- **TH-315A covers 220-225 MHz, TH-415A covers 440-449.995 MHz.**
- **5, 2.5, or 1.5 W output, depending on the power source.** Supplied battery pack (PB-2) provides 2.5 W output. Optional NiCd packs for extended operation or higher RF output available.
- **CTCSS encoder built-in.** TSU-4 CTCSS **decoder** optional.
- **10 memory channels store any offset, in 100-kHz steps.**
- **Odd split, any freqency TX or RX, in memory channel "0."**
- **Nine types of scanning!** Including new **"seek scan" and priority alert.** Also memory channel lock-out.
- **Intelligent 2-way battery saver circuit extends battery life.** Two battery-saver modes to choose, with power saver ratio selection.
- **Easy memory recall.** Simply press the channel number!
- **12 VDC input terminal for direct mobile or base station supply operation.** When 12 volts applied, RF output is 5 W! (Cable supplied!)
- **New Twist-Lok Positive-Connect™ locking battery case.**
- **Priority alert function.**
- **Monitor switch to defeat squelch.** Used to check the frequency when CTCSS encode/decode is used or when squelch is on.
- **Large, easy-to-read multi-function LCD display with night light.**
- **Audible beeper to confirm keypad operation.** The beeper has a unique tone for each key. DTMF monitor also included.
- **Supplied accessories:** Belt hook, rubber flex antenna, PB-2 standard NiCd battery pack (for 2.5 W operation), wall charger, DC cable, dust caps.



Optional Accessories:
• PB-1: 12 V, 800 mAH NiCd pack for 5 W output • PB-2: 8.4 V, 500 mAH NiCd pack (2.5 W output) • PB-3: 7.2 V, 800 mAH NiCd pack (1.5 W output) • PB-4: 7.2 V, 1600 mAH NiCd pack (1.5 W output) • BT-5 AA cell manganese/alkaline battery case • BC-7 rapid charger for PB-1, 2, 3, or 4 • BC-8 compact battery charger • SMC-30 speaker microphone • SC-12, 13 soft cases • RA-3, 5 telescoping antennas • RA-8B StubbyDuk antenna • TSU-4 CTCSS decode unit • VB-2530: 2m, 25 W amplifier (1-4 W input) • LH-4, 5 leather cases • MB-4 mobile bracket • BH-5 swivel mount • PG-2V extra DC cable • PG-3D cigarette lighter cord with filter

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

KENWOOD

KENWOOD U.S.A. CORPORATION
2201 E. Dominguez St. Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745

licenses. Several hams from the Fort Myers ARC have volunteered to be guest lecturers and demonstrators. I am sorry to report that Joe Teaster, N5AMK, became a Silent Key August 12. A QNC from W5TNT, manager RN5, said in part, "...Joe passed away in his sleep. Joe was the most active member of RN5. We all are going to miss him..." N5AMK was on RN5 late just a few hours before his passing. Your Section Manager has changed QTHs—the new address and phone are: 12380 NW 30 Street, Sunrise, FL 33323, phone 305-572-3172. The move came at the first of the month as the reports to headquarters were due AND two diskettes crashed—haven't had a diskette crash in years, so why now? It is hoped that no information sent was lost, but if so those are the reasons! 73 de WA4PFK. Traffic: W3CUL 2662, W3VR 799, WA9VND 625, WA4PFK 351, K4EUK 234, K4SCL 211, K4ZK 198, KA4FZI 191, WA4EIC 176, K4IA 149, WA4RUE 130, N4HAP 121, WB4WYG 116, WV5Z 113, KB4KXV 110, AA4BN 107, N4ORZ 92, KD4GR 92, W3TLV 85, N4MML 70, KA4YHS 62, KF4RL 58, KY4U 57, K4FQU 51, KB4MON 47, N4ET 43, WD4KBW 41, KA4NXF 37, AA4CH 36, KA4SIH 33, KB4AXG 32, N4KFU 29, AB4BC 29, KA4AJR 27, KB4UIA 27, AA4WJ 20, K4JI 19, KB4YBS 18, KB4UHC 15, N4FLG 15, WB4CGK 14, WT4F 13, KAØGYF 13, N2COI 11, WA4VWJ 10, W3IJR 10, KB4LPL 10, KA9AKY 10, K9ALX 8, WD4NXK 8, NØABC 7, NX5Q 7, WA4PIL 6, W4MPV 6, KA4GDU 5, N4PFQ 5, W4DWN 4, N4QER 4, W4MFD 3, N4PSV 3, N4RHJ 2, N4NZI 2, AA4IF 1. (July) KK4WR 220, N4RHJ 5.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP. NMs: K7POF, K6LL, KI6ZH. Welcome to new Cactus HF NM KI6ZH. Net meets daily on 3915 kHz at 1800 MST. Am sorry to report that Charles Payette, WB7UYP, of Cochise, became a Silent Key in August. Bernie, WØYOY, has published FB listing of all known VE exams in AZ for the remainder of 1988. Contact him with SASE for the list. Superstition ARC ARRL Hamfest Dec. 3-4 in Apache Junction rodeo grounds. Contact Bill, KA7SUF, for details. No. AZ DX Assoc. puts out a FB newsletter with Bill, W7YS, as editor. Catalina Radio Club reports they have a six-meter repeater under construction in Tucson. Coconino ARC is busily putting together an ARES trailer for future use in emergency situations and drills. Congratulations. The No. AZ Rptr. Assn. has been asked by the ARCA repeater coordinator to move their new repeater frequency on Mt. Elden from 146.30/90 to 146.22/82 due to a co-channel interference problem. This should be accomplished by the time you read this. We in AZ section can be proud of our Amateur Radio Council of Arizona for their FB efforts in repeater coordination. We can avoid all the difficulties such as law suits that are plaguing other areas such as CA and TX repeater owners by cooperating and appreciating the efforts of the ARCA coordination group. It is a tiring and thankless job that they do. We have good men who do their job well. Congratulations ARCA. Your SM went to ARRL SW Div'n Convention at Disneyland, Sept. 2-4. Will report on this next month. Plan to attend monthly meeting of the AZ ARC in Phx in November. Tried running computer-generated CW Morse and AMTOR from my Pinetop hamshack, after getting a used computer patch interface unit. New thrill. Still have to try packet. 73, and keep those cards and letters coming in.

NET	QNI	Traffic	Sess
SWN	137	62	31
Arizona Cactus Net (HF)	474	78	31
Arizona Cactus Net (VHF)	265	46	31
ATEN	No Report		31

Traffic: W7AMM 218, W7EP 167,W7KCM 146, KA7ARZ 58, W7KXE 54, WE7G 43, K7VVC 40, W7OIF 38, K7KMZ 37, N7ETP 20, W7GAQ 15, K7PLO 14.

LOS ANGELES: SM, Phineas J. Icenbice, Jr. W6BF—The SW Div. Convention at the Disneyland Hotel was a great success by methods of measurement. Thanks to the STAFF and all of the professionals who made HAMCON 88 a big success. ARRL was well represented by Jay, W6EJJ, Fried, WA6WZO, Sandy, WA6WZN, and all of the Southwestern Division Section Managers. Three of the ARRL Headquarters people gave the Section Managers and the ARRL leadership the opportunity to exchange up-to-date information with Headquarters. The area radio clubs were very active at this great convention. The Inland Empire Amateur Radio Club operated a special event station WA200ZEF from the Disneyland Hotel—A celebration of the Bicentennial of the US Constitution. QSL to Ken, WA6ZEF, for a great certificate. HAMCON 89 is now established and under way with Joe, KB6AXK, as the Chairman. HAMCON 89 needs a Los Angeles Club to establish a SPECIAL EVENTS Station for the next year at the LAX HILTON. This is your chance to get your club some real action and attract some new members. The HAMCOM 89 Convention planners will meet every month until the Convention next year. The meetings will be on the last Sat. of each month just after the TRW Swap meet. The meeting place will be at Erv's W6GC QTH or the Hotel which ever has better dining facilities. Always check at the ARRL table at TRW for all of the latest info and free hand-outs. Fried, Phineas and Sandy are scheduled every month to provide this ARRL service table. TRW officer Don Renkowitz, W6SQF, attended the Aug. HAMCON 89 planning meeting and pledged TRW's commitment to help with the FEATURED ATTRACTION. The TRW Swap meet special for HAMCOM 89. Buses will be scheduled on a regular basis for HAMCON 89 to and from the LAX Hotel for anyone who wants to park at the TRW swap meet and attend the convention. The well-known celebrity Lenore Jensen, W6NAZ, reports that our local late-night coast-to-coast radio talk show, KABC, carried a three-hour Amateur Radio program recently. Ray Brlem, N6FFT, interviewed Lenore Jensen, W6NAZ, Joe Moell, KØOV, and April Moelt, WA8OPS, for three hours on many different Amateur Radio topics. Over 25 incoming calls were aired, many from hams who added interesting anecdotes, as they quite frequently do. The address of ARRL was given out frequently to those curious as how-to earn a license. The Los Angeles County Fair, the largest in the Nation, is over for another year, and the local area Amateur Radio clubs made a big hit as usual. This year, the special events station W6LAF (Los Angeles Fair) was active from the fair grounds to publicize Amateur Radio, to nearly two million fair visitors. This is another regular event sponsored by the LAACARC. An embossed certificate with the fair logo "MAKING TRACKS," is available if you send your QSL and 45 cents postage to W6LAF, PO Box 1770, Covina, CA 91722. (DO NOT use the Callbook.) Seymour Schwartz is a very popular name, so popular in fact, that K6LP and KE6XS both use this name at the Westside Amateur Radio Club. Incidentally both hams are also engineers and furthermore both have worked at the same time for three different companies. You guessed it wrong—they are not related! 73 Good DX. STM News: Local traffic is picking up and the packet boys are helping a lot. However, there seems to be some difficulty for them to get delivery on the messages. They seem to get delayed in the mail boxes along the way. We need some good CW/old timers to help out. Traffic: K6UYK 482, W6INH 255, W6TH 194, N7CZF 114, KI6A 57, W6NKE 13, K6CL 8.

ORANGE: SM, Joe H. Brown, W6IJBQ—ASM: Riv. Co. W6LKN Bob (714-686- 3823). ASM: Org. Co. Ralph, WB6JBI (714-776-9272). ASM: San Ber. Co. Tony WB6QHB. SW Div Convention. It is an honor to congratulate Leonard, NC6H, and the HAMCOM staff KB6GPM, N6FSL, WA6ODK, N6GXZ, N6JSE, KA6DGD, W6CBA, N6AWF, N6ISY,N6ECA, W6HHC, WA6WZN, KA6WZN, KA6BJP, KJ6EW, W6LO, WA6OPS for a most enjoyable, informative and fun filled week-end at the convention. GOOD SHOW FOLKS!! ACC Sandy, WA6WZN, SCSMC T-Hunt, dual band event won by John, WA6BFH and Merrils, N6PON. It's been reported that KØOV and his red hair helped a couple of confused hunters. Fm the BPARC Communicator. A plain ham likes to watch meters and see the rig go, and still gets a kick out of radio. He likes to listen and loves to talk around the world or across the table. He thinks hams are great people although they may live in strange places and think and do strange things. In our hobby, there are all kinds of hams. What kind are you? de Bill, KA6JIG. OCCORA sponsored Amateur Radio booth wins first place at Orange Co. Fair. Designed by Virginia, KA6TSV, Chairperson Eric, KA6IHT, paint and building by Brad, KB6GPM, Mark KG6KQ. Antennas by Stan, KA6NNB. Inland Empire ARC. The SW Div. Convention and the activation of the BICENTENNIAL WA200ZEF special-event station was a great success. de Charlie, N7QQ. Circle City Comm ARC Norco Corona rpts Sec/Tres Fred, W6TKV, has also taken over the job of Section Bulletin Manager. He will have a bulletin station at every club in the Orange Section. For a Ham that has just confirmed 3076 counties, a piece of cake, Fred. SEC Ken, WA6ZEF, rpts Larry, KA6GND, has been appointed EC for Riv Co. VIP Comm. Brett, N6NLN, appointed EC and RACES officer for the Cochilla Valley. Bob, N6NYZ, new EC for the City of Moreno. Good luck guys. STM Dan, WF6O, is now getting the majority of individual station reports via Packet. Jerry, AD0A, SCN 1/2 Manager sez you are the cream of the crop. Checking in for delivery of traffic is the biggest need. We are frequently starving for outlets. SCNV QNI 309, QTC 174. SCN 1 QNI 289, QTC 347. BPL: WF6O, KD6SQ. Sysop N6KZB. PSHR WF6O WA6OCA WB6QBZ KA6TND. Traffic totals: WF6O 598, AD0A 177, K6DD 89, WB6QBZ 80, K6ZCE 76, KA6HJK 63, WA6OCA 56, W6CPB 53, N6GOT 42, KA6GND 23, KA6TND 22, W6NTN 13, KB6VPI 10. Packet BBS totals N6ADV 12, N6KZB 182, WA6YNT-1 192, AJ6F-1 244, KD6SQ-2 748. SM Comments. The Simulated Emergency Test. 5th and 6th Nov 1988 for the Orange Section. What is the SET? If the ACC does the job, the clubs will be alerted to support the local EC. If the GL performers, the way will be paved for government involvement. The OOC will be prepared to find that ham, sitting on his mike. The TC will have assisted hams set up radios in public buildings, so that RFI does not become a problem. The BM will pass the word to the amateur community. The PIO will assist the locals get that all important media coverage. The STM will have liaison stations to local emergency nets for intercounty or interstate traffic. ARES types can now devote their time to tactical traffic in the local area. The SEC will be up to his ears filling requests for assistance in the area of manpower. Is the Section Data Base ready? If the SM does his job, all of the above will happen. So, what is the SET? It is a test of the ARRL SECTION Field Organization. 73.

SAN DIEGO: SM, Arthur R. Smith, W6INI—STM: N6GW. PIO: N6PKY. TC: N6JZE. SEC: W6INI. Packet oprs urgently needed for portable-emergency operation in disasters. 12v opn not necessarily a requirement. Contact W6INI, 273-1120. The Blue Angels air show (Aug 20, 21) was assisted by 86 oprs in an extensive medical response system. ATV and packet also proved valuable over the two-day period. SANDRA's newly-refurbished comm trailer was used as a comm center providing a central location for medical emergency reports. Extreme fire-hazard weather cropped up in Southern Calif during the SW Div Conv resulting in a Red Flag Alert from the Calif Dept of Forestry in SD County. Patrol routes were staffed by 48 ARES oprs over a three-day period. ARC of El Cajon now meets at Wells Park RecCen, 1153 E Madison Ave, El Cajon. Palomar ARC has a full-blown disaster preparedness program including hardening the repeater site to withstand fire and earthquakes. Convair ARC has open house at the club stn, W6UUS, on second and fourth Wed each month from 7 to 9 PM. NCTN 30 sessions, QNI 216, QTC 474. ARES CW 4 sessions, QNI 8. Traffic: KI6ZM 187, KI6ZH 110, N6RVO 67, KB6PCF 66, N6GW 65.

SANTA BARBARA: SM, Thomas I Geiger, W2KVA—ASM/Ventura: N6MA. ASM/Sbar: WB6BYU. ACC: KB5AH. BM: KI6XG. STM: N6WP. OOC: W8AKF. PIO: N6FOU. TC: W6KFV. SEC: WB6IIY. DEC/Ventura: WB6RVA. DEC/So. Sbar: KA6KGF. DEC/No. Sbar: KI6XG. DEC/SLO: WB6IIY. All the "action" reported to your SM this month was in San Luis Obispo County. On August 13 PG&E conducted their annual EARLY WARNING TEST, with 103 amateurs participating from around the Section. While hams provided the manpower for this exercise, there were no ON-THE-AIR operations, as this would have been in violation of Part 97 rules. Instead, the amateurs mobiled out to various assigned locations and filed written reports on the time, duration and loudness of the PG&E sirens. The sirens are used to warn the public in the unlikely event of an accident at the Diablo Canyon nuclear power plant. On August 28, the second annual SEA-VENTURE TRIATHLON was held in Pismo Beach. Amateur Radio provided communications for the event under the able direction of our own PIO, N6FOU- net control. Others supporting the event were: WF6D, KG6XQ, KA6PVG and KA6QQF. Their efforts were recognized in the local media by KSLY-FM sportscaster Dean Clark and KSBY-TV's Mitch Massey, as well as by the "Five Cities Times-Press-Recorder." Thanks to all the above for a fine job. The Santa Barbara ARC held their annual hamfest on Sunday, August 21, and all

(continued on page 128)

KENWOOD

...pacesetter in Amateur Radio

NEW!

Affordable DX-ing!

TS-140S

HF transceiver with general coverage receiver.

Compact, easy-to-use, full of operating enhancements, and feature packed. These words describe the new TS-140S HF transceiver. Setting the pace once again, Kenwood introduces new innovations in the world of "look-alike" transceivers!

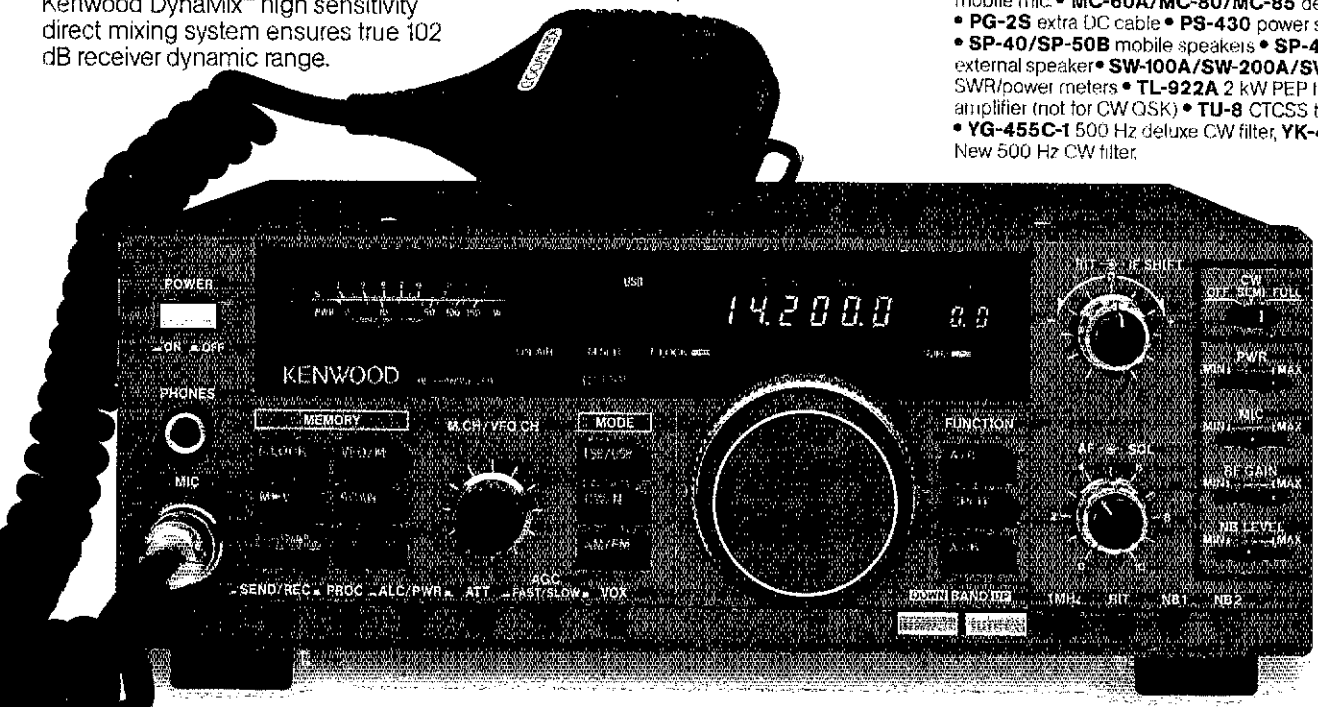
- **Covers all HF Amateur bands with 100 W output.** General coverage receiver tunes from 50 kHz to 35 MHz. *(Receiver specifications guaranteed from 500 kHz to 30 MHz.)* Modifiable for HF MARS operation. *(Permit required).*
- **All modes built-in.** LSB, USB, CW, FM and AM.
- **Superior receiver dynamic range** Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range.

- **New Feature! Programmable band marker.** Useful for staying within the limits of your ham license. For contesters, program in the suggested frequencies to prevent QRM to non-participants.
- **Famous Kenwood interference reducing circuits.** IF shift, dual noise blankers, RIT, RF attenuator, selectable AGC, and FM squelch.

- **M. CH/VFO CH sub-dial.** 10 kHz step tuning for quick QSY at VFO mode, and UP/DOWN memory channel for easy operation.
- **Selectable full (QSK) or semi break-in CW.**
- **31 memory channels.** Store frequency, mode and CW wide/narrow selection. Split frequencies may be stored in 10 channels for repeater operation.
- **RF power output control.**
- **AMTOR/PACKET compatible!**
- **Built-in VOX circuit.**
- **MC-43S UP/DOWN mic. included.**

Optional Accessories:

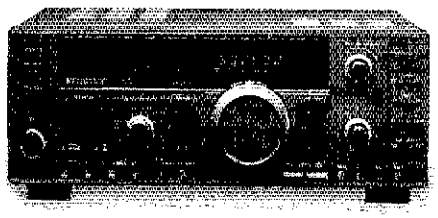
• **AT-130** compact antenna tuner • **AT-250** automatic antenna tuner • **HS-5/HS-6/HS-7** headphones • **IF-232C/IF-10C** computer interface • **MA-5/VP-1** HF mobile antenna (5 bands) • **MB-430** mobile bracket • **MC-43S** extra UP/DOWN hand mic. • **MC-55** (8-pin) goose neck mobile mic. • **MC-60A/MC-80/MC-85** desk mics. • **PG-2S** extra DC cable • **PS-430** power supply • **SP-40/SP-50B** mobile speakers • **SP-430** external speaker • **SW-100A/SW-200A/SW-2000** SWR/power meters • **TL-922A** 2 kW PEP linear amplifier (not for CW QSK) • **TU-8** CTCSS tone unit • **YG-455C-1** 500 Hz deluxe CW filter, **YK-455C-1** New 500 Hz CW filter.



TS-680S

All-mode multi-bander

- 6m (50-54 MHz) 10 W output plus all HF Amateur bands (100 W output).
- Extended 6m receiver frequency range 45 MHz to 60 MHz. Specs. guaranteed from 50 to 54 MHz.
- Same functions of the TS-140S except optional VOX (VOX-4 required for VOX operation).
- Preamplifier for 6 and 10 meter band.

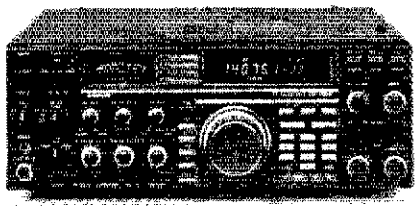


Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications, features, and prices are subject to change without notice or obligation.

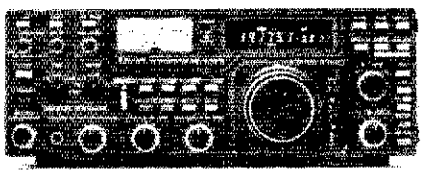
KENWOOD

KENWOOD U.S.A. CORPORATION
2201 E. Dominguez St., Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745

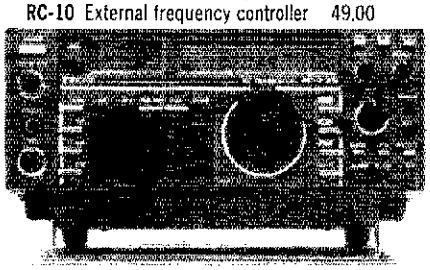
HF Equipment	Regular	SALE
IC-781 Xcvr/Rcvr/ps/tuner/scope	5995.00	Call



IC-761 Xcvr/Rcvr/ps/tuner	2699.00	2369
HM-36 Scanning hand microphone	47.00	
SP-20 Ext. speaker w/audio filter	149.00	139.95
FL-101 250 Hz 1st IF CW filter	73.50	
FL-53A 250 Hz 2nd IF CW filter	115.00	109.95
FL-102 6 kHz AM filter	59.00	
EX-310 Voice synthesizer	59.00	



IC-751A 9-band xcvr/.1-30 MHz rcvr	1699.00	1469
PS-35 Internal power supply	219.00	199.95
FL-32A 500 Hz CW filter (1st IF)	69.00	
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	949.95
PS-55 External power supply	219.00	199.95
AT-150 Automatic antenna tuner	445.00	369.95
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
AT-100 100W 8-band auto. antenna tuner	445.00	389.95
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	79.95

ICOM

★ Large Stocks
★ Fast Service
★ Top Trades
at AES®

VHF/UHF base multi-modes	Regular	SALE
IC-275A 25W 2m FM/SSB/CW w/ps	1299.00	1069
IC-275H 100W 2m FM/SSB/CW	1399.00	1129
IC-375A 25W 220 FM/SSB/CW (c/o)	1399.00	899.95
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	1129
IC-471H 75W 430-450MHz base (c/o)	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 (c/o)	499.00	349.95
IC-47A 25w 440 FM/TTP mic (c/o)	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-28H 45W 2m FM, TTP mic	499.00	439.95
IC-38A 25W 220 FM, regular mic	459.00	329.95
IC-38A 25W 220 FM, TTP mic	489.00	349.95
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

★ Package Special . . .
IC-900A Transceiver controller with UX-29H 2m/45W and UX-39A 220/25W band units.
$969.95

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
IC-1200A 10W 1.2GHz FM Mobile	699.00	549.95
IC-3200A 25W 2m/440 FM/TTP (c/o)	695.00	499.95
UT-23 Voice synthesizer	34.99	
AH-32 2m/440 Dual Band antenna	39.00	
AHB-32 Trunk-lip mount	35.00	
Larsen PO-K Roof mount	20.00	
Larsen PO-TLM Trunk-lip mount	22.00	
Larsen PO-MM Magnetic mount	22.00	
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

Due to the size of the ICOM product line, some accessory items are not listed. If you have a question, please call. All prices shown are subject to change without notice.

MasterCard VISA

Hand-helds	Regular	SALE
IC-2A 2-meters	289.00	259.95
IC-2AT with TTP	319.00	279.95
IC-3AT 220/TTP (c/o)	349.00	269.95
IC-4AT 440 MHz, TTP	349.00	299.95
IC-02AT/High Power	409.00	349.95
IC-03AT for 220 MHz	449.00	289.95
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
IC-2GAT for 2m, TTP	429.00	379.95
IC-4GAT 440MHz, TTP	449.00	399.95
IC-32AT 2m/440MHz	629.00	559.95

IC-u2A for 2m w/o TTP
Reg. $299 - **Closeout $249.95**

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	
CA-5 5/8-wave telescoping 2m antenna	19.95	
CP-1 Cig. lighter plug/cord for BP3 or Dlx	13.65	
CP-10 Battery separation cable w/clip	22.50	
DC-1 DC operation pak for standard models	24.50	
MB-16D Mobile mtg. bkt for all HTs	25.99	
LC-2AT Leather case for standard models	54.50	
RB-1 Vinyl waterproof radio bag	35.95	
HM-9 Speaker microphone	47.00	
HS-10 Boom microphone/headset	24.50	
HS-10SA Vox unit for HS-10 & Deluxe only	24.50	
HS-10SB PTT unit for HS-10	24.50	
SS-32SMP Commspec 32-tone encoder	27.95	

For other HT Accessories not listed please CALL

Receivers	Regular	SALE
R-71A 100kHz to 30MHz receiver	999.00	869.95
RC-11 Infrared remote controller	70.99	
FL-32A 500 Hz CW filter	69.00	
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	
CK-70 (EX-299) 12V DC option	12.99	
MB-12 Mobile mount	25.99	
R-7000 25MHz to 2GHz scan rcvr	1199.00	1049
RC-12 Infrared remote controller	70.99	
EX-310 Voice synthesizer	59.00	
TV-R7000 ATV unit	139.00	129.95
AH-7000 Radiating antenna	99.00	(15)

HOURS • Mon. thru Fri. 9-5:30; Sat. 9-3

Milwaukee WATS line: 1-800-558-0411 answered evenings until 8:00 pm Monday thru Thursday.

WATS lines are for Quotes & Ordering only, use Regular line for other Info & Service dept.

Order Toll Free: 1-800-558-0411

In Wisconsin (outside Milwaukee Metro Area) 1-800-242-5195

AMATEUR ELECTRONIC SUPPLY® Inc.

4828 W. Fond du Lac Avenue; Milwaukee, WI 53216 • Phone (414) 442-4200

AES® BRANCH STORES — Associate Store

WICKLIFFE, Ohio 44092
28940 Euclid Avenue
Phone (216) 585-7388
Ohio WATS 1-800-362-0290
Outside Ohio 1-800-321-3594

ORLANDO, Fla. 32803
621 Commonwealth Ave.
Phone (407) 894-3238
Fla. WATS 1-800-432-9424
Outside Florida 1-800-327-1917

CLEARWATER, Fla. 34625
1898 Drew Street
Phone (813) 461-4267
No In-State WATS
No Nationwide WATS

LAS VEGAS, Nev. 89106
1072 N. Rancho Drive
Phone (702) 647-3114
No In-State WATS
Outside Nevada 1-800-634-6227

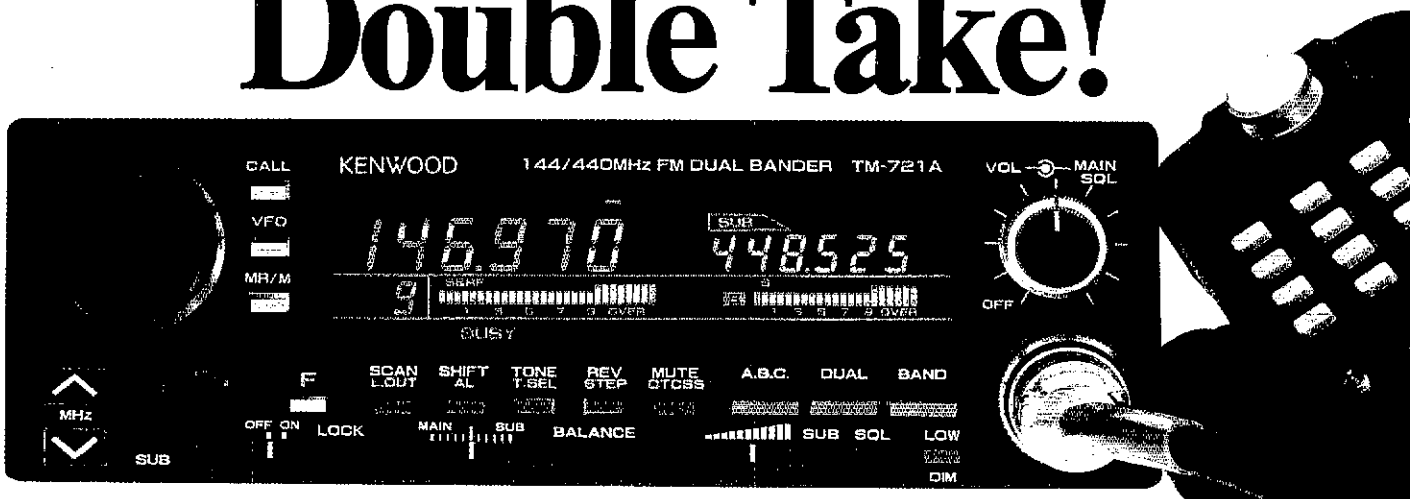
CHICAGO, Illinois 60630
ERICKSON COMMUNICATIONS
5456 N. Milwaukee Avenue
Phone (312) 631-5181
Outside Illinois 1-800-621-5802

KENWOOD

...pacesetter in Amateur Radio

THE FIRST 144/220 MHz Dual Bander!

Double Take!



ACTUAL SIZE FRONT PANEL

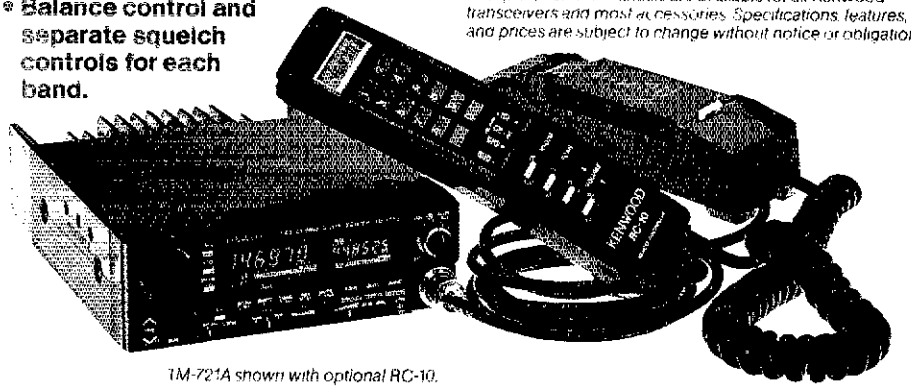
TM-621A/721A

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.

KENWOOD

KENWOOD U.S.A. CORPORATION
2201E. Dominguez St., Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745

reports indicate a terrific time was held by all. Sorry I had to miss this one, but it's only the second one I've missed in 10 years. In any event, ARRL was well represented by our Director Fried Heyn, WA6WZD, and Orange Section ACC Sandy Heyn, WA6WZN, as well as ASM Dale Hunt, WB6BYU, ACC Bill Hoover, KB5AH, DEC Don Fuller, KA6KGF, and OOC Mike Baugh, W8AKF. The next hamfest (after the SW Div convention) on the calendar is the Ventura County ARC (K6MEF) bash on October 15. (Looks like I'll have to miss that one too, as previous commitments and business travel will interfere.) That's all for this month. 73 for now. Traffic: N6NLW 177, W6NOR 131, KB6IEC 26.

WEST GULF DIVISION

NORTH TEXAS: SM, Phil Clements, K5PC—Asst SM: K5MXQ. SEC: W5GPO. STM: W5VMP. BM: W5QXK. PIO: K5HGL. ACC: W5URI. SGL: N1CWP. TC: W5LNL. OOC: WB5JBP. Congrats to L.C. Crawford, W5TNT, for once again making Brass Pounder's League by originating 103 messages into the NTS in August. Once again, the Dallas and Tarrant Co. RACES plans were activated due to the crash of Delta flight 1141 at DFW Airport on August 31. The primary mission was to provide hospital communications and to serve as a back-up for public safety comm. circuits. Further details later, when reports come in. This reinforces the importance of emergency preparedness in both the RACES and ARES organizations in our Section. All disasters are not weather related; we must devise our emergency planning to cover all contingencies. Logistics of how a net is to be activated in a timely manner, interfacing with served agencies, tactical and logistical considerations, equipment requirements, and realistic periodic drills and tests should all be included in our emergency planning, and carried out on our nets. SKYWARN is a fine and noble undertaking for amateur radio public service, but is by no means the only activity that a good ARES or RACES unit can provide vital life-saving services for. There are plenty of public-safety and public-service organizations out there that need our help. We are trained, professional communicators; no other organization on earth even comes close to providing world-wide communications with the flexibility and reliability that Amateur Radio operators do. We cannot stand on past performance; as we keep striving for the state-of-the-art in our stations, we must also update our emergency planning to keep up with the new threats and hazards in this modern society. We should all be proud of our dedicated work in public service; it pays our dues to our fellow Americans for the use of their frequency spectrum! Northeast Texas Tfc and Emergency Net for August: QNI/108, QTC/36 in 23 ssns. 7290 Net for August: QNI/3319, QTC/361 in 50 ssns. The D/FW Metroplex Tfc Net now has almost Section-wide coverage through the use of well-placed liaison stations. The net meets daily on the Dallas 146.28/88 repeater at 6:30 PM local time. Public Service Honor Roll for August: W5YQZ KC5NG KF5BL K5MXQ N5KCL K5UPN and WZ5N. Traffic: K5UPN 446, W5TNT 289, W5YQZ 243, W9OYL 195, KB5DVF 193, K5MXQ 168, WZ5N 129, W5VMP 125, KF5BL 119, KD5RC 76, KC5NG 72, KA5AZK 56, AJ5K 37, WA5EZT 33, WX5O 22, N5KCL 16, WA8ZNC 2.

OKLAHOMA: SM, Bill Goswick, K5WG—Affiliated Club Coordinator Ernie Buck, WB5CDW. Section Emergency Coordinator Bennett Basore, W5ZTN. State Government Liaison Larry Hazelwood, W5NZS. Section Traffic Manager Sam Sitton, KV5X. Technical Coordinator Ken Isbell, W5QMJ. This will be the last Section News column that I will write as Section Manager. I would like to thank the League members of the Oklahoma Section for allowing me to serve you as Section Manager for the past two years. It has been a memorable experience, and I am grateful for the opportunity. But most of all, I am grateful for the experience of meeting and working with the many hard-working field appointees of the Oklahoma Section, especially the Section-level leaders listed above. These dedicated individuals have, through their selfless efforts, made significant contributions to the Oklahoma Section in particular and Amateur Radio in general, and have helped to make my job as Section Manager a manageable and enjoyable experience. The Section is indeed fortunate to have had the services of these outstanding amateurs. To these distinguished individuals, as well as the many amateurs who serve in the field organization, I would like to extend my sincere thanks for a job well done. 73, Bill, K5WG.

SOUTH TEXAS: SM, Art Ross, W5KR—SEC: K5DG. STM: WR5O. ACC: WB5YDD. PIO: WA5UZB. OOC: WA2VJL. TC: NZ5U. BM: K5CVD. SGL: K5KJN. ORS: WD5GKH enjoyed busman's holiday by QNI TEN, RN5, OLZ, and North Platte, NE 2-meter net while vacationing. NM N5KCL announced code practice 8:00 PM local time on Texas Slow Speed Net 3745 kHz nightly; also learn to pass traffic. B-VARC Bulletin, Brazos Valley ARC (Ft. Bend & Harris Counties) reports VE team's August session successful; WB5WAF, KB5DWL, WB5UGT went to Advanced; KA5USF to General; one unlicensed to General, one unlicensed to Novice, plus others who passed one or more elements; WJ5B, WA5F and Trustee N5APW made improvements in 145.47 repeater; KA5WJB and WN5A holding code practice sessions 8:00 PM local time week nights and 10:30 AM weekends on or about 28,200 kHz, 21,170 kHz or 7,120 kHz (check on 145.47 rptr for details. DRN5 NM WB5YDD rprts 635 messages in 62 August sessions; STX represented 100% by KD5KQ, W5KLV, WV5X, WD5BQR, WB5HZQ, NZ5U, KD5CB, KE5ZV, WB5EPA, WB5FQU, WB5YDD. The Hill Country ARC Bulletin, Kerrville, rptrs club responded to Red Cross request during July storm; with AK5M as NCS there were KB6PG, K5AZ, KF5GA, W5NTJ, W6BJA, N5CND, N5ASQ and KA5ONN. OBS W5KLV rpts 5 propagation forecasts, 16 bulletins given 32 readings on 7 nets in August. BARN, Beaumont AR News, rprts KB5FEC, KB5GXB, KB5FOW, KB5GHT and KB5GNX upgraded to Technician. CAND Asst NM WB5YDD rprts 575 messages in 31 August sessions; RN5 represented 100%, STX stations helping were KE5ZV, KD5KQ, W5KLV, NX5V, WB5EPA, WB5FQU, WB5YDD. ACC WB5YDD announced San Benito ARC qualified for renewal of SSC designation. Recommend any club considering Public Service assistance in parades, air shows, boat races or other public affairs purchase at least one copy of ARRL publication FSD-400 (1-88), The Special Events Communications Manual; it will clear up 99 44/100% of your questions; Public Service in Special Events is legal, but there are some limitations.

WEST TEXAS: SM, A. Milly Wise, W5OVH—ASM: KA5PTG. ASM: WF5E, AI5S, WD5EFJ, N5DO. SEC: W5MVJ. PIO:

220 MHz Model FT-312RM Now Available

Introducing the only mobiles that double as answering machines.

Now you can stay in touch—even when you're away from your radio.

With Yaesu's 2-meter FT-212RH and 70-cm FT-712RH, an optional, internal digital voice recorder serves as a convenient answering machine for you and your friends. And that's just the beginning!

High performance mobiles. The FT-212RH features wideband receive coverage of 140-174 MHz (144-148 MHz Tx), while the FT-712RH covers 430-450 MHz. An oversize amber display includes an innovative photo-sensor which increases the display brightness during the day. The function buttons are arranged in a chromatic musical scale—ideal for visually-impared operators. You get 45 watts output on 2 meters, 35 watts on 70 cm.

An autodialer DTMF microphone with 10 memories, each ready to store telephone numbers up to 22 digits long.

And, like our FT-211RH Series mobiles, you'll enjoy simple controls, yet sophisticated microprocessor-based flexibility. Including 18 memories that store frequency, offset, PL tone, and PL mode (PL encoder built in, decoder optional). Band or memory scanning. Offset tuning from any memory channel. Memory channel lockout for scanning. High-low power switch.

All in an amazingly small package, shown actual size below.

Digital voice recorder option. Only Yaesu brings you the advanced technology found in our digital voice recorder option.

You can store messages or your call sign—in your own voice, not a synthesized replica—or give your friends a private code for leaving messages on your radio. All they need is a DTMF microphone! Then you can play back your messages either in-person, or remotely by using another radio with a DTMF microphone. And you've always got security because you can command your radio to respond only to in-person playback requests.

Visit your Yaesu dealer today. And test drive Yaesu's FT-212RH and FT-712RH mobiles. The only radios with the power to keep you in touch. Always.

YAESU

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. **Repair Service:** (213) 404-4884. **Parts:** (213) 404-4847.

Prices and specifications subject to change without notice. PL is a registered trademark of Motorola, Inc.

KE5ZW. ACC: K5IS. OOC: K5KNC. TC: K5CU. STM: AE5I. West Texas appointments usually not written about much and to whom I wish to express my thanks for all the work they do. The Emergency Coordinators K5ISD, WB5MEX, WB5ZDK, KE5FE, N5INC, WA5ROE, KB5NO, WA5YSV, W5FBQ, N5CAN, WB5GMZ, W5BEY, W5YCK, WA5MFP, N5IJD, N5FHR, KE5ZW, KE5YF, W5VRE, WB5OTF, K5JEZ, N5ENS, K5IS, WT5C, KJ5C, KA5QVC, WD5EYA, KA5PTG, KA5IYW, NG5R. Then there are the DECs: AE5I, NG5T, N5FHR, WD5EFJ, W5MVC, K5KNC, and overall the Section Emergency Coordinator Sandy, W5MVJ. Next month the appointees of the TC, the OOC, the ACC (PIA's, ORS, OO's ATC's) and the NMs. Without the help of these dedicated persons, my work would be impossible. Prairie Dog ARC bulletin says their water leak in their comm. trailer has been fixed by KD5ZX and K5OVO. The Amarillo Hamfest was well attended. N5IVK upgraded to Advanced. OOC Bill Brewer, N5KNC is still looking for qualified and capable OOs for West Texas. San Angelo ARC's bulletin "The Kilowhat" had news that an addition of a 2.5 kVa generator donated by Art, WA5RQV, makes the emerg. trailer have a total power capability of 9 kVa. Active duty officer Major Larry Zenter, KA2RUJ, took command of the CAP Squadron in San Angelo. The Panhandle ARC 146.67 repeater sustained heavy damage to its duplexers due to a lightning strike. Gene, AE5I, is remodeling house and moving ham shack to remodeled bedroom and installing a new ground and antenna system. 73. Milly Wise, W5OVH.

We go to great lengths

...**with our design and engineering.** The HR 2510 is a full featured 10 meter mobile transceiver. You get all of 10 meters—from 28.0000 to 29.6999 MHz. You also get a full complement of operating modes (CW/SSB/AM/FM), and enough power to do the job, with 25W PEP for CW and SSB modes, and 10W for AM and FM. A built-in Digital VFO (tuned with a knob, *not buttons*) with steps of 10 KHz, 1 KHz, and 100 Hz, and Digital Display of your selected transmit frequency makes it easy to use.

...**to make operation easy.** We haven't neglected the receiver either. With typical sensitivity of only .25 μV for 10 dB S/N in CW and SSB modes, the HR 2510 has the extreme sensitivity needed for operation with less than ideal mobile antenna systems. There's also a highly effective switchable Noise Blanker for the ultimate in mobile ignition noise suppression. You also get receive scanning, (scan fifty 10 KHz channels), and RIT (Receiver Incremental Tuning) to precisely zero beat on your receive.

...**with lots of standard features.** Of course, an easy to read multifunction LCD display with selectable dim or bright backlighting, multifunction metering on the LCD with S/RF, Modulation, SWR Cal, and SWR functions, RF Gain control,Frequency Lock, and Channel Up/Down switches on the PTT microphone are all standard features.

...**to make the President HR 2510 the best 10 Meter Mobile Transceiver on the market today.**

President is a leading manufacturer of transceivers, and we've put that know how to work in the HR 2510 to bring you the finest 10 meter mobile in its class.

PRESIDENT

For more information on the President HR 2510, please write to: President, 4700 Amon Carter Boulevard, Fort Worth, TX 76155
Attn: Literature Department (Amateur Radio)

TECH TALK from ICOM

Selectivity and The Incomparable IC-781

Two previous Tech Talks discussed the exceptionally versatile operating features and advanced circuit designs responsible for top-line sensitivity in ICOM's deluxe IC-781 HF transceiver. This time we will look at another aspect of the IC-781 especially significant to all radio amateurs; its overall selectivity and interference reduction techniques. This transceiver's superior designs reflect direct inputs from noted DX'ers and contest operators around the world. ICOM carefully studied the most effective means of fulfilling those requests, then incorporated every imaginable QRM-minimizing feature in the IC-781. The final combination of unparalleled sensitivity and selectivity results in a true dream unit light years ahead of the competition.

Reception of a single desired signal on today's active bands requires the best interference reduction methods available in modern electronic technology. Independent selection of steep-skirted filters with various bandwidths is vital for mating with ever changing conditions, plus an effective means of tailoring their response is most important for weak signal reception and DX'ing. Concentrating exclusively on those prerequisites, however, still leaves "open ends" and examplifies why many HF transceivers understandably exhibit shortcomings in reduction of undesired interferences. A pace-setting unit like the IC-781 must also sidestep tune-up heterodynes, a myriad of noises, and outside influences on AGC actions. Since the previous combination of special designs and features is quite extensive, let's take a closer look at how ICOM incorporates all of them in the IC-781.

First, **the industry's most elaborate array of IF filters are factory-installed in the IC-781.** Various bandwidths are front panel selectable in a mix-and-match manner according to your operating needs. You can independently activate its wide or narrow filters for SSB, and 2.4kHz, 500Hz, or 250Hz filters for CW/RTTY with separate switch call-ups of second and third IF stage filters. The beauty of this flexible arrangement is overall bandwidths and their skirts/shaping factors are easily tailored to every specialized need. Additionally, **specific filter preferences can be stored right along with their related frequency and mode selections in any of the IC-781's tunable 99 memories.** Since each memory operates like a separate VFO, you can change frequencies and filters via front panel controls. New selections do not alter your originally stored data unless you specify that action by pressing the "MEMORY WRITE" button. If this transceiver was any more user friendly, it would operate itself!

