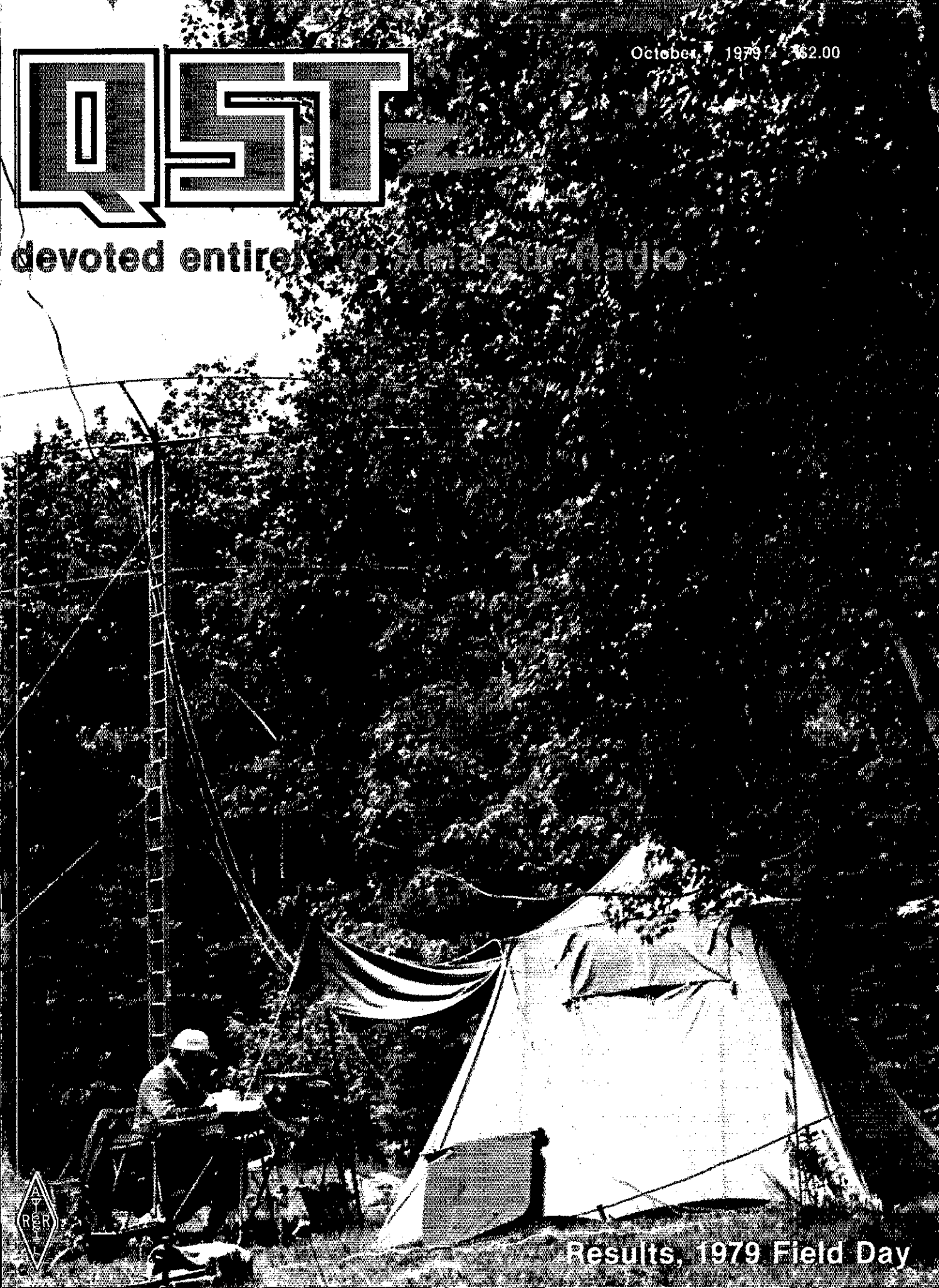
QST

October, 1979 $2.00

devoted entirely to Amateur Radio



Results, 1979 Field Day

The TEMPO S-2

ONCE AGAIN... TEMPO IS FIRST

This time with a superior quality synthesized 220 MHz hand held transceiver. With an S-2 in your car or pocket you can use any 220 MHz repeater in the United States. It offers all of the advanced engineering, premium quality components and exciting features of the S-1. It is completely synthesized, offering 1000 channels in an extremely lightweight but rugged case.

If you're not on 220 it's about time you try it and this is the perfect way to get started. With the addition of a matching Tempo solid state amplifier you can use your S-2 as a powerful mobile or base station as well. It's all you really need. And if you already have a 220 MHz rig, the S-2 will add versatility you never dreamed possible.

Also...the price is right. The ni-cad battery pack, charger, and telescoping whip antenna are included. Although not a necessary option, the touch tone pad shown in the illustration adds greatly to its convenience at a low price.

The time has never been better to expand your horizons...there has never been a better little rig for 220 than the S-2.

SPECIFICATIONS

Frequency Coverage:	220 to 225 MHz
Channel Spacing:	Receive every 5 kHz, transmit Simplex or -1.6 MHz
Power Requirements:	9.6 VDC
Current Drain:	17 ma-standby 500 ma-transmit
Batteries:	8 pieces ni-cad battery included
Antenna Impedance:	50 ohms
Dimensions:	40 mm x 62 mm x 165 mm (1.6" x 2.5" x 6.5")
RF Output:	Better than 1.5 watts
Sensitivity:	Better than .5 microvolts

Price... $349.00

With touch tone pad . $399.00

SUPPLIED ACCESSORIES

Telescoping whip antenna, ni-cad battery pack, charger.

