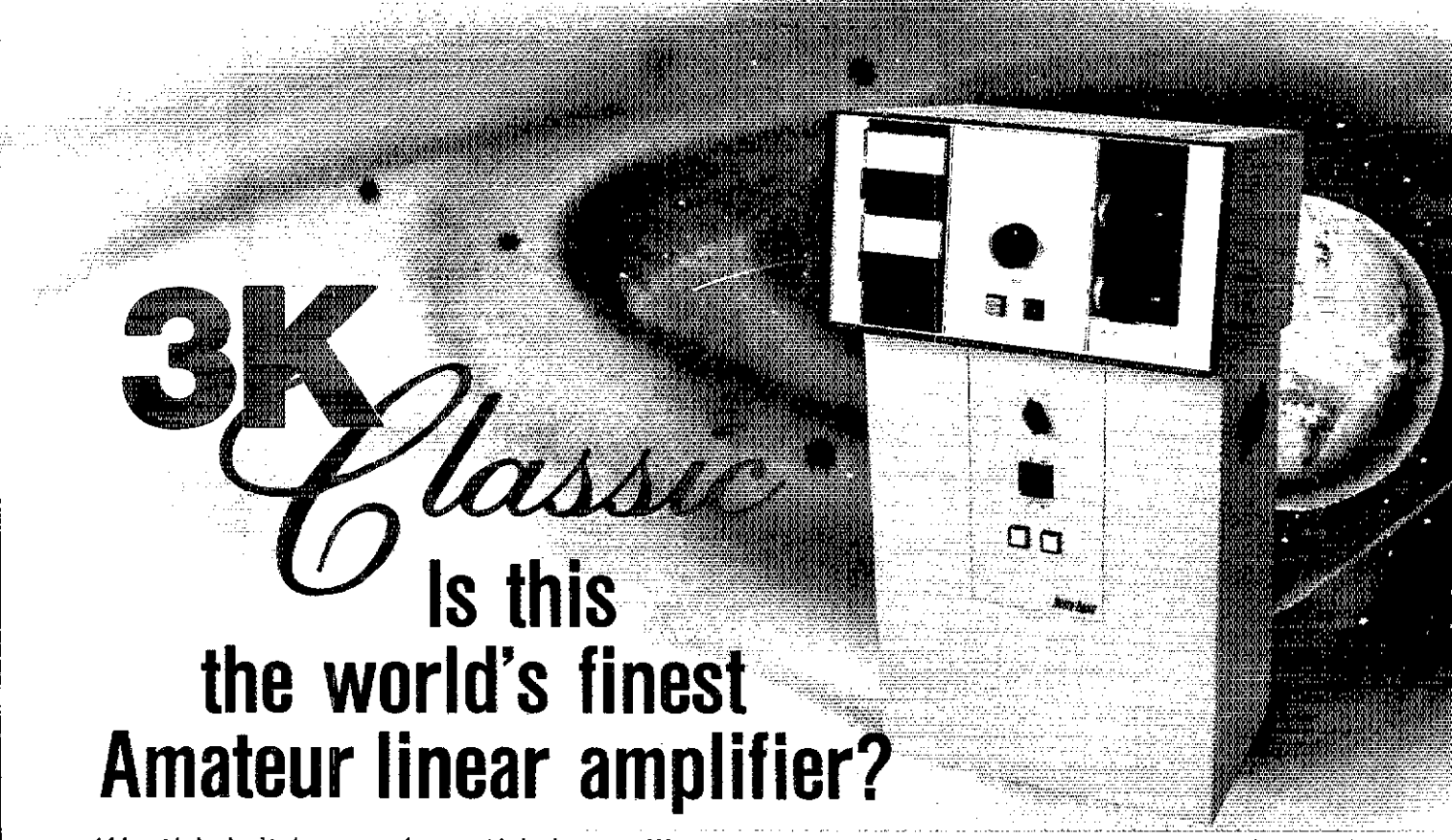
QST

May 1981 $2.50

devoted entirely to Amateur Radio

Computers in the ham shack



3K Classic

Is this the world's finest Amateur linear amplifier?

We think it is...and we think you'll agree with us.

2K Classic and 3K Classic pictured above

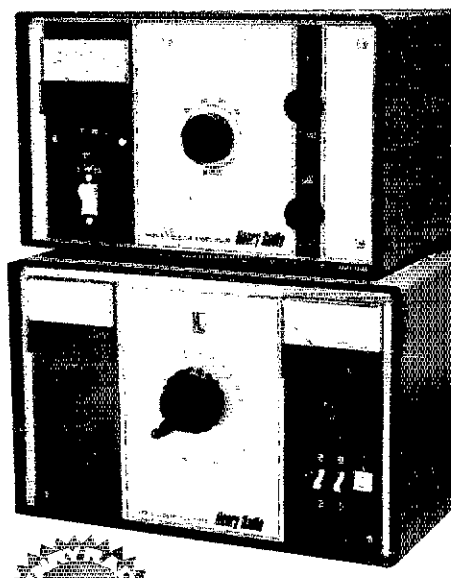
Ever since we made our first Amateur amplifier almost 20 years ago, our goal has been to make the finest, most rugged and reliable amplifier possible. Now with the 3K Classic we have accomplished this. It contains all of the famous Henry amplifier features plus the magnificent 8877 tube, rugged heavy duty power supply components and advanced antenna switch relay for semi break-in on CW. This is the amplifier of every Amateur's dreams! *Subject to FCC type acceptance*

The 3K Classic/X with heavy duty power supply and 10 meter operation is available for sale outside the USA where FCC type acceptance is not required.

The 2K Classic The 2K Classic represents the culmination of years of experience in developing, manufacturing and improving the 2K series. It remains as always a "workhorse", engineered and built to loat along at full legal power for days or weeks without rest. A look inside shows why! It is truly a "Classic" amateur amplifier. Heavy duty, top quality components along with its rugged construction assures you trouble free operation. It will put your signal on the air with greater strength and clarity than you ever dreamed possible. The 2K Classic operates on all Amateur bands, 80 through 15 meters (export models include 10 meters). Price $1295.00

The 1KD-5 ...Another fine member of the famous Henry Radio family of superior amplifiers. And we're still convinced that it's the world's finest linear in its class. The 1KD-5 was designed for the amateur who wants the quality and dependability of the 2KD-5 and 2K-4, who may prefer the smaller size, lighter weight and lower price and who will settle for a little less power. But make no mistake, the 1KD-5 is no slouch. Its 1200 watt PEP input (700 watt PEP nominal output) along with its superb operating characteristics will still punch out clean powerful signals...signals you'll be proud of. Compare its specifications, its features and its fine components and we're sure you will agree that the 1KD-5 is a superb value at only $695.

The 2KD-5 We have been suggesting that you look inside any amplifier before you buy it. We hope that you will. If you "lift the lid" on a 2KD-5 you will see only the highest quality, heavy duty components and careful workmanship...attributes that promise a long life of continous operation in any mode at full legal power. The 2KD-5 is a 2000 watt PEP input (1200 watt PEP nominal output) RF linear amplifier, covering the 80, 40, 20, and 15 meter amateur bands. It operates with two Eimac 3-500Z glass envelope triodes and a Pi-L plate circuit with a rotary silver plated tank coil. Price $945.



Henry amateur amplifiers are available from select dealers throughout the U.S. And don't forget the rest of the Henry family of amateur amplifiers...the Tempo 2002 high power VHF amplifier and the broad line of top quality solid state amplifiers. Henry Radio also offers the 4K-Ultra and 3K Classic/X superb high power H.F. amplifiers and a broad line of commercial FCC type accepted amplifiers for two way FM communications covering the range to 500MHz.

53 YEARS OF SERVICE

2050 S. Bundy Dr., Los Angeles, CA 90025 (213) 820-1234
931 N. Euclid, Anaheim, CA 92801 (714) 772-9200
Butler, Missouri 64730 (816) 679-3127

TOLL FREE ORDER NUMBER: (800) 421-6631
For all states except California.
Calif. residents please call collect on our regular numbers.

Henry Rad

Prices subject to change without notice

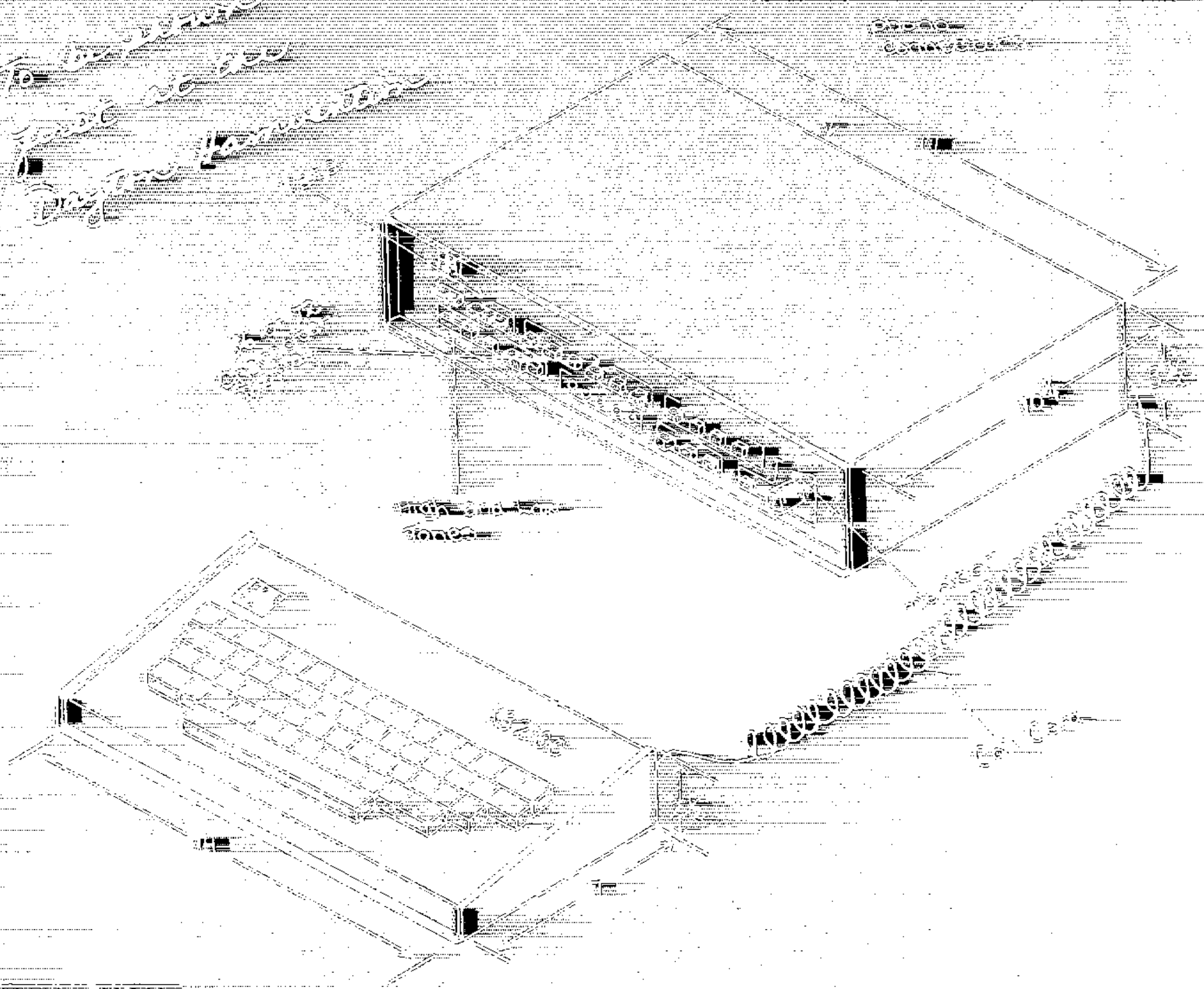
HAL COMMUNICATIONS CORP.

NEW PRODUCTS

DATE: 1-15-81 SCALE:

DRN BY:
APP BY:
No.

The CT2100 Communications Terminal



SPECIFICATIONS

- Two cabinets - basic CT2100 plus separate KB2100 keyboard.
- RTTY and Morse demodulators and video circuits included in CT2100.
- Small keyboard size connects with one "coil-cord" for popular "lap operation".
- Streamlined CT2100 cabinet is attractive and small - may also be rack mounted.
- Satin finish black vinyl front panel with multicolor graphics.
- 16 control switches - red for "primary" and blue for "secondary" controls.
- 16 rear panel connectors - standard phono connectors.
- On-screen tuning indicator, LED indicators, and external scope connections.
- LED indicators for mark, space, cw tune, RTTY tune, audio overload and KOS.
- CT2100 demodulates, decodes, and displays received Morse and Baudot or ASCII RTTY.
- CT2100 with KB2100 transmits and receives Morse, Baudot, or ASCII.
- Morse receive circuit tracks speed and minor frequency variations: 5 to 100 wpm.
- Morse transmit 5 to 100 wpm; key negative or positive key lines.
- Baudot or ASCII data rates of 45, 50, 57, 74, 100, 110, 150, 300, 600 or 1200 baud.
- Internal RTTY demodulator for both "high" and "low" RTTY tones plus two sets of modem tones (1070/1270 Hz or 1200/2200 Hz). Narrow shift CW ID included.
- All three RTTY shifts (170/425/850 Hz) for both "high" and "low" tones.
- Input/output connections for audio, tape recorder, RTTY loop, or RTTY RS232 data.
- RTTY mark-hold, autostart, normal/reverse, full or half duplex, KOS transmit control.
- Large character (36 per line) or standard display (72 characters per line).
- White characters on black screen or reverse video.
- Two pages of receive display.
- Split screen for transmit buffer - pretype WHILE receiving.
- Two user-programmable 32 character HERE IS messages.
- Eight non-volatile, 250 character EPROM stored brag-tape and HERE IS messages.
- Serial printer output prints all received text: Morse, Baudot, or ASCII.
- Built-in 120/220, 50/60 Hz power supply.
- Receive-only users need only the CT2100 - add the KB2100 for transmitting later.

LOW COST!

CT2100 Receive Only Communications Terminal	$845.00
KB2100 Transmit Option Keyboard	$175.00
ESM914/TR930 TV Monitor - 9"	$189.00

HAL COMMUNICATIONS CORP.
Box 365
Urbana, Illinois 61801
217-367-7373

"Simply the best!"

. . . That's not just a tag line . . . that is what people are actually saying about ICOM's new family of ham units.

ICOM is the leader in computer digital technology applied to amateur radio . . . giving better reliability and ease of operation.

Below, you see four of our popular base units: IC-451A, IC-720, IC-551D and IC-251A.

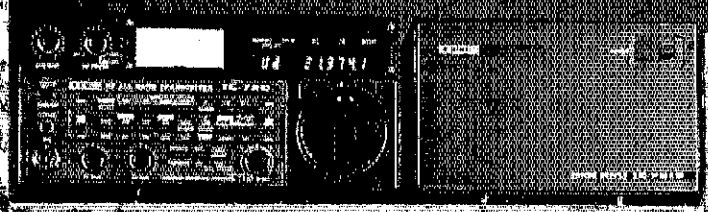
When you buy ICOM, you buy a system that is . . . Simply the Best!

ICOM

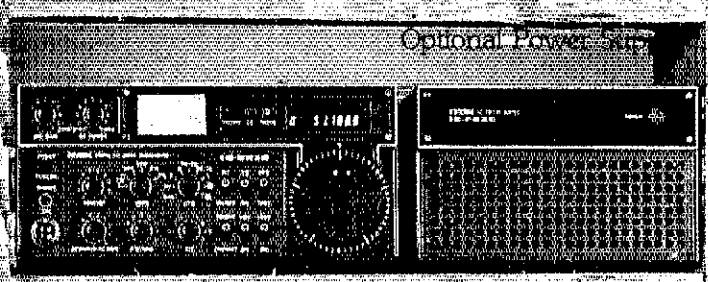
For the Professional Amateur

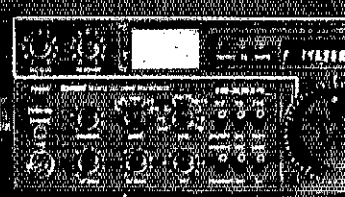
The **IC-451A** is the newest ICOM member. Perfect for OSCAR, DX and local ragchewing. Covers 430-440 or 440-450 MHz (your choice). SSB, FM, C.W. (optional).

The **IC-720** astounded the ham community when it came out with its general coverage receiver, all solid state, broad banded, state of the art circuitry. Dual VFO's, WARC frequency coverage, very compact.



Optional Power Supply





The **IC-251A** is still the best 2 meter all-mode transceiver on the market.

The **IC-551D** brings 6 meters to life! 80 watts to really punch out. Dual VFO's, SSB/C.W. (FM optional).

QST

May 1981 *Volume LXV Number 5*

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

Offices

225 Main Street
Newington, CT 06111 Tel: 203-666-1541

Member of the Audit Bureau of Circulations

Subscription rate $18.00 per year postpaid, U.S. funds, U.S. & Possessions; $26.00 in Canada and elsewhere. Individuals may apply for membership at the rates shown. Membership and *QST* cannot be separated. Fifty per cent of dues is allocated to *QST*, the balance for membership. Single copies $2.50. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U.S. and for an equivalent amount in U.S. funds.

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. Microform editions available from Xerox University Microfilms, Ann Arbor, MI 48106.

THE COVER

Computers in the hamshack can make mundane tasks fun, and complex ones possible! For two practical examples, see pages 18 and 30.

Contents

The best amplifier value just got better....

Clipperton-L, now with tuned input.

Clipper ships sailing to foreign shores. Sixteen amateurs primed for adventure, coming together as the first group in 20 years to set foot on the remote French Island, Clipperton. Their goal: 30,000 QSO's in just 7 days.

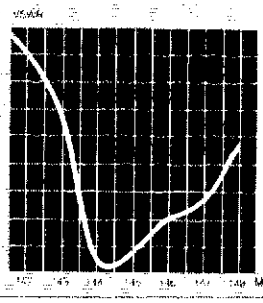
If you're like most of us, a rare DXpedition is more a dream than a reality, but the Clipperton Linear Amplifier from DenTron brings the thrill of a DXpedition to you.

The Clipperton-L™ was inspired by the famous DXpedition on which 3 MLA-2500's were used. We built the Clipperton with 4 rugged, economical, 572 B's in the final to provide a full 2KW PEP on SSB and 1KW CW on 15 through 160 meters. With features like hi-lo power selector for equal efficiencies at 1 or 2 KW, a power transformer that is vacuum impregnated, wide spaced tuning and loading capacitors, built-in ALC and an improved whisper-quiet cooling system, the excitement of crashing a pile-up can be yours.

Clipperton-L suggested price $699.50.

DenTron Radio Co. Inc.
1605 Commerce Drive
Stow, Ohio 44224
(216) 688-4973
Telex - 986456

Dedicated to making amateur radio more fun.



Boomer

6 and 2 meter High Performance Yagis

Two Meter Boomers

Whether you have the space for the 3.2 λ 32-19 or the compact 2.2 λ models, two meter Boomers are your best choice. They offer the maximum gain available for their boom length (See NBS no. 688). They feature trigon reflectors for additional front-to-back ratio and cleaner patterns. All stainless steel hardware and heavy gauge heat treated aluminum are used throughout. Whatever your choice of two meter amateur activity, the Boomer will fill your needs. For FM use the 228FB or 214FB. For CW/SSB on the low end use 32-19 or 214B, in EME, DX or just reliable QSOs, Boomer will perform for you.

Six Meter Boomer

The new six meter Boomer offers more boom and more gain from its new element spacing. The six meter Boomer has Cushcraft's typical attention to detail, including T match feed with balun, and extra heavy duty mechanical construction. The key to this Boomer's super performance and relatively lightweight is special element spacing and boom length.

Specifications

Model No.	32-19	214B	214FB	228FB	617-6B
Frequency range (MHz)	144-146	144-146	144.5-148	144.5-148	50.0-51
Forward gain (dBd)					
Front to back ratio (dB)					
E-plane B/width (deg)	2x14	2x17	2x17	2x17	2x19
H-plane B/width (deg)	2x17	2x18	2x18	2x9	NA
Side lobe attenuation (dB)	>60	>60	>60	>60	>60
SWR less than (typ)	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1
Impedance (ohm)	50	50	50	50	50
Recommended stacking distance					
E-plane (ft)	14	10	10	10	NA
E-plane (m)	4.27	3.05	3.05	3.05	NA
H-plane (ft)	12	10	10	10	22.5
H-plane (m)	3.66	3.05	3.05	3.05	6.86
Weight (lbs)	12	8	8	22	26
(kg)	5.44	3.63	3.63	9.98	11.79
Length (ft)	22	15	15	15	34
(m)	6.71	4.57	4.57	4.57	10.36
Longest element (in)	40⅝	40⅝	39½	39½	113⅞
(cm)	102.5	102	100.3	100.3	289
Turning radius (ft)	11	7.5	7.5	9.5	17.7
(m)	3.35	2.29	2.29	2.90	5.39
Windload (sq ft)	3.5	1.7	1.7	4.0	4.8
(sq m)	.33	.16	.16	.37	.45

Stacking Kits

For stacking two Boomers, use the following coax harness and power divider kits.

32-19 = 32-SK 214B = 22-SK 617-6B = 617-SK

When stacking four Boomers, use the following complete stacking kits. They include H frame, harness, hardware and complete instructions.

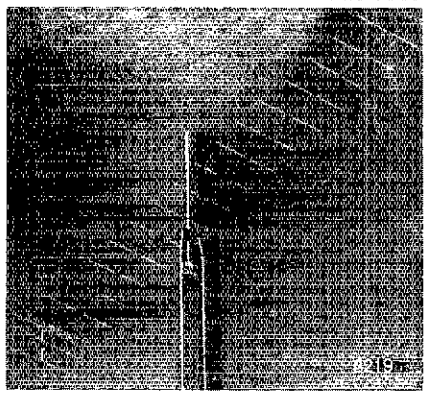
32-19 = 324-QK 214B = 224-QK

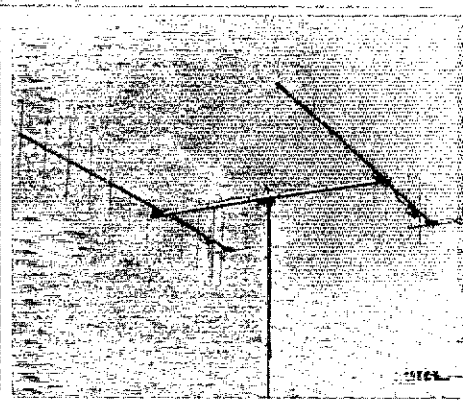
Specifications, Stacked Boomers

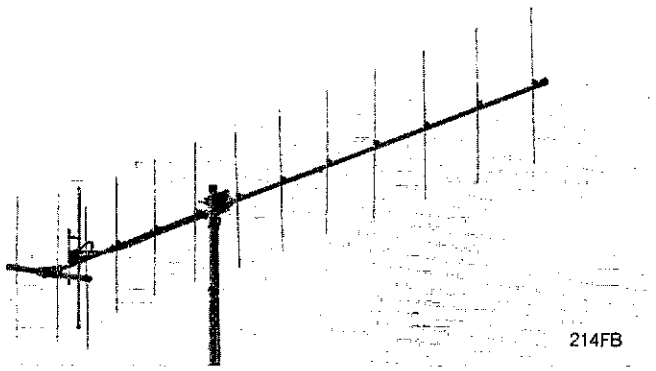
Antenna	2x214-B	2x32-19	2x617-6B	4x214-B	4x32-19
Forward gain (dBd)					
Front to back ratio(dB)					
E/H plane beamwidth (deg)					
E-plane	34°	28°	55°	17°	12°
H-plane	19°	17°	20°	19°	15°
Stacking dist Vert (ft)	10	12	34	10	12
(m)	3.05	3.66	10.36	3.05	3.66
Horiz (ft)	—	—	—	10	14
(m)	—	—	—	3.05	4.27
Wt approx (lb)	18*	26*	62*	69	97
(kg)	8.16	11.79	28.12	31.30	44.00
Turn radius(ft)	9	11	18	9	13.4*
(m)	2.74	3.35	5.49	2.74	4.06
Wind Area (Ft2)	3.4*	7.0*	9.6*	6.3	15.2
(sq m)	.32	.65	.89	.77	1.41

*Support mast not included

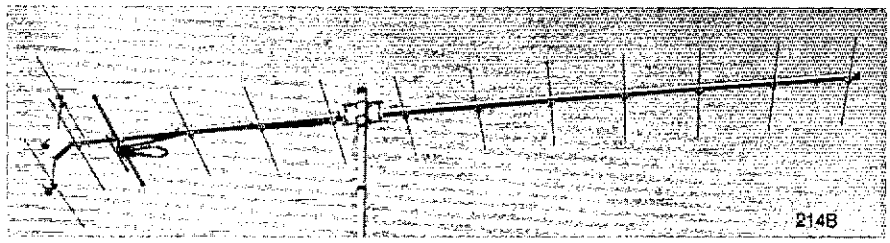
The nominal dimensions and weights listed are for complete arrays. The antennas and stacking kits must be ordered separately.



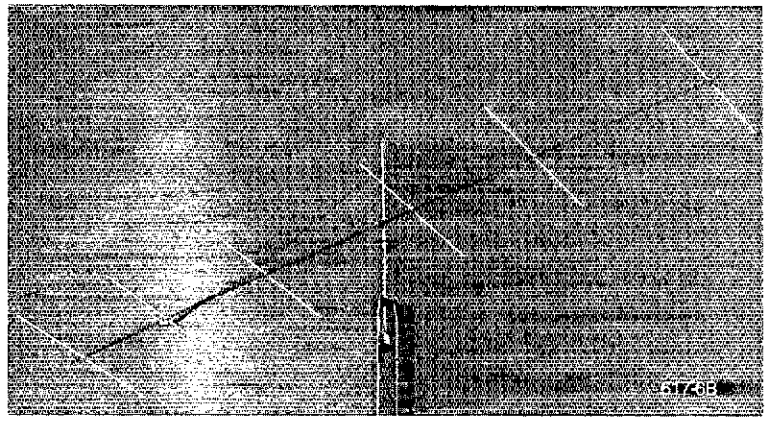




214FB



214B



cushcraft CORPORATION
The Antenna Company
48 Perimeter Road, P.O. Box 4680
Manchester, NH 03108

"Cents-

IF shift, digital display,

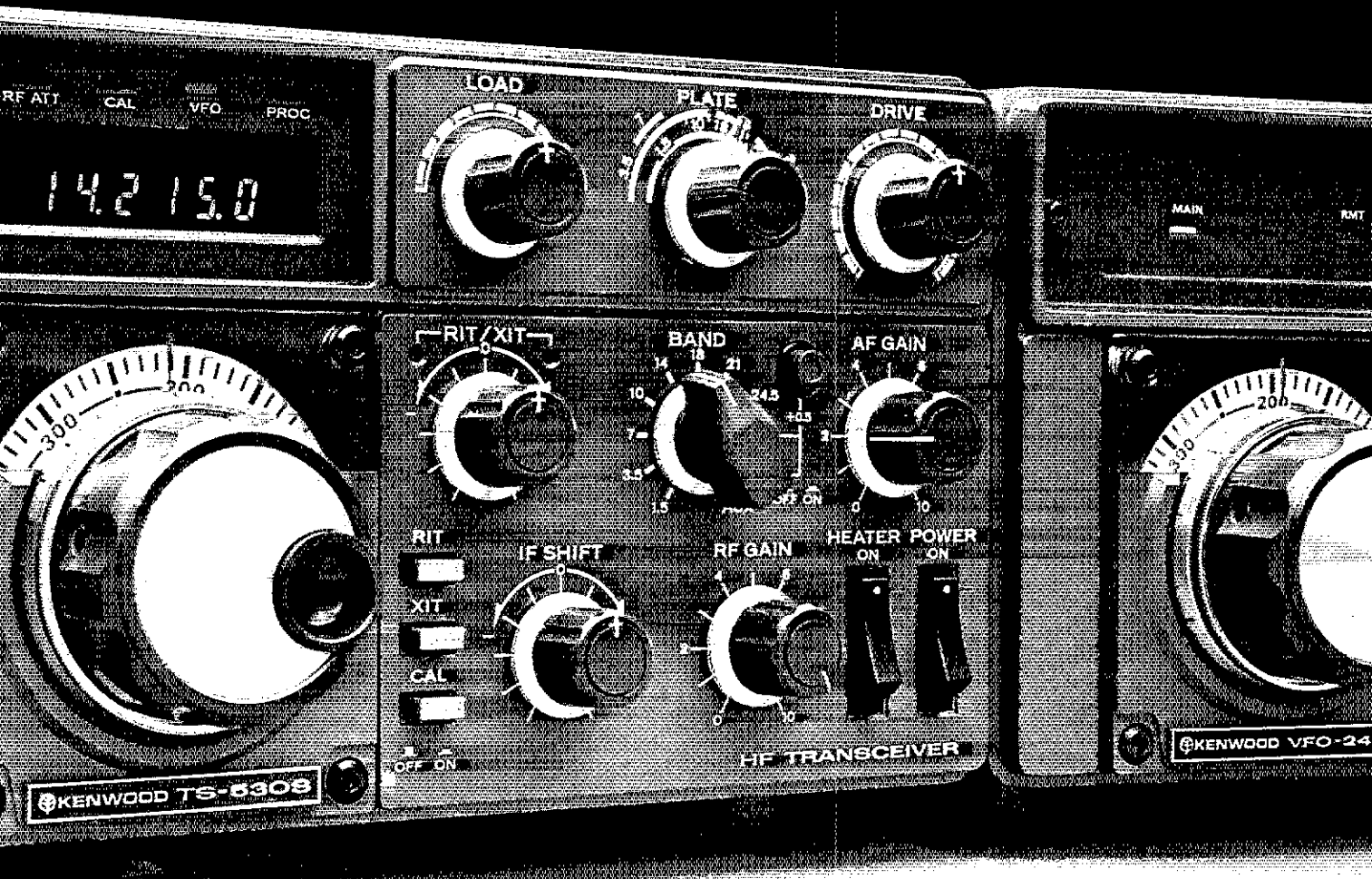
TS-530S

The TS-530S SSB/CW transceiver is designed with Kenwood's latest, most advanced circuit technology, providing wide dynamic range, high sensitivity, very sharp selectivity with selectable filters and IF shift, built-in digital display, speech processor, and other features for optimum, yet economical, operation on 160 through 10 meters.

TS-530S FEATURES:

- **160-10 meter coverage, including three new bands**
  Transmits and receives (LSB, USB, and CW) on all Amateur frequencies between 1.8 and 29.7 MHz, including the new 10, 18, and 24 MHz bands. Receives WWV on 10 MHz.
- **Built-in digital display**
  Large, six-digit, fluorescent-tube display shows actual receive and transmit frequencies on all modes. Backed up by analog subdial.
- **Narrow/wide filter combinations**
  Any one or two of three optional filters . . . YK-88SN (1.8 kHz) SSB, YK-88C (500 Hz) CW, YK-88CN (270 Hz) CW . . . may be installed for selecting (with "N-W" switch) wide and narrow bandwidths on CW and/or SSB.
- **IF shift**
  Moves IF passband around received signal and away from interfering signals and sideband splatter.
- **Built-in speech processor**
  Combines an audio compression amplifier with change of ALC time constant for extra audio punch and increased average SSB output power, with suppressed sideband splatter.
- **Wide receiver dynamic range**
  Greater immunity to strong-signal overload, with MOSFET RF amplifier operating at low level for improved IMD characteristics, junction FETs in balanced mixer with low noise figure, and dual resonator for each band.
- **Two 6146B's in final**
  Runs 220 W PEP/180 W DC input on all bands.
- **Advanced single-conversion PLL system**
  Improved overall stability and improved transmit and receive spurious characteristics.
- **Adjustable noise-blanker level**
  Pulse-type (such as ignition) noise is eliminated by built-in noise blanker, with front-panel threshold level control.
- **RF attenuator**
  The 20-dB RF attenuator may be switched in for rejecting IMD from extremely strong signals.

-ational."



narrow-wide filter switch

- **Optional VFOs for flexibility**
  VFO-240 allows split-frequency operation and other applications. VFO-230 digital VFO operates in 20-Hz steps and includes five memories and a digital display.
- **RIT/XIT**
  Front-panel RIT (receiver incremental tuning) shifts only the receiver frequency, for tuning in stations slightly off frequency. XIT (transmitter incremental tuning) shifts only the transmitter frequency, for calling a DX station listening off frequency.

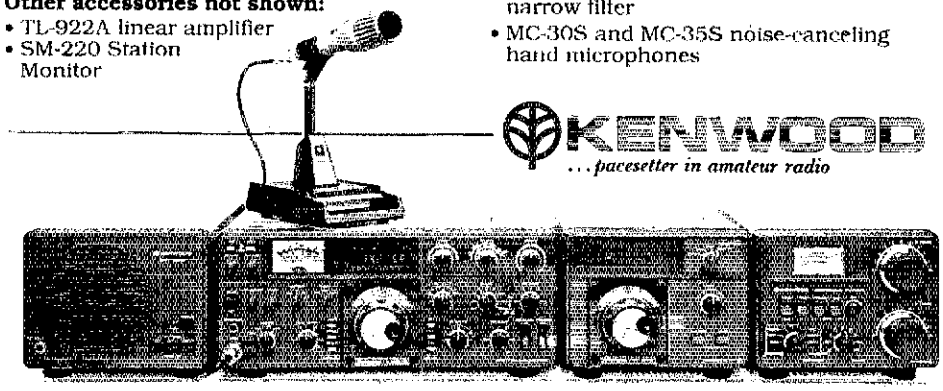
More information on the TS-530S is available from all authorized dealers of Trio-Kenwood Communications, Inc., 1111 West Walnut Street, Compton, California 90220.

Matching accessories for fixed-station operation:

- SP-230 external speaker with selectable audio filters
- VFO-240 remote VFO
- AT-230 antenna tuner/SWR and power meter
- MC-50 desk microphone

Other accessories not shown:

- TL-922A linear amplifier
- SM-220 Station Monitor
- VFO-230 remote digital VFO with 20-Hz steps, five memories, digital display
- KB-1 deluxe VFO knob
- PC-1 phone patch
- HS-5 and HS-4 headphones
- HC-10 digital world clock
- YK-88C (500 Hz) and YK-88CN (270 Hz) CW filters and YK-88SN (1.8 kHz) SSB narrow filter
- MC-30S and MC-35S noise-canceling hand microphones



KENWOOD
...pacesetter in amateur radio

Specifications and prices are subject to change without notice or obligation.

Directors

Canada

MITCH POWELL,* VE3OT, 782 North Mile Rd., London, ON N6H 2X8 (519-471-6853)

Vice Director: Frederick H. Towner, VE6XX, 123 Rundleridge Close, N.E., Calgary, AB T1Y 2L2 (403-280-0074)

Atlantic Division

JESSE BIEBERMAN, W3KT, RD 1 — Box 66, Valley Hill Rd., Malvern, PA 19355 (215-827-7426)

Vice Director: Hugh A. Turnbull, W3ABC, 6903 Rhode Island Ave., College Park, MD 20740 (301-927-1797)

Central Division

EDMOND A. METZGER, W9PRN, 1520 South Fourth St., Springfield, IL 62703 (217-523-5861)

Vice Director: Kenneth A. Ebneter, K9EN, 822 Wanona Trail, Portage, WI 53901

Dakota Division

GARFIELD A. ANDERSON,* KØGA, 5820 Chowen Ave South, Minneapolis, MN 55410 (612-922-1160)

Vice Director: Tod Olson, KØTO 292 Heather Lane, Long Lake, MN 55356

Delta Division

LIONEL A. OUBRE, K5DPG, Star Route A — Box 185-E, New Iberia, LA 70560 (318-367-3901)

Vice Director: O. D. Keaton, WA4GLS, 141 Medearis Dr., Old Hickory, TN 37138 (615-758-2329)

Great Lakes Division

LEONARD M. NATHANSON, W8RC, 20840 Southfield Rd., Suite 240, Southfield, MI 48075 (313-569-3191)

Vice Director: George H. Goldstone, W8AP 1010 Burnham Rd., Bloomfield Hills, MI 48013

Hudson Division

STAN ZAK,* K2SJQ, 13 Jennifer Lane, Port Chester, NY 10573 (914-939-6681)

Vice Director: Linda S. Ferdinand, N2YL, Sunset Trail, Clinton Corners, NY 12514 (914-266-5398)

Midwest Division

PAUL GRAUER, WØFIR, Box 190, Wilson, KS 67490 (913-658-2155)

Vice Director: Claire Richard Dyas, WØJCP 2933 Dudley St., Lincoln, NE 68503 (402-476-2438)

New England Division

JOHN C. SULLIVAN, W1HHR, Whitney Rd., Columbia, CT 06237 (203-228-9111)

Vice Director: Richard P. Beebe, K1PAD, 6 Tracy Circle, Billerica, MA 01821

Northwestern Division

MARY E. LEWIS, W7QGP, 10352 Sandpoint Way, N.E., Seattle, WA 98125 (206-523-9117)

Vice Director: Mel C. Ellis, K7AQZ, S. 4302 Altamont, Spokane, WA 99203 (509-448-0595)

Pacific Division

WILLIAM J. STEVENS,* W6ZM, 2074 Foxworthy Ave., San Jose, CA 95124 (408-371-3819)

Vice Director: Robert C. Smithwick, W6JZU, 516 Remington Dr., Sunnyvale, CA 94087 (408-736-8601 business)

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

LYS J. CAREY, KØPGM, 13495 West Center Dr., Lakewood, CO 80228 (303-986-5420)

Vice Director: Marshall Quiat, AGØX, 1624 Market St., Suite 200, Denver, CO 80202

Southeastern Division

FRANK M. BUTLER JR., W4RH, 323 Elliott Rd. S.E., Fort Walton Beach, FL 32548 (904-244-5425)

Vice Director: Mrs. Evelyn Gauzens, W4WYR, 2780 N.W. 3rd St., Miami, FL 33125 (305-642-4139)

Southwestern Division

JAY A. HOLLADAY, W6EJJ, 5128 Jessen Dr., La Canada, CA 91011 (213-790-1725)

Vice Director: Peter F. Matthews, WB6UIA, 3403 S. Walker Ave., San Pedro, CA 90731 (213-547-5816)

West Gulf Division

RAYMOND B. WANGLER, W5EDZ, 642 Beryl Dr., San Antonio, TX 78213 (512-733-9632 home, 512-684-5111 business)

Vice Director: Thomas W. Comstock, N5TC, 1700 Dominik, College Station, TX 77840 (713-693-1181)

*Executive Committee Member

Section Communications Managers of the ARRL

Reports Invited: The ARRL Board of Directors (see list at left) determines the policies of ARRL. The 16 divisions of the League are further arranged into 73 administrative "sections," each headed by an elected Section Communications Manager. Your SCM welcomes reports of individual and club activity. ARRL Field Organization appointments are available covering a wide range of amateur radio operating interests. Whatever your license class, your SCM has an appointment available. Check with your SCM (below) for further information. Section boundaries are defined in the booklet *Operating an Amateur Radio Station*, free to members.

Canadian Division

Alberta — E. Roy Ellis, VE6XC, P. O. Box 2, RR 1, Fort Saskatchewan T8L 2N7
British Columbia — H. E. Savage, VE7FB, 4553 West 12th Ave., Vancouver V6R 2R4 (604-224-5226)
Manitoba — Peter Guenther, VE4PG, Box 178, Morris R0G 1K0 (204-746-2218)
Maritime-Nfld — Donald R. Welling, VE1WF, 36 Sherwood Dr., St. John, NB E2J 3H6 (506-696-2913)
Ontario — L. P. Thivierge, VE3GT, 34 Bruce St. W., Rentrew K7V 3W1 (613-432-5967)
Quebec — Harold Moreau, VE2BP, 80 Principale, St. Simon Co., Bagot JØH 1YØ (514-798-2173)
Saskatchewan — W. C. "Bill" Munday, VE5WM, 132 Shannon Rd., Regina S4S 5B1 (306-586-4963)

Atlantic Division

Delaware — Roger E. Cole, W3DKX, 345 E. Roosevelt Ave., New Castle 19720 (302-328-0581)
Eastern Pennsylvania — Karl W. Pfeil, W3VA, 211 Schuylkill Ave., Tamaqua 18252 (717-668-3533)
Maryland-D.C. — Karl R. Medrow, W3FA, 718 W. Central Ave., Davidsonville, MD 21035 (301-261-4008)
Southern New Jersey — William C. Luebkemann, Jr., WB2LCC, 116 Country Farms Rd., Marlton 08053 (609-983-8844)
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 — Larry M. Keeran, K9ORP, 706 East Fremont, Bloomington 61701 (309-829-7389)
Indiana — Bruce Woodward, W9UMH, 6208 Bramshaw Rd., Indianapolis 46220 (317-251-5606)
Wisconsin — Roy Pedersen, K9FHI, 510 Park St., Juneau 53039

Dakota Division

Minnesota — Helen Haynes, WBØHOX, 3101 N.W. 18th Ave., Rochester 55901 (507-288-2437)
North Dakota — Lois A. Jorgensen, WAØRWM, Box 55, Abercrombie 58001 (701-553-8724)
South Dakota — Erwin C. Heimbuck, Jr., KØOTZ, 3312 Parkview, Rapid City 57701 (605-348-5433)

Delta Division

Arkansas — Dale E. Temple, W5RXU, 1620 Tarrytown Rd., Little Rock 72207
Louisiana — James R. Giammanco, N5IB, 9451 Corsica Ave., Baton Rouge 70810 (504-766-5583)
Mississippi — Paul C. Kemp, WB5SNB, 3581 Beaumont Dr., Pearl 39208 (601-939-7612)
Tennessee — Earl Leonard, KB4G, 126 Sheridan Circle, Oak Ridge 37830 (615-482-2157)

Great Lakes Division

Kentucky — David L. Vest, KZ4G, 2314 Oak St., Flatwoods 41139 (606-836-4116)
Michigan — James R. Seeley, WB8MTD, 14630 Clinton Rd., Springport 49284 (517-569-2411)
Ohio — Allan L. Severson, AB8P, 1275 Ethel Ave., Lakewood 44107 (216-521-1565)

Hudson Division

Eastern New York — Paul S. Vydareny, WB2VUK, 259 N. Washington, North Tarrytown 10591 (914-631-7424)
N.Y.C. & Long Island — John H. Smale, K2IZ, 315 Kensington Ct., Copiague 11726 (516-226-4835)
Northern New Jersey — Robert E. Neukomm, KB2WI, 404 O'Brien Ct., Wyckoff 07481 (201-891-3064)

Midwest Division

Iowa — Bob McCaffrey, KØCY, 3913-29th St., Des Moines 50310 (515-279-8978)
Kansas — Robert M. Summers, KØBXF, 3045 North 72nd, Kansas City 66109 (913-299-1128)
Missouri — Larry G. Wilson, KØRWL, 5415 E. 97th St., Kansas City 64137 (816-966-8953)
Nebraska — Shirley M. Rice, KAØBCB, 510 East 16th St., Scotts Bluff 69361 (308-632-4337)

New England Division

Connecticut — Stanley Horzepa, WA1LOU, 72 Stiles St., Waterbury 06706 (203-755-1516)
Eastern Massachusetts — Richard P. Beebe, K1PAD, 6 Tracy Cir., Billerica 01821 (617-667-5609)
Maine — Clevis O. Laverty, W1RWG, 17 Fair St., Norway 04268 (207-743-2353)
New Hampshire — Robert Mitchell, W1SWX/W1NH, Box 137-A, Chester 03036 (603-895-3456)
Rhode Island — John Titterington, W1EOF, 45 Mountain Ave., Riverside 02915 (401-438-3619)
Vermont — Robert L. Scott, W1RNA, 9 Laroe St., Swanton 05488 (802-868-4944)
Western Massachusetts — Arthur Zavarella, W1KK, 1702 Main St., Agawam 01001 (413-786-9115)

Northwestern Division

Alaska — Fred S. Wegmer, KL7HFM, 1910 Rosemary St., Anchorage 99504 (907-274-3464)
Idaho — Lemuel H. Allen, Jr., W7JMH, 1800 S. Atlantic St., Boise 83705 (208-343-9153)
Montana — L. C. "Les" Belyea, N7AIK, P. O. Box 327, Belgrade 59714 (406-388-4253)
Oregon — William R. Shrader, W7QMU, 2042 Jasmine Ave., Medford, 97501 (503-773-8624)
Washington — Robert L. Klepper, W7IEU, 7027 51st NE, Marysville 98270 (206-659-3005)

Pacific Division

East Bay — Bob Vallio, W6RGG, 18655 Sheffield Rd., Castro Valley, CA 94546 (415-537-6704)
Nevada — Ralph E. Covington, Sr., W7SK, P. O. Box 7750, Reno 89510 (702-322-7988)
Pacific — J. P. Corrigan, KH6DD, Box 698, Kaneohe, HI 96744
Sacramento Valley — Norman A. Wilson, N6JV, Rte. 1, Box 730, Woodland, CA 95695 (916-666-1465)
San Francisco — Arthur P. Samuelson, W6VV, 440 Davis Ct. #811, San Francisco, CA 94111 (415-986-3129)
San Joaquin Valley — Charles P. McConnell, W6DPD, 1658 W. Mesa Ave., Fresno, CA 93711 (209-431-2038)
Santa Clara Valley — Jettie B. Hill, W6RFF, 22410 Janice Ave., Cupertino, CA 95014 (408-255-6714)

Roanoke Division

North Carolina — Ed Stephenson, AB4S, 700 Madison Ave., Cary 27511 (919-467-6832)
South Carolina — Richard McAbee, W4MTK, 205 Jewel St. N.W., New Ellenton 29809 (803-652-2596)
Virginia — Byron C. "Luck" Hurder, WA4STO, Box 167, Seven Fountains 22653
West Virginia — Karl S. Thompson, K8KT, 5303 Pioneer Dr., Charleston 25312 (304-776-4352)

Rocky Mountain Division

Colorado — Lawrence E. Steimel, WØACD, 1750 Roslyn St., Denver 80220
New Mexico — Joe Knight, W5PDY, 10408 Snow Heights Blvd., N.E., Albuquerque 87112
Utah — Royce Henningson, K7QEQ, P. O. Box 1267, Moab 84532 (801-259-5018)
Wyoming — Richard G. Wunder, WA7WFC, Box 2807, Cheyenne 82001 (307-634-7385)

Southeastern Division

Alabama — James M. Bonner, K4UMD, Rte. 15 — Box 246, Birmingham 35224 (205-788-2003)
Georgia — Edmund J. Kosobucki, K4JNL, 5525 Perry Ave., Columbus 31904 (404-322-2856)
Northern Florida — Billy F. Williams, Jr., N4UF, 911 Rio St. Johns Dr., Jacksonville 32211 (904-744-9501)
Southern Florida — Woodrow Huddleston, K4SCL, 219 Driftwood Ln., Largo 33540 (813-584-0984)
West Indies — Julio Negroni, KP4CV, Georgetown, No. 269, Rio Piedras, PR 00927 (809-764-8099)

Southwestern Division

Arizona — Erich Holzer, N7EH, 3526 E. March Pl., Tucson 85713 (602-326-8976)
Los Angeles — Stanley S. Brokl, N2YQ, 2645 North Marengo Ave., Altadena, CA 91001 (213-798-8827)
Orange — Fried Heyn, WA6WZO, 962 Cheyenne, Costa Mesa, CA 92626 (714-549-8516)
San Diego — Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego, CA 92117 (714-273-1120)
Santa Barbara — Robert N. Dyruff, W6POU, 1188 Summit Rd., Santa Barbara, CA 93108 (805-969-3073)

West Gulf Division

Northern Texas — Phil Clements, K5PC, 1313 Applegate Ln., Lewisville 75067 (214-221-2222)
Oklahoma — Leonard R. Hollar, WA5FSN, RFD 1, 710 South Tenth St., Kingfisher 73750 (405-375-4411)
Southern Texas — Roger D. Coday, N5FN, 213 Ave. G, RFD 4, Brazoria 77422 (713-798-7970)

THE AMERICAN
RADIO RELAY
LEAGUE, INC.

"It Seems to Us..."

The American Radio Relay League, Inc., is a noncommercial association of radio amateurs, bonded for the promotion of interest in Amateur Radio communication and experimentation, for the relaying of messages by radio, 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.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worthwhile amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in Amateur Radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

All general correspondence should be addressed to the administrative headquarters at Newington, Connecticut 06111.

Election Procedures

If you're looking for another of those sparkling editorials that usually flow from the pen of this writer, forget it. But if you're interested in seeing how the ARRL Board of Directors has taken further steps to strengthen the League, read on. And why should you be interested? Because the American Radio Relay League is a membership association, whose policies are established by a Board of Directors elected by and from the membership. You have a stake in how *your* representatives are chosen.

At this year's annual meeting of the ARRL Board, held in March, the directors made a number of changes in the procedures relating to the election of directors (and vice directors). The intent of these changes is to provide better information on the candidates for those members who will be voting, to spell out more clearly the conditions under which lists of members would be provided to those candidates who wished to mail campaign literature, and to outline certain standards which ought to apply to those who would be candidates for office or who would serve as director. In addition, the Board adopted a procedure which permits the recall of a director who is judged by his division membership not to be serving their interests properly.

In the months ahead in *QST*, and in an updated edition of the booklet *Articles of Association and By-Laws (AABL)*, available for the asking, we'll be providing the details of these several changes. This month we wanted to talk only about the procedures for nominating a candidate for director (or vice director) in order to give you plenty of advance warning on a somewhat different procedure.

Henceforth, nominating petitions signed by 10 or more full members of a division, naming a full member of that division as a candidate for director, must be received at the Hq. no later than the first day of September. Each petition must be accompanied by information (on a form provided by the Hq.) which will allow the Executive Committee to determine the eligibility of the candidate in accordance with the provisions of the By-Laws, and by a statement of not more than 300 words, setting forth the candidate's qualifications, which will be included with the ballot mailed to members. There must also be a signed statement that the submitted information is true to the best of the candidate's knowledge and belief. (Each candidate for office will also be required to execute and be bound by a covenant not to sue.) The candidate's statement shall be reprinted without content editing. No candidate will be allowed to make any derogatory statement about any person or entity. Any willful violation of the signed statements concerning accuracy and suit shall be grounds for disqualification by the Executive Committee, whose decision is final and may not be appealed except to the full Board of Directors.

It is expected that the inclusion of the 300-word statement with the ballot to each member will reduce the necessity for campaign mailings by individual candidates. Because of the expense of postage and printing these days, these new procedures should reduce the financial hardship on some would-be candidates.

That's enough for one month, but we did want you to have early warning on the new deadline for filing nominations and on the new informational requirements that must accompany nominating petitions. As usual, the official call for nominating petitions will be contained in the July and August issues of *QST*. — *Richard L. Baldwin, W1RU*

League Lines...

New third-party message agreement. The United States and The Gambia (prefix C5) have agreed to permit the exchange of third-party messages, but not phone patches, by their amateurs effective April 15, 1981. The messages must be of a technical or personal nature not important enough to justify transmission by the public telecommunications network. An exception permits the handling of messages related to the safety of life or property when an emergency has disrupted the public system.

The FCC has adopted an Order which will establish a Quiet Zone for Amateur Radio repeater stations in certain areas of Virginia and West Virginia, purportedly to minimize possible harmful interference at the National Radio Astronomy Observatory at Green Bank, West Virginia, and the Naval Research Laboratory at Sugar Grove, West Virginia. Details of the proposal appeared in January 1979 QST, page 62, and a full report of this action will appear in next month's "Happenings." The new rules become effective May 13, 1981.

The FCC has denied a petition for reconsideration of its action abolishing the licensing of new club, military recreation and RACES stations. Presently existing club, military recreation and RACES station licenses may be renewed or modified. However, the petition attempting to reverse the Commission's decision regarding new club station licenses failed, and Docket 21135 has been closed. This latest attempt was filed by the Capitol Hill Amateur Radio Society.

The Atlanta Radio Club has announced its third annual competition for two $500 cash scholarships. Each scholarship will go to a licensed radio amateur entering college in the fall of 1981. Deadline for application is May 31, 1981. For information and an application, write to the Atlanta Radio Club Scholarship, 259 Weatherstone Pkwy., Marietta, GA 30067.

The CRRL is proud to announce that RAQI, Radio Amateur du/of Quebec, will be translating QST technical articles into French, for publication in the RAQI Journal.

On June 17, the IEEE International Conference on Communications will hold an Amateur Radio session at the Denver Hilton Hotel, Denver, Colorado. The session will be conducted in the evening, and all radio amateurs are urged to attend.

Effective immediately, no mailing labels will be supplied by League Hq. under any circumstances, unless the request has already been received in writing. Such letter must clearly state the purpose of the request. No telephone request for labels will be honored regardless of who makes the request. ARRL membership lists are not available to anyone unless access is permitted under the Bylaws of the ARRL.

Are you interested in serving on an ARRL Hq. Communications Department Ad Hoc Committee on vhf/uhf contesting? This committee will study the entire range of vhf/uhf objectives and how the League's contest program can best meet those needs. If you are interested, contact John Lindholm, W1XX, at ARRL Hq.

Do you have enough postage on file with your QSL Bureau? Radio amateurs are reminded that increased U.S. postage rates for first class mail are now in effect. The new rates are 18 cents for the first ounce and 17 cents for each additional ounce. Please be sure that you have envelopes with proper postage on file with your QSL Bureau. Need their addresses? Turn to page 68 in this issue.

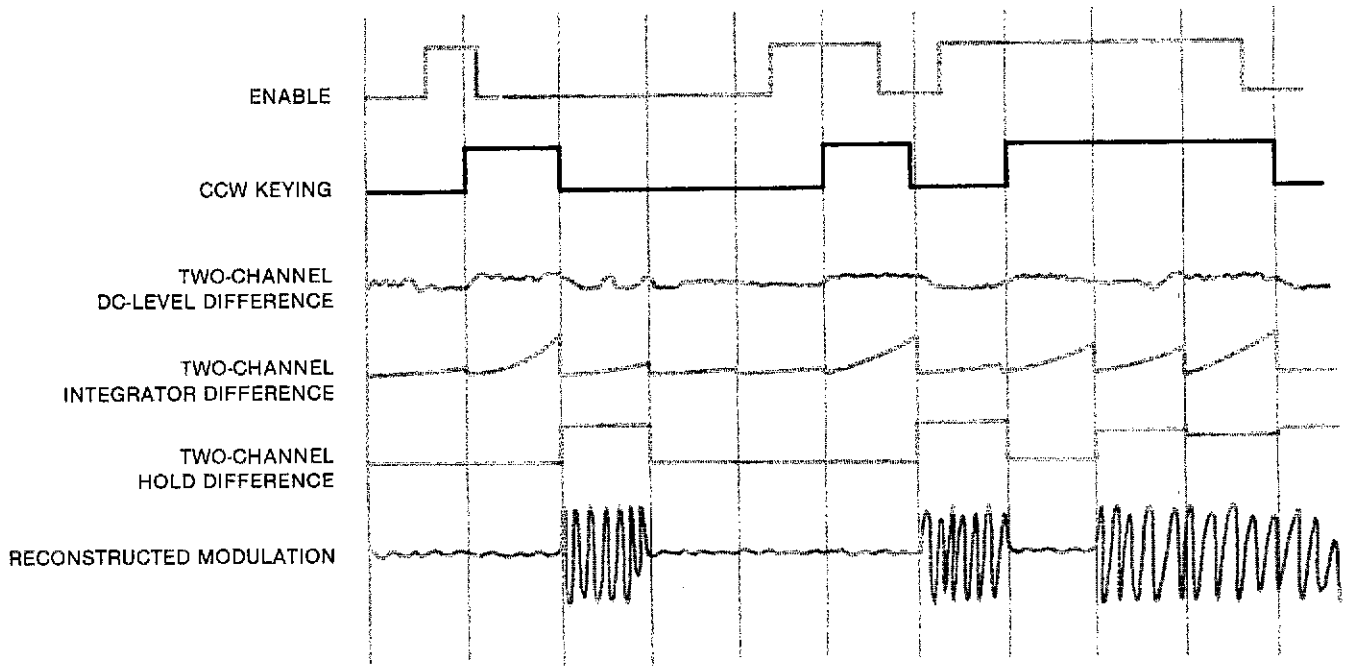
Mark S. Fowler, a Washington, DC, attorney, has been nominated by President Reagan to the FCC and is expected to succeed Charles Ferris as chairman. Mr. Fowler, 39 years of age, is a partner of the law firm of Fowler and Meyers.

League members and other interested persons are always welcome during regular business hours for tours of the ARRL Administrative Headquarters and the Maxim Memorial Station, W1AW. Visiting hours for both are Monday through Friday from 8 A.M. to 4:30 P.M. Large groups should make arrangements one week in advance. W1AW is open until 1 A.M. on weeknights and from 3:30 P.M. until 1 A.M. on Saturdays and Sundays. An FCC-licensed amateur may operate the station in between bulletin and code-practice sessions. All facilities will be closed Monday, May 25 (Memorial Day); Monday July 6 (Independence Day observance); Monday, September 7 (Labor Day); Thursday, November 26 (Thanksgiving Day); and Friday, December 25 (Christmas).

Coherent CW — The Concept

Part 1: Would you think that you could *decrease* your transmitter output power by a factor of 10 and *increase* signal readability by the same amount — simultaneously? It's being done now.

By Charles Woodson,* W6NEY



The more we know about something we seek, the easier it is to find. This principle applied to Morse cw communications is called coherent cw or ccw. On-the-air trials of this technique have shown it will provide an improvement of more than 20 dB in communications effectiveness over ordinary cw methods. This same principle can be used with RTTY, ASCII and fsk signals, but this discussion will focus on cw keying.

Cw signals may be analyzed as a series of digital units, all of which have (at least approximately) a unit of time in common. For convenience, I'll call this time unit a "frame." Each frame contains either a "mark" (key down) or a "space" (key up). Fig. 1 illustrates this concept.

Ordinary cw dots, dashes and spaces begin at somewhat arbitrary times, depending on when the operator happens to press the key. Thus, the frame length varies to a considerable degree, and you can't predict when each frame starts and ends. With ccw, all dots, dashes and spaces are exact multiples of the basic time unit and occur within predictable time frames. This includes any pauses during transmission. When received, ccw signals sound like any other cw signal except that they are being sent very precisely, as with

*2301 Oak St., Berkeley, CA 94708

Fig. 1 — The elements of ccw communication. Frames, in 0.1-second units, are shown on the horizontal axis. The enable (top waveform) shows the closure of a manual key by the operator. When referenced to the precise frame times, it can be seen that the dots, dashes and spaces of the enable are not accurate in length. Note that with the ccw-keyer waveform a mark or space is begun only at the beginning of the frame period and continues for the full period(s). As received, the signal is mixed with QRM and QRN. The difference between the dc voltages from the switching mixers of the two channels (third waveform) is a function of the desired, but weak, signal. An integrator sums the power (voltage) received over the frame period. This sum is sampled at the end of the period and held until the beginning of the next period. The recovered modulation is used to key an audio signal for detection by ear.

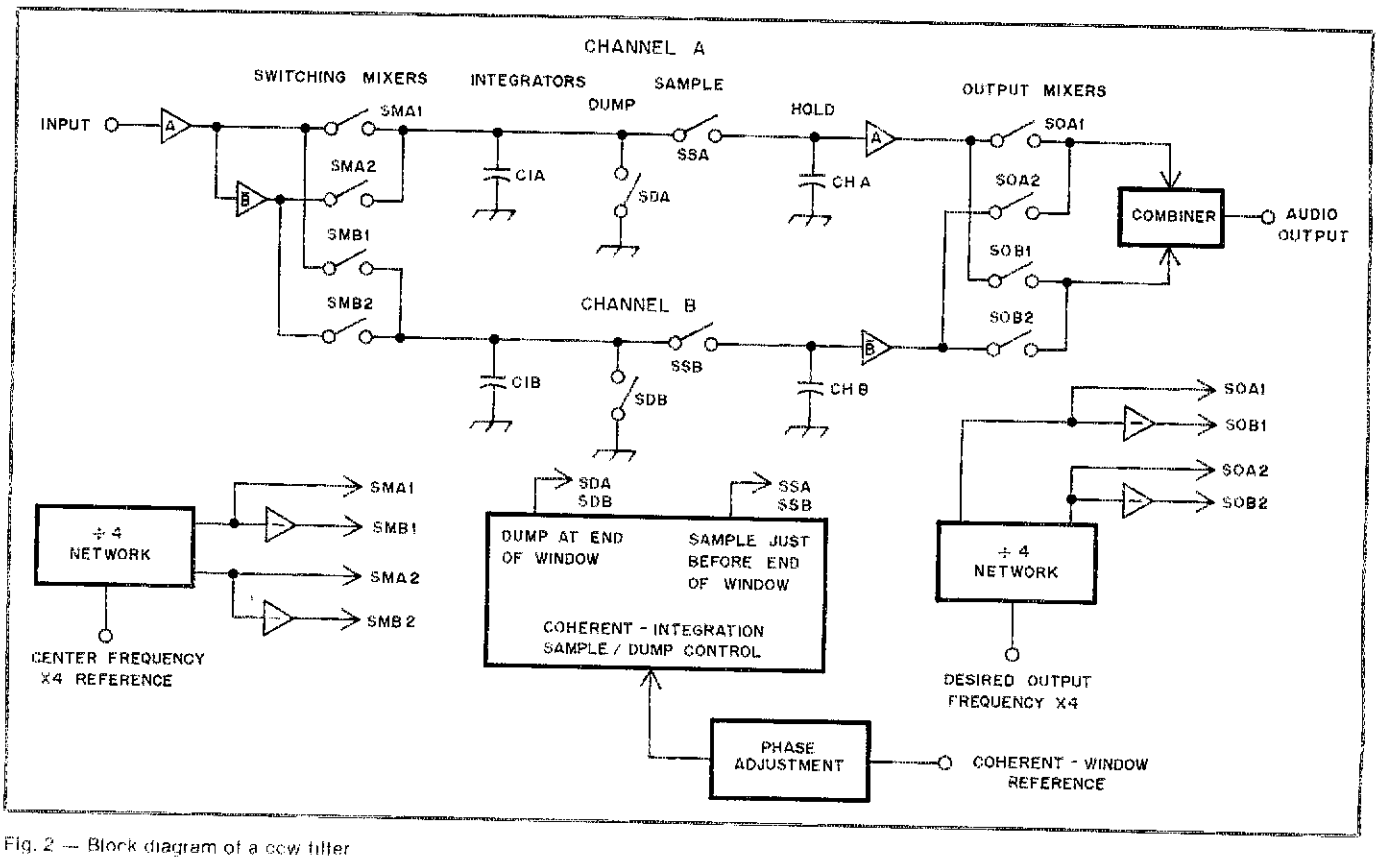


Fig. 2 — Block diagram of a ccw filter

a perfect "fist." This characteristic is utilized to permit the use of very narrow bandwidth filters.

CW Filters

In general, receiver filters with bandwidths much wider than that of the desired signal are less effective because they allow reception of additional noise and undesired signals. At 12 wpm a cw signal occupies about 10 Hz of the spectrum, yet 500- or 2300-Hz-wide filters are frequently used for cw reception. With a 500-Hz filter, one hears the 10-Hz-wide desired signal and 490 Hz of noise and QRM! By analogy, an ssb operator using a similar approach would listen to 100 kHz of the band at one time!

High-Q analog cw filters are not useful at the narrow bandwidths approaching the bandwidth of a 12-wpm cw signal. Such filters, with bandwidths less than 500 Hz, tend to "ring" or produce an output after the signal ceases. The human ear is confused by such ringing. Also, the receiver stability and resetability required in conjunction with the filter, on the order of a few hertz, is difficult to achieve.

Phase-locked loop (PLL) filters with time constants long enough to produce bandwidths of only a few hertz unfortunately take tens of seconds to achieve lock. PLLs also tend to lock on the strongest signal in the passband and are, therefore, sensitive to QRM. PLL filters have their place of importance, but not with the bandwidths required here.

The filter we need will provide a bandwidth of only a few hertz without ringing and without a tendency to lock on the QRM. Such a filter improves the signal-to-noise ratio dramatically. A 1-W signal copied through a 10-Hz bandwidth filter is comparable to a 50-W signal heard through a 500-Hz filter or a 230-W signal heard through a 2300-Hz filter.

The CCW Station

Typically, ccw stations agree on an operating frequency (e.g., 14,049,000 Hz ± 2 Hz) and a frame length (usually 0.1 second, the speed of 12 wpm), and acquire the "framing" — when each frame starts and ends — as part of the signal-tuning process. Thus, the frequency, frame length and frame phase are all known at the receiving end and are used to advantage in the detection process.

To achieve the necessary frame-length accuracy and to get on the operating frequency within the narrow tolerance of the filter, all frequency-determining oscillators in both the transmitter and receiver of the ccw station must be highly stable and accurate. The stability and accuracy requirements are obtainable by using carefully built crystal oscillators which are compared to a reference frequency such as WWV. Time discipline for the transmitted signal is determined by a reference oscillator which is divided to provide a 10-Hz synchronizing signal for the transmitter keyer. The ccw filter at the receiving station uses timing signals derived from the station reference oscillator. These timing signals tell the receiver filter when to expect a frame to begin and end.

The Coherent Integrating Filter

Fig. 2 shows a block diagram of the filter which makes possible the efficient reception of a ccw signal. The major blocks of each of the two filter chains are: input mixers, integrators, sample-and-hold circuits, output mixers and the timing and control circuitry. The reason for the two chains will be examined later; for now, we'll follow the signal through one chain.

The Mixer: The first part of each filter chain is a switching mixer where the desired signal (along with adjacent QRN and QRM) is mixed with a reference signal of the same frequency as the desired signal. (Solid-state switching is performed in the actual circuit, but for simplicity, mechanical contacts are shown in Fig. 2.) The reference signal is obtained from a stable source such as the timing and control circuitry, and it determines the center point of the ccw filter. A signal at the desired frequency comes out of the mixer as a dc voltage — the stronger the signal, the larger the voltage. An off-frequency signal, however, comes out of the mixer as a low-frequency ac voltage. We mix the incoming signal right down to zero beat. Undesired signals will be distinguished

from the desired signal because they are not exactly zero beat.

The Integrator: An op-amp integrator comprises the second part of each filter chain. We use the integrator to distinguish the desired signal (the zero-beat dc voltage) from the undesired signals (low-frequency ac voltages) coming from the mixer. The integrator may be thought of as a moderately large capacitor. A synchronizing "dump" signal from the timing and control circuitry shorts out this capacitor at the start of each time frame. Any desired signal (dc voltage) during the time frame causes the capacitor to charge. The resulting voltage at the end of the time frame is a function of the strength of the desired signal received during that frame.

QRM and QRN, being off frequency, appear as ac signals to the integrator capacitor. These charge the capacitor for part of the time frame, but discharge it for other parts of the same period. Consequently, signals off frequency do not have as great an effect on the integrator output as do signals exactly on the desired frequency. That is how the ecw filter achieves its selectivity.

As an example, consider an interfering carrier which is 10 Hz above or below the desired signal. Following the switching mixer, this QRM appears as a 10-Hz ac voltage. If the filter is set to the ecw standard frame length of 0.1 second, then the 10-Hz interfering signal goes through one complete cycle during the integrating period. At the end of the time frame, the QRM-produced voltage at the integrator output is zero. Thus, the ecw filter has a null just 10 Hz above and below its center frequency. There are also similar nulls at other 10-Hz multiples.

Sample-and-Hold and Integrator Reset: At the end of each time frame, a "sample" signal from the timing and control circuit transfers the voltage at the integrator output to the sample-and-hold circuit. That circuit "remembers" that voltage for the following interval. Once the sample-and-hold has acquired the integrator output voltage, a dump signal from the timing and control circuitry shorts out the integrator capacitor. It does this by means of a CMOS analog switch connected across the capacitor. This allows the integrator to start over again with zero voltage at the start of the next time frame.

Resetting the integrator at the end of each time frame lets the ecw filter avoid the ringing (or intersymbol interference) common to other narrow-bandwidth filters. Note that this is possible only because the ecw filter "knows" when each time frame begins and ends. It is here that the time discipline of the transmitted signal is used to advantage in the detection process.

Output Mixer: This last block of the filter chain is much like the input mixer: it functions as an amplitude modulator, using the sample-and-hold output voltage to control the amplitude of a sidetone. The purpose of this mixer is to construct a sidetone for the human operator to hear.

Why Two Channels?

If the incoming signal is in phase with the center reference, then the mixer output is always positive. The integrator which follows will see a positive dc voltage. If the signal is out of phase with the reference, then the mixer output is always negative. The integrator will see a negative dc voltage. The positive or negative dc voltage charges the integrator capacitor, the sample-and-hold "remembers" that charge during the next time frame, and the output mixer generates a sidetone whose amplitude is proportional to the voltage on the sample-and-hold capacitor. But if the signal is 90° out of phase with the reference frames, then the mixer output will at times be positive and at other times be negative during a given input cycle. This output will be averaged to zero by the integrator. The result is no filter output from this channel.

The situation is different for each channel because the A channel input mixer is operated by a reference which is 90° out of phase with the B channel reference. Thus, if a signal is 90° out of phase with the A channel, it will be in phase (or 180° out of phase) with the B channel. At all phase differences between the two channels, the product of the two channels is always the desired signal despite the phase relationship between the center frequency reference and the incoming signal.

If the desired signal is graphed as a phasor (as in Fig. 3) one might say that the B channel picks up the X component of that phasor, and the A channel picks up the Y component of the phasor. The two-channel output mixers are also driven with signals 90° out of phase. That way, the output tones combine vectorially. The result is that the combined output is a tone whose amplitude reflects the amplitude of the desired signal, regardless of the signal phase. The phase of the output tone also reflects the phase of the desired signal.

The theoretical response curve of the filter may be developed. We won't go into the mathematical details except to say that the amplitude response is a sin X/X curve, like that in Fig. 4. For a 0.1-second frame length, the nulls in the filter response occur every 10 Hz either side of the center frequency. The 3-dB points on this curve are 9 Hz apart; the 6-dB points are 12 Hz apart.

Fig. 5 compares the ecw filter (0.1 second frames) with an ordinary 500-Hz cw filter and a 2700-Hz ssb filter. On this scale it is impractical to show the numerous nulls in the ecw-filter response; shown instead is the envelope of the primary response.

How Much Improvement?

One way of comparing ecw with the ordinary cw method is to consider the filter noise bandwidth. This is the bandwidth of

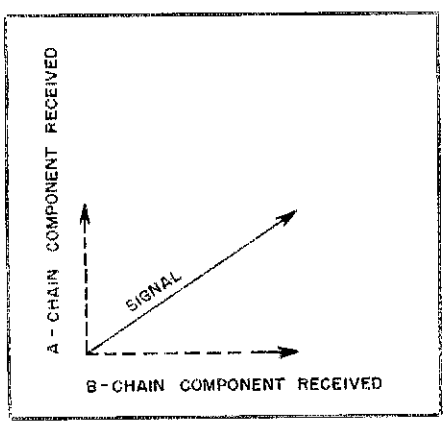


Fig. 3 — The desired signal considered as a phasor.

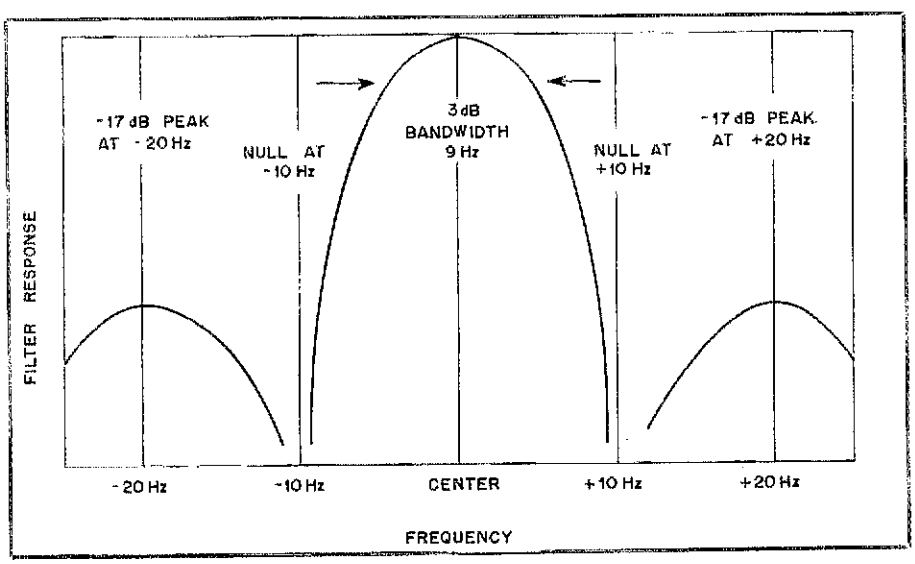


Fig. 4 — Filter-response curve for a 10-Hz bandwidth ecw filter.

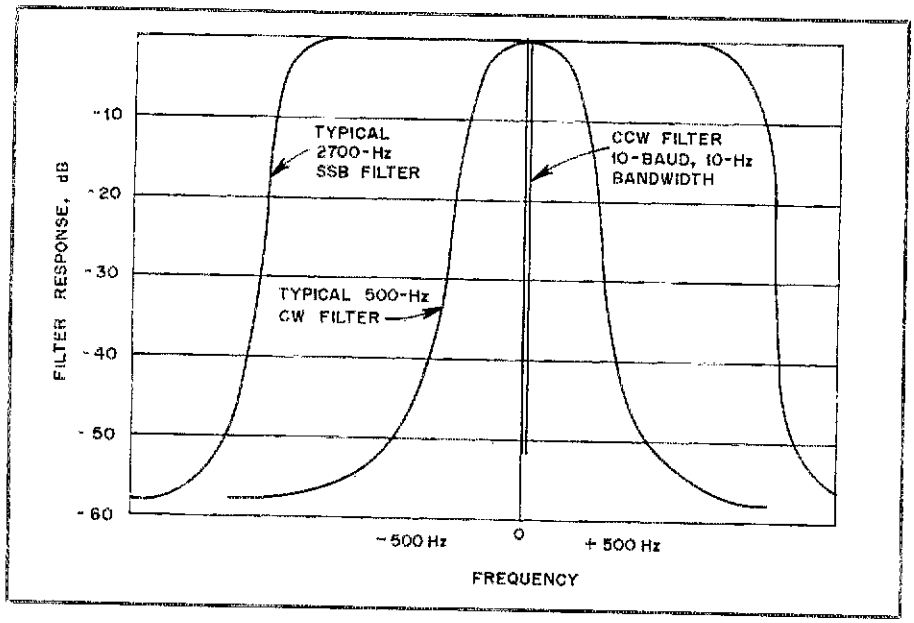


Fig. 5 — A comparison of three filter-response curves.

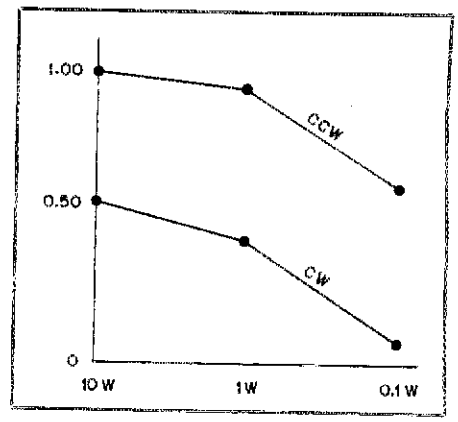


Fig. 6 — A graph of the average proportion of copy made by four operators of simultaneously sent cw and ccw signals. Three different power levels were used. See text.

an ideal steep-sided filter which would pass the same amount of random noise as the filter being considered. For 0.1-second frame length ccw, the filter noise bandwidth is 10 Hz. This equates to an approximate superiority of 17 dB over a 500-Hz cw filter and about 24 dB over a 2300-Hz filter. Such estimates should be reasonably accurate with respect to noise, but when QRM is present, the ccw filter probably does even better. Using a ccw system of 0.1-second frames with ground wave in the presence of natural noise, and adjusting power for matching readability, I have measured an approximate 16-dB improvement over a 470-Hz crystal filter; this is close to the theoretically expected value.

Narrowing the ccw bandwidth by using longer frame times provides an additional signal-to-noise advantage at the price of slower information transmission rates. A 0.1-second integration period gives about 24 dB improvement over a 2300-Hz crystal filter; a 1-second integration period (1.2 wpm), 34 dB; a 10-second period, (0.12 wpm), about 44 dB. These speeds are slow, but the improvement in effective communication with lower power is quite fascinating.

The improvement gained by long-frame ccw is limited by phase modulation introduced by the propagation path. For 14-MHz signals, motion in the F layer typically produces 2 or 3 Hz of phase (or frequency) modulation for a JA to W6 path.[1] (We have also observed what appears to be propagation time delays under poor band conditions.) When the filter passband becomes so narrow that this modulation exceeds the filter bandwidth, further improvement in signal-to-noise ratio cannot be obtained by narrowing the filter passband.

In evaluating filter effectiveness, noise bandwidth does not tell the whole story; there are psychological considerations, too. The human ear is frequency sensitive, and the human brain can focus on particular cw signal frequencies amid the noise and QRM. Skillful cw operators use this capability well. My observations have led me to conclude that this skill is worth at least a 6-dB margin when using a 2300-Hz filter. QRM, however, is often a confusion factor and therefore causes more degradation of copy than an equivalent amount of random noise. These psychological factors are difficult to quantify, but probably reduce the advantage of ccw over ordinary cw.

Fig. 6 shows graphically the results of on-the-air comparisons between cw and ccw made in 1975. Transmissions were made on 14,049,000 Hz from JR1ZZR at power levels of 10 watts, 1 watt and 0.1 watt using ccw and a vertical ground-plane antenna on a four-story building. A three-element beam was used for reception at W6BB. The ccw signals were received simultaneously as cw and ccw signals, and were recorded on separate channels of a stereo cassette recorder. We selected sample periods from the cassette recording and played back the signals to four moderately experienced cw operators. The average proportion of copy shown on the graphs is based upon words considered copied. The copy content was taken from radio journals. Extrapolation of these data indicate an estimated 13-W cw signal as equivalent to a 0.1-W ccw signal in communications effectiveness, or a 24-dB superiority for ccw.

Concluding Remarks

The ccw technique appears to be most promising, especially where signals are weak compared to the noise and QRM. Under high absorption and QRN conditions (as often experienced on 80 and 160 meters) the additional selectivity of ccw would be helpful; we don't have data on that yet however.

Ccw might be used for EME communication, but the problem is complicated because of lunar-motion Doppler effects. One might need a computer to calculate the frequency at which the signal is expected to return. Also, achieving the necessary frequency stability of 1 or 2 Hz is more difficult at the higher frequencies used for EME.

Some of the simplest rigs are the easiest to convert for ccw operation. To obtain the full advantage of the ccw mode, however, receiver quality should be high. In Part 2, I will describe the equipment and methods used for communicating by ccw. [ost]

[1][Editor's Note: The amount of "signal spreading" is determined in large measure by the earth's geomagnetic activity (A-index), which is more severe under disturbed conditions.]

References

Petit, "Coherent CW: Amateur Radio's New State Of The Art?", *QST*, September 1975.
Sekine, "Coherent CW Wa Nandesuka (What is Coherent CW?)", Japanese *Ham Radio Journal*, January, 1976.
Weiss, "Coherent CW — The CW Of The Future," *CQ*, June and July, 1977.
Petit, "Fundamentals of CCW," CCW Newsletter 75:7. Note: Back copies of volumes of the Coherent CW Newsletter (CCWN) are available from CCWN, 2301 Oak St., Berkeley, CA 94708: 1975, $5; 1976, $5; 1977, $10; 1978, $10. Volumes 75 and 76 are well summarized in the Weiss article in *CQ*. Most of volumes 77 and 78 are summarized in this article. Further volumes of the CCWN are not planned, but a book on ccw is being assembled by Petit. This article has benefited from suggestions by: Jim Maynard, K7KK; Ray Petit, W7GHM; Keitaro Sekine, JA1BLV; and Ed Johnson, W2ZWA=JA1YVW.

Coaxial Cable Antenna Traps

These traps are neat, compact, cheap and easy to assemble. If you're a ham, that's got to sound interesting!

By Robert H. Johns,* W3JIP

Both the coil and capacitor of a parallel-resonant antenna trap can be made from the same length of coaxial cable. This type of trap construction offers several electrical advantages and is easy for the home builder to construct.

The Concept

Parallel-tuned circuits, such as shown in Fig. 1A, are common. An inductance, L, is tuned to resonance by means of a capacitor made from a piece of coaxial cable. The capacitor is formed by the capacitance existing between the inner and outer conductors of the cable. By proceeding one step further, both the inductor and capacitor of the resonant circuit may be made from the same length of coaxial cable. This is shown in Fig. 1B where the cable is formed into a coil. The upper end of the braid (X) has become the right side of the inductor and the lower end (Y) has looped around and joined the antenna wire and inner conductor from the other side of the coil to become the left end of the inductor. Note that the inner conductor is cross-connected to the outer braid at the opposite end of the coil; this is essential. Were it joined to the braid at X, there would be no capacitor formed, since there would be no voltage difference between the conductors at X and by transformer action, all points along the cable would be at the same potential.

To help visualize the inductors and capacitors formed by this connection, the inner conductor and outer braid coils are separated as shown in Fig. 1C and placed end to end. The cross connection is joining the two in series, X to Y, in the middle. The capacitors indicated by the dashed lines are representative of the distributed capacitance between corresponding points of the two coils and the capacitance between the inner and outer conductors of the cable. Antenna traps made this way have excellent Q. High Q is desired for a trap in a multiband antenna because at frequencies lower than the one to which it is tuned, it becomes a loading coil.

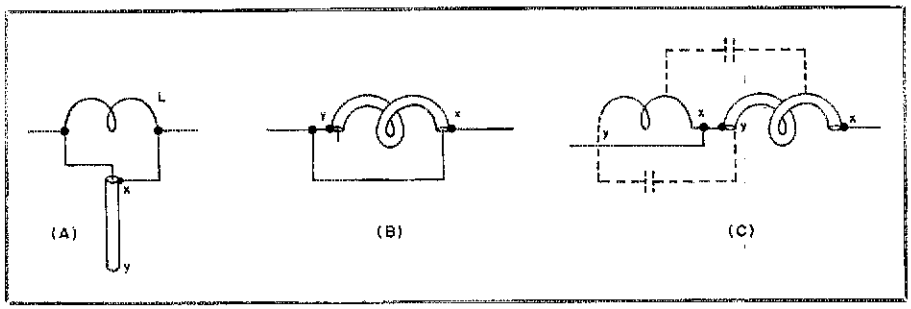


Fig. 1 — The simple trap at A uses a length of coaxial cable for the network capacitor. At B, a single piece of coaxial cable serves as both the coil and capacitor. The presentation at C is explained in the text.

Coaxial cable capacitors have good high-voltage ratings and don't change capacitance with temperature. Assuming the impedance at the end of a dipole to be as high as 8000 ohms, a kilowatt of power in the antenna would develop 3000 volts rms at the end of the dipole to drive the resonant current in a trap located there.[1] While it is difficult to estimate the actual coaxial cable trap ratings, I have tested traps made with RG-58/U at a 1-kW input power level and they held up nicely. High Q, conservatively rated traps could be made from RG-8/U cable with some increase in construction difficulty and weight. The weakest point (at which the cable might arc over if not insulated properly) is at the free end of the inner conductor, point Y, in Fig. 1. Any sharp points exposed to the air at that location require attention.

[1]Notes appear on page 17.

Traps for Wire Antennas

Figs. 2 and 3 show a trap made for use

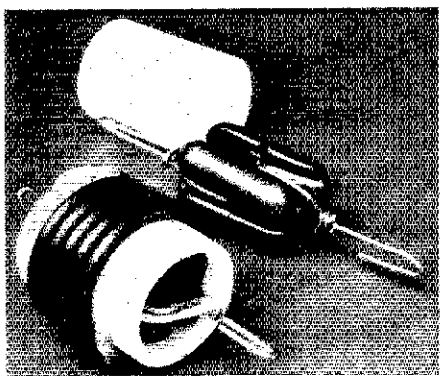


Fig. 2 — The construction of a coaxial-cable trap. Copperweld wire loops are first attached to the egg insulator. Holes are drilled in the polyethylene form to pass the cable leads as described in the text. The form is a snug fit around the insulator.

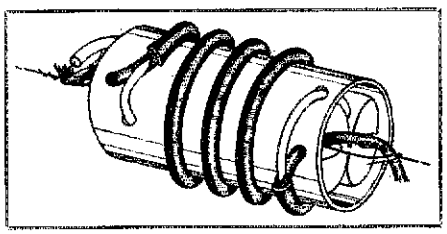


Fig. 3 — The braid of the coaxial cable is used to form the trap coil; it is soldered to the no. 14 Copperweld wire which is looped through the insulator and used for attachment to the antenna wire. At the right-hand side of the trap, the inner conductor is separated from the braid and passed through the inside of the trap. At the left end of the trap it is soldered to the braid and antenna wire, forming the cross connection. The inner conductor emerging from the coax at the left of the trap is held in place merely by means of a hole drilled through the coil form; no solder connection is made.

*R. H. Johns — Scientific Instruments, 3379 Papermill Rd., Huntingdon Valley, PA 19006

with a dipole, inverted V or other wire antenna. The coaxial cable, RG-58/U, is wound on a 1/8-in. (3.2 mm) wall polyethylene tube coil form 1-1/2 in. (38 mm) in diameter that is force fit over a plastic egg insulator. This assembly is lightweight, strong and inexpensive, and also helps in making the necessary cross connections. The thick-walled tubing aids in insulating the free end of the coaxial cable inner conductor.

To make a trap, several inches of the cable jacket are removed, the braid loosened, and the inner conductor and dielectric fed through a hole in the loosened braid. Two pieces of Copperweld wire should be attached to the egg insulator (Fig. 2); they furnish tie points for the antenna wire and traps, and the capacitance between them will be part of the completed trap. As shown in Fig. 3, the cable braid is passed through a hole in the polyethylene tubing at the right-hand side of the coil and is soldered to one piece of the Copperweld wire on the insulator. The center conductor passes through another hole in the coil form 90 degrees beyond the first hole and is routed through the egg insulator beside the other piece of Copperweld wire and soldered to it at the opposite end. (This is the cross connection shown in Fig. 1B.) The required number of turns of cable may be determined from Table 1. Wind them tightly onto the coil form. Once again, separate the braid and center conductor. Pass the braid through a hole in the form and solder it to the Copperweld wire (as shown in Fig. 3) at the left of the coil. A diagonal hole is drilled into the wall of the coil form and the free end of the inner conductor of the cable placed into it to provide some degree of mechanical stability and electrical isolation; this end is left unattached.

When constructing a trap, one should keep in mind that both a coil and capacitor are being formed. The cable should be handled carefully, especially the dielectric between the inner and outer conductors. The mechanical arrangement does not require soldering close to the dielectric, which shouldn't be harmed if unnecessary heating from a soldering iron is avoided. It's better to heat a joint quickly with a large iron than cook the work for a long time with a small iron.

The coaxial cable is available with either a stranded or solid-center conductor. Stranded conductor cable is more flexible and is preferred. If solid-center conductor cable is used, it will require more care and patience in separating the braid from the dielectric and center conductor because of the stiffness of the cable. The lengths of cable given in Table 1 are measured between the holes in the tubing through which the braid passes. These lengths are about 0.4 in. (10 mm) longer than that required by a close-wound coil of the same number of turns. The coils can be tuned to the proper frequency with the aid of a GDO by spacing the coil turns on the form. An adjustment range of 5 to 10% is possible.

Once the traps are tuned to the desired frequency, they should be secured in position. Tape could be used, but I suggest covering the entire trap with a weatherproofing and insulating layer such as the silicone rubber coating produced by Dow Corning. This compound is brushed on and will set overnight. It is intended as a roof-mending product, but has excellent insulating properties as well. It is available in quart (0.95 liter) sizes at most discount stores. The trap shown in Fig. 4 has been coated with this material. Silicone rubber caulking material that is widely available in tubes may also be used.

Fig. 5 contains the dimensions of a five-band trap dipole for 75 through 10 meters. It may prove to be a bit short on 75 meters since the antenna with which the measurements were made was only about 20 ft (6 m) high at the center and drooped to about 8 ft (2.4 m) at the ends. Notice that the antenna is not as short or as heavily loaded by the traps as some trap dipoles. The coaxial traps are relatively small and do not offer much loading inductance on the lower-frequency bands. This provides an advantage in antenna bandwidth, each dipole exhibiting a low SWR over almost as broad a range as a normal half-wave dipole. Trap antennas which are heavily loaded by the trap coils display a narrow bandwidth.

The reason for this loading coil behavior can be seen in Fig. 6, where the sum of all the distributed capacitance is shown as C. The inductance of the circuit is comprised of the inner and outer conductors of the coil in series. The antenna connections are "tapped down" on the outer braid half of this coil. At resonance, the trap still presents a high impedance. Below the resonant frequency of the trap, the loading coil inductance is much less (perhaps 25%) of the total inductance, producing a very small loading coil at below-resonant frequencies.

Traps for Verticals and Beams

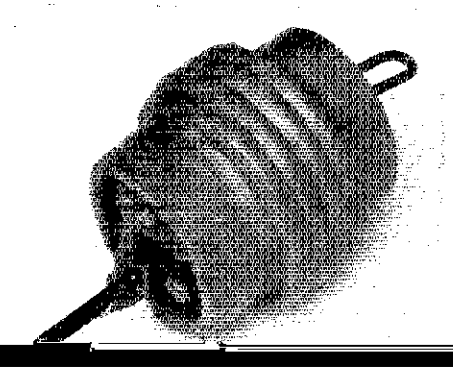
The coaxial cable trap can be incorporated into antennas made from tubing by wrapping the cable on an insulating

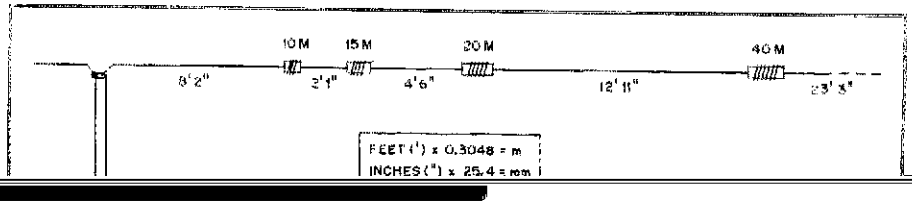
Table 1

Construction Data for the Traps

Band of Resonance (meters)	On 1-1/2-in. (38 mm) form Number of turns RG-58/U	Coil length (mm)	On 7/8-in. (22 mm) form Number of turns RG-58/U	Coil length (mm)
10	3-3/4	30	6-1/2	90
12	4-1/2	30	7 1/2	95
15	5	35	8-1/4	95
17	5-3/4	35	9-1/2	60
20	6-3/4	45	12	80
30	9-3/4	60	17	100
40	12-3/4	75		

In. × 25.4 = mm





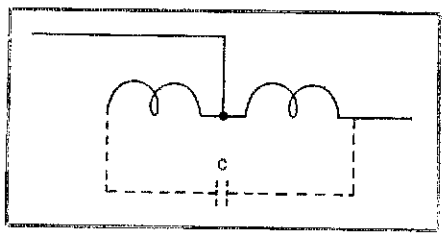


Fig. 6 — The entire coil formed by the inner and outer conductors in series is contributing to the trap inductance at resonance. Below resonance, when the trap is acting as a loading coil, only the outer braid is active, producing a much smaller effective loading inductance than that normally encountered with other types of traps.

section between the tubes. A wooden insulating section may be made from rock maple dowels, which are sold in most hardware stores. Wood is a perfectly good insulating and support medium for antennas when it is protected from moisture. With modern materials like potting plastics or silicone rubber to coat the dowels, we don't have to boil them in paraffin like grandpa did.

Fig. 7 shows a trap mounted on a 7/8-in. (22 mm) dia dowel placed between two lengths of 1-in. (25.4 mm) dia aluminum tubing. Dowels that are 1/8-inch (3.2 mm) smaller in diameter than the tubing will telescope nicely, provided the tubing wall thickness is 0.058-inch (1.5 mm). Dowels can also be used to join sections of 3/4-inch (19 mm) diameter aluminum tubing and 1-1/4-inch (32 mm) diameter TV masts.

A lengthwise slot is sawed in the dowel to pass the inner conductor of the cable beneath the coil turns to make the cross connection. The braid of the cable trap is soldered to a lug that is held to the tubing by means of a bolt passed through the tubing and the dowel. Tuning of the trap is done by spacing the cable turns on the form. This should be done before attaching the tubing, as the presence of the tubing will lower the apparent trap frequency, and resonances in long lengths of tubing can be coupled to the GDO, producing confusing results.

While a hardwood insulating section secured between lengths of tubing is strong enough for beams and most verticals, it might not be strong enough to use when a 10-meter trap is mounted near the base of a large, unguyed vertical antenna. In such a case, additional strength may be obtained by building up a fiberglass sleeve around the trap and ends of the tubing, as shown in Fig. 8. Fiberglass repair kits for automobile bodies are available in auto parts stores. If you aren't familiar with the use of these materials, make a practice trap first. Since the resin is messy and has an obnoxious odor, the work should be done outdoors.

Approximate lengths for a vertical antenna can be taken from Fig. 5. Lengths for triband beam elements proved to be almost the same as those of a half-wave dipole. Start with those lengths and make the elements shorter as required. A simple 40-, 15- and 10-meter vertical using a single (10-meter) trap has been described.[2]

Amateurs are encouraged to build these traps for their own use. Manufacturers are cautioned that a patent application has been filed for these traps and all rights under the patent code will be enforced. Kits are also available from the author to aid in assembling the traps described in this article.[3] QST

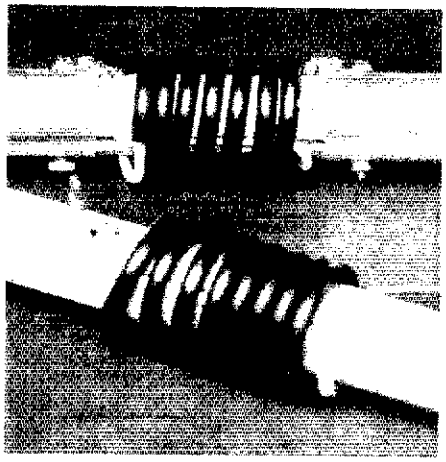


Fig. 7 — These coaxial-cable traps are wrapped on wooden dowels. The inner conductor of the cable at the right-hand side completes the cross connection at the left end by passing beneath the turns of the coil through a slot made in the dowel. The tree end of the inner conductor at the left-hand end is tucked into a hole in the dowel.

Fig. 8 — This trap has been reinforced by a fiberglass sleeve, as described in the text.

[1] *The ARRL Antenna Handbook*, thirteenth edition, p. 109.
[2] Johns, "Three Band Trap Vertical," *Ham Radio Horizons*, December 1980.
[3] R. H. Johns — Scientific Instruments, 3379 Papermill Rd., Huntingdon Valley, PA 19006. Parts and coaxial cable to construct two traps for wire antennas: W10, W15, W20 — $4.90; W40 — $5.40. Parts and cable for one trap for antennas made with tubing: T10, T15 — $3; T20, $3.50. Please add $1 for postage. The ARRL and *QST* in no way warrant this offer.

Strays

TA PROFILES

The talents of ARRL Technical Advisor Paul M. Wilson, W4HHK, of Collierville, Tennessee, are sincerely appreciated. He is our specialist for vhf/uhf meteor scatter, EME and related modes of communication.

Licensed as W4HHK since 1941, Paul now holds an Extra Class license, plus Radiotelephone First and Radiotelegraph First Class licenses with a Radar endorsement. His primary interests in Amateur Radio are vhf/uhf and cw. He received an ARRL Technical Merit Award jointly with W2UK in 1955 for 144-MHz meteor-scatter work, and jointly with W3GKP in 1969 for 2300-MHz EME work. Several "firsts" can be added to Paul's achievements in Amateur Radio: first 144-MHz meteor-scatter contact, first 2300-MHz EME contact, and first confirmed amateur reception of NASA's Apollo Missions on "S" Band (2.2 GHz) as Apollo X spacecraft orbited the moon (see "The World Above 50 MHz," January 1954, December 1970 and August 1969 *QST*).

Paul has written technical articles for *QST* and has been a member of ARRL since 1940. He is also a member of Army MARS, Society of Wireless Pioneers, Mid-South Amateur Radio Association and Central States VHF Society.

Retired from his position as a studio engineer with WMC-TV, Paul now has more time for Amateur Radio, photography, camping and traveling with W4UDQ, his wife, "D.B." — *Marian Anderson, WB1FSB*

TA Paul Wilson, W4HHK, stands before his towering 18-ft dish antenna.

Crystal Filter Design with Small Computers

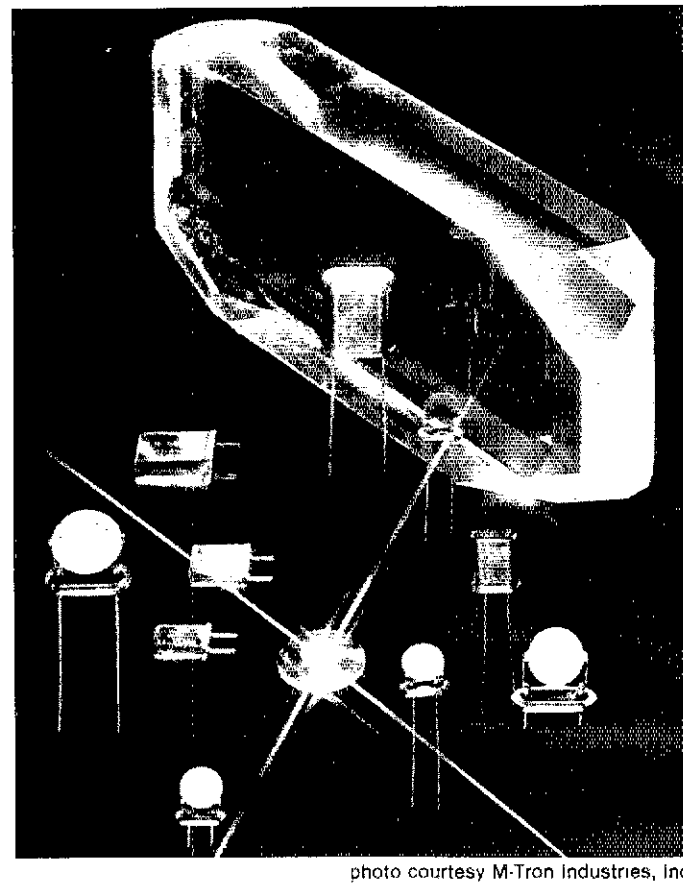


photo courtesy M-Tron Industries, Inc.

Thinking of making a crystal filter? This computer program will provide excellent results. It even allows calculations for filters that provide large bandwidths.

By Dr. Ulrich L. Rohde,* DJ2LR

Crystal filters are being used where superior selectivity is required and the specific bandwidth may be anywhere from a few hundred hertz up to 100 kHz. Crystal filters, as generally offered, are of the Chebyshev design. These filters, however, frequently exhibit bad ringing and group-delay distortion. A natural question at this point would be, "Is there an alternative and, if so, what is it? In answer, this article provides information on the use of a small BASIC computer to aid in building more suitable crystal filters. The actual program is shown, along with computer results. In addition, attenuation graphs are provided to illustrate the effects of additional filter poles. The program is written in such a way that it allows the calculations of large-bandwidth crystal filters. Such information has not been available previously.

Standard Filter Design

A half-lattice crystal filter with one crystal appears in Fig. 1. Filters of this type have been designed into receiver circuits, but with rather poor results. By tuning the neutralizing capacitor, C1, a pole can be moved in order to influence the bandwidth and the notch depth.

Fig. 2A presents the attenuation performance of a single-crystal 300-kHz filter. The notch at the right is set by the neutralizing capacitor. Attenuation in excess of 100 dB is possible.

The close-in performance of the single-crystal filter can be seen in Fig. 2B while Fig. 2C is a graph of the overall performance. If the pole is removed far enough, as in Fig. 2C, the selectivity improves greatly on the left side and the filter action becomes symmetrical. In reality, though, such filters do not offer outstanding performance. Consequently, they are seldom used today.

A typical ssb filter has a total of six crystals. How a filter of this type behaves is indicated by Fig. 2D. In practice, the ultimate rejection would be limited to 120 dB.

Crystal filters are found frequently in up-conversion receivers like the DJ2LR HF-1030. Fig. 2E shows the performance of a typical circuit of this nature. If the filter is improperly tuned, a performance similar to that in Fig. 2F can be expected. At times, such an adjustment may be useful to suppress a mixing product or an image if a 60-dB attenuation on the other side is sufficient.

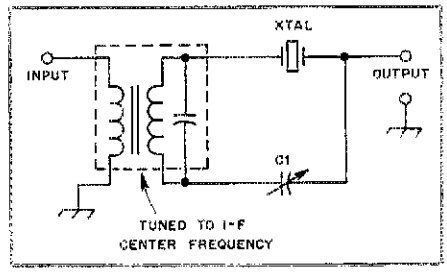


Fig. 1 — A half-lattice crystal filter circuit.

In practice, we should evaluate those performances when we are working with a crystal filter design and then calculate the parameters of the particular crystal filter in which we are interested. This can be done with the aid of the program.

Table 1 contains a list of program information covering a wide variety of possible bandwidths for a universal crystal filter. The basic configuration for such a crystal filter appears in Fig. 3. It consists of three tuned transformers constructed with small pot cores suitable for high-frequency application. A pot core recommended for this application is Siemens' type 4.6 × 4.1 (mm), no. B65495-K0005-A017 for lower-frequency use. For the region around 10 MHz, the core material K65495-K00016-A001 is satisfactory.[1]

Computer-Aided Design of a Crystal Filter

Lines 1 through 20 in the program of

*52 Hillcrest Dr., Upper Saddle River, NJ 07458

[1]Details on Siemens' pot cores are found in the Siemens book, *Ferrites Soft-Magnetic Material Data Book 1979/80*, p. 98. This book is available from the Siemens Corporation, 186 Wood Ave. S., Iselin, NJ 08830, tel. 201-494-1000.

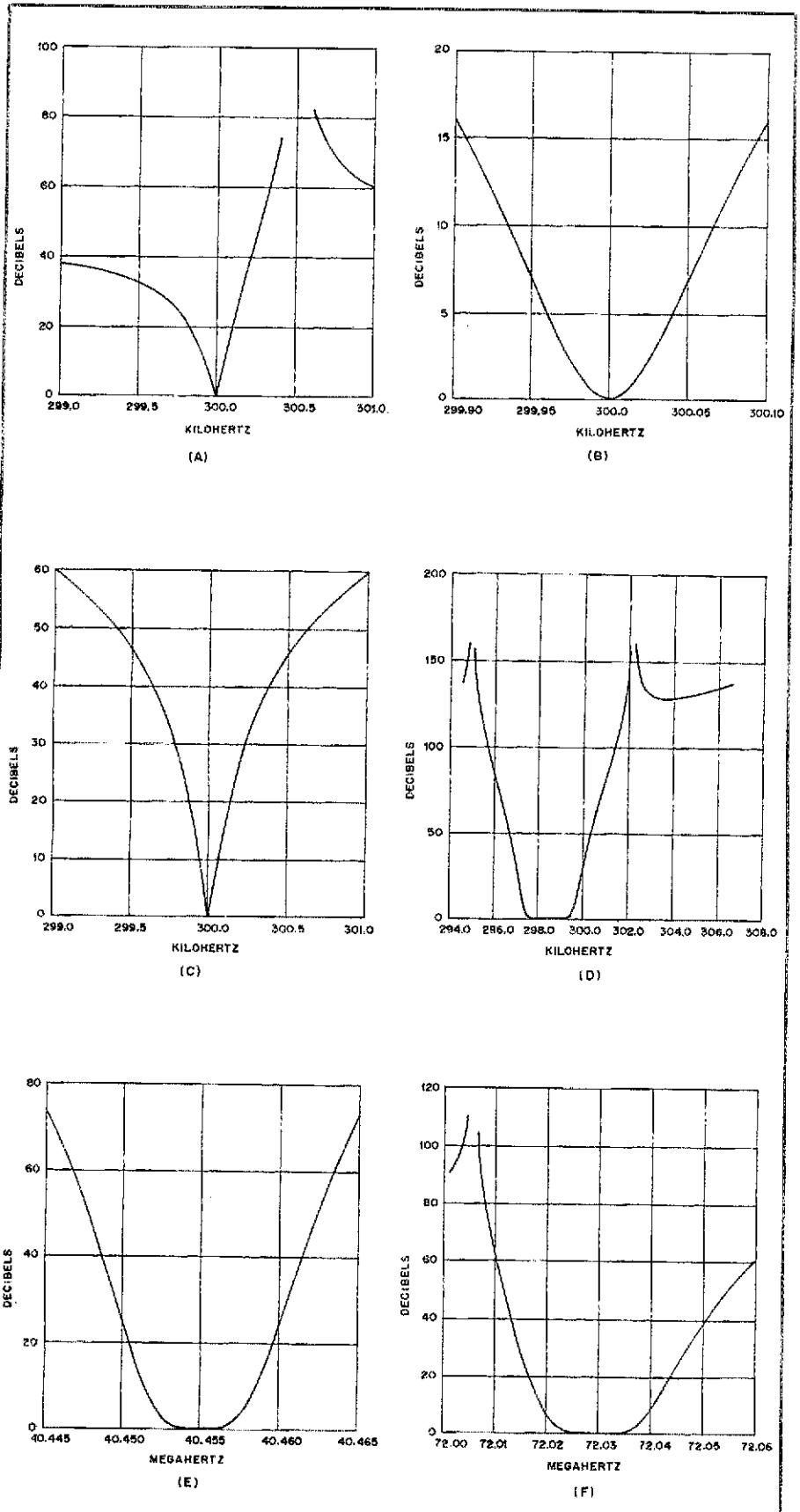


Fig. 2 — Crystal filter responses. The amplitude response of the crystal filter in Fig. 1 with C1 set to generate a pole 500-Hz above center frequency is shown at A. The close-in performance of this same filter is indicated at B, while the overall response is represented in C. In the latter case, the pole is tuned considerably away from the center frequency. At D the amplitude response of a six-crystal single-sideband filter at 300 kHz. A Chebyshev six-crystal filter at 40.455 MHz is represented by the curve at E. The curve at F is for the amplitude response of a 72.03-MHz crystal filter with an attenuation pole on the left side.

Table 1 activate the user-definable keys available on the Tektronix 4051/52 computers. After initiation of the program, it will start on line 100 and ask whether the results should be displayed on the screen or on the printer. Most of the hobby computers on which this program will run have printer-definable ports that have to be addressed. The address to which the information is routed is V5.

In line 200, the computer will ask the center frequency. In line 230, it will ask the bandwidth while in line 250 it will request the crystal inductance.

Fig. 4 shows the inductance in relation to a function of frequency for a crystal that can be manufactured. The highest possible inductance for L1 should always be selected without sacrificing performance in a manner that would lead to spurious response. A minimum Q of 80,000 (100,000 is better) for the crystal is desired for narrow bandwidths. If you start building a crystal filter and order the crystal from a company like Bliley, a firm experienced in crystal and filter manufacturing, you will do well to have them verify these two parameters.

At line 260, the computer will ask you for the capacitance of the holder. You can generally presume that the HC-18/U holder is rated at 1.5 pF, with the larger HC-6/U unit having a capacitance of 6 pF.

On line 280, you will finally be asked what filter response you desire. Various types of responses are available. If selectivity is the prime object, a Chebyshev filter should be chosen. Where constant group delay and therefore low fm distortion are required, a flat delay is important. For perfect pulse response, either the linear phase filter or the Gaussian response should be chosen.

Amateurs who desire additional general information on filter theory will find Zeverev's *Handbook of Filter Synthesis*, published by John Wiley and Sons, particularly useful. The "look-up" tables I refer to in this computer program are taken from his book. In this publication, Zeverev briefly elaborates on the difficulties in building crystal filters that have a large bandwidth in comparison to the center frequency. A typical problem, for instance, is one concerning a 10- to 20-kHz-bandwidth filter designed for 10 MHz. Because Zeverev seems to avoid giving clear design rules for such filter circuitry, additional guidelines are needed. This is where the computer program fills in, for it incorporates the necessary "spreading inductance" which will cure the problem.

Another good source of general filter information is the ITT book *Reference Data for Engineers*, fifth edition, chapters 7, 8 and 9. Inasmuch as many readers may be less interested in precise theory, preferring just to build some filters, none of the mathematics is repeated. Fig. 5 is a graph

with the different response curves shown in comparison with each other.

Computerized Tuned-Circuit Information

After you have responded to the query in the filter program concerning the type of filter you wish to have, the computer will use the "look-up" table as provided by line 890 and 1290. The aim of this part of the program is to calculate the component values of lines 380 through 580. You can delete lines 140 and 590, a screen-erase command for the Tektronix computer. Lines 600 through 840 transfer the characteristic values to the printer or the screen. Lines 600 to 650 print, respectively, the header, the center frequency, the bandwidth, the inductance, the internal impedance and the external reference capacitance. Other information includes the input impedance that is printed in line 660 with the required inductance, the capacitance in line 700, and the output values in line 670 together with line 710.

Lines 680 and 690 determine the tuned circuit for the middle of the range. In order to obtain the right crystal from the manufacturer, the four frequencies required are printed on lines 720 through 750. A six-digit accuracy is desirable when these crystals are ordered. Line 800 gives the reference input voltage for a second computer program to determine the actual band-pass characteristic. Lines 820 through line 840 verify that all tuned circuits are on the center frequency.

When aligning the filters, do realize that any mistuning of the input stages will result in poles as shown in Figs. 2A, 2D and 2F. In order to get sharper skirts at times, it is desirable to use poles like these. They can always be determined experimentally. The procedure is to set all three tuned circuits precisely on the center frequency with the crystals inserted.

For those amateurs who do not have a computer, some calculations of interest also are shown in the tables. Table 2 shows the Butterworth, Chebyshev, flat-delay crystal filter, linear-phase crystal filter and Gaussian response filter for a 250-Hz bandwidth. The Chebyshev response should really be avoided because of ringing. The optimum choice probably is the flat-delay or linear-phase approach.

As we take a look at the filters of Table 2, we see that 9 MHz has been selected for the center frequency with a 250-Hz bandwidth. The present inductance is 200 mH. All other values are self-explanatory.

My calculations for single-sideband filters for both upper and lower sidebands are shown in Table 3. For perfect low distortion, the flat-delay versions should be preferred.

In cases where further selectivity is required, two of those crystal filters can be cascaded either directly with a 1-dB resistive matching pad in between or a transistor stage with 3 to 4 dB gain and heavy feedback. Finally, for those in-

Table 1

Wide Bandwidth Filter Design Program

```
  1 GO TO 100
  4 RUN 280
  8 PAGE
  9 GO TO 2ØØ
2Ø LIST 129Ø, 2ØØØ
1ØØ INIT
11Ø SET KEY
12Ø DIM C(13)
13Ø C$ = ""
14Ø PAGE
15Ø PRINT "*** CRYSTAL FILTER PROGRAM *** J__J__"
16Ø REM COPY-RIGHT RESERVED
17Ø REM ULRICH L. ROHDE, PH.D., SC.D.
18Ø PRINT "DO YOU WANT OUTPUT AT SCREEN (32) OR PRINTER (41)?"
19Ø INPUT V5
2ØØ PRINT "WHICH CENTER FREQUENCY DO YOU WANT?"
21Ø INPUT FØ
22Ø PRINT "WHICH BANDWIDTH DO YOU WANT?"
23Ø INPUT BØ
24Ø PRINT "WHICH INDUCTANCE DO YOU HAVE?"
25Ø INPUT L
26Ø PRINT "WHAT HOLDER CAPACITANCE DO YOU HAVE"
27Ø INPUT C(9)
28Ø PRINT "WHICH FILTER TYPE DO YOU WANT, BUTTERWORTH,"
29Ø PRINT "CHEBYSHEV, FLAT DELAY, LIN. PHASE, GAUSS RESP. (B,C,F,L,G)?"
3ØØ INPUT A$
31Ø IF A$ = "" THEN 1290
32Ø IF A$ = "B" THEN 89Ø
33Ø IF A$ = "C" THEN 97Ø
34Ø IF A$ = "F" THEN 1Ø5Ø
35Ø IF A$ = "L" THEN 113Ø
36Ø IF A$ = "G" THEN 121Ø
37Ø RETURN
38Ø RØ = PI*L*BØ
39Ø CØ = 1/(2*BØ*PI↑2*FØ*L)
4ØØ QØ = 15ØØØØ*BØ/FØ
41Ø R1 = RØ*(K2↑2 + (1/Q1 – 1/QØ)↑2)/(1/Q1 – 1/QØ)
42Ø R2 = RØ*(K2↑2 + (1/Q4 – 1/QØ)↑2)/(1/Q4 – 1/QØ)
43Ø C(1) = CØ*K2/(K2↑2 + (1/Q1 – 1/QØ)↑2) – 2*C(9)
44Ø C(8) = C(1) + 2*C(9)
45Ø GO TO 13ØØ
46Ø C(2) = CØ*K2/(K2↑2 + (1/Q4 – 1/QØ)↑2) – 2*C(9)
47Ø C(1Ø) = C(2) + 2*C(9)
48Ø GO TO 134Ø
49Ø C(11) = CØ/K2 – 4*C(9)
5ØØ C(3) = 1/((2*PI*FØ)↑2*L1) + C(11)
51Ø F1 = FØ – BØ/2*(K2 + K1)
52Ø F2 = FØ – BØ/2*(K2 – K1)
53Ø F3 = FØ – BØ/2*(K2 + K3)
54Ø F4 = FØ – BØ/2*(K2 – K3)
55Ø C(4) = 1/(4*PI↑2*F1↑2*L)
56Ø C(5) = 1/(4*PI↑2*F2↑2*L)
57Ø C(6) = 1/(4*PI↑2*F3↑2*L)
58Ø C(7) = 1/(4*PI↑2*F4↑2*L)
59Ø PAGE
6ØØ PRINT @V5:F$;"J__"
61Ø PRINT @V5:"FØ = ";FØ
62Ø PRINT @V5:"BØ = ";BØ
63Ø PRINT @V5:"L = ";L
64Ø PRINT @V5:"RØ = ";RØ
65Ø PRINT @V5:"CØ = ";CØ
66Ø PRINT @V5:"RIN = ";R1
67Ø PRINT @V5:"ROUT = ";R2
68Ø PRINT @V5:"CK = ";C(3)
69Ø PRINT @V5:"LK = ";L1
7ØØ PRINT @V5:C$;L1,"CIN = ";C(12)
71Ø PRINT @V5:D$;L2,"COUT = ";C(13)
72Ø PRINT @V5:"F1 = ";F1
73Ø PRINT @V5:"F2 = ";F2
74Ø PRINT @V5:"F3 = ";F3
75Ø PRINT @V5:"F4 = ";F4
76Ø PRINT @V5:"CS1 = ";C(4)
77Ø PRINT @V5:"CS2 = ";C(5)
78Ø PRINT @V5:"CS3 = ";C(6)
79Ø PRINT @V5:"CS4 = ";C(7)
8ØØ VØ = (R1 + R2)/R1
81Ø PRINT @V5:"VØ = ";VØ
82Ø WØ = 1/(2*PI*SQR(L1*(C(12) + C(1))))
83Ø W1 = 1/(2*PI*SQR(L2*(C(13) + C(2))))
84Ø PRINT @V5:"POLE FREQUENCIES ARE ";WØ;" ";W1
```

```
850 CALL "WAIT",1
860 PRINT @V5:"J__J__J__"
870 GO TO 280
880 END
890 Q0 = 100
900 F$ = "BUTTERWORTH RESPONSE 4TH ORDER CRYSTAL FILTERJ__"
910 Q1 = 1.0457
920 Q4 = 1.0457
930 K1 = 0.7369
940 K2 = 0.5413
950 K3 = 0.7369
960 GO TO 380
970 Q0 = 1000
980 F$ = "CHEBYSHEV RESPONSE 4TH ORDER CRYSTAL FILTER 0.01DB RIPPLEI__J__"
990 Q1 = 1.8258
1000 Q4 = 1.8258
1010 K1 = 0.6482
1020 K2 = 0.5446
1030 K3 = 0.6482
1040 GO TO 380
1050 Q0 = 1000
1060 F$ = "MAXIMALLY FLAT DELAY 4TH ORDER CRYSTAL FILTERJ__"
1070 Q1 = 0.2334
1080 Q4 = 2.2404
1090 K1 = 2.5239
1100 K2 = 1.1725
1110 K3 = 0.6424
1120 GO TO 380
1130 Q = 1000
1140 F$ = "LINEAR PHASE 4TH ORDER CRYSTAL FILTER 0.05DEG PHASE ERRORJ__"
1150 Q1 = 0.4934
1160 Q4 = 0.7182
1170 K1 = 1.632
1180 K2 = 0.7181
1190 K3 = 0.7391
1200 GO TO 380
1210 Q0 = 1000
1220 F$ = "GAUSSIAN RESPONSE 4TH ORDER CRYSTAL FILTERJ__"
1230 Q1 = 0.2747
1240 Q4 = 0.4083
1250 K1 = 2.2792
1260 K2 = 0.7553
1270 K3 = 0.9896
1280 GO TO 380
1290 END
1300 C$ = "TUNED INPUT L1 = "
1310 C(12) = 1. 0E - 11*1. 0E + 8/F0
1320 L1 = 1/((2*PI*F0)↑2*(C(12) + C(1)))
1330 GO TO 460
1340 D$ = "TUNED INPUT L2 = "
1350 C(13) = 1. 0E - 11*1. 0E + 8/F0
1360 L2 = 1/((2*PI*F0)↑2*(C(13) + C(2)))
1370 GO TO 490
```

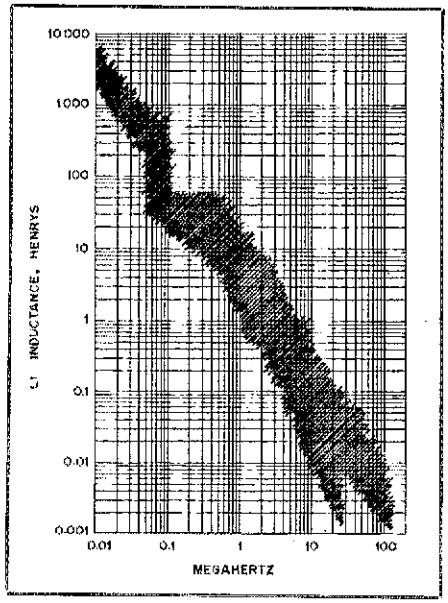


Fig. 4 — This graph shows the relationship of inductance and frequency for a particular crystal selected as a test example.

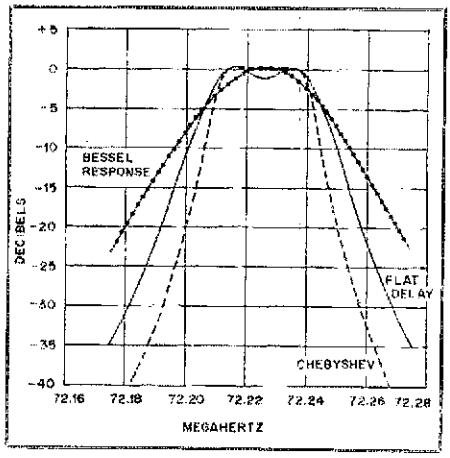
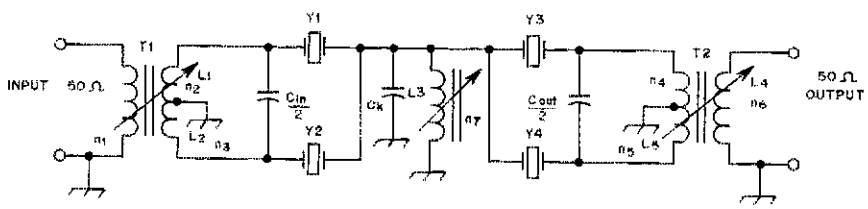


Fig. 5 — The Bessel, flat-delay and Chebyshev responses are represented by this composite graph. The Chebyshev response provides the steepest skirts, while the Bessel response has the poorest amplitude curve.



$n_2 = n_3$

n_2 is determined from L1 or L2
To obtain the required value for n_2 let

$$n_1 = \sqrt{\frac{R_{in}}{50\ \Omega}} \cdot n_2$$

$n_4 = n_5$

n_4 is determined from L4 or L5.
To obtain the value n_6 let

$$n_6 = \sqrt{\frac{R_{out}}{50\ \Omega}} \cdot n_4$$

For different impedance, n_2 and n_4 may be changed or the source on board changed from 50 ohms.

Fig. 3 — A four-crystal filter circuit. The input and output impedances are determined by the turns ratio of the input and output transformers. Also shown are the calculations for this filter.

terested in constructing a double-conversion receiver, the parameters for a 41-MHz crystal filter are provided in Table 4. Table 5 is a Gaussian response filter designed for use in a radar receiver.

In Summary

This short presentation on how to design and build crystal filters with the aid of a small computer should encourage experimentation with various types of filters. In the past, wideband filters like the 72.225-MHz, 31-kHz bandwidth filter of Table 5 required special computer programs. Now this unique program can solve the design problem for an extremely wide bandwidth range.

Table 2

Calculations for Some Large-Bandwidth Filters

	BUTTERWORTH RESPONSE FOURTH ORDER CRYSTAL FILTER	*CHEBYSHEV-RESPONSE FOURTH ORDER CRYSTAL FILTER (Ø.Ø1dB RIPPLE)*	*MAXIMALLY FLAT DELAY FOURTH-ORDER FILTER*	*LINEAR PHASE FOURTH ORDER ORDER CRYSTAL (0.05° PHASE ERROR)*	*GAUSSIAN RESPONSE FOURTH ORDER CRYSTAL FILTER*
FØ =	9ØØØØØØ	9ØØØØØØ	9ØØØØØØ	9ØØØØØØ	9ØØØØØØ
BØ =	25Ø	25Ø	25Ø	25Ø	25Ø
L =	0.2	0.2	0.2	0.2	0.2
RØ =	157.Ø79632679	157.Ø79632679	157.079632679	157.079632679	157.079632679
CØ =	1.12579Ø929E-1Ø	1.12579Ø929E-1Ø	1.12579Ø929E-1Ø	1.12579Ø929E-1Ø	1.12579Ø929E-1Ø
RIN =	176.77Ø073394	199.739282Ø7	688.699716Ø17	325.996645717	560.476789Ø07
ROUT =	176.77Ø073394	199.739282Ø7	1078.92346935	251.3Ø4525198	387.579899958
CK =	3.856888Ø33E-1Ø	4.655256668E-1Ø	2.055712Ø9E-1Ø	2.8Ø686Ø945E-1Ø	2.581716487E-1Ø
LK =	1.7Ø2249344E-6	1.18Ø9353Ø2E-6	2.7Ø6242448E-6	2.4Ø7155723E-6	2.716479143E-6
TUNED INPUT					
L1 =	1.7Ø2249344E-6	1.18Ø9353Ø2E-6	2.7Ø6242448E-6	2.4Ø7155723E-6	2.716479143E-6
CIN =	1.111111111E-1Ø	1.111111111E-1Ø	1.111111111E-1Ø	1.111111111E-1Ø	1.111111111E-1Ø
L2 =	1.7Ø2249344E-6	1.18Ø9353Ø2E-6	1.553941872E-6	2.Ø57891921E-6	2.527836771E-6
COUT =	1.111111111E-1Ø	1.111111111E-1Ø	1.111111111E-1Ø	1.111111111E-1Ø	1.111111111E-1Ø
F1 =	8999840 225	8999850.9	8999537.95	8999706.2375	8999620.6875
F2 =	9ØØØ24.45	9ØØØ12.95	9ØØØ168.925	9ØØØ114.2375	9ØØØ19Ø.4875
F3 =	8999840.225	8999850.9	8999773.1375	8999817.85	8999781.8875
F4 =	9ØØØ24.45	9ØØØ12.95	8999933.7375	9ØØØØ2.625	9ØØØØ29.2875
CS1 =	1.563654Ø31E-15	1.56365Ø322E-15	1.563759Ø72E-15	1.5637Ø6591E-15	1.56373Ø32E-15
CS2 =	1.56359Ø617E-15	1.563594Ø13E-15	1.563539819E-15	1.56356882E-15	1.563532327E-15
CS3 =	1.563654Ø31E-15	1.56365Ø322E-15	1.563677343E-15	1.563661806E-15	1.563674Ø3E-15
CS4 =	1.56359Ø617E-15	1.563594Ø13E-15	1.563621537E-15	1.563597601E-15	1.563588337E-15
VØ =	2	2	2.5666Ø94297	1.77Ø88Ø7Ø844	1.69151819943
POLE FREQUENCIES	9ØØØØØØ 9ØØØØØØ	9ØØØØØØ 9ØØØØØØ	9ØØØØØØ 9ØØØØØØ	9ØØØØØØ 9ØØØØØØ	9ØØØØØØ 9ØØØØØØ

Table 3

Single-Sideband Filter Calculations

	UPPER SIDEBAND CHEBYSHEV RESPONSE FOURTH ORDER CRYSTAL FILTER Ø.Ø1dB RIPPLE	*UPPER SIDEBAND MAXIMALLY FLAT DELAY FOURTH ORDER CRYSTAL FILTER*	*LOWER SIDEBAND CHEBYSHEV RESPONSE FOURTH ORDER CRYSTAL FILTER Ø.Ø1dB RIPPLE*	*LOWER SIDEBAND MAXIMALLY FLAT DELAY FOURTH ORDER CRYSTAL FILTER*
FØ =	9ØØ21.ØØ	9ØØ21ØØ	8997ØØ	8997ØØ
BØ =	21ØØ	21ØØ	21ØØ	21ØØ
L =	Ø.Ø3	Ø.Ø3	Ø.Ø3	Ø.Ø3
RØ =	197.92Ø337176	197.92Ø337176	197.92Ø337176	197 920337176
CØ =	8.932764334E-11	8.932764334E-11	8.93693393E-11	8 93693393E-11
RIN =	215.822217917	906.264311969	215.821952659	906.266750613
ROUT =	215.822217917	733.98Ø82547	215.821952659	733.962678696
CK =	3.52Ø472927E-1Ø	1.836453586E-1Ø	3.522137182E-1Ø	1.837352494E-1Ø
LK =	1.611Ø14457E-6	2.754931668E-6	1.611772269E-6	2.756184362E-6
TUNED INPUT				
L1 =	1.611Ø14457E-6	2.754931668E-6	1.611772269E-6	2.756184362E-6
CIN =	1.11Ø851912E-1Ø	1.11Ø851912E-1Ø	1 11137Ø431E-1Ø	1.11137Ø431E-1Ø
L2 =	1.611Ø14457E-6	1.779138943E-6	1.611772269E-6	1.77996Ø146E-6
COUT =	1 11Ø851912E-1Ø	1.11Ø851912E-1Ø	1.11137Ø431E-1Ø	1.11137Ø431E-1Ø
F1 =	9ØØØ847.56	8998218.78	8996647.56	8994Ø18.78
F2 =	9ØØ22Ø8.78	9ØØ3518.97	8998Ø08.78	8999318.97
F3 =	9ØØØ847.56	9ØØØ194.355	8996647.56	8995994.355
F4 =	9ØØ22Ø8.78	9ØØ1543.395	8998Ø08.78	8997343.395
CS1 =	1.Ø422Ø27Ø4E-14	1.Ø42811741E-14	1.Ø43176Ø16E-14	1.Ø43785Ø96E-14
CS2 =	1.Ø41887546E-14	1.Ø41584337E-14	1.Ø4286Ø416E-14	1.Ø42556783E-14
CS3 =	1.Ø422Ø27Ø4E-14	1.Ø42353989E-14	1.Ø43176Ø16E-14	1.Ø43327513E-14
CS4 =	1.Ø41887546E-14	1.Ø42Ø41582E-14	1.Ø4286Ø416E-14	1.Ø43Ø14668E-14
VØ =	2	1.8Ø9897Ø86Ø7	2	1.8Ø987488Ø8
POLE FREQUENCIES	9ØØ21ØØ 9ØØ21ØØ	9ØØ21ØØ 9ØØ21ØØ	8997ØØ 8997ØØ	8997ØØ 8997ØØ

Table 4

Calculations for a Double-Conversion Receiver 41-MHz Crystal Filter

	CHEBYSHEV RESPONSE FOURTH ORDER CRYSTAL FILTER Ø.Ø1dB RIPPLE	*CHEBYSHEV RESPONSE FOURTH ORDER CRYSTAL FILTER Ø.Ø1dB RIPPLE*	*CHEBYSHEV RESPONSE FOURTH ORDER CRYSTAL FILTER Ø.Ø1dB RIPPLE*
FØ =	4.Ø455E + 7	4.1E + 7	7.Ø455E + 7
BØ =	7ØØØ	7ØØØ	7ØØØ
L =	Ø.Ø1	Ø.Ø1	Ø.Ø1
RØ =	219.911485751	219.911485751	219.911485751
CØ =	1.78895746E-11	1.769177415E-11	1.Ø27212746E-11
RIN =	24Ø.Ø69542975	24Ø.Ø8611Ø77	241.4Ø15Ø5946
ROUT =	24Ø.Ø69542975	24Ø.Ø8611Ø77	241.4Ø15Ø5946
CK =	6.6Ø9534562E-11	6.511358Ø11E-11	3.465894436E-11
LK =	3.943635932E-7	3.893569691E-7	2.341Ø824Ø9E-7
TUNED INPUT			
L1 =	3.943635932E-7	3.893569691E-7	2.341Ø824Ø9E-7
CIN =	2.471882338E-11	2.439Ø2439E-11	1.419345682E-11
L2 =	3.943635932E-7	3.893569691E-7	2.341Ø824Ø9E-7
COUT =	2.471882338E-11	2.439Ø2439E-11	1.419345682E-11
F1 =	4.Ø4508252E + 7	4.Ø9958252E + 7	7.Ø4508252E + 7
F2 =	4.Ø4553626E + 7	4.1ØØØ3626E + 7	7.Ø4553626E + 7
F3 =	4.Ø4508252E + 7	4.Ø9958252E + 7	7.Ø4508252E + 7
F4 =	4.Ø4533626E + 7	4.1ØØØ3626E + 7	7 Ø4553626E + 7
CS1 =	1.548Ø51812E-15	1.5Ø7165686E-15	5.1Ø349971E-16
CS2 =	1.5477Ø4578E-15	1.5Ø6832117E-15	5.1Ø284239E-16
CS3 =	1.548Ø51812E-15	1.5Ø7165686E-15	5.1Ø349971E-16
CS4 =	1.5477Ø4578E-15	1.5Ø6832117E-15	5.1Ø284239E-16
VØ =	2	2	2
POLE FREQUENCIES	4.Ø455E + 7 4.Ø455E + 7	4.1E + 7 4.1E + 7	7.Ø455E + 7 7.Ø455E + 7

Table 5

Calculations for a 31-kHz Bandwidth Filter

GAUSSIAN RESPONSE FOURTH-ORDER CRYSTAL FILTER

FØ =	7.2225E + 7
BØ =	31ØØØ
L =	Ø.Ø13
RØ =	1266.Ø618394
CØ =	1.74Ø514567E-12
RIN =	4788.47944845
ROUT =	3377.929Ø4618
CK =	7.245912256E-12
LK =	4.438ØØ5914E-7
TUNED INPUT	
L1 =	4.438ØØ5914E-7
CIN =	1.384562132E-11
L2 =	4.39519567E-7
COUT =	1.384562132E-11
F1 =	7.217796525E + 7
F2 =	7.224862Ø45E + 7
F3 =	7.219795Ø4Ø5E + 7
F4 =	7.222863165E + 7
CS1 =	3.74Ø138126E-16
CS2 =	3.732826Ø2E-16
CS3 =	3.738Ø67416E-16
CS4 =	3.734892759E-16
VØ =	1.7Ø5428327
POLE FREQUENCIES	7.2225E + 7 7.2225E + 7

Strays

John Schmale, K2IZ, N.Y.C./Long Island SCM, towers behind members of the Hall of Science Amateur Radio Club (Queens, New York) after presenting Public Service Commendations to many of them for their dedicated efforts during the recent Italian earthquake disaster. Club members received, relayed, answered or directed more than 1000 messages during the around-the-clock operation that lasted nearly two weeks. *(photo by Fred Kahn, WB2TBC)*

FIRE AT SEA

☐ Last October, the Dutch ship *Prinsendam* caught fire in the Gulf of Alaska, and 533 passengers and crew were forced to abandon ship. Through poor sea conditions, people were lifted by helicopter from their lifeboats to the rescue ships. Alaskan Amateur Radio operators monitoring the situation quickly realized that their services would be needed. Health-and-welfare nets were organized, and liaisons with the Red Cross, Alaska State Troopers and the Coast Guard were set up.

As the passengers and crew safely arrived on shore, the expected communications crunch developed. Shifting band conditions were a problem. Another obstacle was passing traffic to foreign countries with whom the U.S. had no third-party agreement. As a result of outstanding cooperation among amateurs and their good on-the-air conduct, over 300 pieces of traffic were successfully passed. Fortunately, there were no fatalities during the rescue; the ship, however, sank. — *Don Bush, KL7JFT*

From left to right stand Jack van der Zee, radio officer of the *Prinsendam*, Jim Pfister, N6CF, and David Ring, N1EA, radio officers aboard the *Williamsport*, one of the tankers involved in the rescue effort. Jack maintained vital communications in the smoke-filled radio room despite melting cables and dwindling emergency power. Providing an essential link in the communications, Jim and David relayed positions and estimated time of arrivals and kept the distress frequency clear. *(photo courtesy David J. Ring Sr.)*

The Vertical-V Antenna

"Rabbit ears for hf? Heresy!" you declare. Or is it? Let this article tempt you to find out what the "ears" can do for you!

By Dr. Lawrence B. Owen,* WB6HNQ

Most amateurs undoubtedly are familiar with the properties of inverted-V hf antennas. The inverted V is simple, is inexpensive to build, provides a good match to a 50-ohm coaxial line and produces a quasi-omnidirectional horizontally polarized radiation pattern when used at its fundamental frequency. It occurred to me recently that a vertical-V (an inverted V rotated 180 degrees in the vertical plane) might also have some interesting performance characteristics. In terms of appearance, the vertical-V is reminiscent of an indoor TV rabbit-ears antenna (Fig. 1).

A cursory literature review revealed that rigorous analysis of basic V-antenna performance had been completed by the late 1940s.[1,2] In fact, Wells[3] can probably be credited for the invention of the inverted V in 1944. Kraus, in the introductory chapter of *Antennas*,[4] points out in a generic sense that a cylindrical vertical-V can be expected to yield a broader usable bandwidth than the corresponding dipole. In considering the relative merits of vertical-V versus other common types of wire antennas, it seems clear that the vertical-V offers the potential for significantly improved performance. I am surprised, therefore, to find that in *QST*, at least, there has been no description of a practical vertical-V for amateur hf use.

The classical inverted V, while providing excellent performance, does suffer from several deficiencies. Ground effects undoubtedly degrade radiation efficiency and influence feed-point impedance. If the antenna is supported from a metallic structure, additional parasitic losses can occur. Since the antenna is center fed, unbalanced currents may be induced on the transmission line even if a balun transformer is used at the feed point. Finally, sloping the elements downward increases the likelihood of parasitic losses in nearby ground-mounted structures.

Vertical-Vs would be affected to a much lesser degree by the factors described above. In addition, vertical-Vs provide the additional advantages of increased effective antenna height, simpler construction (only one central support required when self-supporting aluminum elements are used) and a capability for rotating the antenna. My experiments indicated that a vertical-V exhibits a 6-dB

*Terra Tek, Inc., 420 Wakara Way, Salt Lake City, UT 84108

Notes appear on page 25.

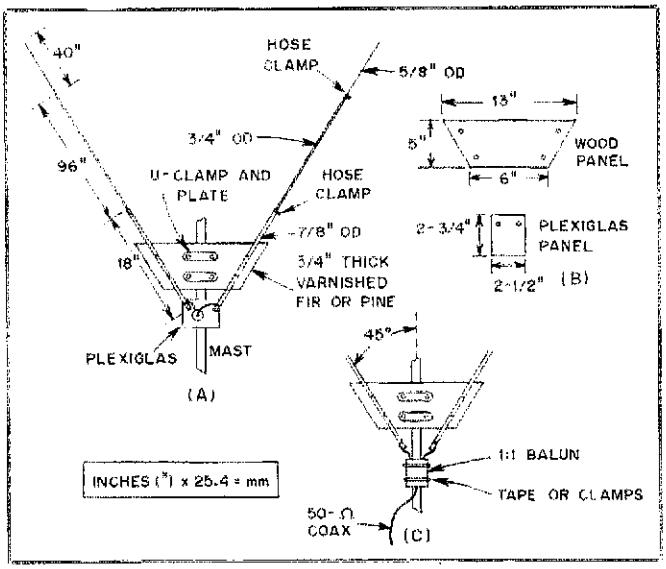


Fig. 1 — Construction details for the 15-meter vertical-V antenna. As indicated in section A, each element is bolted to the wood and Plexiglas panels. For the wooden panel use 1/4 x 2-1/4-inch bolts. For the Plexiglas panel use 1/4 x 1-1/2-inch bolts. Panel dimensions are shown at B. Part C shows the angle for the elements and the position for the balun. Both elements are individually adjusted to a length of 135.7 in (3.446 m) for resonance at 21.225 MHz.

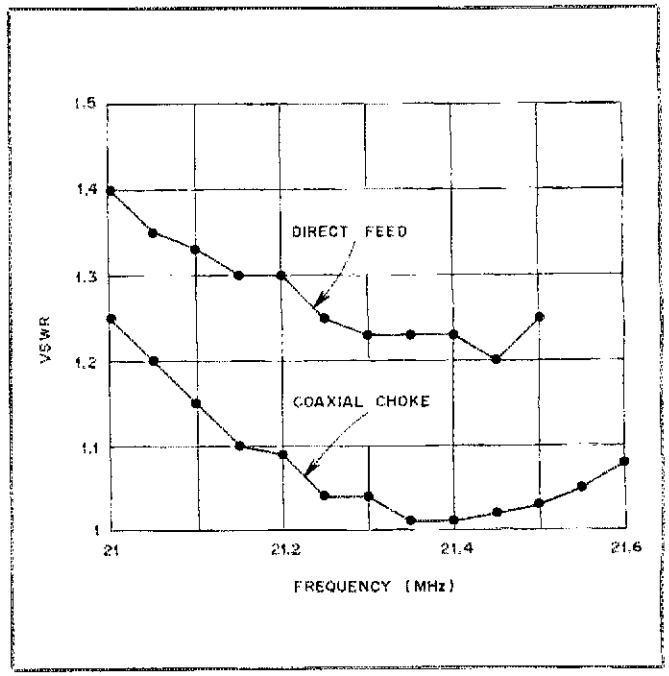


Fig. 2 — The VSWR performance of the 15-meter vertical-V antenna with and without the coaxial cable choke.

front-to-side ratio, suggesting that the ability to rotate the antenna might be advantageous under certain operating conditions.

Making a comparison of the mechanical properties of a vertical-V with those of an equivalent single-element delta loop or quad also proves to be instructive. A rather obvious point is that the vertical-V is lighter and offers lower wind loading than either a quad or delta loop cut for the same fundamental frequency. My experiments indicate that the length in feet of a resonant half-wave vertical-V constructed from aluminum tubing is approximated by 480/frequency (MHz). The length in meters is 146.3/frequency (MHz). A 1/4-wave vertical-V element is, therefore, about 28.5% and 4.5% shorter than single legs of corresponding equilateral delta loops and quads, respectively. You can conclude that the vertical-V offers the advantages of reduced construction cost, lower wind loading and weight. Besides being simpler to construct, it permits direct matching to a 50-ohm coaxial transmission line.

Construction

The basic design for a single-element 15-meter vertical-V is shown in Fig. 1A. Telescoping sections of aluminum tubing are used for the elements, which have outer diameters of 7/8 in. (22 mm), 3/4 in. (19 mm) and 5/8 in. (16 mm). One end of each of the two 7/8-in. and 3/4-in. element sections are slotted with a hacksaw to a depth of about 1 inch (25 mm). Since the elements must be insulated from each other and from the support bracket, the 7/8-in. dia element sections are mounted on a wood base. The wood (fir or pine) has several coats of varnish to ensure reasonable service life. The 3/4-in. OD elements are telescoped into the base section and secured with stainless steel hose clamps. The same procedure is used to secure the 5/8-in. OD sections to the 3/4-in. OD elements. A standard "coax" male connector is mounted in a piece of Plexiglas that is secured directly to the base-element sections.

The input impedance of the antenna is a function of the apex angle. My prototype employed an apex of 100°. As shown by the SWR curves in Fig. 2, excellent bandwidth and low SWR were attained. The data suggest, however, that an even better match to 50-ohm coaxial cable could be obtained by reducing the apex angle slightly to between 90° and 95°.

Initially, the antenna was fed directly by RG-8/U coaxial cable. With this arrangement the upper SWR curve shown in Fig. 2 was obtained. The SWR seemed too high and my Century 21 transceiver was bothered by severe distortion in the keying monitor. Rf feedback, traced to rf flowing along the shield of the transmission line, takes the blame for this condition. A coaxial choke installed at the antenna feed point solved the difficulty. This choke is constructed by simply forming a 5-in. (130-mm) dia coil consisting of four turns of transmission line that is taped to the mast.

Setting the resonant frequency of the antenna requires loosening the two base-element clamps and adjusting the telescoping elements as necessary for the lowest SWR. The initial 1/4-wave element length (11.3 feet or 3.45 meters for 21.225 MHz) was obtained from my empirically derived expression: length in feet for a quarter wavelength = 240/frequency in MHz. To determine the length in meters the equation is m = 73.2/frequency in MHz. The solder joints and the coaxial cable were subsequently sealed with a rubber repair compound obtained from a local hardware store. Any one of several commercial or homemade 1:1 baluns may be used to eliminate the need for separate Plexiglas coaxial connector mounts and coaxial chokes.

Performance of the 15-meter vertical-V was excellent during a six month period from October 1979 to March 1980 while I was using a Century 21 transceiver with 25 watts of rf output. All operations took place from a QTH located about 50 miles east of San Francisco. A total of 103 stations were worked. DX included contacts with Canada (6), Mexico (3), Hawaii (2), Japan (24), Australia (9) and New Zealand (1). The remaining 58 contacts included all contiguous U.S. call areas.

A second series of tests was carried out after the vertical-V elements had been shortened to 8.9 ft (2.7 m) for CB operation. CB tests, using a Radio Shack ssb rig, were conducted as a simple means of evaluating the major polarization mode of the antenna. Several local CB operators used quad antennas that featured instantaneous selection of either horizontal or vertical polarization. Tests indicated that the V was about 12 dB stronger when horizontal polarization was selected by the other operator. This suggests that a significant element of vertical polarization was produced by the V. Thus, the vertical-V offers a reasonably good compromise between quasi-omni-directional radiation and bipolarization performance.

There seems little doubt that the vertical-V is an excellent performer. Construction of single-element monoband versions for operation from 14 to 30 MHz (or higher) is certainly feasible. Multiband operation should be relatively easy to achieve by making use of various concepts developed over the years for conventional dipoles and verticals. A more intriguing thought, however, would involve appropriate modifications for producing a vertical-V beam antenna. As a starting point, I would suggest using conventional element spacing parameters developed for horizontal Yagi arrays. Input impedance, however, will probably be lower than for the equivalent Yagi. The advantages of increased effective height, shorter turning radius, reduction of adverse boom and tower interactions on beam performance, and the potential for increased bandwidth should be sufficient to justify further experimentation. QST

Notes

[1]Jasik, *Antenna Engineering Handbook*, McGraw-Hill, 1961.
[2]King, *The Theory of Linear Antennas*, Harvard University Press, 1956.
[3]Wells, *The Quadrant Aerial*, J. IEE (London), 1944, Part III, Vol. 91, p. 182.
[4]Kraus, *Antennas*, McGraw-Hill, 1950.

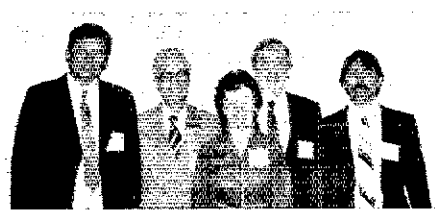
Strays

AMATEURS NEEDED TO ASSIST IN CONTAINING CALIFORNIA FIRES

☐ Amateurs in San Bernadino County have been asked to assist the California Department of Forestry during wildland fires. Two-meter communications will be provided for reconnaissance from the fire scene to central headquarters. Logistical support traffic will be passed from the fire camps to headquarters. Messages for the National Traffic System will be accepted for out-of-county and out-of-state firefighters. Interested volunteers please contact Thomas L. Markley, WA6IKH, 17400 Valley Blvd., No. 70, Fontana, CA 92335 or tel. 714-350-2194.

***QST* congratulates . . .**

☐ Stuart Meyer, W2GHK, who was recently elected President of the Institute of Electrical and Electronic Engineers Vehicular Technology Society.



Some participants in the ARRL-sponsored IEEE SOUTHCON/81 professional program (Session 15) in Atlanta, Georgia, were, left to right, Dr. Ulrich Rhode, DJ2LR; Bill Allen; Marian Anderson, WB1FSB; Doug DeMaw, W1FB; and Tom Hayes. For further details see April 1981 *QST*, page 39. *(photo courtesy W1FB)*

• *Basic Amateur Radio*

Which Antenna to Use?

Many beginners ask the ARRL staff, "What's the best antenna I can put up?" Well, there is no "best" antenna, but here are some pointers for the newcomer.

By Doug DeMaw,* W1FB

"Your *Antenna Book* and the *Handbook* confuse me. They don't tell me which antenna works best." Statements like that are common in letters sent to ARRL Hq. by new amateurs, and understandably so. But, it's a question that has no specific answer because of the many factors that must be considered when making a choice. Generally, the criteria are based on usable property, economics, materials available, operating frequency, attitudes of neighbors, desired communications distance (local or DX) and restrictions and zoning ordinances. All of the foregoing must be considered when selecting an antenna for amateur use. In order to avoid being long-winded in this discussion, let's assume that the following conditions prevail: no restrictions, no problems with neighbors, the house is on a standard city lot, the materials are available locally and we want to work DX and close-in stations. This is a typical scenario for a new radio amateur, and we will key our discussion to this setting of the stage.

Some Basic Requirements

In order for any antenna to perform to the best of its capability it must be as high in the air as possible, and preferably 1/2 wavelength or greater above ground at the chosen operating frequency. Thus, for operation in the 40-meter Novice band (7.1 MHz), our antenna should be 69 feet (21 m) or more above ground. This can be approximated by dividing 492 by the frequency in MHz, or 492/f(MHz), which provides the height in feet. If our 40-meter dipole were only 30 feet (9 m) above ground, it would still work okay, but it would be less useful for DXing. This would be caused by the *angle of radiation* being higher at reduced antenna heights. We can understand this phenomenon by referring to Fig. 1. The outgoing wave from an antenna strikes the ionosphere obliquely and reflects back to earth. This might be compared to a pool shot, where the ball is banked. Therefore, the lower the radiation angle in degrees, the greater distance the ball or signal will travel.

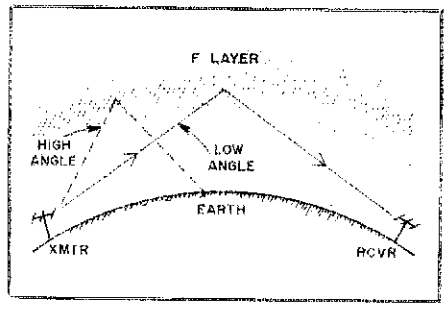


Fig. 1 — Illustration of how radio waves are reflected from the ionosphere. The low radiation angle is preferred for long-distance communications. If high-angle radiation (dashed lines) prevails, the skip distance will be much shorter.

Under some conditions of propagation the signal may take two hops (double-hop skip), and the distance covered will be even greater. The radiation angle will, however, still determine the actual distance of the communication. The angle of radiation is shown in simple form versus antenna height in Fig. 2 at B and C.

We can see from the foregoing discussion that an antenna which is relatively close to the ground can work in our favor for short-haul contacts. The higher radiation angles will return the signal to earth much closer to the transmitting station than in the case of DX work, and local contacts out to a few hundred miles will be enhanced by virtue of our stronger signals. When antennas are very high above ground (one wavelength or more) it is not uncommon to have "dead zones" a few hundred miles from the transmitter; but, at great distances the signal will be much louder than when the transmitting antenna is close to the ground. Some operators have identical antennas for a given band, with one close to the ground and the other quite high up. The antennas are then chosen for the desired communications distance versus band conditions at a given time. This discussion applies only to high-frequency communications. At vhf and higher the antennas should be as high above ground as possible for *line-of-sight* work. In other words, our discussion deals mainly with signals that are reflected from the ionosphere.

The height of an hf antenna has an effect also on the *radiation resistance*, par-

*Senior Technical Editor

ticularly with respect to horizontal dipoles. This effect is shown graphically in Fig. 3. For a typical amateur hf-band antenna installation, however, the mismatch will not pose a problem of great consequence unless the feed line is quite long (more than 100 feet or 30.5 m). The longer the feed line (especially coaxial cable), the greater the losses in the line. These losses increase as the operating frequency is made higher. For example, if the feeder caused a 3-dB loss of the rf energy and the transmitter was putting out 50 watts, there would be only 25 watts of power delivered to the antenna. There would be a similar loss during receive. A 3-dB loss is one half an S unit (if they are accurate). The smaller the diameter of the coaxial cable, the greater the losses per foot. For this reason we should try to use RG-8/U or RG-11/U rather than RG-58/U or RG-59/U types of cable at the higher frequencies. Surplus coaxial cable should be avoided, for aging causes contamination of the dielectric material and makes the cable very lossy. It is wise to start with new cable and replace it every few years.

We should strive to keep the radiating portions of our antenna well removed from trees, power lines, phone wires, downspouts or other conductive objects. Close proximity will cause distortion of the radiation pattern and absorption of the signal energy, which will make our antenna less effective than it might be otherwise. Metallic objects that are close to the antenna (a few feet or less) can detune the antenna and cause a mismatch at the feed point. From all of the foregoing we can extract a basic rule: *keep the antenna as high and as in the clear as possible.*

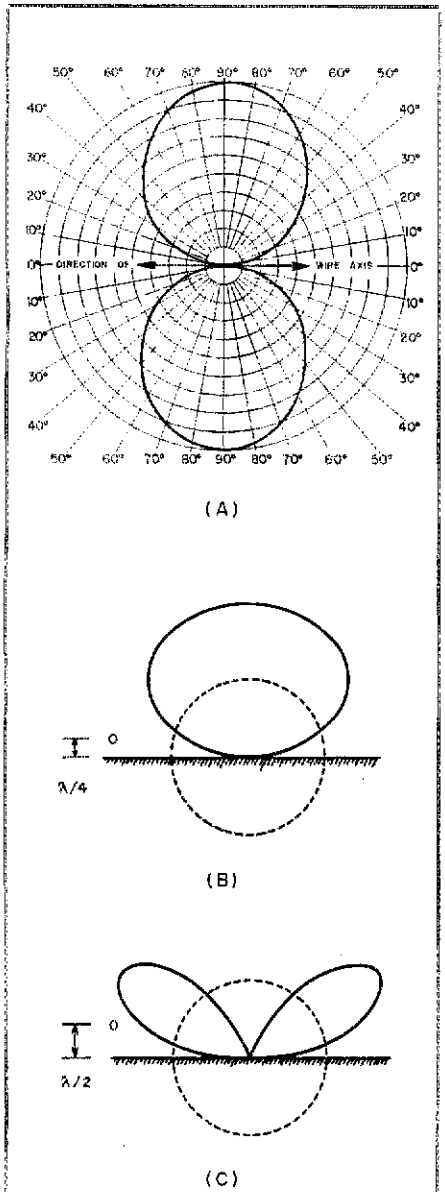


Fig. 2 — If we could rise above our dipole antenna and observe the radiation, we would see the figure-8 pattern at A. This would be seen if the horizontal dipole was 1/2 wavelength or greater above ground. The lobes are off the broadside of the dipole. At B we can see the effect of having the dipole only 1/4 wavelength above ground. There is no apparent directivity, and the radiation angle is very high. At a height of 1/2 wavelength (C), the dipole exhibits two major lobes and has a much lower radiation angle (desired for DX work).

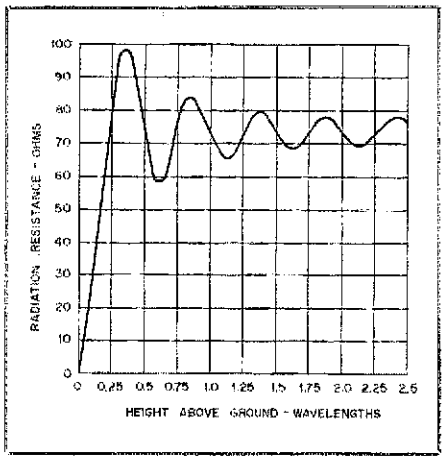


Fig. 3 — The radiation resistance of the antenna feed point varies with the effective height above ground. Here we see the effects of height for a dipole at various elevations above a theoretically perfect ground. At a height of 1/2 wavelength the antenna can be matched nicely with 72-ohm feed line.

Wire Antennas are Easy

Not many amateurs are willing to invest in towers, rotators and beam antennas at the beginning. We can apply the "crawl before walking" concept, and obtain good results with wire types of antennas. Plenty of DX has been worked with simple antennas, so let's see what options are open to us.

Random-Length Wires: A random length of wire can be used to explore the hf bands, but it represents the least effective of the wire antennas unless it is erected high and has considerable length [1/4 wavelength or greater, derived from 234/f(MHz), which yields the approximate length in feet]. Long spans of wire do not constitute a "long-wire antenna," although they are called that rather frequently. A classical long wire is 1 wavelength or more in electrical dimension.

The "random" antenna is one that is strung from a point near the ham station to some supporting structure a convenient distance away. It will exhibit a variety of feed impedances over the range of hf amateur bands. If it approaches a 1/4-wavelength condition (or odd multiple thereof), the impedance will be low — probably between 15 and 100 ohms, depending on a variety of factors. But, at other frequencies it may be close to 1/2 wavelength or multiple of that electrical length. This being the case, the feed impedance will be very high — 1000 ohms or more. If we are to provide an impedance match between our 50-ohm transmitter/receiver combination and the end of the antenna, it will be necessary to use an antenna-matching device (Transmatch, antenna coupler or antenna tuner, as they

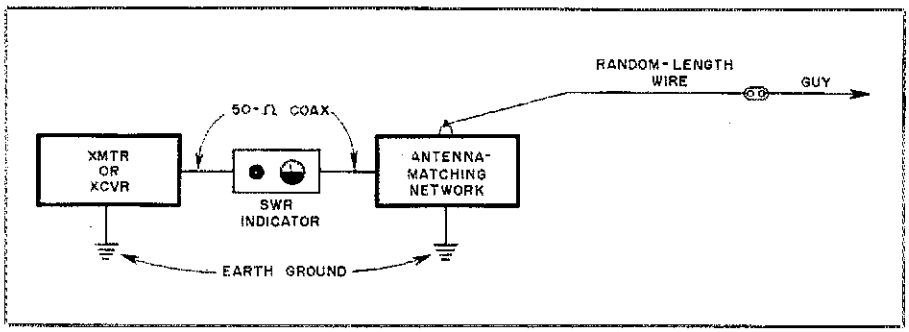


Fig. 4 — Method for using a random-length antenna for multiband operation. The wire is matched to the transmitter by means of a coil and capacitor network (Transmatch). Proper tuning of the network is determined by observing an SWR indicator and adjusting the network for minimum indicated SWR.

are called). This will enable us to change bands and maintain maximum power transfer to the antenna, which will happen when a matched condition exists. Our SWR indicator will show a ratio of 1:1 when the tuner is adjusted correctly. A setup of this kind is shown in Fig. 4.

The shortcoming of this type of antenna system is that rf energy can easily appear on the station equipment. A "hot" key, microphone or transceiver panel will be noted. Also, unwanted rf energy can get into the keyer or the rig and raise havoc. This is most apt to occur when the antenna operates close to a half wavelength or multiple thereof. When the feed impedance is low, rf will probably be absent on the station equipment. In either case, a *short* earth ground is necessary to minimize the hot-chassis problem. The shield braid from a discarded piece of coaxial cable will serve nicely as a ground conductor. It should be as short and direct as possible, running from the chassis of the rig and antenna matcher to a cold-water pipe and/or pipe driven into the ground just outside the shack. Ham shacks that are on the second or third floor of a dwelling are notorious for exhibiting the hot-chassis syndrome. This is because it is difficult to effect a good earth ground from so high up. Sometimes 1/4 wavelength of wire can be laid around the baseboards of the room to serve as a counterpoise ground, and often it will prevent rf from getting on the station equipment.

End-fed Hertz antennas, and some end-fed Zepp antennas, create similar problems with stray rf energy, owing to their relatively high feed impedances (high rf-voltage point). When this problem can't be solved, it is wise to use a coaxial-cable feed system with an appropriate low-impedance antenna, such as a dipole or doublet.

Dipole Antennas: The most common of the beginner antennas is the standard half-wavelength dipole. It is fed at the center by means of low-impedance line, such as coaxial cable, TV Twinlead or open-wire feeders. Some amateurs have even used plastic zip cord (ac line cord) with considerable success! The dipole can be erected horizontally, as a "sloper" or as an "inverted V." The latter was derived from the Quadrant antenna which was used in the early days of radio. Fig. 5 illustrates the various formats for a dipole antenna.

Dipoles are bidirectional (figure-8 pattern) off the broad side of the antenna, but only when the dipole is 1/2 wavelength or more above ground. The closer the antenna is to the earth, the less directional it becomes and the higher the radiation angle will be (Fig. 2). The sloper and inverted-V configurations produce essentially vertical polarization, which is excellent for ground-wave and DX contacts. The sloper, if not mounted on a metallic support, will be omnidirectional in response, as will the inverted V. If either antenna is supported on a steel mast or tower, there will be some directivity (not gain) in the direction of the wire slope.

The advantage of the dipole antenna is its simplicity. The disadvantage is its single-band performance (unless tuned feeders and a Transmatch are used to provide multiband operation, as in Fig. 6). The length of a dipole in feet is determined from 468/f(MHz). Hence, a dipole for 3.7 MHz would be 126 feet, 6 inches (38.5 m) long. Some final adjustment of the leg lengths is usually done to bring the VSWR as close to 1:1 as possible. This can be achieved by inserting a VSWR indicator (sometimes called a "bridge") in the coaxial feed line at a convenient point, then cutting or adding wire in equal amounts to the ends of the dipole until the lowest reflected voltage is noted on the in-

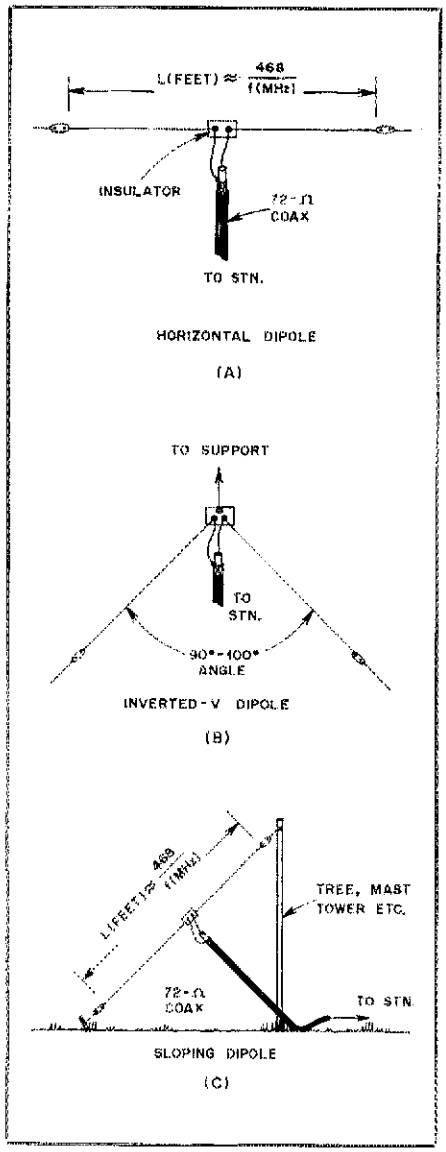


Fig. 5 — Examples of simple but effective wire antennas. A horizontal dipole is shown at A. The legs can be drooped to form an "inverted V," as seen at B. A sloping dipole (sloper) is illustrated at C. The feed line should come away from the sloper at 90° for best results. If the supporting mast is metal, there will be some directivity in the direction of the slope. The antennas at B and C provide vertical polarization and are predominantly omnidirectional if they are supported on a non-metallic mast.

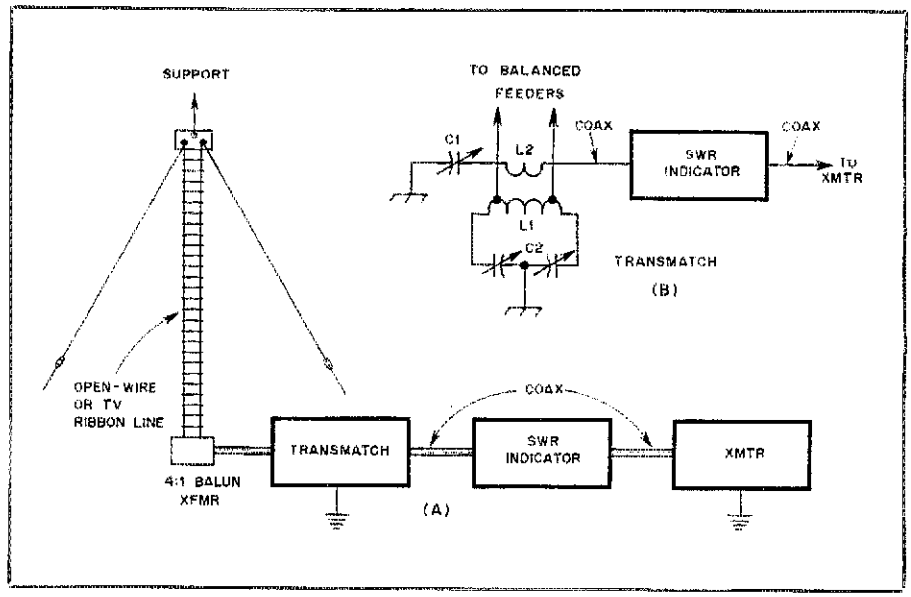


Fig. 6 — Fundamentals of a multiband inverted-V dipole. Balanced, low-loss feeders are recommended (see text). A Transmatch is used to maintain an SWR of 1:1 over the operating range of the antenna. At A we have a balun transformer (to convert from a balanced to unbalanced feed line), a Transmatch and an SWR indicator. Typically, these components are located near the operating position. At B we see the circuit of a Transmatch that is well suited to use with balanced feed lines. The balun at A can be eliminated when using the network at B, and generally the overall system will be more efficient with this style of Transmatch.

dicator. This will usually be a value less than 2:1, in terms of the forward/reflected voltage ratio respective to a half-wavelength dipole that is fed with coaxial cable.