Futher complimenting multiple filter selection is the IC-781's exclusive **twin Passband Tuning:** a self-tracking system that optimizes frequency response of the second and third IF filters in a most pronounced manner. Rotating the Passband Tuning's concentric 9MHz and 455kHz controls in opposite directions peaks low or high frequency response to a signal while reducing overall bandwidth from that of a selected filter to less than 100Hz. Rotating both controls in the same direction optimizes receiver response while maintaining a selected filter's originally established bandwith in a double IF Shift fashion. Briefly visualize combined use of the IC-781's clever operating features in your own station. You enjoy beautiful sounding SSB audio with a 2.8kHz filter, switch to a 2.4kHz filter for DX'ing, use the twin Passband Tuning to narrow that width to 1.8kHz and less (!) plus experience CW operations truly in a class all their own. Transceivers of this caliber happen only once in a lifetime!

Amazing as it seems, multiple IF filters and twin Passband Tuning are only part of the IC-781's interference sidestepping excellence. Additional features include a **tunable IF level Notch filter** that sharply attenuates a heterodyne or tune-up carrier before it is detected and/or degrades AGC performance, **continuously adjustable AGC** to ensure hold/release times are not influenced by undesired outside signals, **a competition grade Audio Peak Filter,** and **the most sophisticated dual Noise Blanker in any transceiver built.**

The IC-781's Noise Blankers host **two innovative features.** A dedicated **bandpass filter** is utilized "ahead" of the blanker's circuitry to assure adjacent/strong signals do not superimpose on blanking action or create unnecessary "hash" often associated with conventional blankers. Naturally, its threshold/sensitivity is continuously adjustable to prevent excessive insertion or overload common to many blankers. **The wide blanker's width is also fully variable from one to fifteen milliseconds** for totally eliminating over-the-horizon radar pulses and its propagation echoes. Yes, friends, the IC-781's blanker cuts all forms of noises...including the woodpecker and his tail!

We've said it before and we will say it again: if you can find a transceiver with more total performance and advanced electronic engineering than the IC-781, buy it! Top-of-the-line sensitivity and selectivity are only two of many assets you get in the IC-781 (indeed, any ICOM product!) unyielding customer support, the industry's best warranty and innovative designs are built into every unit. **ICOM's commitment to excellence is always designed with you foremost in mind!**

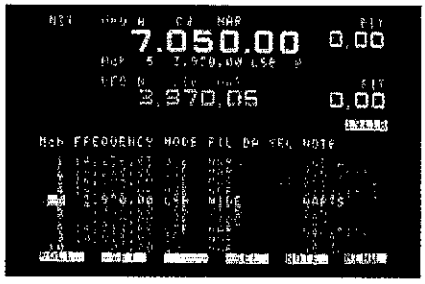
ICOM'S NEW IC-781 *"The future of amateur communications."*

ICOM America, Inc., 2380-116th Ave. N.E., Bellevue, WA 98004 **Customer Service Hotline (206) 454-7619**
3150 Premier Drive, Suite 126 Irving, TX 75063 1777 Phoenix Parkway, Suite 201, Atlanta, GA 30349
ICOM CANADA, A Division of ICOM America, Inc., 3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4 Canada

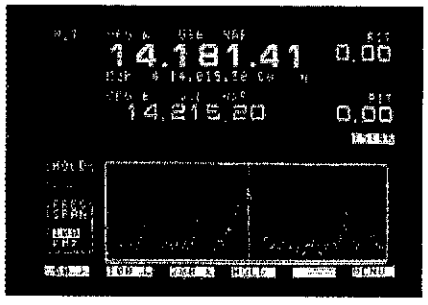
THE FUTURE OF AMATEUR COMMUNICATIONS

Once in a lifetime, a transceiver is introduced that's so extraordinary and innovative that it opens a totally new era in HF communications. ICOM's pacesetting IC-781 proudly exhibits that hallmark achievement with futuristic designs and features of true legendary proportions. Whether DX'ing, contesting, pioneering new interests or enjoying unquestionable top-of-the-line performance, the IC-781 is indeed today's standard of excellence!

Multi-Function Five Inch CRT. Displays frequencies, modes, memory contents, operating notes, RIT, two menu screens, plus a panoramic view of all signals in a selected range. A portion of the screen also serves as a display for data modes like RTTY, AMTOR, and PACKET.



Unique Spectrum Scope. Continuously indicates all signal activities and DX pileups with your operating frequency in the center. Selectable horizontal frequency spans of 50, 100, and 200KHz for each side of the frequency you're listening to. Vertical range indicates relative signal strengths. A contester's dream!



Dual Width Noise Blanker includes MCF filter plus **level and width controls** to eliminate pulse and woodpecker noise with minimum adjacent-signal interference.

Incomparable Filter Flexibility. Independent selection of wide and narrow SSB filters plus CW filters. Second and third CW IF filters are independently selectable!

Dual Watch. Simultaneously **receives two frequencies in the same band!** Balance control adjusts VFO A/B receive strength levels. You can check additional band activity, even tune in your next contact, while in QSO without missing a single word!

DX Rated! 150 watts of exceptionally clean RF output. Easily drives big amplifiers to maximum power.

Twin Passband Tuning with **separate controls for second and third IF stages!** Increases selectivity and narrows bandwidth, independently varies low and high frequency response, or functions as IF shift. **It's DX'ing Dynamite!**

A Total Communications System! Includes built-in 100% duty AC supply, high speed automatic antenna tuner, iambic keyer, semi-automatic or full QSK CW break-in to 60 wpm, Audio Peaking Filter (APF), RF speech processor, multiscanning, 105dB dynamic range, all-band/all-mode receiver with general coverage, and much more!

ICOM Dependability. The phenomenal IC-781 is built for action and backed with the most extensive warranty in the industry.

See the IC-781 at your local ICOM dealer.

ICOM

First in Communications

ICOM America, Inc., 2380 116th Avenue N.E., Bellevue, WA 98004
Customer Service Hotline (206) 454-7619
3150 Premier Drive, Suite 126, Irving, TX 75063
1777 Phoenix Parkway, Suite 201, Atlanta, GA 30349
ICOM CANADA, A Division of ICOM America, Inc.,
3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4
All stated specifications subject to change without notice or obligation.
All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 781188.

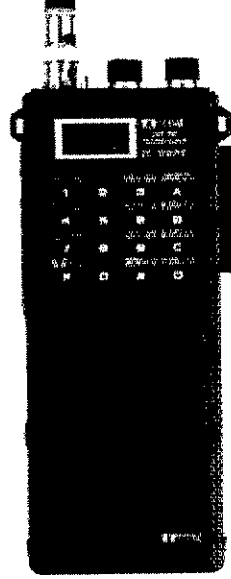
ICOM DAY!

Presented by:

LEVCO
(formerly Electronic Center, Inc.)
2809 Ross Ave., Dallas, Tx 75201
(800) 441-0145 Texas
(800) 527-2156 USA
(214) 969-1936

SATURDAY
November 5, 1988
8am til 2pm

ICOM

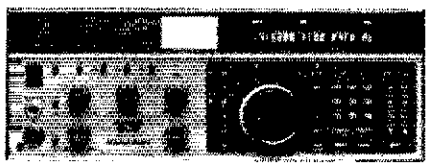


WIN!!
Grand Prize
IC-02AT 2M
DIGITAL READOUT HANDHELD

Prize Drawings each hour.
Come and register to win.
(No purchase necessary to win.)

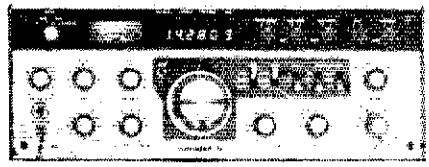
- Special pricing
- ICOM personnel to demonstrate new equipment
- See the new line of ICOM equipment

TEN-TEC . . . Made in the USA . . . In stock at AES®



PARAGON	List	SALE
585 9-band xcvr w/.1-30 MHz rcvr	2245.00	1899
961 Deluxe 22A ps w/speaker	239.00	219.95
256 FM transceive module	65.00	
257 Voice synthesizer	89.00	
258 RS-232 interface	65.00	
282 250 Hz 6-pole CW filter	69.00	
285 500 Hz 6-pole CW filter	69.00	
288 1.8 KHz 8-pole SSB filter	69.00	
700C Electret hand microphone	37.00	
705 Electret desk microphone	69.00	
1140 18/24.3A DC circuit breaker	18.00	

TITAN	List	SALE
425 1.5kw linear (SN below 1000)	2685.00	2289
425 1.5kw linear (SN 1000 & up)	2795.00	2389



CORSAIR II	List	SALE
561 9-band digital transceiver	1445.00	1249
961 Deluxe 22A ps w/speaker	239.00	219.95
263G Remote VFO	269.00	249.95
282 250 Hz 6-pole CW filter	69.00	
285 500 Hz 6-pole CW filter	69.00	
288 1.8 KHz 8-pole SSB filter	69.00	
603 KR-1B Dual keyer paddle	69.00	
700C Electret hand microphone	37.00	
705 Electret desk microphone	69.00	
1140 18/24.3A DC circuit breaker	18.00	

ACCESSORIES	List	SALE
2510B SSB/CW Mode B satellite conv	695.00	629.95
209 300w dry dummy load	29.00	
229B 1.8-30 MHz 2KW PEP tuner	349.00	319.95
3229 Balun kit for 229B	18.00	
3180 80m mobile 78" high	34.00	
3175 75m mobile antenna	34.00	
3140 40m mobile antenna	31.00	
3130 30m mobile antenna	28.50	
3120 20m mobile antenna	27.50	
3115 15m mobile antenna	25.00	
3110 10m mobile antenna	24.50	
3101 42" top section stinger	7.75	
3001 80-20m mobile matcher	18.00	

MasterCard USE YOUR CREDIT CARD VISA

Large Stocks, Fast Service • Order directly from this ad!
Late model SSB/FM gear** (no handhelds) **accepted in trade.

Order Toll Free: 1-800-558-0411
In Wisconsin (outside Milwaukee Metro Area) 1-800-242-5195

AMATEUR ELECTRONIC SUPPLY® Inc.
4828 W. Fond du Lac Avenue; Milwaukee, WI 53216 • Phone (414) 442-4200

AES® BRANCH STORES — Associate Store

WICKLIFFE, Ohio 44092
28940 Euclid Avenue
Phone (216) 585-7388
Ohio WATS 1-800-362-0290
Outside Ohio 1-800-321-3594

ORLANDO, Fla. 32803
621 Commonwealth Ave.
Phone (407) 894-3238
Fla. WATS 1-800-432-9424
Outside Florida 1-800-327-1917

CLEARWATER, Fla. 34625
1898 Drew Street
Phone (813) 461-4267
No In-State WATS
No Nationwide WATS

LAS VEGAS, Nev. 89106
1072 N. Rancho Drive
Phone (702) 647-3114
No In-State WATS
Outside Nevada 1-800-634-6227

CHICAGO, Illinois 60630
ERICKSON COMMUNICATIONS
5456 N. Milwaukee Avenue
Phone (312) 631-5181
Outside Illinois 1-800-621-5802

ICOM

IC-761 HF Transceiver

1988 Canada/USSR Trans Polar Ski Trek

"For more than three months, under the most exacting conditions, the Icom equipment performed superbly in support of the Polar Bridge Expedition... Icom equipment was our first choice."

— Barry Garratt VE3CDX/VE8CDX/4K0DX, Chief Operator/North Pole 28 1988 Canada/USSR Trans Polar Ski Trek

ICOM IC-761 ON TOP OF THE WORLD

The Canada/USSR Trans Polar Ski Trek did not include leeway for second best. That's why they chose Icom's IC-761 HF transceiver. With amateur radio as the sole means of communication in their 1,240 mile venture across the frozen Arctic, exceptional performance and dependability were vital to their mission. Just as they are to your globe-spanning home station activities:

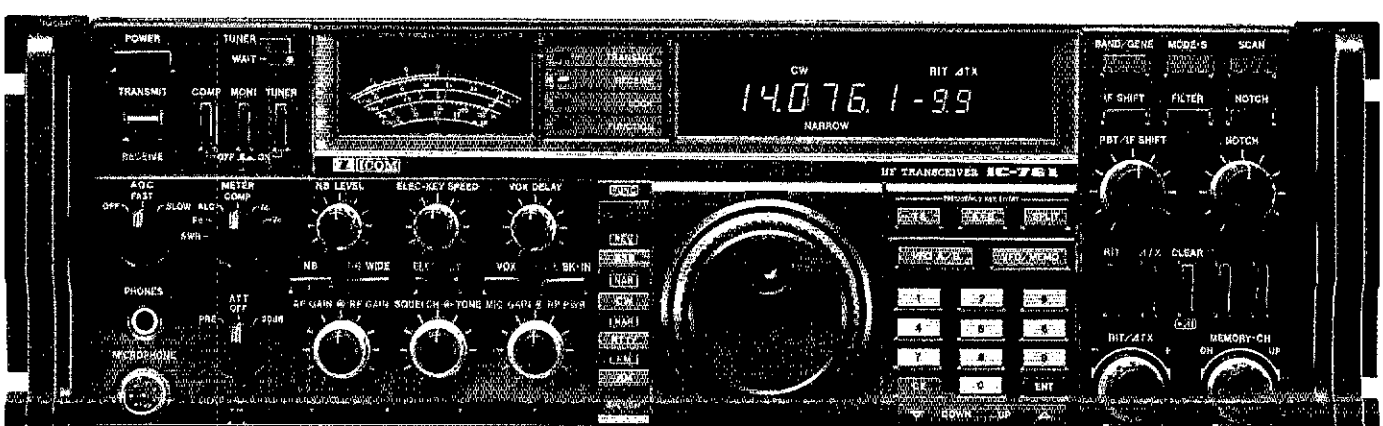
THE COMPLETE HF TRANSCEIVER!
Includes: • Built-in AC power supply • Automatic antenna tuner • 105dB dynamic range • Exceptionally low phase noise • 100W output on most modes • 100% duty cycle • High stability crystal oscillator • Self-calibrating SWR bridge • Multiple filter selection • Dial or front keypad frequency selection • 32 memories • All bands, all modes with general coverage receiver • Passband tuning • IF shift • Built-in iambic keyer • Semi or full QSK rated at 60WPM • Built-in wide/narrow SSB and CW filters.

BEST IN RELIABILITY!
Field proven top performance backed by a one-year warranty and four North American service centers. Icom's IC-761... when there is no room for second best.

ICOM

First in Communications

ICOM America, Inc., 2380-116th Ave. N.E., Bellevue, WA 98004
Customer Service Hotline (206) 454-7619
3150 Premier Drive, Suite 126, Irving, TX 75063 / 1777 Phoenix Parkway, Suite 201, Atlanta, GA 30349
ICOM CANADA, A Division of ICOM America, Inc.,
3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4 Canada



ICOM DAY!

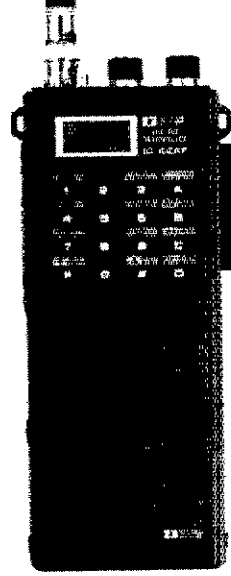
Presented by:

ege, inc.

14803 Build America Drive
Building "B"
Woodbridge, VA 22191
(800) 444-4799 or (703) 643-1063

SATURDAY
November 12, 1988
9am til 5pm

ICOM



WIN!!

Grand Prize
IC-02AT 2M
DIGITAL READOUT HANDHELD

Prize Drawings each hour.
Come and register to win.
(No purchase necessary to win.)

- Special pricing
- ICOM personnel to demonstrate new equipment
- See the new line of ICOM equipment

"ONLINE" U.S. CALL DIRECTORY

Hamcall service gives you ALL hams via your computer & modem. Updated each month! Only $29.95 per year. Unlimited use — you pay for phone call.

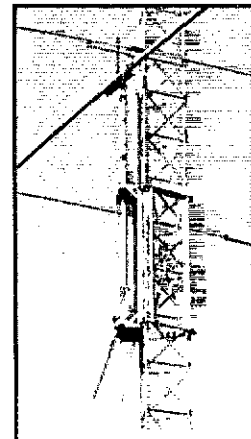
BUCKMASTER PUBLISHING
Route 3, Box 56
Mineral, Virginia 23117
703: 894-5777 visa/mc 800: 282-5628

SOLAR POWER
OPERATE YOUR HAM STATION OFF "FREE" PV POWER

☐ Low Cost Photovoltaic Solar Electric Panels
☐ Electronic, Low-loss Charge Regulator (kit or assembled)
☐ Accessories: meters, cigarette lighter plugs, etc.

Send $1.00 for Application Note package and Price List to:

KG6JA, BERG ENTERPRISES
P.O. Box 4207, Carlsbad, CA 92008



SAVE TIME and MONEY with THE HAZER

Bring things down for safety and convenience.

Never climb your tower again with this elevator system. Antennas and rotator mount on HAZER, complete system trams tower in vertical upright position. Safety lock system operates while raising or lowering. Never can fall.

Complete kit includes winch, 100 ft. of cable, hardware and instructions. For Rohn 20 and 25 G Towers.

Hazer 2-Heavy duty alum. 12 sq. ft. load	$311.95 ppd.
Hazer 3-Standard alum. 8 sq. ft. load	$223.95 ppd.
Hazer 4-Heavy galv. steel 18 sq. ft. load	$291.95 ppd.

NEW for ROHN 45 and 55 Towers

Hazer 8-Heavy duty galv. steel 16 sq. ft. load	CALL
Ball Thrust Bearing TB-25 for any of above	$64.50 ppd.

Send for free details of aluminum towers specifically engineered for use with the Hazer. Two sizes; M-13 (13" wide) and M-18 (18" wide). All bolted construction, no welds. Easy to install hinge base, walk up erection. Complete tower UPS or air freight shippable. Pre-assembled or kit form.

Satisfaction guaranteed. Call today and charge to Visa, MasterCard or mail check or money order.

GLEN MARTIN ENGINEERING INC.
Rte 3, Box 322
Boonville, MO 65233
(816) 882-2734 FAX 816-882-7200

SURPLUS SALES OF NEBRASKA

WHERE THE HARD TO FIND PARTS ARE FOUND

Dow-Key® 50Ω RELAYS

Series 60
SPDT
BNC connectors
12 vdc coil
Dual aux. contacts
Rated to 1000 Mhz
1000 watts CW
2000 watts PEP
New in the box!

$49 each 2/ $90

Series 411-2308
TRANSFER RELAY
SMA connectors
26.5 vdc coil
Insertion Loss: .1db typ.
Isolation: 70db typical
25 watts CW @ 26.5 GHz
250 watts CW @ 100 MHz
New in the box!

$110 each 2/ $200

Store owned & operated by Bob Grinnell, WD0FDF

DOORKNOB CAPACITORS

Series 58 • 5 KV • $11each • 4/$ 40
10, 12, 20, 25, 28, 30, 40, 47, 50, 57, 63, 65, 80, 85, 100, 120, 140, 200, 500 & 1000 pf

Series 57 • $29each • 4/$ 110
40, 100, 200, 500 & 1000 pf • 15KV
(Series 57 also available in 1500pf for $33.each)

AND ON HAND

ROCKWELL COLLINS
NEW REPLACEMENT PARTS

- Paint, fresh16oz spray, original shades of gray for ham gear $20ea 3/$55
  #126-trim ring, #180-cabinet, #250-front panel, #270-St. James- old gear
- Crystals. All frequencies in stock $7each, 5 or more only $6 each
- KWM2A 970-2439-010 (X96) or 970-2439-020 (X97) relays $49.95
- 75S-3C Complete conversion kit converts 75S-3B to 75S-3C $195
- 500 cycle CW filter for 75S-3 (526-9494-00 • F455FA-05) $259
- Microphone connectors: 3/16" phone plug $5ea($8 w/cord); panel jack $3
- 30L-1 caps,100µf, 450v,Sprague TVA1718(slightly large than original) $7 10/$65
- 30L-1 Blower fan motor $ 45
- 30S-1 power transformer, 662-0351-000 $265
- Oak on/off and switch for rotary switch repair on Collins gear $ 15
- Trim Ring for 516/312 (small cabinet) plastic (609-1254-001) $ 25
- KWT-6 Power transformer, 5950-679-9511 $115
- KWS-1 Power transformer, 662-0155-00 $175
- KWM380 Matched Pair Transistors: Finals $110pair Drivers $18pair
- KWM380 1.7 KHz RTTY filter 293-1337-020 new from Piezo $249
- KWM380 Receiver / Exciter board, empty, no components $6.95
- KWM380 Display board, all components except digital displays $18.95
- KWM380 Power Amplifier board,80% complete,missing finals,etc. $34.95

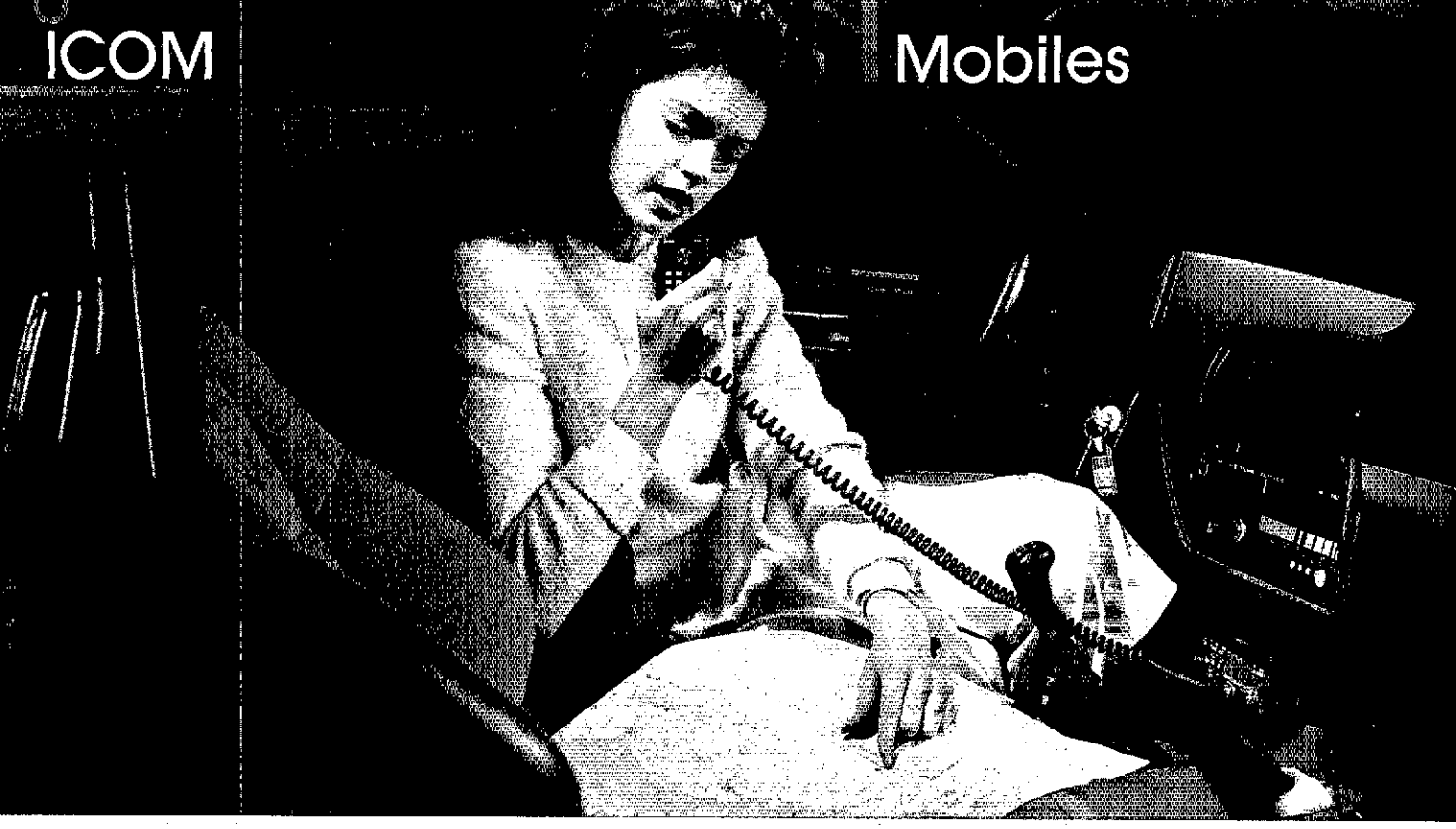
BARKER & WILLIAMSON sale prices include shipping. Deduct 4% for cash.

PT-2500A 1500 watt Amplifier	$1795	850/160 Pi-network	$108
VS-1500A 1500 watt Transmatch	$ 439	850A or 852 Pi-network	$ 96
VS-300A 300 watt Transmatch	$ 105	AC 3.5-30 Folded Dipole	$180

1315 JONES STREET
OMAHA, NE 68102
ORDERS OR INFO *402-346-4750*
FAX: 402-346-2939

ORDERING INFORMATION
Enclose $2.50 for UPS on first lb. Add 50¢ per lb. up to 70 lb.
Add $3 for CODs
Foreign orders sent via Airmail
We accept the following terms:
Checks, Bank Checks, COD
VISA, MC, AMERICAN EXPRESS

CATALOG 5 + new flyer via FIRST CLASS SEND $2 • FOREIGN $5



YOU'RE LOST WITHOUT IT

Whether you're trying to find your way to an unfamiliar location or need assistance in an emergency, ICOM mobiles help you find your way. ICOM's dependable mobiles steer you to a friendly voice or a helping hand.

Most Popular Mobiles.

ICOM's popular mobiles include the 2-meter **IC-28A** and **IC-28H**, 220MHz **IC-38A**, 440MHz **IC-48A** and 2-meter/70cm dual band **IC-3200A**.

21 Memories.

Store frequency, offset and tone, with an offset check button on the front panel. The IC-3200A features 10 fully tunable memories.

Packet Perfect.

The IC-28/38/48 series includes a high speed microprocessor and switching circuit for superb packeting!

Top Features.

- Band and Memory Scanning
- Compact Size
- All Subaudible Tones Built-In
- Backlit LCD Readout with Dimmer
- DTMF Mic Included

"I feel any company willing to build radios as survivable as my IC-28A deserves my ham radio dollars. . ."

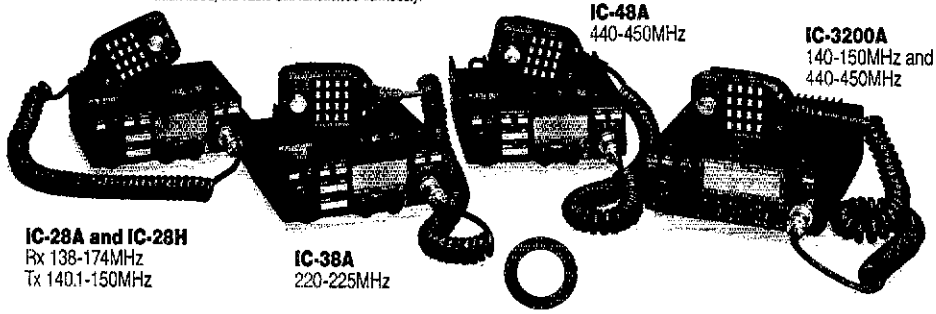
-Jonathan Starr AH6GJ
After his truck and IC-28A were washed away in a flash flood, the radio still functioned flawlessly.

Options.

Options include the UT-28 digital coded squelch, SP-10 speaker, HS-15/HS-15SB boom mic and PTT switchbox and PS-45 AC power supply.

ICOM Mobiles.

Don't be lost without them. Find them at your local ICOM dealer.



IC-48A
440-450MHz

IC-3200A
140-150MHz and
440-450MHz

IC-28A and IC-28H
Rx 138-174MHz
Tx 140.1-150MHz

IC-38A
220-225MHz

ICOM
First in Communications

ICOM America, Inc., 2380 116th Avenue N.E., Bellevue, WA 98004, **Customer Service Hotline (206) 454-7619**
3150 Premier Drive, Suite 126, Irving, TX 75063 • 1777 Phoenix Parkway, Suite 201, Atlanta, GA 30349
ICOM CANADA, A Division of ICOM America, Inc., 3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4

NOVEX

RF Signal Generator/Counter

- ✓ .1 - 150 MHz
- ✓ Harmonics to 450
- ✓ AM modulation
- ✓ XTAL input/check
- ✓ Digital readout

NOVEX SG4162AD only $249.95 + $4 S&H

NOVEX SG4160A same as above except no digital readout/counter only $149.95 + $4 S&H

AF Audio Generator/Counter

- ✓ 10 Hz - 1 MHz
- ✓ Sine - sq wave
- ✓ Low distortion
- ✓ 8V RMS output
- ✓ Digital readout

NOVEX AG2603AD only $249.95 + $4 S&H

NOVEX AG2601A similar to above except no digital readout/counter only $149.95 + $4 S&H

Function Generator

- ✓ Sine, sq, triangle
- ✓ .5 Hz - .5 MHz
- ✓ DC offset
- ✓ 20 Vpp output
- ✓ 120 VAC power
- ✓ includes test leads
- ✓ External inputs can control AM (VCA) or FM (VCF) and produce AM, FM, sweep, ASK, or FSK signals

NOVEX FG2020A only $149.95 + 4 S&H

EEB Orders: 800-368-3270 Local & tech info 703-938-3350
Electronic Equipment Bank
516A Mill St. NE, Vienna, VA 22180
(just minutes from Washington, DC)

NOVEX

DM4061 Dip Meter *every ham needs one*

A must for every ham shack - check coils, tank circuits, antennas, use as RF generator, internal modulation, look for harmonics. 1.5 - 250 MHz 6 plug-in coils.

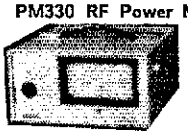
only $79.95 + $4 S&H

SWR-3P SWR/Power/Field Strength

- Measures output/SWR, while on the air
- 10 & 100 watt scales
- 1.7 to 150 MHz
- SO 239 conectors
- 5" whip antenna

only $19.95 +$4 S&H

PM330 RF Power Meter/Dummy Load



- 1.8 to 500 MHz
- 50 ohms "N"f
- 5/20/120 watt ranges
- measures your HF & HT power output

only $99.95 + $4 S&H

FC5250 Counter *know your transmit frequency*

- 10 Hz to 150 MHz
- 7 digits
- Accurate to ±1 count
- Gate times 1 or 5 sec.
- HF & VHF inputs
- Excellent for audio
- AC power adapter PA9P included

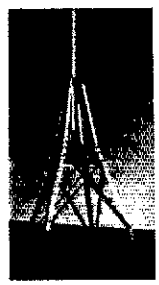
only $129.95 + $4 S&H

EEB Orders: 800-368-3270 Local & tech info 703-938-3350
Electronic Equipment Bank
516A Mill St. NE, Vienna, VA 22180
(just minutes from Washington, DC)

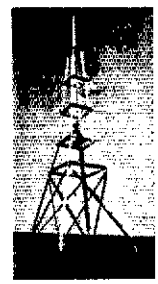
EEB ELECTRONIC EQUIPMENT BANK

STORE HOURS
TU, W, FR 10-5
TH 10-9, SA 10-4
SU, M — CLOSED

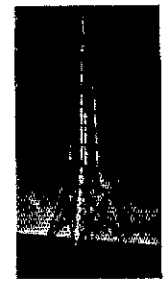
ROOF TOWERS



CR-18



CR-30



CR-45

CREATE ROOF TOWERS CONSTRUCTED OF HIGH GRADE ALUMINUM WITH GALVANIZED STEEL BRACING FOR ADDED STABILITY AND STRENGTH WILL EASILY ACCOMMODATE YOUR ANTENNA REQUIREMENTS. THREE SIZES OF ROOF TOWERS WILL SUPPORT VHF ANTENNAS, HF TRI-BANDERS, AND OSCAR SYSTEMS. ROTATORS EASILY MOUNT INSIDE THE TOWER. AN OPTIONAL THRUST BEARING (#303) IS RECOMMENDED. SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE OR OBLIGATION.

MODEL	HEIGHT	MAXIMUM ANTENNA WIND LOAD IN FT 2	BASE WIDTH	MAX. VERT. LOAD LBS.	TOWER WEIGHT LBS.	PRICE
CR-18	5'10"	21 @ 90 MPH	31-1/3"	440	28	129.00
CR-30	9'10"	27 @ 90 MPH	39"	1,322	39	224.00
CR-45	14'9"	23 @ 90 MPH	39"	881	55	328.00
CK46	Thrust Bearing For CR-18, CR-30, and CR-45 Maximum Acceptable Mast Diameter 2½"					52.00

***BUYING IS REQUIRED ON ALL ROOF TOWERS. UPS SHIPPABLE**

MODEL HF6V

Compare Active Element Lengths

Band	HF6V	Typical multiband trap vertical
10M	26 ft. (7.8 A)	= 8 ft. (2.3 A)
15M	12 ft. (3.6 A)	= 10 ft. (2.7 A)
20M	26 ft. (7.8 A)	= 12 ft. (3.7 A)
30M	26 ft. (7.8 A)	
40M	26 ft. (7.8 A)	=30 ft. (9.14 A)
80M	28 ft. (8.6 A)	=28 ft. (8.6 A)

Electrical and Mechanical Specifications

Shipping weight: 12 lbs./5.4 kg
Height: 26 ft./7.9 m.
Feedpoint impedance: nominal 50 ohms through included matching line (includes RF connectors for direct connection to any length of 50-ohm cable terminated in PL-259).
VSWR at resonance: 1.5:1 or less on all bands in typical ground level or above ground installations.
Bandwidth for VSWR of 2:1 or less: 10 meters - 1500 kHz; 15 meters - entire band; 20 meters - entire band; 30 meters - entire band; 40 meters - 280 kHz; 80/75 m. - 40 to 100 kHz

NOTE: These SWR bandwidths are what may be expected over ground systems of better than average conductivity. Over average or less efficient systems even greater bandwidths are likely.

Power Rating: Legal limit SSB and CW all bands
Wind loading: 1.8 sq. ft./.49 sq. meters
Ungoyed wind survival rating: 90 m.p.h./129 k.p.h. assuming no icing and precipitation

Installation

Comes complete with 2 ft./79 cm. tubular mounting post (1-1/8 in. O.D.) for direct placement in earth or into standard steel TV mast (1 1/4 in. O.D. with .058 in. wall) or Buttermut Mounting Post Sleeve (Model MPS). Eye level adjustment of 80, 40 and 30 meter resonator coils, length adjustment on 15 and 10 meters. 20 meter adjustment is a function of 40 and 30 meter tuning. Coils for 80/75, 40 and 30 meters are 3/16-in. diameter aluminum wire, air wound and self supporting, typical spacing between adjacent turns is 1/2 in. or greater.

Model HF6V-X, an export/DXpedition version suitable for surface parcel post shipment to most countries is available. Electrically identical to the standard model. Shipping weight 12 lbs./5.4 kg.

HF6V 127.00

MISC ITEMS

DXA	160, 80, 40 dipole	49.95	
AP151-3G	2m on glass	36.95	
UGM	1/4 λ mag.	21.95	
HB144BN	2m duck	16.95	
MONR51	scanner mag	39.95	
BL1500	9:1 balun	46.95	
Coaxseal		2.95	
GR6	6' gnd rod	6.00	
5RG58N	5' jumper	4.99	
M5	5' mast	5.95	
CS3G	3-way switch	33.95	
LAC2	Blitz Bug	8.95	
4UU	4' jumper	8.95	
TRT60	5' tripod	19.95	
AR300XL	TV rotor	59.95	
258XUU	25' cable	9.95	
508XUU	50' cable	15.95	
758XUU	75' cable	20.95	
1008XUU	100' cable	25.95	
CS201	coax switch	25.75	
CS401	coax switch	109.95	
	AND MORE!		

ROHN

20G	10' sect.	45.95
20AG	top sect. 9'	56.95
25G	10' sect.	57.95
25AG2	top sect. 9'	67.95
45G	10' sect.	137.95
45AG2	top sect. 9'	140.95
AS25G	access shelf	22.95
AS45G	access shelf	56.95
TB-3	thrust bearing	53.95
M200	10' mast	19.95
SB25G	short base	26.95
SB45G	short base	56.95
EF2545G	gin pole	324.95
	AND MORE!	

HUSTLER

6BTV	6 band trap vert.	147.95
5BTV	5 band trap vert.	125.95
4BTV	4 band trap vert.	95.95
G7-144	Fix stat. 2mt collinear	125.95
MO-1/MO-2	mobile masts	22.95
RM10/RM15	10m-15m resonator	12.95
RM10S/RM15S	super resonator	17.95
RM20/RM20S	std. & super resonator	16.95/22.95
RM30	30mt. std. resonator	17.95
RM40/RM40S	std. and super	18.95/26.95
RM75/RM80	75 or 80 std.	19.95
RM75S/RM80S	75 or 80 super	37.95
BM-1	bumper mt.	16.95
SSM-2	stainless ball mt.	18.95
SSM-3	spring	16.95
QD-1	quick disconnect	15.95
SGM-2	2mt. 5/8 mag. mt.	28.95
HOT	trunk mt. w/swivel ball	17.95
	AND MORE!	

VAN GORDEN

PD8010	80-10 dipole kit	35.95
PD6040	60-40 dipole kit	33.95
PD4010	40-10 dipole kit	31.95
SD80	80 shortened dipole	29.95
SD40	40 shortened dipole	26.95
ALL BANDER	160-10mt.	28.95
GR5V		49.95
	AND MORE!	

KLM

KT34A	triband 4 el.	
KT34XA	triband 5 el.	
2M-14C	2mt. satellite	
2M-22C	2mt satellite	
435-18C	70cm satellite	
435-40CX	70cm satellite	
432-30LBX	70cm satellite	
2M-13LBA	2 meter	
2M-16LBX	2 meter	

CALL FOR PRICES

CABLE & CONNECTORS per/ft.

Belden 9913	Low Loss	.54
Columbia RG213	50 Ω (OHM)	35cts
RG8/U	Foam	30cts
RG 8X	Mini	22 cts
RG59/U	72 OHM	14 cts
PL259/Silver		.99/1.39
N-Male for 8/U		4.00
BNC(M)-UHF(F)		4.80
Columbia Low Loss		39cts

CUSHCRAFT

A4	4 el. triband	353.95
A3	3 el. triband	259.95
AV5	5 band trap vert.	117.95
32-19	19 el. 2mt. boomer	107.95
215WB	15 el. wide band 2 mt.	85.95
424B	24 el. 70cm boomer	85.95
416TB	16 el. OSCAR 435 MHz	67.95
A144-10T	10 el. OSCAR 145.9 MHZ	57.95
AOP-1	OSCAR pack 2mt. & 70cm	167.95
AR-2	2mt. vert. ringo	27.95
ARX-2	2mt. vert. ringo ranger	34.95
ARX-2B	2mt. vert. ringo ranger II	41.95
	AND MORE!	
R4	4 band vert.	214.95
	AND MORE!	

BUTTERNUT

HF6V	80-10 vertical	127.00
HF2V	80-40 vertical	119.00
2MCV5	2MT vertical	54.00
RMKII	roof mtg. kit	45.00
TBR160S	160m add on	47.00
MPS	mtg. post sleeve	6.00
HF5B	HF mini beam	199.95

HY-GAIN

TH7DXS	7 el. triband	
TH5MK2S	5 el. triband	
EX-14	4 el. triband	
TH3JRS	3 el. 750W pep	
18AVTS	5 band trap vert.	
14AVQS	4 band trap vert.	
V2S	2mt. omni-direct	
V4	70cm omni-direct	
HB144MAG	2mt. mag. mt.	
	AND MORE!	

CALL FOR PRICES

HY-GAIN ROTORS

T2X	20 sq. ft.	359.95
HAM IV	15 sq. ft.	299.95
CD45II	8.5 sq. ft.	213.95

DAIWA ROTORS

MR750E	16 sq. ft.	319.95
MR750PE	w/preset	419.95
MR750U	motor	119.00

AEA

ISOPOLES ARE BACK IN STOCK!

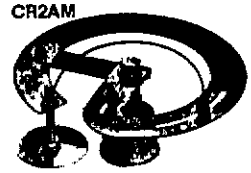
2 Meter	44.95
220 MHz	44.95
440 MHz	64.95

LARSEN

LMMM	mag. mt.	16.95
LM150	2m coil & whip	25.95
NMOMM	mag. mt.	19.95
NMO150	2m coil & whip	27.95
NM02/70	coil & whip	38.50
KD4270	dual band duck	26.95
LM220	220 coil & whip	25.95
	AND MORE!	

UNTENNA

CR2AM



2½"

CR2AM	PERM MT — CALL —	41.00
CR2A	2M Mag MT	41.00
CR3A	220MHz Mag MT	37.00
CR4A	140MHz Mag MT	34.00
CR2RD	Radome Cover – CALL –	12.00

CABLE IS NOT INCLUDED

WE CARRY THE FOLLOWING BRANDS AS WELL: AEA, ALINCO, ALPHA DELTA, ARISTA, ASTRON, B&K, B&W, BECKMAN, BENCHER, BIRD, DATONG, FLUKE, HAL, HEIL, ICOM, IWATSU, J.I.L., KENWOOD, LEADER, MARANTZ, MAXON, MFJ, NOVEX, NYE VIKING, SANGEAN, SONY, TEN-TEC, TOKYO-HY-POWER, TOSHIBA, TRIPP LITE, WELZ, YAESU.

EEB ELECTRONIC EQUIPMENT BANK

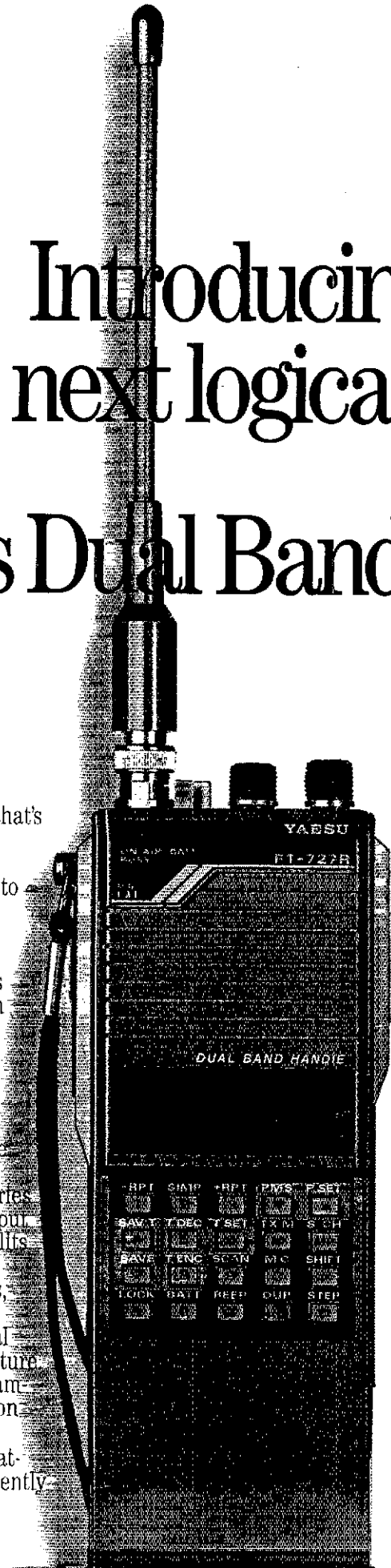
516 Mill Street NE

Vienna, VA 22180 USA

Prices & specs subject to change.
Shipping charges not included.
1 week for delivery
Returns subject to 20% restock charge
ORDER TOLL FREE 800-368-3270
Tech Info—VA orders 703-938-3350
NO C.O.D.'s

Introducing the next logical step.

Yaesu's Dual Band Handie.



Two affordable radios in one—that's exciting.

Yaesu's dual-band FT-727R packs our best HT know-how into one compact design. At a price that's in step with your ham budget.

Hit hard-to-reach repeaters with a powerful 5 watts on both 2 meters and 440 MHz.

Work the bands quickly and easily with a wealth of microprocessor-controlled commands:

Jump between the separate VHF and UHF VFO registers. Program each of the ten memories for instant recall of repeater input and output frequencies, odd splits and tone encode/decode.

Scan the memory channels, the entire band, or a band segment. And return to any special frequency with the priority feature.

Use link repeaters by programming TX on one band and RX on another.

Conserve power with the battery saver. It lets you monitor silently while drawing negligible current. And measure your battery level with the digital battery voltmeter. There's even a "Low Battery" LED.

Finally, your operation is rounded out with features like VOX capability. A one-touch repeater reverse switch. An LCD readout with illumination lamp. A high/low power switch. Remote computer control capability. An optional CTCSS module. And Yaesu's full line of optional accessories.

So step up your operating capability now with the logical choice in HT operation.

Yaesu's dual-band FT-727R.

YAESU

Yaesu USA
17210 Edwards Road, Cerritos, CA 90701
(213) 404-2700
Repair Service: (213) 404-4884
Parts: (213) 404-4847

Prices and specifications subject to change without notice.

The Paragon

The PARAGON, Performance Plus...

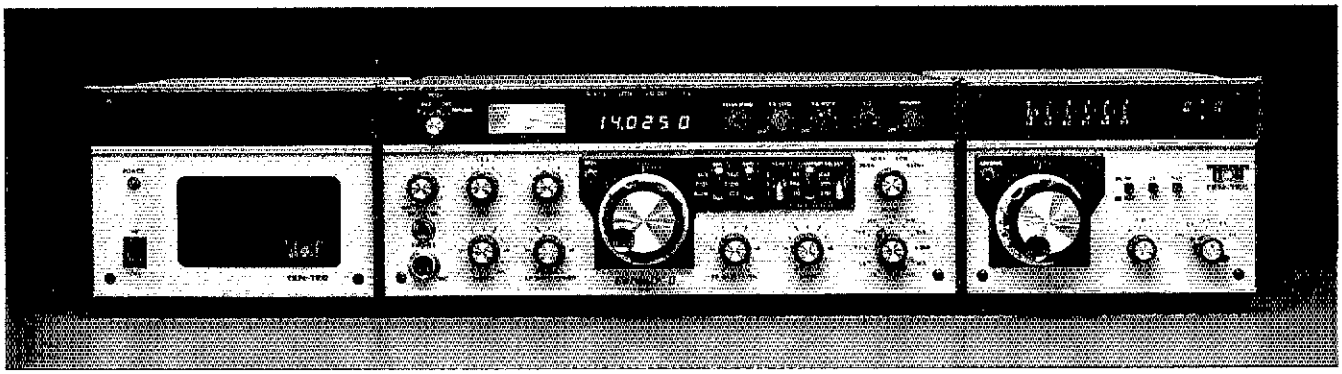
All mode versatility and a transmitted signal you will be proud of. A receiver that has set new standards for sensitivity and quietness. Receives from 100 kHz to 29.999.99 MHz. Transmits on all bands from 1.8 MHz to 29.999.99 MHz with 100 watts output. SSB, CW, real FSK and optional FM. Standard equipment includes speech processor, noise blanker, dual VFOs, TX split, RX split and QSK with a changeover time of 30 ms or less. Five I-F filter positions with the 6 kHz AM filter and 2.4 kHz SSB filter, standard. Optional 1.8 kHz, 500 Hz and 250 Hz filters are selectable independent of mode. Two selectable tuning rates. Passband tuning, notch filter, audio bandpass filter, tone control, squelch and more!