OPTIONAL ACCESSORIES

Touch tone pad (not installed):$39 • Tone burst generator: $29.95 • CTCSS sub-audible tone control: $29.95 • Rubber flex antenna: $8 • Leather holster: $16 • Cigarette lighter plug mobile charging unit: $6 • Matching 25 watt output 13.8 VDC power amplifier (S-25): $89 • Matching 75 watt output power amplifier (S-75): $169

The TEMPO S-1. The world's first synthesized 2 meter hand held transceiver. Its superb engineering and top quality components give it an uncommon degree of reliability...a fact now proven by the thousands of units in use worldwide

TEMPO VHF & UHF SOLID STATE POWER AMPLIFIERS

Boost your signal. . . give it the range and clarity of a high powered base station. VHF (135 to 175 MHz)

Drive Power	Output	Model No.	Price
2W	130W	130A02	$209
10W	130W	130A10	$189
30W	130W	130A30	$199
2W	80W	80A02	$169
10W	80W	80A10	$149
30W	80W	80A30	$159
2W	50W	50A02	$129
2W	30W	30A02	$ 89

UHF (400 to 512 MHz) models, lower power and FCC type accepted models also available.

The Tempo line also features a fine line of extremely compact UHF and VHF pocket receivers. They're low priced, dependable, and available with CTCSS and 2-tone decoders. The Tempo FMT-2 & FMT-42 (UHF) provides excellent mobile communications and features a remote control head for hide-away mounting.

The Tempo FMH-42 (UHF) and the *NEW* FMH-12 and FMH-15 (VHF) micro hand held transceivers provide 6 channel capability, dependability plus many worthwhile features at a low price. FCC type accepted models also available.

Please call or write for complete information. Also available from Tempo dealers throughout the U.S. and abroad.

51 YEARS OF SERVICE

11240 W. Olympic Blvd., Los Angeles, Calif. 90064 213/477-6701
931 N. Euclid, Anaheim, Calif. 92801 714/772-9200
Butler, Missouri 64730 816/679-3127

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

Henry Radio

Prices subject to change without notice

The VBC Model 3000, the world's first and only narrow band voice modulation system is now a proven success. Leading communications engineers were enthusiastic about the NBVM system from the beginning. Now the idea of more QSO's per kilocycle has fired the imagination of Amateurs everywhere. The benefits of this advanced communications system are being demonstrated all over the world.

For present VBC users we can provide a list of other happy owners. For those Amateurs, who have not experienced NBVM yet, "why not add your name to the list?"

The VBC Model 3000 provides full audio level compression and expansion... complete intelligibility in only 1300 Hz bandwidth. It permits you to take full advantage of other stations' RF speech clippers and processors... similar to the amplitude compression and expansion used for many years in telephone and satellite communications.

The Model 3000 is for mobile and fixed station use and requires no modifications to your existing equipment. It is completely self contained, including its own audio amplifier. The unit automatically switches into transmit mode when microphone is keyed or voice operation is used. It connects just after the microphone on transmit and just prior to the speaker on receive. In addition to its basic function of operating in a narrow bandwidth, the Model 3000 also increases the performance of your station in the following ways:

- Reduces adjacent channel interference
- Increases signal to noise ratio
- Increases communications range

Some of its outstanding features include:

- High quality narrow band speech
- Self contained transmit/receive adapter
- Built in audio amplifier
- 5 active filters with a total of 52 poles
- Rugged dependable hybrid IC technology
- Low power consumption

Receive only features, such as sharp voice and CW filtering and amplitude expansion, provide improved reception without requiring a unit at the transmitting station.

For the more advanced experimenter the Model 3000 is available in a circuit board configuration for building into your present transceiver.

Henry Radio is ready to offer technical assistance and advice on the use and servicing of the Model 3000 and will help introduce new owners to others operating NBVM units. Get in on the ground floor... order yours now.

Price: VBC Model 3000 $349.00
Circuit board configuration $275.00

For more detailed information please call or write. The Model 3000 will be available from most Tempo dealers throughout the U.S. and abroad.

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

HENRY RADIO 51 YEARS OF SERVICE

11240 W. Olympic Blvd., Los Angeles, Calif. 90064 213/477-6701
931 N. Euclid, Anaheim, Calif. 92801 714/772-9200
Butler, Missouri 64730 816/679-3127

Henry Radio

Prices subject to change without notice.

IC-255A

143.800 — 148.200 MHz Mobile Transceiver

Power to the mobile operators! This one is brand new, and it carries a powerhouse punch wherever you're going. ICOM unveils a full 25 watts of mobile power with the introduction of the new **IC-255A.** When you want increased mobile QSO range, ICOM delivers; and **nobody does it better.**

The microprocessor controlled **IC-255A** is a deceivingly compact unit which packs more big, multifeature flexibility than any other ICOM mobile to date. This one offers a 5 channel memory, complete with memory scan, adjustable scanning speed, and auto-stop. The 5 channels can easily be written from any inband frequencies; and the scan function can be programmed to scan all 5 or only 2, stopping on any signal.

Like the other new ICOM transceivers, the IC-255A comes with 2 VFO's built-in at no extra cost. The radio is programmed to come up to power operating at 600Khz splits, but it can be reprogrammed to any split of your choice. The dual VFO's and single tuning knob provide you with smooth, easy tuning in 15KHz or 5KHz steps.

The use of new low-noise, dynamic range junction FET's (for the RF amplifier and the first mixer) and helical cavity filters (for the antenna and RF circuits) provides excellent sensitivity and intermodulation distortion characteristics. A pair of high quality monolithic crystal filters and ceramic filters facilitates interference free reception reliability.