All antennas have a specific useful bandwidth. Dipoles are no exception. The lower the operating frequency, the narrower the antenna bandwidth over a specified VSWR range. Therefore, the antenna should be optimized for the part of the band we use the most. Novices should tune the antenna for the center of the Novice band when using coaxial-cable feed line. At 80 and 40 meters the bandwidth will be especially narrow between the 2:1 VSWR points (Fig. 7), with 100 kHz being typical on 80 meters, and 200 kHz an average expectation on 40 meters. For this reason it is common to hear an amateur say, "I don't work 80-meter cw because my dipole is cut for the ssb portion of the band." In such cases the antenna won't load (accept power) because of the high VSWR in the opposite end of the band. A Transmatch could be utilized to *disguise* the SWR condition, and fair performance would result. But, the mismatched condition at the dipole feed point could not be remedied by that means. A Transmatch merely effects a match between the transmitter and the station end of the feed line — this is important to remember. If it were connected between the antenna feed point and the feed line, it *could* correct the mismatch, but this would be impractical.

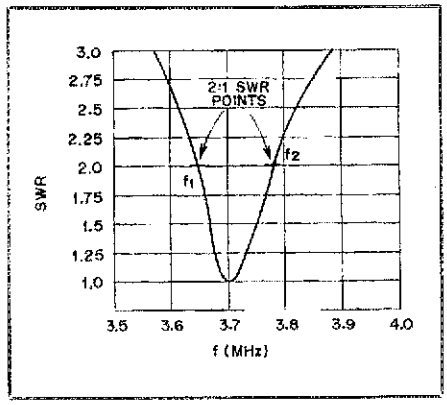


Fig. 7 — Typical SWR curve for an 80-meter dipole with coaxial-cable feed. The antenna should accept the transmitter power quite well when the SWR is less than 2:1 (3650 to 3750 kHz in this example). The bandwidth of an 80-meter dipole may be greater than that indicated here, depending on how it is built.

Multiband Operation

In Fig. 6A we have what is called a multiband inverted-V antenna. It could just as well be a horizontal dipole if the builder preferred that format. Balanced open-wire or TV-ribbon feeders are specified. The open-wire line is preferable, because the losses will be lower than with TV ribbon. The overall length of the dipole is determined by 468/f(MHz) at the lowest intended operating frequency. If it is dimensioned for use on 80 meters, operation will be possible from 80 through 10 meters by using a balun (balanced to unbalanced) transformer and a Transmatch, as illustrated. Some Transmatches come equipped with a built-in balun, which is included for use with balanced feeders.

A more effective method for matching the transmitter to a balanced feeder system is shown in Fig. 6B. In this example the feeders are brought to the operating position and tapped on L1 of the matching network. The length of L1 (effective inductance) must be changed for each band of operation, and this is possible by means of a switch or clip leads. The feeder tap points on L1 must also be changed in accordance with the band of operation. The E. F. Johnson Matchboxes were based on this kind of matching network.

The shortcoming of a multiband dipole is its declining performance as the operating frequency is increased: an 80-meter antenna of this type will perform rather well on 80 and 40 meters. It will give fair results on 20 meters, and may yield mediocre performance on 15 and 10 meters in terms of DX work. However, the multiband inverted V is a very popular all-around antenna despite the compromises. Once erected, it need not be trimmed. The Transmatch will compensate for the SWR "seen" by the transmitter.

The tuned-feeder concept can be applied to the antennas in Fig. 5 as well. The classic name for a straight dipole with tuned feeders is the "Center-Fed Zepp." The inverted-V format is preferred by many because it requires only one support, is essentially omnidirectional and is vertically polarized. The center should be erected as high as possible above ground for best results.

What Kind of Wire is Best?

There is confusion among beginners about what kind of wire is suitable for the radiator of an antenna. Some have asked, "Can I use wire that has plastic insulation?" Others have wondered, "What size wire must I use?" In both cases there is no particular answer. Bare wire and insulated wire both work fine in the range from 1.8 to 30 MHz. The insulation will not degrade the radiation of the antenna. The wire size can be the largest you can acquire or afford. Generally, 12-, 14- or 16-gauge sizes are used. But, very fine wire, such as nos. 20 through 26, is satisfactory if there is not too much stress on the legs of the antenna. The smaller wire will break easily in wind and ice, and this must be considered when making a choice.

Hard-drawn copper or Copperweld wire is the most rugged, and is not subject to stretching with stress versus time. No. 12 or 14 plastic-coated house wiring is excellent for dipole antennas if it is available. Stranded copper works just as well as solid copper for amateur antennas. Some amateurs use insulated hookup wire and report good results. The primary consideration is that we use strong enough wire to ensure that the antenna stays aloft once it is erected.

The end insulators can be made from any good grade of material such as glass, plastic or phenolic. If you don't want to buy insulators, you can make them from pieces of glass-epoxy pc board (copper removed) or Plexiglas. Some amateurs have used the white, plastic six-pack retainers as strong insulators. Others report fine results with plastic clothespins and hair curlers. The center insulators for dipoles can be fashioned from Plexiglas or similar material. Always be sure to seal the open end of the coax cable with epoxy cement or Silastic compound to keep the dirt and moisture from entering the cable.

Homemade open-wire line can be built easily. The line spacing and wire size aren't important for a multiband dipole. A good compromise is to use no. 16 wire for the two conductors, spaced 3 to 4 inches apart. The spacers can be made from plastic clothespins, hair curlers or even a 1/4-inch (6-mm) diameter wooden dowel rod that has been boiled in paraffin wax. We must be innovative if we are to save money!

Trap Dipoles

"Can't I use a trap dipole?" Sure, if you don't mind buying a commercial product. But, a homemade trap dipole is hard to design and to tune if one is a beginner to radio, so the commercial product might be the best to consider.

A trap dipole permits multiband operation without a Transmatch. It uses a coaxial feed line which can be connected directly to the transmitter and receiver. It can be erected as shown in Fig. 5. The trade-off is in performance. The bandwidth will be narrower than with a full-size dipole, and there will be some losses in the traps. However, in an actual on-the-air situation it may be hard to tell the difference between a trap dipole and a single-band, full-size one. Nearly all multiband antennas represent a compromise between convenience and performance.

The best plan is to try various antennas and learn which one will work best for you. Identical antennas often yield different results at separate locations. This is because of the terrain, conductivity of the earth below the antenna and other factors. It won't take long to determine how effective your antenna is, once you start contacting stations near and far. If the performance is dismal, try another style of antenna. Experimenting is part of what Amateur Radio is all about!

Computer Control of the IC-255A

Ready for the computer age in Amateur Radio? It won't be long before many hams tie their computers to their radios. Here is an example of what we may all be doing one of these days.

By Curt Terwilliger,* KI6J

If you want unlimited scanning ability, or a chance to try spread spectrum techniques, or even an automated logger, build this simple interface and connect your ICOM IC-255A 2-meter fm transceiver to your computer. No modifications to the rig are required — just plug the interface into the accessory socket on the rear apron! The interface lets your computer set the frequency, check the squelch, read the frequency and activate the PTT line — all from one parallel input port and one parallel output port. And if you add a modem or TU, you have an automated ASCII station.

Inside the IC-255A

The secret of the IC-255A's versatility is its internal microcomputer. The tuning, offset and frequency memory of the radio are controlled by information that its internal central processing unit (CPU) gives the synthesizer. Normally, this information is read from the front panel knobs and switches, but ICOM also provided for a remote data input from the accessory socket. The CPU periodically scans the socket to see if a remote control device is active, and then reads or writes data as requested. The program that is stored in its CPU specifies the exact timing format for data exchanges. I obtained a timing sketch by writing to the factory; unfortunately, the explanatory notes were in Japanese! However, Mr. Don Specht of ICOM provided a most helpful translation. Anyway, computer signals are an international language.

The message format is shown in Fig. 1. The first character transmitted is the destination address. The possible destinations are 435 MHz, 144 MHz, 50 MHz hf and Idle. These are represented by numbers 11 through 15 (hexadecimal B through F). Because the destination in this case is the IC-255A, the address is 12 (C_{16}). The rig responds with its address as acknowledgment. Then four digits of data are transferred, most significant first. These are equivalent to the digits displayed in the LED readout on the front panel. The remote interface may read or write each digit as desired. For example, if the remote interface were to set the frequency to 147.360 MHz, it would write 7 3 6 0 after the address exchange. If it were to verify the frequency it would read the four digits after the address exchange.

Control Signals

The three signals that control data transfer are DATA BUS CONTROL (DBC), REMOTE (RT) and NOT DATA VALID ($\overline{DV}$). DBC controls the direction of data transfer; a high level signals data from remote to the rig. To send an address, the data bus is loaded, DBC is raised and then

*1328 Balboa Ave., Burlingame, CA 94010

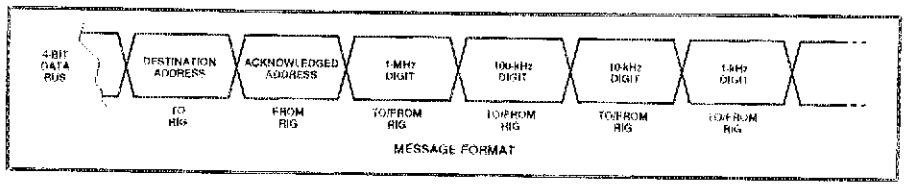


Fig. 1 — Message format required by the IC-255A internal CPU.

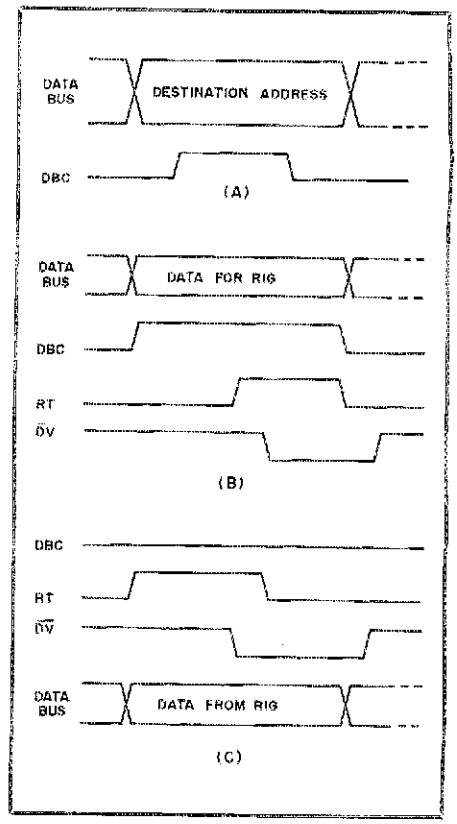


Fig. 2 — Timing diagrams for IC-255A/interface data exchange: at A, address transmission; at B, data sent from interface to IC-255A and at C, data sent from IC-255A to interface.

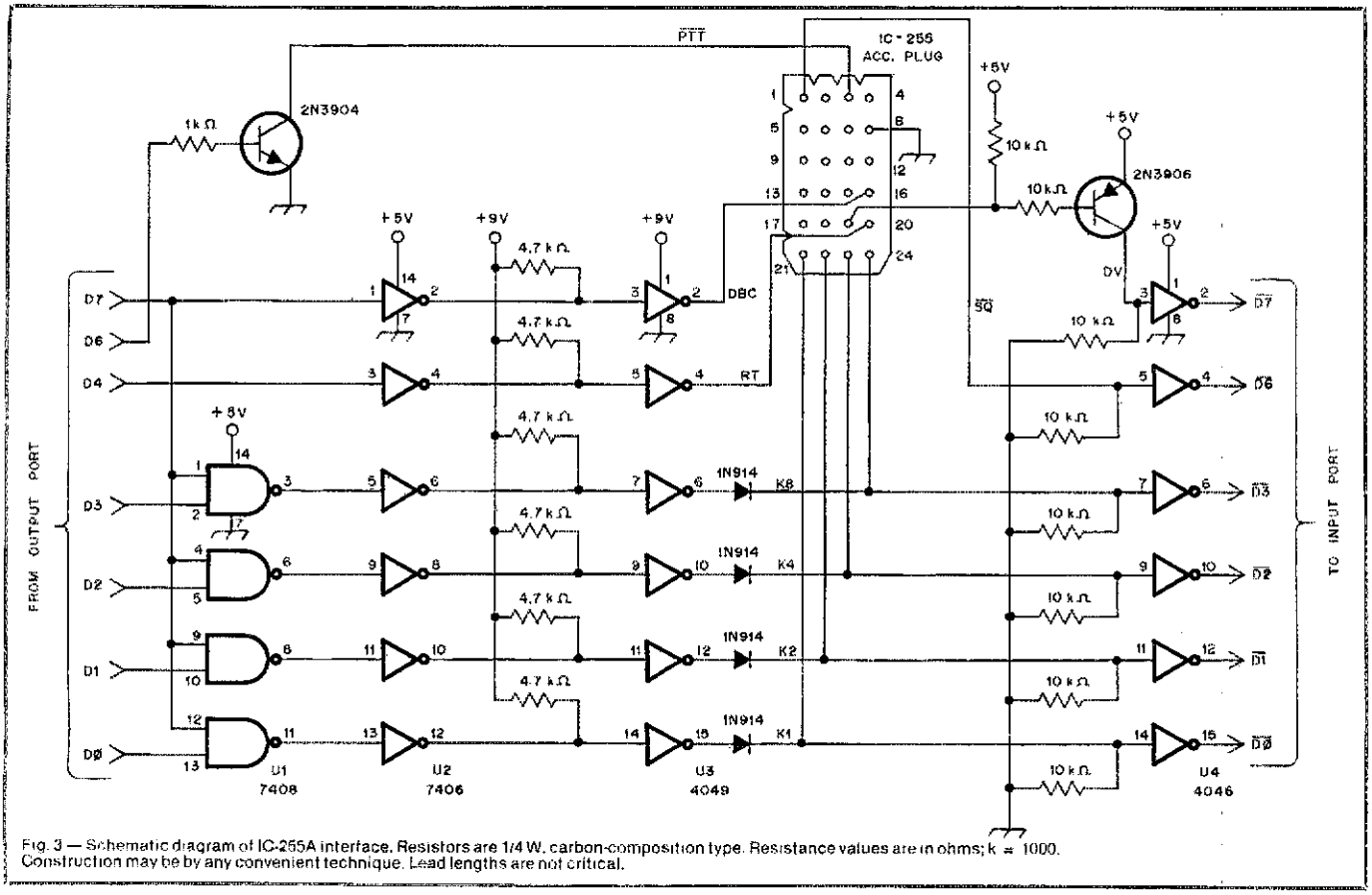


Fig. 3 — Schematic diagram of IC-255A interface. Resistors are 1/4 W, carbon-composition type. Resistance values are in ohms; k = 1000. Construction may be by any convenient technique. Lead lengths are not critical.

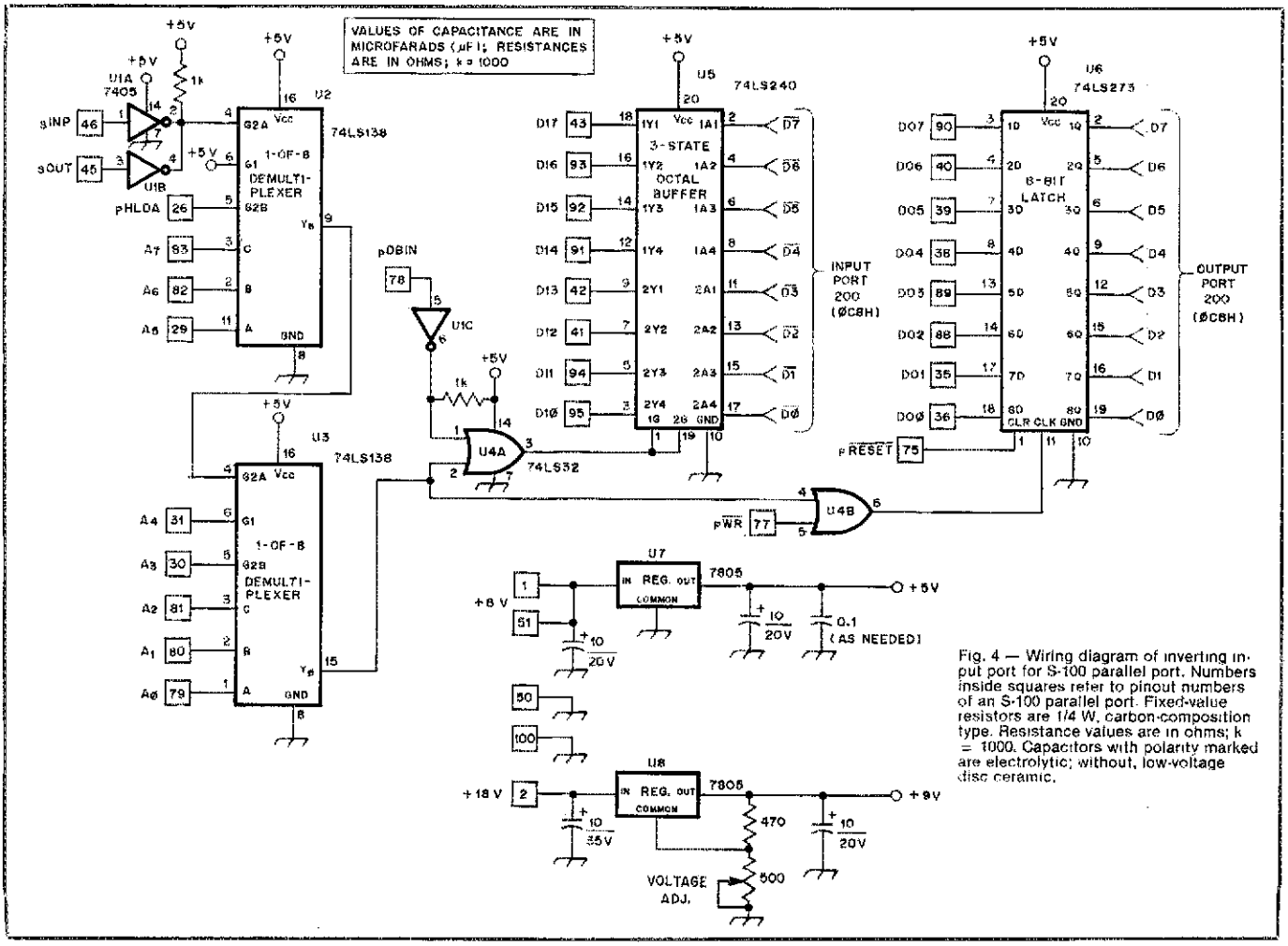


Fig. 4 — Wiring diagram of inverting input port for S-100 parallel port. Numbers inside squares refer to pinout numbers of an S-100 parallel port. Fixed-value resistors are 1/4 W, carbon-composition type. Resistance values are in ohms; k = 1000. Capacitors with polarity marked are electrolytic; without, low-voltage disc ceramic.

DBC is lowered. This procedure is shown in Fig. 2A.

The lines RT and $\overline{DV}$ regulate the transfer of subsequent data. The remote interface writes a digit by raising DBC and placing data on the bus. It then raises RT to signal data availability. The rig lowers $\overline{DV}$ to indicate it is reading the data. The remote interface lowers RT to signal the end of that digit, and the rig raises $\overline{DV}$ to indicate readiness for a new digit. This sequence is shown in Fig. 2B.

The remote interface reads a digit by lowering DBC and raising RT. The rig places the digit on the bus and then lowers $\overline{DV}$. The interface reads the digit and lowers RT. The rig then raises $\overline{DV}$. This sequence is shown in Fig. 2C. This type of "handshake" allows the slowest device to control the transfer, whether it is the rig or the remote interface. Thus we needn't worry about the type of computer used for remote control.

The Control Circuit

The control circuit basically shifts logic signals between CMOS levels (for the ICOM) and TTL (for the computer). The four data bus signals are fed to the input port through 4049 CMOS inverters. Output signals to the data bus are enabled by the DBC line. When DBC is high, the four AND gates pass output port data through two inverters and a series diode to the data bus. The series diode allows the inverter output to pull up but not to pull down. The resistors to ground (both on the interface and inside the rig) form a passive pulldown. A similar output stage is used inside the rig. It is set to a low state when DBC is high, allowing the interface to control the data bus without any interference.

When DBC is low, the interface data is set to all zeroes, and the data drivers in the rig are enabled. The rig can pull any line up if desired or let the lines sink low through the pull down resistors. The diodes in the output lines of the interface prevent its inverters from shorting the data bus to ground.

The $\overline{DV}$ output from the rig can only pull down. It is shunted by a pulldown resistor, which makes it inconvenient to

Table 1

Program Listing for IC-255A SCAN

```
  5    REM  THIS IS CROMEMCO 32K  STRUCTURED BASIC
 1Ø    PRINT"ICOM SUPER SCAN"
 2Ø    PRINT
 3Ø    I = 1
 4Ø    INPUT"ENTER SCAN FREQ. IN HERTZ (Ø TO TERMINATE) = ";F(I)
 5Ø    IF F(I) = Ø THEN GOTO SCAN1
 55    FLAG = Ø
 6Ø    IF(F(I)>= 143ØØØ.Ø) AND F(I)<= 148195.Ø THEN FLAG = 1
 7Ø    IF NOT FLAG THEN PRINT "OUT OF RANGE." : GOTO 4Ø
 8Ø    I = I + 1
 9Ø    GOTO 4Ø
1ØØ  *SCAN1
11Ø    REM SCAN ROUTINE
12Ø    LASTI = I - 1
13Ø      FOR I = 1 TO LASTI
14Ø      F = F(I) - 14ØØØØ.Ø
145      NOESC
15Ø      GOSUB SET'FREQ
154      ESC
155      COUNT = 125
156      GOSUB DELAY
16Ø      GOSUB LISTEN
17Ø      IF NOT ACTIVE THEN GOTO SS2ØØ
175      DCOUNT = Ø
18Ø      GOSUB LISTEN
19Ø      IF NOT ACTIVE THEN DCOUNT = DCOUNT + 1
2ØØ      IF DCOUNT = 1ØØ THEN GOTO SS2ØØ : REM NEXT CHANNEL
21Ø      IF ACTIVE THEN DCOUNT = Ø
22Ø      GOTO 18Ø
23Ø    *SS2ØØ
24Ø      REM NEXT SCAN VALUE
25Ø      NEXT I
26Ø    GOTO 13Ø
7ØØ    REM ICOM DRIVERS
71Ø    REM
72Ø    REM THIS IS AN SBASIC VERSION OF THE ICOM DRIVERS
73Ø    REM WHICH CONSISTS OF READ AND WRITE ROUTINES
74Ø    REM WHICH ARE CALLED FROM SBASIC BY GOSUBS.
750  *READ'FREQ
76Ø    REM READ'FREQ RETURNS THE FREQUENCY IN A BYTE
77Ø    REM RANGING FROM 38ØØ TO 8ØØØ
78Ø    GOSUB TXADR
79Ø    GOSUB IRCV
8ØØ    REM GET FIRST DIGIT
81Ø    GOSUB IRCV : F = A*1ØØØ
82Ø    REM SECOND DIGIT
83Ø    GOSUB IRCV : F = F + A*1ØØ
84Ø    REM GET THIRD DIGIT
85Ø    GOSUB IRCV : F = F + A*1Ø
86Ø    REM GET LAST DIGIT
87Ø    GOSUB IRCV : F = F + A
88Ø    REM FINISHED
89Ø    RETURN
9ØØ  *SET'FREQ
91Ø    REM SET FREQ SETS THE ICOM TO THE FREQ SPECIFIED
92Ø    REM by 14ØØØØ kHz PLUS FREQ F
93Ø    GOSUB TXADR
94Ø    GOSUB IRCV
95Ø    REM FIRST DIGIT
96Ø    A = INT(F/1ØØØ) : GOSUB ISEND
97Ø    F = F-A*1ØØØ
98Ø    REM SECOND DIGIT
99Ø    A = INT(F/1ØØ) : GOSUB ISEND
1ØØØ   F = F - A*1ØØ
1Ø1Ø   REM THIRD DIGIT
1Ø2Ø   A = INT(F/1Ø) : GOSUB ISEND
1Ø3Ø   F = F - A*1Ø
1Ø4Ø   REM LAST DIGIT
1Ø5Ø   A = INT(F) : GOSUB ISEND
1Ø6Ø   RETURN
1Ø7Ø  *TXADR
1Ø8Ø   REM TXADR SEND THE 144 MHz ID TO THE ICOM
1Ø9Ø   OUT 2ØØ,128 + 12 : REM SET DBC AND SEND ØCH
11ØØ   COUNT = 32 : GOSUB DELAY
111Ø   OUT 2ØØ,12
112Ø   COUNT = 18 : GOSUB DELAY
113Ø   RETURN
114Ø  *I RCV
115Ø   REM IRCV READS A BYTE FROM THE ICOM
116Ø   OUT 2ØØ,16 : REM BIT 4 IS RT
117Ø   J = INP(2ØØ)
118Ø   IF J<128 THEN GOTO 117Ø
119Ø   J = BINAND(J,15)
12ØØ   A = J
121Ø   OUT 2ØØ,Ø
122Ø   J = INP(2ØØ)
123Ø   IF J>= 128 THEN GOTO 122Ø
124Ø   RETURN
125Ø  *I SEND
126Ø   REM ISEND TRANSMITS A BYTE TO THE ICOM
127Ø   OUT 2ØØ,128 + A : REM FIRST SIGNAL WITH DBC
128Ø   COUNT = 18 : GOSUB DELAY
129Ø   OUT 2ØØ,128 + 16 + A : REM ADD RT
13ØØ   J = INP(2ØØ)
131Ø   IF J<128 THEN GOTO 13ØØ : REM WAIT FOR DV
132Ø   OUT 2ØØ,A
133Ø   J = INP(2ØØ)
134Ø   IF J>= 128 THEN GOTO 133Ø
135Ø   RETURN
136Ø  *DELAY
137Ø   REM ABOUT 2 MILLISECOND PER COUNT
138Ø     FOR C = 1 TO COUNT
139Ø     NEXT C
14ØØ   RETURN
141Ø  *LISTEN
142Ø   REM RETURNS ACTIVE = 1 IF SQUELCH BROKEN
143Ø   MASK = BINAND(INP(2ØØ),64) : REM BIT 6 IS SQUELCH
144Ø   ACTIVE = NOT MASK
145Ø   RETURN
```

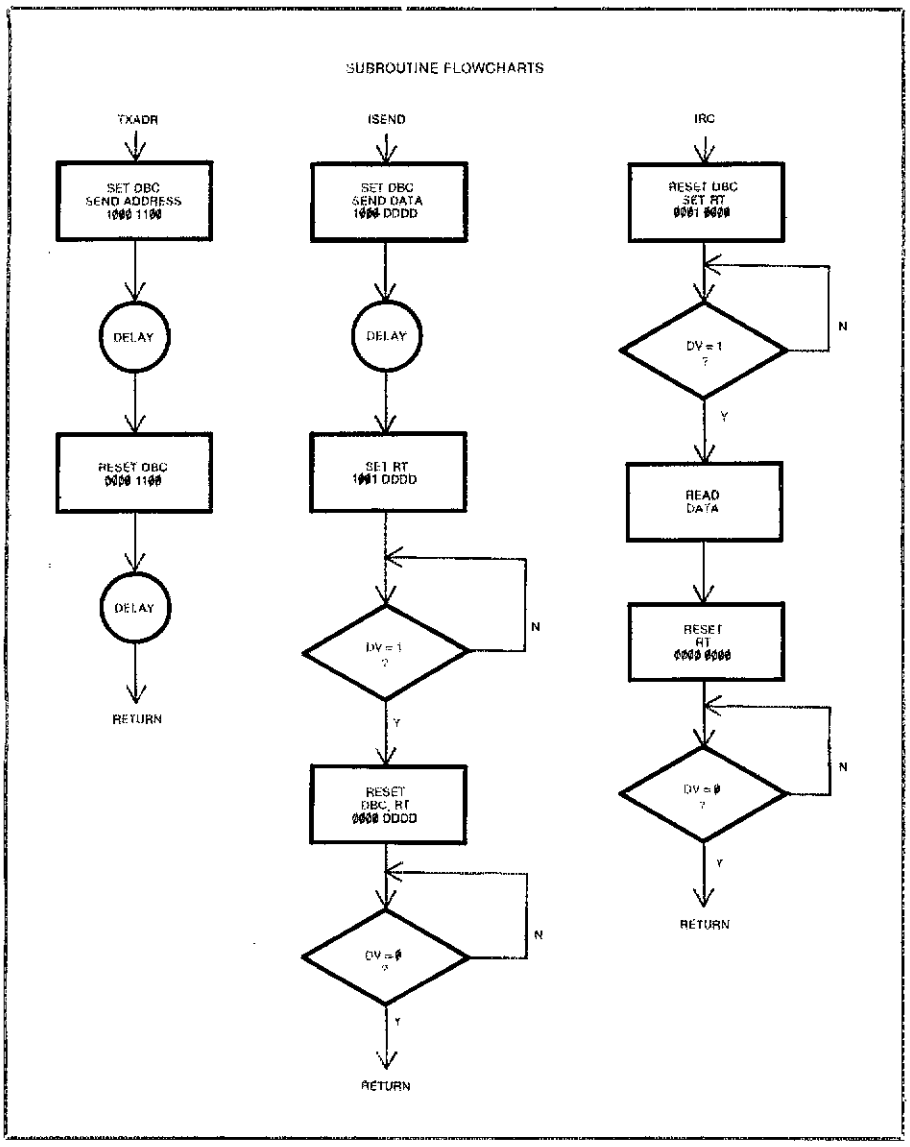


Fig. 5 — Flowcharts for subroutines used to make up various programs.

drive a CMOS input. Therefore, a discrete transistor is used; this extra inversion causes the input port to read DV (active high) rather than $\overline{DV}$ (active low).

The circuit in Fig. 3 can be connected to any parallel port with latched output data. Seven output bits and six input bits are required. The output bits are active high while the input bits are active low; the input bits may be complemented in software or by an inverting input port. A suggested circuit for an S-100 parallel port is shown in Fig. 4. This circuit was used in a Cromemco machine to develop the software to be described.

Some Software Examples

The BASIC program in Table 1 is a demonstration program of a 10-channel scan routine. The scan stops on an active channel and resumes about three seconds after activity stops. One advantage of having a large number of scan entries is weighting the scan sequence. For example, suppose you wanted to monitor the club repeater on frequency A, and you also wanted to check the simplex frequencies B and C occasionally. The scan sequence might then be AAAABAAAAC to monitor A 80% of the time and B and C 10% each.

This program is made up of three fundamental subroutines: transmit address, receive data and send data. Using these it is possible to then write elaborate programs. Flowcharts for these subroutines are shown in Fig. 5. With these few bytes of software, some very trivial outboard hardware and a little imagination, you will be bringing your shack into the computer age. A couple of more pieces of equipment and you have an automated ASCII station. Packet or spread spectrum, anyone?

Strays

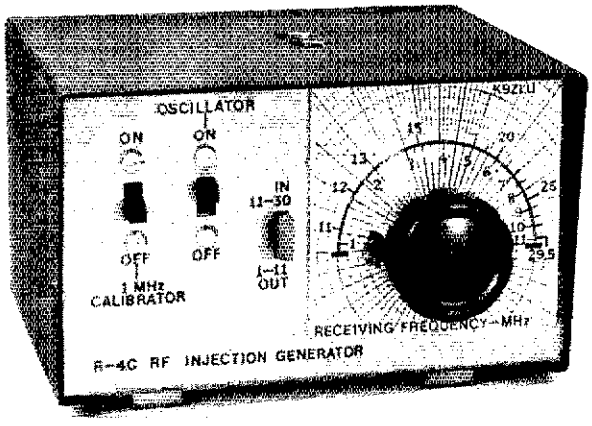
QST congratulates . . .

☐ Graham MacLachlan, VE3HDU, of Willowdale, Ontario, who despite having suffered a stroke, was "determined not to let that stroke deprive me of a useful life." MacLachlan organized and maintains a stroke-unit fund for the Sunnybrook Medical Centre in Toronto, works dedicatedly for the Ontario Heart Foundation and still finds time for his hobby, Amateur Radio.

☐ Margaret (WB8CLG) and Sam (WB8FNR) Noblet of Middletown, Ohio, who recently were honored with a "Ham of the Year Award" by the Dial Radio Club for their services to Amateur Radio.

Members of the Livonia (Michigan) Amateur Radio Club prepare for a test run of their vertical DXpedition, Operation Skylark, to be held at 10,000 ft over Livonia on Sunday, May 24, on 146.58 MHz simplex. Deciding that the only unexplored regions left were *up*, the club christened this to be the first Aerpedition. All 2-meter hand-held operators are encouraged to participate in this QRP DX adventure. Contacts will be limited to those using 5 watts or less. Could this be amateurs' "A small step for man . . .?" *(photo courtesy Harry G. Wayne, W8RYH)*

General-Coverage Reception with the Drake R-4C Receiver



With this low-cost adapter, you now can enjoy the full capabilities of the R-4C. The basic idea is adaptable to other such receiver types as well.

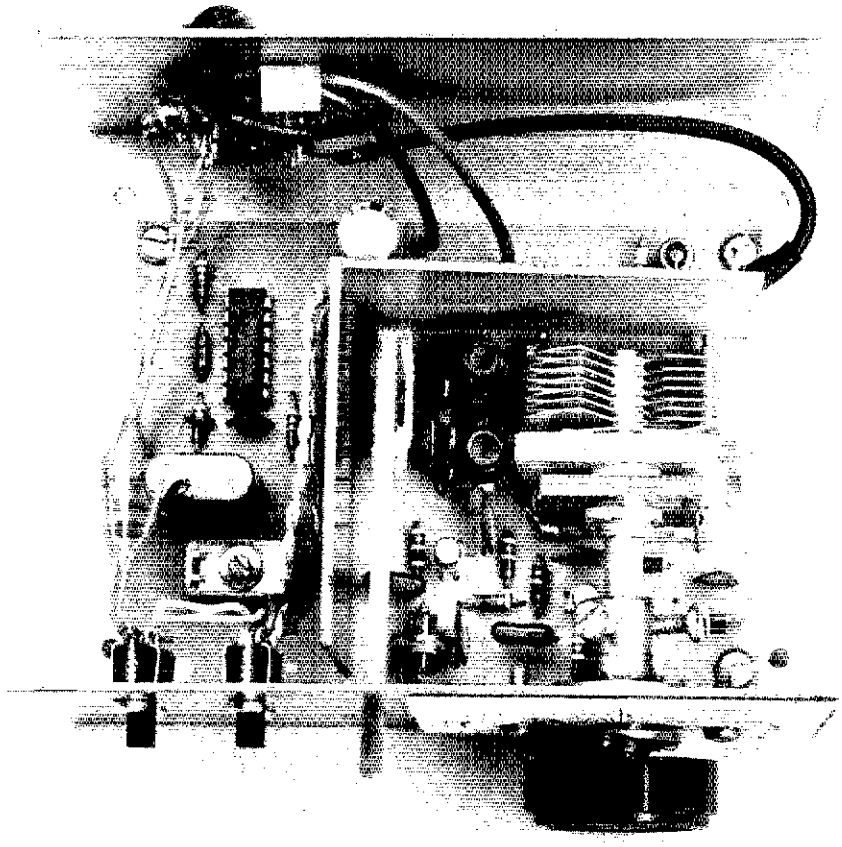
By Robert H. Luetzow,* K9ZLU

This rf injection generator is designed as a general coverage receiving adapter for use with the Drake R-4C receiver and may also be used with the R-4B series. The output of the generator is connected to an unused auxiliary crystal socket at the rear of the receiver chassis and provides the rf voltage required to permit reception on frequencies between 1.5 and 30 MHz. Operation between 5 and 6 MHz is *not* recommended because of the i-f arrangement of the receiver. If all new parts are used for construction of the unit, the total cost of this project should not exceed $40. The basic design may be altered as required to be used with other types of receivers.

The Circuit

An injection frequency between 12.6 and 40.6 MHz with an amplitude of approximately 1.3 volts is required at the auxiliary crystal socket. Injection frequencies needed for specific receiving frequencies are shown in Table 2-1 of the R-4C manual, and the preselector settings may be found in Fig. 3-2.

The generator circuitry is shown in Fig. 1. It consists of a band-switched, grounded-drain Colpitts oscillator coupled to a source follower to provide isolation from the R-4C. Band switch S1 selects coils L1 and L2 for oscillator fre-



The crystal calibrator may be seen at the left of the photo, with the power supply components arranged along the top of the pc board. Phono jacks, mounted on the rear panel, are used for the antenna input/output and rf output connections. The supply voltage lines and ground strap pass through a grommet and are secured by a cable clamp attached to the rear panel.

*1327 Grayston Ave., Huntington, IN 46750

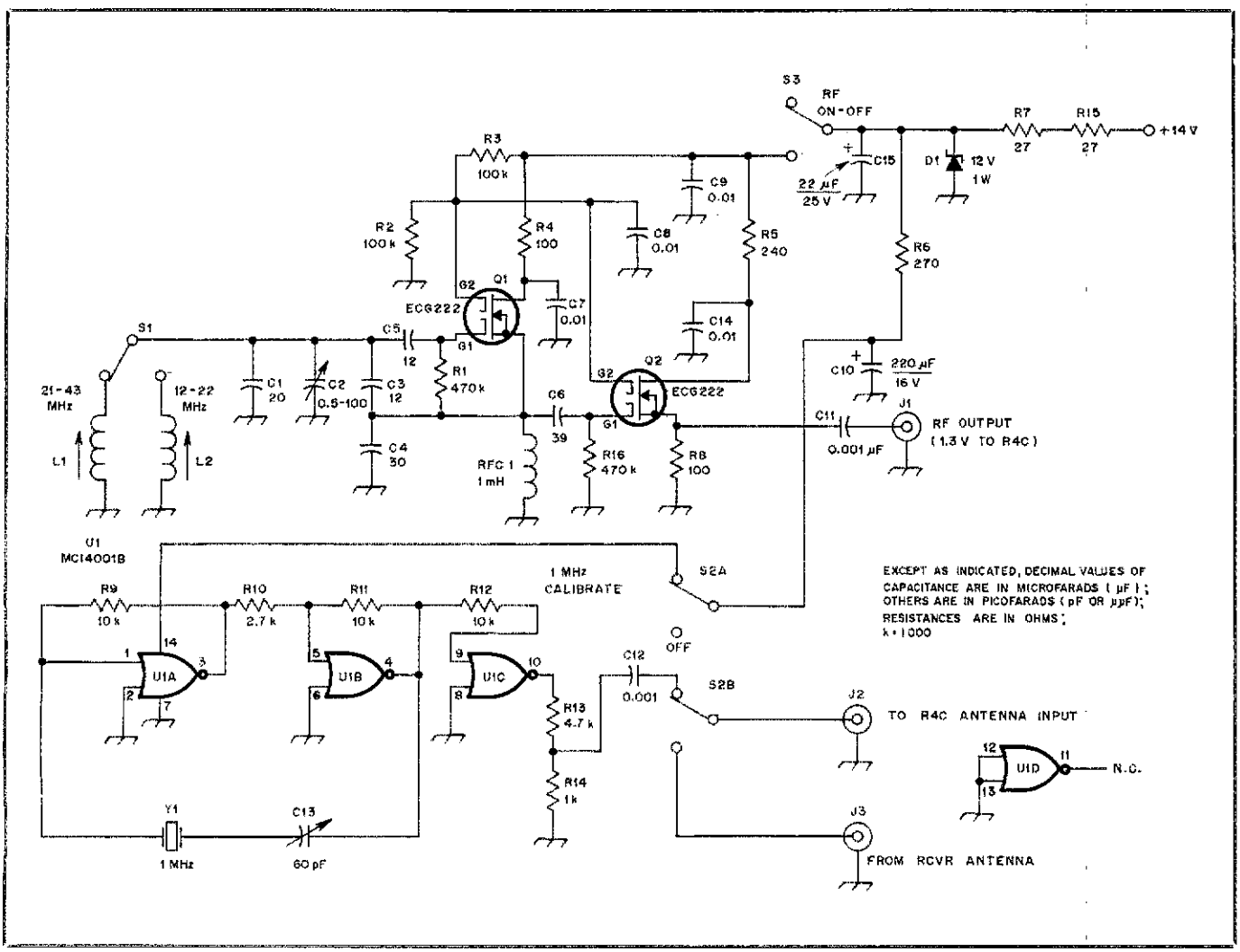


Fig. 1 — Schematic diagram of the rf injection generator. All resistors are 1/4-watt types, 10% tolerance.
C1 — 20 pF silver mica, 100 V.
C2 — 0.5-100 pF air variable.
C3, C5 — 12 pF silver mica, 100 V.
C4 — 30 pF silver mica, 100 V.
C6 — 39 pF silver mica, 100 V.
C7, C8, C9, C14 — 0.01 µF disc ceramic, 50 V.
C10 — 220 µF, 16-V electrolytic.
C11, C12 — 0.001 µF disc ceramic, 50 V.
C13 — 60 pF compression trimmer.
C15 — 22 µF, 25-V electrolytic.
D1 — 12-V, 1-W Zener diode.
J1-J3, incl. — Phono jacks.
L1 — Adjustable 0.5-0.7 µH, slug-tuned phenolic form, pc mount, 1/4-in. (6 mm) dia, 7 turns no. 24 enam. (see text).
L2 — Adjustable 1.5-2.6 µH, same form as L1, 12 turns no. 24 enam.
Q1, Q2 — N-channel, dual-gate MOSFET, 12,000 µmhos, ECG222 or equivalent.
S1 — Spdt slide switch (see text).
S2 — Dpdt slide switch.
S3 — Spdt slide switch.
U1 — Quad NOR gate, MC14001B or equivalent.
Y1 — 1-MHz crystal, HC-6/U holder.

quencies of 21 to 43 MHz or 12 to 22 MHz, respectively. Approximately 1.6 volts at 12.6 MHz and 1.3 volts at 40 MHz is available from the generator when it is connected to the receiver. A crystal calibrator (U1) uses a quad NOR gate CMOS IC to generate a good, clean calibration signal for use between 1 and 30 MHz. S2, the calibrator ON/OFF switch, is wired to supply the calibrating signal to the R-4C antenna circuit when the calibrator is turned on, and connect the receiving antenna to the circuit when the calibrator is off.

Generator Construction

The most stringent construction requirement of the generator is the mechanical rigidity required to secure oscillator stability. All components are mounted on a pc board; the overlay is shown in Fig. 2. An L shaped shield encloses the tunable generator circuitry. It is fashioned from pieces of single-sided pc board and connected to the main board by means of short lengths of bare wire. These wires (soldered to the copper foil of the shield pieces) are passed through small holes in the main pc board (not evident in the pc layout) and soldered to the ground foil of the main board.

C2, the tuning capacitor, is secured to the main pc board by means of an L shaped bracket made from sandwiched pieces of circuit board material. This bracket is mounted so it will align the tuning capacitor shaft with the vernier dial mechanism mounted on the front panel. The vernier mechanism was removed from a readily available 8:1 reduction drive dial assembly (Calectro E2-744).† A piece of clear plastic, salvaged from an electronic parts package, is used as dial pointer. If the construction described is followed closely, the dial layout shown in Fig. 3 can be used. Any change in parts values in the VFO circuitry will cause a corresponding change in the tuning dial layout. The markings are used only to locate the correct calibration signal. If you wish to make your own dial layout, do so only after the generator has been completed and installed in the cabinet *with the cover*

†[Editor's Note: *Various types of reduction* drives are available from Radiokit, Box 411, Greenville, NH 03048.]

in place. A shadow front 3 × 5 × 4-inch (76 × 127 × 102-mm) metal box (Calectro H4-746) was used for the unit shown in the photographs.

The band switch is made from a slide switch (mounted on the main pc board) that has a piece of unclad circuit board material notched to fit the switch actuator and epoxied to it. This arrangement results in a push-pull switch that is activated by the extension arm through an elongated slot in the front panel. The coil forms used for L1 and L2 are 1/4-inch (6.4 mm) slug-tuned pc-mount units from a Radio Shack assortment.

This receiving adapter is designed to use the +14 V supply available at the R-4C ACCESSORY socket. It has been observed that some receivers have a high amount of ac ripple in the accessory supply, which causes ac modulation of the received signal. If an excessive amount of ac ripple is present in your receiver supply, the simple ripple filter shown in Fig. 4 may be constructed on a small piece of perf or pc board and attached to the rear of the oscillator compartment shield. Zener diode D1 and resistors R7 and R15 should be removed. The output of the ripple filter is then connected to the point on the circuit board that was formerly the junction of D1 and R7.

You should also check C166, C167 and C201 in the receiver accessory supply if it has a high ripple content. Note that the R-4C accessory supply is rated only for 50 mA and is not protected by a fuse. So make sure there are no wiring errors in the receiving adapter circuit!

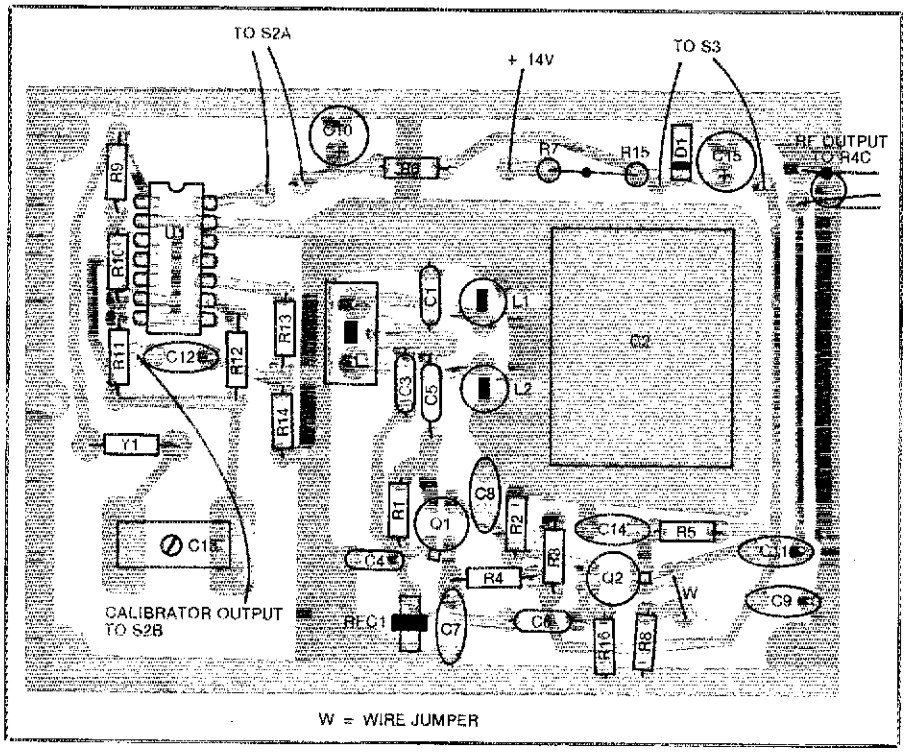


Fig. 2 — Parts-placement guide for the general-coverage receiving adapter. Parts are placed on the unclad side of the board; the shaded area represents an X-ray view of the copper pattern.

Interconnection

A short piece of RG-174/U coaxial cable is used to interconnect the rf generator and the R-4C. One end of the cable is terminated with a plug made from the bottom section of an HC-6/U crystal holder. The center conductor of the cable is connected to one pin, the other pin is left empty and the braid of the cable is attached to the body of the crystal case which is then filled with epoxy. When connecting the generator to the receiver, the crystal holder plug is arranged so that the center conductor of the cable from the generator is connected to the *top* hole of an auxiliary crystal socket at the rear of the R-4C. *Nothing* is connected to the bottom pin of the socket. A partial diagram of the R-4C circuitry involved is shown in Fig. 5. A ground lead (made

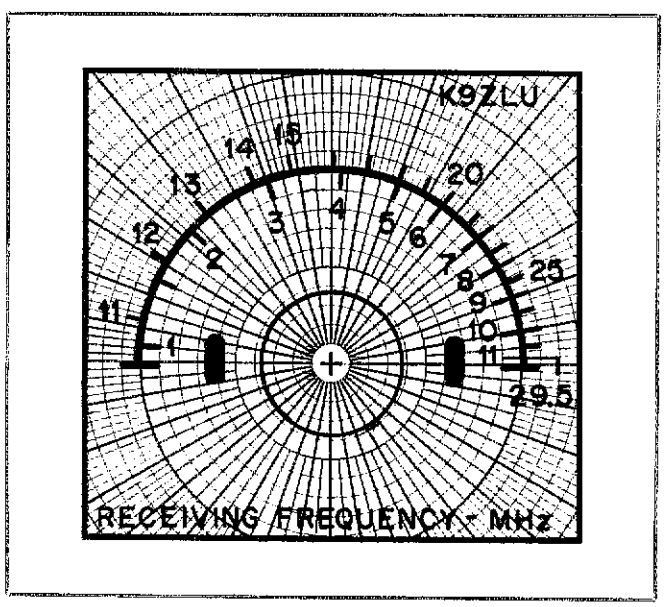


Fig. 3 — The dial layout for the general-coverage receiving adapter. If the VFO circuit parts values do not vary widely from those given in Fig. 1, this pattern may be used directly. Refer to the text for further information.

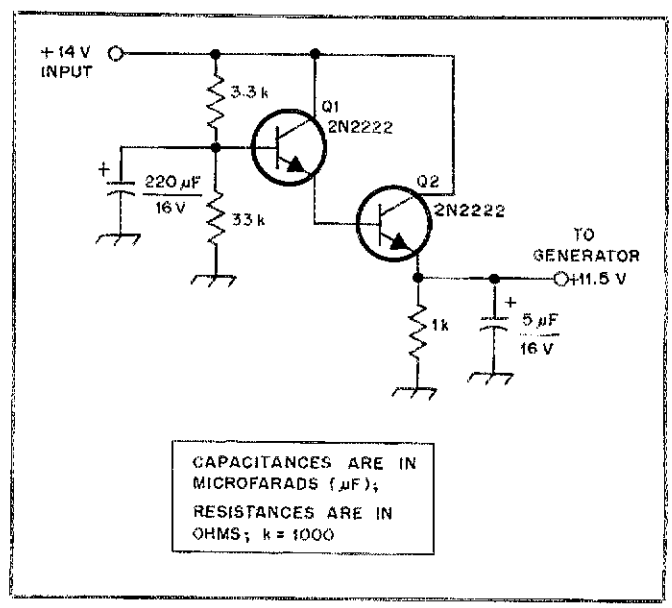


Fig. 4 — This optional ripple filter may be constructed on a piece of perf or pc board. Its use is discussed in the text.
Q1,Q2 — Npn silicon bipolar transistor, general purpose type, 500 mW, 2N2222 or equivalent.

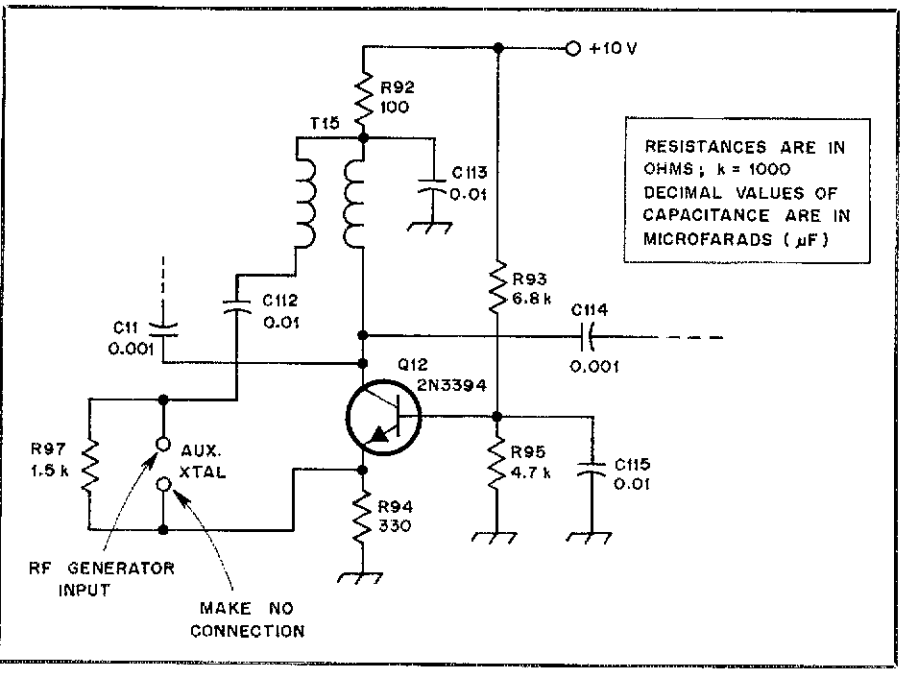


Fig. 5 — A partial diagram of the R-4C crystal oscillator circuitry. Component designations are those of the manufacturer.

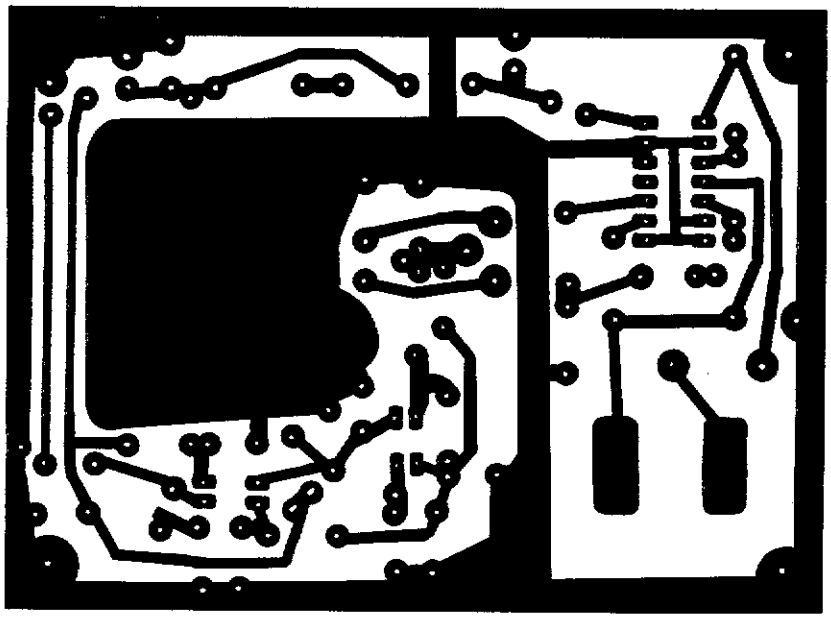


Fig. 6 — Circuit-board etching pattern for the general-coverage receiving adapter (see the parts layout of Fig. 2). Black represents copper. The pattern is shown at actual size from the foil side of the circuit board.

from a piece of coaxial cable braid) is connected between the ground foil of the generator circuit board and the receiver chassis. This additional ground lead helps reduce the detuning effects of hand capacitance. Keep all connecting leads as short as possible.

Preliminary Checks

After making the proper generator/receiver interconnections, turn on the receiver, generator and 1-MHz calibrator. Check for a calibrator signal at 4, 7, 14, 21 and 28 MHz. Once calibrator operation has been ensured, check to see if the rf generator is working properly. With the generator band switch in the 1 to 11 MHz position and the generator oscillator tuned to 14 MHz, a 14 MHz signal should be audible in the receiver (XTAL switch in NORMAL position.) Remember, with the generator band switch in the 1 to 11 MHz position, the generator produces an rf signal between 12.1 and 22.1 MHz. With S1 in the 11 to 30 MHz position, a 22.1 to 40.6 MHz signal is generated. A 28 MHz signal should be located with S1 in the 11 to 30 MHz position.

Calibration

The enclosure cover must be in place before calibration can be completed. Start by tuning the R-4C to a 7-MHz signal with the XTAL switch in the NORMAL position. Then tune the generator to 7 MHz and adjust L2 so the 7-MHz signal can be received. Next, locate a signal at 4 MHz. Adjust the generator dial pointer and coil L2 to locate the 4- and 7-MHz calibration points as accurately as possible. Set the R-4C to receive WWV at 10 MHz and adjust C13 in the calibrator circuit for zero beat. You may need to readjust coil L2 and the dial pointer to ensure the 4- and 10-MHz dial settings are accurate. The 11- to 30-MHz band is calibrated in a similar manner by adjusting coil L1 and using the 20-, 15- and 10-meter bands for alignment purposes.

While the R-4C was not designed for receiving signals below 1.5 MHz, I have been able to receive strong broadcast stations at frequencies as low as 1 MHz while using the rf injection generator. Three units have been built according to the information given here and all three have worked flawlessly. Have fun and many enjoyable hours of listening! QST

Strays

ANOTHER ATLANTIS?

☐ The Bowie (Maryland) Amateur Radio Club will be operating a mini-DXpedition from Tangier Island, Virginia, May 23 at 0000Z to May 25 at 1500Z. Each year, the club operates from a remote island on which no amateur activity has previously taken place; Tangier Island, it has been predicted, will eventually disappear from Chesapeake Bay because of erosion. To receive an Island Certificate, amateurs working the station, N3GR/4, should send a large s.a.s.e. and a QSL card to John Rouse, KA3DBN, P. O. Drawer M, Bowie, MD 20715. Cw — about 40 kHz up from the bottom of 80 through 10 meters; Novice — 7125, 3725, 21,125 and 28,125 kHz; ssb — 3895, 7245, 14,305, 21,380 and 28,590 kHz. — *John Rouse, KA3DBN, Bowie, Maryland*

Product Review

Conducted By Paul K. Pagel,* N1FB

Kenwood TS-830S HF Transceiver

Intense interest? That would be an understatement of the atmosphere created at Hq. by the announcement and subsequent arrival of the TS-830S. Why? Well, some of its more salient features are a double-conversion receiving system, a choice of a number of cw filter options at *both* intermediate frequencies, the inclusion of independent variable bandwidth tuning (VBT), and IF SHIFT with a tunable i-f NOTCH as well as receiver and transmitter incremental tuning (RIT, XIT). Fixed-frequency control (FIX), ssb off-the-air monitoring (MONI), a 20-dB receiver front-end attenuator, noise blanker and transmitter rf-type speech processor are all push button selectable. The display hold (DSP) switch will maintain digital readout of a chosen frequency while the VFO is tuned to another frequency — like an electronic note pad. There's also a built-in 25-kHz marker generator, manually selectable age functions (OFF, FAST, SLOW), and LEDs which indicate the operator's choice of RIT, XIT, RF ATTenuator, VFO, FIX and NOTCH.

Connections to and from a linear amplifier, monitor scope, and transverter are provided for on the rear panel by means of one 7-pin and two 8-pin DIN jacks. The 1/4-inch (6.4 mm) key jack, 1/8-inch (3.2 mm) external speaker jack, anti-VOX, bias, and rf output voltmeter controls, antenna and ground connectors, fuse, screen voltage on/off switch, and a very quiet PA cooling fan are also on the rear panel. The two-conductor (ungrounded) power cable is permanently wired into the unit; no multi-pin connector is used. Two predrilled holes are provided for additional phono jacks if required for some added function. All of the previously mentioned "goodies" are contained in a package smaller than that of the TS-820.[1] Unlike the '820, no provisions have been made for use with a 13.8-V dc supply or fsk.

Some Features

A PLL circuit and programmable divider are used in the TS-830S which eliminates the need for separate heterodyne oscillator crystals for each band. This circuit uses a single 10-MHz crystal and with the 5.5- to 6-MHz VFO provides all the injection frequencies required by the transceiver.

QRM may be fought by using the variable bandwidth tuning (VBT), IF SHIFT and i-f NOTCH controls of the '830. These features may be used independently or in conjunction with one another. VBT permits the operator to vary the i-f passband width within limits determined by i-f filters installed. With only the stock 2.4-kHz filter in the transceiver, an effective bandwidth of 500 Hz may be obtained at the narrowest setting of the control. The IF SHIFT moves the i-f passband frequencies higher or lower without upsetting the frequency to which the receiver is tuned, and it has an adjustment range of approximately ±1.2 kHz. An interfering carrier within the passband of the filter may be reduced or eliminated by the NOTCH filter in the receiver second i-f.

Age is manually switched. Three switch positions are provided: FAST, SLOW or OFF. This is a welcome feature, especially for cw operators. Age action is smooth with no evidence of popping.

One attraction of the '830 for many amateurs is the use of reliable 6146B tubes in the final amplifier stage. They're proven performers and are still preferred by many operators. The '830 provides a bit more output than was available from the '820, too.

Operational Notes

One word could be used to sum up the on-the-air behavior of the '830 — smooth. The review unit was put into service in several "shacks" over a period of months. Contest operators commented favorably about the control locations. Audio-level balance between the internal speaker and headphones is excellent; tweaking the audio gain during such a changeover is unnecessary. The audio quality of the internal 3-inch (76 mm) speaker is quite good, better than that of many units I have heard.

The digital frequency display will show the proper receive or transmit frequency, including the cw offset. It is fully operational beyond the 500-kHz frequency segments (unlike the TS-120),[2] and the analog dial is like that of the TS-120. Analog-dial linearity error never exceeded approximately 800 Hz.

VFO stability is excellent both electrically and mechanically. To test the mechanical stability, I used the gravitational-attraction and manual-persuasion methods — dropping the front of the transceiver about 3 inches (76 mm) to the desk top and pounding on the top of the cabinet with a clenched fist. A considerable amount of physical abuse was required to shift

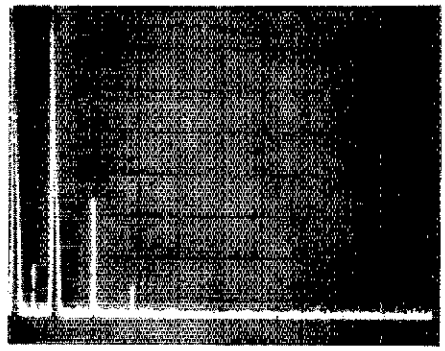


Fig. 1 — Spectral display of the TS-830S on 160 meters (worst case). Vertical divisions are 10 dB each; horizontal divisions, 2 MHz. Second harmonic output is approximately 45 dB below the peak of the fundamental. The TS-830S complies with current FCC regulations regarding spectral purity.

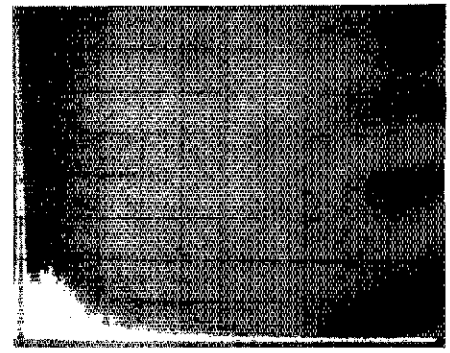


Fig. 2 — Spectral display of noise about the carrier frequency of the TS-830S. The carrier is at the left. Output power is 100 watts at a frequency of 14.25 MHz. Vertical divisions are 10 dB each; horizontal divisions are 20 kHz each. The bottom line of the trace is the analyzer noise floor at 80 dB below peak output.

*Assistant Technical Editor

[1] "Product Review," *QST*, September 1976.

[2] "Product Review," *QST*, February 1980.

the VFO frequency even slightly.

Receiver "birdies" are at a bare minimum and very weak; in no instance did one cause the S meter to move. With an antenna connected to the transceiver, none was discernible. Only one response was noted to be in-band (1.843 MHz), two are out of band (7.343 and 7.464 MHz), and all others occur at frequency segment edges (0 or 500 kHz).

Many airborne pulse-type noises were effectively reduced or eliminated by the noise blanker. The effectiveness of the blanker is dependent on the frequency of operation and the noise source itself. In some instances, it was found to work well against the "woodpecker."[1] The blanker threshold is adjustable from the front panel. Care should be taken to avoid excessive blanker gain, especially with crowded band conditions, because distortion products will become evident within the receiver — you'll hear QRM you ordinarily wouldn't.

The receiver and transmitter incremental-tuning controls (RIT/XIT) are useful in avoiding interference and also in snagging that hard-to-get DX station in a pileup. The range is somewhat limited, approximately ±2 kHz, and I felt a range of ±5 kHz would be more suitable.

WARC, AUX and FIX

In the stock transceiver, the three WARC bands (10, 18 and 24.5 MHz)[4] are operational during receive only, but a simple modification outlined in the manual enables transmission. The bands may be added singly (by removing individual diodes) or simultaneously (by cutting a wire). The latter method is far easier because the diodes are somewhat inaccessible.

An auxiliary (AUX) position on the BAND switch permits the user to install components to provide for *receive only* operation on yet another frequency range of choice. The FIX button selects a single, user-supplied crystal for operation on a specific frequency (MARS or AUTOSTART, for instance). To gain access to the crystal socket, the bottom cover of the '830 must be removed, but the crystal trimmer can be reached by means of an access hole in the cabinet bottom.

[Editor's Note: The "woodpecker" is a pulse transmission frequently heard in the 20-meter amateur band, occasionally in others. The pulse duration and repetition rate create a woodpecker-like sound when the signal is tuned in a receiver.]

[4]Baldwin and Sumner, "The Geneva Story," *QST*, February 1980, p. 53.

Table 1

Kenwood TS-830S Transceiver, Serial No. 1020313

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: 160-10 meters, WARC bands included.	As specified plus approximately 70 kHz beyond upper and lower band edges.
Modes of operation: ssb/cw.	As specified.
Readout: analog and digital; 6-digit, fluorescent-blue digital display.	0.25-inch (6.4 mm) digits
Resolution: analog, 1 kHz; digital, 100 Hz.	As specified.
kHz/turn of knob: not specified.	25
Backlash: not specified.	Nil
RIT/XIT range: ±2 kHz.	−1.5, +1.9 kHz
I-f notch depth: >40 dB.	30 dB
Receiver attenuator: 20 dB.	As specified.
S-meter sensitivity (μV/S9): not specified.	160 m, 56; 80 m, 56; 40 m, 56; 30 m, 100; 20 m, 56; 17 m, 48; 15 m, 75; 12 m, 54; 10 m, 67.
dB/S unit: not specified.	From S5 to S9, 5 dB; below S5, non-linear and less than 5 dB/unit.
Receiver sensitivity: 0.25 μV for 10 dB S + N/N.	Receiver dynamics measured with optional YK-88C and YG-455C 500-Hz i-f filters installed.

	80 m	*20 m*
Noise floor (MDS) dBm:	−136	−136
Blocking DR (dB):	129	noise limited
Two-tone 3rd order IMD DR (dB), high- and low-frequency products.	83 (h) 89 (l)	82 (h) 89 (l)
Third-order input intercept	−13.5 (h) −5 (l)	−13 (h) −5 (l)

Audio power output (8-ohm load): 1.5 W	As specified.
Power consumption: receive (heaters off), 32 W; transmit, 295 W.	Not measured.
Transmitter rf power output: not specified.	>100 W every band.
Spurious suppression: better than 60 dB.	−62 dB
Harmonic suppression: better than 40 dB.	Approximately −45 dB on 160 m (worst case).
Carrier suppression: better than 40 dB.	As specified.
Third-order IMD: better than −36 dB.	−32 dB (see spectral photos)
Key-down time limitation: cw — 1 minute.	
Frequency stability: within 1 kHz during the first hour after 1 minute of warmup; within 100 Hz during any 30-minute period after warmup.	<10-Hz drift from a cold start to 30 minutes later. (Measured with transmitter operating at 80-W input, key down.)
Size (HWD): 5.3 × 13.3 × 13.3 inches (133 × 333 × 333 mm).	
Weight: 29.8 lb (13.5 kg).	
Color: gold-brown gray.	

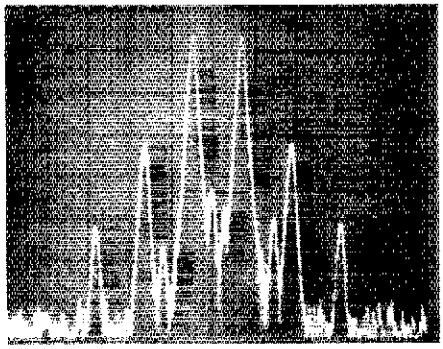


Fig. 3 — Two-tone, third-order transmitter IMD spectral display of the TS-830S. Operating frequency is 14.250 MHz; power input, 110 watts average; vertical divisions, 10 dB; horizontal divisions, 1 kHz. The third-order distortion products are approximately 32 dB below PEP output; individual tones are 6 dB below PEP output. All measurements were made in the ARRL lab.

SSB

DX-station reports repeatedly attested to the effectiveness of the speech processor; it is an rf type and utilizes the 8.83-MHz i-f filter to "scrub" the signal. Therefore, substitution of the narrower YK-88SN (1.8-kHz) optional filter is not advised in an attempt to narrow the receiver passband; the VBT (variable bandwidth tuning) function may be used instead. Some of the natural voice quality is lost when the processor is used, but this is characteristic of these devices. In addition to the use of the transceiver metering system, operation of the processor can be readily verified by observing the output waveform displayed on the station monitor scope (what do you mean, you don't have one?) and by using headphones (to avoid feedback) with the MONITORING feature of the '830. Some "talk-back" was noted during ssb operation while wearing headphones (MONI switched off), but it was not noticed when using a speaker.

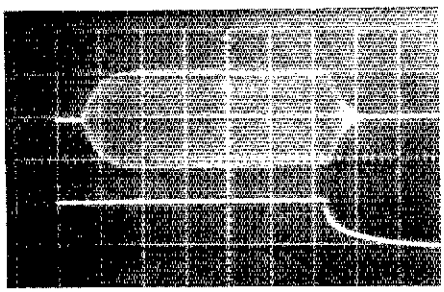


Fig. 4 — Keyed cw waveform of the TS-830S. The CAR control has been adjusted for no alc indication as described in the text. This waveform is essentially click free.

The operator should ensure that the DRIVE control of the '830 is properly peaked. Otherwise the alc meter indications will be low. This might lead to improper adjustment of the MIC gain or PROCESSOR LEVEL controls and earn you a bad on-the-air reputation. When the controls are properly adjusted, the meter alc indications are sharp and reliable.

Both high- and low-impedance microphones may be used with the TS-830S. With low-impedance types, the MICROPHONE gain will simply be set at a higher level. A four-pin microphone connector is used.

CW

Early in the review period, cw operation was undertaken with only the 2.4-kHz ssb filter in the transceiver. By using the VBT, IF SHIFT, NOTCH and TONE controls to advantage, I was quite satisfied with the receiver performance. It

is conceivable that the occasional cw operator might never need to add the sharper cw filters; you can always install them at your leisure. But dyed-in-the-wool cw operators will rejoice at the choice of options afforded them. The review unit was later operated with 500-Hz filters in both i-fs and then with the 250-Hz filter in the second i-f. My opinion (and that of many other operators) is that the combination of the two 500-Hz filters provides sufficient selectivity for all but the most critical situations. There's even an optional 270-Hz filter for the first i-f, if you're not satisfied! Filter installation takes only about 10 minutes. I'm sure someone is bound to offer a filter-switching addition for the '830. Perhaps a post-filter amplifier stage will also be included since there is none supplied with the '830 to make up for the additional filter loss, although this created no great difficulty.

The cw-output waveform is well-shaped. Care must be taken to ensure that the CAR level control is adjusted to the point where no alc reading is indicated on the meter. This manner of adjustment is not pointed out in the operator's manual, but should be observed in order to prevent making the wavefront too sharp, which would result in the generation of key clicks.

When using VOX-keyed cw (so-called "semi break-in") the initial code element is shortened, and a steep wavefront is created that definitely will produce a click. This is characteristic of all transceivers which use similar VOX-keyed T-R systems for cw operation. Also, the VOX will drop out between words at slow cw speeds even with the DELAY control set at maximum. One way to avoid both these situations is to use the SEND REC switch or PTT operation; a foot switch may be connected by means of the ACCESSORY jack if desired. I modified the VOX delay circuitry for a longer delay time constant to suit my operating tastes. The procedure is outlined in the "Hints and Kinks" section of this issue.

In the cw positions of the MODE switch, a low-pass filter is switched into the audio chain to attenuate the higher audio frequencies and make copying a bit less tiring. Use of the TONE control will also help.

RTTY, SSTV and ASCII

To operate these modes, interconnections are made to the MIC and SPEAKER jacks. There is no RTTY position on the MODE switch, and operation takes place with the ssb filter in place on lsb. Here, the VBO and IF SHIFT functions will come in handy during reception. The manufacturer recommends that the final-amplifier input power be reduced to less than 100 watts during these modes of operation. However, the measured efficiency at that power-input level is poor — about 20%.

The instruction manual contains a number of errors of different types, and some information I felt would be helpful is lacking. The description of the location and means of access to the final-amplifier neutralizing capacitor is incorrect. This capacitor may be found mounted in an inverted position beneath the plate tuning capacitor with the shaft protruding near a notch in the final-amplifier tube-socket mounting board. Switches S19 and S21, which appear on the schematic, are not mentioned in the text, but are part of the SWTR and EXT VFO jacks, respectively. When the appropriate plug is inserted into the jack, the switches are automatically activated.

A 7-pin DIN plug is supplied for use with the REMOTE jack, but no 8-pin plug for the SWTR jack. These 8-pin plugs may be obtained directly from Kenwood.

Some TS-830S owners have reported an intermittent shift in display and operating frequency (no such problem was experienced with the review unit). The cause may be traced to a loose self-tapping screw on the SL-SWR unit (X49-1140-00). Kenwood service bulletin no. 840 recommends placing a toothed lock washer between the pc board and heat sink at two screw locations.

Conclusions

Did I like its performance? You bet! So did everyone else who had a chance to use it. The '830 is an ideal unit for fixed-station operation and small enough to grab by its built-in handle and take on vacation with you. Whether your operating style is casual or contest, the TS-830S has a lot to offer you.

Among the extra "goodies" available to accompany the '830 are two VFOs, the VFO-230 and VFO-120. The '230 is a 20-Hz-step digital VFO with five memories while the '120 is the analog unit which also mates with the TS-120 transceiver. The TS-830S is available from Trio-Kenwood Communications, Inc., 1111 W. Walnut St., Compton, CA 90220. Price class: TS-830S, $930; VFO-120, $160; VFO-230, $300. — *Paul K. Pagel, N1FB*

CUSHCRAFT A3 TRIBAND ANTENNA

The arrival of the A3 had been perfectly timed — just before the beginning of a spring holiday weekend — and the prospect of good weather was encouraging. Three hours (and a couple of big insect bites) after the box was opened, the A3 was ready to have the coaxial feed line attached. No parts were missing except the weatherproof connector boots which the enclosed literature stated were supplied for use with the PL-259 connectors. I was later informed by the manufacturer that no such boots are included in the A3 package and that the paperwork had been mistakenly packaged with some of the earlier A3s.

Mechanical Aspects

A 3/16 inch (4.8 mm) thick, 6 inch (152 mm) square plate is used for the boom-to-mast adaptor. Solid aluminum V blocks are used for the plate-to-mast clamping pieces, not a type of plastic as found on some antennas. The element ends are slotted to provide a good mechanical and electrical connection between the sections of telescoping tubing, but no conductive grease is supplied.

The 12 traps are rated for full-legal-power handling capability, separate traps being used for the 10- and 15-meter bands on each element. All parts are rugged and of good quality. I would have preferred stainless-steel worm-gear clamps at all the required positions; that type is used only at the boom splice and on the center section of the driven element. The other clamps are those which employ a machine screw for tightening the clamp.

If any newcomers may be contemplating the assembly of the A3, remember to check the trap labels, keep the arrows on the labels pointing toward the boom, and keep the drain holes in the traps pointing downward. Otherwise, you'll have the traps reversed, and in the second instance, you'll not allow for proper drainage of accumulated moisture from the traps.

Three sets of element-length measurements are suggested by the manufacturer for different portions of the bands: phone, cw and midband. A glance at the manufacturer's VSWR charts for the A3 and some thinking about which mode you most often use will help you make your choice. I used center-band lengths. Some touching up of element lengths may be required at any one particular installation. In my case, I elected to lengthen the element tips by 1/2 inch (13 mm) to move the 20-meter VSWR curve slightly to favor the cw portion of the band. This resulted in the curve being shifted approximately 50 kHz lower, still providing good coverage of the whole band without an excessively high VSWR. The SWR curves shown in Fig. 5 are the results obtained at these settings.

Fig. 6 shows a close-up of the driven element. The center section of the driven element is a piece of fiberglass tubing 1/8 inch (4 mm) thick, 10 inches (254 mm) long and 1 inch (25.4 mm) in diameter. This insulates the feed point from the boom. The coaxial feed line has the braid and center conductor separated for a length of 4 inches (102 mm) for attachment to the feed point. An 8-turn, 6 inch (152 mm) diameter feed-line choke is formed from part

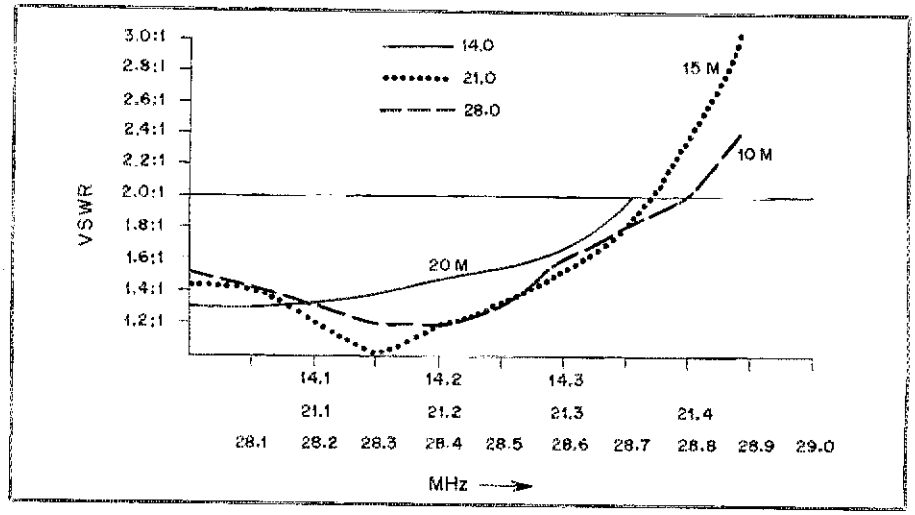


Fig. 5 — SWR curves for the Cushcraft A3 installed at N1FB. Midband settings were used and the beam installed at a height of 30 feet (10 m).

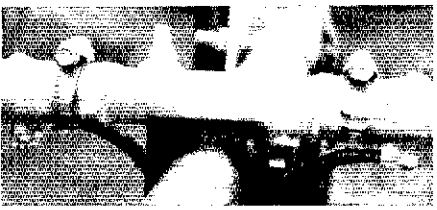


Fig. 6 — A piece of fiberglass tubing serves as a driven element insulator. The clamps, screws and bolts have been coated with a clear waterproof sealant for weatherproofing.

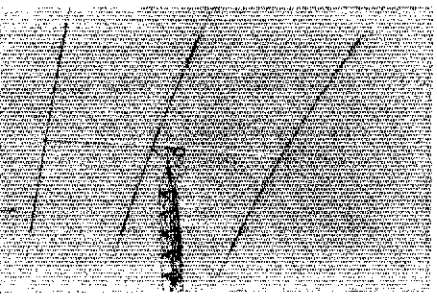


Fig. 7 — The Cushcraft A3 triband beam is shown here ready for action on 20, 15 or 10 meters. The feed-line choke is attached to the boom.

of the feed line.[1] I taped and clamped the choke to the boom with a stainless-steel hose clamp. This choke may be seen in Fig. 7.

The A3 has been a good performer during the many months it's been in service. Good front-to-back and front-to-side ratios have been observed on both DX and local signals on all three bands. No "cold" numbers are available for such ratios. The ARRL does not have an antenna testing range to accurately measure such parameters, and measurements performed at different station locations with the same antenna would likely produce varying results.[2] No structural failures have occurred since the antenna was installed despite some rough New England weather conditions.

The low values of SWR encountered have made operating with broadbanded transceivers a pleasure. Changing bands becomes a simple matter of flipping the band switch to the desired band of operation. It would be somewhat ridiculous to use a "no-tune" transceiver and have to use a Transmatch!

The Cushcraft A3 is available from: Cushcraft Corp., 48 Perimeter Rd., P. O. Box 4680, Manchester, NH 03108. Price class: $220. — *Paul K. Pagel, N1FB*

MIRAGE B-23 2-METER, 30-WATT, ALL-MODE AMPLIFIER

If a piece of equipment has a lot of knobs and switches, a reviewer can go on ad nauseam listing every detail of operation. But what do you say about something that has no switches or knobs to fiddle with? Well, it is certainly simple to operate. In fact the B-23 is so simple to use that one can easily install it out of sight (under the dash?) and forget about it.

The active device in the circuit is a Motorola MRF-240, which is a relatively new 40-W vhf device that is capable of being operated in a linear mode. The circuit is designed so that the

[1] The ARRL Antenna Book, thirteenth edition, pp. 115-116.
The ARRL Antenna Anthology, pp. 145-148.

Table 2

Mirage B-23 Serial No. 868-980

Manufacturers Claimed Specifications	*Measured in ARRL Lab*
Frequency range: 144 to 148 MHz	144 to 148 MHz
Power input: 100 mW to 5 W maximum	100 mW to 5 W
Power output: 30 W for 2-W input	30 W for 5-W input, 25 W for 1.5-W input
Modes: fm, cw and ssb	
DC power input: 13.6 V dc at 5 A nominal	3.5 to 3.8 A at 13.8 V dc (varies with drive).
Size: 2.25 × 4.75 × 4 in. (57 × 120 × 102 mm)	
Weight: 1.25 lb (0.57 kg).	

amplifier is limited to about 30-W output when operated within specifications, thus contributing to the safety margin and longevity of the MRF-240. With about 1-1/2 W drive (fm carrier), the amplifier produces an output power of 25 W. Under these conditions, it draws about 3.5 A from a 13.8-V source. If the driving power is raised to 5 W, the output power increases to 30 W and current consumption to 3.8 A. The MRF-240 is designed to withstand high VSWR without self-destruction, but at reduced output. When operated into a load with a VSWR of 2:1, the B-23 output power was reduced by about 20%.

I used the amplifier strictly with a low-powered fm driver — it certainly seems to be ideal for that. But there is another side to the B-23; it can be used as a linear amplifier for low-level ssb signals. Spectral examination indicates that its linearity is as good as any other solid-state, 2-meter linear power amplifier that we have checked in the lab. It would appear that the B-23 is also a good choice for those having a low-powered, 2-meter ssb unit.

The B-23 has adequate output filtering to ensure that spurious signals outside the passband are attenuated more than enough to meet current FCC specifications. Part of this filter, including two harmonic traps, is always in the circuit whether the B-23 is powered or not. This is significant because the amplifier has a T-R relay that is actuated by an rf-sensing circuit. A small portion of the signal present at the input is diode rectified and triggers a transistor relay driver. A diode is a nonlinear device that does an excellent job of generating harmonics. Therefore, if all the filter sections were switched out of circuit when the amplifier was not powered, the resultant output could contain harmonics with amplitudes well above the maximum allowed. A number of amplifiers currently being sold suffer from this design problem — they are not advertised in *QST* because of this. Happily, the B-23 passed this check with flying colors.

With dc power applied and with no signal present at the input, the B-23 draws less than 4 mA. Theoretically, a typical automobile battery could be expected to last for several thousand hours under this current drain without need of recharging. However, my personal inclination is to turn everything off when I get out of my car (actually, a heavy-duty relay energized by the ignition switch does this for me). I would recommend that the user install a toggle switch of adequate rating so that he may turn the amplifier on and off at will. An LED and a current-limiting resistor could be added as a visual indicator of the status of the amplifier. In a mobile installation, the switch, LED and resistor could be placed conveniently near the operating position with the amplifier mounted safely out of sight.

A few words about the B-23 construction are

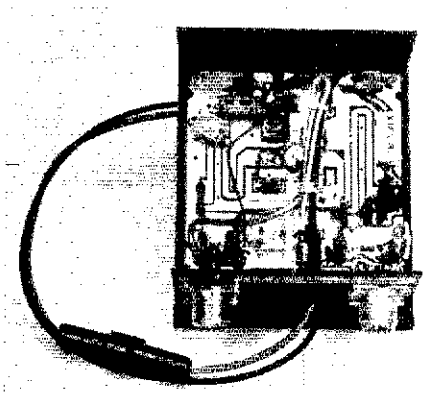


Fig. 8 — Neat, compact layout of the B-23 amplifier. This package can easily be tucked out of sight — even in today's compact cars.

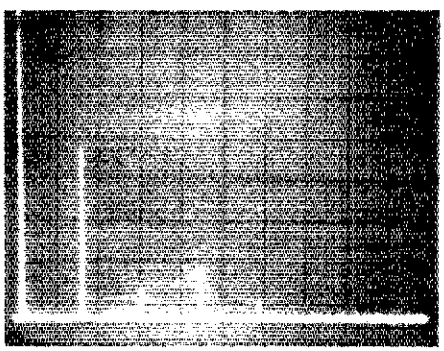


Fig. 9 — ARRL-lab spectral photograph of the output of the Mirage B-23 amplifier. Vertical divisions are 10 dB each; horizontal divisions, 100 MHz. The fundamental frequency at 144.05 MHz has been attenuated approximately 32 dB by means of a two-cavity notch filter in order to prevent overload distortion in the spectrum analyzer. The B-23 complies with current FCC specifications regarding spectral purity.

in order. The circuit board is the usual glass epoxy, silver-plated stripline style that has become the vhf standard. The case and heat sink are made of heavy-duty, black anodized aluminum which contributes to durability and heat dissipation. It appears that quality components have been used throughout. A reverse-polarity protection diode is connected across the dc line after the fuse.

In short, I am pleased with the performance, construction and design of this amplifier. Anyone looking for an amplifier to go with his hand-held should give consideration to the B-23 — particularly if low-power ssb operation is contemplated. Further information may be obtained from Mirage Communications Equipment, Inc., Box 1393, Gilroy, CA 95020. Price class: $90. — *Peter O'Dell, KB1N*

Technical Correspondence

Conducted by
Jerry Hall,* K1TD

5-A LOAFER FEEDBACK AND UPDATE

All voltage regulators are not created equal! After our article appeared last November[1] we received a letter from Virgil Leenerts, WØINK. He warned us that he had experienced difficulty with some 3-terminal, 1-A monolithic regulators when employed, as we suggested, with diodes in series with pin 3 (common). The circuit arrangement is depicted in Fig. 1. His experience was that the regulator would self-destruct if the output of the regulator were shorted to ground. He suggested that we experiment with the 5-A variety and determine if the same problem existed for the higher-current models.

First we connected the common and input of a Fairchild 78H12 regulator to a 20-V supply and shorted the output to ground (common). The chip became quite warm; as soon as the short was removed, the output returned to 12 V. We then installed the diodes between pin 3 (common) and ground as shown in Fig. 1. Again the output was shorted to ground (not to common). After a few seconds, the case became quite hot. We removed the short and checked the voltage at the output — now 20 V! The regulator had failed; had there been 12-V equipment connected to the output, chances are that it would have been damaged. We then duplicated the tests with a National Semiconductor LM-340-K; it did not fail.

We contacted Fairchild and were told that they were unaware of any such problem, but that they would check into the matter and get back to us. A few days later the engineer from Fairchild called back and told us their laboratory had confirmed that the regulator could fail in this manner. He said that not every chip failed, but that enough did to suggest avoiding this circuit. Apparently the constant voltage drop of the diodes can reverse-bias a transistor inside the regulator. This forces the internal pass transistor to turn on when it should be shut down.

Fairchild recommends a voltage divider approach for those circuits requiring a higher output voltage than the nominal voltage of the regulator chip (Fig. 2). Suppose that U1 is a 12-V regulator, and that we desire an output of 13.8 V. R1 is arbitrarily chosen to be 560 Ω. The value needed at R2 is calculated based on the formula

$$R2 = R1 \frac{V_X}{V_0}$$

where V_0 is the nominal output voltage of the regulator chip and V_X is the difference between the desired output and V_0. From the formula, we determine that R2 should have a value of 560 × 1.8÷12 or 84 Ω. A standard-value, 82-Ω resistor should work quite well. Because there is a constant potential of 12 V across R1, it will have a continuous current of 21 mA. This means that the resistor will have a constant power dissipation of about 260 mW. A 1/2-watt resistor should provide an adequate safety margin for R1. A 1/2 watt resistor for R2 will also be adequate.

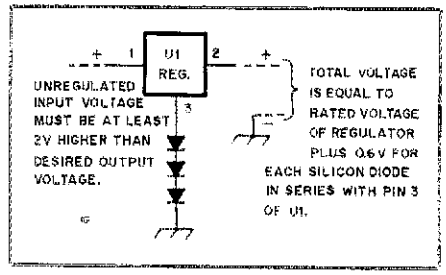


Fig. 1 — A common circuit for boosting the output voltage of a 3-terminal, voltage-regulator chip. Fairchild has determined that, under certain conditions, this circuit can cause failure of the regulator, resulting in the full input voltage appearing at the output terminal. If you use this circuit, the diodes should be removed for safety (see accompanying text).

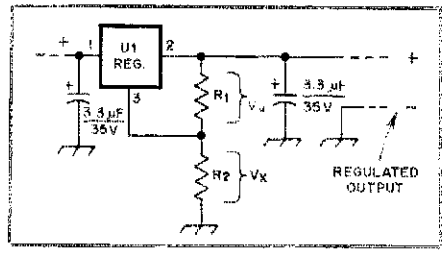


Fig. 2 — If you must raise the output voltage of a 3-terminal regulator, this is the circuit that Fairchild recommends. It would be wise to test the regulator by shorting the output to ground for a few seconds. If the output returns to normal after the short is removed, it should be safe to attach equipment.

The circuit in Fig. 2 should be immune to the shortcomings of Fig. 1. It is now our recommendation, however, that you use 3-terminal regulator chips at their nominal output voltage just to be on the safe side. If it is necessary to raise this voltage, then use the circuit in Fig. 2. Nevertheless, it would be advisable to test your particular regulator chip by shorting the output to ground for a few seconds and then by checking the output with a voltmeter. If the circuit is safe, the chip should not be damaged; if it is not safe, it is better to find out now instead of later when several hundred dollars' worth of equipment may be connected to the supply. *Peter O'Dell, KB1N, and Bob Shriner, WA0UZO*

COMPONENTS FOR MORSE READOUT DIGITAL DIAL

I would like to pass along to *QST* readers some information about obtaining components for the digital-dial Morse readout.[1] The 1981 Jameco catalog (Jameco Electronics, 1355 Shoreway Rd., Belmont, CA 94002) lists the 74C915 7-segment to BCD decoder IC that many builders have had trouble locating. In fact, this catalog lists *all* of the ICs used in the project. — *Bill Alliston, W3ICB, 4880 Greensburg Rd., Murrysville, PA 15668*

FINE POINTS ON MODULATION SYSTEMS

The article on modulation systems in August 1980 *QST* is most interesting and informative. I would suggest only one change in the article. Mr. Greaves uses the term *deviation ratio*, D, as the ratio of the peak carrier-frequency deviation to the corresponding maximum-frequency component of the message. Most modern textbooks on the subject call this ratio the *modulation index*, β, and use the term deviation ratio to mean the peak carrier-frequency shift divided by the carrier frequency. The modulation index is usually defined in the way indicated for purely sinusoidal audio. This may be a small point, but I feel that modern terminology should be used to keep confusion from occurring when other articles are read. — *James N. Thurston, W4PPB, 322 Woodland Way, Clemson, SC 29631*

I read the article by Wayne Greaves, WØZW, on modulation systems with great interest.[1] I have worked with and designed modulation systems professionally for many years, and would like to point out that the noise performance of different systems can be obtained only by assuming that the same peak transmitter power and the same type of message signal exist in all systems. If this is done, dsb is 6 dB better than a-m, and ssb is 9 dB better than a-m. It is this 9 dB, plus the availability of good, low-cost band-pass filters, that has killed a-m in Amateur Radio systems.

As far as fm is concerned, it all depends on the deviation ratio. If this ratio is unity, the system is about 5 dB better than a-m because of the triangular noise spectrum. One can, of course, get better noise performance by increasing the deviation ratio, as Greaves explains in the article. — *Leland E. Thompson, K6SR, 14851 Devonshire Ave., Tustin, CA 92680*

RADIOTELEPRINTER CODES

In the September 1980 issue of *QST*, the article "ASCII, Baudot and the Radio Amateur," by G. W. Henry, Jr., K9GWT, perpetuates the misuse of two terms which have caused confusion for a long time. The terms are Baudot in reference to the teleprinter code, and baud rate in reference to signaling or pulsing rate.

The code shown in Table I of Henry's article is in reality the CCITT alphabet no. 2 derived from Donald Murray's work at the turn of the

[1] O'Dell and Shriner, "5-A Loafer," November 1980 *QST*, p. 43.

*Technical Editor, *QST*

[1] Alliston, "A Morse Readout for Your Digital Dial," November 1979 *QST*, p. 33.

[1] Greaves, "Modulation Systems and Their Noise Performance," August 1980 *QST*, p. 23. See reference 3.

century to free the telegraph operator from requiring a knowledge of the code structure. Baudot's work some 15 to 20 years earlier on multiplexing telegraph signals produced a different code structure (the real Baudot code) which resulted in the CCITT alphabet no. 1. Alphabet nos. 1 and 2 are similar only in having five elements per character, but the codes are otherwise entirely different, since they were developed to serve different requirements. Even the idle condition is different, Murray's idling on continuous marking and Baudot's idling on continuous spacing.

Baudot's code has never been used commercially in North America. When Messrs. Krumm developed the start-stop teleprinter in the U.S. in the 1910s, they chose a slightly modified version of Murray's code, and this has been used for five-level machines, essentially unchanged, ever since. In short, there *is* a Baudot code, and it is *not* used in North America. A very good reference on these codes is chapter 2 of *Telegraphy* by J. W. Freebody (Sir Isaac Pitman and Sons, Ltd., London, England).

One often sees the term *baud rate* thrown about in current literature. Baud is, by definition, a rate. Therefore to talk of baud rate is to talk of the rate of a rate, which mathematically implies the rate of change of a rate. With care and attention, careless or uninformed use of terminology and the resulting confusion can be avoided. — *Ernest J. Moore, VE3CZZ, 37 Ashgrove Cres., Nepean, ON K2G 0S1*

TUNING AND CONSTRUCTING BALANCED TRANSMISSION LINES

☐ In the December 1980 issue of *QST*, O'Dell illustrates the popular T-match circuit for tuning unbalanced coaxial transmission lines, and he describes a more complicated circuit for tuning balanced lines.[1] If the T match is a good circuit for unbalanced lines, then a balanced version of the T match (see Fig. 3) could be used for tuning balanced lines. The balanced feeder itself could be made from equal lengths of coaxial cable suitably connected (see Fig. 4), thus forming a shielded balanced line to facilitate routing it between the antenna and the transceiver.

The balanced T match, Fig. 3, requires fewer elements to tune and is easier to construct and adjust than the circuit described by O'Dell, T1.

[1] O'Dell, "Antennas and Grounds for Apartments," December 1980 *QST*, page 40.

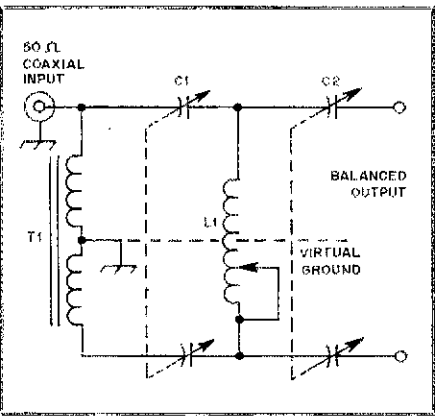


Fig. 3 — A balanced T match for antenna transmission lines. T1 is a standard 1:4 toroidal balun. See text for values of C1, C2 and L1.

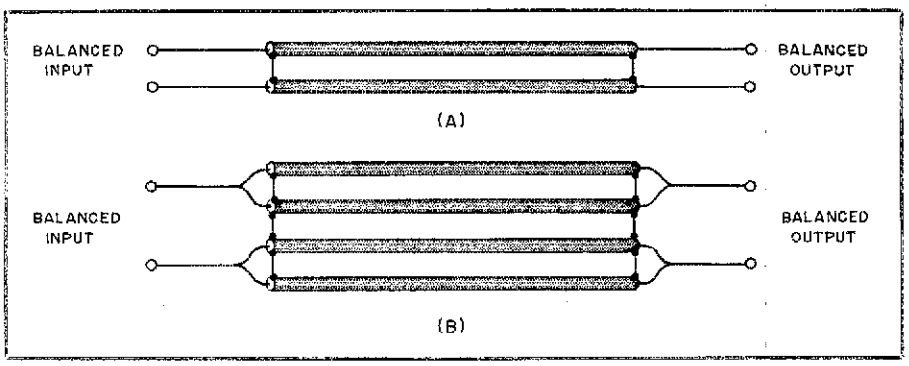


Fig. 4 — Shielded balanced transmission lines utilizing standard small-size coaxial cable, such as RG-58/U or RG-59/U. These balanced lines may be routed inside metal conduit or near large metal objects without adverse effects.

the balun transformer, provides the required unbalanced (transceiver output) to balanced transformation. Since it is on the *input* or matched side rather than the output unmatched side typical of most Transmatch circuits, its losses are minimized. Harmonic generation by the balun, which could be a problem for high SWR and power, is also avoided. The balanced T match can be thought of as two unbalanced T sections symmetrical with respect to "virtual" ground (the dashed line in Fig. 3). The load impedance to be matched is divided and balanced with respect to this ground. Thus for the same impedance match, balanced with reference to unbalanced, the series capacitive reactance values and the shunt inductive reactance value each side of virtual ground will be halved. The total inductance is twice its halved value, or the same value. In the circuit shown, T1 is a 1:4 balun and the load is matched to 200 ohms balanced instead of 50 ohms unbalanced. Therefore the component values used for the coaxial T match should be satisfactory for its balanced cousin, except that dual-section capacitors are needed.

Shielded balanced lines are more useful than open-wire lines. Since there is no noise pickup on long lines they can be buried and they can be routed through metal buildings or inside metal piping. Shielded balanced lines having impedances of 140 ohms or 100 ohms can be constructed from two equal lengths of 70-Ω or 50-Ω cable (RG-59/U or RG-58/U would be satisfactory for amateur power levels). The shields are connected together (see Fig. 4A) and the two inner conductors are the balanced line. At the input, the coaxial shields should be connected to chassis ground; at the output (the antenna side), they are joined but left floating. A high power, low loss, low impedance 70-Ω (or 50-Ω) balanced line can be constructed from four coaxial cables. Again the shields are all connected together. The center conductors of the two sets of coaxial cables which are connected in parallel provide the balanced line. — *John S. Belrose, VE2CV, 3 Tadoussac Dr., Aylmer, PQ J9J 1G1*

HARDLINE CONNECTORS AND CORROSION

☐ I read with interest the article in Hints and Kinks, September 1980 *QST*, "Connectors for CATV 'Hardline' and Heliax." The construction details for the 1/2-inch hardline were, to me, timely and very easy to follow.

I modified the adapter sleeve, however. Instead of the 1/2-inch ID aluminum sleeve to join the coaxial connector with the aluminum jacket, I used copper tubing, slotted and tinned on the inside. My reasoning was based on the compatibility of metals. The EMF (volts) for copper is −0.20, for tin-lead solder −0.50 and for aluminum −0.60. I felt there would be less corrosion between the tinned copper surface and the connector or the aluminum jacket than between the aluminum sleeve and the connector. I also felt the aluminum oxide on the aluminum sleeve and the aluminum jacket would increase contact resistance. Further, the stainless steel clamp (the EMF is −0.20 volt, the same as copper) is more compatible with the copper sleeve adapter. — *Dennis Pochmerski, WA2DBV, RD 1, Box 155, Freehold, NJ 07728* QST

Feedback

☐ "Receiving with Plessey ICs," April 1981 *QST*, page 13, did not carry a credit line for J. M. Bryant, G4CLF. The authors wish to acknowledge his part in developing the 80-meter receiver; he built the test model.

☐ In Wetherhold's "Modern Design of a CW Filter Using 88- and 44-MHz Surplus Inductors," December 1980 *QST*, Fig. 1B should show a connection across the top two terminals of the left-most inductor in the lower stack.

☐ The correct address for author Jim Pitts, KE4Y, whose article, "A QRP Transmitting Converter," appears in April 1981 *QST*, is 4113 Dienes Way, Louisville, KY 40216.

☐ In "Results — 1980 Simulated Emergency Test," April 1981 *QST*, local activity listings for Michigan and Ohio were accidentally interchanged. Cheboygan/Presque Isle is actually in Michigan, while Columbiana and Montgomery/Greene Counties are actually in Ohio. The correct totals for these two ARRL sections are Michigan — 4148, Ohio — 9406.

☐ CARRC (Canadian NewsFronts, March 1981 *QST*) have advised that although it is hoped that a second balloon package will be carried as a passenger on a scientific flight during 1981, no firm commitment has yet been negotiated. Present or future club participation in the space shuttle project should not be assumed. — *James Barrie, VE4FK, Pinawa, Manitoba* QST

Hints and Kinks

Conducted By Stuart Leland,* W1JEC

TS-830S VOX DELAY MODIFICATION

☐ A number of TS-830S owners have commented that they felt the maximum VOX delay time offered is a bit too short when operating cw; this becomes quite apparent at slower keying speeds. This VOX circuit differs a bit from the ordinary in that it has been designed to offer two different delay time constants: a longer one for ssb and a shorter one for cw.

As shown in Fig. 1A, two capacitors, C48 and C49, are involved. During ssb operation Q14 shorts out C49, placing C48 in the circuit alone. When operating cw, C48 and C49 are in series, reducing the total capacitance from 3.3 μF to half that value.

To negate Q14 action, I removed C48 and C49 and replaced them with a single capacitor as shown in Fig. 1B. The AF unit pc board (X49-1140-00) must be removed to accomplish this. Five screws hold the board and associated heat sink in place on the chassis (do not remove the screws holding the board to the heat sink). No wires or connectors need be undone. Using a low-wattage soldering iron and wicking material, remove the two capacitors. Replace them with a single capacitor which has its positive terminal inserted into the pc board hole formerly occupied by that of C48; the negative end of the capacitor is soldered to the pad which held the negative terminal of C49 (ground foil). This leaves Q14 isolated and without effect on the VOX circuit delay.

I personally preferred a longer time constant than that originally afforded by the circuit and used a 6.8 μF Tantalum capacitor as a replacement. With front panel control of the delay time constant, I find there is sufficient range to suit my operating requirements. — *Paul K. Pagel, N1FB, ARRL Hq.*

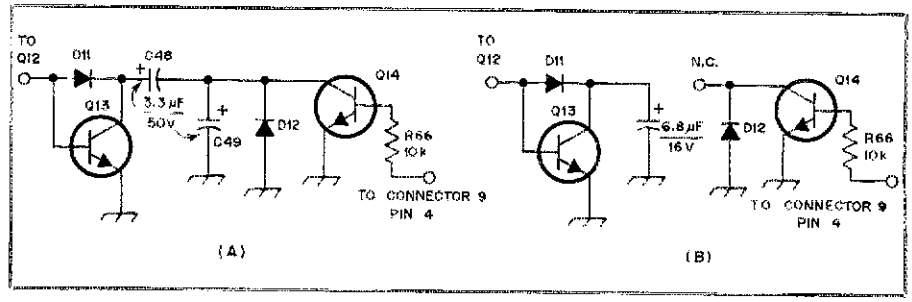


Fig. 1 — At A, a portion of the TS-830S VOX delay circuitry. The modified circuit is shown at B. Component designations are those of the manufacturer. Resistances are in ohms; k = 1000.

SOLAR PANEL CHARGES BOAT BATTERY

☐ At trolling speeds the alternator on my boat does not rotate fast enough to charge the battery. As a result, the charge would become depleted over a period of five or six weeks. The sun's free energy provided an ideal solution to the problem.

I procured a 36-cell solar panel mounted on an aluminum T section that's about 4 feet (1.2 meters) long. The cells are so connected that they produce 0.5 A at 15 V. I bolted the panel to the stern of the boat in a position that is clear of the motor when the latter is in the tilt-up position. See Fig. 2. I wired the panel circuit in parallel with the alternator as indicated in Fig. 3. A diode protects the cells from fluctuating alternator voltage and from the battery voltage during noncharging hours. A 500-mA meter monitors the charging rate.

Results so far have been excellent. Over a year's time the battery did not run down nor was there any need to add water. The panel produces nearly 200 mA on a sunny day, while on dull days the output drops to 50 mA. If the battery is fully charged, the rate is automatically cut to a mere trickle.

*Assistant Technical Editor

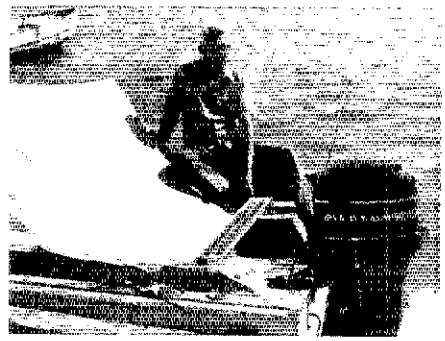


Fig. 2 — Walter Wright, WB5MQX, uses solar power to keep his boat battery fully charged. The 36-cell solar panel is positioned to clear the motor in its tilt-up position.

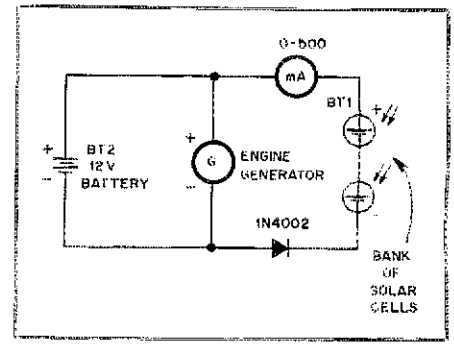


Fig. 3 — With this circuit, a storage battery can be kept fully charged with the help of sunlight. On a sunny day a 36-cell panel will provide a charging current of 200 mA.

A member of our radio club, Felix Campbell, K5DMU, simultaneously used the same idea for his boat. Neither of us was aware of the other's experiments. In view of our success, I am submitting my plan to *QST* in response to suggestions that I publicize it for the benefit of other amateurs. — *Walt Wright, WB5MQX, Santa Fe, New Mexico*

MAKING DOUBLE-SIDED CIRCUIT BOARDS

☐ Perhaps one of the most difficult tasks in constructing double-sided photosensitive pc boards in the home is the alignment of the negatives (or positives) before exposing the board. A very simple and inexpensive method is used in the ARRL lab. It requires a piece of sheet glass the same thickness as the pc board to be used. The size depends on how large the pc pattern happens to be.

A scrap of pc board is butted against the edge of the glass. One negative is then placed on the top of the glass and the edge of the negative is taped to the scrap pc board with masking tape. See Fig. 4. The glass is then flipped over so that the other negative can be mounted in a similar manner and aligned with the first negative. Look straight down on the negatives to avoid parallax. After alignment, the glass sheet is removed and replaced by the sensitized pc board. A piece of tape can be used to hold the negatives against the board while making the exposure. — *Gerre Hall, AK4L, ARRL Hq.*

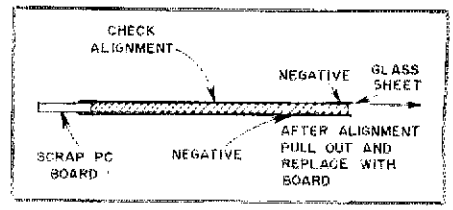


Fig. 4 — A method of checking negative alignment for double-sided circuit boards.

CONVERTING A VIBRO-KEY INTO A KEYER PADDLE

☐ Modifying a Vibroplex-type key into a paddle for use with an electronic keyer involves only a few changes. The first step is to make a new bar from steel, brass or copper. Having the bar chrome plated will give it a professional appearance. There are specialty shops in many areas where such plating is done.

Dimensions for the bar are shown in Fig. 5A. The bar should be drilled and tapped to accept a machine bolt for adjusting the paddle. I used a 4-mm (5/32-inch) dia bolt equipped with a 16-mm (5/8-inch) dia screw nut that locks the bolt in position.

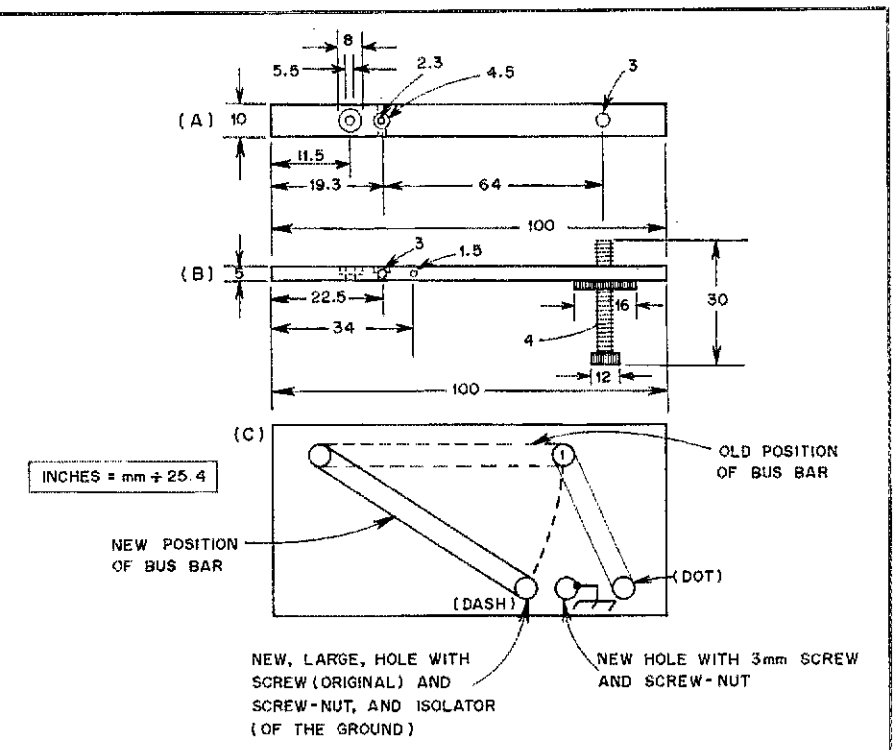


Fig. 5 — These simple modifications are for converting a Vibroplex-type key into a paddle for use with an electronic keyer. Dimensions for the new bar required for this modification are shown in A and B. On the bottom of the key the bus bar shown in heavy lines is moved to the position indicated. The output terminals are at the lower right in the drawing at C. Holes for the original terminals may have to be enlarged to accommodate insulating sleeves, which can be made from plastic tubing or other material. A new hole must be made for the ground connection. Measurements are in millimeters.

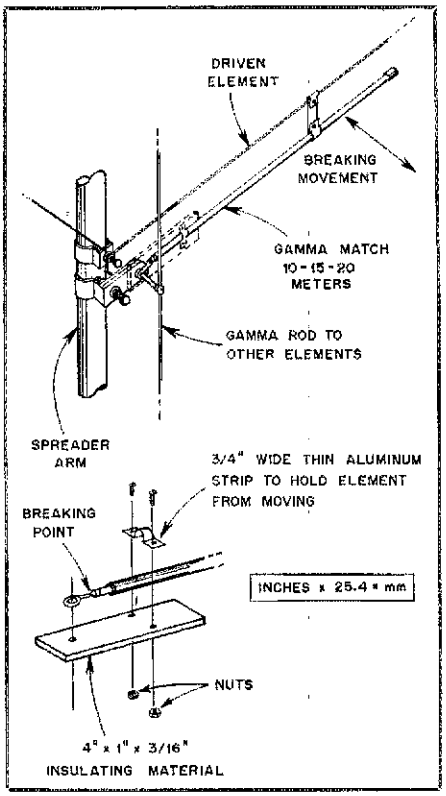


Fig. 6 — Addition of the insulating strip shown in this drawing is advised by Merell Hess, Sr., WØMLT, as a means of preventing wind damage to the stubs on a Hy-Gain quad antenna.

The terminals on the base are modified as needed so that the dot and dash circuits are insulated from the base. The original holes may be enlarged to accommodate sleeves for insulating the terminal bolts from the base. An additional hole, bolt and nut must be provided for a ground terminal. This hole may be placed midway between the two original holes. The ground connection on the key is to be connected to the ground on your electronic keyer.

As indicated by the drawing, the left-hand terminal on the key is for dashes while the right-hand terminal is for dots. Notice also that one of the bus bars (Fig. 5C) is moved to a new position so that it connects directly to the dash terminal.

After all the components have been installed as illustrated, simply adjust the setscrews for good operation. "But, how well does it work?" you may ask. To that question I'd say, "Hear me on 20 meters!" — *Fernando Cereja, CT1ZQ, Lousan, Portugal*

PREVENTING WIND DAMAGE TO MATCHING STUBS

My Hy-Gain quad was constantly being subjected to breakage of the matching stubs as a result of strong winds. The force of the wind would move the stub in a front-to-back direction while the mounting lug was held rigidly. Replacements are expensive and quads are not always readily accessible at a nearby store. Three small insulating blocks solved the problem. Now the element cannot move as before. The detail in Fig. 6 illustrates the mechanical cure. I am sure many hams will appreciate the idea of this simple addition, which eliminates replacing the damaged parts. — *Merell Hess, Sr., WØMLT, Westminster, Colorado*

NUT STARTING WITH NEEDLE-NOSE PLIERS

Needle-nose pliers can be converted into a useful gadget for starting nuts in those places that are difficult to reach with your fingers. See Fig. 7. The handle bearing against the knurled screw head is drilled for a loose fit while the opposite handle is tapped with a 6-32 thread. A bolt with a knurled screw head is inserted through both the drilled and tapped holes. Adjustment of the bolt permits the pliers to become a small vise that will hold a nut firmly at various angles, resulting in a less "profanogenic" situation. Clearly, the screw may be removed for normal use of the pliers. — *Frank Noble, W3MT, Bethesda, MD*

DIMENSIONS FOR THE K7HNM BENCHER DUST COVER

Amateurs who wish to make a copy of Chet McClellan's dust cover for the Bencher key (see Hints and Kinks, *QST*, February 1981) will find the following dimensions helpful for preparing the clear plastic (Lucite) panels. For A and A1, cut two pieces (3/16 × 1-7/8 × 4-1/8* inches (4.76 × 47.63 × 104.78 mm). For B and B1, cut two pieces 3/16 × 1-7/8 × 4-1/64 inches (4.76 × 47.63 × 102 mm). For C, one piece is required with dimensions of 3/16 × 4-1/8* × 4-3/8* inches (4.76 × 104.78 × 111.13 mm). Four pieces are needed for D and these have dimensions of 3/16 × 3/8 × 1-5/8 inches (4.76 × 9.53 × 41.28 mm). Tolerances indicated by the asterisk (*) are +1/64 inch and −0 (0.397 mm and −0). — *Stu Leland, W1JEC, ARRL Hq.*

A TOUCH-TONE IMPROVEMENT

I am employed in commercial broadcasting as a chief engineer for WDUZ. For years I have

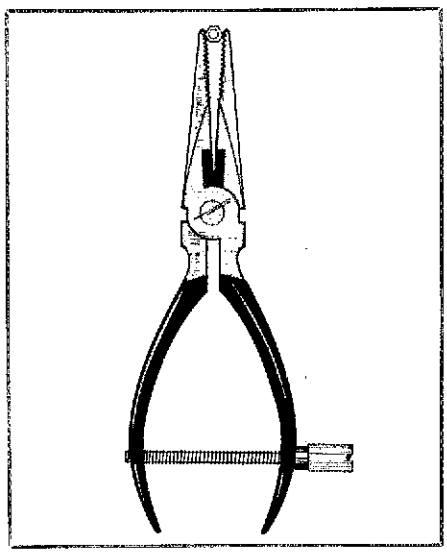


Fig. 7 — A pair of pliers may be converted into a vise-like gadget for nut starting by drilling a hole in each handle and tapping one hole. A 6-32 bolt with a knurled nut on one end serves to adjust the clamping action of the tool.

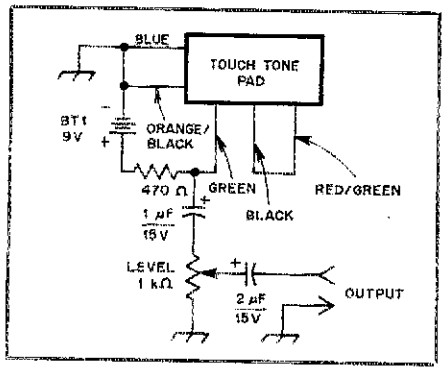


Fig. 8 — Stephen Konopka suggests this modification of the Touch-Tone pad circuit illustrated on page 439 of the 1977 *Handbook*. He indicates the change improves keying and frequency stability.

used the *Handbook* as a reference.

I would like to offer an improvement on a circuit described in the 1977 edition. Page 439 shows connections for making a standard Touch-Tone pad operable. While the unit does function as described, I find that oscillation starts somewhat slowly and the frequency tolerance is below that of the capability of the pad. My offering is the result of experimentation and studying a Bell System manual concerning the subject.

A simple connection change will result in proper operation. I am providing a revised diagram (Fig. 8). The change results in sharper keying and better frequency stability. — *Stephen A. Konopka, Green Bay, Wisconsin*

THE HW-8 AND THE ACCU-KEYER — A GOOD CW TEAM

☐ In the process of modifying my HW-8, I built and installed an Accu-Keyer inside this QRP rig. The circuit is taken from the *Handbook*. To begin this addition, take off the front panel of the transceiver. Remove the bandwidth switch and in its place insert the speed control potentiometer for the keyer. Mark the size of the potentiometer on the inside of the chassis. Then, remove the potentiometer. Just to the left of the band switch there is space for a toggle switch. Mark the location for the switch hole, replace the panel and carefully drill the hole. Then once again remove the panel. Mount the speed control and the switch on the chassis with nuts and lock washers. These provide the correct spacing between the chassis and front panel. Tighten them securely and replace the front panel. Use an additional nut on each new control. Connect the leads from the bandwidth switch to the new toggle switch, positioning the wires carefully. I use *up* for wide and *down* for narrow.

Drill a hole and mount a 1/4-inch (6 mm) 3-conductor phono jack on the rear panel. Make two small holes for mounting the keyer board. Leave ample room for clearance between the keyer board and the "cans" standing up on the main circuit board. Connect the dot, dash and ground input leads from the keyer to the 1/4 inch (6 mm) jack. Install the wires from the speed control potentiometer to the hand-key jack.

The +5 V needed for the keyer may be taken from the power switch in the HW-8. To regulate this voltage, I installed a 5 V, 1 A voltage regulator which I mounted on the rear wall of the HW-8. The wall serves as a heat sink and a chassis ground.

A 2500:8-ohm output transformer, inserted in the audio output of the HW-8, provides enough audio to drive a loudspeaker that can be heard even when operating mobile. This addition does not prevent the use of headphones.

My modification plans also include the RIT/QSK circuit changes described in July 1977 *QST*. By moving the preselector peaking capacitor to the rear panel, the mounting hole left vacant by the capacitor provides a suitable location for the RIT control. There is also room on the panel for a spotting switch. I prefer to use an spdt push-button type for this purpose.

If you wish to refinish the panel of an HW-8, paint can be prepared by a paint dealer so that it will closely match the light Heathkit green. New labels are easily made with dry transfers. When refinished, the set should look as good as new. — *Bill Inkrote, Jr., K2NJ, Flemington, New Jersey*

[Editor's Note: Carl Youngs, W3NWS, notes that a wrinkle-finish paint closely matching the Heath panel color is packaged in a spray can by the Illinois Bronze Powder and Paint Company, Lake Zurich, IL 60047. The color is Celestial Blue, No. 338. Many local hardware stores carry products from this firm. Attention is also called to the painting idea suggested by Carl Nebelsky, AA1U, in Hints and Kinks, *QST*, March 1979.]

OLD TIMER'S NOTEBOOK: A THREE-ELEMENT WONDER BAR FOR 10 METERS

☐ When the Wonder Bar antenna was reintroduced in Hints and Kinks (April 1980 *QST*) in response to reader inquiries, I recalled how I adapted the Wonder Bar design to a 3-element beam. Because this antenna performed so well on 10 meters, I thought some *QST* readers may wish to try my scheme. Essentially the antenna consists of three bow ties arranged and spaced as indicated in Fig. 9. Only the middle element is driven with the end elements parasitically operated.

Each element is constructed with aluminum tubing in a similar manner to that described in Hints and Kinks. The center insulator for each element is made from Plexiglas and is mounted to the boom by an aluminum angle. A two-turn link, connected to the transmission line, is placed at the center of the middle radiator coil.

Use of a dip oscillator will enable the builder to check the resonant frequency of the antenna. Element tuning is accomplished by spreading or compressing the coils to obtain resonance at the desired frequency.

Because this antenna is effective yet inexpensive, it should appeal to 10-meter enthusiasts. Connections and the terminating end of the transmission line should be weatherproofed. — *Frank Masho, W3CBM, Springfield, Pennsylvania*

NEUTRALIZING HINT

☐ An ordinary vacuum-tube voltmeter, coupled by means of an rf probe to the output circuit of a transmitter, serves well as a sensitive "feed-through" indicator while neutralization adjustments are being made. With excitation and filament voltage applied to the final amplifier tube (be sure to kill the plate and screen voltages), adjust the neutralizing capacitor for minimum reading on the VTVM.

If the transmitter is completely shielded and coupled to a coaxial output line, insert a coax T-coupler between the amplifier and the line to provide a tap point for rf probe. — *V. L. Clark, W6ZW, La Crescenta, California*, Hints and Kinks for the Radio Amateur, *1959*.

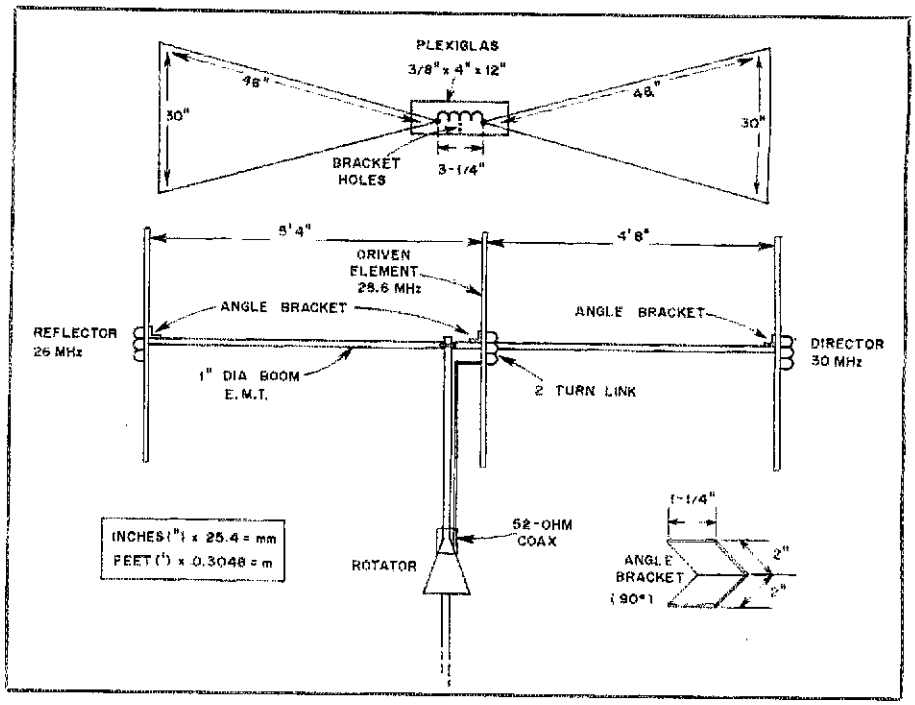


Fig. 9 — This version of the Wonder Bar antenna was originally used at W3CBM back in 1957. Construction of the elements is similar to the method described in Hints and Kinks, April 1980. The tuning coils are made with no. 12 aluminum wire. Coil dimensions are: Reflector — 14 turns, 1 inch (25 mm) dia. Driven element — 12 turns, 1 inch (25 mm) dia. Director — 10 turns, 1 inch (25 mm) dia. Coil length — 3-1/4 inches (83 mm). Angle Brackets — Three 1-1/4 in. long brackets are required and can be made from 2-inch aluminum angle stock.

RFI Assistance List Update

Do you lose sleep when your garage door opens and closes itself at 3 A.M.? Does your organ "speak" to you in CB? This list of manufacturers will show you how to remedy these — and other — types of RFI problems.

By Harold R. Richman,* W4CIZ

The following is an update of the ARRL RFI Task Group's RFI Assistance List.[1] The quest to eliminate RFI continues, spurred on by the increased use of electronic devices that are subject to the problem. The status of RFI solutions remains unchanged, however. The first RFI bill was introduced in Congress in 1972,[2] but none has yet been passed. This leaves RFI problems, for now at least, to be dealt with at the individual consumer level, not at the manufacturing level. Aside from writing your Congressman to urge adoption of an RFI bill that would put the burden on manufacturers to produce RFI-free equipment, you can take direct action to combat radio frequency interference through the services provided by these manufacturers. They have made this information available voluntarily, and a vote of thanks goes to them and to Harold Richman, W4CIZ, who compiled this useful list.

Admiral

No longer in business. For parts, tel. 800-447-8361.

Akai America (C)

Akai products include audio tape recorders, video tape recorders, a-m/fm receivers, speaker systems and related accessory products. Inquiries related to RFI should be addressed to the Customer Service Department, 800 W. Artesia Blvd., Compton, CA 90220, or to P. O. Box 6010, Compton, CA 90224, tel. 213-537-3880. "Upon receipt of these inquiries, we will investigate the situation and, to our utmost, try to resolve the customer's problems."

Allen Organ Company (C)

When a complaint is received via the dealer, Allen Organ Co. sends the dealer an informational service bulletin on RFI and sufficient components to cover all amplifiers in the affected instrument. This service is offered at no cost to the customer. Refer RFI problems to the local Allen dealer. Inquiries may be made to Mr. David L. George, National Service Manager, Macungie, PA 18062, tel. 215-966-2200.

Altec Lansing International (NC)

Customer RFI problems are referred to the authorized Altec warranty stations located nationwide and denoted by an information card furnished with each piece of equipment. Unusual situations are, at the option of the warranty station, referred to Altec Customer Service, 1515 W. Katella Ave., Anaheim, CA 92803, tel. 714-774-2900, or to the Engineering Department, 1515 S. Manchester Ave., Anaheim, CA 92803, Attention: Chief Engineer, Electronics.

Apple Computer, Inc. (N)

"Our products include business, professional, educational, scientific, industrial and home computers, peripheral devices, and software. These products are designed to be compliant with the FCC guidelines covering Class A and Class B computer devices. Inquiries related to RFI should be addressed to any of our more than 800 dealer-operated Level One service centers. If the service technicians there are unable to solve the situation, they will contact our Corporate Engineering Services Group."

Arvin Industries, Inc., Consumer Electronics Division (C)

Customer problems involving RFI should be referred to Mr. John Currey, Manager Engineering Support Group, E. 15th St., Columbus, IN 47201, tel. 812-372-7271.

Audio Research Corporation (C)

In the event of an RFI problem, the customer may write to Mr. Richard Larson, Chief Engineer, 6801 Shingle Creek Pkwy., Minneapolis, MN 55430, tel. 612-566-7570.

Baldwin Piano and Organ Company (C)

"RFI complaints are usually handled by the local Baldwin service technician. Factory personnel are available to assist a technician when needed. Baldwin maintains its own staff of technical representatives who travel in the field and may be called upon to assist a dealer technician with difficult problems, including RFI. Several Baldwin Technical Manual Supplements are available with specific instructions for RFI suppression on specific models. This information is readily available upon request. Inquiries may be directed to Mr. Gilbert C. Carney, Manager Organ Technical Service, Baldwin Piano and Organ Co., 1801 Gilbert Ave., Cincinnati, OH 45202, tel. 513-852-7838."

Bogen Division of Lear Siegler, Inc. (N)

"Bogen Division manufactures professional, commercial and industrial sound equipment. In the event of an RFI problem with any Bogen unit, write for the division's free Field Service Bulletin No. 59 about RFI signal interference, or contact Allen Guthman, Service Manager, Bogen Division/LSI, Box 500, Paramus, NJ 07652, tel. 201-343-5700."

Carver Corporation, Inc. (C)

Carver Corporation manufacturers high-fidelity components. "Problems pertaining to RFI should be directed to our service manager, Mr. Philip Fenner, P. O. Box 664, 14304 N.E. 193rd Pl., Woodinville, WA 98072, tel. 206-487-3483."

Conn Keyboards, Inc. (C)

RFI complaints should be referred to the local Conn dealer, whether instrument is in or out of warranty. Factory assistance is available to the dealers who are unable to correct the RFI. RFI problems encountered within the term of instrument warranty are usually corrected by the selling dealer without cost to the organ owner. Contact Mr. Thomas A. Umbaugh, National Service Manager, 350 Randy Rd., Carol Stream, IL 60187, tel. 312-653-4330.

Crown International (N)

"Crown International is the manufacturer of high-end audio products. RFI suppression is incorporated in the design of the product. If a customer should encounter an RFI problem, he may contact the Technical Services Department of Crown International, 1718 W. Mishawaka Rd., Elkhart, IN 46517."

Symbols

(N)	New listing as contributed by manufacturer.
(C)	Item includes changes as reported by manufacturer or corporate representative.
(NC)	No change from February 1978 listing, supported by direct reference to manufacturer.

*ARRL TA, 3908 Lake Blvd., Annandale, VA 22003

[1]Notes appear on page 50.

Curtis Mathes (C)

Curtis Mathes products include color TVs and stereos (100% solid state) in portable, console and combination configurations. Customer complaints involving RFI should first be resolved at the retail-dealer level. If not satisfied, then the complaint should be made in writing to the Consumer Relations Department giving all details of the problem, along with the model information, serial number, date of sale, dealer and service history. Each complaint will be handled individually. Write to Curtis Mathes Manufacturing Co., Curtis Mathes Pkwy., Athens, TX 75751, tel. 800-527-7646, Texas only tel. 800-492-9543.

Delco Electronics, Division of GM Corporation (see GM Corp.)

Dumont (see Emerson Quiet/Kool Corp.)

Electra Company, Division of Masco Corporation of Indiana (N)

Electra Co. asks that RFI problems with "Bearcat," its automatic scanning radio, be referred to its service department at 300 E. County Line Rd., Cumberland, IN 46229, tel. 317-844-1440.

Emerson Quiet/Kool Company (C)

Mr. Jerome Roth reports that his company has not made TVs or audio devices since 1972. As a continuing gesture of goodwill, however, Mr. Roth suggests that customers may refer RFI problems with equipment previously marketed by Emerson Quiet/Kool Co. to him for recommendations, at the mailing address below. *Do not confuse* this company with Emerson Radio Corp., which is an entirely different publicly owned corporation. Contact Emerson Quiet/Kool Co., P. O. Box 300, Woodbridge, NJ 07095, tel. 201-381-7000.

Emerson Radio Corporation (N)

Customers may refer RFI inquiries related to Emerson Radio Corp. TV and radio problems to Mr. Dave Buda. Emerson Radio does not supply filters. The new address is: Emerson Radio Corp., One Emerson Way, Secaucus, NJ 07094, tel. 201-865-4343.

Epicure Products, formerly Elpa Marketing Industries, Inc. (C)

"Complaints are handled with respect to parts and labor on an individual basis. Necessary modifications for RFI are made on a no-charge basis for parts and labor during the term of instrument warranty. Beyond warranty, modification parts are available free of charge. The customer then pays for labor involved in the installation of the parts. Refer RFI problems to Mr. John E. King, National Service Manager, 25 Hale St., Newburyport, MA 01950, tel. 800-225-7932."

Fisher Corporation (NC)

Fisher Corporation asks that RFI problems involving a Fisher product be handled as follows: request assistance from the local selling dealer or request assistance from the local Fisher authorized service station (a list is packed with every Fisher unit). Contact with local Fisher agencies is the preferred method of handling. Fisher's service coordination group maintains close communications with Fisher authorized service stations and Fisher's Engineering Department, and works under the supervision of the office of the National Service Manager. If the problem cannot be solved at the first two service levels, contact Service Coordination, 21314 Lassen St., Chatsworth, CA 91311, tel. 213-998-7322.

Garrard/Plessey Consumer Products (C)

Garrard advises the consumer on methods that may eliminate RFI. In unusual cases where the suggestions are ineffectual, customers should refer the RFI problem to Mr. Al Praneckevicus, National Service Manager, 85 Sherwood Ave., Farmingdale, NY 11735, tel. 516-293-2400.

General Electric Company (C)

RFI problems involving G.E. television receivers should be referred to the nearest General Electric Customer Care Service Operation. If G. E. Customer Care Service is unable to correct the RFI, the customer should refer the problem to General Electric Co., Mr. J. F. Hopwood, Manager of Consumer Affairs, Appliance Park, Louisville, KY 40225, tel. 502-452-3754. All RFI problems involving G. E. radios, record players and other audio products should be referred to Manager of Consumer Counseling, Mrs. Patricia C. Cleary, Electronics Park, Bldg. 5, Syracuse, NY 13221, tel. 315-456-3388.

General Motors Corporation (N)

"From time to time you may have questions concerning the electromagnetic compatibility of mobile transmitters when installed on General Motors vehicles. To help avoid such questions from arising, it is urged that care be taken to follow any applicable GM service procedures. The local GM Service Manager for the Car or Truck Division whose vehicle is involved should be contacted for information about such service procedures. If you are unable to obtain such assistance locally or if questions nevertheless arise, we have established a central contact point for all such inquiries. Accordingly, you should direct your inquiries to: Mr. Henry J. Lambertz, GM Service Research (GMSR), Service Development Center, 30501 Van Dyke, Warren, MI 48090, tel. 313-492-8448. He will direct your inquiries to the appropriate divisions or staff within GM and follow up to see that appropriate action is taken."

Gulbransen, Division of CBS Musical Instruments, Inc. (C)

Gulbransen cooperates with dealers and customers in offering suggested solutions to RFI. Gulbransen does not reimburse the consumer for servicing. When extreme cases are encountered because of the proximity of the transmitter and relative power, however, the dealer may sometimes absorb the cost of servicing RFI problems. Customers should refer RFI problems to the local dealer. Inquiries may be directed to Mr. J. A. Jacono, Consumer Service Supervisor, 100 Wilmot Rd., Deerfield, IL 60015, tel. 800-323-1814.

Hammond Organ Company (C)

"RFI difficulties are usually handled by the local Hammond dealer service technician. Hammond maintains a staff of technical service representatives who travel in the field and may be called upon to assist local dealer technicians with difficult or unusual service problems, including RFI." Hammond states that the services of the Engineering and Technical Field Service Departments under its control are provided to consumer and dealer without charge. RFI problems should be referred to the local Hammond dealer. Inquiries may be directed to the Hammond Technical Service Department, 4200 W. Diversey Ave., Chicago, IL 60639, Attention: Jerry J. Welch.

Harman/Kardon, Inc. (C)

RFI problems should be directed to Harman/Kardon at 240 Crossways Park West, Woodbury, NY 11797, tel. 516-496-3406, Attention: Customer Relations Dept.

Heath Company (C)

Heath Co. suggests that, for fastest service on matters related to RFI regardless of the product line involved, customers may now reach the Technical Consultation Department by either writing directly to that department at Heath Co., Benton Harbor, MI 49022, or by using a new direct-line telephone system to the department by calling 616-982-3302. Do not write to an individual.

Hitachi Sales Corporation of America (C)

"Our primary products are TVs, radios, tape recorders, hi-fi components and video tape recorders. Hitachi Sales Corp. of America attempts to cure each RFI problem on an individual basis. Customers should provide model number and information concerning the nature of the problem. RFI problems should be referred to the nearest Hitachi Regional Office." *Eastern Regional Office*, 1200 Wall St. West, Lyndhurst, NJ 07071, tel. 201-935-8980, Attention: Service Dept. *Mid-Western Regional Office*, 1400 Morse Ave., Elk Grove Village, IL 60007, tel. 312-593-1550, Attention: Service Dept. *Western Regional Office*, 612 Walnut, Compton, CA 90220, tel. 213-537-8383, Attention: Service Dept. *Southern Regional Office*, 510 Plaza Dr., College Park, GA 30349, tel. 404-763-0360, Attention: Service Dept.

J. C. Penney Company, Inc. (NC)

J. C. Penney Company asks that customers with RFI problems contact their nearest J. C. Penney store for personal assistance. J. C. Penney Company, Inc., 1301 Avenue of the Americas, New York, NY 10019.

Kenwood Electronics, Inc. (C)

Kenwood asks that customers with RFI problems take the affected unit to an authorized service center where an adjustment will be made at no cost to the customer if the product is properly registered with Kenwood and is within warranty. It is suggested that prior authorization for the return be obtained from Mr. Toshi Furutsuki, 1315 E. Watsoncenter Rd., Carson, CA 90745, tel. 213-518-1700.

Lafayette Radio Electronics Corporation (C)

"Customers should refer RFI problems involving Lafayette products to the local dealer. If the dealer cannot alleviate the problem, the customer may contact Mr. Charles Tanner, Vice President Administration, 111 Jericho Tpk., Syosset, NY 11791, tel. 516-921-7700."

Lowrey Division of Norlin Music, Inc. (C)

"Lowrey customers should refer RFI problems to the local Lowrey dealer or certified Lowrey technician. Lowrey provides all technicians with technical literature regarding RFI and will provide assistance to local service organizations through its staff of field technical representatives when needed. Inquiries may be directed to Mr. Larry R. Thomas, Director of Product Service, 707

Lake Cook Rd., Deerfield, IL 60015."

Magnavox Consumer Electronics Company (C)

"RFI problems are usually handled by the local Magnavox Authorized Service Center. Technical assistance in resolving such problems is provided by the Magnavox Field Service Staff through four Area Service Offices. Technicians or customers may refer unusual RFI problems involving Magnavox products to their nearest Area Service Center." In the *New York area* contact Magnavox Consumer Electronics Co., 161 E. Union Ave., East Rutherford, NJ 07073. In the *Chicago area* contact Magnavox Consumer Electronics Co., 7510 Frontage Rd., Skokie, IL 60077. In the *Atlanta area* contact Magnavox Consumer Electronics Co., 1898 Leland Dr., Marietta, GA 30067. In the *Los Angeles area* contact Magnavox Consumer Electronics Co., 2645 Maricopa St., Torrance, CA 90503.

Marantz (see Superscope)

McIntosh Laboratory, Inc. (C)

"McIntosh has a number of authorized service agencies located throughout the country. Customers will be assisted to receive prompt help. RFI and other service-related problems can be directed to Mr. John Behory, Customer Service Manager, 2 Chambers St., Binghamton, NY 13903, tel. 607-723-3512."

MGA Mitsubishi Electric Sales America, Inc. (C)

MGA is the new sales and service representative for the Mitsubishi Electric Corp. RFI reports from the field, beyond the dealer's capability to resolve and in which MGA becomes involved, are handled on an individual basis, as in the past. "All attempts will be made to give customer satisfaction." MGA suggests that requests for assistance be addressed to 3030 E. Victoria St., Compton, CA 90221, or the Service Department may be contacted by telephone, toll free, at 800-421-1132. Mr. Ken Kratka is the new National Service Manager.

Midland International Corporation (C)

Midland policy remains the same. If any RFI problems are encountered with Midland portable black-and-white and color TVs or audio and radio products, individuals should contact Mr. Dennis Oyer, Vice President Customer Service, P. O. Box 1903, Kansas City, MO 64141, or at 1690 N. Topping, Kansas City, MO 64120, tel. 816-241-8500.

Montgomery Ward (C)

Service for RFI should be obtained from the nearest Montgomery Ward location. If service is not obtainable locally, the customer may write to: Customer Service Product Manager, Corporate Offices, Montgomery Ward Plaza 4-N, Chicago, IL 60671. The Montgomery Ward field service organization can call upon factory and corporate engineering talent for assistance in handling difficult RFI problems.

Morse Electro Products Corporation (C)

"RFI complaints related to Morse entertainment products may be referred to Mr. Phillip Ferrara, Service and Parts Dept., 3444 Morse Dr., Dallas, TX 75221, tel. 214-337-4711 or 800-527-6422."

Nikko Audio (C)

"Nikko's line of products includes stereo receivers, tuners, amplifiers, combination preamp and main-amp pairs, tape decks and signal processors. For information and assistance with any Nikko products, inquiries should be made to Mr. Robert Fontana, National Service Manager, Service Dept., 320 Oser Ave., Hauppauge, NY 11787, tel. 516-231-8181."

North American Phillips Corporation

This corporation no longer manufactures its own RFI-prone products. (See Sylvania.)

Nutone Division (C)

"Refer RFI problems to Mr. Norman W. Aims, Field Service, Scovil Housing Products Group, Madison and Red Bank Rds., Cincinnati, OH 45227, tel. 513-527-5415."

Panasonic Company (C)

When instances of RFI occur, the customer should contact Panasonic at the following address: Panasonic Co., Division of Matsushita Electric Corp. of America, One Panasonic Way, Secaucus, NJ 07094, Attention: Supervisor of Quality Assurance Group, tel. 201-348-7000. The customer should provide model number, serial number and information concerning the problem. Upon review of the problem, the customer will be contacted and advised where to return the unit for corrective repair. "Panasonic will absorb both parts and labor costs in these instances."

Phase Linear Corporation (N)

"RFI problems should be directed to Phase Linear Service Dept., Rick Bernard, Service Manager, 20121 48th Ave. West, Lynnwood, WA 98036, tel. 206-774-8848. In-house articles regarding RFI cures are available upon request at no charge."

Quasar Company (Matsushita Corporation of America) (C)

For a high-pass filter, the consumer should contact Quasar Co., Consumer Relations Manager, Mr. George Datillo, 9401 W. Grand Ave., Franklin Park, IL 60131, tel. 312-451-1200. Model and serial number of the receiver and frequency of the interfering signal, if known, should be included with the written request, as well as whether sound or picture or both are affected. The Quasar distributor serving the local area should be contacted relative to any other interference problem that is unique to Quasar products.

Radio Shack (C)

"Customers who encounter unique interference problems involving Radio Shack audio products may write to Mr. Dave Garner or Mr. Al Zuckerman, Product Development Engineers, National Headquarters, 1100 One Tandy Center, Fort Worth, TX 76102, tel. 817-390-3205."

RCA Consumer Electronics (C)

"RFI problems involving both TV and audio products may be referred to Mr. J. J. Sanchez, 600 N. Sherman Dr., Indianapolis, IN 46201, tel. 317-267-6448. Requests for filters should include model number and serial number of the RCA television receiver. Filter installation charges will be the customer's responsibility."

Rodgers Organ Company, Division of CBS Musical Instruments, Inc. (C)

RFI problems involving the Rodgers Organ may be referred to Custom Organ Test Department, 1300 N. East 25th Ave., Hillsboro, OR 97223, tel. 503-648-4181.

Rotel of America, Inc. (C)

Stereo receivers, amplifiers, tuners and tape decks are made by Rotel. RFI problems should be referred to Michael Gregory, National Service Manager, 13528 S. Normandie Ave., Gardenia, CA 90249. "RFI problems will be handled according to the terms of our limited warranty."

Sansui Electronics Corporation (C)

"RFI problems should now be directed to Mr. Frank Barth, Vice President Frank Barth, Inc., 500 5th Ave., New York, NY 10110, tel. 212-398-0820. Frank Barth, Inc. is the new advertising and public relations agency representing Sansui. Mr. Barth will direct the customer to an appropriate Sansui Service Center." A Sansui representative has previously stated that all Sansui products are carefully checked prior to final engineering commitments for susceptibility to RFI. "Units are often taken to high-rf-level areas such as New York City to determine any design flaws."

Sanyo Electric, Inc. (C)

"In the event an RFI problem should occur, the customer is requested to take the set to the nearest Sanyo authorized repair station. Transportation to and from the shop is the responsibility of the customer. Should the shop not alleviate the problem, either the customer or the shop should contact Mr. Brad Coulter, Consumer Relations Manager, Sanyo Electric, Inc., Electronics Division, 1200 W. Artesia Blvd., Compton, CA 90220, tel. 213-537-5830."

Scientific Audio Electronics, Inc. (C)

"Refer RFI inquiries to Mr. Michael L. Joseph, National Marketing Manager, or contact Mr. Robert Hunt, National Service Manager, 701 E. Macy St., Los Angeles, CA 90012, tel. 213-489-7600."

H. H. Scott, Inc. (C)

This manufacturer offers a simple instruction sheet to aid customers in resolving problems involving rf pickup. The information includes suggestions about suitable equipment grounding, power-line bypassing and hints and suggestions on how to determine where rf is entering the equipment. "Customers should refer any RFI problems to Mr. D. F. Merryman, Engineering Dept., 20 Commerce Way, Woburn, MA 01801, tel. 617-933-8800."

Sears, Roebuck and Company (NC)

Sears asks that customers with an RFI problem involving a Sears product contact the nearest Sears service department for assistance. Inquiries may be directed to Mr. R. C. Good, Manager Marketing Communications, Home Appliances, Dept. 703, Sears Tower, Chicago,

IL 60684, tel. 312-875-8366.

Sharp Electronics Corporation (C)

"Sharp Electronics will, with proof of purchase, supply customers with a Drake TV-300 high-pass filter at no cost. Audio rectification problems are handled on an individual basis by the Service Department. Refer RFI problems to Service Manager, 2 Keystone Pl., Paramus, NJ 07652, tel. 201-262-9000."

Sherwood, Division of Inkel Corporation (C)

Customers with interference problems should contact Mr. David Daniels, Vice President Marketing, 17107 Kingsview Ave., Carson, CA 90746, tel. 213-515-6866.

Shure Brothers, Inc. (C)

The manufacturer recommends the use of balanced-line, low-impedance microphones and cables. If an RFI problem persists after the above measures have been taken, the customer should contact Shure Brothers, Inc. with specifics so that they may be able to help solve the problem. Refer RFI problems to Customer Services Dept., 222 Hartrey Ave., Evanston, IL 60204, tel. 312-866-2553.

Sony Corporation of America (C)

"Our primary products are color television, black-and-white television, video tape recorders, stereo equipment, audio components and word-processing equipment. RFI assistance is provided through regional service managers of Sony Factory Service Centers through the Customer Care Dept. An RFI booklet is available from the company on request. Sony Corp., 47-47 Van Dam St., Long Island City, NY 11101, tel. 212-361-8600."

Sound Concepts (N)

"We handle all RFI complaints at our main laboratories at 27 Newell Rd., Brookline, MA 02146, tel. 617-566-0110. We request that the offending unit be accompanied by a description of the nature of the RFI; there is no charge for this service."

Soundesign Corporation (C)

"Soundesign Corp./Acoustic Dynamics requests that all service problems relating to nonstereo merchandise be referred to Mr. Thomas R. Greene, Administrative Vice President, 34 Exchange Pl., Jersey City, NJ 07302, tel. 201-434-1050. All service problems on stereo merchandise are to be referred to our authorized service centers. The nearest one can be found by calling toll free in the continental U.S., 800-631-3092."

Superscope/Marantz Corporation (C)

Superscope/Marantz manufacturers a-m/fm receivers, tuners, amplifiers, tape recorders, record players and audio systems. In the event of special RFI cases resulting from extremely high fields, contact the Technical Services Dept. at Superscope corporate offices. "Modifications necessary to resolve such RFI problems are provided to customers on an individual basis." Superscope/Marantz Corp., 20525 Nordhoff St., Chatsworth, CA 91311, tel. 213-998-9333. For Service Dept., call toll free, 800-423-5224, Attention: Mr. Albert Almeida, Technical Service Manager.

Sylvania/Philco, Division of North American Phillips Corporation (C)

Sylvania policy remains as follows: "Factory field service and field engineering personnel work together to solve many of the TVI and audio rectification problems. If the consumer has an interference condition, he should contact his local dealer. He is in touch with the manufacturer's services that will help resolve it." Consumers should contact the dealer and work through his services first. RFI problems are handled on an individual basis. Sylvania has available for their technicians an excellent pictorial TVI training manual titled, *Diagnosis, Identification and Elimination of TVI.* Sylvania/Philco, Mr. Jack Berquest, Manager Service Training, Consumer Electronics Division, 700 Ellicott St., Batavia, NY 14020, tel. 716-344-5000.

Tandberg of America, Inc. (C)

When RFI occurs in Tandberg products, the manufacturer suggests that the unit be returned to them. "We will do any modification possible to eliminate the RFI." Authorization should be obtained from Mr. Tor Sivertsen prior to return of the unit. Mr. Tor Sivertsen, Technical Vice President, Labriola Ct., Armonk, NY 10504, tel. 914-273-9150.

Thomas International Electronic Organs, Division of Whirlpool Corporation (C)

"RFI is usually resolved at the dealer level. If the manufacturer's field service is made aware of a consumer complaint regarding RFI, they contact the seller and advise him on how to eliminate the problem." Thomas has six field service engineers. In the event of a call for assistance, an engineer personally contacts the consumer by telephone and makes an appointment to visit the home of the consumer to correct the RFI condition, with or without the dealer's technician. "We do not charge the consumer for this service." Refer RFI complaints to the dealer. Inquiries may be directed to Mr. Daniel E. Hofer, Manager Field Service, 7300 Lehigh Ave., Chicago, IL 60648, tel. 312-647-8700 or 800-323-4301.

Toshiba America, Inc. (C)

Customers should contact the nearest regional office, an updated listing of which appears below, for obtaining assistance in solving RFI problems involving Toshiba televisions, radios, tape products, amplifiers, tuners and receivers. Mr. Stanley Friedman, National Service Manager, 82 Totowa Rd., Wayne, NJ 07470, tel. 201-628-8000. Mr. Sy Rosenthal, *Eastern Regional* Service Manager, 82 Totowa Rd., Wayne, NJ 07470, tel. 201-628-8000. Mr. Ray Holich, *Mid-West Regional* Service Manager, 2900 MacArthur Blvd., Northbrook, IL 60062, tel. 312-564-5110. Mr. C. B. Monroe, *Southwest Regional* Service Manager, 3300 Royalty Row, Irving, TX 75062, tel. 214-438-5814. Mr. S. Ito, *Western Regional* Service Manager, 19515 S. Vermont Ave., Torrance, CA 90502, tel. 213-538-9960.

U.S. JVC Corporation (C)

"Inquiries related to RFI involving JVC products may be referred to Mr. T. Sadato, Chief Engineer, 41 Slater Dr., Elmwood, NJ 07407, tel. 800-526-5308."

U.S. Pioneer Electronics Corporation (C)

"Contact: Mr. Andrew Adler, *Eastern Region,* 75 Oxford Dr., Moonachie, NJ 07074; Mr. John Noa, *Southern Region,* 1875 Walnut Hill Ln., Irving TX 75062; Mr. Clarence Skroch, *Western Region,* 4880 W. Rosecrans Ave., Hawthorne, CA 90250; Mr. Daniel Brostoff, *Mid-West Region,* 737 Fargo Ave., Elk Grove Village, IL 60007."

Wells-Gardner Electronics Corporation (C)

"Wells-Gardner is a private-label manufacturer of consumer products. Inquiries related to RFI should be referred to our private-label customers whose address appears on the model-number label attached to the product. Special problems which may be encountered by private-label customers are usually referred to Wells-Gardner, Mr. Harry McComb, Service Manager, 2701 N. Kildare Ave., Chicago, IL 60639, tel. 312-252-8220."

Wurlitzer Company (C)

"The Wurlitzer Company makes available a toll-free telephone line, 800-435-2930, to assist any technician or customer in any and all needs pertaining to the Wurlitzer product. The Wurlitzer company maintains a staff of field service managers who can assist should an RFI problem arise." Wurlitzer Co., 403 E. Gurler Rd., DeKalb, IL 60015.

Yamaha International Corporation (C)

The Yamaha organization attempts to cure each RFI problem on an individual basis. Yamaha supplies all necessary technical information at no charge. If interference is caused by design error, Yamaha takes steps at its own expense to remedy the problem. Refer RFI problems to the local dealer. The dealers are kept well informed and current on RFI countermeasures. Inquiries may be directed to Mr. William Perkins, Electronic Service Manager, Electronic Service Dept., P. O. Box 6600, Buena Park, CA 90622, tel. 714-522-9351.

Zenith Radio Corporation (C)

"Zenith gives consideration to handling and providing relief for RFI problems on a case-by-case basis. RFI problems should be referred to Service Division, 11000 W. Seymour Ave., Franklin Park, IL 60131, tel. 312-671-7550. RFI referrals should include model and serial numbers of the affected unit. Customers with a unique, difficult problem may direct a letter to Mr. Richard Wilson, National Service Manager, at the same address."

Other Manufacturers

Ms. Sally Browne, Director of Consumer Affairs, Consumer Electronics Group, Electronic Industries Association, 2001 Eye St., N.W., Washington, DC 20006, tel. 202-457-4900, may be contacted for assistance or recommendations in the handling of RFI problems involving manufacturers not listed here, or for assistance when the product is no longer manufactured.

Notes

[1]Richman, "RFI Assistance List," *QST*, February 1978, p. 43.

[2]Lowry, et al., *Radio Frequency Interference*, ARRL, 1978.

The author is a former FCC Engineer in Charge and is well versed on the subject of RFI. Hal is a member of the ARRL RFI Task Group, and has presented numerous papers on RFI and RFI correction at club meetings, seminars and technical symposia. He was also the recipient of the ARRL Roanoke Division Service Award. His special efforts have been recognized by the ARRL and the FCC, which included Richman's original RFI assistance list in its RFI publication, How to Identify and Resolve Radio-TV Interference Problems.

Orlando Rendezvous

After fallen roofs, WARC anxiety, searing heat, WARC jubilation, volcanic show and blizzard — a Board Meeting that catches up on "housekeeping" in pleasant Florida spring weather.

By Perry Williams,* W1UED

Perhaps the most remarkable thing about the ARRL Board of Directors Annual Meeting, held March 11 and 12, 1981 at the Howard Johnson's Hotel-Florida Center, in Orlando, was its lack of remarkability. Oh, much was accomplished at the meeting — the minutes run 129 paragraphs — but in contrast to several of its predecessors it was not a Headline Happening. Rather, the Board was able, finally, to turn its attention to "housekeeping" — to fine tuning of the corporate machine, to ensure its control by the members, to keep it running smoothly. More on that, later.

The toughest decision the Board had to make has already been reported, in the editorial for April *QST*: the decision to raise the dues to a new rate of $25 per year (which becomes effective July 1). Getting that editorial into the April issue was a story in itself. At its meeting February 5 and 6, the Management and Finance Committee knew it had to seek the dues increase at the March meeting; quoting from its report: "Deliberations included consideration of the continuing inflation, increasing air fares, hotel and room rates, printing, postage, gasoline, . . . adjustments in salaries to retain and attract a competent staff . . . the probable need for additional revenue . . ."

Knowing that the M&F committee would make the recommendation, the Editor prepared in advance, so he could give notice to members at the earliest possible time, should the measure receive the 12 votes (of 16) needed for a By-Law change. The printer was warned that the editorial and table of contents pages would be late; overtime was authorized to cope. An alternative editorial of timeless nature was prepared should the dues increase be postponed or fail to pass.

And the difficult time was still ahead: each director had to study the facts, ask questions — and make his or her own decision. It happened at Minute 34 as recorded in "Moved and Seconded," which follows this article. A new By-Law was written, too, setting the dues of Full Members over 65 at 80% of normal. Affiliated clubs acting as ARRL's agents in accepting and forwarding membership dues may retain (for their own treasury) $2 after July 1, compared to $1.50 at present. A motion to raise Family Member dues (without *QST*) from the present $2 to $4 was defeated, 8 to 8 (see Minute 127). Members may sign up for three years in advance, buy Life Membership at $450 or enroll in a "Life Quarterly" plan (eight payments over two years leading to Life Membership) at current rates if they act before July 1. Meanwhile, readers missing the April editorial might wish to look it up for its insights into the "why" of the increase.

Regulatory, Legal and Legislative Matters

Turning away from internal affairs for a moment, the Board unanimously adopted a policy toward PR Docket 80-729, FCC's Notice of Proposed Rulemaking leading to "plain language" rules for amateurs. Beginning with the statement that, ". . . radio amateurs have proven themselves capable of understanding (and obeying) the rules for the Amateur Service as they are presently

*Washington Area Coordinator, ARRL

Committee Work

Not everything could be finished during the meeting. Here's a sampling of the many matters that were assigned to committees for study:

☐ Should FCC be asked to allow General class licensees to use 3825 to 4000 kHz? (Plans and Programs Committee)

☐ Should free services continue to be furnished to nonmembers and nonaffiliated clubs? (Membership Affairs Committee)

☐ Should there be an "Emergency Operating Fund" at Headquarters, receiving contributions that could be used to reimburse amateurs incurring special expenses during emergency communications episodes? (Membership Affairs and Emergency Communications Advisory Committees)

☐ Should the insurance administrator's offering of club liability and legal reimbursement insurance be adopted? (Management and Finance Committee)

☐ Should there be changes in DXCC awards for single-mode operation? (DX Advisory Committee)

☐ How can the bulletin service to members, offered by W1AW and certain volunteer stations, be improved? (Membership Affairs Committee)

☐ What standards should the Amateur Radio community adopt for handling digital communications? (Special "Ad Hoc" committee to be nominated by President Dannals)

☐ Should there be an official ARRL windbreaker available for purchase by members? (Membership Affairs Committee)

☐ What should be done about regional differences in "split channels" on the 2-meter band? (Plans and Programs Committee)

☐ How can amateurs deal with interference caused by scanners? (RFI Task Group)

Do *you* have answers? Write the Committee Chairman with your suggestions.

Participants in the 1981 Annual Meeting of the ARRL Board of Directors enjoyed Florida sunshine along with many hours of discussion, both formal and informal. Left to right, front row, are: K5DPG, W7QGP, W9PRN, W1HHR, WØFIR, K2SJO, W2HD, W1RU, WØBWJ, VE3CJ, W4UG, VE3OT, KØGA and W8RC. Second row: N2YL, W4WYR, K7AOZ, W1QV, WØBUO, K9EN, W4RA, K1LLU, W5EDZ, WØJCP, W1FB, W4KFC, WB6UIA, W8AP and W3KT. Third row: W6ZM, WA4GLS, N3AKD, W1UED, N5TC, AGØX, W1XX, W4RH, W3ABC, N4MM, K1ZZ, KØPGM, KØTO, K1PAD, VE2VW and W6EJJ.

written," the policy goes on to say that the League does not desire "to oppose legitimate attempts to improve and strengthen . . . the amateur rules." It will therefore concentrate on the substance of the Docket. A few areas of concern already identified include the "Basis and Purpose" section, which seems to be restated in a way which reduces the traditional scope of the service; the deletion of any specific references in the proposed rules to net operation; and an apparent error in Proposed Rule 30 regarding permitted antenna heights. Comments on the rules from ARRL officials and members will be collected at Hq. The League will seek a meeting between FCC and ARRL under the "ex parte" rules to explain its findings, and then file comments offering, where appropriate, constructive alternatives to the Commission proposals. (Details at Minute 77).

A controversial ARRL decision of last summer, under which ARRL would have petitioned FCC for a phone "DX window" on 40 meters, was put on hold pending review by the Plans and Programs Committee (Minute 91). A controversial FCC action will be brought back to the Commission as ARRL seeks (Minute 67) issuance of club licenses to amateur groups not presently holding one. (Those clubs which presently have licenses in their own name may renew them and may change trustees as may be necessary, under current rules.) Some perceived breaches of hospitality by amateurs operating here with reciprocal operating permits — occasionally compounded by language barriers — has led to a decision at Minute 92 in which the League will ask that reciprocal operator privileges not include the handling of international third-party traffic. During debate it was clear that the Board welcomes visiting amateurs to our shores and wants them to have a full range of operating modes and frequencies on which to chat with us. Abuses of the phone patch in particular, however, had become an obvious problem, which this action could help solve. ARRL is to continue efforts toward full privileges in the 1.8- to 2.0-MHz band, now that the U.S. has stopped operating Loran in the 160-meter band (Minute 108). On the local legal scene, the Board has called for prompt production of revised kits, one for laymen, one for attorneys, which reflect recent court decisions (Minute 104). Finally, ARRL directors publicly thank Representative William E. Dannemeyer, R-California of Fullerton, for introducing HR 2203, Minute 126. This bill would allow FCC to use volunteers in its licensing and enforcement processes and provide for an exception to the Secrecy Clause (Section 605 of the Communications Act) so that amateurs may work together at solving interference problems. The Board also urged members of ARRL to write to their representatives in support. See "Happenings," April 1981 *QST*, for more information, including a list of subcommittee members who must first approve the bill.

International Affairs

Moving on to international affairs, the Board at Minute 58 encourages observance of the voluntary band plan adopted by the 1980 Region 2 Conference of the International Amateur Radio Union (IARU) for the new 10.1- to 10.150-MHz band. When that band becomes available — we hope at the beginning of 1982 — IARU calls for F1 emissions such as Teletype to use the upper edge, 10.140 to 10.150 MHz. Another policy of IARU toward that band was adopted by ARRL at Minute 66: Contest operation and operating awards credits will not be encouraged in the new 10.1- to 10.15-MHz band as long as amateur use of this band is on a secondary shared basis. A third policy concerns adherence to principles of phone patch operation adopted by the IARU group (Minute 71). Actually, most of these policies are contained in the League's free pamphlet, "Autopatch and Phone Patch Use — ARRL Guidelines," which can be obtained upon request accompanied by an s.a.s.e. And the Board endorsed, at Minute 73, the proposal to designate April 25 as International Amateur Radio Day. The idea came from the Liga dos Amadores Brasileiros de Radio Emissao, IARU Member Society for Brazil, which chose the date to commemorate the founding of IARU on April 25, 1925.

General Actions

The amateur satellite program got another boost from the Board at Minute 82; the ARRL Foundation will receive an additional matching fund up to $10,000 to support construction of Phase III spacecraft. ARRL will join other organizations around the world in recognizing the International Year of the Disabled Person. The resolution at Minute 60 also notes that while Amateur Radio is valuable to disabled people, disabled amateurs are of great utility to the amateur service, often being the available operators for emergency messages and for daytime net control spots. A pamphlet will be prepared for potential *QST* authors, of both technical and general material, explaining deadlines, corrections and alterations and the like (Minute 57). ARRL and its QSL Bureaus, outgoing and incoming, will encourage use of QSL cards at least 2-3/4 in. high but not taller than 4-1/4 in.; at least 4-3/4 in. wide but not broader than 6-1/4 in. Metric ranges are 7 to 11 cm high by 12

to 16 cm wide (Minute 84); odd sizes are difficult to handle in the Bureau. There will be a new Hq. slide collection available to affiliated clubs by July 1 (Minute 95), and assistant directors and public information assistants will soon be able to buy pale blue ARRL pins designating their office (Minute 96).

League Affairs

Back to the organizational matters: After the ARRL elections last autumn, during which some weaknesses in the process became apparent, the President appointed a special Ad Hoc Committee on Ethics charged with three tasks — to develop an orientation program for new directors, to examine the conduct of elections and make recommendation for change, and to suggest standards of ethical conduct for directors and officers. Vice President Larry Price, W4RA, was appointed chairman; he and General Manager Baldwin were the only members of the committee presently serving on the Board. Others were Past Director Richard Egbert, W8ETU; Past General Manager John Huntoon, W1RW; and Past Vice Director John Sanders, WB4ANX.

Committee recommendations on control of mailing lists and preparation of ballot material were adopted by the Board at Minute 14. It is expressly agreed by all candidates that the determination of the Executive Committee as to eligibility can be appealed only to the full Board; each candidate will sign a covenant not to sue. The biographical sketch for each candidate will be provided by that candidate in 300 words or less; it will not mention any other person by name or inference; and it will be printed separately from the ballot, without editing as to content.

Standing Committees

Membership Affairs Committee — Mr. Sullivan, Chairman; Mrs. Lewis, Mr. Nathanson, Mr. Carey, Mr. Price. *Plans and Programs Committee* — Mr. Bieberman, Chairman; Mr. Oubre, Mr. Milius, Mr. Holladay, Mr. Smith. *Management & Finance Committee* — Mr. Wangler, Chairman; Mr. Metzger, Mr. Grauer, Mr. Butler, Mr. Arnold. *The Executive Committee:* President Dannals, Vice President Smith, General Manager Baldwin; Directors Anderson, Powell, Stevens and Zak.