Sixty-two programmable memories that store frequency, mode, filter selected, channel number and a 7 character alpha-numeric "tag" for entering channel I.D. Scan rate is selectable and as each memory is scanned all of the stored information is displayed (what a light show!). Alternately, the memories can be tuned with the main tuning knob.

Frequency selection is with the main tuning knob, direct keypad entry or up/down buttons that will shift in 100 kHz or one MHz increments or to the next ham band. DISPlay button selects 24 hour clock or date or tag. VOICE button causes a voice frequency announcement with optional synthesized voice board installed.

Rear panel controls are provided to adjust the VOX, cw monitor level and tone, and SSB sidetone monitor level. Switching is provided to control conventional linear amplifiers and of course, high speed switching for QSK linears, such as the Titan or the Hercules II. Other rear panel inputs and outputs for transverters, FSK (170 Hz shift), fixed level audio out, audio in, external speaker, aux dc jack and provision for the optional RS-232 control interface. An absolute delight for the all mode operator.

The Paragon is the result of a three year engineering effort. We are proud of the Paragon and we think it has set new standards of excellence in synthesized rigs. Check it out yourself. We think that you will share our pride in the Paragon.



The Classic CORSAIR II...

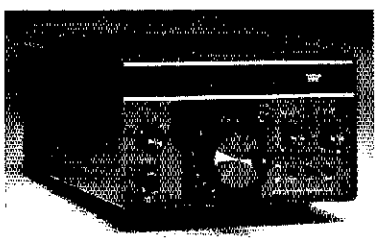
Unique in all the world, the CORSAIR II is the only ham transceiver available that uses a crystal mixed, permeability tuned oscillator. The ability of this scheme to reject strong adjacent signals and to dig out weak signals under the most adverse conditions is legendary. The 95 dB of dynamic range is all useable!

Frequency tuning is also unique. The main tuning is 18 kHz per turn. Dual range offset tuning can control transmit, receive or transceive. Selectivity is enhanced with a 16 pole crystal ladder filter and pass band tuning. The 50 + dB notch filter virtually eliminates carrier type interference. An eight pole audio filter is standard and the I-F filters are selectable independent of mode for superior operation on the digital modes.

The transmitter is well known for outstanding audio quality on SSB and QSK CW performance is simply beyond comparison. All ham bands are covered, 160 through 10 meters with WWV at 10 MHz. The front panel is a thoughtful and spacious arrangement with only the controls that you need.

If your number one priority is outstanding performance on the ham bands, and simplicity is still a virtue, you may be the kind of purist who deserves the classic CORSAIR II.

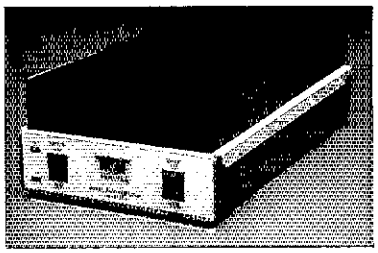
Add Satellite Communications To Your HF Station



Model 2510B

The Model 2510B, mode B, satellite station is a 70 cm, 10 watt SSB and CW transmitter with a super-sensitive, low noise, 2 meter to 29 MHz receive converter. The receive conversion idea takes advantage of the excellent selectivity and sensitivity that you already have in your HF station. Frequency tuning is with the PTO in the 2510B and the transmitter automatically tracks the receive frequency for "transceive" operation. "Split" operation is also provided. Two bands are included for full coverage of Oscar 10 and Oscar 13.

The Model 2410 is an all mode, broadband, 100 watt, 70 cm amplifier that adds 10 dB of gain to your up-link signal. Tx/Stby control can be hard-wired or automatic when the drive signal is present. Primary power is 12 to 14 Vdc at 20 amps.



Model 2410

TITAN: A Gallon And A Half Out! (5.68 Liters)

Titan

The TITAN has it all! 1500 watts output with ease, all legal bands 160 through 15 meters including MARS frequencies (10 meters after owner mod), lightning fast QSK for full break-in CW or the digital modes and a two speed blower for quiet operation on SSB. This awesome performance from a 17 lb desk top amplifier is made possible by a pair of Eimac® 3CX800A7 ceramic triodes and an external 45 lb power supply that is an absolute "horse."

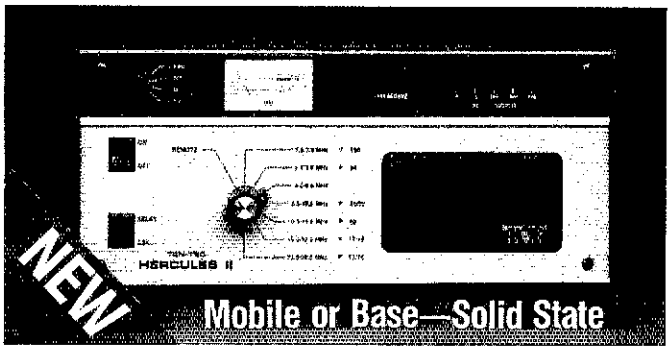
The heart of the power supply is our own tape wound, four core Hypersil® transformer that weighs in at an impressive 41 lbs. The transformer is conservatively rated at 2.5 kva CCS. (9.5 kva IVS.) The power supply is housed in a separate utility enclosure and is nearly noiseless even at full power.

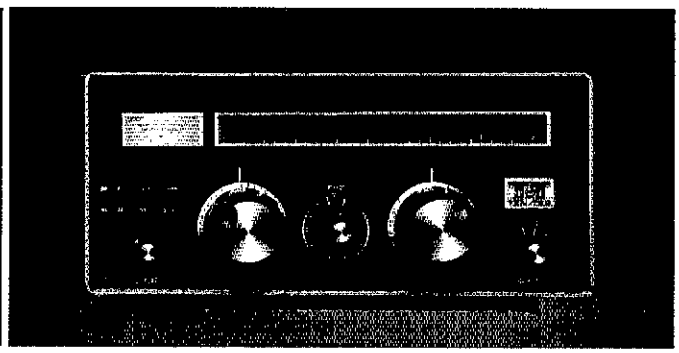
Front panel features include a ten element LED bargraph that displays peak power, a multi-meter selectable to read plate voltage, forward or reverse power and grid current. A matching meter is dedicated to display plate current. The TUNE and LOAD controls use 3:1 vernier drives which, in combination with a great RF deck design, make the TITAN a real "pussy cat" to operate.

The low drive requirement of the TITAN (65 watts for 1500 watts output, typical) makes life much nicer for your exciter too. This is especially comforting when operating keydown modes such as RTTY. Two product review articles have been published, see QST April 1986, CQ February 1986.

If you are ready to choose your dream amplifier the TITAN has everything but the highest price. Check it out!

THE TITAN IS BACKED BY A THREE YEAR LIMITED WARRANTY.





Hercules II No Tune HF Amplifier

The HERCULES II, Model 420, is an amplifier design that offers a combination of unique features that can only be achieved using modern solid state technology. Instant on, 12 - 14 Vdc operation, no-tune broadband final and compact size. General coverage operation from 1.8 to 22 MHz (to 29.999 MHz with authorized modification). Add to that lightning fast QSK cw, remote control, superb linearity and a low drive requirement. Outstanding!

The HERCULES II will interface nicely with virtually all transceivers. The front panel includes an analog multi-meter for collector current, voltage, forward power and SWR. A 10 element LED bar-graph display indicates peak output power. Band selection is made from the front panel switch or remotely controlled through a rear panel connector. Accessories are available for mobile remote control and automatic band tracking when using a Paragon. A front panel speaker is built-in.

The Model 9420 115/220 Vac power supply is in a separate utility enclosure and connects to the RF deck using a 6 foot power cable. It provides 80 amps to the amplifier plus 20 amps at 13.8 Vdc to power a 100 watt output exciter.

KW Antenna Tuner

The Model 229B adds a lot of versatility to your HF station antenna system. With this tuner you can load virtually any unbalanced (coax or single wire) antenna. With the accessory balun, antennas with balanced feeders can be used. Maximum legal power may be used from 1.6 to 30 MHz. The modified "L" network will tame an SWR of at least 10:1, any phase angle, without "false load" problems. Lighted multi-meter shows power in two ranges plus reflected power. A great way to operate all bands with something less than a world-class antenna farm.

ONE OF OUR BEST FEATURES IS ONE THAT YOU MAY NEVER NEED ... FAST, EFFICIENT AND CARING SERVICE.

...America's Best!

MADE IN U.S.A.

Send for the complete Ten-Tec Catalog!

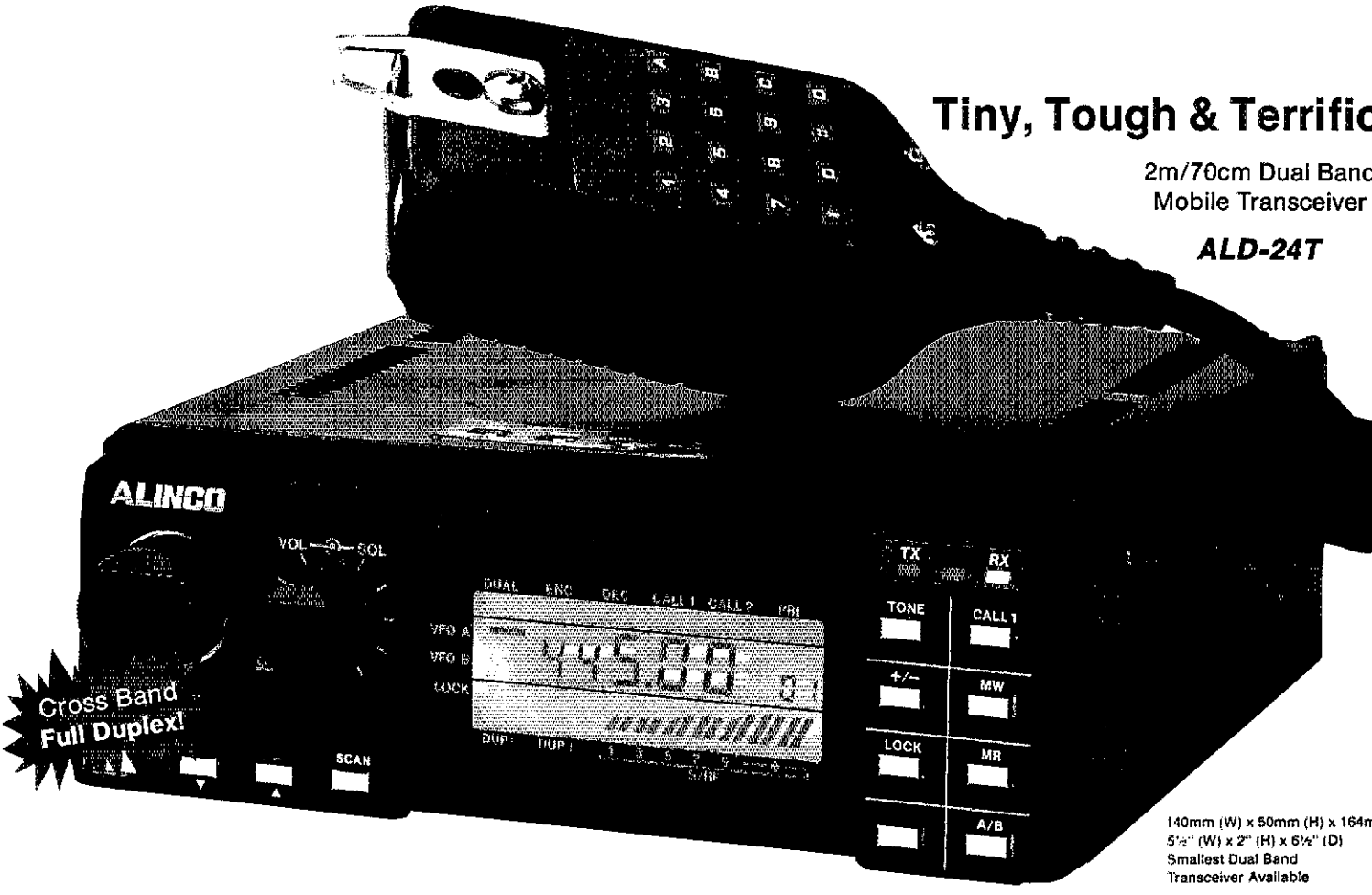
TEN-TEC

Highway 411 East
Sevierville, Tennessee 37862
615/453-7172

ALINCO ELECTRONICS

20705 South Western Ave., Suite 104 Torrance, CA 90501 · (213)618-8616

Dual Bander



Tiny, Tough & Terrific

2m/70cm Dual Band
Mobile Transceiver

ALD-24T

140mm (W) x 50mm (H) x 164m
5½" (W) x 2" (H) x 6½" (D)
Smallest Dual Band
Transceiver Available

With ALINCO's advanced engineering and technology, the ALD-24T 2m/70cm Dual Band Mobile Transceiver is designed to be the ultimate in compact size with an impressive array of features, allowing maximum flexibility in installation and ease of operation.

- 140-149.995 Mhz/440-450 Mhz
- CAP and MARS compatible
- 25 Watt High - 5 Watt Low Power both bands
- 21 Memory Channels
- Dual VFOs
- Large LCD
- **CTCSS Encoder/Decoder: Standard**
- 16-Key Autopatch Microphone with Up/Down Buttons
- Programmable Band Scan
- Memory Scan and Memory Lockout
- Ultra Compact & Light Weight
- Simple to Operate
- Programmable Standard and Non-Standard Repeater Offset

* Many more features, see your Dealer!
Also available:
25WATT 2m, 45 WATT 2m
and 25 WATT 450 MHZ.

*ALL ALINCO Products carry a 2-year Factory Warranty.
See your favorite dealer, listed below, for full details.*

Alinco's products are carried by these fine dealers

A-Tech, - Burbank CA
Amateur & Advance Comm, - Wilmington, DE
Amateur Comm. ETC., - San Antonio, TX
AES - Milwaukee, WI
AES - Wickliffe, OH
AES - Orlando, FL
AES - Clearwater, FL
AES - Las Vegas, NV
Austin Amateur Radio Supply - Austin, TX
Barry Electronics - New York, NY
Burghardt Amateur Center - Watertown, SD
Colorado Comm Center, Denver, CO
Delaware Amateur Supply - New Castle, DE
Doc's Communications - Rosaville, GA
El Original Electronics - Brownsville, TX
EEB - Vienna, VA
EGE, INC. - Salem, NH
Erickson Communications - Chicago, IL
F & M Electronics - Greensboro, NC
Floyd Electronics - Collinsville, IL
The Ham Station - Evansville, IN
The Ham Hut - Amarillo, TX
Hatry Radio - Hartford, CT
Henry Radio - Los Angeles, CA
Hirsch Sales Co., Williamsville, NY
HR Electronics - Muskegan, MI
HRO - Anaheim, CA
HRO - Atlanta, GA
HRO - Burlingame, CA
HRO - Oakland, CA
HRO - Phoenix, AZ
HRO - San Diego, CA
HSC - Santa Clara, CA
HSC - Sacramento, CA
HSC - Sunnyvale, CA
International Radio Systems - Miami, FL
Jun's Electronics - Culver City, CA
Kennedy Associates - San Antonio, TX
KJI Electronics - Cedar Grove, NJ
Madison Electronics - Houston, TX
Maryland Radio Center - Laurel, MD
Memphis Amateur Electronics - Memphis, TN
Michigan Radio - Mt. Clemens, MI
Mission Consulting - Houston, TX
Missouri Radio Center - Kansas City, MO
N & G Electronics - Miami, FL
Omni Electronics - Laredo, TX
Quement Electronics - San Jose, CA
R & L Electronics - Hamilton, OH
Reno Radio - Reno, NV
Rivendell Associates - Derry, NH
Rogus Electronics - Southington, CT
Rosen's Electronics - Williamson, WV
Ross Distributing Co. - Preston, ID
Satellite City, Minneapolis, MN
Sound North Electronics - International Falls, MN
Tel-Com Electronic Comm. - Littleton, MA
Texas Comm. Center - Houston, TX
Texas Towers - Plano, TX
VHF Communications - Jamestown, NY
Williams Radio Sales, Colfax, NC

CANADA:
Canadian Distributor
Texpro Sales Inc. - Burlington, Ontario

ALINCO ELECTRONICS INC.

20705 South Western Ave., Suite 104 Torrance, CA 90501 ☎ (213)618-8616

Tiny, Tough & Terrific

NOW AVAILABLE 220 MHz "DJ-220T"

The *NEW* Generation of T.T.& T. Hand Held Transceivers From Alinco Are Just Around the Corner!

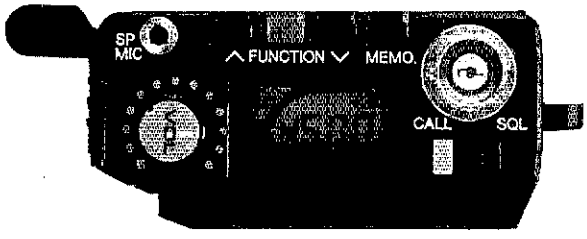
Introducing The DJ-100T 2 Meter Hand Held Transceiver

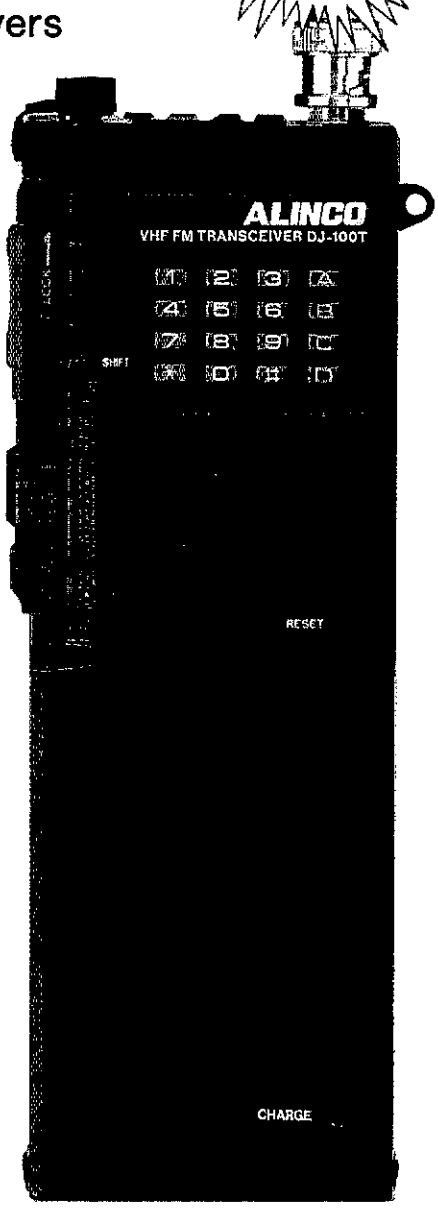
- **Tiny** = 1-3/16" D x 2-3/8" W x 6-5/8" H
- **Tough** = 6.5 Watts (With Optional EBP-8NAZ Nicd Battery Pack)
- **Terrific** = Features and Benefits

Suggested List Price $299.00

- LCD with Switchable Backlighting
- 10 Memories
- BNC Antenna Connection
- 16 Button DTMF Pad
- Easily Accessible Dip Switches For Encoding Sub Audible Tones
- Battery Save Draws 15mA For Extended Battery Life
- .20uV Sensitivity
- 144.00 MHz to 147.995 MHz
- CAP and MARS Modifiable – Simplex only
- Standard Battery, EBP-9NAZ Has DC/DC Converter Built In
- Stores Standard Repeater Offsets In Memory
- Full Range of Accessories
- 220 MHz and 440 MHz To Follow Shortly

(Optional EBP-2NAZ Ni-Cd battery)





CIRCLE 66 ON READER SERVICE CARD

Alinco's products are carried by these fine dealers

-Tech - Burbank, CA
mateur & Advance Comm. - Wilmington, DE
mateur Comm. ETC. - San Antonio, TX
ES - Milwaukee, WI
ES - Orlando, FL
ES - Clearwater, FL
ES - Las Vegas, NV
ustin Amateur Radio Supply - Austin, TX
erry Electronics - New York, NY
urghardt Amateur Center - Watertown, SD
olorado Comm Center - Denver, CO
elaware Amateur Supply - New Castle, DE
oc's Communications - Roseville, GA
Original Electronics - Brownsville, TX
EB - Vienna, VA
GE, INC. - Woodbridge, VA

EGE, INC. - Salem, NH
Erickson Communications - Chicago, IL
F&M Electronics - Greensboro, NC
Floyd Electronics - Collinsville, IL
The Ham Station - Evansville, IN
The Ham Hut - Amarillo, TX
Hatry Radio - Hartford, CT
Henry Radio - Los Angeles, CA
Hirsch Sales Co. - Williamsville, NY
HR Electronics - Muskegan, MI
HRO- Anaheim, CA
HRO - Atlanta, GA
HRO - Burlingame, CA
HRO - Oakland, CA
HRO - Phoenix, AZ
HRO - San Diego, CA
HRO - Van Nuys, CA

HSC - Santa Clara, CA
HSC - Sacramento, CA
HSC - Sunnyvale, CA
International Radio Systems - Miami, FL
Jun's Electronics - Culver City, CA
Kennedy Associates - San Antonio, TX
KJI Electronics - Houston, TX
Madison Electronics - Houston, TX
Maryland Radio Center - Laurel, MD
Memphis Amateur Electronics - Memphis, TN
Michigan Radio - Mt. Clemens, MI
Mission Consulting - Houston, TX
Missouri Radio Center - Kansas City, MO
N&G Electronics - Miami, FL
Omni Electronics - Laredo, TX
Quement Electronics - San Jose, CA
RF Enterprises - Merrifield, MN

R&L Electronics - Hamilton, OH
Reno Radio, Reno, NV
Rivendell Associates - Derry, NH
Rogue Electronics - Southington, CT
Rosen's Electronics - Williamson, WV
Ross Distributing Co. - Preston, ID
Satellite City - Minneapolis, MN
Tel-Com Electronic Comm. - Littleton, MA
Texas Comm. Center - Houston, TX
Texas Towers - Plano, TX
VHF Communications - Jamestown, NY
Williams Radio Sales, Colfax, NC

CANADA:
Canadian Distributor
Texpro Sales Inc. - Burlington, Ontario
(416) 332-5844

THE *New* PCS-6000

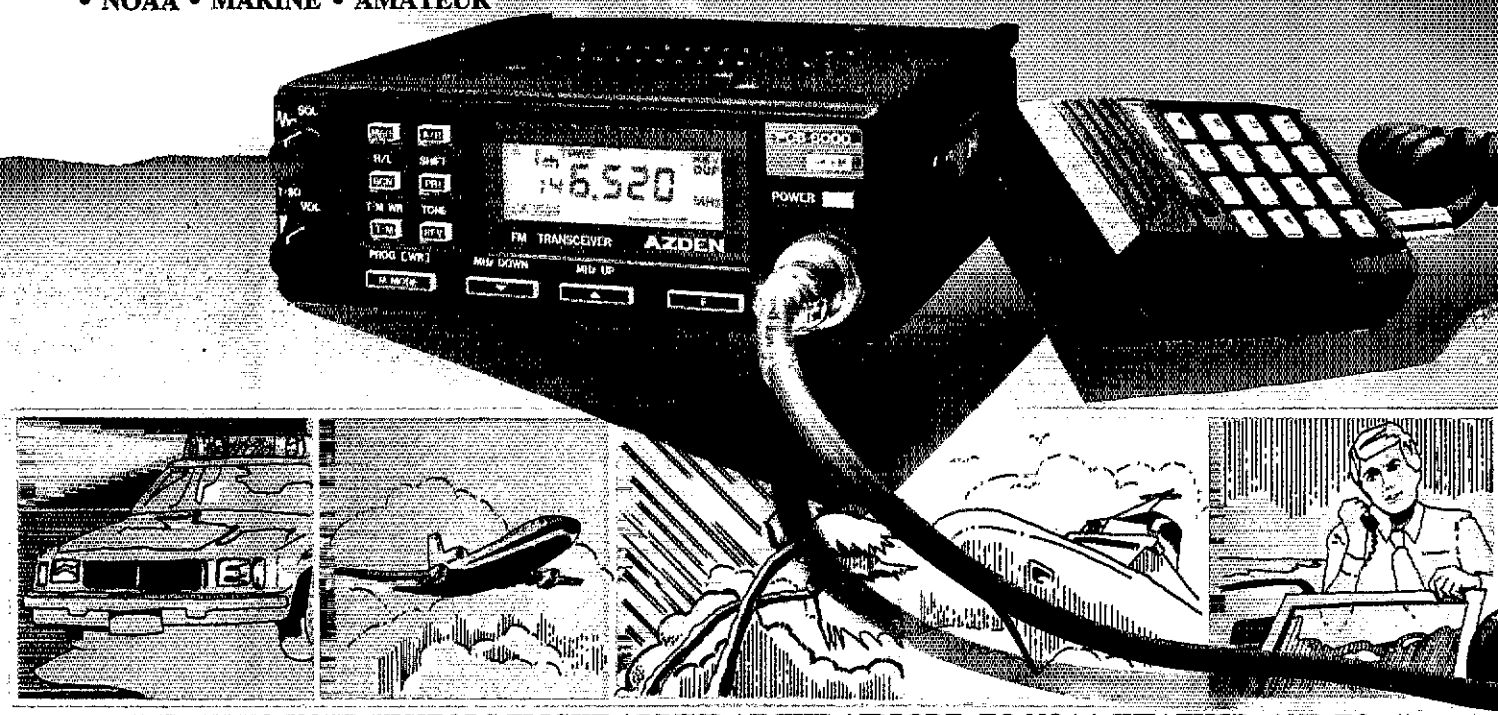
BOLDLY GOES WHERE NO OTHER TRANSCEIVER HAS GONE BEFORE!!

AZDEN

RECEIVE 118 TO 173.995 MHZ.

• AM AIRCRAFT • PUBLIC SERVICE

• NOAA • MARINE • AMATEUR



LISTEN TO YOUR VISITORS FLIGHT ARRIVE AT THE AIRPORT, TO NOAA WEATHER, AND TO PUBLIC SERVICE, POLICE, FIRE, FORESTRY AND MARINE FREQUENCIES

MODELS: PCS-6000/PCS-6000H (25W/45W). *Also coming soon PCS-6200 220MHZ, PCS-6300 70CM and PC-10 10 Meter FM Handheld.* **CMOS AND ADVANCED SURFACE MOUNT TECHNOLOGY PROVIDE UNPRECEDENTED COMMERCIAL QUALITY AND RELIABILITY.**

UNPRECEDENTED WIDE REQUENCY COVERAGE: The PCS-6000 receives 118.00 to 135.995 MHZ AM Aircraft/136-173.995 MHZ FM and transmits 140.100 to 150.000 MHZ. Modifiable to ALL MARS and CAP frequencies (proof of authorization/license required)

TINY SIZE: Only 2 inches high, 5½ inches wide and 7¼ inches deep!! Easily fits anywhere, even in the smallest car!

20 CHANNEL MEMORY IN TWO BANKS PLUS 1 TEMPORARY CHANNEL (TM): Two memory banks, A and B have 10 memory channels each. The memories store frequency, shift width, offset information, and PL tone frequency as programmed. *An extra memory channel (that we call TM-temporary memory) is provided to allow you to store any operating condition instantly again and again!!*

UP TO 21 NONSTANDARD SPLITS: Program any split in any channel.

VERSATILE SCANNING FUNCTIONS: Dual memory scan, programmable band scanning, hold scan and delay scan functions are provided, with selectable delay time. ALL memory channels are tunable independently.

PRIORITY CHANNEL MONITORING: Memory Channel BØ(the first channel in memory bank B) is monitored every four seconds regardless of any operating condition. When a signal is received, a beep is heard.

DISCRIMINATOR CENTERING (AZDEN EXCLUSIVE PATENT): Always stops on frequency desired when scanning.

PROGRAMMABLE FREQUENCY STEPS: In memory, frequency steps can be set at 5KHZ to 20KHZ in any increment.

BUILT-IN PROGRAMMABLE TONE ENCODER: 37 different tones are built in for instant programming of PL tones into memory channels and microcomputer. Tone frequency can be entered independently in RX and TX. A tone decoder is available as an option.

LITHIUM BATTERY BACKUP: Memory information can be stored for up to 5 years even if power is removed.

FREQUENCY REVERSE: Allows you to listen to repeater input frequency.

FEATHER-TOUCH TUNING CONTROL KEYBOARD: The LED backlighted light touch keyboard performs all tuning operations simply by pushing the key(s) and key actuation is audibly verified.

LARGE LCD (LIQUID CRYSTAL DISPLAY): The LCD display shows the operating frequency, S/RF, memory channel in use and various other operating functions. The LCD is back-lighted by green LEDs, making it possible for you to read the display even in total darkness.

FULL 16 KEY TOUCHTONE PAD MICROPHONE: DTMF Microphone functions as auto-patch when transmitting.

DIGITAL S/RF METER: Shows incoming signal strength and relative transmitter power.

MICROPHONE CONTROLS: Up/Down memory and frequency control.

TRUE FM, NOT PHASE MODULATION: Unsurpassed intelligibility and audio fidelity. High/Low Power: 25W/45W or 5W/10W (6000/6000H). Output-Fully adjustable.

SUPERIOR RECEIVER: Sensitivity is better than 0.15 Microvolt for 20-DB quieting. Commercial-Grade design assures optimum dynamic range and noise suppression.

AUDIO OUTPUT: 2 Watts or more.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

OTHER FEATURES: Rugged dynamic touchtone DTMF microphone, built-in speaker, mobile mounting bracket, remote speaker jack, and all cords, plugs, fuses and hardware are included.

EXCLUSIVE DISTRIBUTOR:

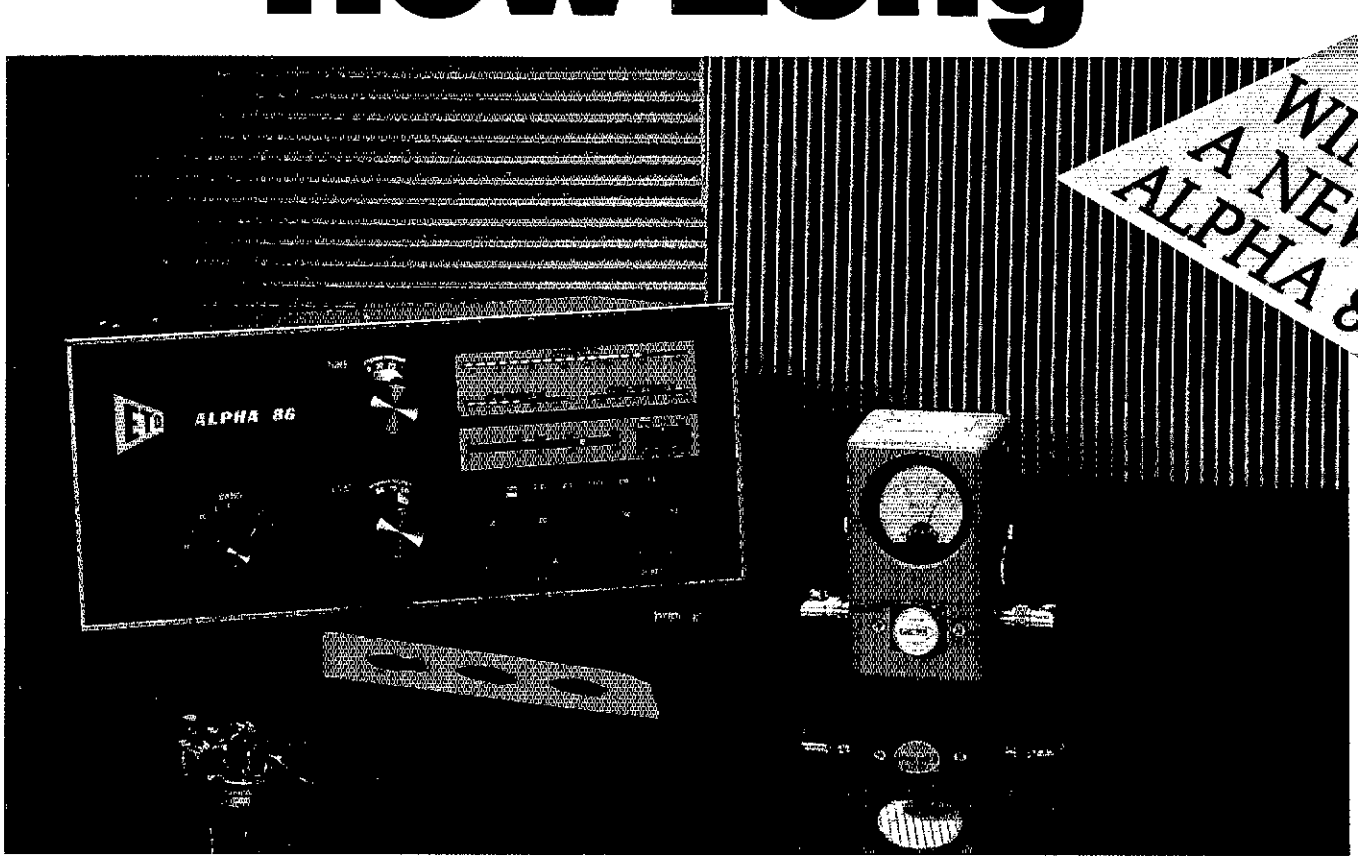
AMATEUR-WHOLESALE ELECTRONICS
46 Greensboro Highway, Watkinsville, Georgia 30677 Telephone (404) 769-8706

FOR YOUR NEAREST DEALER OR TO ORDER:
TOLL FREE 1-800-451-2397
FAX (404) 769-7970 (7pm-10am) Telex: 4930709 ITT

MANUFACTURER:
JAPAN PIEZO CO., LTD.

DISCOVER MasterCard VISA

How Long



Will This Go On?

YOU'LL PROBABLY NEVER SET A BRICK ON YOUR KEY FOR 26,000 MINUTES, AS WE DID WITH AN *ALPHA 76* ELEVEN YEARS AGO.

1977 Advertisement

We did it to dramatize how ETO's unequivocal ***no-time-limit*** ratings set ***ALPHA's*** apart from other linears (including those that ***claim*** continuous duty of a sort, with time limits, and some that just aren't too clear about it). The *'76* ran maximum legal FCC power—which then was 1000 watts average D-C input, yielding about 675 watts RF output—continuously for 18 plus days.

SAME BRICK, 122% MORE POWER

*ETO's new **ALPHA 86** delivers maximum legal power, too. But today that means 1500 watts RF output. There's still no time limit. You get 122% more "brick on the key" power!*

YOU MAY WIN A NEW *ALPHA 86*

How long will we leave the brick on the key this time? Mail a post card or QSL to Ray Heaton with (a) the name of this magazine, (b) your guess in hours, minutes, and seconds as to how long we'll run the ***ALPHA 86*** continuously at 1.5 kW RF output (we plan to spend roughly $75 for electricity), and (c) your choice of ETO keychain or mug should your guess be one of the 50 closest.

Entries must be as above, postmarked by November 30, 1988, one only per licensed amateur. Closest guess wins a new ***ALPHA 86.*** If the winner already owns an *'86*, the prize will be a new ***ALPHA 87.***

GET YOUR *ALPHA* NOW

Why not enjoy great operating with a BIG *ALPHA* SIGNAL during this sunspot peak? Call Ray Heaton at ETO now for prompt delivery.

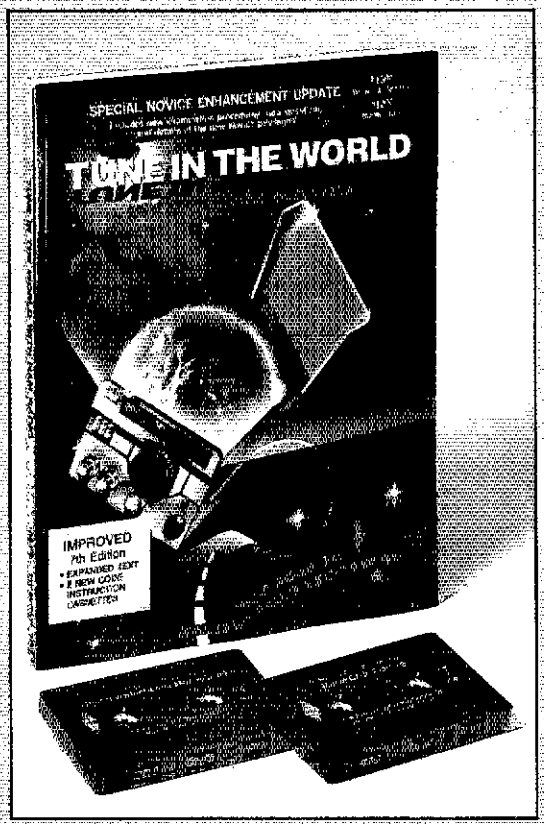
ETO EHRHORN
TECHNOLOGICAL OPERATIONS, INC.

4975 North 30th Street
Colorado Springs, CO 80919
Telephone (719) 260-1191

TUNE IN THE WORLD WITH HAM RADIO

YOUR ROAD TO HAM RADIO EXCITEMENT

Tune in the World with Ham Radio has put the fun back into learning what Amateur Radio is all about. Enhanced Novice class privileges have brought the fun back into operating. Now beginners with their Novice licenses no longer have to spend all of their time on the air using only Morse code. Novices can now use voice communications on 10-meters and use VHF and UHF repeaters. The new privileges include the use of digital communications so that home computers can be linked through packet radio networks.



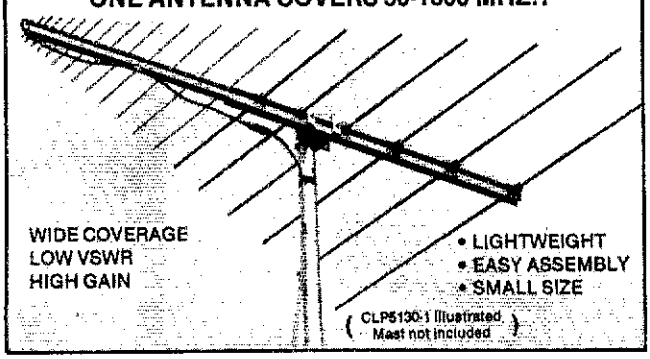
Imagine being able to personally communicate with an astronaut as the Space Shuttle circles the globe. Perhaps you would like to become a friend over the airwaves with someone on a remote island in the South Pacific or on an ice-flow in the Arctic. There are hams everywhere!

The FCC requires that Novices know something about their new privileges and that's where the expanded *Tune in the World with Ham Radio* text comes in. You'll find what you need to know explained in clear, concise bite-sized chunks of information. You'll find all 300 possible questions on the Novice exam with their distractors and answer key. Besides improving the text, we've added almost three times the code practice material to the package in the form of two C-90 tape cassettes. One tape teaches the code, the other provides practice. They are recorded in stereo so you can switch off the voice portion for even more practice. These new tapes make learning the code a snap!

The *Tune in the World with Ham Radio* package including the text and both tapes is available for $15. The text alone is $12 and the set of tapes is $10. Add $3.50 for shipping and handling.

CREATE A GREAT SIGNAL THIS SUMMER!

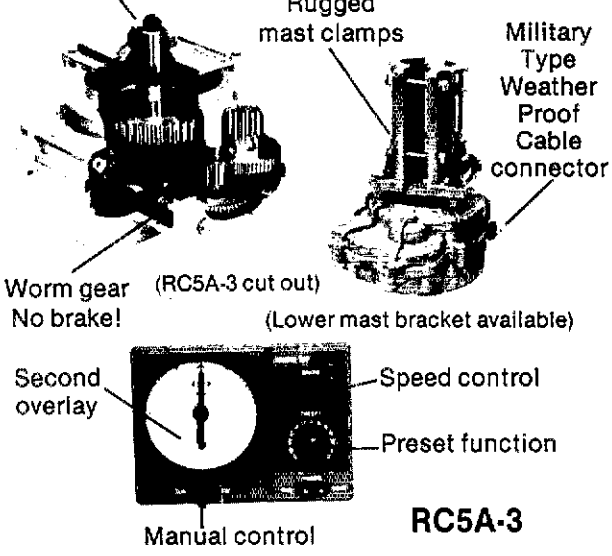
HIGH PERFORMANCE LOG PERIODIC ANTENNA
ONE ANTENNA COVERS 50-1300 MHZ!!



CLP5130-1 50-1300 MHz 25 el. 500W 6' Boom $239 + shipping
CLP5130-2 105-1300 MHz 20 el. 500W 4'6" Boom $139 + shipping

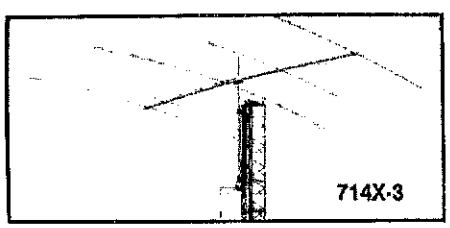
Operate on 6m, 2m, 1¼m, 70cm, 900 MHz and 1.2 GHz using only one antenna and one feedline. No tuning is required and the VSWR is 2:1 or less across the entire frequency range with excellent forward gain. The boom is made of high quality aluminum and the elements are precut for easy assembly. Each model can be mounted for either vertical or horizontal polarization. Create VHF/UHF log periodics are great for the amateur bands, scanners and numerous other applications.

ROTATORS



RC5-1	10 sq. ft.	$251
RC5-3	10 sq. ft. preset	$328
RC5A-2	25 sq. ft.	$399
RC5A-3	25 sq. ft. preset	$459
RC5B-3	35 sq. ft. preset	$736

All rotators will fit most towers. Please call for additional information.

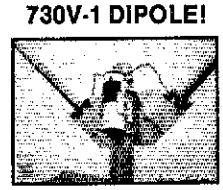


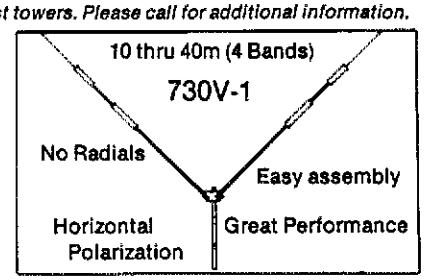
714 Series Tribanders
15-20-40 Meters
On One Boom!

Model	Elements 40-20-15	Boom Length	Longest Element	Turning Radius	Wgt. Lbs.	Power PEP	Price
714T	2/4/4	28'6"	43'	25'3"	71	2 kw	$574.
714X	3/4/4	32'5"	44'	26'2"	75	2 kw	$762.
714T-3	2/4/4	28'6"	43'	25'3"	75	3 kw	$707.
714X-3	3/4/4	32'5"	44'	26'2"	80	3 kw	$928.

(Prices include balun)

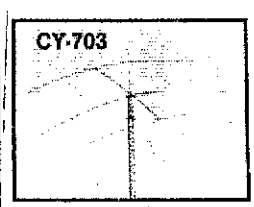
730V-1 DIPOLE!

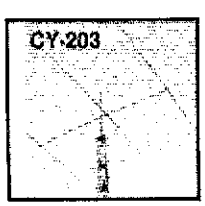


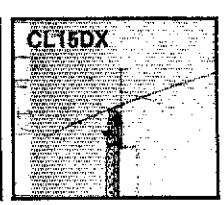


Find out why more and more people are replacing their lossy verticals and moving up to the super performing 730V-1 dipole. The 730V-1 consists of two 19 ft. heavy duty, self-supporting elements and bracket with an efficient balun that is ready for mounting on a standard TV mast. Rotation is not necessary! The V-dipole is superior to standard vertical antennas in gain, noise and efficiency. $159 + shipping.

Rugged High Performance Mono Banders!

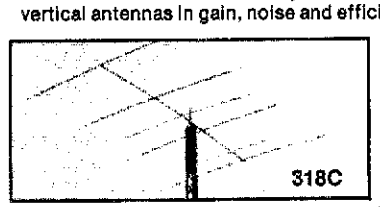






Mono Bander Data

	Freq MHz	El.	Boom Length	Longest El.	Turning Radius	Wgt. Lbs.	Power	Price
CY104	28.0	4	18'8"	18'4"	12'11"	19	2 kw	$185.
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	$205.
CL15DX	21.00	6	40'8"	24'3"	24'3"	58	3 kw	$559.
CL20	14.00	4	30'9"	36'8"	36'8"	58	3 kw	$495.



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
			(Prices include balun)			2 kw	

Price does not include shipping.

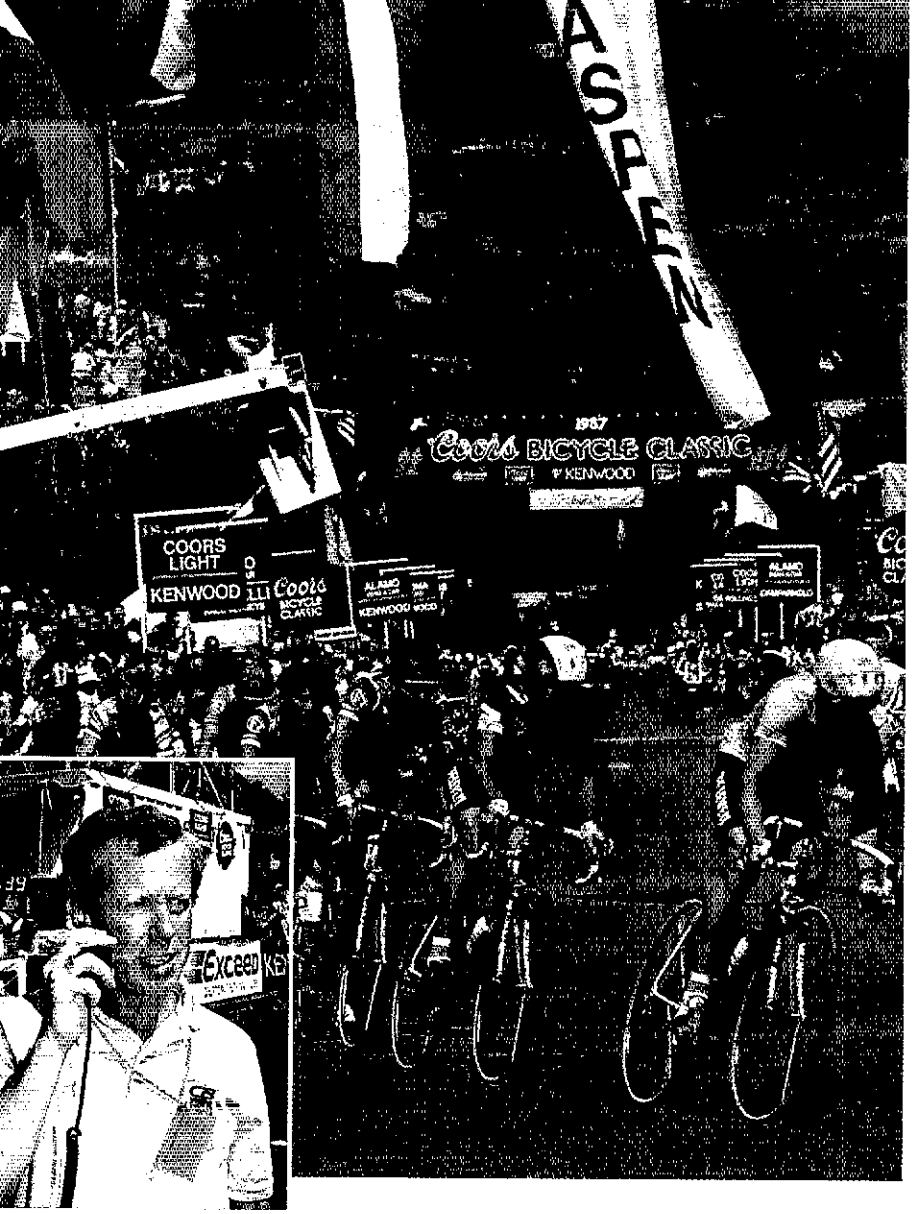
ALSO AVAILABLE: ROOF TOWERS • MONOBANDERS • TRIBANDERS • TOWERS • DUALBANDERS • COMMERCIAL

All Create Antennas Are Manufactured With High Quality, Heavy Duty, Precision Aluminum Tubing For Easy Assembly and Long Life.