The new **IC-255A's** power is selectable 25W high or 1W low, yet it draws only 5.5 amps when transmitting in the high power mode. A directly amplified VCO output, without the use of multipliers or mixers, and a power module in the PA unit produce a very clean transmitted signal, with low spurious radiation. When you're in an RF trap, the **IC-255A** can get out the signal. To give your mobile FM operations big features with a power punch, give yourself the **IC-255A.**

HF/VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

ICOM

ICOM WEST, INC.
Suite 9
13256 Northrup Way
Bellevue, Washington 98005
(206) 747-9020

ICOM EAST, INC.
Suite 307
3331 Towerwood Drive
Dallas, Texas 75234
(214) 620-2780

ICOM CANADA
3071 Victoria Drive
Vancouver, B.C. V5N 4L1
Canada
(604) 321-1833

Phone numbers for parts orders: ICOM West, Inc., (206) 747-9020; ICOM East,

ICOM INFORMATION SERVICE
3331 Towerwood Dr., Suite 304 Q
Dallas, Texas 75234

Please send me: ☐ IC-255A specifications sheet; ☐ full color ICOM Product Line Catalog; ☐ List of Authorized ICOM Dealers.

NAME _____ CALL _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

October 1979
Volume LXIII Number 10

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

Offices

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

Subscription rate $18.00 per year postpaid, U.S. funds, U.S. & Possessions; $20.00 in Canada; $21.00 elsewhere. Single copies $2.00. 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 the blind and physically handicapped on magnetic tape from the Library of Congress, Division for the Blind and 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

Neither bugs nor storms nor the other ravages of Mother Nature kept hams from their appointed rounds during FD weekend last June. This station, VE2XL, Mille Isles, PQ, was snapped by VE2XS.

Contents

Technical

Basic Amateur Radio

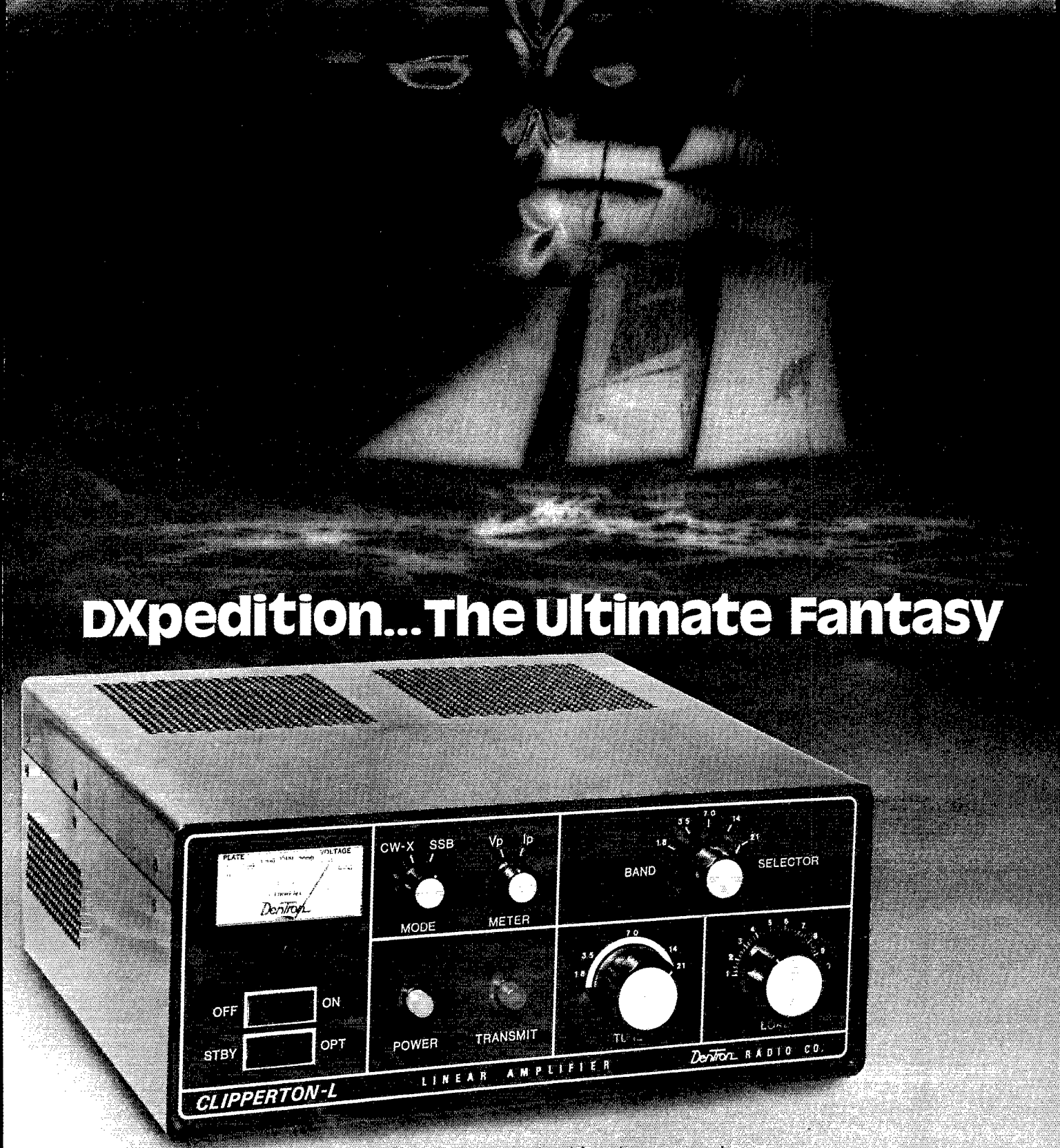
General

Operating

Organizational and Regulatory

Departments

DXpedition... The Ultimate Fantasy



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.