A new booklet, just for director and vice director elections, will be prepared, to include rules for use of mailing lists and mailing permits and suggestions for ethical conduct (Minute 15). A summary of guidelines will also be placed in the "Directors' Workbook" (Minute 16). Article 11 was amended at Minute 17, removing the "laundry list" of occupations which might make one ineligible for membership on the Board, and substituting a clear statement on conflict-of-interest: "No person shall be eligible . . . whose business connections are of such a nature that he could gain financially, through the shaping of the affairs of the League . . ." The directors also voted for the first time to install procedures for recall of a director, amending Article 7 and adopting a new By-Law to accomplish this (Minutes 18 and 20). Finally the Board changed the deadline for nominations, from September 10 to September 1, to allow more time for the candidates to prepare ballot information (Minute 21).

But that wasn't quite the end of the "housekeeping" actions: More came from another Ad Hoc group, the Committee on Committees comprised of chairmen of each Standing Committee with Vice President Arnold as chairman. On its recommendation, the Board cut the number of Standing Committees from five to three, keeping Management and Finance, Membership Affairs and Plans and Programs. The work of the International Affairs Committee was transferred to the Vice President for International Affairs, and the tasks of the Legal and Regulatory Committee were specified as duties of the Executive Committee. The membership of each standing committee was set at four directors and one vice president; directors serving on the Executive Committee will not be eligible for a standing committee. And By-Law 39 was amended to make it clear that the Articles and By-Laws apply equally to men and women (Minutes 22 through 27). Other motions made the Treasurer a member of the Board without vote; changed the Board meetings from January and July to March/April and September/October with flexibility to accommodate religious holidays; and provided that, in the future, every director making a motion for a program would have to furnish an estimate of its cost and suggest ways of funding. Directors Anderson, Stevens and Zak were reelected to the Executive Committee; Canadian Director Powell was newly chosen for that group. Honorary Vice President Chapman was elected a "public" director of the ARRL Foundation; the League directors elected to its Board are Messrs. Metzger, Grauer and Holladay.

These are mere highlights: please continue on to "Moved and Seconded" for digests of officer reports and full texts of motions. QST

Moved and Seconded

MINUTES OF THE 1981 ANNUAL MEETING
OF THE BOARD OF DIRECTORS
THE AMERICAN RADIO RELAY LEAGUE, INC.
March 11-12, 1981

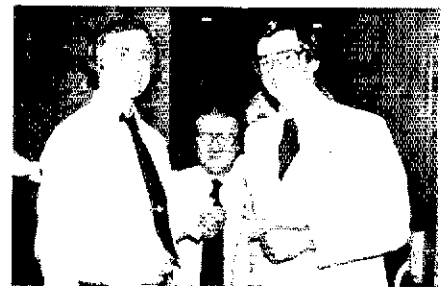
1) Pursuant to due notice, the Board of Directors of the American Radio Relay League, Inc., met in annual session at the Howard Johnson's Hotel, Florida Center, Orlando, Florida on March 11, 1981. The meeting was called to order at 9:30 A.M. with President Harry J. Dannals, W2HD, in the Chair, and the following directors present: Garfield A. Anderson, KØGA, Dakota Division; Jesse Bieberman, W3KT, Atlantic Division; Frank M. Butler, Jr., W4RH, Southeastern Division; Lys J. Carey, KØPGM, Rocky Mountain Division; Paul Grauer, WØFIR, Midwest Division; Jay A. Holladay, W6FEI, Southwestern Division; Mary E. Lewis, W7QGP, Northwestern Division; Edmond A. Metzger, W9PRN, Central Division; Gay E. Milius, Jr., W4UG, Roanoke Division; Leonard M. Nathanson, W8RC, Great Lakes Division; Lionel A. Oubre, K5DPG, Delta Division; A. Mitchell Powell, VE3OT, Canadian Division; William J. Stevens, W6ZM, Pacific Division; John C. Sullivan, W1HHR, New England Division; Raymond B. Wangler, W5EDZ, West Gulf Division; Stan Zak, K2SJO, Hudson Division.

Also in attendance, as members of the Board without vote, were Carl L. Smith, WØBWJ, First Vice President; Larry E. Price, W4RA, Vice President; Noel B. Eaton, VE3CJ, International Affairs Vice President; and Richard L. Baldwin, W1RU, General Manager. Also in attendance, at the invitation of the Board as non-participating observers, were the following vice directors: Richard P. Beebe, K1PAD, New England Division; Thomas W. Comstock, N5TC, West Gulf Division; Claire Richard Dyas, WØJCP, Midwest Division; Kenneth A. Ebneter, K9EN, Central Division; Mel C. Ellis, K7AOZ, Northwestern Division; Linda S. Ferdinand, N2YL, Hudson Division; Evelyn Gauzens, W4WYR, Southeastern Division; George B. Goldstone, W8AP, Great Lakes Division; John C. Kanode, N4MM, Roanoke Division; O. D. Keaton, WA4GLS, Delta Division; Peter F. Matthews, WB6UIA, Southwestern Division; Fod Olson, KØTO, Dakota Division; Marshall Quat, AGØX, Rocky Mountain Division; and Hugh A. Turnbull, W3ABC, Atlantic Division. There were also present Honorary Vice Presidents Robert York Chapman, W1QV, Victor C. Clark, W4KFC, and Charles Compton, WØBUO; Treasurer James E. McCobb, Jr., K1LLU; Canadian Counsel B. Robert Benson, QC, VE2VW; Chris Imlay, N3AKD, assistant to General Counsel Booth; Assistant General Manager David Sumner, K1ZZ; Technical Department Manager Doug DeMaw, W1FB; Communications Department Manager John F. Lindholm, W1XX; and Washington Area Coordinator Perry F. Williams, W1UED.

2) The assembly observed a moment of silence in

Caucusing — from left: WØBWJ, KØGA, AGØX, KØPGM, W8AP. Back to camera: W8RC.

"My point is . . .": W6EJJ, observed by K5DPG.



Surrounded by Californians: W8RC overshadowed by W6EJJ (l) and WB6UIA.

recollection of Donna Hesler, VE1YX, wife of past director Ron Hesler, VE1SH; past director Franklin K. Matejka, K5RS; past director George Steed, W5BUX; and other ARRL members who had become silent keys since the July meeting of the Board.

3) The Chair welcomed new Directors Carey, Lewis, Metzger and Milius; Vice Directors Beebe, Ellis, Ferdinand, Kanode and Quiat to the meeting.

4) The Board next considered the agenda for the meeting. On motion of Mr. Sullivan, seconded by Mr. Powell, it was unanimously VOTED that agenda item 6n, Committee on Director Election Ethics be made item 6a; that item 6m, Committee on Committees be made agenda item 6b; and that the remainder of the matters in item 6 be relettered accordingly. On motion of Mr. Powell, seconded by Mr. Holladay, it was unanimously VOTED that the report of the CRRL President be listed as item 5h on the agenda.

5) On motion of Mr. Anderson, seconded by Mr. Butler, it was unanimously VOTED that the Minutes of the 1980 Second meeting of the Board of Directors are approved in the form in which they were issued by the Secretary.

6) Reports of the officers were presented here. The President orally highlighted certain sections of his written report. An important activity of the League during the past year has been the work of the Long Range Planning Committee. Hundreds of radio amateurs corresponded with the LRPC and provided input, some of which was directly associated with the particular specialty interests of the contributor. There are so many distinctive interest groups with so many variations that it is always difficult to address an entire subject adequately. This point has for years plagued the editors of *QST* because our journal must be representative of the members' interests! The first report of the LRPC at this meeting will provide many subjects for Board action; the program of long-range planning is an ongoing one which must be continued in active form. The League is many faceted, functioning as a service organization, a representative of Amateur Radio, and above all it belongs to its members. The President also summarized his comments from the written report on the economic condition of the League; on Amateur Radio in space; the affairs of the International Amateur Radio Union; and our contact work in and around Washington, DC, including work on Capitol Hill by our two registered lobbyists, General Manager Baldwin and Washington Area Coordinator Williams. Conditions on the bands, wise use of spectrum, a growth rate for the amateur service which does not endanger its traditions, and the extreme importance of the work done by volunteers within ARRL were also highlighted in the President's remarks.

7) On motion of Mr. Smith, seconded by Mr. Price, it was unanimously VOTED at 10:06 A.M. that the Board resolve itself into a Committee of the Whole for the purpose of discussing legal matters. At the request of the Chair, those present who were not directors or officers left the room. At 11:21 A.M. the Committee arose and reported to the Board. The assembly then was in recess until 11:37 A.M., at which time staff members and observers returned to the meeting. On motion of Mr. Sullivan, seconded by Mr. Nathanson, unanimously VOTED that the report of the Committee of the Whole is accepted.

8) First Vice President Smith presented his written report, highlighting orally the problem of interference, as it is being addressed by the Interference Task Force, as being of major importance to all amateurs individually and collectively. Among tasks it has begun to perform are the development of effective leadership at the local level, increased liaison between designated ARRL personnel and the Washington, DC, office of the Federal Communications Commission, and educational program updating material of the Club & Training Department and correcting misunderstandings about the nature of the work which can be performed by FCC field offices. The written report also touched on committee assignments with Plans & Programs, transfer of the RFI Task Group assignment to Vice Director Turnbull, communications between members, directors and staff, International Amateur Radio Union affairs, the results of WARC-79 and the importance of the Intruder Watch program. Vice President Price in presenting his written report called attention to the sections on the Long Range Planning Committee, the Ad Hoc Committee on Ethics, and some thoughts on the financial future of the League. The written report also covered other committee work and membership contact travel. In the absence of Vice President Arnold, his report was placed on file; it touched on committee work, travel at hamfests and conventions, and the membership survey performed for ARRL by the Florida State University with the assistance of the ARRL Long Range Planning Committee. International Affairs Vice President Eaton, who also serves as President of the International Amateur Radio Union, reported on four trips to Europe, one to Santo Domingo, one to Peru, the Region 1 Radio Direction-finding Championships in Poland and various meetings in the United States. There was also the Triennial Conference of IARU Region 2; and meetings of Study Group 8 of the International Radio Consultative Committee held in Geneva. Plans for travel in 1981 were also covered.

9) General Manager Baldwin reported that the financial results of 1980 were very good, but tempered by the fact that staff positions remained vacant and accordingly reduced services were being offered to the members. Continued high inflation would quickly erode current surpluses unless additional resources are arranged. Headquarters activities in support of IARU; postal rates, especially those outside the U.S.; a proposal from our insurance administrator; a new League display booth for conventions; and plans for the new computer, expected in house by July, were other matters reported on extensively by the General Manager. The Board was in recess for luncheon at 12:40, reassembling at 1:37 P.M. with all persons hereinbefore mentioned present.

10) Treasurer McCobb's report described a new cash management system which had been established, under which funds in excess of the day's cash requirements are automatically invested for periods as short as overnight; during 1980, yields on these investments averaged in excess of 15%. On recommendation of the League's auditor, Price Waterhouse & Co., custody and control of investment securities has been transferred to the Shawmut Bank of Boston. The Treasurer's report also told of activities within the portfolio during the year.

11) In the absence of General Counsel Booth because of illness, Chris Imlay placed his report on file. It covered budget and staff reductions at FCC, the expected closing of a number of FC Coffices, and the effects these events will have on the Amateur Service. The legislative program for 1981 has been presented to appropriate people on Capitol Hill. Representative William L. Dannemeyer, R-39th District of California, introduced the FCC volunteer bill, H.R. 2203. It would amend the Communications Act allowing the Commission to employ voluntary services for monitoring violations of the Act and for preparing and administering examinations for certain amateur operation licenses. General Counsel Booth also reported on antenna problems, some legal breakthroughs during 1980, and some serious cases which are still pending. Mr. Imlay amplified the written report with oral comment on interference to and from cable TV systems, aggravated by leaks in the cable, and the present state of the 11-meter amplifier band. Associate General Counsel for Canada Benson read a report on his activities, especially highlighting the work which led to the reduction of tariffs on Amateur Radio equipment. There was also a summary of legal activities on behalf of members in Canada.

12) ARRL Foundation President Chapman read the report of that organization, covering changes in the Board of Directors, studies of fund-raising techniques, sums pledged and received by the Foundation during the year, and its plans for the current year.

13) The report of the Canadian Radio Relay League, Incorporated, was presented by its President, Canadian Director Powell. CRRL's President represents the Canadian amateur to Government agencies and is official Canadian representative to the IARU. Government activities included meeting with the Department of Communications to discuss the outcome of the World Administrative Radio Conference, liaison with the Canadian Radio Technical Planning Board, participation in five government/industry working groups preparing for future international conferences, and development of a new syllabus for amateur examinations. Petitions had been submitted to the Government for third party traffic with Australia, for improvements to television receivers, for assignment of the 10.1-10.15 MHz band to amateurs on a primary basis in Canada, for issuance of special call signs and for authorization of repeaters on the 10-meter band. CRRL is jointly sponsoring a request by Ottawa Packet Radio Experimenters for time and space on the experimental satellite Anik-B II. Permission has been granted for the publication of *QST* articles in French to the Radio Amateurs du Quebec, Incorporated; the same organization is translating CRRL's *Licencing Manual* into that language, as well.

14) Vice President Price, as Chairman, reported on the work of the Ad Hoc Committee on Ethics. It was moved by Mr. Oubre, seconded by Mr. Nathanson, that the report of the Ad Hoc Committee on Ethics is ADOPTED by the Board and the General Manager is directed to implement the recommendations contained therein with regard to control of mailing lists and the preparation of ballot materials; a summary of those actions shall be printed in *QST*. After discussion, on motion of Mr. Nathanson, seconded by Mr. Powell, VOTED to amend the motion so that there be an addendum to page 7, paragraph B of the report, which will require each candidate for office to execute and be bound by a covenant not to sue. It is expressly agreed by all candidates that the determination of the Executive Committee as to the eligibility of that person to be a candidate shall be final and unappealable except to the full Board of Directors. Moved by Mr. Carey, seconded by Mrs. Lewis, that the matter is laid on the Table, but the motion to Table was LOST. Moved by Mr. Grauer, seconded by Mr. Sullivan, to divide the motion to consider separately mailing lists and ballot materials, but the motion to divide was LOST, 6 in favor to 10 opposed. Moved, by Mr. Bieberman, to amend the report, page 3, paragraph A, so that if any candidate requests a set of mailing labels, all other candidates for the same office be immediately notified of this request and be informed on how to also request labels, together with the cost of the same. There being no second, the motion to amend the report was LOST. Whereupon, the question being on the main motion as amended, the same was ADOPTED. Mrs. Lewis requested to be recorded as voting opposed. During the course of the above, the Board was in recess from 3:37 to 3:54 P.M.

15) On motion of Mr. Zak, seconded by Mr. Grauer, after discussion, VOTED that the General Manager is directed to prepare an informational pamphlet for candidates for director/vice director which outlines the substance of the pertinent Articles and By-Laws pertaining to the office as well as the rules for use of mailing lists, mailing permits, and sug-

gestions for ethical conduct, along the lines of the recommendations of the Ad Hoc Committee on Ethics. The pamphlet shall be reviewed by the Executive Committee prior to initial distribution. Mrs. Lewis requested to be recorded as voting opposed.

16) On motion of Mr. Milius, seconded by Mr. Nathanson, VOTED that the General Manager is directed to prepare for insertion in the Director's Workbook a summary of guidelines for ethical conduct for directors/officers consistent with the recommendations of the Ad Hoc Committee on Ethics; the guide shall be reviewed by the Management & Finance Committee prior to distribution.

17) Moved, by Mr. Anderson, seconded by Mr. Milius, that Article 11 be amended by striking the text of the second sentence and substituting therefor: "No person shall be eligible for, or hold, the office of Director, Vice Director, President or Vice President whose business connections are of such nature that he could gain financially through the shaping of the affairs of the League by the Board, or by the improper exploitation of his office for the furtherance of his own aims or those of his employer. The primary test of eligibility under this Article shall be the freedom from commercial or governmental connections of such nature that his influence in the affairs of the League could be used for his private benefit." A roll-call vote being required, the question was decided in the AFFIRMATIVE, all of the directors voting in favor.

18) Moved, by Mr. Stevens, seconded by Mr. Zak, that Article 7 be amended by the insertion of the word "recall" in the third line of the first sentence after the word "resignation." A roll-call vote being required, the question was decided in the AFFIRMATIVE; all directors voted in favor except Messrs. Carey and Gruber.

19) Moved, by Mr. Stevens, seconded by Mr. Zak, that the text of present By-Law 19 be added to By-Law 18 as the last sentence of that By-Law. A roll-call vote being required, the question was decided in the AFFIRMATIVE; all the directors voted in favor except Messrs. Bieberman and Carey.

20) Moved, by Mr. Stevens, seconded by Mr. Holladay, that a new By-Law 19 be added with the text as follows: "19. In accordance with the provisions of Article 7 of the Articles of Association, members of a territorial division may petition for recall of the director of their division. The recall petition shall be presented to the secretary not later than June 1st of the second year of the term of office. A valid petition shall contain the signatures of not less than 10 percent of the number of full members voting in the election at which

vote being required, the question was decided in the AFFIRMATIVE, with all directors voting in favor.

25) Moved, by Mr. Butler, seconded by Mr. Zak, that By-Law 32 be deleted and replaced with the following: "32. Each standing committee shall consist of at least four directors and a vice president. No elected member of the Executive Committee shall serve as a member of a standing committee. Appointments shall by made by the President and shall be for a term of 1 year. The President shall designate the chairman of the committee. Standing committees shall make written annual reports at least 30 days prior to each annual meeting of the Board of Directors. At the beginning of the term of each committee, it shall review any pending items and report to the next meeting of the Board." A roll-call vote being required, the question was decided in the AFFIRMATIVE, with all directors voting in favor.

26) Moved, by Mr. Anderson, seconded by Mr. Milius, that By-Law 36 be deleted; that By-Law 37 be renumbered as new By-Law 36; and that a new By-Law 37 be adopted as follows: "EXECUTIVE COMMITTEE 37. Pursuant to Article 6, the Executive Committee is assigned specific responsibility for: Monitoring progress of Board actions and recommendations in order to see they are expeditiously accomplished. Monitoring expenditures for legal assistance. Providing assistance to the staff and general counsel in connection with Board recommendations for petitions to the Federal Communications Commission and other governmental agencies. Evaluating for the Board proposed rule and regulatory changes." A roll-call vote being required, the question was decided in the AFFIRMATIVE, with all directors voting in favor except Mrs. Lewis.

27) Moved, by Mr. Nathanson, seconded by Mrs. Lewis, that By-Law 39 be amended by insertion of the following between the first and second sentences: "Any reference in these By-Laws to words 'he, his or him' is understood to mean 'he/she, his/her and himself/herself.' " A roll-call vote being required, the question was decided in the AFFIRMATIVE, with all directors voting in favor except Mr. Carey.

28) On motion of Mr. Anderson, seconded by Mr. Zak, unanimously VOTED that Standing Order #57 is amended by striking all after the first line and substituting, "Committees up to $6000 annually. Special Board appointed committees shall be budgeted as specifically directed by the Board of Directors."

29) On motion of Mr. Holladay, seconded by Mr. Butler, unanimously VOTED that Standing Order #53 of the Standing Orders to the Board is deleted. At 5:49

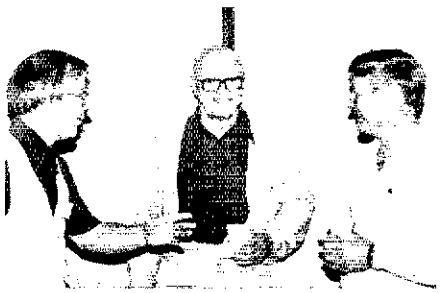
Radio Conference in Geneva. The Chairman of the Committee had been asked to attend the Region 2 Triennial Conference in Lima, Peru; he did so, and his report on that meeting is incorporated in the Committee report.

32) Mr. Holladay, as Chairman, presented the report of the Plans and Programs Committee, expressing approval of RM-3788 in which ARRL requested FCC to permit amateurs to use digital modes on frequencies above 50 MHz; suggesting that the League should provide leadership in digital and packet work; and requesting that the articles in *QST* concerning the organization of ARRL should be made into a booklet.

33) Mr. Sullivan, as Chairman, presented the report of the Membership Affairs Committee, concerning the Hall of Fame, membership application envelopes, the listing in *QST* of articles which have been accepted for the magazine but not yet published, special membership rates for handicapped amateurs, QSL bureau matters, the ARRL Technical Excellence Award and club bulletins.

34) Mr. Stevens, as Chairman, presented the report of the Management & Finance Committee. On his motion, seconded by Mr. Milius, at 8:57 P.M., the Board resolved itself into a Committee of the Whole for the purposes of discussing By-Law 4. At 11:30 P.M. the Committee arose and reported to the Board. Moved, by Mr. Stevens, seconded by Mr. Milius, that By-Law 4 be amended effective July 1, 1981, by striking "$18" and substituting therefor "$25." A roll-call vote being required, the question was decided in the AFFIRMATIVE, with all directors voting in favor except Mr. Carey. The Board recessed at 11:34 P.M., reconvening at 8:30 A.M., March 12, in the same place with all persons hereinbefore mentioned present except Mr. Clark.

35) Moved by Mr. Stevens, seconded by Mr. Smith, that By-Law 20 is amended by the following changes: 1) In the first sentence by striking the words "on the third Thursday in January" and substituting therefor "in March or April." 2) In the second sentence by striking the words "on the third Thursday in July" and substituting therefor "in September or October." 3) By adding to the third sentence a new section (3) as follows: "or (3) the exact dates to be determined annually by the Executive Committee." After discussion, on motion of Mr. Sullivan, seconded by Mr. Oubre, the motion was AMENDED by striking all after the words "sixty days previous to the date proposed for the meeting" in the proposed By-Law. The question then being on the motion as amended, a roll-call vote being required, it was decided in the AFFIR-



Light moment: W1XX, KØGA, KØTO

some parts of the U.S.

42) Mr. Olson, as liaison, delivered the report of the Contest Advisory Committee, noting that a very satisfactory working relationship existed between the Committee and the headquarters staff.

43) Mr. Kanode, as liaison, delivered the report of the DX Advisory Committee, which noted that changes in DXCC Rule 12 had been made during the year as a result of the committee's recommendations to the Communications Manager.

44) Mr. Sullivan, as liaison, reported for the Emergency Communications Advisory Committee, which is working on an updated version of the emergency coordinator's workbook.

45) Mr. Zak, as liaison, delivered the report of the Public Relations Advisory Committee. The report included several recommendations which the General Manager was asked to consider.

46) Mr. Holladay, as liaison, reported for the VHF/UHF Advisory Committee, including the pending 902-928 MHz allocation, the need for a revised 6-meter band plan, the possible need for a band plan for the 1240-1300 MHz band, and interest in a locator system to pinpoint the location of vhf stations such as is presently in use in Europe.

47) Mr. Holladay, as chairman, also delivered the report of the Amateur Satellite Service Council, in which he noted the increasingly international nature of the Amateur Satellite Program.

48) Mr. Sullivan, as Chairman, reported on behalf of the Official Availability Committee on possible candidates for the Board of Directors of the ARRL Foundation.

49) Mr. Anderson, as Chairman, delivered the report of the Interference Task Force, which noted a number of ongoing efforts to combat this serious problem.

50) Mr. Turnbull, as Chairman, reported for the RFI Task Group, which has renewed its activity in recent months.

51) Mr. Wangler, as Chairman, reported on behalf of the Ad Hoc Committee on the Biological Effects of RF Energy. The committee plans to continue its monitoring of government activity in this area and its compilation of data and technical reports which may be applicable to Amateur Radio.

52) On motion of Mr. Sullivan, seconded by Mr. Stevens, unanimously VOTED to accept the reports of the officers and directors. The Board was in recess from 10:25 to 10:51 A.M.

53) The Chair announced that the Board would now proceed to the election of four directors to the Executive Committee for the ensuing year. Messrs. Ebneter and Matthews were appointed as Tellers. Mr. Powell nominated Mr. Stevens. Mr. Metzger nominated Mr. Grauer. Mr. Anderson nominated Mr. Zak. Mr. Zak nominated Mr. Anderson. Mr. Grauer nominated Mr. Metzger. Mr. Holladay nominated Mr. Powell. Mr. Stevens nominated Mr. Milius. Mr. Grauer asked that his name be withdrawn. On motion of Mr. Sullivan, seconded by Mr. Butler, unanimously VOTED that nominations are closed. The Tellers announced the result of ballot as follows: Mr. Anderson with 14 votes, Messrs Stevens and Zak with 13 votes and Mr. Powell with 12 votes were elected. Mr. Metzger received 6 votes and Mr. Milius received 5 votes.

54) On motion of Mr. Sullivan, seconded by Mr. Butler, unanimously VOTED that Vice President Price is appointed Parliamentarian of the Board for the year 1981.

55) At this point the following Committee appointments were announced:

Membership Affairs Committee — Mr. Sullivan, Chairman; Mrs. Lewis, Mr. Nathanson, Mr. Carey, Mr. Price.

Plans and Programs Committee — Mr. Bieberman, Chairman; Mr. Oubre, Mr. Milius, Mr. Holladay, Mr. Smith.

Management & Finance Committee — Mr. Wangler, Chairman; Mr. Metzger, Mr. Grauer, Mr. Butler, Mr. Arnold.

56) The Chair announced the opening of nominations for director of the ARRL Foundation, other than directors of the League, there being one position to fill. Mr. Sullivan nominated Mr. Chapman. On motion of Mr. Anderson, seconded by Mr. Sullivan, it was unanimously VOTED that nominations are closed and that a single ballot be cast for Mr. Chapman. The Chair then announced the opening of nominations for director of the ARRL Foundation from among the directors of the League, there being three positions to fill. Mr. Sullivan nominated Messrs. Metzger, Grauer, and Holladay. On motion of Mr. Anderson, seconded by Mr. Zak, unanimously VOTED that nominations be closed, and that a single ballot be cast for each of the nominees.

57) On motion of Mr. Bieberman, seconded by Mr. Holladay, unanimously VOTED that the General Manager prepare a guideline pamphlet for authors of both technical and non-technical articles, and for columnists, explaining *QST* policies for articles and columns, including deadlines, corrections and alterations, requirements for drawings and diagrams, and any other pertinent data; this pamphlet to be made available upon request to any prospective writer.

58) On motion of Mr. Powell, seconded by Mr. Zak, unanimously VOTED that the ARRL encourages observance of the voluntary band plan adopted by the 1980 IARU Region 2 Conference regarding use of the frequencies 10,140-10,150 kHz for FI emissions when the 10,100-10,150 MHz band becomes available for amateur use.

59) Moved by Mr. Metzger, seconded by Mr. Anderson, that the use of the ARRL non-profit postal privilege on directors' mailings be restricted 90 days previous to the deadline for filing of nominating petitions, such restriction to continue until counting of ballots is completed. After discussion, on motion of Mr. Sullivan, seconded by Mr. Stevens, unanimously VOTED that the matter is laid on the Table.

60) On motion of Mr. Oubre, seconded by Mr. Grauer, the following resolution was unanimously ADOPTED:

WHEREAS, Amateur Radio has long been recognized as a window on the world for the handicapped and

WHEREAS, handicapped radio amateurs have used their time and talent in the public interest, convenience and necessity in such ways as serving in net control spots for nets and in handling emergency traffic, and

WHEREAS, 1981 is the International Year of the Disabled Person (IYDP), now therefore,

BE IT RESOLVED, that the American Radio Relay League at its Annual meeting March 11-12, 1981, does hereby recognize the value of Amateur Radio to the handicapped, and the value of handicapped amateurs to the Amateur Radio Service. It commends the staff for its Blind and Handicapped program and urges continuation and enhancement of this program. It further urges enrollment of ARRL and CRRL in the national programs in the U.S. and Canada supporting the International Year of the Disabled Person.

61) On motion of Mr. Nathanson, seconded by Mr. Grauer, unanimously VOTED that there be referred to the Management and Finance Committee the study of the issuance of a bumper sticker, the proceeds of which would be attributed to a legal fund which shall be a source of money to finance and aid legal expense of the members in appropriate cases.

62) On motion of Mr. Zak, seconded by Mr. Grauer, unanimously VOTED that the Board of Directors instructs the President to serve as ARRL member of the IARU Region 2 area B Committee established by action of the 1980 IARU Region 2 Conference.

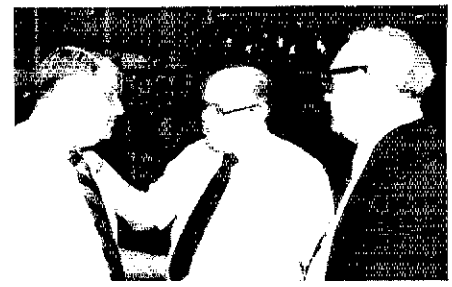
63) Moved by Mr. Grauer, seconded by Mr. Sullivan, that headquarters be directed to petition the FCC to extend the limits of the 80-meter General class phone subband to 3825-4000 kHz. After discussion, on motion of Mr. Holladay, seconded by Mr. Zak, VOTED that the matter is referred to the Plans and Programs Committee for study. Mr. Grauer requested to be recorded as voting opposed to the referral.

64) On motion of Mr. Sullivan, seconded by Mr. Grauer, unanimously VOTED that the Executive Committee consider eligibility requirements and election procedure for honorary officers and report back to the Board at its second meeting in 1981.

65) On motion of Mr. Stevens, seconded by Mr. Sullivan, VOTED that the second ARRL Board of Directors meeting of 1981 shall be held September 10-11 in the area of Hartford or Newington.

66) On motion of Mr. Milius, seconded by Mr. Stevens, unanimously VOTED that the ARRL Board of Directors endorses the policy adopted by the 1980 Region 2 IARU Conference whereby contest operation band operating awards credits will not be encouraged in the new 10.1-10.15 MHz band as long as amateur use of this band is on a secondary shared basis.

67) On motion of Mr. Butler, seconded by Mr. Oubre, VOTED that the General Manager is instructed to petition the FCC to reinstitute the issuance of new club licenses. Mr. Powell abstained.



Consultation: W4RA, W1HHR, W1QV

68) On motion of Mr. Wangler, seconded by Mr. Sullivan, unanimously VOTED that the Membership Affairs Committee is directed to review the conditions under which League services are furnished to non-ARRL members and non-affiliated clubs and to develop suitable recommendations to the Board not later than the second 1981 meeting of the Board. The Committee shall include in its study consideration of differential pricing of League services to non-members and non-affiliated clubs.

69) Moved by Mr. Bieberman, seconded by Mr. Grauer, that the W1AW schedule be printed in every issue of *QST*. After discussion, on motion of Mr. Smith, seconded by Mr. Sullivan, unanimously VOTED that the matter is laid on the Table.

70) On motion of Mr. Metzger, seconded by Mr. Grauer, unanimously VOTED that the Membership Affairs Committee make a study of publishing material to distribute free of charge to interested prospective amateurs.

71) On motion of Mr. Powell, seconded by Mr. Anderson, unanimously VOTED that the General Manager, through the medium of *QST* and other ARRL publications, is instructed to promulgate and encourage adherence to principles concerning phone-patch operation as adopted by the 1980 IARU Region 2 Conference.

72) On motion of Mr. Oubre, seconded by Mr. Anderson, unanimously VOTED that item 8 of the Policies Governing the Availability from Headquarters of lists of ARRL members and affiliated clubs be expanded to provide that one copy of materials mailed shall be sent to each director concerned.

73) On motion of Mr. Nathanson, seconded by Mr. Zak, unanimously VOTED that the Board of Directors endorses the proposal of the Liga De Amadores Brasileiros de Radio Emissao (LABRE) to designate April 25 as International Amateur Radio Day, and authorizes the Vice President for International Affairs to communicate this position to the IARU.

74) On motion of Mr. Zak, seconded by Mr. Sullivan, unanimously VOTED that the Membership Affairs Committee, with input from the Emergency Communications Advisory Committee, study the feasibility of establishing an "Emergency Operating Fund" at Headquarters to receive contributions. This fund would be used to reimburse those stations that have direct expenses attributed to a bona fide emergency, i.e., telephone calls, equipment parts, etc.

75) On motion of Mr. Grauer, seconded by Mr. Milius, unanimously VOTED to refer the proposed insurance program to the Management & Finance Committee for their consideration and evaluation. The Committee is to report to the Executive Committee prior to the second meeting of the Board in September.

76) The Board was in recess for lunch from 12:27 to 1:16 P.M., reconvening with all persons hereinbefore mentioned present except Mr. Clark.

77) On motion of Mr. Sullivan, seconded by Mr. Butler, unanimously VOTED the adoption of the following policy statement regarding the FCC proposal for the adoption of so-called plain-language rules for the amateur service:

1) ARRL believes that radio amateurs have proven themselves capable of understanding (and obeying) the rules for the amateur service as they are presently written.

2) However, the League does not desire to oppose legitimate attempts to improve and strengthen the manner of presentation of the amateur rules.

3) Therefore, the League supports the concept of plain-language rules and will concentrate its comments on the substance of the proposal contained in Docket 80-729.

4) In its study of the proposed rules the League has already identified several areas of concern where it is

believed that substantive changes are being introduced. For example, a few areas of concern already identified include:

A) The basis and purpose of the Amateur Service appear to be restated in a way which reduces the traditional scope of the rationale for the service.

B) The deletion of any specific references in the rules to net operation.

C) An apparent error in proposed Rule 30 regarding permitted antenna heights.

5) The League's plan for dealing with Docket 80-729 is to:

A) Collect comments from ARRL officials, members, and other interested parties.

B) Seek a meeting between ARRL representatives and FCC staff and/or commissioners to discuss areas of concern in accordance with Commission rules for ex-parte contacts.

C) File comments offering, where appropriate, constructive alternatives to the Commission proposals.

78) Moved by Mrs. Lewis, seconded by Mr. Holladay, that the General Manager is directed to establish a Court of Honor at an appropriate headquarters location. The purpose of the Court of Honor is to commemorate the sacrifice of those radio amateurs who have lost their lives while engaged in public-service activities. After discussion, on motion of Mr. Sullivan, seconded by Mr. Nathanson, VOTED that the matter is referred to the Membership Affairs Committee for study. Mr. Holladay requested to be recorded as voting opposed to the referral.

79) Moved by Mr. Stevens, seconded by Mr. Zak, that By-Law 9 is modified by adding the word "Treasurer" in the second sentence after the "Vice President." A roll-call vote being required, the question was decided in the AFFIRMATIVE, with all directors voting in favor.

80) On motion of Mr. Milius, seconded by Mr. Oubre, VOTED that the DXAC review the guidelines for single-mode DX awards, including confirmation procedures and operating ethics, and report to the fall meeting of the Board of Directors.

81) On motion of Mr. Carey, seconded by Mr. Grauer, unanimously VOTED that the Membership Affairs Committee is directed to study the methods and procedures currently used to disseminate ARRL Official Bulletins and to recommend ways of improving this service to our members.

82) On motion of Mr. Holladay, seconded by Mr. Oubre, unanimously VOTED that in continuation of its support for the Amateur Satellite program, the ARRL donate the sum of $10,000 to the ARRL Foundation on a matching-fund basis.

83) At this point the Chair recognized Mr. Baldwin, who announced his decision to retire as General Manager and Secretary of the League in June 1982.

84) On motion of Mr. Bieberman, seconded by Mr. Zak, unanimously VOTED that the Board of Directors endorses the recommendations of the 1980 IARU Region 2 Conference regarding QSL card dimension tolerances and instructs the General Manager to promulgate this standard to U.S. amateurs employing ARRL QSL bureau facilities.

85) On motion of Mr. Oubre, seconded by Mr. Holladay, unanimously VOTED that the President is directed to form an ad hoc committee to recommend standards for digital communications in the Amateur Radio Service.

86) Moved by Mr. Nathanson, seconded by Mr. Sullivan, that By-Law 10 is amended to add language that the treasurer serves without vote by inserting the word "Treasurer" after "Vice Presidents." A roll-call vote being required, the question was decided in the AFFIRMATIVE, with all directors voting in favor.

87) Moved by Mr. Grauer, seconded by Mr. Sullivan, that the club bulletin be replaced by a column in *QST* quarterly. Moved by Mrs. Lewis, seconded by Mr. Holladay, the matter is laid on the Table; but the motion to Table was LOST. After further discussion, moved by Mr. Zak, seconded by Mr. Grauer, that the matter is referred to the Membership Affairs Committee for study. After further discussion, on motion of Mr. Stevens, seconded by Mr. Oubre, VOTED that the matter is laid on the Table.

88) On motion of Mr. Sullivan, seconded by Mr. Grauer, unanimously VOTED that the Membership Affairs Committee is instructed to consider establishment of a suitable award to ARRL members achieving sixty-year membership tenure.

89) On motion of Mr. Stevens, seconded by Mr. Milius, unanimously VOTED that, in cooperation with the efforts of the IARU Region 2 organization to achieve international agreement and harmony in the assignment of vhf/uhf repeater frequencies, copies of ARRL Repeater Directories be routinely sent to each Region 2 IARU member society and to each member of the IARU Region 2 Executive Committee.

90) Moved by Mr. Milius, seconded by Mr. Butler, that the ARRL make all League publications available at discount prices to clubs and convention/hamfest committees, when purchased in quantities, for resale at club meetings, conventions and hamfests so that the purchasers may derive a small profit therefrom by selling them at list prices. After discussion, moved by Mr. Holladay, seconded by Mr. Butler, that the matter be referred to the Management & Finance Committee for study. Moved by Mr. Nathanson, seconded by Mr. Carey, that the matter is laid on the Table; but the motion to Table was LOST. The question then being on the referral, the same was ADOPTED.

91) On motion of Mr. Carey, seconded by Mr. Holladay, unanimously VOTED that the present proposal of the 40-meter window frequencies now ready for presentation to FCC not be filed at this time, but be reconsidered by the Plans & Programs Committee.

92) On motion of Mr. Butler, seconded by Mr. Grauer, unanimously VOTED that the General Manager is directed to prepare for filing by the General Counsel with the FCC a petition for rulemaking seeking the addition of the following provision to subpart G of Part 97 of the Commission's Rules: "Except in emergency situations involving the immediate safety of life or property, the operation of an amateur station by an alien amateur under a permit issued by the Commission shall not include international third-party traffic as defined in Section 97.3(v) of the Commission's Rules."

93) On motion of Mr. Holladay, seconded by Mr. Sullivan, unanimously VOTED that the Board of Directors reaffirms its support of the ARRL Foundation and directs that the General Manager provide administrative support for the Foundation comparable to that presently provided the CRRL and IARU.

94) Moved by Mr. Bieberman, seconded by Mr. Oubre that a list be published in *QST* of the members of the Committees in the Senate and the House of Representatives who have jurisdiction over the FCC, together with the States and Congressional Districts which they represent. After discussion, on motion of Mr. Sullivan, seconded by Mr. Zak, VOTED that the matter is laid on the Table.

95) On motion of Mr. Powell, seconded by Mr. Sullivan, unanimously VOTED that the General Manager is directed to prepare the slide and cassette tape program ordered at Minute 66 of the 1980 Annual meeting for distribution by July 1981.

96) On motion of Mr. Metzger, seconded by Mr. Anderson, unanimously VOTED that an emblem pin of appropriate size and design be made available to assistant directors at a small fee.

97) On motion of Mr. Nathanson, seconded by Mr. Grauer, unanimously VOTED that a report of the current status of Project Goodwill be prepared by the General Manager and that it be presented to the Board not later than the Board meeting of September 1981.

98) On motion of Mr. Zak, seconded by Mr. Grauer, unanimously VOTED that the General Manager investigate the feasibility of sponsoring "Industry Seminars" between the Amateur Radio Industry and the ARRL on a periodic and geographical basis to serve as a common meeting ground and interchange of ideas.

99) On motion of Mr. Grauer, seconded by Mr. Sullivan, unanimously VOTED to rescind a motion relating to the appointment of Bonn A. Gilbert, Jr., as Group Insurance Administrator for ARRL as adopted July 1977 by Minute 45.

100) On motion of Mr. Sullivan, seconded by Mr. Grauer, unanimously VOTED that the judging for the ARRL Technical Excellence Award be by a panel of Technical Advisors who should report to the Membership Affairs Committee 90 days prior to the second Board meeting. The General Manager is to appoint a Hq. coordinator.

101) On motion of Mr. Milius, seconded by Mr. Carey, unanimously VOTED that the ARRL Board of Directors expresses to Director Butler and Vice Director Gauzens of the Southeastern Division, and to the many League members in the Orlando area, its sincere appreciation for the warm hospitality and the many courtesies extended to the officers, directors and staff members of the ARRL and their spouses on the occasion of this meeting in Orlando.

102) Moved by Mr. Holladay, seconded by Mr. Wangler, that the President is directed to appoint an ad hoc committee of amateurs knowledgeable in the field of membership organizations to study the current League organizational structure and make recommendations for improvement. This committee shall work with the Long-Range Planning Committee in developing recommendations for presentation at the 1982 annual meeting of the Board of Directors. After discussion, on motion of Mr. Grauer, seconded by Mr. Sullivan, unanimously VOTED that the matter is laid on the Table.

103) On motion of Mr. Wangler, seconded by Mr. Holladay, unanimously VOTED that a summary of the Washington Representative's report be added at least monthly as part of Directors' Letter List "A."

104) On motion of Mr. Nathanson, seconded by Mr. Anderson, unanimously VOTED that the existing legal packet be updated to provide information on antenna height, towers, interference and other legal problems of concern to radio amateurs and that it be referred to the Executive Committee for approval. The Board was in recess from 3:20 to 3:42 P.M.

105) On motion of Mr. Zak, seconded by Mr. Grauer, unanimously VOTED that the General Manager study the feasibility of publication and distribution of a catalog listing all items available from Headquarters, i.e., pins, banners, awards, books, etc.

106) Moved by Mr. Grauer, seconded by Mr. Powell, that the General Manager cause to be published in *QST* from time to time a list of future articles and their authors which will appear in future issues. After discussion, on motion of Mr. Price, seconded by Mr. Zak, VOTED that the matter is laid on the Table.

107) Moved by Mr. Sullivan, seconded by Mr. Grauer, that the General Manager inquire of prospective *QST* authors, the possibility of having their articles appear in other ARRL publications if not selected for *QST*. After discussion, on motion of Mr. Zak, seconded by Mrs. Lewis, VOTED that the matter is laid on the Table.

108) On motion of Mrs. Lewis, seconded by Mr. Milius, unanimously VOTED that the ARRL continue to press the FCC to return full amateur privileges in the 1.8-2.0 MHz band.

109) Moved by Mr. Stevens, seconded by Mr. Milius, that prior to presenting a motion at a Board meeting that requires funding of any amount, it shall first be presented to the Management & Finance Committee at least 30 days prior to its Board presentation, so that the cost of the action contained therein can be determined and a means of funding can be decided upon. After discussion, on motion of Mr. Carey, seconded by Mr. Sullivan, VOTED that the matter is laid on the Table.

110) On motion of Mr. Milius, seconded by Mrs. Lewis, VOTED that the Membership Affairs Committee consider the designing and marketing of an official ARRL windbreaker.

111) On motion of Mr. Butler, seconded by Mr. Oubre, VOTED that the Plans & Programs Committee review the findings of the VRAC regarding a band-plan for 2-meter 15-kHz "splinter channel" repeater frequencies and present a recommendation for a band plan to the next Board meeting. Mrs. Lewis requested to be recorded as voting opposed.

112) On motion of Mr. Stevens, seconded by Mr. Sullivan, unanimously VOTED that the General Manager is hereby authorized to reimburse the division directors for actual expenses incurred by them

"As bad as that?" — WØBWJ (l), VE3CJ

Coffee break: W7QGP, KØPGM

during the year 1981 in the proper administration of ARRL affairs in their respective divisions, up to the amounts as follows: Canadian Division — $8000, Atlantic Division — $7000, Central Division — $7500, Dakota Division — $2500, Delta Division — $6500, Great Lakes Division — $5500, Hudson Division — $4000, Midwest Division — $5000, New England Division — $5800, Northwestern Division — $5400, Pacific Division — $7800, Roanoke Division — $8000, Rocky Mountain Division — $3600, Southeastern Division — $7500, Southwestern Division — $7500 and West Gulf Division — $6500.

113) On motion of Mr. Anderson, seconded by Mr. Bieberman, unanimously VOTED the following authorizations for continuing committees other than standing committees for the year 1981: RFI Task Group — $2500, Biological Effects of RF Energy — $2500 and Interference Task Force — $1000.

114) On motion of Mr. Oubre, seconded by Mr. Metzger, unanimously VOTED that to continue the Board's policy of reimbursing Section Communications Managers for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1981 a total amount not to exceed $32,000 under terms prescribed by the Communications Manager, following the general pattern established by the Board.

115) On motion of Mr. Zak, seconded by Mr. Sullivan, unanimously VOTED that to continue the Board's policy of reimbursing QSL Managers of the League for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1981 a total amount not to exceed $4000 under terms prescribed by the General Manager, following the general pattern established by the Board.

116) On motion of Mr. Oubre, seconded by Mr. Anderson, unanimously VOTED that to continue the Board's policy of reimbursing Section Emergency Coordinators for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1981 a total amount not to exceed $12,000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

117) On motion of Mr. Sullivan, seconded by Mr. Nathanson, unanimously VOTED that to continue the Board's policy of reimbursing National Traffic System officials above the section level for certain approved travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1981 a total amount not to exceed $13,000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

118) On motion of Mr. Oubre, seconded by Mr. Wandler, unanimously VOTED that to continue the Board's policy of reimbursing Section Traffic Managers for certain travel in furthering ARRL organizational activities, the General Manager is hereby authorized to pay during the year 1981 a total amount not to exceed $12,000 under terms prescribed by the Communications Manager following the general pattern established by the Board.

119) On motion of Mr. Anderson, seconded by Mr. Stevens, unanimously VOTED to remove from the Table the motion concerning Standing Order #222. On motion of Mr. Anderson, seconded by Mr. Mims, unanimously VOTED to amend the motion by striking the reference to the Internal Revenue Service and substituting therefor "a rate of reimbursement equivalent to that permitted U.S. Government employees." The question then being on the motion as amended, the same was unanimously ADOPTED.

120) On motion of Mr. Sullivan, seconded by Mr. Grauer, unanimously VOTED that the General Manager purchase envelope-type membership applications and make them available for use as appropriate. The Board was in recess from 4:50 to 5:07 P.M.

121) On motion of Mr. Bieberman, seconded by Mr. Anderson, unanimously VOTED that the RFI Task Group study the problem of the interference caused by many makes of vhf and uhf scanners to reception of weak signals in the vhf and uhf amateur bands, and report at the next Board meeting.

122) Moved by Mr. Zak, seconded by Mr. Nathanson, that Mr. Clarence Tuska be inducted into the ARRL Hall of Fame. After discussion, moved by Mr. Sullivan, seconded by Mr. Grauer, that the motion is amended to add the name of F. E. Handy, W1BDI. After further discussion, on motion of Mr. Nathanson, seconded by Mr. Butler, VOTED that the amendment is amended so as to place in nomination the names of all seven candidates submitted to the Executive Committee by the Membership Affairs Committee. The question then being on the motion as amended the same was ADOPTED. The Board was in recess from 5:51 to 8:30 P.M. for dinner, reconvening with all persons hereinbefore mentioned present except Messrs. Clark and Olson.

123) On motion of Mr. Zak, seconded by Mr. Powell, unanimously VOTED that the Board resolve itself into a Committee of the Whole for the purpose of considering nominees to the ARRL Hall of Fame at 8:43 P.M. The Committee rose at 8:48 P.M. and reported to the Board. On motion of Mr. Sullivan, seconded by Mr. Butler, unanimously VOTED that the report of the committee is adopted. On further motion of Mr. Sullivan, seconded by Mr. Zak, unanimously VOTED that Mr. Clarence D. Tuska is elected to the ARRL Hall of Fame (applause).

124) On motion of Mr. Zak, seconded by Mr. Nathanson, unanimously VOTED that the qualifications for submission to the ARRL Hall of Fame be re-examined by the Membership Affairs Committee and that a moratorium of one year be placed on further nominations.

125) On motion of Mr. Stevens, seconded by Mr. Sullivan, unanimously VOTED that each director offering a motion requiring the expenditure of funds for implementation shall include with the motion his estimate of the costs involved and the suggested method of funding those costs.

126) On motion of Mr. Holladay, seconded by Mr. Butler, unanimously VOTED that the Board of Directors of the American Radio Relay League extends thanks to U.S. Representative William E. Dannemeyer for his support of the Amateur Radio Service. The Board urges all ARRL members to express their written support for House Bill H.R. 2203 to permit the use of volunteers by the Federal Communications Commission so as to facilitate the administration of FCC services to radio amateurs.

127) Moved by Mr. Price, seconded by Mr. Sullivan, that By-Law 5 be amended by replacing the text with the following: "Provided that a member is without sight he may at his request pay dues of $2.00 per year in advance but without the right to receive *QST*. If a member is the husband or wife, brother or sister, son or daughter, father or mother of another member living at the same address and either a Life Member or one paying dues in accordance with By-Law 4, he may at his request pay dues of $4.00 per year in advance, but without the right to receive *QST*, said Family membership to be concurrent with that of the member receiving *QST*. A roll call vote being required, with 12 votes necessary for passage, the motion was DEFEATED; 8 directors voted in favor, and 8 opposed. Those voting opposed were Messrs. Carey, Grauer, Holladay, Lewis, Metzger, Nathanson, Oubre, and Powell; all others voted in favor.

128) On motion of Mr. Baldwin, seconded by Mr. Powell, unanimously VOTED that the General Manager is hereby authorized to reimburse actual expenses incurred in the administration of CRRL Headquarters during the year 1981 a total amount not to exceed $4000.

129) All those present were given the opportunity for informal closing comments. There being no further business, on motion of Mr. Grauer, seconded by Mr. Sullivan, the Board adjourned, *sine die* at 11:05 P.M. Total time in session as a Board 16 hours, 2 minutes; as a Committee of the Whole 3 hours, 8 minutes; total direct authorizations $209,100.

Respectfully submitted,

Richard L. Baldwin, W1RU
Secretary

50 Years Ago

May 1931

The two-day Hudson Division Convention is to be held at the Hotel Pennsylvania in New York City. The banquet promises to be a bang-up affair, with Broadway entertainers and, for dancing, Ed Berlin's Society Orchestra. Convention/banquet tickets are $5, $3 for YLs or OWs.

"Amateur Radio As an Aid to Terrestrial-Magnetic Research" by S.L. Scaton, W3BWI, tells how hams relayed traffic from the research vessel *Carnegie* during the voyage from Washington, D.C. to Apia, Samoa. Ham radio was also a link from the observatory, VK6MO, near Watheroo, Western Australia, and the headquarters in Washington. Another ham station is being installed at the observatory at Huancayo, Peru, in the Andes Mountains.

George Grammer, W1DF, heralds the arrival of "The Variable-Mu Tetrode" in a six-page article describing the physical construction and electrical action of this new development. Advantages include good extended gain-control action and the reduction of "cross talk."

Paul Schwerin of the Perryman Electric Co. describes "A Full-Wave Mercury-Vapor Rectifier" designed to replace the Type '80 thermionic rectifier and provide greater power-handling capability. The new 80-M has been used to replace a pair of '81s in a ham transmitter for a 22% power gain.

Ivan O'Meara, ZL2AC, tells about "New Zealand's Tragic Earthquake" and the brilliant job ZLs did in providing communications when all wire services failed during the earthquake and fires that killed 350 and injured thousands. (The full *QST* page of text was sent by radio from ZL2AC to Managing Editor Clark Rodimon, W1SZ.)

"A Home-Made Photocell" made from an '01-A is Harley Iams' topic. Heating a part of the tube envelope volatizes the internal "getter" coating and leaves a clear window. The "getter" condenses on the plate of the tube to provide the photocell cathode, and grid and filament tied together form the anode. The light from a 100-watt lamp a foot away can provide a photocell current of about two microamperes.

25 Years Ago

May 1956

The cover and lead article is "An Experimental All-Transistor Communications Receiver," by Carl Heinen, W@MCN. This 7-transistor, 80- through 15-meter superhet is believed to be the first amateur-built multi-band superhet using available solid-state components. W@MCN tried 10 meters but the SB-100 mixer was too noisy for acceptable operation. "Store-bought" i.f. transformers were too broad for ham use, so tube-type transformers were modified and used. The band-switched receiver is housed in a 10 × 5-1/2 × 3-inch chassis.

Murray Crosby, W2CSY, introduces the readers to "Reception with Product Detectors" and points out the advantages for c.w. and s.s.b. reception. Two circuits are shown, one using a pentagrid converter tube and another (patented by Crosby in 1949) with three triodes.

Will Herzog, W9JSK, describes his "Cathode-Follower T-R Switch," which has to be the ultimate in simplicity. It uses a 6C4 tube, three fixed capacitors and two resistors. There are things to watch out for, however, according to "Variations in T-R Switch Performance" by Laird Campbell, W1CUT. His tests with two commercial t-r switches show the effects at 28 Mc. of frequency, transmitter tuning and connecting-cable length on receiver sensitivity.

The "Contest Man's Receiver-Tracking VFO for 7 Mc." of A. D. LaRue, W1IAP, is a well-designed conversion exciter using the 5 Mc. output of his Collins 75A-2 receiver. Features include a balanced mixer and band-pass tuned circuits.

"The Great Flood — West Coast Version" is an extensive report by George Hart, W1NJM, of the emergency communications provided by amateurs during the December floods. Northern California and southern Oregon saw the most damage. More than six pages are used to record the great work done by hams.

Albert Magagnat, W8RWW, shows how to build "A Dual Quad for 15 and 10." Elements are in the same planes, so the wavelength spacing is greater on 10 than it is on 15.

Quiet Quiz introduces a (to become) classic problem, submitted by Dr. Earl Weston, W8BXO. It involves two boxes connected together by *two* wires. One box has two switches and an a.c. input, and the other box has two lamps. One switch controls one lamp; the other switch controls the other lamp. What's the circuit?

W1DX presents a brief history of "Radio Astronomy" and an account of his visit to the Ohio State University radio telescope. The OSU project head is Dr. John Kraus, known the ham world over for his W8JK close-spaced beam and his antenna text book. — *Byron Goodman, W1DX*

Happenings

Conducted By W. Dale Clift,* WA3NLO

AMRAD Gets Special Waiver for Spread-Spectrum Experiments

The Federal Communications Commission has granted 28 Amateur Radio stations permission to conduct spread spectrum (SS) experiments on Amateur Radio frequencies. The radio amateurs involved are members of the Amateur Radio Research and Development Corporation (AMRAD), a nonprofit corporation and ARRL affiliated club comprised of over 350 members whose primary interest is developing skills and knowledge in radio and electronic technology. Spread spectrum is an unconventional form of modulation that uses 10 to 100 times the bandwidth needed to carry the same information via more conventional modes. However, its advantage lies in the fact that an SS signal's energy is spread throughout a band of frequencies so that the amount of energy at any particular frequency is much less than that produced by conventional narrow-band signals.

There are four basic ways an SS signal can be "spread": *direct sequence*, which is produced by modulating a carrier with a digitized code stream; *frequency hopping*, which is produced by jumping the signal to a number of different frequencies in an agreed sequence; *pulse-fm (chirp)*, where the carrier frequency sweeps over a wide band of frequencies at a known rate; and *time hopping*, which is a form of pulse modulation using a time-coded sequence to control the pulse. *Hybrid* spread spectrum systems use a combination of the four basic systems.[1]

AMRAD's application to the Commission for the special temporary authority (STA) emphasized that spread-spectrum modulation techniques can conserve radio spectrum because different SS code sequences, or synchronizing SS signals at various points within one long code sequence, will permit many simultaneous communications free of interference from each other. Spread-spectrum receivers with the wrong code and conventional narrow-band receivers will be unable to demodulate the SS signal and may not even be able to detect the presence of the signal. In fact, depending on the transmitter power level and the receiver's distance from the transmitter, the spread-spectrum signal may be below the noise level.

The FCC's STA gives AMRAD the authority to conduct four experiments. The first experiment will be conducted with commercially available hf frequency-hopping transceivers so that the group can quickly gain on-the-air experience with the technique. Test paths will be between Washington, DC, and Rochester, New York, on 3675-3775 kHz, 7050-7150 kHz and 14,100-14,200 kHz. Because of the crowding on these bands, particularly at certain times of the day, AMRAD plans to make prior announcements of the tests on these bands. W1AW will carry these announcements to the general Amateur Radio community.

The second experiment involves 10-meter frequency-hopping tests. To keep the costs low, the AMRAD group plans to modify several Citizens Band single-sideband transceivers for frequency hopping in the 28.1- to 29.3-MHz frequency range. The group will also investigate frequency hopping of the Inoue Communications Equipment Corporation (ICOM) IC-701 hf transceiver, one of a few amateur transceivers capable of external digital control. Because more spectrum is available in the 10-meter band than in those bands proposed for the first experiment, AMRAD will not have to make prior announcements of its tests via W1AW.

The third experiment involves the 420- to 450-MHz (70-cm) band for direct-sequence spread-spectrum tests. The group's initial plan is to use inexpensive television color-burst crystal modulators as the foundation for producing a phase-shift keyed (PSK) signal with shifts of 0° and 180°. One part of the experimentation, in cooperation with the Metrovision Amateur Television (ATV) Club in Alexandria, Virginia, is to operate SS concurrently with ATV transmissions to assess mutual interference potentials. Another part is to determine the feasibility of using an ATV repeater to pass SS signals, thereby obtaining the range advantage of a repeater. Also, the wide bandwidth of an ATV repeater assures small time delays for synchronizing SS signals sent through it.

The fourth and final experiment involves spread-spectrum techniques for enhancing earth-moon-earth (moonbounce) communications. Under the supervision of David Phillips, W3PJM, AMRAD will use an 84-ft parabolic dish antenna located at Cheltenham, Maryland. The AMRAD group believes that by spreading signal information over many different frequencies, it will eliminate the deep nulls that occur over narrow-band channels. The SS receiver, it is hoped, by correlating the SS transmitter's signal contributions across the band, will deal with the problems of libration fading and fading caused by wide-space reflections from the moon, rapidly adding to and then cancelling the reflected signal.

The Federal Communications Commission took the occasion of its granting the STA to AMRAD to encourage other Amateur Radio experimenters. In a news release, the Commission stated that it realized that in certain instances proposed experiments may conflict with existing amateur rules. It emphasized that it is willing to grant rule waivers for many different experiments, including: spread spectrum, packet-switching networks, radioteleprinter codes (other than ASCII and Baudot, which are already permitted under the present rules), beacons for propagation studies, medium-scan television, frequency and/or amplitude compandoring, digitized voice techniques, digitized video techniques, trunked repeater systems and EME communications.

According to the Commission, radio amateurs wishing to conduct experiments within the amateur bands should first refer to the Commission's rules to determine if a rule waiver is required. If a proposed experiment will conflict with any of the Commission's rules, the licensee conducting the experiment must write to the Commission requesting a waiver of the specific rule(s). Waiver-request

FCC Private Radio Bureau Chief Carlos V. Roberts (2nd from right), presents a Special Temporary Authority to experiment with spread-spectrum transmissions to Hal L. Feinstein, WB3KDU (far left) and Paul L. Rinaldo, W4RI. Dr. Michael J. Marcus (far right), chief, Technical Planning Staff of the Commission's Office of Science and Technology, witnesses the ceremonial occasion at the Commission's offices. Messrs. Feinstein and Rinaldo are two of the amateurs affiliated with the Amateur Radio Research and Development Corporation granted the STA. (*FCC photo*)

[1] See "Spread Spectrum and the Radio Amateur," by Paul L. Rinaldo, in November 1980 *QST*, p. 15.

*Deputy Manager, Membership Services, ARRL

letters should be addressed to: Federal Communications Commission 334 York St., Gettysburg, PA 17325, Attention: Technical Section.

The waiver-request letter should cover complete details of the proposed experiment, including all technical parameters, specific frequencies to be used and a justification for the project. The Commission will approve or deny any request in writing, and no experimentation may begin until the written approval is received.

SLEEPER CASE RECEIVES UNFAVORABLE RULING

The Massachusetts Appeals Court has ruled against Donald H. Sleeper, W1ONK, in his legal battle with the Regional Historic District Commission on Cape Cod, Massachusetts.[1] One sentence on the front page of the opinion sums up Don's problems: "It is his misfortune that his home is located in the Old King's Highway Regional Historic District."

In 1977, the commission denied Don's application for a certificate of appropriateness for his 68-ft-high amateur antenna located in his backyard in East Dennis, Massachusetts. Don appealed the decision to the regional commission and, after receiving an adverse decision there, appealed to the Second District Court of Barnstable. That court affirmed the commission's decision, and Don appealed again, this time to the Appellate Division. After another adverse decision, Don appealed to the Supreme Judicial Court; however, it transferred the case to the Appeals Court. It is the Appeals Court that has released this latest decision, affirming the lower courts.

The Appeals Court recognized that Don's house is not itself historic. The house is located in a subdivision of 109 lots occupied by one-story, ranch-style houses built in the late 1960s. Fifty-six of the houses have television antennas on their roofs and five have pole or whip Citizens Band antennas that stand 17 to 20 feet above the roof line. Nevertheless, the court refused to overturn the commission's conclusion that the antenna "is not evocative of what section 1 of the Act [the Historic District Act] says is to be promoted: 'the aesthetic tradition of Barnstable County, as it existed in the early days of Cape Cod.' "

The court also found that Don's being prevented from engaging in his hobby to the fullest, while undoubtedly a blight on his spirit, is not a hardship in the statutory sense. Furthermore, in response to Don's argument that the matter is preempted by the federal government, the court held that "[a]lthough the Federal Communications Act of 1934 [sic] . . . preempts 'local regulation of radio transmission, including assignment of frequencies, interference phenomena and the content of broadcast material [citation omitted],' it does not purport to regulate the manner in which physical structures involved in radio transmission have an impact upon local land-use considerations."

The ARRL has been closely involved with the Sleeper Case through its General Counsel, Robert M. Booth, Jr., W3PS, of Booth and Freret, Washington, DC. Don Sleeper is represented by Duane P. Landreth, of LaTanzi, Spaulding and Landreth, Orleans, Massachusetts. (Mr. Landreth is the son of Harry W. Landreth, W8NZC, of Cleveland, Ohio.) As *QST* went to press, no decision had yet been reached on whether a further appeal would be made to the Supreme Judicial Court of Massachusetts.

[1] *Sleeper v. Bourne*, Massachusetts Appeals Court, No. 80-471 (March 13, 1981).

PETITIONS DISMISSED BY FCC

FCC Will Not Ban A-M

The Federal Communications Commission has dismissed a petition calling for the prohibition of amplitude modulation on the amateur bands. RM-3665, filed by Robert W. Stankus of Easton, Connecticut, proposed that a-m be prohibited after January 1, 1985, because amateurs should make better use of the radio spectrum and progress in the state of the art by abandoning an obsolete method of communications.

The Commission dismissed the petition because it felt that Mr. Stankus' motives conflicted with the Commission's goals for the Amateur Radio Service. The Commission's aim, according to the dismissal order, is to provide Amateur Radio operators with diverse modes of communication for experimentation rather than restricting them to certain methods of communication. Furthermore, numerous comments on the proposal indicated that a-m communications provided operators with their introduction to Amateur Radio. A-m equipment is easier to build, and has provided many operators with the necessary incentive to become interested in more advanced areas of Amateur Radio. Other comments indicated that for the Commission to phase out amplitude modulation would deprive many operators of their hobby because their equipment would become obsolete, and they could not afford other equipment.

According to the Commission, Mr. Stankus provided unpersuasive arguments for his petition. He stated that he conducted an impartial survey and found fewer than 5000 amateurs still using a-m. However, he provides no data to support his conclusions. Also, he claims that manufacturers no longer produce a-m transceivers. On the contrary, current Amateur Radio catalogues show several Amateur Radio transceivers available for sale with a-m capability. If Mr. Stankus' claims were valid, there would be little reason for the Commission to impose a ban on a mode which was rarely used, the Commission concluded.

Accordingly, the Commission dismissed the petition as not being in the public interest. The Commission received 83 comments in this proceeding. Only one comment supported the petition.

Typewriters Not Generally Permitted at FCC Exams

The FCC Private Radio Bureau has dismissed, under delegated authority, a request for rulemaking which would have permitted amateur applicants to use typewriters during FCC exams. The petitioner, Michael R. Reynolds, justified his request partially on the basis that applicants for First Class Radiotelegraph licenses are allowed typewriters. The FCC pointed out that it administers about 50 "First Telegraph" examinations a year compared with 30,000 Amateur Radio tests, usually in groups. The distraction caused by typing to other applicants was cited by the Commission as the reason for turning down the request without even assigning it a rulemaking number. The Commission will, however, continue to permit the use of typewriters by the handicapped, with advance notice.

No Autopatch Business Calls — Even if They are Important

The Private Radio Bureau also dismissed RM-3562, a petition that proposed allowing the use of autopatch facilities to make "important" but nonemergency business calls via Amateur Radio when a telephone was unavailable. The Commission summarized its action by saying that the proposal "is in serious conflict with the nature and purpose of the Amateur Radio Service." The petition was filed by Raymond Dopmeyer, NØBGP, at P. O. Box 228, Willmar, MN 56201.

FCC SUMMARIZES ACTION TAKEN IN SF BAY AREA JAMMING CASES

The FCC's regional director for the San Francisco Region has issued a public notice to inform the amateur community of the results and status of several cases of malicious interference involving amateur repeater operations in the Bay Area. The following is a summary of the FCC's updated information released February 26, 1981.

Traumann, KA6KXF

June 9, 1980: Official Notice of Violation was issued to *Marsha R. Traumann, KA6KXF*, 7525 Belle View Ave., Sebastopol, CA 95472, for alleged violation of Sections 97.7(e) — operation on frequency not authorized, 97.82 — unavailability of license during inspection, 97.84(a) — unidentified transmissions, 97.103 — nonmaintenance of station log and 97.121 — use of false call sign, as a result of monitoring and inspection performed May 21 and 22, 1980.

May 29, 1980: FCC's Private Radio Bureau set aside the recent grant of Ms. Traumann's license by telegram, thus returning her earlier application to pending status.

Latest known action: The Private Radio Bureau issued a letter February 3, 1981, stating its intent to designate Ms. Traumann's license application for hearing. If PRB receives no reply within 20 days, it will dismiss the application under Section 1.962 of the Commission's Rules.

Traumann, KB6IL

August 6, 1980: A certified letter was sent to *Pete D. Traumann, KB6IL*, 7525 Belle View Ave., Sebastopol, CA 94572, making inquiries about the May 21 and 22, 1980 operations involving Marsha R. Traumann, KA6KXF.

September 17, 1980: FCC issued Mr. Traumann an Official Notice of Violation, alleging violation of Sections 97.84(a) and 97.121, partly since he had later claimed to be the "control operator" during his wife's cited operations. (In view of the action being taken against KA6KXF, it does not appear that the Private Radio Bureau will take further action against KB6IL solely for the identical operations.)

Gilbeau, N6OZ

June 5, 1980: The FCC issued an Official Notice of Violation to *Donald E. Gilbeau, N6OZ*, 645 North Argonaut St., Stockton, CA 95203, for alleged violation of Sections 97.84(a) — failure to transmit call sign, 97.123 — unidentified signals and 97.125 — causing malicious interference, as a result of monitoring and inspection performed May 28, 1980.

atest known action: The Private Radio Bureau released an order February 13, 1981, ooking toward revocation of Mr. Gilbeau's tation license and suspension of his operator's icense. The Bureau has ordered Mr. Gilbeau to ile a written request within 30 days if he wants hearing. (The Order is a public document, nd limited copies may be requested from the FCC Office of the Regional Director, 211 Main t., Room 537, San Francisco, CA 94105.

Unlicensed Individual

August 14, 1980: The FCC sent a certified varning letter to a person residing in a single-amily dwelling located in Antioch, California, oncerning unlicensed operation on 147.66 MHz, as a result of monitoring and inspection ttempts during the evening hours of July 15, 980. The female resident at the located ad-ress did not hold an amateur license and has ot seen fit to reply to the warning letter. Although a major investigative case was pened in this matter, no subsequent operation s known to have taken place, and no addi-ional sanction action is anticipated, barring urther unlicensed operation. (Identification of he person involved is not now being released y the FCC.)

Rhoads

August 15, 1980: The FCC sent a certified varning letter to *Donald L. Rhoads*, 1214 Polk t., No. 232, San Francisco, CA 94109, oncerning alleged unlicensed operation and ule infractions on 146.22 MHz as a result of nonitoring and inspection performed July 23, 980. Alleged rule infractions include: 97.84(a) – identification, 97.113 — broadcasting, 7.115 — music, 97.119 — indecent language, 7.121 — false call sign and 97.123 — unidenfied signals. While Rhoads has no amateur uthorization, he does hold a valid restricted adiotelephone operator permit.

atest known action: On February 11, 1981, he FCC issued to Rhoads a Notice of Apparent Liability of Forfeiture in the amount of 750, pursuant to Section 503(b) of the Communications Act. As of the day the FCC's ublic Notice was released, Mr. Rhoads' 0-day response period had not yet passed.

Kerr, WA6JIY

eptember 3, 1980: FCC issued an Official lotice of Violation to *Gary W. Kerr, VA6JIY*, 1511 North Carlton, Stockton, CA 5203, or 130-1/2 East 3rd, San Dimas, CA 1773, for alleged violations of Sections 97.78 – not operating in accordance with good mateur practice, 97.113 — broadcasting and 7.125 — causing interference to normal peater operations, as a result of monitoring erformed August 6, 7, 8 and 10, 1980.

eptember 16, 1980: FCC's Private Radio ureau set aside the recent grant of Kerr's five-ear renewal application by telegram, thus eturning his application to pending status.

atest known action: On February 18, 1981, he Private Radio Bureau issued a Designation rder for a hearing on his renewal application. err was ordered to file a written request ithin 30 days if he wants to appear at the earing. If Kerr waives his right to a hearing, s renewal application will be dismissed with rejudice. (The Order is a public document, nd limited copies are available from the San rancisco Regional Office, FCC.)

ance, K6MMZ

eptember 5, 1980: FCC issued an Official Notice of Violation to *Allen R. Vance, K6MMZ*, 1718 High St., No. 3, Oakland, CA 94601, for alleged violation of Section 97.119 (indecent language) as a result of monitoring and inspection performed August 30, and September 4, 1980.

Latest known action: The FCC's Private Radio Bureau has apparently decided to take no further action in this manner, pending Vance's subsequent behavior.

McQuien, KA6KWN

November 18, 1980: FCC issued an Official Notice of Violation to *William R. McQuien, KA6KWN*, 127 Casey Dr., South San Francisco, CA 94080, for alleged violation of Sections 97.7(e) — operation on unauthorized frequency and 97.123 — unidentified signals, as a result of monitoring and inspection performed November 16 and 17, 1980. Because of certain misbehavior under CB station license KPC-7501 in 1978, McQuien had, as noted in a Private Radio Bureau letter of September 17, 1980, been issued a "short-term," one-year Novice license, pursuant to Section 1.110 of the FCC Rules. Mr. McQuien's amateur and CB licenses both expire later this year. Should he see fit to file a renewal application, the Private Radio Bureau may designate the matter for hearing.

FCC "CENSURE-Y" CLUB

K6EOA Revocation Proceeding

[The following is a report of the findings of fact by FCC Administrative Law Judge Lenore G. Ehrig in the revocation of license proceeding against John W. Munson, Jr., K6EOA. These factual determinations are subject to appeal for 30 days from the Decision's public release dated March 23, 1981. If no appeals are filed, the Decision becomes effective 50 days after its public release.]

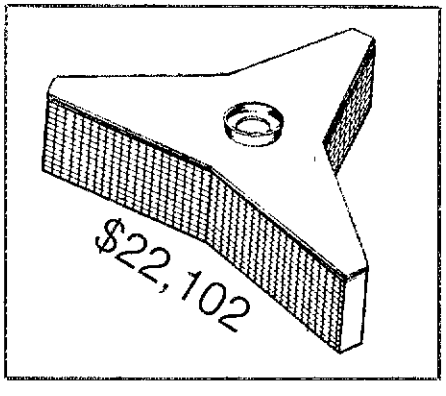
According to the Decision, on October 21, 1980, the Chief of the FCC's Private Radio Bureau issued an Order directing Munson to show cause why his license for amateur station K6EOA should not be revoked. The Order alleged that Munson made radio transmissions in apparent violation of the Commission's rules and of the Communications Act of 1934, as amended.

On October 2, 1979, according to the Decision, FCC engineers approached Munson's residence "within 15 minutes after monitoring and taping unidentified radio signals" emanating from his antenna. Munson "refused to allow the engineers to inspect his station" and told them to "leave the premises, which they did." According to the Commission Order, immediately after Munson's refusal the engineers monitored Munson transmitting "threats to kill the engineers." Munson, the Commission indicated, said that "he would kill the engineers if they came back to his home and that, if they did not return, he would go looking for them and kill them." The Order further indicated that as a result of Munson's threats, an arrest warrant and a search-and-seizure warrant were issued against Munson by the U.S. Attorney's office in Los Angeles. When Munson appeared at the Long Beach FCC office with a typed letter of apology, he was arrested and a search of his residence yielded a stolen transceiver, a loaded rifle, marijuana plants and transmitting equipment, all of which were seized. In The Decision, on March 19, 1980, Munson was indicted by a Federal Grand Jury for the threats. On May 23, 1980, however, the "Federal indictment was dismissed due to a finding by a court-appointed psychiatrist that Mr. Munson was psychotic and legally insane . . ." On September 15, 1980, a four-count Information was filed in the Superior Court of the State of California for the County of Los Angeles alleging that Munson, in his attempt to refrain FCC engineers from doing acts in the performance of their duties, threatened unlawful injury on them. The Order indicated that Munson pleaded guilty on November 26, 1980, and on January 8, 1981 was sentenced to 3 years probation, fined $500, directed to undergo psychotherapy and ordered not to use his station. Munson, according to Ehrig's Decision, testified that he had stated, "I would love to shoot be a couple of feds," and "maybe if I jam for four hours, they'll come back" at which point, "you gonna find some heavy metal in your belly . . ."

The Commission concluded: "In sum, Mr. Munson has been convicted of the felony of threatening, over Amateur radio, to kill Commission personnel. He has been found by a federal court-appointed psychiatrist to be legally insane. . . . He has willfully violated the Commission's Rules. Accordingly, Mr. Munson does not possess the necessary qualifications to be or remain a Commission licensee." — *Richard Palm, K1CE*

TWENTIETH ANNIVERSARY AMATEUR SATELLITE FUND DRIVE

The ARRL Foundation, in recognition of the need for further development of the Amateur Satellite program, recently initiated the Twentieth Anniversary Amateur Satellite Fund Drive. Last month in "Happenings" we reported the status of funds received and included a list of contributors of $100 or more. Every month, we'll continue to monitor the progress of the Foundation's satellite drive in the pages of *QST*. Why not become a part of Amateur Radio's tomorrow by sending your contribution today to ARRL Foundation, 225 Main St., Newington, CT 06111.



Recent contributors of $100 or more include: Richard C. Thompson, WA6NOL; James W. Goodwin, WB5JAO; Columbia (Maryland) Amateur Radio Association; Bellbrook (Ohio) Amateur Radio Club; Russell T. Lund, Jr., WBØLNG; C. Spencer Powell, W9FSD; Peter W. Glaser, W6OKG. — *Richard Palm, K1CE, Assistant Secretary, ARRL Foundation*

Correspondence

Conducted By Bruce R. Kampe,* WA1POI

THE WORLD WRITES BACK

☐ I read with interest VE2FSM's letter in *QST* Correspondence for March 1981. First, the expression "Canadian Sub-band" is a tongue-in-cheek reference to the fact that many VE hams historically used them to avoid "U.S. QRM." Concerning the rest of the letter, I think that Michael is the one who is not being considerate or thinking of others. He insinuates that the QRM in the rest of the band is because of the presence of U.S. hams. Do only U.S. hams use the "U.S. Sub-bands"? It would seem that U.S. hams are being told that they have to be excluded to preserve the scenic beauty of these frequencies. His point about amplifiers is well taken but accounts for only a fraction of the problems caused by sheer overcrowding. Moreover, why should only U.S. hams be discriminated against? Why not exclude JA (who outnumber U.S. hams), VE, G, F and all the other technologically advanced countries that have access to gear the equal of U.S. hams and leave these frequencies for the third-world countries that have a legitimate beef? There is no ITU regulation against U.S. phone-band expansion; the sub-band is a relic from the past. Although I personally don't care if we expand or not, the days when VE's (and most of the rest of the world) need to be "protected" from "U.S. QRM" are, touch to their credit, over. — *Kevin Olson, K3OX, Ridgefield Park, New Jersey*

☐ Mr. Masella bemoans the Americans, complaining about the cw use of the 20- and 40-meter bands. On more than one occasion, I have been on 10 meters, above the Novice bands, but below 28.5 MHz. After listening for several minutes and sending several QRL's and getting no response, I sent CQ. Several times, a ham speaking perfect English came back and proceeded to call me everything except late for dinner. He rudely informed me that this section is not for cw use, that I am not a gentleman and would I QSY. So, after moving back down below 28,200 MHz, and having not been given the other "informant's" call sign, I proceeded to conceal my frustration and anger.

Not to make it seem as if I take full offense to Mr. Masella's letter, I happen to agree with him about inconsiderate operators. I also (as 99% do) value my operating privileges very highly.

Not all U.S. hams are bad. To be sure, we have some, but so does every other country. Also, many of my finest QSO's have been with VE's. I ask that we exercise just a bit more caution on the air. — *Ed Pataky, KO5X, Houston, Texas*

WHERE ARE YOU?

☐ The new call-sign system has removed whatever QTH information there was in a call. Frankly, it was never very helpful. Yet, a little QTH informtion is often a help.

Instead of going to the FCC who will correctly tell us to mind our own business, I suggest that we "regulate ourselves."

My suggestion is that the ARRL encourage U.S. amateurs to add the two-letter state abbreviation to our calls when we call CQ. That is not hard, and it would really help those who want to work all states or tell where the band is open. This practice would be voluntary as it should be. During some contests we probably wouldn't want to use it. — *John Ailes, KS4D/VA, Fairfax, Virginia*

[Editor's Note: We would not want to confuse state abbreviations with country prefixes. N1AKB/CT could be in Connecticut or Portugal.]

LESS GLARE SAVES GREEN STUFF

☐ I have been mulling over your editorial, "Difficult Decisions in Difficult Times," March 1981 *QST*. I am in business and have been facing problems of a similar nature for a long time. Here are a few suggestions to help the League save money.

I have been annoyed by the glare from the coated paper used to print *QST*. It seems no matter where I read it I get reflections. Using a less expensive paper would surely save money and, as a side benefit, make me happier. Then, perhaps *QST* could reduce the technical articles by one each month and eliminate the *QST* Profiles column.

The Directors may believe these are impractical ideas; but I'm thinking, and perhaps better ideas will come forth. — *Karl Schworer, KA2BUF, Schenectady, New York*

A VIDEO ALTERNATIVE

☐ Last Saturday, February 14, I had the pleasure of viewing *The World Of Amateur Radio* on our local PBS TV station, and was impressed with the fine quality of the production. Please accept my compliments for a job well done. I am sure that many "non-Amateur Radio folks" were watching and now have a different, broader understanding of what Amateur Radio is all about. My thanks for the highly professional undertaking. I was proud of your efforts. — *Ted Yearsly, W3TY, Pittsburgh, Pennsylvania*

RULE CHANGES

☐ This is in reference to proposed rules changes to Sub-Part 97 (Docket 80-729). I *urge* you, with all due haste, to rally our membership against the proposed change to rule 97.1. The change itself, to better define the Amateur Radio service, is good and quite acceptable; but the *exclusion of the Basis and Purpose* of the service from the rules eliminates the very reason and need for our existence. It is these five principles which make us different and provide the essence of the Amateur Radio Service. Excluding them from a revised document would open the door to misunderstanding the service by any uninformed source, for whatever the reason.

The principles as they are now written are not difficult to understand; I would not be opposed to rewording, provided they (the principles) continue to be included in the sub-part.

I will make my comments known to the commission, and I sincerely hope that you will advise our membership to do likewise. — *Robert P. Erk, W3XN, New Britain, Pennsylvania*

☐ I write about the so-called plain language nonsense proposed by the FCC for all us undereducated, functionally illiterate, low-IQ folk who operate Amateur Radio or who would like to. Where does the FCC think we are from — Dullsville? Even through all the deregulation of recent years, we managed to maintain a certain pride in the fact that we could read (or understand, if it was read to us) on the eighth-grade level. Shall we try for the third grade?

When your ARRL advises you of proposed changes and when you are invited to express your comments, express them. You can bet your sweet rig that nobody else out there will do it for you. — *John B. Black, WD4CVR, Spartanburg, South Carolina*

HISTORY CAN HURT

☐ Some very valuable information is still missing from the ARRL *Handbook*. It seems that in 1753, in an attempt to measure the speed of electricity, the Abbe Mollet caused an electric charge to be administered to a circle more than 1.5 kilometers in circumference, in which 200 Carthusian Monks were linked together by lengths of iron wire. Since they all jumped simultaneously, the Abbe concluded that electric propagation was rapid indeed.

Later, Don Franciso Salva, of Barcelona, modified the system to a multi-wire arrangement in which screams of different pitches were used as a sort of shorthand telegraphy. We surmise that 73 wires and 73 monks were used in this experiment, giving rise to the expression "Best Regardses."

Final stroke, however, was made on a brilliant intuitional flash by an experimenter named Pithball Morris. He simplified to a two-wire system, in which a tall, skinny monk and a short, fat monk were connected to form dots and dashes. This was copied visually; but by raising the voltage, it could also be copied aurally. Thus, the Morris code was born. — *Keith Olson, W7FS, Belfair, Washington*

CALL SIGNS

☐ The new call-letter scheme put out by the FCC is ridiculous. The multitude of prefixes and configurations must be confounding to non-U.S. operators. Permitting licensees who change call-sign districts to keep their old calls will eventually make the "district digit" meaningless. Also, I intend to keep by W#xxx call and operate under my Advanced class privileges, even though my Group C call sign may mislead some into thinking I am a General class licensee. Has the FCC got this programmed into their computer, or will I be issued a "pink slip"? Under difficult receiving conditions, all sorts of errors can occur. KA#x can be read as A#xK , or NG#xx can be read as G#xxN. If the call sequences were limited to W#xx, W#xxx, and Wx#xxx, there would be 425,228 calls available for each district, leaving plenty of calls for licensees who are inactive or about to be cancelled! — *Ralph McFadden, WØOMJ, Lakewood, Colorado*

*Membership Services Assistant, ARRL

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

Malicious Interference — FCC Enforcement

Last month, we examined some of the regulatory aspects of the blight that is malicious interference. Because of the serious nature of the problem, we're continuing our discussion this month with a look at the various kinds of interference and a conspectus of recent FCC enforcement actions.

Q. What are the different kinds of interference?

A. According to an ARRL Interference Task Force report, "The term 'malicious interference' is really a misnomer, for it characterizes only one of the varieties of amateur-to-amateur interference. Such interference can be in one of four categories. It can be inadvertent: one can cause interference without meaning to do so. It can be careless: one can cause interference by not using a dummy load to tune up. These two categories, inadvertent and careless, account for over 90% of the QRM on the amateur bands. Interference can also be harassing if the intent is to disrupt communications deliberately, or it can be malicious if the intention is to do damage or to harm another seriously. . . . Amateurs, through local interference committees, should be able to handle virtually all cases of inadvertent and careless interference, and some cases of harassing interference, while seeking the Commission's help with only the more serious cases."

Q. Well, that's fine, but just what is the FCC doing about these "hard-core" offenders?

A. Table 1 presents a partial conspectus of FCC enforcement actions in recent malicious interference cases. Currently, the Commission is conducting active investigations in other serious cases. *QST* will continue to report these actions in "Happenings" FCC Censure-y Club.

Q. Is there anything brewing on the legislative front that may help amateurs and FCC in cases of interference?

A. Yes. Volunteers would be permitted to assist FCC in monitoring violations of amateur rules under a bill recently introduced into the House by U.S. Representative William E. Dannemeyer (R-California). The bill, known as H.R. 2203, is intended to give support to the hams' effort to combat malicious interference on the amateur bands. For more information on this bill, see April 1981 *QST* "Happenings" for a report by ARRL's Washington Area Coordinator, Perry Williams, W1UED.

Q. What is the single, most-effective means for an individual amateur to deal with malicious interference?

A. In a word — Ignore! In many cases, well-meaning operators are their own worst enemies by acknowledging or attempting to fight back the interference on the air. By ignoring offenders, you deprive them of their one need — infantile attention. Additionally, from an FCC Monitoring Station standpoint, you make their job easier by keeping your operation above reproach. QST

*Assistant Manager, Membership Services, ARRL

Table 1

A Sampling of FCC Enforcement Actions

WD8NLS Revoked

FCC Administrative Law Judge Edward Luton has revoked the license of Alexander G. Sullivan, WD8NLS. FCC monitored Sullivan transmitting in the 40-meter amateur band and, as a result, cited him for violation of §97.119 of the rules: Obscenity, Indecency and Profanity. The Commission also cited Sullivan for violations of Sections 97.113 and 97.115; Sullivan had rebroadcast a commercial fm station which contained music.

Sullivan claimed he was intoxicated at the time of his August 1, 3 and 5, 1978 transmissions. He also testified that his transmissions were made during a period when he was a member of an informal group which called itself the "anti-communist free thinkers net."

The Commission concluded that "Sullivan's conduct was contrary to the public interest, and he does not possess the qualifications to remain a Commission licensee."

FCC Catches Two Repeater Violators

The FCC, in response to complaints of malicious interference to amateur repeater operations in the San Francisco Bay area, investigated and issued notices of violation to two amateurs.

During the late evening hours of August 30, 1980, FCC officials observed the transmissions from a particular station operating on the input frequency of the Grizzly Peak repeater. These transmissions were constantly sprinkled with sexually explicit and vulgar terminology and were determined to be originating from a station assigned a K6 call sign and located in Oakland, California. Engineers from the Livermore and San Francisco offices conducted a follow-up investigation of the station and as a result, issued a citation for violation of §97.117, "Transmitting communications containing obscene, indecent or profane words, language or meaning".[1]

[1]§97.117 has since been redesignated §97.119.

As a result of a similar investigation of the Grizzly peak repeater by FCC officials, a General class licensee was issued a citation for violation of §97.78 (good amateur practice), §97.113 (broadcasting) and §97.125 (interference).

As of September 8, 1980, FCC has served notices to five different persons for observed violative operations while interfering with the Grizzly Peak repeater. — *FCC Public Notice*

KA1AQ Cited, Fined

James H. Rafuse Jr., KA1AQ, of Scituate, Massachusetts, paid a fine of $50 for violation of §97.121 (false signals). The Commission's attention was drawn to the operation of Rafuse by complaints of interference to several nets along the east coast. As a result of close FCC surveillance, Rafuse was cited for violation of §97.78 (good amateur practice) and fined for violation of §97.121. Rafuse was observed to call other stations between 5:57 P.M. and 6:05 P.M. on 3965 kHz without allowing time for answers between calls. He was further observed transmitting tape recordings of other stations without their authorization (the fine was levied for false call-sign transmission by way of these recordings).

WB2QHC Fined $2000

Steven M. Spicer, WB2QHC, from Niagara Falls, New York, has pleaded guilty in U.S. District Court to charges that he used Amateur Radio airwaves to broadcast obscene and indecent language and to threaten another person with injury. The incidents took place during the months of December 1979 and January 1980. Assistant U.S. Attorney Michael R. Lindburg prosecuted the case for the Government, and U.S. Magistrate Edmund F. Maxwell imposed the $2000 fine. Spicer was found to be in violation of Section 97.116 of the FCC Rules, which states, "The transmission of radiocommunication or messages by an Amateur Radio station for any purpose, or in connection with any activity, which is contrary to Federal, state or local law is prohibited." Under Title 18, U.S.C., §502 (The Communications Act), the maximum penalty is $500 per day for each violation. The investigation of Spicer was handled by the FBI and was made possible through the cooperation of local Amateur Radio operators.

WB6LHB Station License Revoked

In February 1979, Scott Lookholder, WB6LHB, was convicted in U.S. District Court after he pleaded guilty of violating Sections 97.119 (use of obscene, indecent or profane language) and 97.125 (intentional interference) of the Commission's Rules. No appeal has been taken from Lookholder's conviction and the time for filing an appeal has expired.

Accordingly, the FCC has revoked station WB6LHB. In its decision, the Commission said that "the transmission of radio communications containing certain explicit words or forms thereof) . . . are patently offensive to listeners. . . . Consequently, these expressions are prohibited by Section 97.119 of the Commission's Rules." The Commission also expressed concern that over 350,000 Amateur Radio licensees, plus shortwave listeners and those studying for an Amateur license, are constantly tuning in and out of the radio bands and are subjected to unexpected contents of the communications. Like the broadcast in the case of *FCC v. Pacifica Foundation*, 438 U.S. 726 (1978), "Lookholder's transmissions were uniquely accessible to children and could have enlarged a child's vocabulary in an instant, unlike written messages."

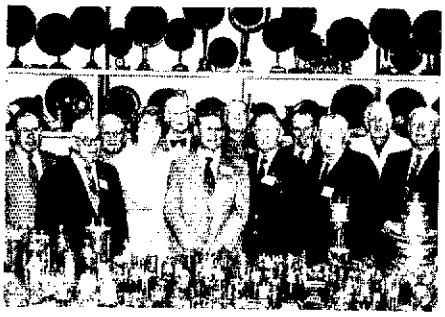
The Commission also noted that Lookholder's actions have outraged the amateur community. Therefore, it wants to assure the amateur community that it is prepared to act severely when FCC rules and regulations are blatantly disregarded by amateur licensees such as Lookholder. In light of Lookholder's criminal conviction, FCC has concluded that the license of station WB6LHB must be revoked.

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

Happenings

Tom Wong, VE7BC, of Burnaby, British Columbia, frequently makes business trips to mainland China. In January, the League sent Tom 18-1/2 tons of books to present to Chinese authorities on Tom's next trip to that country. In the shipment were 13,430 1979 and 1980 *Radio Amateur's Handbooks*, 6888 copies of *A Course in Radio Fundamentals*, and over 8000 copies of other League publications — 28,568 books in all. They are a gesture of goodwill, the gift of U.S. and Canadian League members to the people of China. They were being shipped to China at League expense, and were expected to arrive in the Peking area before Tom's visit to China on April 3. It is expected that by now Tom will have personally presented the books to the Institute of Radio Communications of China and the Chinese Radiosport Association, both educational and information-gathering organizations which may become instrumental in re-establishing Amateur Radio in China.



Fred Hammond, VE3HC; his wife Izzy; Marshall Killen, VE3KK; and 10 other friends, at the opening of Fred's new radio museum in the Hammond Manufacturing plant, in Guelph, Ontario.

Fred Hammond, VE3HC, has moved his extensive collection of radio equipment to a new, larger museum in the recently opened Hammond Manufacturing plant, on Curtis Drive, in Guelph, Ontario. The 1800 square-foot museum features displays of early radio parts, Fred's vast tube collection, early broadcast receivers and amateur equipment, including a working spark-gap transmitter, and a Paragon RA-10 receiver — the same model that Paul Godley took to England for the League's 1921 transatlantic tests. The museum is open weekdays from 8 to 5. Fred will make special arrangements for large groups and after-hours or weekend visitors. Visiting amateurs may operate the museum station, VE3BI, or look in down the hall, where Hammond Manufacturing builds its fine line of linear amplifiers and antenna tuners for the amateur market.

Lou Vermond, VE3BDV, and Dave Woodhouse, VE3HBA, are organizing a VE QRP club. If you are interested in building and operating QRP rigs, write to Lou at 83 College Ave. West, Guelph, ON N1G 1S2, for information. The club already has a station. You guessed it — VE3QRP!

This mobile OSCAR station, built and operated by Bert Anderson, VE4AP, is a real drawing card at Manitoba hamfests. Bert is 73 years young, active on all bands from 160 meters to 23 cm, and project manager for CARRC's new, portable EME station. Still, Bert finds time to help new hams. Bill Bowman, VE4AFO, writes, "If ever there was an award for 'Elmer of the Year,' this man would leave all others behind."

CRRL NEWS

RAQI, Radio Amateur du/of Quebec, has chosen the CRRL *Canadian Amateur Radio Licencing Manuals*, by Ralph Zbarsky, VE7BTG, to be translated into French, for adoption by their organization as the training manuals for French-Canadian amateurs. Details of the project are being worked out. It is expected that costs, distribution and profits will be shared by RAQI and CRRL, as both carry on their good work on behalf of Canadian Amateur Radio.

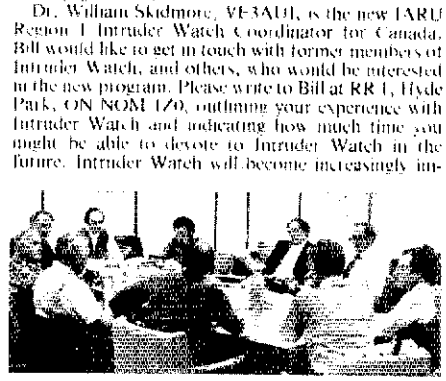
CRRL Counsel Bob Benson, QC, VE2VW, has been in touch with Tariff Division of Department of Finance again, this time to discuss how tariff item 44534-2 is being applied to amateur equipment with general-coverage receive capabilities. Tariff Division has assured Bob that it wants to permit duty-free entry of such equipment, but that this could require a rewording of the tariff item and possibly a new budget proclamation. Bob has suggested other courses of action, and a favorable outcome is expected soon.

CRRL Assistant Director Bill Loucks, VE3AR, represented amateurs at a meeting of CRTPB's Electromagnetic Interference Committee in Toronto in February. The committee discussed RFI created by devices such as home computers, and the susceptibility of home-entertainment equipment to such RFI. The committee proposed that USA write RFI standards for such equipment. Electrical equipment would have to meet these standards before being marketed in Canada. Bill judged the proposal to be of great potential benefit to radio amateurs.

Sid Jones, VE7FDR; Bill Gillespie, VE6ABC; John Gowron, VE4ADS; and Andy McLellan, VE1ASJ are new ARRL-CRRL assistant directors. Use them kindly, but use them. They are your League contact people. They have accepted these appointments because they want to serve you.

John, VE4ADS, is also CRRL's Executive Public Information Officer. He is looking for new PIA's (public information assistants), in all parts of Canada. If you would be willing to take on 10 to 12 mini-projects a year: visiting a club or group, lining up a news story on Amateur Radio, setting up a library book display and the like, write to John at 229 Kisel Bay, Winnipeg, MB R3M 3J8.

Dr. William Skidmore, VE3AUI, is the new IARU Region 1 Intruder Watch Coordinator for Canada. Bill would like to get in touch with former members of Intruder Watch, and others, who would be interested in the new program. Please write to Bill at RR 1, Hyde Park, ON N0M 1Z0, outlining your experience with Intruder Watch and indicating how much time you might be able to devote to Intruder Watch in the future. Intruder Watch will become increasingly important in the next few years, as we begin to gain access to our new WARC bands.



CRRL and CARF representatives meet with DOC in Ottawa on January 26, to discuss a new, revised, TRC-24. Seated around the table, clockwise from lower right, are CARF's VE3NR, VE3IDW, VE3AHU and VE3ZS. Next, DOC's Lloyd Nelson and Jean-Jacques Rousseau; CRRL's VE7BTG; DOC's Peter Fitzgerald; CRRL's VE3OT; and DOC's Larry Greetham. Also in attendance for CRRL: VE3GRO.

UPCOMING HAMFESTS AND CONVENTIONS

Here's a list of the events we know about at press time.

June 13: Central Ontario Amateur Radio Flea-market and Computer Fest, at Regal Hall, Guelph. Contact VE3DGA for information.

July 4-5: Maple Ridge Hamfest, at the fairgrounds, Maple Ridge, British Columbia. Contact VE7HI for information.

July 10-12: Ontario Hamfest, at Milton Fairgrounds, Milton. Contact VE3DUF for information.

August 1: Northern Alberta and Lakeland ARC Hamfest, at Andrews Fairgrounds, Lakeland. Write to Box 2049, Leduc, AB T9E 2Z3 for information.

August 22-23: Maritime Old-Timers' Club Convention, at Mount Allison University, Sackville, New Brunswick. Contact VE1SH for information.

October 2-4: Radio Society of Ontario Convention in Kitchener. Contact VE3AVY for information.

And, finally, mark your calendars now! The Saskatoon Amateur Radio Club will be hosting the ARRL-CRRL Midwest Convention, to be held next year, July 2-5, 1982, in Saskatoon, Saskatchewan. It promises to be a good one.

CRRL AMATEUR OF THE YEAR AWARD

Nominations for CRRL Amateur of the Year should be in by June 30, 1981. The CRRL Board will vote on the final ballot shortly after that date. The award will be presented at the 1981 RSO Convention, in Kitchener, on October 3. Submit your nominations, with documentation, to CRRL, Box 7009, Station E, London, ON N5Y 4J9.

*163 Meridene Crescent West, London, ON N5X 1G3

International News

Conducted By David Sumner,* K1ZZ

India Liberalizes Amateur Equipment Imports

Radio amateurs in India have achieved a breakthrough in their efforts to solve the problem of obtaining equipment. The manufacture of communications equipment in India is a government monopoly, and demand is such that even the needs of the government itself cannot be fully met. At the same time, import controls have severely limited the amount of equipment brought into the country from abroad.

Prominent Indian amateurs had been making representations to the government for several years, requesting relaxation of import controls. Until recently, however, their efforts had not met with success.

Last year, an improvement in the foreign-exchange position enabled the government of India to make concessions to certain groups, such as scientists and professionals, who were allowed to import equipment for their personal use to a value of Rs.10,000 (about U.S. $1200). Indian amateurs saw an analogy between the scientists and the amateur community, and convinced the Electronics Commission that the extension of similar privileges to amateurs was the only solution to the equipment problem. The communications link set up at Morvi by Indian amateurs in 1979, after the bursting of a dam had killed an estimated 30,000 people, provided convincing evidence of the utility of Amateur Radio to the nation.

Relentless representations to the various ministries finally resulted in the inclusion of radio amateurs in the category of scientists, and they were allowed the privilege of importing test equipment up to a value of Rs.10,000 per year. There were more representations, and the momentous decision was announced to permit the import of "Amateur Radio communication equipment including kits, accessories (including antenna rotator motors, feed lines and standing-wave-ratio bridges), instruments, spares and components" up to the same limit, without the need for a formal import license.

Indian amateurs are not resting on their laurels. They are continuing their efforts to have the manufacture of simple amateur equipment thrown open to private industry, so that it can be made available to the less-affluent amateur at prices expressed in hundreds of rupees instead of thousands, which is the case with imported equipment. It is hoped that another breakthrough is on the way, which will help Amateur Radio in India to become more accessible to the common man. — *K. Rama and D. H. Rankin*

"Public Service," *QST*, Dec., 1979, p. 106.

IARU Regional Secretariats

Region 1 (Europe, Africa, USSR)
R. F. Stevens, G2BVN
1 Priory Court
Barley Lane, Goodmayes
Essex 1G3 8XN England

Region 2 (North and South America)
Pedro Seidemann, YV5BPG
P. O. Box 2253
Caracas 101
Venezuela

Region 3 (Asia, Oceania)
David H. Rankin, 9V1RH
P. O. Box 14, Pasir Panjang
Singapore 9111
Republic of Singapore

*Assistant General Manager, ARRL

NEW ZEALAND AMATEURS CAN USE 7100-7300 KHZ

Before WARC-79, New Zealand amateurs requested and were granted permission to operate in the segment 7100-7300 kHz on the condition that harmful interference was not to be caused to the broadcasting service operating in that portion of the 40-meter band. The New Zealand Post Office has now confirmed that this arrangement will be continued in view of the fact that WARC-79 did not resolve the problem of broadcasting at 7100-7300 kHz.

PHILIPPINES TO RELEASE 10-MHZ BAND TO AMATEURS

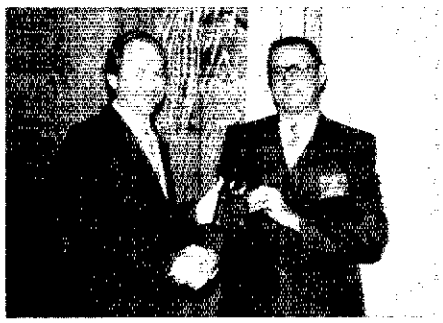
The National Telecommunication Commission of the Philippines has confirmed that it intends to permit its Amateur Radio licensees to operate in the new 10.1-10.15 MHz band effective January 1, 1982. Present thinking in the Philippine Amateur Radio Association (PARA) is to recommend that single-sideband operations be permitted in the band, but only in the upper 25 kHz. PARA notes that in parts of the world where there are relatively few amateurs, limiting the band to cw and RTTY operation is not as attractive an idea as it is in countries with large amateur populations.

PARA also has expressed optimism at the prospect of amateurs in the Philippines being permitted to operate in the 220-225 MHz band. The band is not allocated to the Amateur Service in Region 3, but a country may permit operations outside the International Table of Frequency Allocations provided that harmful interference is not caused to stations operating in accordance with the Table. QST

Strays

AMATEURS PROVIDE OLYMPIAN COMMUNICATIONS

Ithaca will be the host city of the New York State Special Olympics to be held on June 12 to 14 at Southside High School. Last year more than 100 Rookies Amateur Radio Association members from the area provided such effective and reliable communications that Ithaca was, in an unprecedented decision, chosen as host city for the second year in a row. Area amateurs interested in participating in this year's event should contact Jack A. Daugherty, WA2PGS, 318 W. Lenox Ave., Ithaca Heights, NY 14903.



West Gulf Division Director Raymond Wangler W5EDZ (right) presents a plaque to Neal Martin, WA5ESR, for his service to Amateur Radio through the SKYWARN program in conjunction with the National Weather Service. *(photo courtesy of W5EDZ)*

ARRL BULLETINS

ARRL bulletins are being printed on the Portland Apple Bulletin Board System and may be accessed by calling 503-224-6409. *Jeff Friedman, K2IF*

I would like to get in touch with . . .

amateurs interested in establishing a net to exchange video recordings and information about video equipment. Howard A. Sine, WB4WNF/KL7, P. O. Box 83370, North Pole, AK 99705.

anyone having contacts with amateurs in or near Berne, Switzerland. John Herman, K9WMD, 411 Woodland Ave., Bloomington, IL 61701.

The New Frontier

The World Above 1 Gig

Conducted By Bob Atkins,* KA1GT

Microwave Contests

Charlie Suckling, G3WDG, the RSGB microwave columnist, and his wife Petra, G4KGC, visited the KA1GT QTH recently. Among the many subjects that came up for discussion was that of microwave contests. During this discussion it was suggested that stations in the USA might like to enter this year's RSGB microwave contest. The organization of this contest has a number of features which might be new to many readers — features which bear careful consideration in plans that may be made in the future concerning the organization of a microwave contest in the USA. For this reason I will go through a number of these rules and the rationale behind them.

The first question to be asked about any contest is why have the contest at all? Exchanging numbers and winning certificates does not seem to me to be a good reason to hold a contest. On the bands above 1 GHz activity is low and equipment is usually of a home-constructed and experimental nature. It seems reasonable that any microwave contest should be geared to promoting activity on a long-term rather than a one-shot basis, and to giving an opportunity to test out new equipment and ideas. How can a contest achieve these goals?

The RSGB microwave contest is what is called a "cumulative contest." This means that the contest is split up into a number of relatively short operating periods. In the case of the 10-GHz event there are six operating periods of 11 hours each, spaced at monthly intervals. The contest score is taken as the sum of the scores of the best three operating periods. This means that you don't have to enter all six operating periods to win the contest (though, obviously, the more you enter the better your chances will be of getting three high scores). The operating periods are short (let's face it, there aren't that many stations to work) so this means that large amounts of time do not have to be committed to radio operating in the face of conflicting domestic requirements. The contest is evenly spread out over six months, which sustains a level of activity and allows changes and experimentation in equipment design between operating periods. There are six operation periods, which increases the chances of at least one of them coinciding with enhanced propagation conditions (and lowers the chances of portable stations' operation being hampered by bad weather for the whole contest). The scoring system for this contest is based on distance. Distance is hard won on the microwave bands and the only equitable scoring system is one that awards more points for longer-distance contacts. This brings up the subject of locator systems for determining the distance between stations. This subject has been aired a number of times by Bill Tynan in "The World Above 50 MHz" and requires no further comment here (see his September 1979, September 1980 and February 1981 columns). You may also note in the rules of this contest that crossband contacts are permitted (for half points). In developing equipment for the microwave bands, it is often the case that a receive converter is the first piece of equipment to be built; and since we are trying to encourage activity with the contest, it seems only logical that it be allowed to be used in crossband contacts in the hope that perhaps next time a transmitter will be constructed for a full two-way QSO.

Listed below are the dates, operating times and bands for the 1981 RSGB microwave contest. You may note that there are really five different contests under one heading. The 10-GHz contest (six operating periods, best three scores count), a 24-GHz contest (two operating periods, all scores count), a 5.7-GHz contest (two operating periods, all scores count), a 3.4-GHz contest (one operating period) and a 2.3-GHz contest (one operating period). The operating periods are from 9 A.M. to 8 P.M. local time on the following dates and bands: April 19 — 10 GHz and 3.4 GHz, May 17 — 10 GHz and 24 GHz, June 21 — 10 GHz and 5.7 GHz, July 19 — 10 GHz and 2.3 GHz, August 16 — 10 GHz and 24 GHz, and September 13 — 10 GHz and 5.7 GHz. Unfortunately the April date will have passed by the time you read this, but there are plenty more operating periods to go!

Rules, 1981 RSGB Microwave Contest

1) Contest exchange is RST plus sufficient information on QTH to enable score to be calculated, as in rules 2 and 3 (e.g., lat. and long. to nearest minute).

2) Score 1 point per kilometer for completed 2-way QSOs on any band.

3) Score 1/2 point per kilometer for 1-way (crossband) QSOs.

4) Portable stations may change site once during any operating period. A move of less than 5 km does not count as a change of site. If a station is worked (twice during one operating period (from different sites) only the larger scoring contact will be counted.

5) Portable stations may change site between operating periods.

6) The final score is the sum of the best three operating periods for the 10-GHz contest; for the 2.3-, 3.4-, 5.7- and 24-GHz contests all scores count.

7) All stations, whether or not ARRL or RSGB members, may enter.

8) Final log entries should be submitted before September 30 to KA1GT c/o ARRL, and they will be forwarded to the RSGB.

9) An award will be made to the leading U.S. station(s).

So there you have it. If you want a microwave contest to enter, you now have one! Unfortunately there is no 1.3-GHz operation, but perhaps in the future we can do something about that, too.

CONFERENCES

Here are more details on the Eastern VHF/UHF Conference (see last month's column). Pre-registration for the conference ($13.50) and the banquet ($13.75) is required by May 10. Registration will be $20 at the door. Pre-registration may be made with Rick Commo, KF1OG, 3 Pryor Rd., Natick, MA 01760.

Details of the West Coast UHF Conference arrived a little late, but news is that it will be held May 1-3 at the Sunnyvale Hilton, 1250 Lakeside Dr., Sunnyvale, CA 94086.

LOW COST GaAs FET PREAMPLIFIER

The use of GaAs FETs in preamplifiers is often desirable for two reasons. First, GaAs FETs often have a lower noise figure at microwave frequencies than bipolar devices and, second, GaAs FETs usually have a much wider dynamic range than bipolar devices and are thus much less susceptible to intermodulation problems when used in a strong-signal environment. The preamplifier described in this column in January shows both a very low noise figure and good dynamic range but uses a relatively expensive transistor. Though it provides a somewhat higher noise figure, the 3SK97 GaAs FET can be substituted in this circuit with the modifications shown in Fig. 1. The 3SK97 is a dual-gate device. The signal is applied to gate 1, and gate 2 is biased as shown by 10-kΩ resistors to ground and to the positive supply. The 5.1-volt Zener shown in the circuit in the January column may be changed to a 7-volt device. The source resistor is changed from 100 ohms to 68 ohms or may be adjusted to give an I_d of about 15mA. Under these conditions the preamplifier shows a noise figure of around 2.5 dB and a gain of 10 to 12 dB with high stability. This preamplifier has shown good resistance to intermodulation problems in a local, high-rf environment, where an NEC 64535 bipolar preamp was almost unusable without a cavity filter because of intermodulation problems from nearby commercial broadcast transmitters. Though its noise figure is not particularly low by today's state-of-the-art standards, it should still provide improved performance when used with any of the commercially available receive converters or transverters. At the time of writing, the 3SK97 is available at a price of $8 from Lunar Electronics, 2785 Kurtz St., No. 10, San Diego, CA 92110. Since the 3SK97 is a relatively inexpensive device and has an inherently higher noise figure than the NEC 24483, which was used in the original circuit, some circuit economies may be desirable. BNC-type connectors are quite acceptable on the input and output of this preamp, and ceramic piston trimmers may be used to tune the input and output lines without too serious an effect on circuit performance. It isn't cost effective to use four $6 trimmers with a $5 transistor, though of course they will work very well! DST

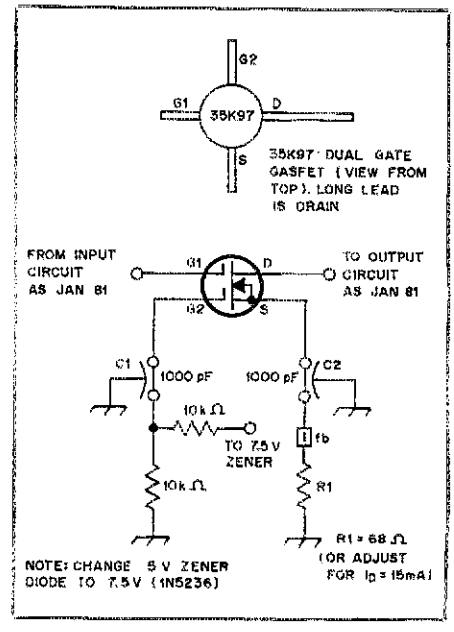


Fig. 1 — Modifications to the WB5LUR preamp (see January 1981 column) to use 3SK97 dual-gate GaAs FET.

*c/o ARRL, 225 Main St., Newington, CT 06111

How's DX?

Conducted By Ellen White,* W1YL/4

DXing On the Human Side

March "How's" elicited an interesting letter from Mary, KA7FEF, reminding us that our comment on "easy" in reference to certain countries was, perhaps, editorially simplistic. In truth, your writer should have indeed prefaced that remark with another one indicating that "easy" depends on lots of factors, not the least of which is *where* you're located. Generally speaking, West Coast amateurs have an easier time of it with paths to the Pacific and Asia, while West Coasters claim that East Coasters find Europe as easy as shooting fish in a barrel.

What is difficult and what is simple is a very personal thing. Think back to your earlier DXing days and reflect on how "hard" those first countries were and how your experience, confidence, station (and perhaps sun spots!) have made them "easy" DX today.

Mary added something very special to her letter — a copy of a note to her from a JA. We reproduce the note below to refresh the perspective we've all shared from time to time — the special quality of DXing allowing us to share personal insights into a different country, a different culture — what DXing is really all about. When was the last time *you* shared a little of your way of life with a new friend a "country or more" away?

Dear my friend Mary;

Thank you very much for the fine QSO and the opportunity to QSL direct to you. I received your hand made QSL today. And I'm so glad to received from you. I prefer to QSL direct because I feel it helps bring people together as friends.

As I said I'm a research student at university. I'm making special study of physics. I've been a radio amateur for five years and active on 15 m band and like to QSO with U.S.A. Because it's my wish to foster friendship and build up international understand through amateur radio.

How many do you have in your family? I've parents and one elder brother but no sister. hi hi My father keeps a small office which is concern in news paper co. Elder brother has already graduated from graduate school in university and he now working for a company. My other hobbies are reading, sports (Judo, baseball, etc.) and wander in the mountains near by on a holiday.

Mary's pen pal winds up asking her to ask questions and apologizing for his lack of proficiency in the English language.

Amateur Radio: the unique ability to foster and enhance international goodwill. Do *your* share!

Here's what the J2ØIA Abu Ail crew looked like (obviously *before* their hectic operation). From left to right: Pierre, J28AZ; Franz, DJ9ZB; Didier, TU2IR; Dave, K6LPL; and Joe, F6ATQ. Right photo: A shot of Abu Ail. Catch K6LPL's early spring Fernandez operation? QSL via W6ORD. In the meantime, stand by for receipt of documentation by the ARRL DXCC crew *(K6LPL, DJ9ZB photos)*

CAUSE FOR CONCERN

One respondent to our plea for column input wrote thoughtfully about contributing problems plaguing hf DXing today. He feels, and his feelings *are* shared by many, that malicious interference continues to be a grave cause for concern. It is a tough problem, one best addressed by not lowering yourself to the level of those perpetrating the nonsense. If you succumb to the human temptation, it not only demeans you, but it also increases the impression that more persons are involved in the antics then there really are.

On an auxiliary tack, this well-experienced radio amateur feels that some phone stations continue to abuse speech-processing accessories — enough said. Our writer has an evident strength of character we could all use — he keeps a current card file of countries worked-confirmed and has enough self-discipline to keep from jumping into a pileup for a country he already has "just to flex his muscles."

Another writer, not caring to be identified but justly irate nevertheless, angrily wrote that following his recent return to hf his modest signal was stomped on repeatedly by "tuners-up." He feels these thoughtless individuals appear to have moved straight from 27 MHz onto our DX bands and observes that a dummy load is a minor investment. His final observation dwelt upon a missing item in FCC testing: the how-why-what of *courtesy*.

So, problems begin to become delineated. But how so solutions? Is it enough to say we've got problems and let the *other* guy go ahead and so something about it? Does the shoe fit?

TIMELY TIPS

☐ A planned March start-up by 9Y4CDR will, hopefully, last till the middle of September with Mike, N5CDR, principally active on the lower end of the 10-and 15-meter phone bands. He also will be trying out his beginning fist with patient tyros in the Novice portions of the bands — speed demons take note! Times to watch are from 2000 to 0400Z daily. His station in Trinidad will be a TS-830S, SB-201, and Wilson System-33 Tribander plus a 40-meter dipole. QSLs sent to his manager, WD5JOL, will get speedy replies, particularly if accompanied by an s.a.s.e.

☐ VE3BCZ has been getting numerous cards from U.S. hams for 4S7CF contacts. K1ZZ reminds us that the place to send those cards is VE3BOZ.

☐ Last month should have seen operation from Hawaii, Palmyra and possibly Kingman from AD0S, W6TPH and KB7NW. All cards go to George Carleton, AD0DS, Box 43, Merrifield, MN 56465.

☐ TL8CN's logs have not as yet arrived, reports N5JM. Please, when filing your QSLs with this manager, to be patient while you AS.

☐ The Amsterdam DX Club offes the Amsterdam DX Certificate (ADXC) upon submission of proof of two-way QSOs with 10 club members (who have to have received *your* card). Counts are valid from January 1, 1957, any mode, and may be supplied in the form of a log extract signed by yourself and two fellow hams. The application should be accompanied by 6 IRCs (or $3 U.S. or DH. 5). Send your entry to ADXC, Box 9, 1000 AA, Amsterdam, Netherlands. When the band is open to Europe keep this list in front of you and have some fun working their club members: PA2s JSL MAX RPC SWL, PA3s AAI AAR ACC ADI AJW ASD ASF ASI AUB AWX BAC BAV, PA0s, ANH ASD AWJ BEA CHN CTO DOG EED END FCM FMK GAR GPA HAI HIL HPO IF IWO JAC JEI JPC JVB JWA KHR KJH KST LGJ LGR LRK MFC MIR MJA NIC NLC NMN OI PAN PAU PER PJE PRY RCA RHA TAP TKS VDW WFB WIK WIL WS, PD0s BAK BAI CBH DEI GDZ HAV HHW HKM HVP HXZ IIP IND JBL JHN JKU JMG JMH JOI JOV, PEIs AMI BMX BVI CDK CRT CSW DGZ DTY EXR FFV FHS FIF FKF, PK4ASD. (Note: PD/PE stations operate vhf/uhf only.)

☐ The Wiesbaden Amateur Radio Club will sponsor its sixth annual DXpedition to Liechtenstein on May 23-31 using the call DA1WA/HB0. Operating modes will be cw, phone and RTTY on all bands; OSCAR Mode A; cw and ssb on 160 meters; and 6-meter to 10-meter crossband operations. For American Novices, cw operations will be attempted on 3.725 and 21.120 MHz, ± 5 kHz, between 1900-2100 hours EST. The QSL manager is DJ0IC, Dr. Hugo Jakobljevich, Am Weinburg 10, 6200 Wiesbaden-Auringen, West Germany. Stateside QSLs may be sent, along with an s.a.s.e., to Mr. Stephen Hutchins, Box 4573, APO New York 09109.

RECORD KEEPING REVISITED

WA4NEU uses a Rolodex with dividers for each alphabetical section. On the little cards he notes stations worked in pencil, inking the call in upon receipt of the DX QSL. A notation on the card designates the band, zones and sometimes beam headings. This system could also be used to note the operator's name, etc. Bud also reminds neophytes of VE3GCO's *Towards Directory of the World*, which contains good formats for DXCC record keeping.

On the other hand, VE3BTQ/W4 likes the notebook approach, listing prefixes vertically down the page on the left and ruling the remaining section of the page into columns for bands and zone. Each of the new columns is again bisected vertically for phone and cw. Jack then fills in the call letters of the station worked on band/mode using colored pencils/pens, which indicate QSL disposition. For example, he uses a blue pen for *QSL sent* and a red one for *QSL received*. VE3BTQ finds that 13 pages will comfortably handle all the listings on the ARRL Country Compilation, all placed within a school-type binder for neatness and ease of use. The system has worked just fine for him for the past five years.

WA4QZX's method is simple and inexpensive: using the DXCC List as a score card, Bob uses a color to indicate how he QSL's (pencil for bureau, blue for direct, green for manager, red for confirmation in hand). In addition, circles indicate 10 meters, triangles

*19620 SW 234 St., Homestead, FL 33031

15 meters, squares — 20, etc. An inspection of his checklist might find that opposite country A3 is a green square and a red triangle. This would indicate that he has A3 confirmed on 15, plus a card on the way to the manager for a 20-meter QSO.

DEGREE OF DIFFICULTY

Continuing along with this story and keeping in mind KA7EEF's cautions, we find those countries with a small resident amateur population. Often, DXpeditions plus the good propagation we've been enjoying make them good possibilities for addition to your own DXCC totals. These difficult prefixes include: 3A 3B6 3B9 3C 3C0 4S 5V 6O 8Q 9M8 9U 9X A3 A5 A6X A7X BV C2 CE0Z CR3/5 CR9 D2 D6 FA9 FP FR8 FR8Z FH FK FR(Glorioso Is.) FR(Juan de Nova) FR(Tromelin, Wallis & Futuna) H4 HC8 HK0(Baja Nuevo) HK0(Malepo Is.) HV JD(Minami Torishima) JD(Ogasawara) JW JX KB/KH1 KC4/KP1 KC6(Eastern Caroline Is.) KC6(Western Caroline Is.) KH7 KL/KH3 KM/KH4 KP3/HK0 KP4(Desecheo Is.) KP6/KH5 KW/KH9 OJ0 P2 PY0(Fernando) PY0(Trindade) S2 S1 ST0 SU SV(Crete) SV(Dodecanese Is.) SV(Mt. Athos) EA 7H9 TN TR TY UA1(Franz Joseph Land) UG6 UH8 UI8 UJ8 VE1(Sable Is.) VK9(Lord Howe Is.) VK0(Macquarie Is.) VK9(Cocos Is.) VK9(Christmas Is.) VP8(South Georgia Is. VP8(South Orkney Is.) VP8(South Sandwich Is.) VP8(South Shetland Is.) VR6 VS5 XF4 XT1 YI YV0 ZD7 ZD9 ZK1(North Cook Is.) ZK2 ZL(Auckland & Campbell) ZL(Charham Is.) ZL(Kermadec Is.) ZM7 ZS2. QST

QSL Corner

Administered By Joan Becker

The ARRL DX QSL Bureau System (Incoming)

Within the U.S. and Canada, the ARRL DX QSL Bureau System is made up of call area bureaus that act as central clearing houses for QSLs arriving from foreign countries. These "incoming" bureaus are staffed by volunteer workers. The service is free and ARRL membership is not required.

How it Works

Most countries have "outgoing" QSL bureaus that operate in much the same manner as the ARRL Membership Overseas QSL Service. The member sends his cards to his outgoing bureau where they are packaged and shipped to the appropriate countries.

A majority of the DX QSLs are shipped directly to the individual incoming bureaus where volunteer workers sort the incoming QSLs by the first letter of the call sign suffix. One individual may be assigned the responsibility of handling from one to three letters of the alphabet.

For detailed information on the operation of the bureau serving your district, please send an s.a.s.e. for a prompt reply.

Claiming Your QSLs

1) Send a 5- × 7 1/2-in. s.a.s.e. to the bureau serving your district.

2) Neatly print your call sign in the upper left hand corner of the envelope.

3) A preferred way to send envelopes is to affix an 18-cent stamp. If you expect to receive more than 1 oz. of cards, please affix postage accordingly.

4) When requesting *any information* from the bureau serving your district, always include an s.a.s.e. for a prompt reply.

Some incoming bureaus sell envelopes or postage credits in addition to the normal handling of s.a.s.e.'s. They provide the proper envelope and postage upon prepayment of a certain fee. The different stages of presorting and sorting cards take time. A period of 6 to 8 months, or longer, may take place before you receive your cards.

Helpful Hints

Good cooperation between the DXer and the bureau is important to ensure a smooth flow of cards. Remember that the people who work in the area bureaus are volunteers. They are providing you a valuable service. With that thought in mind, please pay close attention to the following DOs and DON'Ts.

DOs

Do keep self-addressed 5- × 7-1/2-in. envelopes on file at your bureau, with your call in the upper-left corner, and affix at least one unit of first-class postage.

Do send the bureau enough postage to cover envelopes on file and enough to take care of possible postage-rate increases.

Do respond quickly to any bureau request for envelopes, stamps or money. Unclaimed card backlogs are the bureau's biggest problem.

Do notify the bureau of your new call as you upgrade.

Do include an s.a.s.e. with any information request to the bureau.

Do notify the bureau *in writing* if you *don't* want your cards.

Do be appreciative of the fine efforts of these volunteers.

DON'Ts

Don't expect DX cards to arrive for several months after the QSO. Overseas delivery is very slow. Many cards coming from overseas bureaus are over a year old.

Don't send your outgoing DX cards to this bureau (see "ARRL Membership Overseas QSL Service" in this column every other month).

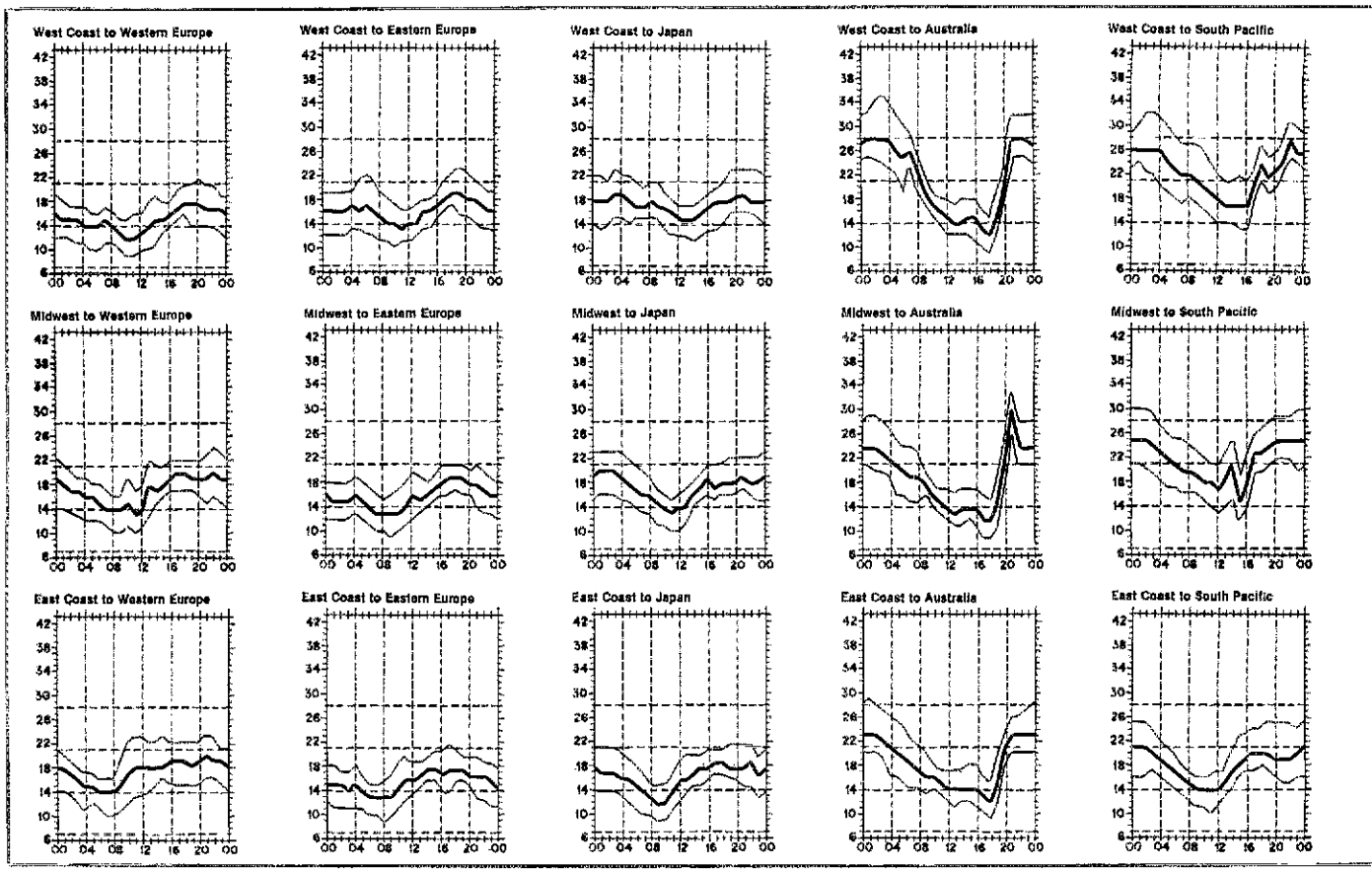
Don't send envelopes to your "portable" bureau. For example W4ISQB/2 sends envelopes to the W1 bureau, *not* the W2 bureau.

ARRL DX QSL Bureau System

First Call area: all calls* — Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.

Second Call Area: all calls* — North Jersey DX Assn., P. O. Box 8160, Haledon, NJ 07538.

Third Call Area: all calls* — Leon Lapkiewicz,



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for 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

K3GM, P. O. Box 6238, Philadelphia, PA 19136.

Fourth Call Area: single-letter prefixes — Mecklenburg ARS, P. O. Box DX, Charlotte, NC 28220.

Fourth Call Area: two-letter prefixes — Sterling Park Amateur Radio Club, P. O. Box 599, Sterling Park, VA 22170.

Fifth Call Area: all calls* — ARRL W5 QSL Bureau, Box 1690, Sherman, TX 75090.

Sixth Call Area: all calls* — ARRL Sixth (6th) District DX QSL Bureau, P. O. Box 1460, Sun Valley, CA 91352.

Seventh Call Area: all calls — Willamette Valley DX Club, Inc., P. O. Box 555, Portland, OR 97207.

Eighth Call Area: all calls — Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.

Ninth Call Area: all calls* — Northern Illinois DX Assn. Box 519, Elmhurst, IL 60126.

Zero Call Area: all calls* — WØ QSL Bureau, Ak-Sar-Ben Radio Club, P. O. Box 291, Omaha, NE 68101.

Puerto Rico: all calls* — Radio Club de Puerto Rico, P. O. Box 1061, San Juan, PR 00902.

U.S. Virgin Islands: all calls — Graciano Belardo, KV4CF, P. O. Box 572, Christiansted, St. Croix, VI 00820.

Canal Zone: all calls — LPRA, P. O. Box 9A-175 Panama 9A, Republic of Panama.

Hawaiian Islands: all calls* — John H. Oka, KH6DQ, P. O. Box 101, Aiea, Oahu, HI 96701.

Alaska: all calls* — Alaska QSL Bureau, 4304 Garfield St., Anchorage, AK 99503.

Guam: AH2, KH2, WH2 and KG6 calls — Joseph J. Frekot, AH2G, P. O. Box 7227, Tamuning, Guam 96911.

SWL — Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

QSL Cards for Canada (VE and VO) may be sent to: CRRL Central QSL Bureau, Kennebecasis Valley Amateur Radio Club, Box 51, St. John, NB E2L 3X1. Or, QSL cards may be sent to the individual bureaus.

VE1* — L. J. Fader, VE1FQ, P. O. Box 663, Halifax, NS B3J 2T3.

VE2 — A. G. Daenen, VE2IJ, 2960 Douglas Ave., Montreal, PQ H3R 2E3.

VE3 — The Ontario Tollhums, P. O. Box 157, Downsview, ON M3M 3A3.

VE4* — W. A. Stunden, VE4BJ, 578 Oxford St., Winnipeg, MB R3M 3J9.

VE5 — A. Lloyd Jones, VE5JI, 2328 Grant Rd., Regina, SK S4S 5L3.

VE6* — G. D. Holeton, VE6AGV, 4003 First St., N.W., Calgary, AB T2K 0X2.

VE7* — Burnaby ARC, Box 80555, South Burnaby, BC V5H 3X9.

VE8* — Rolf Ziemann, VE8RZ, 2888 Lanky Ct., Yellowknife, NT X1A 2G4.

VO1, VO2 — CRRL VO QSL Bureau, P. O. Box 6, St. John's, NF A1C 5H5.

VY1 — ARRL QSL Bureau, W. L. Champagne, VY1AU, P. O. Box 4597, Whitehorse, YT Y1A 2R8.

*These bureaus sell envelopes or postage credits. Send an s.a.s.e. to the bureau for further information.

QSL MANAGER VOLUNTEERS

WD9IHW¥	K5QPT
WD9IHZ/K	KB9TA
WA2PMW	KC4MJ

KB2KM and KB2KN are not the QSL manager for YJ8NPS.

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

CT1AVW (K5ODD)
EM6CX (UF6CX)
EM6EAO (UF6EAO)
FGØYO/FS (W2KN)
FGØFOK (YASMI)
HV3SJ (IØDUD) QSOs beginning Nov. 11, 1979 only; otherwise (W6KNH)
H44AP (KO6KF)
J87BU (W1JP)
KH3AB (KB7MO)
K2EJ/EA9 (K2EJ)
LI2Z (LA6ZW)
SVØAU (WA3WIY)
TL8CN (N5JM)
VE3HD/C6A (VE3HD)
VP2E (K8ND)
VP2MIX (G6HC)
VP2VPG (WØDVZ)
VP5JDT (W1HCS)
VP5TDX (W1HCS)
VP5KPS (WA1KPS)
VQ9NN (AA6AC)
YB1AEE (VE7DZR)
YS9YS (WD8RGU)
ZD7WT (ZD8 QSL Bureau)
TAØKM (IØMGM)
4N7SP (YU7AJJ)
6W8IH direct to Box 3024, FVL, Dakar, Senegal
9K2AH (JA8BI)
9U5JM (F3LQ)

Reminder

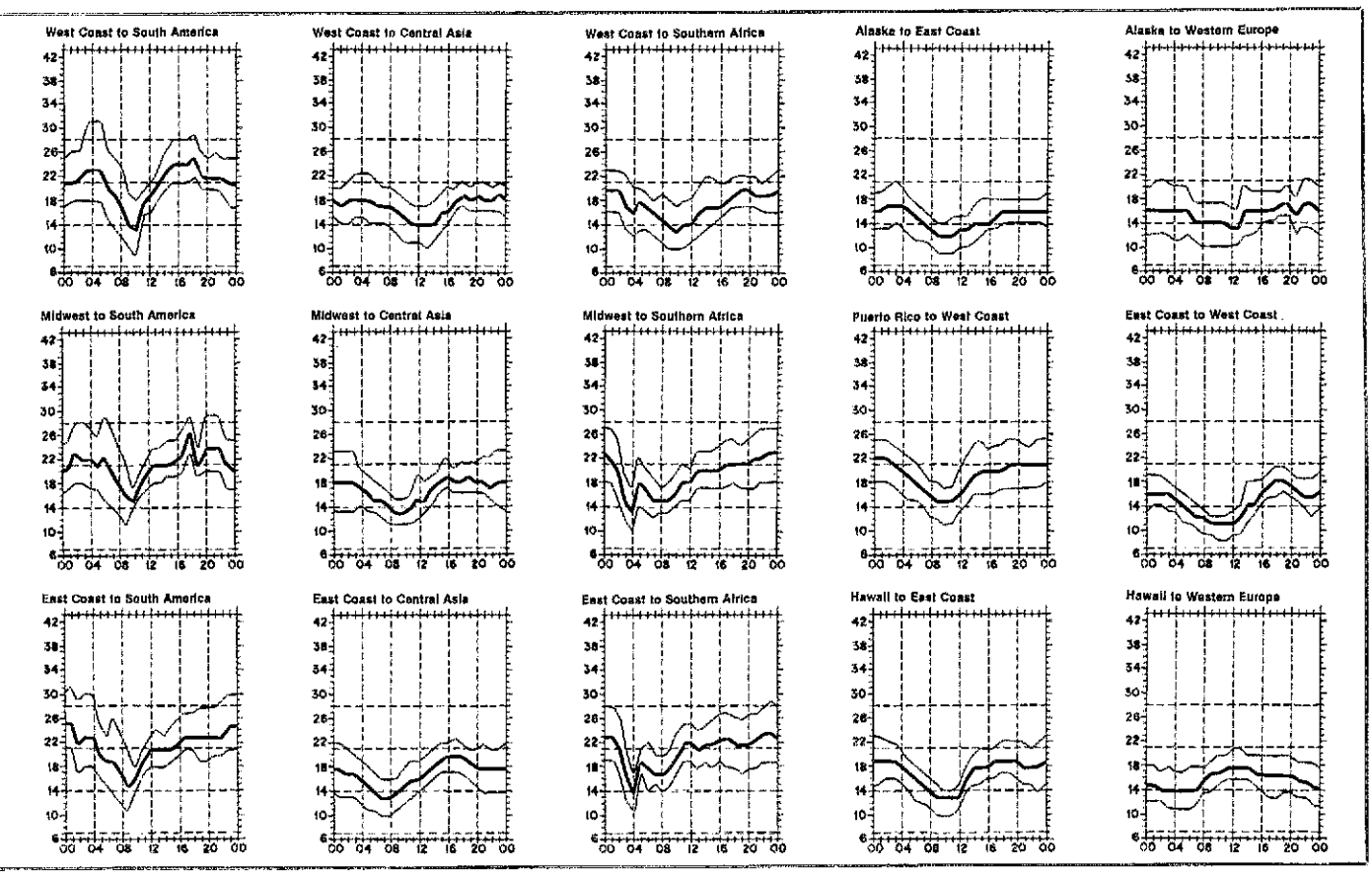
Because of increase in postal rates, please be sure to send extra postage to cover your s.a.s.e.'s on file with your Incoming Bureau.

Note

A new regulation by the German Government has caused some trouble with direct QSL requests. Suggestion — mail to Berlin; write Berlin, followed by WEST or EAST. Mail to other points should be addressed either to the Federal Republic of Germany (West Germany) or to the German Democratic Republic (East).

All QSLs for HP5 prefix may be sent via HP5FI, Box 153, Chitre, Republic of Panama. Apparently, other HP5 stations have experienced postal delivery problems, and they asked Paco to provide his private box for HP5 bureau services.

WBØPYD would like to be a DX QSL manager for Central and South American or South Pacific stations. Since he has upgraded recently, watch for new call of KIØ or KJØ. QST



lowest curve (optimum traffic frequency, or fot). See January 1977 *QST*, page 58, September 1977 *QST*, page 35 and January 1979 *QST*, page 11, for a complete explanation. The horizontal axis shows Coordinated Universal Time (UTC); the vertical axis, frequency in MHz. Data are provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for May 15 to June 15, 1981, assume a sunspot number of 135, which corresponds to a 2800-MHz solar flux of 180.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from January 22 through February 19, 1981. An s.a.s.e. will bring you the full rules for participation in the DXCC, the DXCC list and application forms.

New Members

Mixed

DF3TL/124 JA1GRH/105 PAØXSA/107 WB1AAP/103 W3ENL/101 AC5G/132 N6VO/109 KA8FAL/106 KC9R/102
DK9IM/130 JA1HEH/106 VE1BPY/101 W8IGKT/104 W3HIK/100 KA5FLX/104 W6MTV/107 KN8COQ/207 WD9BBI/101
EA7AXA/181 JA1NTK/126 VE2FMH/106 WB1GLJ/107 KA4BFU/110 KA5CCO/111 W6ZID/220 N8MK/103 AKØB/104
EP2FR/101 JG1HND/228 VE3BAK/104 AF2O/254 KA4DLC/103 KB5EK/103 WA6IRN/118 N8SL/107 AKØA/272
F5DE/130 JA2BOV/157 VE3FS/103 K2NT/214 KA4MNT/110 KO5C/127 WA6NHP/103 W8BYK/106 KØHQW/101
F6ARN/118 JA2LMY/102 VE7BD/322 KC2X/129 KC4HR/102 W5HKA/102 N7WS/205 W8HYQ/111 KØMPH/109
G4EXD/106 JA4COF/112 YU3APR/282 KF2F/102 KS4K/100 WA5WDB/101 W7OAX/220 W8VK/108 NØBSH/150
G4JCC/150 JA8AED/277 ZL3PO/C/136 N2AJV/101 W4NCC/162 WB5PKH/105 WB7PAP/104 WA8SAE/208 WØBF/114
GM4GRC/100 JA8CYU/256 4Z4JS/103 N2CBG/101 W4TL/150 K6OX/129 WB7SGU/124 WD8KEO/104 WØLP/106
GU3MBS/107 JH8MFS/110 K1QQG/101 WA2IFL/110 WA4NRO/112 KJ6F/114 WB7TAW/106 K9AYK/104 WØWDW/102
HB9BZA/126 LA5LT/132 N1AJO/240 WA2KEK/107 WB4RXR/103 N6DHV/103 WB7VUF/110 KA9DES/102 WB8VHE/174
HB9WZ/169 ON6IT/119 W1JNZ/109 WB2RAJ/122 WD4ASP/101 N6FL/160 AD8C/101 KA9DIS/100 WD8EKU/103
I8LPR/152 PAØFDJ/129 WA1ZVD/102 K3OXS/106 WD4MPG/108 N6OC/297 KA8DZI/105

Radiotelephone

CT1ABL/116 EA9IB/154 OZ1BHQ/171 KB2UQ/109 KA4EKO/100 KB5EK/100 WA6IRN/113 WA8VPU/108 W9NUD/100
CT1APF/111 G4JCC/149 SM6JHO/118 N2ADT/109 KF4M/108 KB5QQ/109 WB6NBR/104 WD8AWV/102 WA9BZW/125
DF1NP/113 GM4HJO/106 VE2FMH/103 N2AIF/106 KS4K/100 WB5LSV/102 KB7MP/143 WD8IDE/155 WB9GTC/112
DF3SF/117 IC8EAA/124 VE3BAK/100 W2HAP/167 N4AYJ/100 WB5POQ/101 N7WS/205 WD8KEO/101 WD9EQU/102
DF3TL/106 IC8XIS/104 YU1SM/102 WA2GRG/106 W4BIM/249 WD5CAY/108 W7OAX/208 WD8LTC/155 ADØI/103
DK8IF/131 JA1NTK/124 9Q5GB/108 WA2IFL/105 W4NCC/154 N6AFI/129 WA7MAP/101 AG9S/214 KØHQW/100
EA3BDE/102 JA4COF/111 N1AJO/240 WA2KGN/102 WA4FHQ/274 W6ANC/103 WB7SGU/123 K9IML/105 WØENO/102
EA3CFW/117 JH6JTE/110 W1TN/165 WA2KGN/VE3/102 WA4ZWH/100 W6DRV/105 KN8COQ/195 K9JDF/101 WA0UYW/207
EA5BCX/121 JT1BG/117 WB1AAP/101 WB2IUP/103 K5RPC/141 W6MTV/105 K9JDF/101 K9YBC/152 WB0VHE/173
EA7AXA/180 ON6IT/114 K2JLA/158 K3NB/103 KA5AOR/101 W6NAC/103

CW

DJ7IT/107 RB9WZ/144 LA5LT/121 K1OQG/101 AG3D/110 N5UR/163 N6AN/193 K7LAY/102 WB8ZRL/103
DK9NH/105 JG1HND/220 LB8CA/105 W1HSP/105 AI3E/113 WB5OON/101 N6DHV/102 K7NO/168 AD9B/100
F5DE/110 JA3BQE/240 PAØVLB/220 W1TN/104 K3JGJ/105 K6XT/102 W6LEN/102 KA7BDA/104 AEØK/200
G3VTT/107 JE3FSO/105 SM6JHO/149 KA2EWT/103 KA3R/101 KB6ZL/102 W6OUL/126 KA7CDQ/101 KØINR/102
G4EXD/100 JA8AED/191 VE3KUC/117 KG2A/107 W4LWS/102 KC6X/104 W6ZID/201 KA8DJZ/115 WØII/100
GM3YTS/173 JA8CYU/121 VO1CA/101 W2SR/177 KA5V/100 KM6N/107 K7GM/121 W8ELE/105 WB0YLP/106

RTTY

DK5WJ

5BDXCC

DA2DC K9TUS K3FN WØWP KE4I OH3XT K7ZR WB4OSS W6GO
W8BO W6PT VE3II W1BL SM7DZZ SM4EMO F6CUK K8CX W2LZX

Endorsements

Mixed

DF2ED/212 LA3XI/309 K1QXD/128 W2HG/251 K4RD/311 K5TA/251 KF5A/250 K8VYY/290 K9TI/250
DJ1BV/310 LZ1AZ/202 K1ST/290 W2HKE/225 K4WJT/244 KA5ACC/252 N6AFI/140 K8KAE/298 N9AIB/200
DJØLC/223 OE7UDH/327 KA1EI/150 W2LZX/307 K4XG/326 KA5V/285 N6AW/325 K8MNG/274 N9ALC/209
DL1DA/282 PAØBE/217 KA1HQ/156 W2NJ/280 KA4S/305 KB5WQ/175 N6ST/273 K8RA/320 W9AND/306
DL7WL/240 SLØAS/190 N1UN/294 W2SR/216 KB4FO/141 KC5M/177 W6GMF/343 K8VFV/271 W9KBV/279
EA2HW/279 SM4ARQ/316 W1BFA/320 W2JVN/334 KB4LX/197 N5IH/263 W6LEN/188 K8WD/263 W9LT/343
EA4MY/300 SM5API/330 W1OQH/290 W2XL/225 KJ4L/150 N5JR/293 W6MYP/210 K8ZO/261 W9NUD/157
G3GMY/139 SM5BFJ/303 W1ETH/186 WA2CWP/155 N4MA/181 N5UR/313 W6OMR/308 KB8PK/129 WA9EKA/250
G3VTT/120 SM5DBR/271 W1HSP/272 WB2GTB/174 N4VZ/306 W5FGO/210 W6OUL/184 N8BIK/178 WA9NAY/130
HB9AMO/309 SM6JHO/199 W1PV/262 WB2LNY/207 N4XX/325 W5IRG/310 W6RLB/233 N8TT/266 WB9TIZ/160
HB9KC/285 SM7BIP/317 W1RED/309 WB2OHD/276 N4ZS/261 W5MGO/320 W6SSC/225 W8LZX/282 WB9UKK/220
HC1HV/225 SP3AIJ/252 W1SP/341 AD3R/201 W4BOY/362 W5ODD/198 W6TXL/333 W8UVZ/293 WB9VIN/206
HI8LC/290 TG4NX/283 W1TN/194 AI3R/265 W4CLO/161 W5RJC/253 W6OU/270 K8ZIP/302 WB9YXY/292
HKØBKX/310 VE2AGP/252 W1VH/282 K3AO/301 W4FLA/320 W5WF/127 WA6DZM/225 WA8OVC/290 WB9ZBE/285
I5UA/349 VE2FOU/127 WA1NSJ/225 K3KP/332 W4PRX/259 WA5BYG/163 WA6EJL/229 WB8SCD/225 WB9ZOA/249
IØMMI/224 VE4IU/225 WA1ZDW/120 K3VW/166 W4YJ/357 WB5UFR/154 WA6MXD/151 WB8VPA/270 WD9AOB/262
IT9AUA/317 VE5JO/151 WB1DQC/283 KA3BFX/245 W4YKH/300 WB5YKD/201 WA6TLA/301 WB8ZRL/263 WD9HWY/139
JA1AAT/327 VE6HT/275 K2ON/219 KA3BVI/155 WA4DAN/291 WB5ZGP/250 WA6TOO/291 WD8IDE/157 ABØX/298
JF1SEK/252 YU1BCD/340 K2OVS/161 KA3CMR/125 WA4DRU/324 AC6V/270 WB6CDM/155 WD8MOV/283 KØCS/280
JH1OJU/272 YU1DZ/305 K2OWE/182 KA3R/125 WA4GHO/229 AF6Y/266 WB6RWJ/259 WD8RIU/242 KDØB/157
JH1QOJ/309 YU2CAL/271 K2QF/250 W3MPN/203 WA4KWC/119 AJ6V/200 WB6WKM/176 AA9L/149 NØALL/269
JA7BAL/250 YU2CDL/261 K2TV/286 W3YT/272 W4CZU/307 K6FS/201 AJ7V/269 AA9M/290 WØBK/345
JA2IU/221 YU3GI/279 K2UFM/308 WB3AVN/252 WA4LRF/212 K6GXO/256 K7CU/255 AB9V/193 KØCL/306
JA3AAW/324 YU3TRI/160 K2UKQ/327 WB3CQN/255 WA4MCH/175 K6OXU/178 K7NO/276 K9GN/283 KØHT/272
JA3DY/345 5W1AU/257 K2YGM/298 WB3IET/164 WB4BHQ/255 K6RQ/348 W7HN/201 W9KXW/253 KØINR/179
JA5EN/311 AA1K/299 KA2EWT/156 AA4CK/294 WB4OSN/295 K6UV/195 W7IYW/305 K9AWK/332 KØJFN/153
JA5JGY/245 AB1A/253 KA2K/250 AA4M/300 WB4RUA/305 K6WC/318 W7JKA/180 K9LHA/231 KAØE/217
JA5PUL/302 AB1P/251 KG2A/149 AA4S/323 WD4HLK/230 K6YUI/315 W7KH/363 K9MIE/200 WØJF/256
JA6RIL/282 K1BV/315 N2AIF/174 AG4L/283 WD4RCO/250 N6AN/319 WA7CWM/229 K9MK/279 WØKZV/235
KH6BZF/269 K1FI/291 N2KA/302 K4KUZ/263 AE5H/268 W6YQ/270 WA7IRD/222 K9IW/293 WB0BIY/223
NL7J/150 K1HZ/302 W2FZY/353 K4OMU/179 AG5X/276 KD6LB/150 AD8J/150 K9QVB/302 WB0LXM/225
LA1ND/234 K1KO8/125

Radiotelephone

CN8AK/284 JA5JGY/191 ZP5RS/260 WA2VCM/152 K4XG/298 KF5X/144 W6TPC/255 WB7RGN/210 N9AIB/161
CT1AIF/190 JA5PUL/296 5W1AU/257 WA2VJL/125 KB4CL/204 N5AXB/175 W6TXL/283 K8EK/150 W9DMH/260
CT1UA/303 JA6RIL/270 AA1O/226 WB2GTB/164 N4BHJ/226 N5IH/261 WA6DTG/262 K8VFV/270 W9HJ/302
DF5SL/163 JA7BAL/226 K1MIZ/201 WB2JFH/178 N4XX/320 W5NLB/214 WA6VIO/176 K8WD/263 W9LT/316
DJ1BV/299 JA7JH/319 K1ST/272 WB2SZH/260 W4BQY/313 W5PLN/209 WB6CDM/154 K8ZO/260 W9RKP/281
DK9KD/261 JA8BAR/308 KA1AWH/168 WB2VPV/199 W4LCL/254 W5RJC/185 WB6RWJ/254 KB8PK/128 W9XM/300
DL1HH/332 KH6BZF/269 KA1EI/150 AD3R/180 W4UW/240 WA5HPV/123 WB6TKK/128 W8CBA/272 WA9EKA/200
DL2KC/240 LA1ND/225 KA1HQ/156 K3IXD/137 W4YJ/354 WA5ZIJ/244 WD6ENL/154 W8JJK/261 WB9UKK/188
EA3ALD/299 LA3XI/302 W1BFA/302 KA3BFX/243 WA4DAN/281 WB5VZA/204 AJ7V/267 W8PNC/290 WB9VIN/191
EA4DO/331 LA5WN/205 W1DO/323 W3DQJ/261 WA4DRU/306 WB5KYF/242 KA7CBO/130 W8UVZ/186 WB9ZQA/249
EA8OZ/297 LU7MAJ/191 W1ETH/179 W3FDP/292 WA4LRF/209 AC6V/266 K7CU/230 W8WVM/181 WD9ADB/261
G3YJJ/260 LU8CW/292 W1HSP/253 W3MPN/203 WA4WTG/309 AF6Y/183 N7BES/178 WB8SCD/225 WD9HWY/139
GM4CUB/126 OE1SKC/200 W1KSZ/290 W3NB/196 WB4EEM/281 K6DQ/220 W7AEP/200 WB8VPA/270 AKØA/254
I1GEA/324 OE7UDH/324 W1SP/340 WB3IET/161 WB4WHE/123 K6WC/314 W7KH/337 WB8ZRL/259 KØCL/269
I1TBE/300 P29GC/199 WB1DQC/282 AA4CK/280 WB4YNL/181 K6YUI/252 W7MSI/269 WD8BSX/256 KØINR/150
I2PQW/200 PAØKB/294 WA1DPX/140 AA4M/252 WD4DZF/124 N6AW/321 W7OGT/212 WD8CZR/150 KØRRY/131
I4FAF/274 PY2DSQ/282 AF2O/251 AA4S/284 WD4GSE/177 N6OC/292 W7YR/293 WD8MOV/275 KØVGB/125
I5UA/349 S5AAP/200 AG2K/151 AG4L/279 AE5H/253 N6ST/251 WA7CWM/175 WD8NOE/270 KDØB/152
IC8EGO/281 TG4NX/282 K2TV/269 AK4E/240 K5GOE/201 W6AEO/159 WA7ECU/149 K9GN/183 NØACH/164
IC8OGS/133 VE1AVX/305 K2UFM/305 K4CAH/321 K5LVZ/123 W6LUR/181 WA7PVE/137 K9IW/281 WØDG/199
IØOLK/309 VE3KGK/175 N2KA/266 K4KCS/200 KA5V/280 W6OMR/273 WA7VMC/216 K9LHA/230 WØJKM/180
IT9GAI/333 VE5QY/226 N2KW/295 K4ONF/268 KB5DN/250 W6OU/245 WA7WLT/126 K9MK/262 WØRAO/251
JA1AAT/325 VE6RP/244 W2IOO/305 K4KUZ/242 KB5DQ/231 W6RLB/228 WB7NFK/126 K9TI/216 WA0QIT/160
JF1SEK/231 ZL1AJL/290 W2NC/290 K4WJT/164 KC5M/175 W6SSC/220 WB7QVB/146 KB9PO/130 WB0CIW/127
JA2BOV/156 ZL1AMN/310

Cw

DJØLC/165 OZ7BW/272 K2OWE/150 W2LZX/250 W4RHZ/124 N5JR/287 W6YQ/223 WD8MOV/159 K9TI/180
DL1HH/265 SLØAS/189 K2QF/184 AA4CK/201 W4WJ/274 W5ODD/169 WA6TLA/292 AB9V/186 W9RY/201
HB9BNB/126 TG4NX/158 K2TV/183 AA4M/245 WA4MCH/155 AF6Y/201 K7CU/147 K9GN/247 WA9EKA/175
IT9RAN/215 AA1K/267 K2UFM/175 K4IEX/290 WA4YCI/171 N6ST/132 N7CW/250 K9IW/210 WB9UKK/120
JA2IU/122 W1EWD/190 N2AC/225 K4KUZ/204 WB4OSN/234 W6PYV/174 N8BM/225 K9MK/152 ABØX/198
JA5JGY/127 W1IQ/124 N2AIF/135 K4XG/188 AA5C/176 W8UVZ/280 K9OVB/267 KAØE/201
OZ1FRR/209 W1KSZ/192 N2KW/283 W4BQY/207 AE5H/154 WA8SAE/203

DXCC Notes Honor Roll Corrections: Mixed, W7TE 309/320, K1KG 312/321

QST Profiles

Conducted By Dave Bristol, KA2BNV

Russell S. Ohl, Father of the Modern Semiconductor Industry

Most active in the early days of radio, Russell S. Ohl, N6DJG, of Vista, California, was instrumental in many developments in amateur and commercial radio

A native of Macungie, Pennsylvania, Russell S. Ohl, N6DJG, earned in 1918 a BS degree in electrochemical engineering from Penn State University. That was the beginning of what was to be an illustrious and prolific career which would have far-reaching effects on Amateur Radio and the field of electronics.

Following his college graduation, Mr. Ohl joined the U.S. Army and was assigned to test radio transmitters during flight. In 1922, he accepted a position in the budding field of radio communications — doing research for AT&T. During this time, he initiated interest in the use of quartz crystals to stabilize frequencies of a-m broadcast transmitters for improving the quality of received voice frequencies. He also demonstrated the advantages of heater-type cathodes in vacuum tubes.

In June of 1927, he was transferred to the newly formed Bell Telephone Laboratories where his research was carried on in a field radio lab. He was principally concerned with the quality of voice signals received from transatlantic communications. He was able to demonstrate single-sideband reception and single- or double-sideband reception with greatly reduced carrier. This was made possible by the use of quartz crystal filters which were then in an initial experimental stage. During this period, semiconductors were applied in many critical circuits.

In 1932 Mr. Ohl undertook exploratory research into the microwave radio field. The object of his work was to find ways and frequency limits for the use of high-frequency radio waves. This project was begun under adverse conditions because neither receiving nor transmitting equipment existed at that time! After more than a half decade of experimenting with substances and methods for use at very high frequency ranges, it became evident that a silicon device with a tungsten contact was the preferred combination to respond to frequencies as great as 100 nanohertz. This work was immediately classified as secret and remained so until after 1947. Based on those research results, manufacturing specifications were written for diodes needed throughout WW II.

While studying the anomalous behavior of a bar of silicon cut from an ingot of purified silicon, Mr. Ohl discovered a photovoltaic effect in the bulk material. It was found that the photo sensitivity occurred at a junction of two types of silicon. He named these types N and P, and the junction is now known as the NP junction. This was the breakthrough that made the invention of the transistor possible, and also became the basis of the solar cell.

Having received 82 U.S. and 50 foreign patents, Mr. Ohl has also published five scientific papers. He is a life member in the Institute of Electrical and Electronic Engineers and is listed in "Who's Who in Engineering." Having held the calls 2BHN, 2XBA, 2XBD and 3BFU, he again enjoys Amateur Radio as N6DJG.

QST: What is your most memorable Amateur Radio related incident?

Ohl: I believe it was the reception of NAA (the spark transmitter located at Arlington, Virginia) signals with a crystal detector and headset, early in 1918, when all Amateur Radio transmissions were silenced.

QST: Did you have any idea what your early experiments with high-purity silicon wafers would lead to?

Ohl: Yes. The early work with diodes as applied to microwaves was considered theoretically. It was indicated that high-purity silicon wafers were needed to reduce backward current and increase the front-to-back ratio of the diode. The first high-purity silicon was imported from Germany. It was fused in a quartz container with an oxygen/gas flame. A small sample of this material gave an indication of the improvement to be expected. It was my objective to produce silicon diode wafers of uniform surface characteristics in large quantities at a reasonable cost. The use of high-purity silicon was no accident, but was planned in an effort to use silicon diodes in the low-wavelength microwave spectrum where vacuum tubes were no longer practical. The program was very successful.

QST: Similarly, did you have any idea that the transistor would have such an impact on the world?

Ohl: Yes. When I discovered the NP junction it was evident to me that this would enable the development of a solid-state amplifier. Shortly after the photovoltaic junction was found, a demonstration was set up in my office in which I illuminated the junction with a flashlight bulb so that, with suitable circuitry, oscillations took place. William Shockley saw this and suggested that an electrode attached to the junction might make it possible to realize a solid-state amplifier. I had already thought of this but did not have the facilities to try it. A few years later I had the opportunity to attempt the construction of a solid-state amplifier. Some initial successes indicated that an amplifier could be made.

QST: Your early experiments with silicon also led to what we now know as the solar battery. In fact, many people credit you with inventing the solar battery. Could you tell us about some of your experiments?

Ohl: I invented the solar battery in its early form. This was later developed and perfected in another section of the Bell Laboratories. When the photovoltaic effect in silicon was discovered, studies indicated that the natural barrier was made up of multiple striations. It soon became evident that the photovoltaic barrier should exist on the surface. Surface effects were first produced by slicing the silicon along the barrier and thus exposing the photovoltaic silicon surface. The first photovoltaic barrier surface was produced by heating a polished slab of silicon sealed in a quartz tube in the presence of yellow phosphorous. Heat treatment at about 1000° centigrade caused the phosphorous to diffuse into the surface and produce a photovoltaic battery. By following through with this diffusion approach chemists later developed the highly advertised solar battery. Before the solar battery was developed, however, the ion implantation method of producing photovoltaic surfaces was developed. In the early days, when the photovoltaic effect in silicon was considered, the efficiency of sunlight conversion was accurately measured by E. F. Kingsbury using cells that I manufactured. At that time, speculative calculations were made for using large areas of cells in batteries for power generating purposes. Experiments indicated the superiority of performance in a high vacuum, as well as at a temperature of molten tin. Many future applications for silicon photovoltaic cells were envisioned and have since come to be fact.

QST: We have heard rumors of some early radio development in your three-room Bronx apartment.

Ohl: In 1924 I conducted some transmission experiments, at approximately 2 meters, in my New York apartment. At the time we were uncertain of the transmission properties at this wavelength. We found that the signal could be detected easily with amateur silicon detectors. The signals were quite strong and they bounced from steel objects several miles distant.

QST: Your daughter, Sylvia, WB7VRK, has shown you her modern 2-meter rig. Any comments comparing the operation of the old and new gear?

Ohl: The early 2-meter experiments, licensed with the call 2XBD, were performed with a crudely built transmitting tube transmitter. The receiver was an equally crude crystal detector. Comparing this to new gear and operation is like comparing two different worlds. QST

FM/RPT

Conducted By Stan Horzepa,* WA1LOU

Lo, the Kerchunker!

As sure as there is a repeater in your neighborhood, someone is going to kerchunk it.

Let me say right here that I am not talking about the deliberate repeater trasher, the deviate who destroys repeater QSO's. That person is beyond the scope of this discussion. I'm talking about the innocuous soul who likes to kerchunk his local repeater occasionally — or more often.

As Joni Mitchell could have written, "I've looked at kerchunking from both sides now..." I am a repeater owner as well as a repeater user, and that has affected my perspective on kerchunking. Instead of gnashing my teeth and thinking evil thoughts about the unknown perpetrator of these transgressions (which I still sometimes do — especially at 3 A.M.), I've done some thinking on the subject and have found two ways of dealing with the situation.

The first solution is the way I designed the control system of my repeater. It includes a "kerchunk detector." Anytime the repeater is keyed up after the repeater transmitter has been off for more than a few seconds, a "kerchunk timer" is activated to time the key-up. If the key-up is less than 1.2 seconds, there is a half-second squelch tail and then the transmitter turns off. If the key-up is longer than 1.2 seconds or the VOX circuit is activated, the tail is extended to five seconds, the repeater identifies after the user has released his mike PTT button and a PL tone is transmitted for four seconds to alert the control operator, monitoring with a PL'd receiver, that the repeater is on. The control operator then switches off the PL in order to monitor the QSO in progress. This feature lets the kerchunkers do their thing, while sparing the control operator from the frustration of having to listen to all those kerchunkers out there.

The second solution to kerchunking is this article. So, let's consider kerchunking for a moment. I think that once people understand why kerchunking is so prevalent, we could go a long way toward solving it.

I can imagine the average repeater user who gets up, showers, shaves, eats breakfast and kerchunks the repeater (and not necessarily in that order). If the rig is in the car all of the

time, kerchunking the system is as much a part of starting the car as setting the choke. You might say that in hamdom, kerchunking has replaced fastening your seat belts.

You see, it's a little part of the kerchunker's world in which he has control. The repeater does his bidding. He has power over several thousand dollars worth of equipment.

Don't laugh at this theory. Of course, Joe Ham isn't thinking in those terms when he presses and releases the mike PTT button without a word, let alone a legal identification. But let the repeater be off for one day and watch what happens. Joe is, at least, disappointed; more likely, he is dismayed, especially if he is a member of the repeater's technical committee. He feels a loss of control and power. Often, if you're listening to the input frequency of the machine during such a crisis, you'll hear several Joes frantically kerchunking away without success. At a time like this, Joe and all of us learn that repeaters can be like anything else in our lives — imperfect. Think about that the next time it happens to you.

Another perspective — that most of us consider kerchunking to be one of the Seven Deadly Sins of Hamdom is attested to by its anonymity. No one will "fess-up" to ever doing it. I vividly remember a meeting of a big Chicago area repeater club, where the chair asked for a show of hands of anyone who had never kerchunked the system. Amid the forest of arms that shot skyward, the motion was made to rename the group "The Liar's Club." It brought down the house.

As a repeater owner and control operator, I often long to find out who and where is that nameless, unknown operator behind that fast mike button. On occasion, I will call him back — "QRZ from K9XI" — without response. Nothing.

Hey, guys and gals, I'm really not upset with you! And I won't send the Wouff Hong after you. I'm only curious as to who you are and where you're located. From the sounds of some of the signals, some of you are really out in the boonies. My repeater is not large and I would like to know how well it covers and, believe it or not, you kerchunkers are my best means of finding out. Seriously!

I hope you get the picture. I really don't mind kerchunkers. I designed my repeater to accommodate them. If I don't want to hear them, I PL my receiver and that's that. Often, however, I'd love to find out who's listening and where they are to indicate to me that my system is operating. That's my peace of mind. So, if you're ever in the northwest suburbs of Chicago and you kerchunk the repeater on 222.1/223.7, just give your call, your location and say, "checking the system." I'll understand. That tells us all that you don't have the time for a QSO, but that all is right with you and the repeater. It's a tradeoff, you see. I find out how well the system is working and you get to kerchunk the system.

Carefully considering all of this has changed my operating practices. I never kerchunk a repeater without identifying and giving my general location. Whatsay we all do the same?

Lo, the kerchunker! You are really more valuable than you think you are. If only you knew (and now you do). — *Art Reis, K9XI, Crystal Lake, Illinois*

[Editor's Note: The preceding article originally appeared in the Bulletin of the McHenry County Wireless Association.]