TO ORDER CALL TOLL FREE 1-800-255-7020,
or in CA 818-888-4927 M-F 9:00 AM to 6:00 PM PST

(Specifications and prices subject to change without notice or obligation) *FAX 818-888-5112 TELEX 697-4899*

ORION HI-TECH
P.O. Box 8771
Calabasas, CA 91302



"You're miles ahead with Larsen."

Rick Woodsome, Communications Consultant
Woodsome and Associates, Boulder, Colorado

When the directors of the Coors International Bicycle Classic needed a sophisticated mobile communications system, they turned to communications consultant Rick Woodsome. As a communications specialist, Woodsome knows what it takes to make a communication system work.

That's why he turned to Larsen Antennas.

"You don't pull off the largest sports event in the Western Hemisphere without good communication. And you don't have good communication without the right equipment.

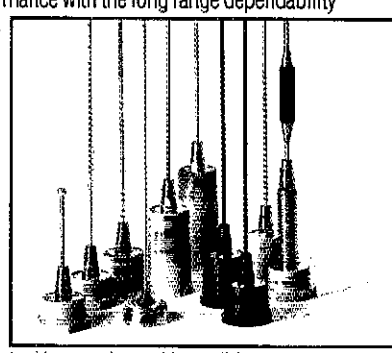
"Larsen antennas were instrumental in making last summer's Coors Classic an overwhelming success. They were key to our entire communication network.

"Without Larsen, it would have been uphill all the way."

Rick Woodsome

THE AMATEUR'S PROFESSIONAL.

Larsen Kūlrod® and Kūlduckie® antennas provide amateurs the same advantages enjoyed by commercial two way radio users. Both combine top performance with the long range dependability you want.



See your dealer for the complete line of Larsen antennas and permanent and temporary mounts. You can buy with confidence, because they're all backed by Larsen's No Nonsense Warranty for a full six months.

For a professional approach to amateur radio, tune in to Larsen.

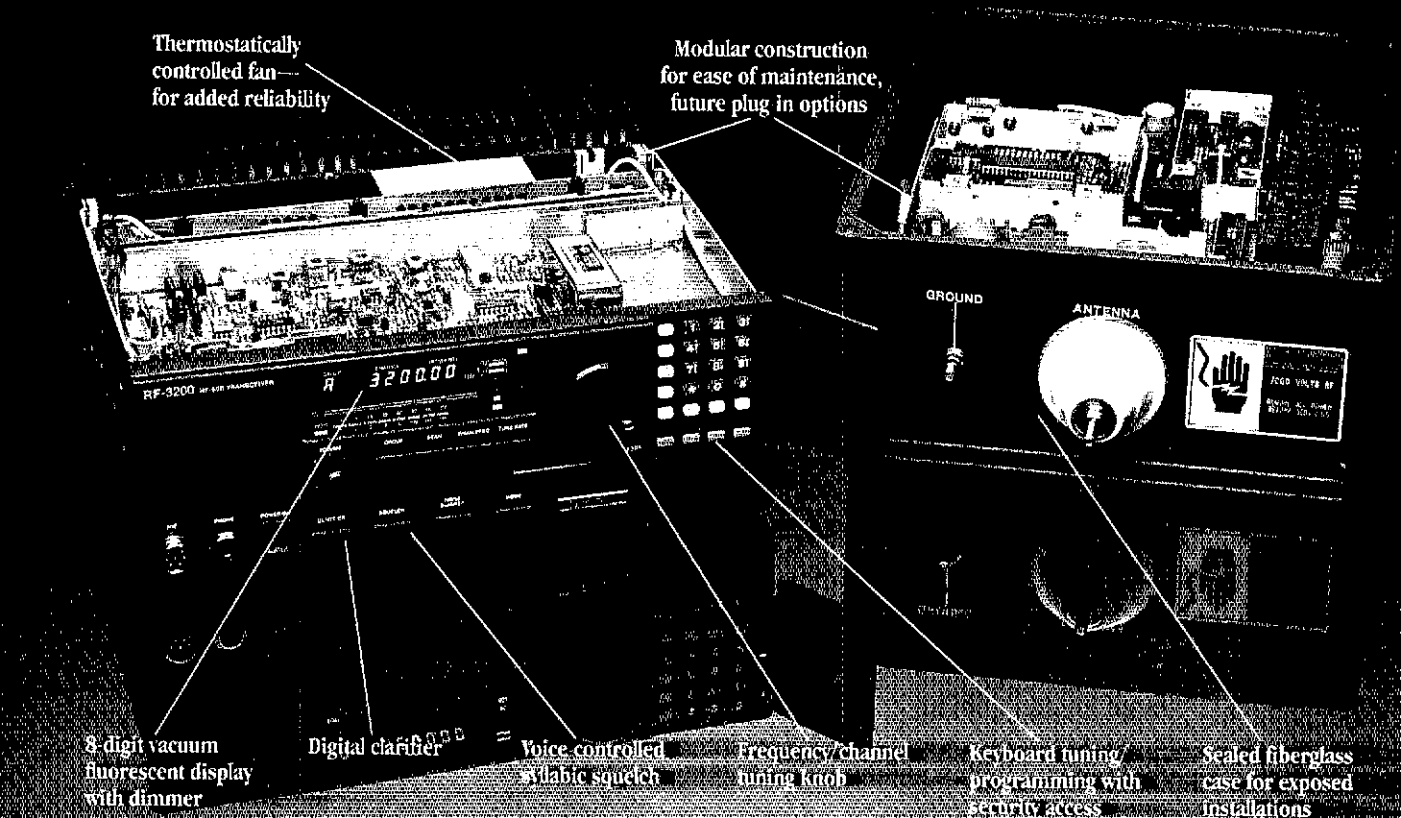
Larsen Antennas

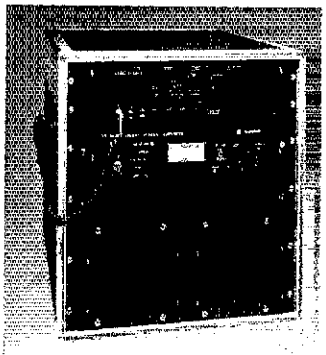
IN USA: Larsen Electronics, Inc., 11611 N.E. 50th Avenue, P.O. Box 1799, Vancouver, Washington 98668 (206) 573-2722. Toll Free order line: 1-800-426-1656. In Washington State: 1-800-562-1747. Telex: 15-2813 LARSENELC VANC. Fax: (206) 574-5703.

IN CANADA: Canadian Larsen Electronics, Ltd., 149 West 6th Avenue, Vancouver, B.C. V5Y 1K3 (604) 872-8517. Toll Free: 1-800-663-6734. Fax: (604) 872-8655.

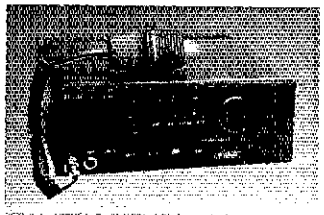
RF-3200 SERIES

The *New* SSB Transceiver for Professional Communicators

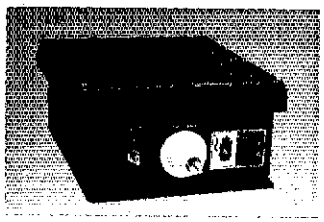




RF-3230 1kW Solid-State Amplifier with RF-3200



RF-3200 Series Transceiver



RF-3281 Digital Antenna Coupler

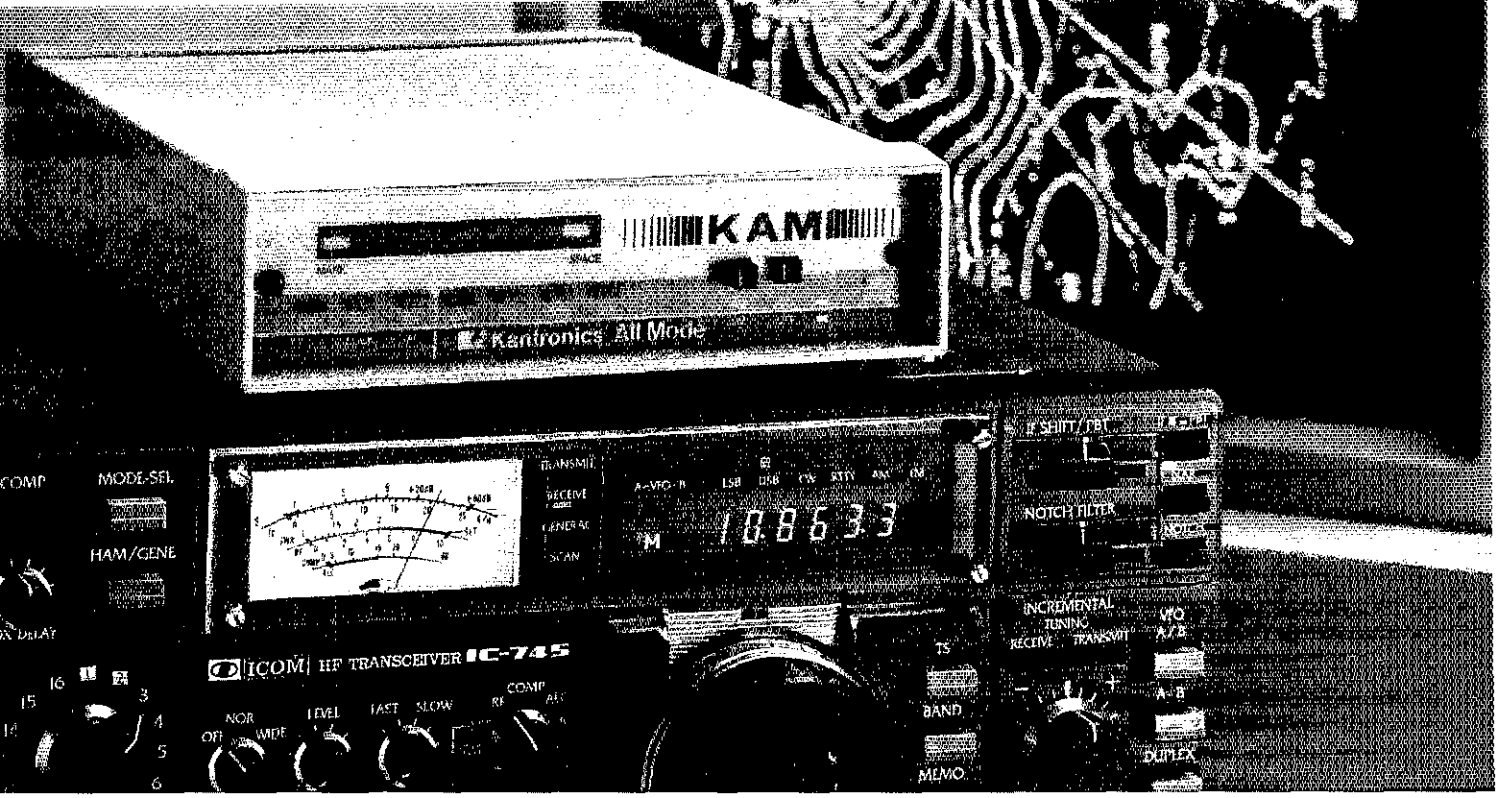
Harris introduces the RF-3200, a new series of HF-SSB high-performance, long-range voice-and-data communications transceivers. The RF-3200 Series rugged design, outstanding reliability, and minimal maintenance costs, make them ideal for:

- Federal, state, and local agencies
- Police and security forces
- Foreign embassy communications
- Natural resource exploration
- Rural development agencies
- Public and private utilities

Does your program need a low cost state-of-the-art transceiver system? Then call us today. (716) 244-5830, Extension 3681. Or write RF Communications Group, Long Range Radio Division, 1680 University Avenue, Rochester, New York 14610.

FCC Type Accepted

HARRIS



Join the fun at the top of the pack!

Whatever your interest, you'll find the **All Mode**™ from Kantronics at the top of the pack. CW, Radioteletype, AMTOR, ASCII, WEFAX and Packet, "**KAM**™ handles them all." HF and VHF simultaneous operation? You bet! The **KAM** can operate RTTY or AMTOR on HF while communicating Packet on VHF. Believe it. *It's the only true dual-port on the market.*

World-Class

Swedish and German hams have noticed **KAM**'s engineering and are some of our biggest fans. The Japanese scruitinized our features and gave us ideas for extras like a subject field for the **Personal Packet Mailbox**™, listings of digipeater paths and more CW characters and functions. We are shipping **KAM** around the world.

Fun for Everyone

You'll be the envy of the airwaves with all the modes and features **KAM** brings to your fingertips. In addition to Packet, ASCII, AMTOR, WEFAX, CW and Radioteletype, you'll have Dual-Port Operation (the only TNC offering this feature), **Personal Packet Mailbox**™, **KA-NODE**™ operation, **Gateway**™ operation and digipeater operation.

You can operate non-packet modes on HF while maintaining a packet station at the same time on VHF. Or run an HF/VHF accessible personal mailbox or pc-based BBS totally dedicated to packet. Configure your **KAM** as an HF to VHF digipeater (**Gateway**) or KA-NODE. Or open your LAN to the world. All these modes and more features are waiting to be discovered. Increase your station abilities to the most advanced available.

Today and Tomorrow

KAM is packed with all the latest features of today with Kantronics-written firmware. And since we write and copyright our own firmware, we're in a position to lead you into the exciting modes of tomorrow first. We have a history of keeping our customers current. Proof is in our firmware updates (2.82 in 1987 and 2.84 in 1988) offered at a fraction of the cost of a new purchase.

So join the fun, join the Top of the Pack.

Kantronics
RF Data Communications Specialists
1202 E. 23 Street Lawrence, Kansas 66046 (913) 842-7745

Kantronics All-Mode, KAM, Personal Packet Mailbox, KA-NODE, and Gateway are trademarks of Kantronics Company, Inc.

SOLID STATE DESIGN

Solid State Design for the Radio Amateur was first released in 1977 as a theoretical and practical guide for the radio amateur interested in using solid-state devices in RF design work. In the second printing, the occasional errors and omissions which inevitable creep into a work of this magnitude have been corrected, making this publication even more valuable not only to amateurs, but professional RF designers as well.

Solid State Design is among the select few technical books that have sold more than 50,000 copies. Why has it achieved this enviable sales milestone? For one thing, its 9 chapters and 256 pages are chock full of good basic information on circuit designs and their applications. Much of the data such as transistor modeling, cannot be found in other publications. Some of the topics covered are: basics of transmitter design, power amplifiers, matching networks, receiver design basics, advanced receiver concepts, modulation methods and test equipment. 1st edition, 2nd printing. $12.00 in US funds. Add $2.50 for shipping and handling ($3.50 for UPS).

ARRL 225 MAIN ST., NEWINGTON, CT 06111

1-2-3 BEDROOM HAM RETIREMENT CONDOMINIUMS

N. Myrtle Beach, S.C. The finest beach on the East Coast

40 18-Hole Championship Golf Courses • Fresh and Salt Water Fishing
Medical Facilities • Large Shopping Malls

Community room will have the latest in amateur radios. HF, VHF, Packet, Computer, Printer, Towers, Beams, 40 & 80 mtr. wires. Space and connections for your personal gear. Move in and start talking.

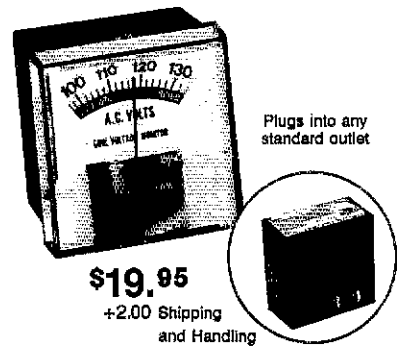
Prices start as low as

$49,900

For further details, write

Elrod-Mitchell Enterprises
P.O. Box 30502, Charlotte, NC 28230

"PLUG-IN," LINE VOLTAGE MONITOR



Plugs into any standard outlet

$19.95
+2.00 Shipping and Handling

Simple and accurate, plug-in, AC volt meter to continuously monitor the exact line voltage to avoid low voltage periods which cause erratic equipment behavior

- **Plugs into any 115 volt AC outlet for instant accurate line voltage**
- **Records full range from 95 - 135 line voltage**
- **Color coded dial is accurate to plus or minus 2% and is built into a sturdy plastic case**
- **Leave permanently plugged in for constant reading of line voltage**
- **90 day limited warranty**

Send Check or Money Order to:

TEP, INC.
P.O. BOX #104
WINONA, OHIO 44493

MasterCard VISA

Credit Card Orders
In Ohio - 800-334-7479
Outside Ohio - 800-824-3241
Ohio Residents add 5% Sales Tax

LOGWRITE™

Bring your station into the computer age with **LOGWRITE**, the menu driven, user friendly logging program written by Ed Troy (NO3V). **LOGWRITE** is the perfect accessory for the complete ham station. It simplifies your operation and gives you the competitive edge in contesting and DXing. **LOGWRITE** works with all IBM PC's and compatibles.

LOGWRITE's unique split screen feature allows for simultaneous logging and text processing. Logging features include:

- Instant call sign or prefix search
- Print, Edit, or View records
- Plenty of room for notes & addresses
- Automatic time/date stamping

Text processor features automatic word wrap, backspace correct, and scrolling. Throw away your pen and paper!

To order your copy of **LOGWRITE**, complete with instruction manual, send $24.95 (Pa. residents add $1.50 sales tax) to:

Aerospace Consulting
P.O. Box 156, Gwynedd, Pa. 19436

Or call 1-(800) 345-4156 ext. 54 to order with Visa/MasterCard. (Please specify 3.5 or 5.25 inch floppy.)

ALL BAND TRAP VERTICAL ANTENNAS!

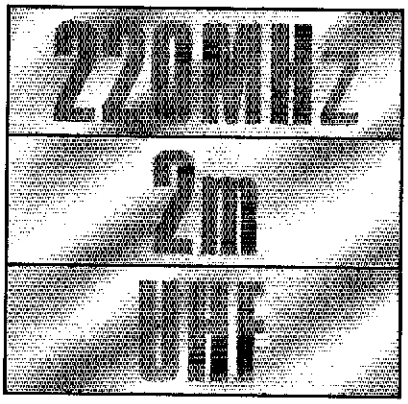
FULL 1/4th WAVE - All Bands! Automatic Selection with proven HI-Q Traps. 5 Models-ALL self supporting - Ground or roof mount. HI STRENGTH FIBERGLASS TUBING OVER - ALL. NO WOBBLY, LUMPY TRAPS - NO UNSIGHTLY CLAMPS needed - Size 1 1/4" all the way up - Traps hidden inside. You can use it in a 1 ft. sq. Backyard! FOR APARTMENTS, MOBILE HOMES - CONDOS etc. where minimum space and neat appearance is MANDATORY! Instant "Drive In" ground mount (included). Use with or without radials (included) (All angle roof mount - Extra) COMPLETELY PRETUNED - NO ADJUSTMENTS NEEDED EVER! NO TUNER NEEDED FOR MOST TRANSCEIVERS! Use - RG8U feedline, any length! 2000 Watt PEP, input power. Shipped - PREPAID IN USA. Assembles in 10 min. using only screwdriver. WEATHERPROOF!

No.-AVT80-10	5 Band	26'6"	$199.95
No.- AVT40-10	4 Band	18'9"	$139.95
No.- AVT20-10	3 Band	11'4"	$109.95
No.-AVT80-10 W	6 Band	22'	$279.95
No.- AVT40-10 W	7 Band	18'9"	$199.95

SEND FULL PRICE FOR PP DEL IN USA (Canada is $10.00 extra for postage, clerical, Customs) or order using VISA, MASTER CARD or AMER-EXP. Ph 1-308-236-5333 9AM-6PM weekdays. We ship in 2-3 days. All Antennas Guaranteed for 1 year -10 day money back trial. Free Inf.

WESTERN ELECTRONICS
Dept. AQ Kearney Ne. 68847

Yaesu's mini HTs. The smallest, smartest, toughest radios. Anywhere.



Whether you're a Novice or Extra class operator, you're sure to appreciate the high power, durability and size of Yaesu's FT-23R Series mini-HTs.

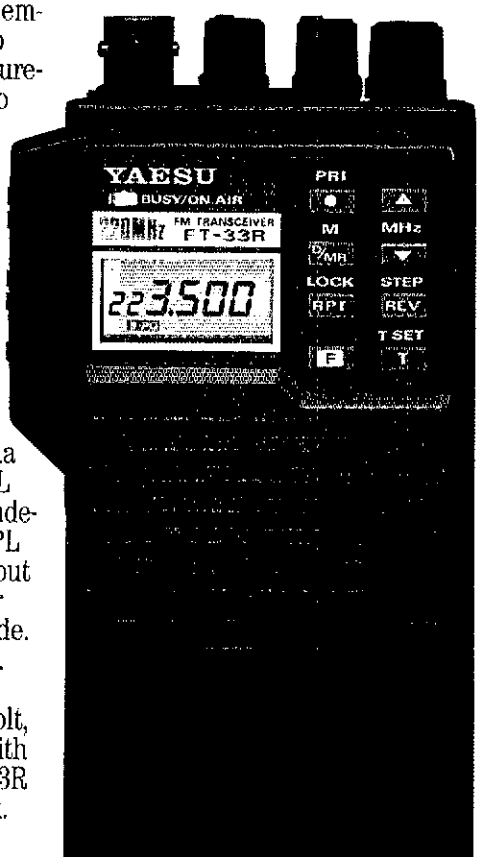
To begin with, you'll find a model that's right on your wavelength. The 2-meter FT-23R. The 220-MHz FT-33R. Or the 440-MHz FT-73R.

Whichever you choose, you benefit from incredibly small packaging. (Take a look at the actual size photo.) Aluminum-alloy cases that prove themselves reliable in a one-meter drop test onto solid concrete. And moisture-resistant seals that really help keep the rain out.

But perhaps best of all, each radio blends sophisticated, microprocessor-controlled performance with surprisingly simple operation. In fact, it takes only minutes to master all these features:

Ten memories that store frequency, offset and PL tone. Memory scan at 2 frequencies per second. Tx offset storage. Priority channel scan. Channel selection via tuning knob or up/down buttons. PL tone board (optional). PL display. Independent PL memory per channel. PL encode and decode. LCD power output and "S"-meter display. Battery-saver circuit. Push-button squelch override. Eight-key control pad. Keypad lock. High/low power switch.

The FT-23R comes with a 7.2-volt, 2.5-watt battery pack. The FT-73R with a 7.2-volt, 2-watt pack. And the FT-33R with a powerful 12-volt, 5-watt pack.



You can choose the miniature 7.2-volt, 2-watt pack shown in the photo below. And all battery packs are interchangeable, too.

And consider these options: Dry cell battery case for 6 AAA-size cells. Dry cell battery case for 6 AA-size cells. DC car adapter/charger. Programmable CTCSS (PL tone) encoder/decoder. DTMF keypad encoder. Mobile hanger bracket. External speaker/microphone. And more.

Check out the FT-23R Series at your Yaesu dealer today. Because although we can tell you about their incredible performance, toughness and small size, seeing is really believing.

YAESU

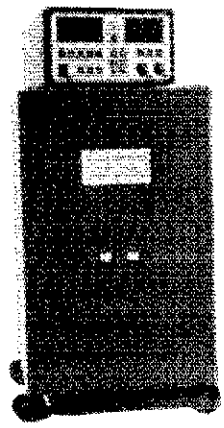
Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. Repair Service: (213) 404-4884. Parts: (213) 404-4847.

the 230A Linear Amplifier

Something new in a high power, high quality, HF linear amplifier

The Advanced Radio Devices (ARD) 230 series represents a new generation in high power linear amplifiers. Utilizing microprocessor control, the 230 provides full "HANDS OFF" automatic operation.

- » Full power is always available
- » Completely automatic
- » Microprocessor controlled tuning
- » No time limit for QRO
- » Full QSK
- » LCD metering
- » VSWR readout
- » Microprocessor controlled protection
- » Automatic tube monitoring
- » Easy modification for 10 meters
- » RS-232C output for external control
- » Modular construction
- » Export/commercial versions available
- » Remote antenna switching control
- » Remote control up to 250 feet away
- » UPS shippable (3 boxes)



Suggested Retail $5495.00
Call For Quote

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

EEB

Orders: 800-368-3270
Local & tech info
703-938-3350

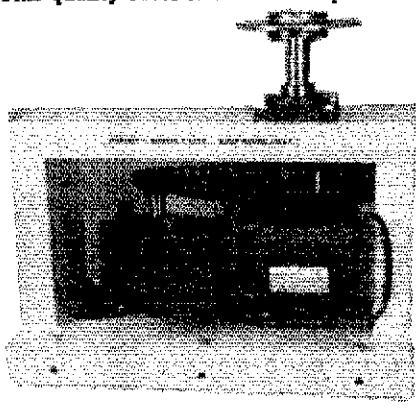
Electronic Equipment Bank
516A Mill St. NE, Vienna, VA 22180
(just minutes from Washington, DC)

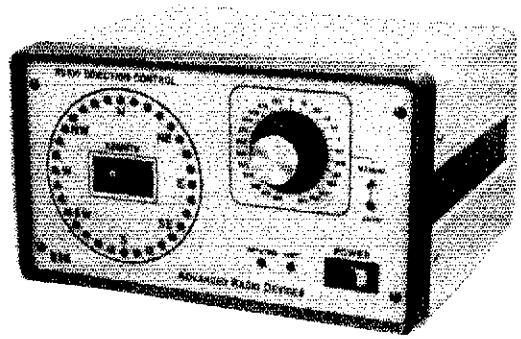
R9100 *SUPER ROTATOR*

The Advanced Radio Devices (ARD) R9100 is the heavy duty antenna rotator designed for the big gun with antenna loads to one ton. All components are designed and selected for durability and long life, a quality often over looked.

The control system provides both analog and digital readout of direction to within ±1 degree. Provisions for external computer control which allows rotor positioning by the mere keyboard entry of a target country's prefix. Software is provided for use with most popular computers.

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)
Priced Under $4000.00, Call For Quote
Write for complete specs and installation information

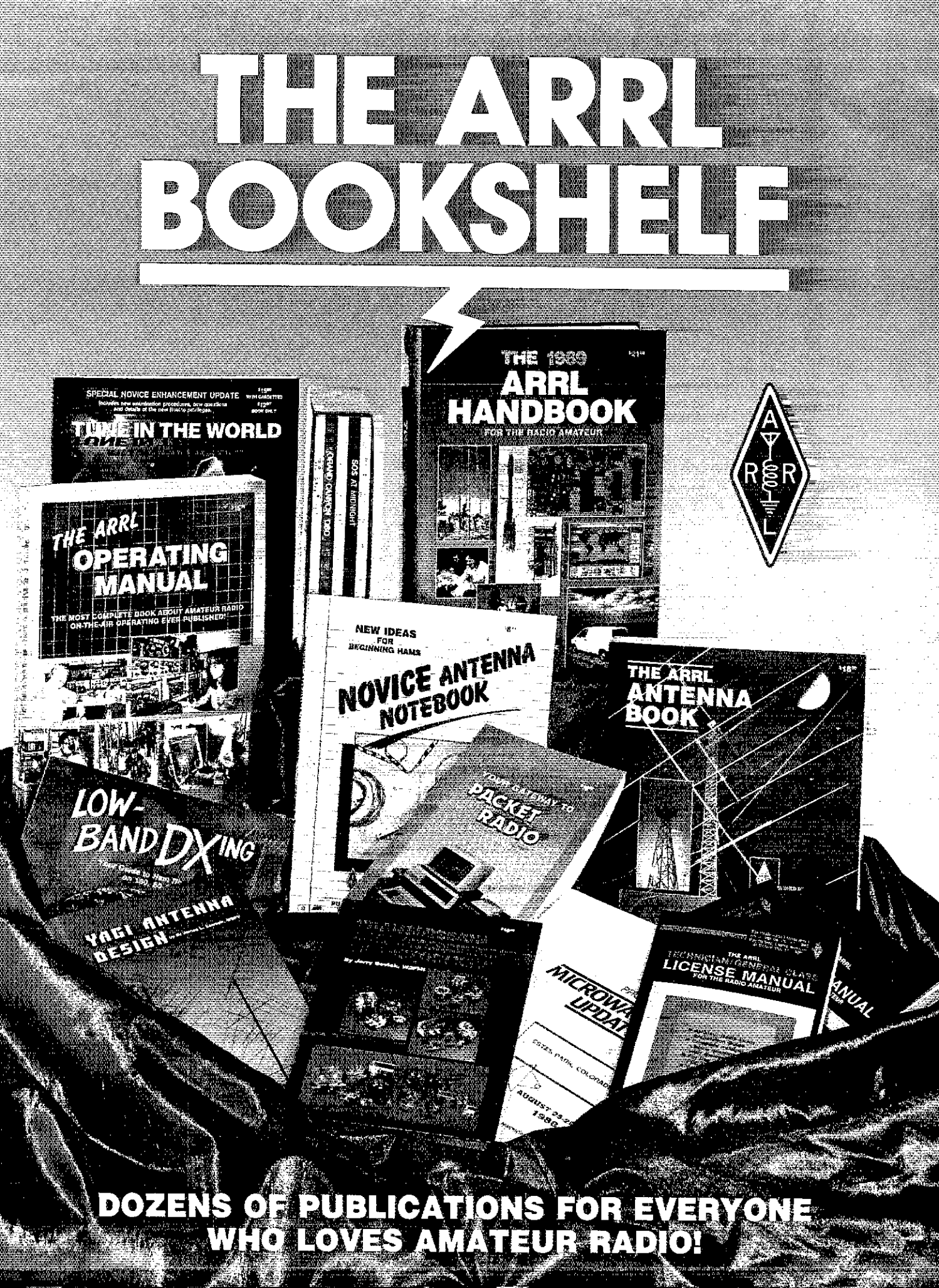
Distributed Exclusively by EEB

EEB

Orders: 800-368-3270
Local & tech info
703-938-3350

Electronic Equipment Bank
516A Mill St. NE, Vienna, VA 22180
(just minutes from Washington, DC)

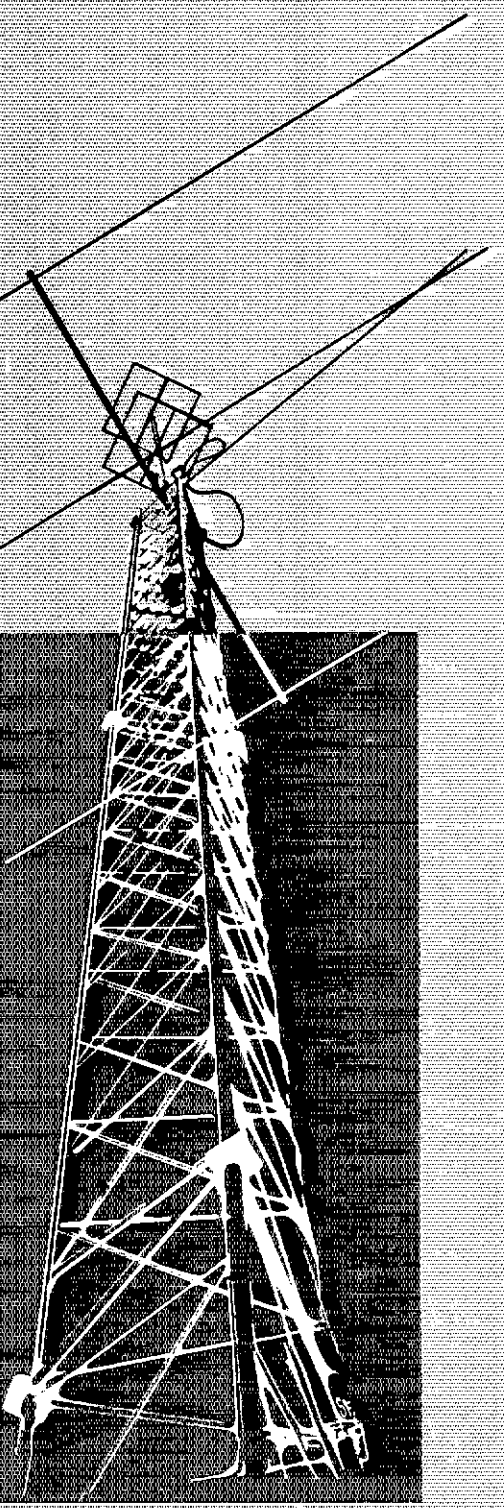
THE ARRL BOOKSHELF



DOZENS OF PUBLICATIONS FOR EVERYONE WHO LOVES AMATEUR RADIO!

A Great New ARRL Antenna Book

Twice the size of the previous edition
Over 700 pages
987 figures
Edited by Gerald L. Hall, K1TD
QST Associate
Technical Editor



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).

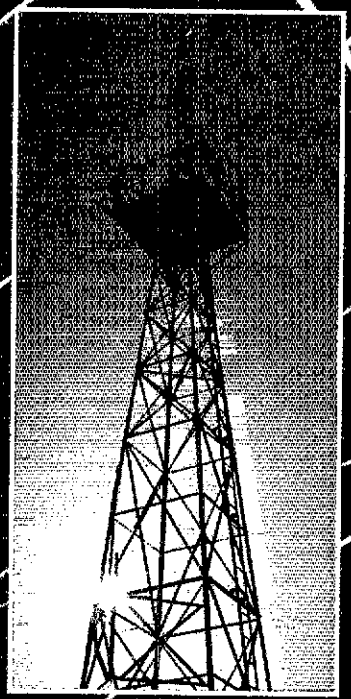
CHAPTER LINEUP:

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).

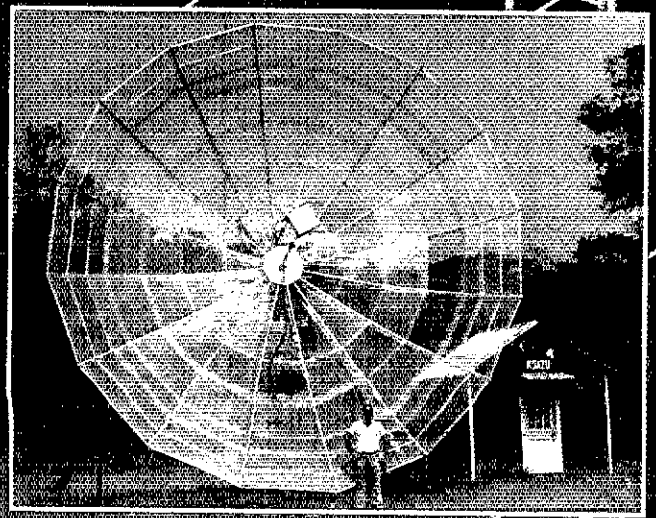
ARRL, 225 MAIN ST., NEWINGTON, CT 06111

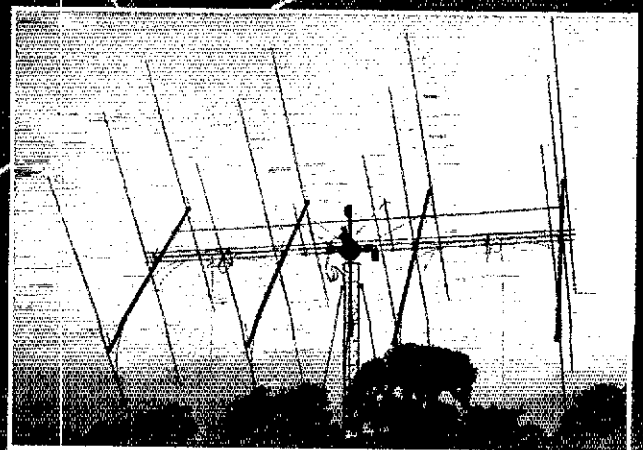
THE ARRL ANTENNA BOOK

$18.00



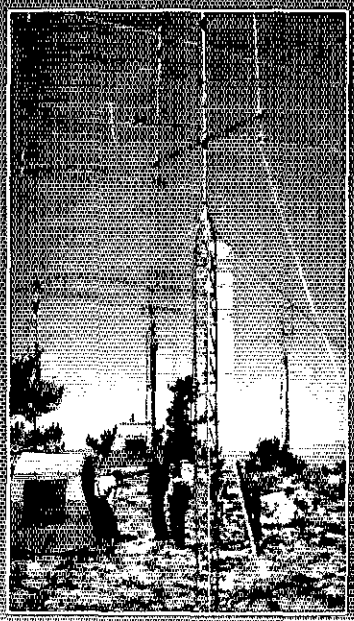
PUBLISHED BY

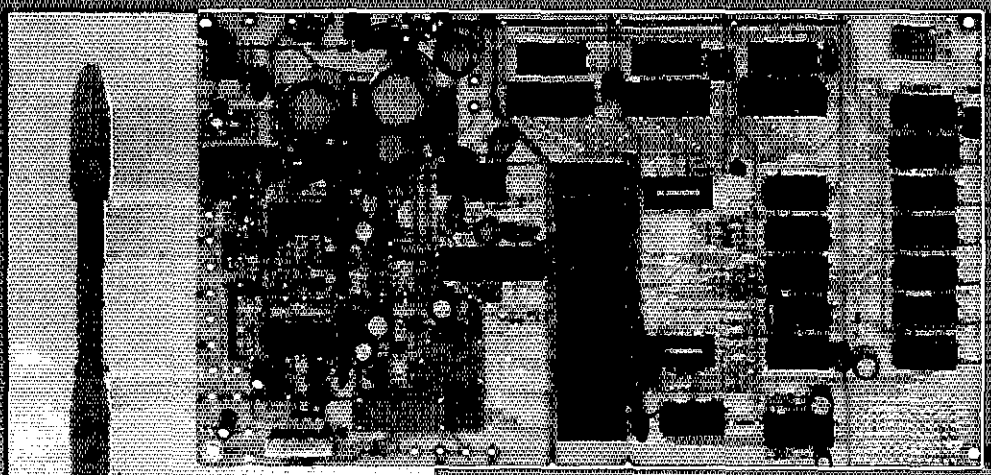


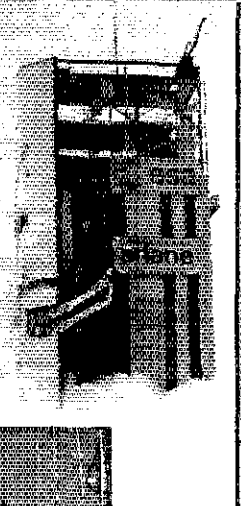


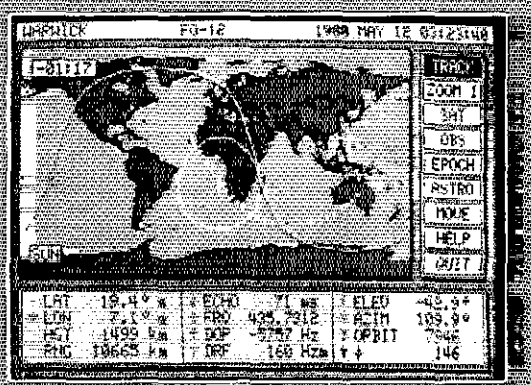
THE 1989 ARRL HANDBOOK

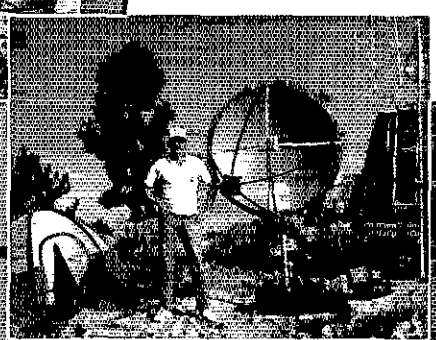
FOR THE RADIO AMATEUR

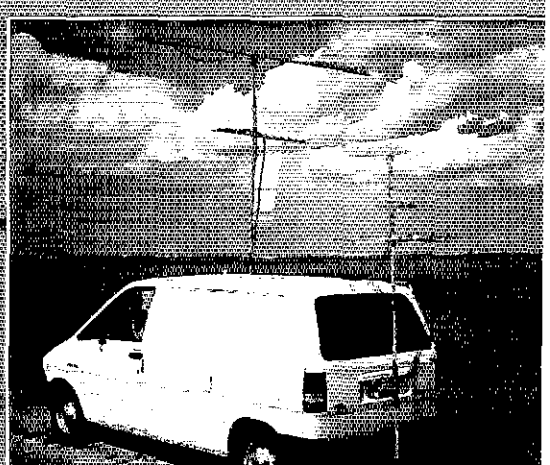












PUBLISHED BY:
THE AMERICAN RADIO RELAY LEAGUE

CELEBRATE

the 75th anniversary of ARRL with a new Handbook!

1989 marks the 75th anniversary of the founding of the League. There's no better way of celebrating this momentous occasion than with the new 1989 *ARRL Handbook for the Radio Amateur!*

The 1200-page sixty-sixth edition contains over 2100 tables, figures and charts. The new *Handbook* is better than ever with new information on phase noise measurement, direct frequency synthesis, and spread-spectrum communication techniques. The section on repeaters has been updated including a new CW identifier circuit. You'll find new spectrum analyzer and oscilloscope material, as well as several new projects in the test equipment chapter.

As always, we've added a host of new construction projects in this new edition. Just some of the new projects include: A 500-MHz frequency counter, 160 through 10 meter legal limit amplifier, simple CMOS keyer project, digital audio memory keyer and a LC meter for measuring coil inductance.

But that's not all. You'll find many other popular construction projects that can be built in a weekend such as power supplies and VHF/UHF preamps. For the more ambitious builder there are projects like the 1.8 MHz QSK transverter (there are VHF/UHF transverter projects too) and there are many amplifier designs to suit your needs from HF through microwaves.

The Handbook has always been famous as a reference for component data and you will find an entire chapter devoted to everything from transmitting tube and transistor specifications to aluminum tubing sizes. Satellite enthusiasts will find that the digital TR sequencer will add operating convenience to your station. Of course, you'll find the most up-to-date information on digital techniques, and the video communications chapter is packed with information not only on SSTV, ATV and FAX but Weather FAX as well. QRP enthusiasts will find the famous "Cubic Incher" transmitter, not much bigger are the QRP SWR indicator and QRP Transmatch. There is also a VXO-controlled 6-watt CW transmitter for your favorite band between 80 and 15 meters. There are a number of useful station accesories that you can build like DTMF encoders and decoders, PIN-diode TR switch, digital PEP wattmeter and SWR calculator, Transmatches and dummy loads.

For $21, *The ARRL 1989 Handbook for the Radio Amateur*, remains an exceptional value for a hardcover technical publication. The price outside the US is $23. For postage and handling, add $2.00 (or $3.50 for insured mail or UPS — please specify).