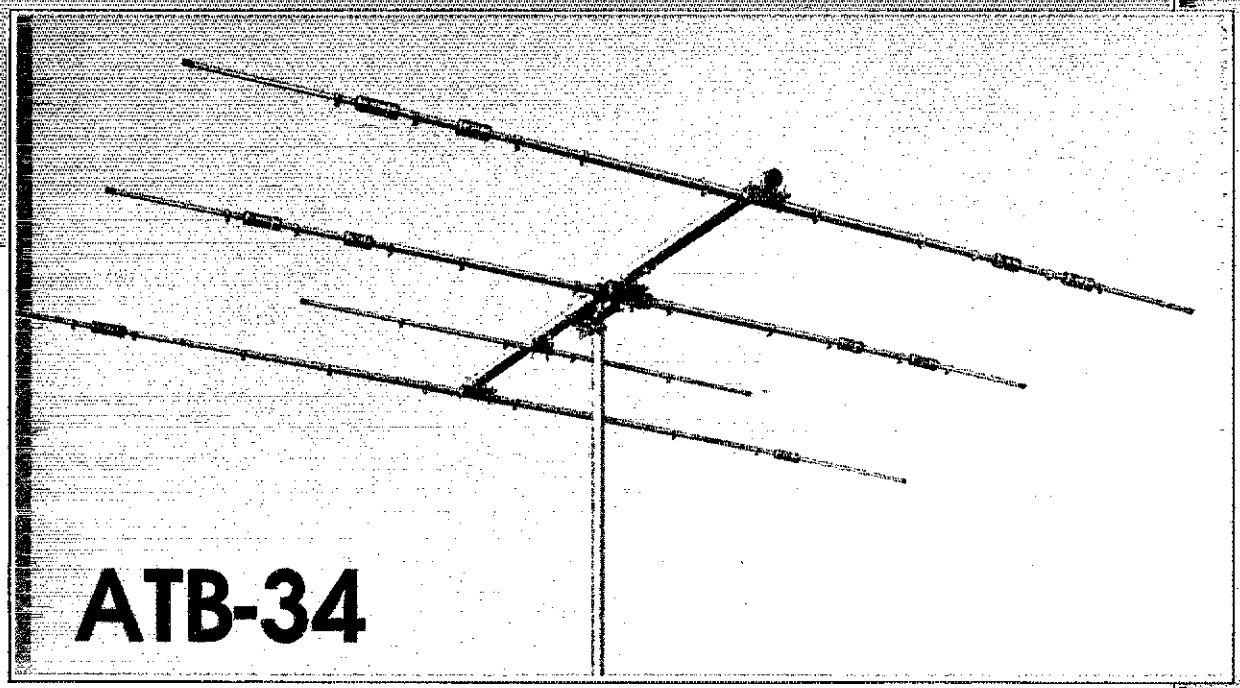
The Clipperton-L™ was inspired by the famous DXpedition on which 3 MLA-2500's were used. We built the Clipperton with 4 rugged, economical, 572 B's in the final to provide a full 2KW PEP on SSB and 1KW CW on 15 through 160 meters. With features like hi-lo power selector for equal efficiencies at 1 or 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.
FCC type accepted.

DenTron
Radio Co., Inc.
2100 Enterprise Parkway
Twinsburg, Ohio 44087
(216)425-3173

Dedicated to making amateur radio more fun.

CUSHCRAFT IS THE HF MULTI-BAND ANTENNA COMPANY.



ATB-34

Punch through the pile-ups with an ATB-34, the only three band beam to give you real full size performance. We invite a full comparison and ask you to check ATB-34 element lengths, check the trap design and construction. Check the spacing and the specially developed balun. All of these features add up to the no compromise performance that you expect from Cushcraft.

SPECIFICATIONS

Gain	*
F/B Ratio Avg.	*
3dB Beam Width	62°
Nominal Impedance	50 ohms
Power Handling	2000 Watts PEP
Boom Length	18'
Longest Element	32'8"
Turning Radius	18'9"
Wind Area	5.4 Ft.^{2}
Weight	42 lbs.
Maximum Mast O.D.	2.25"

*Antenna gain specifications cannot be published in QST. For complete information on all Cushcraft antennas, see your dealer or write for a free A-9 catalog.

ATV-5

Cushcraft vertical antennas are designed to meet the exacting demands of your amateur radio station. They give top performance in easy to use packages. They can be installed at ground level or roof top.

Durability is guaranteed with double wall seamless aluminum base sections and fiberglass high Q traps. If you are interested in local contacts or long path DX communications, a Cushcraft vertical antenna is your best choice.

ATV-3	ATV-4	ATV-5
10-15-20 Meters	10-15-20-40 Meters	10-15-20-40-80 Meters
Height 13'7" (4.2m.)*	Height 19'2" (5.9m.)*	Height 24'9" (7.4m.)*

ALL MODELS

Power Handling 2000 Watts, Nominal Impedance 50 ohms, Maximum Mast Size 1¾" O.D. Termination: accepts PL-259

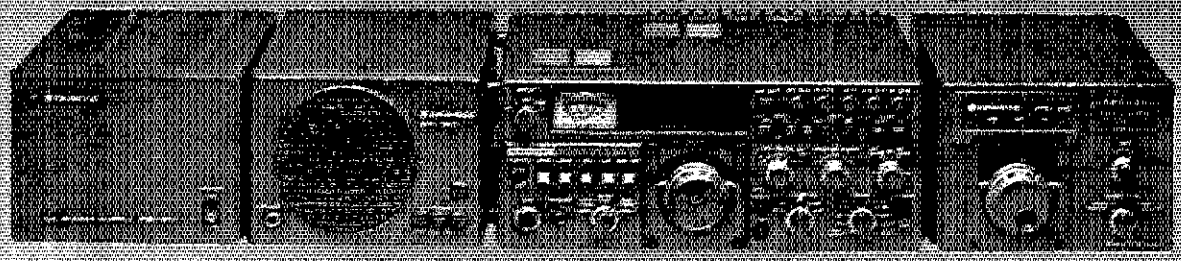
*Nominal height when set for phone operation.