SURVEY RESULTS

In the last installment of FM/RPT, I stated that, "If all goes well, the next installment of this column will have the results of the (January) survey." Well, all went too well! The response to the survey was tremendous. Completed surveys are still arriving in the mail. Thus, the job of compiling and analyzing the results goes on. Hopefully, next time we meet I'll have the results on hand and will share them with you.

BLACK HOLE ON 2 METERS

In the March installment of this column, I presented an annotated 2-meter spectrum-usage chart. W6VON pointed out a gaping hole in the chart between 145.49 and 145.80 MHz.

The reason I left out that part of the spectrum is that, to my knowledge, nothing much goes on there. There may be some simplex work, but it certainly isn't a hotbed of activity and has never been designated for any particular use in the band plan. Since there wasn't much to say about it, I said nothing. The omission does make the chart incomplete, however, so please insert "145.49-145.80 — unused, in general" in the chart.

*72 Stiles St., Waterbury, CT 06706

YL News and Views

Conducted By Jean Peacor,* K1IJV

Happy Birthday WRONE

On May 2, 1981, Storrowton Tavern in West Springfield, Massachusetts will be the scene of a gala luncheon celebration. Women Radio Operators of New England (WRONE) will celebrate its 25th year as an organized club.

As early as 1950, there were reports of licensed-YL gatherings in New England, but it was not until 1955 that a formal club was discussed. In April of 1955, 64 YLs attended a luncheon at Boston's Sheraton Plaza Hotel. Barbara Harrington, W1TRE, who had organized this meeting, announced that plans were underway to organize a club for New England YLs. The initial meeting was scheduled for the fall of 1955.

Charter members at WRONE meeting in the fall of 1956. Some of the first Executive Board officers are: front row (l-r) — W1VOS, 1st YL, and W1TRE, 3rd YL; back row (l-r) — W1QON, 1st YL, and W1SVN, 7th YL.

The fall meeting was held as planned at Boston's Hotel Kenmore. W1TRE was Chairman of the affair. A club, named Women Radio Operators of New England, was formed, and annual dues were set. The following Executive Board was elected: Chairman, Barbara Harrington, W1TRE; Secretary/Treasurer, Mildred Doremus, W1SVN; Eleanor Wilson, W1QON; Esther Routhier, W1RYJ; Marjorie Snow, W1VOS. A spring luncheon meeting was scheduled, and it was voted to start a YL Net in October 1955, with Chata Swenson, W1RLQ, as Net Control. This would allow all YLs to keep in touch. Because only 31 YLs attended this first meeting, Charter Membership in WRONE was extended to the next meeting in the spring of 1956.

The spring meeting found 61 YLs in attendance. Here it was agreed to have another meeting at Boston's Hotel Touraine the following May in 1956. It was also decided that two meetings would be held each year, in the spring and fall, with the Executive Board deciding the location for the meetings. At the May meeting, membership certificates were awarded to all YLs who had paid their dues; this included 68 YL Charter Members. WRONE was officially born.

Jean Thompson, K1TVT, from Mechanic Falls, Maine, is President of WRONE for 1981.

Miss Wrone has become the club's emblem. In 1959, she was used in the corner of the club's newsletter; shortly thereafter, the letter became "Miss Wrone's Chatter." She adorns Wrone stationery and certificates; there are even Miss Wrone pins for members. Recognizable by her acorn head (acorns can be found in all of New England), by her skates (depicting a popular New England sport), and by her skating outfit. Miss Wrone's colors are green, brown and gold.

Throughout the years, WRONE meetings have been held in all six New England states. They continue to be held twice each year in the spring and fall. Membership, which now numbers more than 200, is open to all licensed women radio operators. Officers for 1981 are: President, Jean Thompson, K1TVT; Vice President, Judy Townsend, WA1TZX; Secretary/Treasurer, Betty Phillips, WB1FIQ; Hospitality, Norma Mellen, WA1WWA, and WB1ACQ, Donna Shotwell; Net and Membership, Millie Doremus, W1SVN, and Rita Essigman, WB1API. Dues are $2 payable to the Treasurer at 235 Ames Rd., Hampden, MA 01036.

WRONE NETS — The Yankee Lassie Net meets each Wednesday at 1330 UTC on 3910 MHz; the cw net meets each Wednesday at 1900 UTC on 3720 MHz. Both nets welcome all YLs.

Heather Hall, WB1ABF, is in charge of the 1981 spring luncheon reservations. Storrowton Tavern, situated on the grounds of the Eastern States Exposition and home of New England's largest annual fair, will be inundated in May with YLs from all over New England as WRONE celebrates its silver anniversary. Happy Birthday, WRONE.

CHARTER MEMBERS' COMMENTS

Records indicate there are about 16 original Charter Members with 25-year continuous membership. They have all had the opportunity to see WRONE grow. All were licensed in the early 1950's. Comments as to what created their interest in becoming licensed radio amateurs varied greatly. "No television set until you become a licensed radio amateur." "The faraway places were beckoning as my OM worked more and more DX." "As a bride, I thought my OM's hobby was strictly for men. I quickly learned that I needed to know more about this hobby." "My OM wanted to practice Morse code with someone, and I was standing nearby." "If you can't fight it, join it." "It all began while helping my two sons learn Morse code." "After having talked to some of my OM's contacts, I heard, 'No more talking until you get your own license.' "

This exclusive group of 16 members includes: Faye Kuehl, W1EYS; Bonnie Grant, WA1GQZ (ex-K2DKL); Millie Doremus, W1SVN; Tisha Young, W1NUO; Eunice Gordon, W1UKR; Marge Snow, W1VOS; Gladys Chase, W1VPF; Onie Woodward, W1ZEN; Margaret Teid, ex-W1WJA; Charlotte Stafford, W1ZPR; Leona Peacor, W1YPH; Chata Swenson, W1RLQ; Malva Gray, W1EFY; Agnes Warrington, W1YQL; Mary Heffinger, W1ZEJ; and Sylvia Winton, W1SLQ. This has been an active group with many having served as officers for WRONE and YLRL. Many are now members of QCWA and Charter Members of QCWW.

WRONE CERTIFICATE RULES

Work six WRONE members with representation from at least three of the New England States — after May 1, 1959 — on any band. Repeater contacts and WRONE Net contacts are not valid. Contacts must be made from one location except for Maritime Mobile stations, which need only work the specified number of contacts while Maritime Mobile.

Application may be made by sending a list of six contacts showing call, date, frequency and state. Have the list certified by an officer of a radio club or two radio amateurs. (A certified list shows the information shown on the QSL cards from WRONE members — the signatures of the radio amateurs certify that they have seen the QSL cards that correspond with the list submitted.) The list and $.50 should be sent to: Custodian, Carol Anderson, AD1P, 430 Diamond Hill Rd., Warwick, R.I. 02886. There is a Gold Sticker issued when another list is submitted with contacts listing the other three New England states.

YLRL SCHOLARSHIP

Applications for the 1981 YLRL Scholarship are being accepted by the Foundation For Amateur Radio during the month of May. The YLRL Scholarship pays $300 to a YL studying for a degree in electronics/communications or a related science. Preference is given to a handicapped person, but need and potential are major considerations. Applicants are also considered for any of the seven scholarships offered by the Foundation. QST

*Country Club Dr., Monson, MA 01057

The World Above 50 MHz

Conducted By William A. Tynan,* W3XO

Calling Frequencies

The subject of vhf/uhf calling frequencies and how to use them seems always to be with us. The topic has been addressed in this column on a number of occasions over the past few years. But, as we are entering another summer season of enhanced propagation, this seems to be an appropriate time for a review of what frequencies are employed for calling and how to use them to gain the maximum benefit for the most people. I will confine this discussion to cw, ssb and a-m calling frequencies. Fm-simplex calling and working frequencies are covered in the *ARRL Repeater Directory* and elsewhere.

Since 6 meters is our lowest frequency vhf assignment, and because the selection and optimum use of calling frequencies for this band seem to be more controversial than for the higher bands, it should be a good place to begin. Ever since the FCC set aside the first 100 kHz of the 50-MHz band for cw about 20 years ago, 50.110 MHz has been the most popular spot in the entire 4 megahertz. To hear it when the band is busy, one would almost conclude that half of the stations on 6 meters are crystal controlled or are using transceivers with broken dial cords. One of the reasons for this behavior is, I am sure, that the band is so variable in its propagation characteristics. After all, this is one of the reasons many of us find the 50-MHz band so fascinating. Much of the time it is like 2 meters, offering consistent coverage out to perhaps 150 to 200 miles. Under this "dead band" condition, there are usually few stations to be heard and hence little potential for QRM when QSOs take place on 110. But, when Mother Nature goes to work and presents 6-meter buffs with aurora, Es or F2 propagation, all you-know what breaks loose around that part of the band!

This extreme crowding could be alleviated if we could just learn to use the calling frequency only for calling and then move off as soon as contact is established. It is hard to remember to do, I agree. Certainly W3XO has been guilty of not QSYing on too many occasions, but I intend to try harder. It has been argued by some that holding QSOs on the calling frequency is good practice because it provides signals for distant stations to hear so they can be alerted to the existence of enhanced propagation conditions. This may be true; but, on the other hand, several loud locals holding forth on a calling frequency can obscure a distant station that may be putting out a CQ. Even if one hears such a distant station under the locals, there is a tendency not to respond, because of hesitation to break up a contact. So the CQ may go unanswered and activity suffers.

Another aspect has become more important over the last few years with the advent of new equipment incorporating squelch on ssb and cw. Many of us have adopted the habit of parking the receiver on the calling frequency with the squelch set to open when even a weak signal pokes its head up. A short CQ or two by an S9-plus local can be tolerated without upsetting household activities, but a prolonged QSO usually prompts one to go into the shack and turn the thing down before the family gets upset. Chances are that our DX chaser will then become engrossed in a TV show or the latest copy of *QST*, and forget to turn the audio gain back up again. Is he upset when he finds out the next day that the band opened to the Caribbean and he missed an H18 and an FM7! Also, if a QSO is in progress on the calling frequency, others who wish to use it to initiate a call will usually not do so. Thus, they are denied the use of this common meeting point at least for the duration of the contact, which can be quite some time.

So please, let's use calling frequencies for calling, either CQ or a specific station. Once contact is established, move off far enough so that sideband splatter won't prevent others from listening for weak signals. Often, 5 kHz is not a sufficient QSY — a better minimum might be 10 kHz. Of course, the need to move off a calling frequency depends on the level of activity on the particular band. Since activity is considerably lower on 6-meter a-m than is currently the case on ssb, it would not appear as important to vacate 50.4 MHz to engage in an a-m QSO. The same applies to the 144.4-MHz spot where a revival of 2-meter a-m operation is beginning to take hold. The relatively low activity on 1-1/4 meters and 70 cm also makes for different considerations with respect to these bands. But in the case of 6- and 2-meter ssb, QSYing to another frequency is certainly indicated.

The selection of 50.110 MHz as the 6-meter ssb calling frequency has long been criticized by some of the band's most experienced operators, but habit is a strong human trait shared by most of us. As a result, it has been difficult to convince many that a change would be beneficial. This is despite the fact that it is clear that concentrating so much activity within 10 kHz of the band edge results in a great deal of QRM. On 2 meters, there were, until a few years ago, two ssb calling frequencies — 144.110 and 145.025 MHz. When Technician class licensees were given operating privileges on the entire band in 1978, there was a great debate as to what calling frequency should be adopted in the face of the expanded activity that the 144-MHz segment of the band was about to experience. Some Technicians expressed great glee in finally being able to set up shop on 144.110 MHz. But thanks to a recommendation from the ARRL VHF-UHF Advisory Committee (VUAC) and the support of SWOT, a calling frequency of 144.200 MHz was proposed and all but universally adopted by 2-meter ssb operators. Imagine the chaos that would exist if all the activity that is so nicely spread up and down the band from 144.200 were concentrated near 144.110 MHz! Certainly operation on 2 meters is more pleasant and productive as a result of the choice of a calling frequency made by the inhabitants of this popular band.

Noting the success of 144.2 MHz on 2 meters, those attending the Operating Forum at last year's Central States VHF Conference proposed that a "domestic calling frequency" of 50.2 MHz be established for 6 meters. Realizing that spreading the word of the change to foreign 6-meter operators would be difficult, as well as seeing the advantage of setting aside a portion of the band for working DX, the assemblage proposed that 50.110 MHz remain the calling frequency for DX operation. This approach is in line with the attempt by a number of south Florida stations over the past few years to reserve 50.100 to 50.125 MHz for use while engaged in DXing. The idea of establishing a new calling frequency at 50.2 MHz for general calling was picked up by the VUAC. That group, under the chairmanship of W4WD/7, is presently giving the idea careful study. But we need not wait for a VUAC recommendation before acting. After all, most of the proposals made by that group are based on current band usage with due consideration to expected future developments. We can begin to use 50.2 MHz for most of our 6-meter calling right away and to check the area around 50.110 MHz when contacts out of the U.S. and Canada appear possible. This conductor plans to make extensive use of the 50.2-MHz portion of the band beginning this Es season. I hope to have lots of company.

For the 1-1/4 meter band the group meeting at the Central States VHF Conference, seeing how well the use of 432.1 MHz has helped reduce QRM to EME operation on 70 cm, proposed that 220.1 MHz be established as the calling frequency for cw and ssb operation for this emerging band. Using the same reasoning, it was also proposed that 1296.1 MHz be used in lieu of 1296.0 MHz on 23 cm.

By proper selection and use of calling frequencies we can all work more and have a better time doing it.

A DX OPPORTUNITY

With the approach of the summer Es season, Tom, K4GFG, wishes to call attention to a propagation mode capable of supporting some interesting and unusual contacts on 2 meters, and possibly higher bands, out to about 1100 miles (1800 km). The mode to which Tom refers is connected with Field Aligned Irregularities in the E region of the ionosphere. Contacts on 2 meters via this FAI mode were reported in this column for August 1979. The effect seems to form on a fairly high percentage of those evenings on which 6 meters is open for Es propagation, and the location of the propagating medium tends to be that corresponding to the midpoint of most of the 6-meter paths. Stations trying to take advantage of this mode on 2 meters or higher should aim their antennas to the north of the direct path to the area which they are trying to work and in the general direction of what they would conclude should be the reflection point for much of the 6-meter propagation. Tom urges that they not give up as soon as 6 meters closes. He notes that experience has shown that FAI propagation often takes place an hour or so after 50-MHz Es has ceased.

Until further details are published, why not go to it,

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730, or call 301-384-6736 and record your message.

and see what can be worked with this fascinating mode. It will be particularly interesting to know whether 1-1/4-meter and 70-cm contacts can also be made via FAI. Let me know how you make out, and I will present a report of results early in the fall.

CENTRAL STATES VHF SOCIETY AWARDS PROGRAM

At its 1980 conference, The Central States VHF Society members established an Awards Committee under the chairmanship of Lance Collister, WA1JXN/7. Committee members include WB6NMT and WØVB. This group has arrived at recommendations for a series of awards to recognize vhf and uhf achievement and to solicit comments from those active on these bands. The awards they propose are as follows:

VUCC — The VHF/UHF Century Club Award would be available to anyone having worked 100 or more different stations on 144 MHz or above using any mode and by any means of propagation, except that the signal must not be retransmitted by any repeater, terrestrial or airborne/orbiting. Crossband contacts would not count. Endorsement stickers would be available for additional contacts via any one mode of propagation such as EME, aurora or m.s., etc. This is to serve not only as an entry-level award in areas of the country with high levels of activity but also as continuing incentive and challenge for all. It is designed to be achievable, yet nevertheless a challenge, for those with stations of various complexities and capabilities.

Grid Award — This award would be available to those making contact with stations located in 100 different one-by-one degree squares on 144 MHz or higher. Stickers would be available for additional squares in increments of 25. Contacts could be by any nonrepeater mode.

DX Coverage Award — This award would combine the number of stations contacted with distance and consistency of operation. The intent is to provide a method of equalizing the difficulty of its attainment between those located in different parts of the country, and to reward the more active operators. The award would be available for operation on 144 MHz and above to those accruing 1000 QSO points or more during any 2-month period on a particular band.

QSO points would be accumulated by identifying the one-by-one degree square of each station worked. Contacted stations in the same square as the participant would not count; stations one square away would count 1 point; stations two squares away would count 2 points, etc. Points would be added to arrive at the score for the month.

Please send comments on these proposed awards as soon as possible to: Lance Collister, WA1JXN/7, P. O. Box 243, Frenchtown, MT 59834.

ON THE BANDS

6 Meters — F2 DX continued briskly well into March, that is, if one looks at reports on a worldwide basis. In some areas, however, like the eastern portion of the U.S., openings grew quite few and far between. Nevertheless, even in these deprived parts of the world, the ionosphere was kinder this year than during the same period of 1980. One of the better days during the mid-February to mid-March reporting period was February 28. The eastern part of the country was treated to a short but pleasant West Coast opening around 1700Z — quite unusual so late in the F2 season. Just prior to that, beginning at 1540Z, EL2AV nabbed VP2VGR, W1QXX/KP4, DL3ZM/YV5, 8P6KX and 9Y4JA. At about 1720Z some of the western states got a crack at Africa, as EL2AV was worked by KØAYK Colorado, K7ICW Nevada and several Arizona stations. The following day, March 1, the Pacific Northwest was treated to a brief but intense opening to Argentina. One of those active from the southern end of this circuit, LU3EX, worked a total of 11 stations in Oregon and Washington during a 20-minute period. Earlier the same day the path from South Africa to Europe provided many crossband, and a few two-way, contacts for ZS6LN. Jack lists 6- to 10-meter QSOs with such familiar calls as DK6JL, SM6PU, I5CTE, PAØCRA and G5KW. Also crossbanded were HB9BZ, DL9SH, G3APY and F8ZW. A two-way was completed with E16AS, and the 15TDJ beacon on 50.319 MHz was heard. This was probably one of the best of many openings in that part of the world during that time of the year. In the Far East, regular north-south openings were also taking place between Japan and the South Pacific. Why there is so much north-south propagation in other parts of the world and so little between North and South America, I do not know. Does anyone have any thoughts on this? The best day we in the Mid-Atlantic states experienced during the report period came on March 6. As in early February, 28 days before, this opening occurred the morning after an aurora. Although in this case the aurora was a full 24 hours before during the morning of March 5. The 6th began with backscatter about 1335Z with W8HXT/4 being worked on cw by this conductor. Following that came a good ssb QSO with IT2NA in which signals were not particularly strong but very readable. In the course of this contact, Eric noted that my signal was best when he aimed his beam more to the east than north, so backscatter was apparently at work here, too. Next heard were the Colombian fm repeaters with extremely strong signals. HK4EB must have been alerted by the racket on the repeaters, because it wasn't long before he was on working the pileup. The other high spot of that morning was reception by a number of us in the eastern part of the country of the PY2AA beacon on 50.055 MHz. Incidentally, the operators of this beacon are very anxious to receive reports from anyone hearing it. Address: PY2AA Beacon Project, P. O. Box 22, 01000 Sao Paulo, SP Brazil.

March 7 around 1400Z brought two-way contacts by I5TDJ with ZS5TR, ZS6BMS and ZS6BGG. Pete also heard on this occasion the beacons of ZS6PW and ZS3E. On the 9th EL2AV worked a number of East Coast stations including VE1AVX, WB2CZB, WB2MAT and W4CKD. The evening before, from 0000 to 0100Z south Florida experienced a TE opening into Argentina. Not much has been reported relative to TE this year. I guess that mode is considered routine by those lucky enough to experience it regularly. KP4EOR says that 6 meters has been open to southern South America a few evenings every week since last September, except for a hiatus during December! David has also experienced a number of 2-meter openings to the same area. Another with a fortunate location for TE, XE1GE south of Mexico City, notes that he has been working LU8MBI nightly in recent weeks on 6 meters.

March 11 produced a real surprise for VE1ASJ when Andy worked about 25 JAs beginning around 2130Z. Earlier that day, between 1700 and 1800Z, a number of stations in the 5th, 6th, 7th and 8th call areas reported hearing LU8WAT, WB8BKC in Ohio is said to have worked the Argentine station, which should be in the extreme southern part of the country, according to the "W" in the call. About the same time that VE1ASJ was experiencing his field day to Japan, WA5IYX was working ZL3NE. Incidentally, Pat is back home recuperating from surgery. It's nice to have him back on. What he terms "the best day he has seen to New Zealand" came on the afternoon of March 13 for WA5IYX, with seven ZLs being heard at his San Antonio QTH. ZL openings began about February 25 in south Texas, according to information received from W5UWB south of Corpus Christi, with the appearance of ZL1s QS, MQ and AVZ, and ZL2s QS and KT. Numerous openings from the western part of the country to the South Pacific have occurred since just before that time, but reports have been somewhat sketchy so I can't provide many details. I guess the gang is too busy working DX to pass along much information. One exception is WA6BYA in central California. Bob reports five ZL QSOs on February 20 and one more on the 25th. But the really big day for him came on the 27th when the band was open to New Zealand for seven hours beginning at 2021Z. This session netted WA6BYA seven QSOs with six different stations. Signals ran to 60 dB over S9! Even after QSYing to 51 MHz, the signal from ZL2KT remained at that level, and ZL1AUM registered S7 on 52 MHz. On March 2, WA6BYA got in on the Caribbean opening in the morning working DL3ZM/YV5, PJ2DEW and TI2NA, and later in the day snagged JA8RC and JH1ECU as well as ZL2KT, KG6OX and VK4PU (on 6 to 10 crossband). Bob comments that he worked eight countries that day and could have added two more if he had been able to be home the entire day!

Several other major openings are worthy of note. One of these took place March 3 from just before 0000Z until 0530Z and involved KH6IAA and a number of Caribbean stations including VP2VGR, TI2NA, 8P6KX, FM7AD as well as Ecuador station HC1BI. Another session reported by KP4EOR, occurred on the 6th at about 2300Z. On that occasion David, along with KP4AAN, worked several JAs with their beams aimed southeast. At the same time LU3EX, whom they were also hearing, contacted 127 Japanese stations over a 3-hour period.

A group along the East Coast, sparked by W3IWU, is planning to mount a concerted attempt to work G stations crossband 6 to 4 meters during this summer's Es season. To maintain liaison with the gang across the pond, two frequencies are proposed for use when 28.885 MHz drops out for the season. They are 14.345 and 21.400 MHz. In addition to maintaining a general watch on these frequencies, it is proposed that a net be held at 1900Z on Saturdays. The 15-meter frequency will be primary, with 14.345 MHz as a backup. It is further proposed that stations on this side with 4-meter receiving capability operate automatic keyers between 50.000 and 50.020 MHz whenever they are in the shack and not otherwise occupied. Tune to the 3821-kHz, Tuesday-night net beginning at 2359Z for additional information.

Word has come that the PAØ stations have received 6-meter operating privileges of sorts. For the next year, they are allowed 25-W erp on three spot frequencies of 53.875, 53.925 and 53.975 MHz! At least it may be a step in the right direction.

QSL cards for DL3ZM/YV5 and ZS3E may now be sent to K8EES.

2 Meters — VE7BQH, the latest 2-meter operator to amass all 50 states, says that he is not resting on his laurels. Lionel has plans for a bigger and better antenna. He notes the ever-increasing cadre of DX stations coming on 2-meter EME, and wonders if DXCC can be too far away. Achievement of such a feat will certainly be a landmark in the history of the world above 50 MHz. Who will be the first to cop this prize? Another who extols the level of 2-meter EME activity is VE2DFO. Don comments that things are much different now than back in 1972 when he first got on. He says that there were no more than five or six stations active in those days. Now the band sounds like the low end of 20 meters! The new array at VE2DFO consists of twelve 14-element Junior Boomers and seems to be working very well indeed. A new convert to the 2-meter moonbounce contingent, W7HAH of Montana, puts in a plea for retention of the Standings Boxes. Shep contends that the 2-meter box is useful to him in learning who is on in the states he needs so he can request schedules. In addition, he suggests establishment of a One Hundred Stations on EME Award. He notes the need for something to keep people active once they have completed WAS. The EME Annals, which I have been trying to get off the ground for several years, might form the basis for such an award. I must say, however, that very few moonbouncers have submitted the necessary information for listing. Drop me an s.a.s.e., and I'll send the forms for use in submitting reports.

A lot of the 2 meter news seems to come from the West this month. N7BHC of Hunter, Utah, reports his success to date. Over the winter Dave managed to work Green River, Wyoming, stations WB7QBC and WB7QEB on tropo as well as WØSD in South Dakota and WB7TYU/7 in Oregon via m.s., but his major goal is EME capability. It is expected that an array of four Boomers will be in operation soon, and a kilowatt won't be far behind. You should be very popular, Dave, but not completely alone. W4WD has moved from Florida to Utah and is due to be active also.

As this is being written in mid-March, word is expected soon of 2-meter contacts across the Equator from the Caribbean to Ascension Island. ZD8TC has already reported hearing the 144.3-MHz transmissions of KP4EOR while using a 6-meter beam on the receiver. He has also heard PY signals. Ted now has a 2-meter beam installed so he can transmit. We may be hearing of some epic 2-meter contacts shortly!

70 Cm and Down — According to the K2UYH *432 and Above EME News*, new stations now operational on 70-cm EME include KL7WE Alaska, K4PKV North Carolina, WB4IZR Georgia, ZS6NG and SM5CFD. Also, WB5LUA has joined the ranks of 23-cm moonbouncers with a 24-foot dish.

On the terrestrial scene, VE3FN reports a very good aurora on February 6 that was intense enough to reflect 70-cm signals. Ray nabbed VE2DFO and K2YCO via the "buzz" mode on that occasion.

Enjoy vhf and uhf contests? How would you like to try an ATV contest? Sounds challenging indeed! The rules for last year's affair excerpted from the Belgian magazine *CQ-QSO* provide some indication of just how challenging it could be!

Rules: a) Bilateral contact (sound es image received on both sides) on 70 cm, 2 points/km (as till now our PTT does only permit us to use 70 cm for ATV, 23 cm es 3 cm is illegal for ATV in Belgium.

b) Reception from ATV stn only: 1 point/km.

Log: The following information must be received by both stations —

a) Call sign, IMAGE es SOUND.

b) QTH-locator, IMAGE or SOUND.

c) Signal report (B0 to B5) with serial number 1001 to start with).

d) A code number consisting of four nonconsecutive figures, transmitted only with the image transmitter (e.g. 1785 or 9753).

The log must be completed with following information: total points per QSO, total points, call sign, name, address, QTH-locator and best DX.

Hamfest Calendar

[Note: Sponsors of large ham gatherings should check with League headquarters 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.]

Arizona: The White Mountain ARA is sponsoring a hamfest June 6-7 at Blue Ridge High School, Lakeside. Dealer exhibits, technical sessions and demonstrations, contests, prizes, and activities for the ladies. For further information write to Paul Smith, WB7ULN, Box 148, Snowflake, AZ 85937. Talk-in on 146.01/61 and 146.04/64.

Arkansas: The Northwest Arkansas ARC, Inc. will hold its 1st annual hamfest/swapmeet on Saturday, May 16, at the Siloam Springs Community Building, from 8 A.M. to 5 P.M. Commercial exhibitors free tables; flea market tables $2 each. Prizes, refreshments, parking. Talk-in on 16/76 or 52 simplex. For more info write to Bob Harmon, W5SFP, Rte. 1 Box 13F, Elkins, AR 72727 (include s.a.s.e.).

California: The 9th annual Sacramento Valley Radio Ham Swap sponsored by the North Hills Radio Club will be held Sunday, May 31, from 9 to 3 at the Machinists Hall, 3081 Sunrise Blvd., Rancho Cordova. Table rentals, food, club auctions and prizes. Admission free. Talk-in on K6IS, 144.59/145.19 and 223.18/224.78.

Colorado: The Rocky Mountain VHF Society will hold the annual spring hamfest on Sunday, May 17, from 9 A.M. to 4 P.M., at the Boulder National Guard Armory, 4750 N. Broadway, Boulder. Admission $2 per family. No sellers' charge; bring your own tables. Setup at 8:30 A.M. Prizes and ham swap. Technical demonstrations and seminars. Food and drink available. Talk-in on 146.16/76 and 146.52. For more information, contact Richard Ferguson, KAØDXM, 1150 Albion Rd., Boulder, CO 80303, tel. 303-499-2871.

Connecticut: The Norwich Tech Ham Radio Club will sponsor a hamfest on Saturday, May 9, at the Norwich Regional Vocational Technical School, 590 New London Tpk., Norwich, from 9 A.M. to 4 P.M. Admission $1, vendors $7 (some tables available). For more info write to the school or tel. 889-8453, Electronics Dept. Talk-in on 146.13/73 and 146.52.

Florida: The annual "Conchfest" sponsored by the Key West ARC will take place May 16-17. Tickets $25/person ($15 for harmonics under 12) include dinner, beverages, Continental breakfast, book of discount coupons to Key West attractions, awards. Special rate at Sportsmen's Inn. For more info write to KA4CDD, Key West ARC, P. O. Box 2371, Key West, FL 33040.

Georgia: The Toccoa/Hartwell Campfest will be held May 30-31 at Group Campground, Hwy. 29, north of Hartwell Dam, Hartwell. Free camping (no hook-up), free flea market. Talk-in on 93/33 and 146.895/.295.

†Idaho: Kootenai Amateur Radio Society's Hamfest '81 will be on Saturday, May 9 at the North Idaho Fairgrounds, Coeur D'Alene. Commercial displays, free swap tables (while they last), many awards. Snack bar and free overnight parking (no hook-ups). Friday night get-together from 7 to 9 at fairgrounds with entertainment. Talk-in on 146.37/97. For information write to KARS, 1614 Montana Ave., Coeur D'Alene, ID 83814.

†Illinois: The Starved Rock Radio Club will hold its hamfest on June 7 at the Bureau County Fairgrounds, Princeton. Registration $2 before May 20, $3 at the gate. Parking, refreshments and prizes. Free coffee and doughnuts from 8:30 A.M. to 9 A.M. Swap and Shop, ARRL forum, and dealers' booths. Talk-in on 147.12/72, 146.07/67 and 146.52. Send s.a.s.e. for more info to George E. Keith, W9QIZ, RFD 1, Box 171, Oglesby, IL 61348.

Indiana: The Fri State ARS (TARS) will hold their annual hamfest on May 17 at the Vanderburgh 4H Center, Evansville. Grounds open at 6 A.M. CSDT. Admission $1. Indoors, air-conditioned. 70 tables available. Outdoor flea market. Talk-in on 147.75/15 or 146.19/79. Contact Tom, WA9QDZ, 2851 Wayside Dr., Evansville, IN 47711.

†Indiana: The Wabash County ARC will hold its 13th annual hamfest on Sunday, May 17, from 6 A.M. to 3 P.M. at the Wabash County 4H Fairgrounds, Wabash. Admission $2.50 in advance, $3 at the gate. Plenty of food and parking. Camping spaces available for Saturday night. Talk-in on 147.63/03 or 52 simplex. For tickets or more info send an s.a.s.e. to Dave Spangler, N9AIDO, 45 Grant St., Wabash, IN 46992.

Kentucky: The Northern Kentucky ARC Ham-O-Rama will be held on May 31 at the Boone County Fairgrounds in Burlington. Flea market, exhibits, prizes. Admission $4, children under 12 free. For more information write to Ken Miller, WD8ISC, P. O. Box 257, Erlanger, KY 41018.

†Louisiana: The BRARC annual hamfest is May 16-17 at Catholic High School in Baton Rouge. Banquet Saturday night, swap tables both days. Many prizes, excellent food, ladies' activities, dealers. Talk-in on 19/79 and 34/94. For more information call hamfest chairman, Herb Ramey, KB5AO, tel. 504-344-6746, or write Box 4084, Baton Rouge, LA 70821.

Maine: The Portland Amateur Wireless Association and the University of Southern Maine/Gorham, will sponsor an Amateur Radio flea market from 8 to 5 May 30 in the gym and parking lot of the university campus at Gorham. Admission $1. Food and drinks available. Contact John Taylor, N1SD, tel. 207-773-2651 for information.

Maryland: The 7th annual Easton ARS hamfest is May 17, rain or shine, 10 A.M. to 4 P.M., at the Easton Senior High School cafetorium on Rte. 50 south of Easton at mile marker 66. Hamfest signs will be posted at Rte. 50 north and south. Talk-in on 146.445/147.045 and 52. Donation $2, with additional $2 for tables or tailgaters. Write R. C. Thompson, KA3BKW, P. O. Box 1473, Easton, MD 21601, or Easton ARS, Inc., Box 781, Easton, MD 21601.

Maryland: The Maryland FM Association's annual hamfest/computer show is on Sunday, May 31, at the Howard County Fairgrounds, West Friendship, from 8 to 4. Donation $3, tailgating $2, tables $6. Talk-in on 146.16/76. For more information, write MFMA, c/o Heru Walmsley, Post Office, Harmans, MD, tel. 301-766-3545.

Massachusetts: The seventh annual Eastern VHF/UHF Conference will be held May 15-17, at the Sheraton Inn and Conference Center, I-495 at Rte. 111, Boxboro. Featured will be technical talks by well-known xhf'ers, a banquet, noise-figure and antenna-gain measurements, and other activities. Preregistration is $13.50 from K1LOG, Rick Comino, 3 Pryor Rd., Natick, MA 01760 before May 10. Registration at door is $20.

Massachusetts: The 7th annual hamfest and flea market sponsored by the Eastern Connecticut ARA will be held on May 17, at Point Breeze Restaurant, Webster, rain or shine. Info via Richard Spahl, K1SYI, Lake Parkway, Webster, MA 01570, tel. 617-943-4420 after 8 P.M.

Michigan: Cadillac's 21st annual "Swap Shop & Eyeball QSO" will be from 9 A.M. to 4 P.M. on Saturday, May 16, at the Michigan National Guard Armory, Haynes St., Cadillac. Prizes, plenty of parking, lunches available. Tickets $2, $3 per 8-ft table. Talk-in on 146.37/97. Further info via Wexaukee Amateur Radio Association, P. O. Box 163, Cadillac, MI 49601.

†Michigan: The Chelsea Swap and Shop will be held on Sunday, June 7, at the Chelsea Fairgrounds. Gates will open for sellers at 5 A.M.; open to the public from 8-2. Admission $1.50 in advance, $2 at the gate. Children under 12 and nonham spouses free. Talk-in on 146.52 simplex and 147.855 Chelsea repeater. For more info, write to Wilham Altenberndt, 3132 Timberline, Jackson, MI 49201.

Michigan: The Grand Rapids Spring Swap and Shop sponsored by the Independent Repeater Association will be held on Saturday, June 6, at the National Guard Armory, 44th St., one quarter mile west of U.S. 131. Prizes, refreshments, dealers, forums, indoor swap area and trunk sales. Reserved dealer area available. Doors open at 8 A.M. Tickets $2, indoor tables $5. Talk-in on 147.765. Information: David Jenista, WD8NZZ, 437 Airview SE., Wyoming, MI 49508.

Minnesota: The Arrowhead Radio Amateur Club will hold their annual spring swapfest May 9, at the First United Methodist Church, 230 East Skyline Pkwy., Duluth. Doors open at 10 A.M. Advance admission $1.50 (s.a.s.e. requested), $2 at the door. Prizes, auction, programs, displays, food and beverages, free parking. Talk-in on 34/94. For table reservations or further information write or call Duane Elyea, KB0IC, 4907 Peabody St., Duluth, MN 55804, tel. 218-525-4580.

Minnesota: The North Area Repeater Association will sponsor the state's largest swapfest and exposition for radio amateurs and computer hobbyists on May 30 at the Minnesota State Fairgrounds, St. Paul. Free overnight parking for self-contained campers on May 29. Exhibits, booths, prizes. Admission $3. Talk-in on 16/76 and 52. For information or reservations, write Amateur Fair, P. O. Box 30054, St. Paul, MN 55175.

Missouri: Indian Foothills ARC 6th annual hamfest is Sunday, May 17, at the Saline County Fairground Building, Marshall. Advance registration 4 for $5, $2 each or 3 for $5 at the door. Coffee and lunch available. No charge for tables; reservations requested. For information and advance tickets contact Phyllis French, W0WIE, Rte. 4, Box 168, Sedalia, MO 65301, tel. 816-826-8319 after 5 P.M. or K0BVB, tel. 816-886-2837.

†New York: LIMARC — The Long Island Mobile Amateur Radio Club, Inc., will sponsor Hamtair '81 at the Islip Speedway, Islip, Exit 43 south of the Southern State Parkway (Islip Ave., Rte. 111), from 9 to 4 May 17 (rain date May 24). No reservations needed. General admission $2, exhibitors $3. ARRL info, dealers, swap and shop, prizes, ample parking. Refreshments available. Computers, TV, satellite communications, VHF Tune-up Clinic. For additional information call at night only, Hank Wener, WB2ALW, tel. 516-484-4322 or Sid Wohn, K2LJH, tel. 516-379-2861.

New York: The Rome Radio Club, Inc. is having its 29th annual "Ham Family Days" on June 7. Activities start at 9 A.M. at Beck's Grove, 10 miles west of Rome, just off Rte. 49 adjoining Beck's Grove Airport. Flea market, displays. Talk-in on 146.28/88, 146.34/94 and 146.52.

North Carolina: The Durham FM Association announces Durhamfest '81, May 16-17, at South Square Mall, U.S. 15-501 south. Prizes, large covered flea market, rental tables available. Free tailgating or dealer spaces, $3 admission. Talk-in on 147.825/.225, 146.52, 222.34/223.94. Advance tickets and further information from Durham FM Association, P. O. Box 8651, Durham, NC 27707.

North Carolina: A regional meeting of the Antique Wireless Association will be held in Winston-Salem at the Ramada Inn Downtown on May 23. Interesting displays of antique radios, flea market and talks by outstanding collectors. An evening banquet followed by Pitcairn Island program presented by Tom Christian, VR6TC. Registration fee. For further details contact L. W. Elias, W4DBT, 3919 Poindexter Dr., Winston-Salem, NC 27106.

†North Carolina: The Gaston County ARS will sponsor a hamfest on Saturday, May 23 starting at 9 A.M., at Kariyae Park, Gastonia. Advance admission $2.50, at the gate $3. Flea market, prizes, lunch, dealers, food service available. Tables for rent or tailgating permitted. Talk-in on 147.72/147.12. For information and tickets write to Glenn Varner, W4PBQ, 1332 Poston Cir., Gastonia, NC 28052.

Ohio: The Athens County ARA annual hamfest will be held on Sunday, May 17 at the Athens City Recreation Center, East State St., from 8 to 4. Free flea market for electronics-related items on large paved area; some indoor space available on first-come-first-served basis. Setup at 7 A.M. Food, free parking. Adjacent to Athens Mall, several restaurants and recreation area. Tickets $1 advance, $1.50 at gate. Talk-in on 34/94. For further info send s.a.s.e. to AARA, c/o Jeff White, WD8OXK, P. O. Box 767, Athens, OH 45701, or tel. Joe Tollrod, WB8DOD, 614-797-4874.

Ohio: The fourth annual King of the Pumpkin Hamfest, sponsored by the Teays Amateur Radio Club, will be held 9-5, Sunday, June 7, at the fairgrounds coliseum, Circleville. Indoor and outdoor flea market, new and used equipment, prizes, refreshments, parking. Tables available at $3 per 8-ft space. Tailgate $2. Advance admission $2, at the door $3. For advance reservations and information, contact Dan Grant, W8UCF, 22150 Smith Hulse Rd., Circleville, OH 43113, tel. 614-474-6305.

Oklahoma: The 3rd annual BARC Swapfest will be held in the Oklahoma National Guard Armory, 637 E. College, Broken Arrow. Doors open at 10 A.M. Registration is $1. Talk-in on 31/91 and 52.

Ontario: The Central Ontario Amateur Radio Flea market and computerfest, sponsored by the Guelph ARC, will be held on Saturday, June 13, from 8-4, at the Centennial Arena, College Ave. West, Guelph. Admission $1, 12 and under free. Vendors additional $2 (please bring your own table). Some tables available (3 × 8) at $5 each. Displays indoors and outdoors. Computer software and hardware. Talk-in on 52, 37/97 and 96/36. Contact Dennis Gore, VE3DGA, tel. 519-836-6226 or Andy Janosik, VE3GDY, tel. 519-824-3227.

Pennsylvania: The 27th annual Breeze Shooters Hamfest is May 17 from noon to 5 at the White Swan Park, Rte. 60 (Parkway West) near the Greater Pittsburgh International Airport. Free flea market, prizes, contests, family amusement park. Registration $2 or three for $5. Under-cover tables for vendors by advance registration only. Talk-in on 28/88 or 28.0 MHz. Contact Don Mysiewski, K3CHD, 359 McMahon Rd., North Huntingdon, PA 15642.

Pennsylvania: The Tamaqua Transmitting Society

†ARRL Hamfest

and the Anthracite Repeater Association will hold its annual hamboree crain or shinei, Sunday, May 17, starting at 9 A.M., at the I.O.O.F. grove, 1 mile south of Tamaqua, off Rte. 309. Pavillions and tables available for vendors, plenty of space for tailgaters. Food, prizes, contests, gabfests, free parking. Donation $3 per call, tailgaters $1 extra, wives and harmonics free. Talk-in on 146.07/67, 147.705/105 and 52. For more information contact Tony Sarli, W3CMA, 164 Spruce St., Tamaqua, PA 18252.

Pennsylvania: The Third Annual Reading Hamfest sponsored by the Reading Radio Club will be on May 24, at Hamburg. Indoor and outdoor facilities. Doors open at 8 A.M. (EST), 7 A.M. for tailgaters. Many prizes. Adult donation $2, space outside $2, table inside $3. Talk-in on 146.31/91 and 146.52. Write Box 124, Reading, PA 19603 for reservations.

Pennsylvania: The 10th annual MARC (Milton Amateur Radio Club) Hamfest will be held from 8 to 3, on June 14, rain or shine, at the Allenwood Firemen's Fairgrounds, U.S. Rte. 15, 4 miles north of I-80. Advance registration for sellers $2.50, at the gate $3, wives and children free. Flea market, auction, contests, prizes, free portable- and mobile-fm clinic, supervised children's activities, food and beverages. Talk-in on 37/97 and 52. For further details, call or write Harold C. Dennin, AC3Q, c/o Milton Amateur Radio Club, P. O. Box 235, Milton, PA 17847, tel. 717-538-5455.

Rhode Island: The Newport County Radio Club will hold an auction on Monday, May 18, at 7 P.M., at the club headquarters, Seamen's Church Institute Building, 18 Market Square, Newport. Talk-in on 147.96/36.

†South Carolina: The Columbia Amateur Radio Club will sponsor the 4th annual "Columbia Hamfest" on Saturday, May 30, at Midlands Tech College, Beltline Campus. Doors open at 9 A.M. Outdoor flea market on south parking lot, indoor dealer displays. Food available. Talk-in on 34/94. For more information write or call Bob Burks, KC4LB, CARC, P. O. Box 5802, Columbia, SC 29250, tel. 803-776-9054.

Tennessee: The Radio Amateur Club of Knoxville presents the Greater Knoxville Hamfest May 23-24, at Bearden High School, from 9 to 5 on Saturday and 10 to 4 on Sunday. Doors open at 7 A.M. Saturday for dealers. Admission $2, table $5 one day or $8 both days. Refreshments, forums, code contest, prizes. Reservations: Ron McKean, WD5EUN, 12108 W. Kingsgate Dr., Concord, TN 37922, tel. 615-966-2619. Other info: Larry Poore, KA4HAI, 4320 Felty Dr., Knoxville, TN 37918, tel. 615-687-4154. Talk-in call W4BBB — 3.980, 90/30, 13/73.

Tennessee: The Humboldt ARC annual hamfest will be held on Sunday, May 31, at Shady Acres City Park in Trenton. Flea market, prizes, ladies' activities, light lunches, restaurants nearby. Talk-in on 37/97. For further info contact Ed Holmes, W4IGW, 501 N. 18th Ave., Humboldt, TN 38343.

†Texas: The Texas Signal Core will sponsor "Ham-Com '81" June 6-8, at the North Park Inn Convention Center, 9300 Central Expy., Dallas. Exhibits, flea market, forums and seminars. Single pre-registration $5, $6 at the door; family pre-registration $7.50, $8.50 at the door; DARC banquet $18.50; flea market reserved tables $5 each. Talk-in on 146.28/88. For time schedule, registration and tickets, general info, write to Ham-Com, Inc., Box 64, Richardson, TX 75080, tel. 204-867-6766.

†Virginia: The Roanoke Valley Amateur Radio Club Mayfest is scheduled for Sunday, May 24, at the Roanoke Civic Center Exhibit Hall, from 9 to 4. Admittance (registration $3, at the door $3.50. ARRL forum, cw contest, ladies' and kiddies' functions. Motels, camping, hotels available. Talk-in on 146.385/985 and 52.

†Virginia: The Ole Virginia Hams ARC of Manassas announces its 7th annual hamfest on June 7, from 8 to 5, at the Prince William County Fairgrounds, located off Rte. 234, one-half mile south of Manassas. Admission $3, children under 12 free, $2 additional for tailgaters (setup at 7 A.M.). Dealers, flea market, manufacturers, food, prizes, parking. Talk-in on 37/97 and 52. For further information and reservations, write to Bruce Keller, WD4ODM, 4636 Angus Dr., Gainesville, VA 22065, tel. 703-754-2635.

†Washington: The Clark County ARC presents the Fort Vancouver Hamfair on Saturday and Sunday, May 9-10, at the Clark County Fairgrounds, 7 miles north of Vancouver on I-5 (exit 9). Doors open both days at 8 A.M. Admission $4.50, Saturday night buffet dinner: adults $5.50; kids, 12 and under $2. Seminars, dealers, swap and shop, hidden-transmitter hunts, prizes. Talk-in frequencies: 147.84/24, 146.13/73, 52 and 49. Make checks payable to Clark County ARC. For further information and registration, write to Ken Westby, W7DYX, 606 Miami Ct., Vancouver, WA 98664.

Washington: The Amateur Radio Association of Bremerton will hold a hamfest on Armed Forces Day, May 16, at the Holiday Inn in Bremerton. Prizes, swapshop, displays, tour to the *U.S.S. Missouri* on Puget sound and more will be featured. Ticket registration $4; banquet $10. For tickets and information, contact K7EVN/7CCH, 2150 Shamrock Dr., Bremerton, WA 98310.

†Washington: The Tri-City Hamfest and Computer Fair will be sponsored by the Tri-City Hamfest Council May 30-31 at the Richland Community House, Richland. Doors open 9 to 6 on Saturday, 9 to 2 on Sunday. Banquet at Red Lion Motor Inn, Pasco, WA, Saturday evening. Admission $3, under 15 free. Dealers, seminars, swap shop, computer displays, contests, prizes, refreshments. Campground (self-contained). Talk-in on 04/64, 16/76 and 52. For further information, contact John Herb, W7EDI, Box 533, Richland, WA 99352.

Wisconsin: The Green Bay Mike and Key Club swapfest will be held Sunday, May 17, from 8 to 3, at the Ashwaubenon Recreation Center, Anderson Dr. (just west of Oneida St.). Food and beverages, prizes, table spaces available. Admission $2. Talk-in on 72/12 and 52. For further information, contact Robert Duescher, 1011 13th Ave., Green Bay, WI 54304. — *Marjorie C. Tennes, WB1FSN, Convention/Travel Coordinator, ARRL*

DST

Coming Conventions

May 15-16
Atlantic Division/New York State, Rochester

May 15-17
Pacific Division, Fresno, California

May 16-17
Southeastern Division, Birmingham, Alabama

June 5-7
Northwestern Division, Seaside, Oregon

June 12-13
Ohio State, Cincinnati

June 20-21
Georgia State, Atlanta

July 4-5
West Virginia State, Weston (Jackson's Mill)

July 12
Indiana State, Indianapolis

July 24-26
West Gulf Division, Oklahoma City

August 1-2
N. Florida Section, Jacksonville

ARRL NATIONAL CONVENTIONS

July 23-25, 1982
Cedar Rapids, Iowa

October 7-9, 1983
Houston, Texas

ATLANTIC DIVISION/NEW YORK STATE CONVENTION

May 15-16, 1981, Rochester

The Atlantic Division/New York State Convention combined with the Rochester Hamfest will be Friday and Saturday, May 15-16, at the Monroe County Fairgrounds, Rte. 15A, Rochester. Commercial exhibits will be open from 1 to 9 P.M. Friday and from 8:30 A.M. to 6 P.M. Saturday. Huge outdoor flea market opens 1 P.M. Friday and runs continuously until closing Saturday evening.

FCC exams will be conducted on Saturday, May 16. Send *new* Form 610 before May 1 to FCC, 111 W. Huron St., Buffalo, NY 14204. Indicate "Rochester Hamfest, Rochester, NY" in Section II-B of the form.

Programs include an NTS Forum with Bob Halprin, K1NA, ARRL Asst. Communications Manager, a League Forum with President Harry Dannals, W2HD, Directors Jesse Bieberman, W3KT, Stan Zak, K2SJO, and others. Other programs will be on antennas, transmitters and vhf; for the beginners programs will be presented by Bill Myers, K1GQ, Pete O'Dell, KB1N, and Ray Heaton, WA0DYZ. There will also be an ARES forum and section and local net meetings. A highlight of the day will be the 2nd annual W2RUI Memorial Code Contest. Ladies' programs will be presented all day at hamfest hotel headquarters, the Marriott Thruway. Bus transportation will be provided from the fairgrounds to the hotel and to shopping malls.

The annual awards banquet will be Saturday evening at the Marriott. At midnight the Woutl Hong ceremony will be presented. All are welcome to participate.

Registration $4 in advance, $5 at gate. Banquet $11. Flea market permits, $2 per parking space. For tickets write Rochester Hamfest-Tickets, 737 Latta Rd., Rochester, NY 14612. For other info write P. O. Box 1388, Rochester, NY 14603, or call 716-424-1100.

SOUTHEASTERN DIVISION CONVENTION

May 16-17, 1981, Birmingham, Alabama

The Birmingham Amateur Radio Club will host the Southeastern Division Convention at its annual hamfest. BirminqHAMfest '81 will be held at the Birmingham-Jefferson Civic Center and will feature a wide spectrum of attractions from our multi-faceted hobby.

Some of the hamfest/convention highlights include tech forums, ARRL meetings, a DXers' forum and on-the-spot checking of cards for DXCC. The FCC will administer Technician through Extra Class exams; computer buffs will be treated to forums centered around both the APPLE and TRS-80 machines. Bargain hunters can browse the large, air-conditioned flea market or visit the exhibits of all the latest commercial gear displayed by manufacturers and dealers including some things from the electronics and computer world that nonham family members will enjoy seeing.

Our prize list is sure to send several hams home with a dandy new addition to the shack. Wives' and kids' programs have been planned to make the whole family's hamfest visit an enjoyable one. The Saturday night banquet will have good food, fellowship and fine entertainment. Newcomers to the hobby will be interested in a display on getting started in ham radio without investing a fortune.

Parking, lodging and restaurants are available adjacent to the Civic Center. Concessions are located in the main exhibit area. Tickets good for both days of the hamfest are $3. Nonham family members will be admitted at the special price of $1; children under 12 are free. For talk-in purposes use the 146.34/.94 repeater or 146.52 simplex. For more information write to BirminqHAMfest '81, P. O. Box 603, Birmingham, AL 35201.

NORTHWESTERN DIVISION CONVENTION

June 5-7, 1981, Seaside, Oregon

The ARRL Northwestern Division Convention will take place on the beautiful north Oregon coast at Seaside. It will be held June 5-7 at the spacious and modern Seaside Convention Center. All events and exhibits will be under one roof and on one level.

There will be forums covering a wide range of subjects from the ARRL, DX, and antennas to computers and many other subjects. Dealers and manufacturers will have displays of the latest in ham equipment and accessories. The hams will have a large flea market and swap-fest. There will be contests in home-built equipment, cw, and others for the novice to the expert. Many surprises for the hams, nonhams and children. On the evening of the 6th there will be a banquet with a choice of prime rib or a seafood-combo plate.

Come and enjoy the beautiful north Oregon coast and take part in the clam digging (there will be a prize for the largest clam dug), beach combing, gift shops, amusement parks, salmon fishing and many more activities besides an excellent convention.

Convention registration is $5 a person or $7 for the family. Swap-fest tables are $5 each for the length of the convention. Banquet tickets are $12.50. For information or pre-registration write ARRL Northwestern Division Convention, P. O. Box 920, Seaside, OR 97138.

DST

Club Corner

Conducted By Sally O'Dell,* KB1O

EXHIBITIONISM FOR FUN AND PROFIT!

Like frosting on the cake or sugar in your coffee, exhibits add that extra touch. Exhibits are the sugar in Amateur Radio. Just a little bit of contact with the outside world and suddenly you have a whole new collection of people waiting for the next Novice class that your club is sponsoring. How sweet it is!

Many clubs around the country put on Amateur Radio displays any place they can find the space. Usually they set up indoors, though some groups have been brave enough to prepare and set up a display outside.

The Southern Chester County ARC (Malvern, Pennsylvania) put on an exhibit inside a local mall. They posted a sign proclaiming "See Amateur Radio in action! We talk around town and around the world!" The five stations in action contacted 20 states and 10 countries and sent over 200 Mother's Day greetings. The club felt they had accomplished something important and valuable, while providing good training for the operators. Over 200 people had some form of contact with an active group of Amateur Radio operators in a positive way. Hams were doing them a favor. Hams were helping them keep in touch.

Exhibits are the best place to display class announcements. If someone is interested in studying for an amateur license, he or she can contact those who have the most to say about it — namely, hams. The main point in preparing an exhibit for the public is planning. *Plan Ahead!* Prepare yourself and your club. Think through the whole commitment in people-hours and cost to yourselves and your club. If your club has not participated in an exhibit before, see if you can talk to someone locally who has. An exhibit can be very inexpensive, but it will cost something. Posters should be prepared well in advance — posters that put your club in a good light! Plan out your display table. Will you be there with or without equipment? If without, will you have photographs of

*Club Program Manager, ARRL

Central Ohio AREC/RACES booth at the Ohio State Fair.

a complete station? If you will be setting up a station, will you demonstrate a contact locally or across the continent? Are you prepared to send messages? How about using a prepared message form which says "check one" and lists a number of different prepared messages, ARRL or ones customized for the occasion? Learn how to handle "book" messages properly. Just be sure the messages you invent are *brief*.

Are there MARS (Military Affiliate Radio System) members in your club? MARS members can refile amateur messages and pass them to military personnel overseas. Either Army, Air Force or Navy MARS members can accept messages for any branch of the service which can then be routed to the proper destination.

Clubs, councils and other groups across the country have been and will be preparing displays for the general public year-round. From the Hampden County Radio Association (Springfield, Massachusetts) who have been negotiating since November for space at the Eastern States Exposition next September, to the Orange County Council of Amateur Radio Operators (Costa Mesa, California) displaying at the Orange County Fair in July, to the Ohio Council of Amateur Radio Clubs who display at the Ohio State Fair — all these groups and others across the country are planning months in advance to prepare exhibits that will be attractive and inexpensive to the group, and that will draw attention.

Where are these exhibits? Where do you "set up"? The locations are limitless. Some places to consider are: science-fiction conventions; library science week or school science fairs; open house at an astronomy club; Rotary, Lions or Masons gatherings; local, general flea markets sponsored by anyone; *anywhere* large numbers of people will gather.

We offer, in limited amounts that you may copy, an exhibit kit containing some handouts — sample certificates, a map to arrange your QSL cards around, and so forth. Write to the Club and Training Department, Dept. 101, requesting an "exhibit kit" for your next exhibition. Be sure to request your kit at least three weeks before you need the materials.

When preparing your exhibit, consider composing a handout about *your* club in *your* neighborhood. When Fuzd Thungwhump stops by to see what is going on, he will be more interested in Amateur Radio next door rather than Amateur Radio across the country. Send an s.a.s.e. to the Club and Training Department, ARRL, requesting "Amateur Radio in Tompkins County" for a sample handout you can adapt for your club. One excellent type of local PR could be originating a message from your mayor to your governor or congressman. Photograph the mayor at the mike. Your local paper may even choose to cover the event.

Remember, an exhibit is a good place to advertise your club and ham radio. Put up some posters announcing your next Novice class and be prepared to start that class shortly after your display. You and your club can be responsible for a positive reaction to Amateur Radio in your community. QST

Silent Keys

It is with deep regret that we record the passing of these amateurs:

W1CTS, John E. Gibson, Jr., N. Berwick, ME
W1IYC, Peter J. Young, West Roxbury, MA
W1NER, Daniel L. Byrd, New Canaan, CT
W1NNN, Charles F. Bortano, Swansea, MA
W2AKC, Paul F. Durham, Penn Yan, NY
K2ILO, Henry J. Boer, Wyckoff, NJ
K2IV, Harry B. Braun, Dolgeville, NY
K2JKJ, Mario T. Rodriguez, Sag Harbor, NY
W2LPJ, Albert F. Emrich, Miller Place, NY
W2LYC, William D. Tietz, Schenectady, NY
K2POI, Irvin R. Weir, Jacksonville, FL
WB2SQK, Sammy Wasserfaut, Swan Lake, NY
W3DOD, Elmer J. Grabb, Clearwater, FL
W3GE, Charles G. Crider, York Haven, PA
W3GYN, Sheldon S. Davenport, Salisbury, MD
W3HCU, Archie Roberts, New Kensington, PA
W3IIY, John W. Hammond, York, PA
W3OB, John G. McKinley, Pittsburgh, PA
W3PMY, John F. Nordine, Jr., Gardners, PA
W3UQG, Theodore J. Piotrowicz, Erie, PA
W4CMZ, Roy E. Chapman, Decatur, GA
W4GV, Harry L. Penn, Atlanta, GA
WA4IPP, Dr. David Robinson, Tybee Island, GA
K4IU, Melville W. Gheu, Redington Beach, FL
WD4JBB, Fred W. Jobe, Longboat Key, FL
W4JYX, Howard K. Weber, Jeffersontown, KY
K4KHP, S. Ray Reisinger, Orlando, FL
*WB4KYL, Daniel F. Morris, Ellenwood, GA
WB4LUF, Dewey E. Eubanks, Gaffney, SC
W4OEJ, Charles W. Foust, Graham, NC
K4QH, James B. Strang, Lyon, NC
K4SGO, Marvin H. Graham, Bristow, VA
W4SIX, Charles M. Woodman, Orlando, FL
WB4SML, William H. Taft, Cameron, SC
W4SN, Stacy W. Norman, Charlottesville, VA
W4TGK, Curtis A. Luke, College Park, GA
WB4TLL, Edwin P. Hosking, Sr., Key West, FL
W5CIX, Bernard B. Thorn, Cuero, TX
K5CWB, Charles K. Stahl, Wolfforth, TX
ex-K5DQN, Fred Murtaugh, Corpus Christi, TX
W5KCC, Bert S. Parker, Texarkana, AR
W5KYV, Robert G. Sharp, Wake Village, TX
W5OHH, Leland E. "Buzzy" Brooks, Midwest City, OK
W5OMY, Ferrel A. Rowe, Savage, MS
W5RSP, William D. Smith, Texarkana, AR
W5TJ, Milo Novotny, Onalaska, WI
K5VZO, Robert C. Gant, Duncan, OK
WA5WNA, Clyde E. Kerr, New Braunfels, TX
W5ZOK, Richard Brown, Lubbock, TX
W6BBV, Maurice J. Blais, Loma Linda, CA
W6BVY, Elvyn J. Beall, Modesto, CA
kB6EW, Jefferson G. McKee, Ellensburg, WA
WD6GEG, Ulysses M. Culver, Escondido, CA
K6GQX, Donald L. Brown, Palmdale, CA
W6IWU, George R. Stray, Hemet, CA
W6LB, Harold M. Wollam, Casmalia, CA
K6LFQ, Irvin H. Sartwell, Santa Barbara, CA
WA6LZG, Harlow F. Codling, San Diego, CA
W6OZZ, John G. Thompson, Forestville, CA
W6UFD, Kenneth H. Steward, Hayward, CA
WB6WIU, William N. Hayton, Redding, CA
W7AAD, William O. Hammond, Hillsboro, OR
KA7ADR, Orville E. Rider, Sidney, MT
W7AUX, Richard H. Ward, Liverpool, NY
WB7BCIS, Rolland D. Shearer, Kennewick, WA
KA7CML, Barbara J. Shatila, Seattle, WA
KA7EQI, Ransom E. Hainy, Caldwell, ID
WA7JAQ, Henry F. Bray, Tucson, AZ
W7JIX, Frank A. Barry, Sun City, AZ
W7JJL, Walter Froembgen, Lake Stevens, WA
W7KGJ, Edward G. Brown, Billings, MT
WD7RXN, Joseph R. Jarrett, Deer Park, WA
W8APC, Sanford J. Dye, Columbus, OH
K8CMY, Adam R. Turtle, Dearborn Hgts., MI
WD8CTF, Adam J. Shagie, Amherst, OH
K8JED, Arthur B. Dewey, Ludington, MI
W8NDV, Earl R. Schneider, Dayton, OH
W8NOQ, Victor D. Beale, Livonia, MI
WD8PCC, James E. Hanna, Marietta, OH
K8PXM, Leo J. Atwell, New Port Richey, FL
W8ZDJ, Alan F. Tabor, Royal Oak, MI
KA9ANY, Elisha Chestnut, Jr., Jasper, IN
W9CVU, Thomas F. Runyon, Richmond, IN
WD9DMA, Kenneth G. DeVilbiss, Blue Island, IL
K9DPC, George B. Bellinger, Park Forest, IL
W9KZN, Earl J. Green, Evansville, IN
WA9LGY, Robert M. Oberlin, Wolcottville, IN
WB9OBN, Joseph A. Jenkins, Sr., Indianapolis, IN
WB9OIY, C. Harold Jordan, Ely, MN
W9QHM, August C. Meier, Hoffman, IL
W9RAR, Stephen A. Urbanczyk, Rensselaer, IN
WB9RTE, Arthur M. Thiele, Park Forest, IL
W9UM, M. Wales Macy, Syracuse, IN
W9VJZ, Albino Lovaro, Wauwatosa, WI
W9VUC, Jack M. Lawrence, Carthage, MO
WØAGJ, Dedrick B. Bullemer, Wapello, IA
WDØFWU, Raymond A. Reid, Cedar Rapids, IA
WØGPI, Lyle L. Leach, Pueblo, CO
WØHEN, Charles D. Marcy, Anoka, MN
KAØHNT, Robert J. Egan, Brainerd, MN
WBØLOS, Clayton C. Sargent, Austin, MN
WØOZE, William W. Wheeler, Littleton, CO
KØWVF, John A. Cook, Omaha, NE
VE1HM, A. E. Cochrane, Sussex, NB
VE2VZ, Maurice Bourque, Longueuil, PQ
VE3EZL, Clarence G. Plummer, Owen Sound, ON
VE6DR, Joseph J. Dobry, Calgary, AB
VE6OH, Otto H. Meginbir, Medicine Hat, AB
VE7GQ, William Jones, Surrey, BC
OK1ADP, Frantisek Meisl, Decin, Czechoslovakia
ex-VK5AX, Alf Traeger, Corryton, Australia
F6BXS, Col. Gerard "Jerry" Swarthout, Venice, France

*Life Member, ARRL

Note: 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*.

Rules, 1981 IARU Radiosport Championship

The Radiosport enjoys very good participation from around the world, and many very hard-to-work countries are often QRV for this one. To run up a big score, you'll need to strike a balance between a large QSO total and a large multiplier total. While 10 meters doesn't have the best propagation in July and 80 and 40 meters are often very noisy with QRN, patience and good operating there will reward you with some extra multipliers.

For those not familiar with ITU zones around the world, a map of ITU zones is available from ARRL/IARU Hq. Send an s.a.s.e. or one IRC for the proper forms (including the map) early so you'll have them in time for the contest. Good luck!

Rules

1) **Eligibility:** All licensed amateurs worldwide.

2) **Object:** To contact as many other amateurs in as many parts of the world as possible using 1.8 through 148 MHz.

3) **Date:** Second full weekend of July (July 11-12, 1981).

4) **Contest period:** 0000 UTC Saturday until 2400 UTC Sunday, with single-operator stations operating a maximum of 36 hours.

5) **Categories:**

A) Single Operator: Phone-only, cw-only and mixed-mode sections. One person performs all operating and logging functions. Use of spotting nets is not permitted. Off times must be at least 30 minutes long.

B) Multioperator: Single transmitter, mixed mode only, must remain on a band at least ten minutes at a time.

6) **Contest Exchange:** All stations send signal report and ITU zone.

7) **Valid Contact:** The same station may be worked once per frequency band. Cross-mode, cross-band and repeater QSOs do not count.

8) **QSO Points:**

A) Contacts within your ITU zone count one point.

B) Contacts within your continent (but different ITU zone) count three points.

C) Contacts with a different continent count five points.

9) **Multipliers:** ITU zones worked on each band.

10) **Scoring:** Multiply total number of QSO points by the sum of ITU zones worked on each band for the final score.

11) **Reporting:**

A) All entrants are encouraged to use forms available from IARU/ARRL Hq. (s.a.s.e. or one IRC).

B) Logs should indicate times in UTC, bands, calls, complete exchange. Multipliers and off times should be clearly marked in the log. Cross-check sheets (dupe sheets) are required if more than 500 QSOs are made.

C) Entries must be postmarked within 30 days after the contest (by August 12, 1981). Any entry received after mid-October 1981 may not be in time to be included in the printed results.

12) **Awards:** A certificate will be awarded to the high-scoring cw-only, phone-only, mixed-mode and multioperator entrant in each ARRL section, each ITU zone and each DXCC country. In addition, achievement-level awards will be issued to those making at least 250 QSOs (1000-QSO sticker also) or having a multiplier total of 50 or more. Additional awards may be made at the discretion of each country's IARU society.

13) **Conditions of entry:**

A) Each entrant agrees to be bound by the provisions of this announcement, by the regulations of his licensing authority and by the decisions of the IARU/ARRL Awards Committee.

B) Disqualifications: an entry may be disqualified if the overall score is reduced by more than two percent. Score reduction does not include correction of arithmetic error. An entry *will* be disqualified if more than two percent of duplicates are left in the log, or if the log shows excessive operating time (single-operator stations). A penalty of three QSOs will be assessed for each duplicate QSO found during ARRL/IARU log checking or for each miscopied call sign. See January 1981 *QST*, page 79, for complete details. QST

Prefix/ITU Zone

A2	57	FH	53	W1	08	PY	13, 15	UH8,		VS6	44	3D2	56
A3	62	FK	56	W2	08	PYØ	13	UK8H	30	VS9	41	3D6	57
A4	39	FM	11	W3	08	PYØ	15	UI8, UK8	30	VS9K	39	3V	37
A5	41	FO	10, 63	W4	08	PZ	12	UJ8,		VU	41	3X	46
A6	39	FP	09	W5	07	S2	41	UK8J/R	30	VU7	49	3Y	67
A7	39	FR	53	W6, 7	06	S7	53	UL7, UK7	30	VU7	41	4S	41
A9	39	FS	11	W8, 9	08	S9	47	UM8,		XE	10	4U1ITU	28
AP	41	FW	62	WØ	07	SM	18	UK8M, N	31	XF4	10	4U1UN	08
BV	44	FY	12	KC4	67, 69,	SP	28	UO5,		XT	46	4W	39
BY	42, 43	G	27		70, 71,	ST	48	UK5O	29	XU	49	4X, 4Z	39
C2	65	GD	27		72, 73	SU	38	UP2,		XV	49	5A	38
C3	27	GI	27	KC6	65	SV	28	UK2B/P	29	XW	49	5B, ZC	28
C5	46	GJ	27	KC6	64	T2	65	UQ2,		XZ	49	5H	53
C6	11	GM	27	KG4	11	T3Ø-1	62	UK2G/Q	29	Y2-9	28	5N	46
C9	53	GU	27	KG6/KH2	64	T32	61	UR2,		YA	40	5R	53
CE	14, 16	GW	27	KHØ	64	TA	39	UK2R/T	29	YB	54	5T	46
CEØA	63	H4	51	KH1	61, 62	TF	17	VE1	09	YI	39	5U	46
CEØZ	14	HA	28	KH6	61	TG	11	VE2	04, 09	YJ	56	5V	46
CEØX	14	HB	28	KJ/KH3	61	TI	11	VE3	04	YK	39	5W	62
CM, CO	11	HBØ	28	KL	01	TI9	11	VE4, 5	03	YN	11	5X	48
CN	37	HC	12	KM/KH4	61	TJ	47	VE6, 7	02	YO	28	5Z	48
CP	12, 14	HC8	12	KP4	11	TL	47	VE8	02, 03	YS	11	6O	48
CR9	44	HH	11	KP6/KH5	61, 62	TN	52		04, 75	YU	28	6W	46
CT	37	HI	11	KS6/KH8	62	TR	52	VK1,2,3,		YV	12	6Y	11
CT2	36	HK	12	KV/KP2	11	TT	47	5, 7	59	YVØ	11	7O	39
CT3	36	HKØ	11, 12	KW/KH9	65	TU	46	VK4, 8	55	ZA	28	7P	57
CX	14	HL, HM	44	KX	65	TY	46	VK6	58	ZB	37	7Q	53
D2, 3	52	HP	11	KZ	11	TZ	46	VK	60	ZD7	66	7X	37
D4	46	HR	11	LA	18	UA, UK,	19, 20, 29, 30	VK9	60	ZD8	66	8P	11
D6	53	HS	49	LU	14, 16	UV UW/I,		VK9	54	ZD9	66	8R	12
DJ	28	HV	28	LX	27	3,4,6		VK9	55	ZE	53	8Z4	39
DU	50	HZ, 7Z	39	LZ	28	UA2, UK2F	29	VKØ	68	ZF	11	9A(M)	28
EA	37	I, IT	28	OA	12	UA, UK, UV,		VKØ	60	ZK1	62	9G	46
EA6	37	IS	28	OD	39	UW9-Ø	20-35	VP1	11	ZK2	62	9H	28
EA8	36	J2	48	OE	28	UB, UK,		VP2F	11	ZL	60	9J	53
EA9	37	J3	11	OH	18	UT, UY5	29	VP2A	11	ZM	62	9K	39
EI	27	J5	46	OHØ	18	UC2, UK2A/		VP2V	11	ZP	14	9L	46
EL	46	J6	11	OJØ	18	C/I/L,		VP2M	11	ZS	57	9M2	54
EP	40	J7	11	OK	28	O/S/W	29	VP2K	11	ZS3	57	9M6, 8	54
ET	48	J8	11	ON	27	UD6, UK6		VP5	11	1S	50	9N	42
F	27	JA	45	OX, XP	05	C/D/K	29	VP8	16	3A	27	9O	52
FB8Z	68	JD	45	OY	18	UF6, UK6F/		VP8	73	3B6, 7	53	9U	52
FB8W	68	JT	32	OZ	18	O/Q/V	29	VP9	11	3B8	53	9V	54
FB8X	68	JW	18	P2	51	UG6,		VQ9	41	3B9	53	9X	52
FC	28	JX	18	PA	27	UK6G	29	VR6	63	3C	47	9Y	11
FG	11	JY	39	PJ	11			VS5	54	3CØ	52		

Field Day Rules

As you read this, there are almost two whole months until Field Day weekend. That's plenty of time to put the finishing touches on your FD plans or more than enough time to plan a FD outing even if you haven't thought about it before.

If there has been a Field Day operation or two in your past you've probably got the routine down pat. If you're a newcomer to the Field Day scene, welcome to one of the few organized activities in Amateur Radio where a premium is placed on operator ingenuity and innovation. Field Day participants make Field Day work, not vice versa. Because of the nature of the event, there is no standard set of instructions on how to plan and execute a successful Field Day operation. Everyone starts out on equal footing by reading the Field Day Rules, listed below, and sending a large s.a.s.e. (with 35¢ postage) to ARRL Hq. for the FD package which includes a Field Day Summary (reporting form) sheet, dupe/check sheets (form CD-77B) and a public-relations suggestion packet. These forms are available now; send early to receive them in time for Field Day.

New in rules for 1981 (see FD rule 5) is the relaxation of the 15-minute rule at frequencies above 30 MHz. This means that, unlike a transmitter used on frequencies below 30 MHz, a transmitter used on vhf *does not* have to remain on a band for a 15-minute period after making a QSO and can be moved to any other vhf/uhf band as desired.

A few quick notes. The "free" Novice station is meant to be an enticement to introduce the Novice/Technician types to the fun of Field Day. To that end it's a good idea to use *one* of the call signs of the Novice or Technician participants as the call for the Novice station. The Novice station sends the same exchange as the stations in the rest of the FD operation. *Carefully* read rule 9 on reporting. Be sure to include *all* the required enclosures with your Field Day report, and be sure to observe the mailing deadline.

If you've got any Field Day-related questions, get in touch with us here at Hq. — that's what we're here for.

Good Luck!

Rules

1) **Eligibility:** Field Day is open competitively to all amateurs in the ARRL Field Organization (plus Yukon and NWT). Foreign stations may be contacted for credit but are not eligible to compete.

2) **Object:** To work as many stations as possible and in so doing, to learn to operate in abnormal situations under less-than-optimum conditions. A premium is placed upon skills and equipment developed to meet the challenge of emergency preparedness and acquaint the public with the capabilities of Amateur Radio.

3) **Dates:** June 27 and 28, 1981 (traditionally, the last *full* weekend of June).

4) **Field Day Period:** From 1800 UTC Saturday until 2100 UTC Sunday. Class A and Class B (see below) stations who do not begin any setting-up operations at the Field Day site until 1800 UTC Saturday may operate the entire FD period of 27 hours. Others must begin their setup no earlier than 1800 UTC Friday, and may operate no more than 24 consecutive hours; i.e. once on-the-air FD operation has started it must end 24 hours from that point.

Field Day Operating Period — 1981

Starts	*Ends*
Saturday, June 27 1800 UTC	Sunday, June 28 2100 UTC

W1AW Field Day Bulletin Schedule

In addition to the regular bulletin schedule detailed on page 94 of April *QST*, extra cw bulletins will be run at 1400 UTC (10 A.M. EDST), and extra phone bulletins at 1500 UTC (11 A.M. EDST) both Saturday and Sunday mornings.

5) **Entry Categories:** Field Day entries are classified according to the maximum number of transmitted signals simultaneously on the air during the FD period, followed by the designation of the nature of the individual or group participation. Below 30 MHz, once a transmitter is used for a contact on a band, it must remain on that band for at least 15 minutes. During this 15-minute period, the transmitter is considered to be transmitting a signal, whether it is or not, for purposes of determining transmitter class. Switching devices prohibited.

(Class A) Club/nonclub portable: Club groups (or nonclub groups with three or more licensed amateurs) set up specifically for Field Day. Such stations must be located in places that are not regular station locations, and must use no facilities installed for permanent station use, nor any structures installed permanently for FD use. Stations must be operated under one call sign (except when the Novice/Technician position is used) and under the control of a single licensee or trustee for each entry. All equipment (including antennas) must lie within a circle whose diameter does not exceed 300 meters (1000 feet). All contacts must be made with transmitter(s) and receiver(s) operating independent of commercial mains. Entrants who, for any reason, operate a transmitter or receiver from commercial mains for one or more contacts will be listed separately at the end of their class.

Any class A group whose entry classification is two or more transmitters (non-Novice) may also use one Novice/Technician operating position without changing its basic entry classification. This station (including antennas) should be set up by Novice and Technician licensees, though assistance, guidance, advice or instruction from higher-class licensees is encouraged. Such assistance serves to pass along hints from those more experienced and to prevent a potentially unsafe situation. The Novice position may only be used for QSOs in the Novice bands and operated only by Novice/Technician operators, who must keep their own log and check sheets. QSOs made at the Novice position will count toward the FD group's final point total.

(Class B) One- or two-person portable: Nonclub stations set up and operated by not more than two licensed amateurs will be placed in Class B. Other provisions are the same as for Class A.

(Class C) Mobile: Stations in vehicles capable of operation while in motion and normally operated in this manner, including antenna. This includes maritime and aeronautical mobiles.

(Class D) Home station: Stations operating from permanent or licensed station locations, not portable or mobile, using commercial power. Class D stations may count contacts only with Class A, B, C and E Field Day groups for points. The exchange received from each station will tell you whether or not the QSO counts.

(Class E) Home stations — emergency power: Class E is the same as Class D, but using emergency power for transmitters and receivers. Work stations in Class A, B, C, D or E.

6) **Exchange:** Stations in the United States, U.S. possessions and Canada will exchange their Field Day operating class (1-A, 5-A, 2-B, 1-D, etc.) and ARRL section (see page 8 in any *QST*). For example, if your club group was planning to operate in the three-transmitter, Class A category from Missouri, you would send "3 A Missouri." If it turns out that you don't get all three transmitters on the air, or you get an extra one going, feel free to change your exchange to 2-A or 4-A if necessary. Valid contacts with stations outside of an ARRL section require you to transmit your normal FD exchange and to receive a signal report and the QTH of the foreign station.

7) **Miscellaneous rules:**

a) Operators participating in FD may not, from any other station, contact for point credit the FD portable station of a group with which they participated. This is intended to outlaw any kind of manufactured contacts.

b) A station used to contact one or more FD stations may not subsequently be used under any other call during the FD period. This rule is intended to outlaw multiple contacts on the same band with the same station, using different calls. It is not, however, intended to prohibit the use of jointly owned stations which are normally used under different calls by members of the same family.

c) Each phone and each cw segment is considered as a separate band. All voice contacts are equivalent and RTTY/ASCII is counted as cw. A station may be worked once on each band. Crossband contacts are not allowed. The use of more than one transmitter at the same time in a single band is prohibited, except that a Novice/Technician position may operate on any Novice band segment at any time. Contacts made by retransmitting either or both stations do not count for scoring purposes, i.e. no repeater contacts.

8) **Scoring:** Scores are based on the number of valid contact points times the multiplier corresponding to the highest power used at any time during the FD period, plus bonus points. Phone contacts count one point each, and cw contacts count two points each. Power multipliers: If *all* contacts are made using a dc input power of 10 watts (20 W PEP) or less (or 5-W dc output/10-W PEP output) *and* if a power source other than commercial mains or motor-driven generator is used (e.g. batteries, solar cells, water-driven generators, etc.), multiply by five. If any or all contacts are made using a dc input power of 200 watts or less on cw and 400 watts PEP or less on ssb, multiply

Rules, 1981 IARU Radiosport Championship

The Radiosport enjoys very good participation from around the world, and many very hard-to-work countries are often QRV for this one. To run up a big score, you'll need to strike a balance between a large QSO total and a large multiplier total. While 10 meters doesn't have the best propagation in July and 80 and 40 meters are often very noisy with QRN, patience and good operating there will reward you with some extra multipliers.

For those not familiar with ITU zones around the world, a map of ITU zones is available from ARRL/IARU Hq. Send an s.a.s.e. or one IRC for the proper forms (including the map) early so you'll have them in time for the contest. Good luck!

Rules

1) **Eligibility:** All licensed amateurs worldwide.

2) **Object:** To contact as many other amateurs in as many parts of the world as possible using 1.8 through 148 MHz.

3) **Date:** Second full weekend of July (July 11-12, 1981).

4) **Contest period:** 0000 UTC Saturday until 2400 UTC Sunday, with single-operator stations operating a maximum of 36 hours.

5) **Categories:**

A) Single Operator: Phone-only, cw-only and mixed-mode sections. One person performs all operating and logging functions. Use of spotting nets is not permitted. Off times must be at least 30 minutes long.

B) Multioperator: Single transmitter, mixed mode only, must remain on a band at least ten minutes at a time.

6) **Contest Exchange:** All stations send signal report and ITU zone.

7) **Valid Contact:** The same station may be worked once per frequency band. Cross-mode, cross-band and repeater QSOs do not count.

8) **QSO Points:**

A) Contacts within your ITU zone count one point.

B) Contacts within your continent (but different ITU zone) count three points.

C) Contacts with a different continent count five points.

9) **Multipliers:** ITU zones worked on each band.

10) **Scoring:** Multiply total number of QSO points by the sum of ITU zones worked on each band for the final score.

11) **Reporting:**

A) All entrants are encouraged to use forms available from IARU/ARRL Hq. (s.a.s.e. or one IRC).

B) Logs should indicate times in UTC, bands, calls, complete exchange. Multipliers and off times should be clearly marked in the log. Cross-check sheets (dupe sheets) are required if more than 500 QSOs are made.

C) Entries must be postmarked within 30 days after the contest (by August 12, 1981). Any entry received after mid-October 1981 may not be in time to be included in the printed results.

12) **Awards:** A certificate will be awarded to the high-scoring cw-only, phone-only, mixed-mode and multioperator entrant in each ARRL section, each ITU zone and each DXCC country. In addition, achievement-level awards will be issued to those making at least 250 QSOs (1000-QSO sticker also) or having a multiplier total of 50 or more. Additional awards may be made at the discretion of each country's IARU society.

13) **Conditions of entry:**

A) Each entrant agrees to be bound by the provisions of this announcement, by the regulations of his licensing authority and by the decisions of the IARU/ARRL Awards Committee.

B) Disqualifications: an entry may be disqualified if the overall score is reduced by more than two percent. Score reduction does not include correction of arithmetic error. An entry *will* be disqualified if more than two percent of duplicates are left in the log, or if the log shows excessive operating time (single-operator stations). A penalty of three QSOs will be assessed for each duplicate QSO found during ARRL/IARU log checking or for each miscopied call sign. See January 1981 *QST*, page 79, for complete details.

Prefix/ITU Zone

A2	57	FH	53	W1	08	PY	13, 15	UH8,		VS6	44	3D2	56
A3	62	FK	56	W2	08	PYØ	13	UK8H	30	VS9	41	3D6	57
A4	39	FM	11	W3	08	PYØ	16	UI8, UK8	30	VS9K	39	3V	37
A5	41	FO	10, 63	W4	08	PZ	12	UJ8,		VU	41	3X	46
A6	39	FP	09	W5	07	S2	41	UK8J/R	30	VU7	49	3Y	67
A7	39	FR	53	W6, 7	06	S7	53	UL7, UK7	30	VU7	41	4S	41
A9	39	FS	11	W8, 9	08	S9	47	UM8,		XE	10	4U1ITU	28
AP	41	FW	62	WØ	07	SM	18	UK8M, N	31	XF4	10	4U1UN	08
BV	44	FY	12	KG4	67, 69,	SP	28	UO5,		XT	46	4W	39
BY	42, 43	G	27		70, 71,	ST	48	UK5O	29	XU	49	4X, 4Z	39
C2	65	GD	27		72, 73	SU	38	UP2,		XV	49	5A	38
C3	27	GI	27	KC6	65	SV	28	UK2B/P	29	XW	49	5B, ZC	28
C5	46	GJ	27	KC6	64	T2	65	UQ2,		XZ	49	5H	50
C6	11	GM	27	KG4	11	T3Ø-1	62	UK2G/Q	29	YZ-9	28	5N	46
C9	53	GU	27	KG6/KH2	64	T32	61	UR2,		YA	40	5R	53
CE	14, 16	GW	27	KHØ	64	TA	39	UK2R/T	29	YB	54	5T	46
CEØA	63	H4	51	KH1	61, 62	TF	17	VE1	09	YI	39	5U	46
CEØZ	14	HA	28	KH6	61	TG	11	VE2	04, 09	YJ	56	5V	46
CEØX	14	HB	28	KJ/KH3	61	TI	11	VE3	04	YK	39	5W	62
CM, CO	11	HBØ	28	KL	01	TI9	11	VE4, 5	03	YN	11	5X	48
CN	37	HC	12	KM/KH4	61	TJ	47	VE6, 7	02	YO	28	5Z	48
CP	12, 14	HC8	12	KP4	11	TL	47	VE8	02, 03	YS	11	60	48
CR9	44	HH	11	KP6/KH5	61, 62	TN	52		04, 75	YU	28	6W	46
CT	37	HI	11	KS6/KH8	62	TR	52	VK1,2,3,		YV	12	6Y	11
CT2	36	HK	12	KV/KP2	11	TT	47	5, 7	59	YVØ	11	7O	39
CT3	36	HKØ	11, 12	KW/KH9	65	TU	46	VK4, 8	55	ZA	28	7P	57
CX	14	HL, HM	44	KX	65	TY	46	VK6	58	ZB	37	7Q	53
D2, 3	52	HP	11	KZ	11	TZ	46	VK	60	ZD7	66	7X	37
D4	46	HR	11	LA	18	UA, UK,	19, 20, 29, 30	VK9	60	ZD8	66	8P	11
D6	53	HS	49	LU	14, 16	UV UW/I,		VK9	54	ZD9	66	8R	12
OJ	28	HV	28	LX	27	3,4,6		VK9	55	ZE	53	8Z4	39
DU	50	HZ, 7Z	39	LZ	28	UA2, UK2F	29	VKØ	68	ZF	11	9A(M)	28
EA	37	I, IT	28	OA	12	UA, UK, UV,		VKØ	60	ZK1	62	9G	46
EA6	37	IS	28	OD	39	UW9Ø	20-35	VP1	11	ZK2	62	9H	28
EA8	36	J2	48	OE	28	UB, UK,		VP2E	11	ZL	60	9J	53
EA9	37	J3	11	OH	18	UT, UY5	29	VP2A	11	ZM	62	9K	39
EI	27	J5	46	OHØ	18	UC2, UK2A/		VP2V	11	ZP	14	9L	46
EL	46	J6	11	OJØ	18	C/I/L		VP2M	11	ZS	57	9M2	54
EP	40	J7	11	OK	28	O/S/W	29	VP2K	11	ZS3	57	9M6, 8	54
ET	48	J8	11	ON	27	UD6, UK6		VP5	11	1S	50	9N	42
F	27	JA	45	OX, XP	05	C/D/K	29	VP8	16	3A	27	9Q	52
FB8Z	68	JD	45	OY	18	UF6, UK6F/		VP8	73	3B6, 7	53	9U	52
FB8W	68	JT	32	OZ	18	O/Q/V	29	VP9	11	3B8	53	9V	54
FB8X	68	JW	18	P2	51	UG6,		VQ9	41	3B9	53	9X	52
FC	28	JX	18	PA	27	UK6G	29	VR6	63	3C	47	9Y	11
FG	11	JY	39	PJ	11			VS5	54	3CØ	52		

Stations Broadcasting the Message of the Secretary of Defense

Transmitting Station	*Frequency (kHz)*
NAM — U.S. Navy Communications Area Master Station, Norfolk, Virginia	4005, 7645, 14,400
NPG — U.S. Navy Communications Station, Stockton, California	4010, 7365, 13,927.5
NAV — HQ Navy-Marine Corps MARS Station, Cheltenham, Maryland	7385, 13,975.5
WAR — HQ U.S. Army Radio Station, Fort Meade, Maryland	4030, 6998.5, 14,403.5
AIR — 2045th Communications Group, Andrews AFB, Washington, DC	6995.5, 13,997.5

is listening. Duration of the contact should be limited to 3 minutes.

CW Receiving Test — The cw receiving test will be conducted at 25 wpm. The broadcast will be a special Armed Forces Day message from the Secretary of Defense to any amateur or SWL desiring to participate. A 10-minute call for tuning purposes will begin May 17 at 0300 UTC. The Secretary's message will be transmitted May 17 at 0310 UTC from these stations and frequencies listed in the table.

RTTY Receiving Test — The radioteletype (RTTY) receiving test will be transmitted at 60 wpm. Radio Station AIR will transmit using 850-Hz (wide) shift. All other stations will transmit using 170-Hz (narrow) shift. A 10-minute cq call for tuning purposes will begin May 17 at 0335 UTC. The special Armed Forces Day message from the Secretary of Defense will be transmitted May 17 at 0345 UTC. This test is to exercise the technical skill in aligning and adjusting equipment by the amateur operator. Transmission will be from the same stations and frequencies as previously listed for the cw receiving test.

Submission of Test Entries — Transcriptions of the cw and/or RTTY receiving tests should be submitted "as received." No attempt should be made to correct possible transmission errors.

1) Time, frequency and call letters of the military station copied as well as the name, call sign and address (including ZIP code) of the individual submitting the entry must be indicated on the page containing the message test. Each year, a large number of acceptable copies are received with insufficient information, or the necessary information attached to the transcription was separated, thereby precluding the issuance of a certificate.

2) Entries must be postmarked no later than May 23, 1981, and submitted to these military commands: (a) stations copying *NAM, NAV* or *NPG* send entries to — Armed Forces Day Test, HQ, Navy-Marine Corps MARS, 4401 Massachusetts Ave., N.W., Washington, DC 20390; (b) stations copying *WAR* send entries to — Armed Forces Day Test, Commander, 7th Signal Command, ATTN: CCN-PO-OM, Fort Ritchie, MD 21719; (c) stations copying *AIR* send entries to — Armed Forces Day Test, 2045th CG/DONJM, Andrews Air Force Base, Washington, DC 20331. QST

Rules, June VHF QSO Party

Just think how awful you'd feel if, when you read the results of this upcoming June VHF QSO Party, you saw that a station in the last state you needed for 50-MHz WAS made over 300 QSOs and you weren't one of them. Just think how left out you'd feel if all the locals on 2 meters started talking about that monster tropo opening during the contest, and you weren't on. The answer to both is — you'd feel lousy! But there's no reason to take those kinds of chances. The 1981 June VHF QSO Party is scheduled for June 13-15, and everyone is invited to participate.

Official entry forms are now available, and are recommended, for an s.a.s.e. to ARRL Hq. Complete contest rules follow. Good Luck!

Rules

1) **Object:** To work as many amateur stations in as many different ARRL sections and countries as possible using authorized amateur frequencies above 50 MHz.

2) **Contest period:** Begins 1900 UTC Saturday, June 13 and ends at 0600 UTC, Monday, June 15. Operate no more than 28 out of the 35 hours. Off time must be in increments of 30 minutes or more. Listening time counts as operating time.

3) **Categories:**

(A) Single Operator

(B) Multioperator. Multioperator stations must locate all equipment (including antennas) within a circle whose diameter does not exceed 300 meters (1000 feet).

4) **Exchange:** Name-of-section. Must be acknowledged by both operators for credit by either. A one-way exchange does not count.

5) **Scoring:**

(A) Score 1 point for 50 or 144 MHz QSOs; 2 points on 220 or 420 MHz; 3 points for higher uhf bands. Multiply the sum of these points by the total number of different ARRL sections plus different DXCC countries (*not* included in an ARRL section) worked *per band*. Note that KP4, KP2/KV4 and KG4 are in the West Indies section; KH6, KH2, etc. are in the Pacific section. Crossband QSOs do not count. Aeronautical mobile stations may not be counted for section multipliers.

(B) Stations may be worked once per band, regardless of mode. Example: W6XJ (San Diego) works A16V (San Joaquin Valley) on 50, 144 and 220 MHz. This gives W6XJ 4 points (1 + 1 + 2) and also three section multipliers. W6XJ may contact other SJV stations on these bands for contact points, but no additional section multipliers.

(C) Foreign stations may only work stations in ARRL sections, giving their country name in the exchange.

6) **Fm restrictions:**

(A) Retransmitting either or both stations, or use of repeater frequencies, is not permitted.

(B) Only these recognized simplex frequencies may be used: 144.90 to 145.10; 146.49, .52, .55 and .58 and 147.42, .45, .48, .51, .54 and .57 MHz. This restriction prohibits use of all repeater frequencies, including 146.76 and .94.

(C) Use of the national calling frequencies 146.52 and 223.50 MHz is restricted to 4 hours total operating time on each frequency, in increments not to exceed 1 hour each (mark clearly in log). An off period of at least 15 minutes must follow each operating period.

7) **Miscellaneous:**

(A) Fixed, portable or mobile operation under one call from one ARRL section only is permitted. A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOC); one operator may not give out contest QSOs using more than one call sign from any one location. The intent of this rule is to accommodate family members who must share a rig, not to manufacture artificial contacts.

(B) Only one signal per band (6, 2, 1-1/4 etc.) at any given time is permitted.

(C) While no minimum distance is specified for contacts, equipment should be capable of real communications (i.e., able to communicate over at least a mile).

(D) Multioperator stations may not include QSOs with their own operators except on frequencies higher than 2.3 GHz. Even then, a complete, different station must exist for each QSO made under these conditions.

(E) Above 300 GHz, contacts are permitted for contest credit only between licensed Amateurs of Technician Class or higher using coherent radiation on transmission (e.g. laser) and employing at least one stage of electronic detection on receive.

8) **Reporting:** Entries must be postmarked no later than 30 days after the end of the contest. Use ARRL VHF QSO Party forms or a *reasonable* facsimile.

9) **Awards:**

(A) Top single operator station in each ARRL section.

(B) Top multioperator station in each section from which three or more entries are received or where exceptional effort has been displayed.

10) **Disqualifications:** See January *QST*, page 79. QST

Results, 1980 ARRL November Sweepstakes

Special section on how the top scorers do it!

By Tom Frenaye,* K1KI and Bill Jennings,** K1WJ

Participants in the 1980 ARRL November Sweepstakes probably noted, after much hard work, that making a clean sweep on both modes was even harder than finishing in the Top Ten. It wasn't as if all sections weren't on the air, since a few did manage to find all 74 sections, but there were some very tough ones, most notably in western and northern Canada. Of the 2344 entries received (1242 — phone, 1102 — cw), Alberta was missing from our own records on both modes.

On the whole, final scores were down from last year's contest, perhaps indicating that DX-ing during these days of high sunspot numbers is taking away a few competitors. For those left trying to run up the big scores, the competition is even tougher. A few QSOs really made a big difference in the final outcome in many cases, and miscopied call signs were a mistake no one wanted to have. More than ever, the operator with the ability to search out the new station to work by carefully listening and changing bands appropriately or by "friendly CQing" is the one with the advantage. Your operating had to be very flexible in order to be competitive this time.

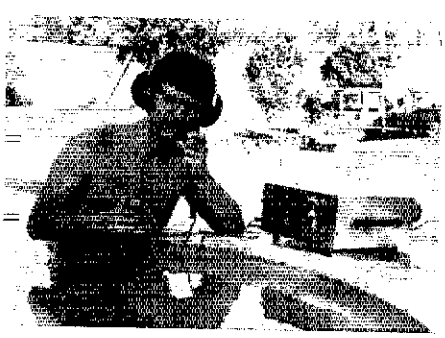
*Assistant Communications Manager, ARRL
**Communications Assistant, ARRL

The best person to tell you how to improve your score next year is probably the one who finished ahead of you. After you've scanned the listing for your own score or that of a friend, take some time to digest the information in the section titled "Keys to Success," compiled from surveys sent to the top finishers.

Perennial "top-tenner" in the SS, K3UA. Phil fought his way to number six on the 1980 cw list.

N6RO was the number eight single op on phone and number nine on cw to be the second of only two ops (WØUA was the other) to make *both* "Top Ten" lists. FB, Ken.

The old one-two punch from Colorado — WØUA piloted KØRF to a first-place finish on cw and a second-place showing on phone in 1980. Well done, George.



K7JA, operating N7DD, became the top op on phone, coming up just short of 2100 QSOs. *Chip found that old habits are hard to break.* It took him three hours of soaking to be able to relax his muscles enough to let go of the mike after the SS.

Keys to Success

Following the 1980 Sweepstakes, a survey was sent to the top 15 finishers on each mode. The survey was designed to provide some insight about the equipment and operating strategy used by the top operators. Responses were received from all but one of those polled.

Equipment Used

RX/TX: R4C with T4XC (or TR4C/T4XB) — 8, TS-820/830 (some with R-820) — 7, 32S-3 with 75S-3 — 2, FT-901DM — 3, CX-11A — 1, KWM-380 — 1, 75S-3/SB102 — 1.
Amplifier: SB-220 — 8, Alpha 77DX — 4, Homebrew 4-1000 — 3, Henry 2K — 2, Homebrew 8877 — 1, Homebrew 4-4CX250B — 1, Collins 30S-1 — 1, Drake L-4B — 1, BTI — 1.
Microphone: Mentioned more than once — Shure 444, Astatic D-104, Superex boom. Also mentioned — Collins, Astatic 10-D, Turner CB, Radio Shack, Heath Electrovoice, Electrovoice 664, Yaesu YE-7A.
Headphones: Mentioned more than once — Telex, Radio Shack, Superex boom, "cheap." Also mentioned — Kenwood HS5, Vanco, Sony, "military," Plantronics, Yaesu YH-77.
Keyer: Most often mentioned — Homebrew Accu-Keyer/Accu-Memory. Also mentioned — CW Sending Machine, MFJ Grandmaster, Autek, Curtis, Morsematic, homebrew.

Antennas

80M: most common — Dipole @ 75 ft, also common — quad/delta loop(s), smallest — inverted V @ 35 ft.
40M: most common — 4-el beam @ 100 ft, also common — 2-el beam @ 90 ft, smallest — inverted V @ 35 ft.
20M: most common — 5-el @ 100 ft, also common — 4-el @ 75 ft, smallest — tribander @ 40 ft.
15M: most common — 4-el @ 90 ft, also common — 3/5-el @ 75 ft, smallest — tribander @ 40 ft.
10M: most common — 6-el @ 80 ft, also common — 7-el @ 90 ft, smallest — no antenna.

Operating Strategy

Used a tape loop (for CQing?) Phone: Yes — 5, no — 10.
Used a memory keyer? cw: Yes — all.
Used memory keyer for CQing? Average — 65% of the time.
Used memory keyer for the exchange? Average — 75% of the time.
Kept a dupe sheet during the contest? Phone: yes — 8, no — 6. Cw: yes — all.
What was your strategy for the first hour or two? Phone: **Don't waste a single syllable — operate like a machine — use the highest band open (except use 40 meters in the East) — CQ exclusively (until the rate drops below 100/hour) — change frequency within the band frequently.
What was your strategy for the last hour or two? Phone: Alternate answering CQs with calling CQs — **call slow CQs, attract non-contesters with friendly voice — change frequency/band often.
What was your strategy for the first hour or two? Cw: **Varied considerable from exclusive CQing to exclusive answering of CQ — quick band change/QSYing essential.
What was your strategy for the last hour or two? Cw: **Varied considerably, generally opposite of first-hour strategy — slow CQ — look for needed multipliers.
How long did you sleep? Phone: varied from 1 to 4 hours — average 2.8. Cw: varied from 1 to 4 hours — average 2.2.
What was the best time-off strategy? Phone: Early morning (3 or 4 A.M.) — stop when rate is one-half that of first three hours — plan meals to off time, not the opposite — it is always slower on Sunday — take as many in 30-minute segments as possible.
What is the best time off strategy? Cw: Go till 0800Z straight through — save as much off time as possible for Sunday — take in 30-minute segments — last hour is either very good or very bad (know your local conditions).
What do you do best in your operating (that others may not)? Phone: **Confidence! — clean crisp audio — don't go too fast — get call/exchange the first time — have backup rig ready — call CQ only if you can keep the rate high — *keep up-to-date dupe sheet — *use every second (efficiency) — persistence — flexibility on antenna switching — better antennas — *know when and how to call (timing). *Cw:* **Confidence! — endurance/efficiency — use memory keyer to allow catching up on dupe sheet — be aggressive — don't worry about multipliers — only a few extra QSOs makes a difference — listen on second band with stereo headphones (have next QSO ready) — send/listen faster — know your limits — don't spend all day trying to hold the frequency — eliminate every extra "dit" in the exchange.
What was your biggest mistake? *Time-out strategy — *didn't QSY enough — call sign was too long — not familiar enough with station (guest operator) — not consistent — antennas too high — hadn't been on the air recently (check out conditions for a couple days ahead of time) — *station not prepared adequately — mismanagement of off times — not enough confidence/concentration — too much listening for missing multiplier(s).
What is your biggest complaint about the operating techniques of those you worked? Phone: **Exchange was repeated (only repeat if asked) — **duplicates! especially from those with fewer than 200 QSOs — too much mike gain — exchange not in proper sequence — stations calling CQ too much (getting too few answers) — not signing complete call signs — CQing w/o asking if frequency in use. *Cw:* **exchange repeated (only repeat if asked) — stations answering too far off frequency — duplicates — slow sending — not copying the first time — the weaker they are, the longer they send — frequency stealing not as much of a problem as it was a few years ago.
How would your overall strategy have differed if you had a station that ran 200 watts, inverted Vs on 40/80 at 45 ft and a tribander at 45 ft? **More QSYing and answering CQs, less CQing — *concentate more on 10-15 meters — CQ at the end of contest, or high in the band — more night time-off periods — keep accurate dupe sheet — practice tail-end timing — move to rarer section — pray for an amplifier.

Other Data

How long have you been licensed? Range was from 7 to 28 years, average was 15 years.
Occupation? Student (several) — civil engineer (two) — airline pilot — heating/air conditioning contractor — chief engineer-commercial radio — electrical design engineer — electrician — physician — research engineer — purchasing/prod. control — land title examiner — R&D manager — electronics engineer — manager telephone/microwave dispatch center — software engineer — engineer — marketing specialist — electronics, avionics engineer — electronics sales manager — purchasing agent — software/timeshare vendor.

A Final Comment

"I think the comments you publish may have a significant influence on the operating techniques of the top 500 scorers. When their techniques change, mine will also, in order to maintain a top position. Conclusion: Simply by publishing some of the winning techniques you will invalidate them. For example, when it is discovered that *all* of the high scorers (phone) do nothing but CQ for most of the contest, many medium scorers will attempt to do that, making CQing less productive than previously. CQing will diminish as a winning technique. If everyone used my VE8/VY1 technique, it wouldn't work for me. I'm sorry, I can't afford to talk about it... I'm sure other high scorers have secrets they don't feel they can share either. It is interesting to see how many high scorers own and operate their own station. If you can afford a good station, you are too old to operate it..."

Table 1
Division Leaders — Phone

Division	High Power	Low Power	Multioperator
Atlantic	W3FA (WA3ZAS)	K3TM	WB3EPC
Central	K9HMB (K9GL)	N9AGC	W9YB
Dakota	KØIJL	KØFRP	AKØT
Delta	W5WMU*	N4TG	WA4UCE
Great Lakes	K8MJZ	W8JWN	K8ND
Hudson	W2PV (K1AR)	WA2STM	K2XR
Midwest	KBØX	WØRR (WBØLFY)*	KØDG
New England	K1PR	K1LL*	K1IK
Northwestern	K7RI (W7WA)	K7SS*	W7ZR
Pacific	WA7NIN	WA6DIL	AA6G
Roanoke	N8II	AA4FF	K4KDJ
Rocky Mountain	KØRF (WØUA)	AA5B*	WBØCMM
Southeastern	K7TBT/4 (WB4QBB)	KB4I (K2PO)*	N4WW
Southwestern	N7DD (K7JA)*	AK6U	K6HRT
West Gulf	K5RC (K5ZD)	KM5H	K5RX
Canadian	VE7IN	VE3GD	VE5QM

Division Leaders — CW

Division	High Power	Low Power	Multioperator
Atlantic	K3UA	W2TZ*	N2ME
Central	W9RW	WD9DCL	W9YB
Dakota	AA4MD/Ø	NØNO	NØBG
Delta	K5GO	K4XU	K5SA
Great Lakes	K8NZ	W8KRR	WB8JBM
Hudson	W2YV (N2NT)	AC2U	KA2ACM
Midwest	NØSS	KØLUZ	KØWA
New England	K1AR	W1ZT*	K1VTM
Northwestern	W7NI	K7SS*	AG7M
Pacific	N6RO	AD7K*	W6BIP
Roanoke	K4PQL	KD8G	N4EA
Rocky Mountain	KØRF (WØUA)	WØCP	KCØD
Southeastern	N4KG (WN4KKN)	KB4I (K2PO)	W4DOC
Southwestern	N6TR	K6WI	WB6SHL
West Gulf	K5TM (K5ZD)	W5MYA	N5AF
Canadian	VE1QST (AK4L)	VE3DAP	VE3ART

Operator (if any) in parentheses.
*Indicates new division record

Table 2
Top Ten

Phone	
N7DD (K7JA)	309,320-2090-74
KØRF (WØUA)	284,604-1923-74
WA7NIN	282,828-1911-74
K5TA	279,572-1889-74
N7DF	268,768-1816-74
K6MYC (N6IG)	251,896-1702-74
K7RI (W7WA)	251,452-1699-74
N6RO	250,416-1692-74
W5WMU	249,232-1684-74
W6XX	243,460-1645-74
CW	
KØRF (WØUA)	176,268-1191-74
K5TM (K5ZD)	167,684-1133-74
N6TR	166,858-1143-73
K1AR	166,586-1141-73
K6LL/7	166,148-1138-73
K3UA	164,834-1129-73
K1KI	164,448-1142-72
K5GO	164,104-1124-73
N6RO	161,320-1090-74
K1TO	159,692-1079-74

Table 3
Top Ten Low Power

Phone	
K7SS	211,788-1431-74
AA5B	207,612-1422-73
WØCP	183,816-1242-74
K1LL	172,568-1166-74
W7XN	167,092-1129-74
AK6U	158,508-1071-74
WA6DIL	158,064-1068-74
KØAB (WBØIWL)	155,744-1097-71
KB4I (K2PO)	151,548-1038-73
KM5H	147,168-1008-73
CW	
W1ZT	139,392-968-72
AD7K	135,780-930-73
K4XU	135,050-925-73
K7SS	133,792-904-74
NØNO	132,048-917-72
W2TZ	131,760-915-72
WØCP	131,760-915-72
W5MYA	128,880-895-72
K7MX (KB7G)	128,160-890-72
KØLUZ	125,856-874-72

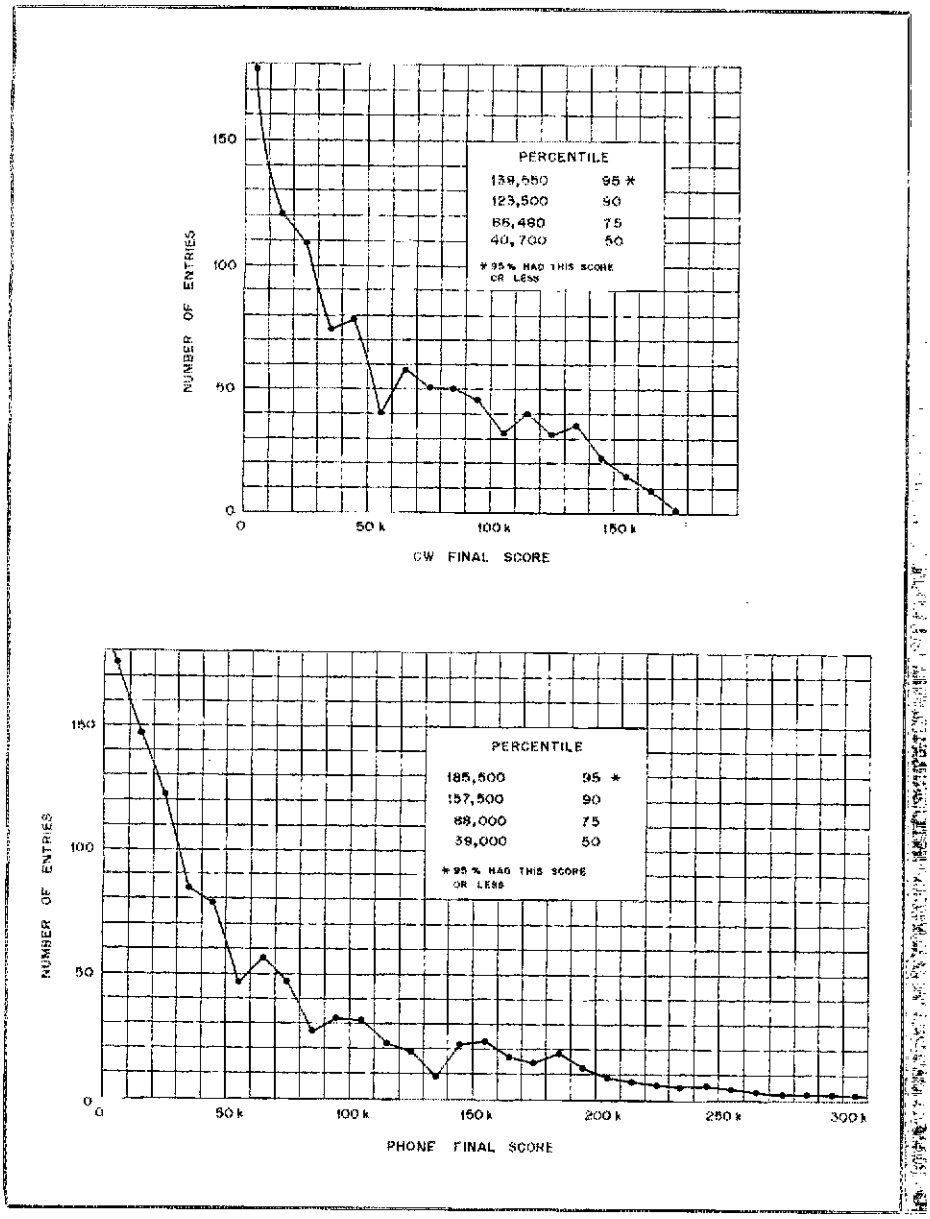
Table 4
Top Five Multiop Scores

Phone	
W7ZR	233,692-1579-74
AKØT	218,448-1476-74
N4WW	217,708-1471-74
AA6G	216,086-1460-74
WØSA	206,460-1395-74
CW	
K1VTM	147,744-1026-72
AG7M	143,080-980-73
KØWA	140,400-975-72
WB8JBM	137,232-953-72
K7QA	130,640-920-71

Table 5
Clean Sweeps — Both Modes

K1TO, W1RM, N2NT, K4PJ, K5TA, K5ZD, WA3OVC/5, N5DU, N6RO, K7JA, W6YX*, N6AUV*, W7WA, K7SS, WØUA

*Multioperator



Score distribution for the 1980 Sweepstakes.

While some people really had the big hardware to back them up, one top-ten finisher on each mode managed to make it with either dipoles and/or delta loops on 40/80 and a tribander for 10/15/20. Big antennas do help, but they certainly can't be a substitute for operating ability. See if you can fine tune your own effort before the 1981 Sweepstakes and move up a few notches!

Looking closely at the Top Ten scores you may see that the West Coast engineered a "clean sweep" of all 10 positions on phone, while on cw the leaders were spread out pretty evenly. Only the upper midwest and southeast were left out in the cold this year. Interestingly, the southeast and upper midwest were represented in the low power and multiop top scorers.

Chip, K7JA, made it as number one for the 10th time, this year on phone, showing that his recent stay in Japan certainly didn't take the edge off his domestic contest-operating techniques. On cw, George, WØUA, outdistanced the competition by a good margin (not to mention his number two phone effort). Seems like the low-power scores edge closer and closer to the high-power scores each year. Another George, W1ZT, finally made the top spot on low power cw after several years of trying, while Dan, K7SS, put in an excellent effort on phone to grab the first spot, in addition to number four on cw. Operating a multioperator Sweepstakes station must be one of the toughest things to do. It's been many years since a top multiop effort has equaled a Top Ten single-operator score. Perhaps the competitive intensity just can't be developed, or maybe most people use multiop efforts to train new operators. Congratulations to the groups at W7ZR (phone) and K1VTM (cw) for their fine efforts.

Club competition continued to be an essential ingredient with almost exactly 50% (1163) of the entries participating for a club. The big winner again was the Northern California Contest Club in the *Unlimited category*, though the Potomac Valley Radio Club is inching closer. In the Medium category, the organizers in the

Pat, W5WMU, put in a lot of hours on antenna work, which paid off with a ninth-place single-op finish on phone.

AKØT (sitting), and, l-r, WBØYIB, KCØW and WAØCYW teamed up to operate AKØT to the number two position for multioperator stations in the 1980 phone SS.

Table 6
Club Competition

Unlimited Category	Score	Entries	Phone Winner	CW Winner
Northern California Contest Club	10,821,317	113	WA7NIN	N6RO
Potomac Valley Radio Club	7,207,750	85	N8II	W3LPL
Medium Category				
Texas DX Society	5,346,694	48	K5RC (K5ZD)	K5GA
III-Wind Contesters	3,932,924	47	K9HMB (K9GL)	W9RW
Murphy's Marauders	3,777,951	43	K1PR	K1TO
Yankee Clipper Contest Club	3,605,198	39	W2PV (K1AR)	K1AR
North Texas Contest Club	2,649,732	31	KA5Q	N5CR
Western Washington DX Club	2,372,650	27	K7RI (W7WA)	W7WA
Mad River Radio Club	2,085,494	18	AD8P	K3LR
Colorado Contest Conspiracy	1,711,594	10	KØRF (WØUA)	KØRF (WØUA)
Central Michigan ARC	1,524,596	22	WD8JFE	N8BIK
Wireless Institute of the Northeast	1,365,506	19	W2RQ	W2RQ
Frankford Radio Club	1,129,968	15	K3ZA	K3WW (KA3BLP)
Connecticut Wireless Assn.	1,109,044	10	W1XX	W1RM
Eastern Iowa DX Assn.	1,044,816	13	WØEJ	WØEJ
Kansas City DX Club	997,956	10	KBØX	WBØUXI
Murgas ARC (PA)	986,008	20	WB3FAA	KA3A
South Jersey Radio Assn.	916,608	29	WA2KOK	W2PAU
Mississippi Valley DX & Contest Club	836,534	13	K9BGL	KBØRC
Ft. Wayne Radio Club	707,974	13	K9UWA	K9UWA
Point Radio Operators Society	690,792	12	K3UA	K3UA
Norwood ARC (MA)	674,534	12	WA1EOT	K1CB
Penn Wireless Assn.	630,990	14	WB3DJF	K3PA
OH-KY-IN AR Society	620,182	15	WA6EZV/8	AA8Z
Rockford ARA (IL)	575,130	22	AK9N	WD9DBC
Kettle Moraine RA (WI)	479,080	17	N9KS	N9KS
Lynchburg ARC (VA)	469,816	11	AA4FF	AA4FF
Northern Ohio ARS	335,924	11	N8TN	AA8S
West Allis (WI) RAC	281,720	12	K9WTF	K9KR
Reading (PA) RC	250,656	12	WB3AAK	
Local Category				
Willamette Valley (OR) DX Club	944,346	7	W7NI	
Machine Contest Club (MI)	910,718	9	K8MJZ	AI8D
South Jersey Contest Coalition	900,746	8	W2KI	N2CQ
Lincoln (NE) ARC	787,008	6	KØSCM	
Arrowhead RAC (MN)	603,766	7	KØIJL	KØIJL
Fraternal Order of Radio Contest Enthusiasts (MN)	593,244	5		
Overlook Mountain (NY) ARC	587,880	10	WA2STM	W2XL
Central Florida DX Assn.	579,386	6	N4SA	N4SA
Buffalo Area DX Club	553,142	7	K2ZJ (WA2LCC)	N2CU
Texas Assn. of Contest Operators	498,404	4		
Western ARA	474,139	8		

Texas DX Society did a truly impressive job, more than doubling their score from last year to vault from fifth to first place! In the Local category, the number one spot goes to the crew from the Willamette Valley DX Club, who moved up from last year's third position.

New to the writeup this year is a graph showing the distribution of scores on both modes, and a table showing where the 50-, 75-, 90- and 95-percentile marks are. Perhaps next year if a little more time and interest is expressed, scores could further be broken down by high- and low power categories. Thanks to K3WT for this idea.

Estimating the number of participants in the contest isn't an exact science, but judging from the calls in the logs received the best guess is that perhaps 3500 or 4000 made more than 10 QSOs on cw and something like 6000 or 7000 did on phone. Thanks to all who sent in logs or check logs and to those who helped by giving out QSOs to the competitors!

SOAPBOX

Do away with the minimum halt hour off times. If you are drinking a lot during the phone contest, it sure is difficult to wait until one of those few off times to go the bathroom (N2MF). I've got a keyer with a memory, but somewhere along the line it developed a mind of its own, too! Darned thing kept sending things other than what I'd intended (KCØW). An absolute electronic orgy! (WD5GSL/WBØTEV). . . then on Monday, Murphy got nasty — did a number on the power transformer on my Hammarlund HQ-145 revr. It went up in smoke while the wife and I were at work (that's the brownish stain on my entry). Fortunately, the transformer opened up before any fire damage occurred to the house (WB9ECM). Unfortunately, I used "WI" for my section in many of my exchanges . . . I realized that "WI" might also be considered as West Indies what with new call sign regulations/allocations (W9YCV). Greetings to the inmates at *QST*. Enclosed, please find the efforts of several efficient operators and one moderately cooperative APPLE II mini-computer that did our logging and duping (WA9AWO). Highlights of the 1980 phone SS . . . Having VY1AC *call me* and then listening to him call CQ (without an answer) for 10 minutes . . . Working VE1CCC for a "clean sweep" with only seven minutes to go in the contest (WB2VFT). Murphy struck in the form of a broken water line. So I spent some of my precious contest time digging for pipes instead of points (KX4V). The startling moments of the contest always amaze me as the bands change from the casual cw QSO to the competitive madness of Sweepstakes. I hope the phone boys have as much fun (W3CEI). This contest is my fourth this year and I have yet to work Maine — that's over 400 hours of operating. Did someone "pull the plug" on Maine or did their squirrel die? (W3GNR).

Arapahoe (CO) RC	470,132	5		KØBN
Eastern Connecticut ARA	440,152	6		K1YRP
Wisconsin Valley RA	422,682	7	W9NA	W9NA
Saginaw Valley (MI) ARA	411,064	9	WB8AYW	N8RW
Motor City RC (MI)	396,530	10	W8MRM (WB8RNY)	K8RV
DX Assn. of Connecticut	384,700	8	K1WJ	WA1CCR
Indy DXers (IN)	365,264	3		
Schenectady (NY) ARA	359,008	7	K2AE (WB2CFP)	WB2CFP
Columbus (OH) ARA	357,448	8	W8LNO	W8ETU
Central Arizona DX Assn.	340,536	3		
Providence (RI) RA	335,232	6	WA1TAQ	
Canton (OH) ARC	320,562	8	AK8W	W8IM
Poughkeepsie (NY) ARC	318,204	8	WA2YSM (WB2KMY)	K2GBH
Splitrock (NJ) ARA	296,426	6	K2RF	K2BLA
Southeastern DX Club	291,758	5	AA4NC	
Northrop RC	283,026	6	W6CN	
Twin City DX Assn. (MN)	279,524	3		
IBM Owego (NY) ARC	276,496	6		K2MQY
RC of Tacoma (WA)	269,296	7	W7LKG	
Ozarks ARC (MO)	254,236	7	WBØOQV	WBØOQV
Mid-Missouri ARC	253,152	4		
Mitre-Bedford (MA) ARC	243,178	8	W1FM	W1FM
Fox River (IL) RC	237,736	3		
Harlan County (KY) ARC	237,556	8	ND4Y	WD4NWW
Ventura County ARC	236,500	8	WA6DJS	
Eastern Michigan ARC	232,756	7	K8DD	K8DD
St. Charles (MO) ARC	232,174	5		AGØU
Foothills ARS	225,088	7	K6MA	W6ASH
Southern California Contest Group	223,586	3		
West Park Radiops (MI)	214,078	7	W8IMF	K8AAZ
Great South Bay (NY) ARC	202,946	4	WB2TCQ	
Natchaug (CT) ARA	197,136	5	KA1CI	
Ramapo Mountain ARC (NJ)	194,538	7	WB2ARS	WB2ARS
Ohio Valley ARA	187,832	3		
Gloucester County ARC (NJ)	183,106	6		K2HPV
Onalaska (WI) Wireless Assn.	169,718	5		KA9BJO
L'anse Creuse (MI) RC	160,798	9	K8RO	WA8VEB
Southeastern Michigan ARA	150,582	3		
Atlanta Radio Club	148,770	5	WB4VSP	
Utica (NY) ARC	147,504	6	K2SOT	K2XU
Wichita (KS) ARC	145,190	4		
Valley Radio Club of Eugene (OR)	137,820	4		AI7W
San Diego DX Club	130,624	3		
Lockport (NY) ARA	122,668	6	KA2EGC	AE2T
Granite State ARA (NH)	115,714	4	WB1FNO	
Wild Rivers (WI) ARC	105,604	4	N9BMK	
Flyweight (TN/VA) DX Group	103,774	3		
Hazleton (PA) ARC	90,200	3		
Long Island Mobile ARC	89,122	7	N2RQ	
COMSAT ARC (MD/VA)	88,550	5		K4JSI
Central Wisconsin ARA	87,708	6	WD9ESX	KA9ACC
Lake Success (NY) RC	74,844	7	WA2ISH	WA2ISH
Cuyahoga Falls (OH) ARC	69,408	5	W8DXT	
Lebanon Valley (PA) Society of RA	65,916	7	WA3NTJ	WB3AKI
Chicago Radio Traffic Assn.	58,026	4	W9HPG	
Syosset (NY) High School AR & TV Club	47,912	3	WB2QEU	
Hamfesters (IL) RC	46,786	3		
Iolani School RC (HI)	38,862	3		
Fresno (CA) ARC	27,228	3		

N2CU lost a little sleep and paid the price in his successful quest to be number one on cw from the Western New York Section. Is there an eye doctor in the house?

N7DF is shown cleaning up his "Sweep-Stakes-Logs." We wonder if Larry knew when he took this picture that he *would* end up with the number five score for single ops on phone of his own *accord*.

Too many East Coast ops give up on 15 meters too soon after dark . . . spent final contest hour on 15 and picked up four new multipliers! (WA2SEL). Although I thought that the contest seemed long, it's nowhere near as long as your task of checking all those logs! (W9UVM). [Roger that, Jim — Ed.] The second annual trip by the Rochester (Minnesota) ARC to North Dakota, still find it a popular section from which to contest (WØSA). Why am I asked to repeat my "ck 35" so often? Us "Old Timers" still enjoy operating even if we do have trouble keeping up with the "young squirts." Believe me, "CK 35" is correct! (W4XD). Biggest thrill for me was working VE8HB four minutes before the end of the contest. So much QRM that I almost didn't make it (N9AIC). I was very delighted to have a "clean sweep" in my first attempt at SS (KB8EI). Sure was embarrassed the next day when I discovered that I had operated for 24-1/2 hours. Goodbye 18 hard-to-find QSOs! (K1KI). My new call sign confused several ops. One chap from Florida replied "No DX, please." When I told him that I didn't know that Maine was on the DXCC countries list, he said in a slow drawl, "The funny way yew Yankees talk made it sound like DX." Hi! (AK1W). Just knew that *this time* I could go the full 24 hours. Sure enough, I dropped dead after 18 hours (N4TY). [R.I.P. — Ed.] Recipe for SS: 2000 log spaces (never filled), 1/2 cup of pencils, 2 pounds of erasers, 1 rig, 1 extra set of finals, 7 elements up 100 feet, and 2 gallons. Broil for 24 hours and check for dupes (KA3FMH). I heard about a guy who was so tired that he answered his own memory keyer. After CW SS, I believe it (AI7W). Believe it or not — the most *courteous* SS yet! (AA6DX). I enjoyed the humorous phonetics; WA1 Great Big Apples, WAØ White, Bald and Ugly, etc. Then I decided to try WAØ Pineapples, Bananas and Lemons (WAØPBL). The number of stations who duped me was very discouraging. I kept a running dupe sheet by suffix and did not deny any QSO based on suffix duping but just marked the log as a possible dupe. The entire log was reduped by prefix and only about 10 of the possible "dupes" were found to be the same suffix with a different prefix. This was only .51% of the total contacts representing only 7.28 minutes of operating time. At this rate the value of suffix duping over prefix duping becomes about equal. The total dupes were about 3.03% of the total number of contacts or about 2.5 per hour. In the first three days after the contest, I have received over 200 QSL cards. The "penalty" for being in a rare state, I guess. In fact, there were five cards waiting in my box Monday morning; I didn't know the Postal Service was so fast. (N7DF). I would like to encourage 5BWAS (5 Band Worked All States) to work the Open CD Party where credit is given for a QSO with the same station on different bands. Would be nice to see the SS be 20 hours out of 30. It's hard on us old timers (34) (K7QD). Found defending my 1979 section and division title more difficult than expected. Michigan deer-hunting season opened the same day as SS. Made the decision to hunt and defend the title. Got buck at 6:30 A.M., got home at 7:30 A.M., then rested and got into the contest with extreme confidence. Now the long wait to see if this "hunt" was successful (W8JWN). [Sure was successful, Tom — tops in low power in Michigan and in the Great Lakes Division — Ed.] The way the QSO rates drop off on

Sunday, why not make it a QSO once *per hand*? Imagine, a 24-hour sprint! (WB8JBM). Oklahoma was easy pickins for everyone — except me. Only worked one Oklahoma . . . better than none (KM5H — Oklahoma Section). I think that SS is still the greatest contest going. Sure it can get boring, but it is the only contest where the little guy can compete with the big gun on almost an even level. While kilowatts and a big antenna system give one a definite advantage, operator ability is quite equally important (K6OMB).

FEEDBACK

On cw, N4AWZ should have been credited with 32,612 points in Georgia. We missed counting KE4I as one of the few with a clean sweep on both modes. W9RE was inadvertently credited with the Central Division record on phone, which K9CT should have been credited with. N4SA was the Northern Florida leader on phone as N4WW (+K0OO) should have been listed as the Southeastern Division multioperator leader. The Hudson Division phone record still belongs to K2TR ('78), not W2PV; in the Southwestern Division W7KW was the all-time leader (N7DD now), and W6AM the cw leader. The Fresno ARC should have been credited with 79,410 points (5 entries), and the Northern California Contest Club with a total of 15,184,266 points (145 entries). Finally, K2BLA, not K2RF, should have been listed as the club cw-certificate winner for the Split Rock ARA.

The scores are listed by call area, ARRL section and in order from highest to lowest score. The single operators are listed first and the multioperator scores are listed at the end of the section listings. The linescore reads: call score — number of multipliers — number of QSOs — power indicator A power indicates 200 watts or less (dc) used at all times, and B power means that a dc input of greater than 200 watts was used. Example N6TR 173,752-1174-74-24-B means N6TR had 173,752 points, 1174 valid QSOs, a clean sweep of all 74 possible ARRL sections in 24 hours of operation, and used a dc input of over 200 watts.

CW Scores

U.S.A.

1

Connecticut

K1KI	164,448-	1142-72-24-B	
K1TO	159,692-	1079-74-24-B	
K1PR	151,372-	1066-71-24-B	
W1ZM(K1ZM,opr)		148,148-	1001-74-24-B
W1RM	137,344-	928-74-24-B	
K1XA	135,072-	938-72-24-B	
W1WEF	133,882-	917-73-24-B	
K1WH	131,108-	898-73-24-B	
W1XX	124,818-	879-71-24-B	
W1BIH	124,392-	852-73-24-B	
AA2Z/1	120,096-	834-72-24-B	
WA1CCR	110,960-	760-73-23-B	
K1RT	106,358-	749-71-19-A	
W1ECH	105,264-	731-72-24-A	
K1JO	94,792-	697-68-22-A	
W1TCJ	94,392-	684-69-21-B	
W1GNR	83,496-	588-71-22-B	
K1RM	80,088-	564-71-15-B	
K1YRP	76,728-	556-69-22-A	
W1GNC	71,154-	531-67-12-B	
WA1YEC	68,206-	509-67-19-B	
WA1DWE	67,728-	498-68-18-A	
K1WJ	61,248-	464-66-15-B	
W1KKF	60,274-	399-63-10-B	
KN1DPS	45,276-	343-66-24-B	
K1DD	37,572-	303-62-13-A	
AA1K	33,396-	242-69-10-A	
N1CC	32,400-	270-60- 6-A	
K1CBR	28,704-	208-69- 9-A	
4J1T	28,670-	235-61- 9-A	
KA1DZV	27,360-	260-53-23-B	
K1DW	21,012-	206-51- 8-A	
K1NYK	19,140-	174-55- 7-A	
KA1DYT	16,922-	177-48-17-A	
AB1U	14,798-	151-49- 4-A	
KA1CLV	11,340-	126-46-18-A	
K1UQE	6510-	105-31-11-A	
N1JW	5950-	85-35- 3-A	
KA1BMB	5548-	73-38- 6-A	
K1THP	3920-	70-28- 2-A	
W1OD	1088-	34-16- 1-A	
K1VTM(+K1s CC JX,WB1AVA)		147,744-	1026-72-24-B
WA1GBA(+WA1HYN)		100,110-	705-71-23-B
AJ1G(+WB1CRF)		91,192-	597-68- -A
KA1DBK(+KA1DTT)		2408-	43-28-20-A

Eastern Massachusetts

N1EE	118,406-	811-73-24-B
K1QB	99,968-	704-71-23-B
W1FM	83,964-	576-72-24-A
K1BU(WB1ANT,opr)	79,016-	581-68-16-B
WA1UZH	67,670-	505-67-15-B
WA1OLV	63,756-	462-69-20-B
W1WAI	63,360-	495-64-12-B
N1RC	57,472-	449-64-17-A
AD1C	54,648-	396-69-19-A
K1XM	48,512-	379-64-13-A
WA1EQT	40,824-	324-63- 7-B
W1KEE	37,674-	299-63-22-A
WB1CNM	32,520-	271-60-17-B
W1AX	24,000-	200-60-24-B
WB1OFV	18,020-	170-53- 6-A
N1AU	10,530-	117-45-11-A
WA1TQP	9200-	100-46- 7-A
W1SR	8190-	91-45- 3-A
W1PLJ	7476-	99-42-10-B
KA1EPD	6408-	89-36-21-A
WA1LKX	5148-	66-39- 1-B
KA1FUF	1476-	41-18-12-A
W1JR	1200-	30-20- 4-A
WB1EDL	986-	29-17- 6-A
WB1BSC	672-	24-14-11-A
W1CF(WA1LKX,opr)	600-	25-12- 1-A
W1TUM	180-	10- 9- 3-A
W1ZF1	80-	5- 5- 2-A

Maine

K1PV	72,588-	526-69-18-A
W1KX	43,287-	323-67-11-A
WB1GLH	40,066-	299-67-20-A
K1SA	12,740-	130-49- 3-B
AK1W	10,080-	105-48-19-B
W1FS	7752-	76-51- 3-A

New Hampshire

K1AR	166,586-	1141-73-24-B
K1RX	127,604-	874-73-24-B
K1LL	119,428-	818-73-24-A
AK1A	103,376-	728-71-24-B
WA1QCG	89,460-	639-70-24-A
W1HCS	86,688-	602-72-24-A
AC1J	81,736-	601-68-22-A
W1JY	40,380-	431-61-24-B
W1UN	29,232-	232-63- 7-B
N1BEY	20,252-	166-61-14-A
K1GW	20,240-	230-44- 7-A
AC1J	9000-	100-45- 7-A
K1TR	4752-	72-33-20-A
KA1BBI	3808-	56-34- 8-A

Rhode Island

K1IU	139,576-	956-73-24-B
N1RI	73,830-	533-69-20-A
WA1CVF	57,408-	416-69-18-A
K1DS	8400-	100-42- 4-A
W1RFG	6068-	74-41- 5-A
KA1AWS	860-	22-15- 6-A
W1GP(K1DT,KA1AWS,N1s AKO HBM,W1GS,WA1s RKL,TAQ, WB1CVV,oprs)		50,256-	608-66-22-B
WA1VQY(+WA1YDU)		31,842-	261-61-20-A

Vermont

WB1GQR(WB2JSJ,opr)		99,688-	733-68-22-B
WA1GUV	76,964-	642-71-22-A
KA1BXW	15,322-	163-47-10-A
W1KQ	12,264-	146-42- 9-B

Western Massachusetts

K1BW	147,606-	1011-73-22-B
N1TZ(K1EA,opr)	143,080-	980-73-24-B
W1ZT	139,392-	968-72-24-A
K1DPB	46,345-	357-65-11-B
WB1HIH	23,484-	206-57- 7-B
K1IJU	20,520-	180-57- 7-A
W1JP	8400-	105-40- 6-A

2

Eastern New York

W2YV(N2NT,opr)		158,656-	1072-74-24-B
W2XL	98,420-	703-70-23-A
WA2STM	90,596-	638-71-24-A
WB2CFP	79,764-	578-69-22-B
K5NA/2	68,752-	432-68-10-B
K2GBH	41,990-	323-65- 9-A
WA2TJE	38,808-	294-66-19-A
KA2EME	38,556-	306-63-24-A
W2DW	38,412-	291-66- 8-B
KC2L	34,224-	276-62-21-A
N2EK	30,120-	251-60-10-A
KA2KGG	25,992-	228-57-14-A
AA2Y	21,600-	200-54- 9-A
W2ARQ	20,020-	143-70-23-B
WA2BXT	17,880-	149-60-21-A
W2NRD	17,770-	150-59-18-A
K2GSF	11,300-	113-50- 9-B
W2PKY	7800-	100-39- 5-A
KE2O	432-	19-12- 1-A
WB2KMY(+KA2ACJ)		47,580-	366-66-19-A

New York City - L.I.

K2SX	124,830-	855-73-21-B
N2GC	103,234-	727-71-24-A
K2AU	99,308-	671-74-19-B
WB2TCQ(WB2RNT,opr)	89,568-	622-72-24-A
KA2CLQ	56,940-	438-65-24-A
WB2DHY	43,188-	354-61-24-B
WB2JAY	27,028-	233-58-10-A
WA2ISH	25,048-	202-62-14-A
K2QO	23,520-	210-56-13-A
WB2QEU	21,452-	173-62-10-A
KA2CLY	21,420-	210-51-11-A
K2CMV	21,204-	186-57-13-A
KA2HTH	18,810-	171-55-13-B
K2HVN	9522-	69-69- 7-A
KA2ELB	7650-	85-45- 7-A
K2YGM	7008-	73-48- 4-A
WA2EYW	4356-	66-33- 5-A
N2BZK	2240-	40-28- 6-A
N2RQ	736-	23-16- 6-A
W2CZZ	260-	13-10- 1-A
KA2KGH	192-	12- 8- 6-A
W2NBI	32-	4- 4- 2-A

Northern New Jersey

W2RQ	158,544-	1101-72-24-B
W2PA	119,138-	839-71-23-B
AE2A	119,220-	823-70-20-B
N7TT/2	114,736-	808-71-20-B
AC2U	112,274-	769-73-24-A
W2SHM	101,016-	732-69-23-B
WA2YZW	95,480-	682-70-20-A
W2GD	93,100-	665-70-11-B
W2SQ	90,720-	648-70-13-B
WA2OVE	90,454-	637-71-15-B
K2JT	87,500-	625-70-19-A
WB2FUE	68,586-	497-69-23-A
AF2L	66,000-	500-66-14-B
K9CW/2	50,820-	383-70-15-A
W2GD	47,328-	364-65-15-A
WB2NGT	48,416-	356-68-15-B
WB2ARS	46,970-	385-61-21-B
WB2IKL	33,642-	267-63-12-A
WA2JAX	32,004-	254-63-25-A
K2RF	27,600-	230-60-13-A
W2HR	9240-	105-44- 6-A
W2TPJ	8910-	99-45- 7-A
W2ZEP	7020-	130-27- 5-B
W2TI	6480-	108-30- -A
W2NPT	4368-	91-24-15-A
WB3JON/2	4026-	61-33- 8-A
K2BJG	3150-	45-35- 6-B
WB2OHV	1118-	43-13- 6-A
KA2AGM(+WB2KYE)	76,254-	537-71-24-B
K2GQ(N2BQ,KA2EYH,WA2NXW, WB2s KGN RLB,oprs)	29,842-	219-59-16-B
KA2INC(+KA2IPV)	12,750-	134-46-25-A

Southern New Jersey

N2CQ	137,232-	953-72-24-B
W2VC	106,260-	759-70-22-B
AB2E	104,974-	719-73-22-B
KB2FD	97,300-	695-70-24-A
W2KI	87,720-	645-68-14-B
W3PAU	74,124-	522-71-19-B
N2UU	62,016-	456-68-13-A
KA2BOP	56,682-	424-67-16-B
WA2KOK	47,754-	379-63-21-B
WB2SUT	41,580-	330-63-23-B
K2HPV	41,470-	319-65-18-A
K2OSV	31,842-	261-61-16-B
WA2NBM	25,080-	220-57-17-A
WB2UVB	22,000-	200-55-13-A
WB2PHD	16,016-	154-52-10-A
W2EA	14,700-	147-50- 8-A
W2FGY	14,112-	126-56-16-B
W2OGZ	6364-	86-37- 9-A
N2AWC	330-	15-11- 5-A
KA2IYY	286-	13-11- 3-A
KA2CQX	60-	6- 5- 1-A
N2ME(+WB2YOF)	64,610-	497-65-15-B
N2BCF(+K2NH)	62,176-	464-67-24-A
KA2FFS(+KA2BEW,WA2RCB, WB2SJA)	41,540-	335-62-24-A

Western New York

N2CU	139,536-	969-72-24-B
W2TZ	131,760-	915-72-24-A
W2RR(WB2AHD,opr)	111,936-	771-72-24-A
AE2T	99,280-	730-68-24-B
K2ET	79,488-	576-69-20-A
N2DE	76,020-	543-70-24-A
K2MQY	61,202-	431-71-19-A
W2ROE/2	57,936-	426-68-18-A
WA2EYA	57,552-	436-66-19-B
N3GO/2	54,912-	429-64-24-A
N2GU	43,164-	327-66-18-A
W2EZ	40,698-	323-63-15-A
W9VU/2	40,260-	305-66-11-A
K2RN	40,052-	323-62-16-A
W2UP	39,060-	310-63- 5-B
K2XU	39,468-	299-66-14-A
K2KIR	35,884-	299-58- 4-B
W2GJ	29,890-	245-61-11-A
W2IMO	29,432-	284-52-17-A
K2VF	25,134-	214-59-13-A
KA2CQV	19,872-	184-54-18-A
WB2YQH	19,800-	165-60- 6-B
WA2LEZ	13,300-	133-60- 9-A
KA2DFM	11,748-	89-66-17-A
KE2K	8960-	112-40- 9-A
KR2IY	5472-	72-38-13-A
WB2SWL	4970-	71-35- 6-A
K2UAN	4050-	75-27- 6-A
KA2HJC	2288-	52-22-13-A
K2QR	1968-	41-24- 1-A
N2DM	1770-	59-11- 3-A
KA2EGC	342-	19- 9- 8-B
WB2MVF	2-	1- 1- 1-A
WA2SDY(KA9EUQ,WB9THY, oprs)	63,512-	467-68-18-A

3

Delaware

K3HBP	32,004-	254-63- 9-B
N4NA/3	17,472-	168-52- 5-A
KA3CMR	2700-	50-27- 4-A

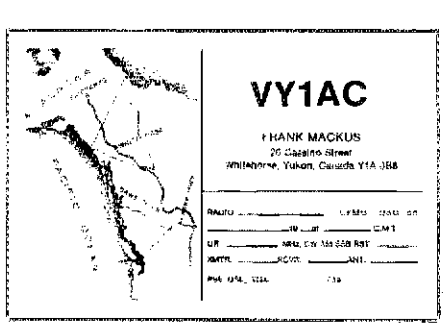
Eastern Pennsylvania

K3PA	138,450-	975-71-24-B
K3WW(KA3BLP,opr)	120,680-	862-70-23-B
W3RJ	98,736-	726-68-12-B
K3ONW	95,900-	685-70-20-B
K3WJV	80,266-	599-67-15-B
AA3B	69,960-	530-66-17-B
KA3A	65,320-	460-71-11-B
KA3BOD	64,008-	508-63-17-A
K3TX	54,406-	387-69-16-A
W3MA	47,916-	363-66-12-B
K3VW	46,540-	358-65- 7-A
KA3BKY	45,312-	354-64-23-A
WB3CAI	45,292-	338-67-24-A
N2EY/3	42,456-	366-58-16-A
K3KW	41,406-	309-67-17-A
WA3MVP	40,526-	317-64-15-B
WA3UQZ	38,896-	374-52-18-A
W3CNS	37,448-	302-62-10-A
WB3FAA	37,332-	306-61-20-A
W3ADE	34,060-	262-65-15-A
W3FEY	33,428-	278-61-16-A
WB3FED	32,760-	273-60-15-A
W3DZH	32,240-	248-65-13-A
W3IKJ(K3FD,opr)	24,120-	201-60- 7-B
K3VYA	23,850-	225-53-16-A
KB3JK	18,700-	187-50-12-A
K3OO	18,400-	200-46- 4-A
KB3GL	16,640-	160-52-13-A
WB3AKI	16,366-	167-49-16-A
W3CEI	13,026-	167-39-13-A
WB3LNZ	12,540-	138-47-14-A
AI3Q	12,240-	120-51- 9-A
WB3IGS	7800-	150-26-16-A
KA3EWT	7272-	101-36-24-A
AG3R	5440-	85-32- 2-A
WB3KKV	3564-	54-33-10-A
WA3YON	2900-	50-29-13-A
WA3NTJ	2580-	43-30- 4-A
W3HMR	960-	30-16- 3-B
KA3FKL	884-	26-17-11-A
WA3LGG	242-	11-11- 5-A
KA3DZV	192-	12- 8- 6-A
WB3AAL	30-	5- 5- 1-A
WB3KAO	18-	3- 3- 3-A
KB3KG(+WB3FLK)	39,130-	301-65-22-A
W3BN(K3WGR,KA3AXE,KB3ER, WB3CAL,oprs)	32,332-	274-59-16-A
W3MN(+WA3YNC)	28,768-	232-62-17-A

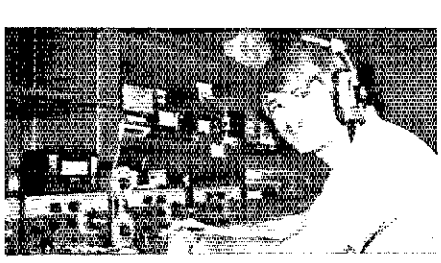
Maryland - D.C.

W3LPL	156,052-	1062-73-24-B
K3EST(WB4SGV,opr)	149,402-	1048-72-24-B
K3RA	138,846-	951-73-24-B
K3SA	134,928-	937-72-24-B
W3GG(WA3UXU,opr)	125,356-	847-74-24-B
K3TM	123,398-	869-71-24-A
K3IU	119,584-	842-71-22-B
K3RS(WA3ZAS,opr)	118,428-	834-71-24-B
K3ZZ	113,540-	811-70-24-B
K3HPG	101,992-	708-72-18-B
W3GN	96,506-	661-73-24-B
W3UJ	86,100-	615-70-22-B
WA3KCY	84,420-	603-70-21-B
W3FA	82,786-	583-71-20-B
W3AZ	64,600-	475-68-20-B
WA3EOQ	64,540-	461-70-24-B
N3GB	60,480-	432-70-12-B
W3GRF	52,780-	406-65-10-B
WB3CZK(WB3JRU,opr)	46,930-	361-65-16-B
K3AO	46,092-	334-69-24-B
N3RL	41,444-	317-66-12-B
WA3UPH	40,576-	317-64- 7-B
K3DI	35,466-	257-69-10-A
K3KU	32,634-	259-63- 6-A
K1MD/3	29,748-	222-67-21-A
K3APM	29,736-	252-59-24-B
W3EE	28,500-	250-57-14-A
W3ICM	25,752-	209-64-22-A
K2PLF/3	23,970-	235-51- 6-B
N3AXA	15,000-	150-50-16-B
K3AK	11,440-	103-55- 8-B
K3AFY	10,710-	119-45-20-A
N3AM	4816-	86-28- 2-A

Andy, N2NT, spent a little time at W2YV and took home the Hudson Division cw title in the 1980 SS.



If you missed VY1/VE8 for a "clean sweep" on phone, it wasn't VY1AC's fault. Frank worked all callers.



Randy, K5ZD, took some time out from his studies at the University of Texas to operate K5TM to a second place, single-operator finish on cw — then boogied over to K5RC to take top single-op phone honors in the West Gulf Division.

W3FQE 3410- 55-31- 6-B
WA3VPL 2912- 56-26- 3-A
W3GNQ 1800- 36-25- 2-B
WA2VUJ/3 1600- 40-20- 8-A

Western Pennsylvania

K3UA 164,834-1129-73-24-B
K3LR 158,118-1083-73-24-B
K3VK 112,000- 800-70-23-A
AD8J/3 93,296- 686-68-20-B
K3VX 81,060- 579-70-20-A
W3HOH 67,452- 462-73-12-B
WA3NOM 62,040- 470-66-16-A
W3GNR 59,780- 427-70-19-A
WA3MDY 52,864- 413-64-23-A
AF3B 42,900- 325-66-11-A
KA3BMU 41,600- 325-64-20-A
AG3H 33,728- 272-62-18-A
WB3KAF 15,300- 150-51- 7-B
KA3FMH 11,224- 122-46-14-A
W3IW 7800- 100-39-24-A
N3BJW 6080- 80-38-14-A
W3AS 3780- 70-27- 1-A
KA3DDG 2756- 53-26- 9-A
KA3FXJ 1482- 39-19-14-A
K3CR(KA3GNF,N3BAO, WA3WMF,WB3EKO,WN3VAW, WD8PUH,oprs) 63,232- 494-64-24-B

4

Alabama

N4KG(WN4KKN,opr) 151,986-1041-73-24-B
N4QB 99,216- 689-72-22-A
K4JXS 38,544- 292-66-21-A
K4GSK 31,500- 250-63-12-A
WD4PZN 21,090- 185-57-16-A
KZ4S 12,688- 122-52- 8-A
K4ZGB 7200- 100-36- 4-A

Georgia

K4BAI 135,342- 927-73-24-B
KB4I(K2PO,opr) 104,300- 745-70-24-A
N4TZ 99,820- 713-70-24-A
K4HAV 84,388- 578-73-23-B
N4VZ 79,200- 550-72-16-B
K4BAM 75,752- 557-68-22-A
K3PI/4 68,272- 502-68-22-A
NA4J 46,860- 355-66-14-B
AA4U 29,646- 243-61- 6-A
W4SAS 10,080- 112-45-13-A
KI4Y 3036- 46-33- 5-A
W4DOC(KA4s DDQ DQF MDF, KR4W,N4s DHH ZM,WH6AEO, oprs) 12,126- 129-47-23-B

Kentucky

K4FU 104,440- 746-70-24-B
WB4FOT 84,456- 612-69-23-A
WA9OTD/4 59,362- 443-67-20-A
N4TY 57,070- 439-65-18-A
KA4IDW 48,230- 371-65-24-A
K4AVX 41,328- 328-63-10-A
WD4NWW 31,680- 264-60-11-B
W4OYI 24,360- 203-60- 8-B
KA4HWG 17,808- 168-53-10-A
KS4K 60- 6- 5- 5-A
W4CN(AC4A,K4TXJ,KA4s DKX FJJ IQD JEE JMX,N4XM,oprs) 60,324- 457-56-23-A

North Carolina

N4AA 122,400- 850-72-20-B
WA4FFW 113,884- 802-71-24-B
AA4NC 108,062- 761-71-24-A
N4FD 91,420- 653-70-24-B
K4UWH 89,424- 621-72-18-A
W6NWS/4 76,464- 531-72-23-A
KW4E 40,320- 320-63-11-A
KB4C 26,532- 198-67-15-A
AA4NN 23,616- 246-48- 7-B
N6DR/4 17,442- 171-51-24-B
KA4FOJ 16,400- 164-50-14-A
KF4I 15,984- 108-74- 7-A
KA4ODX/N 11,026- 149-37-24-A
K4CAX 6800- 100-34- 4-B
W1FTX/4 6800- 85-40- 5-A
W4DGJ 6232- 82-38- 7-B

North Florida

N4SA 135,342- 927-73-24-B
N4WW 69,960- 530-66-12-B
W4AI 43,656- 321-68-16-A
NE4F 43,248- 318-68-20-A
W2AW/4 20,160- 180-56- 8-A
WD4ICQ 5390- 77-35- 3-A
W4VQ 1728- 36-24- 2-A

South Carolina

AE4Y 89,060- 610-73-20-A
N4ZG 55,342- 413-67-17-B
K4ADI 20,400- 170-60-18-A
N4EE 15,840- 176-45-10-B

South Florida

N4BP 142,426-1003-71-24-B
K4XB 64,736- 476-68-20-B
WD4AHZ 57,460- 442-65-18-A
K1ZX/4 50,120- 358-70-12-A
ND4G 14,872- 143-52-15-A
N4XR 14,336- 112-64- 5-A
N4AJD 5148- 66-39- 4-A
N4TW 16- 4- 2- 2-A

Tennessee

K4XU 135,050- 925-73-24-A
K4PJ 83,324- 582-74-24-B
K4OAQ 82,544- 616-67-19-A
WA4EVB 70,380- 510-69-19-A
KE4F 67,864- 499-68-24-A
WB4MUZ 26,130- 201-65-17-B
WD4SIG 23,064- 186-62- 7-A
KA4LLN 13,888- 124-56-10-A
W4OGG 5850- 75-39- 3-B
KT4H 1610- 35-23- 6-A
WA4UCE(KA4s AIB JRG MGG NBG,WA4s OIE QZM,WB4IFB, oprs) 29,160- 243-60-24-A
KN4F(+KN4Z) 11,220- 110-51-12-B

Virginia

K4PQL 136,604- 962-71-24-B
K4FJ 126,948- 894-71-23-B
W4YE 121,656- 822-74-23-B
N4OW 117,576- 828-71-19-B
W4EI 115,640- 826-70-23-B
K4YF 104,976- 729-72-21-B
AA4FF 88,914- 609-73-22-A
W4DM 88,734- 643-69-19-B
K4JST 86,478- 609-71-24-A
N4ZR 72,336- 548-66-17-A
N4CD 69,804- 554-63-19-B
W4XD 68,244- 517-66-18-A
K4TM 48,714- 353-69-11-A
KX4V 46,498- 347-67-12-A

W3YY/4 42,084- 334-63- 9-B
W4ZEI 41,912- 338-62-18-A
WB4FLT 38,220- 294-65- 9-A
NB4J 38,052- 302-63-16-A
K4JSI 37,310- 287-65-13-B
KØDTK/4 35,754- 303-59-11-A
K4CTY 34,770- 285-61- 7-B
N4MO 33,894- 269-63-24-A
N4CMJ 26,078- 221-59-13-B
K4GKD 22,800- 200-57- 4-A
WD4JHY 20,862- 183-57- 8-A
AF4O 20,160- 160-63-18-A
WB4ODK 17,600- 160-55-16-A
K4GEL 12,642- 129-49- 8-A
KA6HWO/4 8640- 108-40-13-A
WB4ZPF 6900- 75-46-13-A
KA4NES 6888- 123-28-15-A
W4RX 6408- 89-36- 3-B
WD4GCE 6072- 92-33- 4-A
N4DEK 1218- 29-21- 5-A
K4DHB 780- 26-15- 1-A
N4MM 72- 6- 6- 1-A
N4EA(+N6ZO) 110,448- 767-72-23-B
W4POX(AA4AT,KA4s BFT BFU MPR,WB4BAB,oprs) 90,168- 663-68-23-B
WA4FKK(+W3DJI) 61,372- 458-67-24-A
K4KDJ(KB3MB,N4DSZ,WA4s IVF RDI,WD4ECK,WD8BKW, oprs) 57,664- 424-68-24-A

West Indies

KV4FZ(N6OP,opr) 143,226- 981-73-24-B
KØOO/KP4 61,770- 435-71-22-A

5

Arkansas

K5GO 164,104-1124-73-24-B
KA5EVR 26,280- 219-60-12-B
KØVGB/5 15,340- 130-59- 9-A
AD5F 6048- 84-36-11-A

Louisiana

W5WG 49,840- 356-70-23-A
K5SA(WA4UIH,WB5TKC) 90,576- 628-72-23-A
KA3BER/5(+WD5EAE) 61,880- 476-65-24-A

Mississippi

AE5H 39,040- 305-64-16-A
W5VSZ 35,636- 302-59- 7-B

New Mexico

K5TA 155,696-1052-74-24-B
AA5B 123,840- 860-72-24-A
WA5YTX 105,122- 741-71-16-B
WD5JYU 83,212- 586-71-24-B
WD5CAW 11,684- 127-46-17-A
W5JOV 9400- 100-47- 4-A

Northern Texas

N5CR 139,576- 956-73-24-B
K5NW 129,210- 885-73-22-B
W5MYA 128,800- 895-72-23-A
KA5Q 126,432- 878-72-24-B
N5JB 122,056- 836-73-24-A
N5AU 115,048- 788-73-17-B
N5BET 107,018- 733-73-23-A
KJ5W 67,200- 480-70-21-A
K5ME 67,024- 472-71-24-A
KB5UL 61,952- 484-64-24-A
K5FUV 49,500- 375-66-16-B
W5ONL 49,352- 398-62-14-B
KA5EMI 44,748- 339-66-21-A
WB5PIP 43,554- 357-61-12-B
KE5C 42,504- 322-66-14-A
K5HM 34,526- 283-61-12-B
K2SCU/5 26,352- 216-61-10-B
KA5GFJ 20,020- 182-55-24-A
W5JD 16,224- 156-52-10-A
KB5AH 17,516- 151-58-19-A
KA5HGE/N 2576- 46-28- 7-A
WB5VZL(+N5HD) 82,248- 596-69-24-A
KB5RH(+KB5QO) 61,644- 467-66-22-A

Oklahoma

NØCP/5 94,650- 678-70-24-A
N5GE 77,484- 587-66-24-A
K5UV 46,718- 329-71-23-A
K5JZN 16,632- 154-54- 6-A
N5CII 5986- 73-41-12-A
NØIN/5 5550- 75-37- 1-B
WB5RLR(WB5s KGP PVL,oprs) 53,040- 408-65-24-B
N5KW(+K5CM) 43,218- 343-63-11-B

Southern Texas

K5TM(K5ZD,opr) 167,684-1133-74-24-B
K5GA 153,328-1036-74-24-B
N5JJ 147,888-1027-72-24-B
K5IY(KA5CHW,opr) 146,730-1005-73-24-B
K5MA 146,000-1000-73-24-B
K5GN 143,080- 980-73-24-B
WB5FND(WA3OVC,opr) 129,056- 872-74-24-B
N5DU 128,908- 871-74-24-B
AD5Q 121,126- 853-71-23-B
K5LZO 119,088- 827-72-24-B
WA5WPB 113,328- 787-72-24-B
K5WA 109,296- 759-72-19-B
WB5WHR 95,620- 683-70-24-B
N5WW 91,664- 674-68-16-B
K3ZMI/5 89,280- 620-72-24-A
K5VWW 83,352- 604-69-22-B
W5JQ 82,740- 591-70-19-B
K5GB 80,154- 549-73-18-B
N5CDO 79,040- 608-65-24-B
W5SG 76,176- 529-72-21-A
KG5U 71,898- 521-69-24-A
K5JS 76,320- 530-72-19-B
K5TU 66,368- 488-68-11-A
N5RF 65,746- 463-71-24-B
N5ATC 54,944- 404-68-22-B
N5BA 42,036- 339-62-11-A
W5ASP 36,352- 284-64-24-A
K5RC 35,836- 289-62- 5-B
K5KG 35,136- 288-61- 7-B
N5EA 27,462- 199-69- 8-B
W5NR 26,412- 213-62-13-B
W5HNS 26,040- 217-60- 9-B
WA5TOS 19,200- 150-64- 7-B
N5BSW 18,444- 174-53-13-A
WD8DKJ/5 12,444- 122-51-17-A
KB5MJ 8652- 103-42-10-A
N5DB 2016- 42-24- 3-A
N5AF(+WB5LVL) 86,664- 646-67-24-B
K5SOR(+K5EJA) 66,920- 478-70-22-A

6

East Bay

N6RO 161,320-1090-74-24-B
K6XV 151,048-1042-72-24-B
K6XO 132,860- 910-73-24-B
N6NE 129,502- 887-73-24-B
K6HIH 115,304- 812-71-24-B
N6KB 115,144- 778-74-24-B
K6ZM 96,360- 660-73-24-B
WB6GPT 66,780- 477-70-24-A
KB6OH 50,400- 360-70-18-A
WB6ZEP 47,704- 356-67-17-A
K6CSL 35,216- 284-62-24-A
K6PJY 28,768- 232-62- 9-A
W6RJ 25,350- 195-65- 7-B
N6TU 22,788- 211-54- 5-B
WA6DIL 7722- 99-39- 2-A

Los Angeles

N6PN 113,442- 777-73-24-A
WA6OYV 101,232- 703-72-24-A
N6HC 73,840- 520-71-17-B
K6MP 66,300- 510-65-10-B
N6SU 47,704- 356-67-15-B
N6GL 41,236- 338-61-18-A
WA6TAF 28,652- 247-58-10-A
AA6RX 9372- 71-66- 5-A
WA6HQS 4352- 64-34-11-A
AC6L(+N6s CCE CYL,WA6JAH, WB6BIM) 68,742- 513-67-24-B

Orange

K6RR(K7JA,opr) 154,216-1042-74-24-B
K6WI 114,610- 785-73-24-A
W6LEN 66,040- 508-65-18-B
K6HRT 51,858- 387-67-19-B
WD6FLV 15,660- 145-54-16-A
WD6CUT 12,288- 128-48-11-A
WB6BZW 9200- 100-46- 3-A
WB6SHL(+N6DFY,WB6s NHV SKE) 83,616- 624-67-24-B
N6DNH(+KB6SI,N6s DBF DNI, WD6GSH) 28,784- 257-56-24-A
KA6CJW(+N6ME,WA6PMX, WD6TOM) 7812- 93-42-24-A

Sacramento Valley

W6TPH 127,584- 886-72-24-B
W6SX 114,594- 807-71-24-B
N6JV 110,376- 756-73-24-B
K6SG 101,520- 705-72-24-B
AI6V 91,254- 681-67-24-A
W8KZH/6 80,372- 566-71-24-B
W6NKR 79,804- 562-71-20-B
W6EGX 44,200- 325-68-15-A
K6YK/M 7800- 100-39- 4-A
KI6O(+K6ZBV) 105,696- 734-72-18-B

San Diego

K6NA 146,192-1002-73-24-B
N6SO 111,312- 773-72-24-B
W7KHN/6 107,494- 757-71-20-B
W6UQF 105,846- 767-69-24-A
AA6EE 28,272- 228-62- 8-A
N6KW 27,480- 229-60- 8-A
K6XT 22,572- 209-54- 5-A

San Francisco

K6LRN 45,080- 322-70-18-A
AA6DX 26,082- 207-63- 9-A
W6BIP(+AA6GM,WA6DJI) 127,020- 870-73-24-B
N6DCJ(+K6ANP) 71,712- 498-72-24-B

San Joaquin Valley

WA6VEF 141,120- 980-72-24-B
N6GG 129,888- 902-72-24-B
W6YKS 28,520- 230-62-24-B
N6PR 18,928- 169-56-12-A
WB6ITM 14,688- 153-48- 5-A
W6MYP 9936- 72-69-14-A
WA6YAB 3720- 60-31- 8-A
KA6EVN 864- 27-16-18-A
W6YKM(+WA6EZM) 119,140- 805-74-22-B

Santa Barbara

N6TR 166,858-1143-73-24-B
WA6VNN 45,440- 355-64-21-A
KR6B 43,656- 321-68-20-A
KA6GKU 7480- 85-44- 9-A

Santa Clara Valley

N6BT 150,812-1019-74-24-B
N6TV 149,504-1024-73-24-B
N6IG 144,720-1005-72-24-B
N6BV 138,384- 961-72-24-B
W6XX 134,900- 950-71-24-B
N6MG 133,792- 904-74-24-B
N6NF 131,066- 923-71-24-B
WB6DSV 118,552- 812-73-21-B
W6MSF(WA6HCI,opr) 118,548- 801-74-23-B
AJ6V 110,618- 779-71-23-B
KC6D 102,200- 730-70-24-A
W6ASH 93,024- 646-72-20-A
K6RU 92,158- 649-71-23-B
N6ZB 88,620- 633-70-21-B
W6SZN 79,236- 558-71-22-A
K6BR 74,550- 525-71-14-B
K6OMB 70,280- 502-70-23-A
K6XM 63,920- 470-68-12-A
WA6WEQ 63,070- 451-70-24-A
W6OKK 60,288- 471-64-12-B
N6ST 57,288- 434-66-12-B
W6ISQ 47,088- 327-72- 9-B
K6RM 46,920- 345-68-19-A
N6YV 40,528- 298-68-15-B
W6IO 23,652- 162-73-14-A
KB6TM 20,600- 206-50-10-A
N6QW 20,196- 198-51- 6-A
W6PRI 18,144- 162-56-12-A
W6KZJ 18,126- 171-53- 9-B
AG6D 17,940- 195-46-12-B
WD6EPV 9890- 115-43- 4-B
N6RZ 9522- 69-69-11-A
K6MO 3876- 57-34- 2-A
N6KT 3658- 59-31- 2-A
AA6T 3100- 50-31- 2-A
WA6OCV 1344- 28-24- 4-A
WA6HAD 748- 22-17-12-A
W6YX(N1OO,N3ER,N7MH, WA6ITV,oprs) 103,156- 697-74-24-B
N6AUV(+N6CCL,G5CMX) 74,296- 502-74-24-B
KD6AZ(+NET) 53,728- 368-73-22-B

Pacific

KH6CP 12,100- 121-50-17-A
NH6A 11,424- 119-48-13-A
AH6BK(+K7TI) 106,500- 750-71-23-B
KH6IFY(KH6KR,WH6s AML AMM AMO AMS AMT,oprs) 448- 16-14-11-A

7

Arizona

K6LL/7 166,148-1138-73-24-B
W7ZMD 99,604- 673-74-22-B
WB7PXS 75,332- 509-74-22-A
N6IA/7 69,552- 504-69-23-A
WA7NXL 55,610- 415-67-19-A
KA7FRS 54,672- 408-67-22-B

Idaho

K7QD 109,620- 783-70-21-A
W7ZRC 102,136- 751-68-23-A
N7AWE 71,264- 524-68-18-A
K7JV 39,060- 315-62-10-A
WB7TJI 30,680- 260-59-24-A
W7IWR 30,096- 228-66-20-A

Montana

W7JYW 112,056- 812-69-23-B
K7CPC 83,376- 620-68-22-A
KØPP/7 80,738- 553-73-24-A
K7QA(+KA7DIQ,W9NFW) 130,640- 920-71-24-B

Nevada

WA7NIN(N6SF,opr) 149,520-1068-70-24-B
AD7K 135,780- 930-73-24-A
W7IA 133,736- 916-73-24-B
WA7UEC 85,358- 637-67-22-A

Oregon

W7NI 158,064-1068-74-24-B
W7WHO 108,346- 763-71-23-A
W7YAQ 73,840- 520-71-19-A
K7KJM 73,416- 532-69-23-A
W7TC 64,944- 492-66-23-A
W7CB 64,894- 457-71-14-B
W7TWL 30,150- 225-67-21-A
WB7UFJ 26,904- 228-59-20-A
AI7W 15,600- 150-52-14-A
K7DBV 12,696- 138-46-12-A
W7LT 10,164- 121-42-14-A
N7DG 1700- 34-25- 3-B
K7WPC(+WE7PQU) 111,366- 807-69-24-B
WA7WBE(KB7JW,WA7s LGN OEM) 33,840- 282-60-19-A

Utah

K3FR/7 67,048- 493-68-19-A
KB7EB 65,646- 521-63-16-A
K7EA 60,520- 445-68-20-A
K6EIL/7 48,144- 354-68-18-A

Washington

W7WA 140,304- 948-74-24-B
K7SS 133,792- 904-74-23-A
K7MX(KB7G,opr) 128,160- 890-72-24-A
W7DAZ 120,336- 872-69-23-B
K7OEW 111,754- 787-71-21-B
K7HBN 97,580- 697-70-24-A
K7WA 95,708- 674-71-24-A
W7LKG 95,496- 692-69-24-B
K7FR 82,552- 607-68-23-A
K7NW 76,568- 563-68-24-A
AD7U 50,830- 391-65-19-A
W7NG 45,648- 317-72-13-B
W2JWF/7 41,844- 317-66-21-A
W7BUN 36,772- 317-58-11-B
W6VNJ/7 35,074- 247-71-14-A
K7UU 30,894- 271-57- 7-B
W7BYK 28,520- 230-62-16-A
W7GB 24,000- 200-60- 4-B
W7LUR 12,852- 126-51-16-A
WB7RMQ 4420- 65-34- 8-A
K7BFL 1536- 32-24- 2-A
K7RS 1026- 27-19- 7-A
W7DRA 390- 15-13- 1-B
AG7M(+Logger) 143,080- 980-73-24-B
N7RV(+K7YST,WA7LVN) 31,200- 260-60-18-B

Wyoming

K9DR/7 106,074- 747-71-22-B
NØCY/7 58,476- 443-66-15-A
W7HRM 21,384- 198-54-10-B
W7TO 2- 1- 1- 1-B

Alaska

KL7IDT 10,320- 120-43- 8-B

8

Michigan

K8CC 141,036- 966-73-24-B
AI8D 108,186- 741-73-24-B
K8MJZ 103,460- 739-70-24-B
K8KA 98,690- 695-71-24-A
WB8MTD 96,740- 691-70-24-B
N8BIK 94,920- 678-70-22-B
K8DD 93,744- 651-72-17-B
K8SS 93,002- 637-73-17-B
N8EA 83,076- 602-69-16-B
WB8YRY 80,784- 594-68-21-B
WD8DWQ 76,648- 572-67-24-A
W8VPC 74,800- 550-68-19-A
K8MW 74,266- 523-71-24-A
K8LF 72,000- 500-72-19-B
KA8CMO 70,488- 534-66-20-A
KA8EHM 60,568- 452-67-24-A
K8RV 46,968- 412-57-16-B
N8LA 43,904- 343-64-22-A
K8SIA 42,640- 328-65-10-B
K8RDJ 42,024- 309-68-18-A
N8RW 37,454- 307-61-15-B
WA8VEB 36,478- 299-61-14-A
WA8QCW 36,414- 289-63-17-A
N8AXH 36,332- 293-62-13-A
WA8OWG 35,960- 310-58-20-A
W8JKU 35,712- 248-72-18-B
AK8I 34,524- 274-63-16-A
AC8W 27,084- 222-63-11-A
N8MK 25,376- 208-61- 9-A
KA8CPA 24,480- 255-48-20-A
WBEGI 24,278- 199-61- 9-A
WB8AAX 22,000- 200-55- 9-A
WA8QAF 19,706- 167-59- 5-A
W8JUP 19,548- 181-54-10-A
K8CV 17,034- 167-51-12-A
W8PVI 17,034- 167-51-12-A
K8QWG 15,904- 142-56-17-A
WB8AYW 14,600- 146-50-18-A
W8GBR 14,476- 154-47-14-A
AC8Y 13,000- 130-50- 3-A
WA8YPY 11,800- 118-50-11-A
N8AOE 11,712- 122-48-10-A
KA8AEE 11,448- 159-36-10-A
W8OM 9292- 101-46- 3-A
KA4GTH/8 9212- 94-49-14-A
KA8JBK/N 8560- 107-40-19-A
W8KZM 4484- 59-38- 5-B
WD8LAQ 3654- 63-29-13-A
KA8IIN 3564- 54-33-12-A
KA4DBL/8 3016- 52-29-12-A

KA8DFJ/N 1656- 36-23- 9-A
N8ALL 240- 12-10- 5-A
KA8JYL 8- 2- 2- 2-A
W8UM(WB8YVI,AG9V,oprs) 110,016- 764-72-24-B
K8JM(+WA8VMS) 74,382- 539-69-20-A
AJ8Z(+AI8U,AJ8C,N8BME, WD8JQL) 71,536- 526-68-24-B
KC8K(+K8UA,KA8IKC,KE8X, W8MPO) 68,724- 498-69-24-A
W8SH(WA6ABD,WB8ZFB, WD8DII,oprs) 60,320- 464-65-24-A
WD8ECT(+KA8KNQ,WD8ECU) 49,280- 385-64-21-B
W8GQN(W8IZS,WA8AXF,oprs) 24,940- 215-58-13-A
KB8RV(+KA8AYW,WB8WIM) 15,190- 155-49-22-A

Ohio

K8NZ 152,884-1037-74-24-B
W8WPC(N9AG,opr) 139,824- 971-72-24-B
K8ND 133,906- 943-71-24-B
W8FN 122,400- 900-68-24-B
AC8E(WD8ALG,opr) 119,646- 867-69-23-B
W8KRR 101,232- 703-72-22-A
K8EE 101,178- 693-73-23-A
K8BL 87,330- 615-71-20-A
W8UPH 85,284- 618-69-24-B
K8AAZ 79,380- 567-70-21-A
WB8JSQ 78,242- 551-71-17-B
W8ETU 66,576- 456-73-18-A
N8LM 66,396- 503-66-16-A
W8LNO 63,360- 480-66-11-B
N8BJQ 63,342- 459-69-19-A
AA8S 59,296- 436-68-21-B
AD8P 52,528- 392-67- 8-B
W8VQI 45,234- 359-63-18-B
W8IM 39,336- 298-66-14-A
W8IDM 34,450- 265-65-13-B
WA8ADA 33,768- 268-63-20-B
WB8SZN 31,222- 233-67-23-A
AA8Z 29,346- 219-67-11-B
N8FU 29,312- 229-64- 7-A
K8OL 28,800- 200-72-10-A
KF8K 27,776- 217-64-24-A
AF8C 24,888- 204-61-21-A
KA8CQI 24,360- 210-58-15-A
KI8D 23,640- 197-60-11-A
K8EM 21,472- 176-61-13-A
W8EAR 17,808- 159-56-11-A
WD8KKF 16,988- 137-62-24-A
K8JK 15,370- 145-53- 5-B
WD8OTG 13,912- 148-47- 4-A
K8HF 11,368- 116-49- 5-B
W8EAO 8930- 95-47-10-A
N8BTT 8400- 100-42- 8-A
WA8MEM 8232- 98-42- 6-A
WD8OBX 6528- 96-34- 7-A
KA8ABU 5304- 68-39- 8-A
W8DXT 4752- 66-36-17-B
N8BKX 3162- 51-31- 6-A
WB8WIS 3068- 59-26- 1-B
WB8JBM(K8US,N8DH,WB8s OQP JMP LSN YQJ,oprs) 137,232- 953-72-24-B
K8MR(+K8MT,W8KIC) 116,440- 820-71-21-B

West Virginia

KD8G 110,880- 770-72-24-A
W4NW/8 76,680- 540-71-17-A
W8UT 64,610- 455-71-18-A
W8JWX 12,544- 128-49- 6-A
KB8FJ 11,616- 121-48- 6-B
WD8NHN 4224- 64-33-14-A

9

Illinois

W9RW 145,416- 996-73-24-B
K9GL 144,832- 992-73-24-B
K9RG 133,054- 937-71-24-B
K9RS 130,782- 921-71-24-B
K9KM 130,214- 917-71-24-B
K9RF(K9UIY,opr) 122,056- 836-73-24-B
WD9DCL 116,784- 811-72-23-A
AG9A 111,600- 775-72-24-A
WAØAVL/9 98,264- 692-71-24-B
W9NEC 90,596- 638-71-24-A
K9LUW 89,976- 652-69-24-B
N9AEJ 86,688- 602-72-22-A
K9JU 84,320- 620-68-22-A
WD9DBC 70,886- 529-67-24-A
K9BGL 69,224- 509-68-12-B
WD9DMV 65,274- 473-69-23-A
W9TM 60,456- 458-66-17-A
K9PPW 55,900- 430-65-20-A
K9LW 45,864- 364-63-11-A
K9WA 45,283- 333-68- 8-A
W9PNE 41,942- 313-67-14-A
WA3JLD/9 41,344- 323-64-16-B
K9MS 39,556- 319-62-17-A
N9UN 35,604- 258-69-11-B
WD9IIX 27,938- 229-61-14-A
AK9N 27,376- 236-58-11-A
N9TI 27,140- 230-59- 6-B
W9REC 23,986- 179-67-17-A
W9HPG 21,888- 192-57-10-A
W9LNQ 19,886- 163-61- 7-A
KA9ACS 15,300- 153-50-16-B
AK9Y 14,688- 144-51-16-B
K9AR 14,352- 156-46- 5-B
N9AQT 11,858- 121-49- 4-A
KA9CQM 11,074- 113-49-12-A
K8KIX/9 10,560- 110-48-16-A
KB9W 9384- 102-46- 6-A
K9VV 8978- 67-67-24-A
KB9PB 8712- 99-44- 6-A
W9ZEN 7600- 100-38- 5-A
KA9EQR 5760- 72-40-19-A
W9AGM 3400- 50-34- 3-A
WB9VLM 784- 28-14- 4-A
W4IZI/9 160- 10- 8- 1-A
WD9BHK(+WD9GGY) 39,650- 305-65-24-A

Indiana

W9TG 144,004- 973-74-24-B
W9RE 136,604- 962-71-24-B
K9UWA 124,272- 863-72-24-B
K9FW(N9NO,opr) 119,700- 855-70-24-B
N9NS(W9OBF,opr) 112,038- 789-71-24-B
W9LT 105,700- 755-70-24-B
W9JOO 88,466- 623-71-24-A
W9XL 86,800- 620-70-18-A
WB9VJE 75,168- 522-72-17-B
N9CR 70,884- 537-66-21-A
WB9QCP 65,280- 480-68-15-B
KC9C 50,116- 374-67-15-B
AJ9C 49,920- 384-65-17-A
K9KB 33,500- 250-67-14-B
KB9H 18,480- 154-60- 8-B
W9QLW 17,400- 150-58- 7-B
KA9FKU 14,608- 149-49-17-A
KA9CZD 2914- 47-31-17-A

W9CM 1610- 35-23- 2-A
WB9UYT 748- 32-17-10-A
W9YB(KA9CCB,KB9KR,KQ4I, Nus EI NB NC,WB9 OJY STO, WB6UAG,oprs)
112,180- 790-71-24-B
KA9JHZ(+W9PV)
14,840- 140-63-15-B

Wisconsin

W9NA 110,192- 776-71-18-B
W2WOE/9 94,780- 677-70-23-B
K9BN 93,684- 633-74-18-B
K9EYA 86,496- 636-68-23-A
N9KS 80,730- 621-65-19-B
W9GHY 77,050- 575-67-20-A
WD9GUR 72,420- 510-71-23-A
K9GDF 71,808- 544-66-15-A
W9HF 70,380- 510-69-16-A
AK9Z 56,718- 411-69-22-A
WB9EJE 51,840- 405-64-21-A
N9TO 40,788- 309-66-18-A
WB9RRU 32,984- 266-62-16-A
K9JF 32,640- 255-64- 6-A
K9HVL 32,110- 247-65-24-A
N9AW 28,188- 243-58- 6-A
KA9ACC 25,164- 233-54-22-A
K9KR 24,178- 199-61-15-B
KA9CHP 23,364- 198-59-15-A
N9EZ 21,890- 199-55- 6-B
WB9KPX 20,880- 174-60- 9-A
K9WTF 17,472- 158-52-13-B
KA9EJO 17,360- 173-50- 8-A
KB9NM 16,200- 150-54-15-A
WD9IKO 15,300- 150-51-11-A
WA9POV 14,592- 152-48- 9-A
AJ9K 11,200- 112-50- 6-A
KA9FOX 11,136- 116-48-10-A
WB9HRO 10,472- 119-44-12-A
WB9GZP 9,540- 106-45- 8-A
WD9GDJ 9348- 123-38-13-A
W9YCV 8064- 96-42- 5-A
W9BCC 5016- 76-33- 5-A
N9HR 3120- 52-30- 5-A
WD9ESX 72- 6- 6- 6-A
KB9S(+KA9ASU,N9ARX)
64,840- 606-70-24-B
WA9AWO(+W9WQ,WA9UJK)
53,520- 446-60-23-A

0

Colorado

K0RF(W0UA,opr)
176,268-1191-74-24-B
W0ZV 144,102- 987-73-24-B
W0YK 141,620- 966-73-24-B
W0CP 131,760- 915-72-24-A
AC0S 121,764- 834-73-24-B
K0AB 120,274- 847-71-24-A
W0ETT 118,224- 821-72-24-A
K0BN 79,520- 568-70-23-A
AD0O 60,800- 475-64-22-A
W0RSR 58,890- 453-65-17-A
AG0L 28,080- 234-60- 6-A
KA0CLS 25,536- 224-57-14-A
W0WME 25,194- 221-57-13-A
KA0AIA 19,176- 188-51-16-A
W0DSW 8400- 100-42- 5-A
KC0DI(KA0BRU,KD0Y,oprs)
112,032- 778-72-24-B

Iowa

W0EJ 130,176- 904-72-24-B
K0LUZ 125,856- 874-72-24-A
KF0H 114,126- 827-69-21-A
WD0FGY 96,986- 683-71-24-A
W0WP 68,742- 513-67-14-A
AE0R 50,652- 402-63-13-A
N0BB 41,132- 307-67-18-A
AK0M 38,682- 307-63- 8-A
AD0M 36,580- 310-59-14-A
W0JTC 25,560- 213-60-12-A
N0AYM 23,142- 203-57- 9-A
AI0Z 21,616- 193-56- 9-B
WB0HUJ 21,228- 183-58-20-A
K0WTF 21,112- 203-52-12-A
WB0YSE 13,950- 144-45- 8-B
WD0GVY(+KA0ELP)
13,420- 122-55-18-A

Kansas

KB0Q 87,636- 654-67-24-A
KF0M 67,068- 486-69-22-B
W0IUB 46,116- 376-61-12-B
WA0LBA 33,000- 275-60-17-A
W0RT 24,960- 208-60- 6-A
WA0CFQ 1558- 41-19- 3-A
KA0IKD 1550- 31-25- 4-A
WD0HAG 5- 1- 1- 1-A
K0WA(+AB0S)
140,400- 975-72-24-B

Minnesota

N0NO 132,048- 917-72-24-A
K0IJL 97,860- 699-70-20-A
K0IHG 97,270- 685-71-24-A
K0MPH 94,392- 684-69-21-A
K0FZG 84,592- 622-68-24-A
K0FRP 82,030- 631-65-21-A
AA4MD/0 73,700- 550-67-23-B
K0BBR 73,698- 519-71-24-A
W0PI 58,156- 434-67-13-A
KB0M 52,716- 382-69-21-A
N0AGW 40,320- 315-64-17-A
W0BF 28,320- 236-60- 6-B
WA0DFL 25,830- 205-63-14-A
KE0C 23,040- 180-64-17-A
WA0WWW 19,152- 171-56-14-A
W0TIV 18,704- 167-56- 7-A
KA0FSJ 12,420- 135-46-18-A
WA0ADX 7396- 99-37- 9-A
K1TMM/0 5976- 83-36- 7-A
N0ADJ 2964- 57-26- 4-B
N0BG(+K0TG,WA0RBW)
124,250- 875-71-24-B
K0TK(+K0s FVF WPK,WB0GDB)
121,520- 856-70-24-B
WA0CJU(WA0s ACF TQT,
WB0GKH,oprs)
53,676- 426-63-18-A
K0LTC(K0GRA,KA0s APX DJJ,
N0s AKZ EUF,W0LIBT,WB0S FBN
HRX SNG SNP TJF,oprs)
52,140- 395-66-24-A

Missouri

N0SS 136,368- 947-72-24-B
KB0RC 121,836- 858-71-21-B
WB0UXI(K0VBU,opr)
121,360- 820-74-24-A
K0RWL 113,574- 823-69-24-B
N0TT 108,720- 755-72-24-A
AA0U 103,076- 756-73-24-B
WB0LFY 101,664- 706-72-24-A
K0DEQ 83,376- 579-72-18-B
W0RNG 63,618- 461-69-14-A
WB0VHN 57,800- 425-68-22-A
WB0QQV 40,128- 304-66-21-A
W0HBH 38,272- 299-64-14-A
K0BM 28,560- 204-70- 6-A
WD0GSY 21,112- 182-58-13-A
WB0RVK 16,284- 138-59-13-A
KA0P 15,162- 133-57- 6-A
KA0GRO 15,158- 143-53-16-A
WD0ARX 11,844- 126-47-19-A
W0KCG 10,600- 106-50- 6-A
KB0J 8800- 100-44- 8-B
WD0CHZ 5110- 73-35-17-A
K0VUW(+K0FJU)
102,900- 735-70-24-B

Nebraska

K7UP/0 77,840- 556-70-20-A
W0KK 8342- 97-43- 8-A
AD0H 7448- 98-38- 7-A
N0SNY 3306- 57-29- 4-A
K0DI(+K0NB)
130,498- 919-71-24-B

North Dakota

W0ZZ 41,724- 342-61- 6-A
KF0A 41,328- 328-63-13-A
KC0W 23,072- 206-56-10-A
WB0UK1/0 7600- 100-38- 6-A
W0HSC(WB0YVX,WD0AJS,oprs)
19,030- 173-55-16-A

South Dakota

KA0CWS 25,742- 211-61-12-A
WD0BWH 12,000- 125-48- 9-A
WA0PBL 4026- 61-33- 8-A
KB0QA(+WD0CXU)
118,128- 856-69-23-B

Canada

Maritime - Newfoundland

VE1QST(AK4L,opr)
139,870- 985-71-24-B
VE1WN(VE1s A2B BPH BQS BZG BZH,oprs) 1804- 41-22- 7-A

Quebec

VE2AH 99,400- 700-71-21-B
VE2WA 72,240- 516-70-21-A
VE2FFE 1656- 36-23- 4-A

Ontario

VE3DAP 96,600- 700-69-24-A
VE3ITP 77,586- 579-67-24-A
VE3ITQ 63,618- 461-69-15-A
VE3MFT 53,360- 495-54- 8-A
VE3ATD 61,512- 466-66-19-B
VE3CPU 61,512- 466-66-21-B
VE3QSTIVE3OT,opr)
56,232- 426-66-13-B
VE3LPE 33,408- 288-58-23-A
VE3ARL 32,208- 244-66-15-A
VE3MKJ 3520- 55-32-16-A
VA3BWV 276- 12- 3-A
VE3ART(VE3s A BIS DAO FBI GAS,oprs) 98,946- 717-69-19-B
VE3BXI(+VE3HGE)
58,616- 431-68-24-A

Manitoba

VE4XI 37,406- 317-59-19-A
VE4RH 29,158- 239-61-13-A
VE4AIV 11,500- 115-50-14-B

Saskatchewan

VE5TT 14,016- 146-48-10-A
VE5AAD 11,070- 135-41- 5-A

British Columbia

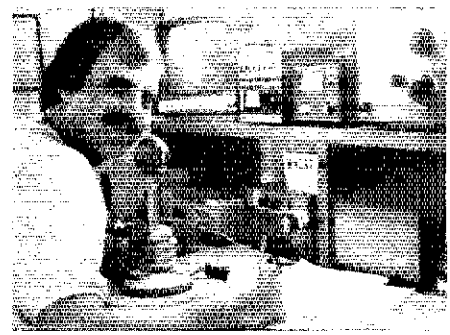
VE7IN 87,100- 650-67-20-B
VE7IQ 47,464- 349-68-22-B

Yukon - N.W.T.