Here is a fuller description of the contents:

INTRODUCTION
1. Amateur Radio
2. Electrical Fundamentals
3. Radio Design Techniques and Language
4. Solid-State Fundamentals
5. Vacuum-Tube Principles

RADIO PRINCIPLES
6. Power Supplies
7. Audio and Video
8. Digital Basics
9. Modulation and Demodulation
10. Radio-Frequency Oscillators and Synthesizers
11. Radio-Transmitting Principles
12. Radio-Receiving Principles
13. Radio Transceivers
14. Repeaters
15. RF Power Amplifiers
16. Transmission Lines
17. Antenna Fundamentals

MODULATION METHODS
18. Voice Communication
19. Digital Communications
20. Image Communications
21. Special Modulation Techniques

TRANSMISSION
22. Radio Frequencies and Propagation
23. Space Communications

CONSTRUCTION AND MAINTENANCE
24. Construction Techniques
25. Test Equipment and Measurements
26. Troubleshooting and Repair
27. Power Supply Projects
28. Audio and Video Equipment
29. Digital Equipment
30. HF Radio Equipment
31. VHF Radio Equipment
32. UHF Radio Equipment
33. Antenna Projects
34. Station Accessories
35. Component Data

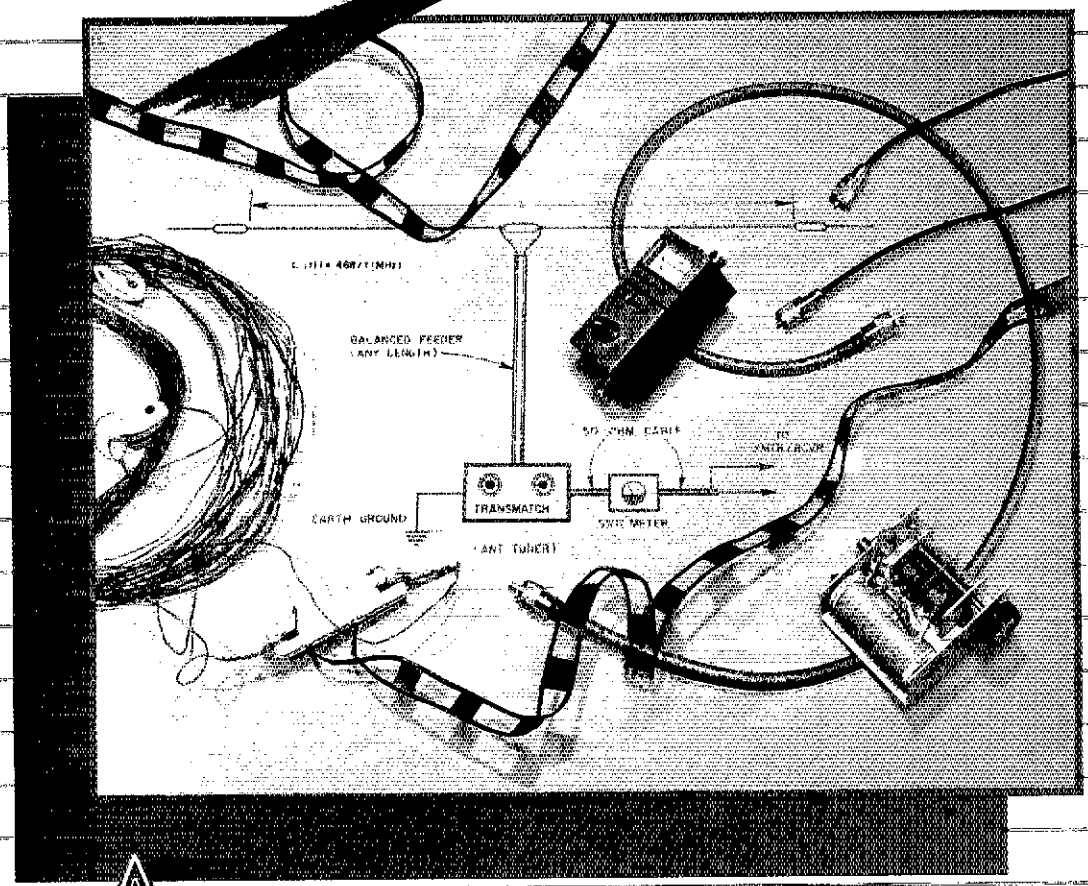
ON THE AIR
36. How to Become a Radio Amateur
37. Assembling a Station
38. Operating a Station
39. Monitoring and Direction Finding
40. Interference

The American Radio Relay League, Inc., 225 Main St., Newington, CT 06111 USA

$8.00

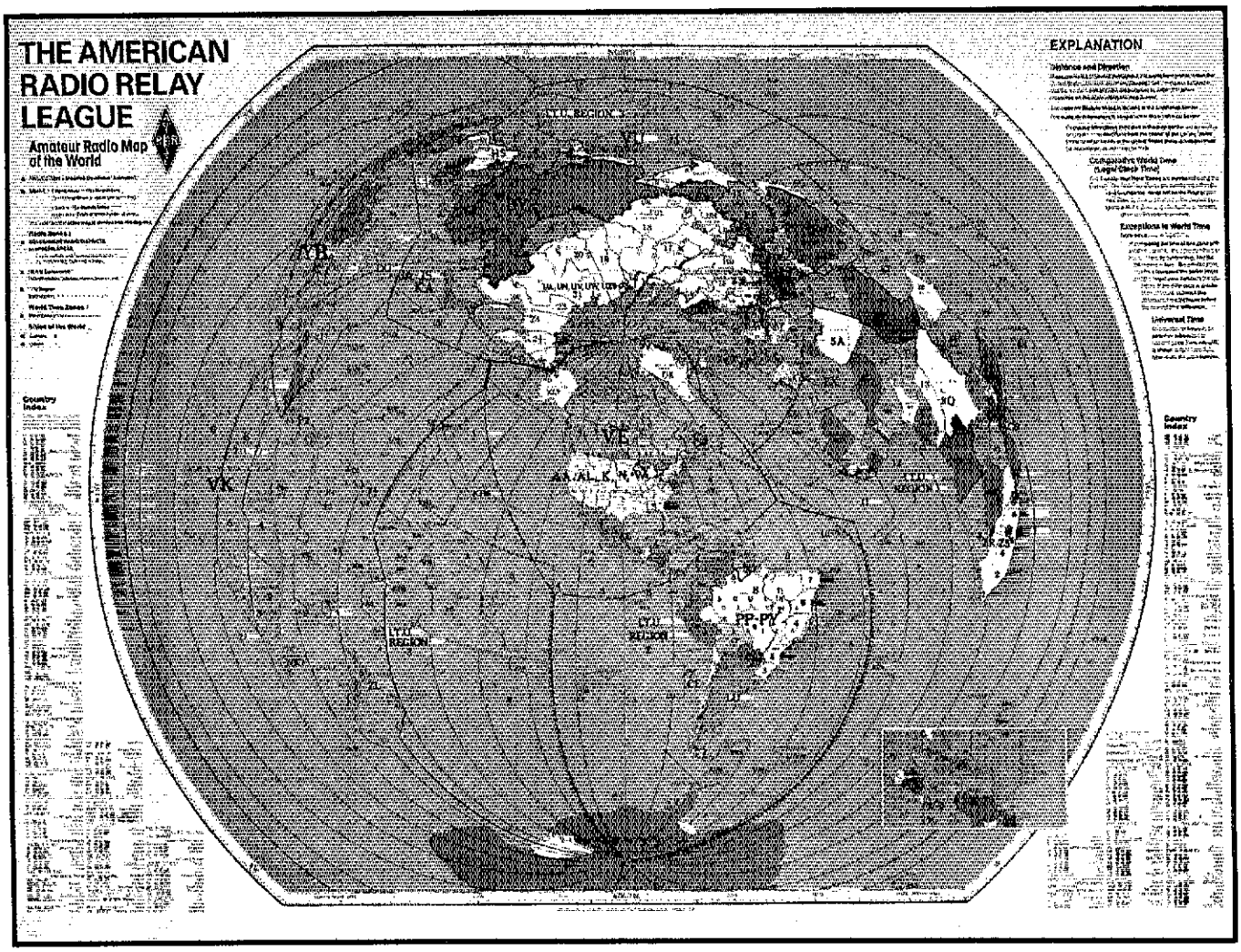
NEW IDEAS
FOR
BEGINNING HAMS

NOVICE ANTENNA NOTEBOOK



By Doug DeMaw, W1FB

PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE



Where in the World?

New edition now available

The new 1988 edition of the popular full-color ARRL Amateur Radio Map of the World will brighten any ham shack wall! We've updated the map to reflect the changes in the DXCC list since the 1985 revision. As usual, Rand McNally has updated the geographic material and map base. The index lists countries alphabetically by prefix and shows ITU and CQ Zones and continents. On the map itself you will find ITU regions, time zones, country prefixes, call districts, important cities and great circle bearings centered on the US. Also the popular detailed Caribbean insert that we added to the last edition has been revised. 30 x 40 inches. $8.00.

The American Radio Relay League, Inc.
225 Main Street
Newington, CT 06111

ARRL BOOKSHELF

11/88

Prices are subject to change without notice. Shipping and handling: add $2.50 for book rate. For $3.50, shipments to US addresses can be made by insured parcel post or UPS. Please specify. The minimum charge order is $7.50. Payment must be in US funds.

ARRL, 225 MAIN STREET, NEWINGTON, CT 06111

THE 1989 ARRL HANDBOOK

This is the most comprehensive edition since the *Handbook* was first published in 1926. It is updated yearly to present the cutting edge of rf communication techniques while presenting hundreds of projects the average Amateur Radio operator can build. The 66th edition is packed with information on digital communication modes as well as new power supplies and amplifiers. Ready-to-use etching patterns are provided for many projects. This *Handbook* belongs in every ham shack. 1216 pages.

Hardcover only #1662 $21 US, $23 elsewhere

ANTENNA BOOKS

THE ARRL ANTENNA BOOK represents the best and most highly regarded information on antenna fundamentals, transmission lines, design and construction of wire antennas as well as yagis and quads for HF. You'll find chapters on VHF/UHF antennas, test equipment and propagation. The new 15th edition has over 700 pages of practical antenna information.
©**1988,** Softcover ..... **#2065 $18**

Novice Antenna Notebook is written for the beginner or experienced amateur who wants practical information on basic antenna designs and construction.
©**1988.** Softcover ..... **#2073 $ 8**

W1FB's Antenna Notebook Practical wire and vertical antenna designs ..... **#0488 $ 8**

TRANSMISSION LINE TRANSFORMERS, cover baluns, use of ferrites, and other aspects of antenna transmission line design and operation. 128 pages ..... ©**1987 #0471 $10**

ANTENNA COMPENDIUM Packed with new material on quads, yagis and other interesting topics.
©**1985 178 pages #0194 $10 US, $11 elsewhere**

HF ANTENNAS FOR ALL LOCATIONS G6XN's look at antennas with practical construction data.
©**1982 264 pages #R576 $15**

YAGI ANTENNA DESIGN by Dr. James L. Lawson, W2PV. Over 210 pages of practical theory and design information.
©**1986 #0410 $15**

PASSING POWER! - THESE PUBLICATIONS WILL HELP YOU THROUGH THE EXAMS

Beginning with **Tune in the World with Ham Radio** for the Novice and progressing through the critically acclaimed **ARRL License Manual Series** for the Technician through Extra Class; you will find passing each exam element a snap! There are accurate text explanations of the material covered along with FCC question pools and answer keys. The latest edition of **The FCC Rule Book** is invaluable as a study guide for the regulatory material found on the exams and as a hand y reference. *Every* amateur needs an up-to-date copy. **Morse Code the Essential Language** has tips on learning the code, high speed operation and history. If you have a Commodore 64™ or C 128 computer, **Morse University*** provides hours of fun and competition in improving your code proficiency. **First Steps in Radio** from **QST** presents electronic principles for the beginner.

*MORSE UNIVERSITY is a trademark of AEA, Inc.

Tune in the World with Ham radio
Kit with book and cassettes ..... **#0380 $15**
Book only ..... **#0399 $12**
Cassettes **$10**

License Manual Series
Technician/General Class ..... **#0143 $ 5**
Advanced Class ..... **#016X $ 5**
Extra Class ..... **#0763 $ 5**
FCC Rule Book 7th Ed. ..... **#0453 $ 5**

Morse Code: The Essential Language covers sending, receiving, high speed operation and history ©1986 ..... **#0356 $ 5**

First Steps in Radio ..... **#2286 $ 5**

GGTE Morse Tutor Software Learn the code, practice for exams, and keep code skills sharp with this software for the IBM PC and compatibles. Teaches code in 11 lessons, and has a random word and QSO generator. You set the speed in wpm. ..... **#2081 $20**

Morse University for C-64 ..... **#2059 $40**

OPERATING

The ARRL Operating Manual 688 pages packed with information on how to make the best use of your station, including: interfacing home computers, OSCAR, VHF-UHF, contesting, DX traffic/emergency matters and shortwave listening.
©**1987 3rd ed. #1086 $15**

The ARRL Repeater Directory, 1988-89
#0437 ..... **$ 5**

The ARRL Net Directory-free shipping.... **#0275 $1**

HOLA CQ Learn to communicate with Spanish-speaking radio amateurs. 90 min. cassette and 15 page text. **#901N** **$7**

The RSGB Operating Manual The third edition published in 1985 is packed with practical operating tips, techniques and tables ..... **#R69X $14**

Passport To World Band Radio 416 pages of information and listings of shortwave broadcast stations with frequency, times, and languages. 1989 ed. **$15**

PACKET RADIO/COMPUTERS

Computer Networking Conferences 1-4 from 1981-1985 Pioneer Papers on Packet Radio .. **#0224 $18**

5th Computer Networking Conference Papers ©**1986** ..... **#033X $10**

6th Computer Networking Conference Papers ©**1987** ..... **#2022 $10**

7th Computer Networking Conference Papers ©**1988** ..... **#2138 $12**

AX.25 Link Layer Protocol ..... **#0119 $8**

Get*Connected to Packet Radio..... **#Q221 $13**

RSGB Amateur Radio Software Contains 85 BASIC programs, 6 in assembly language covering CW, RTTY, Amtor, Packet, Antenna Design, Satellite Predictions, Distances, Bearings and Locators **$18**

Gateway to Packet Radio How to get started, equipment you need and more ..... **#2030 $10**

DX/CALLBOOKS

The Complete DX'er by W9KNI ..... **#2083 $10**
DX Power by K5RSG ..... **#T740 $10**
DXCC Countries List — free shipping ... **#0291 $ 1**
Low Band Dxing ©1987 ..... **#047X $10**
North American Callbook ..... **#C089 $29**
International Callbook ..... **#C189 $32**

QRP

QRP Notebook by Doug DeMaw, W1FB. An exciting book for the low power enthusiast. ..... **#0348 $ 5**

VHF-UHF, MICROWAVE, SPACE

RSGB VHF/UHF Manual ..... **#630 $30**
RSGB Microwave Newsletter Col. ..... **#R000 $18**
21st Central Sts. VHF Conf. **$10**
22nd Central States VHF Conf. ..... **#209X $12**
Microwave Update 1987 Conf. **$10**
Microwave Update 1988 Conf. **$12**
Mid-Atlantic VHF Conference **$10**
The Satelite Experimenter's Handbook by Martin Davidoff, K2UBC, 208 pages ..... **#0046 $10**
AMSAT NA 5th Space Symposium **$12**
Satellite Anthology ..... **$ 5**

INTERFERENCE/DFing

Interference Handbook (Radio Pubs) **$12**
Transmitter Hunting (Tab) **$18**

OTHER PUBLICATIONS

Fifty Years of ARRL ..... **#0135 $ 4**
GIL: Collection of cartoons from QST .. **#0364 $ 5**
Oscarlocator .... **#3037 $8.50 US, $9.50 elsewhere**
200 Meters and Down ..... **#0011 $ 4**
Solid State Design for the Radio Amateur. First published in 1977, just reprinted by popular demand #0402 ..... **$12**
RSGB Radio Communications Hndbk. .. **#R584 $35**
RSGB Buyer's Guide ..... **#R680 $15**
RSGB Data Book ..... **#R673 $18**

FOR INSTRUCTORS

Written for those teaching classes using *ARRL License Manuals* or *Tune In The World*
General Class Instructor's Guide ..... **$ 5**
Technician Instructor's Guide ..... **$ 5**
Novice Instructor's Guide ..... **$ 5**

ADVENTURE

Grand Canyon QSO (Tompkins) .... **#5048 $ 5**
SOS at Midnight. (Tompkins) ..... **#5005 $ 5**
CQ Ghost Ship ...(Tompkins) ..... **#5013 $ 5**
DX Brings Danger (Tompkins) ..... **#5021 $ 5**
Death Valley QTH (Tompkins) ..... **#503X $ 5**
Set of 5 Tompkins books ..... **#1490 $20**

INVITATION TO MEMBERSHIP

JOIN TODAY! Take advantage of these membership benefits: **QST** The interesting, lively way to keep on top of everything that is happening in Amateur Radio: Coverage of regulatory developments; Washington news; operating — DX, VHF-UHF, and repeaters, OSCAR, SSTV, RTTY; Novice Notes; lists of hamfests where you can meet local hams, hear interesting talks, and possibly find a bargain at a fleamarket; and you will find technical articles aimed specifically at the beginner's level. **W1AW** is the voice of ARRL. This station transmits daily code practice sessions and regular bulletins. **LOW COST INSURANCE** for your ham gear. **OTHER SERVICES:** Outgoing QSL Bureau, Operating Awards, Amateur Radio Emergency Service, Field Organization and much, much more! The League is a **democratic organization,** of, by and for its members. The members determine policies of the League through the Board of Directors which is elected directly by the membership. The League is **YOU!**

DUES

	U.S.	Elsewhere
1 Year	$25	$36
2 Years	47	69
3 Years	65	98
Amateurs who are age 65 or over with proof of age:		
1 Year	$20	$31
2 Years	37	59
3 Years	50	83

Life Membership: Please write for formal application.

ARE YOU AGE 17 OR YOUNGER? ARE YOU THE OLDEST LICENSED AMATEUR IN YOUR HOUSEHOLD?

If you answered "YES" to both questions then these special rates apply: Age 13-17 $12.50. Age 12 and younger $6.25. Evidence of your date of birth is required. Attach a copy of your birth certificate or have your parent or guardian certify your date of birth. A list of all other amateurs in your household is required. Family memberships, club commissions and rebates and multiple year rates do not apply.

Family Membership An immediate relative of a full dues paying member living at the same address, may become a family member without **QST** for $2 per year.

USE THIS FORM OR PHOTOCOPY

ORDER BLANK Shipping and handling charges do not apply to membership, the *DXCC List* or *Net Directory*, or membership supply items. Please allow 1 week for us to receive your order, 1 week for processing and 1 to 3 weeks shipping time after your order leaves ARRL.

☐ YES! Sign me up for membership at the rates shown above		Total	
Product #	Quantity	Title	
		Donation to the Legal Defense Fund ($1 min.)	
		Donation to the W1AW Renovation Fund	
Shipping/Handling ☐ by Mail $2.50 ☐ Insured Mail $3.50 ☐ UPS $3.50			
Payment must be in U.S. Funds drawn on a U.S. bank		TOTAL	

$7.50 minimum on all credit card orders

Charge to ☐ VISA ☐ Mastercard ☐ AMEX ☐ Discover

Name _____

Call _____

Street _____

City _____

_____ Card Number

Card good from _____

Card good to _____ Expiration Date

Signature _____

ARRL 225 MAIN STREET NEWINGTON, CT 06111 U.S.A.

MEMBERSHIP SUPPLIES

The ARRL Flag
3 x 5 Cloth Flag ..... #1060 $21.00
Cloth Patch ..... #1090 $ 5.00
Pin ..... #1070 $ 5.00

Amateur Radio Emergency Service
Black and Gold Sticker 2/pkg. ..... #1100 $ 0.50
Red White and Blue Sticker per package of 2 ..... #1105 $ 0.50
Black and Gold Decal 5/pkg ..... #1110 $ 1.00
Red White and Blue Decal per package of 5 ..... #1115 $ 1.00
Black and Gold Patch ..... #1120 $ 2.50
Red White and Blue Patch ..... #1125 $ 2.50

Member 5" Diamond Decal per package of 2 ..... #1130 $ 0.50

Life Member Decal 2/pkg ..... #1135 $ 0.50

Cloth Patches
3" ARRL Diamond ..... #1140 $ 1.00
5" ARRL Diamond ..... #1150 $ 2.00
Life Membership goes with 3" ARRL Diamond ..... #1160 $ 1.00
Life Membership goes with 5" ARRL Diamond ..... #1170 $ 1.25

Membership Pins
Membership ..... #1180 $ 2.50
Replacement Pin for Life Membership ..... #1190 $ 2.50

Banner 14" x 16" gold with ARRL Diamond ..... #1230 $ 7.50

Life Membership Plaque ..... #1240 $25.00

ARRL License Plate ..... #1095 $ 5.00

Member Stationery
50 pieces of stationery and envs .. #1460 $ 8.00
50 pieces of stationery ..... #1465 $ 4.00
50 envelopes ..... #1470 $ 5.00

Log Books
8½ x 11 Spiral ..... #1250 $ 2.50 U.S. $ 3.50 Elsewhere
Mini-Log, 4" x 6" ..... #1260 1.75 U.S.

3-hole Loose Leaf, 96 8½ x 11 sheets ..... #1265 $ 3.00

Maps and Atlases
U.S. Call Area ..... #1270 $ 3.00
World Map—full color great circle map centered on the United States ..... #1280 $ 8.00
Grid Locator (US and Canadian Grid Squares) ..... #1290 $ 1.00
ARRL World Grid Locator Atlas ... #1475 $ 4.00
Polar Map (for OSCAR) ..... #1300 $ 1.00

For Traffic Handlers:
Message Delivery Cards per package of 10 ..... #1310 $ 0.50
Message Pad with 70 sheets ..... #1320 $ 1.00
Message Pad with 70 sheets per package of 3 ..... #1330 $ 2.50

Antenna and Transmission Line Design Aids
Standard Smith Charts per package of 5 sheets ..... #1340 $ 1.00
Expanded Smith Charts per package of 5 sheets ..... #1350 $ 1.00
Antenna Pattern Worksheets 100 8½ x 11 sheets ..... #1360 $ 3.00

***QST* Binders**
6½ x 9½ for *QST* 1975 and prior .. #1370 $ 9.00
8½ x 11 for *QST* 1976 and after ... #1380 $10.00

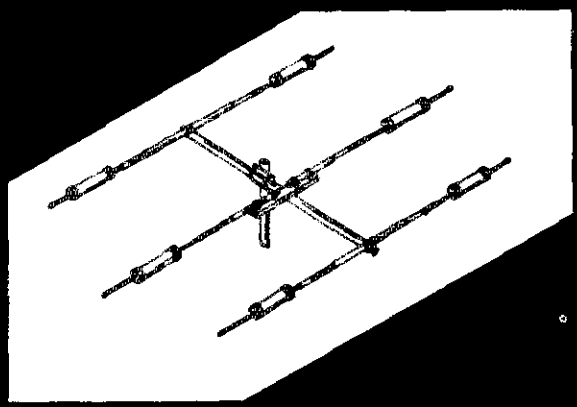
Apparel
Maroon tie with ARRL diamond imprint ..... #1400 $12.00

Video Tapes
SAREX W0ORE Challenger VHS .. #1420 $25.00
SAREX W0ORE Challenger U-Matic ..... #1430 $35.00
Amateur Radio's Newest Frontier VHS ..... #1440 $25.00
Amateur Radio's Newest Frontier U-Matic ..... #1450 $35.00
New World of Amateur Radio VHS ..... #WAR1 $20.00
New World of Amateur Radio U-Matic ..... #WAR2 $35.00

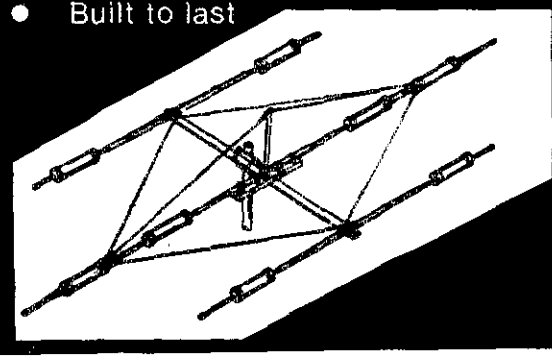
Mosley.....

A BETTER ANTENNA .....

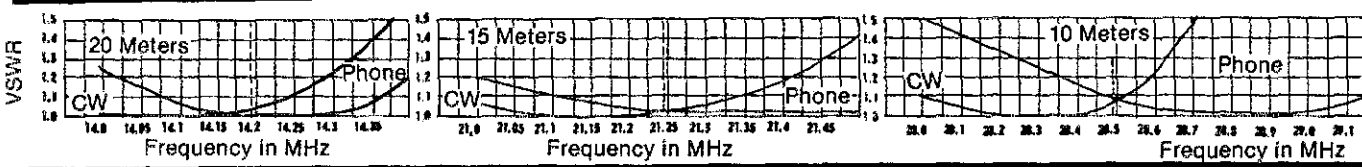
WHY SETTLE FOR LESS?
LOOK WHAT THE MOSLEY TA-33 OFFERS



- 3 Element full power
- All stainless steel hardware
- Ease of assembly
- No balun required
- Now a 2 year limited warranty
- Now a standard 2" mast adapter
- Built to last



- Expandable to 30 or 40 meters
- Superb front to back ratio
- Excellent gain
- Outstanding SWR



SPECIFICATIONS

Forward gain	
Front to Back Ratio	
Power rating CW	1KW
Power rating SSB	2KW P E P
Feedpoint Impedance	52 ohm
VSWR HT Resonance	1 5 to 1 or better
Matching System	Mosley
Number of Elements	3
Longest Element	28'
Boom Length	14'
Mast Size	1½" or 2"
Turning Radius	15'6
Wind surface area (in sq ft)	5 7
Wind load (EIA standard 80 mph)	114 lbs
Assembled Wt	39 lbs
Shipping Wt	44 lbs

- Used around the world
- Work CW or phone without tuning or adjusting antenna
- A great antenna for the new solid state rigs

ALL MOSLEY ANTENNAS AND CATALOGS AVAILABLE AT QUALITY DEALERS OR CALL TOLL FREE

1-800-325-4016

NOW UPS SHIPPABLE

Prices and specifications subject to change without notice or obligation.

REMEMBER WHETHER YOU USE TRAPS OR LINEAR LOADING, GAIN IS GAIN
YOUR RECEIVER CAN T TELL THE DIFFERENCE MOSLEY . . TRAP MASTERS QUALITY STILL SETTING THE PACE . . .

Mosley Electronics Inc 1344 BAUR BOULEVARD ST LOUIS, MO. 63132 1-314-994-7872

Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 85 cents per word. This includes firms or individuals offering products or services for sale. A special rate of 25 cents per word applies to individuals seeking to dispose of or acquire personal station equipment, and to hamfest and convention announcements.

3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 13th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received November 14 through December 13 will appear in February *QST*. If the 13th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in *QST* advertising.

(6) New firms or individuals offering products or services for sale must submit a production sample (which will be returned) for our examination. Dealers are exempted, unless the product is unknown to us. Check with us if you are in doubt. You must furnish a statement in writing that you will stand by and support all claims and specifications mentioned in your advertising before your ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

The League reserves the right to decline or discontinue advertising for any reason.

CLUBS/HAMFESTS/NETS

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers—W7GAQ/6, 146 Coleen Street, Livermore, CA 94550.

IMRA—International Mission Radio Association helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1:00-3:00 PM Eastern Time. Rev. Thomas Sable, S.J., University of Scranton, Scranton, PA 18510.

THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed F. Pleufer, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

HAVE A-M capability? Join S.P.A.M. (Society for Promotion A-M) Membership is free. Write: Don "Hoisy" Hoisington (S.P.A.M.), 202 Baker Drive, Florence, AL 35630. (S.A.S.E. please).

FCC EXAMS. Novice-Extra Class, Walk-in's only. Sunnyvale VEC ARC, POB 60142, Sunnyvale, CA 94088-0142, 408-255-9000, 24/hr. Gordon, W6NLG, President. Flea Market, March-Sept, Foothill College, Los Altos Hills, CA.

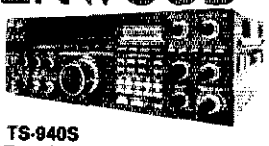
MARCO: Medical Amateur Radio Council, operates daily and Sunday nets. Medically-oriented amateurs (physicians, dentists, veterinarians, nurses, therapists, etc.) invited to join. For information, write MARCO, Box 73's, Acme, PA 15610.

LITTLE Big Horn Net Sundays: 14.057 MHz, 2200 UTC, 21.150 MHz 2230 UTC. Historians and Native Americans welcome. SASE WA2DAC. Note changes!

JOIN The Old Old Timers Club, an international non-profit organization. If you operated a radio station, commercial, amateur or Armed Forces 40 or more years ago, and have an Amateur license at present you are eligible. Join the real pioneers of ham radio. Write O.O.T.C., 20933 Brant Avenue, Long Beach, CA 90810.

HAMFEST-Sunday, October 30,1988, 8AM General Public, 6AM Sellers. Pennsylvania National Guard Armory, RT. 152, Sellersville, PA. Talk-in (Repeaters) 145.310, 145.190, 146.760 and 146.520 (Simplex). Admission $4. Contact: Bob Buontiglio, KA3POV, 361 School House Road, Souderton, PA 18964, tel. 215-723-1016.

KENWOOD

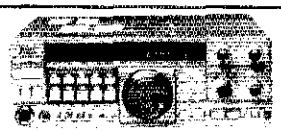


TS-940S
NEW Top-of-the-Line
HF Transceiver
- 100% Duty Cycle
- 40 Memory Channels

CALL FOR SPECIAL PRICES!!

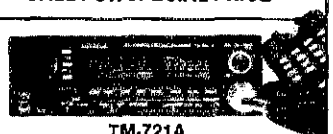
TS-440S NEW!
CALL FOR SPECIAL SALE PRICE

TS-140S
CALL FOR SPECIAL SALE PRICE !



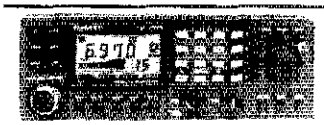
TS-711A **TS-811A**

CALL FOR SPECIAL PRICE



TM-721A
CALL FOR SPECIAL PRICE

TR-751A
All Mode 2m Mobile



COMPACT 2M FM MOBILE

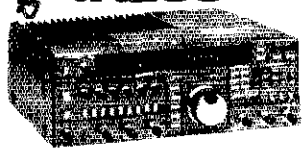
TM 2570A (70W) **TM 3530A (25W)**
TM 2550A (45W) **TM 221A (45W)**
TM 2530A (25W)

CALL FOR SPECIAL PRICE

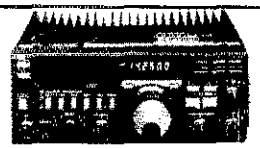
TH 205 AT
High Tech 2M
HT XCVR

TH215A
2m HT XCVR
TH-25AT
TH21BT, TH31BT
TH41AT Also In Stock-
CALL FOR SALE PRICES!

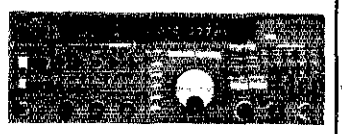
YAESU



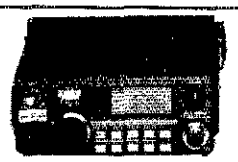
FT 767 GX HF/VHF/UHF
CALL FOR SALE PRICE



FT-757GX/II
CALL FOR SPECIAL SALE PRICE!



FT-736R
New All Mode Base Transceiver
CALL FOR SPECIAL PRICE—
SAVE $$$!



FT290R 2m Portable
FT690R 6m Portable
CALL FOR SALE PRICES!

FT 209/709 RH
HIGH
Tech HT's
5W Output

FT727 RH
2m/70 cmHT
- 5w Output
- 10 memories
- Battery saver

Call For Sale Prices

FT 23R 2m HT
FT 73R 70 cm HT
- compact size
- 10 memories
- up to 5W output W/FNB 11

CALL FOR SALE PRICES!

ASTRON POWER SUPPLIES

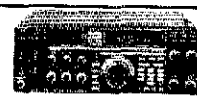
Heavy Duty · High Quality · Rugged · Reliable
- Input Voltage:105-125 VAC Output:13.8 VDC ± .05V
- Fully Electrically Regulated 5mV Maximum Ripple
- Current Limiting & Crowbar Protection Circuits
- M-Series with Meter A-Series Without Meter

Model	Cont. Amps	ICS Amps	Price
RS4A	3	4	$ 45
RS7A	5	7	55
RS12A	9	12	75
RS20A	16	20	95
RS20M	16	20	115
RS35A	25	35	145
RS35M	25	35	160
RS50A	37	50	215
RS50M	37	50	240

ICOM

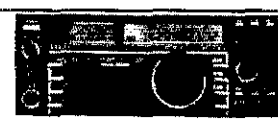
IC-781
HF "PERFORMANCE" RIG
- 160-10M/General Coverage Receiver
- Built-in Power Supply and Automatic Antenna Tuner
- SSB, CW, FM, AM, RTTY • QSK to 60 wpm

CALL FOR SPECIAL PACKAGE PRICES!



IC-761 New HF XCVR
- Built-in AC Power Supply
- Built-in Automatic Tuner
- PBT Plus IF Shift
- QSK Up To 60 WPM

CALL TODAY FOR SALE PRICE



IC735 NEW General Coverage
Ultra Compact
CALL FOR SPECIAL PRICE!

IC-27A **IC-37A** **IC-27H** **IC-47A**
IC-28A **IC-38A** **IC-28H** **IC-48A**

CALL TODAY FOR SPECIAL ICOM PRICES!

IC02AT - 2mtr
IC03AT - 220 MH·
IC04AT - 70cm
High Tech
HT XCVRS

NEW
IC-μ2AT
2m HT

- micro design covers 140-163 MHz
- 10 mem. w/scan
- LCD Readout

CALL FOR SALE PRICE

TEN-TEC

PARAGON
General Coverage HF Transceiver
Microprocessor Controlled Multi-Scan
62 Memories Call For Special Sale Price

561 Corsair II	$ CALL
960 Power Supply	$ CALL
229 2KW Tuner	$ CALL
425 Titan Amplifier	$ CALL

concepts

rlc 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

Call For Sale Prices

AMERITRON AL80A

AL80A	$985.00	ATR10	$325.00
AL84	479.00	ATR15	380.00
AL1200	1825.00	RCS4	134.50
AL1500	2370.00	RCS8V	134.50

CALL FOR SALE PRICES!

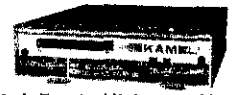
AMP SUPPLY

Model	List	Model	List
LK450	$899	LK45ONT	$1199
LK500ZC	$1395	LK500NT	$1595
LK800A	$2695	LK800NT	$2995
LK550	$1895	AT 3000	$ 499

CALL AND SAVE $$$$$

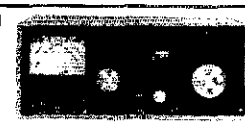
PK-232 Packet Controller **$299.95**
144 MHz Isopole **$49.95**
440 MHz Isopole **$59.95**
Other AEA products also in stock call!!!

Kantronics



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

MFJ



NEW Model MFJ-986 3KW Tuner
Only $239.95

1278 Multi Mode TNC	$219.95
1270B/1274 TNC Units	$129.95/159.95
202/204 Antenna Bridges	$59.95/$79.95
250 Oil Load	$39.95
260/262 Dry Loads	$29.95/$59.95
407/422 Elect. Keyers	$69.95/$119.95
901/941D Tuners	$59.95/$99.95
949C/989 Tuners	$139.95/$299.95

NYE VIKING

MBV-A 3KW Tuner

- Low Pass Pi-Network Tuning
- Built-in Antenna Switch/Balun

List Price $675 CALL TODAY TO SAVE $

NEL TECH LABS

DVK-100 Digital Voice Keyer

- Built-in Auto Repeat Function
- Essential For Contesting
- Fully Compatible With All Xcvrs

CALL FOR SPECIAL PRICE

FREE SHIPPING-UPS SURFACE (continental USA) (most items, except towers/antennas)

ORDER TOLL FREE 1-800-272-3467
Texas, Alaska & for information call 1-(214) 422-7306

VISA MasterCard

TEXAS TOWERS

Div. of Texas RF Distributors Inc. 1108 Summit Ave., Suite 4 • Plano, Texas 75074

Mon-Fri: 9am - 5 pm
Sat: 9am - 1 pm

(Prices & Availability Subject To Change Without Notice)

SCARA INDOOR Ham Radio and Computer Flea Market. Sunday, November 13, 1988 at the North Haven Park and Recreation Center, 7 Linsley Street, North Haven, CT. Sellers admitted at 7 AM, Buyers from 9 AM to 3 PM. Tables are $12 in advance, $15 at the door. General admission $3 per person. Talk-in on 146.01/.61. Reservations for tables must be received with check by November 2, 1988, and NO reservations by phone. For information or reservations, SASE to: SCARA Fleamarket, P.O. Box 81, North Haven, CT 06473 or call between 7 PM and 10 PM Brad at 203-265-6478.

QSL CARDS/RUBBER STAMPS/ENGRAVING

CANADIAN QSL Cards, send $1 for samples refundable with your order. M. Smith, VE7FI, 18610 - 62nd Avenue, Surrey, BC CANADA V3S 4N9.

BE SURPRISED—get a variety of cards—100 for $8 or 200 for $13. Samples $1 refundable. Add $2 S&H. All three colors, fast service, satisfaction guaranteed. Constantine, 1219 Ellington, Myrtle Beach, SC 29577.

ENGRAVING: Callsign/Name Badges by W6LQV. SASE for price sheet. Box 4133, Overland Park, KS 66204.

CADILLAC of QSLs—Completely different! Samples $1. (refundable). Mac's Shack, P.O. Box 43175, Seven Points, TX 75143.

EMBROIDERED Emblems, custom designed club pins, medallions, trophies, ribbons. Highest quality, fastest delivery, lowest prices anywhere. Free info: NDI, Box 6665 M, Marietta, GA 30065.

POST CARDS QSL Kit—Converts Post Cards, Photos to QSL's! Stamp brings circular. My Type Shop, P.O. Box 172, Leeds, NY 12451.

FULL Color—3,000 $300; 6,000 $400; 12,000 $600: WA8CZG, 1-614-452-6375.

CALL Sign Badges: Custom license plate holders. Personal, distinctive. Club discounts. SASE. WB3GND, Box 750, Clinton, MD 20735, 301-248-7302.

QSLs Quality and Fast Service for 29 years. Include call for decal. Samples 50 cents. Ray, K7HLR, Box 331, Clearfield, UT 84015.

QSL Samples—25 cents. Samcards, 48 Monte Carlo Drive, Pittsburgh, PA 15239.

BROWNIES QSL Cards since 1939. Catalog & Samples $1 (refundable with order). 3035 Lehigh Street, Allentown, PA 18103.

PHOTOS, Postcards—Become QSLs. Clear stick on labels. New! "Kall Kards." Stamp brings details. K-K-L, Box 412, Troy, NY 12181-0412.

QSL's—Quality for less is back! See our display ad in this issue of QST. Harry A. Hamlen, P.O. Box 1, Stewartsville, NJ 08886.

SEND SASE for samples. Conner, 522 Notre Dame Avenue, Chattanooga, TN 37412.

FREE, 100 QSLs with first order. Samples cost 3 stamps. Gazebo Press, Rt. 4, Box 4148, LaPlata, MD 20646.

REAR WINDOW Callsign . . . 2 inches x 8 inches . . . Adheres to glass! Instant transfer car to car! Your call or repeater frequency in white lettering. Background is black, blue or red. Also available as a Magnetic Sign with lettering black, blue or red. Background in white! Only $8.50 each sign ppd. Sign-On, Dept. T, 1923 Edward Lane, Merrick, NY 11566.

QSLs Samples $1 (refundable) (stamps okay). M. Dakin, Winzl Press, P.O. Box 265, Revere, MA 02151.

QSLs & RUBBER Stamps. Top quality QSL samples and stamp information $1 (refundable with order). Ebbert Graphics D-3, Box 70, Westerville, OH 43081.

QUALITY QSLs. Samples $.50. Olde Press, WB9MPP, Box 1252, Kankakee, IL 60901.

LOW Cost QSL's Samples SASE. Koepke, 6 Katherine Road, Albany, NY 12205.

GAIL'S QSL'S, $6 first 100, $4 thereafter, stamp for samples, KA9YZT, 1150 Muenz, Wright City, MO 63390.

QSL's by Northwest Imagery. Distinctive quality, affordable prices. 50 cent business size SASE for samples. N7HJM, 11969 Tioga Street, Boise, ID 83709.

QSL CARDS—Look good with top quality printing. Choose standard designs or fully customized cards. Better cards mean more returns to you. Free brochure, samples. Stamps appreciated. Chester QSL's, Dept. B, 310 Commercial, Emporia, KS 66801.

PICTURE QSL Cards of your shack, etc. from your photo or black ink art work. 500 $25.50; 1000 $39.50. Also non-picture cards. Customized cards, send specifications for estimate. Send two stamps for illustrated literature. Generous sample kit $2; half pound of samples $3. Raum's, RD 2, Orchard Road, Coopersburg, PA 18036, phone 1-215-679-7238.

QUALITY QSL Cards and Rubber Stamps. Send 25 cents postage or SASE for samples. Large selection at attractive prices. Sandollar Press, P.O. Box 30726, Santa Barbara, CA 93130.

QSL SAMPLES send $1 (refundable with order) Box 1262, Point Roberts, WA 98281.

RUSPRINT QSLS. Working to help you look good and log that hard earned contact. Several card themes. (Cartoon, Patriotic, Mike & Key, Contesting, Others.) Prices? Low as 2.5 cents each! Quantities? Start at 100. Plastic card holders. Display 20 cards. 3- $3.95. 4 and up $1.20 each. More information? #10 SASE with 2 stamps. Rusprint, RT 1, Box 363QS7, Spring Hill, KS 66083.

COLORFUL QSLs by WA7LNW—High quality craftsmanship using unique printing process that combines brilliant rainbow colors and sparkling metallic inks. Samples $1 (refundable). Colorful QSLs, P.O. Box 5358, Glendale, AZ 85312-5358.

ege inc

REMEMBER - BUY EARLY

ege inc

YOUR BEST CHRISTMAS BUYS

GIFT SUGGESTIONS

Virginia ICOM Day
Saturday, November 12

New Hampshire
New Store Location

UNDER $25

BK136 TECH/GEN MANUAL	5.00
CALL BOOKS 1989	24.95
BK141 EXTRA CLASS	5.00
BK120 REPEATER DIRECT.	5.00
BK102 *NEW *ANTENNA BK.	18.00
LARSEN KD4142HQ	16.95
KANTRONICS MAX-FAX	19.95
ICOM HS10 HEADSET	24.50
ICOM HS10SA/SB	24.50
ICOM LC11,12, OR 14	20.50
ICOM LC24,25,26, OR 27	13.95
MFJ 109 WORLD CLOCK	18.95
MFJ 108 24HR.DUAL LCD	19.95
MFJ1282 STARTER KIT DISK	19.95
MFJ1284 STARTER KITTAPE	19.95
MFJ 284 SPEAKER MIC	24.95
MFJ1702 2POS.ANT.SWITCH	19.95
UNIDELLA W2AU11	16.95
VANGORDEN HI-Q	14.95
VANGODEN D10 10M	19.50
VANGORDEN D15 15M	20.95
VANGORDEN D20 20M	22.95
VANGORDEN D40 40M	24.95
VANGORDEN QSL CARD	4.95
ARRL 1989 HANDBOOK	21.95

UNDER $50

ALLIANCE U110	49.95
ANT SPEC AP1513G	35.95
ANT SPEC AP4503G	35.95
CUSHCRAFT CS147M	38.95
CUSHCRAFT ARX2B	40.95
CUSHCRAFT ARX450B	40.95
CUSHCRAFT 124WB	38.95
ICOM HM46 SPKR MIC	31.99
ICOM HM46L SPKR MIC	31.99
K2RAG RAG10,15,20	35.95
K2RAG RAG4 2KW BALUN	24.95
K2RAG RAG40 40MDIPOLE	45.95
K2RAG RAG80 80M DIPOLE	49.95
KANTRONICS KANTERM	29.95
KENWOOD SMC30	49.95
KENWOOD SMC31	49.95
KETSU5 ENCODER	49.95
KETSU6 ENCODER	45.95
LARSEN KG144	49.95
LARSEN KG144PL	44.95
LARSEN AD2/70	43.95
LARSEN KD14142HW	29.95
MFJ 250 1KW WET	40.95
MFJ 260 300W DRY	26.95
MFJ 1286 GREY LINE ADV.	29.95
NYE 020001LOW PASSFILT.	31.95
NYE 404002OSCILW/KEY	29.95
VAN GORDEN G5RV	45.95
YAESU FNB10 BATTERY	41.95
YAESU MH12A2B	41.95
YAESU MH18A2B	41.95

UNDER $75

ALINCO ELH230G 2M AMP	72.95
ASTRON RS10A PWR SPLY	61.95
ASTRON RS12APWR SPLY	71.95
B&W ASW60LSWL ANT	66.95
BENCHER BY1 BLACK	54.00
BENCHER BY2 CHROME	66.50
ICOM BP5 BATTERY	65.00
ICOM EX243 KEYER	64.50
ICOM FL32 CW FILTER	69.00
ICOM RC11 OR RC12	70.99
KENWOOD HS5	70.99
MFJ 931 GRND TUNER	73.95
SHURE 444D DESK MIC	59.95
YAESU FNB4 OR FNB4A	64.95
YAESU FNB12 BATTERY	59.95
YAESU FTS12 ENCODER	61.95

UNDER $100

ALINCO ELH230D 2M AMP	89.95
ASTRON RS12M	92.95
ASTRON RS20A PWR SPLY	91.95
B&W AS80 80M DIPOLE	94.95
CUSHCRAFT A743	84.95
CUSHCRAFT A744	84.95
CUSHCRAFT 215WB	83.95
HYGAIN 40M KIT EXP.14	99.95
ICOM BC35 CHARGER	79.00
ICOM BP7 OR BP8	79.95
ICOM GC5 24HR WORLD CLK	79.00
ICOM SM8 DESK MIC	89.00
MFJ 482B MEMORY KEYER	91.95
MFJ 941D TUNER	92.95
SANGEAN ATS801 RECVR.	89.95
SONY AN1 ACTIVE ANTENNA	79.95
TELEX PROCOM250	72.90

UNDER $150

ALLIANCE HD73 ROTOR	119.95
ALINCO ELH260D 2M AMP	124.95
UNIDEN 55XL SCANNER	135.95
BUTTERNUT HF6VX	119.00
DIAWA LA2065R 2M AMP	122.95
HYGAIN 18AVT/WB	137.50
ICOM SM10 DESK MIC	130.95
MFJ 1270B PACKET	129.95
YAESU MD1B8 DESK MIC	109.95
YAESU SU726	129.95

UNDER $200

CUSHCRAFT AP8 HF VERT.	153.95
DOCKING BOOSTERWP20	169.95
HYGAIN 105BAS 10M BEAM	173.95
HYGAIN CD45II ROTOR	199.95
ICOM FL44A SSB FILTER	164.95
ICOM PS15 PWR SUPPLY	156.95
KENWOOD AT130 TUNER	184.95
KENWOOD PS430S	175.00
MFJ 1274 PACKET	152.95
SANGEAN ATS803 RCVR	179.95
UNIDEN 70XLT SCANNER	174.95

UNDER $250

CUSHCRAFT A3 HF BEAM	249.95
CUSHCRAFT R4 HF VERT.	249.95
DIAWA CNW419 TUNER	225.95
HEATHKIT HK21 PACKET	215.95
KENWOOD TH31BT 220 HH	239.95
MFJ 1278 ALL MODE TNC	225.95
SONY 2003 SWL RECEIVER	249.95
YAESU 6M736 6M MODULE	234.95

UNDER $300

ALINCO ALR72T	269.95
ALINCO DJ100T 2M HH	263.95
DOCKBOOST.WP727DX	299.95
HYGAIN 155BAS	265.00
HYGAIN HAMIV ROTOR	294.95
ICOM 03AT 220MHz HH	269.95
ICOM U2AT 2M HANDY	286.95
ICOM U4AT 440MHz HH	299.95
KANTRONICS KAM	284.00
KENWOOD TH205AT	CALL
KENWOOD TH25AT	CALL
MFJ 989 3KW TUNER	299.95
SONY SW1S RECEIVER	284.50
UNIDEN 200XLT SCANNER	299.95
UNIDEN 760XLT SCANNER	299.95
YAESU FT23R 2M HANDY	259.95
YAESU FT23R/TT 2M HH	289.95
YAESU FT33R 220MHz HH	299.95
YAESU FT73R 440MHz HH	269.95

PACKAGE DEALS

TS140
$929.95
includes
TS140 HF Transceiver
Astron RS20A Power Supply
UPS Borwn Shipping
EGE One Year Extended Warranty

MFJ 1278
$244.95
includes
MFJ 1278 TNC
1284 Starter Package
UPS Brown Shipping

TS440AT
$1379.95
includes
TS440AT HF Transceiver
MC80 Desk Mic
Astron RS20A Power Supply
UPS Brown Shipping
EGE One Year Extended Warranty

CALL FOR OTHER PACKAGES

Orders & Quotes Toll Free 800-444-4799

Prices are subject to change without notice or obligation

ege inc

New Fall1988 Buyers Guide/Catalog Available-Send $1

EGE VIRGINIA
14803 Build America Drive, Bldg B
Woodbridge, Virginia 22191
Information: (703) 643-1063
Service Dept: (703) 494-8750
Fax: (703) 494-3679

Store Hours: M - F 10-6; Sat: 10-4
Order Hours: M - F 9-6, Sat: 10-4

EGE NEW ENGLAND
224 N. Broadway
Salem, New Hamshire 03079
New England (NH Included)
Toll Free: 800-444-0047
Info & Service: (603) 898-3750

Store Hours: MTuWF: 10-5
Th: 12-8; Sat: 10-4

VISA MasterCard

Our Associate store:
Lacombe Distributors
Davis & Jackson Road
P.O. Box 293
Lacombe, Louisiana 70445
Phone: (504) 882-5355

11/88

QSL SALE! 100 QSL Cards $8, regularly $9. All styles and colors. Shipped within two weeks, postpaid. Free samples. Shell Printing, KD9KW, Box 50, Rockton, IL 61072.