IN STOCK WITH DEALERS WORLDWIDE **UPS SHIPPABLE**

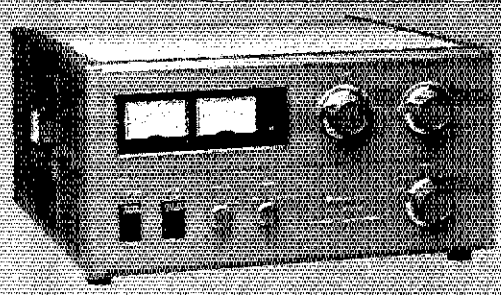
cushcraft CORPORATION

THE ANTENNA COMPANY

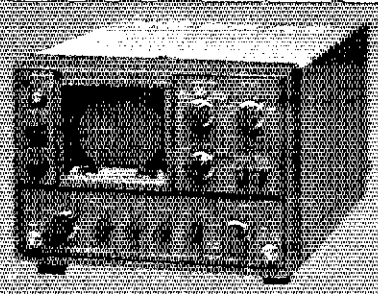
TS-180S SERIES



TL-922A



SM-220



For the ultimate in quality and performance

TS-180S With DFC*

All solid-state, this innovative 160-10 meter SSB/CW/FSK transceiver with DFC (*Digital Frequency Control) includes four memories which can be digitally tuned up or down in 20-Hz steps, slow or fast, by means of memory-shift paddle switches. The original stored frequency can be recalled, and the newly tuned memory frequency can also be stored. The memories are usable in transmit, receive, and transceive modes. It's like having four remote VFO's, but with even more flexibility. Separate VFO and memory RIT controls are provided. The solid-state final requires no dipping or loading, and runs up to 200 watts PEP input. It covers 50 kHz above and below each band (100 kHz with the tunable memories) and is adaptable for three new bands (to be considered at WARC). The built-in microprocessor-controlled digital display shows the actual VFO frequency, or the fixed-channel frequency, or the remote VFO frequency (if the optional VFO-180 is used), and it also shows the RIT frequencies. When a frequency is stored in the "M1" memory, the digital display can be switched to indicate the stored frequency and the difference between the stored and VFO frequencies simultaneously. Other features include IF SHIFT, selectable CW receive bandwidths, tunable noise blanker, RF AGC, and improved RF speech processors. Optional accessories, besides the VFO-180 remote VFO, include the DF-180 Digital Frequency Control; SP-180 external speaker; YK-88SSB SSB filter; YK-88CW CW filter; AT-180 antenna tuner/SWR and power meter/antenna switch; PS-30 base station power supply (turns on and off remotely with TS-180S power switch); MC-50 base station microphone, and HS-4 head phones.

TL-922A

Linear amplifier for 160-15 meters runs maximum legal power with 80 watts or more drive. RF input power is 2000 watts PEP on SSB and 1000 watts DC on CW and RTTY. Features include variable threshold level ALC, turn-off delay circuit for blower, and hefty construction.

SM-220

Station monitor combines a wideband (10 MHz) oscilloscope and built-in two-tone generator to monitor all transmitted and received waveforms. It also shows a trapezoid pattern for checking linearity. Pan-display option allows observing number of signals in ±20 or ±100 kHz band segments.

Specifications for Model TS-180S

	Model TS-180S
Frequency Range:	160m 1.80-2.00MHz 80m 3.50-4.00MHz 40m 7.00-7.30MHz 20m 14.00-14.35MHz 15m 21.00-21.45MHz 10m 28.00-29.70MHz WWV 10.00-10.50MHz (receive only)
Modes	SSB (LSB and USB)/CW/FSK
Power Requirements:	R. 13.8 VDC, 1.8 A T. 13.8 VDC, 20 A
Final Power Input:	160-15m 200 W PEP (SSB) 160 W DC (CW) 100 W DC (FSK) 10m 160 W PEP (SSB) 140 W DC (CW) 100 W DC (FSK)
Audio Input Impedance:	500Ω-50kΩ
RF Output Impedance:	50Ω
Frequency Stability:	Within 100Hz during any 30-min. period after warmup. Within 1kHz during first hr. after 1 min. warmup
Carrier Suppression:	Better than 40dB
Sideband Suppression:	Better than 60dB
Spurious Radiation:	Better than 50dB
Harmonic Radiation:	Better than 40dB
Audio Frequency Response:	400-2600Hz, within -6dB
Receiver Sensitivity:	0.25μV at 10dB S/N
Image Ratio:	Better than 60dB
IF Rejection:	Better than 80dB
Receiver Selectivity:	SSB, CW Wide 2.4kHz (-6dB) 4.2kHz (-60dB) *CW Narrow, FSK 0.5kHz (-6dB) 1.8kHz (-60dB) *(CW Filter Option)
Audio Output Impedance:	4-16Ω
Audio Output:	2W (4Ω)
Dimensions:	13-1/2 (343)W x 5-11/14 (147)H x 14-3/16 (363)D in. (mm) (Inc. heat sink, knobs, etc.)
Weight:	11.5 kg (25.35 lbs.)

See your Authorized Kenwood Dealer for complete information.