VY1DD 1764- 42-21- 2-A

WD8MGQ came in second place for low-power single ops on phone in Michigan.

Glen, KØJGH, beams at his wife (behind the camera), KAØENZ, after his 707 QSOs and a "clean sweep" showing on phone from Iowa.



W4OST, number two on phone from South Florida.

Phone Scores

U.S.A.

1

Connecticut

K1PR 229,548-1551-74-24-B
K1KI(AA2Z,opr)
187,960-1270-74-24-B
W1XX 185,592-1254-74-24-B
K1TO 182,158-1231-74-22-B
K1CC 171,236-1157-74-24-B
W1WEF 166,500-1125-74-23-B
WB1FVS 166,032-1153-72-23-B
W1AW(W3AZD,oprs)
159,984-1111-72-20-B
K1RM 155,400-1050-74-18-B
W1RM 147,260- 995-74-20-B
WA1JDW 128,794- 907-71-23-A
K1EM 126,836- 857-74-21-B
K1ZC 123,808- 848-73-15-B
K1RT 88,330- 605-73-13-A
KA1EKY 86,620- 610-71-21-B
KA1CI 83,482- 632-67-14-B
W1VV 64,232- 434-74-10-B
KA1BMB 62,376- 452-69-19-A
KA1BRD 61,628- 434-71-10-A
WA1YEC 60,836- 454-67-19-B
K1WJ 54,464- 368-74-15-B
WB1EVI 53,244- 444-63-11-B
K1DW 51,830- 365-71-12-A
N1JW 47,784- 362-66-10-A
K1CE 45,472- 392-58- 7-B
W1OD 42,240- 330-64- 5-B
K1YRP 41,076- 325-63-10-A
KA1DZV 40,832- 352-58-24-A
W1ECH 40,800- 300-68- 7-B
KA1JZ 39,032- 287-68-21-A
AB1U 33,280- 256-65- 7-A
K1NYK 32,280- 269-60- 8-A
K1BV 26,786- 227-54- 5-B
K1WA 26,288- 212-62- 5-B
AA1K 26,280- 180-73- 8-A
N1CC 15,300- 150-51- 3-A
W1BIH 14,356- 97-74- 5-B
K1WB 8192- 64-64- 5-B
K1OII 8064- 64-63- 4-A
WB1CCH 6230- 89-35- 6-A
KA1LO 3800- 64-25- 4-B
W1WPR 1702- 37-23- 3-A
WB1FKU 1044- 29-18- 1-A
WA1GBA(+K1AS,WA1s DWF HVN 148,000-1000-74-24-B
WB1ADR(+KA1ARB)
87,317- 642-68-24-A
AI1P(+WB1ASH)
63,784- 469-68-15-B
N1ADE(+KA1DTO,WB1DQP)
41,706- 337-63-14-A

Eastern Massachusetts

WA1UZH 171,680-1160-74-23-B
N1AU 147,408- 996-74-24-B
K1GSK 140,156- 947-74-20-B
WA1EOT 103,368- 708-73-12-B
W1FM 102,816- 714-72-23-A
K1CR 94,752- 658-72-20-B
N1RC 79,378- 559-71-21-A
KA1CC 56,290- 433-65-14-A
WB1EPF 44,022- 319-69-15-A
WB1ANT 33,480- 279-60- 4-B
KQ1CLV 23,184- 190-61-12-A
W1TUM 19,772- 173-57-13-A
WA1OLV 17,108- 182-47- 6-B
W1PLJ 16,200- 150-54- 9-B
W1SR 15,708- 154-51- 8-A
K1XM 15,600- 158-50- 4-A
AJ1T 15,198- 149-51- 4-B
KA1JEG 14,994- 153-49- 7-A
WA1EPO 14,508- 145-50-18-A
WA1RFF 13,230- 136-49- 7-A
K1RB 9672- 93-52-10-A
KA1CBY 8432- 98-43- 7-A
AD1C 1320- 30-22- 1-A
W1WMH 176- 11- 8- 1-B
W1JR 24- 4- 3- 1-A
WA1TQP(+K1BRD,KA1CLE, WA1ILX) 106,560- 720-74-19-B

Maine

N1AFC 58,630- 451-65-18-A
WA1TJX 38,232- 324-54-13-A
KA1DZJ 36,352- 284-64-24-A
K1PV 34,560- 270-64- 9-A
AK1W 28,060- 230-61-21-B
W1OTQ 23,484- 206-57- 8-B
WB1GQE 22,045- 208-53- 7-A
N1SD(+K1IXZ)
136,710- 935-73-21-B
KA1AIF(+WB1GLH)
46,020- 354-65-20-A

New Hampshire

N1EE 192,548-1301-74-24-B
K1LL 172,568-1166-74-24-A
AK1A 169,120-1208-70-24-B
WA1TZV 130,464- 906-72-24-B
AF1T 49,640- 365-68-11-B
KA1IM 41,272- 308-67-15-A
WB1FNO 41,210- 317-65-19-A
N1OM 37,548- 298-62-14-A
AC1J 27,956- 241-58- 6-A
N1BEY 18,848- 152-62-12-A
AG1C 13,600- 136-50- 8-A
W1UN 6622- 77-43- 2-B
W1HCS 4160- 66-32- 2-A
K1GW 832- 26-16- 1-A

Rhode Island

WA1TFF 190,328-1286-74-24-B
WA1TAQ 146,076- 987-74-20-B
WA1CVF 60,928- 448-68-16-B
K1VSJ 60,208- 424-71-20-A
W1RFQ 40,320- 315-64-13-B
K1DS 30,866- 253-61- 7-A
K1HMO 14,016- 96-73-10-B
KA1JR 10,810- 115-47-15-A
KA1AWS 8800- 100-44-11-A
K1DT 2700- 50-27- 2-A
W1QP(K1s DT PLX,KA1AWS,N1s AKO BBM,W1GS,WA1RKL, WB1CVV,oprs)
96,740- 691-70-24-B
N1ASR(+KA1s BHY DLL)
91,392- 672-68-24-A
WA1VQY(+WA1YDU)
37,454- 307-61-21-A

Vermont

WB1GQR(WB2JSJ,opr)
158,330-1115-71-22-B
K1IK(+AE1K,K1XR,KA1DE, WA1UNN,WB1ELC,WB2FOU)
208,236-1407-74-24-B
K2IQ/1(K2OZV,W2JIT,WA2s CZR HRL (MG,oprs)
41,416- 334-62-22-A

Western Massachusetts

K1BW 124,024- 838-74-14-B
K1DPB 121,026- 877-69-20-B
K1KNQ 40,040- 308-65- 4-B
N1ADX 12,190- 115-53-12-B

2

Eastern New York

W2PV(K1AR,opr)
236,504-1598-74-24-B
W2YV(N2NT,opr)
212,232-1434-74-24-B
K2GL(WA2OVE,opr)
182,062-1247-73-23-B
K2AE(WB2CFP,opr)
127,658- 899-71-19-B
WA2STM 107,018- 733-73-24-A
W2XL 106,288- 728-73-24-A
WA2YSM(WB2KMY,opr)
91,140- 651-70-20-A
KC2L 79,662- 561-71-22-A
WB2THN 61,586- 447-69-18-B
W2HBY 59,360- 424-70-18-A
WA2UAA(WA2WVW,opr)
47,444- 373-64-24-A
WB2KHE 31,850- 245-65-19-A
K2GSF 31,470- 235-67-13-B
N2BIN 26,244- 243-54-19-A
KA2EAY 26,160- 218-60-21-B
W2DW 26,040- 210-62- 5-B
WA2RNX 25,724- 218-59- 8-A
N2BHP 25,172- 203-63- 9-A
WA2TJE 24,644- 202-61-10-B
K5NA/2 22,064- 197-56- 8-B
WA2BXT 21,060- 162-65-18-A
WB2MJQ 20,292- 128-57-10-B
K1PTE/2 15,960- 140-57- 6-A
AE2T 15,276- 201-38- 7-B
WA2KCL 14,602- 149-49- 7-A
K2GBH 80- 8- 5- 1-A
W2ARQ(+W2PKY)
84,826- 581-73-24-B
WB2ABJ(KA2s DQK EPK FQJ, WA2s GGM GXK,WD2AEE,oprs)
61,420- 474-65-24-A

New York City - L.I.

WB2TCQ 90,170- 635-71-22-A
K2AU 80,798- 589-71-19-B
N2NC 53,900- 385-70-11-A
WA2SEL 34,544- 254-68- 9-A
K2SX 33,664- 263-64- 5-B
KA2EXU 32,512- 254-64-10-A
N2RG 29,520- 246-60-10-B
KA2CKM 26,562- 233-57- 9-A
WA2ISH 26,078- 221-59-10-A
WB2FZG 24,624- 216-57- 5-A
WA2DZD 19,604- 169-58-13-A
WA2JCX 19,152- 168-57- 9-A
WB2PXA 18,600- 155-60- 8-B
WA2SCI 3408- 96-49- 6-B
K2HVN 6272- 56-56- 3-A
K2RO 5100- 75-34- 7-A
WB2RNT 4608- 72-32- 2-A
WA2LTP 3660- 122-30- 4-A
KG2T 2784- 48-29- 3-B
K2CMV 1386- 33-21- 1-A
WA2ARC 960- 30-16- 4-B
W2CZZ 162- 9- 9- 1-A
AD2S(+WA2BOT)
158,994-1089-73-23-B
WA2JAS(KA2s CLQ CWI ELB HDG HTH ISA KGH KPK, WA2SEL,WB2QEU,oprs)
141,192- 954-74-24-B
N2CAL(+KA2DQS)
30,550- 235-65-20-B

Northern New Jersey

W2RQ 199,948-1351-74-23-B
W1GD/2 84,840- 606-70-21-B
WB2ARS 74,124- 522-71-20-B
K2RF 49,714- 371-67-12-A
AC2U 42,568- 313-68- 8-B
K2BJG 34,840- 260-67-15-B
W2GNW 30,492- 231-66-18-A
W2SHM 30,380- 249-62- 7-B
KA2CQI 26,100- 225-58-15-A
W2SG 24,440- 235-52- 3-B
WD6DBA/2 20,916- 166-63-13-A
WA2UDT 19,920- 166-60- 5-A
WB2IKL 18,998- 161-59- 7-A
WB2UTO 11,656- 124-47- 6-A
WA2UPK 8686- 101-43- 4-A
KB2M 8460- 94-45- 6-A
N7TT/2 6708- 86-39- 2-B
KF2H 5632- 88-32- 3-A
W2CC 3038- 49-31- 6-B
WA2AUO 2900- 50-29- 5-A
K2XR(+KB2M,KC2X,K2OWR,

Southern New Jersey

W2KI 147,314-1009-73-20-B
W2YC 118,844- 814-73-22-B
WB2VPT 114,256- 772-74-22-A
AB2E 112,128- 768-73-20-B
N2CQ 99,718- 683-73-20-B
WA2KOK 95,424- 672-71-21-B
WA2WJL 64,386- 441-73-15-A
W2FGY 61,344- 426-72-23-B
WA2NBM 45,696- 357-64-19-A
WB2AUP 42,560- 304-70-11-B
N2HF 37,760- 295-64- 9-B
N2BCF 35,400- 300-59-12-A
KA2AGE 29,972- 254-59-15-A
WB2UVB 22,000- 200-55-10-A
N2DN 18,676- 161-58- 9-B
KA2FFS 13,932- 129-54-11-A
W2BLV 12,978- 103-63- 9-A
N2FY 10,706- 101-53- 6-A
WB2ERI 9600- 120-40-10-B
W2OGZ 8614- 99-43- 5-B
WB2PHD 7030- 95-37- 6-A
K2ILA 680- 20-17- 1-A
WA3RTI/2 588- 21-14- 2-A
WB2YDF(+N2ATX)
121,978- 859-71-24-B
K2GSV(+WB2SZA)
83,104- 664-68-19-B
K2AA(KA2BLW,WA2RCB,oprs)
31,560- 263-60-12-A

Western New York

N2MF 192,720-1320-73-24-B
K2ZJ(WA2LCC,opr)
165,908-1121-74-22-B
N2NW 81,192- 597-68-18-A
K2DE 72,100- 515-70-21-B
W2SH(WA2AWX,opr)
70,006- 494-71-17-A
W2RR(WB2ABD,opr)
61,608- 453-68-13-A
K2SOT 50,616- 342-74-18-B
W2IMO 48,280- 355-68-20-A
K2VJ 44,088- 334-66-12-B
K2UNR 29,176- 232-59- 7-B
N2CU 16,076- 114-67- 4-A
W2VDX 14,048- 266-74-15-A
WB2YQH 12,200- 200-68- 7-A
N2ARG 25,472- 199-64-10-A
WB2QDN 24,840- 207-60-12-A
KA2EGC 13,932- 129-54- 9-B
WA2PDA 12,672- 144-44- 9-A
K2VF 9984- 104-48- 6-A
KA2DFM 6890- 63-53-17-A
WA2PLR 2960- 40-37- 7-A
KA2ECT 2340- 45-26- 4-A
WA2WPI 1804- 41-22- 6-A
WA2LEZ 30- 5- 3- 1-A
W2OW(KF2X,KG2V,N2s BXC HR,

WB2FDN,oprs)
124,704- 866-72-23-B
W2RCX(WA2ODD,WB2s ODC ODH,N9TE,oprs)
95,424- 672-71-24-B
KA2ATH(+KA2GOH)
43,952- 328-67-24-A

3

Delaware

K3HBP 70,000- 500-70-10-B
N8NA/3 40,320- 315-64- 8-A
WA4JJZ/3 18,560- 160-58-15-A
KA3EFL 18,408- 156-69-15-A
KA3CMR 17,632- 152-68- 9-A
WB2NGT/3 6960- 87-40- 5-A
KB3EE3(K2MS,KA2FQG,WA2NXK WB2s AWM NXK,NA,oprs)
53,328- 404-66-20-A

Eastern Pennsylvania

K3ZA 188,700-1275-74-24-B
K3SME(KA3BLP,oprs)
180,412-1219-74-24-B
N3ATQ 137,480- 882-70-21-B
WB3FAA 133,344- 926-72-24-B
WA2OMY 105,400- 775-68-16-B
WB3EMG 102,524- 722-71-24-B
KA3AQF 90,942- 659-69-24-B
WB3DJF 84,804- 573-72-17-B
KA3A 80,640- 560-72-14-B
K3MRG 77,952- 609-64-19-A
WB3DYQ 71,426- 503-71-24-A
WB3GZV 69,580- 497-70-20-A
KA3AYT 68,544- 476-72-20-A
WB3CIW 66,240- 460-72-17-B
WB3CAI 65,152- 509-64-24-A
WB3AAK 63,792- 443-72-24-A
WA3YON 59,924- 432-71-21-A
AA3B 55,510- 427-65-12-B
WB3KNJ 53,960- 380-71-20-A
W3DZH 45,298- 319-71-16-A
WA3YTI 38,350- 295-65-16-A
WB3FYT 34,060- 262-65-14-A
KA3ETS 32,500- 250-65-18-B
WB3FED 32,194- 233-69-13-A
W3ETB 29,400- 245-60-14-B
KA3DIL 28,556- 242-59-23-A
WB3FYL 25,074- 199-63-11-A
WB3AVF 24,000- 200-60- 8-A
WB3BVF 22,554- 179-63-22-A
WA3RRK 21,476- 182-59- 6-A
N3ANZ 18,324- 194-47-14-A
KB3JK 17,696- 158-56-14-A
KA3AXN 15,290- 139-55-10-B
W3KOK 13,872- 136-51-17-A
WA3JXW 13,536- 144-47-11-A
KA3BTG 13,420- 122-55-13-B
K3WUN 13,312- 128-52-18-A
K3VW 12,446- 127-49- 3-A
W3WJV 12,000- 150-40- 4-B
KB3FZ 8514- 89-49- 8-B
N3AQL 8200- 100-41- 6-A
WA3LGG 8200- 100-41-11-A
W3MN 6624- 92-36- 6-A
KA3CWH 6560- 82-40- 9-A
WA3NTJ 5776- 76-38- 4-A
WB3EPW 2916- 52-28- 3-A
WB3BAQ 1656- 72-23- 4-A
WB3CVK 1368- 38-18- 4-A
W3EYN 960- 32-15- 4-A
KB3KG(+WB3FLK)
81,736- 601-68-22-A
W3BN(K3WGR,KA3ARQ,WB3s CAC EPW,oprs)
57,320- 510-66-24-A
KB3CO(+WB3BCF)
64,752- 456-71-22-A
WA3RCA(K3DLS,KA3s AAE BKQ EVB,WA3s FOF OVH YUE,WB3s CPW CTP HNW,oprs)
58,572- 421-66-23-B
WB3LNZ(+KB3HEE)
58,800- 400-69-20-A
WB3AZF(+K3FD)
52,780- 377-70-23-A
WB3AKI(+WB3IGS)
31,720- 260-61-17-B
K3FKW(+K3OAO)
4216- 68-31- 7-A

Maryland - D.C.

W3FA(WA3ZAS,oprs)
197,284-1333-74-24-B
N3MG 174,312-1163-74-24-B
K3ZJ 178,792-1194-74-24-B
W3LPL(N2FB,oprs)
161,616-1092-74-24-B
W3GG(WA3UXU,oprs)
157,388-1078-73-24-B
K3HPG(WB3FQG,oprs)
147,204- 998-74-22-B
K3NA 146,730-1005-73-24-B
K3KU 144,004- 973-74-24-B
WA3VUQ 132,016- 892-74-21-B
K3IM 125,504- 848-74-22-A
N3GB 123,808- 848-73-19-B
K3ZZ 119,646- 867-69-24-B
KB3EI 119,848- 778-74-24-B
WA3JPH 99,862- 683-72-18-B
N3RL 91,448- 644-71-13-B
W3YOZ 86,430- 645-67-17-B
K2PLF/3 85,400- 610-70-11-B
W3UJ 66,660- 505-66-13-B
W3IPT 64,998- 471-69-19-B
W3ICM 57,794- 409-71-22-A
W3GNQ 50,730- 365-69- 8-B
KB3MF 50,304- 393-64-24-A
K3SA 46,920- 345-68- 6-B
WA3NQJ 41,676- 302-69-13-A
WA3VPL 17,980- 155-58- 8-A
W3XE 12,896- 124-52- 5-B
WA3VKR 9270- 103-45- 6-A
K3AA 7308- 73-53- 4-B
WA3SLW 7128- 81-44- 3-A
K3WS 6912- 108-32- 4-A
N3FQE 6162- 79-39- 6-B
W3TUX 308- 14-11- 1-A
WB3EPC(+WJDQI,KA3CQB)
90,942- 659-69-24-A
WA3EKL(+KA3EIE,WB3HMX)
84,728- 623-68-24-B
WB3CZK(+WB3JTT)
54,612- 369-74-17-B
WB3LHB(+KA3BWT)
36,704- 296-62-17-B

Western Pennsylvania

K3LWM 141,408- 982-72-24-B
K3UA 97,728- 728-63- 9-B
K3VX 70,312- 517-68-17-A
AG3H 70,128- 487-72-17-A
WB3KAF 48,190- 395-61-13-B
WA3MDY 40,710- 295-69-19-A
W3GG 24,318- 193-63- 9-A
W3WC 19,154- 157-61- 5-A
KA3FMH 16,120- 155-52-16-A
WA3ESH 14,214- 103-69-15-A
N3BJW 14,136- 124-57- 8-A
K3VK 11,346- 183-31- 5-B
W3HDH 11,088- 77-72- 9-B
W3IW 5400- 75-36- 2-B
K3RYA 3080- 70-22- 2-A
WA3PCX 384- 16-12- 2-A
W3AS 336- 14-12- 1-A
KA3BRO(+KA3s AYU DEH)
72,174- 523-69-12-B

4

Alabama

N4DMA 52,272- 396-66-15-A
K4ZGB 43,820- 313-70-10-A
AA4TG 41,844- 317-66-18-A
KA4EWD 26,412- 213-62- 9-A
WD6IWP/4 15,196- 131-58-10-A

Georgia

KB4I(K2PO,opr)
151,548-1038-73-24-A
K4HAV 142,524- 963-74-24-B
K4BAI 114,048- 792-72-15-B
WB4VSP 97,200- 675-72-24-B
NA4J 71,280- 495-72-22-B
KB4DT 35,490- 273-65-15-A
BB4X 31,992- 258-62-16-A
K4BAM 31,666- 223-71- 8-A
AA4GA 14,178- 139-51- 2-A
AK4T 7420- 70-53- 7-B
KI4Y 918- 27-17- 3-A
W4AQL(AI4B,WA3WCD,WA4s ABY KXY UKS ZBO,WD4s IZT NEX OLP,oprs)
152,884-1033-74-23-B

Kentucky

K4FU 117,068- 791-74-22-B
ND4V 71,994- 507-71-18-B
WB4FOT 63,474- 447-71-10-B
WD4NWW 58,872- 446-66-16-B
KA4IDW 43,056- 299-72-24-A
KS4K 28,600- 220-65-14-A
WA4RUW 23,718- 201-59-11-B
WA2VBY/4 17,050- 155-55- 5-A
KA4JMZ 4824- 67-36- 7-A
KA4BCD 4032- 63-32- 9-A
WD4FOS 2160- 40-27- 3-B
W4CN(KA4s FJJ IQD JMX, KC4EG,N4XM,oprs)
99,964- 746-67-15-B

North Carolina

WA4FFW 167,684-1133-74-24-B
K4KZZ 162,356-1097-74-24-B
N4FD 139,416- 942-74-19-B
WD4AVY 121,326- 831-73-19-B
WA4ZXA 107,456- 736-73-24-B
N6DR/4 63,748- 468-68-14-B
AA4NC 62,100- 450-69- 9-A
KW4E 43,194- 313-69-11-A
N4MS 25,326- 201-63-12-B
W6NWS/4 17,898- 157-57- 7-A
KE4I 14,800- 100-74- 8-A

Northern Florida

K7TBT/4(WB4QBB,opr)
199,356-1347-74-24-B
N4SA 151,548-1038-73-16-B
N4UF 146,146-1001-73-21-B
KA4HOC 13,750- 125-55- 9-A
W4VQ 3100- 50-31- 1-B
N4WW(+NE4F,WB4s DRZ YFF)
217,708-1471-74-24-B

South Carolina

N4DT 72,864- 506-72-17-A
K4ADI 47,334- 343-69-17-A
WD4NBE 10,120- 110-46-14-A
WA4MIY(+KA4JYT)
19,266- 169-67-13-A

Southern Florida

WD4MWJ 171,252-1206-71-24-B
W4QST 150,818-1033-73-20-B
W4JM 41,736- 282-74-15-B
ND4G 26,460- 210-63-20-A
K1PLR/4 13,932- 129-54- 6-A
W4PZV 13,870- 95-73-15-B
K8UNP/4 6956- 74-47- 6-A
NA4JD 5440- 68-40- 5-A
WD4HRX 4096- 64-32- 9-A
W2HAE/4 3360- 60-28- 3-A

Tennessee

NA4K 115,632- 803-72-11-B
N4TG 69,144- 516-67-14-A
W4QGG 57,600- 400-72-12-B
KE4F 41,328- 328-63-12-A
K4BQ 40,788- 309-66-14-A
KA4KJJ 29,260- 209-70-15-A
K4PJ 54,316- 367-74-20-B
KR4D 16,758- 147-57- 7-A
WA4SCE 12,584- 121-52- 7-A
WA4UCE(KA4s AIB JRG MGG NBG,WA4s OIE QZM,oprs)
72,940- 521-70-24-A
W4EAL(WB1CPW,N4DHA,WA4s HWT ZZU,WB4ZVL,oprs)
69,680- 520-67-18-B

Virginia

WD4AXM 183,456-1274-72-24-B
W4YY/4 182,188-1231-74-24-B
W4PRO(N4ABZ,oprs)
167,754-1149-73-24-B
KA4EKO 147,898-1013-73-22-B
W4MYA 143,560- 970-74-19-B
W4EI 137,048- 926-74-22-B
AA4FF 101,528- 686-74-19-A
N4XD 80,256- 608-66-21-B
W4FV 71,070- 515-69-10-B
W4DM 65,964- 458-69-12-B
WA4CYR 65,320- 460-71-23-A
KB4NT 63,190- 445-71-14-A
W4KFC 52,096- 407-64- 8-B
WD4GCE 50,268- 354-71-13-A
K8OX/4 49,704- 436-57- 8-B
W4YE 49,128- 356-69- 8-B
K4PQL 48,360- 340-62- 8-B
N4MO 48,024- 348-69-24-A
N4AXA 45,012- 341-66-24-A
WB4ZPF 43,960- 314-70-21-A
K4FJ 39,530- 335-59- 7-B
N4CMJ 36,500- 250-73-15-B
K4CTY 36,400- 280-65- 5-B
AI2C/4 36,156- 262-69-11-B
WB4RDV 32,296- 241-67-12-B
W4XD 30,996- 246-63-14-A
K4JSI 30,500- 250-61-10-A
W4NND 26,230- 215-61-10-B
N4CD 22,656- 192-59- 7-B
KA4IUM 19,504- 184-53-19-A
WD4KQJ 18,252- 169-54-11-A
W4WWQ 17,136- 119-72-11-B
N4RA 13,248- 138-48- 4-A
W4ZEI 13,200- 150-44- 8-A
WB4ODK 9416- 107-44- 9-A
KC4HX 6480- 81-40- 8-A
N3JT 5041- 71-71- 8-B
N4MM 682- 31-11- 1-A
K4KDJ(KB3MB,WB4FDB,WD4ECK WD8BKW,oprs)
116,144- 854-68-24-B
W4UVA(AD4J,KA4LXV,KB3KJ, KQ4Y,WB2BYW,opr)
110,460- 789-70-21-B
WB4SGV(+WB4MRI)
62,720- 448-70- 7-B
AF4O(+Logger)
39,804- 321-62-18-A

West Indies

KJ0O/KP4 98,124- 663-74-24-A

5

Arkansas

WB5KED 156,584-1058-74-23-B
K0VGB/5 44,574- 323-69-14-A
AD5F 23,870- 217-55-12-A
K5DO(+KB5ZT)
33,792- 264-64- 8-B

Louisiana

W5WMU 249,232-1684-74-24-B
K5TS 154,956-1047-74-18-B
W5WS 52,998- 363-73-23-A
K5LVZ 28,424- 209-68-14-A

Mississippi

W5VSZ 215,340-1455-74-22-B
AE5H 64,380- 435-74-14-A
W5UCY 12,000- 100-60-16-A
WD5JNC(+KA5HSZ,WD5GUP)
32,640- 258-64-11-B

New Mexico

K5TA 279,572-1889-74-24-B
AA5B 207,513-1427-74-24-B
N5IA 167,170-1145-73-16-B
K5XY 12,672- 288-44- 6-A

Northern Texas

K5QY(K1DG,opr)
234,728-1586-74-24-B
KA5Q 180,708-1221-74-23-B
WD5GSL(WB5TEV,opr)
157,534-1079-73-24-B
WB5V2L 141,284- 958-74-24-A
K5NW 125,244- 882-71-16-B
W5MYA 111,168- 772-72-11-A
N5JB 100,196- 677-74-20-A
K5IID 95,992- 676-71-18-A
W5LKP 90,280- 610-74-20-B
KJ5W 77,526- 531-73-18-A
K5FUV 75,544- 532-71-11-B
WD5JLK 75,456- 524-72-12-B
K5HTT 72,864- 506-72-17-B
W5JD 51,456- 384-67-12-B
KB5AH 46,480- 332-70-20-A
W5QXK 41,464- 292-71-16-A
K5BKO 36,608- 286-64-18-A
K5HM 20,976- 184-57- 8-B
K3SCU/5 10,810- 115-47- 4-B
WB5QIP 3898- 101-49-18-A
WA4JZB/5 3044- 104-43- 8-A
KC5BA 3782- 63-31- 8-A
N5ZR 672- 21-16- 2-A
K5RX(+N5AU)
191,216-1292-74-24-B
KB5RH(N5s AYK BET,KB5s QO RH UT,WB5PIP,oprs)
169,460-1145-74-24-A
W5ONL(multiop)
105,524- 713-74-18-B

Oklahoma

KM5H 147,168-1008-73-24-A
AE5Y 59,400- 450-66-20-A
K5RY 37,950- 275-69-12-B
K5JZN 37,398- 271-69- 6-A
K5DEC 29,480- 220-67-14-B
WD5BZS 8282- 101-41- 8-B
KE5M(+WD5HBX)
125,122, 857-73-23-B

Southern Texas

K5RC(K5ZD,opr)
241,092-1629-74-24-B
K5TM 227,624-1538-74-24-B
K5IY(KA5CHW,opr)
221,704-1498-74-24-B
N5JJ 208,088-1406-74-24-B
N5DU 190,320-1286-74-24-B
K5LZO 188,260-1245-74-23-B
K5KG(K5GN,opr)
179,228-1211-74-24-B
K5WA 175,824-1188-74-20-B
K5MA 170,940-1155-74-20-B
WB5FND(WA3QVC,opr)
167,240-1130-74-23-B
N5ATC 149,240-1066-70-23-B
W5SG 128,652- 849-74-20-B
K5VWW 118,696- 802-74-21-B
K5GB 110,408- 746-74-19-B
K5DX 108,188- 731-74-15-B
KB5FU 105,648- 744-71-18-B
KC5BX 102,528- 712-72-24-B
K5BZU 101,528- 686-74-17-B
N5KO 100,048- 676-74-24-B
W5ASP 94,668- 686-69-18-A
N5WW 92,058- 687-67-13-B
KA5GJO 77,816- 548-71-22-B
W5HNS 74,448- 517-72-15-B
AA5Y 67,536- 469-72-12-B
KG5U 66,500- 475-70-24-A
N5JA 61,060- 430-71-11-A
KA5BYF 60,666- 423-71-23-A
KB5KZ 47,610- 345-69-15-B
K5TU 35,912- 268-67- 8-A
N5ALS 33,930- 261-65-15-A
WA5ABR 33,356- 269-62-14-A
WD5HRC 29,264- 248-59-16-B
KA5DAC 23,552- 184-64-14-A
W5UFA 18,480- 165-56-11-A
W5PXZ(WB5SBR,opr)
15,494- 127-61-12-A
K3ZMI/5 15,410- 115-67- 9-A
WA5IYX 14,994- 147-51- 6-B
N5BPB 11,988- 111-54- 8-A
WD8DKJ/5 5476- 74-37-19-A
N5DB 2600- 52-25- 2-A
N5AF 1540- 35-22- 1-A
WB5WHR(+N5IC,WD5CHY)
136,948- 938-73-24-B
N5EA(+WB5SFS
99,280- 680-73-15-B

6

East Bay

N6RO 250,416-1692-74-24-B
K6HIH 169,656-1147-74-24-B
WA6DIL 158,064-1068-74-22-A
K6XO 148,592-1004-74-24-B
N6KB 137,196- 927-74-22-B
WB6ZEP 90,880- 640-71-21-A
W6BSY 90,428- 611-74-24-B
K6ZM 73,678- 519-71-22-B
K6PJY 71,284- 502-71-10-B
WB6GPT 69,496- 476-73-24-A
K6CSL 26,796- 231-58-22-A
K5GOE/6 26,400- 200-66-10-A
WA6BOB 20,458- 193-53- 5-B
N6NE 15,402- 151-51- 3-A
W6RJ 4224- 64-33- 2-B

Los Angeles

N6HC 172,568-1168-74-19-B
AA6RX 99,604- 673-74-15-B
W6CN 82,344- 564-73-23-B
K6HGW/6 68,244- 517-66-19-B
WB9JFO/6 66,800- 395-72-14-A
N6AXQ 29,298- 257-57-19-A
N6GL 25,724- 218-59-14-A
N9AWJ/6 19,928- 188-53-20-A
N6BCY 14,994- 147-51- 9-A
WB6NFO 14,416- 136-53-16-A
W6NXB 4158- 63-33-15-A
W6NOL 3180- 53-30- 2-A
W6PFE 2610- 45-29- 3-A
KD6CF(+KA6s HKQ KFE,KB6SI, N6CYL,WB6BIM)
69,768- 513-68-22-B

Orange

WD6BNG 95,904- 666-72-24-A
KB6SD 81,322- 557-73-22-A
WD6FLV 28,476- 226-63-14-A
KA4FDX/6 25,724- 218-59-21-A
KA6ISX 12,168- 117-52-16-A
WB6AJV 10,246- 109-47- 8-A
K6HRT(+N6BLH)
111,106- 761-73-23-B
WB6NHV(+KA6s DVW DVX FBI, N6s DJW DJX)
108,144- 751-72-23-B
WB6SKE(+N5s DED DJX DLR, KA6FBI) 59,092- 446-66-21-B
N6ABH(+N6s CBF DNI,W6ESA, WD6GSH) 38,688- 312-62-24-A
KA6CJW(+KA6ART,N6DEC,WA6s OQC PMX PMY)
38,280- 290-66-24-A

Sacramento Valley

AI6V 198,852-1362-73-24-B
KI6O 183,324-1238-74-21-B
W6TPH 150,220-1015-74-24-B
K6SG 140,304- 948-74-24-B
W8KZH/6 83,300- 595-70-19-B
KB6JM 34,706- 259-67-13-A
N6JM 16,714- 137-61- 6-B
W6SX 476- 17-14- 1-B

San Diego

N6ND 209,272-1414-74-22-B
AK6U 168,508-1071-74-24-A
K2UVG/6 117,072- 813-72-16-A
K6GC 61,880- 455-68-14-B
W7KHN/6 22,800- 200-57- 3-A
AA6EE 10,120- 110-46- 5-A
KA6IEH 5928- 76-39- 3-B
K6NA 2888- 38-38- 2-A
K6XT 442- 17-13- 1-A
W6KBD 330- 15-11- 2-A

San Francisco

WB6ECR 119,732- 809-74-21-A
AA6DX 105,376- 712-74-22-A
WB6NBR 41,976- 318-66-16-A
N6QC 39,468- 286-69-22-A
KB6GK 17,248- 176-49-11-A
W6BIP(+WA6DJI)
157,472-1064-74-22-B
K6ANP(+N6DGJ)
142,940- 905-74-24-B

San Joaquin Valley

WA6KMW 121,680- 845-72-18-A
N6PR 68,862- 499-69-18-A
WB6ION 67,470- 519-65- 6-B
W6YKM 43,680- 312-70- 7-B
WB6ITM 8820- 126-35- 3-A
K6TG 7802- 83-47-10-A
W6VMB 7056- 147-24- 5-A

Santa Barbara

KB6I(N6TR,opr)
238,132-1609-74-22-B
WA6VNN 76,032- 528-72-21-A
WA6NHB 70,448- 475-74-23-B
WA6DJS 68,040- 486-70-19-B
W6IKF 47,704- 356-67-12-A
K6VMN 47,124- 307-66-20-B
KA6V 39,000- 300-65-15-A
WA6IJZ 28,396- 229-62- 7-A
KD6LB 28,032- 219-64-14-B
WD6DMC/6 16,800- 140-60- 2-A
W6QBY 1628- 37-22- 2-B
KA6L(+WD6CVW)
78,540- 595-66-15-B

Santa Clara Valley

K6MYC(N6IG,opr)
251,696-1702-74-24-B
W6XX 243,460-1645-74-24-B
N6BT(WA6VEF,opr)
242,276-1637-74-24-B
W6OKK(WB6DSV,opr)
233,544-1578-74-22-B
N6BV 223,480-1510-74-24-B
N6MG(WA6PGB,opr)
199,800-1350-74-24-B
K6HNZ 190,328-1286-74-24-B
N6NF 188,404-1273-74-24-B
K6SEM 181,596-1227-74-24-B
WA7LQO/6 157,626-1138-74-24-B
N6QW 117,216- 792-74-24-A
N6RZ(WA6OCV,opr)
112,420- 770-73-24-A
WA6ITV 104,192- 704-74-20-B
K6OMB 101,808- 707-72-24-A
W6KH 65,808- 457-72-13-B
K6LV 47,460- 339-70-16-B
WD6FPV 41,202- 337-63-10-A
KC6D 38,178- 303-63-10-A
K6SMH 38,080- 272-70- 8-A
KN6K 31,284- 237-66-16-A
W6ISQ 26,532- 201-66- 9-B
N6ZB 25,200- 210-60-11-A
N6RU 24,360- 203-60-13-B
KD6AZ 23,280- 185-64-11-B
K6MA 12,236- 133-46- 4-A
AA6PZ 9900- 110-45- 3-B
N6ST 8600- 100-43- 2-B
N6KT 1554- 37-21- 2-A
AA6G(+W6SZN)
216,080-1460-74-24-B
W6YX(K1JH,N1QO,N3ER,N7MH, W8ZI,oprs) 173,900-1175-74-24-B
N6AUV(+AJ6V)
134,828- 911-74-24-B
AA6T(KA6LAF,N6s BSU HKP RZ, WA6HKP,WB6SHD,oprs)
104,192- 704-74-24-A
AA6KB(+WB6POT)
94,048- 618-68-12-B
K6YA(WA6LIJ,WB6s AAJ OML)
26,100- 225-58-13-A

Pacific

AH6P 26,786- 227-59- 6-A
KH6IFY(KH6CP,opr)
26,314- 223-59-13-A
NH6A 630- 21-15- 3-A

7

Arizona

N7DD(K7JA,opr)
309,320-2090-74-24-B
K7NO 207,644-1403-74-23-B
W7FGT 66,816- 522-64-20-A
K1TU/7 37,572- 303-62-12-A
W7ZMD 33,288- 228-73-15-A
WB7DTX 28,060- 230-61- 8-A
WB7PXS 9476- 103-46- 5-A
K7RUF(KA7s FEK FJS,KA8AMC, oprs) 22,600- 226-50- 8-B

Idaho

W7ZRC 193,436-1307-74-22-B
N7AOS 148,148-1001-74-21-B
KB7NP 76,568- 563-68-13-B
WA7HJU/7 58,254- 511-57-10-B
K7JV 34,970- 269-65- 8-A
W7KOB 3600- 45-40- 3-A
W7KXA 3120- 60-26- 3-A
W7LQT(+WB7WBZ)
178,044-1203-74-22-B

Montana

W7JYW 158,330-1115-71-20-B
W7OIO 12- 3- 2- 2-A
W7FO(K9GIZ,KA7BFK,WA7s FLG FOB LSF,WB7s PUE UKK,oprs)
139,242-1009-69-23-B
KA7ILA(+W9NRW)
119,422- 841-71-21-B

Nevada

WA7NIN 282,828-1911-74-24-B
W7IA 100,660- 719-70-11-B
W7YKN 42,840- 315-68- 9-B
WB7VVH 34,980- 265-66-19-B
WB7PIJ 20,178- 181-67- 7-A

Oregon

W7NI 212,430-1455-73-24-B
W7XN 167,092-1129-74-22-A
W7YAQ 102,638- 703-73-21-A
W7CB 73,260- 445-74-13-B
AI7W 67,298- 502-67-21-A
W7TWL 58,476- 443-66-24-A
W7MLJ 39,712- 288-62-19-A
W7GUR 34,914- 260-69-13-B
K7GDN 26,352- 216-61-10-A
WB7TIU 22,800- 190-60-20-A
N7AIO 21,400- 214-50-15-A
WB7UFJ 19,920- 168-60-14-A
N7DG 3120- 60-26- 2-B
W7ZR(+N4BOS)
233,692-1579-74-24-B
WB7USF(+KA7CED,WB7RAQ)
56,544- 456-62-24-A

Utah

N7DF 268,768-1816-74-24-B
N7SM 126,840- 906-70-18-B
W7JPG 105,558- 723-73-24-A
K3FR/7 13,872- 136-51- 7-A

Washington

K7RI(W7WA,opr)
251,452-1699-74-24-B
K7SS 211,784-1431-74-24-A
AG7M 210,240-1440-73-24-B
WB7BNP 145,562- 997-73-23-A
WA7UQV 112,924- 763-74-21-B
W7DAZ 61,744- 454-68- 9-B
W7LKG 59,976- 441-68-15-B
N7CAE 59,040- 492-60-22-A
K7NW 52,578- 381-69-15-A
WB7RFC 40,120- 295-68-15-A
WB7PNK 36,840- 307-60-16-A
AD7U 31,744- 256-62-13-A
N7AGC 30,016- 224-67-11-A
W7HX 28,000- 250-56- 5-B
WB7AGZ 27,966- 237-59-16-B
W7NP 23,716- 244-53-13-A
WA7RDJ 23,552- 184-64-15-B
KD7C 19,782- 157-63-17-A
K7WA 16,524- 162-51- 6-A
W7LUR 15,198- 149-51- 9-A
WB7OXA 12,480- 130-48- 9-A
K7RS 10,836- 129-42-11-A
K7QLC 10,812- 102-53-10-A
W7ERH 6552- 84-39- 4-A
W7DWJ 2958- 51-29- 4-A
WB7QMR 410- 19-11- 2-A
K7LXC(+K7HBN)
182,500-1250-73-24-B
KB7G(+KC7I)
173,376-1204-72-24-B
K7IR(+KA7s OFQ EXC)
149,616-1039-72-24-B
K7FR(KD7s P ZJE,KE7A,WB7UPU, oprs) 94,530- 685-69-24-A
N7RV(+K7YST,WA7LVN)
92,726- 653-71-24-B

Wyoming

K9DR/7 166,708-1174-71-18-B
N7WY/7 89,830- 691-65-16-A
KB7M 32,825- 253-65-18-B
KA7FYB 13,029- 152-43- 8-A

Alaska

KL7IVX 90,280- 610-74-23-B
AL7AF 81,946- 561-73-22-B
KB8RR/KL7 45,866- 323-71-24-A
WA0SHA/KL7
11,700- 117-50-12-A

8

Michigan

K8MJZ 161,616-1092-74-24-B
AC8Y 152,292-1029-74-19-B
K8LF 132,016- 892-74-23-B
K8SS 125,356- 847-74-16-B
WD8DSV 117,504- 816-72-24-B
AA8U 107,748- 738-73-21-B
W8JWN 107,448- 726-74-24-A
WA8OWG 104,340- 705-74-19-B
WD8JFE 101,470- 695-73-17-B
WD8MGQ 88,038- 603-73-24-A
W8MRM(WB8RNV,oprs)
86,286- 591-73-17-B
WB8AYW 81,934- 577-71-22-B
N8LA 70,128- 487-72-24-A
WA8QCW 67,306- 474-72-17-A
AF8D 60,480- 420-72-19-B
WD8NQE 54,180- 387-70-22-B
WA8MJY 51,120- 360-71-18-A
AI8A 47,334- 343-69-11-A

Ed, WØYK, battled his way to a second-place phone finish and a third-place cw finish in the very competitive Colorado Section.

N6BT (r) was tops on cw from the Santa Clara Valley Section, while WA6VEF (l) operated N6BT for a third-place showing on phone in the SCV Section.

W9PNE from Illinois. Brice thinks that the 14 hours he spent in the cw SS are some of the most enjoyable hours he's spent in all his years on the air.

AD8X	46,900- 350-67-15-A
K8DD	45,880- 370-62- 7-B
W8HNI	43,554- 357-61-17-A
KC8P	43,488- 302-72-10-A
W8VPC	42,250- 325-65-18-A
N8MK	40,870- 305-67-16-A
N8RW	39,424- 308-64-11-B
K8CV	39,128- 292-67-15-A
WA8FSN	38,502- 279-69-17-A
K8CC	37,420- 291-63- 3-B
KB8RK	31,050- 225-69-11-A
KA8EHM	28,304- 244-58-13-A
N8BKO	26,000- 200-65-15-A
W8JKU	25,200- 175-72-20-B
W8KZM	23,296- 208-56- 6-B
K8RO	23,112- 214-54- 7-B
KB8IO	21,804- 158-69-12-B
N8AWD	19,712- 242-44- 8-B
WD8QEI	17,368- 167-52-18-A
N8AFV	16,124- 139-58-12-A
N8BIB	16,100- 175-46- 9-A
N8AOE	15,792- 141-56-11-A
W8ETH	14,014- 143-49- 7-B
WD8LAQ	13,992- 132-53- 9-A
W8EGI	13,000- 125-52- 6-A
WA8OJR	12,296- 116-53- 6-A
WA8QAF	12,272- 118-52- 4-A
K8KUH	10,824- 123-44- 8-B
K8KM	10,246- 109-47- 7-A
K8SIA	10,000- 100-50- 3-A
WD8KZX	8460- 94-45- 5-A
W8JUP	8448- 96-44- 6-A
N8AOA	8000- 100-40- 6-A
K8QLM	8000- 100-40- 8-A
KG8J	3600- 50-36- 3-B
W8GV	3456- 54-32- 3-A
K8IFE	260- 13-10- 3-A
WD8CRY(+K8AQM,KB8HW,KC8A, WB8s VBP ZFB,WD8s CRY LCE)	173,308-1171-74-24-B
KC8K(+K8VA,KE8K,KA8IKC, W8MPD)	97,552- 725-67-24-B
AJ8Z(+AI8U,AJ8C,N8BME, WD8JQL)	89,624- 659-68-24-B
W8UM(AG9U,K8KA,KA8DXR, WB8YVI,WD8DFS,oprs)	83,776- 616-68-18-B
N8ALL(+KA8BCL)	59,904- 416-72-20-B
WA8QPN(+WB8JYX)	59,640- 426-70-21-B
KB8RV(+KA8AYW,WB8WIM)	57,084- 402-71-24-A
N8BHT(+loggers)	53,856- 396-68-22-A
AI8F(+WD8PIB)	52,528- 392-67-23-A
WD8PGQ(+KB8s IS LP)	40,870- 305-67-24-A
W8PLP(KA8s AJC BYY,WA8LAY, WD8s KCO NQG NYW,oprs)	26,334- 209-63-13-A
W8SH(WA6ABD,WD8s DII QXM, oprs)	21,774- 191-57-10-A
W8GBR(+K8HHX,KA8CVE, W8GTP,WD8s AKU OWA QGX RUD)	8424- 108-39- 8-A

Ohio

AD8P	159,840-1080-74-24-B
KB8EI	143,708- 971-74-20-B
WB8VPA	122,494- 839-73-24-B
W8LNO	104,974- 719-73-20-B
WA6EZV/8	104,340- 705-74-22-A
KA8U	98,532- 714-69-22-A
K8EE	92,880- 645-72-22-A
AK8W	91,760- 620-74-20-B
W8UPH	88,184- 604-73-24-B
WB8ZJY	84,320- 620-68-13-B
KA8ESD	78,588- 531-74-22-A
K8BL	75,600- 540-70-22-A
N8BJQ	74,620- 533-70-20-B
W8FN	69,088- 508-68-10-B
N8AHK	60,416- 472-64-15-B
WA6LOW/8	58,926- 427-69-21-A
KF8K	58,016- 392-74-24-A
WA8ADA	52,080- 372-70-20-B
WB8SZN	50,652- 378-67-24-A
WD8RNC	46,596- 353-66-18-A
KI8D	45,570- 349-65-18-B
N8TN	44,574- 323-69-13-B
W8HQN	42,366- 307-69-20-B
WD8NMT	39,468- 286-69-13-A
W8DXT	36,432- 276-66-21-B
WA8AGH	34,932- 246-71-16-B
WB8BGX	34,688- 271-64-15-A
N8AVK	34,500- 250-69-19-A
KB8RA	32,472- 246-66-19-A
WD8EOL	31,744- 248-64-18-A
WD8JBB	31,034- 263-59-14-A
WD8OBX	28,182- 231-61-15-A
WB8SBI	25,200- 200-63- 9-B
W8IMF	23,744- 212-56-10-B
AF8C	21,924- 189-58-14-A
N8AUH	21,460- 185-58-10-A
WD8ECA	20,496- 183-56- 7-A
W8OJW	16,800- 150-56-12-A
N8BTT	15,494- 127-61-10-A
AJ2X/8	14,300- 130-55- 7-A
WB8CXL	13,650- 105-65-12-A
W8ANM	12,980- 118-55- 9-B
WA8UNP	11,176- 127-44-10-A
WD8SDL	11,074- 113-49- 8-A
N8LM	10,700- 107-50- 5-A
N8AKE	10,494- 99-53- 5-B
WD8KKF	10,320- 120-43- 4-B
N8XX	9588- 102-47- 4-A
N8BKX	8600- 100-43-17-A
KB8AE	8500- 85-50- 5-A
WB8TMF	8140- 110-37- 5-A
WD8KTM	7980- 105-38- 7-B
WA8WFX	4080- 60-34- 5-A
WD8PLO	2280- 60-19- 6-A
N8AXA	1472- 32-23- 6-A
KA8CQI	868- 31-14- 1-A
K8ND(+AD8I,WD8ALG)	202,464-1368-74-24-B
WB8JBM(AA8S,K8US,WB8s DQP JMP LSN MQD,oprs)	201,918-1383-73-24-B
K8MR(+K8s MT NZ)	156,528-1087-72-20-B
N8FU(+K8DHK,WA8ZPP)	81,696- 552-74-22-A
WB8DOD(+WA8MAZ)	64,528- 436-74-19-B
W8FW(AA8R,N8s BCM BCX, WB8MEJ,WD8s AMV LOI,oprs)	41,208- 303-68-16-B
KB8QI(+WB8TRW)	40,820- 314-65-23-B
WD8NMV(+WD8NNB)	39,620- 283-70-20-A
WB8QOH(+KA8s JFD JOU, WD8NNB)	27,938- 229-61-20-B
WD8JAW(+KA8s JJA JKO, WD8NNB)	14,448- 129-56-13-A

West Virginia

N8II	210,094-1439-73-24-B
WA3KCY/8	204,536-1382-74-24-B
K8BS	52,080- 372-70-17-A
N8WV	23,436- 217-54- 9-B
W8UT	10,416- 109-48- 4-A
KH8FJ	9804- 114-43- 3-B
WB8WEZ	9576- 82-34- 8-A
WD8CZA	2812- 38-37- 4-A

9

Illinois

K9HMB(K9GL,opr)	207,792-1404-74-24-B
K9BGL	181,448-1226-74-24-B
K9RF(K9NO,opr)	176,256-1224-72-24-B
WAØAVL/9	154,216-1042-74-24-B
K9RS	142,852-1006-71-20-B
N9AGC	122,988- 831-74-23-A
WD9DCL	112,322- 791-71-15-A
W9TM	108,220- 773-70-23-B
W9UVM	96,702- 681-71-24-A
K9LUW	94,032- 653-72-22-B
WD9IIX	88,768- 608-73-24-A
N9AEJ	81,736- 601-68-19-A
W9RW	78,402- 537-73-13-B
KA9CQM	72,562- 497-73-74-A
N9AKE	72,270- 495-73-24-A
KB9E	68,182- 467-73-24-A
AK9N	64,752- 456-71-21-A
K9BG	64,610- 455-71-12-B
WD9FVE	63,066- 457-69-23-A
K8KIX/9	62,496- 434-72-20-A
KB9AW	56,580- 410-69-18-A
K9GH	55,440- 396-70-22-B
K9UIY	50,304- 393-64- 8-A
AG9A	46,920- 345-68- 7-A
WB9VLM	46,104- 339-68-12-B
KB9OF	45,694- 341-67- 8-A
WA9DRE	45,402- 329-69-14-B
K9MS	29,358- 233-63-12-A
WD9DBC	27,816- 228-61-14-A
W5CAT/9	27,690- 213-65-21-A
KA9ADP	26,040- 210-62-11-A
N9ALC	24,716- 167-74-12-A
KB9PC	22,912- 179-64-14-A
WB9SFT	22,144- 173-64-10-A
N9BEM	21,840- 182-60- 9-B
WA9ZZG	20,790- 165-63-14-A
WA9ETR	19,560- 163-60-10-A
W9HPG	19,116- 162-59- 9-A
WB9MMM	17,000- 170-50- 7-A
KA9BNG	14,800- 148-50- 7-A
KB9LN	14,688- 145-51- 5-B
K9JU	12,052- 131-46- 5-B
W9USS	10,260- 114-45-10-B
AK9Y	9702- 99-49- 5-B
WD9FVH	8640- 90-48- 5-A
K9AR	8600- 100-43- 2-B
WA9APA	8528- 104-41-15-B
K9KM	7476- 89-42- 2-B
KB9IW	7052- 82-43- 5-A
W9REC	6768- 72-47-12-A
WA9FFL	6596- 97-34- 6-A
KA9GSV	5440- 68-40- 5-B
KB9MA	4556- 67-34- 2-A
KA8BDN	4320- 90-24-16-B
N9UN	3100- 50-31- 1-A
W9LNQ	2184- 42-26- 1-A
N9AWZ	2068- 47-22- 5-A
WD9GYM	1680- 42-20- 3-A
W9VTL	1672- 38-22- 3-A
WA9NTT	528- 22-12- 2-A
K9VMI	252- 14- 9- 1-A
W9YH(K9s GS VV,KC9J,W9PK, WD9DBT,oprs)	154,322-1057-73-20-B
W9LRG(+N9AG,KB9RI)	53,734- 401-67-10-B
N9BBM(+KA9JOF)	34,844- 281-62-18-A

Indiana

W9OBF	185,888-1256-74-24-B
K9UWA	173,160-1170-74-24-B
K9CLO	116,328- 786-74-22-B
W9RE	112,332- 759-74-10-B
N9QX	100,368- 697-72-18-B
WD9IPP	96,760- 665-72-19-B
N9JG	74,244- 538-69-14-B
W9JOO	65,408- 448-73-21-A
N9RC	64,480- 496-65- 9-B
N9CR	64,260- 459-70-20-A
K9IU(W3EP,opr)	56,840- 406-70-13-A
WA9SUS	39,680- 310-64-11-A
W9NZW	31,248- 252-62-23-A
K9KB	29,040- 242-60- 7-B
W9TE(KB9MO,opr)	28,500- 250-57-10-A
KB9H	23,128- 200-59- 8-B
WB9HBH	22,326- 183-61- 8-A
WB4SYX/9	11,520- 128-45-11-A
WB9VJE	9680- 110-44- 4-B
WD9EWT	9152- 104-44- 5-A
W9QLW	9000- 100-45- 6-B
KA9FKU	6364- 86-37- 9-A
W9YB(DF4CK,KQ4L,N9s EI NB NC,WB9s OJY YCH,oprs)	170,200-1150-74-24-B
KA9CGA(+KA9FSC)	27,776- 224-62-24-B

Wisconsin

N9AW	148,106-1043-71-20-B
KA9FOX	85,264- 584-73-24-A
W9NA	79,920- 555-72-14-A
K9WTF	74,592- 518-72-20-B
WB9VOZ	61,180- 437-70-24-A
K9KR	60,828- 411-74-19-B
WB7OJV/9	60,776- 428-71-19-A
K9EYA	52,932- 402-66-10-A
WD9ESX	52,496- 386-68-24-A
WA9BZW	51,456- 384-67-20-B
N9KS	49,280- 352-70-14-B
KA9BJO	46,670- 359-65-11-A
KB9S	46,512- 342-68-15-A
K9JF	44,220- 330-67- 8-A
K9GDF	41,088- 321-64- 7-A
N9AU	40,960- 320-64-10-A
N9BMK	35,464- 286-62-19-A
N9BDM	30,056- 221-68-17-B
KB9DZ	29,890- 245-61-22-A
WD9IKO	25,560- 213-60-10-A
K9IAC	25,200- 225-56- 9-A
W9HE	21,720- 181-60- 6-A
WB9ECM	21,168- 168-63-15-A
WB9SVN	20,720- 185-56-12-A
WB9GZP	20,160- 168-60-11-B
KB9CT	15,680- 140-56- 6-A
KB9Q	14,364- 133-54- 9-A
W9DLY	14,204- 134-53-10-A
KB9CI	12,980- 118-55- 7-A
WD9EFJ	10,260- 114-45- 8-A
WB9BNK	6840- 76-45- 7-A
WB9EJE	6750- 75-38- 6-A
WB9RKF	5698- 77-37- 7-A
KA9EHI	4864- 76-32- 5-A
W9YCV	374- 17-11- 2-B
W9FK(WA9POV,opr)	112- 8- 7- 1-A
W9BCC	96- 8- 6- 1-A
W9OQA(K9EVR,WB9UEP,oprs)	106,536- 772-69-22-B
KB9RR(+KB9NM)	96,600- 700-69-21-B
AB9L(+WA9DMO)	49,096- 361-68-14-B
WA9AWO(+KA9OC,WA9s JMS VJK,WB9s LNL RQR,WD9s ISS JHP)	44,622- 333-67-24-A
KA9COE(+KA9HXN)	42,284- 341-62-24-A
KB9GF(+WB9UGX)	36,234- 297-61-15-A

Ø

Colorado

KØRF(WØUA,opr)	284,604-1923-74-24-B
WØYK	255,152-1724-74-24-B
KØUK	227,180-1535-74-23-B
NØAFI	189,800-1300-73-23-B
WØCP	183,816-1242-74-24-A
KØAB(WHØIWL,opr)	155,774-1097-71-24-A
ACØS	102,808- 724-71-14-B
AI4M/Ø	98,420- 665-74-20-A
AGØL	92,148- 649-71-18-A
KAØCSL	77,994- 619-63-14-A
NØASN	77,792- 572-68-16-A
KCØD	68,340- 510-67-12-B
ADØO	67,452- 511-66-18-A
KAØFPJ	39,260- 302-65-22-A
ACØY	34,020- 270-63-13-A
KØKRL	21,280- 190-56-16-A
WBØCMM(+WBØSSL)	184,704-1248-74-24-B
WØDK(WB2CBU,WØPWS,oprs)	850- 25-17- 1-A

Iowa

WØEJ	181,596-1227-74-24-B
KØLUZ	176,712-1194-74-20-B
KFØH	123,662- 847-73-15-B
KØAL	119,436- 807-74-17-B
KØJGH	104,636- 707-74-24-A
KBØPR	96,844- 682-71-21-B
WDØFGY	79,968- 588-68-24-A
KBØV	73,438- 503-73-24-A
WØPPF	44,800- 320-70-19-B
AKØM	43,216- 296-73-15-B
WDØEIF	33,176- 319-52-16-B
KAØD	28,304- 232-61-23-A
WDØCMT	27,450- 225-61-18-B
NØCAY	13,250- 125-53-10-A
WBØZVX	12,470- 145-43-10-B
NØAYM	8436- 111-38-15-B
KAØELP(+WDØGVY)	62,712- 468-67-19-B
WØIO(WA1MKE,WD6DMV,oprs)	27,028- 233-58-20-A
WHØOKP(+KAØESL,WØYSE)	23,160- 193-60-14-B

Kansas

KFØM	75,320- 538-70-10-B
WAØTKJ	51,356- 347-74-15-A
KØPFV	25,830- 205-63- 9-A
KØVBU	22,816- 184-62- 5-A
WBØYJT	21,978- 333-66-21-A
WØDEL	7068- 93-38- 5-A
WØMYM	6084- 78-39- 5-A
KØYBV	4480- 70-32- 8-A
KAØDGR	3828- 66-25-10-A
N7PM/Ø	2800- 50-28- 3-B
ABØS(+KØWA)	233,988-1581-74-24-B

Minnesota

KØIJL	150,672-1032-73-18-B
KØFRP	134,820- 963-70-24-A
KBØC	125,856- 874-72-23-B
KØFZG	102,860- 695-74-24-A
KØDD	91,612- 619-74- 9-B
ACØW	82,040- 586-70-24-A
NØADJ	70,980- 507-70-16-B
KBØM	57,270- 415-69-16-A
WAØMHJ	56,420- 434-65- 7-B
KØMPH	53,958- 391-69- 8-A
WAØVHX	45,560- 340-67- 8-A
WAØWWW	38,870- 299-65-14-A
WAØCQG	34,500- 250-69-11-A
KEØA	32,208- 264-61-12-A
WØBF	29,500- 250-59- 6-B
WBØDHS	28,182- 231-61- 8-B
NØAGW	25,440- 240-53-14-A
KEØC	24,344- 179-68-13-A
KØBR	22,820- 163-70-12-A
WØTIV	15,732- 138-57- 8-A
WAØADX	12,740- 130-49- 7-A
K3WT/Ø	11,040- 115-48- 5-A
WBØUKI	9000- 100-45- 5-A
KBØRP	6264- 87-36- 9-A
WAØDEL	3630- 55-33- 6-A
KØVW	2530- 55-23- 2-A
NØBG(+KØTG,WAØRRW)	172,572-1182-73-24-B
KØTK(+KØFVF,WBØGDB)	170,496-1152-74-24-B
KØLTC(KØGRA,KAØs APX DJJ, KBØPM,NØBUF,WØUBT,WBØs SNG SNH SNP FBN,WDØs BQP BQR,WD8MHH,oprs)	89,760- 680-66-23-B
ADØT(+KØKCY,KBØR,WAØIDX, WBØs BIT TRL TQW SCO)	85,680- 595-72-24-B
WBØYUC(+WDØFOF)	82,786- 583-71-21-B
WAØQIT(+WDØGPX)	71,264- 524-68-22-A
KAØBZK(+KAØFEX)	28,160- 220-64-17-A
NØNO(+K3WT)	21,620- 235-46- 4-B
WAØVQR(+WBØs IHR VPK)	4400- 100-44- 3-A

Missouri

KBØX	204,388-1381-74-24-B
KØRWL	160,162-1097-73-24-B
NØRJ	157,388-1078-73-24-B
KBØRC	156,512-1072-73-19-B
WØRR(WBØLFY,opr)	106,848- 742-72-24-A
WBØOQV	82,732- 559-74-19-A
WBØVHN	78,480- 545-72-21-A
WAØRVK	75,920- 520-73-23-A
WAØWBU	73,840- 520-71-21-B
WØHBH	41,400- 300-69-13-A
ACØN	40,950- 315-65-10-B
WBØTPK	30,752- 248-62-16-A
KØIFL	30,618- 243-63- 9-B
KØJJS	22,400- 175-64- 9-A
NØAOP	22,218- 161-69-14-A
KØMYD	20,384- 182-56-15-A
WDØFDK	18,328- 158-58-11-A
AGØU	17,898- 157-57- 9-A
WBØVHH	6930- 99-35-12-A
KØFU	5772- 78-37- 8-B
WDØCFM	5698- 77-37- 6-A
KAØP	5110- 73-35- 3-A
KØAZV(KAØs CDG HDB, WAØUIS,WDØFNP,oprs)	51,546- 363-71-18-B
WAØFYA(KØGDD,WBØVPF WDØELL,oprs)	47,388- 359-66-19-B

Nebraska

KØSCM	112,464- 792-71-17-B
WDØGIL	16,610- 151-54-10-A
K7UP/Ø	12,744- 118-54-14-A
KØDG(+NØs AON BNY,WDØDLN)	198,024-1338-74-24-B
KØNB(+KØDI)	176,222-1207-73-24-B
WØRIC(+KØGNO,WAØYPY)	162,352-1112-73-24-B

North Dakota

KFØA	85,058- 599-71-15-B
AKØT(+KCØW,WAØCYW, WBØYIB)	218,448-1476-74-24-B
WØSA(+KCØP,WAØs DCQ SGJ)	206,460-1395-74-24-B
WØHSC(NØBHR,SP9DOV, WD9DTU,WBØs OAJ YVX, WDØAJS,oprs)	29,106- 231-63-11-A

South Dakota

WBØMWJ	123,078- 843-73-20-B
WAØARZ	97,128- 684-71-24-A
NØBZP	25,760- 230-56-15-A
WAØPBL	18,684- 173-54-14-A
KBØQA(+WDØCXU)	183,224-1238-74-24-B

Canada

Maritime - Newfoundland

VE1AJJ	14,220- 158-45- 6-A
WB5UWI/VE1	3060- 51-30- 3-A
VE1WN(VE1s AZB BQS,oprs)	10,000- 125-40- 8-A

Quebec

VE2YU	47,952- 333-72-15-B
VE2GBZ	12,614- 119-53-11-A

Ontario

VE3GAS	163,228-1118-73-19-B
KB6FR/VE3	151,940-1070-71-23-B
VE3GO	75,184- 508-74-20-A
VE3FCA	23,200- 200-58-12-A
VE3GWM	10,080- 105-48-10-B
VE3MKJ	7502- 121-31-12-A
VE3JTP	1326- 39-17- 2-A
VE3BMV	38- 14- 7- 1-A
VE3BXI(+VE3HGE)	60,306- 437-69-16-A

Manitoba

VE4GN	23,968- 214-56-16-A
VE4AFW(+VE4AFZ)	61,312- 479-64-22-A

Saskatchewan

VE5TT	29,440- 230-64-14-A
VE5AAD	8132- 107-38- 5-A
VE5QM(+VE4IX)	127,428- 861-74-24-B
VE5AG(+VE5s BBQ ZU)	50,952- 386-66-24-B

British Columbia

VE7IN	173,010-1185-73-24-B
VE7CEZ	35,934- 309-63-24-A

Yukon - N.W.T.

VY1AC	13,992- 132-53- 4-A

Check Logs

CW - W1PWK,K2PE,W2AEE, W2LPV,KB4JK,AC5R/4,WD5HRE, WB6ZYA,W8VUV,VE3AWE

Phone - KA1FE,N1R1,K2PE, N2GU,W2NSD(WB8B1H,opr), K3CR,K3NB,KA3BMU,N3ACF, N3BO,W3JSC,W3LR,W3RJ,W3TH, WB3AJC,WB3JCW,KA4NWC, WD5CAW,KB6AA(K6SMH,opr), AK7I,K7EW,KB7P,KL7FDQ/7, K8EKG,K8KI,K8QLM,K8SJE, N8BGJ,N8BNE,W8B1W,W8KNH, W8LHV,WA8PBM,WB8HJX, WB8QXN,WB8RXN,WB8ZEF, WD8KXN,WD8NUM,WD8RBN, WD8SHR,N9BJP,NØAGS (+WBØIUN),WØCDC,VO1AW, VE3AID,VE3QST(VE3OT,opr), VE7CZU

Disqualifications

CW - WA2ECA(WA2ADG,opr) - callsign errors, N4RG - duplicates, WØSA - duplicates, WØYCR - duplicates

Phone - K3LR - callsign errors, K4XS - duplicates, N5KW(+K5CM) - duplicates

Public Service

Conducted By Robert J. Halprin,* K1XA

From the Mailpouch

The following excerpt from a letter written by a West Coast section communications manager expresses an interesting viewpoint, not necessarily that of the conductor.

"I understand and agree with your 'Recruiting Station' (March 1981 *QST*). Guess I'll have to contact W2XD because we have the same problem in our section. But I see it from a different perspective.

"For the entire term that I've been in office, I have yet to get any cooperation from National Traffic System officials in terms of bringing ARES and NTS together. My section traffic manager is a nice guy who hasn't come to any meetings where Amateur Radio Emergency Service people were present. All NTS operators here are only interested in working their schedules. While ARES members know little about NTS, those in NTS seem to have little interest in coupling the traffic system to ARES for any potential emergency use. SETs are a mess. The few ARES operators who can be induced to bend in the direction of traffic and NTS are not met halfway. They are not even acknowledged unless, of course, they put a piece of traffic into the system.

"After talking to others outside the section as well, I have formed an opinion: the National Traffic System, as we know it, is dying.

"While Teletype never did make a dent in the traffic system, the computer is starting to make inroads into the information-handling end of Amateur Radio. It will continue to grow, and the few good traffickers who 'get with it' will make the transition, while the old-timers will continue to enjoy their mode as a-m ops did (do) theirs.

"If we can convert enough progressive traffic people to operate terminals before NTS suffers some kind of mortal blow, portions of the message traffic could begin slowly to be handled within the existing structure (grid system) and increase as time passes.

"I have mixed emotions when I see a good cw operator who says, quite truthfully, that he can run circles around a Teletype net in volumes passed. While the statement is true today, it reminds me of the fabulous abacus trying to compete with an equally competent computer operator.

"There will always be a place in the hobby for good cw people and good phone people and the messages they choose to pass, just as it's a pleasure to watch a salty skipper navigate a boat over thousands of miles of unfamiliar water. But bulk transportation has changed, and bulk information and message handling will also.

"I regret to say that from my observations the National Traffic System operates effectively everywhere the emergency ain't! In general, its aficionados are not interested in emergency work, are not practicing for emergencies, and don't know what to do when an emergency arises. Although one might debate whether ARES and NTS should be separate services, it's doubtful they could ever have become one — all personalities considered.

"So, as we prepare to establish technical and operational standards for data communications, we'll be searching for the very few operators who can be enticed to become data handlers rather than programmers, equipment builders and so on, all of whom will be needed for their skills."

NET DIRECTORY DEADLINE — JUNE 1

The deadline for registering all public service nets for inclusion in the new ARRL *Net Directory* is June 1, 1981. In an effort to increase accuracy and completeness, each ARRL section traffic manager (or section communications manager) has already been asked to register every section and local net that is in existence in the section. Most likely, the STM has already forwarded this information to headquarters — if not, the STM has until the first of June to collect the vital statistics and send them in. Make sure your net has been registered with the STM or SCM. Independent nets (along with NTS area/region nets) will continue to be registered by the individual managers concerned on form CD-85 or equivalent. CD-85 can be obtained from headquarters for an s.a.s.e., but since time is short, it is reproduced here for convenience. Remember, the books close on June 1, 1981.

PUBLIC SERVICE NET
ARRL Net Directory Registration

1. Net Name:		
2. Net Abbreviation (if any):		3. Freq.
4. On what days, based on UTC, does net meet each week?		
5. During the winter, net meets at the following time(s) UTC:		UTC
6. Purpose: ◯ Traffic ◯ Weather ◯ Emergency ◯ .....(specify)	7. National Traffic System? ☐ YES ☐ NO If yes, check one: ◯ Local Net ◯ Section Net ◯ Region Net ◯ Area Net	
8. Direct Coverage:		
9. Liaison(s):		10. Manager's Call:
11. Date Submitted: 19.....		12. Sender's Call:

CD-85(1076) ➲ Return to ARRL, 225 Main Street, Newington, CT 06111

MIDWEST RTTY NET FORMED

For traffic handlers who are active (or want to be) on RTTY, and for RTTY ops who want to get into traffic, the Midwest RTTY traffic net is for you. MRN meets daily at 0330 UTC on 3630 kHz, with 7090 kHz as the alternate frequency, and accepts check-ins from amateurs anywhere in the country who are interested in RTTY message handling. For more information contact the manager, Bill Wright, K4YZU, 1758 West Gaulbert St., Louisville, KY 40310

PUBLIC SERVICE DIARY

☐ Lincoln County, Montana — December 25, 1980. When severe flooding struck the area, members of the Richland County ARES were on hand to help. Using 2 meters and other ht frequencies, amateurs supplied communications for DES and remained at critical areas monitoring water level conditions. (WA7PDC and WB7UTJ)

☐ Westchester County, New York — February 11, 1981. When an aircraft went down in severe weather, amateurs became involved with the search. Using 2 meters, members of the Westchester Emergency Communications Association assisted the county DES office by providing communications for the search teams. After a three-hour search, the downed craft was found. (K2RRR)

☐ Hancock, New York — February 11-12, 1981. When ice floes damaged local telephone equipment, amateurs supplied the only means of communications for the town. Using several 2-meter repeaters and simplex frequencies, the hams assisted in the evacuation of 250 residents and serviced supply requests for Red Cross personnel at evacuation shelters. (W2MTA and WB2SON)

☐ Los Padres National Forest, California — February 13, 1981. Amateur Radio proved valuable recently when an eight-year old sustained head injuries in a fall. Forest Service radio equipment was unable to reach headquarters, so W6RIC and WD6DMK used 2 meters to call the Ventura County Fire Department, ordering a helicopter to evacuate the child. (W6RIC)

☐ Litchfield County, Connecticut — February 25, 1981. An automobile hit an ice patch and plunged over a 100-foot embankment. K1BOP witnessed the accident and immediately reported it via 2 meters. Thanks to his quick response, the driver's life was saved. (K1BOP)

☐ Ranger Mountain, Colorado — February 25, 1981. When an automobile became stuck in a remote area near a cliff, ADØR used 2 meters to notify the State Patrol. (ADØR)

AMATEUR RADIO EMERGENCY SERVICE REPORTS

☐ Bay Minette, Alabama — February 10, 1981. Local ARES members activated to assist local municipal and c.d. personnel when a tornado and severe weather struck the area. Amateurs used 2 meters to relay information to the Mobile (AL) Weather Service. (WB4BXM, EC Mobile County)

☐ Crawford County, Pennsylvania — February 20-21, 1981. When severe flooding occurred in Crawford County, ARES members passed evacuation and water-level information to the county c.d. office. The operation was secured on the afternoon of the 21st when water levels began returning to normal. (WB3IDI, EC Crawford County)

*Assistant Communications Manager, ARRL

In the Los Angeles section, the San Fernando Valley ARES staged a demonstration of the emergency communications capability of Amateur Radio in conjunction with "earthquake awareness week." Shown here are (left to right) Emergency Coordinator N6ZH, District Emergency Coordinator WB6VHS, Section Emergency Coordinator WB6FAK and Los Angeles City Councilman Hal Bernson. *(W6VGQ photo)*

ARRL SECTION EMERGENCY COORDINATOR REPORTS

For February, 38 SEC reports were received, denoting a total ARES membership of 19,152. Sections reporting were: Ala, Alta, Ariz, Ark, Colo, Conn, EBay, EPa, Ill, Ind, Iowa, Kans, La, Me, Mich, Nev, NH, NLI, NFla, NTex, Ohio, Org, SV, SDgo, SF, SJV, SBar, SCV, Sask, SC, SFla, SNJ, VA, WNY, WVa, WMass WPa, Wis.

COMMUNICATIONS SERVICE OF THE MONTH

On the evening of Sunday, November 16, 1980, Santa Cruz County Assistant Emergency Coordinator K6HJU received a call for Amateur Radio communications assistance from the Felton District Headquarters Office of the California Division of Forestry (CDF). CDF reported that a fire was in progress near the headquarters of the Big Basin State Park, that it had consumed approximately 15 acres at that time and that the fire was burning out of control. ARES assistance was requested to begin Monday morning.

K6HJU immediately contacted Santa Cruz Emergency Coordinator, KD6BD, and it was agreed that a net would be commenced Monday morning to provide whatever communications assistance was requested. KD6BD contacted WB6IZF, Santa Clara Valley Section Emergency Coordinator, and put out a general call on 52 simplex and the K6BJ repeater (19/79) in Santa Cruz.

By 8 A.M. Monday, a communications link had been established between Felton-CDF and the main fire camp at Sandy Point, via 2-meter fm. The fire and fire camp were located deep in a canyon of the Santa Cruz mountains, and direct vhf communications were difficult, if not impossible. Relay stations were used on the high ridges for the first few hours.

At about 11 A.M., K6TEH arrived from distant Salinas, California, with his portable repeater for 34/94. That repeater was put into operation at Eagle Rock lookout within an hour and served as the primary ARES frequency. The repeater continued to provide essential, high-quality and totally reliable communications between Felton-CDF and the base camps, and various amateur groups, throughout the entire emergency.

EC KD6BD arrived at Felton-CDF at noon, and spent the rest of the day and evening improving the CDF station antenna system, organizing work schedules and volunteers and establishing liaison with CDF personnel, along with several other hams on the scene.

By 10 P.M., volunteer schedules had been established for coverage of the CDF net control and Sandy Point fire camp stations, as well as a third station at the Huckleberry Creek Fire Camp. All stations were manned by at least two amateurs on a continuous basis at the special request of CDF.

Message traffic was handled primarily through the net control at CDF, with some traffic between fire camps handled directly on the net frequency or 52 direct. K6BJ/rpt and WR6AOK were used extensively for auxiliary links and for recruiting and organizing volunteers.

Felton-CDF net control was equipped with two complete 2-meter fm stations at all times, one on the net frequency and the other used on additional repeaters for organizing, relaying and reporting. Sandy Point and Huckleberry Creek each had at least one operating station at all times, and were usually equipped with back-up equipment, such as hand-helds and so on.

More than 140 fire-related messages were handled. These messages related primarily to logistical matters for the fire-fighting effort including repairs to trucks and equipment, locating lost trucks and equipment, locating mechanics and servicemen and coordinating transport for infrared photographic sensing equipment. Although messages were handled in tactical format, fairly detailed notes were maintained for the vast majority of them, and complete notes are still in the possession of KD6BD.

Traffic was generally light, but everyone agreed that the event provided an excellent training opportunity for all the hams involved. CDF personnel were very pleased with the help we gave them and with the dedication and perseverance of the hams. This was the first time in recent memory that amateurs had worked with CDF personnel on an actual emergency, and CDF was frankly not aware of all that Amateur Radio could do. The three main amateur stations were in continuous operation for approximately 77 hours until the fire, which eventually burned about 400 acres and required 500 CDF personnel to fight, was brought under full control on Thursday, November 20.

Hams responded with time and equipment, many from as far away as Salinas, Monterey, King City, San Mateo and other places. Approximately 32 hams participated on location, and probably about 15 others helped from their home stations. It was estimated that approximately 700 man-hours were contributed by hams who travelled to and worked on location.

I would like to give particular thanks to the many hams who responded willingly and cheerfully to our request for assistance from outside the immediate area, and to my fellow EC's in the Santa Clara Valley section, almost all of whom offered their help and personnel. When you're on the front lines, it's great to know the reserves are there and are with you. Thanks to CDF for some good grub, too! — *Ron Shannon, KD6BD, ARRL Emergency Coordinator, Santa Cruz County*

REPEATER LOG

According to reports received between February 21 and March 21, the following repeaters and simplex frequencies were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Medical Emergency	Vehicular Emergency	Search and Rescue	Fire	Public Safety Events	Drills/Alerts	Power Failures	Total
W1PW								1		1
K2OC	1									1
K2OOD	1									1
W2VL				17						17
WA2JOX	1									1
WR2ABL	1									1
WR2AGH	1									1
WR2AIS			2		1					3
N3AIA				3	1				1	5
N3AQ	1									1
W3EEK	1			3					4	8
WA3ZXG	2			1			2	4		9
WR3ACZ	1									1
WR3AEC	1									1
WR3AES	1									1
WR3AGU	1									1
WR3AHN	1									1
VE3YQT							1			1
WB4TON				2				4		6
WB5VFF				1						1
K6TZ			3	9	4					16
KG6RN							1			1
W6IYY				6			1	4		11
W6PVR				1	1			4		6
WA6EUZ				5		1				6
WA6VNN								1		1
WA6WTT			1	4					1	6
WB6PVS			4	2			1	4		11
WR6ABD			1							1
K7CC				2	9					11
WR7ACE					1					1
WA8ULB					2					2
WR8ADO					1			3		4
WR8AES								3		3
WR8AJL								1		1
WR8ARB					3					3
W9FUL								2		2
WR0AMX	38									38
Total	52		9	4	60	7	1	6	31	6	176

NATIONAL TRAFFIC SYSTEM

Personnel department: Dot Black, WD4CNQ, has been appointed manager, 4RN/c2, replacing Warren Gibson, WA4CCK, who is now assistant manager, EAN/c2. WØHXB has removed the word "acting" in front of his title of TCC Director-Pacific Area/c2, following an endorsement by the NTS Pacific Area Staff.

Section department: The Quebec Section Net (QSN) has been reactivated with VE2PJ as Net Manager. It meets nightly on 3643 kHz at 0030 and 0245 UTC. The Vermont Net (VTN) meets on 3614 kHz at 0000 UTC seven days a week. WB1ABQ is the Net Manager. Amateurs in those two sections are cordially invited to participate in their NTS section nets.

February Reports

1	2	3	4	5	6	7
Cycle Two						
Area Nets						
EAN	28	1507	53.8	1.129	95.2	
CAN	28	934	33.4	.498	100.0	
PAN	54	623	11.5	381	100.0	
Region Nets						
1RN	55	470	8.5	.303	87.5	100.0
2RN	52	635	12.2	.624	83.2	100.0
3RN	28	385	13.7	.520	93.8	92.9
4RN	56	1101	19.7	.707	85.7	96.4
RN5	28	536	19.1	.438	98.7	100.0
RN6	81	377	4.6	.221	68.0	96.4
RN7	56	448	8.0	.516	98.0	96.4
8RN						100.0
9RN	62	491	7.9	.376	100.0	100.0
TEN	28	224	8.0	.177	76.0	100.0
ECN						79.3
TWN	51	227	4.5	.287	58.2	96.4
TCC						
TCC Eastern	104[1]	546				
TCC Central	76[1]	395				
TCC Pacific	94[1]	373				
Cycle Four						
Area Nets						
EAN	28	2161	77.2	1.822	96.4	
CAN	28	1014	36.2	1.045	99.4	
PAN	28	1163	41.5	1.288	97.6	
Region Nets						
1RN	56	843	15.1	584	90.8	100.0
2RN	84	966	11.5	.740	97.1	100.0
3RN	56	516	9.2	.632	97.6	92.9
4RN	56	935	16.7	.628	95.4	92.9
RN5	56	686	12.3	.524	94.9	100.0
RN6	56	737	13.2	.492	—	98.2
RN7	56	768	13.7	.996	99.7	94.6
8RN	56	619	11.1	.517	98.2	92.9
9RN						98.2
TEN	56	398	7.1	.398	92.9	100.0
ECN	56	219	3.9	.419	91.1	100.0
TWN	56	538	9.6	508	97.5	100.0
TCC						
TCC Eastern	103[1]	535				
TCC Central	76[1]	409				
TCC Pacific	110[1]	815				
Sections[2]	5987	35,095	6.0			
Summary	7378	58,689	8.0			
Record	6996	51,585	24.3			

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (218): APSN ATN (AB), AENB AEND AENJ AENK AENM AENR (AL), ATEN HARC (AZ), BCEN (BC), NCN NCTN SCN (CA), CN CPN NVHFTN RASON WESCON (CT), BEN FAST FMSN FMTN FPON FPTN MEN PEN QFN SBEN SPARC SWFTN TPTN (FL), CGVN CVEN GCN GSN GSSBN GTFCN GTN OHEN (GA), 75MN ICN ITEN TLCN (IA), ILN (IL), IGN ITN QIN (IN), KPN KSBN QKS (KS), KYN (KY), LAN LRN (LA), EM2MN EMRI EMRIPN EMRISS HHTN NEEPN RIEM2MTN WMFN WMN (MA/RI), AEN MPSN MSN PTN SGN SPSN (ME), MACS MITN MNN QMN SEMTN UPN (MI), MNAMWXN MSN MSPN (MN), ACE NEMOE (MO), APN (MR/NF), MTN (MS), MEPN MMN MTN WRIN (MT), CMN CNCTN JFK M2MEN P22O RARS THEN TRN (NC), CN CNN (NC/SC), DATA FORX YLWX (ND), CC2MN MN2MN MNARES NCHN NE160 NE40 NE75 NMPN NP2MN NPMN NQCN NSN P2MN PV2MN WNN (NE), GSFM GSPN NHN NHPN JSARS (NH), NJN NJPN NJSN NJVN NWNJVN OBTTN SOCTN UCETN (NJ), NSN (NV), CNYTN LIMARC NLI NLIPN NLISCVHTN NLIVHFN NYPON NYS OCTEN STAR WDN (NY), ALERT BN FRCN LCNWOARES OSMN OSN OSSBN TATN VWCARES (OH), OFON OLZ OPEN OTWN STN (OK), BSN ORARES OSN PTTN SOARESVHF WCN

(OR), D3ARES EPA EPAEPTTN HARC NWPATMTN WPA WPAPTN WPATMTN (PA), QSN WQV/UHF (PQ), BR2MN CSLN D6MN LC2MN NCARES SC2MSSBN SCNTN SSBN TARCARES WSCEN YC2MN (SC), PWXN RARA S2MN SATN SPN (SK), TN TNVHFTN TPN TSN (TN), DFW TEX TSN TTN (TX), BUN UCN (UT), VLN VN VNTN VSBN VSN (VA), VTN (VT), PSTS WSN (WA), WINC WINO WINS (WE/IN), BEN BWN NWTN WIN WNN WSBN WSSN (WI), WVFN WVN WVNN (WV).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

The following received certificates (years of service in parentheses) by virtue of activity at TCC-Pacific/c4: KT6A (1), W7AK (1), K7MC (1), WØHXB (1), KØBN (5), VE7ZK (6), KØTER (7), W7EP (8). For TCC-Eastern/c4: W2FR (18), W3FAF (4).

1	2	3	4	5
Cycle Two				
TCC Eastern	112	92.8	1095	546
TCC Central	84	90.5	651	395
TCC Pacific	112	83.9	747	373
Summary	308	89.1	2499	1317
Cycle Four				
TCC Eastern	125	82.4	1641	535
TCC Central	84	90.5	795	409
TCC Pacific	114	96.5	1612	815
Summary	323	89.8	4048	1759

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (February) *Cycle Two* — Eastern Area (N2YL, Director) — K1XA, N1BHH, W1s QYY XX, N2YL, K2PL, W2s CQB RQ XD ZOJ, WB2IQJ, K3JSZ, WB3GZU, W4s JK SQQ, WA4CCK, WB4PNY, AF8V, W8PMJ, WB8YDZ, VE3s ATU CWA GOL. Central Area (W9JUJ, Director) — W4OGG, WD4HIF, K4VM, W5KLV, KA5BSN, KB5UL WA5s INJ RKU, WB5s NKC YDD, K5s BNH KJN PE, W9s JIJ JUJ NXG, WB9WGD, WBØCID. Pacific Area (WØHXB, Director) — W5JOV, KA5DDW, WB6EIG, KM6I, KT6A, W7s DZX GHT TGU VSE, WØs EJD HXB RE, WAØOYI, WBØs FFV LFR MTA, WDØAIT, KØDJ, KDØM, NØBDE. *Cycle Four* — Eastern Area (W4SQQ, Director) — W1s KX NJM, K1s BA EIR GN SSH XA, WA1ZAZ, W2s CS FR GKZ MTA RQ, K2NY, WA2s ICB SPL, W3s FAF PQ, K3KW, WB3GZU, W4s JK MEE SQQ UQ, K4s BKX KNP, KB4N, WB4PNY, N4s KB NK, W8PMJ, WB8WTS, K8KMQ, KC8C, VE3s ATU CWA GOL SB. Central Area (W5GHP, Director) — W4ZJY, W5s RB SBE, N5s BB BT RB TC, K5TL, W9s CXY DND NXG, WB9UYU, WØs AM HI, KØs CW EVH EZ. Pacific Area (KØDJ, Director) — N5NG, W5KH, N6s GW PZ, W6s EOT OA VZT, WB6PVH, KN6C, KT6A, K7s HLR KSA, KB7JW. W7s DZX EP GHT LYA VSE, WA7GYQ, KØs BN DJ TER, WØHXB, WDØAIT, VE7ZK.

Independent Nets (February 1981)

1	2	3	4
Amateur Radio Telegraph Society	28	768	352
Central Gulf Coast Hurricane	28	2852	244
Clearing House	28	310	384
Early Bird	28	930	348
Hit and Bounce	28	506	576
Hit and Bounce Slow	28	134	538
IMRA	24	472	1103
Mid-West RTTY	18	141	170
Mission Trail	28	217	1266
New England Novice	25	70	190
New England Teleprinter	9	23	39
Piconet All Day Watch	180	237	3570
Southwest Traffic	28	119	1313
20-Meter ISSB	24	1331	853
75-Meter ISSB	28	596	1102
7290 Traffic	44	2841	610

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll
February 1981

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 SCM). 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. 5; (9) Participating in a public service event, 5 points, max. 5. This listing is available to Novices and Technicians who achieve a total of 40 or more points.

869
KA9CPA
234
N4EDH
215
W7LRB
205
N1BHH
198
WD8LRT
176
WB3GZU
175
WB2TQC
171
KA1CMR
161
KZ4K
150
WA4PFK
147
WDØAIT
146
WD4COL
140
WB2MCO
138
W2ZOJ
135
W2AHV
134
W7VSE
133
WB4FVV
132
NG4J
131
K4SCL
KY4K
124
KB5TC
123
W7LNE
WA3PXA
121
W9JUJ
WA1TBY
120
WD4AWN
W4NFK
119
W9YCV
118
KA8CPS
117
WA4UTC
KB3DT
115
AF8V
114
W2GLH
113
W5VMY
N8ABA
K2GCE
WD4HIF
WB1CPF
112
KB2HM
K9BVE
WB5YDD
111
WA4CCK
WA5RVT
WB2PJU
110
W2MTA
AA4FG
109
WB1HIH
108
WD8NYN
WB2EAG
WB7DZX
107
K2VX
KA1FBG
KA4LNA
KU4W
N3AZT
WA3WIY
WA4JDH
WA4STO
106
WA2UWA
WA3EHD
103
KT6A
N9AUG
WØOYH
WB2BNY
102
AJ3R
K3JSZ
K8AAZ
KN6C
W4NWM
W5DTR
101
AK1W
KA1BTU
KB8MX
W1TN
100
W1EOF
K1OSM
99
K3CR
VE1WF
98
W5KLV
WA4SRD
W1GUX
W4WXH
97
K4DZM
KB2KW
W2UEZ
WB4WYG
96
W4GPL
WB8JGW
95
W1RWG
W4ANK
W5HMR
WB2HDU
N1NH
94
K3JL
KA4GFU
KB5NX
W4CKS
WA4EIC
W4OGG
93
K4JST
KA1FE
N9BYK
WB1ESJ
92
KA2CTU
KG5L
VE3DPO
W2AET
WD4ALY
91
N9AEI
WD8RNQ
90
KB5UL
N4BZH
N8BJD
W2TCA
WA3NAZ
WA7MEL
89
KA2GSL
N4AXN
N5CEK
N5TC
WØFT
W7GHT
WAØTNM
WA5RKU
WB3CAI
WB8SYA
WD4CNR
88
WA7LGN
WD8IBY
87
KI2D
VE5AE
WØKJZ
WA3DUM
WB5MMI
WDØCID
86
KK5B
WØRE
W9QLW
WA2KOJ
85
KA4ASZ
N7AKX
N8CW
W1BJ
W2XD
W4JK
WB8MTD
84
KBØMB
W8VPW
83
K4EV
K5TL
KA2HNQ/T
N5RB
W7BS
W9NXG
WDØBQG
82
KA3T
KA5CFP
KA6A
KB2WI
KB7JW
N2CR
VE5WM
WB7OEX
WB8YDZ
KC4MW
81
K9PNG
KA4MZY
KE8X
WB4AID
WB5UVX
80
NE4L
VE3GOL
W4FMN
WA1YNZ
79
KA8DJZ
KF8J
N3BKV
N4AZI
N6GW
78
KB4OZ
VE3HTL
W6RNL
W9QBH
WD8KBW
77
AFØO
AGØG
WA2ZJP
WA8GMT
WB6BZZ
76
K5DY
N3EE
N5BT
VE3GT
W3VA
WA7IHS
WB9JSR
WD5JYI
WD8BHE
75
KØEZ
KA5AVQ
W9DM
WB6QBZ
WD4CNQ
74
AJ5F
K8OZ
KA2CLQ
KA9HPQ
N2BDW
N6ANL
73
AG2R
W8EK
WB5LAT
72
KA9GBE
N3AKC
W5CTZ
W5VMP
WB2IDS
WD4JJK
71
KA2GHM
KC5FX
N2BLX
N6AWH
WB5NKD
WA6LVO
70
KØDJ
K8DTG
WØOTF
W1TM
W4LXB
WA4EYU
WB7OFI
69
K3RZR
K7JV
N2BNB
N4PL
N4UF
W8GGZ
W9JIJ
WA8PIM
WB4RUJ
68
K4VHT
KØSI
N2JK
67
KF2T
W5TI
KA3BMV
WB3GZV
KA1KP
66
WB2NAO
WD9AJA
WD5GKM
KB6FC
WB2RMJ/T
K4NLK
KA1DZV
65
WØHXB
WB2AZW
WB2OWO
KB5EK
WA3VIL
64
KA9IHR
W8VE

Brass Pounders League
February 1981

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: WB1EZT, WB2EAG, K3JSZ, WB4FVV, W4GPL, AK4L, WA4LJI, W4SIZ, N5AMK, WB6QBZ, VE7FB, W7LYA, KA8CPS, AF8V, K9BVE, NØAOL, WØHXB, WØHZU, AFØO.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM 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 standard ARRL form.

1	2	3	4	5	6
W3CUL	513	2997	2481	38	6029
NØBQP	29	1275	302	674	2280
KA9CPA	41	964	235	763	2003
WØWYX	54	846	304	542	1746
WA4JDH	0	747	647	6	1400
W9JUJ	5	583	597	20	1205
WAØHJZ	28	695	33	449	1205
WB2IQJ	4	629	506	23	1162
W7DZX	21	549	547	5	1122
WA3WQP	0	566	542	6	1114
W3VR	235	319	510	10	1074
WD4HIF	7	501	511	17	1036
WA6MBZ	10	493	493	10	1006
N1BHH	7	457	413	104	981
KB6FR/VE3	0	488	485	3	976
W9JIJ	14	452	437	15	918
VE3CWA	13	413	457	6	889
WA4STO	6	460	400	1	867
WA2UWA	0	427	417	0	854
WØZWL	0	371	1	445	817
WB8DMF	5	374	365	0	739
WA1TBY	72	280	321	31	704
WB4FVV	3	348	294	32	677
W7VSE	0	351	268	45	662
WD8LRT	31	307	225	97	660
KA8CPS	80	236	275	55	646
W7SQT	0	445	1	160	606
W4NFK	24	264	277	36	601
KØONK	3	473	115	9	600
W4JK	4	279	300	1	584
WA4CCK	0	280	281	15	576
K3JSZ	0	270	298	6	574
AF8V	2	291	267	14	574
K4SCL	1	299	247	15	562
W9NXG	0	272	275	5	552
K4TH	11	243	178	115	547
W1EOF	0	251	280	13	544
N4EDH	9	200	175	153	537
WB4EXA	229	37	236	30	532
WB8UBR	185	76	245	16	522
W3ATQ	3	258	247	12	520
N4PL	14	230	255	15	514
KZ4K	2	264	184	60	510
NG4J	11	238	216	27	502
WA2HSB	12	252	231	11	506
N7AKX (Dec.)	3	331	295	21	650

Multioperator Stations:

W4DUG	3715	77	3761	5	7558
K4KDJ	560	43	561	27	1191
WD4IIO	306	50	306	50	712

BPL for 100 or more originations plus deliveries:

W7LRB	276
N4AET	249
AB4J	164
KA1CMR	124
WA4PFK	108
WA4EQW/m (Dec.)	101

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

WB8SIQ
WD8DYW
WD8KFN
K7NTG
K4EJ
N2BGR/T
VE3KK
WA2EQW
WB2IXR
63
KB4OW
WB5NKC
WD8RHU
62
KØJCP
K6INK
KCØT
KF4U
N2BXB
N3BFL
WØWYX
W1YNE
WA8DHB
WB2PKG
WD9IUX
AK1E
61
AK1J
K6YD
KA7IPS
KB2GT
KB8TA
VE3JLL
VE3LNN
60
K4IWW
K4ZB
KA4FDX
VE3BVG
VE3DUK
VE5HG
W2GJ
W4HON
WA2CUW
WA7DPK
WB2MVC
WD5AAH
WD8QMP
W4ZJY
51
KA5IWF/T
50
WB2AIU/T
48
KA8DEZ/N
47
KA4BBA/T
KA4IKH/N
43
WD8PMW/T
42
KA1CGP/T
KA4ODX/N
41
WD4JTO/N
40
K8LUY/T

Operating News

Conducted By John F. Lindholm,* W1XX

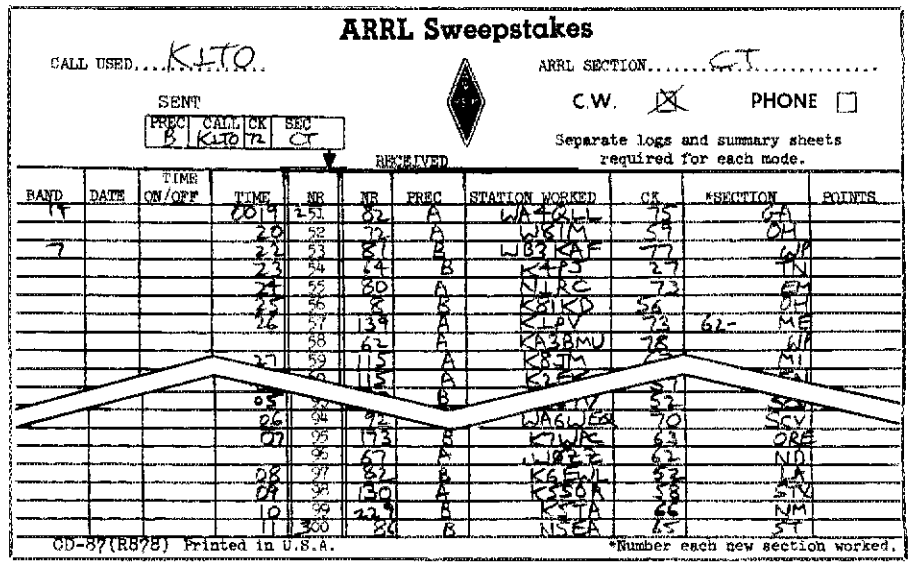
Keeping A Log

Despite FCC relaxation of log-keeping requirements in 1974, maintaining a detailed log has not become a lost art. We were recently reminded of this by KA4LNN, who urged we continue to stress the value of maintaining a log. The practice will not die because it is a matter of great personal pride with the active radio amateur. Before enumerating other reasons for maintaining a detailed station log, let's first review the few FCC requirements that remain.

Information required is limited to the call sign of your station, your signature, location, start and finish dates of operation and, when necessary, similar information for portable operation. There are no mobile log requirements at all, except in the case of handling third-party message traffic. If you operate a station other than your own, you must enter the times and dates you operated the station, plus your own signature and call sign in the log of the station you're operating. If any third-party traffic is sent or received, you must log the names of the third parties and a brief description of the message. Maintaining a file of such messages in their entirety, of course, meets this requirement. The station log must be kept for a period of one year from the date of last entry and be made available to the FCC for inspection if required.

Additional entries must be made for auxiliary and remotely controlled stations, as well as with some repeater operation. More detailed information on this can be found in chapter 6 of the ARRL *License Manual*.

Many have generally not been satisfied with the above "bare bones" logging, especially those licensed previous to 1974 who keep a detailed log simply out of habit. Many well remember logging every "NST" and CQ. Although most amateurs no longer log every single contact and transmission, keeping a detailed log of activity has many virtues to newcomers and old-timers alike.



ARRL Sweepstakes

CALL USED... K1TO ARRL SECTION... CT

SENT: PREC B | CALL K1TO | CK 72 | SEC CT

C.W. ☒ PHONE ☐

Separate logs and summary sheets required for each mode.

RECEIVED

BAND	DATE	TIME ON/OFF	TIME	NR	NR	PREC	STATION WORKED	CK	SECTION	POINTS
14			2019	251	82	A	WA4BLL	75	GA	
			20	52	32	A	WB1M	59	OH	
7			22	53	81	B	WB3KAF	77	WV	
			23	54	64	B	K4PJ	27	TN	
			24	55	80	A	N1RC	73	EM	
			25	56	8	B	KB1KD	56	OH	
			26	57	139	A	K1PV	73	ME	62
				58	62	A	KA3BMU	75	WV	
			27	59	115	A	K8JM		MI	
					115	A	K2EA		NJ	
			05	60		B		57		
			26	64	92		WA6LVE	52	SF	
			07	65	173	B	K2WR	70	SCV	
				66	67	A	WB2EZE	63	ORE	
			08	67	82	B	K8EWL	62	ND	
			09	68	130	A	K3SOR	52	MI	
			10	69	229	B	K5TA	58	STX	
			11	300	50	B	N5EA	66	NM	

CD-87(R878) Printed in U.S.A. *Number each new section worked.

Dan, K1TO, keeps a neat running log sheet during contests like Sweepstakes, while maintaining a rate shown here in excess of 50 contacts per hour on cw.

Besides the personal pride mentioned earlier, there are some practical reasons for maintaining an accurate and neat station log. The final courtesy of confirmation still involves the QSL, which can only be documented by a station log. With the popularity of such awards as DXCC and WAS, which require submission of QSLs, a log is a necessity. When you work a new one in a DX pileup, it is certainly comforting to know that you're "in the log." All contest activities and Field Day require that accurate logs be kept as final proof of contact. Some less obvious justification for keeping a log is to facilitate the investigation of any potential unauthorized "bootleg" use of your call, and possible RFI/TVI complaints. But the most compelling rationale continues to be that amateurs by and large simply prefer to have an accurate record of their station activities.

We may not have seen the end of FCC relaxation of logging requirements. The Commission's proposal to revise the Amateur Radio Service Rules into plain language may effectively eliminate all logging requirements. Although this is seen as easing an "unnecessary record-keeping burden," we feel that amateurs will continue to recognize the need for keeping a station log for their own purposes.

I suppose we would be remiss if we did not suggest you consider the *ARRL Universal Logbook* as your means to better operating record keeping. The horizontal-format log has adopted a new look that we think you will find appropriate for ragchewer, contester and DXer alike. It is the result of consolidating the log "wish list" of a number of active amateurs into one attractive and utilitarian format. We think it's the best log around, tailored to today's operating.

See you later on down the log.

JANUARY CD PARTY

Leaders in the January CD Party are listed below. Competition on cw was extremely heated, with many close scores near the top. Top scorer on phone, AG7M, is an Official Observer and Official Relay Station, while the cw leader, W2GD, serves as Assistant Director in the Hudson Division. — *Tom Frenaye, K1KI*

CW

W2GD	34,320-572-60-10-NNJ
K2KIR	33,489-549-61-10-WNY
K7NHV	32,096-544-59-10-ID
N6TR	32,037-543-59-10-SB
K6LL/7	31,903-523-61-10-AZ
WN4KKN	30,840-514-60-10-AL
W2RQ	30,740-530-58-10-NNJ
N7DF	29,520-492-60-10-UT
K1XA	29,500-500-59-10-CT
N4ZZ	29,500-500-59-10-TN
W5XX	29,280-480-61-10-MS
AG7M	28,320-472-60-10-WA
WA6OTU	26,100-450-58- LA
N4SA	25,429-431-59-10-NFL
N6NF	24,072-408-59-10-SCV
K4BAI	23,026-397-58-10-GA
W6BIP	22,715-385-59-10-SF
W6UQF	21,417-363-59-10-SDG
KA1R	21,395-389-55-10-EM
KN5H	20,184-348-58-10-STX
WB2SJG	20,068-346-58- 7-NLI

Phone

AG7M	14,688-272-54-10-WA
KB6FR/VE3	13,988-269-52-10-ONT
WB1HIH	12,428-239-52-10-WM
KA1R	11,025-225-49-10-EM
K5CM	10,900-218-50- 9-OK

*Communications Manager, ARRL

SCM ELECTION NOTICE

To all ARRL members in the Southern Texas, Colorado, San Francisco, British Columbia, Sacramento Valley, Los Angeles, Georgia, West Virginia and Washington sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. 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*. No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

Petition forms (CD-129) are available on request from ARRL headquarters but are not required. The following form is suggested:

(Place and date)

Communications 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 Communications Manager for this Section for the next two-year term of office. (Signature . . . Call . . . City . . . ZIP).

An SCM candidate must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, June 5, 1981.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on July 1, 1981 and returns counted August

18, 1981. SCMs elected as a result of the above procedures will take office October 1, 1981.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition for a two-year term beginning October 1, 1981.

If no petitions are received for a section by the specified closing date, such section will be resolicited in October *QST* and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

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

John F. Lindholm, W1XX
Communications Manager

SCM ELECTION RESULTS

The following were elected for two-year terms of office beginning July 1, 1981:

Uncontested: Nebraska — Shirley M. Rice, KAØBCB; *New Hampshire* — Robert C. Mitchell, W1NH/W1SWX; *Northern New Jersey* — Robert E. Neukomm, KB2WJ; *Rhode Island* — Gordon Fox, W1YNE; *San Joaquin Valley* — Charles P. McConnell, W6DPD; *Alberta* — E. Roy Ellis, VE6XC; *MDDC* — Karl R. Medrow, W3FA; *Nevada* — Ralph E. Covington, Sr., W7SK.

FREQUENCY MEASURING TEST

Ninety-eight participants submitted a total of 1430 individual measurements for the February 15 FMT. The umpire measured frequencies for the early run at 14,063.834, 7056.089 and 3501.203 MHz, and the late run at 7128.922 and 3553.410 MHz. The late "twenty" was not heard. Eighty-two were able to measure within 100 Hz of the umpire, an annual requirement of Official Observer "precise frequency measurement." They are listed as follows, with an average error preceding their call signs: (0 Hz) W1PLJ K2RG W5IJW AH6D W6BEW K6MZN W6RQ WB6ZHN WA7DUY WA7PHD W8CUJ W8OK WØUSL VE3FVU DJØSG ex-7HM, (1) W1JH WA3RXE WA4AXA WA4CAW W4IBU W4NTO W5FMO K5JV WA5NOM KH6JNT K7CC W8UCI W9EJ KØBRS, (2) WB2YIZ W5SG KR4XL WB8RSQ VE3AC, (3) W2YTO W3WD KB4WI AI5P, (4) WB4PMG W8ZM, (5) W7SC WØDJV, (6) K3DI K7AW WB8STQ, (7) WB6CBX WØPBP, (8) WA7CYQ, (10) W2SBI (11) N7BCS, (12) W4PKD, (14) W4QN WDØEKP, (15) W3FYK WB8UPN, (17) W2ND, (18) W3KEK, (21) KE5A, (22) W4HU, (26) KB5NX VE3FCU, (28) WØIJY, (29) W8LX WØGW, (31) N1QY, (33) AAØJ, (34) KH6CZ, (38) K9WMP VE3GIV, (40) K4AO, (41) WA3YTI, (46) W8ZRL, (48) W3BFF, (50) KAØDWX, (53) NØAJP VE7FDR, (67) W4UCL, (73) K6SUO, (75) K5KQG, (91) W3GVR, (93) AG3H. All entries measuring over 100 Hz have been notified individually.

Excerpts

This is my first attempt in the FMT, and I enjoyed it very much. I used a digital mixer on the Collins 75S3C as well as a scope/audio oscillator to measure the audio-frequency difference (AH6D). My measurements were made with a Ramsey CT-50 frequency counter which measured the frequency of the exciter output of my Heath SB-400 (final off, of course, and antenna disconnected from the transmitter). The signal from the transmitter was adjusted to be the same as the W1AW signal by feeding the receiver audio (beat note) to the vertical deflection channel of a scope and a constant audio tone to the horizontal. A 1:1 Lissajous pattern from both signals indicated equal frequency for the reading. No effort was made to calibrate the counter, which has been kicking around the shack for at least two years without any adjustments (W2SBI). My procedure was to adjust the marker frequency on my well-warmed Collins 75 A-4 to WWV at 15 MHz, then determine the error of my frequency counter at the nearest 100-kHz marker spot on each band, then find the W1AW signal. I zero beat the W1AW signal with a transmitter in tune position and measured the frequency of the transmitter VFO. I took three or four measurements of each signal, averaged them and applied the counter correction (AAØJ). The next scheduled FMT will be on May 9 (UTC). Please check the "Contest Corral" column in April *QST* for full details. — *Jeannie DeMaw, W1CKK*

W1AW NOTE

The complete W1AW summer operating schedule appears in April *QST*, page 94. A W1AW schedule also is available on request from ARRL headquarters. Please enclose an s.a.s.e. See the "Contest Corral" section of *QST* for times and dates of W1AW Code Proficiency Runs. QST

OSCAR Operating Schedule

Date (UTC)	OSCAR 7 Orbit No.	Time (UTC) Hr Mn	EQX W. Long. (Degrees)	OSCAR 8 Orbit No.	Mode	Time UTC Hr Mn	EQX W. Long. (Degrees)
1 May	29,545	0050	90.8	16,076	A + J	0013	63.4
2 May	29,558	0144	104.2	16,090	J	0018	64.6
3 May	29,570	0044	89.0	16,104	J	0022	65.8
4 May	29,583	0138	102.6	16,118	A	0027	67.0
5 May	29,595	0037	87.5	16,132	A + J	0032	68.2
6 May	29,608	0131	101.0	16,146	X	0036	69.4
7 May	29,620	0031	85.9	16,160	A	0041	70.7
8 May	29,633	0125	99.5	16,174	A + J	0046	71.9
9 May	29,645	0024	84.3	16,188	J	0051	73.1
10 May	29,658	0118	97.9	16,202	J	0055	74.3
11 May	29,670	0018	82.8	16,216	A	0100	75.5
12 May	29,683	0112	96.3	16,230	A + J	0105	76.7
13 May	29,695	0011	81.2	16,244	X	0109	77.9
14 May	29,708	0105	94.8	16,258	A	0114	79.1
15 May	29,720	0005	79.6	16,272	A + J	0119	80.3
16 May	29,733	0059	93.2	16,286	J	0123	81.5
17 May	29,746	0153	106.8	16,300	J	0128	82.7
18 May	29,758	0053	91.6	16,314	A	0133	84.0
19 May	29,771	0147	105.2	16,328	A + J	0137	85.2
20 May	29,783	0046	90.1	16,342	X	0142	86.4
21 May	29,796	0140	103.6	16,355	A	0004	61.8
22 May	29,808	0040	88.5	16,369	A + J	0008	63.0
23 May	29,821	0134	102.1	16,383	J	0013	64.2
24 May	29,833	0033	86.9	16,397	J	0018	65.4
25 May	29,846	0127	100.5	16,411	A	0022	66.6
26 May	29,858	0027	85.3	16,425	A + J	0027	67.8
27 May	29,871	0121	98.9	16,439	X	0032	69.0
28 May	29,883	0020	83.8	16,453	A	0036	70.2
29 May	29,896	0114	97.4	16,467	A + J	0041	71.5
30 May	29,908	0014	82.2	16,481	J	0046	72.7
31 May	29,921	0108	95.8	16,495	J	0051	73.9
1 June	29,933	0007	80.6	16,509	A	0055	75.1
2 June	29,946	0102	94.2	16,523	A + J	0100	76.3
3 June	29,958	0001	79.1	16,537	X	0105	77.5
4 June	29,971	0055	92.6	16,551	A	0109	78.7
5 June	29,984	0149	106.2	16,565	A + J	0114	79.9
6 June	29,996	0049	91.1	16,579	J	0119	81.1
7 June	30,009	0143	104.7	16,593	J	0123	82.3

Orbit predictions by Project OSCAR, P. O. Box 1136, Los Altos, CA 94022. To keep abreast of the latest developments, tune in to the regular phone and cw bulletins over W1AW, AMSAT bulletins transmitted around 29.490 MHz on Mode A, 145.960 MHz on Mode B, and 435.160 Mode J, during O 7 and O 8 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays; Mid States at 0200 UTC; West Coast at 0300 UTC, all on 3850 kHz lsb); (international net at 1800 UTC Sundays on 14,280 kHz usb and 1900 UTC Sundays on 21,280 kHz).

O 7 progresses an average of 28.7372° W. per orbit in a period of 114.9415 minutes.
O 8 progresses an average of 25.8006° W. in a period of 103.1921 minutes.

O 8 modes of operation are Mondays and Thursdays — Mode A, Tuesday and Friday — Mode A + J. Saturdays and Sundays — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D. Mode A + J is simultaneous operation of both transponders.

Mode J Club

Become a member of the Mode J Club. Complete eight Mode-J contacts. QSL cards are not required. Just list the call sign of each station worked, date, orbit number and station equipment used. Send this information along with $3 in U.S. funds, a one-time charge to cover the certificate and newsletter costs, to Mode J Club, c/o Larry Roberts, W9MXC, 3300 Fernwood, Alton, IL 62002.

OSCAR 8 QSL

To receive an OSCAR 8 QSL card, send a copy of the telemetry from the 29.402- or 435.095-MHz beacons. Please send your report, along with an s.a.s.e., to ARRL hq.

Spacecraft Frequencies

Spacecraft	Uplink	Downlink	Beacon
O 7			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.502 MHz
Mode B	432.125-432.175 MHz	145.975-145.925 MHz	145.972 MHz
O 8			
Mode A	145.850-145.950 MHz	29.400-29.500 MHz	29.402 MHz
Mode J	145.900-146.000 MHz	435.100-435.200 MHz	435.095 MHz

Formulas for calculating approximate downlink frequencies. x = downlink frequency.

OSCAR 7

Mode A: x = uplink frequency − 116.450 MHz ± Doppler shift
Mode B: x = uplink frequency − 578.100 MHz ± Doppler shift

OSCAR 8

Mode A: x = uplink frequency − 116.458 MHz ± Doppler shift
Mode J: x = uplink frequency − 581.106 MHz ± Doppler shift

Note: A minus sign in front of the downlink frequency indicates that the passband of the satellite is inverted in that mode. This means that signals transmitted up to the satellite at the low end of the uplink passband will appear at the high end of the downlink passband.

Additionally, upper-sideband signals transmitted on the uplink will appear as lower-sideband signals on the downlink.

Further information on the radio amateur satellite program can be obtained free of charge from ARRL Hq.

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Tom Frenaye,* K1KI

MAY

2-3

County Hunters SSB Contest, April *QST*, page 96.

Alexander Volta RTTY DX Contest, April *QST*, page 96.

5

West Coast Qualifying Run, (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0400Z May 6 (9 P.M. PDST May 5). Frequencies are approximately 3590/7090. Underline one minute of the highest speed you copied, certify that your copy was made without aid, and send to ARRL for grading. Please enclose your full name, call (if any) and complete mailing address. A large, self-addressed envelope will help expedite your award/endorsement.

8-9

ARRL Frequency Measuring Test, April *QST*, page 96.

9-10

ARRL International EME Contest, part II, March *QST*, page 76.

World Telecommunications Day Contest, phone, April *QST*, page 96.

CQ-M Contest (USSR), April *QST*, page 96.

10 Meter RTTY Contest, March *QST*, page 82.

Rocky Mountain Division QSO Party, April *QST*, page 96.

11

W1AW Qualifying Run, 35-10 wpm at 0200Z May 12 (10 P.M. EDST May 11). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. See May 5 listing for more details. A complete W1AW schedule appears on page 94 of April *QST*, or is available for an s.a.s.e. from ARRL.

16-17

Armed Forces Day, this issue, page 81.

World Telecommunications Day Contest, cw, April *QST*, page 96.

Michigan QSO Party, sponsored by the Oak Park ARC, from 1800Z May 16 until 0300Z May 17, and 1100Z May 17 to 0200Z May 18. Exchange signal report, serial number and QTH (county for MI stations; state/country for others). Suggested frequencies: phone — 1815 3905 7280 14,280 21,380 28,580 50,125 145.025; cw — 1810 3540 7035 14,035 21,035 28,035; Novice — 3725 7125 21,125 28,125. Count one point per phone and two points per cw QSO. MI stations multiply by sum of MI counties, U.S. states and DX countries worked for final score. Non-MI stations multiply by number of MI counties worked (max. 83). Contacts with club station W8MB count 5 points each. Vhf-only entries: add multiplier per band, no repeater QSOs, five points per OSCAR QSO. Club competition for MI clubs. Mail entry by June 30 to Mark Shaw, K8ED, 3810 Woodman, Troy, MI 48084.

Massachusetts QSO Party, sponsored by The Greater New Bedford Contesters, from 1600Z May 16 until 0200Z May 18. Exchange signal report and QTH (county for MA stations, state/province/country for others). Suggested frequencies: phone — 1820 3960 7260 14,290 21,390 28,590 50.110; cw — 1810 and 60 kHz from low end; Novice — 7120 21,120 28,120 (cw in the cw bands only). Count two points for phone and four points for cw QSOs. MA stations multiply QSO points by sum of MA counties, states and provinces (not countries) worked. Others multiply by total MA counties worked. Club competition for MA stations. Mail entry by June 30 (35¢ postage for results) to Larry Purcell, N1AS, 146 Armour St., New Bedford, MA 02740.

Florida QSO Party, sponsored by *Florida Skip*, from 1400-1900Z May 16, and 0001-0500Z and 1500-2300Z May 17. Separate phone and cw contests. Two entry classes for FL stations: (A) portable or mobile using emergency power running 200 W or less outside home county, (B) everybody else. Exchange signal report and QTH (county for FL; state/province/country for others). Suggested frequencies — phone 3945 7279 14,319 21,379 28,579 50.2 146.52; cw — 55 kHz from low end. FL stations: Count one point per QSO, multiply by sum of states (max. 49), provinces (max. 12), countries (max. 27) worked for final score, others: Count two points per FL QSO, multiply by FL counties worked. FL Class A stations multiply by 1.5 for final score. FL club competition. Entries must be received by June 15. Send to Florida Skip Contest Committee, Box 501, Miami Springs, FL 33166.

23-24

Iberoamerican Contest, sponsored by Union Radioaficionados Espanoles, from 2000Z May 23 until 2000Z May 24. 80-10 meters, phone only. Work Iberoamerican countries: CE CO CT CT2 CT3 CP C9 CX C31 EA EA6 EA8 EA9 HC HI HK HP HR KP4 LU OA PY TG TI XE YS YV ZP. Exchange signal report and serial number. Count one point per QSO. Multiplier is sum of Iberoamerican countries worked per band. Participation award for 50 QSOs. Entry must be received by July 15. Mail to URE, Box 62, Moliet del Valles, Spain.

28

W1AW Qualifying Run, 10-35 wpm at 2000Z (4 P.M. EDST). See May 11 listing for details.

30-31

CQWW WPX Contest, cw, March *QST*, page 82.

JUNE

3

West Coast Qualifying Run, 0400Z June 4 (9 P.M. PDST, June 3). See May 5 listing.

6-7

New York State QSO Party, sponsored by SUNY-Buffalo, from 1700Z June 6, until 0500Z June 7, and 1200-2359Z June 7. Exchange signal report, serial number, and QTH (county for NY stations; state/country for others). Suggested frequencies: phone — 3900 7275 14,285 21,375 28,550; cw — 1810 and 60 kHz from low end; Novice — 3725 7125 21,125 28,125. Count five points per QSO. NY stations multiply QSO points by sum of states, provinces, countries. Others multiply by NY counties worked. S.a.s.e. for results. Mail logs by July 10 to Scott Bauer, WA2LCC, 816 E. Fillmore Ave., East Aurora, NY 14052.

9

W1AW Qualifying Run, 10-40 wpm at 0200Z June 10 (10 P.M. EDST June 9).

13-14

ARRL VHF QSO Party, this issue, page 82.

20-21

All Asia Contest, phone

S.M.I.R.K. QSO Party

23

W1AW Qualifying Run

27-28

ARRL Field Day

JULY

11-12

IARU Radiosport Championship

AUGUST

8-9

ARRL UHF Contest

Standard Contest Guidelines

1) Make sure your log details the date, time, band, call sign and complete exchange sent and received, for each QSO claimed for the contest credit.

2) Your summary sheet should indicate your score, including how you figured it, and a declaration that you followed FCC/DOC regulations and the contest rules. Your name, call sign and complete address should be typed or printed in block letters.

3) Crossband, crossmode and repeater contacts are usually not permitted. Contacts with the same station on different bands are usually permitted.

4) Your log should be checked carefully for duplicate QSOs and, if more than 200 QSOs are made, dupe sheets should be included with your entry.

5) Your log may be considered a checklog or disqualified if it is incomplete or if too many errors are detected by the contest committee.

6) Avoid standard net frequencies.

7) International contests generally offer awards to top scorers from each U.S. call area and each country; state QSO parties to each state/province.

8) Your summary sheet should include the following statement: "I have observed all competition rules as well as all regulations established for Amateur Radio in my country." The declaration should be signed and dated.

*Assistant Communications Manager, ARRL

Strays

GOOD NEWS TRAVELS FAR

☐ The birth announcement of Anthony Nicolas Laubach traveled over 11,000 miles via Amateur Radio. Bill McCoy, KD6GP, put through a phone patch from the Point Mugu (California) Radio Club Station and mother Liz' hospital to new father LTJG James M. Laubach, stationed in Antarctica. Though the happy news didn't come as a complete surprise, it did leave Lt. Laubach "a little incoherent" — a condition that this time probably couldn't be blamed on poor band conditions!

RUN FOR THE ROSES

☐ The 1981 Kentucky Derby will be commemorated by the special-events station operation, W4CN, to be held from 1100Z April 30 to 0400Z May 1, by the Amateur Radio Transmitting Society of Louisville, Kentucky. Approximate frequencies used will be 21.115 MHz — cw; 14.285 and 7.240 MHz — phone. Send a large s.a.s.e. to ARTS, W4CN, 5504 Datura La., Louisville, KY 40258.

QST congratulates . . .

☐ Cameron Pierce, K6RU, who was named "1980 Contester of the Year" by the Northern California Contest Club. Now 63 years old, Cam has reason to be proud — the average age of NCCC members is under 30!

I would like to get in touch with . . .

☐ anyone having photos and brief outlines of teenaged and younger hams' beginnings in Amateur Radio for a children's book I am writing on the subject. Carl Woodcock, WA2KWW, Rising Sun Tavern Rd., Clarksburg, NJ 08510.

Section Activities

A-1 OPR ✕ EC ✕ DXCC ✕ RCC ✕ WAS ✕ STM ✕ OES ✕ OTS ✕ NM ✕ SCM ✕ ARES ✕ OVS ✕ SEC ✕ OBS ✕ TCC ✕ OO ✕ NTS ✕ WAC ✕ CP ✕

CANADIAN DIVISION

ALBERTA: SCM, E. Roy Ellis, VE6XC — SEC: VE6XC, A/SCM: VE6AMM, STM: VE6ABC, NMs: (ATN) VE6ABC, (APSN) VE6AFO. Congrats to VE6ABC on his appointment to Asst Dir of CRRL for this area and to VE6BJD, an ardent ARES man, on passing his Advanced. CARA put on an excellent demo of RTTY and computers at their monthly meeting. Yours truly attended to gain some know how for a possible ARES net. Looking for volunteers for the Boy Scout Jam to be held in Edmonton July 1-13. Preparations for the Alberta Hamfest to be held July 31 to Aug 2 at Andrew fairgrounds, Andrew Alta continue. Traffic: VE6CHK 176, VE6ABC 51, VE6XC 18.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — British Columbia Emergency Net 3650 kHz at 0300Z has a new Net Manager, VE7CSI. We all wish to say thanks to VE7COA for his years as NM and welcome our new NM. British Columbia Public Service Net 3650 kHz at 0200Z activity check-in High 185, Low 105 average 150, total for 28 days, 4,194. Vancouver ARC held a unique ceremony last meeting by presenting those that passed the DOC examines with a certificate awarded by the Instructors Group. They also set up simplex on two and were awarded first contact certificates by working the president, VE7APT, across the room. Traffic: VE7ZK 67, VE7FB 51, VE7COA 30, VE7BLO 26, VE7CCJ 23, VE7EON 19, VE7BNI 14, VE7BZI 11, VE7BLK 6.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst ASM: VE4JP. SEC: VE4TR. Asst SEC: VE4HK. STM: VE4RO. NMs: VE4s VJ TE AEJ NM. Due to lack of snow several winter events were canceled. VE4FK is holidaying in southern USA and is heard from time to time. VE4GJ is back home from the hospital and doing FB. VE4HK has been appointed as Asst SEC and will help as a backup for VE4TR. MEPN QNI 1047, QTC 18, sess 28. MMN QNI 524, QTC 28, sess 28. MTN QNI 253, QTC 91, sess 28. WRIN QNI 144, QTC 1, sess 4. Traffic: VE4AEJ 59, VE4PG 53, VE4RO 44, VE4TE 33, VE4YE 22, VE4AAD 15, VE4JA 15, VE4ID 14, VE4AJE 10, VE4LN 10, VE4APO 6, VE4NM 6, VE4NE 5, VE4LB 4, VE4ADS 3, VE4AP 3, VE4AAT 2, VE4CR 2, VE4JP 2, VE4AAE 1.

MARITIME—NFLD: SCM, D. R. Welling, VE1WF — A/SCM: VO1FG, NM: VO1JN VE1WF. SEC: VE1EI. STM: open. VE1LCR rcvd 1 CARE AWARD for outstanding Public Service. VE1LCR/RO made Hon. Life Member of Armdale Fairview Rockingham Lions Club. Congrats. Several new Asst Dir appts incl. VE1ASJ VE1OC and VE1WF. Congrats. OBS program working well. NBARA is sponsoring an EMO seminar in Fredericton on May 23. All amateurs are invited to attend. Watch for further announcements on various nets. Hospital — VE1AHW. Silent Key — VE1YX. APN, 28 sess, QNI 166, TFC 62, time 320 mins. APN is looking for more traffic handlers anyone welcome. Traffic: (Feb.) VE1WF 220, VE1LCR/RO 57, VE1XF 20, VE1BXA 17, VO1AW 11, VE1BSH 5, VE1AUL 4, VE1BPM 3, VE1OC 2. (Jan.) VE1AUL 8.

ONTARIO: SCM, Larry Thivierge, VE3GT — A/SCM: VE3GOL. SEC: VE3GV. STM: VE3QI. The MacLachlan Stroke Unit at the Sunnybrook Medical Centre is named after VE3HDU who was instrumental in raising funds to establish the centre after suffering a serious illness. Using various types of 2 meter gear and battery power, the following members of the Peterboro ARC, VE3s CRT ACD MEW IOZ FDP KQH JNG IRW BAU and KXB, provided communications for the Kawartha Nordic Ski Club cross country event. The Wise Owl Net sponsored by the OVMRC and meeting on repeater VE3TWO, 147.90/30 MHz Fri at 2000 local is one year old. With regret I announce the following have become Silent Keys: VE3s ADX DM GUU JAX KYI MDB and PR. Congrats to VE3JPP who is the first Canadian to win Holland's Zeeland Award. He was also busy with VE3IRB, holding a public service demo at the Pickering Village Retirement Centre where they offered correspondence service for senior citizens via Amateur Radio. Each Wed at 10:20 A.M. at the Longhorn restaurant in Waterloo, a group meets to talk about Amateur Radio. They are the members of the KWARC Coffee Club, numbering some 20 amateurs. Most are retired, coming from all walks of life. VE3CEA is the prez. Niagara Peninsula ARC will be in attendance at the special Bi-Centennial Boy Scout Jamboree to be held at Niagara-on-the-Lake July 2 to 6th. Special prefix CJ3VM has been authorized for the occasion. Field appts: VE3s FN GRO and IBV as OBS and VE3HKW as EC for North Bay. VE3OT, president of the CRRL will be the guest speaker at the May 12th meeting of the Peterboro ARC. VE3GCE who is busy working on his 5BDXCC has been doing a fair amount of OSCAR work and expects to have a station fully capable of Phase III in time for launch. Traffic: (Feb.) KB6FR/VE3 976, VE3CWA 889, VE3JLL 256, VE3GOL 250, VE3KK 216, VE3DPO 176, VE3HTL 167, VE3GT 145, VE3GNW 144, VE3HGJ 140, VE3CYH 89, VE3LNN 52, VE3ISW 47, WE3JRT 40, VE3DZK 34, VE3DVE 29, VE3FPI 28, VE3KOM 28, VE3BVG 27, VE3WM 27, VE3KXB 23, VE3FGV 22, VE3TFC 19, VE3AWE 17, VE3IXB 16, VE3WG 16, VE3AJN 15, VE3AYZ 14, VE3DUK 14, VE3GXM 12, VE3ANJ 11, VE3EWD 9, VE3EFX 7, VE3DZH 1. (Jan.) KB6FR/VE3 40, VE3AWE 37.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2FFE. NM: VE2PJ. New appointment: VE2PJ, as NM for the QSN. VE2YU plans to be on 144 MHz, moonbounce by the spring. VE2s FSA DEA AQU and FRV provided comms at the Laurentian loppet x-country ski marathon. We all wish VE2WH speedy recovery after two weeks in hospital. VE2QST logged close to 200 contacts at the ARRL DX International contest (cw). L'association Radio-Amateur de la Mauricie a plusieures activities pour les prochains mois, dont le Field Day. Ils ont 5 repetitrices, des DXers, techniciens, tournois d'echecs et en plus, un bel esprit de fraternite. Leur Pres. est VE2ZG. Traffic: VE2PJ 90, VE2FKI 80, VE2BP 41, VE2EC 38, VE2FFE 36, VE2FSA 19, VE2EKC 16.

SASKATCHEWAN: SCM, Bill Munday, VE5WM — STM: VE5XC. SEC: VE5II. NMs: VE5DC VE5HG VE5SF VE5TT VE5WM. Net reports: SATN, 28 sess, 350 QNI, 24 QTC; SPN, 28 sess, 1456 QNI, 26 QTC; PWXN, 28 sess, 556 QNI; SKTN2, 28 sess, 210 QNI; RARA2, 28 sess, 467 QNI, 4 QTC; RPRC2, 3 sess, 16 QNI. It is with regret that I announce that VE5AC has become a Silent Key. The Rock Point Repeater Club has started an information net on the VE5XW repeater. Code practice is sent Monday thru Saturday by VE5NF and VE5TT on 3725 kHz at 0845 CST. Traffic: VE5HG 37, VE5WM 28, VE5KS 21, VE5CN 20, VE5AAT 15, VE5AE 15, VE5XC 14, VE5AAY 8, VE5TT 4, VE5PR 3, VE5XY 2.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ. STM: WA3WIY. PSHR: WA3WIY 107, K3JL 94, WA3DUM 87, N3AKC 72. Our sympathy to W3MDJ on the loss of her OM, W3HGA. Lower Delaware amateurs furnished communications for a parade in Seaford, DE held in honor of Greg Persinger, returned hostage. DEPN QNI 62, QTC 6; DTN QNI 361, QTC 61; DSSN (Jan.) QNI 35, QTC 8. Traffic: W3AKC 110, WA3WIY 90, K3JL 40, N8NA 36, WB3FOC 35, WB3DUG 26, WA3DUM 20, K3ZXP 9, W3WD 5, WA3ZBI 5, N3AXH 4, WA3RTX 2, WA3PWT 1.

EASTERN PENNSYLVANIA: SCM, Karl W. Pfeil, W3VA — SEC: WA3PZO. STM: WB3JYZ.

Net	Freq.	Time	QNI	QTC	Sess	Mgr.
EPA	3610	7/10 P.M. Dy	464	347	55	AA3B
EPAEPTN	3917	6 P.M. Dy	469	262	28	AJ3R
PFN	3958	5 P.M. M-S	305	728	26	WA3WQP
PTTN	3610	6:30 P.M. Dy				AG3R

Local and vhf nets reporting: D3ARES, HARCTN, Luzerne Cty, ARES, WARCVTN and WB3JOE/Rpt with a total QNI 352, QTC 96 in 29 sessions. BPL: K3JSZ WA3WQP. OBS reports: K3EBZ W3AVJ and W3VA. OO reports: W3GVR and KC3B. OVS reports: W3GOA and KA3DZD. PSHR reports: K3EBZ W3VA W3GOA W3YZW WB3FYT K3JSZ WB3CAI N3AZT N3BFL WA3VIL WB3HIW WA3EHD KC3B AJ3R KA3DZD WB3GZV AA3C and WB3JYZ. New appointments: WB3OXA EC for Lackawanna Cty, WA3ZXG EC for Cumberland Cty. K3QXC to ORS and WB3DJF to OES, congrats. Upgrades: WB3EFI to big E, KA3CXB to A, N3BIJ to Gen and KA3EYW to Tech, congrats. New officers for FRC: W2LT, pres.; W3BGN, v.p.; K3VW, secy.; WA2DPU, treas. New gear dept: K3ANT and N3AXT IC2ATs, K3EBZ a new TA33 tri-band beam and WB3FKP a new Dentron tuner. WBARA will be celebrating its 25th anniversary this year. WB3FKP reports for first time. K2BPP gave a very interesting talk and showed slides of his recent trip to the North Pole at the EPA VHF Society banquet. New Novice ops in Hazleton area are KA3GSX and KA3GSZ and KA3GUP KA3GUS and KA3GUT in the Warminster area. WB3CAI is new NM for Luzerne Cty ARES net. W3GVR reports electric fence QRM driving him up a wall — anyone offer him some help to cure this? Mt Airy VHF RC now celebrating its Silver Anniversary. New affiliate is the Phila ARC, welcome aboard. Lancaster ARES group hoping to get a "GO" vote on the Standard Tone Alert System. N3BAY reported the part hams played in the recent Matamoras flood. EPA CW Net welcomes N3AZT and nice to hear OTs W3AXA and WJKX back again. Congrats to N3AZT and XYL on new harmonic. WB3FPL reports as EC for Berks Cty that they have more than 12 Public Service events scheduled for the summer months. WB3JYZ took 1st chair at Penna. Music Education Region V Band Festival. WA3CKA completed cw DXCC, now awaiting the cards. WB3FYI on 220 fm. AF3Z reports this is his worst time for ham radio. WA3PZO reports EPA has a total of 350 ARES members with 30 local emergency nets active and 28 with NTS liaison and a total of 120 net sessions, drills or tests. All NCS please try to get your QNS to your NM ASAP so he can get his report to this office by the 10th of the month. Watch this column for details on a section picnic planned for the coming summer. Traffic: WA3WQP 1114, K3JSZ 574, AJ3R 235, WA3EHD 215, WB3CAI 176, W3IPX 174, N3AZT 121, W3VA 105, WB3GZV 102, AA3B 101, KC3B 76, N3CD 72, K3EIP 70, WB3CUF 62, W3ID 62, N3BFL 58, WB3JYZ 56, KB3LF 49, WA3VIL 49, K3WPL 38, WA3GUK 33, WB3FKP 32, N3BMH 26, W3ADE 19, W3AVJ 18, K3ARR 16, KA3FKD 16, W3YZW 16, K3QXC 13, W3CL 12, K3EBZ 10, WA3CKA 5, W3AXA 4, K3RHI 4, AA3C 2, WB3FYT 2, WB3HTW 1. AF3Z 1.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — SEC: WA3TAI. Help, MDD needs a few good cw men to man liaison spots. KB3AP listens to K3RA bulletins weekdays at 0730 local 146/07/67. KA3DAG sends a ZF2EQ card. KB3NL is exWB3CES and W3ECN becomes KC3D. Good show. The OOs have been active: K3DI K3MR and K8SYH. KB3LV is planning to join them. N3BMB has upgraded, congrats. WB3LTA has a fine new membership folder for the ARES/RACES in Montgomery. KA3DUC is found on ESSN, CNN and TSN. Maria is the name! KB3LV is the man behind the Takoma Amateur Radio Club at Columbia Union College. W3ZNW is not looking to daylight time. N3AFM has an Arizona postmark on his report. KA3DCQ is looking for a transmatch to cover both ends of 80 meters. K3RA W3HYY WA3ARL and W3RUN are instructing the BARC Novice/Generals. Fox hunters are KA3EJJ WB4EZQ KA3EVQ W3HYY WB3DJU W3QYL and WB3JJL. KS6X will be remembered as WB3APN/7 WB2TJR. AK3X has a work sked that knocks him off the traffic nets. K3KMC is QRP DXing on 80 meters. W3LDD is looking for the rare ones. Today W3CYY can forget his snow blower. KA3CDX was NCS for the Laurel ARC Beltsville/Washington Day Run. AJ3X vows to upgrade all Cumberland hams. W3DFW N3BNY WB3EYS and KA8JJY made Extra. KA3DYR and N3BYT Advanced. Congrats to all. WB3BFK puts a lot of MARS traffic on the ham bands. N4DR/3 has KK2XGH experimentally on 10 MHz. WB3GZU gets to eyeball everyone with the Balto Symphony. W3DQI writes many columns. W3FZV is a MDD regular. K3CRW is back in business. KA3T makes weekend trips. W3CDQ has info on the Gaithersburg Super '81 Hamfest September 13. With the nets: Net/Manager, Sessions/Traffic/QNI average. MDC: PON/W3OYY 4/13/27. Jan MDD/W3PQ 62/275/8.2. Brass: W3FA K3JL and N3AKC. Wash County 2M/WB3GEJ 3/1/16. WR PON/W3DFW 10/32/23.8. MEPN/WB3GZU 31/260/29.3. Net contributors KA3ARH WB3GZU W3FA WA3DUM and K3ORW. Traffic: (Feb.) WB3GZU 872, W3FA 233, KA3CDO 151, KA3T 85, N4DR/3 63, W3FZV 61, K3ORW 50, WB3BFK 40, K3KMO 28, W3DQI 15, W3LDD 12, KA3DUC 11, KB3NL 6, W3ZNW 2. (Jan.) KA3CDQ 91. (Dec.) KA3CDQ 56.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, WB2LCC — SEC: W2HOB. STM: WB2LCC. A very significant milestone was reached this month on the RTTY repeater, the ordering of the new 4 cavity duplexer. It will be installed at the repeater site in Waterford Works. The coverage on 147.945/.345 will increase greatly and is something all RTTY, ARES and traffic people have been looking forward to for a long time, as it provides excellent RTTY coverage from one end of the section to the other. An important happening in New Jersey is the case of K2AHL in Springfield, who was ordered off the air by a superior court judge due to his interference with his neighbor's home sound system. Although both parties agreed that better shielding of the sound equipment would do the trick, the judge determined that he should cease operating and that if he didn't his FCC license would be revoked!!! This is a dangerous legal precedent and could mean lots of trouble in years to come. Show your support by contacting K2AHL and by writing ARRL and asking what they are doing to help New Jersey hams. An appeal will cost thousands of dollars. Are you willing to support or would you rather give up your license??? Traffic: WB2IQJ 1162, KA2GSL 268, KO2A 177, AA2H 174, W2ZQ 142, K2YBN 103, WA2HEB 58, WA2CUW 55, WB2PKG 53, WB2LCC 49, N2AEP 38, WA2ONW 38, N2CEO 35, WA2TKW 35, KB2OE 30, WB2HUV 22, KA2GTE 18, WA2GTJ 10, WA2WUL 4.

WESTERN NEW YORK: SCM, William W. Thompson, W2MTA — SEC: W2BCH. STM: N2APB. ASCM: W2GLH. DECs: WA2DHZ WB2NAO. NMs: WA2ELD W2FR K2KIR WA2ZJP. OO reports: W2AET KI2D N2NW. Appointments: (EC-Delaware) WB2VSJ, (OES) K2DTQ K2MR W2TFL WB2KWF, (OO) N2NW, (OVS) K2DNN WB2EXL W2SEU WA2TQZ, (ORS) N2ARD K2DNN KA2GWQ. BPL to WA2HSB. Net reports:

Net	Freq.	Time/Day	QNI	QSP	QND	Mgr.
NYSCN	3677	1000/Sun	50	22	4	W2MTA
NYPON*	3913	1700/Dy	628	517	28	K2KQC
NYSPTEN	3925	1800/Dy	938	99	28	AA2Y
ESS	3590	1800/Dy	463	104	28	W2WSS
OCTEN*	34/94	1815/Dy	383	108	28	WA2MFV
STAR/E*	325/925	1830/Dy	236	90	28	WB2AZW
Q NET	31/91	1830/Dy	476	12	26	KA2CMQ
BSN	93/33	1900/Dy	320	15	26	WA2WXG
NYS/E*	3677	1900/Dy	587	447	28	W2ZOJ
SLVARES	31/91	1930/Sun	47	2	4	WB2NAO
JCARN	10/70	2000/Dy	301	17	24	WA2WAX
WNYECN	3955	2000/3d Sun				W2BCH
OARCN	25/85	2015/Wed	84		4	K2VTT
CNYTN*	90/30	2115/Dy	466	209	28	WA2PUU
WDN*	04/64	2130/Dy	665	176	28	N2APB
NARASEN	22/82	2130/Sun				WA2JPM
NYS/L*	3677	2200/Dy	449	411	28	W2ZOJ
STAR/L*	325/925	2215/Dy	182	66	27	WB2AZW

*Part of NTS. STAR Feb 7 JC Mall ran special, 13 QNI 47 QSP. PSHR: W2ZOJ 138, W2GLH 114, W2MTA 110, N2BXB 108, W2AET 92, KA2CTU 92, KI2D 87, WA2KOJ 86, N2APB 84, WA2ZJP 77, WB2IDS 72, N2BLX 71, KA2GHM 71, WB2NAO 66, WB2AZW 65, WB2OWO 65, N2BXB 61, KB2GT 61, W2GJ 60, WB2MVC 60. Walton area suffered double loss with both W2FMU and W2WQU going Silent Key. Well done: K2DTQ and WA2VUV seven years of Traffic Watch in Southern Tier. K2AGT good info on battery power/chargers; W2AET on Lion Hunt; Fulton ARC Key Award WB2LBE and N2AWP. New officers: RAWNY — WA2FKV WB2OKB WB2OWO WA2OJV W2HB; RARA — WB2RJB W2EBF N2AOB WB2UTI W2ICE K2RL; TIGAR — WA2AUD K2DTQ K2OH WB2EXL; Fulton ARC — KB2RK WA2KKL KA2AOK WB2JOJ; Skyline ARC — KA2BPT N2AGF K2QHV; Utica ARC — WA2AZA WB2BIN WB2JNV WA2LEZ; RAGS — WB2JOD WB2TAB WA2FXS WA2PUU WB2NCK WB2ELM; GRAM — WB2ODH K2IAU WA2ODD KA2ATB; Chenengo Valley ARA — WB2VNM WA2TDO W2RME KI2Y. WNY has 3300 League members and 100 appointees (only 3 percent), join up! Uncle John needs you! Rochester Hamfest May 15-16, program looks FB, don't miss it. Coming events: Batavia Hamfest at Alexander July 12; Rome Ham Family Day June 7; Owego STARC Hamfest May 2. Traffic: (Feb.) WA2HSB 506, W2MTA 492, W2ZOJ 394, WA2ELD 271, KI2D 233, WA2KOJ 176, W2GLH 169, WB2IDS 165, KA2CTU 163, WB2OWO 162, W2AET 161, N2APB 156, WA2WAX 141, KA2GLT 140, N2BLX 89, AF2A 85, WA2ZJP 85, KA2GHM 70, WA2AIV 54, KG2D 52, W2GJ 52, WA2MFU 44, WA2PUU 42, KB2GT 41, WB2MVC 33, N2ARD 30, W2RQF 29, W2FR 27, KA2GOH 24, W2PPS 23, WB2OIX 22, WB2NAO 21, K2VTT 21, WB2LJK 18, WB2TXK 18, AF2K 15, WA2RXO 12, K2DNN 8, K2VR 4, WB2VSJ 3, KA2FYF 2, KA2DBD 1. (Jan.) WA2ANU 16.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMR — ASCM & STM: N3EE. SEC: AB3Q. DEC: WB3JDI. NMs: N3FM W3NEM W3MML WA3PXA

Net	Sess.	QNI	QTC	kHz	Time/Day
WPACW	28	439	283	3585	7:00 P/Dy
WPAPTN	28	651	314	3983	6:15 P/Dy
WPA2MTN	28	595	215	146.28/88	8:00 P/Dy
NWPA2MTN	28	397	36	146.04/64	9:00 P/Dy

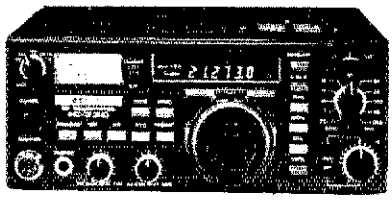
I am sorry to announce that W3BWH is a Silent Key. Remember June 27-28 Field Day will be here and I hope to hear from you. AB3Q is very busy getting the section set up in zones for the DEC appointments, at present we will have four. All of our counties do not have ECs. The following need ECs. Butler, Fayette, Fulton, Greene, Potter and Somerset. The EC duties are not hard and you might help save your own family in case of a disaster. STORMS AND FLOODS CAN STRIKE ANYWHERE. The Pittsburgh Chapter of the Am. Red Cross is now at 225 Boulevard of the Allies in Pittsburgh. It has an amateur station on ht and 2-meter fm. W3YBR

YOU SAVE at HAM RADIO OUTLET

CHECK REGULAR LISTED PRICES
THEN CALL FOR YOUR SPRING SPECIALS.

ICOM

IC-730 MOBILE TRANSCEIVER

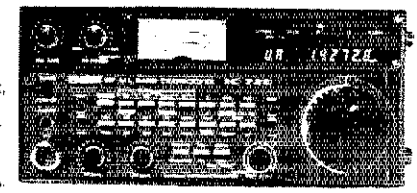


Compact! 3.7"H, 9.5"W, 10.8"D. Fits small car, plane, boat or in a suitcase.
• Covers 80-10 plus WARC bands • WWV reception • 200W pep SSB/CW (40W AM out) • Dual VFO system built-in • Digital readout • RIT • Processor • Noise blanker • VOX • AGC • Fully solid state • 13.8VDC.

REGULAR $829 **ASK FOR YOUR PRICE**

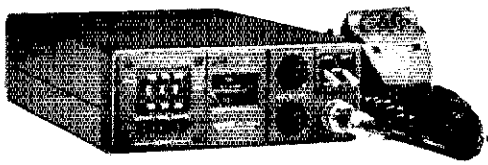
IC-720A ALL-BAND TRANSCEIVER

All 9 HF bands! • All solid state • Broad band tuned • Digitally synthesized w/10Hz resolution • Two VFO's • *General coverage receiver*, 0.1 to 30MHz (no transmit on general coverage) • Simplex, Duplex • RIT • 100W pep out SSB, 100W, CW & RTTY, 40W, AM • Digital readout • pass-band tuning • Dozens of desirable features. Operating voltage: 13.8VDC @20A.