LICENSE Plate Call Sign—on standard 6"x12" metal blank with slotted holes - fits front bracket - white background with 2-1/2" letters in red, blue or black gloss enamel. City and state optional. $8 each, two for $14 ppd. Jim Veverka, KA9WHK, 6434 Woodridge Drive, Woodridge IL 60517.

QSLS: Quality at a reasonable price! Satisfaction guaranteed. Send $1 for samples and coupon worth $2. Sugarloaf Print Shop, P.O. Box 563, Sugarloaf, PA 18249.

FULL Color QSL Cards made on Kodak paper from your negative, slide or print. $32.95 per 100. Request samples (enclose $1). Bizcard Co., Box 191-T, Stevensville, MI 49127.

QSL Printing Equipment. Selling out. Type, cuts, presses, etc. Write K2HVN, call 516-957-6851.

DON'T Buy QSL Cards until you see my free samples. Also I specialize in custom cards and QSL business cards. Write or call for Free Samples and custom card ordering information. Little Print Shop, Box 1160, Pflugerville, TX 78660, 512-990-1192.

QSL Equipment & Copyrights ($12-K Value . . . $5,000). Sam, P.O. Box 55, Petersburg, NY 12138, 518-272-2782.

QSLS Samples—SASE. Eric, WA6FOS, Box 2275, Culver City, CA 90231.

MAGNETIC Call Sign—Flexible, switch from car to car. 2-1/2"x8" white background, letters in red, blue or black gloss enamel. $7 each, two for $12 ppd. Jim Veverka, 6434 Woodridge Drive, Woodridge, IL 60517.

RAISED Printed QSLs. Nothing like it in the industry. You can FEEL the type! Low prices - fast service. Standard designs or your own artwork/cartoons. Choice of typestyles. 318-443-7261 for information/samples. Dennis, WA5QMM, Metro, P.O.B. 13200, Alexandria, LA 71315-3200.

ANTIQUE-VINTAGE-CLASSIC

WANTED: Old microphones for my mic. museum. Also mic-related items. Write Bob Paquette, 107 E. National Avenue, Milw., WI 53204.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. Q, Berwyn, IL 60402.

WANTED: Radio, magazines, horn speakers, pre 1930. W6THU, 1545 Raymond, Glendale, CA 91201, 818-242-8961.

WANTED: *QST* VOLUME 1. W6ISQ, 82 Belbrook Way, Atherton, CA 94025.

SCHEMATICS: Radio receivers 1920's/60's. Send Brand-name, Model No., SASE Scaramella, Box 1, Woonsocket, RI, 02895-0001.

WE MAY HAVE the tubes you need. (Thousands in stock). Send SASE for our list. Fala Electronics, P.O. Box 1376-1, Milwaukee, WI 53201.

BUY, Sell, Collect and Restore early tube equipment? Early receivers, tubes and telegraph gear? Join the Antique Wireless Association which sponsors old-time "meets", flea markets, museum and journal with technical articles and free want ads. Membership and annual dues only $10. Write for information and Museum hours: Bruce Kelley, W2ICE, Route 3, Holcomb, NY 14469.

WANTED: Hallicrafter silver panel Skyriders and other very old or unusual Hallicrafter equipment, parts, etc. Chuck Dachis, "The Hallicrafter Collector," 4500 Russell Drive, Austin, TX 78745.

MICROPHONES and related memorabilia used in radio/TV broadcasting prior to 1960 wanted. Cash paid: trade terms available. Write: James Steele, 160 West 77th Street, New York, NY 10024-6942.

MANUALS For most hamgear made 1935-1970, plus Kenwood. No quotes. Our current catalog "H" at $1 required to order. Over 2,000 models. Hi-Manuals, P.O. Box H-802, Council Bluffs, IA 51502.

WANTED: WWII Military Radios and Accessories. Need ATD Tuning Units, DY43 Dynamotor, BC 222/223 Manuals, ART-13 Connectors, ARR/41/MT-1518 Mount, ATB, GRC 106 Receiver, Hallicrafters HT20. Charlie, 501 Mystic Valley Pkwy., Medford, MA 02155.

WANTED Books: Pre-1900 Electricity and Telegraphy. Pre-1925 Radio, Pre-1940 Television. Books, Magazines or any other related literature. Jim Kreuzer, N2GHD, 6270 Clinton Street, Elma, NY 14059, 716-681-3186.

WANTED: Pre-WW2 Pan American Airways aircraft transmitters/receivers and schematics/manuals for same; Pre-WW2 Speed-X bugs. Conly, 819 Henrietta Avenue, Sunnyvale, CA 94086.

WANTED: Old Hi-Fi Gear, Manuals, Literature, Etc. For my collection. Life ARRL Member. Marcus Frisch, WA9IXP, Box 28803, Greenfield, WI 53220-0803, 414-545-5237.

ANTIQUE RADIO CLASSIFIED. Subscribe to antique radio's largest circulation monthly magazine. Old radios, TVs, ham equip., 40s & 50s radios, telegraph, books & more. Ads & articles. Free 20-word ad monthly. Sample free. Six-month trial: $11. Yearly rates: $19 ($28 by 1st class). Foreign: write. ARC, P.O. Box 2-B3, Carlisle, MA 01741.

E.F. JOHNSON Transmitters, Literature, and Accessories wanted for my station. Will pickup. Len Crispino, Box 702, Hudson Falls, NY 12839, 518-638-8199.

TELEGRAPH Items Bought By Collector: old or unusual keys, bugs, sounders, meters, pre-1920 books, franks, etc. Larry Nutting, WD6DTC, 4025 Slate Court, Santa Rosa, CA 95405, 707-539-1883.

BUY/SELL Pre-1930 *QST*. Richard Titus, NV2C, 231-9 Lucas Lane, Voorhees, NJ 08043, 609-772-0316.

COMPLETE restoration of all tube ham receivers, including full alignment. All work 100% guaranteed, FCC licensed. Contact Healy, Classic Radio Service, Box 764, Woodacre, CA 94973, 415-488-4596.

I PAY CASH for new and used vacuum tubes, especially vintage and transmitting types. Randy Nachtrieb, WA6GJA, 6392 Park Avenue, Garden Grove, CA 92645, 714-897-9351.

SELL: Technical Material Corp. GPR-90 General Coverage Receiver with GSB-1 SSB Adapter and original *Speaker*, all mint, $275. Gonset GSB-100 SSB/CW 80-10 transmitter, mint, $125. K9ZTV, 309-582-5145.

TELEGRAPH BUGS, old keys, keyer paddles sought for private collection. Donations of parts, inoperable items, or memorabilia appreciated. Write: John Hensley, WJ5J, 5054 Holloway Avenue, Baton Rouge, LA 70808.

WANTED: Speaker for Hallicrafter S20R. Glass dial for S53. Pre 1930 QSL Card from Canadian 3XN for local display. Dave Noon, VE3IAE, 19 Honeysuckle Circle, London, Ontario, CANADA N5Y 4P3.

WANTED: The entire 1934 "Z" and "H" line of Silver-Marshall Radios, any condition. Chuck Dachis, WD5EOG, The Hallicrafter Collector, 4500 Russell Drive, Austin, TX 78745.

ABOUT 300 issues of *QST* dated between 1921 and 1976. Most *QSTs* are pre WW2. Send SASE for listing. Mail or phone offer to: W6LXQ, 1106 Donnell Drive, Port Orange, FL 32019, 904-788-6666. Also, will sell collection of parts from same time period.

MY 1920 Rotary Spark Set, Bell Gap, Dubulier .01 MFD 25000 Volt Condensor, Thordarson Transformer, Homemade Oscillation Transformer, Clapp Eastham Key, Drive Motor. $500, will not ship. Elmer Wirsing, W2AWF, P.O. Box 6430, Albany, NY 12206.

SELL: Receivers National NC-98 $55, Hallicrafter S-85 $40. Uship. Wanted 6 Meter Tube Receiver; 6M, 2M Tube Converters. W6RNC, P.O. Box 478, Nevada City, CA 95959.

WANTED: WW2 German, Japanese, Italian radio apparatus and any related items. Also interested in some US and Canadian military, Forest Service, and civilian aircraft equipment pre-1946, exampes: ARC-1, ARR-16, BC-224 or 348 thru letter "C", MBM, PPN-1, PRC-1, PRC-5, RAX, TBY, WS#18/48. Military publications 11-161, 11-227-E, SIG-E, SIG-5, others. Aviation and electronics magazines and other paper items 1940-46 relating to communications, equipment, aviation or broadcasting. What have you? Hugh Miller, KA7LXY, 6400 Maltby Road, Woodinville, WA 98072.

WANTED: Johnson Kilowatt and/or Viking 500 for my station. Will pay cash and pick up. All inquiries are cheerfully answered. Phone 518-638-8199 or write Len Crispino, P.O. Box 702, Hudson Falls, NY 12839.

I PAY CASH for vintage audio equipment by Western Electronics, Altec, McIntosh, Marantz, Westrex, etc. Randy Nachtrieb, WA6GJA, 6392 Park Avenue, Garden Grove, CA 92645, 714-897-9351.

GENERAL

DXERS ANTENNA - Lowbander SM4CAN presents the secret weapon in Practical Bobtail Layouts second edition 5 $US, no checks, Airmail Bruksgatan 18B, S-695 02 Laxa, SWEDEN.

SSB ELECTRONIC LT23S, LT33S, LT28 $499. SLO13 + SRM13 + STM13 + SLA13 $499. DX144, DX220 $109. DX432, DX902, DC1296, DX2320 $159. MV144S01 + DCW15A $199. MV902S + DCW15A $229. PA2310 $189. UEK3 + USM3 902/1296 Xvrtr Kit $229. PM1300 Wattmeter $199. EME Electronic HF400 $129. PA23150 $379. PA33200 $429. PA1325 $359. Microwave Modules MMT144/28R $329. MMT1296/144 $229. MMC432/28S $69. MMS-1 $99. Mutek GMFA144E $99. SLNA50 $79. Transverters Unlimited T144/28 $199. T220/28 $219. PA23200 $250. Visa. Hans Peters, VE3CRU, 416-759-5562 evenings.

WANTED: Drake R7A, RV-75, MS-7. Tony Ficarra, 144 Gladstone Avenue, Wollongong, NSW AUSTRALIA 2500.

JOHNSON Viking Valiant Xmtr. needs some work $100 FOB. Allen Addison, VE4ADB, Box 808, Minnedosa, MB, CANADA R0J 1E0, 204-867-2643.

WANTED PBBS Software for KayPro II or other CPM computer. H.W. Jones, VE1BHZ, 374 Viewmount Drive, RR 2, Tantallon, Nova Scotia, CANADA B0J 3J0.

MEGGER, British Evershed Vignoles, 12 MA, case, good condition, $50. C. Fortier, 62 Richlin, Ottawa, Ont., CANADA K2B 8K4.

RACAL RA 6790 military grade receiver, made in USA, 0 to 30 MHz, all modes, LCD read-out to 1 Hz, 6 bandwidths, mechanical filters, service manual, $2200. Also Signal One CX 11A, late production, mint condition, service manual, $2000. VE3CTP, Toronto, 416-291-0088.

TELETYPEWRITER parts, supplies, gears. Toroids, S.A.S.E. list. Typetronics, Box 8873, Ft. Lauderdale, FL 33310. Buy unused parts, cash or trade.

COLLINS Repair and Alignment, former Collins engineer. Research and Consulting, Glenn A. Baxter, P.E., Registered Professional Engineer. K1MAN 207-495-2215.

WE BUY Electron tubes, diodes, transistors, integrated circuits, semiconductors. Astral Electronics, P.O. Box 707, Linden, NJ 07036. Call toll-free 800-526-4052.

FAST, ACCURATE, readable, nonsensational — The ARRL Letter! Every two weeks, we fill you in on what's happening in Amateur Radio. But, you have to be an ARRL member to get it. For a one year subscription, send $19.50 (U.S. funds) and we'll send you the Letter first class mail anywhere in the U.S. and Canada. The ARRL Letter, 225 Main St., Newington, CT 06111.

INTERNATIONAL Amateur Radio Network 45 minute programs daily: 3.975/14.275/28.475 at 1400Z, 1800Z, 2200Z, 0100Z, 0500Z plus Sunday on 3.890 MHz AM at 2300Z and 7.290 MHz AM at 2400Z. Glenn Baxter, K1MAN, Network Manager.

National Tower Company

P.O.Box 15417 Shawnee Mission, KS. 66215

Hours 8:30-5:00 M-F Price Subject to Change Without Notice

913-888-8864

ROHN FREE BASE STUBS WITH EACH BX SERIES TOWER

25G	10' section	$56.50
25AG2 & 3	model 2 or 3 top section	$65.00
25AG4	model 4 top section	$73.50
45G	10' section	$133.00
45AG3 & 4	model 3 or 4 top section	$136.00
55G	10' section	$166.50
M20D	10' mast, 2"o.d.	$13.50
BX-40	40'self supporting [6 sq.ft.]	$196.00
BX-48	48'self supporting [6 sq.ft.]	$250.00
BX-56	56'self supporting [6 sq.ft.]	$334.50
BX-64	64'self supporting [6 sq.ft.]	$431.50
HBX-40	40'self supporting [10 sq.ft.]	$226.50
HBX-48	48'self supporting [10 sq.ft.]	$308.00
HBX-56	56'self supporting [10 sq.ft.]	$392.50
HDBX-40	40'self supporting [18 sq.ft.]	$284.50
HDBX-48	48'self supporting [18 sq.ft.]	$384.50
	★ GUY WIRE SPECIAL ★	
3/16EHS	500' galvanized 7 strand	$40.00
1/4EHS	500' galvanized 7 strand	$60.00

HYGAIN/TELEX ANTENNAS

	HF ANTENNAS Tribands	
TH3JRS	3 element 'Junior Thunderbird'	
TH5MK2S	5 element 'Thunderbird'	
TH2MK3S	2 element 'Thunderbird'	
TH7DXS	7 element 'Thunderbird'	
EXP 14	Explorer 14 triband beam	
QK710	30/40 M conv Exp 14	
	Monoband	
103BAS	'Long John' 3 element 10 mtr	
105BAS	'Long John' 5 element 10 mtr	
155BAS	'long John' 5 element 15 mtr	
204BAS	4 element, 20 meter	
205BAS	'Long John' 5 element 20 mtr	
7-1S	'Discoverer' rotary dipole 30/40mtr.	
7-2S	'Discoverer' 2 elem 40 meter beam	
7-3S	converts 7-2S to 3 elem beam	
	Multiband Verticals	
18HTS	'Hy-Tower 10 thru 80 meters	
14BMQ	roof mt kit for 12 AVQ,14AVQ and 18AVT/WB	
18VS	base loaded, 10 thru 80 meters	
12AVQS	trap vertical 10 thru 20 meters	
14AVQ/WBS	trap vertical 10 thru 40 meters	
18AVT/WBS	trap vertical 10 thru 80 meters	
	Multiband Doublets	
18TD	portable tape dipole 10-80 meters	
28DQS	trap doublet 40 and 80 meters	
58DQS	trap doublet 10 thru 80 meters	
	VHF ANTENNAS Beams & Verticals	
23BS	2 meter 3 element beam	
25BS	2 meter 5 element beam	
28BS	2 meter 8 element beam	
214BS	2 meter 14 element beam	
64BS	4 element 6 meter beam	
V-2S	colinear gain vertical 138-174 MHz	
V-3S	colinear gain vertical 220 MHz	
V-4S	colinear gain vertical 430-470 MHz	
GP62A	base, 2 mtr, ground plane	
	VHF & UHF Mobiles	
HR144GRI	fiberglass 2 mtr. 3/8-24 mt	
HB144GRI	HyBander 2mtr 3/8-24 mt.	
HB144MAG	HyBander 2 meter	
BN86	ferrite balum for 10-80 meters.	
	OSCAR LINK ANTENNA	
215S	70cm, 435 MHz	
218S	Complete Oscar link system	

CUSHCRAFT ANTENNAS

AOP-1	complete Oscar Link system	$169.00
AP8	8band ¼wave vertical	$152.00
A3	3 element triband beam	$246.00
A743	7 & 10 MHz add on kit for A3	$81.00
A744	7 & 10 MHz add on kit for A4	$81.00
4218XL	18 element 2 mtr, 28.8' boomer	$125.00
R4	10,12,15 20 meter vertical	$204.50
A4S	4 element triband beam	$344.00
AV4	40-10 mtr. vertical	$94.50
AV5	80-10 mtr. vertical	$111.00
ARX2B	2 mtr 'Ringo Ranger'	$39.25
ARX450B	450 MHz 'Ringo Ranger'	$39.25
A144-11	144 MHz, 11 ele VHF	$50.50
A147-11	11 element 146-148 MHz beam	$60.50
A147-22	22 element 'Power Packer'	$141.75
A144-10T	10 element 2 mtr 'Oscar'	$54.00
A144-20T	20 element 2 mtr. 'Oscar'	$77.50
215WR	15 element 2 mtr 'Boomer'	$81.00
220B	17 element FM 'Boomer'	$101.25
230WB	144-148MHz, 30 element	$216.00
32-19	19 element 2 mtr 'Boomer'	$101.25
4249	24 element 'Boomer'	$81.00
10-4CD	4 element 10 mtr. 'Skywalker'	$124.75
15-4CD	4 element 15 mtr. 'Skywalker'	$145.00
20-4CD	4 element 14 MHz 'Skywalker'	$310.50

HUSTLER ANTENNAS

4BTV	40-10 mtr vertical	$75.00
5BTV	80-10 mtr vertical	$105.00
6BTV	6 band trap vertical	$124.00

ROTORS

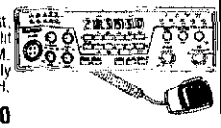
Alliance	HD73 [10.7 sq ft]	$104.00
Alliance	U110	$47.00
TELEX	AR40 TV, 3 sq ft	CALL
TELEX	CD45-II [8.5 sq.ft.]	CALL
TELEX	HAM IV [15 sq. ft.]	CALL
TELEX	12X 120 sq. ft.	CALL

CABLE

[2-18 & 6-22]	4080 - per foot	$0.18
[2-16 & 6-20]	4090 - per foot	$0.35
1108	RG8U Mini 8 low loss foam per foot	$0.17
1198	RG8U Columbia superflex 100'	$31.00
1180	RG8U Low loss 100% bonded foil shield 88% tin copper braided sheild -per foot	$0.35

★ CALL FOR PRICES ★

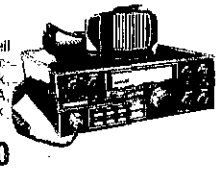
RANGER



10 meter TRANSCEIVER, 25 watt, can be programmed to split transceive, SSB, CW, AM, FM, programmable scanning, fully automatic, noise blanker, 2 3/8H, 7¾W, 110

AR3500 ..... **$349.00**

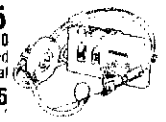
uniden



25 WATT 10 Meter Transceiver, all mode operation, backlit multi function LCD meter, frequency lock, auto squelch, NB, RF gain, PA, external speaker jack 7¼Wx9¼Dx2 3/8H.

HR2510 ..... **$239.90**

MAXON....$26.95

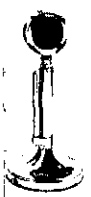


Model 495A - 49 MHz, FM 2-WAY RADIO hands free operation, voice activated transmit up to ½ mile. Batteries optional

model 49B **$34.95**

same features as 495A except uses "AA" nicad batteries and comes with battery charger

ASTATIC



D104 SILVER EAGLE **$69.90**

Chrome plated base station amateur microphone. Factory wired to be easily converted to electronic or relay operation. Adjustable gain for optimum modulation.

ETS D104 SE **$89.90**

NEW, same as above with end of transmission 'Roger Beep'.

RADAR DETECTORS

UNIDEN

RD500 ..... **$69.90**
Dual conversion superhet, city/hwy, LED's, audible alarm, compact

RD9 ..... **$114.90**
2 power cords, travel case, dual conversion superhet, city/hwy, audible & LED alerts, mini size

RD7 ..... **$79.90**
Dual conversion superhet, mini size, LED's, audible alert

RD9XL **$149.90**
Superhet w/two power cords carry case City/Hwy, mini size.

BEL

XKR100 ..... **$43.90**
LED alert, tone alert, X & K band, dash/visor

876 VECTOR **$94.90**
GAas diodes, sequential LED City/Hwy, audio alert

847 ..... **$134.90**
EXPRESS REMOTE X & K band. Superhet, 2-way filter, LED & audible alerts

MAXON

RD2A **$46.90**
Superhet, X & K band, audible & visual alert city/highway setting.

RD3 ..... **$59.90**
Long range dual conversion, X & K band. LED's, audible alert w/volume control antifalsing, city/hwy, dash/visor.

RD21 ..... **$54.90**
Mini size, audible & visual alert, omni-polarity guard, dash/visor

RD25 ..... **$79.90**
Deluxe mini same as above with sequential LED's.

RDXL **$129.90**
CORDLESS X & K bands, anti falsing, sequential LED's, audible alert, city/hwy, dark/mute switch, with carry case.

TENNA PHASE III POWER SUPPLIES

PS3 ..... **$15.90**
Output 13.8V DC - 3 amp constant 5 amp surge, electronic overload protection w/instant auto reset, fuse protected

PS4 ..... **$19.90**
Fully regulated, 13.8 VDC - 4 amps constant with surge protection overload protection w/instant auto reset

PS7 ..... **$24.90**
Fully regulated, 7 amp constant, 10 amp surge capacity.

PS12 ..... **$34.90**
Fully regulated, 10 amp constant 13 amp surge, electronic overload protection w/instant auto reset

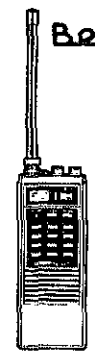
PS20 ..... **$64.90**
Fully regulated 20 amp surge capacity, 13.8 VDC, 17 amp constant, with meter

PS25 ..... **$79.90**
Regulated 4.5-15VDC-25 Amp constant 27 amp surge, instant auto resel, dual meter for current & voltage.

PS35 ..... **$99.90**
Same as above except 35 amp constant, 37 amp surge, adjustable from 10 to 15 volts

uniden

Bearcat



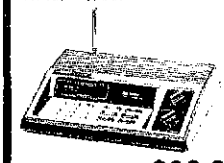
BC55XLT

$114.90

10 Channel 10 band, programmable, keyboard lock 2 digit LCD display, review, channel lockout, battery low indicator, memory backup, built-in delay, direct channel access, track tuning, accepts nicad batteries

BC800XLT . $239.90

40 Ch 12 band, **800 MHz,** aircraft & weather, priority, track tuning, scan delay, auto search direct channel access, auto squelch channel lockout AC/DC.



BC145XL . . . $92.90

16 Ch 10 band, programmable, 2 digit LED, priority, review, direct Ch access, track tuning, built-in delay, memory backup, Channel lockout, direct channel access, weather, AC/DC

BC580XLT $189.90

100 Ch 11 mobile, service search, weather, priority, channel lockout, scan delay, auto search illuminated programmable, track tuning, direct channel access

BP55C Battery pack & charger for BC55XL **$29.90**

BC100XLT 100 Ch 11 band hand held **$199.90**
aircraft, ch lockout, auto search, programmable, with battery pack, AC charger, carry case & earphone

BC200XLT 200 Ch 12 band, hand held. **$269.90**
WITH 800MHz band, priority ch lockout auto search track tuning, direct ch access with battery pack, AC adaptor carry case.

BC175XL 16 ch 11 band aircraft **$149.90**
weather, ch lockout, auto search & squelch, delay, track tuning, memory backup, high/low scan speed, direct Ch access, AC/DC

BC210XLT 40 Ch, 11 band, aircraft & weather **$179.90**
Ch lockout, priority scan delay, auto search, programmable, track tuning, direct Ch access AC/Dc with mobile mounting bracket

BC560XLT 16 Ch 10 band mobile, **$99.90**
LED display, review, priority, memory backup, direct Ch access, weather search, built-in delay, track tuning, external speaker jack.

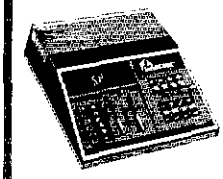
BC760XLT 100 Ch 12 band mobile **$279.90**
WITH 800 MHz, weather & aircraft, base/mobile, priority, service scan, ch lockout, scan delay, auto search programmable, track tuning direct Ch access, memory lock, memory backup, ext speaker jack.

BETTY BEARCAT Frequency Directory

BCFB-W ..... Western UN **$9.90**

BCFB-E ..... Eastern US **$9.90**

Regency®



INF5 . . . . $89.90

40 Powered TURBO SCAN" pre-programmed by state to receive any type of police transmission plus fire and weather, scans at 50 channels per second digital display, instant weather

Z45 . . . . . $99.90

45 Channel 7 band w/aircraft, programmable, 45 preprogrammed channels, search or scan, alarm clock, priority, permanent memory backup, ch lockout, scan delay, AC/DC with both cords.

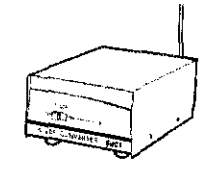
INF1 . . . . $144.90

Preprogrammed mobile receives all 50 states police plus instant weather, scans 40 channels per second DC

R1070 . . . . . $89.90

10 Ch 6 band, programmable, permanent memory backup, dual level digital display, channel lockout, step control, AC only.

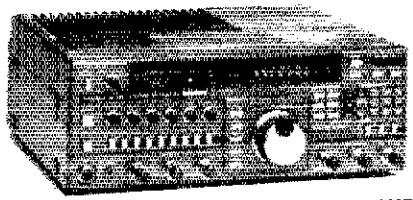
SUPER CONVERTER



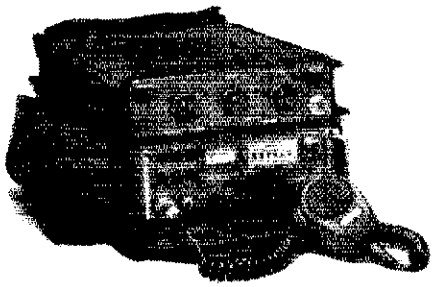
Installs on any scanner and is designed to receive frequencies between 810 MHz & 912 MHz and convert them down to 410 MHz thru 512 MHz, easy to install

YAESU ★ Large Stock ★ Low Prices ★ Top Trades at AES®

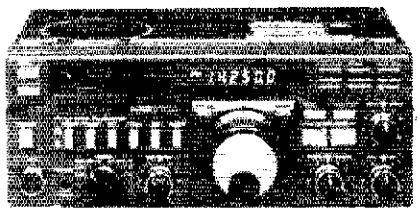
Call TOLL FREE for DISCOUNT Prices or TRADE-IN quote on your clean, late model equipment



HF Equipment	LIST
FT-767GX 160-10m xcvr/.1-29.99 MHz Rcvr	$1929.95
SP-767 Speaker w/audio filters	79.95
2M/767 2m module	199.95
6M/767 6m module	199.95
430/767 430-440 module	249.95
440/767 440-450 module	249.95



FT-70G* MANPACK Ht xcvr (*Special Order)	1069.95
FNB-70* Extra 12V, 4 amp-hour nicad	299.95
NC-70* Nicad battery charger/base supply	259.95
CSC-70* Canvas carrying case	89.95
FC-70M* Manual antenna tuner	199.95
FC-70P* Preset antenna tuner	199.95
RSL-70* Whip antenna for FC-70P	27.95
MH-17* Speaker/microphone	31.95
YA-70* Tripod antenna	269.95
YH-70* Telephone-type handset	59.95



FT-757GX MkII 9-band Xcvr/SW Rcvr/mic	$1129.95
FP-757HD Heavy duty supply with fan	299.95
FP-757GX Compact power supply	239.95
FP-700 Power supply	239.95
FRB-757 External relay box	12.95
FC-757AT Automatic ant. tuner w/memory	399.95
FAS-1-4R Remote antenna selector	99.95
MMB-20 Mobile mount	25.95
FIF-65A Interface: Apple IIe	59.95
FIF-232C for VIC-20/TI/most RS-232	79.95
GX Turbo/F01 Software; Apple II	59.95
GX Turbo/C01 Software; C64/128	89.95
GX Turbo/V01 Software; VIC-20	89.95
FTV-700 Transverter w/no module	175.00
2M/FTV 2m module only	189.00
6M/FTV 6m module only	139.00
70 cm/FTV 430 module only	255.00

FT-747GX Transceiver w/hand mic	889.95
FP-757HD Heavy duty supply with fan	299.95
FP-757GX Compact power supply	239.95
FP-700 Power supply	239.95
FM-747 FM unit	44.95
MMB-38 Mobile bracket	16.95
FL-7000 Auto. tune HF linear amplifier	1995.00

Misc. accessories	LIST
MD-1B8 Desk microphone	109.95
MH-1B8 Mobile microphone	27.95
YS-60 1.8-60 MHz 2kw PEP wattmeter	99.95
YS-500 140-520 MHz 200w wattmeter	89.95
YH-55 Lo-Z headphones	24.95
YH-77 Lightweight headphones	24.95
FF-501DX Low pass filter	47.95

Call TOLL FREE for DISCOUNT PRICES

All items are shown with the Manufacturer's Suggested LIST Prices. On Major items and some accessories, we can offer a Substantial Savings.

VHF/UHF equipment	LIST
FT-726R VHF/UHF Xcvr w/2m, 1TP mic	$1095.00
HF/726 10-12-15m unit	289.95
6M/726 6m unit	269.95
430/726 430-440 MHz unit (OSCAR)	329.95
440/726 440-450 MHz unit (FM band)	329.95
SU-726 Satellite duplex module	129.95
AD-2 50w 2m/440 duplexer	41.95
FT-736R 25W 2m/430 full duplex xcvr	1749.95
FEX-736-50 6-meter module	259.95
FEX-736-220 220MHz module	279.95
FEX-736-1.2 1.2 GHz module	539.95
Other Accessories for FT-736R	Call

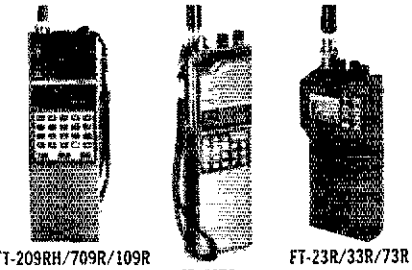
FT-311RM 25w 220MHz FM w/autodialer mic	439.95
FT-711RH 35w 440MHz FM w/autodialer mic	479.95
FT-212RH 45w 2m FM w/autodial mic	459.95
FT-712RH 35w 440 FM w/autodial mic	499.95
FT-2311R 10w 1.2GHz FM w/autodialer mic	559.95
FT-290R MKII 25w 2m FM/SSB xcvr	599.95
FT-690R MKII 10w 6m FM/SSB xcvr	589.95
FT-790R MKII 25w 430-450 FM/SSB xcvr	799.95
FBA-8 Holder for C-cell Nicads	27.95
NC-26B Wall Charger for FBA-8	11.00
CSC-19 Soft case	10.00
MH-10F8 Speaker/Microphone	29.95
MH-10E8 Hand Microphone	22.95
FTS-7 Encoder/decoder	49.95
FT-2700RH 25w 2m/440 FM w/TTP mic	599.95
FTS-8 Encoder/decoder	49.95
FVS-1 Voice synthesizer	34.95
AD-2 50w 2m/440 duplexer	41.95

VISA USE YOUR CREDIT CARD MasterCard

HOURS ● Mon. thru Fri. 9-5:30; Sat. 9-3

Milwaukee WATS line: 1-800-558-0411 answered evenings until 8:00 pm Monday thru Thursday.

WATS lines are for Quotes & Ordering only, use Regular line for info & service department.



FT-209RH/709R/109R FT-727R FT-23R/33R/73R

Handhelds	LIST
FT-209RH 5w 2m FM HT/TTP/batt/cgr	$389.95
FT-109RH 220 FM HT/TTP/batt/cgr	399.95
FT-709R 4w 440 FM HT/TTP/batt/cgr	389.95
FT-727R 5w 2m/440 FM HT/TTP New CPU!	439.95
FT-23R 2.5w 2m HT	299.95
FT-23R/TTP 2.5w 2m HT w/TTP	334.95
FT-33R 5w 220MHz HT	344.95
FT-33R/TTP 5w 220MHz HT w/TTP	389.95
FT-73R 2w 440MHz compact HT	309.95
FT-73R/TTP 2w 440MHz compact HT w/TTP	349.95

Acc. for 09-series/03-series/FT-727R	LIST
FBA-5 Alkaline battery holder for 09/03	14.95
FBA-5A Alkaline batter holder for 727R	14.95
FNB-3 425ma 10.8v batt (comes w/03 series)	49.95
FNB-3A 425ma 10.8V battery for 727R	49.95
FNB-4 500ma 12v batt (comes w/09-series)	64.95
FNB-4A 500ma 12v batt for 727R	64.95
FTS-6 Encoder/decoder; 09-series	49.95
FTS-7 Encoder/decoder; 03-series	49.95
LCC-6 Leather case; 09-series	39.95
LCC-6A Leather case; 727R only	39.95
MH-12A2B Speaker/microphone	41.95
MH-18A2B Lapel speaker/microphone	41.95
NC-9B Wall charger for FNB-3	11.95
NC-15 Desk quick charger/AC ps	89.95
NC-18B Wall charger for FNB-4	11.95
MMB-21 Mobile bracket	11.95
PA-3 Mobile adapter and charger	39.95
TA-2 2m 19" telescoping whip ant	11.95
YH-2 VOX headset	29.95
Other Handheld Accessories	CALL

FRG-9600 FRG-8800

Receivers	LIST
FRG-8800 150 KHz-29.999 MHz Shortwave	$759.95
FRA-7700 Indoor active receive antenna	59.95
FRT-7700 Antenna tuner	64.95
FRV-8800 118-174 MHz VHF converter	129.95
FIF-232C Interface; VIC-20/TI/RS-232	79.95
FF-5 500 KHz low-pass filter for VLF	20.00
DC-8800 DC kit	4.50
FM-W/8800 FM-wide kit	20.00
FRG-9600 60 to 905 MHz receiver	699.95
VU-9600 NTSC video unit	25.00
Catpack software (specify computer)	79.95

Due to changing prices, all items listed on this page are subject to change without notice. Please check with the salesperson when calling to place your order.

Order Toll Free: 1-800-558-0411

In Wisconsin (outside Milwaukee Metro Area) 1-800-242-5195

AMATEUR ELECTRONIC SUPPLY® Inc.

4828 W. Fond du Lac Avenue; Milwaukee, WI 53216 ● Phone (414) 442-4200

AES® BRANCH STORES — Associate Store

WICKLIFFE, Ohio 44092
28940 Euclid Avenue
Phone (216) 585-7388
Ohio WATS 1-800-362-0290
Outside Ohio 1-800-321-3594

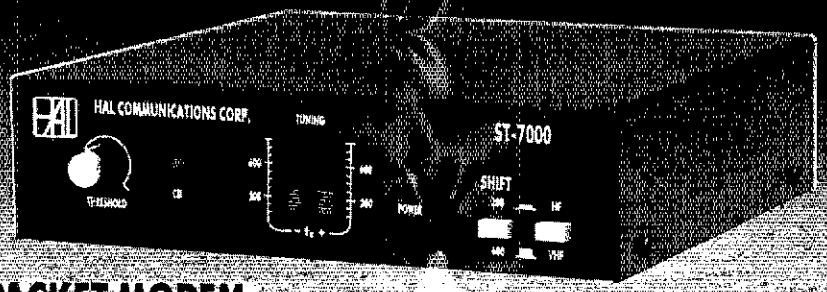
ORLANDO, Fla. 32803
621 Commonwealth Ave.
Phone (407) 894-3238
Fla. WATS 1-800-432-9424
Outside Florida 1-800-327-1917

CLEARWATER, Fla. 34625
1898 Drew Street
Phone (813) 461-4267
No In-State WATS
No Nationwide WATS

LAS VEGAS, Nev. 89106
1072 N. Rancho Drive
Phone (702) 647-3114
No In-State WATS
Outside Nevada 1-800-634-6227

CHICAGO, Illinois 60630
ERICKSON COMMUNICATIONS
5456 N. Milwaukee Avenue
Phone (312) 631-5181
15 min. from O'Hare!

GREAT HF PACKET DESERVES A GOOD MODEM



ST-7000 HF PACKET MODEM

The verdict is in and the opinion of HF Packet operators is clear . . . the HAL ST-7000 is a winner!

The HF Packet communications world is not forgiving. Selective fading, noise, and interference coupled with poor tuning indicators and simplistic phone line modems contribute to the poor performance of packet controllers on HF.

The ST-7000 makes HF Packet Work

The ST-7000 is designed specifically to greatly improve the 300 baud HF Packet performance of all packet and multi-mode controllers. Techniques developed for our government and military ST-8000 (MD-1232/G) HF modem are applied to the special problems of HF Packet radio. It's simple . . . just connect the ST-7000 to your existing packet or multi-mode controller . . . and you're ready to send data, **not** repeats.

The "standard" 200 Hz shift mode of the ST-7000 has a 6-pole input bandpass filter, an optimized detector circuit, plus a 40 db AGC system. These design features make 200 Hz HF Packet work!

The ST-7000 also includes a 600 HZ shift mode for even better performance than is offered by the 200 HZ "standard" shift mode.

Other features of the ST-7000 include:

- A new tuning indicator design assures quick and accurate tuning of HF Packet signals
- CD (carrier detect) and threshold level circuits designed specifically for 300 baud HF Packet
- A sine-wave synthesized transmit tone generator assures minimum phase distortion and splatter
- Easily interfaces with all packet and multi-mode controllers via RS-232C, TTL, or TNC VHF audio tones

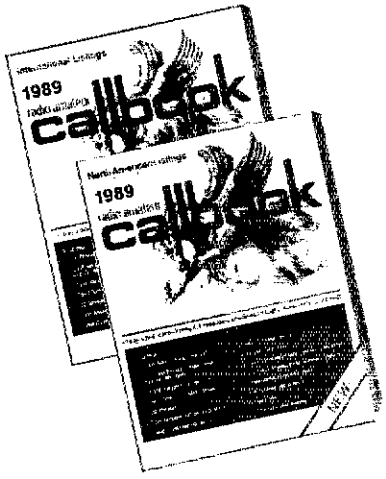
Best of all, the ST-7000 is manufactured and tested entirely in the United States by HAL Communications, a company you've known and trusted for years.

The ST-7000 is available directly from the factory at a price of $299.00, which includes a 12VDC, 0.25A power supply.

WRITE OR, BETTER YET, CALL TODAY TO ORDER YOUR HAL ST-7000.

HAL COMMUNICATIONS CORP.
P.O. BOX 365 1201 W. KENYON ROAD
URBANA, ILLINOIS 61801-0365
PHONE: (217) 367-7373
FAX: (217) 367-1701

1989 CALLBOOKS



THE QSL BOOK!

Continuing a 68 year tradition, we bring you three new Callbooks for 1989, bigger and better than ever!

The North American Callbook lists the calls, names, and address information for 495,000 licensed radio amateurs in all countries of North America, from Canada to Panama including Greenland, Bermuda, and the Caribbean islands plus Hawaii and the U.S. possessions.

The International Callbook lists 500,000 licensed radio amateurs in countries outside North America. Its coverage includes South America, Europe, Africa, Asia, and the Pacific area (exclusive of Hawaii and the U.S. possessions).

The 1989 Callbook Supplement is a new idea in Callbook updates, listing the activity in both the North American and International Callbooks. Published June 1, 1989, this combined Supplement will include thousands of new licenses, address changes, and call sign changes for the preceding 6 months.

Every active amateur needs the Callbook! The 1989 Callbooks will be published December 1, 1988. Order early to avoid disappointment (last year's Callbooks sold out). See your dealer now or order directly from the publisher.

☐ North American Callbook	
incl. shipping within USA	$29.00
incl. shipping to foreign countries	35.00
☐ International Callbook	
incl. shipping within USA	$32.00
incl. shipping to foreign countries	38.00
☐ Callbook Supplement, published June 1st	
incl. shipping within USA	$13.00
incl. shipping to foreign countries	14.00

SPECIAL OFFER

☐ Both N.A. & International Callbooks	
incl. shipping within USA	$58.00
incl. shipping to foreign countries	68.00

****

Illinois residents please add 6½% tax.
All payments must be in U.S. funds.

RADIO AMATEUR **callbook** INC.
Dept. A
925 Sherwood Dr., Box 247
Lake Bluff, IL 60044, USA

Tel: (312) 234-6600 VISA MasterCard

CHASSIS & CABINET Kits. 5120 Harmony Grove Rd., Dover, PA 17315, SASE K3IWK.

COMPREHENSIVE Apple II/II+/IIe Software CW/RTTY with/without TU or TNCless Packet. Callsign and $49.95 brings either and manual on 5.25 inch disk. SASE for free brochure. W1EO, 39 Longridge Road, Carlisle, MA 01741.

SAVE $1.50 SHIPPING on any ARRL book. Send book price plus $1 to Marshall Hill Enterprises, Bradford NH 03221.

RTTY JOURNAL, published 10 times per year for those interested in digital communications. Read about RTTY, AMTOR, MSO, Packet Radio, RTTY DX and Contests, and Technical Articles concerning the digital modes. $10 per year (foreign higher). RTTY Journal, 9085 La Casita Avenue, Fountain Valley, CA 92708.

RADIO SHACK Color Computers: Hardware and Software for ham use. Dynamic Electronics, Box 896, Hartselle, AL 35640, 205-773-2758.

SPY RADIOS WANTED! Buying all types of espionage radios and code machines! Especially wanted are military-type radios in civilian suitcases! Museum, Box 8146, Bossier City, LA 71113, 318-798-7319.

CX7 REPAIRS. Mandelkern, 505-526-0917.

WANTED: LAFAYETTE PrivaCom 3C, 525, 625, or GE5813B. Radio, 2053 Mohave Drive, Dayton, OH 45431, K9SQG.

HAM RADIO REPAIR, all makes, all models. Robert Hall Electronics, PO Box 8363, San Francisco, CA 94128, 408-729-8200.

ELECTRONIC CENTER, INC. can save you money! Call for savings on Kenwood, ICOM, Yaesu, Encomm, Rohn Towers, SWL Receivers, and all accessories. Texas 1-800-441-0145; Nat'l 1-800-527-2156; Metro 263-7464; or 214-969-1936. Ham Department, home of the world-famous Sidewalk Sale, 2809 Ross Avenue, Dallas, TX 75201.

SUPER VR85 replaces the popular VR85 satellite tracking program for the Commodore 64. Features include high resolution color map and satellite sprite, tracking data display, footprint sprite, ground trace, mutual acquisition table, transponder mode display, room for twenty satellite Keplerian element sets, Autotrak compatibility, extensive instructions, and strong user support. Send SASE for details. SUPER VR85: $35 ppd (Calif. residents add 6% sales tax) RLD Research, McCloud, CA 96057. W6AMW owner.

BEAM Headings your QTH. $7. W8JBU, 253 River Road, Hinckley, OH 44233.

ALUMA Towers. Crank-up with hinged base, house bracket, mast. Mobile van, rooftop, trailer towers. Stack sections. Will take amateur gear or computers on trade. McClaran Sales, P.O. Box 2513, Vero Beach, FL 32961, 305-567-8224.

TOWER Climbing Safety Belts, Gorilla Hooks and Accessories. Free specs. W9JVF, 1408 W. Edgewood, Indianapolis, IN 46217-3618.

CLEAR Glass Coffee Mug: Custom engraved with your call sign and your first name. Only $10 per mug. CA residents add 6% sales tax. Write: Regency Glass Engraving, P.O. Box 802, Novato, CA 94948.

MICROWAVE 100+ Watt Linears and 2C39 Cavities for 2304 MHz, 1296 MHz and 902 MHz. Hi-Spec, Box 387, Jupiter, FL 33468, 407-746-5031.

AZDEN Service by former factory technician. Fast turnaround. PCS-300 NiCads $34.95. Southern Technologies Amateur Radio Inc., 10715 SW 190 Street #9, Miami, FL 33157, 305-238-3327.

FREE "Magnolia Bloosom" QSL, send SASE. K4NBN, "No Bad News".

TEFLON, SASE. W9TFY, Alpha, IL 61413.

$$$ SUPER SAVINGS $$$ on electronic parts, components, supplies and computer accessories. Free 40-page catalog for self addressed & stamped envelope. Get on our mailing list. BCD Electro, P.O. Box 830119, Richardson, TX 75083 or call 214-343-1770.

WANTED: All types of transmitting tubes & sockets. Harold Bramstedt, 6104 Egg Lake Road, Hugo, MN 55038, 612-429-9397.

LINEMANS Belts $35. Extra safety straps $12. Climber straps. (20" × 1" × 3/16") $5/pair. $3 postage each item. John Orr, N2RU, 715 River Road, Fair Haven, NJ 07704, 201-747-7334.

UNIVERSAL Multi-Voltage Laboratory-Experimenters' Power Supply. Write for brochure. Pepperkit, 527-10th Street, Sparks, NV 89431-0811.

AIR-1/VIC-20 with AMTOR—formerly manufactured by Microlog—special closeout price. Was $279, now $125. MD res. add 5%. Shipping $5 in US ($10 outside US). G and G Electonics, 8524 Dakota Drive, Gaithersburg, MD 20877, 301-258-7373

LEARN CODE on your IBM-PC (or compatible), or Commodore C64/128. Code-Pro takes you from no knowledge to proficient copy. $10 plus $2 S&H. Specify computer and IBM disk size. Trio Technology, Dept. 862, P.O. Box 402, Palm Bay, FL 32906.

STAMP Collectors! New Liberia amateur radio set $4, Oman $2. SASE for ham stamp price list. WB4FDT, P.O. Box 833, West Hartford, CT 06107.

LIMITED Space Dipoles for 160/80, 160/40, 160/30, coax fed, no tuning, maximum power, $59.50. G5RV multi-bander $35, G5RV junior $32...Postpaid. SASE...Tom Evans, W1JC, 113 Stratton Brook, Simsbury, CT 06070.

HAM TRADER Yellow Sheets. In our 27th year. Buy, Swap, Sell ham radio gear. Published twice a month. Ads quickly circulate—no long wait for results. Send #10 SASE for sample copy. $13 for one year (24 issues). P.O.B. 2057, Glen Ellyn, IL 60138-2057 or P.O.B. 15142, Seattle, WA 98115.

CIPHER MACHINES, manuals and anything else related to secret communications wanted; especially equipment. WB2EZK, 17 Alfred Road, Merrick, NY 11566, 516-378-0263.

GET Your "FCC Commercial General Radiotelephone License". Electronics Home Study. Fast, inexpensive! "Free" details. Command, D-170, Box 2824, San Francisco, CA 94126.

SCHOOL CURRICULUM For Ham Radio by Carole Perry, WB2MGP. 26 lesson plans, code practice oscillator, audio cassette and VHS video tape. Suitable for all school grade levels with pull-out lessons. Can be used as separate course or as part of Social Studies or Science program. Also suitable for summer camp program, $99.95. Media Mentors Inc., P.O. Box 131646, S.I., NY 10313-0006, 718-983-1416.

ATARI CW, RTTY, ASCII, and Packet Programs for 8 bit models. Each program available on disk for $15 and on cartridge for $35. SASE for info. Electrosoft, 1656 South California Street, Loveland, CO 80537.