KENWOOD

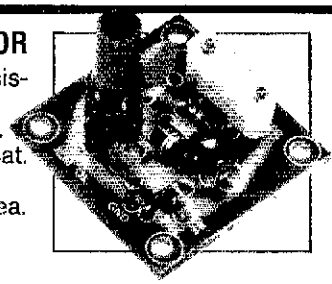
the pacesetter in amateur radio

TRIO-KENWOOD COMMUNICATIONS INC.
1111 WEST WALNUT COMPTON, CA 90220

FOR THE EXPERIMENTER

INTERNATIONAL CRYSTALS & KITS/OSCILLATORS • RF MIXERS • RF AMPLIFIER • POWER AMPLIFIER

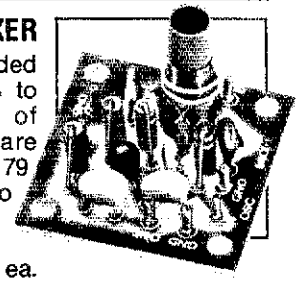
OX OSCILLATOR



Crystal controlled transistor type. 3 to 20 MHz, OX-Lo, Cat. No. 035100. 20 to 60 MHz, OX-Hi, Cat. No. 035101.

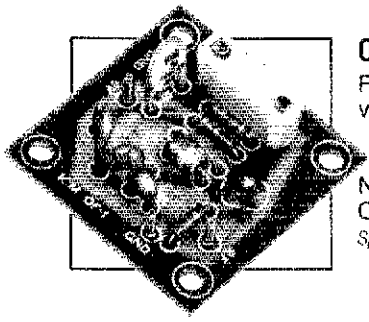
Specify when ordering. $5.22 ea.

MXX-1 TRANSISTOR RF MIXER



A single tuned circuit intended for signal conversion in the 3 to 170 MHz range. Harmonics of the OX or OF-1 oscillator are used for injection in the 60 to 179 MHz range. 3 to 20 MHz, Lo Kit, Cat. No. 035105. 20 to 170 MHz, Hi Kit, Cat. No. 035106.

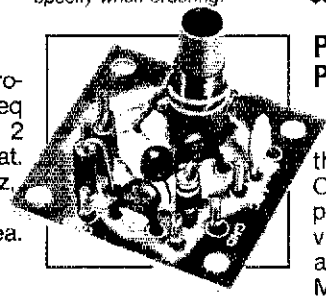
Specify when ordering. $5.80 ea.



OF-1 OSCILLATOR

Resistor/capacitor circuit provides osc over a range of freq with the desired crystal. 2 to 22 MHz, OF-1 LO. Cat. No. 035108, 18 to 60 MHz, OF-1 H Cat. No. 035109.

Specify when ordering. $4.48 ea.



PAX-1 TRANSISTOR RF POWER AMP

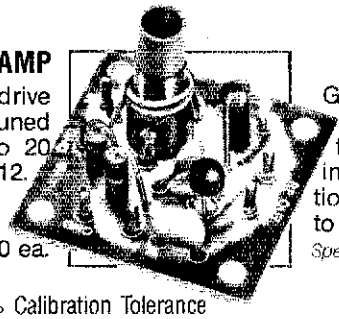
A single tuned output amplifier designed to follow the OX or OF-1 oscillator. Outputs up to 200 mw, depending on frequency and voltage. Amplifier can be amplitude modulated 3 to 30 MHz, Cat. No. 035104.

Specify when ordering. $6.06 ea.

SAX-1 TRANSISTOR RF AMP

A small signal amplifier to drive the MXX-1 Mixer. Single tuned input and link output. 3 to 20 MHz, Lo Kit, Cat. No. 03512. 20 to 170 MHz, Hi Kit, Cat. No. 035103.

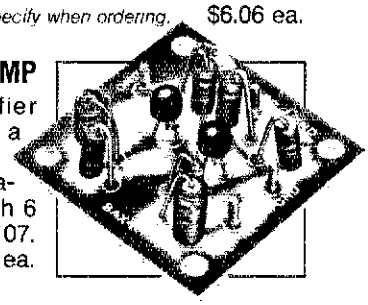
Specify when ordering. $5.80 ea.

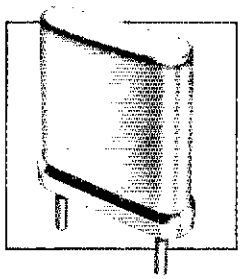


BAX-1 BROADBAND AMP

General purpose amplifier which may be used as a tuned or untuned unit in RF and audio applications. 20 Hz to 150 MHz with 6 to 30 db gain. Cat. No. 035107.

Specify when ordering. $6.06 ea.





.02% Calibration Tolerance

EXPERIMENTER CRYSTALS (HC 6/U Holder)

Cat. No.	Specifications	
031080	3 to 20 MHz — for use in OX OSC Lo	
	Specify when ordering	$6.25 ea.
031081	20 to 60 MHz — For use in OX OSC Hi	
	Specify when ordering	$6.25 ea.
031300	3 to 20 MHz — For use in OF-1L OSC	
	Specify when ordering	$5.22 ea.
031310	20 to 60 MHz — For use in OF-1H OSC	
	Specify when ordering	$5.22 ea.

Shipping and postage (inside U.S., Canada and Mexico only) will be prepaid by International. Prices quoted for U.S., Canada and Mexico orders only. Orders for shipment to other countries will be quoted on request. Address orders to: M/S Dept., P.O. Box 34297, Oklahoma City, Oklahoma 73132

INTERNATIONAL CRYSTAL MFG. CO., INC.
10 North Lee Oklahoma City, Okla. 73102

Directors

Canada

RONALD J. HESLER, VE1SH, P. O. Box 418, Sackville, NB E0A 3C0 (506-536-1208)

Vice Director: William W. Loucks, VE3AR, 155 Brentwood Rd. N., Toronto, ON M8X 2C8 (416-231-8474)

Atlantic Division

HARRY A. McCONAGHY, W3SW, 8708 Fenway Dr., Bethesda, MD 20034 (301-365-4421)