REGULAR $1349 **ASK FOR YOUR PRICE**

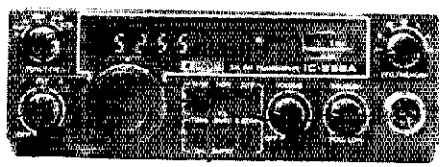
NEW! IC-22U FM VHF transceiver



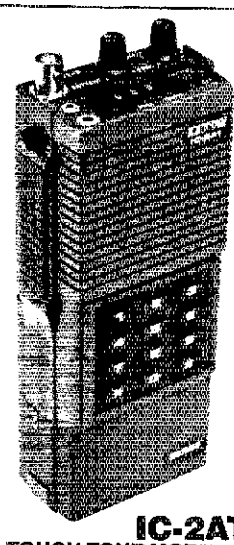
REGULAR $329 **ASK FOR YOUR PRICE**

IC-255A, 2 METER FM TRANSCEIVER

WITH HM-8 TOUCH TONE® MIC.



REGULAR $399 **ASK FOR YOUR PRICE**



IC-2AT

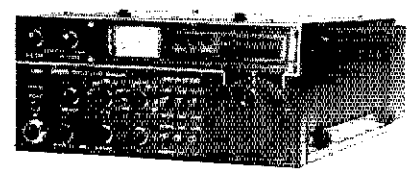
TOUCH TONE MODEL
REGULAR $269.50

IC-2A REGULAR $239.50
ASK FOR PRICE

IC-451A, 430 MHz BASE STATION

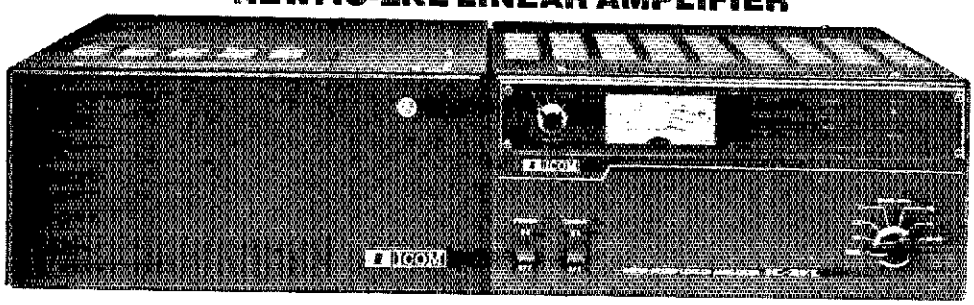
REGULAR $899 **ASK FOR YOUR PRICE**

IC-551D, 50MHz ALL MODE TRANSCEIVER



REGULAR $699 **ASK FOR YOUR PRICE**

NEW! IC-2KL LINEAR AMPLIFIER



• 160 through 15 meter operation. Includes new 10 and 18MHz bands.
• All-solid-state • Broadband tuning
• 500W output SSB (p.e.p.) CW & RTTY
• Fully protected final • Heat pipe cooling system • Full metering
• Power supply, 115VAC or 220VAC.
• Automatic bandswitching (when used with IC-701/IC-720 units.

REGULAR $1795
WITH POWER SUPPLY.

ASK FOR YOUR PRICE

FREE SHIPMENT, ALL OF THE ABOVE ITEMS, UPS (Brown)

Store addresses and phone numbers are given on opposite page.

FIVE STORE BUYING POWER!

SPRING SPECIALS

SHIPPING REGULARLY TO COUNTRIES IN ALL CONTINENTS.

FREE PHONE
800
854-6046
CALIF. CUSTOMERS PLEASE CALL OR VISIT LISTED STORES

FREE SHIPMENT
(UPS Brown)
CONTINENTAL U.S.A.

master charge VISA

HAM RADIO OUTLET

ANAHEIM, CA 92801
2620 W. La Palma,
(714) 761-3033 (213) 860-2040
Between Disneyland & Knott's Berry Farm

BURLINGAME, CA 94010
999 Howard Ave., (415) 342-5757
5 miles south on 101 from S.F. Airport.

OAKLAND, CA 94609
2811 Telegraph Ave., (415) 451-5757
Hwy 24 Downtown. Left 27th off-ramp.

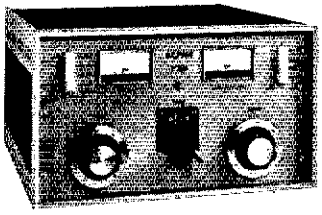
SAN DIEGO, CA 92123
5375 Kearny Villa Road (714) 560-4900
Hwy 163 & Clairemont Mesa Blvd.

VAN NUYS, CA 91401
6265 Sepulveda Blvd., (213) 988-2212
San Diego Fwy at Victory Blvd

OVER-THE-COUNTER
Mon. thru Sat. 10AM to 5:30PM

AEA • ALLIANCE • ALPHA • AMECO • AMPHENOL • ARRL • ASTRON • AVANTI • BENCHER • BERK-TEK • BIRD • B&W • CALLBOOK • CDE • COLLINS • CUBIC • CURTIS • CUSHCRAFT • DAIWA • DATONG • DENTRON • DRAKE • DX ENGINEERING • EIMAC • HUSTLER • HY-GAIN • ICOM • J.W.MILLER • KENWOOD • KLM • LARSEN • LUNAR • METZ • MFJ • MICRO-LOG • MINI-PRODUCTS • MIRAGE • NYE • PALOMAR • ROBOT • ROHN • SHURE • SWAN • TELEX • TELREX • TEMPO • TEN-TEC • TRISTAO • YAESU and many more!

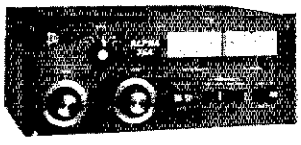
ETO ALPHA



77DX
REGULAR
$4945 *

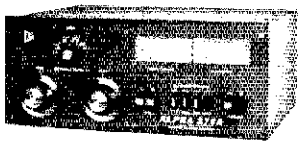
78
REGULAR
$3185 *

*** CALL NOW FOR YOUR SPRING SPECIAL PRICES**



76PA
REGULAR
$2195 *

374A
REGULAR
$2395 *



YAESU FT-207R HANDIE

REGULAR
$299 *

Includes:
NBP-9 battery pack.
NC-9B wall charger.
FEP-1 earphone, rubber flex. ant.

***ASK FOR YOUR PRICE**

MIRAGE B-1016 2M AMPLIFIER

160 W OUTPUT
SSB, FM, CW.

Freq. range: 144-148MHz • RF out:160W nom. (10W in). • RF power in: 5-15W • DC operating pwr: 13.8VDC @ 20-25A • Intermittent duty cycle • Built-in receiver pre-amp. Automatic internal or external relay keying.

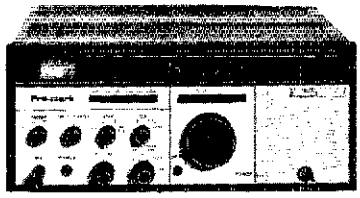
REGULAR
$279.95 **YOUR PRICE $249.95**

R.L. DRAKE TR-7/DR-7

REGULAR $1549

ASK FOR YOUR PRICE

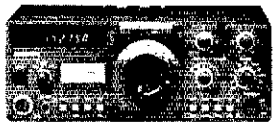
COLLINS KWM-380



NEW REGULAR PRICE $3496

LIMITED NUMBER AT OLD PRICE $2695

KENWOOD

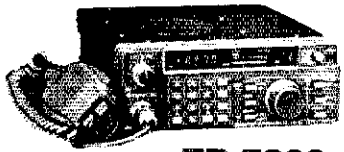


TS-130S
REGULAR $759.95

TR-2400

REGULAR
$395

TS-830S
REGULAR $929.95



TR-7800
REGULAR $399.95

CALL NOW FOR YOUR SPRING SPECIAL PRICES

Prices, specs subject to change without notice

Calif. residents please add sales tax.

is the man in charge. The station is also the center for the PGH Division of the Red Cross. AB3Q is also working on a plan for the National Weather Serv. Office in Pgh to monitor the Allegheny River watershed to assist them in predicting possible flash floods and river conditions. Any input will be appreciated. Traffic handlers did a great job this month. Traffic: K3CR 764, W3EGJ 503, WA3PXA 331, KB3DT 227, N3EE 177, W3AS 167, N3BKV 129, N3FM 122, N3KB 113, AC3N 112, WB3JDI 111, W3KMZ 97, N3WS 85, W3MML 79, W3YQ 76, W3GUK 67, KA3BMU 66, WA3JGD 60, WA3UNX 57, KA3DEH 48, K3SMB 47, WB3IAB 44, W3NGO 40, K3HCT 38, W3EXC 31, W3KYN 31, W3KUN 24, W3EXG 23, KA3BGC 18, W3RUL 17, WA3QNT 16, W3SN 15, W3TTN 12, W3SMV 9, W3VQV 9, AB3X 8, N3BKU 5, WB3KRI 4, WB8PAV/3 4, AF3B 2, W3LOD 2, KA3ETC 1.

CENTRAL DIVISION

ILLINOIS: SCM, Larry M. Keeran, K9ORP — SEC: W9QBH, STM: WB9JSR, Asst SCM: W9RYU.

Net	Freq	Times/Days	QTC	Sess.
ILN	3690	0030/0400	366	56
Ill Phone	3915	2130 Dy	200	28
NCPN	3915	1200/1700 Dy	99	47
IEN	3940	1400 Sun	6	4
W9VEY Mem Stn 2 meters			8	4

Those interested in helping on the May 9th Cerebral Palsy Walk-a-thon in the Sterling-Rock Falls area should contact KA9IMF on the 25-85 repeater there. On Feb. 13-14, 18 members of Western Ill ARC participated in Police Expo 81, operating on all bands, as communications support of the Adams County Civil Defense Police. A slide show by K9IKR and WA9MFP, who toured the far east, was the highlight of the CIRC's annual cherry pie and ice cream social on Feb. 25th. Several area of the state have active participation in organized weather spotting: Lisle, Deerfield, Sauk Village, Bloomington, West Frankfurt, Clinton, DeKalb, Quincy as well as others have held weather related training sessions with many having National Weather Service representatives officiating. For further information: contact your Emergency Coordinator. It is a good time to formalize your plans for Field Day while you are checking out your generator. The Operation Red Cross Message Relay held during April was a chance to establish contact with local chapters and maintain them through the year. On March 7-8th, WB9RLX combined two hobbies by using 10-meter ssb while in motion skiing at Brule Mountain, quite a few DX stations worked the ski-mobile. Congratulations go to KA9JMG who is the new Lake County EC. The following amateurs have upgraded: to Extra, K9CZB; to Advanced, N9BOV WD9IUT KA9BYB; to General, KA9DVZ KA9IOB KA9GST KA9CTM; to Technician, KA9HHC and KA9JEN. The Argonne Amateur Radio Club's president was incorrectly stated in the March OST and should be K9CZB and the treasurer is W9SKD, sorry WB9STX will run a daytime ARES net on 10-61 Wheaton at 11-11:30 A.M. Tuesdays. There will be a Knox County RTTY net in Galesburg on 28.090 MHz. Sincere sympathies to W9OOJ on the loss of his wife on Feb. 4th. Silent Key: W9ASG Chicago. Hamfests: DeKalb May 3rd at a new location, The Fieldhouse, talk-in 13-73, 94, 52; Sullivan May 3rd at Moultrie Co. Fairgrounds; Remember, meet your ARRL representatives at the Starved Rock Radio Club Hamfest at Princeton on June 7th. W9JIJ and W9NXG are the BPL recipients for Feb., great job fellows. The Southern Ill Amateur Radio Society provided communications for the organizers of the 3rd annual Battle of Makanda Civil War Reinactment on April 12th. 9RND reported 56 sessions and 491 messages with Illinois 100% represented by W9NXG K9BVE W9JIJ W9HOT W9TLU WD9FDR WB9WGD. CAND reported 28 sessions and 934 messages and Illinois 100% in ORN9 with WB9WGD W9NXG W9HOT WD9FDB W9JIJ. W9QBH had 397 amateurs check in on the tornado preparedness test March 3rd. Traffic: W9JIJ 918, W9NXG 552, K9BVE 302, W9HOT 249, WB9JSR 170, W9OYL 143, K9PNG 114, KB9X 103, W9OK 99, W9QBH 88, KN9BAM 56, WD9EVV 51, W9LNQ 42, W9HBJ 33, WB9QFO 25, N9BJQ 22, W9KSU 14, W9HPG 14, N9PN 13, W4IZI 7, WD9EBQ 5, WD9HZF 4, W9SSP 4, WB9UEA 2, WA9WXC 1.

INDIANA: SCM, Bruce Woodward, W9UMH — SEC: W9UMH, STM: W9JUJ, NMs: ITN W9QYY, QIN WD9GXW, ICN N9AEI, VHF W9PMT, IWN K9DCK, IPN W9DLF, IPON K9RGF. Net reports:

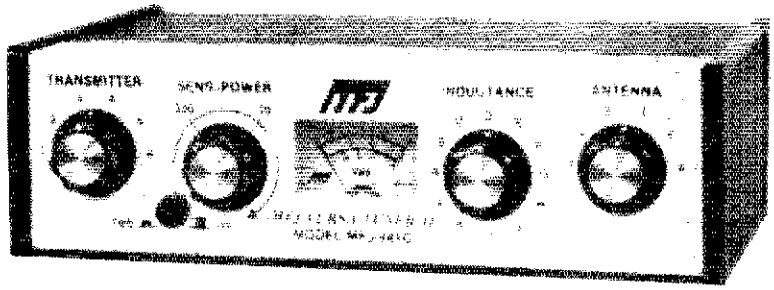
Net	Freq.	Time/UTC	QNI	QTC	Sess.
ITN	3910	1330/2300 Dy	2455	382	56
QIN	3656	1430/0100/0400 Dy	800	424	84
ICN	3708	0014 Dy	163	32	27
IPN	3910	2130 Dy	1163	173	28
IWN	3910	1315 Dy	1013		28
IPON	3910	1300 Sun	70	6	4

Hoosier vhf nets: QNI 4148, QTC 192 Bulletins 29. Time 4173 for 18 nets. 9RND 100 percent Indiana stations: W9JUJ W9QLW W9DLF K9CGS W9URQ WB9MIK WD9CIS K9KTB. QTC 491. 9RN 100 percent Indiana stations: W9JUJ W9QLW W9EI K9WWJ WD9GXW N9HZ KB9IT W9XD WB9UYU WA9QCF N9AEI QTC 134. CAND 100 percent Indiana stations: W9DLF W9JUJ W9QLW K9CGS K9KTB. QTC 934. Appts: ORS — KA9EJT WB9OTX; EC — WB9VEI Howard County, WD8QBB Jefferson County, K7NHK Bartholomew County. Endorsements: EC — N9EV Whitley County, K9ILU Marshall County, WA9HVP Newton County; OBS — WA9KWH WA9BIG W9PMT. ORS — WB9VJE W9PMT WD9JAB K9DKB WD9CIS. Lightning Bolt N9AHP. EC reports: WD9JLT WD9DVA WB9WWB WB9VIW KB9VD KB9IJU KØKJ WA9KWH N9AHP K9FVN WD9JAB WD9BHR WB9QKK K9PQP K9UJK WA9UGP WA9HVP W9QWI N9BLK W9ENU N9AST W9RTH K9BRF WA9OHX KC9C W9MJI WD9BKA KA9FDF. Thanks to WWVARC's WB9NTL for the Novice code and theory classes. Their problems with Cable TV are interesting. 145.25 seems a strange place for them to be. WD9GXW gives special thanks to N9PS W9ZGC K9SHQ — KB9IT WB9OZZ N9PS W9EI W9JUJ N9AEI. FWRC and ACARTS are now planning for Amateur Radio participation in their Three Rivers Festival. N9BEG's modifying the M-800 P RTTY program in the WVARA bandspread makes me wish I had the gear to try it. If the rest of the month is like the first, it will be known as American Red Cross Message month. I am hopeful Indiana will make a good showing in the activity. Porter County will have some fine new Novices thanks to W9SNJ and KA9FAW. I sure hope the weather breaks soon so that W9FVF can get up a new antenna. I expect some others are in need also. Traffic: (Feb.) W9JUJ 1205, WB9UYU 241, K9KTB 215, W9QLW 210, WD9GXW 137, W9FC 134, N9AEI 131, K9DGX 118, W9EI 114, W9WKM 104, W9PMT 99, W9QYY 92, K9FZX 79, WA9QCF 79, W9XD 72, WD9JAA 58,

MFJ ANTENNA TUNERS 16 MODELS

MFJ-941C 300 Watt Versa Tuner II

Has SWR/Wattmeter, Antenna Switch, Balun. Matches everything 1.8-30 MHz: dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.



Ham Radio's most popular antenna tuner. Improved, too.

$89.95

Fastest selling MFJ tuner . . . because it has the most wanted features at the best price.

Matches everything from 1.8-30MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced and coax lines.

Run up to 300 watts RF power output.

SWR and dual range wattmeter (300 & 30 watts full scale, forward/reflected power). Sensitive meter measures SWR to 5 watts.

Flexible antenna switch selects 2 coax lines, direct or through tuner, random wire/balanced line, or tuner bypass for dummy load.

12 position efficient airwound inductor for lower losses, more watts out.

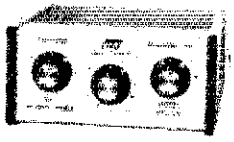
Built-in 4:1 balun for balanced lines. 1000V capacitor spacing.

Works with all solid state or tube rigs.

Easy to use, anywhere. Measures 8x2x6", has SO-239 connectors, 5-way binding posts, finished in eggshell white with walnut-grained sides.

4 Other 300W Models: MFJ-940B, $79.95 (+$4), like 941C less balun. **MFJ-945, $79.95** (+$4), like 941C less antenna switch. **MFJ-944, $79.95** (+$4), like 945, less SWR/Wattmeter, **MFJ-943, $69.95** (+$4), like 944, less antenna switch. Optional mobile bracket for 941C, 940B, 945, 944, $3.00.

MFJ-900 VERSA TUNER



MFJ-900

$44.95 (+$4)

Matches coax, random wires 1.8-30 MHz.

Handles up to 200 watts output; efficient airwound inductor gives more watts out. 5x2x6".

Use any transceiver, solid-state or tube.

Operate all bands with one antenna.

2 OTHER 200W MODELS:

MFJ-901, $54.95 (+$4), like 900 but includes 4:1 balun for use with balanced lines.

MFJ-1601O, $34.95 (+$4), for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-949B VERSA TUNER II

MFJ-949B

$139.95 (+$4)

MFJ's best 300 watt Versa Tuner II.

Matches everything from 1.8-30 MHz, coax, randoms, balanced lines, up to 300W output, solid-state or tubes.

Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.

Built-in 4:1 balun. 300W, 50-ohm dummy load, SWR meter and 2-range wattmeter (300W & 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case 10x3x7".

MFJ-962 VERSA TUNER III

MFJ-962

$199.95 (+$4)

Run up to 1.5 KW PEP, match any feed line from 1.8-30 MHz.

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected.

6 position antenna switch handles 2 coax lines, direct or through tuner, plus wire and balanced lines.

4:1 balun. 250 pf 6KV cap. 12 pos. inductor. Ceramic switches. Black cabinet, panel.

ANOTHER 1.5 KW MODEL: MFJ-961, $179.95 (+$10), similar but less SWR/Wattmeter.

MFJ-984 VERSA TUNER IV

MFJ-984

$299.95 (+$10)

Up to 3 KW PEP and it matches any feedline, 1.8-30 MHz, coax, balanced or random.

10 amp RF ammeter assures max. power at min. SWR. SWR/Wattmeter, for./ref., 2000/200W.

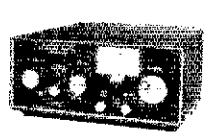
1[8] position dual inductor, ceramic switch.

[1]2 pos. ant. switch. 250 pf 6KV cap. 5x14x14".

300 watt dummy load. 4:1 ferrite balun.

3 MORE 3 KW MODELS: MFJ-981, $209.95 (+$10), like 984 less ant. switch, ammeter. **MFJ-982, $209.95** (+$10), like 984 less ammeter, SWR/Wattmeter. **MFJ-980, $179.95** (+$10), like 982 less ant. switch.

MFJ-989 VERSA TUNER V



MFJ-989

$319.95 (+$10)

New smaller size matches new smaller rigs — only 10-3/4Wx4-1/2Hx14-7/8D".

3 KW PEP. 250 pf-6KV caps. Matches coax, balanced lines, random wires 1.8-30 MHz.

Roller inductor, 3-digit turns counter plus spinner knob for precise inductance control to get that SWR down.

Built-in 300 watt, 50 ohm dummy load.

Built-in 4:1 ferrite balun.

Built-in lighted 2% meter reads SWR plus forward/reflected power. 2 ranges (200 & 2000W).

6 position ant. switch. Al. cabinet. Tilt bail.

To order or for your nearest dealer

CALL TOLL FREE

800-647-1800

For tech. info., order or repair status, or calls outside continental U.S. and inside Miss., call 601-323-5869.

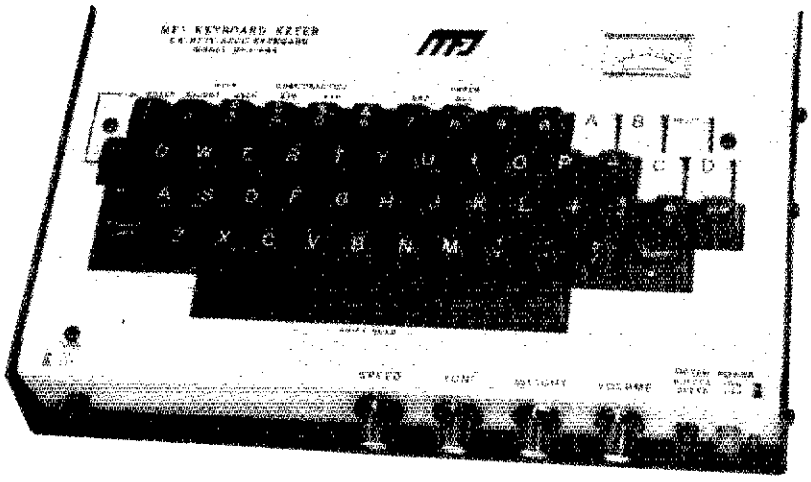
- **All MFJ products unconditionally guaranteed for one year (except as noted).**
- **Products ordered from MFJ are returnable within 30 days for full refund (less shipping).**
- **Add shipping & handling charges in amounts shown in parentheses.**

Write for FREE catalog, over 80 products

MFJ ENTERPRISES, INCORPORATED

Box 494, Mississippi State, MS 39762

MFJ Super Keyboards



5 MODES: *CW, Baudot, ASCII, memory keyer, Morse code practice.* ***TWO MODELS: MFJ-496, $339.95.*** *256 character buffer, 256 character message memory, automatic messages, serial numbering, repeat/delay.* ***MFJ-494, $279.95.*** *50 character buffer, 30 character memory, automatic messages.*

MFJ brings you a pair of 5 Mode Super Keyboards that gives you more features per dollar than any other keyboard available. You can send CW, Baudot, ASCII. Use it as a memory keyer and for MORSE code practice.

You get text buffer, programmable and automatic message memories, error deletion, buffer preload, buffer hold, plus much more.

MODE 1: CW

The 256 character (50 for 494) **text buffer** makes sending perfect CW effortless even if you "hunt and peck."

You can preload a message into the buffer and transmit when ready. For break-in, you can stop the buffer, send comments on key paddles and then resume sending the buffer content.

Delete errors by backspacing.

A meter gives buffer remaining or speed. Two characters before buffer full the meter lights up red and the sidetone changes pitch.

Four programmable message memories (2 for 494) give a total of 256 characters (30 for 494). Each message starts after one ends for no wasted memory. Delete errors by backspacing.

To use the **automatic messages,** type your call into message A. Then by pressing the CQ button you send CQ CQ DE (message A)

The other automatic messages work the same way. CQ TEST DE, DE, QRZ.

Special keys for KN, SK, BT, AS, AA and AR.

A lot of thought has gone into human engineering these MFJ Super Keyboards.

For example, you press only a one or two key sequence to execute any command.

All controls and keys are positioned logically and labeled clearly for instant recognition.

Pots are used for speed, volume, tone, and weight because they are more human oriented than keystroke sequences and they remember your settings when power is off.

Weight control makes your signal distinctive to penetrate QRM.

MODE 2 & 3 (RTTY): BAUDOT & ASCII

5 level Baudot is transmitted at 60 WPM. Both RTTY and CW ID are provided.

Carriage return, line feed, and "LTRS" are sent automatically on the first space after 63 characters on a line. This gives unbroken words at the receiving end and frees you from sending the carriage return. After 70 characters the function is initiated without a space.

All up and down shift is done automatically. A downshift occurs on every space to quickly clear garbled reception.

The buffer, programmable and automatic messages, backspace delete and PTT control (keys your rig) are included.

The ASCII mode includes all the features of Baudot. Transmission speed is 110 baud. Both upper and lower case are generated.

MODE 4: MEMORY KEYER

Plug in a paddle to use it as a deluxe full feature memory keyer with automatic and programmable memories, iambic operation, dot-dash memories, and all the features of the CW mode.

MODE 5: MORSE CODE PRACTICE

There are two Morse code practice modes. Mode 1: random length groups of random characters. Mode 2: pseudo random 5 character groups in 8 separate repeatable lists (with answers).

Insert space between characters and groups to form high speed characters at slower speed for easy character recognition.

Select alphabetic or alphanumeric plus punctuation. You can even pause and then resume.

MORE FEATURES

Automatic incrementing serial number from 0 to 999 can be inserted into buffer or message memory for contests.

Repeat function allows repetition of any message memory with 1 to 99 seconds delay. Lets you call CQ and repeat until answered.

Two key lockout operation prevents lost characters during typing speed bursts.

Clock option (496 only) send time in CW, Baudot, ASCII. 24 hour format.

Set CW sending speed before or while sending.

Tune switch with LED keys transmitter for tuning. Tune key provides continuous dots to save finals. Built-in sidetone and speaker.

PTT (push-to-talk) output keys transmitter for Baudot and ASCII modes.

Reliable solid state keying for CW: grid block, cathode, solid state transmitters (-300V, 10 ma Max, +300V, 100 ma Max). TTL and open collector outputs for RTTY and ASCII.

Fully shielded. RF proof. All aluminum cabinet. Black bottom, eggshell white top. 12"Dx7"Wx1¼"H (front) x3½"H (back). Red LED indicates on.

9-12 VDC or 110 VAC with optional adapter.

MFJ-494 is like MFJ-496 less sequencial numbering, repeat/delay functions. Has 50 character buffer, 30 character message memory. Clock option not available for MFJ-494.

Every single unit is tested for performance and inspected for quality. Solid American construction.

OPTIONS

MFJ-53 AFSK PLUG-IN MODULE. 170 and 850 Hz shift. Output plugs into mic or phone patch jack for FSK with SSB rigs and AFSK with FM or AM rigs. $39.95 (+ $3).

MFJ-54 LOOP KEYING PLUG-IN MODULE. 300V, 60 ma loop keying circuit drives your RTTY printer. Opto-isolated. TTL input for your computer to drive your printer. $29.95 (+ $3).

MFJ-61 CLOCK MODULE (MFJ-496 only). Press key to send time in CW, Baudot or ASCII. 24 hour format. $29.95 (+ $3).

110 VAC ADAPTER. $7.95 (+ $3).

BENCHER IAMBIC PADDLE. $42.95 (+ $4).

A PERSONAL TEST

Give the MFJ-496 or MFJ-494 Super Keyboard a personal test right in your own ham shack.

Order one from MFJ and try it — no obligation. See how easy it is to operate and how much more enjoyable CW and RTTY can be. If not delighted, return it within 30 days for refund (less shipping). One year unconditional guarantee.

To order, call toll free 800-647-1800. Charge VISA, MC, or mail check or money order for **$339.95** for MFJ-496, **$279.95** for MFJ-494, **$39.95** for MFJ-53 AFSK module, **$29.95** for MFJ-54 Loop Keying module, **$29.95** for MFJ-61 Clock module, **$7.95** for the 110 VAC adapter and **$42.95** for Bencher Paddle. Include $5.00 shipping and handling per order or as indicated in parentheses if items are ordered separately.

Why not really enjoy CW and RTTY? Order your MFJ Super Keyboard at no obligation today.

TO ORDER OR FOR YOUR NEAREST DEALER
CALL TOLL FREE 800-647-1800

Call 601-323-5869 for technical information, order/repair status. Also call 601-323-5869 outside continental USA and in Mississippi.

Write for FREE catalog, over 80 products

MFJ ENTERPRISES, INCORPORATED
Box 494, Mississippi State, MS 39762

KA9EJT 55, WA9OKK 46, WD9ART 45, KB9UU 38, KB9VD 28, WB9AWI 26, K9WWJ 26, N9PS 24, WB9YAY 22, W9ZGC 22, W9IRT 21, W9URO 18, WA9OHX 17, N9ACG 16, W9RTH 16, K9DIY 13, W9ZW 12, WD9DRM 11, KC9C 10, K9CGS 10, WA9JNC 10, N9BJX 9, WD9EXI 9, WB9ZOE 9, WA9KWH 8, K9OUP 8, WD9JAB 7, W9WEI 7, N9AST 6, WD9EPU 5, WB9AJY 4, W9BUQ 4, W9ENU 4, W9UPI 4, WD9DWD 3, W9MAX 3, N9BLK 2, WB9KQT 2, W9BDP 1, WD9CIV 1, W9KMY 1. (Jan.) WD9GXW 150, WB9ZOE 7, WD9CIV 4, W9UPI 3.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9OAK. STM: K9UTO. BWN 1245Z 3985, QNI 884, QTC 992, WB9YPY. BEN 1800Z 3985, QNI 763, QTC 192, WB9ESM. WSBN 2300Z 3985, QNI 1078, QTC 469, WD9ESZ. WNN 3723 0000Z, QNI 244, QTC 51, N9AUG. WIN-E 3662 0100Z, QNI 348, QTC 137, W9YCV. WIN-L 3662 0400Z QNI 259, QTC 88, K9LGU. XPO 3925 1801Z QNI 452, QTC 36, WA9NIX. NWTN .34/.94 0030Z QNI 393, QTC 36, WB9YPY. Gr. Bay .72/12 0230Z Wed., QNI 8, WB9NRK. WSSN 3662 0030Z, QNI 52, QTC 15, N9BYK. WSSN 3662 NWF 0030Z, QNI 17, N9BYK (Jan.) N9AZI has Advanced. WD9AOX now Tech. Sorry to report W9HHG a Silent Key. WB9PAW now KE9C. WB9NYG has 93 confirmed, waiting for 7 more. KA9DCB now KB9UI. Now is the time to get your 2-meter rig and antenna in good working order. Watch and be prepared to relay severe weather tornados. Lake Area ARC is now affiliated with ARRL. congrats. WB9YSA is now WP2ACE having moved to St. Croix in U.S. Virgin Island. KA9EYJ now N9BZB, KA9DFX now N9BZC, WD9CYR now N9BXY, all from Baraboo. K9BIL has Extra. WB9EIW had a good time operating portable KP2. KA9CPA made BPL. New Novice Madison, KA9KFF. Dane County ARES meets on Tues on .34/.94 6:50 P.M. local. Traffic: (Feb.) KA9CPA 2003, N9AUG 371, WD9ESZ 296, WA9WYS 241, W9YCV 204, W9CXY 198, WB9YPY 190, WD9IUX 189, K9FHI 183, WD9DHF 145, W9UGL 142, N9AZI 129, K9AKG 103, W9SO 102, N9BYK 99, W9DND 96, K9GDF 85, WB9NRK 68, W9IHW 60, WB9ESM 59, W9LDO 48, K9AO 47, N9BCX 45, AG9G 45, K9JPS 40, K9LGU 39, W9DM 37, KB9NG 35, KA9EMF 34, W9CJE 32, WD9BKT 29, K9HDF 29, W9AJA 28, KB9CV 28, WB9RGO 28, WB9WHO 28, WB9ICH 27, K9UTO 27, WB9ABF 25, K9VSY 25, WA9GGH 24, W9LIW 23, WB9JSW 22, N9CP 17, KB9FM 17, WB9YPZ 17, KA9HPO 16, KB9TC 15, KA9GBE 14, KA9IHR 14, K9ANV 10, KE9C 8. (Jan.) KA9GBE 15.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX. SEC: WAØQIT. STM: AFØO. Net reports:

Net	Time	Freq.	QNI	QTC	Mgr.
MSN/1	0030Z	3685 kHz	210	88	AFØO
MSN/2	0400Z	3685 kHz	159	29	KØJCF
MSPN/N	1810Z	3945 kHz	596	53	WAØAIN
MSPN/E	2345Z	3929 kHz	914	142	KCØT
MNAMWXN	0015Z	3929 kHz	446	304/24	WDØCGM
RARES			130	15	KØTS
MSSN	2315Z	3710	No net mgr.		

The congrats of the section go to KNØKCW of Wilmar, who conducted a Novice class from October to December of last year, under the sponsorship of the Wilmar Area Emergency ARC and Wilmar Community Education, and came up with the following crop of new Novices: KAØKGZ, KAØKHA, KAØKHJ, KAØKHB, KAØKII, KAØKIZ. Among the upgrades are KAØIEP, Novice to General, new call NØCGG; KAØIVQ, Novice to Tech. New call for WBØZAH is KBØSU. The following stations have received Tenth Region Net Certificates from WØSS, TEN Mgr., KØJCF AFØO KØPIZ WØRIO. A special event station celebrating the 125th Birthday of the city of St. Cloud, will be in operation on all bands from April 24-26, under the call of WØSV. All contacts who submit an s.a.s.e. will receive a certificate for their scrapbooks. The 2nd Annual John Beargrease Sled Dog Race, which the Arrowhead ARC was looking forward to handling, was cancelled....the reason???? NO SNOW IN MINNESOTA IN FEBRUARY! Better luck next year. Traffic: (Feb.) WAØTFC 298, KBØMB 267, WØHZU 182, AFØO 102, WDØCGM 93, WAØONE 93, WØDFX 88, KCØT 84, NØRUY 72, KØJCF 68, WBØNZB 58, WØPET 56, WAØAIN 48, WBØTHZ 46, KØPIZ 42, KØCSE 28, KAØEPY 26, WØGRW 25, KCØZ 21, NØBRC 16, KØTS 9, KNØKCW 6, NØJP 4, WØGUX 2. (Jan.) KØJCF 72, WBØSCN 12, NØAXU 11.

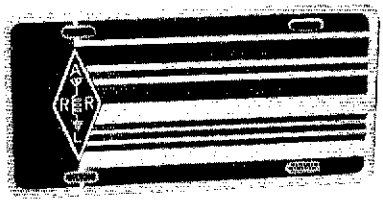
NORTH DAKOTA: SCM, Lois A. Jorgensen, WAØRWM — SEC: WBØTEE. NM: WAØCRH. OO: WDØCLB. Congrats to new Novices KAØKIR KAØKJG. WDØBRL is now KIØE, WDØVWJ is KBØUJ. FARC election: WDØAQY, pres., KAØAYR, vice pres.; KAØCLH, secy., KEØA, treas. WDØAQY is also EC. Mayville Club will hold their hamfest and auction on June 7, there are camping facilities. For more information contact WAØCSL. April 1 was the end of YL WX Net, thanks to everyone who participated — we had a good net and wx. AKØS has been real busy giving cw to those who need ND, hope he isn't the only cw in ND to help. Congrat to WØGQD on his 3.. decades of service to rural America with REC. Congrat to KØALL and XYL on their new harmonic. Traffic: WAØRWM 205, KBØIP 97, WAØCRH 44, KØGGI 32, NØAFP 27.

SOUTH DAKOTA: SCM, Erwin Heimbuck, KØOTZ — Congratulations to WØZWL for making BPL this month. Signal Hill ARC reports election of officers for this year: WBØVHI pres.; KAØDDS, v.p.; WØDVB, secy.; WØKJZ treas. Congratulations on your election. Black Hills ARC again provided race communication for the Badlands Baja. Reports indicate they did a fine job for officials. Rapid is getting a new 100 watt solid state 34/94 repeater this summer. NJQ Net elections have returned WAØVRE to the position of net manager. Good luck. Net reports: NJQ 700, 25, 28; WXN 809, 776, 24; SDN 117, 90, 28; Eveng 1335, 59, 28; TriSt 39, 5, 4. Traffic: WØZWL 817, WDØBMR 208, KØAIE 120, WAØUEN 119, KØFRE 113, WØHOJ 112, WØKJZ 110, WAØTNM 106, WØDVB 105, NØBVW 83, WAØVRE 82, WØRWE 24, WBØOMF 21.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC: K5TML. NMs: WA5LGN W5MYZ W5POH WA5ZWZ. Nets: ARN 3.995 0030/dy 1032 51 WA5LGN. OZK 3.760 0100/dy 258 59 W5MYZ. APN 3.937 1200/M-S 847 35 W5POH. M-Bird 3.928 2230/M-F 735 20 WA5ZWZ. SCARC 28.765 0230/M&T 66 18 K5HZ. New officers Ft. Smith ARC: WB6SXR, pres.; KB5BV, vice pres.; W5FFY, secy/treas.; N5BRD, act.; W5JM KA5JVJ KB5DO, dir. Silent Keys: W5QEK & WB5IIY. Our sympathy to their families. March 6th, AR held a tornado drill and the Ark WX Net was activated, with many area stations being active. OBs K5DW 4, W5UAU 2. Traffic: W5QFU 85, K5BIL 54, KBØUX 26, W5UAU 13, WB5KUI 6, WB5GQH 5.

LOUISIANA: SCM, Jim Glammanco, N5IB — N5FK reports that on March 6 a simulated disaster drill was



FRONT LICENSE PLATES

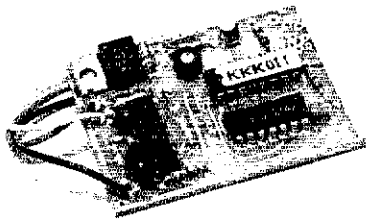
$5.00 for either type

AVAILABLE FROM

ARRL
225 MAIN ST.
NEWINGTON, CT 06111

PROUD OF YOUR CALL? WORRIED ABOUT THEFT? BUILDING A REPEATER?

Identify your FM transceiver with automatic code on each transmission.



SMALL: 1 3/4" X 2 1/4" X 5/16"
Perfect means of RTTY code ID

PRICE **$49.95** Ppd.
+$3.00 for Calif. address.

Full feature repeater IDer with timer **$79.50** Ppd. +$4.77 for Calif. address.

WARRANTY
Returnable for full refund within ten day trial period. One year for repair or replacement.

Your call sign programmed at factory, please be sure to state call sign when ordering.

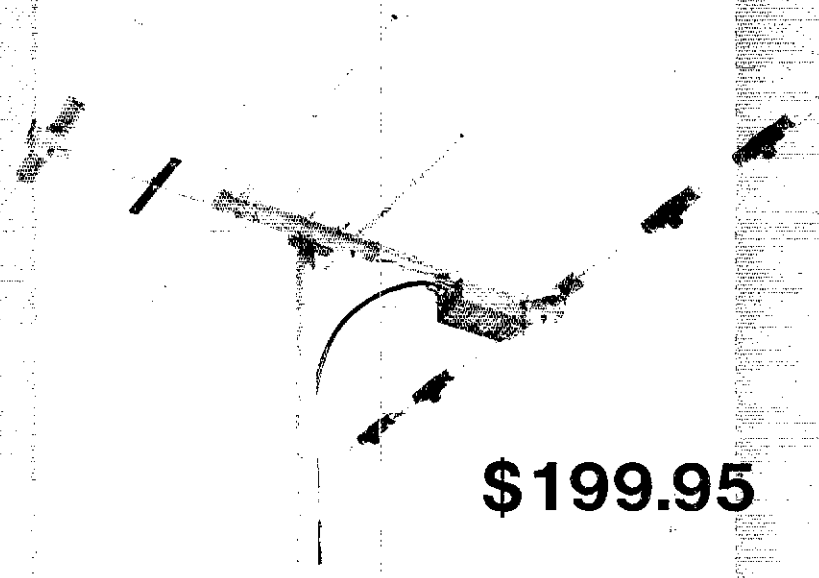
Inquire about commercial models.

AUTOCODE
8116 Glider Avenue, Dept. Q
Los Angeles, CA 90045
(213) 645-1892

STEP UP TO TELREX

with a TRI-BAND ARRAY designed to LAST and OUTPERFORM

10, 15, 20 Meter "Tri-Band" Array
MODEL TB4EC



$199.95

The TB4EC is the only **Professionally** designed, commercially available Tri-Band Array providing Optimum Performance, compactness, quality, and longevity at a low price.

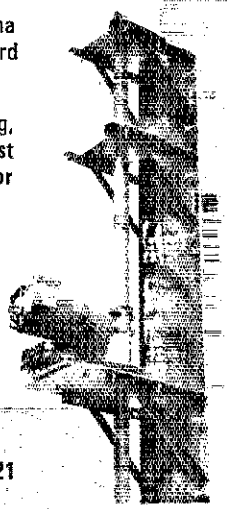
"A TRUE VALUE"

Performance exhibited by an excellent Forward Gain, and f/b ratio, with deep side nulls incorporated within a precision tuned pattern.
Compactness in a 15'6" turning radius.
Quality in stainless steel electrical hardware, hermatically sealed epoxied traps, preformed mounting straps, pre-drilled reinforced extra-heavy walled aluminum elements and boom, and hand crafted workmanship.
Longevity in an average life span approaching 20 years - actual experience.

The perfect combination to peace of mind - a Telrex antenna system and utility-pole hardware kit mounted to a standard utility-pole.

All heavy-duty, welded angle iron, through the pole anchoring, and 3 platform construction assures support protection against high winds in a trouble and maintenance free setting for **decades to come.**

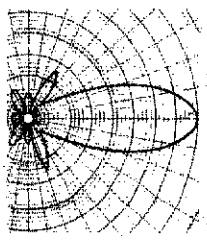
Two kits are available - the TMPH10 (rated 18 sq. ft. at 100 mph) and the XTMPH10 (rated 50 sq. ft. at 100 mph)



For technical data and prices on the complete line of Telrex Professionally designed equipment, write for Catalog PL-8.

Phone anytime night, day or holiday and leave your call sign - we will respond with our latest catalog.

T L I



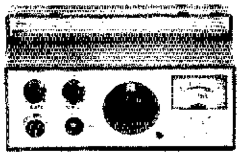
Communication Antennas Since 1921

telrex LABORATORIES

P.O. Box 879 - Asbury Park, N.J. 07712 Phone 201-775-7252

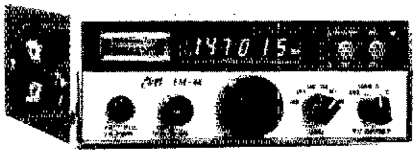
$$

SUPER VALUES FROM CLEGG.



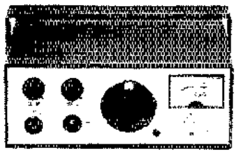
MARK 3
$205

- 144–148 MHz
- 12 channels—crystal controlled
- 15 watts
- Special modifications for CAP & MARS available



FM-88
$299

- 143–149 MHz (synthesized)
- 25 watt (variable)
- .25 uv receiver
- Provisions for non-standard offsets (MARS, CAP, etc.)
- 1 year warranty



FM-76
$195

- 220–225 MHz
- 12 channels—crystal controlled
- 10 watts
- If you're not on 220, now is the time to try it with an FM-76

Phone 1 (800) 233-0250 (In PA (717) 299-7221) today to place your order or to request a detailed brochure describing these transceivers and related power supplies, antennas, amplifiers and other accessories.

**Special quantity pricing is available on the MARK 3 and FM-76 transceivers. Get your group together and call for a quote on your requirements.*

Prices subject to change without notice.

Clegg Communications Corp
1911 Old Homestead Lane
Greenfield Industrial Park East
Lancaster, PA 17601

$$

MIDCOM

DEAL WITH #1!

CARLOAD INVENTORIES • ROCK BOTTOM PRICES

24-HOUR SERVICE

LINES:

AEA	ALPHA	CUSHCRAFT	DENTRON	KLM	MOR GAIN	PALOMAR ENG.	UNIVERSAL
AVANTI	BEARCAT	COLLINS	HY GAIN	KENWOOD	MIRAGE	REGENCY	UNARCO-ROHN
ASTRON	BIRD	CDE	HUSTLER	MICROLOG	MFJ	SWAN	VIBROPLEX
ALLIANCE	BENCHER	DRAKE	ICOM	MINI-PRODUCTS	NYE	TEN TEC	KANTRONICS

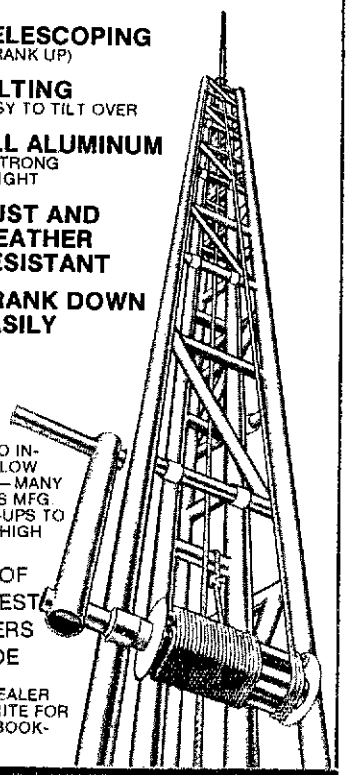
CALL TOLL FREE 1-800-325-3609 IN MISSOURI 314-961-9990

MID-COM ELECTRONICS • 8516 MANCHESTER ROAD • BRENTWOOD, MO 63144

ALUMA TOWERS

EXCELLENT FOR AMATEUR RADIO

- ★ **TELESCOPING** (CRANK UP)
- ★ **TILTING** EASY TO TILT OVER
- ★ **ALL ALUMINUM** —STRONG —LIGHT
- ★ **RUST AND WEATHER RESISTANT**
- ★ **CRANK DOWN EASILY**



EASY TO INSTALL. LOW PRICES—MANY MODELS MFG CRANK-UPS TO 100 FT. HIGH

ONE OF THE BEST TOWERS MADE

SEE DEALER OR WRITE FOR FREE BOOKLET.

ALUMA TOWER COMPANY
BOX 2806QST
VERO BEACH, FLORIDA 32960 U.S.A.
305-567-3423 TELEX 80-3405 FRANKE VERO

CUSHCRAFT SPECIALISTS

32-19 144-146MHz 19 Element Antenna	$68.00
32-SK Stack, Harness & P.D. 2 Boomers	30.59
ATB-34 14, 21, 28MHz, 4 Element Beam	199.95
AV-3 20-15-10 Meter ¼ Wave Vertical	37.39
AV-4 40-20-15-10 Meter ¼ Wave Vertical	77.00
AV-5 80-40-20-15-10 Meter ¼ Wave Vertical	81.60
40-4CD 14 MHz 4 Elem Skywalker Beam	217.75
20-3CD 14MHz 3 Elem A14-3 Skywalker	149.65
15-4CD 21MHz 4 Elem A21-4 Skywalker	88.45
15-3CD 21MHz 3 Elem A21-3 Skywalker	74.80
10-4CD 28 MHz 4 Elem A28-4 Skywalker	68.00
10-3CD 28 MHz 3 Elem A28-3 Skywalker	54.49
AMS-147 146-148MHz Mobile Stainless Magnet Mt	22.49
ATS-147 146-148MHz Mobile Stainless Trunk Mt	22.49
A147-4 146-148MHz 4 Elem. FM Antenna	20.49
A147-11 146-148MHz 11 Elem FM Antenna	30.69
A147-20T 144 & 147MHz 20 Elem FM Antenna	51.10
A220-7 220-225MHz 7 Elem FM Antenna	22.50
A220-11 220-225MHz 11 Elem FM Antenna	29.39
A449-11 449MHz 11 Element FM Antenna	29.25
ARX 2B 135-170MHz Ringo Ranger FM Antenna	33.98
A147-SK Stacking Kit for two A147-11	15.69
A14T-MB Twist Mounting Boom & Bracket	16.98
A144-10T 145MHz 10 Elem Twist Antenna	37.39
A144-20T 145MHz 20 Elem. Twist Antenna	51.10
A50-3 50MHz 3 Elem. VHF/UHF Beam	37.10
A50-5 50MHz 5 Elem. VHF/UHF Beam	51.10
A50-6 50MHz 6 Elem VHF/UHF Beam	68.00
A144-11 144 MHz 11 Elem. VHF/UHF Beam	30.79
DX-120 144MHz 20 Elem. Colinear DX Array	46.23
DX-1BN 1-1 Balun for DX-120	12.95
214B 144-146MHz 14 Elem Boomer Antenna	54.40
214FB 144.5-148MHz 14 Element Boomer Antenna	54.40
ALLIANCE HD-73 Rotor	95.00

CALL FOR QUOTES ON OTHER RELATED PRODUCTS FOB SAN ANTONIO

Amateur Equipment, Accessories & Antennas. No Service Charge for COD. Export Anywhere. Amateur & Commercial Repair Service

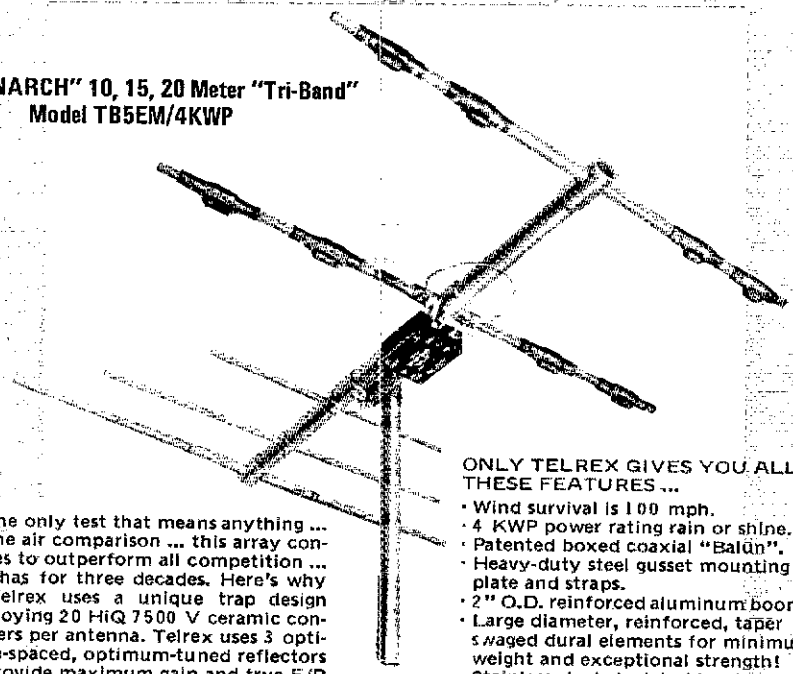
Appliance & Equipment Company inc.

2317 Vance Jackson Rd. San Antonio, TX 78213
800-531-5405 (512) 734-7793 (TX)

STEP UP TO TELREX

Professionally Engineered Antenna Systems

"MONARCH" 10, 15, 20 Meter "Tri-Band"
Model TB5EM/4KWP

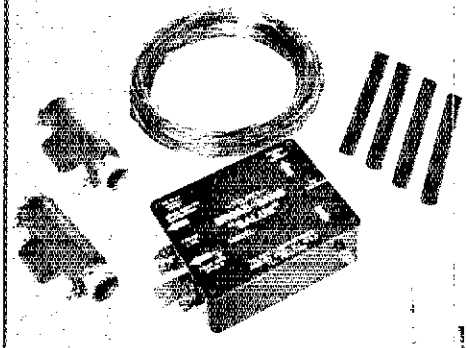


By the only test that means anything ... on the air comparison ... this array continues to outperform all competition ... and has for three decades. Here's why ... Telrex uses a unique trap design employing 20 HiQ 7500 V ceramic condensers per antenna. Telrex uses 3 optimum-spaced, optimum-tuned reflectors to provide maximum gain and true F/B Tri-Band performance.

ONLY TELREX GIVES YOU ALL THESE FEATURES ...

- Wind survival is 100 mph.
- 4 KWP power rating rain or shine.
- Patented boxed coaxial "Balun".
- Heavy-duty steel gusset mounting plate and straps.
- 2" O.D. reinforced aluminum boom.
- Large diameter, reinforced, taper swaged dural elements for minimum weight and exceptional strength!
- Stainless steel electrical hardware.
- Phone and CW capability all bands!

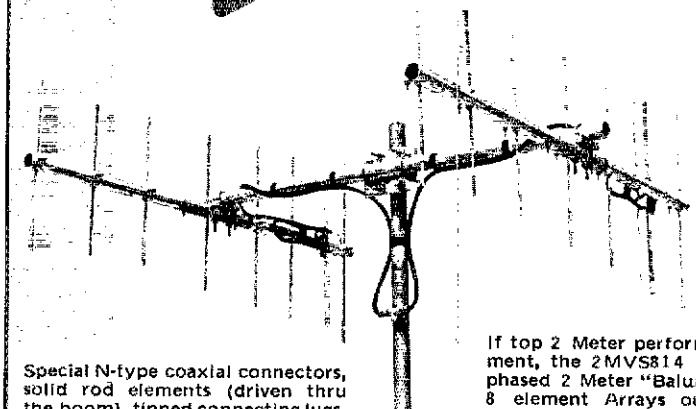
A Telrex "Balun" fed "Inverted-Vee" kit is the ideal hi-performance inexpensive and practical to install low-frequency mono or multiple band, 52 ohm antenna system.



Better than optimum full sized Dipole performance in an antenna which can be set up within the hour, needing a minimal support structure. (existing tower, house tree etc.) The "Inverted-Vee" produces a low-angle "Balanced" Omni-Directional pattern, which increases the signal to noise, and signal to interferance ratios. Complete simplified instructions are provided.

NO TUNERS NEEDED!

MIVD/2 frequencies $75.95 Post Paid (U.S.)



Special N-type coaxial connectors, solid rod elements (driven thru the boom), tinned connecting lugs, and s/s electrical hardware provide you with peace of mind for many years!

If top 2 Meter performance is your requirement, the 2MVS814 kit consisting of 2 ea. phased 2 Meter "Balun" fed precision tuned 8 element Arrays outperform even quad stacked antennas of other makes.

TLI

For technical data and prices on the complete Telrex line, write for Catalog PL-82.

Communication Antennas Since 1921

Telrex LABORATORIES

P.O. Box 879 - Asbury Park, N.J. 07712 Phone 201-775-7252

held in Lake Charles, including a flood, a derailed tank car, and a tornado. Ham operators were used to pass emergency traffic. Welcome to new ARRL affiliated club, the SOWELA ARC, with WB5ITX as president. This June 28, the Jefferson ARC will be celebrating its 25th anniversary of incorporation. N5RB awarded 16 LAN certificates last month, congrats to each recipient. Congrats to K5PO who just received her DXCC. Operation Red Cross Message Relay is coming up in May. Contact your SCM for details. We just received a copy of the FCC newsletter "Feedback" and almost had heart failure opening the envelope. They print the darn thing on PINK paper! Clubs especially, please note that the deadline for comments on the FCC proposed "plain language" rules for hams is mid-June. And send a copy to ARRL Hq as well. Don't forget the Baton Rouge Hamfest on May 16 and 17. Hope to see many of you there.

Net	Freq.	Time	QNI	QTC	Mgr.
LAN	3615 kHz	7 & 10 P.M. Dy	224	87	N5RB
LTN	3910 kHz	6:30 P.M. Dy	595	169	N5EK
LSN	3703 kHz	7:30 P.M. M-F	180	49	WD5EAE
LRN	3587.5 kHz	6:30P Su, 8P W	9	0	N5RB
LEN	3910 kHz	8:00 P.M. Sun	---	---	---

Traffic: (Feb.) WD5FLM 150, N5RB 142, K5TL 106, WB5UVX 63, WD5GKP 61, W5VMY 56, WD5EAE 42, N5IB 28, WB5ODJ 27, WD5GJB 26, WD5CWK 21, K5WOD 9, WB5JZP 6, WB5IKT 5, KA0CSM 4. (Jan.) KA3BER 1.

MISSISSIPPI: SCM, E. Ed Robinson, W5XT — SEC: WB5FXA. With some sadness and happiness I write this month's column. The sadness is that this is the last SCM column for me to write. Happiness is turning it over to a more capable person, your new SCM, WB5SNB, Paul Kemp. He will do an outstanding job! Congrats! QCWA has chartered the Magnolia Chapter (#133) Jackson, with 13 charter members. Congrats to upgrades KA5AGD KA5AEN WB5OUC N5BTG to Advanced. New officers Vicksburg ARC: KA5AEN, pres. KA5AGG, v.p.; WB5ADC, 2nd v.p.; K5VXV, secy/treas. Remember, support your nets and report to WB5SNB. CAND (W5KV) sess 28, QTC 934, with DRNS rep. 100% by MS stations W5EDT N5AMK, DRN5 (WB5NKD) sess 28, QTC 536, with MS up 100% by KA5AFT N5AMK KA5BPJ W5EDT KC5EY WD5EYM W5HKW W5VMC KB5W W5YD WB5YMO KB5ZO CGCHN (KB5NX) sess 28, QNI 2852, QTC 244, MSBN (WD5EYM) sess 28, QNI 2103, QTC 77, MTN (K5OAF) sess 28, QNI 125, QTC 35. MN (WB5RMW) sess 28, QNI 448, QTC 9. MSN (KA5GGG) sess 7, QNI 16, QTC 1, RACES (N5AMK) sess 4, QNI 170, QTC 3, CAEN (KA5AGD) 3, QNI 90, QTC 3, GSEN (KB5W) sess 20, QNI 472, QTC 19. Traffic: KB5W 242, N5AMK 173, K5OAF 115, W5EDT 85, WB5SNB 62, W5XT 35, WD5EYM 33, W5RIM 17, N5XA 1.

TENNESSEE: SCM, Earl Leonard, KB4G — STM: WB4PRF. SEC: W4NZW. The hottest topic of discussion these days is the "Plain Language" rules change proposal. I have heard a lot of discussion and there seems to be a controversy. So I urge every amateur to put your comments on paper and send them to the FCC and also send a copy to the League so they will know how you feel about these important issues. Comments must be received by the FCC by the 19th of June so times-a-wasting. Let them hear from you. Nets reporting: Phone nets — LF 84 sessions, QNI 4553, QTC 291. VHF 107 sessions, QNI 2526, QTC 596. Cw 48 sessions, QNI 668, QTC 236. CW Net Honor Roll: TN N4EAM WB4PRF W4DDK W4ZJY W4WXH NG4J W4RMD KB4G and W5LVC. TSN WA4CMS W4DDK KA3DUC N4DZW N4EAM: NG4J WA4LXP KC4MW KA4NWF KA4DWU KA4RJC KA4RUE KC4UH and WB4YSN. The Tennessee Slow Net (TSN) now meets seven nights a week. N4EAM is assistant manager. Frequency is still 3710 kHz, time is still 2300Z (7 P.M. EDT). Traffic: NG4J 502, W4OGG 211, WB4BKF 195, W4WXH 126, W4ZJY 125, K4VM 85, W4DDK 69, W4MRD 48, WB4ZSZ 30, WB4PRF 23, KY4L 21, W4VS 21, WD4NRJ 20, W4PFP 18, K4WOP 17, KA4GSS 15, W4CSY 14, KC4MW 13, K4AMC 12, K4YOL 12, WA4CGK 9, W4PSN 8, KA4BSG 2, W4DPO 2.

GREAT LAKES DIVISION

KENTUCKY: SCM, Dave Vest, KZ4G — Feb nets:

Net	QNI	QTC	Net	QNI	QTC
KRN	516	35	B-ARES	64	7
MKPN	1167	89	5-ARES	78	4
KTN	1353	174	SEKEN	20	---
KNTN	392	161	CARN	171	21
KYN	279	111	PAEWTN	319	36
KSN	164	34	TRI-ST	397	68
KYPON	56	8	EWPN	239	1
D-9RN	100%	491	MRN	170	141

Many thanks to the Bullitt ARS for turning out more Novices. New calls KC4VB and KC4WN are KA4AZT and WD4ONV. Thanks to KA4MZY and WD4BSC, their help on D-9RN made KY 100%. Traffic: K4YZU 187, KA4MZY 123, K4DZM 112, K4LJX 86, KB4OZ 75, WB4ZDU 73, KA4GFU 67, WD4LXX 65, KC4WN 60, KS4V 57, WB4ILF 49, WA4AVV 41, WD4BSC 41, WA4EBN 41, WA4AGH 40, WD4IYI 35, WA4JTE 33, WD4JTO 31, KZ4G 28, KA4IKH 28, KA4SAA 28, KC4VB 27, KA4MBF 25, WD4COF 21, WA4GAL 21, K4HOE 18, W4CDA 15, WB4AUN 14, W4PKX 14, WB4APC 13, KA4FJR 10, KU4A 8, WA4YPO 8, WD4CJQ 6, WA4NOG 6, K4AVX 5, W4TPB 4.

MICHIGAN: SCM, James R. Seeley, WB8MTD — ASCM: WA8DHB. SEC: WA8EFK. STM: AF8V. DECs: WB8FLK K8RCT W8VWY. NMs: WD8BHE WA8DHB K8LNE K8KMQ WD8LRT WD8NKT WA8PIM W8SCW WA8RNB WD8RNQ WB8YDZ K8ZJU

Net	Freq.	Time/Day	QNI	Tfc	Sess.	Mgr.
OMN*	3663	1800 Dy**	1401	583	84	WA8PIM
MITN*	3953	1900 Dy	823	474	28	WD8LRT
GLETN	3932	2100 Dy	1271	204	28	K8DTG
UPN*	3922	1700 Dy	783	141	32	WA8DHB
MACS*	3953	1100 Dy	709	135	28	K8LNE
MNN*	3722	1730 Dy**	534	122	56	WD8BHE
SEMTN*	146.64	2045 Dy	243	44	28	WA8RNB
BR	3930	1730 M/S	331	25	21	W8HIN
MEN	3930	0900 Su		6	4	W8HIN
WSSBN	3935	1900 Dy		(N/A)		W8POZ
VHF Nets 14 reports			748	48	64	WD8NKT

*NTS Nets. Times local. **QMN late net, 2200; MNN late net 2000. 3932 kHz in MI emergency frequency. Traffic workshop Su 3953 kHz, 1600. ARES net Su 3932 kHz, 1730. ARES (U.P.) Thur. 3922 kHz, 1800. New ORS: N8BJD K8LUY. OO reports: K8JH W8MVR W8QG AC8Y. OBS reports: W8MPD K8NKB WA8RNB N8ABA. Silent Keys, with deep regret: WA8AHY K8YJO W8CO K8NWH (Dec. '80) W8YLY K8ZKM. N8BFJ now KE8Z. KA8DVU now KC8AJ, soon to change again. Chelsea Communications Club 1981 officers: WB8HSN, managing dir.; KA8FPM, secy/treas.; N8AYY, act. chmn. K8LUY becomes our first and only Tech license to be appointed ORS, joining our lone Novice, WD8OEP, in this category.

Destined to become an old friend

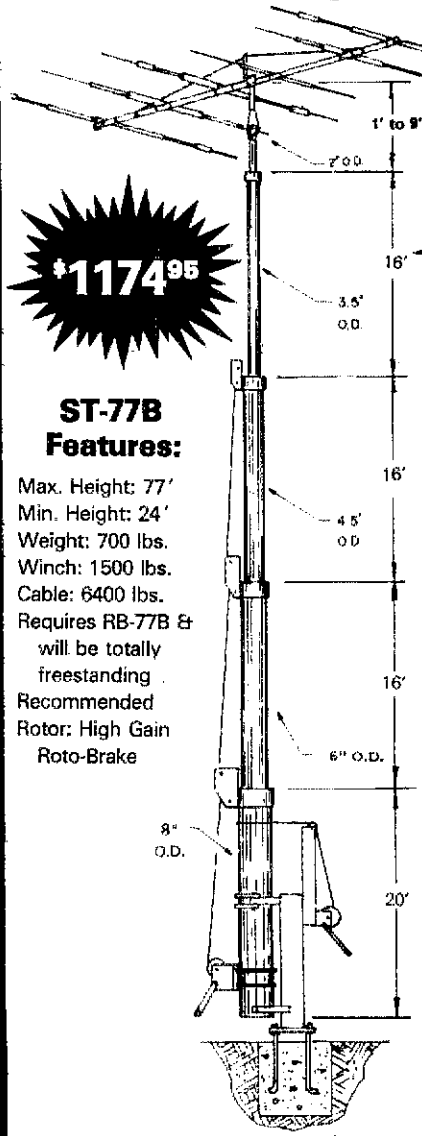
This is one piece of equipment you'll keep for a *long* time. We've designed *out* the obsolescence with our new plug-in application modules. These fully shielded modules, about the size of a business card, will keep your ATR-6800 as new as tomorrow with updates, and future program expansion. You'll be proud of its top "on-the-air" RTTY/CW performance, and of its versatility as your HAM COMPUTER/STATION CONTROL. Make a permanent place in your station for the system that won't gather dust! ATR-6800 system with 10 practical programs in module number one, and nine inch video monitor . . . $2495. Companion printer, add $450. Module #1 separately, $189. Get to know the *active* hams at MICROLOG Corp., 4 Professional Drive, Gaithersburg, MD. 20760. Tel.: (301) 948-5307.

ATR-6800
COMMUNICATIONS SYSTEM

MICROLOG
INNOVATORS IN DIGITAL COMMUNICATIONS

WILSON SYSTEMS TOWERS

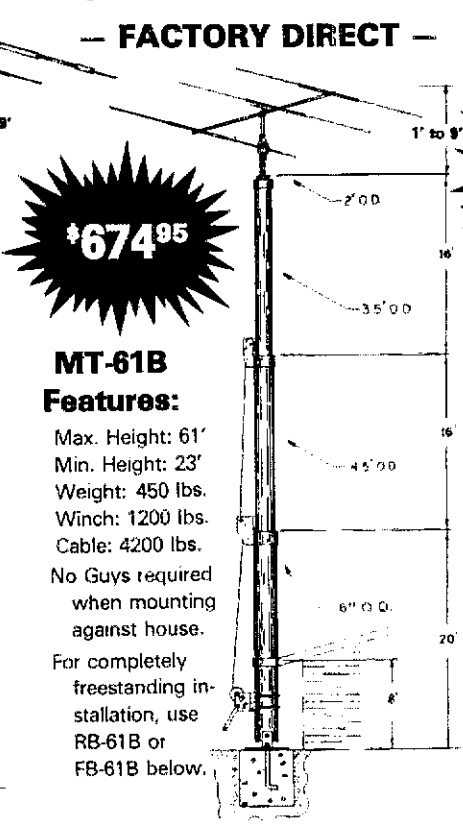
— FACTORY DIRECT —



$1174.95

ST-77B Features:

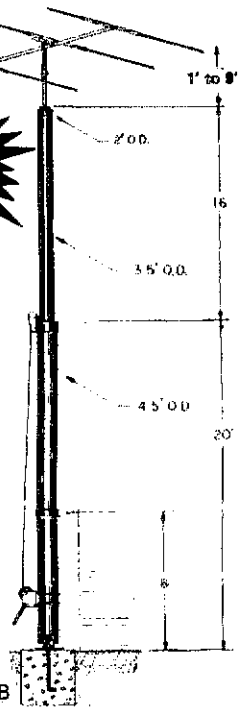
Max. Height: 77'
Min. Height: 24'
Weight: 700 lbs.
Winch: 1500 lbs.
Cable: 6400 lbs.
Requires RB-77B & will be totally freestanding
Recommended Rotor: High Gain Roto-Brake



$674.95

MT-61B Features:

Max. Height: 61'
Min. Height: 23'
Weight: 450 lbs.
Winch: 1200 lbs.
Cable: 4200 lbs.
No Guys required when mounting against house.
For completely freestanding installation, use RB-61B or FB-61B below.



$409.95

TT-45B Features:

Max Height: 45'
Min. Height: 22'
Weight: 250 lbs.
Winch: 1200 lbs.
Cable: 4200 lbs.
No Guys required when mounting against eve of house.
For completely freestanding installation, use RB-45B or FB-45B below.

NEW! Wilson Electric Winch

Now you can raise and lower your Wilson Tower electrically. The electric winch will replace the hand-operated winch. Available for use on the TT-45, MT-61 and ST-77 towers.

EW-45 (TT-45)
EW-61 (MT-61)
EW-77 (ST-77) **$249.95**

Remote Switch $24.95

BASE CHART		
TOWER	WIDTH	DEPTH
TT-45B	12" x 12"	30"
FB-45B	30" x 30"	4½'
RB-45B	30" x 30"	4½'
MT-61B	18" x 18"	4'
FB-61B	3' x 3'	5½'
RB-61B	3' x 3'	5½'
ST-77B	See Below	
RB-77B	3½' x 3½'	6'

WIND LOADING			
Tower	Height	Sq. Ft.	
ST-77B	69	16	Square Footage Based on 50 MPH Wind
	77	10	
MT-61B	53	18	
	61	12	
TT-45B	37	18	
	45	12	

Wilson Systems uses a high strength carbon steel tube manufactured especially for Wilson Systems. It is 25% stronger than conventional pipe or tubing. The tubing size used is: 2" & 3½"-.095; 4½" & 6"-.125; 8"-.134. All tubing is hot dip galvanized. Top section is 2" O.D. for proper rotor and antenna mounting.

The TT-45B and MT-61B come complete with house bracket and hinged base plate for against-house mounting. For totally freestanding installation, use either of the tilt-over bases shown below.

The ST-77B cannot be mounted against the house and must be used with the rotating tilt-over base RB-77B shown below.

TILT-OVER BASES FOR TOWERS

FIXED BASE

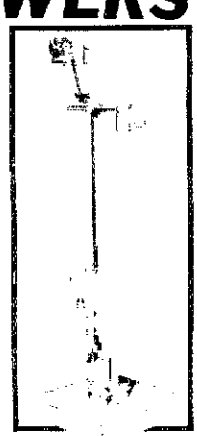
The FB Series was designed to provide an economical method of moving the tower away from the house. It will support the tower in a completely free-standing vertical position, while also having the capabilities of tilting the tower over to provide an easy access to the antenna. The rotor mounts at the top of the tower in the conventional manner, and will not rotate the complete tower.

FB-45B.. 112 lbs... $209.95
FB-61B.. 169 lbs... $299.95

ROTATING BASE

The RB Series was designed for the Amateur who wants the added convenience of being able to work on the rotor from the ground position. This series of bases will give that ease plus rotate the complete tower and antenna system by the use of a heavy duty thrust bearing at the base of the tower mounting position, while still being able to tilt the tower over when desiring to make changes on the antenna system.

RB-45B.. 144 lbs... $289.95
RB-61B.. 229 lbs... $379.95
RB-77B.. 300 lbs... $569.95



Tilting the tower over is a one-man task with the Wilson bases. (Shown above is the RB-61B. Rotor is not included.)

ORDER FACTORY DIRECT
1-800-634-6898

WSI WILSON SYSTEMS, INC.

Specifications Subject to Change Without Notice

4286 S. Polaris Ave., Las Vegas, Nevada 89103

WILSON SYSTEMS, INC. MULTIBAND ANTENNAS

WV-1A $64.95
FACTORY DIRECT

4 BAND TRAP VERTICAL (10 - 40 METERS)

No bandswitching necessary with this vertical. An excellent low cost DX antenna with an electrical quarter wavelength on each band and low angle radiation. Advanced design provides low SWR and exceptionally flat response across the full width of each band.

Featured is the Wilson large diameter High-Q traps which will maintain resonant points with varying temperatures and humidity.

Easily assembled, the WV-1A is supplied with a base mount bracket to attach to vent pipe or to a mast driven in the ground.

NOTE: Radials are required for peak operation. (See GR-1 below)

SPECIFICATIONS

- 19' total height
- Self supporting—no guys required
- Weight — 14 lbs.
- Input impedance: 50 Ω
- Powerhandling capability: Legal Limit
- Two High-Q traps with large diameter coils
- Low angle radiation
- Omnidirectional performance
- Taper swaged aluminum tubing
- Automatic bandswitching
- Mast bracket furnished
- SWR: 1.1:1 or less on all bands

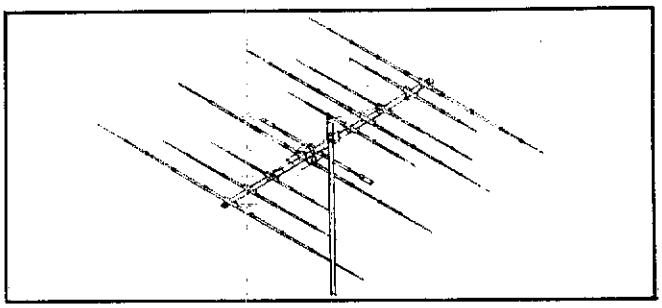
GR-1 $14.95

The GR-1 is the complete ground radial kit for the WV-1A. It consists of 150' of 7/14 stranded aluminum wire and heavy duty egg insulators, instructions. The GR-1 will increase the efficiency of the WV-1A by providing the correct counterpoise.

33-6 MK $64.95

Now you can have the capabilities of 40-meter operation on the SYSTEM 36 and SYSTEM 33. Using the same type high quality traps, the 40-meter addition will offer 150 KHZ of bandwidth at less than 2:1 SWR. The new 33-6 MK will fit your present SY36, SY33, or SY3 and use the same single feed line. The 33-6 MK adds approximately 15' to the driven element of your tri-bander, increasing the tuning radius by 5 to 6 feet. This addition will offer an effective rotatable dipole at the same height of your beam.

SY-40 $349.95



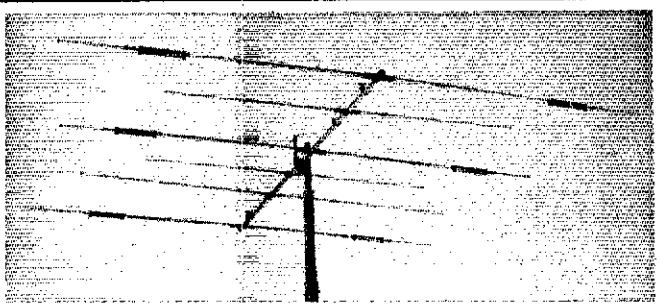
★ 3 MONOBANDERS on 1 Boom
- 4 elements on 20 mtrs FULL SIZE
- 4 elements on 15 mtrs
- 5 elements on 10 mtrs

The System 40 is the answer to the DXer who does not have space to stack monobanders yet wants the advantages they offer. Through the use of our split beta matching method, only one feed line is required and complete coverage of both the phone and cw bands are available with only one setting.

SPECIFICATIONS

Max. Pwr. Input ..... Legal Limit	Matching Method ..... Split Beta	Surface Area ..... 12.1 sq.ft.
VSWR @ Res. 1.2:1	F/B Ratio ..... Call Factory	Wind Loading @ 80 mph. ..... 309 lbs.
Impedance ..... 50 ohm	Boom ..... 2" x 26'	Assem. Weight ..... 75 lbs.
Feed Method ..... Balun Supplied	Longest Element ..... 36'	Shipping Weight ..... 97 lbs.
Gain (dBd) ..... Call Factory	Turning Radius ..... 22'6"	

SY-36 $209.95

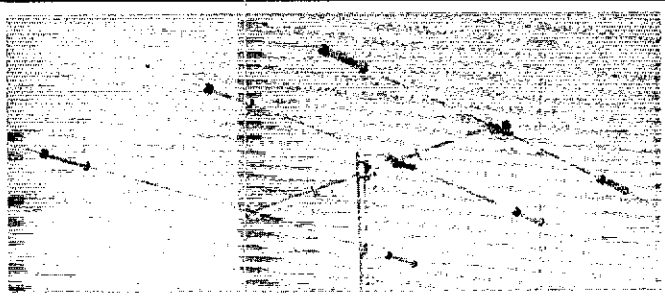


A trap loaded antenna that performs like a mono-bander! That's the characteristic of this six element three band beam. Through the use of wide spacing and interlacing of elements, the following is possible: three active elements on 20, three active elements on 15, and four active elements on 10 meters. No need to run separate coax feed lines for each band, as the bandswitching is automatically made via the High-Q Wilson traps. Designed to handle the maximum legal power, the traps are capped at each end to provide a weatherproof seal against rain and dust. The special High-Q traps are the strongest available in the industry today.

SPECIFICATIONS

Band MHz. 14-21-28	Boom (O.D. x Length) ..... 2" x 24'2¼"	Wind Loading @ 80 mph. ..... 215 lbs.
Maximum Power Input ..... Legal Limit	Number of Elements 6	Maximum Wind Survival ..... 100 mph
Gain (dBd) ..... Call Factory	Longest Element ..... 29'6½"	Feed Method ..... Coaxial Balun
VSWR @ Resonance 1.3:1	Turning Radius ..... 18'6"	(Supplied)
Impedance ..... 50 ohm	Maximum Mast Diameter ..... 2"	Assembled Weight (approx.) ..... 53 lbs.
F/B Ratio ..... Call Factory	Surface Area ..... 8.6 sq. ft.	Shipping Weight (approx.) ..... 62 lbs.

SY-33 $159.95



Capable of handling the Legal Limit, the SYSTEM 33 is the finest compact tribander available to the amateur. Designed and produced by one of the world's largest antenna manufacturers, the traditional quality of workmanship and materials excels with the SYSTEM 33. New boom-to-element mount consists of two 1/8" thick formed aluminum plates that will provide more clamping and holding strength to prevent element misalignment. Superior clamping power is obtained with the use of a rugged 1/4" thick aluminum plate for boom to mast mounting. The use of large diameter High-Q Traps in the SYSTEM 33 makes it a high performance tri-bander and at a very economical price. A complete step-by-step illustrated instruction manual guides you to easy assembly and the lightweight antenna makes installation of the SYSTEM 33 quick and simple.

SPECIFICATIONS

Band MHz. 14-21-28	Boom (O.D. x Length) ..... 2" x 14'4"	Wind Loading @ 80 mph. ..... 114 lbs.
Maximum Power Input ..... Legal Limit	Number of Elements 3	Assembled Weight (approx.) ..... 37 lbs.
Gain (dBd) ..... Call Factory	Longest Element ..... 27'4"	Shipping Weight (approx.) ..... 42 lbs.
VSWR at Resonance 1.3:1	Turning Radius ..... 15'9"	Direct 52 ohm feed ..... No Balun Required
Impedance ..... 50 ohm	Maximum Mast Diameter ..... 2" O.D.	Maximum Wind Survival ..... 100 mph
F/B Ratio ..... Call Factory	Surface Area ..... 5.7 sq. ft.	

ORDER FACTORY DIRECT 1-800-634-6898

WSI WILSON SYSTEMS, INC.

4286 S. Polaris Ave., Las Vegas, Nevada 89103

Prices and specifications subject to change without notice.

A reminder that Novices and Techs ARE eligible for field appointments. Applications on request from this office. A reminder also that all field appointees must report regularly to the SCM and maintain their ARRL membership to keep their appointments in effect. Glad to hear the many reports of severe weather training sessions at this time of year. ARES membership is at an all-time high in Michigan, and our level of emergency preparedness appears to be excellent and improving all the time. Twenty-one PSHR reports this month. BPL: KA8CPS WD8LRT AF8V. Traffic: WD8LRT 660, KA8CPS 646, AF8V 574, WA8PIM 280, W8DSE 232, WB8MT 227, KB8MX 177, W8BYDZ 171, WD8OSE 146, WD8RNO 141, WD8LSV 120, WA8TAQ 119, K8KMQ 115, K8DTG 111, W8UE 110, WD8BHE 92, WB8SYA 89, N8ABA 81, KE8X 81, W8IHX 77, W8CUP 75, WB8JAD 73, WD8MJB 72, WD8EIB 64, WD8BSE 62, WA8DHB 62, AD8X 60, WD8NKT 59, K8GXV 59, W8VPW 58, W8VIZ 56, W8EOI 52, W8SCW 48, W8YIQ 47, WD8IBY 44, N8BJD 43, WB8HPZ 42, K8LNE 41, WB8YRY 40, WB8TTA 37, KA8AID 36, KA8DEZ 32, WD8RWR 32, K8UPE 31, KA8HFS 30, K8OCP 29, K8LUY 27, WD8RHU 27, W8HIN 22, KI8Q 18, W8RNQ 18, K8BZ 16, K8BGC 16, WA8LKC 16, KB8GT 15, WB8YWA 15, KA8ATV 14, WD8OEP 12, K8ZJU 11, WD8JRT 10, W8JUP 10, W8LDS 10, W8PBO 9, W8TBP 9, W9NXD 8, W8MQF 7, W8BEZ 6, N8BNC 6, WB8HSN 6, WA8YBP 5, W8QG 4, W8YNY 4, WD8LIP 2, K8RV 2, WA8VBF 1.

OHIO: SCM, Allan L. Severson, AB8P — Asst SCM: W8MOK, SEC: K8AN, STM: K8OZ, NMs: K8AAZ WD8KBW K8OZ WD8QMP WB8YGW. Net reports:

Net	QNI	QTC	Sess.	Time (local)	Freq.
BN	506	346	56	6:45/10 P.M.	3.577
BNR	123	58	22	6 P.M.	3.605
ONN	221	40	28	6:30 P.M	3.708
OSN	256	139	28	6:10 P.M	3.577
OSSBN	2795	1544	84	10:30 A.M. 4:15 & 8:45 P.M.	3.9725
O6MN	270	37	28	9 P.M.	50.169

The Ohio State ARRL Convention, slated for June 12 & 13 (not 13 & 14 as previously stated here) is shaping into a really outstanding affair under the skillful leadership of K8JE and KB8BV. Harry Dannals, W2HD, will represent League Headquarters, and Ohio Representative John Ashbrook is scheduled as the banquet speaker. Complete convention details are available elsewhere and I hope this reminder will jog you into making plans to attend. You still have time. If you want to hear an inspiring story, corner WB8TTQ (Lucas County EC) and ask him about the Lucas County ARES communications van. It is absolutely amazing what a dedicated public service group under creative leadership can accomplish with an old bookmobile, small sums of foundation money, and large amounts of grit, perseverance, talent and knowledge. I'm hoping that by the time this column appears many of you will have seen the van and congratulated Paul and the Lucas County crew in person. Upgrades in one family: W8JOU to Extra, KB8YZ to Advanced and N8CKA to General.

Local Nets	QNI	QTC	Sess.
BRTN	401	202	28
CCOME	84	24	8
COARES	112	14	3
Firelands Red Cross	71	5	4
Huron Co. ARC	53	5	4
LCNWARES	480	127	28
MASER (Jan.)	79	4	4
MASER (Feb.)	97	2	4
RARA	60		4
TATN	576	167	27
TSRAC	756	95	32
VWCEN	47	3	4

Traffic: (Feb.) WB8DMF 739, WB8LIBR 522, K8AAZ 412, W8PMJ 322, W8MOK 304, WB8JGW 271, K8OZ 260, WA8GMT 236, WD8KFN 205, KB8YS 199, WB8MEK 194, AB8P 181, WB8WTS 176, W8OZK 176, N8CW 160, WD8KBW 145, WB8ICL 130, WD8DDE 124, W8EK 120, WB8SIQ 116, K8BYR 109, KF8J 106, WA8HGH 104, N8XX 98, K8DL 94, W8GGZ 89, K8AN 78, K3RC 77, WD8JIK 76, KA8DJZ 66, K8PYT 65, WA8SSI 63, W8BHL 61, WB8AWM 60, WB8QHU 60, WD8PEI 58, WB8PIY 51, WB8SGL 51, WA8BUW 47, N8JR 47, KA8KFW 47, WD8RIB 47, N8BKH 44, KK8L 44, WA8SED 42, WB8TTQ 37, WD8DYK 36, N8AKS 31, K8KWO 28, WD8NEC 28, WD8PMW 28, WB8YGW 26, WA8WCU 26, WA8MHO 25, W8TP 25, W8UPD 25, W8RG 23, WD8ODV 22, KA8HGH 21, W8MGA 21, WB8MRL 21, N8AUH 20, KA8DLF 20, WA8ZID 20, WA8JNO 19, N8CDO 16, N8CJS 16, WA8RPK 16, K8JA 15, WA1QAA 15, WB8WHF 15, WB8YYS 14, WA8LOI 13, WB8CJU 12, W8EDU 12, W8HVA 12, WA8MAZ 12, K8CKY 11, W8LZE 11, WB8TRK 11, WA8TSX 11, K8GET 10, WD8INK 10, WA8OYJ 10, K8WWS 10, WD9HDZ 9, W8IM 9, WD8NEB 9, K8DEV 8, KA8GRD 7, KB8BV 7, WB8VLR 7, WB8YTD 7, WD8MIO 7, WD8JAI 6, W8CAR 6, KA8CDE 6, N8CGA 6, N8CGM 6, KA8GOV 6, W8ZM 6, WA5BOV 5, WD5DJR 5, WA8HED 5, N2NS 5, WD8OYO 5, W8OQL 5, WD8RAN 5, WB8YUS 5, N8AJU 4, K8DHK 4, WD8EKI 4, WD8JAM 4, WD8QAC 4, N8AHK 3, WA8POA 3, WD8CHL 2, KA8EZU 2, WB8KKI 2, WB8NHV 2, WB8NTR 2, WA8POA 2, N8BHQ 1 (Jan.) WD8KFN 143, K8BYR 82, WB8ICL 65, WB8JIB 53, WB8TKU 39, WA8SSI 30, N2NS 9, WD8PEI 6, WA8ZID 6, N8BKH 1.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Paul S. Vydareny, WB2VUK — SEC: KB2TM, STM: WA2SPL, ASCM: KB2KW W2IT K2AV, NM: W2WSS WB2IXR N2BDW WB2ZCM WB2EAG WA2SPL WB2HDU W2ZOJ.

Net	Time/Day	Freq.
EPN	2300Z	3902
ESS	2300Z	3590
NYPON	2200Z	3913
NYSPTEN	2300Z	3925
NYS	0000/0300Z	3577
CDN(TROY)	2330Z	146.34/94
HVN(Beacon)	0300Z M-F	146.37/97
HVN(Pearl)	0030Z S-S	144.535/135
SDN(White Plns)	0230Z	147.66/06
SCRN(Catskill)	0100Z	146.135/735

May issue WILL have PD4 results! SCRN had some antenna problems — hopefully all taken care of by now. Sullivan EOC has new all mode 2m rig and new antennas. Ulster RACES called up 11 Feb and 20 Feb for flooding in Kingston. Crew included W2GJF WA2UBI WA2KLV W2XL N2AVN K2HA WA2MBB WA2QLI WB2AGU KC2L K2IYQ. WA2EQW now Life Member of ARRL. Congratulations to KA2DVM, now County Coordinator for Schenectady Law Enforcement Radio District. Would appreciate it if all clubs would mail me copy of their newsletter. Thanks! PSHR: N2BDW WB2EAG WA2EQW WB2HDU WB2IXR N2JK KB2DW

SOLID COPY...

. . . Most radio amateurs know what that phrase means. But that phrase can also be applied in a literary sense. In both cases, the message comes across clear — uncluttered, readability 5, dead full quieting. Solid copy describes *The New ARRL Operating Manual.*

If you belong to an active affiliated club, you probably have had a chance to look at the *Operating Manual* at a club meeting. We think this is the finest book on Amateur Radio operating ever written. It should be. Each chapter was written by an expert with extensive on-the-air experience in his or her field. For those who have not had a chance to see for yourselves, here is a chapter by chapter glimpse:

Strange Magic: The editor of the *Operating Manual* sets the tone of the book — the Amateur Radio experience is fun and rewarding!

Basic Amateur Radio: Getting your license, setting up your station, making your first contact, QSLing, the HANDI-HAMS and information on radio clubs.

Rules and Regs — An Introduction: A brief description of the FCC, applying for your license, modifying your license, U.S. call signs, third-party communications, operating in another country, proper identification, guest operating, logging, RFI, and the *new* bands.

Traffic Handling: Originating a message in the proper form, checking into nets, how the National Traffic System works.

Emergency Communications: The Amateur Radio Emergency Service and its operation in a communications emergency. *Must* reading for every amateur.

DX and DXing: Find the right band, the right time and the right frequency to work foreign Amateur Radio stations. Propagation on each band is described as well as using propagation forecasts. A section on low power DXing is included, as is information on use of the QSL bureau systems.

Contests: This chapter makes you want to "jump in and join the fun." Contains all sorts of tips on preparing for a contest, competitive operating, accurate logging, and checking for duplicate contacts.

Awards Chasing: How to collect "wallpaper" for your shack to show off your achievements in Amateur Radio.

FM and Repeaters: How repeaters work, antenna requirements, the autopatch — "mobile communications for a mobile society."

VHF/UHF Operating: There's more to VHF/UHF operating than FM and Repeaters. Even low-power stations find 1000-mile DX isn't uncommon. Besides commercial equipment there are still frontiers to explore by building your own gear, and there are plenty of records to be set!

Satellites: Nothing can match the excitement the first time you hear your own signal coming back from space — unless it is your first QSO via satellite. K1JX tells how it is done.

Visual Communications: Tired of pounding brass or just talking? This chapter provides some new excitement showing how to make your first Teletype or television QSO. Even FAX is explained.

Microcomputers: Within the next several years, the small computer will become as common an item in the ham shack as a transmitter and receiver are today. This chapter tells what computers can do in the ham shack and provides basic (no pun intended) information as to how computers work.

SWLing: The radio world extends far beyong the ham bands. SWLing is not just for the beginner; many experienced radio amateurs find this an interesting pastime.

References: 5BDXCC country check-off list, ARRL Numbered Radiograms, Table of Allocations of International Call Signs, Spanish Phonetics, Q Signals, CW Abbreviations, ARRL Station Appointments, RST System, ARRL Field Organization, DX Operating Code.

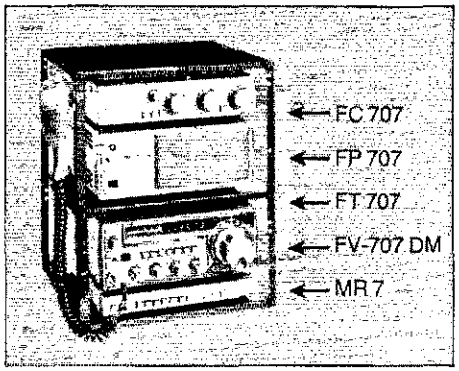
The **ARRL Operating Manual** is available for $5.00 in the U.S. or $5.50 elsewhere (in U.S. funds) from ARRL Headquarters or your local dealer. Order you copy *today!*

THE AMERICAN RADIO RELAY LEAGUE, INC
225 MAIN STREET
NEWINGTON, CT 06111

N&G DISTRIBUTING

Call TOLL FREE
1-800-327-3364

7201 N.W. 12th ST.
MIAMI, FLORIDA 33126
1-305-592-9685 • 1-305-763-8170
WE ALSO CARRY MANY
MARINE & AIRCRAFT RADIOS

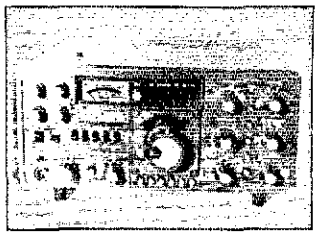


LARGEST IN THE WORLD

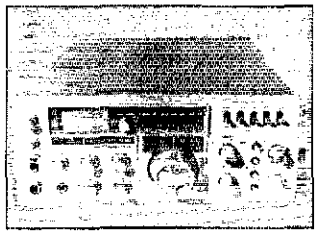
WE SERVICE WHAT WE SELL...

N&G DISTRIBUTING CORP is an Import and Export business serving the Caribbean area since 1956. In recent years, having expanded our business to South America and South Florida. We are two minutes from the MIAMI INTERNATIONAL AIRPORT.

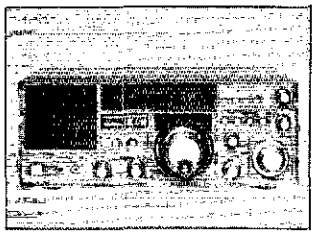
SPECIAL THIS MONTH YAESU



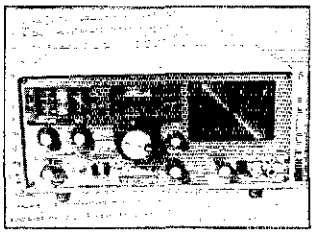
FT 901 DM
LIST 1535.00
N&G PRICE 1195.00



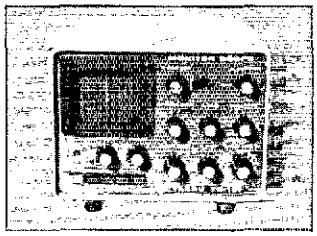
FT 107 M
LIST 1045.00
N&G PRICE 850.00



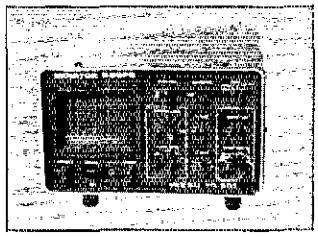
FRG 7700
LIST 550.00



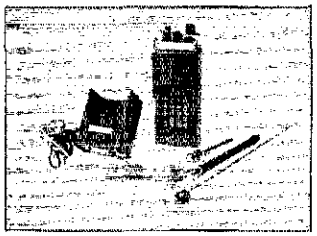
FRG 7
LIST 300.00



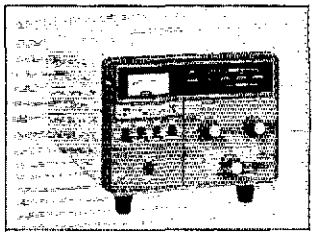
YO 101 SCOPE
LIST 320.00
N&G PRICE 220.00



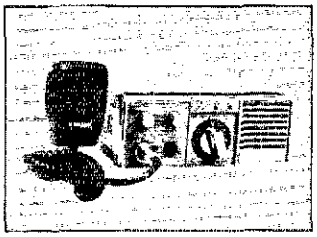
YO 301 SCOPE
LIST 320.00
N&G PRICE 220.00



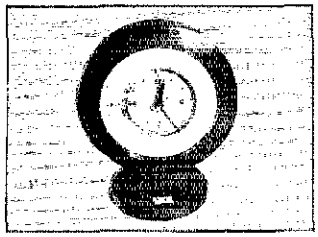
FT 207 HANDLE
LIST 300.00



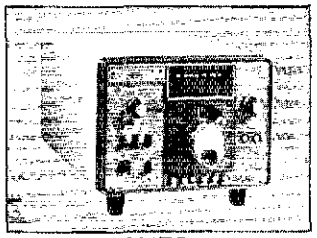
FT 901 TRANSVERTER
LIST 389.00



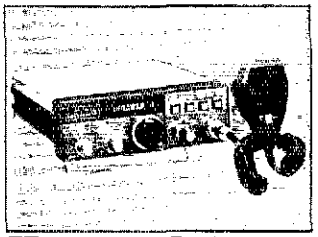
FT 127 220 MHz
LIST 350.00
N&G PRICE 295.00



YAESU QTR 24 hr.
LIST 50.00



FV 901 DM VFO
LIST 475.00



FT 408 METER ALL MODE
LIST 529.00

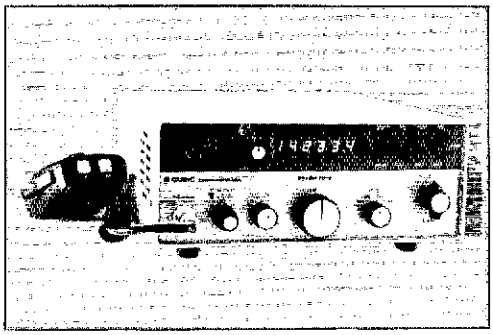
ALL PRICES ARE SUGGESTED RETAIL PRICES • PLEASE CALL FOR QUOTES.

N&G DISTRIBUTING

Call TOLL FREE
1-800-327-3364

7201 N.W. 12th ST.
MIAMI, FLORIDA 33126
1-305-592-9685 • 1-305-763-8170

WE ALSO CARRY MANY
MARINE & AIRCRAFT RADIOS



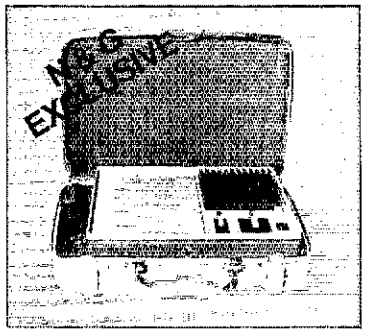
ASTRO 150 $975.00
MATCHING POWER SUPPLY 179.95
MATCHING ANTENNA TUNER 169.95

General Frequency Range
160 Meter Band – 1.8-2.4 MHz†
80 Meter Band – 3.0-4.5 MHz
40 Meter Band – 6.0-8.3 MHz
20 Meter Band – 13.8-16.0 MHz
15 Meter Band – 20.8-23.0 MHz
10 Meter Band – 28.0-30.0 MHz††
† Model 150 only
†† Model 151 only

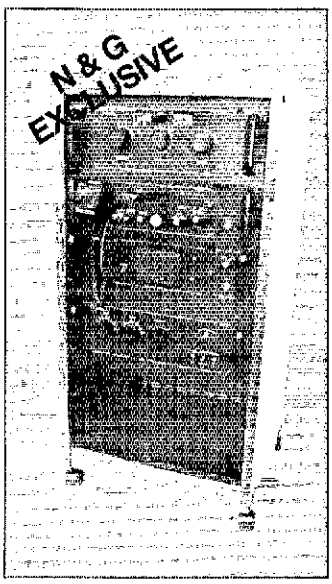
HF/SSB PORTABLE RADIO STATION 100 WATT 775/230V 50/60 Hz AC OR 12V DC IS AVAILABLE

CUBIC

DIPLOMAT 150

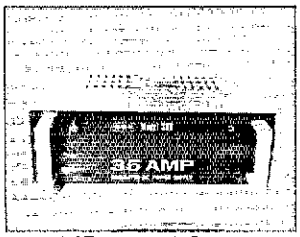


BATTERY PACK CHARGER

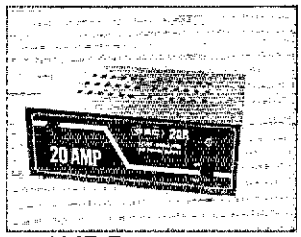


ST 2 TUNER
ASTRO 150
PSU 5 POWER SUPPLY
1500Z Amp.
LIST PRICE 3000.00

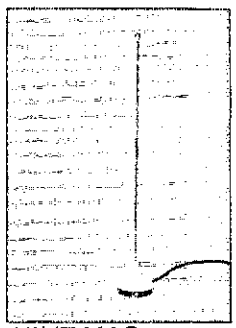
BIRD WATT METERS & ACCESSORIES
LARGEST SELECTION IN THE EAST



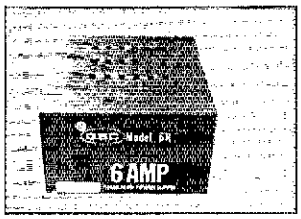
35 AMP Reg. P.S.
LIST 250.00
N&G PRICE 149.00



20 AMP Reg.
LIST 129.00
N&G PRICE 79.95

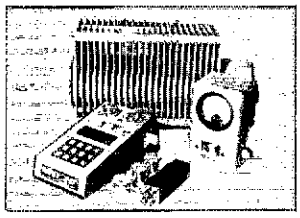


WAVE MAG
LIST 24.95
N&G PRICE 15.00



6 AMP Reg.
LIST 89.95
N&G PRICE 39.95

MA 25B
LIST 279.00
N&G PRICE 249.95



BIRD 43 142.00
All Bird Prod. in Stock

ALL PRICES ARE SUGGESTED RETAIL PRICES • PLEASE CALL FOR QUOTES.

WB2MCO. Traffic: (Feb.) WB2EAG 299, WB2HDU 266, WA2JBO 211, WB2MCO 186, KB2KW 171, N2JK 157, W2IQK 120, N2BDW 111, WA2EQW 51, WB2IXR 46, WB2SON 42, K2MI 25, WA2CJY 14, WB2OHH 6, N2EF 2 (Jan.) WA2CJY 29.

NEW YORK — LONG ISLAND: SCM, John Smale, K2IZ — Asst. SCM, Dwight Ernest, KA2CNN. SEC: WA2KKJ. STM: WB2BNY. The following are traffic nets around the section, please check in: NLI CW 3630 kHz 1900/2200 WB2TQC mgr; NLI Phone 3928 kHz 1815 WA2SEL mgr; Nassua VHF 146.04/64 2100 M, W, Sun 2100 WA2SOE mgr; Big Apple VHF 147.915/315 2000 KA2DBW Mon-Fri; Suffolk VHF M-F 144.74/145.37 2030 N2BKK. All times are local, please try and help out. For those clubs looking for a speaker's spot to fill for a club meeting, WA2DHF has an outstanding program and slide show on the 1980 Winter Olympic Torch Run to Lake Placid, contact him for further details. New EC for Smithtown is WB2HTW. The new LILCO Amateur Club Net meets on Thursdays at 2000 local on 145.37 rpt XMIT is down 600, all are invited members or not, NCS is KA1NH, who use to b WB2DCJ. The FCC confirms that this is his new call. KA1NH, maybe Long Island is starting to drift north in the view of the FCC? LIMARC Flea Market is May 17, at Islip Speedway. KA2CLO is now NCS on NLIPN on Fridays, NLIPN also welcomes KA2ELB. KA2CLO is closing in on DXCC, he needs fewer than ten QSLs to qualify. KE2N has started a H.R. Club at Rockaway Beach JHS in Rockaway Park, anyone wish to donate books, parts, etc, contact KE2N. Welcome to newly affiliated clubs: I.S. 206B in the Bronx and Seaside School Amateur Radio Club (PS 225Q) in Rockaway Park Queens. WB2TBC has upgraded to Extra and is now living on the 24th floor of his apt. bldg making his new antenna height 305ft, and we here on the island struggle with 40 ft above sea level. K2IZ was at the March Hall of Science meeting to present Public Service awards to those stations who helped with disaster communications during the Italian earthquake. WB2EUF is the new NM for the NLS Net, which meets on 3710 kHz at 1800 local, if you are interested in finding out about traffic, why not give it a try. Traffic: (Feb.) WA2UWA 854, W2AHV 316, KA2CLO 253, WB2TQC 212, W2GKZ 160, W2MLC 100, K2GCE 95, KA2CNN 90, N2BGR/1 78, WB2BNY 63, WB2EUF 63, KA2ELB 38, W2DBO 26, WA2SEL 26, WB2IDP 21, K2IZ 18, KA1NH 14. (Jan.) WA2SEL 24.

NORTHERN NEW JERSEY: SCM, Robert Neukomm, KB2WI — SEC: WB2VUF. STM: W2XD. NMs: N2CR N2BOP W2PSU KA2GQO W2TCA W2UEZ & WB2IQJ.

Net	Freq.	Time/Days	Sess	QNI	QSP
NJN/E	3695	7 P.M. Dy	28	432	265
NJN/L	3695	10 P.M. Dy	28	289	191
NJPN	3950	6 P.M. Dy	31	574	318
NJSN	3735	6:30 P.M. Dy	28	211	70
NJVN	49/49	10:30 P.M. Dy	28	280	196
OBTTN	72/12	8 P.M. Dy	28	633	208
UCLTN	085/685	7:30 P.M. Dy	28	205	98
NWNJWN	90/30	8:30 P.M. Wed	4	35	1
NJRTTY	147.51	Autostart Dy	28	102	24

From the Ka-Chunker, JSARS reports completing the Novice training class with 10 students taking the FCC exams. A DX trophy has been given in memory of K2UJX. Nutley ARC reports the following upgrades: Extra: KA2IJA now KJ2F and KB2UQ now KJ2G. KJ2O has received his cw-WAS award. Eight members toured WOR Radio in February 16th visiting both the transmitter site and the studio. NARS now has a net on 147.57 Wednesdays at 8 P.M. METROPLEx reports upgrades: WB2TBC to Extra, WB2JUN 1st Class Commercial and KA2GHD to General. They have 2 repeaters now operational on 440 it's 446.750/441.750 (4A PL needed to access) and 223.100/224.700 no tone — both are stand alones and anyone can use them. RAMAPO FORTY NINER: April is the start of transmitter hunts and the Annual Spring Fling on April 4th. N2AAZ heads up the vht contest and WA2WFF has Field Day. RMARC will cover the first 20 km of the Passaic County Community College Mini-Marathon on April 5th. They will also cover the March of Dimes Walk-a-thon on April 26th around both Pequannock and Garrett Mountain. WA2MVQ after 10 years changed his call to KB2WI, and he gave a talk on Amateur Radio to the Ridgewood "Old Guard" at Westside Presbyterian Church. KB2EI was on the John Garner show (Ch. 81) talking on traffic and emergency service in Amateur Radio. TCRA news, upgrades: W2NEH to Advanced and KA2CGD to General. TCRA's annual Hamfest/Flea Market is to be May 3rd (see QST Happenings for place). From BARA BEACON, upgrades: W2ISA to General, K2TWI N2BSG and N2BGU to Advanced and N2BPW to Extra, new call signs: KA2KYM KB2VM (was N2BQP) KJ2Z (was WA2RHO) and N2CFJ. BARA Flea Market is April 5th at Bergen Community College. SARA — Split Rock repeater has voted to accept the linking proposal of NNJ and SNJ on 2 meters. OO reports from W2TPJ WA2QZD & WA2MVQ. RAVEN now has a newsletter and KA2FXA has proposed the use of his 450 repeater. They report that c.d. is now known as "Emergency Management." Sussex County QSC reports a new repeater will soon be on 220. They were active during the flood of 11-12th around Port Jarvis. Traffic: W2UEF 541, W2RQ 446, KF2T 331, W2RO 316, AG2R 291, N2CR 218, K2VX 201, N2BOP 193, AF2L 176, KB2HM 164, KA2CYZ 133, W2TCA 126, KA2HNO 102, W2XD 83, WB2KLF 80, KB2WI 77, KB2TY 62, N2BNB 55, KA2IFX/T 52, WB2RMJ/T 50, KA2GQO 49, WA7DPK 42, N2AYJ 40, N2SU 39, N2BC 32, W5DTR/2 32, WB2HSG 20, K2UH 19, N2BQL 18, WA2CLP 17, WA8ZNH/2 14, W2NKD 12, AB2AIU 10, W2CC 10, K2WM 6, KA2XA 4.

MIDWEST DIVISION

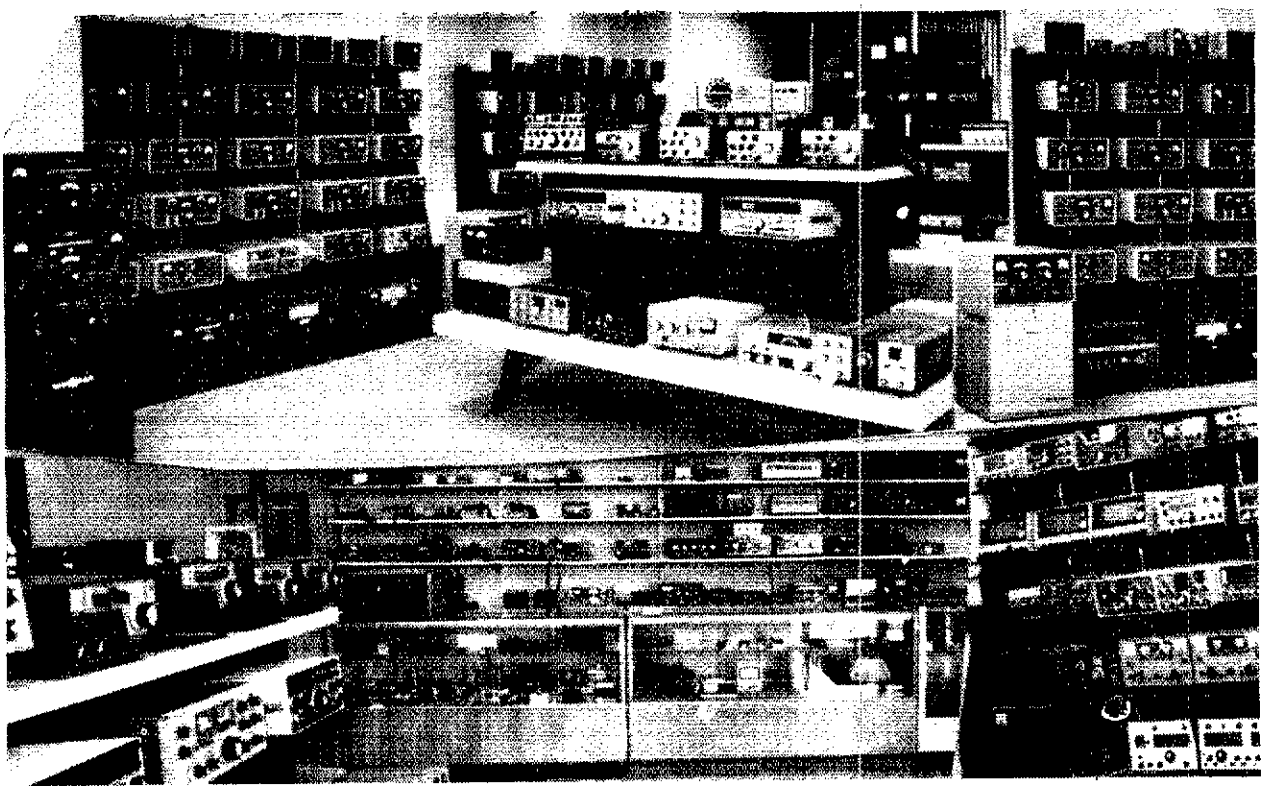
IOWA: SCM, Bob McCaffrey, KØCY — SEC: WØRPK. STM: KAØX. NMs: WBØAVW WØYLS WØHND Congrats to KØGP for being named "Iowa ARRL Amateur of the Year." He is involved with the Elmer program, as well as an instructor at Camp Courage, active with TLCN, HARK, a civic leader and a worthy recipient. A plaque will be presented. Hope all are getting Field Day preps made, make it an ARES project. WDØHND and ICN crew doing a FB job, why not join them. New officers in Cedar Rapids are KBØPR WBØVSM WØGON WBØVVZ. New Novice calls: KAØKKR KAØJZF KAØKAD KAØKAE KAØKAF KAØKAG KAØKAH. Looks like alot of good section DX scores during contest. I need an OBS in your area. Thanks to Newton and HARK for nice reception. Storm season is upon us, cooperate with the ECs with Skywarn, they need your help. DTRN and TEN rep 100% again. Excellent participation for traffic. WBØYBV moving so he can have a new tower (boy!) New calls: WBØURB now KBØVI, KAØASM now KBØVT, WAØDWL now KBØVC, WBØJTQ now KBØVF. Watch for another Fun-pedition from the Podunk Center Gang. Keep reports coming!!!

ASSOCIATED RADIO

913-381-5900
8012 CONSER BOX 4327
OVERLAND PARK, KANSAS 66204

CALL US WITH YOUR REQUIREMENTS

AMERICA'S NO. 1 Real Amateur Radio Store



"ASSOCIATED" IS THE BEST PLACE TO BUY.

***NOTE: WE BUY EQUIPMENT, AS WELL AS SELL AND TRADE.**

Your VISA welcome here

WE'LL DO IT YOUR WAY!

master charge THE INTERBANK CARD

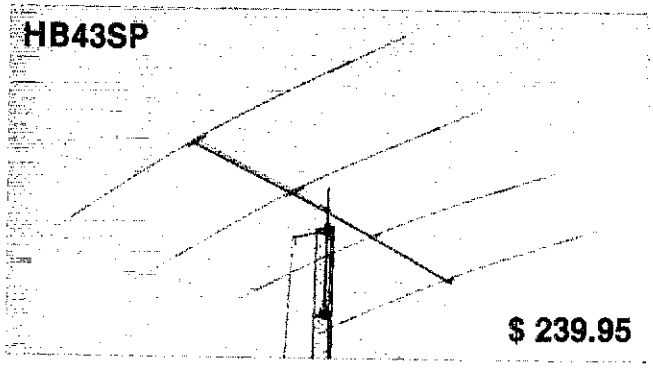
NOTE: SEND $1.00 FOR OUR CURRENT CATALOG OF NEW AND RECONDITIONED EQUIPMENT.

*ALSO WE PERIODICALLY PUBLISH A LIST OF UNSERVICED EQUIPMENT AT GREAT SAVINGS. A BONANZA FOR THE EXPERIENCED OPERATOR. TO OBTAIN THE NEXT UNSERVICED BARGAIN LIST, SEND A SELF ADDRESSED STAMPED ENVELOPE.

TET ANTENNA SYSTEMS

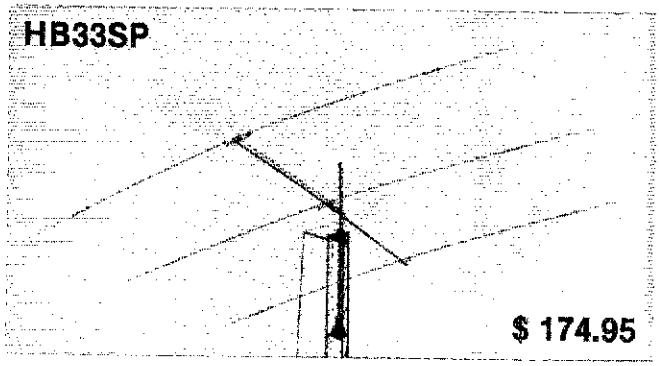
HB9CV SUPER MULTIBAND SERIES

HB43SP



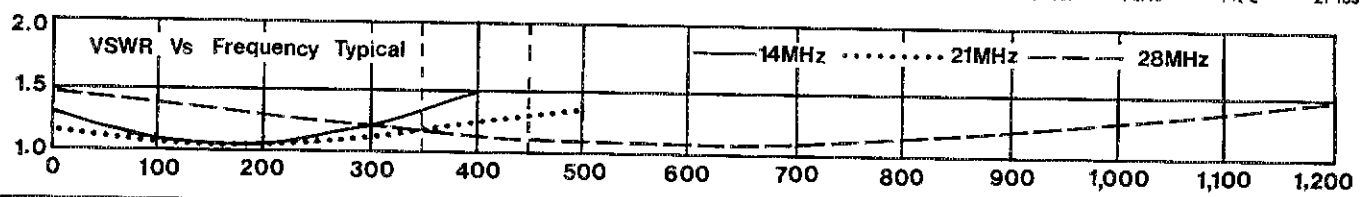
$ 239.95

HB33SP



$ 174.95

MODEL	BANDS	ELE-MENTS	ELE-MENTS PER BAND	PWR MAX	VSWR	IMPEDANCE	MAX ELEMENT LENGTH	BOOM LENGTH	TURN-ING RADIUS	WIND SURFACE AREA	WIND LOAD @80 mph	BOOM DIA-METER	MAST SIZE	WT.
HB43SP	14/21/28	4	4	2KW	BELOW 1.5	50 Ohm	27'	19'8"	16'9"	6.62 s.f.	131.3 lbs.	2"	1½-2"	38 lbs.
HB33SP	14/21/28	3	3	2KW	BELOW 1.5	50 Ohm	27'	13'2"	15'0"	4.73 s.f.	102.0 lbs.	1-9/16"	1¼-2"	27 lbs.



- State of the art antenna technology. Designed to provide phone and CW operation with solid state transceivers without using an antenna tuner.
- Dual driven elements for maximum power transfer and broad bandwidth.
- VSWR Bandwidth (1.5:1): 14.0-14.35, 21.0-21.45, 28.0-29.2 MHz. Typical 1.1:1 at resonance.
- Highest quality materials throughout. All tubing 6061-T6 aluminum alloy. Stainless steel fasteners for all electrical connections. Tubing is cut and drilled to precision tolerances for easy assembly.
- Superior performance when compared against conventional yagi designs. (Call factory for gain dBd and front to back ratio.) All elements active on all bands. No unused elements.
- Light weight and low wind area for simpler installation.

SPECIFICATIONS

MODEL	BAND	ELEMENT	Z	VSWR	PWR RATING	MAX EL LENGTH	BOOM LENGTH	WEIGHT	PRICE
MULTIBAND ANTENNAS								PRICES EFFECTIVE APRIL 1, 1981	
HB43SP	14/21/28	4	50	1.2:1	2KWpep	27'	19'8"	38	$ 239.95
HB33SP	14/21/28	4	50	1.2:1	2KWpep	27'	13'2"	27	174.95
TE43L	7/21/28	4	50	1.5:1	1KWpep	22'8"	16'5"	33	174.95
MV4BH	7 Thru 28	Vertical		1.5:1	2KWpep	13'5"		5.5	59.95
RD3	7/21/28	Dipole	50	1.5:1	2KWpep	2.2 '8.4"		9.1	89.95
HF HB9CV MONOBAND ANTENNAS			(*Dual Drive Swiss Quad)						
HB10F3	28	3	50	1.2:1	2KWpep	17'9"	9'10"	11.5	63.95
HB10F4	28	4	50	1.2:1	2KWpep	17'8"	13'2"	15.2	77.95
HB10F5	28	5	50	1.2:1	2KWpep	17'8"	19'8"	18.1	113.95
HB15F3	21	3	50	1.2:1	2KWpep	23'4"	13'2"	17.4	72.95
HB15F4	21	4	50	1.2:1	2KWpep	23'9"	19'8"	27.5	135.95
HB15F5	21	5	50	1.2:1	2KWpep	23'9"	26'3"	41.2	199.95
HB20F3	14	3	50	1.2	2KWpep	34'9"	16'5"	39.6	135.95
HB20F4	14	4	50	1.2	2KWpep	37'8"	26'3"	49.5	199.95
HB40M3	7	3	50	1.5	1.5KWpep	38'	32'10"	52	295.95
SQ10*	28	2	50	1.5	2KWpep	11'3"	9'11"	12	81.95
SQ15*	21	2	50	1.5	2KWpep	14'6"	13'2"	15	63.95
VHF ANTENNAS									
SQ61*	50	2	50	1.5	2KWpep	5'11"	5'11"	5.5	59.95
HB6F6	50	6	50	1.2	2KWpep	9'10"	19'8"	17.6	89.95
HB6F8	50	8	50	1.2	2KWpep	9'10"	26'3"	22.5	119.95
SQ22*	144	Dual 2	50	1.2	2KWpep	22.5"	6'8"	4.1	54.95
AX210N	144	2x10	50	1.2	2KWpep	42.5"	11'7"	7.7	89.95
AX210NW	144	Dual 2x10	50	1.2	2KWpep	42.5"	11'7"	21.4	189.95
TE214W	144	Dual 14	50	1.2	2KWpep	40.2"	19'8"	26.4	169.95
SQ007*	432	Dual 2	50	1.2	2KWpep	8.0"	2'6"	2.6	79.95

MODULAR ROOF TOWERS

TE35A	11.5' Roof tower with bearing & rotor plate	$ 149.95
TE55B	18' Roof tower with thrust bearing & rotor plate	214.95
TE75C	25' Roof tower with thrust bearing & rotor plate	279.95
20B	6.5' Add on tower section for TE35A & TE55B	64.95
KS050	Thrust bearing for mast diameter 1¼-2" OD	19.95
KS065	Thrust bearing for mast diameter 1½-2½" OD	29.95

ROTATORS

KR400	Azimuth rotator rated for 8.6 S.F. wind load	$ 99.95
KC038	Lower mast brackets for KR400	9.95
KR500	Elevation rotator rated for 7.5 S.F. wind load	189.95
KR2000	Azimuth rotator rated for 32 S.F. wind load	299.95

CALL TOLL FREE 1-800-654-3231 8 a.m. - 5 p.m. Mon - Fri and most evenings & weekends until 9 p.m.

Foreign Dealer inquiries invited.

TET U.S.A. INC.
425 HIGHLAND PARKWAY, NORMAN, OKLAHOMA 73069 - TEL.: (405) 360-6410 - TLX 796004 TET USA NO

VISA · master charge

The Collins KWM-380. For those who missed out last year, another chance.

Remember last year when we introduced the new KWM-380?

It sold out practically overnight. Strong testimony to the high-technology appeal of this successor to the famous Collins S/Line and KWM-2.

What makes the KWM-380 so popular? Fifty years of HF communications experience. An established technology base. AC/DC power supply, speaker and accessory functions all in one unit. Microprocessor frequency control for rate selectable tuning in 1 MHz, 1 kHz, 100 Hz or 10 Hz. Frequency memory provides split VFO function for half-duplex transmit and receive.

The high resolution frequency synthesizer locked to a high stability frequency reference is accurate to 10 Hz. Undesirable signals are easily eliminated with independently selectable I.F. bandwidths and passband tuning. Optional I.F. filters can be selected independent of operating mode.

The Collins KWM-380. See it at your authorized dealer before someone else beats you to it. Collins Telecommunications Products Division, Rockwell International, Cedar Rapids, Iowa 52406. Phone 319/395-5963. Telex 464-435.

Rockwell International

...where science gets down to business

Net	Freq.	UTC	QNI	QTC	Sess.
75M Phone	3970 M-S	1830-2330	2159	145	48
TLCN	3560 Dy	0300-0400	392	130	56
ICN	3713 TThS	0100	64	15	12

Traffic: WAØAUX 322, WØSS 165, WØYLS 112, KAØX 107, KØGP 77, WBØUPF 59, AEØR 56, WØBW 52, KØCY 47, WDØHND 33, WBØAVW 27, WDØCON 17, WBØQAM 17, WØLFF 14, KFØD 13, KAØJQG 10, WA4VWV 10.

KANSAS: SCM, Robert M. Summers, KØBXF — SEC: WØKL. NMs: WØOYH phone, WØFT cw and we must not forget WAØSZS for vhf even if we do not have any actual state traffic network set up at the present time. We are thinking about same. If you are interested in such, contact WAØSZS. WØAM now has added RTTY to his 'shack.' Congrats to WØHI on receiving his 50 year certificate from QCWA. Tnx to an 6CM's report way back in 1931. Net reports: KPN, QNI 303 and QTC 26. QKS QNI 329, QTC 123, with a number of new stations beginning to check in. All cw NCS should now remember to keep the speed at a pace the newcomers can feel comfortable with until they sprout their wings. KSBN QNI 1183, QTC 131. Tnx also to WØQMT for the rep job on DTRN. WØKL back into the swing of things again, right in time to get involved in another communication exercise involving the American Red Cross. Received club papers from DCARC, PAARC, WARC, PKARC, CKARC and Pittsburg Rptr Org. this month. Does your club put out a bulletin??? It is possible you might see to it your SCM and Div. Director are on the mailing list. THANKS. Traffic: WØQMT 187, WØAM 133, WØOYH 104, KØEZ 83, WØHI 82, WØFT 68, WDØACG 62, WØFIR 60, WBØYLP 60, KØBXF 47, WØPB 36, WØCHJ 40, ACØE 37, WØASY 34, WØRBO 19, KØYTA 19, WØKL 3, WØNYG 1.

MISSOURI: SCM, L. G. Wilson, KØRWL — Asst. SCM: Joe Flowers, WØOTF. ABØI had a multi/multi and a multi/single effort in the recent ARRL contests involving a number of Missouri operators. Look for good scores on the combined weekend totals. It was also noted during the contests that the smoke from the amplifiers exited the house in large amounts along with all of the operators. The Heart of America Radio Club is now conducting Novice classes. It is hoped that this class will be as successful as the last. Preparations are under way for Field Day. Clubs are again gearing up for a big effort and it promises to be another great Field Day weekend. Get yourself involved.

Net	QNI	QTC
MEOW	294	25
HBN	378	71
ACE	49	3
NEMOE	136	5

Congratulations to WØAR who again this year won the KCDX Club's WØAAA award for most countries worked during 1980 with a total of 270 countries. Congratulations to the following Novices from the Jefferson City Radio Club: KAØs JYJ JYK KAP JYM KGG KFU and JYI. Congratulations to the following upgrades: Tech-KAØCGG, General-WAØZIF, Advanced-NØAUN and KAØAVG and Extra-KGØY. Traffic: KØONK 600, WØOUD 149, WØBMA 118, KØSI 108, WØOTF 64, KAØP 28, WDØGCZ 25, KAØE 23, NØBFP 13, KØRWL 10.

NEBRASKA: SCM, Shirley M. Rice, KAØBCB — SEC: WAØASM. STM: WDØBQG. Congrats to Anni. couples KØCXI 66 yrs & WØFQB 55 yrs. New upgraders are KAØJYZ Novice, KAØIIG KAØFKF KAØGON WBØWYI Tech. WDØBQK WDØBMX KAØJGF Gen, WAØHWR Extra. New ECs appointed: WAØBHT Chadron, WDØBOM Scottsbluff. Received emergency plans from NØAIH Omaha, AJØA Grand Island, tnx for FB job! KØBRS has been a dedicated OBS and will take the summer off. Will be looking for your reports next fall. Thanks! Chadron Hamfest June 6 & 7 see you there! North Platte ARC planning special event station: Nebr. Land Days June 20 & 21. GL! Traffic: WDØBQG 159, WBØSXM 117, WDØCID 114, KØBRS 86, KAØBCB 33, WØEUT 29, WØZNI 23, WDØAHV 18, WØFQB 18, WAØCEX 16, WBØGMQ 12, WBØSGB 12, WBØGWR 11, WBØSXN 11, WØNIK 10, WAØDXY 6, KØSFA 4, KØTUH 4, KØODF 4, WØLJO 3, WØWZR 3, WØDJU 2, WAØPGC 2, WØYFR 2.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, Stan Horzepa, WA1LOU — SEC: W1SY. STM: KA1KD. Asst SCM: WB1AIU.

Net	Freq.	EST	Sess.	QTC	QNI	NM
CN	3640	1900 & 2200	56	308	376	K1EIR
CPN	915/315	1800/1000 Su	28	169	289	WB2PJU
NENN	3720	1815	25	70	190	WB1CPF
NVTN	28/88	2130	26	83	302	WA1ELA
RTN	13/73	2100 M-Sa	24	90	242	WB1CPF
WCN	78/18	2030	28	138	386	W1DPR

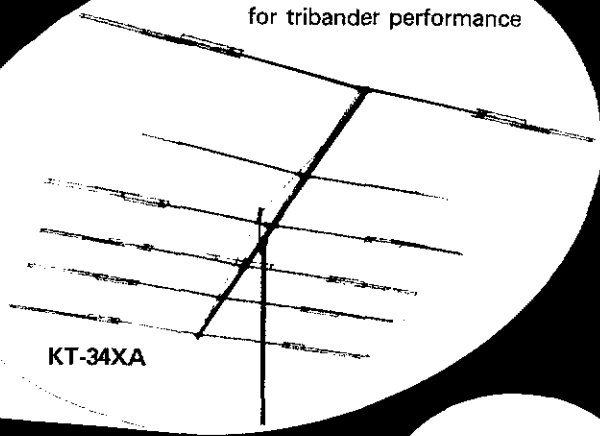
High QNI CN: WB1ESJ W1OJM WB2PJU K1UQE, CPN: K1AQE KA1KD WA1LOU WB2PJU. High QTC Nutmeg: W1EFW. Candlewood ARA's Novice course will be on Danbury's Cable Tv Channel 6 starting March 11. W1AW is now repeating on 144.85/145.45 MHz. KA1CWB KA1GY and KA1JP received awards of merit for outstanding volunteer service to the Greater Fairfield ARA. The Pratt & Whitney Aircraft Club Amateur Radio Group and the Salisbury School ARC are new ARRL affiliates. KA1GKU and 8-year old (!) KA1GKT are new Novices. N1BFU (ex-KA1EFJ) is new General. KB1H (ex-WA1DWF) and KB1I (ex-WA1GBA) are new Extras. Eastern Connecticut ARA Flea Market will be held May 17 at the Point Breeze Restaurant in Webster, Mass.; contact K1SY! for details. N1AN has proposed that 147.48 MHz be the simplex frequency for the Meriden ARC. Southington ARC heard K1WJL's presentation about quad antennas. South Meriden Amateur Group has begun a club project for converting cb rigs to 10-meter fm. K1OGG became new DXCC member. NM W1DPR published new issue of WESCON Newsletter. Greater Fairfield ARA Net meets Tuesdays on 146.55 MHz, at 8 P.M. Transplanted Nutmegger W1YL/4 now writing QST's "How's DX?". Annual CN/CPN Dinner, April 25, at Fortin's Restaurant, Naugatuck. BCNU with my new IC-720A. Traffic: WB1CPF 408, K1GF 251, WB2PJU 242, W2EFW 226, WB1ESJ 124, K1AQE 123, WB1GXZ 108, KA1BHT 93, WB1CRH 93, K1DM 85, WA1WOG 81, W1BDN 62, W1DPR 51, KA1DZV 50, W1XX 48, WA1LOU 41, KA1KD 40, KA1KP 36, K1CE 33, K2UQE 29, K1EUW 17, W1ICF 15, W1KV 12, KA1CCK 7, W1CUH 6, K1OQG 4.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — STM: WA1TBY. SEC: WA1BLG. ASCM: WA9NEW.

Net	Mgr.	Freq.	Time(loc)/Dy	QNI	QTC
EMRI	NTGQ	3.658	1900/2200/Dy	398	385
EMRIPN	KA1BJY	3.898	1730/Dy	343	216
EM2MN	KA1CGP	90/30	2000/MWF	258	120
NEEPN	K1BZD	3.945	0830/Su	60	16
HHTN	K1BSO	04/64	2230/Dy	372	193

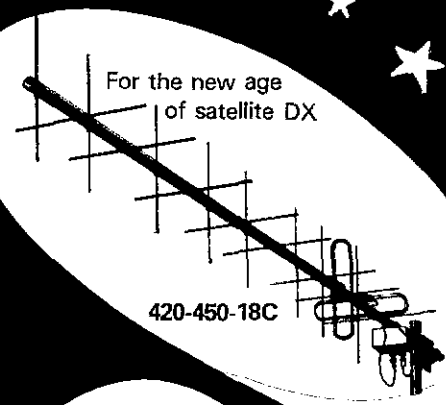
The *KLM* Spotlight on:

The new pacesetter
for tribander performance



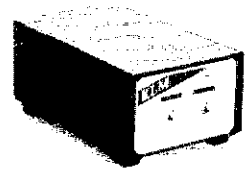
KT-34XA

For the new age
of satellite DX



420-450-18C

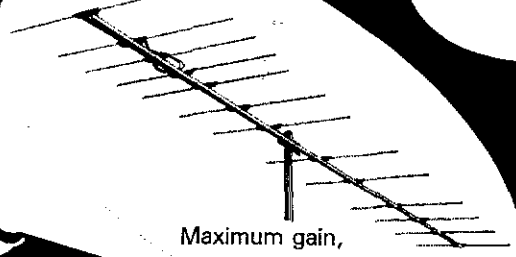
Handie Power!
35W, Charger, Preamp



MA-35BL

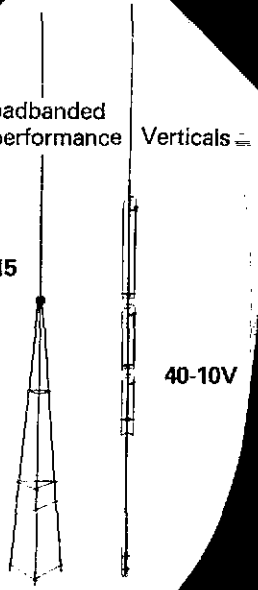
See your KLM dealer

144-148-13LB



Maximum gain,
across the whole band

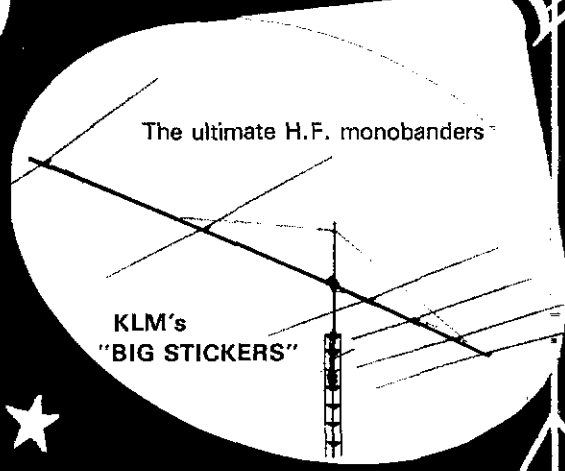
Broadbanded
hi-performance Verticals



SSV
80-40-15

40-10V

The ultimate H.F. monobanders



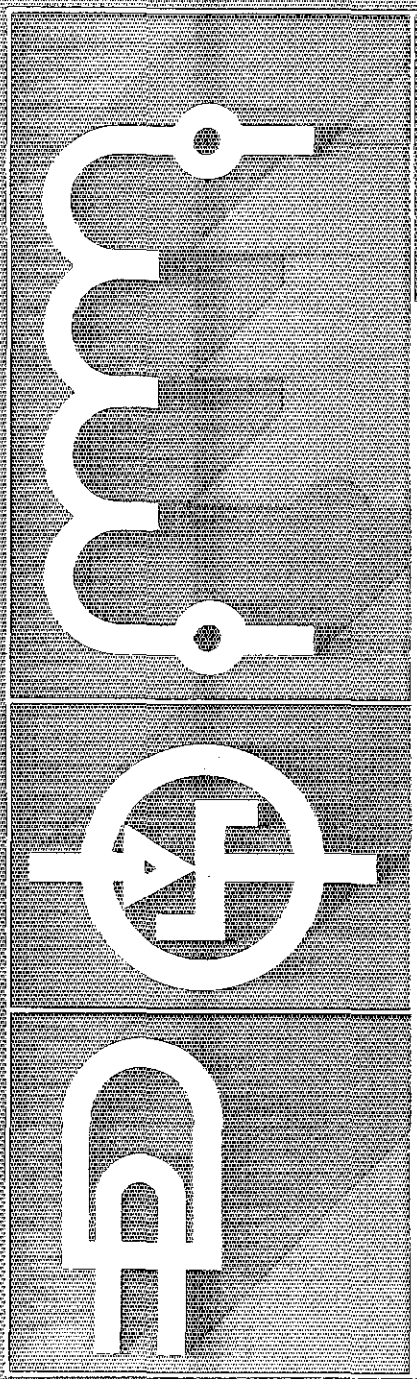
KLM's
"BIG STICKERS"

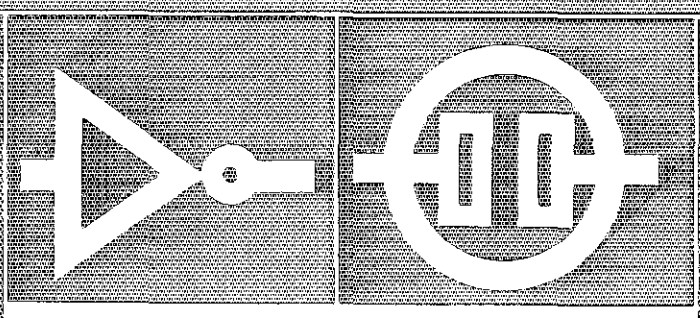
Plus much, much more!
Write for a complete catalog

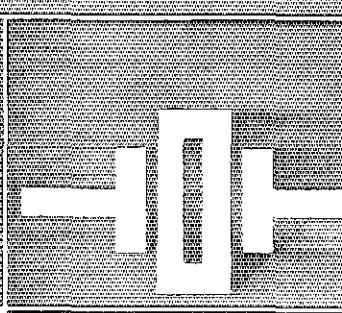
KLM P. O. Box 816, Morgan Hill, CA 95037
(408) 779-7363

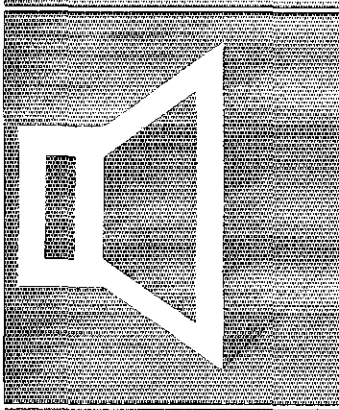
UNDERSTANDING AMATEUR RADIO

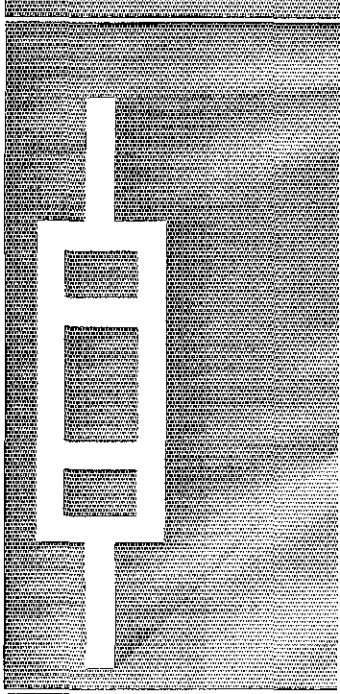
Principles & Construction











If you're a relative newcomer to Amateur Radio, then this book is just what you need. Some of the topics of interest to the beginner are:

- HOW TO SOLDER
- HOW TO USE A VOM
- THEORY NEEDED FOR THE TECHNICIAN/GENERAL FCC EXAM
- HOW TO USE A TRANSMATCH
- HOW TRANSMITTERS AND RECEIVERS WORK

The more experienced amateur will find:

- HOW TO TROUBLESHOOT YOUR EQUIPMENT
- WHERE TO BUY COMPONENTS
- HOW TO BUILD USEFUL ACCESSORIES
- REVIEW OF ELECTRONIC BASICS

This book has 217 pages of text. It is available at your dealer or directly from ARRL. (Use the handy order form elsewhere in this issue.) Price is $5.00 in the U.S. and $5.50 elsewhere in U.S. funds.

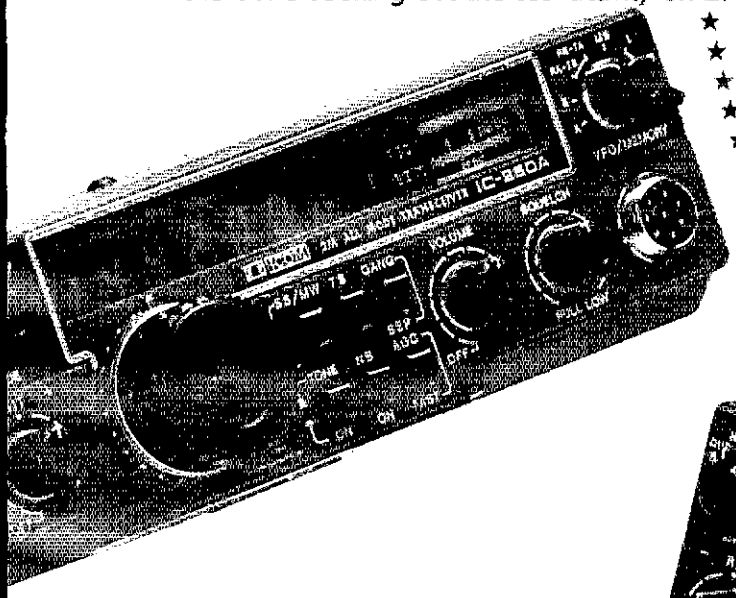
PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE

ICOM MOBILE!
ICOM MOBILE!

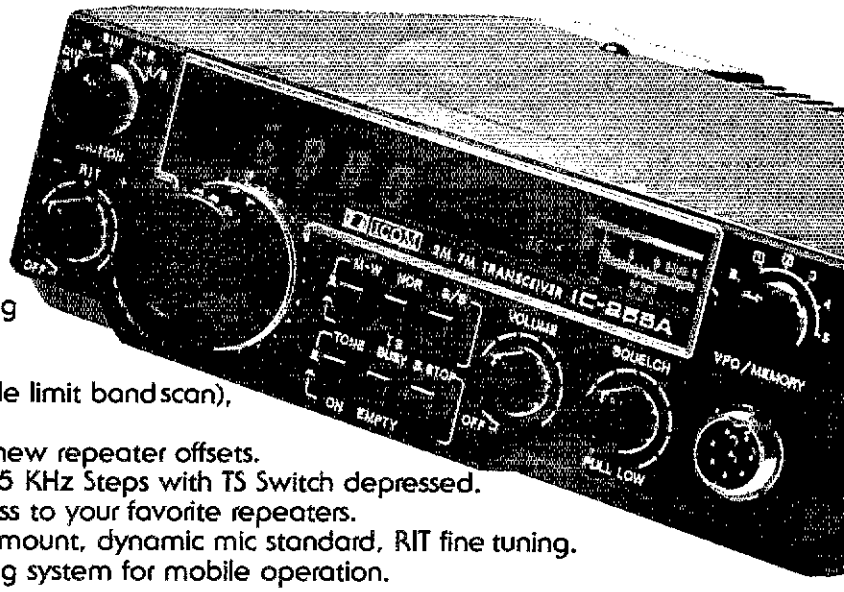
TAKE ANOTHER LOOK AT THE POPULAR MOBILE TWINS . . . IC-260A AND IC-255A.

ICOM IC-260A. Enjoy VHF mobile at its best. Sideband, FM or CW, the ICOM IC-260A does it all. The ICOM IC-260A contains all the features a mobile operator would want in a compact 2 meter mobile package with FM, SSB, CW operation. Features customers ask for most including:

★ Squelch on SSB. The 260A will automatically and silently scan the SSB portion of the band seeking out the SSB activity on 2.



★ 3 memories built in.
★ Memory scan.
★ Programmable band scan.
★ 600kc repeater offset built in.
★ Variable repeater split — with the 2 built in in VFOs, it's possible to work the odd splits.
★ Multimode operation — USB, LSB, CW, and FM. Great for getting into OSCAR, plus enjoying SSB rag chewing as well as repeater operation.



ICOM IC-255A. Features that have made the field proven and tested IC-255A the most popular 2 meter FM rig on the air today.

★ 25 W / 1 W battery saving output.
★ Scanning (memory and programmable limit band scan), now with automatic scan resume.
★ Programmable splits — Flexibility for new repeater offsets.
★ Dual speed tuning — 15 KHz Steps, 5 KHz Steps with TS Switch depressed.
★ 5 memory channels — For easy access to your favorite repeaters.
★ Dual VFO's built in, lockable, mobile mount, dynamic mic standard, RIT fine tuning.
★ Simple, easy to use single knob tuning system for mobile operation.

HF/VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

ICOM

2112 116th NE, Bellevue, WA 98004
3331 Towerwood Drive, Dallas, TX 75234

Announcing the Heathkit VF-7401 2-meter FM Digital Scanning Transceiver

LED indicates 5 kHz position.

The 0 kHz/5 kHz Switch gives you an effective choice of 8002-meter channels in 5 kHz steps.

Dim/Bright Switch for bright illumination of frequency read-out and meter for daytime, and lower intensity for safe mobile operation at night.

The Manual/Scan Switch lets you choose your frequency manually, or have the VF-7401 find an active channel for you.

Lock/Latch Switch. In Scan Latch mode, a channel latch-up signal inhibits scan circuits when signal is detected, and the 7401 stays on that frequency. If it detects a 4-8 second break in received signal, scanning resumes. In the Scan-Lock mode, once the receiver scans to a signal, it remains on that channel until reset.

Optional Micoder II Microphone/Auto Patch Encoder lets you phone through repeaters with auto patch input. Draws power from the 7401, so no mike battery is necessary.

The Squelch Control also functions as the receiver's sensitivity control to stop scanning only upon reception of "full-quieting" signals, skipping the weak ones.

The 100 kHz Selector button controls the VF-7401's tuning in 100 kHz increments. **The 7401's 1 MHz Selector** button lets you choose any 1 MHz segment of the 2-meter band.

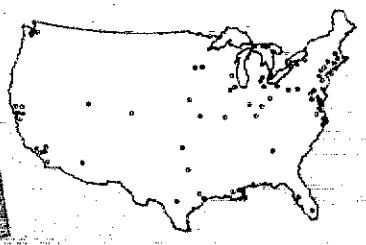
The 10 kHz Selector advances in 10 kHz steps. In Scan, as it recycles from "9" to "0," it also causes the 100 kHz readout to advance by one digit. Depress once to resume scan function.

More features that make the VF-7401 the 2-meter rig that belongs in your shack and vehicle

No more searching through repeater guides while mobiling in unfamiliar territory – your new Heathkit VF-7401 will find the active channels for you. It will even alert you to band openings. You're going to enjoy building your VF-7401... and you're going to love using it. The VF-7401, the ultimate 2-meter rig...from the more than 200 Hams at Heath.

- Adjustable, 15-watt (nominal), solid-state, narrow-band FM Transceiver. Fully synthesized digital circuitry provides full-band coverage without need for added crystals.
- All-new, state-of-the-art circuits provide the exciting, exclusive features of 1 MHz bandwidth scanning, and Scan Lock/Latch capability on 2-meters.
- A receiver hotter than Heath's HW-2036A features dual-gate MOSFET front-end to minimize overload and adjacent-channel interference.
- "Power-up" on a pre-programmed frequency of your own choice, such as your favorite repeater.
- Convenient detachable mike using 4-pin connector.
- Power to the Micoder II Microphone (if used) eliminates need for a battery.
- Sturdy SO-239 rear-panel antenna jack.
- Chassis-mounted power and external speaker plugs.
- Improved synthesizer, eliminating need for panel mounted sync lock light.
- Tuning for Power Amplifier and output power level adjustment is accessible without removing case.
- Capability of mobile or base operation (with Model VFA-7401-1 AC Power Supply – 13.8 V at 4A nominal, transmit).

SEND FOR FREE CATALOG OR VISIT YOUR HEATHKIT ELECTRONIC CENTER



The new VF-7401 is featured in the latest Heathkit Catalog. For a free copy write: Heath Company, Dept. 009-774 ,Benton Harbor, MI 49022. Or visit the nearest Heathkit Electronic Center in the U.S. or Canada where Heathkit products are displayed, sold and serviced. See the white pages of your phone book for location. In the U.S., Heathkit Electronic Centers are units of Veritechnology Electronics Corporation.

Heathkit®

AM-413

EMRISS WB1DHW 3,715 2030/Dy 167 64. Recent ALERT frequency drill by AB1Z a big success with 79 participants. Kudos to AB1Z for his work in this regard. For more info contact him. As I write this I am on my way to testify for the bill to reduce call letter plate fees and for the one to have them available for any type of vehicle. More later on this. Framingham Club preparing for 50th anniversary celebration. Whitman Club graduated 8 Novices and making big plans for Field Day. Chelmsford Club training 20 Novices and continuing their Sunday morning sked with Chelmsford England. Greater Lawrence Club members K1TVZ, K1RTM and AE1D looking for some competition playing chess on 145.25 am. Massasoit Club preparing to help with Brockton centennial parade on May 23rd. Contact WB1EZT if you can help. The NEAT ATV group gave interesting demo at 90/30 Repeater Club meeting. Quannapowitt Club member W1HL still having tower problems with town of Andover. Acton Boxboro Club had W1JR talk on moonbounce. Pentucket Club scrutinizing the "plain language" FCC rule rewrite. Algonquin Club busy preparing for Field Day. Billerica Club had K1CE from ARRL give a talk. Wellesley Club had K1OGF give a talk on test equipment. Middlesex Club member WA1HXQ called in a fire via 2 meters while on vacation in Fla. W1NF is celebrating his 33rd year as an OO and 10th year in Intruder Watch — congrats. W1IPZ reports his group working on a new repeater in Fitchburg on 145.85/45. Foxboro club had W2MU speak on Bermuda ARC contest. I am on my way to sunny (?) Fla for the National Convention. I'll report back. Traffic: (Feb.) N1BHH 981, WA1TBY 704, KA1CMR 290, KA1BJY 178, WB7TPY 147, KA1MI 69, KA1CGP 54, KA1KU 50, WA1DXT 45, W1ATX 42, WB1EZT 41, AK1J 35, KA1EMQ 30, K1BZD 21, W1CE 13, WA1FNM 12, WA1VMG 12, K1BSO 10, W1PJ 8, K1LCQ 6, W1IPZ 4, KA1R 3, W1XA 3. (Jan.) W1CE 14.

MAINE: SCM, Cliff Laverty, W1RWG — STM: W1BJ. SEC: KL7IJG. W1BJ is handling the Red Cross message relay. KL7IJG seeking cooperation with Maritimes on emerg procedures. Aroostook hams furnished comms for Caribou Winter Carnival, led by WA1YNZ. SEC needs more volunteers for EC. PSHR: AK1W 101, W1RWG 95, W1BJ 85, WA1YNZ 80. Sessions/ONS/QTC: PTN 28/386/156; SGN 24/1248/126; SPSN 11/119/81; RACES 4/58/19; MSN 12/88/11; MPSN 5/89/8; AEN 4/57/2; BN 24/811/0. Participation in Civil Defense monthly drills by hams improving. Traffic: W1BJ 154, W1RWG 121, AK1W 110, W1KX 86, WB1BYR 75, AF1L 56, W1HDC 43, W1BMX 42, W1JTH 27, KA1EKT 23, WA1YNZ 21, W1AHM 17, W1GKJ 17, K1TVT 14, W1CTR 12, KA1AIF 11, W1OTQ 10, WA1ZJL 8, KA1CFU 6, KA1ENL 6, KA1EIW 4, WA1JCN 1.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH — STM: W1TN. SEC: AK1E. NMs: N1NH K1OSM. Greetings from Bermuda. AK1E looking for Emergency Coordinator in a few counties. Do you know where your EC is and where he is tonight? If not, contact AK1E for information. The GSFM Net had 696 check-ins and 281 traffic. Plan ahead says KA1BWE to attend the 15/76 hamfest at King Ridge on Sept. 27th from 9 to 5. W1GUX's class of Novices at Laconia HS will add six new calls to our state. Congrats to W1AM who is now on DXCC Honor Roll. KB1A will be Red Cross Relay Coordinator for our state. W1JY and W1QWJ are latest NH hams to join QCWA. K1MFQ vacationed in California. Good Grief! KB1A was only EC to report this month. Bermuda is great. High winds and rain. One day of sunshine so far. Mobile on moped is tricky. Traffic: (Feb.) W1TN 295, N1NH 222, KA1CXP 209, K1OSM 202, W1GUX 195, WB1DKX 156, KA1BJ 112, AK1E 82, W1MHX 55, KB1A 50, W1VTP 32, W1CUE 32, KA1BBI 31, N1ALM 30, W1ALE 20, W1NH 12, WA1PEL 8, K1NH 4. (Jan.) W1QYY 330, W1GUX 176.

RHODE ISLAND: SCM, J. Titterington, W1EOF — RIEM 2-Mtr. Tfc Net — sess. 20, ONI 188 and tfc 58. KA1JR pulls up stakes and moves to West Coast. KA1BHY upgrades and is now KA1NO. We send condolences to AJ1O whose wife passed away. WA1YUH is a Silent Key and will be sorely missed. Newport CRC, Sub Signal ARC and Bristol County ARC of Fall River planning joint Field Day effort at Battleship Cove in Fall River. KB1G is new ORS. congrats. KA1FBR waiting for new call. We will be participating in national message relay celebrating 100th anniversary of American Red Cross. We need more people for the EMRI traffic nets. Traffic: W1EOF 544, KA1BTU 206, W1YNE 203, KA1FE 115, KA1FBR 63, KB1G 35, N1RI 22.

VERMONT: SCM, Bob Scott, W1RNA — STM: WB1ABQ. SEC: W1VSA. GMN 24/492/41, SSB 28/448/113, Carrier 24/492/41, VTN 26/82/28, RFO 4/4/78/17, VPN 4/72/5. The VTN is getting a few more check-ins who are fairly regular. It is a short net and mainly tfc with 1RN reps. Your participation is invited with or without tfc: 3614 plus/minus, 1900 hours, daily. Net mgr suggests, try it, you might like it! We had some response re stations wishing official appointments. Any others? ARRL mbrship needed for openers. Current appointments are under review with some due for non-renewal due to inactivity along appointment requirements. Tfc handlers are many more than showing, but without reports they are missing from this column. Traffic: K1BOB 192, N1ARI 107, WB1ABQ 53, W1RNA 31, AE1T 17.

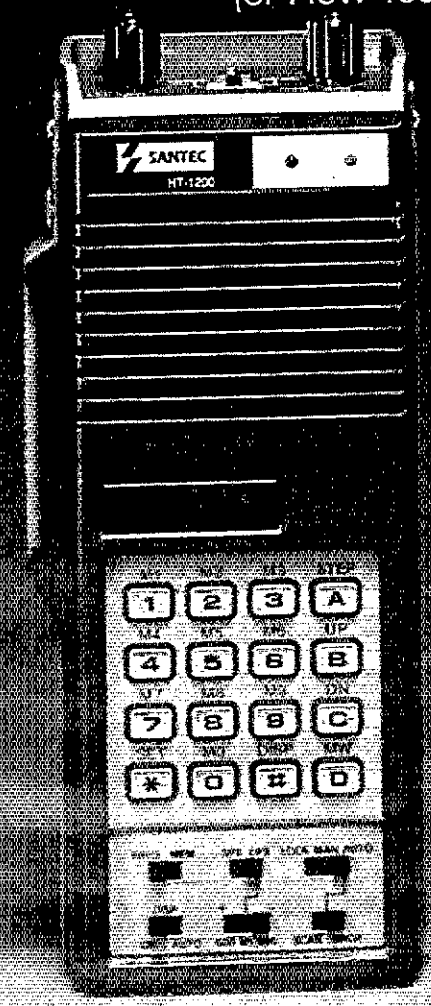
WESTERN MASSACHUSETTS: SCM, Art Zavarella, W1KK — ASCM: K1BE. STM: W1TM. SEC: W1JP. NMs: W1UD W1UPH WA1ITL WB1DBN. Newly started: a 6-meter Mt. Greylock fm repeater net Sun 9:15 A.M. 52.23/53.23, and a 2-meter HCRA sideband net Mon 8 P.M. 144.160. Recent new WMTNers-WB1GLZ KA1GDV WA1ZKT WB1DQN KA1GND. WA1MJE on skeds with KA1FQF now in Dominica as J73R. Kudos: WA1ITL, AEC Hampshire County, WB1HKN, AEC Franklin County, W1DOY Comm-chief 10K Square Dancers in Worcester. W1WF regular cw skeds with W1BKG/4. PSHR: WB1HIH 109, W1TM 70. Traffic: (Feb.) W1UD 369, WB1HIH 212, W1TM 203, W1KK 155, WB1EXJ 72, WA1YYW 70, K2SSH 61, W1YI 48, K1JHC 35, W1EFC 32, K1NWE 14, WA1OPN 10, WA1MJE 8, W1JP 6, WB1HKN 4, W1UPH 4. (Jan.) K1IJV 65, K1NWE 27.

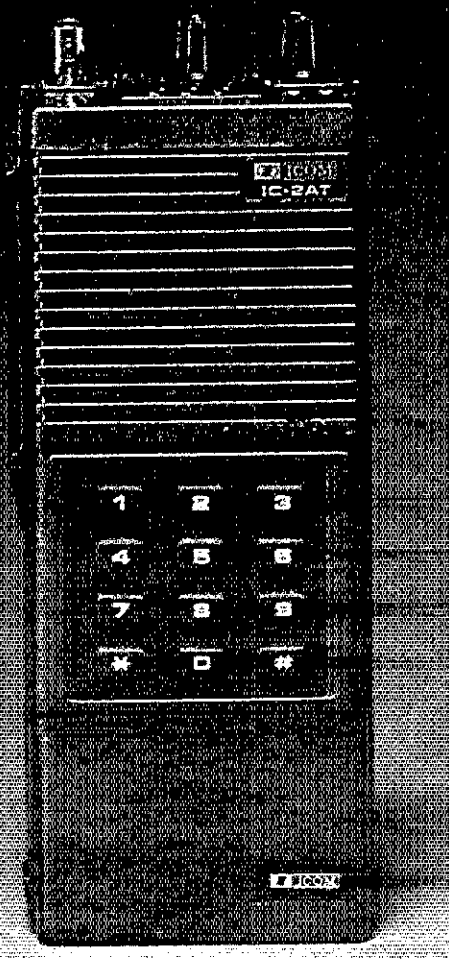
NORTHWESTERN DIVISION

ALASKA: SCM, Fred S. Wegner, KL7HFM — ASCM: AL7AC KL7IBG. SEC: KL7EWQ. STM: AL7O. ECs: AL7AW Anchorage, KL7JFT Juneau. Alaskan hams are busy getting ready for the 1981 Iditarod Trail Dog Sled Race which officially starts on March 7 with 53 mushers and their dogs heading for Front Street in Nome, 1049 miles away. Approximately 100 hams from all over Alaska will be involved in the support communications for the three to four week period. Each check-point along the way offers conditions not usually found in Field Day or SET exercises. Good training for emergency readiness. KL7FD is to be congratulated for his hard

Santec Makes an Unfair Comparison

(or How You Can Get More for Less.)





It's a little unfair to compare the features of the ICOM IC-2AT to those of the SANTEC HT-1200: the ICOM doesn't even claim to offer the big rig features that are packed into the SANTEC. This is really like comparing apples and oranges, but a quick match-up of features may surprise you if your biggest concern is cost. If you like the little extras you can buy for the IC-2AT, you'll love the SANTEC ... it actually delivers more for less.

Compare these two "uncomparable" units for yourself; and while you're making your unfair comparison, think of everything you want your handy to do for you ... more or less.

	SANTEC HT-1200	ICOM IC-2AT
BASIC RADIO	$ 379.00	$ 269.95
SCAN	no charge	not available
SEARCH	no charge	not available
10 MEMORIES	no charge	not available
HIGH POWER 3.5W OUTPUT	no charge	$ 47.95*
CHARGER	no charge	$ 69.95**
TOTAL COST	$ 379.00	$ 387.85

* The IC-2AT requires a larger battery for 3.5W output.

** The IC-2AT requires a special charger for the larger battery.

SANTEC

The SANTEC HT-1200 is approved under FCC Part 15 and exceeds FCC regulations limiting spurious emissions.

2000 Avenue G, Suite 800, Plano, Texas 75074

Phone (214)423-0024 • INTL TLX 203920 ENCOM UR

Encomm, Inc.
2000 Avenue G
Suite 800
Plano, TX 75074

☐ Please send me more information about the Santec HT-1200 and a list of Authorized Santec Dealers.

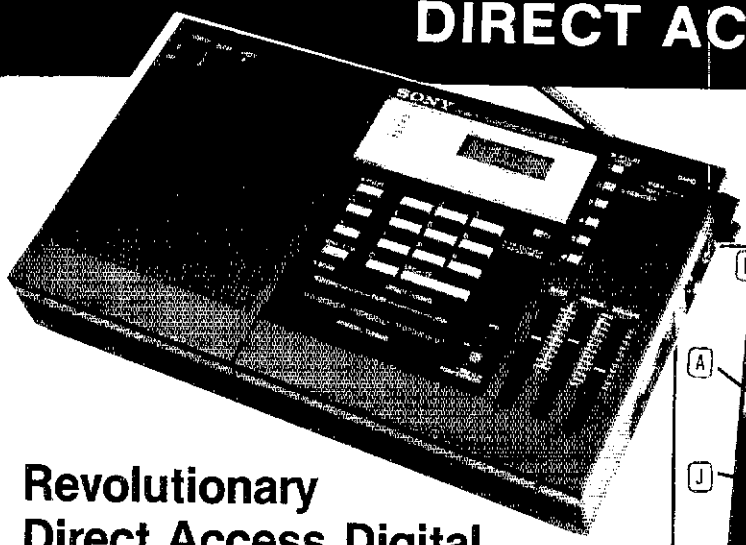
NAME _____ CALL _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

YOU MAY SEND A DUPLICATE OF THIS FORM.

INTRODUCING SONY'S NEW DIGITAL DIRECT ACCESS RECEIVER!



only **$299.95** plus $5.00 shipping

Revolutionary Direct Access Digital Shortwave Scanner

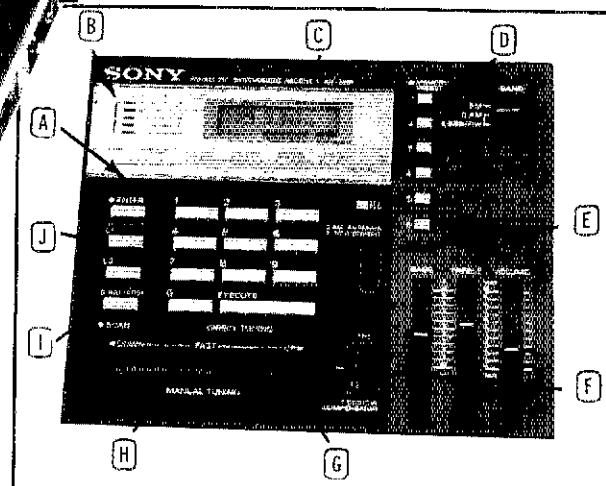
- **Continuous Scanning of LW, MW, SW, & FM Bands**
- **Instant Fingertip Tuning—No More Knobs!**
- **6 Memories for Any Mode (AM,SSB/CW, & FM)**
- **Dual PLL Frequency Synthesized—No Drift!**

A WHOLE NEW BREED OF RADIO IS HERE NOW! No other short wave receiver combines so many advanced features for both operating convenience and high performance as does the new Sony ICF-2001. Once you have operated this exciting new radio, you'll be spoiled forever! Direct access tuning eliminates conventional tuning knobs and dials with a convenient digital keyboard and Liquid Crystal Display (LCD) for accurate frequency readout to within 1 KHz. Instant fingertip tuning, up to 8 memory presets, and continuous scanning features make the ICF-2001 the ultimate in convenience.

Compare the following features against any receiver currently available and you will have to agree that the Sony ICF 2001 is the best value in shortwave receivers today:

DUAL PLL SYNTHESIZER CIRCUITRY covers entire 150 KHz to 29.999 MHz band. PLL_1 circuit has 100 KHz step while PLL_2 handles 1 KHz step, both of which are controlled by separate quartz crystal oscillators for precise, no-drift tuning. **DUAL CONVERSION SUPERHETERODYNE** circuitry assures superior AM reception and high image rejection characteristics. The 10.7 MHz IF of the FM band is utilized as the 2nd IF of the AM band. A new type of crystal filter made especially for this purpose realizes clearer reception than commonly used ceramic filters. **ALL FET FRONT END** for high sensitivity and interference rejection. Intermodulation, cross modulation, and spurious interference are effectively rejected. **FET RF AMP** contributes to superior image rejection, high sensitivity, and good signal to noise ratio. Both strong and weak stations are received with minimal distortion.