WANTED: Vomax + 8874 + Swan WM3000. K4NBN, "No Bad News".

RIGID Plexiglas Cover for following keys: Bencher $9.95; MFJ-422 $9.95; Vibroplex lambic $11.95. George Chambers, KØBEJ, 302 S. Glendale Avenue, Coffeyville, KS 67337.

HAM HOLIDAY in VP5. Join cycle 22 fun from rare DX QTH Turks & Caicos Islands. We supply transceiver, antenna, process license and offer accomodations as low as 7 nights $390 each double occupancy in private bungalow. Direct Pan Am service, 80 minutes Miami. Details VP5D, P.O. Box 100858, Ft. Lauderdale, FL 33310.

THE QUAD CLIP-TM Beat the broken quad antenna wire syndrome. For information send a 25 cent stamp to Ampruss Co., KH6CTQ, P.O. Box 551, Aiea, HI 96701-0551.

ATLAS RADIO - Swan Repair Service: Factory trained technicians, fast service and reasonably priced. RF Parts Co., 1320 Grand, San Marcos, CA 92069, 619-744-0720, 800-854-1927.

DX QSLs. The "Go List". We make getting the QSL cards as much fun as the QSO itself. Over 5000 QSL managers. Updated and published monthly. The W6GO/K6HHD QSL Manager List, POB 700A, Rio Linda, CA 95673. $20/yr/USA.

DXCC plus 829 other international Certificates from 99 countries listed in K1BV's comprehensive directory, $14.80. Ted Melinosky, 525 Foster Street, South Windsor, CT 06074-2936.

ATLAS RADIOS Wanted—working or not. RF Parts Co., 619-744-0720, 800-854-1927.

ATTENTION! Trade your old wristwatches (Rolex, Hamilton, Patek, Chronograph, etc.) for my classic ham gear or $. Eskenazi, 619 Broadway East, Seattle, WA 98102, 206-328-2847.

THE DX Bulletin provides all the DX, propagation, QSL, equipment, DXpedition information you need every week. SASE or call for samples. Box 50, Fulton, CA 95439, 707-523-1001.

COMMODORE Packet TNC emulator with interface schematics (HF/VHF) and documentation, $6 ppd. Interface PC board $10.65, complete kit $49.95 (add $2.50 s/h). See 73 Magazine, August 1988, article for details. SASE for info. Barry Kutner, W2UP, 614-B Palmer Lane, Yardley, PA 19067.

HAMLOG Computer Program. 17 Modules Full features. Autologs, 7 band WAS/DXCC. Apple $19.95. IBM, CPM, Kaypro, Tandy, C-128 $24.95. *QST*-KA1AWH, POB 2015, Peabody, MA 01960.

CLUB SECRETARY/Treasurer: The finest computer tool available to assist you in your duties is ready! Order: ARC Membership + (MS/DOS) $49.95 or demo disk $5 from Atlantic Software House, P.O. Box 3187, Indialantic, FL 32903 or call A.D. Link, KL7QH, 407-724-4113.

NICADS new AA 500 MAH Quick Charge. Ten for $12 plus $1.80 shipping. Twenty for $23 plus $2.45 shipping. Raymond Richard, 5113 Town Ridge, Middletown, CT 06457.

WANTED: Yaesu FT-680R 6M Xceiver. Any condition. QSL w/price or call collect (best time 7-11 PM EST). Bob, KI4MB, 6608 N 18th Street, Arlington, VA 22205, 703-533-0650.

WANTED: Bencher Paddle. J. Waskowitz, 580 83rd Street, Brooklyn, NY 11209.

'N-TENNA Quad Kits, Boomless Tribanders, $64.50. Box 5332, Hickory, NC 28603.

KWM-380/HF-380 Repairs. Kirby, K7WOC, 713-320-2324.

TUBES WANTED: I pay cash or trade for all types of transmitting or special purpose tubes. Mike Forman, 1472 McArthur Blvd., Oakland, CA 94602, 415-530-8840.

DXpedition to Montserrat for only $300/week, radio included. Complete details for SASE or call: Box 50, Fulton, CA 95439, 707-523-1001.

W5YI REPORT—Twice monthly award winning ham radio newsletter brings confidental insights, alerts, predictions...worldwide news. 24 issues $23. Check, MO, Credit Card (817-461-6443). Free samples: two stamp SASE. W5YI, Box #565101, Dallas, TX 75356.

INTERNATIONAL Radio Inc. ICOM, Kenwood, & Yaesu Newsletters available. Send SASE (.45) for details. International Radio Inc., 751 S. Macedo Blvd., Port St. Lucie, FL 34983, 407-879-6868.

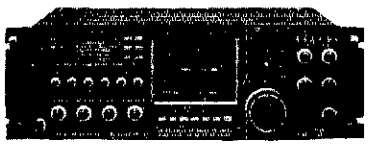
QRP CW Xmtr Kits and Components. SASE brings catalog. W1FB, Box 250, Luther, MI 49656.

CUSTOMLOGS (IBM). SASE Demo. NQ5V, 306-B W. 34th, Austin, TX 78705.

HAM PROGRAMS for Commodore, IBM-PC, Apple, TI99/4A. Send legal size SASE: EPO Software, 7805 NE 147th Avenue, Vancouver, WA 98682.

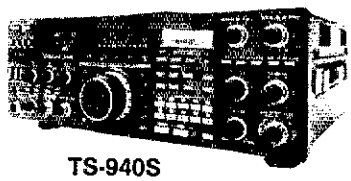
AREC & EMERGENCY Operators! Scanner & shortwave frequency directories! Public Safety, Federal Agencies, Aero, etc. Big free catalog. CRB, Box 56-QS, Commack, NY 11725.

ICOM KENWOOD YAESU



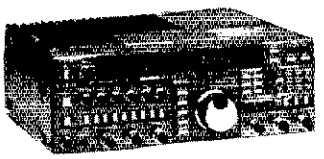
IC-781

HF Equipment	List	Juns
IC-781 New Deluxe HF Rig	$5995.00	Call $
IC-761 Loaded With Extras	2699.00	Call $
IC-735 Gen. Cvg Xcvr	1099.00	Call $
IC-751A Gen. Cvg. Xcvr	1699.00	Call $
IC-575A 10m/6m Xcvr	1399.00	Call $
Receivers		
IC-R7000 25-1300 + MHz Rcvr	1199.00	Call $
IC-R71A 100 kHz-30 MHz Rcvr	999.00	Call $
VHF		
IC-228A New 25w Mobile	509.00	Call $
IC-228H New 45w Mobile	539.00	Call $
IC-275A All Mode Base w/PS	1299.00	Call $
IC-275H All Mode Base 100w	1399.00	Call $
IC-28A FM Mobile 25w	469.00	Call $
IC-28H FM Mobile 45w	499.00	Call $
IC-2GAT, New 7w HT	429.95	Call $
IC-2AT FM HT	319.00	Call $
IC-02AT FM HT, HP	409.00	Call $
IC-μ2AT Micro HT	329.00	Call $
IC-900 Six Band Mobile	639.00	Call $
UHF		
IC-475A All Mode 25w	1399.00	Call $
IC-475H All Mode 75w	1599.00	Call $
IC-48A FM Mobile 25w	509.00	Call $
IC-4GAT, New 6w HT	449.95	Call $
IC-4AT FM HT	349.00	Call $
IC-04AT FM HT	449.00	Call $
IC-μ4AT 440 FM HT	369.00	Call $
IC-3200A FM 2m/70cm 25w	649.00	Call $
IC-32AT Dual Band Handheld	629.95	Call $
IC-3210 Dual Band Mobile	TBA	Call $
220 MHZ		
IC-375A All-Mode, 25w, Base Sta.	1399.00	Call $
IC-38A 25w FM Xcvr	489.00	Call $
IC-37A FM Mobile 25w	499.00	Call $
IC-3AT FM HT	349.00	Call $
IC-03AT Deluxe HT	449.00	Call $
1.2 GHz		
IC-1271A All Mode 10w	1269.00	Call $
IC-1200 FM, 10w Mobile	699.00	Call $
IC-12AT Deluxe 1w HT	473.00	Call $



TS-940S

HF Equipment	List	Juns
TS-940S/AT Gen. Cvg Xcvr	$2449.95	Call $
TS-440S/AT Gen. Cvg Xcvr	1379.95	Call $
TS-140S Compact, Gen. Cvg Xcvr	929.95	Call $
TS-680S HF Plus 6m Xcvr	1099.95	Call $
TL-922A HF Amp	1649.95	Call $
Receivers		
R-5000 100 kHz-30 MHz	999.95	Call $
R-2000 150 kHz-30 MHz	749.95	Call $
RZ-1 Compact Scanning Recv.	599.95	Call $
VHF		
TS-711A All Mode Base 25w	1029.95	Call $
TR-751A All Mode Mobile 25w	649.95	Call $
TM-221A Compact FM 45w	439.95	Call $
TM-2530A FM Mobile 25w	479.95	Call $
TM-2550A FM Mobile 45w	499.95	Call $
TM-2570A FM Mobile 70w	599.95	Call $
TH-215A, 2m HT Has It All	379.95	Call $
TH-25AT 5w Pocket HT NEW	349.95	Call $
TM-721A 2m/70cm, FM, Mobile	649.95	Call $
TM-621 2m/220, FM, Mobile	699.95	Call $
UHF		
TS-811A All Mode Base 25w	1,229.95	Call $
TR-851A 25w SSB/FM	749.95	Call $
TM-421A Compact FM 35w	449.95	Call $
TH-415A 2.5w 440 HT	399.95	Call $
TH-45AT 5w Pocket HT NEW	369.95	Call $
TW-4100A, 2m/70cm FM	599.95	Call $
TH-55 AT 1.2 GHz HT	499.95	Call $
TR-50 1w 1.2GHz FM	629.95	Call $
220 MHZ		
TM-3530A FM 220 MHz 25w	499.95	Call $
TH-31BT FM, 220 MHz HT	299.95	Call $
TM-321A Compact 25w Mobile	449.95	Call $
TH-315A Full Featured 2.5w HT	399.95	Call $



FT-767GX

HF Equipment	List	Juns
FT-747 GX New Economical Performer	$889.95	Call $
FT-757 GX II Gen. Cvg Xcvr	1129.95	Call $
FT-767 4 Band New	1929.00	Call $
FL-7000 15m-160m Solid State Amp	1995.00	Call $
Receivers		
FRG-8800 150 kHz - 30 MHz	759.95	Call $
FRG-9600 60-905 MHz	699.95	Call $
VHF		
FT-212RH NEW 2m, 45w mobile	459.95	Call $
FT-211 RH 2m, 45w, FM	459.95	Call $
FT-290R All Mode Portable	599.95	Call $
FT-23 R/TT Mini HT	344.95	Call $
FT-209RH FM Handheld 5w	389.95	Call $
UHF		
FT-712RH, 70cm, 35w mobile	499.95	Call $
FT-711RH FM Mobile 35w	449.95	Call $
FT-73 R/TT Mini HT	349.95	Call $
FT-709RH FM HT 4w	389.95	Call $
FT-790R MKII FM/SSB, 25w	799.95	Call $
FT-2311R 10w, 1.2 GHz, FM	559.95	Call $
VHF/UHF Full Duplex		
FT-736R, New All Mode, 2m/70cm	1749.95	Call $
FEX-736-50 6m, 10w Module	259.95	Call $
FEX-736-220 220 MHz, 25w Module	279.95	Call $
FEX-736-1.2 1.2 GHz, 10w Module	539.95	Call $
FT-690R MKII, 6m, All Mode, port.	569.95	Call $
Dual Bander		
FT-727R 2m/70 cm HT	439.95	Call $
220 MHZ		
FT-33R, mini HT	389.95	Call $
FT-109 RH New HT	399.95	Call $
FT-312 RM, Mobile	TBA	Call $
FT-311 RM Mobile	499.95	Call $
Repeaters		
FTR-2410 2m Repeaters	1269.95	Call $
FTR-5410 70cm Repeaters	1289.95	Call $

JUN'S ELECTRONICS
800-882-1343

JUN'S BARGAIN BOX

SPECIAL BARGAIN PRICES THIS MONTH ONLY

OVERSTOCKED ICOM SUPER SPECIAL PRICE CALL TODAY
IC-03AT 220 MHz HT

YAESU
FT-727, 2m/70cm HT
FT-711 RH, 70cm, 35w, Mobile

KENWOOD
TH-315A 220 MHz HT
TH-31BT, Pocket Sized 220 MHz w/DTMF
TW-4100A, 2m/70cm FM Mobile

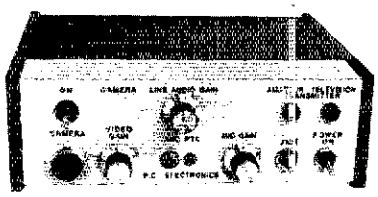
• AMATEUR • TWO WAY • MARINE • SE HABLA ESPANOL
• Free U.P.S. Cash Order • (Most Items, Most Places)

(213)390-8003 3919 Sepulveda Blvd. Culver City, CA 90230

AMATEUR TELEVISION

P.C. ELECTRONICS
2522 PAXSON
ARCADIA, CA 91006
Maryann W86YSS
Tom W6ORG

NOVICES: NOW YOU CAN TRANSMIT VIDEO WITH OUR NEW TX23-1



Value plus quality from over 25 years in ATV

Only $299

TX23-1 one watt ATV transmitter crystaled for 1289.25 MHz runs on 12-14 Vdc @ .5A. PTL T/R switching. 7x7x2.5". Transmitters sold only to licensed amateurs for legal purposes verified in latest Callbook or copy of license sent with order.

You as well as all classes of licensed amateurs can now easily transmit live action color and sound video just like broadcast TV with our TX23-1 transmitter. Use any home TV camera by plugging in the composite video and audio into the front panel 10 pin VHS connector or use the rear panel phono jacks. **Call (818) 447-4565** or write for our complete ATV catalog for downconverters, linear amps, antennas, and accessories on the 70, 33, & 23cm bands.

SELL: Kenwood TS820S w/CW Filter, MC50 Mic., Heath 2060 Antenna Tuner, Dentron W-2 SWR & Watt Meter. With all manuals in original cartons. Mint condition. I ship UPS—call Louis, 213-836-3102 after 5:00 PM PST.

MOTOROLA Mostar Sale. KA3DBG, 301-946-6460.

REVIVING and revising best live DX show "30 Greatest DX-peditions Of All Time" for 1989 hamvention season. WA4WME, 202C Chapel Ridge, Hazelwood, MO 63042.

ELECTRON TUBES. All sizes and types. Transmitting, Receiving, Microwave—large inventory. Same day shipment. Ask about our 3-500Z special. Daily Electronics, P.O. Box 5029, Compton, CA 90224, 800-346-6667.

CALL SIGN Belt Buckle, solid USA brass, makes perfect Christmas gift, $11.99. H. Hornsby, Route 1, Box 211, Lake Isabella, CA 93240.

1989 CALLBOOKS. North American $26. International $29. Both $52. Insured UPS Paid. Personal Check. Order now. Shipments start Nov. 18, 1988. Avatar/W9JVF, 1408 W. Edgewood, Indianapolis, IN 46217.

WANTED: TS-930S and TS-430S. W3CRH, Box 20, Macomb, IL 61455, 309-833-1809.

DX-100, HQ-110, More, Excellent. WA2RAI, 718-459-3377.

IBM-XT Compatible: 512K, 2FD, serial, parallel, monochrome, like new, $495 FOB. Bae, Box 4808, Santa Clara, CA 95054, 408-739-1833.

COMPUTER Code Course. Apple II +/c/e/GS, C-64/128. 37 modes, graphics, 1-100 WPM, menus, proportional spacing, variable frequency, more ($29.95). With wordprocessor ($39.95). Manual ($10). Check/MO. Laresco, P.O.B. 2018-QS, Calumet City, IL 60409, 1-312-891-3279.

CUBICAL Quad 2 elements 3 bands boomless. Brand new. Spider, spreaders, wire, insulators, instructions. Prepaid in 48. $450. WZ6P, 92 Lloyd Court, Newbury Park, CA 91320.

ESTATE of W3LZD, Amp Supply Co. LK-500ZB $400, IC735 $600, IC730 $250, PS-15 $90, Motorola Pwr. Supply TPN1154A 12VA 20A $100. AA3W, 1-717-344-2257.

APARTMENT Dwellers/Portable Antenna System. For HF. SASE for information. Burk Electronics, 35 North Kensington, La Grange, IL 60525, 312-482-9310.

ICOM 751—has five months total operating time on it. (Works perfect) with HM-12 mic. and manual. ($895 plus shipping): also, DX-302 triple-conversion general coverage receiver (immaculate), ($250). WB5PUB, 1-512-837-7770 on weekends.

SELF-STUDY Ham Course progresses from no code/theory knowledge through Technician. Two code learning tapes, two textbooks, FCC Rule Book, code key, oscillator . . . and more! Regular: $39.95. . . now $29.95 postpaid! Money back guarantee. Check, MO, Credit Card (817-461-6443). W5YI, Box #565101, Dallas, TX 75356.

WANT: RS-6 Radio or Components of. W8MFL, 612-698-4851.

WANTED: Six Meter FM Equipment. Interested in Genave GTX-600, Regency HR-6, etc. Also GE, Motorola, RCA portables, mobiles or bases that are low band high split that could be converted for six meters. Reasonable. WA3RSP, 469 Jayson Avenue, Pittsburgh, PA 15228.

KENWOOD TS530S and Amp LA-1000 Linear. Sell together only $700. K6TSV, 714-544-4973.

NY HAMS Dream House. A modern ranch house on 1.5 acres, 450' ft. above sea level, 40 ft. tower, good reception, 2M and 6M extends over 200%, 22 miles north of the Empire State Building in White Plains, NY. Easy commute to Manhattan, 360° view of horizon, no other buildings or structures at same level for miles, very private setting, borders 1000 acre natural preserve. For Sale by owner, $750,000. Dick, 914-761-1966, 717-253-1278 eves.

MACKET: Macintosh packet program, $42.45. Now supports RTTY and PK-232 Host Mode. Contact WD8PUH, S. Fine Software, P.O.B. 6037, State College, PA 16801.

DIL AWARDS for that LID you know. Set of four different official awards. Worked All Neighbors, Radio's Biggest Egotist, Nothing Ever Works and World's Biggest LID. $7 ppd. Fred England, W2SVS, 3900 Canterbury Road, New Bern, NC 28562.

BIRDS on your antenna? Try our Decoy Owl, $19.95. They really work! Ham Radio Outlet, 1-800-854-6046.

POLO SHIRTS and Sweaters, Swiss embroidered with block letter callsigns make beautiful Christmas/Birthday presents. Specify red, white, navy, light blue, yellow, or kelly shirt; red, white, navy or kelly sweater. Any color embroidery. Shirts highest quality American made 50/50 Pique Weave, sweaters V-neck pullovers. Shirt letters 1/2 inch, sweater 3/4. Send size, (S thru XL), callsign, colors desired, check/mo, ($26/shirt, $30/sweater) to Westend Enterprises, 5018 Sangamore Road, Bethesda, MD 20816.

1989 HAM CALENDAR. Comprehensive list of upcoming major operating events and contests. Dates included. Send $1 to Paul Rasmussen, WB4DDA, 2415 Tronjo Circle, Pensacola, FL 32503.

ORDER Now For Xmas. Solid Brass Belt Buckles. Name or Call one line $12; Name and Call two lines $14. Add $1 postage. S. Slonim, 320 Rose Street, Massapequa Park, NY 11762.

LOG PERIODIC 7-30 MHz - 10 Element Telrex Model CMRTEL 1048 Serial #70187. Built to military specs. Used less than one year, mint, in commercial shipping container. Original cost $3458 FOB Telrex. Asking $875. NA0K, 505-268-5144.

LEARN CODE using IBM PC or compatible (256kB RAM). Easy to follow menu-driven program on DS/DD floppy fully prepares you to copy 5 WPM for novice license to 50 WPM. Features adjustable intra/intercharacter timing with 1-50 WPM sending rate, keyboard-selected and randomly generated characters including FCC-required punctuation/signals. $11 including shipping. Logicon, P.O. Box 426, Lexington Park, MD 20653.

MILITARY Surplus Sale. SASE for list. G. Cain, 1775 Grand #302, St. Paul, MN 55105.

WANTED: Six Meter SSB Equipment. Interested in Drake, Swan, Heath, etc. Also interested in rf amplifiers. Reasonable. WA3RSP, 469 Jayson Avenue, Pittsburgh, PA 15228.

NATIONAL Radio Manual and NCL-2000 factory parts lists. SASE. Max Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

ATLAS 350-XL Wanted. N5NM, Box 2189, Sante Fe, NM 87504-2189, 505-988-2305.

COLLINS 75S3C Rcvr. 32S-3 Transmitter 312 B4 Station Console, Manuals. Great cond. $500 or will Trade for HF Transceiver. Kenwood 9000 All Mode 2M Mobile, factory tuned good for satellites $275. Marty, N7GQR, P.O. Box 71632, Las Vegas, NV 89170, 702-739-7151.

WANTED: ICOM 451A UHF Transceiver and Heath SB200 or SB220 Amplifier. Contact Richard McMahon, P.O. Box 316, FPO New York 09518.

COMPLETE Ham Radio Station For Sale. Kenwood TS-520SE MC-50 Mike, SP-230 Speaker. 3 Element Triband Beam Antenna, Alliance Rotor and 30 Foot Tower. All excellent condition. $750 delivered within 500 mile radius of Cedar Rapids, IA. Tom, KC0MW, 319-396-8151.

KELLY'S KUPS. Handmade. White/color choice callsign, name, trim. 16 oz. stein or 10 oz. pedestal. $10, shipping $2.55. 208 West "I" Street, Ontario, CA 91762, 714-629-0646, KB6MZS/N6BOP.

TELREX 10M313 $100, 15M317 $125, 20M326 $200. Uship. Jerry, N8BM, 216-494-1534.

TOP PRICE Paid for Yaesu FTV-250 2 Mtr. Xvtr. in excellent condition. Call Tom, WD0EMP, 314-256-7814.

WANTED: Vibroplex Original, Trade B&H 977Q Slide Proj. Mint or your price. R. Guttentag, KA2YWA, 29-10 137th Street, 4B, Flushing, NY 11354.

KENWOOD TS530-S, WARC Bands, MC50 Mic. $475 incl. shipping. Rick, AH6IR, 808-623-1701.

WANTED: Info Lewytt RC77/GRC9 US Army Signal Corps Field Radio, Operating Manual, Schematics. Write: Andrew, N9HFV, 4700 Highland Avenue, Downers Grove, IL 60515, 312-969-1148.

COLLINS New Tube Sets 75S3ABC - $60, 75A4 - $80. KWM2 - $65 & 32S3 - $50 without 6146's, add $30 for 6146B's. $3 shipping. WE2T, 65 Alsta, Rochester, NY 14623.

NRD-515, Spkr., Pad, Memory $995. Alinco 2 Meter Mobile $199. Satellite 650 Softwave $795. Century-21 & Calibrator $249. SASE for list. Wanted Kenwood R-1000 or R-2000. Bob, Box 1202, Akron, OH 44309, 216-376-2402 daytime.

W2UK De W4HHK Happy 35th Anniversary Our 1953 2 Meter QSO. 73, Paul.

TEXANS 60 ft. crank up Aluma Tower with hinged base, Ken Pro Rotor and Mast. Best offer. WD5ICB, 1-512-428-2198.

CLEANING House: Lots of Ham Goodies. Definitely priced to sell. SASE, WA2PRB, P.O.B. 72072, Corpus Christi, TX 78472.

KENWOOD TS-780 Dual Band Rig. Covers 2 Meter/70 CM and is ideal for satellite use. Comes with MC-42 Mike and is in excellent condition. Call KD4AJ after 7:00 PM 404-396-6760.

ROGERS RT/Duroid 5880 .015 Diel. 30 cents per inch & S&H. Will Trade. Bob Verdon, KA2FWN, RD 2, Box 764, Kellogg Street, Clinton, NY 13323, H 315-853-2030, W 315-732-7896.

WANTED: Manual and Schematic for Gonset GSB 101 Linear Amplifier. Original or copy. W4IRP, 4543 W. Idlewild Avenue, Tampa, FL 33614.

IBM PC OWNERS: IMCT, the ultimate Morse code program is now available. Does more than the others! Menu/1-20+ WPM/reads ASCII text files/lessons/etc. Plus - explains ham talk/you set the spacing/on screen notepad/listen to full QSOs and contesters with the on screen computeradio!! 5¼" diskette, 256K and DOS 2.1 or greater #39.95. AC3L Software, Box 82520, Pittsburgh, PA 15218.

50 FOOT Windmill Tower and 20 Meter Beam with Rotator. Free but you must remove. Red Bank, NJ area. For full information, call Ida, 201-747-2581.

WANTED: Hallicrafters HA6, HA2 Transverters. Federal Transmitting Tubes. McMurdo Silver 5C or Similar. General Electric or Pilot all wave Receiver Model 81-82. Grebe Amateur Receiver CR18. K4UJZ, 608 W. Thompson Lane, Murfreesboro, TN 37129, 615-893-5344.

WANTED: KWM2 and Power Supply. Also HW16 and VFO. Must be very good to mint condition. L. Daniels, WA3LKV, 22 Ridge, Lansford, PA 18232.

SELL: Heath HX1681 CW Transmitter with PS23 Supply $95, KDK FM144 Transceiver $95, Two Pace-MX 2 Meter HT's with Accessories $110, Sonar Crystal Scanners FR2528 $55, FR104 $20. All good condition. Sony BVU-100 Broadcast 3/4" VCR and Accessories, needs work $125. Jim, NR2P, 516-579-5132.

SONY ICF 2010, like new, $265 firm. Shapiro, 3679 Edinburgh, Las Vegas, NV 89103, 702-876-2044.

FOR SALE—Kenwood TS-520S, CW Filter, $350. Needs little work. Irv, WB2BVL, 516-698-9280.

HEATHKIT HW101 with Power Supply and Mic. Good for Novice 10M, $225. Call Marty, N7GQR, 702-739-7151.

STATION LOGBOOK - DX Info in a single IBM/clone program. Allows full logging operations with on-line access to beam headings and country information for over 450 countries. User customizable. 5-1/4" disk $20. 3-1/2" disk $25. Info SASE - LEB Enterprises, KI6LO, 933 Forrest Knoll #A18, Ridgecrest, CA 93555.

AMP SUPPLY LK450 special built. With Jennings vacuum ant. change over relay, and heavy duty components. 10 meters to 160 meters. Less than 1 year old. 1 year left on warranty. Less than 5 hrs. on final tube. $850, prefer local pick up or you ship. KD8HW, 304-727-3066 or 407-727-1211.

FOR SALE: Kenwood TH41AT w/PL, Stubby Duck, and Belt Clip $150. Pace Communicator II 25W 2M FM Mobile, PL and Touch Tone Mike $150. Scott, KF5JQ, 312-830-7689.

WANTED: Collins MM-1 Microphone. State Price and Condition. KB2DMD, Box 6020, Lawrenceville, *NJ 08648.*

SWAP: Regency 720-channel, digital input Flight Scanner for all aircraft frequencies, for good SW receiver, such as Kenwood. Wallace Balla, 189 Taconic Road, Greenwich, CT 06831.

NEW 90' Heavy Duty Triangular Steel Tower. 18" each side. Unassembled, complete with all hardware, guys, anchor rods and gin pole, $1500. W8CJJ, 803-439-7141.

WANTED: Power Xfmr., #54-258, for Heath Model 10-102 Oscilloscope or Sell Scope and Manual. Best offer. K4VR, 615-967-8760.

TEN-TEC Century 21 Xcvr, xlnt. condx., with MFJ 901-B Antenna Tuner and SWR Bridge. $185 takes all. You pay shipping. Call 818-765-9070, leave msg. for "J.P.", or write "J.P." Hagey, 4057 Camellia Avenue, Studio City, CA 91604.

HIGH Efficiency J-pole antenna, virtually 1:1 SWR at any center frequency from 144-460 MHz. Superior to ¼ and 5/8 wave designs. You supply copper waterpipe for elements and mast. Assembles in 30 minutes. $14 + $2 shipping. Specify BNC and UHF. SASE for more details. LTJ-Pole, Andy Mitz, WA3LTJ, 4207 Amber Drive, Kensington, MD 20895.

FOR SALE - Collins, 2-KWM-2, S16-F2 Power Supply, Mobile Power Supply, Mobile Kit. Best offer. J. Lasser, N1EKH, 6 Marion Street, Danbury, CT 06810.

R-390A RECEIVER Parts: Info SASE. CPRC-26 Military Manpack Radio, 6 Meter FM, with Antenna, Crystal, Handset: $22.50, $42.50/pair. Military-Spec TS-352 Voltohm/Multimeter, Leads, Manual: $12.50. $4.50/piece shipping, $9 maximum. Baytronics, P.O. Box 591, Sandusy, OH 44870.

SIGNAL/ONE CX11A, Hi-Power Option - $2,895. Alpha 77DX - $3,895. Alpha 78 - $2,195. All - low hours, mint condition. A. Emerald, 8956 Swallow, Ftn. Vly., CA 92708, 714-962-5940.

WANTED: Ten-Tec 509 or 515 in good condx. AA6IT, P.O.B. *1069, Desert Hot Springs, CA 92240.*

FCC EXAM? Upgrade to Advanced. Practice on your C64/128 computer. Complete list questions & answers with diagrams on disk. Your call printed with optional printed summary of tests. Send call with order. $24.95 postpaid. Other classes *coming soon. Ralph Parlette, WB6JOY, 27 Morning Sun* Avenue, Mill Valley, CA 94941, 415-383-0507.

NRD-515, Memory Unit, Keypad, Speaker, Mint, $1,049. FV-700DM VFO, $125. 4 Head VHS, $199. HX-2200 w/Cellular, $149. Pro-2021, $225. PS-30 Kenwood, $150. FP-700, $150. Everything mint! KA8UWR, 216-376-2402 9-5 PM.

TEN-TEC 580 Delta Solid-State Digital Xcvr., 160-10M + WARC Bands, Matching PS, Mic and CW Filter, $390. Paragon 1.8 KHz SSB Filter, $60. Karl, N8NA/3, 302-792-1096 eves.

FOR SALE—Yaesu 726-R 2-10-12-15 Meters, mint, $550. 2-4218XL 2M Beams with Balancer, $100. 1-105BAS 10M Beam, $75. Prices include shipment in US. Gordon, WB4JQZ, 904-269-1013.

COMMUNICATIONS Batteries: NiCd Packs/Inserts/Rebuilding. Exact Replacement Packs: Yaesu FNB2 / Wilson BP4 $22.95, Santec 142/1200 (3 pin) $23.95, Motorola: HT220-Slim $29.95, HT220-Omni $34.95. Battery Inserts: ICOM: BP2/Rap $18.95, BP3/CM3 $16.95, BP5/Rap $24.95, BP7/PB8/Rap $29.95, Kenwood: PB21 $13.95, PB24 $21.95, PB25/25H/26 $25.95, Azden: 300 $21.95, Standard BP1/C118/Pace MX-BT2 $25.95, Tempo: S1/270 $23.95, S1, 2, 4, 5,/450 $23.95, S15 $24.95, Yaesu: FNB3/3A $32.95, FNB4/4A $33.95, *Ten-Tec* 2991 $24.95, Santec: KTBP $16.95, KTBP2 $23.95, KTBPH $24.95, Rebuilding: ICOM/Ken/Yaesu/T-T add $4 to insert prices. Others available. SASE/free catalog. In PA add 6%. For M/C & Visa add $2/order. Phone: 814-623-7000. Add $3 shipping/order. Cunard Associates, Dept. A, RD 6, Box 104, *Bedford, PA 15522.*

TEN-TEC Corsair Model 560 with PS, Ext. VFO, Mike, all CW and SSB Filters, $750. KC7IG, 602-942-9764.

ROSS'$$$$ New November Specials: Kenwood TW-4100A $469.90, TS- 440S/WAT $1164.90, TH-215A $318.90, TH-315A $299.99, TL-922A $1359.90, Robot 1200 $1159.90, *Hal PCI-2000 $479.99, AEA PK- 64A/HFM $209.90, ICOM* IC-735 $929.90, IC-45A $289.99, IC- 28AW/HM14 $424.50, IC-27A $334.99, IC-781 $5539.90, Yaesu FP- 757GX $199.90, FT-727R $344.90, FT-747GX $729.90. All LTO (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, FOB Preston. We close at 2:00* Saturdays & Mondays. Ross Distributing Company, 78 South State, P.O. Box 234Q, Preston, ID 83263, 208-852-0830.

SUPERFAST Morse Code Supereasy. Subliminal cassette. $10. Learn Morse Code In 1 Hour. Amazing new supereasy *technique. $10. Both $17. Moneyback guarantee. Free cata*log: SASE. Bahr, 2535-G8 Marietta, Palmbay, FL 32905.

FOR SALE: Yaesu FT-101EE in mint condition with mic. and ac/dc power cords. You pay shipping, $425. F.D. Williams, K3PUR, 1394 Old Quincy Lane, Reston, VA 22094, *703-437-4818.*

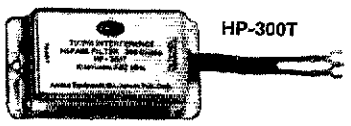
TRADE Yaesu FT-209RH 2 Meter FM HT and PK 64A-HFM Multimode Data Controller for TS-530S Transceiver, AB4BP, 803-651-7426.

PARAGON or Corsair Ten-Tec Wanted. Good condition and reasonable. Walt Witten, KV3F, 134 Allan Drive, Beaver, PA 15009, phone 412-728-2975.

STOP TVI

with the new AMECO

HIGH-PASS FILTERS



Eliminate interference to TV, FM & VCR sets caused by ham, CB, short-wave, equipment, etc. with high quality, lab-type filters. Each filter has 9 shielded sections, a sharp cut-off at 52 MHz and over 70 dB attenuation below 50 MHz.

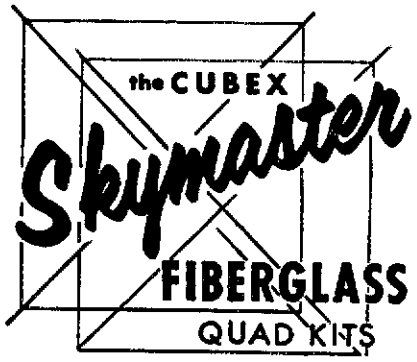
Model HP-75T is for coax systems. Includes all connectors and a length of coaxial cable $12.95

Model HP-300T is for twin-lead systems. Has screw terminals and twin-lead with lugs $12.95

At your dealer or add $2.00 S&H to:

Ameco Equipment-Div. Ameco Pub. Corp.
220 East Jericho Tpke., Mineola, N.Y. 11501
Tel. # (516) 741-5030

"CHOICE OF THE DX KINGS"



2 ELEMENT— 3 BAND KIT SPECIAL

ONLY $269.95

FOB Calif.

CONTENTS

- **8 Fiberglass Arms, 1 pc. White 13 ft.**
- **2 End Spiders (1 pc. castings)**
- **1 Boom/Mast Coupler, 2" to 2"**
- **16 Wraplock Spreader Arm Clamps**
- **1 CUBEX QUAD Instruction Manual (Boom and wire not included)**

MK III 2 EL COMPLETE "PRE-TUNED" QUAD ONLY $299.95

2-3-4 or more element Quads available. Send 50¢ (cash or stamps) for complete set of catalog sheets, specs & prices

CUBEX COMPANY

P.O. Box 732, Altadena, California 91001
Phone: (818) 798-8106 or 449-5925

YOU CAN'T SAY "QUAD" BETTER THAN "CUBEX"

COLORADO COMM CENTER

MasterCard VISA Discover

BUTTERNUT • LARSEN • WELZ • MFJ • YAESU • ASTRON • ALINCO • BENCHER

ICOM • KENWOOD • AEA • HY-GAIN • HUSTLER • RFC • CUSHCRAFT • B & W

KENWOOD

TS-140

- Kenwood Quality at a Great Price
- HF Transceiver with General Coverage Receiver
- 100 W on All HF Bands

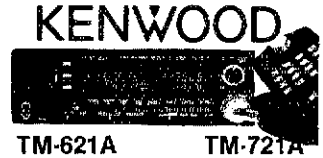
KENWOOD

RZ-1
New Scanning Receiver

- 500 kHz-905 MHz
- AM, Narrow & Wideband FM
- 100 Memories
- Compact Size

ORDER YOURS TODAY!

KENWOOD

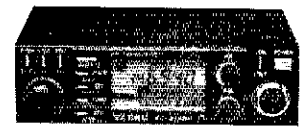


TM-621A **TM-721A**
DeLuxe FM DualBanders

- 144/220 MHz
- 45 W on 2 Meter 25 W on 1¼ Meter
- 30 Memories
- 144/450 MHz
- 45 W on 2 Meter 35 W on 70 cm
- 30 Memories

MANY MORE FEATURES

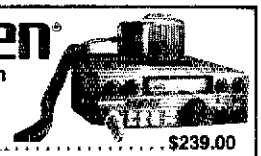
YAESU



FT-212RH

- 2 Meter Mobile that Doubles as Answering Machine
- 45 Watts Output
- Covers 138-174 MHz
- FT-712RH for 70 cm

uniden



HR-2510 10m Transceiver

HR-2510	$239.00
BC-560 XLT	$ 99.00
BC-580 XLT	$199.00
BC-760 XLT	$269.00
BC-200 XLT	$259.00

ASTRON

• RS7A	$50.00	• RS35M	$155.00
• RS12A	$72.00	• VS35M	$175.00
• RS20A	$92.00	• RS50A	$199.00
• RS20M	$109.00	• RS50M	$225.00
• VS20M	$129.00	• RM50M	$245.00
• RS35A	$139.00	• VS50M	$239.00

WE TRADE **800-227-7373** WE TRADE

525 E. 70th Unit IW • Denver, CO 80229
303 • 288 • 7373
Mon. - Fri. 9-5 M.S.T. — Saturdays 9-3

NEW!
The classic "Antenna Bible" now in a thoroughly-revised, much-enlarged edition

ANTENNAS

2nd edition
by John Kraus, W8JK
Ohio State University

Covers both theory and its applications to practical systems. Over 1000 illustrations and nearly 600 worked examples and problems. Over 100 new topics. Complete with design formulas, tables and references

917 pages, hardcover. $51.95

Add $2.50 per book for shipping and handling U.S., $5.00 elsewhere.

CYGNUS-QUASAR BOOKS
P.O. Box 85, Powell, Ohio 43065
Tel. 614-548-7895

WD4BUM'S
1/4 WAVE MAG. MOUNT ANTENNAS
ONLY $13.00

Complete with strong chrome plated maganet & 15' RG58 coax a PL259 is installed.

ORDER- M300 for 2 Meters
- M301 for 220 Mhz
- M302 for 440 Mhz

SEND CHECK, M.O., VISA or M.C.

To: MOBILE ANTENNAS and ACCESSORIES LAKEVIEW CO.
P.O. Box 5706 • Anderson, SC 29623
1-803-226-6990
Catalog available - Dealers welcome

ALPHA 70 Vapor and 3CV1500A7 Wanted. WD5JFR, 4161 Oak Road, Tulsa, OK 74105, 918-742-1845.

55 YEAR accumulation For Sale to highest bidder by December 1, 1988 includes National HRO's, SW-3 with PS, new small prop. pitch motor, Thordarson AM Transmitter, Motorola AM 494/495, Radiola II, Gonset II, military airborne, RTTY journals and gear. SASE for complete list. Albert Webb, W1HOD, 4 Bullard Avenue, Holyoke, MA 01040.

CRYSTALS For Builders, Experimenters, Conversions, Ancient Rigs, QRP—FT-243's made to order. 160M $3.95, five $2.95. 80M $2.95, five or more $2.50 each. 40M fundamentals and multipliers $2.95, five $1.95. 30M $2.95, five $2.50. Write for other bands and general listings-circuits. Two stamps or stamped SAE. "Crystals Since 1933." W9LPS. See October classified. C-W Crystals, Marshfield, MO 65706.

HEATHKIT—(HW101) checked out & works A-1 with extras and manual, $250. W8MDV, ph. 616-445-8447.

HY-GAIN TH5-DX Antenna, Ham IV Rotator and Accessories. No checks. Pick up. KA9EZB, 618-283-3116.

HARDLINE 75 Ohm. 35 Cents Foot. K1BW, 508-797-4190.

TEKTRONIX Equipment: Scope Plug-In Units: 1A1 Dual Trace 50 MHz, late model w/FET Inputs, $85. Type-M, 4-Trace, $75. Type-82, 75 MHz Dual Trace, $75. HP-140T Spectrum Analyzer Display, $275. Also Tektronix 5103/D10 Scope, 4.6 GHz Sampling Scope, complete set 661 Sampling Manuals, Probes, Scope Camera, send SASE. Joseph Cohen, 200 Woodside, Winthrop, MA 02152, 617-846-6312.

SELL: Eico Signal Generator Model 315 $45, Ten-Tec 12V 9A Power Supply Model 225 $55, Signal Generator 20-480 MHz Model TS 323/UR $45, Low Pass Filter 75Ω BW Model 426 $15, Handbook ART13 Xmtr. $15, Surplus Conversion Books Tom Kneitel 1964 $15, W1ORR Volume III 1960 $15. All in excellent condition. P. Lelong, N6GO, 5408 Simpson Avenue, North Hollywood, CA 91607, 818-766-4010.

FOR SALE: Hammarlund HQ129X $100. National NC46 with Matching Speaker $125. Johnson Valiant I and II both for $125. Collins 310B Exciter $150. Collins 32V2 $250. Johnson Ranger needs work $75. Johnson Ranger II mint $250. K4UJZ, 608 W. Thompson Lane, Murfreesboro, TN 37129, 615-893-5344.

WANTED: EX-242 FM and EX-243 Keyer Boards for ICOM 745. W4HAN, 205-622-3988.

IC22S Synthesizer Board Wanted or Sell My Perfect Main Board. N1AA, 617-334-6703.

SELL: Collins 32S1/75S1/30L1 together $500. EZ Way RBS-40 Crank-Up Tower. You remove $200. W2MN, Dix Hills, NY 11746, phone 516-427-3940.

STAINLESS Steel U-Bolts, Turnbuckles, Eye Bolts, Screw Eyes, Bolts, Screws. Free catalog. Elwick, Dept. 712, 230 Woods Lane, Somerdale, NJ 08083.

DRAKE TR-7 Transceiver with P-7 Power Supply; 250, 500 & 1800 Hz Filters, Noise Blanker, WARC Bands, Fan, Mic. Immaculate condition. Bob, W8SX, 200 Lewiston, Dayton, OH 45429, 513-299-7685 after 6:00 PM.

FOR SALE: Swan 700 CX. Best offer. Kenneth Irwin, WA9YRF, 11171 Meadowlark Lane, Belvidere, IL 61008, 815-547-6566.

FOR SALE: URC32 six foot rack of Collins equipment. Good for replacement parts. Chick, W1UKX, Hamden, CT 06518, 203-288-0930.

SELLING: Collins Directional Wattmeter 100/1000 Watts Incid/Refl. Sensing Unit, Switch and Meter, Instruction Manual, $50. Moe Jolfe, W6PHE, 7251 Willoughby Avenue, Los Angeles, CA 90046, 213-876-4734.

COLLINS KWM-380. All options: NB, SP, 140 cy., 360 cy., 1700 cy., 2400 cy., filters, mike, WARC, manuals, all factory updates, mint condition, $2900. K2AOU, 315-343-4387 evenings & weekends.

SALE: IC-751 new 7/86, IC-SM6, HM-12, PS-430, Drake MN-4C. All mint, $995. Steve, W2DOR, 201-349-1892.

MACINTOSH Ham Software. MacTrak™ tracks satellites, sun, moon. Graphic or tabular outputs. Compatible with Mirage Tracking Interface for rotor control, $49.95. DX Helper™ provides DX info including distance, bearing, sunrise, sunset, propagation MUF, great circle display, more, $24.95. SASE for info from R. Stegemeyer, P.O. Box 1590, Port Orchard, WA 98366.

WANTED—HQ1 Mini-Quad Antenna. Mike McKay, 117 Bowmoor Bank, Peachtree City, GA 30269, 404-487-8048.

MICROWAVE Module MMT220/28s (25 or 28 MHz I.F.), Mirage C1012 Amplifier, KLM 22 el. 220 Antenna, all in like new condition, $390 or best; ICOM IC-230 2 Meter, works great $75, IC-22S, needs repair $30; Want ICOM IC-RP3010 Repeater. Call John, KC5GB, 713-376-1616.

ANNOUNCING Call Sign Lapel Pins and Pendants. Specify horizontal, vertical or diagonal. Solid 14 karat gold. Great gifts, $48.95 plus NYS sales tax. Chains available. KB2MB, H&M Jewelry, 26 Edgecomb Road, Binghamton, NY 13905.

NEW or Used Serviceable Coils for HQ-1 Mini-Quad. W4ADX, 1162 S. Harbor Drive, Riviera Beach, FL 33404.

FOR SALE: RS DMP-130-$100; Everex Graphics Edge Card-$50; US Robotics 1200/300 Modem-$40; RS 20 Ch. Scanner All Band-$200; Wanted TNC. KB4YKC, 904-733-3692.

DIGITAL Automatic Displays. All Radios. Grand Systems, P.O.B. 3377, Blaine, WA 98230.

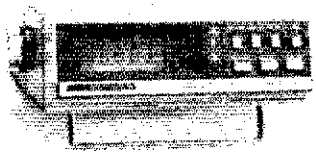
NEW Multimode PAKRATT 64 w/HF Modem $165. Letter Quality Printer Axiom Elite 5 $150 or Best Offers. Both items for Commodore 64 use. WA2ANG, 340 Torrance Avenue, Vestal, NY 13850, 607-754-7767.

SELLING: Yaesu FT-230R 2M FM Radio. Excellent condition, $235; I ship stateside. Call Kevin, NEØD, 612-732-3250.

AES® / KENWOOD • Closeouts & Specials of the Month . .

AX-2
Shoulder Strap with Ground Plane Antenna Base* for TR-2400/2500/2600 3500/3600 handhelds . . . **$9.95**
*antenna not included

***New!* TM-621A** 2m/220MHz
45/25 Watt
FM mobile transceiver/TTP
Now In Stock!
List $699.95 - **Call for Price**



CD-10
Call Sign Display
Closeout $49.95
For DCL/DCS series tranceivers. Stores call sign of calling station in memory and displays it on LCD display.

FREE Extra Battery Pack!

TH-21BT
2-meter Handheld
.15/1 Watt with 180 ma. battery, wall charger, built-in CTCSS encoder.
Closeout $199.95
— includes —
FREE Battery!
Extra PB-21 180 ma. battery included at No Extra Charge.

220 MHz . . . Temporary Specials
TM-321A 25W 220FM xcvr w/TTP mic
TM-3530A 25W 220 FM xcvr w/TTP
TH-315A* 2.5W 220 FM HT/TTP
TH-31BT* 15/1W 220 FM HT/TTP
Call for Prices
*Special Price includes a **FREE** extra std. battery

Limited Quantities - all prices and availability subject to change without notice. Check with your salesman.