Vice Director: Jesse Bieberman, W3KT RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355 (215-827-7426)

Central Division

DON C. MILLER, W9NTP, RR 1, Box 95, Waldron, IN 46182 (317-525-6452)

Vice Director: Kenneth A. Ebneter, K9EN, 922 Wanona Trail, Portage, WI 53901

Dakota Division

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

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

Delta Division

MAX ARNOLD,* W4WHN, 129 Page Rd., Nashville, TN 37205 (615-352-1358)

Vice Director: John H. Sanders, WB4ANX, 2149 Heatherly Rd., Kingsport, TN 37660 (615-247-3702)

Great Lakes Division

RICHARD A. EGBERT,* W8ETU, 6479 Red Fox Rd., Reynoldsburg, OH 43068 (614-866-3022)

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

Hudson Division

STAN ZAK, K2SJO, 13 Jennifer Lane, Port Chester, NY 10573 (914-939-6681)

Vice Director: George A. Diehl, W2IHA, 20 Wilson Ave., Chatham, NJ 07928 (201-635-8703)

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 (402-432-2436)

New England Division

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

Vice Director: Fred E. Evans, W1JFF 74 Bedlow Ave., Newport, RI 02840 (401-847-4206)

Northwestern Division

ROBERT B. THURSTON, W7PGY, 7700 31st Ave., N.E., Seattle, WA 98115 (206-523-8167)

Vice Director: Ronald D. Mayer, K7BT, 6115 S.E. 13th Ave., Portland, OR 97202 (503-232-7363)

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

L. PHIL WICKER, W4ACY, 4821 Hill Top Rd., Greensboro, NC 27407 (919-299-9187)

Vice Director: Gay E. Milius, Jr., W4UG, 1416 Rutland Dr., Virginia Beach, VA 23454 (804-481-5095)

Rocky Mountain Division

MAURICE O. CARPENTER, KØHRZ, 1310 South Tejon St., Denver, CO 80223 (303-936-1411)

Vice Director: Lys J. Carey, KØPGM, 45 South King St., Denver, CO 80219 (303-935-2285 home, 303-744-4245 business)

Southeastern Division

LARRY E. PRICE,* W4RA, P. O. Box 2067, Georgia Southern Station, Statesboro, GA 30458

Vice Director: Frank M. Butler Jr., W4RH, 323 Elliott Rd. S.E., Fort Walton Beach, FL 32548 (904-244-5425)

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

JACK D. GANT, W5GM, 521 Monroe, N.W., Ardmore, OK 73401 (405-223-2619)

Vice Director: Raymond B. Wangler, W5EDZ, 642 Beryl Dr., San Antonio, TX 78213 (512-733-9632 home, 512-684-5111 business)

*Members Executive Committee

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 74 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	Sydney T. Jones, VE6MJ, 10706 — 57 Ave., Edmonton T6H 0Y6 (403-434-3862)
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	Aaron D. Solomon, VE1OC, 8 Crichton Park Rd., Dartmouth, NS B3A 2N8 (902-466-5188)
Ontario	L. P. Thivierge, VE3GT, 34 Bruce St. W., Renfrew K7V 3W1 (613-432-5967)
Quebec	Harold Moreau, VE2BP, 80 Principale, St. Simon Co., Bagot J0H 1Y0 (514-798-2173)
Saskatchewan	Norman F. Waltho, VE5AE, 1547 Glendale St. W., Moose Jaw S6H 7B3 (306-692-3047)

Atlantic Division

Delaware	Roger E. Cole, W3DKX, 345 E. Roosevelt Ave., New Castle 19720 (302-328-0581)
Eastern Pennsylvania	George S. Van Dyke, Jr., W3HK, 4607 Convent Ln., Philadelphia 19114 (215-637-8329)
Maryland-D.C.	Karl R. Medrow, W3FA, 718 W. Central Ave., Davidsonville 21035 (301-261-4008)
Southern New Jersey	William C. Luebkemann, Jr., WB2LCC, 116 Country Farms Rd., Marlton 08053 (609-983-8844)
Western New York	Lonnie J. Keller, WA2AOG, 260 Girdle Rd., East Aurora 14052 (716-652-4890)
Western Pennsylvania	Otto Schuler, K3SMB, 3732 Colby St., Pittsburgh 15214 (412-231-6890)

Central Division

Illinois	Edmond A. Metzger, W9PRN, 1520 South 4th St., Springfield 62703 (217-523-5861)
Indiana	John M. Kell, W9LTU, RR 8, Box 383, Greenfield 46140 (317-462-6097)
Wisconsin	Roy Pedersen, K9FHI, 510 Park St., Juneau 53039

Dakota Division

Minnesota	Helen Haynes, WBØHOX, 16 N.E. 7 Ave., Rochester 55901 (507-288-2437)
North Dakota	Lois A. Jorgensen, WAØRWM, Box 6, Abercrombie 58001 (701-553-8724)
South Dakota	Lydia S. Johnson, WØKJZ, 506 Green St., Lead 57754 (605-584-1449)

Delta Division

Arkansas	Sid Pokorny, W5UAU, P. O. Box 4071, Horseshoe Bend 72512 (501-670-5598)
Louisiana	S. T. "Tom" Losey, Jr., K5TL, 172 Moor Rd., Shreveport 71106
Mississippi	E. Ed Robinson, W5XT, P. O. Box 4181, Jackson 39216 (601-982-4440)
Tennessee	O. D. Keaton, WA4GLS, 141 Medearis Dr., Old Hickory 37138 (615-758-2329)

Great Lakes Division

Kentucky	Joseph E. Miller, K4DZM, 8901 Honor Ave., Louisville 40219 (502-969-2034)
Michigan	Stanley J. Briggs, W8MPD/K8SB, 1885 Pinetree Rd., Trenton 48183 (313-676-6248)
Ohio	Harold C. Chapman, WB8JGW, 990 Northwest Potee Rd., S. Vienna 45369 (614-852-4260)