EXTENDED SPECTRUM CONTINUOUS TUNING



A Enter Button
B Signal Strength Indicator
C Liquid Crystal Display
D Memory Preset Buttons
E Antenna Adjustment Dial
F SSB/CW Compensator
G Execute Bar
H Manual Tuning Buttons
I Scan Button
J High/Low Limit Buttons

OPERATIONAL FEATURES

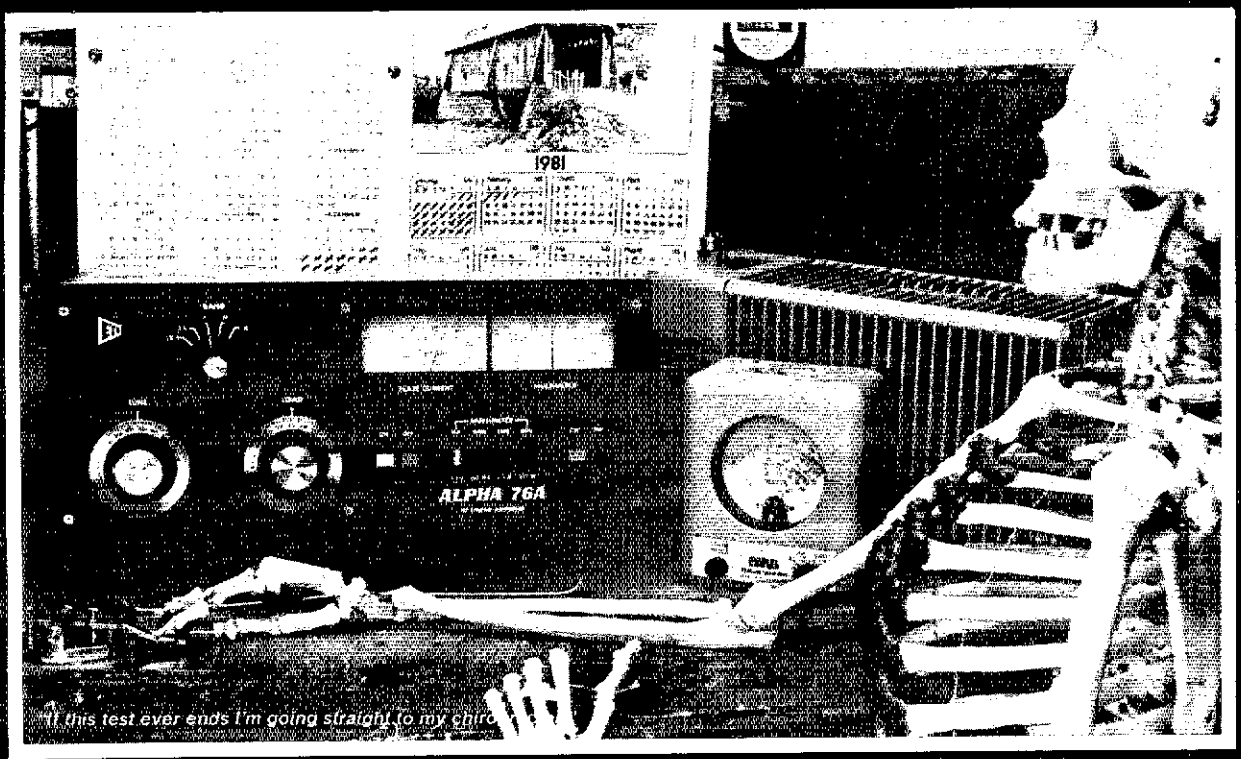
INSTANT FINGERTIP TUNING with the calculator-type key board enables the operator to have instant access to any frequency in the LW, MW, SW, and FM bands. And the LCD digital frequency display confirms the exact, drift-free signal being received. **AUTOMATIC SCANNING** of the above bands. Continuous scanning of any desired portion of the band is achieved by setting the "L_1" and "L_2" keys to define the range to be scanned. The scanner can stop automatically on strong signals, or it can be done manually. **MANUAL SEARCH** is similar to the manual scan mode and is useful for quick signal searching. The "UP" and "DOWN" keys let the tuner search for you. The "FAST" key increases the search rate for faster signal detection. **MEMORY PRESETS.** Six memory keys hold desired stations for instant one-key tuning in any mode (AM, SSB/CW, and FM), and also, the "L_1" and "L_2" keys can give you two more memory slots when not used for scanning. **OTHER FEATURES:** Local, normal, DX sensitivity selector for AM; SSB/CW compensator; 90 min. sleep timer; AM Ant. Adjust.

SPECIFICATIONS

CIRCUIT SYSTEM: Fm Superheterodyne; AM Dual conversion superheterodyne. **SIGNAL CIRCUITRY:** 4 IC's, 11 FET's, 23 Transistors, 16 Diodes. **AUXILIARY CIRCUITRY:** 5 IC's, 1 LSI, 5 LED's, 25 Transistors, 9 Diodes. **FREQUENCY RANGE:** FM 76-108 MHz; AM 150-29,999 KHz. **INTERMEDIATE FREQUENCY:** FM 10.7 MHz.; AM 1st 66.35 MHz., 2nd 10.7 MHz. **ANTENNAS:** FM telescopic, ext. ant. terminal; AM telescopic, built-in ferrite bar, ext. ant. terminal. **POWER:** 4.5 VDC/120 VAC **DIMENSIONS:** 12¼ (W) X 2¼ (H) X 6¾ (D). **WEIGHT:** 3 lb. 15 oz. (1.8 kg)

SPECTRONICS, INC.
1009 GARFIELD ST. OAK PARK, IL. 60304
PHONE (312)848-6777

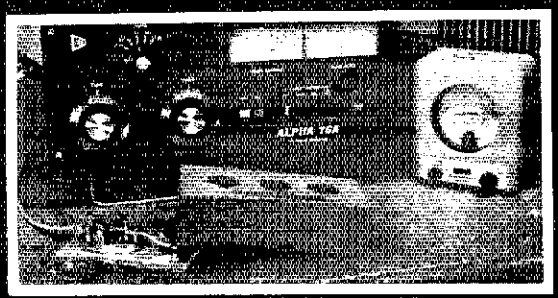
Key Down How Long?



Nine Hundred Consecutive Hours At A Full Kilowatt!

It couldn't be anything but...

Back in 1977 we ran an ***ALPHA 76*** for eighteen days with a brick on the key at a full kilowatt. To emphasize that ***ALPHAs*** keep getting even better, we recently fired up a new ***ALPHA 76A*** at maximum legal power ***and let it operate twice as long***—more than 37 days—900-plus hours!



WHAT MAKES AN ***ALPHA*** SO GOOD THAT WE DARE WARRANT IT FOR EIGHT TIMES AS LONG AS OTHER LINEARS. SPECIFY "NO TIME LIMIT" AT FULL RATED POWER, AND CONFIDENTLY PUT A "BRICK ON THE KEY" FOR HUNDREDS OF HOURS? Above all, such spectacular durability depends upon a truly rugged transformer and excellent cooling.

ALPHA TRANSFORMERS ARE LEGENDARY. Every one is designed and built to handle full rated power ***CCS***—in practical effect, forever. As ETO's remarkable two year factory (limited) warranty suggests, they virtually ***never*** fail.

Alpha!

A FIVE YEAR TRANSFORMER WARRANTY? Yep. The Hipersil™ transformer design used in ***ALPHA*** models ***76CA, 78,*** and ***77Dx*** is so tough that we've extended the warranty on transformers in those specific models to five years!

SUPERB COOLING DESIGN IS ANOTHER ***ALPHA*** TRADITION. ***AMATEUR RADIO PROFILES,*** the new "Consumer Reports" type publication, says, "... the ***(ALPHA)*** 76A possess(es) perhaps the best cooling system yet encountered. After prolonged use the amplifier is barely warm to the touch ... ambient noise is barely audible."

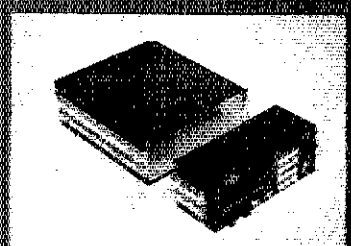
ARP adds, "Service is spectacular ... Alpha gives a full 24 months (warranty) ... evidence that they really stand behind their product!" And the editor of a prominent DX newsletter recently cited ***ALPHA*** amplifiers as notable examples of equipment ***designed by experienced operators for real-world use.***

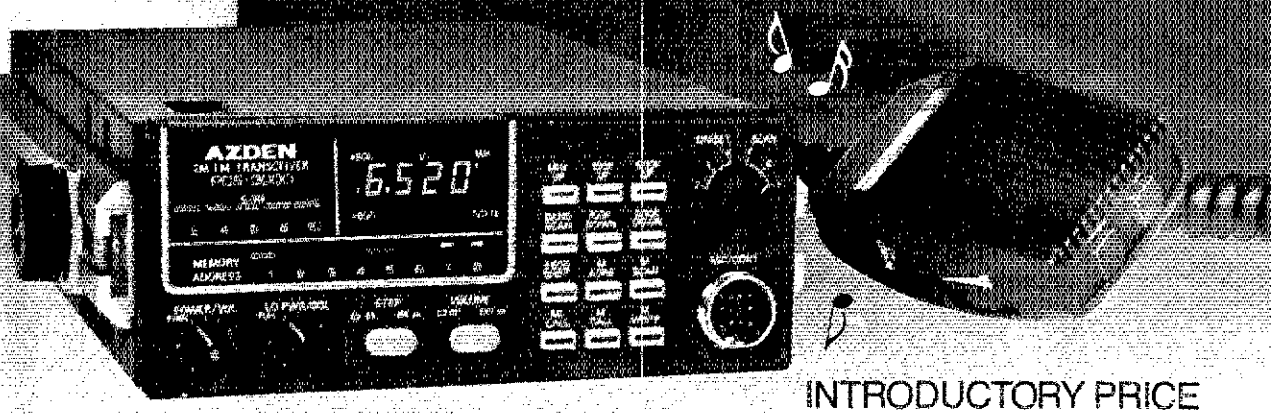
It's been said that forethought is the only sure cure for buyer's remorse. We couldn't put it better. Every ***ALPHA*** linear amplifier is meticulously engineered and built to handle continuous operation in any mode, at maximum legal power, with no time limit. The factory warranty protects you for years, not months. Isn't that food for (fore)thought?

Ehrhorn Technological Operations, Inc.
Box 708, Canon City, CO 81212
(303) 275-1613

the AZDEN PCS-3000

BLAZING THE FRONTIER OF MICROCOMPUTER COMMUNICATIONS





SUPERIOR COMMERCIAL GRADE 2-METER FM TRANSCEIVER

INTRODUCTORY PRICE

$339.00

FREE TOUCH-TONE® PAD KIT INCLUDED

COMPARE THESE FEATURES WITH ANY UNIT AT ANY PRICE

- 8 MHZ FREQUENCY COVERAGE, INCLUDING CAP/MARS BUILT IN: Receive and transmit 142.000 to 149.995 MHz in selectable steps of 5 or 10 kHz. COMPARE!
- SIZE: Unbelievable! Only 6¾" by 2⅜" by 9¾". COMPARE!
- MICROCOMPUTER CONTROL: All frequency control is carried out by a microcomputer.
- MUSICAL TONE ACCOMPANIES KEYBOARD ENTRIES: When a key is pressed, a brief musical tone indicates positive entry into the microcomputer. COMPARE!
- PUSHBUTTON FREQUENCY CONTROL FROM MICROPHONE OR PANEL: Frequency is selected by buttons on the front panel or microphone.
- 8 CHANNEL MEMORY: Each memory channel is reprogrammable and stores the frequency and offset. Memory is backed up by a NICAD battery when power is removed.
- INSTANT MEMORY 1 RECALL: By pressing a button on the microphone or front panel, memory channel 1 may be accessed immediately.
- MEMORY SCAN: Memory channels may be continuously scanned for quick location of a busy or vacant frequency.
- PROGRAMMABLE BAND SCAN: Any section of the band may be scanned in steps of 5 or 10 kHz. Scan limits are easily reprogrammed.
- DISCRIMINATOR SCAN CONTROL (AZDEN EXCLUSIVE PATENT): The scanner stops by sensing the channel center, so the unit always lands on the correct frequency. COMPARE this with other units that claim to scan in 5-kHz steps!
- THREE SCAN MODES WITH AUTO RESUME: "Sampling" mode pauses at busy channels, then resumes. "Busy mode stops at a busy channel, then resumes shortly after frequency clears. "Vacant" mode stops at a vacant channel and resumes when signal appears. If desired, auto resume may be prevented by pressing one button. COMPARE!
- REMOTABLE HEAD: The control head may be located as much as 15 feet away from the main unit using the optional connecting cable. COMPARE!
- PL TONE OSCILLATOR BUILT IN: Frequency is adjustable to access PL repeaters.
- MICROPHONE VOLUME/FREQ. CONTROL: Both functions may be adjusted from either the microphone or front panel.
- NON-STANDARD OFFSETS: Three accessory offsets can be obtained for CAP/MARS or unusual repeater splits. CAP and Air Force MARS splits are BUILT IN! COMPARE!
- 25 WATTS OUTPUT: Also 5 watts low power to conserve batteries in portable use.
- GREEN FREQUENCY DISPLAY: Frequency numerals are green LEDs for superior visibility.
- RECEIVER OFFSET: A channel lock switch allows monitoring of the repeater input frequency. COMPARE!
- SUPERIOR RECEIVER: Sensitivity is better than 0.28 uV for 20-dB quieting and 0.19 uV for 12-dB SINAD. The squelch sensitivity is superb, requiring less than 0.1 uV to open. The receiver audio circuits are designed for maximum intelligibility and fidelity. COMPARE!
- ILLUMINATED KEYBOARD: Keyboard backlighting allows it to be seen at night.
- TRUE FM, NOT PHASE MODULATION: Transmitted audio quality is optimized by the same high standard of design and construction as is found in the receiver. The microphone amplifier and compression circuits offer intelligibility second to none.
- OTHER FEATURES: Dynamic microphone, built-in speaker, mobile mounting bracket, external remote speaker jack (head and radio) and much, much more. All cords, plugs, fuses, microphone hanger etc. included. Weight: 6 lbs.
- ACCESSORIES: CS-ECK 15-foot remote cable . . . $35.00. CS-6R 6-amp ac power supply . . . $59.95. CS-AS remote speaker . . . $18.00. CS-TTK touch-tone® microphone kit (wired and tested) . . . $39.95.

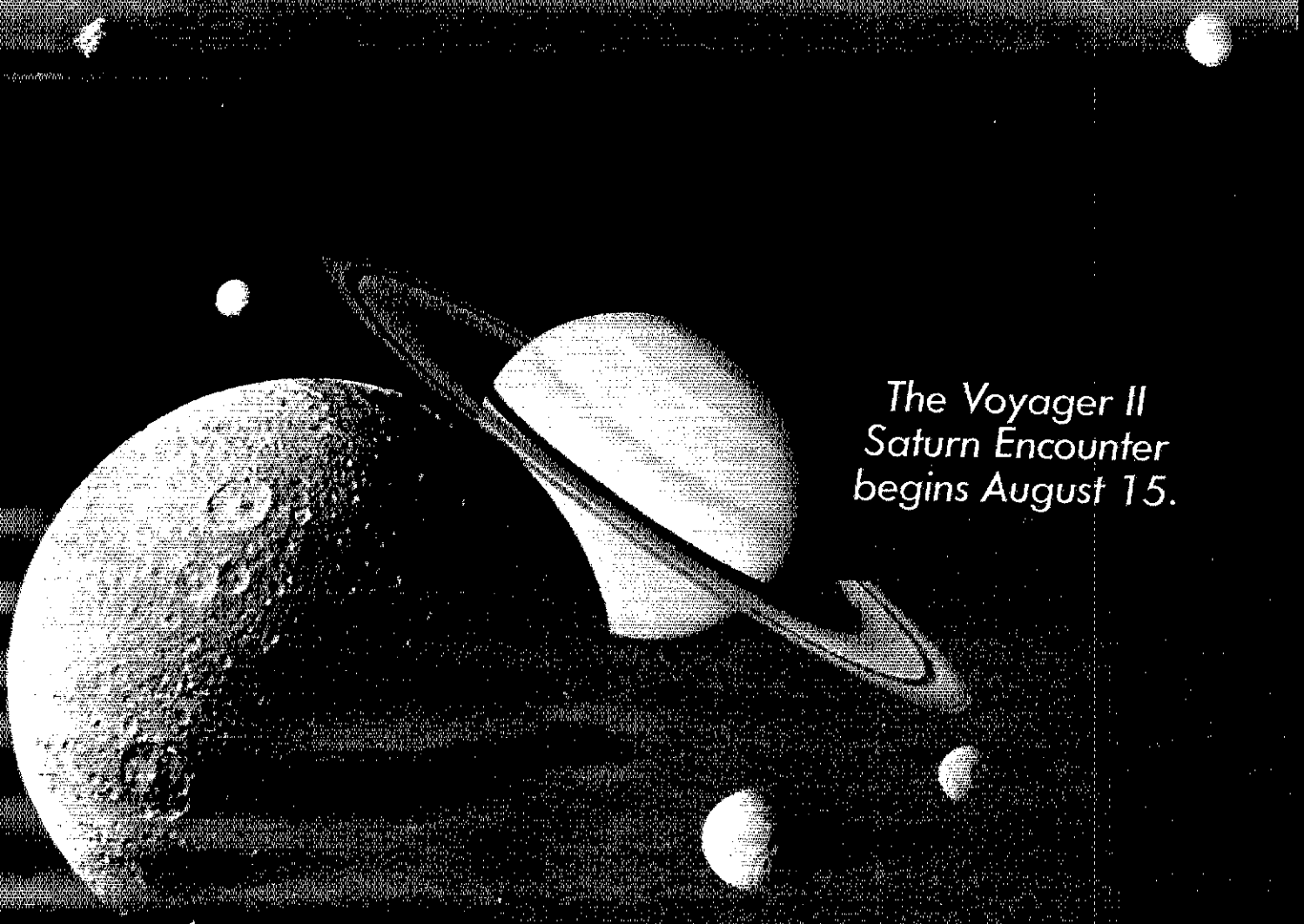
AMATEUR-WHOLESALE ELECTRONICS ORDER NOW TOLL FREE

8817 S.W. 129th Terrace, Miami, Florida 33176
Telephone (305) 233-3631 • Telex: 80-3356
HOURS: 9 - 5 Monday thru Friday
• U.S. DISTRIBUTOR • DEALER INQUIRIES INVITED

MasterCard VISA

800-327-3102

CREDIT CARD HOLDERS MAY USE OUR TOLL FREE ORDERING NUMBER.

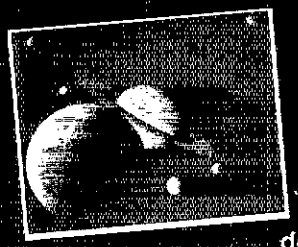


The Voyager II Saturn Encounter begins August 15.

See it first with a Robot Scan Converter.

The coming Saturn Encounter promises to be one of the most spectacular events of the century. And thanks to the JPL's Amateur Radio Club, hams with Slow Scan Television equipment will be able to receive and view the pictures from Voyager II as the space craft passes the ringed planet. The club will maintain a regular operating schedule (see below) during the encounter so that you will be able to receive the pictures within seconds of their arrival on earth.

If you've been thinking about adding SSTV to your station, we recommend you act now so you will be able to enjoy the historical Saturn Encounter. Not only will the Robot 400 enable you to view the pictures on a monitor or your home TV set, but you can record them on an audio tape recorder for future playback.
**Home TV hookup requires an RF Adapter kit.*



FREE!

Let your Robot dealer give you a demonstration of the Robot 400 and you'll receive a beautiful 8 x 10 full color picture of Saturn FREE! But act soon. Supplies are limited, and the Saturn Encounter is just a few weeks away.

JPL'S AMATEUR RADIO CLUB'S VOYAGER II ENCOUNTER OPERATING PERIOD

Call Sign: W6VIO
(Voyager in Outer Space)
SSTV Freq: 14235, 21340
or 28680 kHz. (±5 kHz)

Dates: Aug. 15-Aug. 30, 1981
Times: Daily
1930 to 2130 GMT
0030 to 0430 GMT

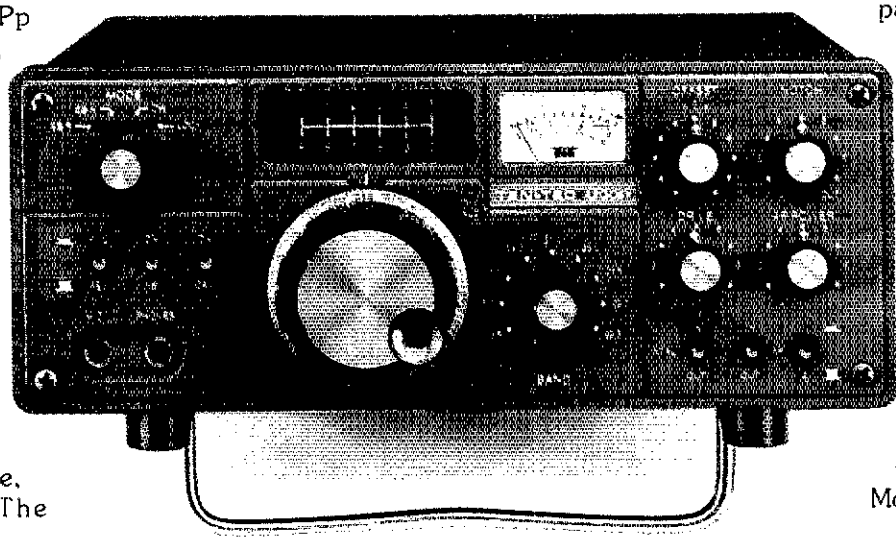
Additional activity is planned for weekends. Listen to announcements on above frequencies for additional times and frequencies.

Closest encounter: Aug. 25

ROBOT

ROBOT RESEARCH, INC.
7591 Convoy Court
San Diego, CA 92111

Here's a Concept You Haven't Seen In Amateur Radio For A Long Time— Low Price.



The right design — for all the right reasons. In setting forth design parameters for ARGOSY, Ten-Tec engineers pursued the goal of giving amateurs a rig with the right features at a price that stops the amateur radio price spiral.

The result is a unique new transceiver with selectable power levels (convertible from 10 watts to 100 watts at the flick of a switch), a rig with the right bands (80 through 10 meters including the new 30 meter band), a rig with the right operational features plus the right options, and the right price for today's economy—just $549.

Low power or high power. ARGOSY has the answer. Now you can enjoy the sport and challenge of QRPp operating, and, when you need it, the power to stand up to the crowds in QRM and poor band conditions. Just flip a switch to move from true QRPp power with the correct bias voltages to a full 100 watt input.

New analog readout design. Fast, easy, reliable, and efficient. The modern new readout on the ARGOSY is a mechanical design that instantly gives you all significant figures of any frequency. Right down to five figures (± 2 kHz). The band switch indicates the first two figures (MHz), the linear scale with lighted red bar-pointer indicates the third figure (hundreds) and the tuning knob skirt gives you the fourth and fifth figures (tens and units). Easy. And efficient—so battery operation is easily achieved.

The right receiver features. ***Sensitivity*** of 0.3 μV for 10 dB S+N/N. ***Selectivity:*** the standard 4-pole crystal filter has 2.5 kHz bandwidth and a 1.7:1 shape factor at 6/50 dB. Other cw and ssb filters are available as options, see below. I-f frequency is 9 MHz, i-f rejection 60 dB. ***Offset tuning*** is ± 3 kHz with a detent "off" position in the center. ***Built-in notch filter*** has a better than 50 dB rejection notch, tunable from 200 Hz to 3.5 kHz. An optional noise blanker of the i-f type has 50 dB blanking range. ***Built-in speaker*** is powered by low-distortion audio (less than 2% THD)

The right transmitter features. ***Frequency coverage*** from 80 through 10 meters, including the new 30 meter band, in nine 500 kHz segments (four segments for 10 meters), with approximately 40 kHz VFO overrun on each band edge. ***Convertible power:*** 100 or 10 watts input with 100% duty cycle for up to 20 minutes on all bands. ***3-function meter*** shows forward or reverse peak power on transmit, SWR, and received signal strength. ***PTT*** on ssb, ***full break-in*** on cw. PIN diode antenna switch. ***Built-in cw sidetone*** with variable pitch and volume. ***ALC control*** on "high" power only where needed, with LED indicator. ***Automatic*** normal sideband selection plus reverse. ***Normal 12-14V dc*** operation plus ac operation with optional power supply.

The right styling, the right size. Easy-to-use controls, fast-action push buttons, all located on raised front panel sections. New meter with lighted, easy-to-read scales. Rigid steel chassis, dark-painted molded front panel with matching aluminum top, bottom and back. Stainless steel tilt-up bail. And it's only 4" high by 9½" wide by 12" deep (bail not extended) to go anywhere, fit anywhere at home, in the field, car, plane or boat.

The right accessories—all front-panel switchable. Model 220 2.4 kHz 8-pole ssb filter $55; Model 218 1.8 kHz 8 pole ssb filter $55; Model 217 500 Hz cw filter $55; Model 219 250 Hz cw filter $55; Model 224 Audio cw filter $34; Model 223 Noise blanker $34; Model 226 internal Calibrator $39; Model 1125 Dc circuit breaker $10; Model 225 117/230V ac power supply $129.

New TEN-TEC Argosy $549

Model 525 ARGOSY —— $549.

Make the right choice, ARGOSY—for the right reasons ***and*** low price. See your TEN-TEC dealer or write for full details.

TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862
EXPORT: 555 LINCOLN AVE., CHICAGO, IL. 60645

ARRL Publications/Supply Order

☐ THE 1981 RADIO AMATEUR'S HANDBOOK The standard manual of Amateur Radio Communications.

SOFT COVER	CLOTHBOUND
$10.00 U.S.	$15.75
$11.00 Canada	$18.00
$12.50 elsewhere	$18.00

TUNE IN THE WORLD WITH HAM RADIO All the beginner needs to know to obtain the Novice license. Package includes text, code practice cassette, and workbook. $7.00

ARRL ANTENNA ANTHOLOGY The best from QST. $4.00 US, $4.50 Elsewhere

ARRL ANTENNA BOOK Contains theory and construction of all types of antennas. $5.00 US, $5.50 Elsewhere

BASIC BOOK OF HAM RADIO An overview of the radio amateur's world in layman's terms. $4.95

ARRL CODE KIT Two 60 min. cassettes and booklet to get you from 5 to 13 wpm quickly! $8.00

A COURSE IN RADIO FUNDAMENTALS Classroom text and home study guide. $4.00 US, $4.50 Elsewhere

ARRL ELECTRONICS DATA BOOK reference guide of charts, tables, & circuits. $4.00 US, $4.50 Elsewhere

FM AND REPEATERS FOR THE RADIO AMATEUR Complete manual of fm and repeater operation and equipment design. $5.00 US, $5.50 Elsewhere

HINTS AND KINKS Contains over three hundred practical ideas for your hamshack. $4.00 US, $4.50 Elsewhere

SOLID STATE DESIGN FOR THE RADIO AMATEUR Practical circuits and theory. $7.00 US, $8.00 Elsewhere

UNDERSTANDING AMATEUR RADIO Written for the beginner. Contains theory and how-to-build-it info. $5.00 US, $5.50 Elsewhere

WEEKEND PROJECTS FOR THE RADIO AMATEUR Easy to build projects from QST. Vol. 1 $3.00 US, $3.50 Elsewhere

☐ LICENSE MANUAL Complete text of amateur regulations, FCC exam syllabus, radio theory for Technician through Extra. $4.00 US, $4.50 Elsewhere

☐ ARRL OPERATING MANUAL Definitive source of good operating practices applied to over a dozen most popular Amateur Radio activities. $5.00 US, $5.50 Elsewhere

Q&A BOOKS Give sample questions and answer to FCC amateur exams.

☐ NOVICE $2.00 US, $2.50 Elsewhere

☐ TECH. & GENERAL $2.50 US, $3.00 Elsewhere

☐ ADV. & EXTRA $3.00 US, $3.50 Elsewhere

☐ RADIO FREQUENCY INTERFERENCE Solutions to a real problem that faces every radio amateur. $3.00 US, $3.50 Elsewhere

☐ REPEATER DIRECTORY listing of U.S. and Canadian repeaters. $1.00 US, $1.50 Elsewhere

☐ SINGLE SIDEBAND FOR THE RADIO AMATEUR A compilation of the best s.s.b. articles from QST. $4.00 US, $4.50 Elsewhere

☐ SOLID STATE BASICS Designed to clear away all the mystery that surrounds, semiconductor devices. $5.00 US, $5.50 Elsewhere

☐ "AMATEUR RADIO" License Plate $5.00

THE ARRL FLAG
- ☐ 2' x 3' cloth flag $15.00
- ☐ 3' x 5' cloth flag $21.00
- ☐ License Plate $5.00
- ☐ Cloth Patch $5.00
- ☐ Pin $2.00

THE ARRL TIE
- ☐ BLUE $12.00
- ☐ MAROON $12.00

BINDERS
- ☐ 6½ x 9½ (US and Canada only) $6.00
- ☐ 8½ x 11 (US and Canada only) $7.00

☐ L/C/F CALCULATOR Slide-rule type for problems on inductance, capacitance and frequency $3.00

DECALS
- ☐ Amateur Radio Emergency Service 2/$0.50
- ☐ Amateur Radio Emergency Service 5/$1.00
- ☐ Member or Life Member, each $0.25

CLOTH PATCHES (washable)
- ☐ Amateur Radio Emergency Service 3½ inch diameter $2.50
- ☐ 3" League Diamond $1.00
- ☐ 5" League Diamond $2.00
- ☐ Life Membership chevron for 3" League Diamond Patch $1.00
- ☐ Life Membership chevron for 5" League Diamond Patch $1.25
- ☐ Rubber Stamp $2.00

MEMBERSHIP PINS
- ☐ Membership $2.00
- ☐ League Official _____ Title $2.00
- ☐ Replacement for Life Members $2.00
- ☐ LIFE MEMBERSHIP PLAQUE (for replacement-allow 8 wks. delivery) $25.00

LOG BOOKS
- ☐ 8½ x 11 Spiral $1.75 US, $2.50 Elsewhere
- ☐ Mini Log 4x6 $1.00 US $1.50 elsewhere
- ☐ 3-hole Loose Leaf 96 8½ x 11 sheets $3.00

MAPS
- ☐ US Call Area: Full color showing call areas, ARRL division/section boundaries and time zones $3.00
- ☐ World Map, 1980 edition Great Circle map with country prefix list, ITU region boundaries, time zones and much more $4.50
- ☐ MESSAGE DELIVERY CARDS 10 for $0.30
- ☐ RADIOGRAM PADS 70 sheets $0.75

SMITH CHARTS®
- ☐ Standard (set of 5 sheets) $1.00
- ☐ Expanded (set of 5 sheets) $1.00
- ☐ ANTENNA PATTERN WORKSHEETS 100 8½x11 sheets $3.00
- ☐ MEMBER'S STATIONERY 100 8½ x 11 sheets $3.00

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE. PLEASE ALLOW 3-4 WEEKS FOR DELIVERY.

PAYMENT MUST BE IN U.S. FUNDS

Ship postpaid to:

NAME _____ CALL _____

STREET _____

CITY _____ STATE/PROV. _____ ZIP/PC _____

Total Enclosed (or charge to MC, VISA or Chargex) $ _____

VISA or Chargex No. _____ Expires _____

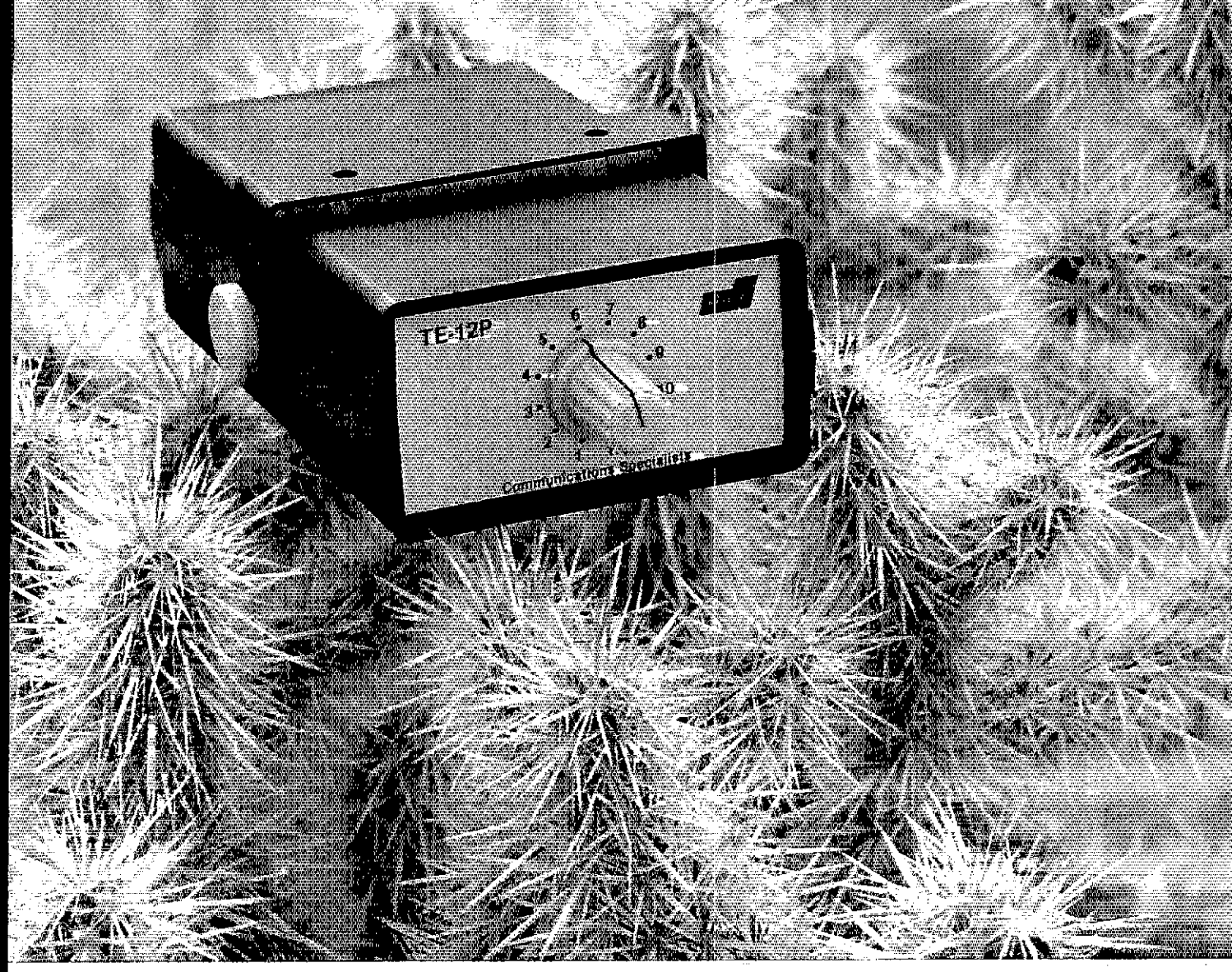
Mastercard _____ Expires _____

Bank No. _____

Have you fully completed your order form? Is your check signed or charge number indicated?

THE AMERICAN RADIO RELAY LEAGUE

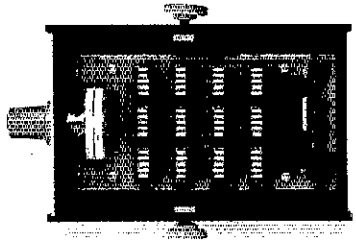
~~225 MAIN ST~~ NEWINGTON, CT 06111



Stuck with a problem?

Our TE-12P Encoder might be just the solution to pull you out of a sticky situation. Need a different CTCSS tone for each channel in a multi-channel Public Safety System? How about customer access to multiple repeater sites on the same channel? Or use it to generate any of the twelve tones for EMS use. Also, it can be used to access Amateur repeaters or just as a piece of versatile test equipment. Any of the CTCSS tones may be accessed with the TE-12PA, any of the audible frequencies with the TE-12PB. Just set a dip switch, no test equipment is required. As usual, we're a stickler for 1day delivery with a full 1 year warranty.

- Output level flat to within 1.5db over entire range selected.
- Immune to RF.
- Powered by 6-30vdc, unregulated at 8 ma.
- Low impedance, low distortion, adjustable sinewave output, 5v peak-to-peak.
- Instant start-up.



TE-12PA

67.0 XZ	85.4 YA	103.5 1A	127.3 3A	156.7 5A	192.8 7A
71.9 XA	88.5 YB	107.2 1B	131.8 3B	162.2 5B	203.5 M1
74.4 WA	91.5 ZZ	110.9 2Z	136.5 4Z	167.9 6Z	
77.0 XB	94.8 ZA	114.8 2A	141.3 4A	173.8 6A	
79.7 SP	97.4 ZB	118.8 2B	146.2 4B	179.9 6B	
82.5 YZ	100.0 1Z	123.0 3Z	151.4 5Z	186.2 7Z	

- Frequency accuracy, ±.1 Hz maximum –40°C to +85°C
- Frequencies to 250 Hz available on special order.
- Continuous tone

TE-12PB

TEST-TONES:	TOUCH-TONES:		BURST TONES:			
600	697	1209	1600	1850	2150	2400
1000	770	1336	1650	1900	2200	2450
1500	852	1477	1700	1950	2250	2500
2175	941	1633	1750	2000	2300	2550
2805			1800	2100	2350	

- Frequency accuracy, ±1 Hz maximum –40°C to +85°C
- Tone length approximately 300 ms. May be lengthened, shortened or eliminated by changing value of resistor

$89.95

COMMUNICATIONS SPECIALISTS

426 West Taft Avenue, Orange, California 92667
(800) 854-0547/California: (714) 998-3021

MasterCard VISA

Mark of the Professional

Now in Stock . . .

Rockwell-Collins

KWM-380

Call Today for our Deal!

Some available at the Old Price plus liberal AES Discount.

Call 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 Florida 32803
621 Commonwealth Ave.
Phone (305) 894-3238
Fla. Wats 1-800-432-9424
Outside Fla. 1-800-327-1917

LAS VEGAS, Nevada 89106
1072 N. Rancho Drive
Phone (702) 647-3114
Pete, WA8PZA & Squeak, AD7K
Outside Nev. 1-800-634-6227

ERICKSON COMMUNICATIONS
CHICAGO, Illinois 60630
5456 N. Milwaukee Avenue
Phone (312) 631-5181
Outside ILL. 1-800-621-5802

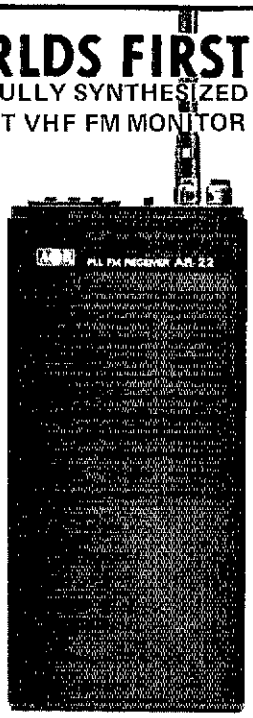
ACE COMMUNICATIONS, INC.
2832-D Walnut Avenue, Tustin, California 92680
Phone (714)544-8281

Factory Direct Only!

AR-22

FACTORY DIRECT
PRICE $125.00
This price in U.S. only

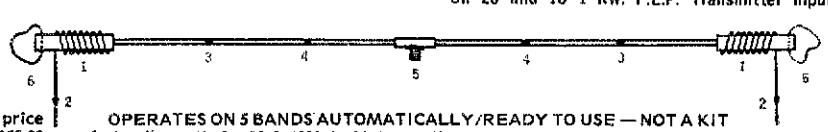
THE WORLDS FIRST
1800 CHANNEL FULLY SYNTHESIZED
COMPACT VHF FM MONITOR



- FULL BAND COVERAGE. 141.000-149.995 MHZ 5 KHZ, Steps by digital switches.
- SLIM SIZE AND LIGHTWEIGHT. 5¼" (H) x 2½" (W) x 1" (D) 7.1 oz with NiCd Battery Pack.
- COMMERCIAL BAND TYPE (151-159 MHZ) IS ALSO AVAILABLE.
- CREDIT CARDS/MONEY ORDER OR ANY COMMERCIAL GUARANTEED CHECK U.P.S. COD.

LRL-66 ANTENNA 66' LONG. 80 THRU 10M

Power rating 2 Kw. P.E.P. or over on 80, 40, 15 On 20 and 10 1 Kw. P.E.P. Transmitter input



price $75.00 in Cont. USA ppd.

OPERATES ON 5 BANDS AUTOMATICALLY/READY TO USE — NOT A KIT

1. Loading coils for 80 & 40M doublet operation
2. Adjustable ends to set 80 meter resonance
3, 4. Decoupling stubs for 20 & 10 meters
5. Center insulator with female coax connector to take PL-259 plug
6. Fittings on insulators to tie on rope

LATTIN RADIO LABORATORIES • Box 44 • Owensboro, Kentucky 42301

NOW

An 8044 with Speedmeter*

from CURTIS

★ EK-480: C-MOS Deluxe Keyer	$134.95
★ EK-480M: Above plus speedmeter	149.95
★ I-480: InstructoMate	124.95
★ M-480: MemoryMate	124.95
★ IM-480: Instructo-MemoryMate	179.95
★ KB-480: Morse KeyboardMate	199.95
★ KB-4900: Morse-RTTY keyboard	399.95
Above prices FOB factory	
8044: Keyer-On-A-Chip (ARRL Hdbk '77-'81)	14.95
8044-3: IC, PCB, Socket, Manual	24.95
8044-4: Semi-Kit	54.95
*8044M (incl. speedmeter funct.) add $5.00	
8045: Morse Keyboard-On-A-Chip IC	59.95
8045-1: IC, PCB, FIFO, Sockets, Manual	89.95
8045-2: Semi-Kit	159.95
8046: Instructokeyer-On-A-Chip IC	49.95
8046-1: Semi-Kit	79.95
8047: Message Memory-On-A-Chip IC	39.95
8047-1: IC, PCB, RAM, Sockets, Manual	69.95

(add $1.75 on kits for postage and handling)

Curtis Electro Devices, Inc.
(415) 494-7223
Box 4090, Mountain View, CA 94040

VISA master charge

work as this year's coordinator. Another very interesting exercise will be the ham involvement in the Peak District Alaskan Expedition to the Matanuska Glacier on May 15. GM4FZH and G8PQQ will accompany the expedition which will be supported by Alaskan hams. With the approaching summer, Alcan Highway traffic will increase, travelling hams are invited to check-in on 14,292 anytime, and the Alaskan Bush Net on 7250 at 0530Z. Congrats to KL7IYL on his reaching 10-Meter FM WAS!

IDAHO: SCM, Lem Allen, W7JMH — WB7RES & W7MRA are co-chairmen for the fourth annual TVRA Hamfest at Payette Mini-Dome June 20-21 — plan to attend. WA7LGN has new IMN Net certificate. VK3DCO flies for Quantas, skiing at Sun Valley three days this month. W7IWV plans California trip, will take HW-8. KA7FOV recovering nicely from major surgery. K7PEZ at Elks Convalescent Center in Boise, would appreciate visitors. Welcome to KF7F from Calif. Net reports:

Net	Freq.	Time	Sess.	QNI	QTC
FARM	3935 ssb	7 P Dy	29	1505	39
IMN	3635 cw	8 P M-F	20	208	74
CD	3990 ssb	8:10 A M-F	20	628	18

Spring is a good time to inspect & improve antennas. Traffic: W7GHT 279, W7KDB 94, AC7P 87, W7JMH 40, K7JV 24.

MONTANA: SCM, Robert Leo, W7LR — I want to thank all of those hams that have given such fine support during my two terms as SCM. It has been a pleasure working with all of you, and I've enjoyed being SCM, and hope to do this again some day. N7AIK, the new SCM, will welcome the same kind of support. Welcome aboard Les! IMN QNI 208, QTC 74. Hamfests: Sidney, June 20-21, contact N7BMR; WIMU, W Yellowstone, July 31, Aug. 1, 2, N7AIK; Coeur D'Alene May 9; Glendive Centennial stn July 4, 16 to 23 Z, 7240, 14280, s.a.s.e. KB7BO for commemorative QSL. KØPP: Anaconda 19/79 2-mtr rptr will return; new EC Deer Lodge County. KB7O: 6-mtr openings Feb 1, 7, Es Aurora F2 QSO 5 states 5 countries. KB7O KB7BJ working on moonbounce system. Eaglehead Rptr Assn directors: KF7R, KF7T, KB7BJ KA7AZR W7LR, K7CPC QSY to Utah. WB7DZX on PSHR again, FB. W7IDK: hamfest Aug 9, Beaver Creek Park MTN Jan QNI 1193, QTC 135. LYARC newsletter tells how they solved cable RFI problems. 7240 Net QNI 197, QTC 9. N7AFE 2-mtr ARES Net QNI 52. W7LBK and W7PSX receive section net certificates from KJ7V, IMN NM. Traffic: (Feb.) WB7DZX 124, W7IXD 56, W7NEG 14, W7LBK 5, W7LR 3. (Jan.) W7IXD 74.

OREGON: SCM, William B. Shrader, W7QMU — SEC: K7OLN STM: W7VSE. Section nets:

Net	Time/Day	Freq.	QNI	QTC	NM
BSN	0145Z Dy	3908	807	53	K7WPC
OSN	0230/0600 Dy	3587	359	362	KB7JW
WCN	0300Z Dy	3706			K7ZIG
OARES	0115Z Dy	3993.5	466	104	W7HLF
	0230Z Dy	3993.5	126	66	W7HLF
PTTN	0300Z Dy	146.76	555	237	W7LRB
PdxARES	0330Z Dy	147.32	840	84	K7WWR
LBLARES	0330Z Dy	146.79	624	17	WB7QQH
SOARES	0315Z ThS	146.94	211	56	KA7DBS
SOEM	0230Z Tue	146.64	114	2	W7FDU
MPARES	0300Z TTh	147.02	218	5	WA7ZAF

W7LRB made a record 215 points in Public Service Honor Roll. W7TC has only Delaware left for QRP WAS with 0.1 watt cw output. New calls: KA7CPP, Roseburg; KA7JOH and KA7JRC, Medford; KB7RW and KB7NZ, Salem. Upgrades: WA7TDU (Extra), N7CDB (Tech), and KA7GHS (Gen). Congratulations to all!! Special congrats to KA7JCY for new Technician, he is blind. We need Official Observers in Oregon Section, let SCM know if you are qualified and interested. Traffic: (Feb.) W7VSE 662, W7LRB 398, KB7JW 321, K7NTS 235, W7LNE 170, WA7LGN 152, WB7OEX 125, WA7IHS 114, KA7IPS 90, WA7WBE 82, W7QMU 75, KA7CZG 32, W7HLF 32, WB7OFI 71, K7QPW 42, K7IWD 27, W7LT 17, KA7DBS 13, W7FDU 12, W7TC 9 (Jan.) K7QPW 28, KA7CZG 14, W7LT 8.

WASHINGTON: SCM, Bob Klepper, W7IEU — SEC: WA7RWK. STM: W7DZX. Nets reporting this month are: NTN, QNI 1192, QTC 80; WARTS, QNI 3233, QTC 195; NWSSBN, QNI 694, QTC 41; WSN, QNI 645, QTC 193; EWTN, QNI 81, QTC 104; IETN, QNI 191, QTC 55; PSTS, QNI 154, QTC 100; SCARES, QNI 129, QTC 13. Sorry to report that W7ETO and W7MCW have become SKs. K7CYZ was presented the Doc Spike *Inspirational* Award for 1980 at Radio Club of Tacoma meeting. A very interesting discussion of the current status of ARES in King Cty was presented to the West Seattle ARC. Clallam Cty ARC's "The Boondocker" reports WB7RHT can be found operating IT9WPO from Sicily, 0900 PST on 21.307. BEARS Club has set up a Slow Scan TV Committee. Clark Cty ARC reports KA7DIZ KA7DWW and KA7FLI have upgraded. KB7G has 13 states on OSCAR 8. WA7ETH is editor/publisher of HAMS Club paper "The Feedline." PSCARC is looking for input and delegates from clubs in the Puget Sound area. is your club represented? Spokane Dial Twisters Shrine Hospital project moving along smoothly. A very interesting program on basics of computers was presented to HAMS Club by K7NCG. Mike and Key ARC enjoyed interesting presentation on integrated circuits and projects using IC's presented by KA7BZL. Mt Baker ARC members will soon be sporting new logo patches. K7CAZ presented an interesting program on keyers and a novel direction finder to the North Seattle ARC. Upcoming hamfests are Vancouver Hamfair May 9 & 10, Bremerton May 16, and NW Division at Seaside, OR June 5, 6 & 7, and Tricities May 30 & 31. Radio Amateurs of Skagit Cty (RASC) were out in full force providing communications for the Skagit Runners' Nookachamps Road Run. RASC also put on demonstration and operated from Mt Vernon on George Washington's birthday. Radio Club of Tacoma planning another big hamfair in August. LCARA hosted 40 intellectual gifted school children and their parents on a tour of the local DES and the Club's clubhouse. New officers for Spokane Dial Twisters are: KA7FUS, chief dial twister; WB7DFD, second officer; KA7DDU, third officer; KA7BQI, secy. New officers of the 147.90/30 Longview Rptr are: WA7SJN, pres.; WA7SHN, vice pres.; K7WF, secy/treas. Look for a new NTS net soon on 147.86/26 rptr in the southwest area of the section. Traffic: W7DZX 1122, WB7TQF 292, K7GXZ 230, AD7G 179, N7AFZ 134, K7CTP 127, W7FJZ 124, WA7BDD 86, W7IEU 86, WB7WOW 70, KE7I 59, W7GB 57, W7BUN 33, WA7RCR 32, N7AFY 24, WB7CFH 17, W7ERH 15, W7LG 8, W7APS 6, K7RBT 6, WD7G 3, WA7OJI 3, W7AIB 2, W7FQE 1.

PACIFIC DIVISION

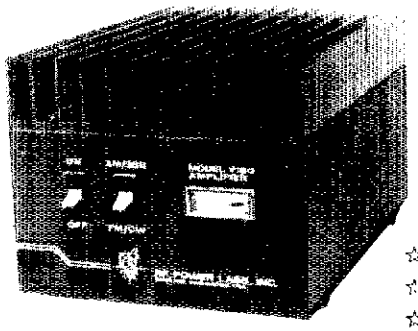
EAST BAY: SCM, Bob Vallio, W6RGG — Asst SCMs: W6ZF YE2AQV. SEC: WB6KQU. Welcome to new section ECs. WA6OFI, Pacheco; N6DRT, Albany; W9QG, Vacaville. MDARC 1980 license classes had 13 pass the

LINEAR POWER AMPLIFIERS

160 - 80 - 40 - 30 - 20 - 17 - 15 - 12 - 10 - 6 - 2 METERS

(1.8 to 148 MHz)

MODEL: V350



MODEL: V180

- ☆Built-in 115/230 VAC Supply
- ☆AM-FM-CW-SSB-RTTY
- ☆60dB Harmonics
- ☆60dB Spurious
- ☆Heavy Duty Design

All Solid-State!

- ☆Illuminated Panel Meter
- ☆Automatic T/R Switching
- ☆VSWR Protected
- ☆ +13V/3A Accessory Socket
- ☆U.S. Manufactured

MODEL	FREQUENCY	INPUT	OUTPUT	SIZE WxDxH	WEIGHT	FAN KIT REQUIRED	PRICE
**C500X	2-22MHz	15-40W	500W	432x330x203mm	23.4 kg (52 lbs)	CW & FM	$1395.00
A1000	160-15 Meter	50-100W	600W	432x330x203mm	23.4 kg (52 lbs)	CW & FM	1395.00
**A1000X	160-10 Meter	15-40W	600W	432x330x203mm	23.4 kg (52 lbs)	CW & FM	1395.00
V76	50-54MHz	8-15W	100-120W	216x330x178mm	11.7 kg (26 lbs)	No	399.00
V360	50-54MHz	5-10W	400-450W	432x330x203mm	23.4 kg (52 lbs)	Yes	1085.00
V70	144-148MHz	10-15W	75-90W	216x330x178mm	11.7 kg (26 lbs)	No	349.00
V71	144-148MHz	1-3W	75-90W	216x330x178mm	11.7 kg (26 lbs)	No	399.00
V180	144-148MHz	5-15W	170-200W	216x330x178mm	13.5 kg (30 lbs)	CW & FM	599.00
V350	144-148MHz	10-20W	350-400W	432x330x203mm	23.4 kg (52 lbs)	Yes	1085.00
F110	Fan Kit, 115VAC			135x135x50mm	1 kg (2.2 lbs)	—	$ 39.00
F220	Fan Kit, 230VAC			135x135x50mm	1 kg (2.2 lbs)	—	39.00
*F135	Fan Kit, 115VAC			381x140x89mm	3.2 kg (7 lbs)	—	75.00
*F235	Fan Kit, 230VAC			381x140x89mm	3.2 kg (7 lbs)	—	75.00
RM-1	19 Inch Rack Adaptor			483x3x178mm	1 kg (2.2 lbs)		29.00
*RM-2	19 Inch Rack Adaptor			197x32x28mm	.5 kg (1.1 lbs)	—	19.00

* Used with the V360, V350, A1000, A1000X, C500X /
**For Export Only

rf POWER LABS

RF POWER LABS, INC.

21820 87th SE, Maltby Industrial Village, Woodinville, WA 98072
Telephone (206) 481-8833 - Telex No.: 32-1042

master charge

VISA

Now, upgrade faster!

All cassettes 60 minutes.

Theory Tapes

Designed with an instructive, interview-style format, Kantronics Study Tapes are great supportive theory material for the latest exams.

- ☐ **Novice Study Tape** - $4.95
- ☐ **General Study Tape set** - (two) $8.95
- ☐ **General Q & A Tape** - Questions similar to those on the FCC exam with good possible answers by Extra-class John Lenahan, KØRW. $6.95
- ☐ **The Advanced Study Tapes** - (two) $11.95
- ☐ **The Extra Study Tape** - $6.95

Gradient

Push yourself gradually with slowly increasing code generated by computer to exact Morse specifications. Tape transcripts included.

- ☐ **Novice Gradient** - 4 to 9 WPM $6.95
- ☐ **General Gradient** - 7 to 15 WPM $6.95
- ☐ **Extra Gradient** - 13 to 23 WPM $6.95
- ☐ **High-Speed Gradient** - 18 to 30 WPM $6.95

QSO Series

Simulated "on-the-air" conversations designed for the new-style FCC tests. Tape transcripts and multi-choice exams included.

- ☐ **QSO Tape** - 7.5, 10, 13 and 15 WPM $4.95
- ☐ **QSO-2 Tape** - another hour of QSOs at 7.5, 10, 13 and 15 WPM $4.95
- ☐ **QSO-13 Tape** - all 13 WPM $4.95

QXX Tapes

"On-the-air" format at Extra-class speeds. Tape transcripts included.

- ☐ **QXX Tape** - 20, 23 and 26 WPM with exam $4.95
- ☐ **QXX-2 Tape** - another hour of QSOs at 20, 23 and 26 WPM $4.95
- ☐ **Q-Signals and Short Words** - Learn to hear groups of letters as units at high speed. 22, 33 and 40 WPM $4.95

Super Tapes

Kantronics' Super tapes generate characters sent at higher speeds with longer spaces for easier copying. Great for learning code and breaking copying barriers! Transcripts included.

- ☐ **Super 5 WPM** - Instructor teaches code from characters to words and sentences. $4.95
- ☐ **Super QSO 13** - QSO format with enhanced code at 13 WPM. $4.95

Bookshelf

- ☐ **Novice-Class Amateur Radio License Manual** - By Phil Anderson, WØXI. $3.95
- ☐ **General-Class Amateur License Study Guide** - By Phil Anderson, WØXI. $6.50
- ☐ **Federal Frequency Directory** - $12.95

Please include $1 shipping / handling for single tapes and manuals or $2 for other orders.

Mastercard and Visa orders require card number and expiration date.
Be sure to include your name and shipping address with your order.

Kantronics
1202 E. 23rd Street (913) 842-7745
Lawrence, Kansas 66044

More Useable Antenna for your Money

Only Butternut's HF5V-III with Differential Reactance Tuning leaves the entire antenna active on 10, 20, 40, and 80 meters! On 15 a loss-free linear decoupler provides a full unloaded quarter-wave conductor (with the ad-added advantage of decreased wind loading and lower center of gravity).

★ Compare active element lengths band-for-band for the HF5V-III and *any* multi-trap design of similar height; when it comes to SWR bandwidth, efficiency, and overall performance, there's really no comparison! And if your rig covers 160 meters, what other antenna offers six-band capability?*

★ No lossy traps or unsightly, wind-catching "top hats".

★ Useable on adjacent MARS frequencies with little or no adjustment.

★ Longer elements mean greater bandwidth and significantly higher efficiency for superior low-angle DX performance.

★ Heavy duty air-wound inductors permit correct resonance on 80 and 40 meters and can be adjusted for lowest SWR on these bands.

★ Easiest five-band vertical to assemble and adjust.

★ Sleek, trim design makes the HF5V-III "XYL approved" and requires no guying.

*With optional TBR-160

Engineering quality for the serious Amateur

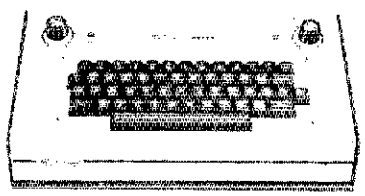
BUTTERNUT ELECTRONICS CO.

P.O. BOX 1411 SAN MARCOS, TX 78666
Phone: (512) 396-4111

Pat. applied for

Request free catalogue today.

AFFORDABLE CW KEYBOARD



Transmits perfect Morse Code * Built-in 16 character buffer * Internal speaker and side-tone * Reed relay output eliminates keying problems * All solid state circuits and sockets for reliability * Speed range 5—45 WPM * Perfect companion to our MORSE-A-WORD CW code reader.

MORSE-A-KEYER KIT, model MAK-K, Complete kit of parts & manual $159.95
MORSE-A-KEYER, model MAK-F, Factory wired & tested $205.00
MORSE-A-KEYER ESSENTIAL PARTS KIT, model EPK-K. . . . . $ 69.95
(Essential parts kit for home-brewers consists of pc board, board parts and manual. You supply ASCII keyboard, cabinet, power supply & miscellaneous parts.)

Send check or money order. Use your VISA or MasterCard. Add $5.00 shipping and handling for Continental U.S. Wisconsin residents add 4% Wisconsin State Sales Tax.

Microcraft Corporation Telephone: (414) 241-8144
Post Office Box 513Q, Thiensville, Wisconsin 53092

code test, 12 the written, with 1 still awaiting notification. They are currently running 5 separate courses in the Amateur Radio arts with K6BUY WA6KGJ KA6AOC WA6ZFZ KB6TP and KT6X (ex-WA6YXY, congrats) as instructors. W6EEN is again Field Day chairman and laying 1981 plans with co-chairman, K6XC. SBARA's THE GROUND PLANE featured photos of their recent trip to the RCA Global Communications center at Pt. Reyes. EBARC meets 2nd Fridays at 7:30 P.M., Salvation Army, 36th & Rheem, Richmond. LARK newsletter distributor, AD6X, has relinquished his duties after years of service and WA6AFP & AA6F have assumed the arduous task. Their recent upgraded members are. N6DOA KA6LEW KA6LSK KA6LSL KA6KZV to Technician; KA6ATV KA6AUB to General; K6YEO to Advanced and KU6F to Extra — congrats to all. Traffic: W6OA 60, KA6ERF 4.

NEVADA: SCM, Ralph E. Covington, W7SK — SEC: WA7KCD, WB6VEW welcome to Carson City, KA6CPN welcome to Reno. W7BYR still active on OSCAR with Hawaii the latest conturmation. N7RH/R with auto patch now on frequency 90/30 low level in Reno area. WA7EGV back on the air with antenna raising assistance of W7UIZ K7AZ and K7WLY. NARA group in Reno planning a picnic June 6 at Davis Creek Park, contact K7QOP for information. Las Vegas Radio Amateur Club had a lively fox hunt March 1 with K7SN and KB7OX as foxes. WB7DWB is now KB7TH and WB7UJR is now KF7E. 1981 Sierra Hamfest will be in Reno, August 22, contact W7BS for details. EC for Washoe County is KB7MV and emergency net is conducted Thursday 7 P.M. on 01/61. Nevada Sagebrush Net Monday through Friday 7:30 P.M. Pacific Time on 3906 kHz. Traffic: N7AKX 428, W7BS 114.

PACIFIC: SCM, Pat Corrigan, KH6DD — STM: WØKON. SEC: KH6CKJ. EC: KH6ILR Honolulu, KH6H Maui. SEC, KH6CKJ, unfortunately suffered a slipped disc and was hospitalized. A full and speedy recovery is hoped for by all section members. Pac. TFC Net still looking for more help. W. Coast stalwart of net, N6WP, feeling better now. KH6HIJ doing yeoman service on PTN. ARRL Bulletins are also broadcast on Maui Emerg. Net, Mon. at 7 P.M. on 146.76 and Fri. at 6:30 P.M. on 146.52 for Maui members. The Jan/Feb seasonal storms played havoc with antennas again. W6HTH/KH6 doing a lot on 6-M DX. KH6IJ more and more active. KH7VJ waiting to get better setup again for DX since his return from W6. Receive/hear a lot of complaints about the KH6 listing in with all 6's in Callbook. Write to them direct and let them know your feelings.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: N6AUB. ASCM: AI6T. WB8GFJ, our SEC for the last few years, moved to the Bay Area. We all owe him a big debt of gratitude for an outstanding record of public service. He isn't off the hook and will continue in his capacity with the Skywarn System. I am pleased to announce that N6AUB of Grass Valley will be our new SEC. The North Hills RC has scheduled their annual Ham Swap for Sunday May 31, from 9 A.M. to 3 P.M. The Swap will again be held at the Machinists Hall, 3081 Sunrise Blvd., Rancho Cordova. Clean out that garage. Congratulations to W6GO on qualifying for 5BDXCC. Traffic: W6DEF 15, W6SX 10, WB6HEV 2, W6RSP 2.

SAN FRANCISCO: SCM, Art Samuelson, W6VV — SEC: WB6ZRK. STM: K6TP. Officers of Humboldt ARC are: KA6ERE, pres.; W6RNL, vice pres.; W6GGR, secy./treas. Far West Repeater Association is making improvements to their system. WA6RDA and WB6VSD are getting active on ATV. K6GWE/R had demonstration at Computer Faire. San Francisco RC set up antenna for use at Ralph K. Davies Medical Center. WR6ACI is again holding emergency drills. W6GGR is working on a cw computer program. PSHR: W6RNL. Traffic: W6IPL 406, W6RNL 168, K6TP 119, K6TWJ 51, W6GGR 10.

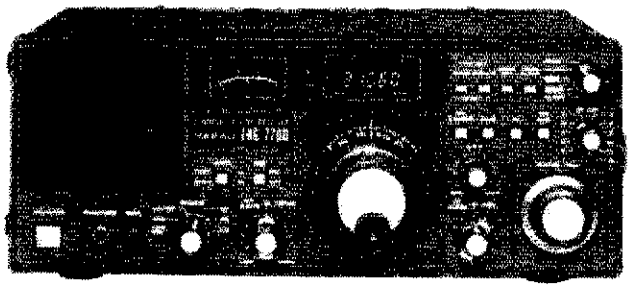
SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. Asst SCMs: WA6YAK W6TRP WA6HIN. WA6OYF is new EC for Stanislaus County. All SJV'ers should start planning for Field Day. KB6GC has DXCC. K6YK has 300 countries confirmed. K6PBT and N6AWH are ARRL Life Members. WB6TTP is Extra. KA6CQX is General. KA6JSL is N6DYJ. KA6LGH is N6DTZ. KA6LGC is N6DTX. KA6GCC is KD6OM. KA6IRP is N6DUG. KA6LGA is N6DUA. KA6GCB is N6DTY. KA6GCF is N6DUC. KA6GBZ is N6DUB. KA6MQI is N6DXU. WB6LZU is KD6LO. WD6CNC is N6DYL. KA6CQX is N6DTC. WB6TIA has a TR 7800. N6XU has a TR 7400A. K9YBM has a FT 101EE. N6BNW has a L-4. WA6NIF has a TR 8400. WB6KAD has a TS 130. W7POR has an IC 2A. This is the month for the ARRL Pacific Division Convention in Fresno. I hope to see you there. Traffic: (Feb.) N6AWH 43, WA6YAB 19, WD6FRS 16, WB6TTP 16, K9YBM 7, W6DPD 3. (Jan.) WD6FRS 8.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. New Curator of Foothill Electronic Museum is 50 year veteran of ham radio, W6FKF, he takes over from W6EGW. Gabilan ARC provided communications for 10km foot race and participated in a local disaster fire drill. San Lorenzo Valley and Santa Cruz clubs held another successful joint breakfast meeting. KQ6E spoke to San Mateo RC on home computers. SMRC reports WB6DLS as a Silent Key. LERA ARC has their new 220 repeater on the air. REMINDER: Pacific Division Convention in Fresno, May 15-17 — see you there. FARS/EMARC held a joint outing at Sunset Beach State Park. K6RTU spent a few days in the hospital getting his ticker in sync. SPECS members attended a Red Cross first aid course. SPECS Flea Market had a good turn out and a lot of "stuff" changed hands. EMARC's Novice class has a very good turnout. WA6ROM received an Award of Merit from Pac. Div Director. WB6GFJ, a new member of SCV, also rcvd Certificate of Merit. Congrats. Director W6ZM spoke before the Santa Cruz CARC. SCCARC's Flea Market also was a success. W6RFF presented a talk on emergency communications and traffic handling to the SLVARC. New members of NPSARC are K6ENP N6DQY and WA7GQD, also graduates of their Novice classes are now KA6NRI and KA6NVU. Welcome! Special events station operated at the 18th hole of the Bing Crosby Pro-Am Tournament at Pebble Beach. The WB6OOS rptr group provided communications for the March of Dimes Walkathon. They are a very busy Public Service group. SBARA had a great time touring RCA Global Comm station at Pt. Reyes. Traffic: W6YBV 300, W6KZJ 100, W6OII 72, W6RFF 37, W6ZRJ 26, W6ASH 14, WA6HAD 7, WB6IZF 3.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Ed Stephenson, AB4S — ASCM: N4UE. STM: WD8NYN. SEC: WA4BFT. NMs: CN AB4V, CMN WD8NYN, THEN WD4CNR, JFK WD4CNQ, NCSSB WB4CES, CNN WD4JJK. Recent upgrades: KA4KJI to General, WD4DIP and NG4A to Extra. Congrats. WA4WTX authored an interesting history of the Durham FMA in their newsletter. Congrats to WB4SXR, new President of Western Carolina ARS. Profile of the

High Performance - All Mode
GENERAL COVERAGE RECEIVER
Yaesu FRG-7700



List Price
$549.00

$459.00

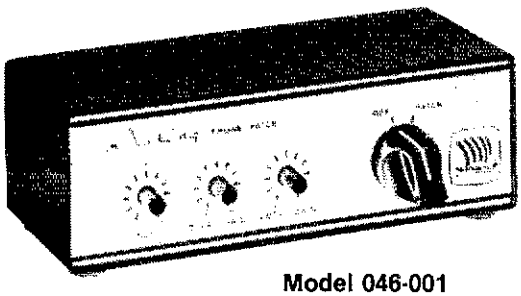
(Free shipment UPS
U.S.A. Continental 48 States)

* 150 Khz. to 29.999 Mhz.
* SSB, CW, AM and FM
* Digital Frequency Display
* Digital Clock/Timer
* NB, AGC and RF attenuator
* Wide Med. & Narrow AM Selectivity
* Optional 12 Memory Frequency Storage & Recall, MU-7700 - $129.00

Call toll-free 1-800-325-3636

HAM RADIO CENTER
8340-42 Olive Blvd. P.O. Box 28271 St. Louis, MO 63132

Call toll-free 1-800-325-3636



Model 046-001

NYE VIKING
Automatic Phone Patch
FCC approved!

Type acceptance registration under Part 68 of the FCC Regulations allows direct connection to telephone lines!*

The new Nye Viking Models 046-001 and 003 furnish hams with the very finest of interface connections with telephone lines* available! Each comes complete with 7' connector cord and quick connector plug and has new, telephone company approved circuitry to protect company equipment and telephone lines. This eliminates the need (and **cost**) of a telephone company-supplied coupling device.

The Nye Viking Model -001, without speaker, provides connection to your own external speaker. Model -003 has built-in speaker, and is designed for use with most transceiver installations.

Model 046-001 $51.50 **Model 046-003 $65.00**

*Phone Patches may not legally be connected to party, or pay phone, lines. Certification applies only to lines in U.S.A.

Available at leading dealers throughout the U.S.A. or Call 206-454-4524

WM. M. NYE COMPANY, INC.
1614 - 130th Avenue N.E., Bellevue, WA 98005

Save on Scanners! NEW Rebates!

Communications Electronics,™ the world's largest distributor of radio scanners, celebrates Father's Day early with big savings on *Bearcat* scanners. Electra Company, the manufacturers of *Bearcat* scanners is offering consumer rebates on their great line of scanners, when purchased between April 1 and May 15, 1981.

With a scanner, you can monitor the exciting two-way radio conversations of police and fire departments, intelligence agencies, mobile telephones, energy/oil exploration crews, and more. Some scanners can even monitor aircraft transmissions! You can actually hear the news *before* it's news. If you do not own a scanner yourself, now's the time to buy your scanner from **Communications Electronics**. Choose the scanner that's right for you, then call our *toll-free* number to place your order with your Visa or Master Charge.

We give you excellent service because CE distributes more scanners worldwide than *anyone* else. Our warehouse facilities are equipped to process thousands of scanner orders every week. We also export scanners to over 300 countries and military installations. Almost all items are **in stock** for **quick shipment**, so if you're a person who prefers fact to fantasy and who needs to know what's *really* happening around you, order your scanner today from CE!

NEW! Bearcat®† 350

The Ultimate Synthesized Scanner!

Allow 120-240 days for delivery after receipt of order due to the high demand for this product.

List price $599.95/**CE price $419.00**

4-Band, 50 Channel • Alpha-Numeric • No-crystal scanner • AM Aircraft and Public Service bands. • Priority Channel • AC/DC

Bands: 30-50, 118 136 AM, 144-174, 421-512 MHz.

The new *Bearcat* 350 introduces an incredible breakthrough in synthesized scanning: Alpha-Numeric Display. Push a button—and the Vacuum Fluorescent Display switches from "numeric" to word descriptions of what's being monitored. 50 channels in 5 banks. Plus, Auto & Manual Search, Search Direction, Limit & Count, Direct Channel Access, Selective Scan Delay, Dual Scan Speeds, Automatic Lockout, Automatic Squelch, Non-Volatile Memory. Reserve your *Bearcat* 350 today!

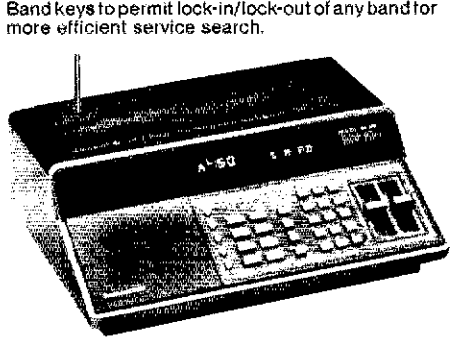
Bearcat® 300

List price $549.95/**CE price $349.00/$25.00 rebate**
Your final cost is a low $324.00

4-Band, 50 Channel • Service Search • No-crystal scanner • AM Aircraft and Public Service bands. • Priority Channel • AC/DC

Bands: 32-50, 118-136 AM, 144-174, 421-512 MHz.

The *Bearcat* 300 is the most advanced automatic scanning radio that has ever been offered to the public. The *Bearcat* 300 uses a bright green fluorescent digital display, so it's ideal for mobile applications. The *Bearcat* 300 now has these added features: Service Search, Display Intensity Control, Hold Search and Resume Search keys, Separate Band keys to permit lock-in/lock-out of any band for more efficient service search.



NEW! Bearcat® 350

FREE Bearcat® Rebate Offer

Get a coupon good for a $25 rebate when you purchase a *Bearcat* 300, 250, 220 or 210XL; $20 rebate on model 160; $10 rebate on model Four-Six Thin Scan and $5 rebate on the *Bearcat* 5. To get your rebate, mail this coupon with your original dated sales receipt and the *Bearcat* model number from the carton to Electra. You'll receive your rebate in four to six weeks. Offer valid only on purchases made betwen April 1, 1981 and May 15, 1981. All requests must be postmarked by May 30, 1981. Limit of one rebate per household. Coupon must accompany all rebate requests and may not be reproduced. Offer good only in the U.S.A. Void where taxed or prohibited by law. Resellers, companies, clubs and organizations-both profit and non-profit-are not eligible for rebates. Employees of Electra Company, their advertising agencies, distributors and retailers of *Bearcat* Scanners are also not eligible for rebates. Please be sure to send in the correct amount for your scanner. Pay the listed CE price in this ad. *Do not* deduct the rebate amount since your rebate will be sent directly to you from Electra. Orders received with insufficient payments will not be processed and will be returned.

Bearcat® 250

List price $429.95/**CE price $279.00/$25.00 rebate**
Your final cost is a low $254.00

50 Channels • Crystalless • Searches Stores • Recalls • Digital clock • AC/DC Priority Channel • 3-Band • Count Feature.

Frequency range 32-50, 146-174, 420-512 MHz.

The *Bearcat* 250 performs any scanning function you could possibly want. With push button ease you can program up to 50 channels for automatic monitoring. Push another button and search for new frequencies. There are no crystals to limit what you want to hear. A special search feature of the *Bearcat* 250 actually stores 64 frequencies and recalls them, one at a time, at your convenience.

Bearcat® 220

List price $449.95/**CE price $289.00/$25.00 rebate**
Your final cost is a low $264.00

Aircraft and public service monitor. *Frequency range 32-50, 118-136 AM, 144-174, 420-512 MHz.*

The *Bearcat* 220 is one scanner which can monitor all public service bands plus the exciting AM aircraft band channels. Up to twenty frequencies may be scanned at the same time.

Not only does this new scanner feature normal search operation, where frequency limits are set and the scanner searches between your programmed parameters, it also searches marine or aircraft frequencies by pressing a single button.

Bearcat® 210XL

List price $349.95/**CE price $229.00/$25.00 rebate**
Your final cost a low $204.00

18 Channels • 3 Bands • Crystalless • AC/DC

Frequency range: 32-50, 144-174, 421-512 MHz.

The *Bearcat* 210XL scanning radio is the second generation scanner that replaces the popular *Bearcat* 210 and 211. It has almost twice the scanning capacity of the *Bearcat* 210 with 18 channels plus dual scanning speeds and a bright green fluorescent display. Automatic search finds new frequencies. Features scan delay, single antenna, patented track tuning and more!

NEW! Bearcat® 160

List price $299.95/**CE price $189.00/$20.00 rebate**
Your final cost is a low $169.00

16 Channels • 3 Bands • AC only • Priority Dual Scan Speeds • Direct Channel Access

Frequency range: 32-50, 144-174, 440-512 MHz.

Would you believe...the *Bearcat* 160 is the least expensive *Bearcat* crystalless scanner.

This scanner presents a new dimension in scanning form and function. Look at the smooth keyboard. No buttons to punch. No knobs to turn. Instead, finger-tip pads provide control of *all* scanning operations, including On/Off, Volume and Squelch. Of course the *Bearcat* 160 incorporates other advanced *Bearcat* features such as Priority, Direct Channel Access, Dual Scan Speeds, Automatic Channel Lockout, Scan Delay and Auxiliary. All this performance in sleek, contemporary styling. And at a price so low, it astounds even us!

Bearcat® 5

List price $134.95/**CE price $94.00/$5.00 rebate**
Your final cost is a low $89.00

5 Crystal Channels • 3 Bands • AC only

Frequency range: 33-50, 146-174, 450-508 MHz.

The *Bearcat* 5 is a value-packed crystal scanner built for the scanning professional — at a price the first-time buyer can afford. Individual lockout switches.

Bearcat® Four-Six ThinScan™

List price $189.95/**CE price $124.00/$10.00 rebate**
Your final cost is a low $114.00

Frequency range: 33-47, 152-164, 450-508 MHz.

The incredible, *Bearcat* Four-Six Thin Scan™ is like having an information center in your pocket. This three band, 6 channel crystal controlled scanner has patented Track Tuning on UHF, Scan Delay and Channel Lockout. Measures 2¾ x 6¼ x 1" includes rubber ducky antenna. Order crystals for each channel. Made in Japan.

TEST ANY SCANNER

Test any scanner purchased from **Communications Electronics™** for 31 days before you decide to keep it. If for any reason you are not completely satisfied, return it in original condition with all parts in 31 days, for a prompt refund (less shipping/handling charges and rebate credits).

Fanon Slimline 6-HLU

List price $169.95/**CE price $109.00**

Low cost 6-channel, 3-band scanner!

The *Fanon* Slimline 6-HLU gives you six channels of crystal controlled excitement. Unique Automatic Peak Tuning Circuit adjusts the receiver front end for maximum sensitivity across the entire UHF band. Individual channel lockout switches. Frequency range 30-50, 146-175 and 450-512 MHz. Size 2¾ x6¼ x 1" Includes rubber ducky antenna. Order crystal certificates for each channel. Made in Japan.

Fanon Slimline 6-HL

List price $149.95/**CE price $99.00**

6-Channel performance at 4-channel cost!

Frequency range, 30-50, 146-175 MHz

If you *don't* need the UHF band, get this model and save money. Same high performance and features as the model HLU without the UHF band. Order crystal certificates for each channel. Made in Japan.

FANON SCANNER ACCESSORIES

SCMA-6 Mobile Adapter/Battery Charger..... $49.00
CHB-6 AC Adapter/Battery Charger..... $15.00
CAT-6 Carrying case for Fanon w/Belt Clip..... $15.00
AUC-3 Auto lighter adapter/Battery Charger..... $15.00

OTHER SCANNERS & ACCESSORIES

Regency®‡ M400 Scanner..... $259.00
Regency® M100 Scanner..... $199.00
Regency® R1040 Scanner..... $169.00
SP50 AC Adapter..... $9.00
SP51 Battery Charger..... $9.00
SP58 Carrying Case for *Bearcat* 4-6 ThinScan™..... $12.00
FB-E Frequency Directory for Eastern U.S.A..... $12.00
FB-W Frequency Directory for Western U.S.A..... $12.00
FFD Federal Frequency Directory for U.S.A..... $12.00
MK350 Mobile mounting kit for *Bearcat* 350..... $12.00
B-4 1.2 V AAA Ni-Cad's for ThinScan™ and Fanon..... $9.00
A-135cc Crystal certificate..... $3.00

Add $3.00 shipping for all accessories ordered at the same time.

INCREASED PERFORMANCE ANTENNAS

If you want the utmost in performance from your scanner, it is essential that you use an external antenna. We have six base and mobile antennas specifically designed for receiving all bands. Order **#A60** is a magnet mount mobile antenna. Order **#A61** is a gutter clip mobile antenna. Order **#A62** is a trunk-lip mobile antenna. Order **#A63** is a ¾ inch hole mount. Order **#A64** is a ⅜ inch snap-in mount, and **#A70** is an all band base station antenna. All antennas are $35.00 and $3.00 for UPS shipping in the continental United States.

BUY WITH CONFIDENCE

To ***get the fastest delivery from CE*** of any scanner, send or phone your order directly to our Scanner Distribution Center.™ Be sure to calculate your price using the CE prices in this ad. Michigan residents please add 4% sales tax. Written purchase orders are accepted from approved government agencies and most well rated firms at a 10% surcharge for net 10 billing. All sales are subject to availability. All sales on accessories are final. Prices, terms and specifications are subject to change without notice. *Out of stock* items will be placed on backorder automatically unless CE is instructed differently. Most products that we sell have a manufacturer's warranty. Free copies of warranties on these products are available prior to purchase by writing to CE. International orders are invited with a $20.00 surcharge for special handling in addition to shipping charges. All shipments are F.O.B. Ann Arbor, Michigan. No COD's please. Non-certified and foreign checks require bank clearance.

Mail orders to: **Communications Electronics,™** Box 1002, Ann Arbor, Michigan 48106 U.S.A. Add $7.00 per scanner or phone product for U.P.S. *ground* shipping and handling, or $14.00 for faster U.P.S. *air* shipping to some locations. If you have a Master Charge or Visa card, you may call anytime and place a credit card order. **Order toll free** in the U.S.A. Dial 800-521-4414. If you are outside the U.S. or in Michigan, dial 313-994-4444. **Dealer inquiries invited.** All order lines at **Communications Electronics™** are staffed 24 hours.

Scanner Distribution Center™ and CE logos are trademarks of Communications Electronics.™

†*Bearcat* is a federally registered trademark of Electra Company, a Division of Masco Corporation of Indiana.

‡*Regency* is a federally registered trademark of Regency Electronics Inc.

CODE OF ETHICS

VISA

master charge

COMMUNICATIONS ELECTRONICS™

854 Phoenix □ Box 1002 □ Ann Arbor, Michigan 48106 U.S.A.
Call TOLL-FREE (800) 521-4414 or outside U.S.A. (313) 994-4444

We're first with the best.℠

The 1981 Atlanta HamFestival
and
Georgia State ARRL Convention
June 20-21, 1981

Downtown Atlanta Marriott Hotel

- GIANT covered Fleamarket/Swapshop!
- More than 25 Forums/Meetings!
- FCC Exams!
- Parking for thousands of cars!
- 140 Major Exhibits!
- Special MICROPROCESSOR Section!
- Programs for Ladies & Children
- Activities Galore!

Registration: $4 per person IN ADVANCE, $6 at the door
Children FREE!
If you do not receive a Preregistration Packet by May 15th, write:

Atlanta Hamfestival 1981
P.O. Box 45183
Atlanta, GA 30320

Hotel Rates: $44 per day single OR double!
Write for Hotel Reservations to:
Marriott Hotel • Courtland at International Blvd. • Atlanta, GA 30303
or phone: Area 404/659-6500 and hurry, hurry, hurry!

THE BEST HAMFEST IN THE WORLD!

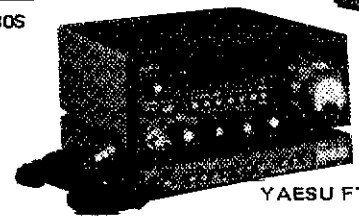
Radio World

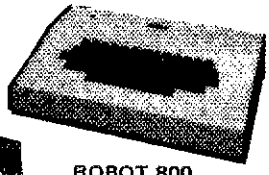
THE NORTHEAST'S LARGEST FULL LINE AMATEUR DEALER


AEA MM-1


KENWOOD TS830S


ICOM IC-720


YAESU FT707


ROBOT 800


DRAKE TR7-DR7


TEN-TEC 580

CALL TOLL FREE 1-800-448-9338

FEATURING: Kenwood, Yaesu, Icom, Drake, Ten-Tec, Cubic, Dentron, Alpha, Robot, AEA, Telrex, Astron, Avanti, Belden, CES, Daiwa, J.W. Miller, Panasonic, B&W, Mirage, Vibroplex, Bencher, Info-Tech, Universal Towers, Callbook, ARRL, Astatic, Shure, Tempo, VoCom, KLM, Hy-Gain, Larsen, Cushcraft, Hustler, Mini-Products, Bird, CDE, Rohn, Alliance, MFJ, Bearcat, Telex, Nye, Palomar Eng., Kantronics, Hayden, Ameco.

We provide factory authorized warranty service for most major lines of equipment, and after-warranty service on all other brands. Write or call for a quote. **You Won't Be Disappointed.**

We are just a few minutes off the NYS Thruway (I-90) Exit 32

VISA master charge

ONEIDA COUNTY AIRPORT TERMINAL BUILDING
ORISKANY, NEW YORK 13424
N.Y. Res. Call (315) 337-0203 or 736-0470

Warren - K2IXN
Bob - WA2MSH
Al - WA2MSI

month: WD8NYN, our STM. Born in Kansas. Got Novice in July, '77 in Mich. WB8YDZ was his Elmer. Checked into first TFC net just two months after getting first ticket. He was active on Mich. TFC net and 8RN. Moved to our section January, '79, and lives in Hendersonville. WD8NYN has earned BPL in NC. Net of the month: CNN. The Carolinas Novice Net has been the starting place for many active traffic handlers in North (and South) Carolina. Any licensee can checkin to CNN — 3715 kHz at 6:15 local time. The net is a credit to everyone involved. Please include local news items with your station activity reports, which should reach me by the 6th of next month. Hope to see many of you at the Durham FMA Hamfest. Traffic: (Feb.) WD8NYN 483, WD4CNO 273, WB4WII 268, AB4S 267, WD4CNR 255, N4AET 249, WA4UTC 215, AB4J 164, WA4SRD 158, WD4JJK 156, KU4W 156, W8PJS 140, AB4V 137, W4EAT 115, WB6OTS 101, K4VHT 96, K4DHX 90, K4NLK 86, W4WXZ 64, K4FTB 62, KF4R 59, KZ4A 58, WB4UJH 58, WA4OBR 52, W4FMN 49, W4RVE 48, K4IWW 46, KA4ODX 45, W4HKB 42, N4CJJ 34, WA4CUD 32, WD4ABZ 25, WB4MJH 20, KC4AM 19, WB4RGS 17, WB4TOP 17, K4XE 15, KA4RZJ 14, WD4AIF 10, WD4KPK 9, W4VTP 8, N4UE 6, W4EHF 4, WA4OJU 4, WA4IHG 4, WB4SLF 2. (Jan.) N4ARY 8.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — Asst. SCM: WB4UDK. SEC: WD4HLZ. STM: W4ANK. NMs: K4PFC W4ODE. Congrats to K4PFC, NM for SC SSBN. Won't you join in and help? Columbia Hamfest May 30. Greenville Hamfest May 2 & 3. Columbia amateurs assisted in Feb 14 marathon. North Augusta-Belvedere amateurs assisted in 10 mile road race. Gov. Riley signed proclamation for Sept. 28-Oct. 4 as Amateur Radio Week. Thanks to all who attended the signing. Check-in/traffic: SC SSBN 1462/182; Blue Ridge 2-Meter Net 1532/75; CN 589/403; SC Noontime Net 67/94; Lancaster County 2-Meter Net 180/15; Western Sc Emergency Net 101/5; Newberry County ARES Net 67/4; Carolina State Line Net 53/2; Laurnes County 2-Meter Net 42/0; CNN (Jan) 271/58 217/48; Trident ARC ARES Net 88/0; York County ARES Net (Jan.) 201/23; Dixie 6-Meter SSBN 10/0; SC 2-Meter SSBN 55/0; SC ARES Net 24/4. Traffic: (Feb.) K4ZN 153, W4ODE 136, W4NTO 106, W4ANK 100, K4ZB 97, WB4UDK 63, K4EAR 48, W4FMZ 44, WA4MIY 41, WD4PPM 40, W4MTK 36, K4FRX 33, KA4AUR 32, AF4E 26, WB8TCT 24, WD4PKZ 22, NG4F 20, WA4MCG 14, WA4VYS 8, WB4NBK 3, WB4OHF 2, W4DRF 2, K4AOH 1, N4ATO 1, KB4CO 1, WA4EDH 1, WD4HLZ 1, K4LQQ 1, KB4RA 1, KB4SU 1, W4TWW 1, W4UMW 1. (Jan.) K4ZB 54, WA4MIY 33.

VIRGINIA: SCM, Luck Hurder, WA4STO — SEC: N4AZI. STM: KY4K. Chief OO: W4HU. Chief OVS: N4CD. Chief OBS: K3RZR. Net stats.

Net	Time	QNI	NM	QTC
VSBN	6:00	660	KZ4K	435
VSN	6:30	669	WB4KSG	183
VN	7:10	671	W4SUS	333
VLN	10:15	561	WD4ALY	214
VNTN	Noon	284	WD4PTK	149
WARC	8:30 A.M. Sun.	43	K4JST	4

Not bad for a February! Valentine traffic accounted for 6 BPLs and 13 PSHRs. Kudos to K4KDJ for an outstanding job with the RTTY gear. Northern VA lost a great friend with the passing of WD4AEX — a super control op on the 19/79 machine. WA4CCK trying to get RTTY operational. K4JST enjoying liaison duties. K3RZR made first PSHR. KA4IUM enjoyed the YL/OM contest — but we suspect she had difficulties keeping Grl under the table! KI4W trying to find someone to climb tower and get her back on nets. STM KY4K pleading for ORS reports by the 5th. K4BAV and WA4JZR teaching Novices/Techs thru Alex recreation center. OES KM4X sez new repeater serving the Marion area. W4NO received SIXTY (!) year ARRL membership award. After a very productive tour of duty as SEC, N4AZI is leaving us for the Louisiana Section to be replaced by very capable KZ4K. This loss to our fine section is particularly sad since many of us have found not only a superb multi-mode op but a close friend in N4AZI. Our best to Paul as new SEC! KY4K KZ4K K4JST and WA4STO gearing up for VA QSO party. Your SCM would like for all to note how close the QNI figures are for the evening nets. Meaning? Most of the real public service ops in VA are digging in on both modes. Thanks folks, it shows. Congrats to new appointees K4MTX WD4APO WA3LVC K3RZR and KA4IUM. Warm weather's-a-comin! Start thinking about the section picnic and your new antennas! Traffic: (Feb.) K4KDJ 1191, WA4STO 857, W4JK 584, WA4CCK 576, W3ATQ 520, KZ4K 510, WB4PNY 342, W4SQQ 321, KY4K 230, K4KNP 203, WD4FTK 199, K4JST 179, K4JM 158, WB4FLT 141, W4SUS 118, WD4ALY 106, W3BBN 106, K3RZR 100, W4UO 99, W4NWM 95, KA3DTE 94, WB4KSG 93, N4AZI 81, W4YVG 74, WB4RWY 72, W3BBO 71, N4YQ 64, K4EJ 59, KB4WT 59, WB4FDT 57, KC4QL 50, N4NK 46, KB8TA 43, WB4KIT 35, WB4UHC 35, N4YE 35, K4MTX 32, WA4QWC 32, WA4YIU 32, KA4IUM 30, W4SVG 30, WA3LVC 27, WA1VRL 27, WD4RDF 27, N4BJX 24, WD4KOJ 24, K4VWK 24, W4CFV 22, KB4PW 21, W4LXB 19, WB4MAE 19, N4IF 17, W4KFC 17, W4NFA 17, KA4ETG 16, WB4ODZ 16, KA4ERP 15, KI4W 15, N4CIR 14, WB4ZNB 14, WB4ZTJ 14, K4DHB 11, WD4EUV 11, WB4DQZ 10, KB4OF 10, W4PVA 9, W4KXE 8, WA4RTS 8, KC4HN 6, WA4ONR 6, WA4FGJ 4, W4KX 4, N4LE 4, W4OKN 4, N3RC 3, W4YE 3, WA4EQW 2, W4JUJ 2, W4TZC 2, WB4FNW 1 (Jan.) WB4SGV 16, KB4PW 14, W4NLC 8, W4KFC 7.

WEST VIRGINIA: SCM, Karl Thompson, K8KT — SEC: K8QEW. STM: KD8G. NMs K8MHR W8FZP KD8G WD8LDY. Fayetteville Hamfest was a nice affair and was very well attended. Congrats to WA8YTM and H. F. Committee. KA8BFX, Bluefield, is now a Silent Key. N8AJC has been appt'd DEC for zone nine. First DEC in WV. New Novice in Oak Hill is KA8LXN. WD8KKV is now KB8ZF. WV Fone Net with 17 msgs, Midday Net, 53 msgs, WVN 55 msgs, Novice Net 17 msgs, Hillbilly Net 48 msgs, Blk. Dia. 2M 6 msgs, and KFC 2M 8 msgs. Traffic: KD8G 242, WD8DIN 51, KA8ETV 38, W8FZP 37, KBQEW 35, N8AJC 33, KB8XM 24, KA8FEU 17, WD8POG 16, KD8X 11, KA8BXX 8, WD8DHC 8, WB8OKY 8, WB8IJDY 8, K8ZPR 8, W8CAL 6, N8CFX 5, WB8ZMX 2.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Lawrence E. Steimel, WØACD — SEC: K3PUR. STM: WBØMCL. NM: NØAXQ WØHZB WØAIT KBØZ. There are many Public Service events at this time in Colorado, with the Denver Symphony Benefit Race March 1, Channel 9 Health Fare April 4 thru 12, March of Dimes Superwalk April 26, and Mile High Marathon May 3. Preparations are under way for Operation Red Cross Message Relay project in conjunction with the Red Cross Centennial Convention in May. The

GOTHAM ANTENNAS
(813) 584-8489

master charge VISA

SMALL LOT TRAP DIPOLES

78' Total Length, Complete with Balun, Wire, Insulators, Support Rope. Legal Limit.

MODEL	BANDS	LGTH	PRICE
TSL 8040	80,40	78'	$49.95
TSL 4020	40,20,15	40'	$47.95
T8040	Traps Only		$19.95
T4020	Traps Only		$19.95

SMALL LOT SHORTENED DIPOLES

Half-Size Dipoles Using Loading Coils. Complete with Balun, Wire, Insulators, Support Rope. Legal Limit.

SL-8010	80,40,20, 15,10	75'	$59.95
SL-160	160	130'	$36.95
SL-80	80	63'	$35.95
SL-40	40,15	33'	$34.95
S-160	Coil Only		$17.95
S-80	Coil Only		$17.95
S-40	Coil Only		$17.95

FULL SIZE PARALLEL DIPOLES

Full-Size, Single Feedline. Complete with Balun, Wire, Insulators, Support Rope. Legal Limit.

FPD-8010	80,40,20, 15,10	130'	$49.95
FPD-4010	40,20,15,10	63'	$44.95

NEW! PORTABLE VERTICAL! IDEAL FOR APARTMENTS, CAMPING, TRAILERS!

Folds to 5' Package. No Radials Required. Fully Assembled. Full Legal Limit. 1:1 VSWR

MODEL	BANDS	HGHT	PRICE
PV-8010	80-10	13'	$59.95

PROVEN DESIGN · GOTHAM ALL BAND VERTICALS

Effective Low Angle Radiation, Easy Assembly and Operation. No Guy Wires Required. Occupies Little Space. Can Be Installed at Ground Level. Rugged, Broad-Banded, Low Cost, Proven and Tested Design. Loading Coil Included. Absolutely Complete.

V-160	160,80,40,20, 15,10,6	23'	$39.95
V-80	80,40,20 15,10,6	23'	$37.95
V-40	40,20,15,10,6	23'	$35.95

FAMOUS GOTHAM QUADS

2 Element — 3 Bands Complete with Boom, Spreaders, Wire, Hardware
ONLY $119.95

CHAMPIONSHIP GOTHAM BEAMS

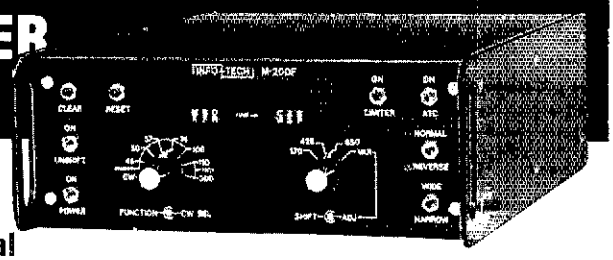
Full Size 2-3-4-5 Elements
2-20 Meters. $79.95 and Up.
WRITE FOR DETAILS.

CALL OR SEND LARGE SASE FOR CATALOG. SHIPPING:
Dipoles & Verticals — $2.50 USA
$7.00 Canada
$5.00 APO & FPO
Beams & Quads UPS Collect
Florida ADD 4% Sales Tax

P.O. BOX 776 • 422 W. Bay DR.
LARGO, FL 33540

The BEST in Code Converters

THE INFO-TECH M200-F TRI-MODE CONVERTER



Converts Morse & RTTY (Baudot & ASCII) to video, *and* serial Baudot or ASCII for hard copy

Morse Reception: 6-55 wpm standard (simple user adjustment for higher speeds). Automatic speed tracking & word space adjustment.

RTTY/ASCII Operation: Decodes RTTY (45, 50, 57, 74, 100 Baud) and ASCII (110 & 300 Baud), Auto CR/LF, automatic threshold control, selectable unshift on space, limiter is switch selectable, solid state tuning "meter". Demodulator has 3 fixed shifts and 1 tunable shift, user selectable printer outputs in ASCII or Baudot for **all** modes with crystal controlled baud rate generator. RS232, TTL & isolated loop outputs. User adjustable autostart.

Video Display Formats
(User Selectable)
16 lines x 32 characters, 16 lines x 72 characters,
25 lines x 32 characters, 25 lines x 72 characters
50 or 60 Hz operation. Cursor, on or off

Built-in 115/230v power supply

Price $595.00
FOB factory

We accept master charge VISA *Mastercharge, Visa*

or See These Dealers

Cohoon Amateur Supply
307 McLean Avenue
Hopkinsville, Kentucky 42240
(502) 886-4534

Colmay Products
14903 Beachview Ave.
White Rock, B.C. Canada V4B1N8
(604) 536-3058

Dialta Amateur Radio Supply
212 48th Street
Rapid City, South Dakota 57701
(605) 343-6127

Germantown Amateur Supply
3202 Summer Avenue
Memphis, Tennessee 38112
1-800-238-6168

Gilfer Associates, Inc.
52 Park Avenue
Park Ridge, New Jersey 07656
(201) 391-7887

Global Communications
806 Cocoa Isles Blvd
Cocoa Beach, Florida 32931
(305) 783-3624

Ham Radio Center
8342 Olive Blvd.
St. Louis, Missouri 63132
1-800-325-3636

Michigan Radio
38270 Mast
Mt. Clemens, Michigan 48045
(313) 469-4656

N & G Distributing
7285 NW 12th Street
Miami, Florida 33126
(305) 592-9685, 753-8170

Radio World
Terminal Building
Oneida County Airport
Oriskany, New York 13424
(315) 337-2622

Ray's Amateur Radio
1590 U.S. Highway 19 South
Clearwater, Florida 33516
(813) 535-1416

Universal Amateur Radio
1280 Ada Drive
Reynoldsburg, Ohio 43068
(614) 866-4267

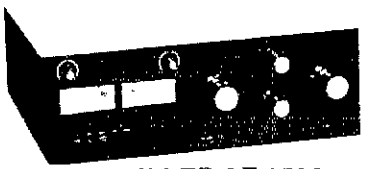
INFO-TECH ELECTRONIC EQUIPMENT

Manufactured by:
DIGITAL ELECTRONIC SYSTEMS, INC.
1633 Wisteria Court • Englewood, Florida 33533 • 813-474-9518

1 (704) 932-8585

Also Stocking: AZDEN, B & W, BENCHER, TRAC, HUSTLER, AVANT, BUTTERNUT, NYE, SAXTON, RF PRODUCTS, HI-Q, CALLBOOKS.

—— PRICES ALWAYS REASONABLE ——



J.W. MILLER AT-2500
2500 Watts PEP
3/30 MC Automatic Antenna Tuner

Piedmont Amateur Radio, Inc.

ROUTE #2 BOX 177 · OLD CONCORD – SALISBURY RD.

ROCKWELL, NORTH CAROLINA 28138

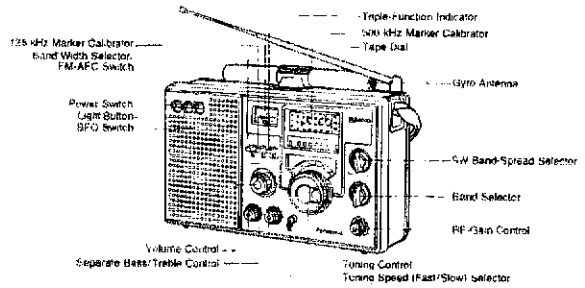
master charge VISA

COMMUNICATIONS CENTER

CALL TOLL FREE

1-800-228-4097

PANASONIC RF-2200

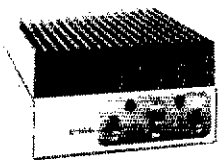


International Short-Wave Radio

Command Series 8-band worldwide shortwave radio. Operates on AC or battery power. Includes AM, FM, and 6 shortwave bands. Double superheterodyne receiver system. 6-step SW band selector. Calibrated linear frequency tape tuning dial. Two speed tuning. Standby reception. Combination 2-stage selectivity and AFC switch. BFO for SSB and CW. RF gain control. Triple function meter. Separate bass, treble, and volume controls. AM Gyro and FM/SW telescoping antennas. 4 Panasonic "D" size batteries, AC power cord, and earphone included.

NAV $209.95 **SALE $169.95**

MIRAGE B-108 Two Meter Amplifier



Features: 10W in—80W out or 2 Watts in 50 Watts output for Handie-Talkies. Built-in Receive Preamp, Adjustable Delay for SSB. Automatic Internal or External Relay Switching. Frequency Range 144 to 148 MHz. Works for SSB, CW or FM Modes. Receive Preamp Provides 10db Gain Min., 5 year Warranty (1 Year on Power Trans.).

*NAV $179.95 **OUR PRICE *159.95**

"Our Most Popular Scanner the JIL SX-100"

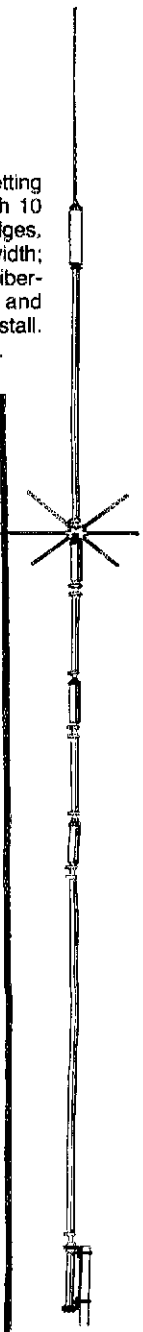
16 Channels. 30-54 MHz; 140-180 MHz; 410-514 MHz. Digital Clock. Date Display. 110 V. AC or 12-16 V. DC.
Seek Rate: Fast 10ch/sec
Slow 5ch/sec
Bright Green 9 Digit Frequency Display. Ext. Antenna Jack. Ext. Speaker Jack. Large Top Mounting Bracket. Scan Rate: Fast 8ch/sec. Slow 4ch/sec
Scan Delay Time Variable 0-4 sec.

*NAV $399.00 **UNBELIEVABLY PRICED AT A LOW $199.95**

HUSTLER 5-BTV

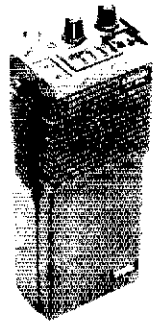
The finest on the market today. One trap setting provides total band coverage from 40 through 10 meters. SWR is 1.6 or better at the band edges. Top loaded at 80 meters for greater bandwidth; higher radiation frequency. Solid one-inch fiberglass trap forms give optimum electrical and mechanical stability. Easy to assemble and install. Features high strength aluminum construction.

CALL FOR DISCOUNT PRICE



OUR MOST POPULAR HANDIE-TALKIE IS ON SALE THIS MONTH!!

ICOM IC-2A

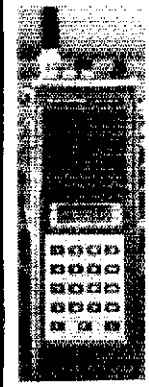


Features: 800 Channels, Output 1.5W or 0.15W, Separate Built-in Speaker and Mic. Comes with Rubber Duck Antenna, Battery, and Charger.

OPTIONAL ACCESSORIES
2A-TIN . . Optional T.T. Pad
BP-2 ...Long Life Battery Pack
BP-3 ....Nicad Battery
BP-4 ...Alkaline or Nicad Case
BP-5 ...2½ Watt Battery Pack
DC-1 . . . . . DC Power Supply
BP3 BC25U... Nicad Pack & Wall Charger
CP-1.... Cigarette Lighter Cord
HM-9 ..... Speaker Mic
FA-1.... ....Rubber Duck
BC-30... Drop-in Rapid Charger

CALL FOR DISCOUNT PRICES

KENWOOD TR-2400



The TR-2400 is the ideal hand held for 2 meter FM. It features a large LCD readout that can be read in direct sunlight or in the dark, 5-KHz step PLL synthesized operation, 10 channel memory, scanning, and 16 button autopatch DTMF encoder. Standard accessories included are: flexible rubber antenna, heavy-duty Nicad battery pack, AC charger, hand strap, earphone, and external microphone plug. Optional accessories available include: BH-1 hook, extra battery pack, LH-1 leather case, SMC-24 speaker / mic, BC-5 quick charger, and ST-1 base stand.

CALL FOR OUR NEW LOW PRICE

COMPUTERS: APPLE, ATARI, PET, & MORE. Call for Discount Prices.

Hy-Gain 205BA 5el. 20 mtr.....	$229.95	Bencher BY-1 Keyer	$39.95	CDE 3 Amp P/S.	$24.95
Mosley TA-36.....	$199.95	Bearcat 211 Scanner	$249.95	Atari 800 Computer.....	Call for Price
Wilson System One	$169.95	Alliance HD-73 Rotor	$109.95	Hy-Gain Antennas	Call for Lowest Prices
Hustler G-6-144B.....	$69.95	CDE 45 Rotor	$109.95	Ten-Tec.....	Call for Close Out Prices
Hustler G-7-144.....	$99.95	CDE Ham IV Rotor	$169.95	Apple Two Plus Computer	Call for Price
Avanti 2 mtr. "On the Glass Antenna"	$29.95	Dentron AT-3K	$229.95	Kenwood R-1000.....	Call for Price

PRICES SUBJECT TO CHANGE AND AVAILABILITY

YOUR ELECTRONICS CENTER

WE TRADE — WE EXPORT

*Nationally Advertised Value

1840 "O" Street Lincoln, Nebraska 68508
In Nebraska Call (402) 476-7331

master charge

VISA

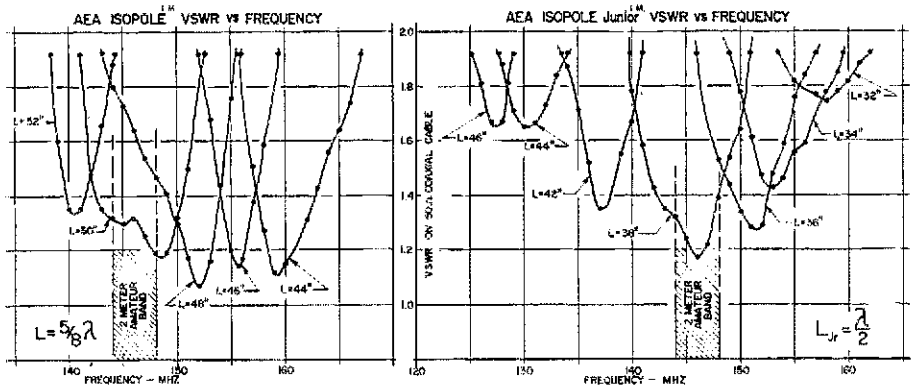
MORE PERFORMANCE FOR YOUR DOLLAR! COMPETITORS KNOW ABOUT THE ISOPOLE™

DO YOU? STUDY THE FACTS . . .

ISOPOLE 144
$49.95
ISOPOLE 220
$44.95
MAST NOT SUPPLIED

The IsoPole is building a strong reputation for quality in design and superior performance. The IsoPole's acceptance has already compelled another large antenna producer to make a major design modification to his most popular VHF Base Station antenna. Innovative IsoPole conical sleeve decouplers (pat. pend.) offer many **new** design advantages.

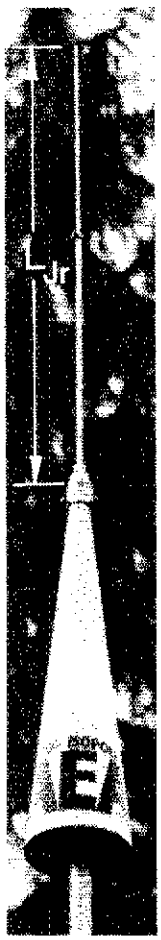
All IsoPole antennas yield the **maximum gain attainable** for their respective lengths and a zero degree angle of radiation. Exceptional decoupling results in simple tuning and a significant reduction in TVI potential. Cones offer greater efficiency over obsolete radials which radiate in the horizontal plane and present an unsightly bird's roost with an inevitable "fallout zone" below. The IsoPoles have the broadest frequency coverage of any comparable VHF base station antenna. This means no loss of power output from one end of the band to the other, when used with SWR protected solid state transceivers. **Typical SWR is 1.4 to 1 or better across the entire band!**



Outstanding mechanical design makes the IsoPole the only logical choice for a VHF base station antenna. A standard 50 Ohm SO-239 connector is recessed within the base sleeve (fully weather protected). With the IsoPole, you will not experience aggravating deviation in SWR with changes in weather. The impedance matching network is weather sealed and designed for maximum legal power. The insulating material offers superb strength and dielectric properties plus excellent long-term ultra-violet resistance. All mounting hardware is stainless steel. The decoupling cones and radiating elements are made of corrosion resistant aluminum alloys. The aerodynamic cones are the only appreciable wind load and are attached directly to the support (a standard TV mast which is **not supplied**)

Operating on MARS or CAP? The IsoPole and IsoPole Jr. antennas will typically operate at least ± 2 MHz outside the respective ham band without re-tuning. However, by simple length adjustment, the IsoPoles can be tuned over a wider range outside the ham bands.

Our competitors have reacted to the IsoPole, maybe you should too! Order your IsoPole or IsoPole Jr. today from your favorite Amateur Radio Distributor. For more information on other exciting AEA products, contact Advanced Electronic Applications, Inc., P.O. Box 2160, Lynnwood, WA 98036. Call 206/775-7373



ISOPOLE
144JR
ISOPOLE
220JR
$39.95
MAST NOT SUPPLIED

AEA Brings you the Breakthrough!

PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE OR OBLIGATION.

repeater groups that have machines in the high country are making plans for their summer work parties. There are some long range plans for at least two more 2-meter links between Eastern and Western Colorado. The Sunday morning ARES net on 29 624 MHz has been in operation since 1947, making it one of the oldest nets in Colorado. According to the logs of WØWYX there were times that over 100 station checked in. Give a look at 0900 local time on Sundays. NETS: HNN 28 sess, QNI 1750, QTC 134, Informals 317, QNF 1328. CWN 24 sess, QNI 275, QTC 322, QNF 1398. Colombine 24 sess, QNI 1002, QTC 67, Informals 145, QNF 792. CWN (Jan.) 30 sess, QNI 308, QTC 303, QNF 1213. Traffic: NØBQP 2280, WØWYX 1746, WAØHJZ 1205, WØEJD 310, KØDJ 301, KØØZ 200, NØBLU 193, WDØAIT 173, WØHXB 144, WØRE 141, WØNFW 39, WØGO 24, KØCNV 16, WBØUWE 15, WØGW 2.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NMs: WB5NNG KG5L. Southwest Net (SWN) meets daily on 7.083 kHz at 1930 local and handled 193 msgs with 242 stations in. New Mexico Roadrunner Net (NMRRN) meets daily on 3939 kHz at 1800 local and handled 138 msgs with 1115 stations in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 70 msgs with 780 checkins. Yucca 2-Mtr Net handled 24 with 558 checkins. Vy sorry to report the passing of W5SBT who was very instrumental in formation of the Socorro ARC. He will certainly be missed. Good to see W5FPB making a good comeback. WB5AZP, one of our best SAR men, moving to Table Rock Lake, MO. We will sure miss him! Traffic: W5DAD 316, N5NG 148, W5ENI 103, KG5L 88, KA5DDW 75, WA5MIY 52, KA5CNE 32.

UTAH: SCM, Royce Henningson, K7OEQ — W7BE reports that the Utah VHF Society Weather and Road Net had 1144 checkins during Feb. The Civil Air Patrol presented special awards to the following members of the Utah Electronic Location team for tracing the emergency locator transmitter (ELT) of a downed airplane. WB7FIC, Steve Baxter, WA7SHU, John Wagner, WB7VCI WA7ARK. A group of amateurs and interested non-amateurs met on March 5th in Price to form a new club — The Carbon Emery Amateur Radio Assn. Rick Ouzles was appointed secy. The officers will be elected next month. They are also putting up a repeater on Bruin Peak, it will be 147.66/06. The Beehive Utah Net certificate was earned by K7FY and K7VBO. Traffic: WA7MEL 42, WA7JRC 27, W7OCX 25, WB4NVO 16.

WYOMING: SCM, Chester C. Stanwaity, W7SDA — As this will be my last activities report, I would like to thank all of you for your help and cooperation during my tenure as SCM. I hope you will give your new SCM, WA7WFC, your cooperation also. The Cedar Mountain ARC has a new repeater ordered to replace the old 146.25/85 machine. The repeater to go on the Big Horn Mountains this spring and will operate on 146.07/67. WB7NHR reports the WCN held 20 sessions with 656 QNI and 22 QTC. WAØPFJ reports the Jackalope Net held 23 sessions with 566 QNI and 0 QTC. Traffic (Feb.) W7SQT 606, WA7GYQ 241, WB7NHR 185, WØOGH/7 110, K7TFW 67, K7SLM 6. (Jan.) WØOGH 66, KA7FK1 30.

SOUTHEASTERN DIVISION

ALABAMA: SCM, James M. Bonner, K4UMD — SEC: W4IBU. The Birmingham ARC will host the Southeastern Convention on May 16-17 at Jefferson Cty. Civic Center in Birmingham during their hamfest. The FCC will be there, all plan to attend. Come early for FCC exams. Mobile ARC will hold their annual hamfest on May 2-3 in Mobile AL. You don't want to miss this one either. Alabama held their Simulated Tornado Warning on March 5th, it was supposed to be a surprise, it came off at 10:15 A.M. local time. All c.d. offices in state and local agencies were involved. Hams throughout the state played a great roll in the exercise. The AENR had QNI 89 in 8 sessions, this is a six-meter net. AENX 2-mtr net had QNI 221 participating in our marathon run, 14 hams involved. AENB 3.575 cw net, QNI 215 in 28 sessions, QTC 108; this net meet daily 1900 local. AEND slow cw net, 165 QNI in 24 sessions, 98 messages. AENM reported by WA4PIZ, manager, QNI 2604 with 224 messages handled. W4CKS and WA4JDH continued to represent ALA into DRN5 96.4 percent. All ARC had some increase in membership. BARC new members for Feb. were W4DEU WD4FQN WA4UYW K4FCB WA4LXP KA4GRB KA4SWR KA4EWV WA8PWF N4CVW W4ROW. HARC and BARC are having fine turn out at their code & theory classes. WA4JDH, our STM, asked more stations to originate traffic. CAND reported W4CKS 100 percent into the net with 934 messages. Traffic: WA4JDH 1400, W4CKS 190, K4JIE 61, KC4MT 51, WD4DHI 43, W4IBU 35, K4UMD 28, K4GXS 20, WB4EKJ 19, WA4LXP 18, NE4L 16, WA4RMP 16, WA4JPK 15, WB4TVY 15, K4HJX 2.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — ASCM/SEC: K4VHC. ASEC: WA4PUP. STM: W4WXA. Chief OBS: W4BIA.

Net	Freq.	Time (all EDST)	Mgr.
GCN	3995	0700 Dy 0800 Sun	W4HON
GSN	3595	1900 & 2200 Dy	K4EV
GTN	7118	1815 MWF	WA4ZBR
GSSBN	3975	1930 Dy	WR4ZVX
ARES	3975	1700 Sun	N4BGH
GA TFC	7243	1200 Dy	W4GH
GERN (RTTY)	3620	2030 Fri	WA4ZHC

From reports received thus far, our Statewide Tornado Simulated drills were a real success. WA4GVJ & WB4DEB recovering well after having surgery. Condolences from all in the section to W4FCW on the loss of his beloved wife Georgia. WA4PNY & N4DHH in the Atlanta area conducting ground wave cw net on 21.150 most evenings at 9:30 local time. Convers Amateur Radio Group seeking ARRL members so they may become an ARRL affiliated club. WB4ULJ invites all to use his 145.19/144.59 machine located on Pine Mountain which has excellent coverage. Am pleased with the increase in monthly traffic reports. Section members please send me your traffic counts and any info that might be used in this column. The Sunday afternoon ARES net invites all to check in for administrative information. W4PJ in an exclusive article on "Old-time Amateur Radio" in the Daily Times-Georgian in Carrollton. When an article appears in your local newspaper on Amateur Radio please forward it to your SCM. The League is very much interested in these. Also when you hear of a Silent Key, please send me all information and if possible, the clipping out of the obituary column. Have a good summer. Traffic: WA3NAZ 225, W4PIM 115, W4ELO 97, W4GH 84, KA4ATM 81, K4AZM 80, K4EV 75, W4FIZ 62, WD4ADV 56, WB4NTW 48, WB4RUJ 47, WB4LBM 38, K4VHC 32, AA4EI 24, KA4PBD 20, K4JNL 14, K4BAI 11, W4HON 11, N4UZ 11, K4PIK 8, W4BIA 7, WA4PUP 1.

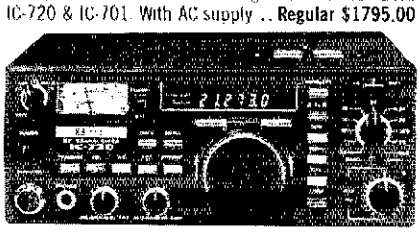
ICOM

You pay LESS at AES...just Call TOLL FREE 1-800-558-0411 - ask for our DISCOUNT DESK

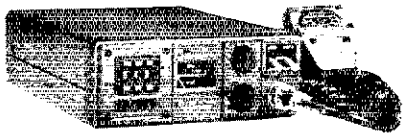
IC-720A Digital HF Transceiver. Transmits on all 9 HF Ham bands, receives .1-30 MHz. Synthesized & all Solid-State, including finals. Output variable 10 to 100w continuous, all bands. Six digit LED readout, dual built-in VFO's, AM, CW, SSB & RTTY filters, Passband tuning, RIT, VOX, semi break-in CW, noise blanker, speech processor & full metering. Has LDA-1 interface for AH-1 or IC-2KL. 13.5 VDC @ 20A max. 4½"h×9⅝"w×12½"d, 17 lbs. Hand microphone incl ..... **Regular $1349.00**

PS-15 Power supply	149.00
PS-20 Continuous duty power supply	179.95
Adapter cord for PS-20/IC-720A	25.00
FL-32 500Hz CW filter	59.50
FL-34 5.2 KHz AM filter	49.50
SP-3 External base station speaker	49.50
Phone Patch	139.00
AH1 5-band mobile antenna/tuner	289.00
LDA-1 Interface for 720/IC-2KL/AH1	27.50

IC-2KL 500W output, 160-15m (incl. WARC) Solid-State, automatic band switching linear for IC-720A, IC-720 & IC-701. With AC supply .. **Regular $1795.00**



IC-730 Compact HF Transceiver. 12V, all solid-state, 80-10m coverage including three new WARC bands, 200w PEP input. Fully synthesized for rock solid stability in mobile operation (1 KHz, 100 Hz, 10 Hz frequency steps). Dual VFOs built-in, eight frequency memory storage (one frequency per band), automatic final protection, IF shift with passband tuning optional. Up/down tuning w/optional mic. 3¾"h×9½"w× 10¼"d, 10 lb. w/HM-7 mobile microphone .. **Regular $829.00**



IC-22U 800 channel synthesized successor to the IC-22S. Same case & styling but frequency selection by a pushbutton & thumbwheels. Output 10 or 1W. HM-7 microphone w/clip, mobile mount, DC cord & plugs. 2¼"w× 5½"w×8¾"d, 4½ lbs..... **Regular $329.00**

IC-251A Microprocessor controlled 2 meter All-mode Transceiver for 143.8-148.1999 Mhz. 7 digit display. 10W output SSB/CW, variable 1 to 10W, FM. 3 memories, memory scan & programmable band scan. 600 KHz offsets, variable splits with two built-in VFO's, 13.8vdc or 117vac, w/amplified hand mic, 4½"h×9¾"w ×10½"d, 11 lbs ..... **Regular $749.00**

IC-451A UHF All Mode Base Station Transceiver for OSCAR mode B or J & simplex on SSB or FM. Available in 2 versions, 430-440 or 440-450 MHz. Features similar to the IC-251A 2m base station..... **Regular $899.00**

IC-551 All mode, microprocessor cont. 6m transceiver for 50-53.999 MHz. 6 digit display, output variable 1-10w. 3 memory channels w/variable speed scanning and 2 VFO's, noise blanker. 13.8vdc & 117vac 4½"h× 9½"w×10½"d, 14 lb. Like IC-251A... **Regular $479.00**

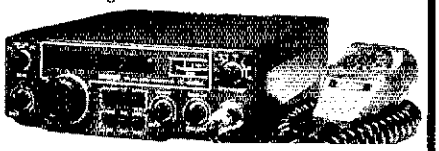
EX-107 VOX unit	55.00
EX-108 Passband tuning & RF processor	105.00
EX-106 FM adaptor for 551/551D	125.00

IMPORTANT!

The prices shown in this ad are suggested by the Manufacturer. On most MAJOR items we can save you money with a Big Discount. Call now TOLL FREE and ask for our DISCOUNT DESK.

IC-551D same as 551 but output variable 1 to 80W and EX-107 & EX-108 built-in. Requires 13.8vdc @ 18A or matching PS-20 AC supply ..... **Regular $699.00**

PS-20 20A AC power supply	229.00
CF-1 Cooling fan for PS-20	45.00



IC-260A Microprocessor controlled 2 meter SSB, FM & CW Mobile Transceiver. 7 digit LED readout. 1 or 10W output SSB/CW; variable 1 to 10W, FM. 3 memories, memory scan & programmable band scan. 600 KHz offsets plus variable split with 2 built-in VFO's. 13.8 VDC @ 3.5A. Hand mic & mobile mt..... **Regular $499.00**

IC-560 6m All Mode Mobile Transceiver. Features are similar to the IC-260A 2m mobile .. **Regular $489.00**

IC-255A Microprocessor cont. 2 meter FM Transceiver for 143.8-148.195 Mhz. 25 or 1w output. 5 memory channels w/scan, adjustable rate & auto stop. 600 Khz offsets, 2 built-in VFO's. 13.8vdc @ 5.5A 7⅛w"×2¼"h ×9½"d. 5½ lbs. w/HM-8 TTP mic.... **Regular $399.00**

SAVE $20

IC-2A Synthesized 2m FM Hand Held. 800 channels in 5KHz steps 144.00 to 147.995; 600KHz offsets. Thumb wheels & +5 khz upshift. With 250ma pack output is 15w LOW or 1.5w HIGH. Optional packs for larger capacity or higher power. With 250ma nicad pack, wall chgr, flex ant, belt clip, strap, earphone and plugs **IC-2AT** has built-in T/T pad. Only 6.6"h×2.6"w×1.4"d, 1 lb.

	Regular	SPECIAL
IC-2A 2m HT w/nicad & wall chgr	$239.50	**$219.50**
IC-2AT HT w/TTP, nicad & chgr	$269.50	**$249.50**
BC-30 Drop-in charger for BP-2,3 & 5		69.00
BP-2* 450 ma, 7.2v nicad pk, 1W output		39.50
BP-3 Extra 250 ma nicad pk, 1.5W output		29.50
BP-4 Alkaline battery case		12.50
BP-5* 450 ma, 10.8v nicad pk, 2.3W output		49.50
CP-1 Cig lighter plug & cord (BP-3)		9.50
DC-1 DC operation module		17.50
HM-9 Speaker/microphone		34.50
LC-2A Leather case for IC-2A		34.95
LC-2AT Leather case for IC-2AT		34.95
2A-TTN TT pad		39.50

*BC-5 required to charge BP-2 & BP-5

IC-ML1 2m mobile amplifier 2.3W input, 10W output (with IC-2A-2AT use BP-5 pack) **$89.00**

IC-202S 2 meter portable SSB Transceiver. 3W PEP output. Uses regular "C" cells, optional Nicad pack & charger or IC-3PS AC supply/speaker. With hand mic, whip antenna and strap..... **Regular $279.00**

IC-20L 2m amplifier, 10w SSB/FM	98.00

IC-402 432 Mhz portable SSB Transceiver. Features same as IC-202S above ..... **Regular $389.00**

IC-30L 432 Mhz amp., 10w SSB/FM	105.00

IC-502A 3W SSB 6m portable, as above.... **$239.00**

BC-10 Memory back-up for 720/551D	TBA
BC-15 Nicads & AC chgr for portables	57.50
BC-20 Nicads & DC-DC charger for ports	57.50
WC-215 Wall charger for BC-20	11.95
IC-3PE 3A power supply/speaker	95.00
IC-3PS AC supply/spkr for portables	95.00
FA-1 2m flexible antenna	9.50
HM-3 Deluxe mobile microphone	17.50
HM-5 Noise canceling microphone	34.50
HM-7 Amplified mobile microphone	29.00
HM-8 Touch-tone mic. for 255A/260A	49.50
HM-10 Scanning mic. for 255A/260A	39.50
SM-2 Electret desk microphone	39.00
SM-5 Electret mic - 251A/255A/260A	39.00
HP-1 Headphones	34.50

master charge THE INTERBANK CARD

VISA®

AES STORE HOURS: Mon, Tue, Wed & Fri 9-5:30; Thurs 9-8 (Vegas 9-6); Sat 9-3

Call 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

WICKLIFFE, Ohio 44092
28940 Euclid Avenue
Phone (216) 585-7388
Ohio Wats 1-800-362-0290
Outside Ohio 1-800-321-3594

ORLANDO Florida 32803
621 Commonwealth Ave.
Phone (305) 894-3238
Fla. Wats 1-800-432-9424
Outside Fla. 1-800-327-1917

LAS VEGAS, Nevada 89106
1072 N. Rancho Drive
Phone (702) 647-3114
Pete, WA8PZA & Squeak, AD7K
Outside Nev. 1-800-634-6227

ASSOCIATE STORE

ERICKSON COMMUNICATIONS
CHICAGO, Illinois 60630
5456 N. Milwaukee Avenue
Phone (312) 631-5181
Outside ILL. 1-800-621-5802

Amateur Radio Supply of Nashville, Inc.

Sure, we take trades on new equipment! Call or write.

615 South Gallatin Road – Madison, TN 37115

CALL A.R.S.O.N. NOW!

615 868-4956

for the Best DEALS

NEW! STORE HOURS
Monday–Friday, 9am–5pm
NOW! Open SATURDAYS
9am – 4pm

We DO NOT print a catalog.
We carry all major lines.
Use this Magazine as your Catalog.
Call or write for price quotes.

USED EQUIPMENT – We have a good stock of late model used equipment. Sorry, no oldies. No lists since stock changes weekly. Call or write your needs.

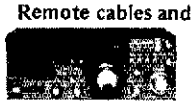
YAESU

NEW! FT-902 DM
Competition-Grade HF Transceiver
An improved version of the favorite 901.

NEW! FT107
Now in Stock! Also Accessory Items!
ALL SOLID STATE

NOW IN STOCK!
FT101ZD
Digital 160M–10M
Deluxe Features
Check the others– then get our price!

FT-720RV/720RU
Synthesized
2m or 70cm models in stock!
Remote cables and switch box available!



SWL's – NEW!
FRG 7700 Deluxe RECEIVER

NEW! FT 707 Wayfarer

NEW! YAESU FT207R Synthesized Handi-Talkie.
Special price break! Call or Write!

NEW! FT 480 – All mode, 2 meter rig.
Fixed or mobile!
NEW! FT404R, 3W, 450 Mhz. Handi Talkie!
FT127 220 Mhz. 10w Xtal.
QTR 24 – QTR 24D CLOCKS!
We stock the complete YAESU line!

ROBOT

Call or write now for prices!

SSTV – ROBOT
Put yourself in the picture
Get in on the latest in Ham Radio!

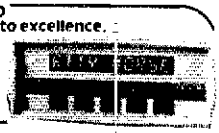
NEW! MODEL 800 SSTV/ RTTY, MORSE, ASCII KEYBOARD.

AMDEK – Video Monitors – SAVE!!!

Kantronics

A commitment to excellence.

Now Stocking!
Field Day Reader II & Mini Reader



– We now stock the following! –
Astron Power Supplies
Valor – 2 meter mobile & fixed antennas.

Prices quoted good until May 30, 1981 & supplies limited to manufacturers availability.

hy-gain Beams & Verticals always in stock!

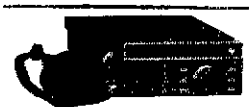
KENWOOD

NEW!

TS830S
New Bands!
New Features!
Call or write for price and specs!

TS520SE
World's best selling Transceiver!
Call for price!!!

TR8400 450 Mhz.
10 watt Synthesized



TR 7800
2m-25w, FM. Mobile

NEW! TS130S
Mobile or fixed. 80-10 includes new bands!
Plus accessories!

NEW! TR-9000
All mode– 2 meter!

TR 2400 - 2M HANDI TALKIE!

R-1000 NEW!
Deluxe Communications Receiver

Full coverage to 30 MHz. DIGITAL READOUT. Also available HS-5 Deluxe Headphones & matching speaker SP-100.

NEW!
Mobile Speaker SP-40 – Dip Meter DM-81
SMC 24 Spkr/Mic –
Station Clock HC10 – Phone Patch PC 1

We stock the full KENWOOD line and provide warranty and after-warranty service.
BUY WITH CONFIDENCE!

ALLIANCE

SPECIAL OFFER!!
Rotor Special
ALLIANCE HD-73

$115 including Shipping in U.S.A.
HD-73 with 100 feet rotor cable $135
HD73 with 100 feet rotor cable and 100 feet RG8U $170
Cashiers check or M.O. please

cushcraft

The Antenna Company

NEW! A3, A4, R3 IN STOCK NOW!
STOCKING FULL LINE OF CUSHCRAFT!

DenTron

GLA 1000B – Clipperton L
MLA 2500B Antennas and Antenna Tuners–

SANTEC

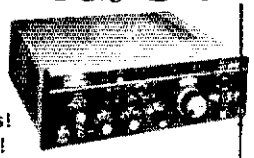
We Have The Santec HT-1200!
Now in stock!

B&W

ANTENNA SWITCHES in stock!
NEW! B&W Folded Dipole in stock!

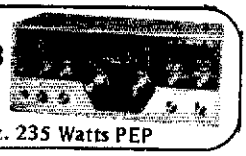
DRAKE

Spring Special!
TR/DR-7
Now in stock!
Full 7 line of accessories!
Limited Quantity!
Call or write for Super Savings Price!



CUBIC

NEW! Astro 103
Dual PTO's
SYNTHESIZED
1.8–30 Mhz. 235 Watts PEP



TEN-TEC

NEW! Model 580 DELTA

NEW! OMNI D-Series "C"
NEW! ARGONAUT 515
All Solid State!
TenTec 1 KW Hercules AMP.

ICOM

New Bands! PLUS General coverage receive!
100 or 10Hz Tuning!
Synthesized! **IC720A**

NEW!
- KW AMP for 720 or 701.
- IC451 UHF Base Station.
- Icom Phone Patch!
- Icom AH-1 Automatic HF Mobile Antenna.

Also . . . IC2AT – 251A – 255A

NEW! Icom IC-730
Compact HF Mobile rig!

MFJ ENTERPRISES, INC.

Tuners – Filters – Clocks – Dummy Loads Keyers, etc. We got 'em!!!

DATONG

We have in stock the amazing Datong FL-1 active audio filter. Also now have the ASP Automatic speech processor . . . Fantastic additions to your station. Call or write for information and prices. **NEW! Datong FL2 Audio Filter!**

MIRAGE

MP1 HF & MP2 VHF
SWR MTR. – B108 2M AMP. & B1016
160 WATT, 2M AMP. In Stock, call or write!
NEW! . . . B23 2-25, 2M Amp!

DAIWA J.W. Miller

Automatic Antenna Tuners!
Call or write for SUPER LOW prices!

avanti antennas

2-Meter Mobile thru- glass Antennas.
NEW! 10 meter lovers! We have the new Avanti 10 meter Switchable Polarity Beam.
Call or write!

Amateur Radio Supply of Nashville, Inc.

NORTHERN FLORIDA: SCM, Billy Williams, N4UF — WA4ZOY & KB4SR received Public Service commendations for emergency during Daytona 500. WA4SNH now NI4D. DBARA held annual banquet with nice turnout. LMARS has several nets on WD4BMN/R including computer, cw practice, ARES, RTTY & traders nets. KB4LY now editor of *Keyed Up*, LMARS bulletin. WB4YPS now signs KC4VK and KA4DYU is N4EEB. N4EDH is ex-WA4CRI. New club officers: Pensacola FM Assn — WA4OJY, pres.; WB4QML, v.p.; WA4TLM, secy./treas.; KB4RG WB4MUS WB4DHL, dirs.; K4MV, trustee. Orange Park ARC — KL7IWS, pres.; KA4KLQ, v.p.; KA4SXJ, secy.; WD4NXY, treas.; WD4KKX WA4UKJ KA1BNQ, dirs. Meanwhile HCARA elected K4ZC, pres.; WA4OEM, v.p.; WD4MLQ, secy.; WD4JXH, treas.; K4CVO WB4EXA WA1ASN K1BUM, comm. chmn. HCARA provided comm. for Run in the Sun. KA4FYD now N4EVH. WB4EXA has new tower. KA4TGI is newly license YF of KO4Z. GARS received *Skip* trophy for top '80 FD score at Miami Hamboree and NOFARS took top club honors for FL QSO Party. N4CMP developing call-up system for Alachua Co. ARES. TARS has club antenna equipment for use by members in constructing towers and skyhooks. WD4NIX has new emergency plan for Seminole Co. Lake ARA had nice banquet at Silver Creek Co. Club. KC4QY and a dozen other area hams finishing work on emergency repeater system mounted on trailer for portable use. KB4RG is FFARA Ham of the Year in Pensacola. W4JV & W4KJE back from VK & ZL-land. The 2 large Jax area clubs, NOFARS & RANGE, are each shooting for 300 members in 1981. New secy. for NOFARS is WD4RPB. All clubs urged to send bulletins or items of interest to me for publication. If your area is not represented, it is because of lack of input. Traffic: WD4HIF 1036, WD4IIO 712, N4EDH 537, WB4EXA 532, N4PL 514, W4SIZ 427, N4EC 266, W4KIX 148, WA4EYU 144, AA4FG 111, W4MGO 84, KF4U 81, N4BZH 80, N4AXN 57, W4JL 54, N4UF 52, WB4TZR 49, WD4DIU 44, W4BSP 43, KA4ASJ 39, WA4STZ 22, W3IDO 20, WB4DTS 19, WA4NMH 19, WA2GIN 17, N4BOY 14, WB4QBB 12, KB4T 11, K4RNS 9, WB8USE 8.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SGL — Asst SCM: W4KGJ. SEC: AA4WJ. STM: K4TH. February traffic, swelled by Florida State Fair at Tampa, showed a section total of 21,570 — very near our all-time record of about 22,000. WD4APM, Pres. of TARC, reporting for W4DUG, expresses thanks to W3CUL WA4JDH W4SIZ W4NFK WD4HIF WB4FVV WA4CRI and Florida NTS nets for helping them move out their 3715 originations. Congrats gang! Aside from W4DUG, with their 14 operators, W3CUL handled the most traffic, as usual, with her 6029 total. W3VR reports his brand new Hercules amplifier is still back at the Ten-Tec factory. Apparently there was some basic incompatibility between this and his brand new latest model Omni. W1NJM, wintering in Florida, reports he is going "back home" after Orlando Hamcation, March 14-15. W4SHJ, 4RN Cycle 4 Manager has been spending quite a bit of time at his Florida residence in Wesley Chapel. W4IYT reports his ARPSC Planning Committee "getting things done." Thanks to Andy's pioneering agreement with Coast Guard 7th District last year, W4GPL, E.C. Pinellas County, reports progress on agreement with Coast Guard St. Petersburg for Amateur Radio to help with emergencies. A big area of concern is possible phone line failure of remote coastal stations operated from St. Pete. W4GPL and Pinellas ARES also working with Eckerd College Search and Rescue Team where Amateur Radio will help when needed in their emergency operations. WB4AID reported FMTN operated "split frequency" several times to handle influx of Florida State Fair traffic. This is essentially the same as operating two nets simultaneously, with two Net Control Stations, each specializing in certain categories of traffic depending on the needs of the moment. Al has expressed concern over D4RN and DEAN operating on cw on weekends. FMTN and TPTN, our main liaisons to D4RN, are phone nets, as is D4RN on 5 days per week. It seems a little ridiculous to go into a different mode of operation on weekends and takes a lot of effort to find ample liaison stations willing to go this way. RN5D, staying on phone 7 days per week, does not present this problem. This is the season for lots of public service events, boat races, walkathons, golf exhibitions, parades, etc. I get bits of information that these are going on but seldom any definite information I can write about. Please report these events so these activities can get on the record. I would be pleased to get more activity reports, both traffic reports and other things you are doing with Amateur Radio. Traffic: (Feb.) W4DUG 7558, W3CUL 6029, W3VR 1074, WB4FVV 677, W4NFK 601, K4SCL 562, K4TH 547, WD4AWN 462, WA4PFK 424, K4EUK 384, K4ZK 369, WD4COL 324, WA4EIC 245, NC4H 214, KA4LNA 203, WB4WYG 194, WB4AID 155, W4GPL 154, W4DVO 142, W4IRA 126, W3QQ 117, WB4PIB 109, W4LX 103, KA4ASZ 89, W3TLV 87, WB4SNX 70, N4KB 62, W4ESH 57, WA4HXU 54, VE3BSY 50, WA4FKE 46, WB4GCK 43, W1NJM 39, KA4FZI 38, KB4OW 35, W4IYT 28, AA4WJ 20, W4SMK 18, KA4BBA 14, WD4APM 12, W4WYR 10, WD4LWT 8, W4UIO 7, WB4GSV 6, W4JM 2, WD4KPG 2. (Jan.) KM4G 110, KA4FZI 38, W4MML 6.

WEST INDIES: SCM, Julio Negroni, KP4CV — A new phone traffic net started operations in February, WINO (West Indies Net Oeste). WINO convenes every day on 146.22/88 MHz at 2130Z. KP4DJ retransmits W1AW Bulletins every day on 3710 kHz just before the start of Wins at 2200 Z. KP4U busy organizing message centers at Plaza Las Americas for Radio Amateur Week celebrations the week before the PRARC-West Indies Section Convention. PSHR: NP4D 72. Traffic: NP4D 166, KP4DJ 84, KP4U 82, KP4FBT 72, KP4EMY 53, WP4AWF 21, WP4AOK 4.

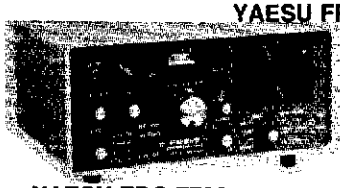
SOUTHWESTERN DIVISION

ARIZONA: SCM, W. L. Haskell, AC7D — SFC: N7EH. STM: W7EP. Congrats to N7EH on his recent election to the post of AZ SCM. Eric, will officially assume this position on April 1. I would like to request that all RC's and ARRL members provide him with Amateur Radio activity in your individual areas. In this respect you will receive recognition in the AZ activity reports. So keep him posted! New Novice in Tuc: KA7JJW. WA4DOU, an active member of CCRC, (for those that don't know is now located in N.C.) still chasing DX! The new Mount Ord rptr is solar powered. A group of ARA members have been working on this for over a year and a half. KA7DSY has been in on the design, research and experimental work. Much of the solar pwr system underwent testing at the OTH of WA7ZCZ. This system has avoided the high cost of installing an ac pwr line to the mountain site during the first few months in service. (The system charges batteries and the latter provides pwr to the rptr). Further in-

COMMUNICATIONS CENTER

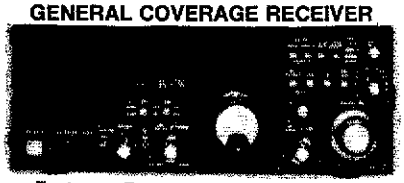
CALL TOLL FREE 1-800-228-4097

YAESU FRG-7 GENERAL COVERAGE RECEIVER
OUR BEST VALUE RECEIVER



Features: 0.5 to 29.9 MHz Coverage, LSB-USB-CW-AM-AM (ANL) Modes, Three Position RF Attenuator, Automatic Noise Suppression Circuit, Three Position Tone Selector. **UNDER $300.00**
CALL FOR OUR DISCOUNT PRICE!

YAESU FRG-7700
GENERAL COVERAGE RECEIVER



Features: Frequency Range of 0.15 to 29.999 MHz, All Mode Capability USB-LSB-CW-AM-FM, Digital Frequency/Time Display, LSI Clock Timer, Selectable AGC, RF Attenuator, Calibrated S Meter, Recording Output Jack, Audio Filtering, Noise Blanker, FM Squelch Control, Dim Switch, Optional 12 Memory Channel Circuit Available. ***NAV $549.95**
CALL FOR OUR DISCOUNT PRICE!

YAESU FT-207R
SYNTHESIZED
HANDIE TALKIE
Comes Complete With Rubber Duck Antenna

Features: Full 144-148 MHz Range, 3 Watts Output, 4 Memories Plus Programmable Offset, Priority Channel, Keyboard, 5 Digit LED Readout, Condensor Mic, Clear/Busy Auto Scan Selector, Remote Speaker/Mic Input, Keyboard Lockout, Display on Left Switch, Memory and Band Auto Scan.
CALL FOR DISCOUNT PRICE!

FT-101ZD
HIGH PERFORMANCE
HF TRANSCEIVER

Features: All Nine H.F. Bands 160-10 M., Built-in AC Supply, Noise Blanker, Variable IF Bandwidth Using 2 Eight Pole Filters, 6146B Final Tubes. True Frequency Counter, Fully Adjustable VOX, Semi-break-in CW with Sidetone, RF Speech Processor, Analog Plus Digital Display, DC Power Supply and CW Filter Optional.
CALL NOW FOR THE NEW LOWER PRICE! ***NAV $889.00**

PRICES SUBJECT TO CHANGE AND AVAILABILITY

WE EXPORT

*Nationally Advertised Value

YOUR ELECTRONICS CENTER

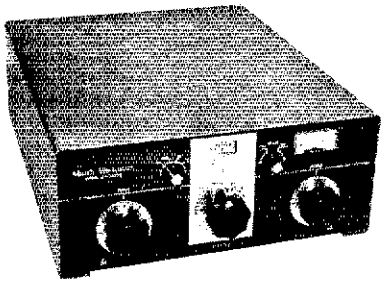
1840 "O" Street Lincoln, Nebraska 68508
In Nebraska Call (402) 476-7331

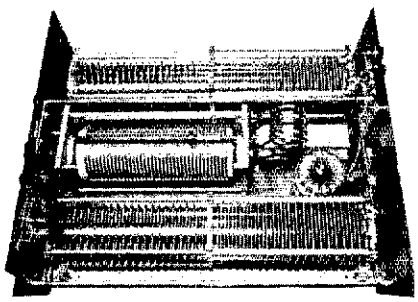
VISA

master charge

Murch - The Leader in Transmatch Products Presents

The Ultimate Transmatch - Model UT-2000B





Specifications

- *Continuous tuning 10-160 meters
- *Front panel function switch -in and out - dummy load (not supplied) - ground
- *Handles any antenna system, dipoles, random wires, verticals, whips, beams, open wire line
- *Built in heavy duty 4 to 1 balun, 3 cores
- *Ceramic rotary inductor, #8 gauge wire
- *Turns counter for precise tuning
- *4000 volt capacitors
- *Built in line sampler- no external bridge needed
- *Full legal power on all bands
- *Provides an SWR of 1 to 1 to the transmitter
- *Gray cabinet, dark gray panel
- *12"w x 15½"d x 5"h
- *Shipping weight: 13 lbs
- *Price: **$248.50** & shipping

Also Available

UT2000A - 10-80 meters - $159.95 & shipping
UT2000A-LS - 10-80 meters - $188.00 & ship.
68A Multiband Antenna 10-80M $54.50 P.P.

Order direct or
dealers please order from
Barry Electronics Corp.
512 Broadway, New York, N.Y. 10012

Order direct or
dealers please order from
Barry Electronics Corp.
512 Broadway, New York, N.Y. 10012

master charge VISA

MURCH ELECTRONICS, INC.

P.O. BOX 69
FRANKLIN, MAINE 04634
207-565-3312

SEND FOR
NEW LITERATURE

fo to be passed on as progress continues! W7KOY, Phnx., praised by Dr. Norman Vincent Peale in a taped radio broadcast over KCPS-FM in Flagstaff on Tues. Feb 3rd for the many community services performed by Gert. Keep up the gud wrk Gert! A-10, QNI 959, QTC 144; SWN, QNI 242, QTC 193. Traffic: KB7HA 86, W7EP 78, AF5Z 63, K7UXB 52, WA7KQE 51, K6KVB 45, K7NTG 44, W7LVB 40, K7JKM 32, K7MC 31, KA5DDW 21, K7NMQ 11, AC7D 8, WB7QOM 7, W7LBW 5, N7EH 4, WA7WEB 4, WA7NXL 3, W7DQS 1.

LOS ANGELES: SCM, Stanley S. Broki, N2YQ — ASCM: N6UK. STM: W6INH. SEC: WB6FAK. N6OU couldn't operate during the DX contest due to high winds taking out his 10-meter beam and 18HT Hytower and part of the roof of his home. I hope March is better for you. Club bulletins were received this month from K6AA United Radio Amateurs San Pedro; Romona Radio Club in San Gabriel; So Cal. ATV Club; W6QFK San Gabrial Valley RC; W6VPZ Northrop RC; W6KA Pasadena ARC; Western ARA; W6TRW TRW Systems ARC; W6SD San Fernando ARC; W6VIO JPL ARC. Some of the clubs are already planning for Field Day. Mostly the clubs are getting ready for an active new year, nothing yet to report. This month is short due to no inputs. You cannot write a column if no one sends you the data. Three OOs reported this month: K6CL with 3; W6TOG with 35; and K6KA with 60. K6KA earned a free set of call books by being one of the top OOs in the country. Congrats and keep up the good work. W6NKE reports that he is an A-1 Op and has been listening to the nets for possible nominee's. So traffic handlers beware, someday you may receive a certificate for your good works, someone is listening. Traffic: W6INH 157, K6OVA 99, K6INK 88, K5DY 95, KB6FC 63, WB6YID 60, N6PZ 41, KT6D 39, K6CL 38, WA6OCM 29, W6NKE 15, KA6ALH 8, W6RO 7.

ORANGE: SCM, Fried Heyn, WA6WZO — ASCM: WA6WZN. SEC: W6UBQ. STM: KA6A. DECs: K6GGS W6LKN WA6TLE WB6YZY. NMs: WB6AKR K6JT W6CPB WA6OCA WA6WZO. N6BAE appointed EC for RACES Dist #4 of San Bernardino County with XYL WA6UVF Asst EC as well as OES and OBS. N6HI appointed OO. N6BAW, appointed OES and OBS, has started a new ARES net which meets on the Keller Peak repeater (146.385/985) 8 P.M. the 1st and 3rd Tuesday. Once again the Orange County Council of ARO will sponsor a booth at the Orange County Fair July 10th thru 19th; the club responsible this year will be W/C ARC under the leadership of KA6NLY (phone 542-3387). Congrats to OO NCPE for fine showing in Nov FMT. The OCARC net that meets on 28.775 Tues at 7 P.M., is a chapter of Ten-Ten International; for more info contact NC WA6HEL. Contact PIA WA6JFP for info on ham classes as well as PR (including showing ARRL film "The World of Amateur Radio"). EC WA6QMW reports considerable activity with Riverside Mountain Rescue Unit with W6UBQ WB6VXC WA6UVF W7IUH K6SNO WA6VXD W6LKN WD6FEM N6CBK providing communications support. Listen for the "West Coast Bulletin" 1st and 3rd Mondays at 3540 kHz 8 P.M. transmitted by W6ZF at 22 wpm. WA6TEY of the So Ca T-Hunters donated a perpetual trophy; WB6YVP was the 1st winner of the trophy in the all day T-hunt with WA6TEY hiding the transmitter. SCATS RTTY 223.12/224.72 Repeater (W6IWO/R) is now on Mt. San Jacinto. N6PY hosted Fullerton RC desert meet & star party. RN6D needs PAN liaison stations; if interested, contact NM WA6LVO. Conrats to K5DY becoming Manager and KA6A Asst Manager of the So Ca Net. SCN activity:

Net	Freq	Time-Dy	QNI	QTC	NM
SCN/1	3598 kHz	6:00 P.M.	351	319	K6FI
SCN/2	3598 kHz	7:15 P.M.	281	151	K6PHV
SCN/VHF	147.045/645	9:00 P.M.	455	261	WA6QCA
SCN/RTTY	3637.5 kHz	7:00 P.M.	—	—	WB5EKU

Traffic: (Feb.) KN6C 274, N6ANL 260, KA6A 208, WB6QBZ 153, WB6BZZ 120, KA4FDX 85, WD6CSL 81, W6NTN 78, WA6QMW 48, WA6QCA 37, K6WI 12, K6JT 6, WA6WZO 3. (Jan.) WB6BZZ 72.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — STM: N6GW (222-5575). SEC: W6INI (273-1120). Asst SEC: N6RD (224-1574). North County TFC Net met 27 times, handled 55 msgs. Net meets nightly at 2000 on 146.13/73 MHz (Palomar ARC repeater). An excellent net to break into traffic handling. Club officers for 1981: SANDRA — WA6JTB, pres.; WA6AIL, v.p.; WA6URS, secy.; WB6CDK, treas.; Poway ARS — W6ORP, pres.; K7DCG, v.p.; KD6DK, secy.; WB6MFI, treas.; San Diego Teleprinter Soc — K5WTA, pres.; WA6PBO, v.p.; WB5TWK, secy.; W6SSL, treas. WA6JSZ is NCS of RTTY net at 1900 Sun on 223.22/4.82. Volunteers assisting City of San Diego in its Flood Status Info Center are W6BFG W6FWF K6HAP W6INI WA6JCG KA6JEH KR6K WB6KUA KA6LEA WA6MAE W6QLJ WB6QYO N6RD KM6S WB6TOH WB6TQF W6TZV. Call sign change: KA6DWV to N6DYO. Every licensed amateur should have a copy of proposed "Plain Language" rules, Docket 80-729. It's not too late to get one from ARRL. Send $1 to help defray costs. New ORS is KB6AI. Traffic: KT6A 405, W6HUJ 191, N6GW 170, KM6I 144, KB6AI 36, K6HAP 32, N6AT 29, W6DEY 23, WA6UFY 3.

SANTA BARBARA: SCM, Robert N. Dyruff, W6POU — 200 Mt. HF/VHF Officials Net meets Sundays 7235 kHz @ 1300 PT and @ 1330 PT via section-wide linked repeaters. ARES/NTS members included. S. W. Div. Dir's meeting devoted heavily to FCC "Plain Language Rewrite" of A. R. Rules. Affil. clubs urged to study and coordinate responses to FCC, copy to ARRL. OES qualifications stiffened. Ask your EC if you quality for appointment; Sheriff/ARES agreements reached in Ventura and SBAR Counties; Conejo Valley ARC spearheaded antenna ordinance drive with assist from other clubs and ARRL; Silent Key: WA6IGL. N6WP resigns traffic post, new STM sought. W6KPS to demonstrate "Ultimate Modem" in Ste Maria for ASCII hf/vhf radio-linked data communications. New Apple owners are K6DZT and KB6PX. Ventura DEC, W6RIC, also data comm. oper. He sprung surprise training quiz on ARES net; Training classes: Satellite ARC — Novice, Mon. & Thurs — W6OLE KA6HYC; Santa Barbara ARC — Novice thru Advanced — KA6S WB6RDV PSHR: K6DZT 10, WB6TRP 31, K6YD 61. Traffic: (Feb.) WD0DEX 218, K6YD 117, WB6TRP 99. (Dec.) WA6MBZ 1,006.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — Asst SCM: WA5OFD. STM: W5VMP. SEC: W5GPO. NMs: N5BT AA5J KA5IWF AE5I. Texas Slow Net (TSN) meets @ 8:00 P.M. local, on 3745 kHz, daily; QNI 278, QTC 60 in 28 sess. New NM is WD5JIM, with WD5JYI assisting. The National WX Service has given the Lubbock Co. ARES unit an award for outstanding service in the Skywarn program. We are in the midst of WX season; if you have a communications emergency, contact W5GPO or myself as soon as possible to get things in

gear for manpower and equipment relief. The larger ARES units are standing by to assist ECs in the lesser populated areas when additional help is needed. The more lead time the responding units have, the better. ECs — do not wait until the situation is critical before letting us know of your needs. We will soon be organizing Emergency Response Teams from the ranks of ARES to work with the Texas Dept. of Public Safety in augmenting their emergency communications needs. Amateurs who reside near DPS Regional Communications Hq. will be asked to volunteer for training and service in this project. WD5EUE now KC5FX; congrats. K2SCU/5 made DXCC. New EC for Dallas Co. is KK5B who has already signed up 163 ARES members! Hope you all are planning a good Field Day weekend this year. Please send me a radiogram re your FD activity. Traffic: W5TI 247, KB5UL 241, N5BT 220, W5CTZ 195, KA5AZK 174, K5BNH 157, AA5J 96, N5CEK 90, WB5BKM 88, KC5FX 86, KK5B 70, W5HMR 47, WA5QFD 45, KA5IWF 37, K5HGX 36, W5ERT 32, WD5JYI 30, WB5LAT 29, KA5AVO 28, KA5CFP 28, W5GPO 27, AJ5F 24, AC5Z 22, AE5I 19, W5VMP 19, K5PC 18, K5SOR 18, WB5YYK 12, WB5UZS 10, W5TAH 9, WA5KZA 2, W5PBN 2.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Broken Arrow Swap Meet under way May 9th. Next is Ham Holiday-81, West Gulf Convention, Oklahoma City, July 24-26th. Hope to see all of you there. WD5EGB has new tower and beams in air, 100'. KB5EK working a lot of DX, DXCC may be close. WB5NXO and K5SZU Silent Keys this past month. 26 ORS, 4 PSHR, 2 OBS and 2 OO reports last month. Where was your report? All nets showed plenty of activity, short month affected averages. Our congratulations to American Red Cross 100th Birthday. Another fine group of volunteers doing a wonderful job. With storm season waning (I hope) this was sent in by WB5NKC: All cities and towns should be linked together by participation in a state net. If no station or town participates in a regular net, then that town is isolated. Is your town linked to rest of state? Traffic: WB5NKC 341, W5REC 301, K5CXP 163, WA5RKU 157, KF5A 154, W5RB 152, WB5NKD 144, WD5IRB 101, KB5EK 88, W5AS 84, WA5OUV 67, WB5EAY 62, W5VXU 60, W5UYH 43, WA5FSN 42, WD5IFB 42, WB5ELG 40, W5SUG 40, K5CAY 37, W5VLW 26, W5VOR 24, W5FKL 22, KA5CXW 9, WB5AXH 7, N0IN 4, W5JJ 1.

SOUTHERN TEXAS: SCM, Roger Coday, N5FN — SEC: AK5N. ASCM/STM: N5TC. OO reporting this month, KN5H. Brenham ARC again sponsored their January banquet with Johnny Holmes, W5ALG, as guest speaker. Holmes is DA of Harris County. El Paso ARC (W5ES) started a new Novice class. West Gulf Division Director, W5EDZ, attended the Brazos Valley ARC meeting in February and presented their charter for ARRL affiliation. WA5KCZ edits a very nice newsletter for TEX CW Net. Houston ARC is still holding Novice classes every Friday night at their club house at 7011 Lozier St. According to the TDXS "Bull Sheet", N5JJ was the class of the CQ 160 Test. K5RC also did very well in the ARRL Ten-Meter Test. The Brazosport ARC operated a demonstration station from a shopping center in Lake Jackson. It was quite a success. It sounds as if WD5JJS has been spending a lot of time on 6-meters lately. WA5OCP, OVS, also reports some 6-meter activity. KA5FPW has upgraded to Extra class and is sporting the new call, KO5X. He also completed WAS. K5RG has added an aln filter to his SB303 and built a dwell/tachometer for his portable generator. K5RVF reports his intention of attending the National Convention in Orlando. AB5X has appointed N5APC and N5MB as Assistant ECs. He also attended the 20th annual Emergency preparedness Conference in Austin. Traffic: (Feb.) WB5YDD 485, W5KLV 404, W5SHN 246, KB5TC 191, N5TG 178, W5TFB 167, W5SBE 124, W5BGE 107, WB5MMI 106, KA5BSN 104, KB5NX 96, WB5YRV 88, WD5JIM 68, WA5RVT 64, K5HZR 46, KA5GYJ 45, KM5J 45, N5FN 42, WB4HML 42, WD5AAH 22, WD5KBK 22, AK5M 19, K5RG 18, KA@CSM 9, WD5JJS 9, WD5DQR 5, W5OO 5, AB5X 5, KD5O 4, KB5KZ 1. (Jan.) WB5TAY 271.

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. A special rate of 25 cents per word applies to hamfest and convention announcements, to individuals seeking to dispose of or acquire personal equipment, and to other advertising which, in our opinion, obviously qualifies for the individual rate.

(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 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received August 21 through September 20 will appear in November *QST*.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permited in *QST* advertising.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising before their 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.

Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, Inc., 1409 Cooper Drive, Irving, TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

CERTIFICATE for proven two-way radio contacts with amateurs in all then USA call areas. Award suitable for framing and proven achievements added upon request. S.a.s.e. brings TAD data sheet. W6LS 2814 Empire, Burbank, CA 91504.

YAESU OWNERS — join the ten-year old International Fox-Tango Club. Receive valuable newsletter monthly, catalogue of modifications, free advertisements, technical consultation, FT Net, more. Annual dues now $8 per year US, $9 Canada, $12 overseas airmail. Send to N4ML, Box 15944, West Palm Beach, FL 33406.

WARRENARA 24th Annual Hamfest, Sunday, August 16, 1981, KSU-Trumbull campus, Outerbelt/Rt. 45. Huge flea market on lawn; equipment displays/sales inside; meals, snacks sold all day. $4,200 awards TenTec Omni' two TenTec Deltas; three IC-218s; plus hourly awards. Details: QSL WARA, Box 809, Warren, OH 44482.

IMRA-International Mission Radio Association Helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1900-2000 GMT. Br. Bernard Frey, Box 192, Garrison, NY 1052.

THE Veteran Wireless Operators Association, a nonprofit organization of communications people founded in 1925, invites your inquiries and application for membership. Write V.W.O.A., 118 River Drive — Bay Ridge, Annapolis, MD 21403.

ANNUAL EVANSVILLE TARS Hamfest May 17, 1981. Vanderburgh County 4-H Fairgrounds. Open at 6AM CDT. All indoors except flea market. 2 seminars: Indiana SCM on traffic handling and Bob Heil on 2-meter repeates and 10-meter fm. Tasting table for the ladies. Admission $1 per adult. Indoor tables $5 each. Flea market $1.50. Talk-in 147.75/15 or 146.19/79. For table reservations and other info contact Tom, 2851 Wayside Drive, Evansville, IN 47711.

MAY 17 & Sept. 20, LIMARC sponsor ARRL HAMFAIR '81 at Islip Speedway Islip Ave (Rte. 111), Exit 43 Southern State Parkway. Over 350 exhibitors including manufacturers and dealers. No reservations needed. Call at nite for info. Sid Wolin, K2LJH, 516-379-2861 Hank Wener, WB2ALW 516-484-4322.

THE WABASH County ARC will hold its 13th annual hamfest on Sunday, May 17, 1981 from 6:00 AM until 3:00 PM at the Wabash County 4H Fairgrounds, Wabash, IN. Admission will be $3 at the gate or $2.50 advance. There will be plenty of food and parking. Also will have camping spaces available for Saturday night. Talkin on 7.63/.03 or .52 simplex. For tickets or more info send ans SASE to Dave Spangler N9ADO, 45 Grant St., Wabash, IN 46992.

SANTA MARIA Amateur Radio Swapfest June 14, 1981. Sponsored by the Satellite Amateur Radio Club. For info on awards, swaptables, dinner and much more, mail inquiries to: Santa Maria Swapfest 1600 E. Clark 49, Santa Maria, CA 93455.

Barry Electronics Corp.

WE SHIP WORLDWIDE

WORLD WIDE AMATEUR RADIO SINCE 1950

Your one source for all Radio Equipment!

cushcraft, Mosley, KLM, hy-gain, avanti, LARSEN

All Handy Talkies In Stock For Immediate Delivery!

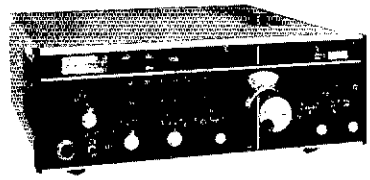
We Will Not Be Undersold

Call: 212-925-7000

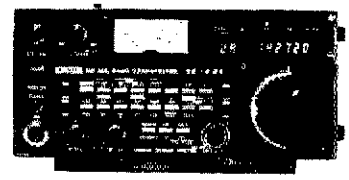
SANTEC HT-1200

ICOM IC2AT

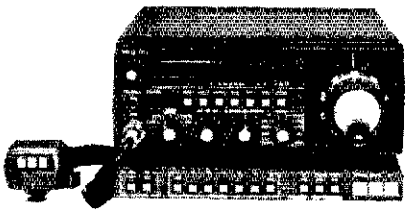
YAESU FT-207R



DRAKE TR-7 & R-7
L-7 2KW Linear Amplifier

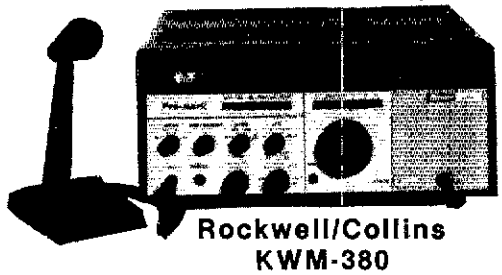


ICOM Model-720A



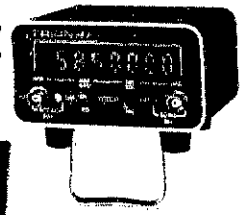
YAESU

FT-101ZD, FT-107M, FT-480R, FT-707, FT-720RU, FT-720RVH, FT-902DM

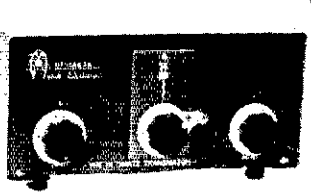


Rockwell/Collins KWM-380

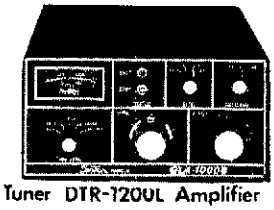
ETO Alpha 76CA
2 + KW PEP/3-8874 FINALS
With Hipersil Transformer



TRIONYX Model TR-1000
Digital Frequency Counter 0-600 MHz



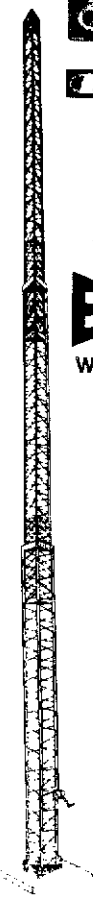
Murch Model UT2000B



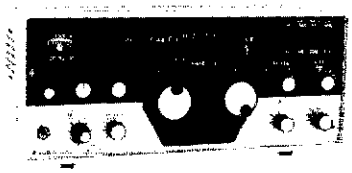
DTR-3KA Antenna Tuner DTR-1200L Amplifier
DLR-2000/MTA-3000/Clipperton "L"

EIMAC 3-500Z, 572B, 6JS6C, 12BYZA & 4-400A

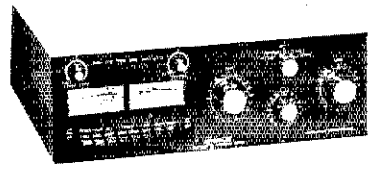
BIRD Wattmeters & Elements in stock



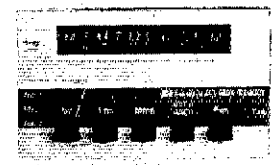
HY-GAIN TOWERS



CUBIC 103 Cubic 102, & 100MX



J.W. MILLER AT-2500
2500 Watts PEP
3/30 MC Automatic Antenna Tuner



KANTRONICS Mini-Reader

Amateur Radio Courses Given On Our Premises

Export Orders Shipped Immediately.