In Stock!
TS-140S 160-10M Tranceiver with 150kHz to 30MHz general coverage reciever... **CALL FOR PRICE**

In Stock! . . . Call Now for Prices
TH-25AT 2.5W FM HT w/battery and charger
TH-215A 2.5W FM HT with batt/chgr/TTP/PG-2V

Miscellaneous Closeouts

KPS-7A 6A power supply	$49.95
FC-10 Freq. controller for TM-201B/4018	29.95
LH-1 Leather case for TR-2400	29.95
LH-2 Leather case for TR-2500/3500	29.95
DF-180 Digital freq control for TS-180S	49.95
MB-1A Mobile mount for TR-2200	2.95
AM-599 AM filter for R-599	2.95

MasterCard **USE YOUR CREDIT CARD** VISA

Clean, late model Trade-ins accepted.
(except for Handhelds and UHF/VHF RF amplifiers)

Order Toll Free: 1-800-558-0411

In Wisconsin (outside Milwaukee Metro Area) 1-800-242-5195

AMATEUR ELECTRONIC SUPPLY® Inc.

4828 W. Fond du Lac Avenue; Milwaukee, WI 53216 • Phone (414) 442-4200

AES® BRANCH STORES — **Associate Store**

WICKLIFFE, Ohio 44092
28940 Euclid Avenue
Phone (216) 585-7388
Ohio WATS 1-800-362-0290
Outside Ohio 1-800-321-3594

ORLANDO, Fla. 32803
621 Commonwealth Ave.
Phone (407) 894-3238
Fla. WATS 1-800-432-9424
Outside Florida 1-800-327-1917

CLEARWATER, Fla. 34625
1898 Drew Street
Phone (813) 461-4267
No In-State WATS
No Nationwide WATS

LAS VEGAS, Nev. 89106
1072 N. Rancho Drive
Phone (702) 647-3114
No In-State WATS
Outside Nevada 1-800-634-6227

CHICAGO, Illinois 60630
ERICKSON COMMUNICATIONS
5456 N. Milwaukee Avenue
Phone (312) 631-5181
15 min. from O'Hare!

Please use WATS line for Ordering and Price Checks. For other Info and Service Dept., please use our Regular lines.

Contact AES® for all of your KENWOOD needs!

★ Low Prices ★ Large Stocks ★ Fast Service
★ Top Trades ★ Toll Free Ordering line
★ **AES®** Ships Coast to Coast

HOURS: Mon. thru Fri. 9-5:30; Sat 9-3

MasterCard **USE YOUR CREDIT CARD** VISA

Note: Our **TOLL FREE** Ordering line **1-800-558-0411** is answered until 8 pm CST Monday thru Thursday.

Clip out this handy Coupon and Mail Today!

TO: AMATEUR ELECTRONIC SUPPLY®
4828 W. Fond du Lac Avenue
Milwaukee, WI 53216

I am interested in the following new KENWOOD Equipment:

_____

_____

I have the following to TRADE (What's your DEAL?)

_____

_____

Rush me your quote - I understand that I am under no obligation.

Name _____

Address _____

City/State _____ Zip _____

KENWOOD TS-430S, MC-42S, FM Board, SSB Filters, Instruction and Shop Manuals, $595. Bob Baer, KI4NT, 2525 Florida Blvd., Apt. 230, Delray Beach, FL 33483, 407-272-5151.

COLLINS 75A/2 Receiver. Best offer plus shipping. V. Dutaney, 1505 Holly Drive, Gering, NE 69341, 308-436-2603.

FOR SALE: Yaesu FT-DX-400, Hallicrafters SR-150, RME Receiver 4350 (CW only), Eico 723 CW Transmitter, Ameco Code Course (on records), Tubes, Meters, Parts. Send for list. Bill, NØZX, 11608 Davenport Plz. #23, Omaha, NE 68154.

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. We sponsor the classroom net on 7.238 at 1100 UTC daily and encourage your QSL for our weekly award. Please write us at: P.O.B. 1052, New York, NY 10002, or call our round the clock hotline: 516-674-4072. Thanks!

TOWER 40 Ft., Rohn 45G, Guys, Turnbuckles, Rods, Instruction Book, $275. N4IRC, 407-275-0936.

TELECOMMUNICATIONS Test Equipment: HP-4944A Transmission Impairment Measuring Set, cost $9000, sell $750. Also Siemens, Wandel-Goltermann Receivers, Generators & PCM Equipment, also at giveaway prices. SASE. Joseph Cohen, 200 Woodside, Winthrop, MA 02152, 617-846-6312.

SELL: Steel Tower 40' Crank Up Self Supporting Retract 10' $275. PU only. P. Lelong, N6GO, 5408 Simpson, North Hollywood, CA 91607, 818-766-4010.

WANTED: 3-1000Z, BTI or Collins Henry Basket Case. WD5JFR, 4161 Oak Road, Tulsa, OK 74105, 918-742-1845.

WANTED: Heathkit SW-7800 shortwave receiver. Operating, non-operating or parts. F.D. Williams, K3PUR, 1394 Old Quincy Lane, Reston, VA 22094, 703-437-4818.

WRITTEN Exams Supereasy. Memory aids from psychologist/engineer cut studytime 50%. Novice, Tech, Gen: $5 each. Advanced, Extra: $10 each. Moneyback guarantee. Bahr, 2535-G8, Marietta, Palmbay, FL 32905.

ROSS'$$$$ Used November Specials: Kenwood TM-401A $289.90, TR-9500 $459.90, TR-2400 $169.90, TR-3600A/TU35B $279.90, TS-520SE $449.90, ETO 76 $1299.90, 76PA $1999.90, ICOM IC-215 $99.90, IC-22SW/VIP $149.90, IC-730 $499.90, Swan Astro 102BX $459.90, Drake P-75 $69.90, PS-75 $129.90. Looking for something not listed?? Call or write. We have over 315 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 234Q, Preston, ID 83263, 208-852-0830.

COMMODORE/Amiga Chips, Parts, Diagnostics. Low price on repairs, (eg. C64-$49.95 plus UPS). Heavy Duty C64 Power Supply-$27.95 plus UPS. We ship worldwide. Kasara Microsystems Inc., 24 West Street, Spring Valley, NY 10977, 1-800-248-2983 or 914-362-3131.

GROUND Radial Wire For Verticals Or Slopers. Improves performance, new #16 bare solid copper. Lowest cost, 1000 foot spool, $33 includes shipping. Davis RF, P.O. Box 230-Q, Carlisle, MA 01741, 508-369-1738.

ROBOT 800C, new condition with manual. $175 will UPS. Call Ed, WB2YTM, 518-392-4801.

WANTED: Drake 2-NT Transmitter. Paul Juen, WEØQ, P.O.B. 29, Vergas, MN 56587.

UNLOCK The Power Of Your Heath Counter. IM-2400 owners, easy one evening kit yields two decades greater resolution. Measure things you thought you'd have to buy another counter for. You won't believe the difference. SASE for info or, $14.95 for kit #1113 to L & R Distributing Inc., P.O. Box 4643, Northbrook, IL 60065-4643.

ICOM 751 mint, used less than 100 hours receive, 10 hours transmit. $1195 or $1395 with internal PS-35 and FL-53A. WD6U, 415-433-6881.

FREE Shipping, Butternut Products, 10-11 Meter Compact Beams, HF6/2V Add-On Kits. Dipole Kits with Free Book. Stamp for Flyer. Hart Eastern Communications, 1444 Darlington, Derby, NY 14047.

WANTED: ICOM IC-211 or IC-251A. Rob Frohne, KL7NA, 119 E. Whitman Drive #10, College Place, WA 99324-1158, 509-529-3585.

WANTED: Omni with WARC Bands and Manual, without Power Supply. State price and condition. Gomolinski, 8803 Lakehill Drive, Lorton, VA 22079, 703-690-1568.

SB-303 (with filters), SB-401 (with crystals), HW-100 (includes HP23A, CW filter, custom ext. VFO), CP-1 modem; $100 each, you pay shipping. Doug, W3AS, 208-773-0480.

HAM WANT Advertiser: Free Advertising, you only pay small fee if sale is made, 200 ads per issue, SASE sample. Communications Exchange Sheet, P.O. Box 754-Q, Concord, MA 01742.

WANTED: Johnson Viking Matchbox. Gene Simon, W2KOY, 12 Remington Street, Cambridge, MA 02138, 617-547-6211.

SLEP SPECIALS, military USM-117C solid state small portable DC-5 MHz oscilloscope, ideal for bench work or modulation/RTTY testing $95, military USM-207 solid state portable 0 thru 500 MHz frequency counter, lab quality, late model $185, HP606A signal generator 50 KHz thru 65 MHz $295, TS-403/U microwave signal generator 1.8 GHz thru 4.2 GHz, military version of HP616B $195, TS-510A/U signal generator 10 MHz thru 420 MHz mil/spec version of HP608D $195, HP614A microwave signal generator 900 MHz to 2100 MHz $285, URM-25 signal generator, 10 KHz thru 50 MHz $145, lab calibrated, have quantity, Visa/MC or check, add shipping. Phone Bill Slep, 704-524-7519, Slep Electronics Company, Highway 441, Otto, NC 28763.

WILL Sell Factory Serviced HW101 in factory sealed carton, service invoice included. W/Manual, 400 Hz Fox-Tango Filter installed. HP23C Pwr. Supply, Cable and Manual, $250. Will Buy Eico #722 VFO W/Manual or Trade Heath HD1250 Solid State Dip Meter W/Manual. KØWOA, Rt. 2, Box 289, Ava, MO 65608.

COLLINS Wanted: 75S-3C Receiver. Contact G. Hawrysko, K2AWA, P.O. Box 568, Boro Hall, Jamaica, NY 11424.

FOR SELL: Collins KW-1 prototype, needs work, $1500; HQ110, $75; NC98, $65; Globe Chief, $50; Knight T-60, $45; Globe King 500A, $300; 5 KW homebrew linear, $1500; 100 foot mast, trailer, $2000; Vibroplex Black Wrinkle Bug, $90; Viking II, $65; Swan 500CX, 117XC, $300; NC200, $75; Katolite 12.5 KW generator trailer, $3500; Telrex 335 40 meter beam, needs shims, $750; Telrex 536 20 meter beam, needs shims, $350; want to buy, QST 1915-1925, Rohn 45, Telrex 10 meter beam, Telrex Rotor, Rotor Cable, RG214, RG17 Coax. K8CCV, 216-427-2303, 6-9 PM weeknights EST.

WANTED: Morse A Word or Code Star. Need help to upgrade. KAØNEM, Box 554, Devils Lake, ND 58301, 701-662-5585.

ANTENNA Parts Catalog, Lowest Costs: Dipole/Quad/Groud Radial Wire, Insulators, Center Feeds, Coax, Relays, Open Wire Feed Line, etc., (#14 multistrand dipole/quad wire, non-stretch, flexible, $29 per 275' (minimum), $.105 thereafter, includes shipping). Catalog: $2. Davis RF, P.O. Box 230-Q, Carlisle, MA 01741, 508-369-1738.

PARTS & Kits for the Home-Brew Radio Amateur. Two first class for latest catalog & flier. Small Parts Center, 6818 Mease Drive, Lansing, MI 48911.

SELLING Xerox 820-II, dual 8 inch drive. $320 or trade for PK-232. You pick up, Hamden, CT. WA1DOU, 203-281-3223.

1989 CALLBOOKS: Prepublication orders until 11/14; North American, $24; International, $27. Both, $48. Any four or more, $23. Any 15 or more, $22. Postpaid USA. Century Print, 6059 Essex, Riverside, CA 92504-1500, 714-687-5910.

IBM-PC RTTY/CW. New CompRtty II is the complete RTTY/CW program for IBM-PC's and compatibles. Now with larger buffers, better support for packet units, pictures, much more. Virtually any speed ASCII, BAUDOT, CW. Text entry via built-in screen editor! Adjustable split screen display. Instant mode/speed change. Hardcopy, diskcopy, break-in buffer, select calling, text file transfer, customizable full screen logging, 24 programmable 1000 character messages. Ideal for MARS and traffic handling. Requires 256k PC or AT compatible, serial port, RS-232C TU: $65. Send call letters (including MARS) with order. David A. Rice, KC2HO, 144 N. Putt Corners Road, New Paltz, NY 10219.

NEW Universal Timer, World Time and Temperature Electronically Displayed in F° or C°. $20 + $2 shipping. Wrist World Timer Calculator, 12 Time Zones. $10 + $1 shipping. NY add tax. Small Solar Panels Chargers. Send SASE. B.E.A.M. Solar & Electronics, N2ZY, 8205-11th Avenue, Brooklyn, NY 11219.

FOR SALE: excellent, very clean, 2 meter xcvrs., Azden PCS 5000, $250. KDK 240, $225, each plus shipping. Certified check, money order. Joseph F. O'Reilly, W9UFL, 414 South 3rd Street, Carrollton, IL 62016.

JOHNSON Kilowatt wanted with or without desk attachment. Carmine Iannace, KA2PAP, 283 Main Street A4, Farmington, CT 06032, 203-677-1332.

K6MOO QTH world wide DX. Top of the world Laguna Beach, CA. Great view of city, Pacific Ocean and Channel Islands and inland vallies. Price firm $375,000. Includes Tri-Ex 72 foot free standing tower and Telrex antenna, 20M model band and 10M & 15M dual bander. Complete with rotator and indicator. 714-494-4661.

ICOM IC-290A with original accessories and shipping carton. $330, I ship. Bennett Rosen, WA2JZO, 201-994-2299 days.

JOBS FOR HAMS

RADIO Observer Position Wanted: Have FCC T2-HQ-8630 and USCG R20539 plus worldwide immunizations. Previous shipboard experience, world traveller, single. K1BTD, 203-564-5217.

RF POWER TRANSISTORS

We stock a full line of Motorola & Toshiba parts for amateur, marine, and business radio servicing

SEE YOU AT THE MIAMI HAMFEST

Partial Listing of Popular Transistors in Stock

P/N	Net/Ea	P/N	Net/Ea
BFR96	$ 2.75	2N3771	3.50
J310	1.00	2N3866	1.25
MRF134	16.00	2N4048	11.95
MRF137	24.00	2N4427	1.25
MRF138	35.00	2N5109	1.75
MRF150	87.50	2N5179	1.00
MRF174	80.00	2N5589	7.25
MRF208	11.50	2N5590	10.00
MRF212	16.00	2N5591	13.50
MRF221	11.00	2N5641	9.50
MRF224	13.50	2N2642	13.75
MRF226	14.50	2N2643	15.00
MRF227	3.00	2N5945	10.00
MRF237	2.00	2N5946	12.00
MRF238	12.50	2N6080	6.25
MRF240, A	15.00	2N6081	8.00
MRF245	27.50	2N6082	9.50
MRF247	26.00	2N6083	9.75
MRF260	7.00	2N6084	11.50
MRF262	8.75	2SC1307	3.00
MRF264	10.50	2SC1946,/A	16.00
MRF317	56.00	2SC1947	9.75
MRF421	24.00	2SC1969	3.00
MRF422	36.00	2SC2075	3.00
MRF428	50.00	2SC2097	28.00
MRF433	11.00	2SC2166C	3.50
MRF450	13.50	2SC2290	16.75
MRF453	15.00	2SC2312	4.95
MRF454	14.00	2SC2509	9.00
MRF455	11.75	2SC2630	28.00
MRF458	20.00	2SC2641	16.00
MRF460	44.00	2SC2879	22.00
MRF475	3.00	3N204, 3N211	2.00
MRF476	2.75	40582	7.50
MRF477	11.75	*OUTPUT MODULES*	
MRF479	10.00	SAU4 *450 MHz*	55.00
MRF485 *MP-KEN*	18.00	SAU17A *903 MHz*	50.00
MRF492	16.00	SAV6 *156 MHz*	42.50
MRF497	14.25	SAV7 *146 MHz*	42.50
MRF515	2.50	SAV12 *146 MHz H.T.*	23.50
MRF555	3.00	SAV15 *222 MHz*	48.00
MRF607	2.50	M57712,M57733	use
MRF630	4.25	M57737, SC1019	SAV7
MRF641	18.00	SC1027	use SAU4
MRF644	21.00	MHW710-2/3	61.00
MRF646	25.00	MHW820-2	89.50
MRF648	31.00	*TUBES*	
MRF660	10.75	12BY7A	7.95
MRF837	2.25	8877	649.00
MRF843	22.50	8875	call
MRF846	37.75	6146B	12.95
MRF873	24.50	6550	14.95
MRF901	1.25	6HF5	13.95
NE41137	2.50	6JB6	10.95
PT9847	21.00	6JS6C	14.95
RF120	22.00	6LQ6	15.95
SD1278-1	13.75	572B/T160L	69.95
SD1407	$25.00	4CX250B	79.50
SRF2072	12.75	3-500Z	114.50
SRF3662	24.00	3CX350A	call
SRF3800	17.50	3CX800A7	call
2N1522	11.95	3CX1200A7	call
2N3553	2.25	3CX3000A7	call

Hi-Gain, Matched, and Selected Parts Available
MATCHED TUBE FINALS IN STOCK FOR HAM EQUIPMENT
WE SERVICE ATLAS, ASTRO & SWAN—CALL FOR INFO

RF Power transistors in stock for Atlas, KLM, Collins, Yaesu, Kenwood, Cubic, Mirage, Motorola, Heathkit, Regency, Johnson, Icom, Drake, TWC, Wilson, GE, etc. Cross-reference on CD, PT, SD, SRF, JO, and 2SC P/Ns.

Quantity Pricing Available COD / VISA / MC

Ship/Hand. 1 lb. U.S. or Foreign Sm Pkt Air 8 oz. $5.00

Orders received by 1 PM PST shipped UPS same day. Next day UPS delivery available

PARTS ORDERS ONLY — NO TECHNICAL
(800) 854-1927

ORDER LINE and/or TECH HELP
(619) 744-0728
FAX 619-744-1943

RF PARTS
1320 Grand Avenue
San Marcos, CA 92069

CALL TOLL FREE 1-800-238-6168

(In Tennessee, call 901-683-9125)

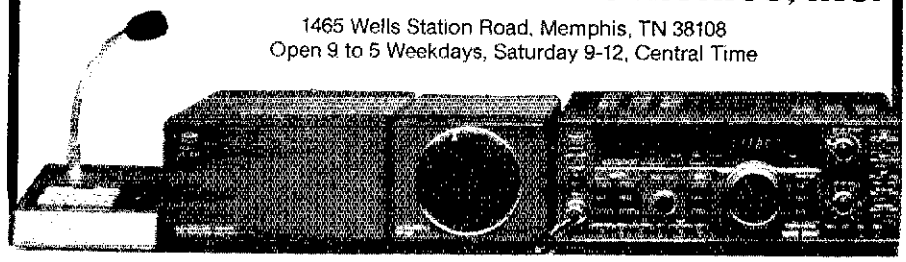
America's Favorite Brands at Competitive Prices!

Authorized Dealer For:
KENWOOD, ICOM, TEN-TEC, HUSTLER, NYE VIKING, BUTTERNUT, CUSHCRAFT, MFJ, AEA, AS, B&W, ASTRON, LARSEN, GRUNDIG, ALINCO, DAIWA, MIRAGE, TOKYO, HY-POWER, AMERITRON, VAN GORDEN, ARRL, AMECO, ALLIANCE, KEN-PRO & OTHERS!

Write For
FREE CATALOG
WE TRADE!
for good used gear!
CALL FOR APPRAISAL!

MEMPHIS AMATEUR ELECTRONICS, INC.

1465 Wells Station Road, Memphis, TN 38108
Open 9 to 5 Weekdays, Saturday 9-12, Central Time



ALL ELECTRONICS CORP.

PIEZO WARNING DEVICE
Murata Erie # PKB8-4A0
High pitched audible alarm.
Operates on
3 - 20 Vdc @ 20 ma.
1" high x 7/8" dia.
P.C. board mount.
CAT# PBZ-84 $1.75 each

XENON TUBE
1" long flashtube prepped with 3 1/2" red and black leads. Ideal for electronic flash or strobe projects.
CAT# FLT-3 2 for $1.00

N-CHANNEL MOSFET
IRF-511 TO-220 case
CAT# IRF 511
$1.00 each
10 for $9.00
LARGE QUANTITY

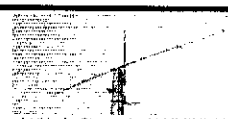
WIDE BAND AMPLIFIER
NEC#UPC1651G
1200 Mhz @ 3 db. Gain: 19db @ f=500 hz 5 volt operation. Small package 4mm dia. x 2.5 mm thick.
CAT# UPC-1651 2 for $1.00
10 for $4.50 100 for $35.00

10 AMP SOLID STATE RELAY
ELECTROL #S2161
CONTROL:5.5 - 10 Vdc
(will operate 3-32Vdc)
LOAD: 10 Amp @ 240 Vac
2 1/4" X 1 3/4" X 7/8"
CAT# SSRLY-10B $9.50 each
10 for $85.00 • 25 for $175.00
50 for $300.00 • 100 for $500.00

SEND FOR:
FREE 1988 56 PAGE CATALOG
WITH OVER 4000 ITEMS

MAIL ORDERS TO:
ALL ELECTRONICS
P.O. BOX 567
VAN NUYS, CA 91408
TWX:5101010163(ALL ELECTRONIC)
OUTSIDE THE U.S.A. SEND $1.50 POSTAGE FOR A CATALOG!!

ORDER TOLL FREE
800-826-5432
INFO: (818)904-0524
FAX: (818)781-2653
MINIMUM ORDER $10.00
QUANTITIES LIMITED
CALIF. ADD SALES TAX
USA: $3.00 SHIPPING
FOREIGN ORDERS
INCLUDE SUFFICIENT
SHIPPING. NO C.O.D.



Light Weight/High Strength ALUMINUM Tubing (Alloy 6061-T6) for Masts and Telescoping Elements

How many antennas have you seen ruined by the failure of the mast? If you are stacking antennas, or have a beam antenna, our 6061-T6 Aluminum masts will increase the survivability of your antenna system. These masts are 67% lighter and 50% stronger than galvanized steel tubing. An example of the weight difference is: 2" OD x ¼" Wall x 24' Long, **AL-39#, Steel-112#.**

Sizes Available:
1½" to 6" OD x ⅛" to ¼" Wall x **24'** Long (For masts and booms) ¾" to 2" OD x .058" Wall x 12' Long (Drawn for telescoping), **⅜" and ½" 6061-T6 Rod, 12' lengths.**

Club and volume discounts are offered. MC & VISA accepted. For a complete stock list, please write or call:

METAL & CABLE CORP., INC.
(formerly Exmet, Inc.)
P.O. Box 117 • 2170 E. Aurora Rd
Twinsburg, Ohio 44087 • (216) 425-8455

FOR IBM PC, XT, AT AND COMPATIBLES
FINALLY — A FULL FEATURED PROGRAM FOR
CW CODE TRAINING AND PRACTICE

THE KEY

FULL FEATURES INCLUDE :

- SIMULATED RADIO BROADCASTS
- RANDOM LETTERS/NUMBERS
- SENTENCE PRACTICE
- VARIABLE CODE SPEED
- TEXT GENERATOR
- WORD PRACTICE
- PRO-SIGNS
- NUMBER PRACTICE
- VARIABLE PITCH
- AUDIO REPLAYS

256K MEMORY 1 DSDD DRIVE 5 1/4 "
MS DOS 2.0 BASIC/GW BASIC

PROGRAM DISKETTE AND USER MANUAL — ONLY $39.99

Richlyn Innovative Software

P.O. BOX 6783 NORTH AUGUSTA, SC 29841

South Carolina Residents Add 5% Sales Tax

SEND BUSINESS SIZE S.A.S.E. FOR DETAILS

ADVERTISING DEPARTMENT STAFF

Bruce O. Williams, WA6IVC, Advertising Manager
Angela M. Beebe, KA1SER, Advertising Assistant

203-667-2494 is a direct line, and will be answered only by Advertising Department personnel.

Index of Advertisers

ANTENNA/TOWER SALE!

hy-gain

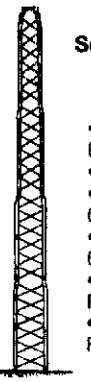
CRANKUP SALE!

All Models Shipped Factory Direct—Freight Paid*!

Check these features:
- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
HG37SS	37 ft	9 sq ft	$CALL
HG52SS	52 ft	9 sq ft	$CALL
HG54HD	54 ft	16 sq ft	$CALL
HG70HD	70 ft	16 sq ft	$CALL

Masts—Thrust Bearings—Other Accessories Available—Call! Prices Shown Are Your Total Delivered Price In Continental U.S.A.!



ROHN

Self Supporting Towers On SALE!

FREIGHT PREPAID

- All Steel Construction—Rugged
- Galvanized Finish—Long Life
- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save $
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	228	$419
HBX48	48 ft	10 sq ft	303	$539
HBX56	56 ft	10 sq ft	385	$829
HDBX40	40 ft	18 sq ft	281	$519
HDBX48	48 ft	18 sq ft	363	$619

*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.

ROHN

Guyed Tower Packages

- World Famous Rohn Quality and Dependability
- Rugged high wind survival-provides safe installation
- Multi purpose towers satisfy a wide range of needs
- Complete packages include: guy hardware, turnbuckles, guy assemblies, w/torq bars, concrete base, rotor plate and top section per manufacturers specs.

Packages shown below are rated for wind zone "B" (86 mph wind). Zone "C" (100 mph wind) design prices slightly higher. All tower packages shipped freight collect from our Plano, TX warehouse, in stock for prompt delivery.

	Model 25G	Model 45G	Model 55G
50'	$689	$1369	$1888
60'	849	1549	1898
70'	919	1699	2069
80'	1099	1899	2299
90'	1179	2199	2489
100'	1269	2399	2689
110'	1499	2569	3129
120'	1579	2749	3349

US TOWER CORPORATION

These rugged crankup towers and masts now available from Texas Towers!

Check these features:
- All steel construction
- Hot dipped galvanized
- Totally self-supporting-
- No guys needed

Coax arms, Thrustbearings Masts, Motor drives, Remote controls, Hinged bases, Rotor bases, & Raising fixtures also in stock-

CALL FOR SALE PRICES!

Model	Min.Ht.	Max.Ht.	Ant.load*	Sale price
MA40 mast	21'	40'	10 sq ft	$629
MA550 mast	22'	50'	10 sq ft	999
TX438	22'	38'	18 sq ft	919
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*

RG-213U

$.36/ft $349/1000 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!

RG-8X

$.22/ft $209/1000 ft.

- RG8X—95% Bare Copper Shield • Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

9086

$.42/ft $409/1000 ft.

- Same Specs as Belden 9913
- Lower loss than RG8U
- 100% shielded-braid & foil

HARDLINE/HELIAX®

Lowest Loss for VHF/UHF!

½" Alum. w/poly Jacket.....$.79/ft.
½" LDF4-50 Andrew Heliax®.....$1.99/ft.
⅞" LDF5-50 Andrew Heliax®.....$4.99/ft.
select connectors below
Heliax® is a Registered Trademark of the Andrew Corp.

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

HARDLINE & HELIAX® CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Alum	$25	$25	$33	$33
½" Heliax®	$29	$29	$29	$29
⅞" Heliax®	$55	$55	$55	$55

COAX CONNECTORS

Amphenol Silver PL259.....$1.50
UG21B N Male.....$3.50
9086/9913 N Male Connector.....$4.95

ANTENNA WIRE & ACCESSORIES

Stranded Copper 14ga.....$.10/ft.
¼ mile 18ga copper-clad steel wire.....$30
Dog bone end insulator.....$.79 ea.

Van Gorden

1:1 Balun.....$15 Center Insulator.....$8
Dipole Kits.....D80 $31.95/D40 $28.95
Short Dipole Kits.....SD80 $35.95/SD40 $33.95
All-band Dipole w/ladder line.....$29.95
G5RV all band antenna.....$49.95

ALPHA DELTA

DX-A 160-80-40 Sloper.....$49

CUSHCRAFT

A3 3-el Tribander.....$259
A4S 4-el Tribander Beam w/S.S. Hdwre.....$349
A743 & A744, 30/40 mtr KIT for the A3 & A4.....$ 89
R4 20-10 mtr Vertical.....$229
AP8 80-10 mtr Vertical.....$159
AV5 80-10 mtr Vertical.....$119
D40 40 mtr Dipole.....$159
40-2CD 2-el 40 mtr Beam.....$339
A50-5 5-el 6 mtr Beam.....$ 98
215 WB NEW 15-el 2 mtr Beam.....$ 89
230 WB NEW 30-el 2 mtr Beam.....$229
4218 XL 18-el 2 mtr Beam.....$129
3219 19-el 2 mtr Beam.....$109
424B 24-el 432 MHz Beam.....$ 89
ARX2B 2 mtr Vertical.....$ 45

hy-gain

CALL FOR SPECIAL PRICES!

Discoverer 2-el 40-mtr Beam.....
Discoverer 3-el Conversion Kit.....
EXPLORER-14 SUPER-SPECIAL.....
QK710 30/40 mtr. Add-On-Kit.....
V2S 2-mtr Base Vertical.....
V4S 440MHz Base Vertical.....
TH5MK2S Broad Band 5-el Triband Beam.....
TH7DXS 7-el Triband Beam.....
TH3JRS 3-el Triband Beam.....
205BAS 5-el 20-mtr Beam.....
155BAS 5-el 15-mtr Beam.....
105BAS 5-el 10-mtr Beam.....
204BAS 4-el 20-mtr Beam.....
64BS 4-el 6-mtr Beam.....
12 AVQ 20-10 mtr vertical.....
14 AVQ 40-10 mtr vertical.....
18 AVT/WB 80-10mtr Vertical.....
18HTS 80-10 mtr Hy-Tower Vertical.....
23BS 3-el 2 mtr Beam.....
25BS 5-el 2 mtr Beam.....
28BS 8-el 2 mtr Beam.....
214BS 14-el 2-mtr Beam.....
2BDQ 80/40 mtr Trap Dipole.....
5BDQ 80-10 mtr Trap Dipole.....
BN86 80-10 mtr KW Balun W/Coax Seal

HUSTLER

6BTV 80-10 mtr Vert $149 5BTV 80-10 mtr Vert $129
4BTV 40-10 mtr Vert $99 G7-144 2-mtr Base $129
G6-144B 2-mtr Base $89

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$16	$17	$19	$22	$26
2KW Super	$20	$22	$25	$29	$39

Bumper Mounts - Springs - Folding Masts in Stock!

BUTTERNUT ELECTRONICS CO

HF6V 80-10m Vertical $129 Delivered
- Full Legal Power
- Highest Q Tuning Circuits

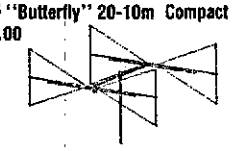
HF2V 80-40m Vertical $129 Delivered
- Full Legal Power
- Automatic Band Switching

Accessories:
RMK II Roof Mtg. Kit.....$49
STR II Stub-Tuned Radials.....$29
TBR160 160m Coil Kit.....$49
30m Add-on Kit.....$29
20m Add-on Kit.....$39
17/12m Add-on Kit.....$27

HF6V HF2V

FREE UPS on ACCESSORIES when purchased w/antenna

HF5B "Butterfly" 20-10m Compact Beam $199.00



- Unique Design Reduces Size
- No Lossy Traps
- Turns w/TV Rotor
- Boom Length 6 Feet
- Element Length 12.5 Feet

FREE UPS Shipping in Continental USA

MIRAGE/KLM

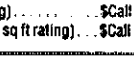
KT34A 4-el Broad Band Triband Beam.....$399.95
KT34XA 6-el Broad Band Triband Beam.....$589.95

ROTORS

Alliance HD73 (10.7 sq ft rating).....$119.95
Alliance U110 (3 sq ft rating).....$49
Telex CD 45II (8.5 sq ft rating).....$Call
Telex HAM 4 (15 sq ft rating).....$Call
Telex Tailtwister (20 sq ft rating).....$Call
Telex HDR300 Heavy Duty (25 sq ft rating).....$Call

ROTOR CABLE

Standard 8 cord cables $.22/ft.
(vinyl jacket 2-#18 & 6-#22 ga)
Heavy Duty 8 Cond cable $.39/ft
(vinyl jacket 2-#16 & 6-#18 ga)



ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS

20G.....$49.50 45G.....$139.50
25G.....$59.50 55G.....$179.50

ALL ACCESSORIES IN STOCK—CALL

ROHN FOLDOVER TOWERS

Model	Height	Ant. Load*	Price
FK2548	48 ft.	15.4 sq. ft.	$1129
FK2558	58 ft.	13.3 sq. ft.	1199
FK2568	68 ft.	11.7 sq. ft.	1239
FK4544	44 ft.	34.8 sq. ft.	1489
FK4554	54 ft.	29.1 sq. ft.	1599
FK4564	64 ft.	28.4 sq. ft.	1699

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.

TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating).....$.15/ft
1/4 EHS Guywire (6650 lb rating).....$.18/ft
5/16 EHS Guywire (11,200 lb rating).....$.29/ft
5/32 7 × 7 Aircraft Cable (2700 lb rating).....$.15/ft
3/16 CCM Cable Clamp (3/16" or 5/32").....$ 45
1/4 CCM Cable Clamp (1/4" Cable).....$.55
1/4 TH Thimble (fits all sizes).....$.45
3/8EE (3/8" Eye & Eye Turnbuckle).....$6.95
3/8 EJ (3/8" Eye & Jaw Turnbuckle).....$7.95
1/2 × 9EE (1/2" × 9" Eye to Eye Turnbuckle).....$9.95
1/2 × 9EJ (1/2 × 9" Eye & Jaw Turnbuckle).....$10.95
1/2 × 12EE (1/2" 12" Eye & Eye Turnbuckle).....$12.95
1/2 × 12EJ (1/2" × 12" Eye & Jaw Turnbuckle).....$13.95
5/8 × 12EJ (5/8" × 12" Eye & Jaw Turnbuckle).....$16.95
3/16" Preformed Guy Grip.....$2.49
1/4" Preformed Guy Grip.....$2.99
6" Diam - 4 ft Long Earth Screw Anchor.....$14.95
500 D Guy Insulator (5/32" or 3/16" Cable).....$1.69
502 Guy Insulator (1/4" Cable).....$2.99
5/8" Diam - 8 ft Copper Clad Ground Rod.....$12.95

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating).....$.32/ft
HPTG4000 Guy Cable (4000 lb rating).....$.52/ft
HPTG6700 Guy Cable (6700 lb rating).....$.72/ft
9901LD Cable End (for 2100/4000 cable).....$9.95
9902LD Cable End (for 6700 cable).....$11.95
Sockettast Potting Compound (does 6-8 ends).....$16.95

GALVANIZED STEEL MASTS

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
.18 in Wall	$49	$89	$129	$149
.25 in Wall	$69	$129	$189	$249

ORDER TOLL FREE 1-800-272-3467

Texas, Alaska & for information 1 (214) 422-7306

VISA MasterCard

TEXAS TOWERS

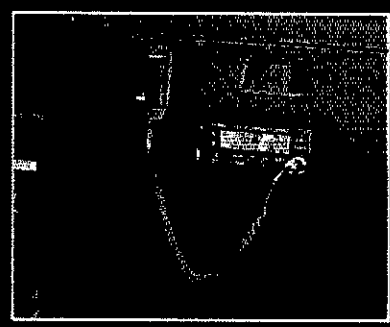
Mon-Fri: 9am - 5 pm
Sat: 9am - 1 pm

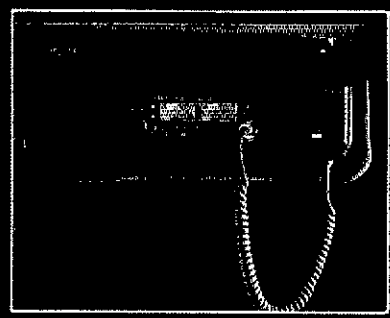
Div. of Texas RF Distributors Inc. 1108 Summit Ave., Suite 4 • Plano, Texas 75074

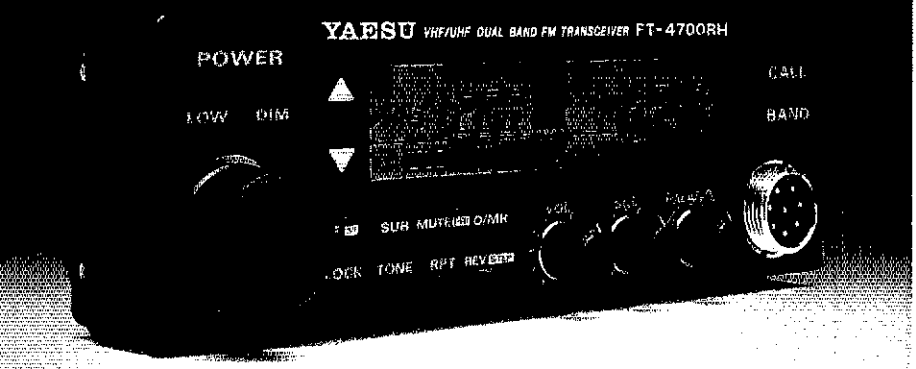
(Prices & Availability Subject To Change Without Notice)

(Antenna/tower product prices do not include shipping unless noted otherwise)

YAESU'S DUAL BANDER GOES PLACES OTHER MOBILES DON'T.







FT-4700RH control head
(1 15/16" x 5 7/8" x 1")

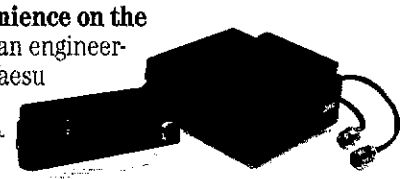
Introducing Yaesu's FT-4700RH dual-band mobile. Choose Yaesu's FT-4700RH, and you open the door to a lot of tight spaces.

While other dual banders just won't fit in today's small cars, the FT-4700RH utilizes a versatile "remote head" design. So you can mount the "brains" on your dash, visor, or door, and hide the "muscle" under your seat.

High-performance package. Packing a solid 50-watt punch on 2 meters (40 watts on 70 cm), the FT-4700RH includes Dual-Band Watch for simultaneous monitoring of both bands, with independent squelch settings on the main and secondary bands. When you transmit, opposite band monitoring goes on in a full-duplex mode.

You can adjust the relative volume of the two receive channels with the balance control, too. And with Yaesu's bright LCD display, transceiver status is clearly visible in sunlight or shade.

Convenience on the road. Human engineering, long a Yaesu specialty, is an important aspect of the FT-4700RH design. The ten-button front panel keypad includes a "do-re-mi" audible command verification, and all important controls are backlit for night operation. Plus you get extended receive coverage of 140-174 MHz (MARS/CAP permit required for transmit on 140-150 MHz, or 430-450 MHz on 70 cm). Nine memory channels on each band. High/low power selection (low power: five watts). One-touch reverse repeater shift button. Optional CTCSS module. And 16-key DTMF microphone.



Optional accessories. FTS-8 CTCSS unit. MH-15D8 Autodialer Microphone with 10-telephone number memory. SP-3 or SP-4 External Speakers. And YH-1 Headset/Boom Mic or MF-1A3B Flex-Arm Boom Mic, both with SB-10 PTT Switch Unit.

Discover Yaesu's FT-4700RH today. And see what "high performance" really means. For dual-band mobile operation, Yaesu's FT-4700RH really fits!

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. **Repair Service:** (213) 404-4884. **Parts:** (213) 404-4847. Prices and specifications subject to change without notice.

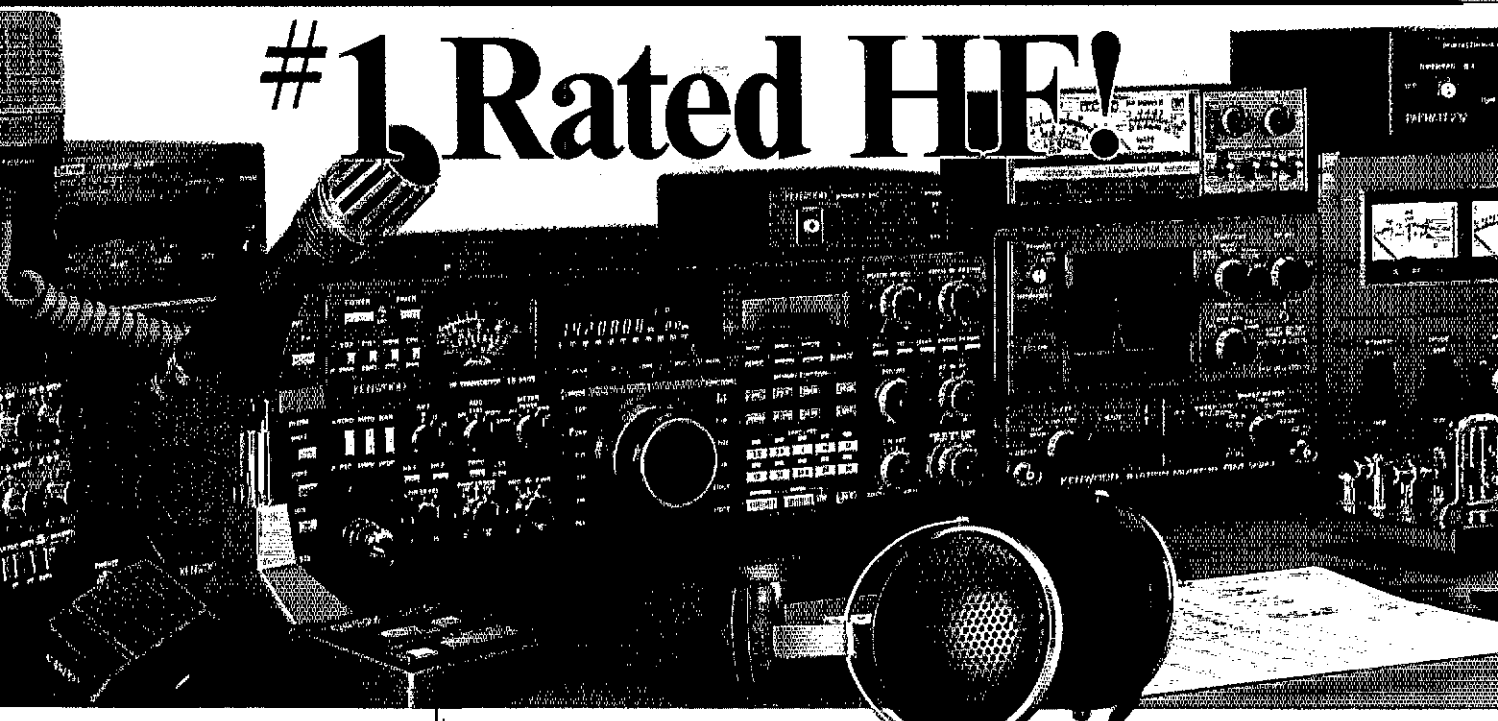
YAESU

KENWOOD

...pacesetter in Amateur Radio

DX-cellence

#1 Rated HF!

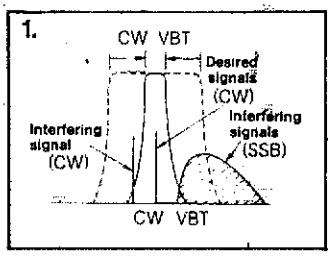


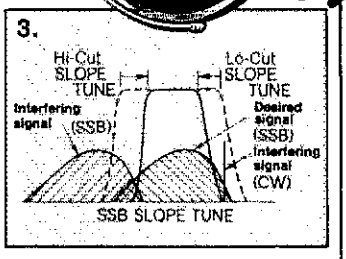
TS-940S

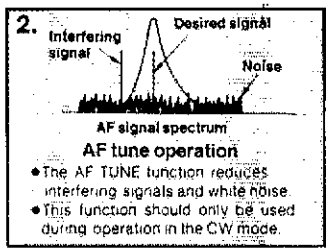
Competition class HF transceiver

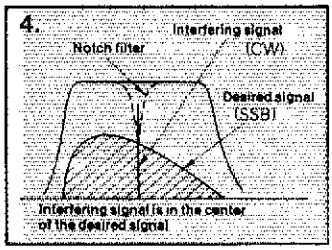
TS-940S—the standard of performance by which all other transceivers are judged. Pushing the state-of-the-art in HF transceiver design and construction, no one has been able to match the TS-940S in performance, value and reliability. The product reviews glow with superlatives, and the field-proven performance shows that the TS-940S is "The Number One Rated HF Transceiver!"

- **100% duty cycle transmitter.** Kenwood specifies transmit duty cycle ***time.*** The TS-940S is guaranteed to operate at full power output for periods ***exceeding one hour.*** (14.250 MHz, CW, 110 watts.) Perfect for RTTY, SSTV, and other long-duration modes.
- **First with a full one-year limited warranty.**
- **Extremely stable phase locked loop (PLL) VFO.** Reference frequency accuracy is measured in ***parts per million!***









1) CW Variable Bandwidth Tuning. Vary the passband width continuously in the CW, FSK, and AM modes, without affecting the center frequency. This effectively minimizes QRM from nearby SSB and CW signals.

2) AF Tune. Enabled with the push of a button, this CW interference fighter inserts a tunable, three pole active filter between the SSB/CW demodulator and the audio amplifier. During CW QSOs, this control can be used to reduce interfering signals and noise, and peaks audio frequency response for optimum CW performance.

3) SSB Slope Tuning. Operating in the LSB and USB modes, this front panel control allows independent, continuously variable adjustment of the high or low frequency slopes of the IF passband. The LCD sub display illustrates the filtering position.

4) IF Notch Filter. The tunable notch filter sharply attenuates interfering signals by as much as 40 dB. As shown here, the interfering signal is reduced, while the desired signal remains unaffected. The notch filter works in all modes except FM.

- **Complete all band, all mode transceiver with general coverage receiver.** Receiver covers 150 kHz-30 MHz. All modes built-in: AM, FM, CW, FSK, LSB, USB.
- **Superb, human engineered front panel layout for the DX-minded or contesting ham.** Large fluorescent tube main display with dimmer; direct keyboard input of frequency; flywheel type main tuning knob with optical encoder mechanism all combine to make the TS-940S a joy to operate.
- **One-touch frequency check (T-F SET) during split operations.**
- **Unique LCD sub display indicates VFO, graphic indication of VBT and SSB Slope tuning, and time.**
- **Simple one step mode changing with CW announcement.**
- **Other vital operating functions.** Selectable semi or full break-in CW (QSK), RIT/XIT, all mode squelch, RF attenuator, filter select switch, selectable AGC, CW variable pitch control, speech processor, and RF power output control, programmable band scan or 40 channel memory scan.

Optional accessories:
• AT-940 full range (160-10m) automatic antenna tuner • SP-940 external speaker with audio filtering • YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters; YK-88A-1 (6 kHz) AM filter • VS-1 voice synthesizer • SO-1 temperature compensated crystal oscillator • MC-43S UP/DOWN hand mic. • MC-60A, MC-80, MC-85 deluxe base station mics. • PC-1A phone patch • TL-922A linear amplifier • SM-220 station monitor • BS-8 pan display • SW-200A and SW-2000 SWR and power meters • IF-232C/IF-10B computer interface.

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

KENWOOD

KENWOOD U.S.A. CORPORATION
2201 E. Dominguez St., Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745