"Aqui Se Habla Español"

New York City's *LARGEST STOCKING HAM DEALER* *COMPLETE REPAIR LAB ON PREMISES—*

MAIL ALL ORDERS TO BARRY ELECTRONICS CORP.
512 BROADWAY, NEW YORK CITY, NEW YORK 10012
BARRY INTERNATIONAL TELEX 12-7670 212-925-7000
TOP TRADES GIVEN ON YOUR USED EQUIPMENT

IN STOCK—NEW ROBOT MODEL #800, BIRD WATTMETER, HY-GAIN, LARSEN, SHURE, KDK-2015R, TURNER, ASTATIC, MOSLEY, VHF ENG., MFJ, KANTRONICS, DSI, AVANTI CORDLESS TELEPHONES, POCKET SCANNERS, NYE, BENCHER, VIBROPLEX

AUTHORIZED DISTS. MCKAY DYMEK FOR SHORTWAVE RECEIVERS

WE NOW STOCK THE MURCH ULTIMATE TRANSMATCH 2000B

DEALER INQUIRIES INVITED, PHONE IN YOUR ORDER & BE REIMBURSED.

MUSEUM for radio historians and collectors now open. Free admission. Old time amateur (W2AN) and commercial station exhibits, 1925 store and telegraph displays, 15,000 items. Write for details. Antique Wireless Assn., Holcomb, NY 14469.

THE HALL of Science ARC fifth annual hamfest will be held on June 7, 1981 from 9 to 4 at the municiple parking garage one block from Queens Blvd., 80-25 126 St., Queens. Sellers $3 Buyers $1. Free parking, refreshments. Talk-in on .52 For further information contact Tom Doyle, KA2DTB at 212-738-8887 or 212-641-1700.

STARVED ROCK Hamfest — June 7, 1981 See May calendar in QST Long s.a.s.e. for information to W9MKS.

7TH ANNUAL hamfest and flea market sponsored by the Eastern Connecticut Amateur Radio Association will be held on May 17th. At Point Breeze Restaurant, Webster, MA. Info via K1SYI Richard Spahl, Lake Parkway, Webster, MA 01570 Telephone 617-943-4420 after 8 P.M. rain or shine.

GASTONIA, N.C. Hamfest. Saturday, May 23, 1981 at Karyae Park on Linwood Rd., about six miles S.W. of town. Talk-in on 147.72/147.12 and 146.52 simplex. Fleamarket, exhibitors, and many awards including TS-520 SE and Icom IC-2AT. Tickets $2.50 in advance or $3 at the gate. Wrtie Glenn Varner, W4PBQ, 1332 Poston Circle, Gastonia, NC 28052. Tele. 704-866-8339.

THE SEVENTH annual C.C.R.A.A. sponsored swap and shop will be held Satruday May 2 at the Chassell Community Center in Chassell, MI. Doors open at 9 A.M., admission $1, half table space $1, hourly awards. Talk in 28/88, 07/67. More information KB8W 906-337-5281.

QSL Cards/Rubber Stamps/Engraving

TRAVEL-PAK QSL Kit — Converts Post Cards, Photos to QSLs. Stamp brings circular. Samco, Box 203, Wynantskill NY 12198.

DELUXE QSLs, Samples 25c. Petty, W2HAZ, P. O. Box 5237, Trenton NJ 08638.

DON'T buy QSL cards until you see my free samples — or draw your own design. I specialize in custom cards. Send black and white sketch: will give quote. Little Print Shop, Box 9848, Austin TX 78766.

DISTINCTIVE QSL's — Largest selection, lowest prices, top quality photo and completely customized cards. Make your QSL's truly unique at the same cost as a standard card, and get a better return rate! Free samples, catalogue. Stamps apreciated. Stu, K2RPZ, Box 412, Rocky Point, NY 11778 516-744-6260.

QSLs, Catalog 45c N & S Print, P. O. Box 11184 Phoenix AZ 85061.

QSLs with class! Unbeatable quality, reasonable price. Samples, 50c refundable. QSLs Unlimited, P. O. Box 27553, Atlanta, Georgia 30327

QSLs Second to none. Same day service. Samples 50 cents. Include your call for free decal. Ray, K7HLR, Box 331, Clearfield, UT 84015.

QSL cards — Eyeball cards — Rubber stamps — Name tags — Emblems — gift items — free catalog — Rusprint, Box 7575, Kansas City, MO 64116.

BE SURPRISED — Get a variety of cards — 100 for $7.00 or 200 for $11.00. All three colors, fast service, satisfaction guaranteed. Constantine, 1219 Ellington, Myrtle Beach, SC 29577.

QSLs by W7HUL. Samples 50c. 8511 19th Ave. N.W., Seattle, WA 98117.

FREE samples — stamp appreciated. Conner. 522 Notre Dame Ave., Chattanooga, TN 37412.

QSLs & rubber stamps. Top quality. QSL samples and stamp information 50c Ebbert Graphics D-3, Box 70, Westerville, OH 43081.

CLUB Call pins: 3 lines, 1-1/4, $1.55 each. Call, first name and club, colors: blue black or red with white letters. Catalog — Arnold Linzner 2041 Linden St., Ridgewood NY 11385.

INTRODUCING: Beautiful natural full color photo QSL cards, made from your color negative or slide. From $224. for 3,000 cards minimum. Free samples, stamps appreciated. K2RPZ, Box 412, Dept. NC, Rocky Point, N.Y. 11778 516-744-6260.

WOODGRAINED QSLs. Beautifully printed. You have to see them. Write for free samples. Ham Graphics, Box 244Q, Camden, NY 13316.

FREE Samples — Stamp appreciated. Samcards, 48 Monte Carlo Dr., Pittsburgh, PA 15239.

QSL ECONOMY: 1000 for $12. s.a.s.e. for samples. W4TG, Drawer F, Gray, GA 31032.

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.

LOW-COST QSLs. Samples s.a.s.e. Koepke, 6 Katherine Road, Albany, NY 12205.

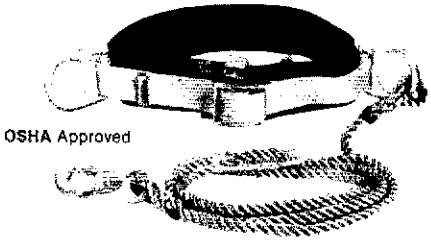
COLORFUL QSLs — 11 ink colors. 13 card colors to choose from. Samples 50c Specialty Printing, Box 361, Duquesne, PA 15110.

QSL cards by reliable company with 15 years experience. Amateur QSL cards (standard designs and design your own). Also available are our own designed State Cards. Top quality, rasonable prices. Free catalog and samples. Write Mail Order Express, Inc., Dept. M, Box 703, Lexington, NC 27292.

"ONV SAFETY BELT" A "MUST" FOR SAFETY!

'73 Bill Salerno

W2ONV
President



OSHA Approved

At last!! — a safety belt designed to meet the safety needs of radio amateurs, radio stations, TV stations, boat owners, painters, construction workers, maintenance people — anyone with the need to climb — now at an affordable price.
Our "ONV Safety Belt" is fitted with two drop forged steel "D" rings. Onto one is spliced a 3 foot length of ½" diameter nylon rope fitted with a drop forged steel snap hook. The 3" wide nylon body comfort pad is secured to 1¾" wide, 9500 lb. test nylon webbing, which is resin or latex treated for abrasion resistance. **The belt is adjustable up to size 46" waist.**
Only $39.95 plus $3.00 for postage and handling. NJ residents add 5% sales tax.

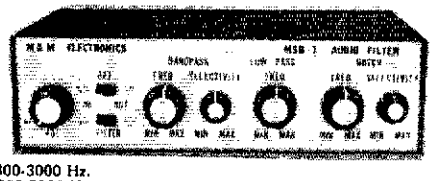
NOW AVAILABLE
ONV TOOL POUCH
DESIGNED FOR ONV SAFETY BELT
$9.95 EACH
Shipping & Handling Prepaid

Immediate UPS Del'y

UPI Communication Systems, Inc.
Mail To: P.O. Box 902 • Saddle Brook, N.J. 07662
N.J. (201) 279-7528 • (800) 526-5277
(Office) 481 Getty Ave. • Paterson, N.J. 07503
Cable: Unipage Telex: 642597

MSB-1 AUDIO FILTER

SSB/CW/RTTY
$84.95



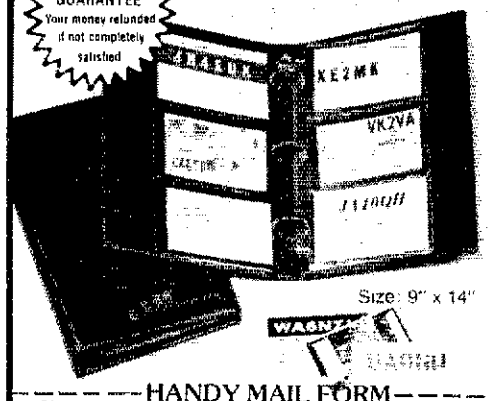
8-Pole Tunable Lowpass Filter Tunable Bandpass Filter	FLP = 300-3000 Hz. FBP = 300-3000 Hz. Bandwidth-Less than 75 Hz. to greater than 1500 Hz.
Tunable Notch Filter	F Notch = 300-3000 Hz., Notch depth-50 dB
6-Pole Fixed Highpass	FHP = 300 Hz.
Audio Amplifier	1 Watt
Power Requirements	12-14 VDC @300 MA 110 Vac with optional adapter ($8.95)

ORDER TODAY. If not completely satisfied, return within 15 days for a prompt refund (less shipping and handling). Add $2.50 shipping and handling. SEND TODAY for complete list of products. Dealer inquiries welcome.

M&M ELECTRONICS, INC.
P. O. BOX 1206/BREWTON, ALABAMA 36427/PHONE (205) 867-2496

Display 240 QSL Cards in the QSL Organizer™

30 day Free Trial
GUARANTEE
Your money refunded if not completely satisfied



Size: 9" x 14"

This handsome Album FREE with every 40 pages ordered.

No more cluttering walls or stuffing QSL's into boxes or drawers. Organize, preserve, and display your cards in roomy 4 x 6 pockets. Each crystal clear heavy duty vinyl page holds 6 cards, back to back. With every 40 pages (min), receive a handsome, richly padded 3-ring album FREE!

Great as gifts, prizes, or for DX contests. Join thousands of delighted hams around the globe. Fill in the handy mail form below . . . send for yours today!

HANDY MAIL FORM

Please send:	PRICE	U.S. Postage	TOTAL
☐ 1 FREE Album and 40 pages (min) at	50¢ ea. 20.00	2.20	$22.20
☐ 2 FREE Albums and 80 pages at	48¢ ea. 38.40	3.85	$42.25
☐ 3 FREE Albums and 120 pages at	46¢ ea. 55.20	5.20	$60.40

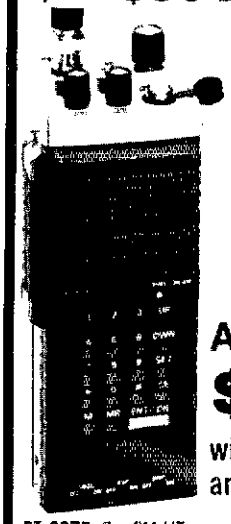
Pages in pkgs. of 40 only.
MEXICO/CANADA Postage $5.50 ea. Album & 40 pages.

☐ Check ☐ Mastercharge # _____ Exp. _____ TOTAL $
☐ Money Order ☐ Visa Signature _____
(CA residents add 6% tax)

Please Print
Name _____ Call _____
Address _____
City _____ State _____ Zip _____

MIL INDUSTRIES Dept T
P. O. Box #44457
Panorama City, CA 91402

PRICE REDUCTION
plus $30 Discount



YAESU

FT-207R

NEW LOW AES PRICE
$269.00

with nicad battery and wall charger.

FT-207R 2m FM HT	REGULAR $299.00
NC-1A 15-hr desk charger	51.00
NC-3 3-hr quick desk charger/AC ps	90.00
FBA-1 Battery sleeve for NC-1A/NC-3	9.40
NBP-9 Extra nicad battery pack	23.00
NC-9B Extra 15-hr wall charger	10.00
LCC-7 Leather carrying case	35.00
MMB-10 Mobile bracket	15.00
PA-2 Mobile adapter & charger	39.00
TA-2 19" telescoping whip ant	9.40
YM-24 Speaker/microphone	32.00
FTS-32E 32 tone CTCSS encoder	40.00
FTS-32ED 32 tone CTCSS enc/dec	75.00

Call TOLL FREE
1-800-558-0411

master charge THE INTERBANK CARD
VISA

AMATEUR ELECTRONIC SUPPLY

4828 W. Fond du Lac Avenue
Milwaukee, Wisconsin 53216
Phone: (414) 442-4200
Wisconsin WATS: 1-800-242-5195
Nationwide WATS: 1-800-558-0411
AES Branch Stores in:
Orlando, FL • Wickliffe, OH • Las Vegas, NV

PACE TRAPS

Multi-band antenna traps still at 1980 prices! Mechanically solid and weather proofed. Handle full power (max 3000 watts PEP)

FG-5 80 through 10 meter KW traps	$19.95
FG4 40 through 10 meter KW traps	$19.95
PT80-10 complete trap dipole system. Includes FG-5 traps, Copperweld, 70' coax w/PL259 end & center insulators	$49.95

Other systems available including complete monoband dipoles. Write for quotes.

PLEASE ADD $7 SHIPPING

Still available at $14.95, the famous Pace Flying Ducky mobile magnetic-mount. Accessory whip at $5.95

Conn. residents add 7½% sales tax

Check or Money Order to:
Box 234, Middlebury, Conn. 06762
203-757-7564

Pace-Traps

CONTESTERS-DXers QSL cards. low price s.a.s.e. for *samples and pricelist*. A1 QSL KB5RH — 1310A Avenue M. Plano, TX 75074.

QSLs since 1934. Satisfaction guaranteed or money back. Send 30c postage for catalogue. VP5QED Press. Box 1523. Boca Raton, FL 33432.

CALL LETTERS. Bold, white on 2×8 desk plate — red, black, or walnut. $2.75 K2KJ Engravomatic, 37 Zeek Road, Morris Plains, N.J. 07950.

CADILLAC of QSL cards, 3 to 4 colors, send $1. for samples (Refundable). Mac's Shack P.O. Box 43175 Seven Points, TX 75143.

CARTOON QSLs. New and different. Top quality, low prices. Write for free samples. Cards West. Box 9771, Ogden, UT 84409.

QSLs — Custom designs for railroad employees and railfans. Send addressed business envelope with double first class postage for free samples and catalog. Marv WØMGI, 2095 Prosperity Ave., St. Paul, MN 55109.

QSLs Samples 30c (stamps OK) Fred Leydon, W1NZJ, 454 Proctor Ave., Revere, MA 02151.

FRAME, DISPLAY or store 280 QSLs in plastic with seven holders containing 20 pockets each. $4 prepaid and guaranteed. (Dealers, write for free sample.) TEPCO, Box 198T, Gallatin, TN 37066.

PICTURE QSLs made from your photo-slides. 250 b/W $21. Single 1,000 full color $70. Samples. Picturecards, Box 5471 Amarillo, TX 79107 806-383-8347.

RUBBER Stamps return address $3.50 includes postage. NJ residents add tax. Clinton Hoar, W2UDO, 32 Cumberland Ave., Verona, NJ 07044.

QSLS — Variety, value, quality, custom, samples and catalot 45c. Alkanprint. Box 3494, Scottsdale AZ 85257.

FREE SAMPLES — Stamp appreciated. Prompt, accurate, guaranteed service. Jim Piel Box 98186 Pgh. PA 15227 Formerly QSLs By K3QK.

WE SELL QSLs not samples! To get samples from all printers you would spend over $10. Send a card and I'll send my samples by return mail. (I pay postage.) QSLs by W4MPY 705 Audubon Circle, Belvedere, SC 29841.

PICTURE QSL cards of your shack, etc. from your photograph or black and white art work, 500 $18. 1000 $26.50. Also unusual non-picture designs. Generous sample pack 75c, half pound of samples $1.25. Customized cards, send specifications for estimate. Raum's, 4154 Fifth Street, Philadelphia, PA 19140 Phone 1-215-BA-8-5460, Closed during month of August.

STUNNING "America the Beautiful" QSL postcards. Full color photo-reproductions printed limited-edition on high-gloss stock. Eight vivid scenes command attention when you "care enough to send the best". Trial-Pak includes 24 ready-to-use cards, quantity prices, order forms. Send $5 to Quality Scenics Limited, P. O. Box 1093, Conway Arkansas (N5CQC) 72032. Satisfaction or money back!

GLOSSY QSLs. Distinctive! Stamp brings samples. A. B. Zanella, P. O. Box 4337, San Francisco, CA 94101.

General

WANTED by Baptist missionary: Collins SM-3 desk top microphone, Collins 637T-2 adjustable dipole antenna, 312B-5 VFO console, state condition and price desired. Norm Zink, Box 197, Goroka, PAPUA New Guinea.

WANTED: Ten-Tec Century 21 cw xcvr in good condition. Please send details to Peter Christensen, VE2ATP, 105 Aurora, Pointe Claire, Quebec, Canada H9R 3G6. 514-697-3402.

DX AWARDS DIRECTORY containing rules, checklists, maps, applications, for 150+ most popular amateur radio awards. $7. postpaid from author VE3GCO Garry Hammond, 5 McLaren Avenue, Listowel, Ontario, Canada, N4W 3K1.

TELETYPEWRITER parts, manuals, supplies, equipment. Toroids. S.a.s.e. for list. Typetronics, Box 8873, Ft. Lauderdale FL 33310 W4NYF. Buy parts, late machines.

SERVICE by W9YKA. Professionnal grade lab, FCC 1st class license. Amateur and industrial ssb-fm equipment. Repairs, calibration, modifications, consultation. Reasonable rates. Write or call Robert J. Orwin, Communications Engineer, P. O. Box 1032, La Grange Park, IL 60525. 312-352-2333.

WANTED: Radios, parts, books, magazines before 1928. W6ME 4178 Chasin Street, Oceanside, CA 92054.

VERY interésting! Next 5 issues $2. Ham Trader Yellow Sheets, POB356, Wheaton, IL 60187.

TEFLON, s.a.s.e. W9TFY, Alpha IL 61413.

COLLECTOR wants to buy battery radios made before 1929, pre 1940 TVs, wireless gear, crystal sets, early parts, tubes, magazines etc. Top prices paid. Jacobs, 1 Eighth Street, Pelham NY 10803.

ARCOS — Amateur Radio Component Service. VHF/UHF high power amplifier kits, parts and accessories. High voltage power supplies. Proven performance in world-wide use. Dowkey, Eimac, Bird, KLM. Sase for catalog. Fred Merry (W2GN) 35 Highland Drive, East Greenbush, NY 12061.

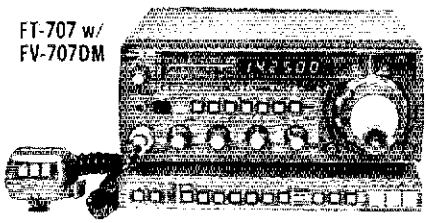
COLLINS repair and alignment, $75. Former Collins engineer, First Radiotelephone. Extra, calibration laboratory, K1MAN 207-495-2215.

TRANSFORMERS rewound, Jess Price, W4CLJ, 507 Raehn, Orlando, FL 32806.

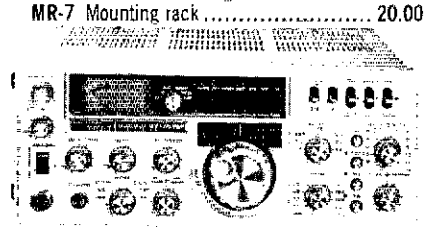
The ARRL Club and Training Department can help you set up licensing classes. Contact them at Hq.

YAESU

You pay LESS at AES...just Call TOLL FREE 1-800-558-0411 - ask for our **DISCOUNT DESK**



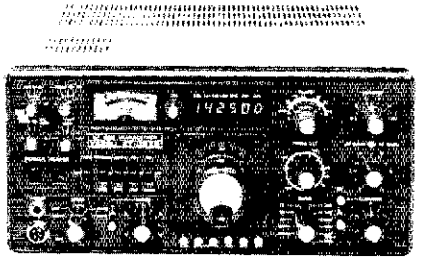
FT-707 8-band, 3.5-30 Mhz digital Xcvr	$810.00
FP-707 Power supply	162.00
FV-707DM Dig VFO w/12 memories	279.00
FC-707 8-band antenna tuner, 150w	110.00
FRB-707 Relay box	39.00
MMB-2 Mobile mounting bracket	20.00
MR-7 Mounting rack	20.00



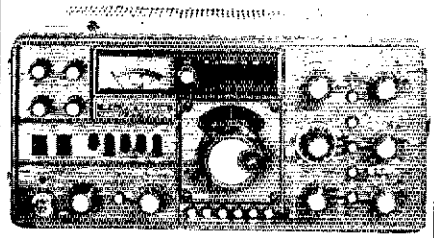
FT-107M/DMS (WARC) 9-band Dig. Xcvr	1149.00
FP-107 Internal power supply	139.00
FP-107E External power supply	145.00
FC-107 9-band ant tuner, 250w	150.00
FV-107 Remote VFO	150.00
SP-107 Speaker	29.00
SP-107P Speaker/patch	76.00
XF8.9B/XF8.9GA AM filter	45.00
FTV-107R Transverter w/2m	284.00
6 meter module only	110.00
70 cm module only	255.00
FT-107M service manual	25.00

Other accessories for FT-707/107M:

XF8.9HC 600 Hz CW filter	45.00
XF8.9HCN 350 Hz CW filter	50.00
YM-34 Desk microphone	31.00
YM-35 Scan noise canx mic	20.00
YM-36 Noise canx mobile mic	20.00
YM-37 Mobile microphone	10.00



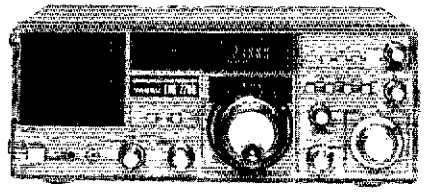
FT-101ZD (WARC) 9-band digital Xcvr	889.00
DC-101ZD DC converter	60.00
YE-7A Hand microphone	17.00
FT-101ZD series service manual	25.00



FT-902DM 9-band digital Xcvr	1535.00

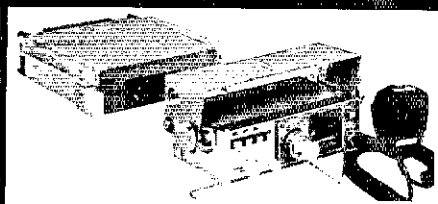
Other accessories for FT-101ZD/902DM:

FA-9 Cooling fan	22.00
SP-901 Speaker	35.00
SP-901P Speaker/patch	76.00
YO-901P Mon. scope w/bandscope	515.00
FV-101Z Remote VFO	175.00
FV-901DM Remote VFO w/memory	415.00
FC-902 9-band ant. tuner, 500w PEP	199.00
FTV-901R Transverter w/2m	389.00
6 meter module only	110.00
70 cm MHz module only	255.00
YR-901 CW/RTTY decoder	730.00
YK-901 ASCII Keyboard	155.00
YVM-1 Video monitor	199.00
CL-901 60 ma. Loop/YR-901	30.00
XF8.9HC 600 Hz CW filter	45.00
XF8.9HCN 350 Hz CW filter	50.00
XF8.9B/XF8.9GA AM filter	45.00



FRG-7700 150 KHz-29.99 MHz dig. Rcvr	549.00
MU-7700 Memory unit	149.00
FRG-7 0.5-29.9 MHz Shortwave receiver	299.00
YH-55 Lo-Z headphone	15.00
YS-200 1.8-150 MHz wattmeter/SWR	79.00
YS-2000 1.8-60 MHz PEP watt/SWR	95.00
YP-150Z Dummy load/wattmeter	TBA

FT-680R 6m SSB/FM/CW/AM Xcvr	520.00
FT-480R 2m SSB/FM/CW Xcvr	529.00
FP-80 Power supply for FT-680R/480R	95.00
FT-127RA 220 FM synth Xcvr w/scan	479.00
FT-127 220 FM 12 ch Xtal Xcvr	299.00
FP-4 4A power supply	50.00
FP-12 12A power supply/spkr	135.00
FSP-1 Remote speaker	21.00



720RU 440/10w module	287.00
S-72 Switch box	85.00
E-72S 6.5' long cable	35.00
E-72L 13' long cable	40.00
MMB-3 Mobile mtg bkt - 720 RF decks	8.00
FT-780R 70 cm synth. All-Mode	TBA
YD-148 Lo-Z goose-neck microphone	32.00
YD-844A Hi/lo-Z desk microphone	32.00
YD-846 Hi-Z hand microphone	17.00
YE-11 600 ohm hand microphone	17.00
YM-21 Noise cancelling microphone	20.00
YM-22 TTP mic for 127RA	69.00
YM-39 TTP mic for FT-720RVH/720RU	76.00
FF501dx Low pass filter	34.00
MMB-6 Universal mobile mt	28.00
QTR-24D Deluxe 24 hour world clock	49.00

IMPORTANT!

The prices shown in this ad are suggested by the Manufacturer.

On most MAJOR items we can save you money with a Big Discount. Call now TOLL FREE and ask for our DISCOUNT DESK.

FT-207R 2m FM HT/TTP/wall cgr/batt	299.00
NC-1A 15-hr desk charger	51.00
NC-3 3-hr quick desk charger/AC ps	90.00
FBA-1 Battery sleeve for NC-1A/NC-3	9.40
NBP-9 Extra nicad battery pack	23.00
NC-9B Extra 15-hr wall charger	10.00
LCC-7 Leather carrying case	35.00
MMB-10 Mobile bracket	15.00
PA-2 Mobile adapter & charger	39.00
TA-2 19" telescoping whip ant	9.40
YM-24 Speaker/microphone	32.00
FTS-32E 32 tone CTCSS encoder	40.00
FTS-32ED 32 tone CTCSS enc/dec	75.00
FT-207R service manual	25.00
FT-404R 70 cm 4 ch. Xtal HT	299.00
FT-404R with 16 button TTP	325.00
FTS-64 64 tone CTCSS/Burst encoder	80.00

master charge THE INTERBANK CARD

VISA

Use your Credit Card

Call 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 Florida 32803
621 Commonwealth Ave.
Phone (305) 894-3238
Fla. Wats 1-800-432-9424
Outside Fla. 1-800-327-1917

LAS VEGAS, Nevada 89106
1072 N. Rancho Drive
Phone (702) 647-3114
Pete, WA8PZA & Squeak, AD7K
Outside Nev. 1-800-634-6227

ERICKSON COMMUNICATIONS
CHICAGO, Illinois 60630
5456 N. Milwaukee Avenue
Phone (312) 631-5181
Outside ILL. 1-800-621-5802

WANTED: Hallicrafter and Echophone receivers, transmitters, parts, accessories, manuals for my collection. "The Hallicrafter Collector." Chuck Dachis, WD5EOG, 4500 Russell, Austin, TX 78745.

MOBILE Ignition Shielding gives more range, no noise. Kits and custom systems. Literature. Estes Engineering. 930 Marine Dr., Port Angeles WA 98362.

STOP Looking for a good deal on amateur radio equipment — you've found it here — at your amateur radio headquarters in the heart of the Midwest. Now more than ever where you buy is as important as what you buy! We are factory-authorized dealers for Kenwood, Drake, Yaesu, Collins, Wilson, Ten-Tec, ICOM, Dentron, Hewlett-Packard Calculators, MFJ, Tempo, Regency, Hy-Gain, Mosley, CushCraft, Swan and many more. Write or call us today for our low quote and try our personal and friendly Hoosier service. Hoosier Electronics, P. O. Box 3300, #9 Meadows Center, Terre Haute, IN 47803. 812-238-1456.

HOSS-Trader "Ed," says Big Sale, shop around for the est price then telephone the Hoss last. New Drake AC-4 power supply regular $150 cash $98. Display Drake TR-7 transceiver $1100. Used HyGain TH6DXX Beam $165. New Swan 103BX transceiver, regular $1395. cash $1165. Sale New Alpha Linears: 76-A, $1549; 76-PA, $1749; 374-A, $1795. New Rohn 50' foldover tower prepaid $679. Specials: New Dentron Clipperton-L linears, 2000 watts, $549. New Dentron MLA-2500B linears, $769. Alliance HD-73 ham rotors, cash $96 New Swan display 100MXA transceiver, regular $699. cash $535. Kenwood 520-SE, $565. New HyGain TH3MK3 Tribander beam, $169. Display Kenwood 130-S, $629. New Icom IC-2A, handy talkie, $209. New two meter Azden PCS-3000 $309. New Icom 720 transceiver, $1295. Display Ham-4 ROTOR $144. New Icom 255-A $310. Moory Electronics Company, P. O. Box 506, DeWitt, Ark., 72042 tel.: 501-946-2820.

HAM RADIO Repair — Professional lab, personal service. "Grid Gridley, W4GJO. April thru October: Rt. 2, Box 138B, Rising Fawn, Georgia 30738, 404-657-7841. November thru March: 212 Martin Drive, Brooksville, FL 33512, 904-799-2769.

DRAKE R-4/T-4X Solid State Tubes directly replace vacuum tubes to give better performance! Pre-mixer and mixers R-4:6EJ7/6HS6/6BE6 plus T-4X: 6EJ7/6HS6/6AU6/12BA6 $17.50 each, ppd. R-4 B/C Improvement kits, $20.60, ppd. Sartori Associates, W5DA, Box 2085, Richardson, TX 75080. 214-494-3093.

TOROIDS, 88 mHy. Five for $6. M. Reed, Box 74, Soquel, CA 95073.

KEYER kits $12.95 to $26.95. Several types. S.a.s.e. for information. MSC, 1304 Toney Drive, Huntsville, AL 35802.

HAMS for Christ. Amateur Radio bible tracts. New address — Dave Friar, AF8D, 4656 Krental Street, Holt, MI 48842. Nets 14300 kHz at 2100Z; 7230 kHz at 2200Z. Info: in South Pacific/Oceania write to ZL1UE, New England, AC1Y.

HARDLINE coax — 7/8" 50 ohm, poly-jacketed, $1.75/ft. Connectors $16.00. Specifications: Link, 1081 Aron St., Cocoa, FL, 32922, 305-631-1117.

NEED help for your Novice, General ticket? Recorded audio-visual theory instruction. No background necessary. Free information: Amateur License Instruction, P. O. Box 6015, Norfolk, VA 23508.

RADIO collector pays top dollar — radios magazines parts etc. Before 1928. Weingarten 67-61 Alderton Street, Flushing NY 11374 212-896-3545.

RALPH HICKS, W5BCO — Your dealer for Motorola fm, ssb and marine. P. O. Box 15633, Tulsa, OK 74112.

WANTED — old microphones — pre 1940, for my microphone museum. Also mic-related items. Write Bob Paquette, 443 N. 31 St. Milw. WI 53208.

WANTED: McIntosh tube type audio equipment. Marcus Frisch WA9IXP P.O. Box 385 Elm Grove, WI 53122 414-475-5356.

WANTED — military radios in suitcases — especially B-2, A-2, A-3, AR-11 etc. Also radios beginning with letters "SS" — example "SSAA-401" — "spy radios" — overseas responses invited. Melton, Box 2037, Ogden, UT 84404 — 801-394-3290.

PREPARING for FCC ham exams? When all else fails, try POSI-CHECK self-test study guides. Continuously successful for 16 years. Now completely rewritten to cover FCC syllabi for 1980 exams. Novice, $5.50; General, $6.95; Advanced, $7.75; Extra, $7.95. Packet contains FCC syllabus for its class, Rules and Regulations that apply, our own multiple-choice questions and diagrams covering each point of the syllabus, IBM sheets for self-testing, keyed answers with explanations. First class mailing USA. Same day service. Send check or money order to POSI-CHECK, P.O. Box 3564, Urbandale, Des Moines, Iowa, 50322.

WE Buy Electron tubes, diodes, transistors, integrated circuits, semiconductors. Astral Electronics, 321 Pennsylvania Ave., Linden, NJ 07036. 201-486-3365.

OWNER repair of radio equipment book, $8.70. Helps you fix your own equipment. Order your copy now. K6RQ. 14910 LG Blvd, Los Gatos, CA 95030.

MIRROR -in-the-lid, spinning disc, and other pre-1946 television sets wanted for historical collection. Will pay $1,000 + for R.C.A. TRK-5, 359 test sets, also looking for pre-war picture tubes such as 12AP4, MW-31-3, plus any parts or literature relating to pre-war T.V. Arnold Chase, WA1RYZ, 9 Rushleigh Road, West Hartford, CT 06117 203-521-5280 (collect calls o.k.).

MANUALS for most ham gear made 1937-1970. Send 25c coin for 18 page "Manual Catalog" prepaid. HI, Inc., Box Q684, Council Bluffs, IA 51502.

CALL Toll-free 800-327-7798). Ask for Bob Hoffman. Jaro Electronics Corp. We buy all types of tubes. Top prices paid for Varian, Eimac, Amperex, RCA, Western Electric, Raytheon, In Florida Call toll free: 800-432-8524. Address 412 27th St., Orlando, FL 32802.

MICROWAVE SPECIALISTS: We buy and sell microwave test instruments, waveguide components. Lectronic Research 1423 Ferry, Camden, NJ 08104.

ICOM — Kenwood owners, very informative separate newsletters. Details s.a.s.e. U.I.R.C. 606Q Brack Road, Fort Pierce FL 33450.

COLLINS KW-1 wanted. Sell mint KWS-1 or trade for KW-1. Will deliver and pick up anywhere. W9NQF, 207-495-2215.

CASH for December 1915 to December 1921 QSTs for personal collection. Ken Miller, K6IR, 16904 George Washington, Rockville, MD 20853. 301-774-7709.

FREE SAMPLE — ham radio/computer Insider Newsletter Also 4-line rubber stamp w/ARRL emblem — $3.95. Visa/MasterCard. W5YI; Box 10101Q; Dallas, TX 75207.

SPIDERS for boomless quads. Heliarc welded aluminum. Al's antennas. 1339 South Washington Street, Kennewick WA 99336.

TRS80 owners. Split-screen RTTY send/receive program runs on any Level II system, tape or disk, through your M80 interface. Guaranteed, $45. Mort Waters, W2NZ, Box 379, Seaford, NY 11783.

OVERPRINTED. 1980 Fox-Tango Club Newsletters. 56 loose-leaf pages packed with modifications and information for Yaesu rigs. Only $5 while they last. N4ML Box 15944, W. Palm Beach, FL 33406.

PRE-1925 QSTs wanted. Paul Kluwe Vermontville, MI 49096.

FAST PROFESSIONAL ham repair service. New York City area. Amateur extra, FCC commercial license. Fully equipped shop. Rich Tashner N2EO, 212-352-1397.

WANTED old keys and mikes K4NBN "no bad news."

YAESU FT-7B new in box with warranty card. must sell because of illness, first $475 takes, W4STX, C. Keith, Box 2644, Cleveland Station, FL 33517.

WANTED: Collins KWS-1 s/n 1000 or higher. KWM-2A round, PM-2. Dan Greeson, 94-703 Manawahine Place, Mililani Town, NI 96789.

WORKED South America award. Send log copy of 13 countries and $2. K5ODZ, 4805 Willowbend, Houston, TX 77035.

BENCHER PADDLES: BY2, Chrome, $37.50. Vibroplex keys and paddles, 20% off net prices, most models available. W2VS Reyco coils, $15. a set. W2AU Baluns, $10.95. All items new. Add $2. for UPS. E. Cheslow, 895 East 54 Street, Brooklyn NY 11234.

COLLINS 32S1 transmitter in mint condition. $350. Bill AA6S, 209-732-7163.

VAPOR TUBE wanted 3CV1500A7. Norton 213-455-1138.

WORKED Central America award. Send log copy of 7 countries and $2. K5ODZ, 4805 Willowbend, Houston, TX 77035.

TS-520S, cw filter, VFO, mint condition. Kevin — 203-561-2451. WB1FVO.

WANTED Collins: KWM-2A, 75S-3C, 32S-3A, 516F-2, filters, cabinets, instruction and service manuals. Marin Radio Supply, P. O. Box 126, Tiburon, CA 94920 415-381-2626.

WANTED: QSLs for display. K4NBN "No Bad News."

!!COLLECTORS Items!! Early Clough-Brengle 3" Scope Hallicrafters SX-28A both working - make offer K3RJF 215-433-7579 8AM-4PM.

SWAN 350B transceiver, like new $395. W6XM 714-459-5527.

HEATH SB-620 Scanalyzer wanted. Tom Segalstad, LA4LN/W3, 601 W. Fairmount Ave., State College, PA 16801. 814-237-2575.

WANTED AN-MS connectors, synchros, etc. send list Bill Williams, P. O. 7057 Norfolk, VA 73509.

SAFETY BELTS $30 and up. Free info. Klein Tool Catalog $1. Avatar Co. (W9JVF) 1147 N. Emerson, Indianapolis, 46219.

HF AMPLIFIER parts, HV power supply parts, tubes, relays, inductors, bandswitches, transformers, other miscellaneous. S.a.s.e. list. Don Bishop, NØEA, 561 Geneva #100, Aurora, CO 80010.

VERTICALS! Using one? Buying one? Success is based on its installation, and our book "Vertical Users: Novice to Extra" is exactly what you're after. Now in its second year. Complimentary comments received from Hustler, Butternut, Worldradio, 73, Ham Radio and Bill Orr, the Dean of Amateur Radio Journalism. $3.95 plus $1 postage/handling. Danrick Enterprises Dept. 99, 213 Dayton Ave., Clifton, NJ 07011.

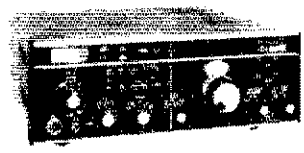
TWO-METER Icom IC-245 FM/SSB. Well cared for and recent factory checked. $395 plus shipping or offer. Cal Cornils, W6TDZ. 707-255-8554.

WHEN changing your address or call sign, don't forget to notify the Circulation Department at ARRL Hq. Enclose a recent address label from a *QST* wrapper, if at all possible. Please allow six weeks for the change to take effect.

THE BEST

YAESU FT-902

KENWOOD
ICOM
TRAC KEYERS
TEN-TEC OMNI



DRAKE TR-7

TOP OF THE LINE. NUMBER ONE. IF YOU'RE THE TYPE OF PERSON THAT WILL SETTLE FOR NOTHING LESS, WE'VE GOT WHAT YOU'RE LOOKING FOR...TOP OF THE LINE FROM THE TOP LINES. WE OFFER MORE THAN JUST THE RIGS -- SUPER SERVICE AFTER THE SALE. CALL US SOON FOR A QUOTE ON YOUR NEXT RIG.

800-845-6183

G.I.S.M.O.
2305 CHERRY ROAD
ROCK HILL, S.C. 29730

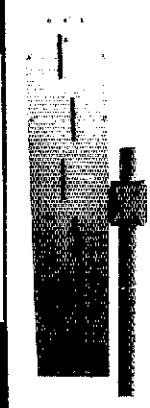
Service Department
Call 803-366-7158

MICROWAVE SYSTEMS,
KITS & PARTS

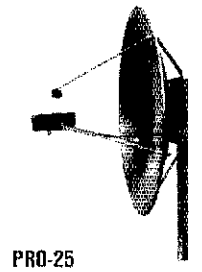
- MICROWAVE TRANSISTORS & DIODES
- MICROWAVE PRE-AMPLIFIERS
- DOWN-CONVERTERS
- POWER SUPPLIES
- CIRCULAR HORNS
- SLOTTED ANTENNAS
- PARABOLIC ANTENNAS

Now you can purchase complete built and tested systems with a 90 day money-back guarantee! We offer a complete line of antennas, power supplies, coaxial cable and connectors for the experimenter. Call or write for details.

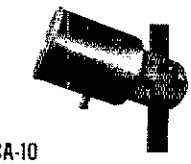
DATA SERVICE COMPANY
3110 Evelyn Street
Roseville, MN 55113
612-636-9469



SA-16

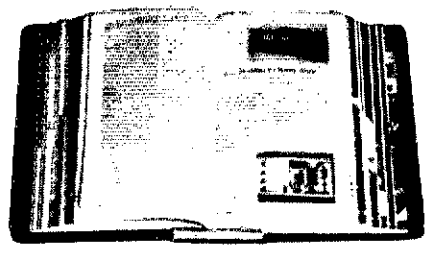


PRO-25



CA-10

QST PROTECTOR!



You have an investment in your copies of QST. Protect this investment with sturdy QST binders.

Binder for QST prior to January, 1976: $6.00. Binder for QST beginning with the January, 1976 issue: $7.00. Available in the U.S. Possessions and Canada.

AMERICAN RADIO RELAY LEAGUE
225 Main Street
Newington, CT 06111

AZDEN
Call for the Best Price
Radios and Accessories

Chuck's Amateur Radio Supply
516 Willis Ave. Madera, Ca 93637
209-674-1435 8-7 Daily

BUY SLY!
The Antenna Farm

Rohn 25G **$38.50**

Hy-Gain, Cushcraft, CDE, Alliance, Bird, Diawa, MFJ, Coaxial Cable, Connectors and much more at similar savings.

6460-H General Green Way
Alexandria, VA 22312
Phone: 703-569-1200

C. comm

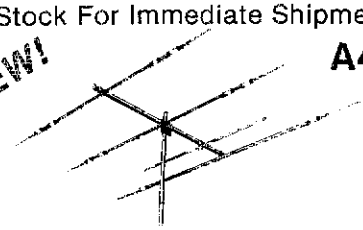
CALL ➡ FREE

SPRING cushcraft SALE

In Stock For Immediate Shipment

NEW!

A4



maximum performance
20-15-10 meter beam
SALE $209.95 SAVE $80.00
40 meter adapter also available

NEW

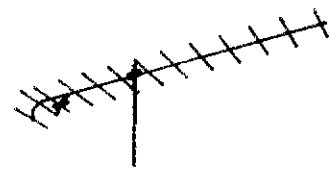
AV-5
10 thru 80M vertical

SALE $89.95
SAVE $30.00

2M FM/SSB TWIST

A147-20T
2-10 element Yagis on 1 boom
SALE $59.00 SAVE $15.95

2M Boomers at big savings:



Model		SALE
32-19	3.2 λ	$75.00 **SAVE $24.95**
214B	2.2 λ	$59.00 **SAVE $20.95**
214FB	2.2 λ	$59.00 **SAVE $20.95**

OTHER MODELS ALSO AVAILABLE

C. comm

We accept

VISA

CALL TOLL FREE
1-800-426-7741

The Northwest's Largest Ham Store

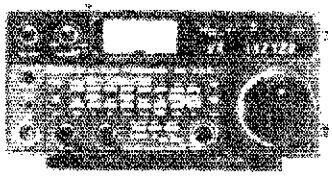
WASHINGTON RESIDENTS CALL 1-800-562-6818

ALASKA RESIDENTS CALL COLLECT 1-206-784-7337

ICOM SPECIALS

IC-2AT AND ACCESSORIES NOW AVAILABLE FOR IMMEDIATE DELIVERY

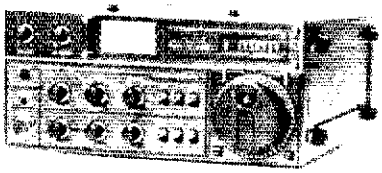
IC-720AHF TRANSCEIVER



CALL FOR PRICE AND AVAILABILITY

9 band coverage — fully WARC compatible covering 10-160M. Continuous receive from 100KHz to 30MHz including AM. Digitally synthesized with dual VFO's in 10Hz steps. Pass Band Tuning in CW, SSB and RTTY modes. RF speech processing included. Power output adjustable from 10-100W PEP.

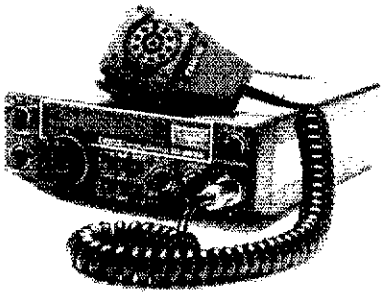
IC-251A 2M ALL MODE



CALL FOR SPECIAL PRICE

143.8000 - 148.1999 MHz, 10W,SSB,FM,CW. Dual VFO's with 3 memories. Dual all mode scanning system. AC supply self-contained.

IC-255A 25W, 2M FM

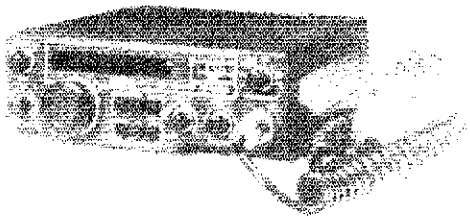


143.800-148.195 MHz, 25W FM. Dual VFO's with 5 memories. Band scan/Memory scan also included. 7.3"(W)x2.5"(H)x8.8"(D).

CALL FOR SPECIAL PRICE

Optional Encoding Microphone Available

IC-260A 2M ALL MODE



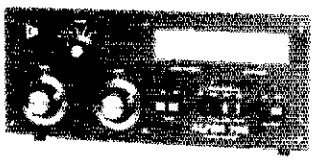
CALL FOR SPECIAL PRICE

143.8000-148.1999 MHz, 10W FM, SSB (USB/LSB) and CW. Dual VFO's with 3 memories. Band scan/Memory scan also included. 7.3"(W)x2.5"(H)x8.8"(D).

AEA MORSEMATIC

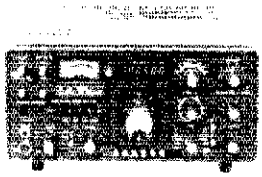
- Dual Microcomputers provide many features.
- Approximately 500 character memory with unique "soft-partitioning."
- Morse trainer mode with programmable speed-up.
- Beacon mode for VHF DX scheduling.
- Automatic serial number sequencing.

ALPHA



YAESU FT-101ZD

Now at a lower price.



DRAKE TR7

Available from stock with most accessories.

CALL TOLL FREE FOR YOUR DISCOUNT PRICE

Dealers For: AEA, ALLIANCE, ALPHA, AVANTI, BENCHER, B&W, CDE, CUSHCRAFT, DAIWA, DENTRON, DRAKE, FLUKE, HUSTLER, HYGAIN, ICOM, INLINE, KLM, LARSEN, LUNAR, MFJ, NPC, NYE, ROHN, SHURE, TEMPO, TELEX, TEN-TEC, VIBROPLEX, YAESU, AND MORE.

WE ARE ALSO EQUIPPED TO HANDLE EXPORT ORDERS.

C-COMM
6115-15th AVE. N.W.
SEATTLE, WA. 98107
(206) 784-7337

We accept VISA

MON. THRU SAT. 9:00 A.M. to 5:30 P.M.

Prices and specifications subject to change without notice or obligation.

WE BACK EVERYTHING WE SELL WITH OUR PERSONAL GUARANTEE

PRICES F.O.B. HOUSTON

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

ITEMS SUBJECT TO PRIOR SALE

MADISON
Electronics Supply

master charge

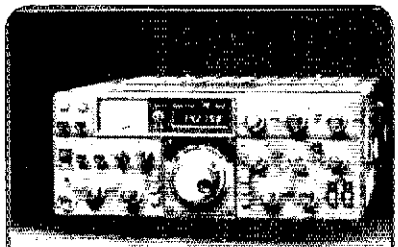
VISA

ORDER YOUR
KWM 380 NOW!
OLD PRICE & FREE GOODS

ELIMINATOR FOR MOBILES/REQUIRES MINOR RADIO MOD $19.95

COMING SOON

2 METER FM 800 CHANNEL
10 MEMORIES, 25 WATT/3 WATT
MAJOR MANUFACTURER LIST 339.00
YOUR COST 289.00

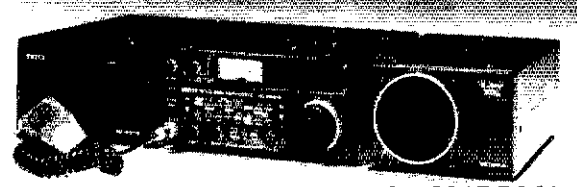


TS830S TRANSCEIVER
160-10 METERS, 3 WARC BANDS, NOTCH, VBT, I F SHIFT, BUILT IN AC
929.00
FREE FILTER 59.00
FREE MC50 45.00
929.00

HARD TO FIND SURPLUS

TELSTAR ENTERPRISES TR-2400 BATTERY

ICOM IC 720A
NEW WARC TRANSCEIVER



LIST 1498.00 WITH AC SUPPLY.
CALL

CALL
6 p.m. - 10 p.m. CENTRAL
MON., WED., FRI.,
NIGHTIME: 1-800-231-3057
DAY: 1-713-658-0268

BELDEN

	Part Number	MHz	db/ 100 ft	db/ 100 m
RG8/u Dbl. Shield	9888 65 ¢/ft.	50	1.2	3.9
		100	1.8	5.9
		200	2.6	8.5
		300	3.3	10.8
		400	3.8	12.5
RG8/u Foam .81VF	8214 36 ¢/ft.	50	1.2	3.9
		100	1.8	5.9
		200	2.6	8.5
		300	3.3	10.8
		400	3.8	12.5
RG8/u Regular . 66VF	8237 32 ¢/ft.	100	2.0	6.6
		200	3.0	9.8
		400	4.7	15.4
		900	7.8	25.6
RG 213 Non-contaminating	8267 43 ¢/ft.	100	2.0	6.6
		200	3.0	9.8
		400	4.7	15.4
		900	7.8	25.6

8448 27 ¢/ft.
No. of Cond. — 8
AWG (in mm) —
6-22 (7 × 30)
2-18 (16 × 30), (1.19)

9405 45 ¢/ft.
No. of Cond. — 8
AWG (in mm) —
2-16 (26 × 30)
6-18 (16 × 30), (1.17)

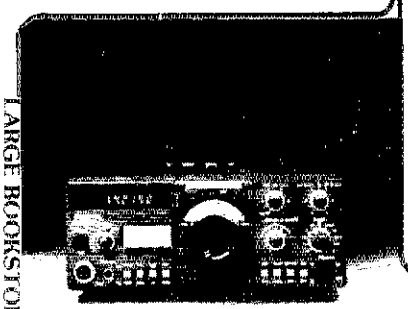
BELDEN MINI

RG-8 19¢/ft./9258

ET CETERA

Cubic-Swan 102BXA	$999.00
Astro 150 A	849.00
Robot 800 A	749.00
Mirage B23 1 watt-30 Watt amp	89.95
DSI 5600A w/Ant/Ac	185.00
Cushcraft A3 Tribander	169.00
Bird 43, Slugs	Stock
CDE Ham-4 Rotor	199.00
Ham-X	269.00
FDK Palm 2 Handie with BP/AC	149.00
Cetron, GE 572 B	38.00
GE 6146B	9.95
Fits Kenwood Yaesu	
Kenwood Service Manuals	
Stock	10.00 ea.
Telrex TB5EM	425.00
Belden #14 8000 Stranded	
Antenna Wire	10¢ ft.
Lunar 2M4-40P	109.00
Adel Nibbling Tool	8.95
Janel QSA5	41.95
Rohn Tower	20% off dealer
25G,45G Sections	
Alliance Hd73 Rotor	109.95
Amphenol Silverplate PL259	1.00
ICOM 255A 2M Synthesized	339.00
w/TT Mike	
ICOM 260A 2M SSB/FM/CW	449.00
Kenwood TS 180S/DFC/SSB	Call
New-Icom IC 720 w/AC/mike	Call
Bearcat 220 - $299.00	300-399.00
Manual Typewriters	$35
Guaranteed to Work	
Mallory 2.5A/1000 PIV	
Epoxy Diode	19¢ ea.
Antique Tubes	Call
2 Guaranteed Service Techs on	
COLLINS KWM-2/KWM-380/S-LINE CALL!	

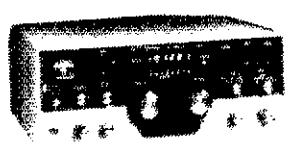
LARGE BOOKSTORE—WHAT DO YOU NEED?



TS 130S
WARC TRANSCEIVER
80-10 METERS
SOLID STATE RIG
3 WARC BANDS
PROCESSOR
759.00
AT 130 139.00
80-10M & WARC
ANTENNA TUNER
FREE
Total 759.00

ALL BAND COVERAGE!
160 THROUGH 10 INCLUDING WARC
9 BANDS FULLY OPERATING

ASTRO 103
Professional Grade
HF SSB Transceiver



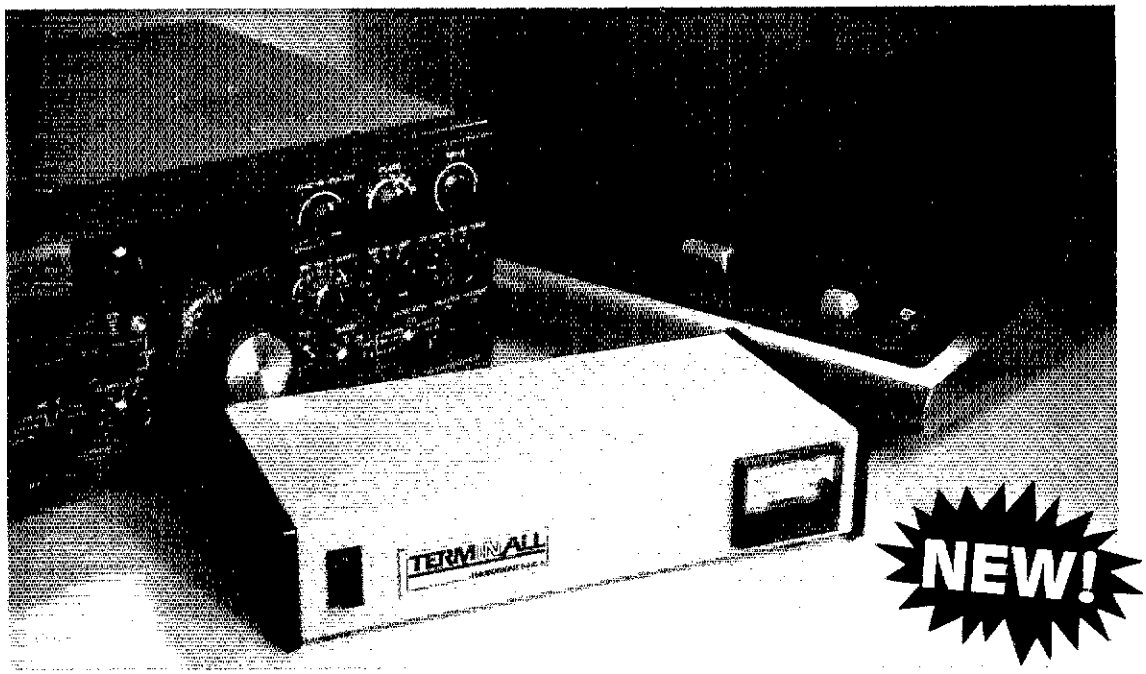
- 100 WATTS ALL BANDS ALL MODES
- AGC DYNAMIC RANGE GREATER THAN 100 dB
- SELECTIVITY 16 POLE CRYSTAL FILTER 2.7 kHz at - 6dB; 3.78 kHz at - 100 dB

$1395.00 SUGGESTED LIST
CALL FOR QUOTE

713-658-0268 **CALL FOR QUOTES** **1508 McKINNEY HOUSTON, TEXAS 77010**

TERMINALL

The communications terminal that does it all!



TERMINALL is a hardware and software system which converts your TRS-80 (Model I or III) into a state of the art communications terminal. TERMINALL is simple to use. TERMINALL has superior performance. TERMINALL works with a general purpose computer and is expandable. TERMINALL has it all!

Simplicity

TERMINALL was designed from the outset to be easy to connect to your radio and easy to use. Plug into your receiver headphone jack and copy Morse code, Baudot or ASCII. Plug into your CW key jack and send Morse code. Attach a microphone connector and send Baudot or ASCII using audio tones (AFSK). That's all there is to hooking it up.

The software may be loaded into your computer from cassette or disk. Enter your callsign and the time and you will start receiving immediately. No settings or adjustments are necessary to receive Morse code—it's fully automatic—and it works! You may type your message while receiving or transmitting.

You will be on the air, receiving and transmitting any mode in minutes. As we said, TERMINALL is simple.

Superior Performance

TERMINALL can do so much that it's simply not possible to list all the features in this limited space. Here are just some of the highlights:

■ **Multi-Level Displays:** Edit window on top to enter transmit text or program messages. Status window displays mode, operating parameters, prompts and error messages. Dialogue window displays received and transmitted text in chronological order. Review window allows examining and editing historical text while receiving or transmitting.

■ **Fantastic Morse reception:** Six stage active filter demodulator copies the weak ones. Auto adaptive Morse algorithm copies the sloppy ones. Keyboard selectable noise threshold. Received code speed displayed on status line.

■ **Hardware clock:** Maintains correct time during all operations, including cassette I/O. User programmable time/date format.

■ **Full ASCII capabilities:** Upper and Lower case, control codes, even/odd/or no parity, 6, 7 or 8 data bits, 75 or 110 baud.

■ **Multiple user-defined WRU:** For each of four WRU functions, you can select any combination of (1) Initiate sequence, (2) Terminate sequence (including none or timeout), (3) What to transmit back (if anything—including ID in any mode, message, serial number, time/date), and (4) Whether to save on tape or not. WRU functions work in all modes (Morse, Baudot, ASCII).

■ **Buffered ASCII** parallel printer output: Select: edited historic text; all text, or WRU activated ("AUTO START") text.

■ **Word wrapping,** word mode editing, diddle, ignore carriage returns, user programmable end of line sequence, adjustable carriage width, Transmit delay (fixed, none, or auto adaptive), Break mode, Keyboard selectable: baud rate, shift, CW ID keying, unshift-on-space, signal invert.

■ **Flexible interfacing:** Builtin: Separate CW and RTTY demodulators, AFSK, CW and PTT keying, 20/60 mil loop interconnect, RS232 IN and OUT, hand-key input, sidetone output, and jumper selectable 110/220 volt AC power supply.

General Purpose vs Dedicated

TERMINALL has capabilities far surpassing other "dedicated terminal" systems. And yet, since it works on a general purpose computer, the majority of your investment (the TRS-80) is spread out over many different applications—not just radio communications. And your system is expandable. For example, Disk based mailbox software may be added at any time.

Simplicity of Operation. Superior Performance. General Purpose Computer. What are you waiting for? This is the way to go!

Complete with software on cassette (including disk loading version), assembled and tested hardware, and extensive instruction manual. Specify Model I or Model III. Level II 16K required. **$499.**

MACROTRONICS, inc. ®

1125 N. Golden State Blvd.
Turlock, CA 95380
(209) 667-2888 / 634-8888

VISA

master charge

15 Day Money Back Trial Period. One year parts and labor limited warranty. Add $4 shipping in U.S.A. CA residents add 6% sales tax.

We continue to experience telephone difficulties, please keep trying.

***Recognized trademark of Tandy Corporation.**

PRINTED CIRCUIT Boards. Especially for the beginner. Make them yourself. Proven simplicity. COVAL, Dept. QST5, 2706 Kirby, Champaign IL 61820, 1-217-352-9336.

FISHING for DX?? $9.95 gets whale of a buy! Personalized Computer Listing, Zero Beat your station Gives DXCC list, beam headings, zones, continents, and much more . . . originating from your QTH (or the nearest locazion with a pop of 2500 or more) Send $1 check or money order (deductable at purchase) for specimen, to: B.A.S.I.C. P.O. Box 14, Palatine, IL, 60067 Operators in the Western Hemisphere order Delta Package Overseas Operators order Echo Package. $1.50 additional air mail or overseas shipping.

WANTED: R-278B, T-217A, & MD-129A/GR (GRC-27 units) unit enclosures. C. T. Huth, 146 Schonhardt St., Tiffin, OH 44883.

FOR SALE: Drake TR-7/DR-7, a.c. supply, mobile mount, 0.5/2.3/6.0 kHz. filters. Jim Young W5ZZ, 1214 Northlake, Richardson, TX 75080 214-235-6927.

NEW Ten-Tec Delta $700/offer. KD6DT 415-447-4746.

QST — back issues 1921 to 1960 S.a.s.e. list, also buying collections W3ZD, 520 Centennial Road, Warminster, PA 18974, 215-675-4539.

WORLD PRESS Radioteletype station lists. Over 50 different worldwide press services contained in 3 lists. By time, by frequencies and ITU combination list. all transmitting in english. 24 hours. Hundreds of confidential and fascinating RTTY news stations in these up to date lists. Utilize your present equipment. Book with lists. $5. postpaid. Universal Electronics 1280 Aida Drive, Reynoldsburg, OH 43068.

TRS-80 48k, EI, one disk drive, M80, Flesher TU-170. $1100 Pickup only. WB5HBO 1103 Serenade, Richardson TX 75081.

WANTED: Viking 500 trans, Viking Valiant, Viking Ranger DX100B, Collins 75A-4. All must be mint or near mint cond. Tom WB2IIS 716-876-2166 aft. 5 P.M. EST Write 288 Knowlton Ave., Kenmore NY 14217.

ASTROTELESCOPE: Celestron C-5 Schmidt-Cassegrain/many accessories. Sell or Trade for TR-7/DR-7. Fred WB2TBC NYC. day/nite 212-289-7048.

KENWOOD TWINS, Azden PCS-2000 Motorola Slimline 470 MHz. Celestron C-5 Astrotelescope. WB2TBC, Fred, New York City. day or nite 212-289-7048.

SALE — HW-16 (excellent) $120 VFO $65, 704-633-9183. Rt. 9, Box 251, Salisbury NC 28144 Jim Howell, KA4EBW.

FOR SALE: Collins 75S-1 receiver $250. KB5OP 504-821-4203 evenings.

DRAKE R-4B, T 4XB, AC-4, MS-4, 7075 Mic, manuals, dustcovers, excellent $600. Also, Telex "Tri-Band, Model TB2E, 10-15-20, $65. Hy-Gain 14 AVQ/WB, 10 thru 40 vertical trap, $30. Bill, WB3IDE, 207 N. 38th Street, Harrisburg, PA 17109 717-657-3059.

HW-8 MODS: RIT, wattmeter, audio filter, 15-m rx improvement, test report. Reprints of articles in May, August and October 1977 CQ by Ade Weiss, K8EEG. $7 to Ade Weiss, 83 Suburban Estates, Vermillion, SD 57069. Proceeds intended to support The Milliwatt DX-CC and FD awards program.

KENWOOD TS-820S cw filter, VFO-820 mint condition like new, used few hours complete $895. Shure 444D microphone $35 — N4TR 502-451-5916.

KENWOOD TS-180S with DFC, YK-88C cw filter, and YK-88S second ssb filter — $900. Mosley CL-33 Tri-band beam — $150. CD Ham III/CD-44 rotator $100. Rohn 25G 50 ft. tower — $100. Package for $1200. Moving into apartment, must sell. Will deliver New York and New England. Gene, W2INO, 518-756-2698 evenings.

COLLINS WARC conversions, $125; S-line dual VFO, $150; KWM-2/75S twin transceive, $250; 75A-4/KWS-1 transceive, $350. K1MAN, 207-495-2215.

REALLY NEED: Collins speaker to match the 51J-4/75A-4; good condx. please. Turner C-4 stand for the Mdel 80 mic. Matching speaker for Hammarlund HQ-170 receiver; good condx. please. Does anybody have these items?? Also, I am looking for an E. H. Scott Philharmonic receiver in Secretaire desk console. Will consider Chippendale or Warrington console. Must be clean and in good operating condition with undamaged cabinetry. AN. Gerli, AC1Y 35 Brookmoor Road, Avon CT 06001.

USED MARINE Electronic for sale: A wide assortment of used marine electronic equipment for sale including vhf radio-telephones which can be converted to two-meter Ron Graham Jr., 12 Rogers St., Gloucester MA 01930.

TRISTAO MM-40 crankup self-supporting Mini Mast, 40 ft. Never Used. $350 f.o.b. KB2QM 315-488-6840.

SELL — Mint VFO for Tempo 2020 — Millen GriDip meter — want TR4 manual. Howerdel, 206 Pearce Ave., Point Pleasant NJ 08742 Tel. 201-899-7570.

NEED series 2 or 3 plug-in module for Tektronix 564 scope, prefer 3A6. W8JBS, 513-464-6201. 10020 C.R. 38, Belle Center OH 43310.

DRAKE TR4CW/RIT, AC4 power supply, RV4C remote VFO $650; HD-1410 keyer $40, WB3DIP, 1-412-537-7693.

COLLECTORS DeForest DV5 tubes paper label $20 each KA7B 406-295-5910.

WANTED TMC SBE-2 (AN/URA-23A) exciter and power supply. Also Central Electronics 200V for parts. Bendix R-1051 for parts. Larry N3AIF 3329 Nautical Dr., Green-Bay WI 54302.

TRANSOCEANIC $150. HX-16 $150. 75A4 $450. SX-100 $150. All as-is. Take TRS-80 trade. Pick-up only, Houston 468-3049, McMahon.

INTERESTED in satellite communications? Contact ARRL Hq. for information about the OSCAR program.

AGL Electronics

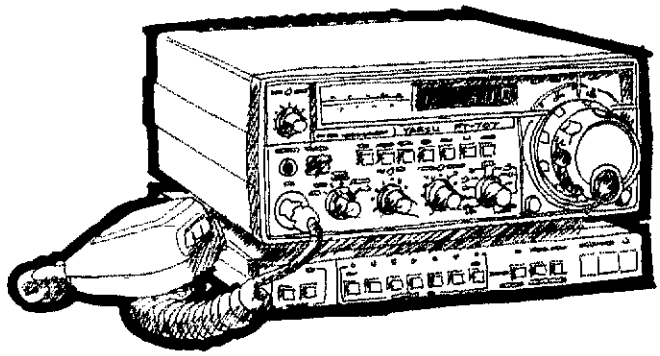
DALLAS, TEXAS
15 miles from South Fork Ranch

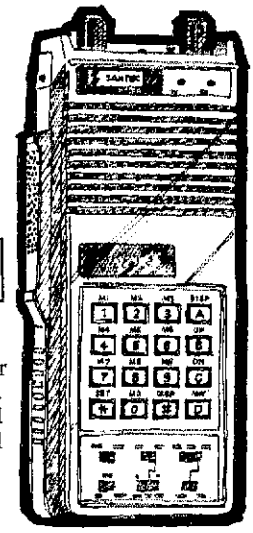
YOUR FULL SERVICE DEALER

The Price Is Right, The Class Is Extra...

AGL Electronics deals in all Ham equipment of the highest quality, and the service and attention are all Extra Class. Our entire staff are holders of Extra Class Amateur licenses, and they've all been dealing in Ham equipment for years.

SANTEC, YAESU, ALPHA, ICOM, HY-GAIN, CUBIC, BIRD, AND MORE.





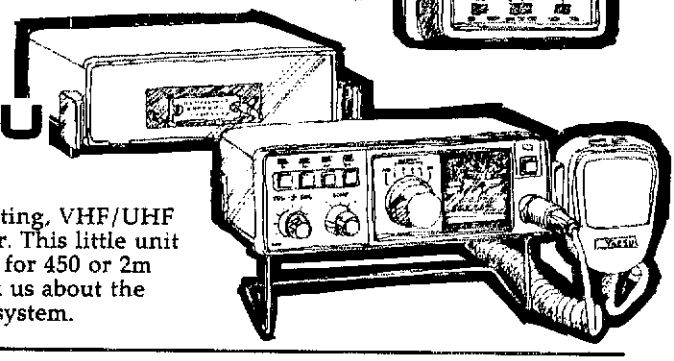
SANTEC

HT-1200

Big-rig features and big power output. 4 W high, 1 W low. Fully integrated keyboard input with 10 memories and 4-mode scanning.

YAESU FT-707

Yaesu's newest multi-mode transceiver, with a full 100 W output on 80—10 meters. Shown here with optional FV-707DM VFO and scanning microphone.



YAESU FT-720

Flexible mounting, VHF/UHF FM transceiver. This little unit is synthesized for 450 or 2m operation. Ask us about the complete 720 system.

JUST SOME OF THE BARGAINS YOU WILL FIND AT AGL:

ROHN TOWER

25G	$37.50	45G	$83.75
FK-2548	$ 655	48 ft Foldover	
FK-4554	$1025	48 ft Foldover	
FK-4564	$1115	68 ft Foldover	
HDBX-48	$ 305	Self-Supporting 48 ft	
HBX-56	$ 335	Self-Supporting 56 ft	

TEN-TEC

580 Delta	$ 781.00
546 Omni "C"	$1085.00
280 Standard P.S.	$ 156.00
285 Deluxe P.S. with speaker	$ 170.98

CUSHCRAFT

ATV-5	$85.00
32-19	$74.00
214B	$58.00
ARX-2B	$38.00

HY-GAIN

TH6DXX	$237.00
TH5DX	$201.00
TH3MK3	$178.00
TH2MK3	$118.84
TH3JR	$137.00
105BA	$ 98.00
155BA	$150.00
205BA	$237.00
204BA	$188.00
402BA	$172.00
DB1015A	$127.00
18AVT	$ 83.00
14AVQ	$ 49.00
18HT	$275.00
BN86	$ 13.00

ROTORS

CDE Ham IV	$169.00
CDE T2X	$239.00
Hy-Gain HDR-300	$395.00

All towers require prepayment by cashier's check or money order. All other advertised specials will receive a 2.5% Discount if order is accompanied by cashier's check or money order.

Free freight on Rohn Tower orders of over $1,500.00. Freight paid on foldover towers. All others F.O.B. Dallas. 10% higher west of the Rockies, unless shipped from Dallas; slightly higher if drop-shipped.

Prices subject to change without notice.

AGL Electronics, We'll do it right.

For quick shipment, call today: 800-527-3418

Store Hours Monday through Friday: Eastern 10-7, Central 9-6, Mountain 8-5, Pacific 7-4

Retail Store: 13929 N. Central Expressway, Suite 419, Dallas, Texas 75234, (214) 699-1081
Mail Order: 705 N. Bowser #106, Richardson, Texas 75081 Prices and Policy Subject to Change Without Notice

AGL Electronics is located only in Dallas and has never been associated with any other dealer.

CENTURY 21 Ten-Tec, Model 570, New finals $250 Call Walter Carper, KA8CEX 304-438-6337 after 4 P.M. weekdays.

WANTED: Rotator with collector rings such as Johnson or Loudenboomer. W4ZWD.

DRAKE 2-B receiver with calibrator and speaker. Excellent condx. KB3IC, Tom, 215-295-8931.

FT-101E $595. 1330 Curtis Berkeley CA 94702. R. M. Nagata.

HEATH SB-101 with SB-102 factory mods and Fox-Tango 1.8 kHz ssb filter, 14 spare tubes, HP-13 A with HP-13 B mods and HP-23 A supplies, SBA-100-1 mobile mount, Electro-Voice 638 and mobile mikes. $425. W8MGI. 614-369-7136.

TOWER, Universal aluminum sections. Add 10 or 20 feet to your tower. 18 STR, $75. 22 STR, $140. W8MGI. 614-369-7136.

AZDEN PCS-2000 2m fm transceiver with touch-tone, new condition, $275. Bearcat 250 scanner, new condition, $200. Motorola Metrum II commercial grade 12-channel 2m FM transceiver, looks good and operates perfectly, $200. Ten-Tec KR50 iambic keyer, new condition, $50. Marty Barrack WA2ZKR, 6682 Old Blacksmith Dr., Burke, VA 22015. Phone 703-455-2141 evenings.

DE FOREST AUDIOTRONS two tubes, circa 1980, in good condition. Send s.a.s.e. for photograph and full description. John Phillips, K2QAI, 9 Everit Place, Smithtown, NY 11787.

HARVEY-WELLS TBS-50D with factory VFO and power supply, $100. Hallicrafters SX-29A with matching speaker, $75. Both operating and have original manuals. W4HWQ, 225 Squaw Creek Road, Willow Park, TX 76086. 817-441-8449.

KENWOOD R300 Rec. used very little $150. Clegg 22BR MK-2 mint cond. $75. 896-3549 WA1DLL.

QST Magazines Complete set Dec. 1915 on 1/2 bound 1/2 binders call weekdays J. Tremblay 714-451-4674.

WANTED: Swan VX-2, AF800 c.w. filter, Aug. 1930 QST. Sell: Drake TR-6 A.M. filter $40., Ameco VFO 621-$50. Heath HW-17 with FM adaptor $115.00 + shipping. Steward Cook K2IUD, 75 Rose Ct., Albany NY 12209. 518-465-5290 eves.

CLEGG: FM-28 two-meter transceiver. EC. $250/best. Frank AC8P 617-225-6168.

R7, new condition, $1090. Cashiers check or MO, shipped UPS, WD4EFD 1600 Chapman, Huntsville, AL 35811 205-534-4012.

WANTED: Hammarlund HQ-170 IF transformer T1 — Hammarlund Part No. K26402-1 F. Thompson, Box 286, 3150 N.E. 36th Ave., Ocala, FL 32671 — 904-622-6143.

WANTED: Collins 30L1, S0S1, 4CX1000A tube. W9QYH, 1605 Ridge Rd., Green Bay, WI 54304.

COLLINS KWM2, PM2, manual, mint condition $550. Genave 2 meter transceiver, xtals $90. Swap for Olympus OM-1, OM2 camera. S. Hochman 5271 N. Shoreland Milw. WI 53217 414-961-2030.

HAMMERLUND HQ-170C, excellent condition, $120. K5WGO, Hammond, LA. 70401 504-345-3283.

SWAP SWLing/QSO audio cassettes. Stamped envelope. Timm, 3212 DuPont So. Mpls., MN 55408.

COLLINS 312B-4, $210. FT101 acdc, fan, filter, $410. Janel QSA-5, $25. Manuals, factory cartons, all excellent. W5KX, 1732 Willow Point, Shreveport, LA 71119.

McGRAW-HILL 1500-page Electronics Buyers' Guide. Lists 5000 manufacturers & their addresses. Details s.a.s.e. Jim Hall W4BLX, Route 3, Box 281A Staunton, VA 24401.

SWAN 350D digital 80-10 meter transceiver, 125 watts output, dust cover, Shure 444 microphone. Mint condition. Seldom used — 1-1/2 years old. $600. Mike Ryder, KA9N, 201 Depot, Oregon, IL 61061.

FOR SALE: Drake TR-3 transceiver with MS-4, power supply. Also, Yaesu FL 2100B amplifier 10-80 meters. W2QUT — Andy Malan 212-726-6759. Best offer accepted.

HEATHKIT HW-101 with HP-23C ps, mint $325. WB1CJX 207-743-9397.

SALE: Drake R4-C receiver, with extra crystals, excellent — $400. Yaesu Memorizer, 2-meter, 10-watts, synthesized base with memory. $250 or best offer takes it. Autek QF-1 audio filter, $45. Call Jay, KD2L, 201-254-5860.

TELETYPE model 28 ASR excellent condition setup with 60 speed comes with extra 100 speed gears, reperf. tape, paper. You pickup $415. Tektronix type 317 oscilloscope, with manual, high voltage probe, all test leads. $185. Dave A1P Southington, CT 203-621-5771.

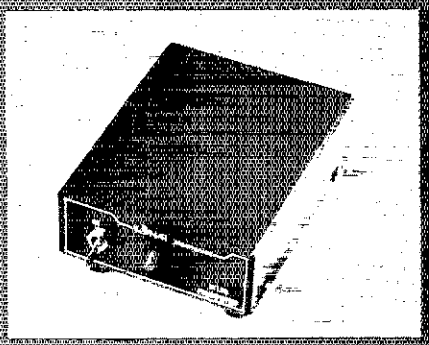
HAMMARLUND SP-600JX and CV-591, excellent with manuals, $350, FOB. CV-157, very good with manual, $150. FOB. W9VZR, 4627 North Bartlett, Milwaukee, WI, 53211.

BUILD antenna tuner from brand-new ARC-5 transmitters. Conversion data included $18.95. Send for Gov't. surplus catalog 50c. G&G Radio 45-47 Warren St., New York, NY 10007 212-267-4605.

75A4 OWNERS: F455J05 filter $95. W9ZR, 1-414-434-2938.

450 MHz h.t. Tempo FMH-42 2 watt 6 freq. 16 button TTP desk charger $225. K5NI 4120 Kipling Beaumont, TX 77706 713-892-0993.

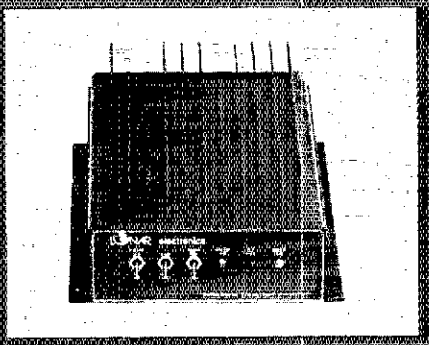
ONE SET: of 6 commercial cavity filters for a 2-meter repeater station. They are set up for 146.250/146.850. Will cover 135 to 165 MHz. Reasonable. Write Jack Golden, Sec./Treas., 28 South Main Street, Portville, NY 14770.



LUNAR RECEIVING PRE-AMPS

These ultra-performance units are suitable to the most demanding needs where low noise figure is important. Use with all types of weak signal work such as EME, tropo, long and Meteor scatter, satellite communications, radio astronomy, etc. Models for all amateur bands through 432 from $35.

(Models available for virtually any HF to UHF application.)



LUNAR LINEARIZED AMPLIFIERS WITH BUILT-IN RECEIVE PRE-AMPS

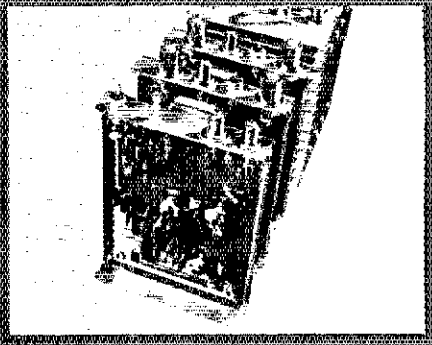
The superior linearity of our amplifiers give you an almost exact reproduction of the input signal so you get all the usable power you are paying for. With minimum side splatter! Compare Lunar's amps output signal with our competitors on the air. You'll buy Lunar.

For 144 MHz
40 to 200 watts power output ..... From $124.95

For 220 MHz
25 to 140 watts power output ..... From $159.95

For 50 MHz (export)
50 to 120 watts ..... From $199.95

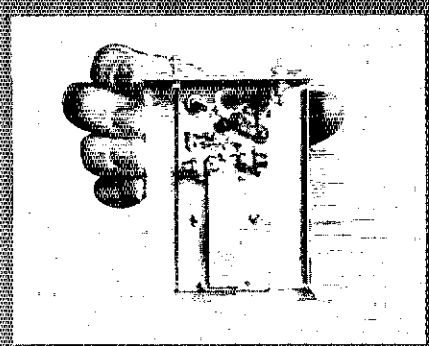
(Commercial, special purpose and repeater amps available.)



LUNAR TRANSVERTER MODULES

The addition of various combinations of Lunar's Transverter Modules to your present transceiver can expand your station coverage from HF through UHF. We have transverter combinations for working OSCAR Phase III, exploring 220 MHz SSB, or transmit/receive 440 MHz ATV from CW. Lunar even has modules for receiving noise from the sun, from weather satellites. Write for information on your specific needs.

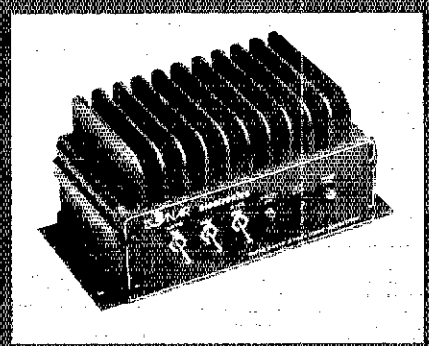
VHF=LUNAR



LUNAR PAG PRE-AMPS

Designed especially for repeater use and low noise/weak signal work, these new GaAs FET pre-amps improve dynamic range up to 10 times over standard FETs and up to 1000 times over bipolar amps. Incredibly low .5 dB NF is typical. Replacing your present front end preamp with a Lunar PAG preamp effectively negates transmission line loss contributions making your system environmentally limited rather than equipment limited.

From $89.95

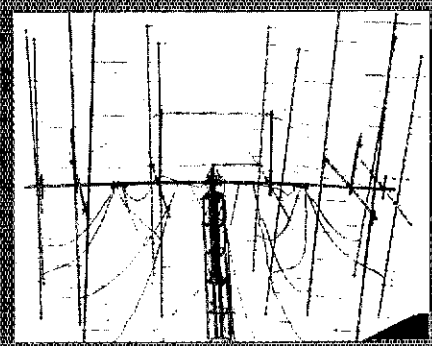


LUNAR 2M 4-40P LINEARIZED AMPS

Makes your handheld synthesized transceiver a GIANT!

- 1 to 4 watts in—10 to 40 watts out
- Can be used with any 1-5 watt radio
- Linearized for compatibility with SSB
- Receive pre-amp has nominal 10 dB gain and under 2 dB NF
- Amp and pre-amp functions independently controllable
- Remote control capability
- Accessory DC voltage for powering handheld models
- 220 MHz Model also available

$129.95



HIGH PERFORMANCE YAGI/UDA ANTENNAS

These modern designs meet the demanding criteria required by all serious VHF enthusiasts. High gain coupled with high efficiency in a moderate boom length give these antennas the highest performance per boom length of any on the market. These antennas were used for many first EME contacts (including the first 144 and 220 MHz EME from Mexico).

NMT-11/144	$79.95
NMT-11/220	$69.95
SST-07/19	$64.95

Prices include baluns.

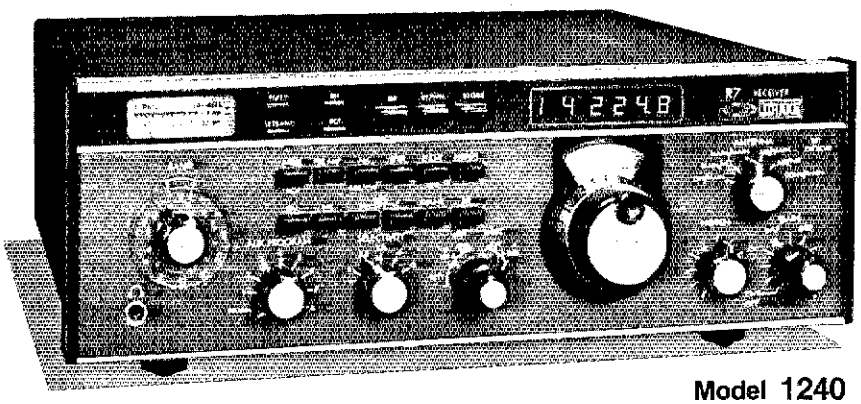
Louis N. Anciaux

LUNAR electronics

2775 Kurtz Street, Suite 11
San Diego, CA 92110
Telephone: (714) 299-9740

DRAKE 7-Line Family

A pacesetter since 1943, Drake led in 1963 with 9 MHz i-f transceiving, and now with 48 MHz i-f "Up Conversion" . . . Drake brings you tomorrow's state of the art today.



R7

Synthesized General Coverage Receiver

Model 1240

Full general coverage reception, 0-30 MHz, with no gaps or range crystals required.

Continuous tuning all the way from vlf thru hf. Superb state-of-the-art performance on a-m, ssb, RTTY, and cw—and it transceives with Drake TR7.

- **100% solid state broadband design,** fully synthesized with a permeability tuned oscillator (PTO) for smooth, continous tuning.
- **Covers the complete range 0 to 30 MHz** with no gaps in frequency coverage. Both digital and analog frequency readout.
- **Special front-end circuitry** employing the high level double balanced mixer and 48 MHz "up-converted" 1st i-f for superior general coverage, image rejection and strong signal handling performance.
- **Complete front-end bandpass filters** are included that operate from hf thru vlf. External vlf preselectors are not required.
- **10 dB pushbutton-controlled broadband preamp** can be activated on all ranges above 1.5 MHz. Low noise design.
- **Various optional selectivity filters** for cw, RTTY and a-m are switch-selected from the front panel. Ssb filter standard.
- **Special new low distortion "synchro-phase" a-m detector** provides superior international shortwave broadcast reception. This new technique permits 3 kHz a-m sideband response with the use of a 4 kHz filter for better interference rejection.
- **Tunable i-f notch filter** effectively reduces heterodyne interference from nearby stations.
- **The famous Drake full electronic passband tuning system** is employed, permitting the passband position to be adjusted for any selectivity filter. This is a great aid in interference rejection.
- **Three agc time constants** plus "Off" are switch-selected from the front panel.
- **Complete transceive/separate functions** when used with the Drake TR7 transceiver are included, along with separate R7 R.I.T. control.
- **Special multi-function antenna selector/50 ohm splitter** is switch-selected from the front panel, and provides simultaneous dual receive with the TR7. This makes possible the reception of two different frequencies at the same time. Main and alternate antennas and vhf/uhf converters may also be selected with this switching network.
- **The digital readout** of the R7 may be used as a 150 MHz counter, and is switched from the front panel. Access thru rear panel connector.
- **The built-in power supply** operates from 100, 120, 200, 240 V-ac, 50/60 Hz, or nominal 13.8 V-dc.
- **The R7 includes a built-in speaker,** or an external Drake MS7 speaker may be used.
- **Built-in 25 kHz calibrator** for calibration of analog dial.
- **Low level audio output** for tape recorder.
- **Up to eight crystal controlled fixed channels** can be selected. (With Drake Aux7 installed.)
- **Optional Drake NB7A Noise Blanker** available. Provides true impulse type noise blanking performance.

Specifications, availability and prices subject to change without notice or obligation.

R. L. DRAKE COMPANY DRAKE

540 Richard St., Miamisburg, Ohio 45342, USA
Phone: (513) 866-2421 • Telex: 288-017

QST DATA FILE NO.8

The Decibel and Signal Enhancement

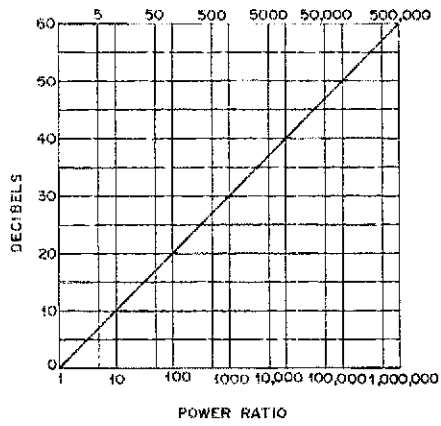
$$dB = 10 \log \frac{P_2}{P_1}$$

or

$$dB = 20 \log \frac{V_2}{V_1}$$

or

$$dB = 20 \log \frac{I_2}{I_1}$$



P = Power (watts)
V = Voltage
I = Current

What might we consider a worthwhile decibel increase for the signal we transmit? Some may argue that an increase of 1 dB can mean the difference between being copied or having one's signal lost in the QRM or QRN. But, most operators agree that a 3-dB increase (doubling the power) represents the boundary for a discernible change in audible level. The actual threshold of observed level change will depend upon the acuity and frequency-response characteristics of the human ear in a given situation. But, let's presume for the purpose of this discussion that a change of 3 dB or greater is significant. Thus, if we increase the power of a cw signal from 10 watts to 20 watts, the audio note from the receiver will sound twice as loud (agc disabled). If we had an accurate S meter, it would register a 3-dB increase in the strength of the incoming signal.

There are many ways we can garner additional decibels in our amateur stations. The most obvious method is to add an rf power amplifier to permit dc-input levels up to the legal limit of 1 kW. The effective signal strength can be increased by employing an antenna that has gain, and this may be less expensive than adding a linear amplifier. An increase in useful radiated power can often be realized by improving the impedance match in an antenna system, and by changing to a transmission line that has lower losses. We can see from the foregoing that an improvement in decibel level is a *cumulative* undertaking.

Let's assume we have a transmitter that provides 60 watts of output on 14 MHz. The antenna is a half-wave dipole (unity gain). We're using 150 feet (46 m) of RG-58/A coax cable as the feeder. The transmission-line loss will be approximately 2.25 dB. First, we can change to 1/2-inch (13-mm) Hardline (RG-231) and cut the loss to 0.45 dB — a gain of 1.8 dB. Next, we can install a 3-element, full-size single-band Yagi beam and increase the signal in a favored direction by roughly 8 dB. Our net gain thus far is 9.8 dB — or equivalent to going from 60 watts of transmitter output to 600 watts! Finally, we can add a linear amplifier and obtain approximately 600 watts of power output (assuming an amplifier efficiency of 60%), to boost the signal strength another 10 dB. Considering all of the above improvements we have gone from an initial erp (effective radiated power) of 36 watts to 3500 watts, with a 19.8-dB increase in our transmitted signal. The signal we receive from the other station will be stronger, too, owing to the 9.8-dB improvement in the antenna system, making the received signal sound about 10 times louder.

Even a 3-dB increase in signal can be helpful when conditions are difficult. Assume that with a given signal level the other station can't copy you because your signal is the same strength as the QRN. You increase your power output to add 3 decibels. Now, your signal is 3 dB above the QRN level and you are being copied Q5. If you had a signal that was, say, 10 dB or greater above the noise, the 3-dB increase would barely be noticed.

If you don't have a copy of the League's plain-talk "beginner's handbook," *Understanding Amateur Radio* (principles and construction), now may be the time to purchase one. It shows how to build gain antennas and explains decibels and power ratios in simple terms. There is also a 250-watt linear amplifier described in the book. It will alow the maximum legal power in the Novice subbands, and is suitable also for boosting the power of a QRP station. Amateurs of all technical levels should find *Understanding Amateur Radio* interesting and informative. — *Doug DeMaw, W1FB*

For more information about *Understanding Amateur Radio*, see page 124 of this issue.

PAIR 4CX1000A's with sockets $150; 4CX5000A $150; HP 340B noise figure meter w/source $395; TET 17' self supporting aluminum tower $125; ASR-33 $295; Hamtronics 220/28 MHz transverter $110; Lunar 11el 220 Yagi $40; Lunar PAE-432-5 preamp $35; SI 1296 loop Yagi $45; B&W FC-30 $20. Wanted: 8877's, 4CX1500B's, 3-1000Z's, 2C39's, UHF coax relays, monobanders, AZ-EL mount/components, rack cabinets, Heliax, UPX-6, ART-42 RG-17A/U, HV diode stacks. Jim Stitt, WA8ONQ, 513-475-4444.

CONTESTERS: Send for a sample of the only publication devoted entirely to contests; The National Contest Journal, Box 79252, Houston, TX 770024.

COAXIAL CABLE sale free catalog — Preassembled patch cords PL-259 both ends. RG-8/U Columbia 3ft $3.25, 20ft. $6.25, RG-58/U 12ft. $3.25 20ft. $3.95, shipping $2. first 3, 35c each extra. Nemal Electronics 5685 SW 80 Street Miami, FL 33143 305-661-5534.

WANTED: Gold plated connector pins/scrap. $1/oz. & up. Ron Guard, W6TWT, 10105 Stern Ave., Cupertino, CA 95014.

COLLINS 75S3 receiver. Excellent thru-out. $385. Karl, WA2BSX 518-489-7254.

KIRK 2-Element 40 meter fiberglass beam. Never assembled. Cost over $500, sell for $400. John Hill, K2YY, 130 West Central Ave., Moorestown, N.J., 08057. 609-235-2777.

ANTENNA MOUNTS: standard 3/8-24 thread base accepts most whips. Fits on trunk lip, complete with 16' RG-58/U preassembled, ready to plug in. 50% off sale $5.95 ea plus $2. shipping. Quantity discount call 305-661-5534 Nemal Electronics 5685 SW 80 Street Miami, FL 33143.

PC Boards. Prototypes, short runs from your film. KJ Circuit Boards, Inc., Box 8013, Orlando, FL 32856.

YAESU FT901 DM, cw and ssb filters, FV901 DM synthesized 40 memory VFO, speaker SP901P with phone patch. Used only 6 months. Jim Cooper, WB4SLV, 12442 Merlin Ave., Baton Rouge, LA 70816. 504-293-6943.

SELL: Drake 2-B, very good condition $135. WBØSSX, RR#3, Mt. Pleasant, IA 52641. Nights 319-696-3465.

WANTED Hallicrafter FPM 300 good condition. 617-896-3549.

WANTED Collins 70K-2PTO for S-line W8BP 2002 Werner Marquette, MI 49855.

DRAKE T4XC, AC4, MS4, R4C with 2.4, 1.5, .5, .25 filters, noise blanker, 160-10 xtals, recently aligned — $985. Regency Whamo programmable scanner $120. pair of new 250 TH P.A. tubes with sockets best offer. Viking II parts. Call WA9PFB after 5:30 at 217-525-0917.

ABSOLUTELY Immaculate Heath station: SB-104A, loaded, power supply, speaker, UG8/D-104 mike, $775. Like new, John 313-759-4539.

NEW KENWOOD 130S and PS30 $780. New ARX-2B $39. Kenwood 180S SSB/CW filters and PS30 $850. WB6FCR 415-584-0880.

INTEL Intellec 4 computer mainframe and mother board with dual power supplies, cabinet, two new inst/data storage boards. Excellent condition. Make offer. Will sell at sacrifice price. Best offer over $50. Lonnie, KAØCIA, P. O. Box 336, House Springs, MO 63051 314-677-4295.

ATTENTION RTTY: 11/16" paper tape for 28 and 33 telex, $15 per box. Quantity discount Dave Lyons, 16c Hampshire Dr., Nashua, NH 03063. 603-889-0462.

HEATH SB-300, SB-401 $300. K4YCL 136 Elder Dr., Wilmington, N.C. 28405.

WANTED: December 1934 Shortwave Craft; copy, EICO 460 oscilloscope schematic; pre-WW2 QTH W1MJY. W2MQB.

DRAKE R4C, T4XC, AC4, MS-4, FR-4, all filters, crystals, DX Engineering processor Shure 444 $900. NØAJZ 314-838-7285.

HEATH SA-2040 tuner, $100; 8044 keyer kit partially assembled, $20; 50 ft RG-17, $30; Triad F28U xfmr $15; Triad T19F6 xfmr $3; unencoded keyboard, $10; 250 pF/3.5 kV Johnson variable, $20. Hamtronics 10-meter preamplifier, $10; Triplett 25-0-25 microamp meter (321-T), $10; Simpson 4-1/2-in. square meters, asstd., $6 each. All plus shipping. N1FB 4 Roberts Rd., Enfield, CT 06082.

WESTERN UNION teleprinter 102 or 103. I need information on how to adjust. Please send your address to Joe Radwan WB2YIZ, 189 Mapleview Rd., Buffalo NY 14225 716-834-5702.

FOR SALE: Drake C-4 console complete $435. E-Tek FR-4 counter for Drake $135. Yaesu YO-100 scope $145. 60' heavy duty free standing tilt tower with Mosley Tri bander $845. Don, KA1EHB, P. O. 721 Goshen, NH 03752, 603-863-5455.

SELL HEATH SB-104A, ssb/cw filters, N.B., H.P. 1144, SB604, SB634, SB614, SB644 & SB230 linear. All "mint" $950. Package deal only. "U" ship. W6OWD, 415-728-7136.

KENWOOD TS-520S with cw filter and matching VFO. Low hours, excellent condition, manuals & cartons included. $550. firm! Certified check or bank check only. Chick Dressell, W3BPZ, 1039 N. 21st St., Allentown, PA 18104, 215-437-1608.

RTTY sale cheap — Model 15 page printer with keyboard, 14 typing reperferator, 14 transmitter distributor, 3-255A polar relays, metal table, etc. all $50. Homebrew TU $15. You pick up. WØYLO (Chet) Box 73, Scott City, KS 67871 days 316-872-3755.

AMPLIFIER — Dentron MLA-1200 $295 WBØZTL/6 512-964-3090.

WANTED: 4D32 transmitting tube. W3AP 215-678-4310.

SSTV KEYBOARD: HCV-3KB, large letters and backspace erase, $200. FT901D with DM memory, $850. KG2I, Route 5A, Whitesboro, NY, 13492 315-736-5515 evenings.

FOR SALE: ALDA 105 xcvr with calibrator and microphone. Good shape, $380. WB9SQH Rte 2 Box 219F Crothersville, IN 47229.

SX100 Hallicrafter rcvr. Mint. manual. $135. I ship. KNØPGH, 612-786-8765.

FOR SALE: KENWOOD TS-820-S practically brand new. Extremely mint. Very few hours use, $695. Kenwood remote VFO-820 brand new, $125. RME pre-selector, mint. $40. Mobile power supply 500 volt, $35. MFJ speech processor new, $35. All plus shipping. J. Plane, 42 Pennsylvania Ave., Niantic, CT 06357.

WANTED: COLLINS 312 B5 Station Control. W8ZRL, 6709 SR132, Goshen OH 45122 315-625-9533.

YOUNG YL needs HG-10 VFO. Reasonable Maria Gloria, 442 Englewood, Buffalo NY 14223.

SELL: Lafayette HA-350 ham receiver, good working condition, manual, speaker, $75. H. Zidlick 32 Chestnut Ave., Park Ridge, NJ 07656.

FOR SALE: Curtis keyer EK420A $45, Collins 75S-3C with 800 cycle filter/spkr $1100, Collins 32S-1 xmitter with supply $350, Drake TR-4cw with RV-4C remote VFO/spkr/ blanker/Astatic mic. $700, Henry 2K-4 (floor console) with spare 3-500-Z final tube $800, All equipment mint. 419-399-2336, WB8TKN, Scott, 774 N. Cherry St., Paulding, Ohio 45879.

COLLINS S-line 75S-1 w/cw filter, notch, VBFO; 32S-1 w/speech proc., 516F-1 p.s. good condition, $750/offer. Dave Wells WA6EJX 3522 Boston Ave., Oakland CA 94602.

HEATHKIT Apache with SB-10, 250 watts, $125., sale or trade. Very clean, very heavy. Gene Miller, W2EAJ, Chaumont, NY 13622. 315-649-5460.

ALPHA 76 linear amplifier 10-160 meters $1000. Kenwood 820 digital remote VFO $100. Dentron MT2000A tuner $100. Programable keyer CMOS MK-1 with Bencher paddle $75. W7YHS 319 North 26th Billings, MT 59101.

COLLINS ssb station complete 30S1 KWM2 312B Heathkit SB610 scope TH6DXX Hy-Gain beam no reasonable offer refused Guy Migliori 415-685-4090 577 VIII Way, Pleasant Hill CA 94523.

COLLINS 75S-1 with Waters Q multiplier, cw filter; 325-3 with DX Engineering clipper, power supply and speaker. $750. AF7E, 10833 Brookside Drive, Sun City, Arizona 85351. 602-974-0851.

ARGONAUT 509- xtal cal, cw filter, mint $295. 315-699-4020. Ferguson.

QUAD KITS $18. $33. S.a.s.e. for information. WAC, 404 Sanders Rd., Huntsville, AL 35802.

FOR SALE: Collins KW-1 SN-98. George H. Rancourt, White Loaf Rd., Southampton, MA 01073. 1-413-527-4304.

ANTIQUES: Hammarlund Super Pro SP400X. Teletype TT 7/FG, punch, w/ps. RME VHF 152A. Make offer. WØSMY, 5019 Burt St., Omaha, NE 68132.

KENWOOD TS-820 digital, Sherwood cw filter, perfect condition, Service Manual, $650. K4JK, 31 Sulphur Creek Drive, Elkmont AL 35620; 205-732-4575.

SELL Triton IV Digital with accessories $600. SB-200 amplifier with big blower $400. Century 21 used 6 hours xtal calib. $250. Want NCL-2000. K4CRF 803-536-2930.

DENTRON GLA-1000 (with 10 meters) Mint condition, $250. N8AYR 616-99-0194.

DRAKE TR-3 and ac supply $350. pair Eimac 4-400A's new $85. each will ship — you pay (AC) 402-457-4237 after 6 P.M. 5415 No. 57 Ave., Omaha, NE 68104 KØOQL.

HALLICRAFTERS HT-41 1 k.w. linear amplifier, reconditioned w. manual, $175./offer, Richard Sanders, 12302 28th Ave. So., G-5, Seattle, WA 98168, 206-242-3346, 206-773-0365.

DRAKE T4XC-R4C with extra xtals, tubes, and cw filter 0.5; AC3 power supply. Always factory serviced — manuals and original cartons. Excellent 300 Belvedere Hights, Bristol, TN 37620 615-968-5321.

FOR SALE: Galaxy GT550 transceiver with AC 400 power supply, SC 550 speaker console, VOX 35C, MFJ model MFJ-949 Deluxe Versa Tuner II. All in mint condition. $426 Will ship. KA2AGG, 491 North Hamilton Ave., Lindenhurst, NY 11757 516-884-5680.

CRYSTALS: Build something — experiment. FT-243's general, novice, any frequency, .01% 7000-8700 kilocycles $1.50, minimum five $1.25 each. 3500-4000 $2.95, five $2.50. 160M $3.45, five $2.95. Sockets 50c. Airmail 20c per crystal. "Crystals Since 1933" WØLPS. Stamp for 1700 — 60000 Kilocycles listing circuits. C-W Crystals, Marshfield, MO 65706.

ALPHA 77SX. Your opportunity to own the finest. New 8877's. Mint $4000/obo. KJ6B, 7151 Bel Air, Corona, Calif. 91720. 714-734-1205.

KENWOOD TS-820S with cw filter plus matching VFO-820. Very clean $725. Art Johnson K2POA 29 Boone Street, Bethpage NY 11714 Phone 516-931-3374.

WANTED: Rohn BXS8 straight 28 inch section for HBX tower. Top dollar 612-535-7189 Denny NØAKZ.

DX

1,500 CONTACTS

120 COUNTRIES

A4

IN 2 DAYS

SPECTACULAR PERFORMER

Top performance, easy installation, 4 band operation, and moderate price are yours with Cushcraft's new A4, 4 element beam. A4 operates on 10-15-20 meters. A74 add-on kit expands operation to either 40 meters or the new 30 meter WARC band. New engineering gives better performance through improved trap design with fewer parts, less installed weight and greater strength. You too can experience exciting DX contacts with

"I used your new A4 during the 1981 Phone ARRL DX conte
It was dynamite!! In 24 hours I had worked 99 countries. Af
48 hours my total was 125. The A74 add-on kit allowed me
work 28 countries on 40 meters alone. It added new versatil
to my 40 meter activity. By the end of 48 hours I had work
almost 1500 contacts with 285 multipliers. Thank you for m
ing my operating more fun." ART HAMBLETON, K1LL.

SIMPLE 2000-2300 down converter. No hard to get parts, no expensive test equipment needed. Plans & Specs, for down converter, five different antennas & power supply for only $12.95. Complete parts kit for down converter available. Branco Electronics, Inc. 2514 Glassboro Cir. Arlington, TX 76015.

VIDEO for Amateur Radio! Free information package explaining how video recorders, color cameras, TVRO Earth Equipment, etc. may be used for amateur radio activities. And we will sell you video equipment at the best prices around. J. V. Electronics, 29 Canal Street, Landing, New Jersey 07850. Phone evenings 201-347-3206.

HEATH SB104A transceiver factory aligned with noise blanker cw filter HP1144A power supply and speaker SB644A remote VFO all excellent condition $600. Firm for quick sale ship 48 states 305-852-5139 KA4EIG.

FOR SALE: Yaesu FT101EE, YC601 digital readout. Less than 900 contacts. Fan, cw filter. Both for $650. Delton Wegner WBØTCX, 308-946-2085, Box 298 Central City, NE 68826.

SELL: HR1680 $160., DX60B-$65., HS1661 spkr — $20., HN31 Dummy Load $15. with Heath Manuals, FOB Howard, CO 81233, KAØDOF, 303-942-3320.

COMPUTER: HEATHKIT H8, terminal H9, H17 disk, 16k, H85 interface, cw receive transmit card. Basic, machine language courses, "mint", Steve Halas, Owego NY 607-785-5044.

MINT: Heath linear, SB-230, 80-10 meters, $350 Heath monitor, SB-614, 80-6 meters. $175 Both $500. WB2MCP, 161 Shorecliff, Rochester, NY 14612.

DENTRON MLA-2500B, mint, with 10 meters, $595. W9ZR, 1-414-434-2938.

COLLINS 75S-1, 32S-1 with husky and neat HB supply. Excellent condition. Original cartons and instructions. $500 plus shipping. W3CPF 717-397-7374.

YAESU FT101E, 160-10, ac and mobile cables, mike and manual, mint, like new, $570., WØPBU, Grand Island, NE., 68801, 1-308-382-1402.

SALE: Hallicrafters receiver, SX-62A. Karl Wagner, 310 Marabou, Newark, DE 19702. Evenings; 302-834-3331.

DRAKE DSR-2, precision, lab-grade, solid-state digital receiver as new, $1600. Kenwood TS-900, solid-state except finals, mint & perfect. $500. FOB, WA6NWP.

YAESU FT-101ZD, FV101Z VFO, cw filter, fan, mint, $799. Includes shipping. K1BW/1 203-222-0866.

SELL NCX-5 MKII, ac and dc supplies, K9GDF, 5003 South 26th Street, Milwaukee, WI 53221.

DX ENGINEERING speech processor Drake transceivers $50. Kenwood SP-180 speaker audio filter $40. Henry Radio TP400 D.C. supply for Swan, Drake, National, Collins, Galaxy, Heath. Hallicrafters transceivers $35. Turner HAM500 desk microphone $20. Hallicrafters HT33A linear converted to six meters, low drive $350. Icom EX-108 $75. EX-107 $40. EX-1 $25. SM-2 $20. Mobile mount $10. Many more items, parts, etc. list for s.a.s.e. K6KUO, Box 3923, Visalia, CA 93278 209-733-3215.

NEW CODE cassettes — New beginners code course with two 90-minute cassettes. Order F1 at $10.95. Many new practice cassettes. Write for new catalog. Order popular QSO tapes similar to FCC exam. C7 — 25 QSOs at 15 wpm. All practice cassettes $5.95 each ppd. Computer generated code, 90-minute, high-quality cassettes. MC and Visa welcome. Fast service! K5SMG, John C. Tarvin, 14480 Shadowlane Ct., Morgan Hill, CA 95037. 408-683-0287.

MICROPHONES: SHURE 444D $43.22 new guaranteed, $1.75 shipping. C. Mele SCA 781 Deer Park Road, Dix Hills, N.Y. 11746 s.a.s.e. for literature.

KWM2A $500, ps516F2 $100. speaker console 312B-4 $100. Round emblems excellent condition W2NHB Percy Persichetty 67 Hunton Street, Staten Island, NY 10304 prefer pick up 212-351-6751.

TRADE: Heathkit HW-8 excellent, for s.s.b. transmitter or old communications receiver. Stan Hojnacki 609-854-8210 after 5:15 P.M. New Jersey.

WANTED Two SK-710 tube sockets Joe L. McDonald Chicago IL 60643 Phone 312-239-5754.

QST 1929-68 24 Binders. Pick-up only. $265. Chris Abernethy WB2CDB 456 Sagamore Ave., East Williston, NY 11596.

DON AND Mike's guaranteed buys: TS830S, TS130S, IC730 — call; IC720A/AC $1298.; IC2AT $249.; KWM380 accessories — stock; TR7/DR7 $1399.; Cubic 103 $1195.; 102BXA $999.; Dentron Clipperton L and tuner $699.; Bird 43-slugs-stock: Kenwood service manuals $10; Santec HT1200 $339; AEA Morsematic $189.; complete Belden coax line: 8214 RG8Foam 36c/ft; 9258 MiniRG8 19c/ft; 8000 14GA antenna wire 10c/ft; Robot 800, new mods, $749.; order your KWM380 now, old prices. Antique/rare tubes? Call! Alpha/ETO specials; New IC22/U $289. Prices FOB Houston, subject to change, prior sale. All items guaranteed. Madison Electronics, 1508 McKinney, Houston, TX 77010. 713-658-0268, nite MWF 6-10 CT 1-800-231-3057.

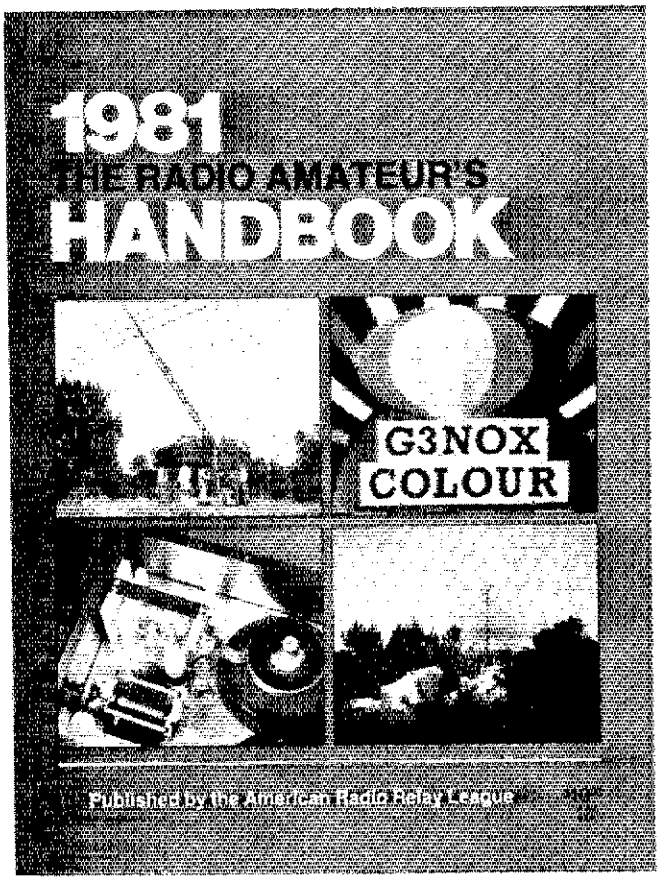
DRAKE R4B with manual. Original owner. Just serviced. Will pack and ship $250. Gene Reynolds, W3EAN. 215-649-1447 evenings 215-841-4829 day.

SELL COMPLETE station: Heath SB-102, SB-230, SB-610, SB-650 HD-15, HM-102, SB-600, HP-23, mike, woody keyboard, mint condition all, best offer, Ron, N3AF, 904-478-9832.

INFO-TECH cw decoder to video, Model 30 and keyboard model 10D with 64 character buffer $400. Venus slo-scan monitor SS2 and model C-1 camera, $400., manuals. Fred Pessaro K4GDN, 989 Golf Street, Rockledge, FL 32955. 305-636-5738.

1981 EDITION

NOW IN ITS SECOND PRINTING



We underestimated the demand for the 1981 *Radio Amateur's Handbook*, and we are back on press for a second printing. You won't find any changes between the first and second printings, but you will notice *big* changes in comparing the 1981 edition with the 1980 *Handbook*. Here is a partial list of additions to the 1981 *Handbook*:

- 600 MHz Frequency Counter
- Link-Coupled Transmatch
- Modulated RX Noise Bridge
- 50-75 ohm broadband transformer
- Foldover tower
- 12-volt, 30 amp regulated supply
- Economy 1.2-15 volt 5 amp Bench Supply
- NBS design charts for 50-432 MHz Yagi Antennas
- Table of optimum guy-wire lengths
- Amateur ASCII and Baudot technical standards and definitions
- Noise figure/temperature definitions and conversions
- New inductance formulas (for strip lines, etc.)
- Transmitting tube cooling specifications and blower information
- Table of phasing line lengths for vhf/uhf arrays
- Updated propagation information
- IC op amp and TV sweep tube charts
- Ferrite toroid electrical and mechanical cross reference
- Digital logic family compatibility chart and interface circuits
- PIN diode QSK system
- Modern Band-Edge Marker
- Buffered Morse Keyboard
- Antenna/Preamp system for EME
- 50 and 432 MHz Yagis
- 50 MHz kw linear amplifier
- Lightweight portable HF Antennas

There are also more template drawings for a variety of circuit boards, plus revised chapters on Solid State Fundamentals; Power Supplies; VHF and UHF Transmitting; Mobile, Portable and Emergency Equipment; Code Transmission; Specialized Communications Techniques; Test Equipment and Measurements; HF Antennas; and Vacuum Tubes and Semiconductors.

The price of the paper edition is $10 in the U.S. and possessions, $11 in Canada, and $12.50 elsewhere. The clothbound edition is $15.75 in the U.S. and Possessions and $18 elsewhere.

The 1981 *Handbook* is available at your radio store or from:

The American Radio Relay League, Inc.
225 Main Street
Newington, CT 06111

HEATH HW-8, HWA-7-1 p.s., manuals. Mint $90. HM-2140 hf Wattmeter, $40. Century/21 cw xcvr. Mint $195. WB7VOO, 602-298-4820.

WANTED: Drake L4B amp deck without power supply or with dead supply, etc. With or without tubes. Price in first letter. Wanted: to purchase or info on Astro Communications labs (now Norlin Communications) SR-209 receiver mainframe. Already have 2-4GHz tuning head. Sell: W7BBX programmable Contest Keyer, never used, cost new $229, sell factory wired for $110. Teletype Model 19, $40, local pickup. TMC PAL-1K linear RF deck, 8295 tube, two vacuum variables, meters, complete; $150. K4RN, Box 312, Versailles, KY 40383.

E-Z WAY tower, free standing 40 ft. crank up and tilt. Sacrifice $200. Alonzo Farr K2JSX 201-364-1253.

COLLINS 7SA2 $250; Realistic DX-150 $75; Heath 1kW HA-10 200; Heath DX-40 $25; Heath Seneca 6&2 $50; Motorola P-33 2M $20; 2 desk facsimile $15 ea.; other items. N4PD, 9705 Lomond Dr., Manassas, VA 22110 703-361-4390.

SELLING Tempo One with ac power, antenna wire, 50 ft. RG8U, logs and books. All for $325 (you ship) or trade for good scope. Call Carl 212-792-2961.

BUY-SELL-TRADE Send $1. for catalog. Give name address and call letters. Complete stock of major brands new and reconditioned Amateur Radio equipment. Call for best deals. We buy Collins, Drake, Swan, etc. Associated Radio 8012 Conser, Overland Park, KS 66204 913-381-5900.

COLLINS 312B-4 Station Control $250.; 180S-1 Antenna Tuner $100.; DL-1 Dummy Load $35.; TD-1 Tape Doublet antenna $75. 390A URR receiver $350.; CP-1 Crystal Pack $100. All new with manuals. L.H. Arnold, K4AET 5100 Monument Ave., Richmond, VA 804-282-3691. Zip 23230.

QSTs: 1956-75, many complete yrs. $1. each. Send s.a.s.e. for reply to letter stating your needs. WA5TWF, 14113, Stoneshire, Houston, TX 77060.

STOP-LOOK-LISTEN! Twist 100 lb beam which is 100 feet in air and 100 ft plus from shack with 2 lb force manually and hydraulically with very good indication. 370 degree swing in 45 seconds and rapid reverse controlled at drive unit. Only one 5/16 inch O.D. soft copper tube connecting link buried 6 inches in ground. The rotator and drive each have two sturdy moving parts. System sealed from atmosphere. Absolutely no leakage. Easily motorized. Has been weather proven for 40 years. S.A.S.E. to W9DRI, 121 East High Street, Seymour, WI zip 54165. Write for facts.

HAL RVD-1005 $199 pp, DKB2010 $199 pp. Collins 75S3 w/200 Hz, 32S3, 516F2, 312B3 $999pp. 30L1 w/572B's $599pp. 312B4 $199pp. All mint. WA5OXK, 504-392-9101.

FOR SALE: Tempo 2020 H.F. transceiver. Excellent condition. Manual, dual built-in ac/dc power supplies, built-in speaker, microphone. $425. Ed Radio, AJ6V, 897, Newell Road, Palo Alto, CA 94303. 415-327-5672.

WANTED — remote VFO for Tempo One, Swan 350 repairable Tempo One. KØHQW, 65 Dellbrook O'Fallon, MO 63366.

COLLINS MINT condition, 75S1, 500 cycle filter, 32S1, 516F-2, 312B, SM-1 mike, 30L1, $12000. E-Z40 tower, TH3-JR beam, Ham-M rotor $300. W8KU 829 N. Elizabeth, Dearborn, MI 48128 313-561-6579.

KENWOOD TS-820S, VFO 520S, SP-820, DS-1A, cw filter $850; KLM-2700 multi-mode transceiver $399; Microwave Modules MMT 432-28S $249. All Like new; Jeff Walker W3JW, 301-437-0171.

WANTED: Yaesu FL-110 amplifier. For sale: DyComm 10-0 2m amplifier, 10W in, 100W out. $90; KDK-2016A, perfect, $235. K3KMO, Box 60, Damascus, MD 20750, 301-774-3481.

HQ-120X $125.; Dentron Jr Tuner $55.; Palomar keyer $65.; plus shipping. S.a.s.e. for list of Radio Boy Books, QST, & HR magazines. Richard Randall, K6ARE, 1263 Lakehurts Rd., Livermore, CA 94550.

SELL TS-820 with DG-1 and cw filter installed. Service and Instruction manuals. Mint condition, in original packing. Moe Joffe W6PHE, 7259 Willoughby Ave. Los Angeles, CA 90046 213-876-4734.

SALE: Heath 2021 2M HT, extra xtals, external microphone, TouchTone kit, $130. Isotron 80M antenna, $35. S.a.s.e. details. Elkind, WB2ARN/3, 6340 Marchand, Pittsburgh, PA 15206, 412-361-3788.

WANTED: Yaesu SP560 or SP401 speaker cabinet. WA3LPK, 2300 Louise Ave., Baltimore, MD 21214.

SELL: Kenwood TS-820S, mint condition, original carton and manual, $749. WBØRTL, work 816-228-3333, home 816-373-1757.

WANTED: Manual for Hammarlund HQ-140-X, also parts, accessories. Contact Mike Lachman, 1545 Sherbrook, South Euclid, OH 44121.

KENWOOD TR-8300 with five pair crystals, Drake encoding mike, manual, original box and packing. Very good condition. $285. WA4WRA. 901-767-1485.

AMATEUR RADIO repair — Professional service, reasonable rates. All brands. USA KDK repair center! Amateur Radio Repair Center, 1020 Brookstown Ave., Winston-Salem, N.C. 27101 1-919-725-7500.

SALE: Heath SB104A digital transceiver, HP-1144A power supply, SB-604 speaker. Electro-Voice microphone. All manuals. $600. Excellent WB2PNK 716-836-8558.

ROBOT 800 RTTY cw keyboard. Moving up to Microlog. Two months old. All modifications made by factory. Absolutely new condition. Original carton with manuals. First $650 or best offer takes. Jack Mathias W9FMW, 721 S. Meadow Rd., Evansville, IN 47715. Evenings 812-477-2516.

WANTED: JH Bunnell catalogs 1898-9. Amateurs equipment from 1930s by Guthman, Browning, Meissner, Utah, Howard, REL, Collins, others. Nagle, 12330 *Lawyers, Herndon, VA 22071.*

HQ-170, $110; HP-13 mobile supply, $65. KB9HA, 317-297-0515.

HEATH Marauder, RME-4300 make offer or trade? K8MEG 313-474-0956 evenings.

COLLINS 75A-4, excellent, $325. Will trade for mint 75A-3. John 313-759-4539.

THIS SUMMER fly with the ducky! The Pace-Traps Flying Ducky mobile magnetic mount. Perfect combination for your H-T. Just $14.95. Accessory 2-meter whip $5.95. Please add $2. shipping. Traps, antenna wire and more at Pace-Traps, Box 234, Middlebury, CT 06762. 203-757-7564.

QUALITY Stainless, threaded, washer, hardware fasteners! Sample 50c. Ceramic Insulators! Lists 25c! Walt, W8BLR, 29716 Briarbank, Soughfield, Michigan 48034.

BUYING OR selling from classifieds can be risky, expensive, and take forever. The solution? Equipment Exchange, electronic equipment brokerage. QSL for business S.a.s.e. brings details. Equipment Exchange, Suite 73-C, 2509 North Campbell Avenue, Tucson AZ 85719. 602-326-1105.

VISITING ENGLAND? Well-appointed farmhouse, with complete amateur station, near Cornwall Coast and original Marconi site. Rental information s.a.s.e. W1HXE 802-387-4653.

A-2516 RECEIVER like new. Preselector, all ham bands, S-meter, large 1 MHz dial 28:1 gears, af-rf gain, am, ssb, cw. 7 x 13 x 10" 18 lb. $110. Pat Matthews, White Oak, SC 29176.

WANTED: Expired ham plates. Collector needs Conn, Del, DC, Geo, Maine, NJ, Ont to complete all state collection. Offering $1. each plus postage. Joe Franko, 1101 Evamar, Midland, MI 48640.

HEATHKIT HD-1410 keyer, $48.; HM-15 SWR, $14.; HDP-21A mike, $36.; WBØGSL, 701-838-3974.

X-BAND gun diode Amprex transmitter receiver. Set has one 8mW transmitter, one receiver and two horn antennas. $90 per set (new) $10 down per set for COD. I will consider swaps for OSI CIP, 5-1/4" or 8" Shugart compatable disk drives. Sym, Rca Microbds, AIM 65, & ROMs for any of the computers listed (BASIC, Assembler). R. Riley 6068 Grove, Flint, MI 48507 313-695-1117 7-8 PM week days.

COLLINS round emblem KWM-2 with PM2 power supply and desk microphone. Excellent condition. $525 UPS collect. K1SW 203-875-0151.

MICROLOG AKB-1 Keyboard package $400; AVR-2 Video Decoder $530; split screen option $90; 9" Sanyo monitor $180. All 4 $1100; without monitor $980. Brand new, never used, original cartons. Ship UPS prepaid. See Oct '79 QST page 173. WA9KEU, Jim 312-772-1851, after 6 P.M.

NOTICE: The listing for WB8ZJW in the 1980 Radio Amateur Callbook should have read: WB8ZJW, E. Alfred J. Taylor, 1153 Gulf road, Elyria, Ohio 44035. Radio Amateur Callbook, Inc.

WANTED: SPR-4 with TA-4 transceive adaptor. State serial number, condition and price. WA9FZQ, 4105 Keewatin, Verona, WI 53593.

MINT CONDITION HW-101 with cw xtal filter and PS-23 poser. Real cream puff. Newly serviced and aligned by Benton Harbor. (papers to prove) Going to smaller rig. Best offer over $350. You pay shipping. N4DBQ, Lloyd Mize, Route 6, Versailles, KY 40383.

SELL: Rohn heavy duty self supporting tower HD-3-5-54 motorized with remote controls plus Ham-M rotator $550. 75S3-B sn 85054 mint $525. WB2HXD 516-334-3808.

SELL: Yaesu, FT 101ZD (WARC), FV-101Z (VFO), FA-9 (fan), and YE 7A (mike), mint $975; Johnson KW Matchbox with SWR $150; TH6DXX, $160; T-UG8-D104 (mike and stand) new $30; Henry 3K, $1000; W3MA, 270 Greentree Rd., RD#2, Malvern, PA, 19355.

R4C, T4XC, AC4 .5Ha filter, N.B., extra crystals. Mint condition, low usage $1050 K2OA 914-691-7957.

AUCTION EACH: New boxed Wilson System One 5-element tribander; VHF HT, touchtone, nicads, duckie; mobile 80 watt two meter amp; two IBM 731 Selectric terminal/typewriters, manuals; New CDE-45 rotator; Model 19 RTTY, reperf, table, TD, parts, manuals; Gary 516-489-3895.

DRAKE L-4B amplifier with 10 meters. Excellent condition. $800. Mark Wilson, AA2Z, 83 Main St. Apt. 10-D, Newington, CT 06111. 203-666-1541 days, 203-666-8623 evenings and weekends.

NEED MONEY? Like to go to hamfests? Why not make engraved name badges? Full time job conflicts with profitable sideline business. New Hermes M-II engraver, cutting table for sheets of plastic, Accu-Cutter beveler, lost of plastic stock plus accessories. Everything you need to start making money now. All equipment in mint condition. New value over $1100. Sell for $879! Peter O'Dell, KB1N, 203-666-1541, days; 203-644-3543 evenings before 10 Eastern.

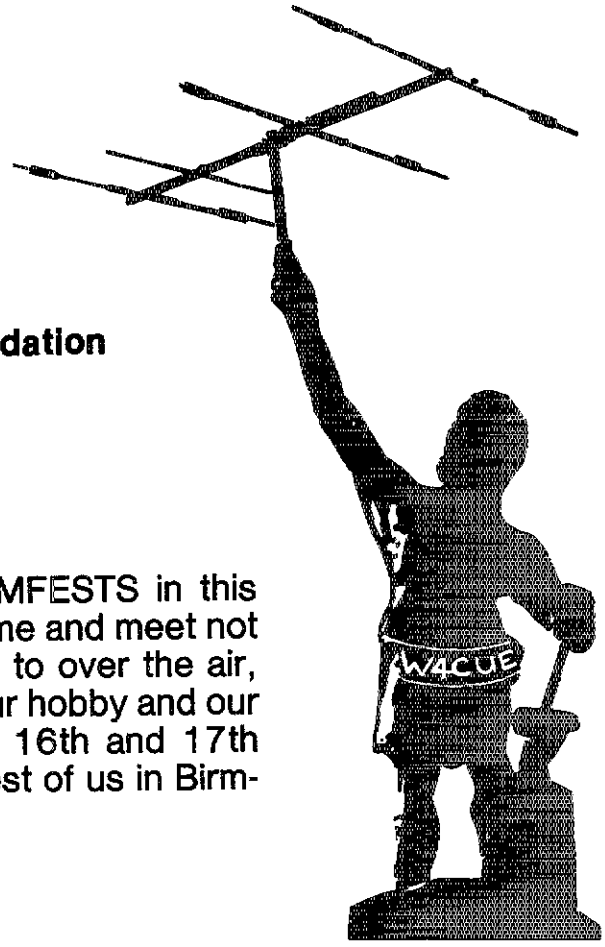
HAMS: "Anywhere a friend, everywhere, Earth" and all hams are urged to take part in "Friendship Week" June 22-28, 1981. In contacts, extend the goodwill of friendship and peace to hams at home and around the world.. K. C. Jones, W6OB, President, Lee DeForest Radio Club, Hemet, CA.

ARC-5 receivers: 3-6 modified to 3.50-3.75, 6-9 modified to 7.0-7.3. many modifications also 1.5-3.0, all excellent condition. Bill Danielsen 916-644-1218.

THE BIRMINGHAM AMATEUR RADIO CLUB PRESENTS

BIRMINGHAMFEST '81

- ★ Technical forums
- ★ ARRL forums
- ★ FCC tech thru extra exams
- ★ Giant flea market
- ★ Saturday night banquet
- ★ Women's and children's activities
- ★ 2 microprocessor forums
- ★ DX forum and ARRL QSL card validation
- ★ New products and exhibits
- ★ Lot's and lots of awards



Birmingham has one of the finest HAMFESTS in this country. It's a place where you can come and meet not only the people you have been talking to over the air, but the people that are the leaders in our hobby and our equipment manufacturing. So on May 16th and 17th load up the family and come join the rest of us in Birmingham.

AND THE ARRL SOUTHEASTERN CONVENTION

BIRMINGHAM JEFFERSON CIVIC CENTER

MAY 16 & 17, 1981

VISA **Long's Electronics** MasterCard

MAIL ORDERS: P.O. BOX 11347 BIRMINGHAM, AL 35202 • STREET ADDRESS: 2808 7TH AVENUE SOUTH BIRMINGHAM, ALABAMA 35233

ESTATE SALE: Amateur station of Bill Pace, SB220, station accessories, parts, test equipment etc. Contact Jerry Molaver, K1TGX. 1008 Split Rock Rd., Cheshire, CT 06410.

DRAKE R4C, T4XC, AC4 power supply, MS4 speaker, 4NB noise blanker, 500Hz cw filter, 160 and all 10 meter crystals, all original interconnect cables, instruction manuals, excellent condition. New matched pair final tubes included. $800. firm, cashier's check. Can ship UPS collect in original cartons. K1NBN Phil Smith, RFD 2, Box 20A, Old Post Road, York, ME 03909. Phone 207-363-3881.

R4C receiver for sale. Loaded with accessories. Contact N7XX, 9601-116th St. E., Puyallup, WA 98371.

B&W 6100 transmitter, 200WPEP ssb/am/cw, synthesized. Excellent condition $225. Hammarlund HXL-1 linear $375 mint. Both $550. Globe 60W cw transmitter $75. Lafayette VFO $25. HyGain TH3MK3 beam $100. Antique National SW-3 $100. W2BCM 212-380-5851.

HEATH amplifier SB-200 1200 watts including 10 meters $325. Mini-Quad HQ-1 $60. Harvey AD2S 212-263-3494.

YAESU FT901 DM with cw filter plus FC901 antenna-tuner. Original cartons cables, manuals. Used 4 months. Perfect. Both for $1,150 plus ship. Tom N9BMR 312-423-2113.

YAESU FT-620B 6-meter xcvr. Absolutely mint. $230 ppd. to 48. Steve Mottola, WB3GUS, 662 7th Ave., Swarthmore, PA 19081.

DRAKE TR-7/DR-7/PS-7, SL-500, AUX-7, 2FA-7, D104 mic. $1425. Dr. Michael Hayes N2OD, 425 Neptune Ave., Brooklyn, NY 11224 212-373-4906.

AZDEN PCS-3000 and PCS-300 HT. Why not buy the best rigs made at the lowest price in this issue? LCC Engineering, 116 Country Farms Road, Box 140, Marlton NJ 08053 609-983-8844 daily 6P.M. till midnight.

DRAKE C-line: R-4C, T-4XC, AC-4, MS-4. Excellent. Only $895. Rick 501-968-7373.

SELL new 572B $38, 4CX1000A $400. 4-400A $95, 3-500Z $110. Swap toward Bird wattmeter. W2GCW 518-828-9860.

FOR SALE: Tektronix DC-1GHZ dual trace sampling oscilloscope w/5T1A timing unit & 4S1 plugin — 2 manuals inc. 4S1 needs work will ship in Tek carton anywhere in cont U.S. $475. Also for sale like new Tetequipment CT-71 curve tracer w/manual $675. Send postal money order only, to H.M. Adams WA4OOF 6115 N. Davis Hwy Apt. 11B Pensacola FL 32504.

DRAKE C-line, Mint. $825. WA2FJI. 516-791-6792.

HW-16 xcvr with HG-10B VFO $140. Bimini 550 2-MHz marine am xcvr $25. Skytec CW-1 spkr, new $10. John, KA1BNJ 617-876-6326.

YORK COUNTY PA. hamfest new location new date. York Fairgrounds, September 27, 1981. 250 inside tables 500 tailgate spaces. Make reservations now. Information contact K3POR Leroy Frey 170 S. Albermarle St., York PA 17403.

COLLINS 75S3-B in mint condition, $450. WA5YTX, Fred Maas, Rte. 3 Box 86-H, Santa Fe, NM 87501.

KDK2016A mint $200. Drake 2015EM TT mic $25. Clayton Wood, AC5H. Dallas Pick-up or pay COD. 214-995-4768.

FOR SALE: Kenwood TS-120-S mint $395. Instructograph with tapes $65. 51J-4 very good condition $275. W0RQN 319-363-8713 3649 White Oak Rd., S.E. Cedar Rapids, IA 52403.

NEED EXPERT antenna and tower installation team to select and install beam/tower and rotor combo, manageable my QTH will pay well for solid overkill job K2FS 212-353-8485, Flushing, New York.

KENWOOD CW filter YG-455 CN. brand new $75. WB9GTK 309-874-2573.

GENERATOR: Kohler 5E81, 5-kW, 120/240-volt, 4-cylinder water-cooled gasoline/propane engine, 1200-RPM; big, slow, quiet. On trailer, with propane tanks, automatic transfer switch, batteries, charger, manuals. Excellent condition, complete, ready to go. $750. K2GTY, 914-337-3523.

Jobs for Hams

WANTED for summer of 1981; Instructors in electronics and ham radio. Must have at least a General Class F.C.C. license. Small boys' science camp in Pennsylvania. Apply: Donald Wacker, 43 Franklin Street, Cedar Grove, NJ 07009

HAM RADIO specialists for outstanding children's residential camps. Excellent salary. Write New Jersey YM-YWHA Camps, 21 Plymouth Street, Fairfield, NJ 07006.

COUNSELORS, Maine Boys Camp-Ham Radio-Electronics — Code — General License — May bring own equipment. Write: Richard Krasker, 95 Woodchester, Dr., Chestnut Hill, MA 02167.

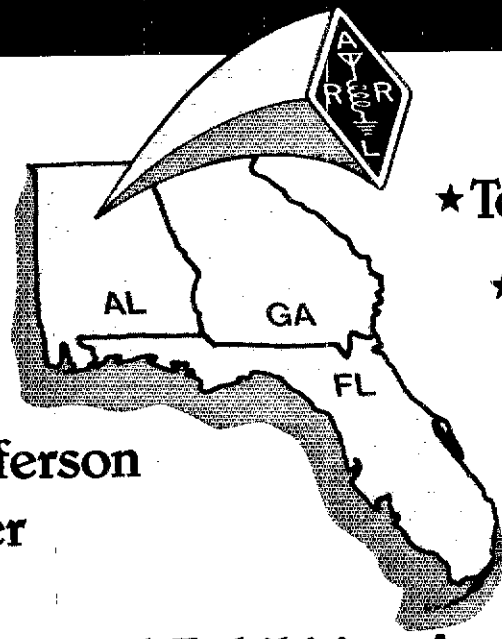
HAM RADIO counselor, 21 years or older, for summer sleepaway camp near Pittsfield, Massachusetts. Camp Emerson, 5 Brassie Road, Eastchester, NY 10707 914-779-9406.

COUNSELOR: Operator with general license to teach ham radio at Pennsylvania co-ed camp. Have completely equipped ham station. Write Trail's End Camp, 215 Adams Street, Brooklyn, NY 11201.

CAMP COUNSELOR: Minimum age 20. To operate amateur station, teach code, assist in building kits. June 22 — August 19. Write: K2GBS 18 Dolma Road, Scarsdale, NY 10583.

BIRMINGHAMFEST '81
AND SOUTHEASTERN DIVISION CONVENTION

MAY 16 & 17



★Technical Forums
★FCC Exams
★Flea Market
★ARRL
★Over $10,000 In Awards!

Birmingham-Jefferson Civic Center

+KP4 KV4

Large Air-Conditioned Exhibition Area

Bencher 1:1 BALUN

- Lets your antenna radiate—not your coax
- Helps fight TVI—no ferrite core to saturate or reradiate
- Rated 5 KW peak—accepts substantial mismatch at legal limit
- DC grounded—helps protect against lightning
- Amphenol® connector; Rubber ring to stop water leakage

New Rugged custom Cycolac® case, UV resistant formulation

New Heavy threaded brass contact posts

NEW Improved

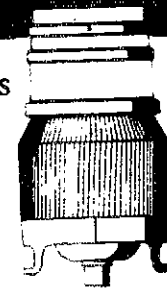
Model ZA-1A	3.5-30 mHz	**$17.95**
Model ZA-2A	optimized 14-30 mHz includes hardware for 2" boom	**$21.95**

Available at selected dealers, add $2.00 postage and handling in U.S.A.
WRITE FOR LITERATURE

BENCHER, INC.
333 W. LAKE ST., CHICAGO, IL 60606 • (312) 263-1808

Turn your excess tubes into instant CASH!!

Call Toll Free Out Of N. J.
(800) 526 - 5277



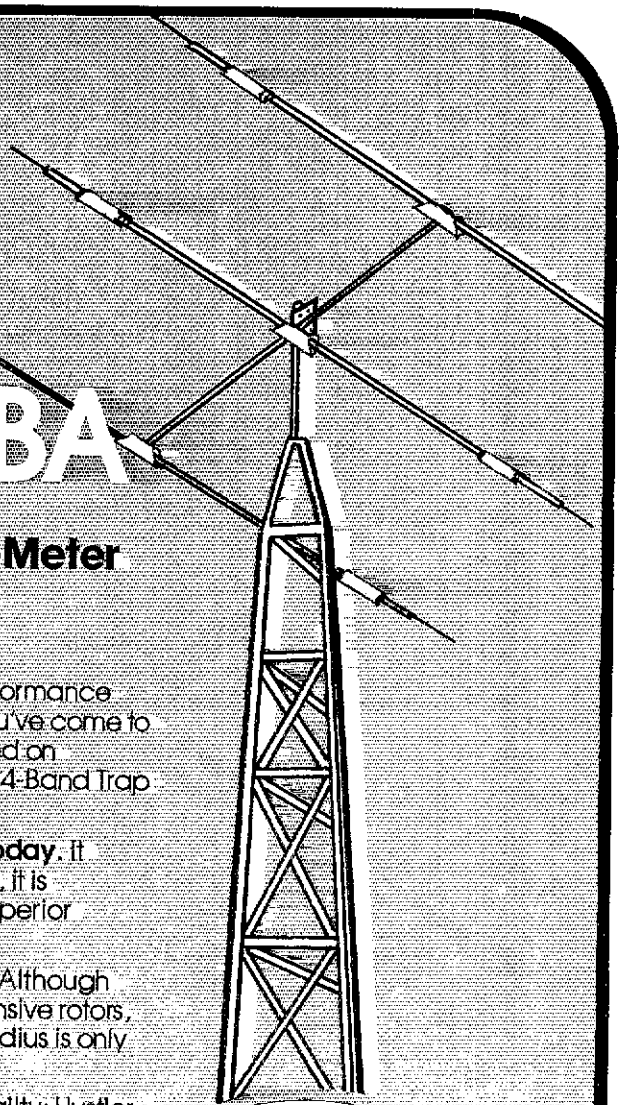
TOP PRICES PAID FOR YOUR EXCESS INDUSTRIAL AND TRANSMITTING TUBES

Send us your list or call for prices.
(201) 279-7528

UPI

481 Getty Ave. Paterson, N.J. 07503

Hustler Tribander 3-TBA



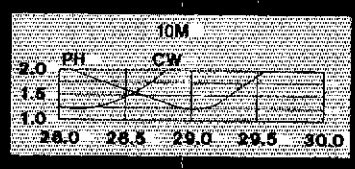
The Rugged, Reliable 10, 15, and 20-Meter Yagi You've Been Waiting for Is Now Available.

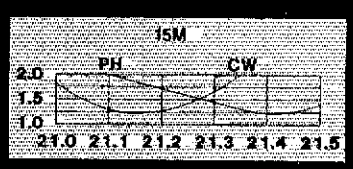
This exciting new tribander sets the pace for dependable performance with its two in one trap design — and the solid construction you've come to expect from Hustler. In fact, its durable design is partially based on concepts used in the time-tested and world-renowned Hustler 4-Band Trap Vertical.

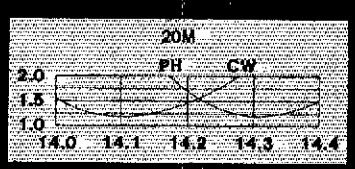
The 3-TBA is the smallest full-featured tribander available today. It offers excellent front to back ratio and SWR at resonance. Plus, it is engineered to provide the widest possible bandwidths with superior power handling capacity.

A special heavy-duty saddle prevents mechanical distortion. Although light enough to ship UPS, and enable use of smaller, less expensive rotors, the 3-TBA can manage windloads up to 100 MPH! Its turning radius is only 14 feet.

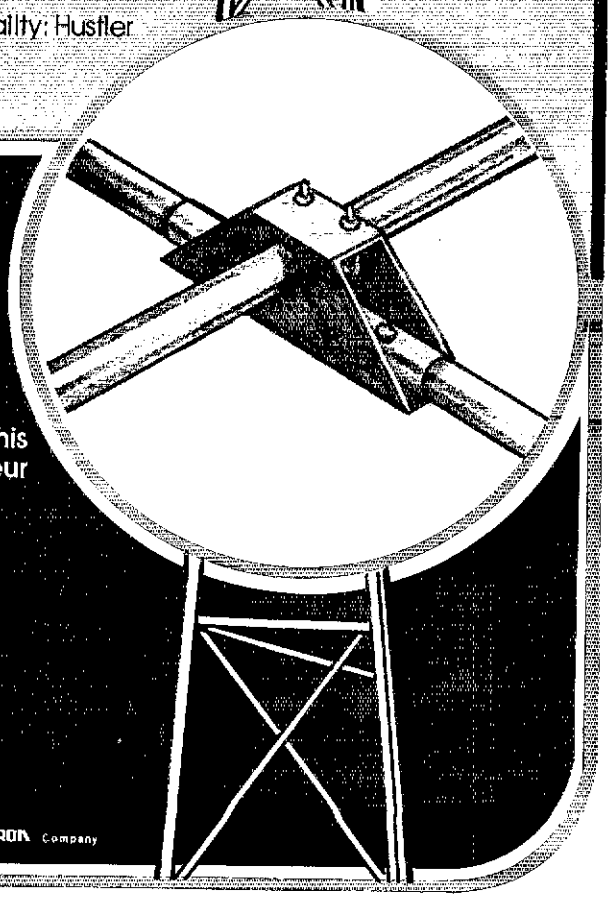
All in all, you can't surpass the Hustler 3-TBA for top triband quality: Hustler — still the standard of performance.







For more information on this and other fine Hustler amateur radio products, contact:



HUSTLER®

3275 North "B" Avenue
Kissimmee, Florida 32741

An ARMATRON Company

ADVERTISING DEPARTMENT STAFF

Lee Aurick, W1SE, Advertising Manager
Sandy Gerli, AC1Y, Assistant Adv. Mgr.
Jean Marhefka, Advertising Assistant

203-667-2494 is a direct line, and will be answered only by Advertising Department personnel.

Index of Advertisers

See what you save...

Call Webster FREE

(800) 344-2198

FOR ORDER INFO ONLY

KENWOOD

ALL SOLID STATE HF EQUIPMENT

180S "DFC" Series		List Price		
TS-180S	160-10M w/DFC	$1149.95	save	$250.00
TS-180S	160-10M no DFC	984.95	save	call
DF-180	DFC	164.95	save	call
VFO-180	VFO	179.95	save	call
SP-180	Ext Spkr	69.95	save	call
AT-180	Antenna tuner	179.95	save	call
YK-88CW	CW filter	59.95	save	call
YK-88SSB	SSB filter	59.95	save	call
PS-30	Power supply	139.95	save	call
TS-830S	160-10M base	929.95	save	call
TS-130S	80-10M mobile	759.95	save	80.00
520 Series				
TS-520SE	160-10M base	629.95	save	60.00
DG-5	Digital display	199.00	save	call
VFO-520	VFO	155.00	save	call
SP-520	Speaker	33.00	save	call
CW-520	CW filter	59.00	save	call
HF Miscellaneous				
R-1000	Gen cov rcvr	499.00	save	call
SP-100	Speaker	44.95	save	call
TL-922A	160-15M amp 2KW	1199.00	save	149.00

VHF/UHF EQUIPMENT

TS-600	6M ssb/cw/fm/am	799.00	save	114.00
TR-9000	2M fm/ssb/cw	499.95	save	65.00
PS-20	P/S -TR9000	74.95	save	call
BO-9	system base	39.95	save	call
TR-2400	2M Hand Held	395.00	save	50.00
TR-7800	2M fm xcvr	399.95	save	call
KPS-7	AC power supply	79.95	save	call
TR-8400	70CM fm xcvr	499.95	save	call

OTHER ACCESSORIES

HC-10	Dig world clock	99.95	save	call
HS-4	Headset	19.50	save	call
HS-5	Deluxe headset	39.95	save	call
MC-50	Base mic	45.00	save	call
MC-30S	n/c mob mic	29.00	save	call
MC-35S	n/c mob mic	29.00	save	call
MC-45	TTN mic	49.95	save	call
PC-1	Phone patch	59.95	save	call

YAESU

HF TRANSCEIVERS

		List Price		
FT-902DM	160-10M	$1535.00	save	185.00
FT-101ZD	160-10M	942.00	save	call

SOLID STATE HF TRANSCEIVERS

FT-107M	with DMS	1149.00	save	169.00
FT-707	80-10M, 200W	810.00	save	call

VHF TRANSCEIVERS

FT-127RA	220MHz scan	479.00	save	call
FT-207R	2M Hand Held	299.00	save	call
FT-625RD	6M all mode	895.00	save	call
FT-627RA	6M 4 memory	399.00	save	call
FT-720RVH	2M, 25watt	458.00	save	call

LCC-7 LEATHER CASE
Now $24.95

YAESU (cont'd) ACCESSORIES

FA-9	Fan	22.00	save	call
FM-902	FM adaptor	45.00	save	call
KY-902	Keyer unit	45.00	save	call
MU-902	Memory unit	124.00	save	call
DC-902	DC-DC conv	60.00	save	call
SP-902	Speaker	35.00	save	call
SP-902P	Speaker/patch	76.00	save	call
FTV-902R	Transv w/2M	389.00	save	call
"	2M adapt only	154.00	save	call
"	6M adapt only	110.00	save	call
"	70cm adapt only	255.00	save	call
YO-902P	Monitor w/scope	515.00	save	75.00
YR-902DM	Code/RTTY	415.00	save	call
FV-902	Antenna tuner	199.00	save	call
XF8.9HC	CW filter	45.00	save	call
XF8.9B	AM filter	45.00	save	call
XF8.9HCN	350Hz filter	50.00	save	call
ZD-1	digital readout	150.00	save	call
FV-101Z	Remote VFO	175.00	save	call
DC-101ZD	DC/DC conv	60.00	save	call

SOLID STATE RECEIVERS

FRG-7	Gen cov rcvr	379.00	save	call
FRG-7700	Gen cov dig	549.00	save	call
FV-707DM	Dig scan/mem	279.00	save	call
FP-707	Power supply	162.00	save	call
FC-707	Antenna tuner	110.00	save	call

UHF TRANSCEIVER

FT-720RU	440-450 FM	499.00	save	73.00

ACCESSORIES FOR VHF EQUIPMENT

PB-1555	Tone squelch	30.00	save	call
FP-4	4amp P/S	50.00	save	call
FP-12	12amp P/S spkr	135.00	save	call

ACCESSORIES FOR 207R

NC-1A	15hr charger	51.00	save	call
NC-2	3hr charger	90.00	save	call
NBP-9	Battery pack	23.00	save	call
FBA-1	Battery sleeve	8.00	save	call
LCC-7	Leather case	35.00	save	call
TA-2	Telesc. antenna	9.40	save	call
FTS-32E	32 tone ctcss	40.00	save	call

MISCELLANEOUS ACCESSORIES

YH-55	Headset	15.00	save	call
FF-501DX	Lo pass filter	34.00	save	call
QTR-24D	Quartz world clock	49.00	save	call

MICROPHONES

YE-7A	Hand mic 101ZD	17.00	save	call
YD-148	Hi-lo desk mic	32.00	save	call
YD-844A	Hi-lo desk mic	32.00	save	call
YM-21	n/c mic	20.00	save	call
YM-22	Keyb scan	69.00	save	call
YM-23	Keyb encod	69.00	save	call
YM-24	Spkr mic	32.00	save	call
YM-34	Desk mic 107/707	31.00	save	call
YM-35	Scan 107/707	20.00	save	call
YM-39	TTN 720RU	76.00	save	call

SERVICE & MAINTENANCE MANUALS

FT-101	Series	25.00	save	5.00
FT-101ZD		25.00	save	5.00
FT-221	Series	15.00	save	2.00
FT-227	Series	15.00	save	2.00
FT-901	Series	25.00	save	5.00

-CREDIT CARDS ACCEPTED-

ICOM

BASE STATION EQUIPMENT

		List Price		
2KL	15-160M lin amp	$1795.00	save	call
251A	2M, fm,ssb,cw	749.00	save	109.00
551	6M, ssb, cw	479.00	save	call
551D	6M,80W,12V with ex107,ex108	699.00	save	call
551D/PS	6M,80W,w/AC p/s 20	928.00	save	104.00
720A/PS	9 band HFxcvr AC & 12Vsup/mic	1498.00	save	call
730	10-80M HFxcvr 12V w/mic	829.00	save	call

MOBILE TRANSCEIVERS

255A	2M,ssb,fm,25W w/HM8 mic	399.00	save	call
260A	2M,ssb,fm,cw,mem	499.00	save	call

PORTABLE TRANSCEIVERS

2AT	2M, ttpad,nicad	269.50	save	call
202S	2M,ssb,portable	279.00	save	call
402	430MHz,ssb,port	389.00	save	call
502A	6M,ssb port	239.00	save	call

POWER SUPPLIES

3PE	AC to12V 3A/spkr	95.00	save	call
PS-15	12V p/s - 720	149.00	save	call
PS-20	20A p/s - 551D	229.00	save	call

ACCESSORIES

EX-106	FM option	125.00	save	call
EX-107	VOX option	55.00	save	call
EX-108	PBT	105.00	save	call
BC-20	nicad supply	57.50	save	call
BC-30	rapid chgr	59.00	save	call
SP-2/3	speaker	49.50	save	call
P.Patch	for 720	139.00	save	call
HM-9	spkr mic	34.50	save	call
SM-2	Desk mic	39.00	save	call
LC	leather case	34.95	save	call

Webster's Super Special
Icom - 260A
Now $ 419.95
Call in your order while they last!

HEAR WHAT YOU SAVE...

-California residents call collect to place your orders-

MAIL ORDER ONLY

Prices and availability subject to change without notice.

Webster radio, inc.

2602 E. Ashlan, Fresno, CA 93726 / Ph. (209) 224-5111
HOURS: 8:30 a.m. to 5:30 p.m. — Mon. thru Fri. / 10 a.m. to 3 p.m. — Sat.

Does Your Shiny New Rig Really Have:

"STATE-OF-THE-ART" SELECTIVITY

EXCITING NEW RADIO ACCESSORIES

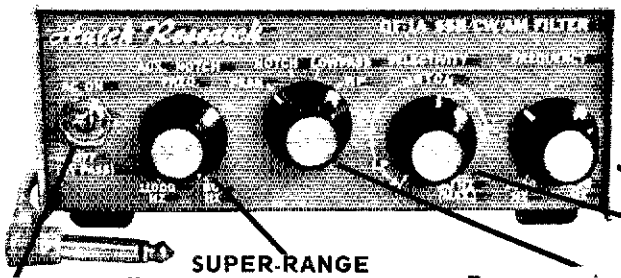
Add an Autek.

QF-1A Active Filter

For SSB & CW

PATENT PENDING

Only $65 ppd. U.S.A.



115 VAC supply built-in. Filter by-passed when off.

SUPER-RANGE Auxiliary Notch rejects 80 to 11,000 Hz! Covers signals other notches can't touch.

Four main filter modes for any QRM situation.

Continuously variable main selectivity (to an incredible 20 Hz!)

Continuously variable main frequency. (250 to 2500 Hz, all modes.)

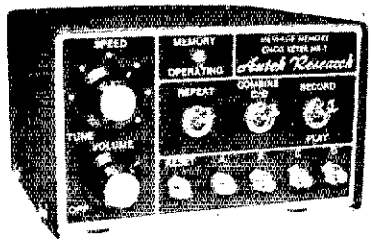
AUTEK pioneered the **ACTIVE AUDIO FILTER** way back in 1972. Today, we're still maintaining that engineering leadership. Our **QF-1A** evolved from suggestions from thousands of owners, and years of dedication to making the "ultimate" filter. No gimmicks — just something that really "works" like the ad says. You're in for a treat!

Autek filters gained their reputation by using a costly **INFINITELY VARIABLE** design. Yet, mass-production (we sell only **ONE MODEL** — the best) makes it a tremendous bargain. You're not limited by a few fixed positions. You vary selectivity 100:1, and vary frequency over the entire usable audio range. **PEAK CW** (or voice) with an incredible **20 HZ BANDWIDTH**, but also variable all the way to "flat." Imagine what the **NARROWEST CW FILTER MADE** will do to **QRM!** Reject whistles with the most flexible **NOTCH** you've heard. Wide or narrow. Depth to 70 dB. **LOWPASS** helps you cope with **SSB** hiss and splatter. Skirts exceed 80 dB. Most above features were in the popular QF-1 (See excellent review in March, 1977 **QST**.) The new "A" model is more selective, adds a **HIGHPASS** mode for **SSB**, and a great **AUXILIARY NOTCH** (35 to 60 dB) to give **TWO NOTCHES, NOTCH/PEAK, NOTCH/LOWPASS,** or **NOTCH/HIGHPASS!** If this doesn't convince you, please **ASK ON THE AIR.** Owners are our best salesmen!

Due to cost and panel-space limitations, even the latest rigs only include a fraction of the **QF-1A** features. We recommend you buy the best rig you can afford, spend $3,000 or more, then add a **QF-1A** and listen to the improvement! **WORKS WITH** Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Collins, Heath, S/1, etc., **ANY RIG!**

Hooks up in minutes. Plug into your rigs phone jack, or attach to speaker wires. Plug speaker or phones into **QF-1A** rear-panel jack. That's it! Filter supplies 1 watt to fill a room. No batteries rqd. (+12 VDC hookup possible.) 6½x5x2½". Handsome light/dark grey styling. Get yours today.!

CMOS PROGRAMMABLE KEYER MAKES CW FUN!



Calls CQ while you relax.

Also remembers name, QTH, contest exchanges.

Record anything you want in seconds!

Model MK-1 $99.50 ppd. U.S.A.

Our classic **MK-1** should make you wonder why anyone would buy an ordinary keyer, when memory costs so little! Records 4 messages. Just select "record," tap the A, B, C, or D message, and start sending at any speed! Record over old messages as easily. Playback by tapping the same button. Each message holds about 25 characters (letters, numbers). Total 100 characters. Handy repeat switch repeats message forever until reset. Very useful for **CQ's. YOU SIT BACK AND WAIT FOR A CALL!** Another switch combines two messages for 50 characters. "Memory-saver" feature standard.

This "state-of-the-art" keyer pleases beginners and CW "pros" alike. **DOT AND DASH MEMORIES. TRIGGERED CLOCK. IAMBIC. SELF COMPLETING. JAM PROOF. 5 to 50+ WPM. LATEST CMOS FOR LOW CURRENT.** Built-in monitor, speaker. Widely adjustable tone, volume. Perfect weighting at all times. No fiddling with an adjustment that varies with speed. **NEW: DUAL TRANSMITTER OUTPUTS** key **ANY** modern (post 1963) ham rig directly without a battery or relay, including difficult-to-key solid-state rigs. **115VAC** supply built in, or connect **9-14 VDC** to rear panel. Use with **ANY** paddle. 6x3½x5". Burned-in and tested. Sockets for **IC's.** Full instructions.

NOW AVAILABLE. 4096 BIT MEMORY EXPANDER (ME-1) allows 16 messages, 400 chars. & "combine" for longer messages. Plugs into memory socket of **ANY MK-1** ever made. Installs in 10 to 30 mins. Full instructions. Buy your **MK-1** now and easily add memory later if you wish!

FLASH! MK-1 used to set new world's CW record. A single operator worked 3992 DXQSO's & 275 band-countries in only 48 hours! Get the choice of champions — AUTEK.

ORDER BLANK (Or Use Separate Sheet of Paper)

Please Rush ppd. via Speedy UPS.

- ☐ QF-1A Filter at $65.00
- ☐ MK-1 Keyer at $99.50
- ☐ ME-1 Expander for MK-1 at $40 (factory installed)
- ☐ ME-1 Owner installed at $30 (save $10)

Add 4% tax in Fla. or 6% tax in Calif. Add $3 each to Canada, Hawaii and Alaska, $2 for UPS air. Add $15 each elsewhere (shipped air).

Enclosed is $_____

VISA or MC# _____ Exp. date _____

NAME _____

ADDRESS _____

CITY STATE ZIP

Send to Autek Research, Box 302E, ODESSA FL 33556

ORDER WITH CONFIDENCE. NO LONG DELAYS HERE. We ship 95% of orders from stock. 1 year limited parts & labor warranty. Try our great service! VISA & MC Welcome.

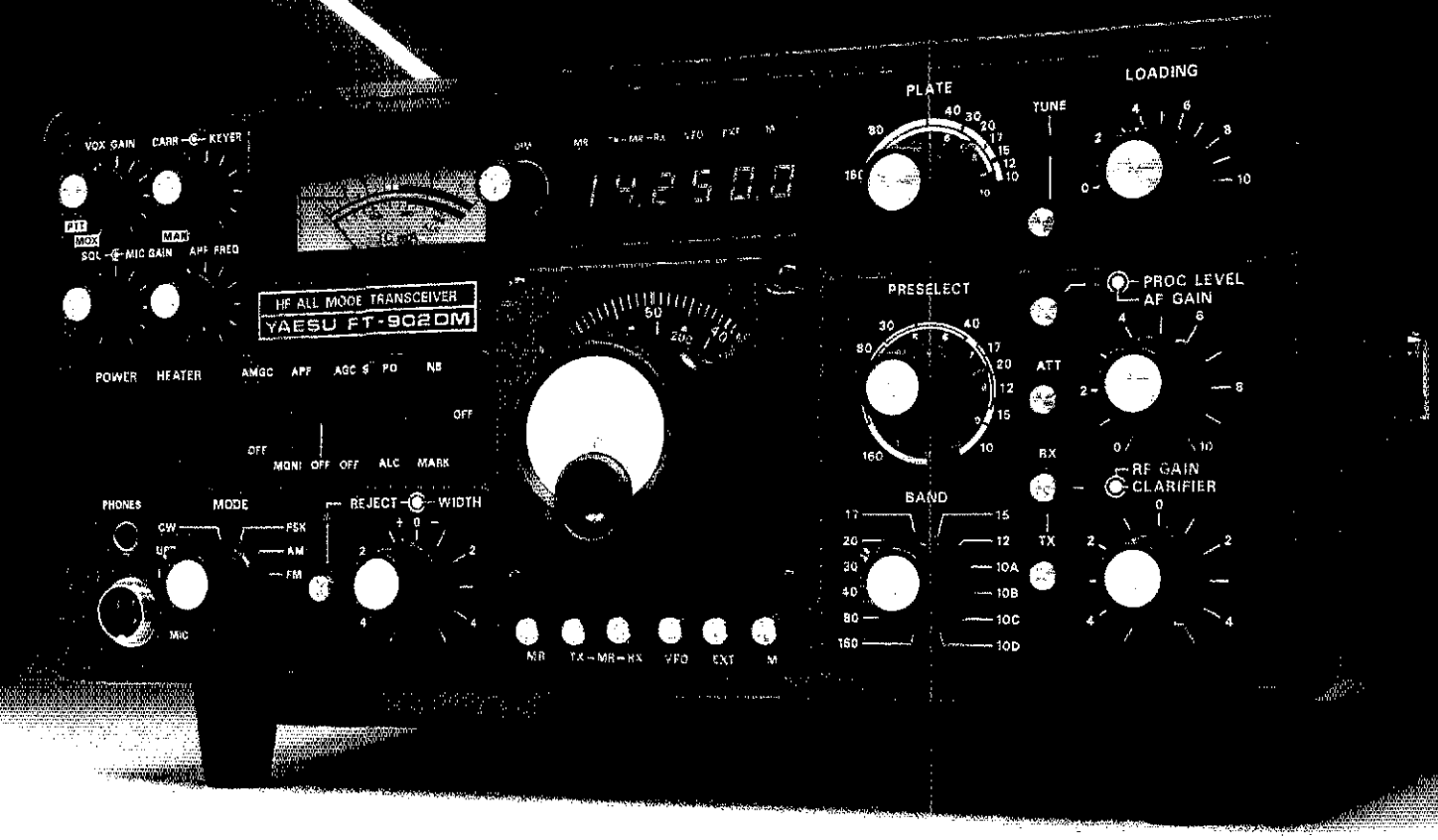
WE'VE MOVED TO FLORIDA.

PLEASE NOTE OUR NEW ADDRESS.

Autek Research

Box 302E
ODESSA, FL
33556

The New Yaesu FT-902DM



What's so new about the 902?

- **WARC Bands Factory Installed!**
  Your FT-902DM won't be "obsoleted" when the new bands become available.
- **True Reading Frequency Counter!**
  No need to recalibrate when changing bands or modes.
- **Diode Ring Receiver Front End!**
  The industry-standard dynamic range of the FT-901DM is now better than ever.
- **Curtis 8044 IC Keyer!**
  Full dot and dash memory are now provided on the built-in keyer.

What's more, the FT-902DM retains these great features of the '901:

* Variable IF Bandwidth
* Built-in memory system
* Audio peak CW filter
* IF rejection tuning
* SSB, CW, AM, FM and FSK
* Digital plus analog readout
* RF speech processor
* Highly stable PLL local oscillator
* Plug-in modular construction
* AC and DC operation built in

The FT-902DM . . . designed to give you the competitive edge!

Price And Specifications Subject To Change Without Notice Or Obligation

YAESU *The radio.*

181

YAESU ELECTRONICS CORP. 6851 Walthall Way, Paramount, CA 90723 • (213) 633-4007
Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246 • (513) 874-3100

40 W, 15 memories/offset recall, scan, priority, DTMF touch-pad

TR-7850

Kenwood's remarkable TR-7850 2-meter FM mobile transceiver provides all the features you could desire, including a powerful 40 watts RF output. Frequency selection is easier than ever, and the rig incorporates new memory developments for repeater shift, priority, and scan, and includes a built-in autopatch touch-pad (DTMF) encoder. A 25-watt output version, the TR-7800, is also available.

TR-7850 FEATURES:

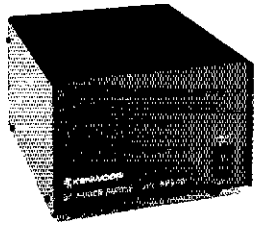
- **Powerful 40 watts power output**
  Selectable high or low power operation. High 40-watt output provides reliable signal for wide area coverage.
- **15 multifunction memory channels, easily selectable with a rotary control**
  M1-M13...memorize frequency and offset (±600 kHz or simplex). M14...memorize transmit and receive frequencies independently for nonstandard offset. M0...priority channel, with simplex, ±600 kHz, or nonstandard offset operation.
- **Internal battery backup for all memories**
  All memory channels (including transmit offset) are retained when four AA NiCd batteries (not Kenwood supplied) are installed in battery holder inside TR-7850. Batteries are automatically charged while transceiver is connected to 12-VDC source.
- **Extended frequency coverage**
  143.900-148.995 MHz, in switchable 5-kHz or 10-kHz steps.
- **Priority alert**
  M0 memory is priority channel. "Beep" alerts operator when signal appears on priority channel. Operation can be switched immediately to priority channel with the push of a switch.
- **Built-in autopatch touch-pad (DTMF) encoder**
  Front-panel touch pad generates all 12 telephone-compatible dual tones in transmit mode, plus four additional DTMF signaling tones (with simultaneous push of REV switch).
- **Front-panel keyboard**
  For frequency selection, transmit offset selection, memory programming, scan control, and selection of autopatch encoder tones.
- **Autoscan**
  Entire band (5-kHz or 10-kHz steps) and memories. Automatically locks on busy channel; scan resumes automatically after several seconds, unless CLEAR or mic PTT button is pressed to cancel scan.
- **Up/down manual scan**
  Entire band (5-kHz or 10-kHz steps) and memories, with UP/DOWN microphone (standard).
- **Repeater reverse switch**
  Handy for checking signals on the input of a repeater or for determining if a repeater is "upside down."
- **Separate digital readouts**
  To display frequency (both receive and transmit) and memory channel.
- **LED bar meter**
  For monitoring received signal level and RF output.
- **LED indicators**
  To show: +600 kHz, simplex, or -600 kHz transmitter offset; BUSY channel; ON AIR.
- **TONE switch**
  To actuate subaudible tone module (not Kenwood-supplied).
- **Compact size**
  Depth is reduced substantially.
- **Mobile mounting bracket**
  With quick-release levers.

More information on the TR-7850 is available from all authorized dealers of Trio-Kenwood Communications, Inc., 1111 West Walnut Street, Compton, California 90220.

KENWOOD
...pacesetter in amateur radio

Matching accessory for fixed-station operation:
- KPS-12 fixed-station power supply for TR-7850

Other accessories not shown:
- KPS-7 fixed-station power supply for TR-7800
- SP-40 compact mobile speaker



TR-7850 is subject to FCC approval.

Specifications and prices are subject to change without notice or obligation.