Hudson Division

Eastern New York	Guy L. Olinger, K2AV, 126 Dahlia Dr., Mahopac 10541
N.Y.C. & Long Island	Paul A. Lindgren, WA2UWA, P. O. Box 1158, East Hampton 11937 (516-324-1542)
Northern New Jersey	Robert E. Neukomm, WA2MVQ, 404 O'Brien Ct., Wyckoff 07481 (201-891-3064)

Midwest Division

Iowa	Max R. Otto, WØLFF, 733 W. Benton St., Iowa City 52240 (319-337-7179)
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	Rex P. Greenwell, KØKP, 1534 "E" St. Apt. 11, Lincoln 68508 (402-477-5016)

New England Division

Connecticut	William J. Pace, W1ID, 15 Upland Rd., Middlebury 06762 (203-758-9228)
Eastern Massachusetts	Richard P. Beebe, K1PAD, 82 Wyman Rd., Billerica 01821 (617-667-5609)
Maine	Edward B. Bristow, Jr., WA1MUX, Box 187, Route 4, Skowhegan 04976
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 Large St., Swanton 05488 (802-868-4944)
Western Massachusetts	William T. Lowe, W1TM, Commonwealth Ave., Great Barrington 01230

Northwestern Division

Alaska	Roy Davis, KL7CUK, Star Route A 560E, Willow 99688 (907-733-2317)
Idaho	Lemuel H. Allen, Jr., W7JMH, 1800 S. Atlantic St., Boise 83705 (208-343-9153)
Montana	Robert E. Leo, W7LR, 6790 South 3rd Rd., Bozeman 59715 (406-586-6147)
Oregon	Dale T. Justice, K7WWR, 1369 N.E. Sunrise Ln., Hillsboro 97123 (503-648-8232)
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 (415-537-8704)
Nevada	Ralph E. Covington, Sr., W7SK, P. O. Box 11874, Reno, NV 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	William C. Parris, AA4R, 6210 Gothic Ct., Charlotte 28210 (704-552-0675)
South Carolina	Richard McAbee, W4MTK, 205 Jewel St. N.W., New Ellenton 29809 (803-652-2596)
Virginia	Richard "Rick" L. Genter, K4BKX, 3707 Bonmark Dr., Richmond 23234 (804-271-0505)
West Virginia	Rebecca L. Thompson, K8BT, 5303 Pioneer Dr., Charleston 25312

Rocky Mountain Division

Colorado	Robert W. Poirier, KØDJ, 1884 Pepperwood Dr., Colorado Springs 80910
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	Chester C. Stanwalty, W7SDA, 353 S. Ferris St., Powell 82435 (307-754-3624)

Southeastern Division

Alabama	William E. Scates, WA4JYU, 172 Redstone Way, Birmingham 35215 (205-853-6391)
Canal Zone	
Georgia	Edmund J. Kosobucki, K4JNL, 5625 Perry Ave., Columbus 31904 (404-322-2856)
Northern Florida	Frank M. Butler, Jr., W4RH, 323 Elliott Rd., S.E., Fort Walton Beach 32548 (904-244-5425)
Southern Florida	Woodrow Huddleston, K4SCL, 219 Drittwood Ln., Largo 33540 (813-584-0984)
West Indies	Jose R. Lebron, KP4JL, 666 Manzanillo, Venus Gardens, Rio Piedras, PR 00926 (809-755-2579)

Southwestern Division

Arizona	Willard L. Haskell, AC7D, 3915 N. Campbell Ave. Sp. 102, Tucson 85719 (602-327-3960)
Los Angeles	Perry Masterson, KD6C, 485 S. Euclid Ave., Pasadena, CA 91101 (213-793-8557)
Orange	Roy C. Zukerman, AC6H, P. O. Box 8305, Fountain Valley, CA 92708 (714-962-8318)
San Diego	Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego, CA 92117 (714-273-1120)
Santa Barbara	D. Paul Gagnon, N6MA, 3800 So. J St., Oxnard, CA 93030 (805-484-1951)

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

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.

Speak Up!

If you believe, as we do, that Article 41 of the ITU Radio Regulations should not be changed to permit the dropping of the Morse code requirement below 144 MHz, register your opposition now. If you believe, as we do, that the amateur hf bands should not be shared with those who do not have a knowledge of the Morse code, register your opposition now. If you believe, as we do, that amateurs worldwide have convincingly demonstrated an opposition to a change in Article 41 and have supported the retention of the Morse code requirement as it now stands, speak up now.

When we began to prepare for WARC-79 a number of years ago, a great part of our input from amateurs in other countries came via the IARU, a worldwide association of Amateur Radio societies, which has 105 members at the present time. Among the subjects thoroughly and exhaustively discussed at meetings all over the world, including three regional conferences, was that of a possible change in Article 41. Without exception, the result of these conferences was that amateurs did not believe that a change in Article 41 to permit the elimination of the Morse code requirement below 144 MHz was in our best interests. The opposition to such a change by international Amateur Radio was overwhelming.

When, in 1975, the FCC's Docket 20284 proposed a drastic restructuring of U.S. amateur licenses, ARRL surveyed its approximately 100,000 licensed members and obtained a 56-percent response. The response indicated a very clear opposition to the abandonment of a code requirement.

Thus, Amateur Radio operators, both domestically and internationally, have very clearly stated their desire that we amateurs continue to have a requirement for a knowledge of the Morse code below 144 MHz — i.e., no change in Article 41 of the ITU's Radio Regulations.

As we pointed out in an editorial in the February issue of *QST*, we were quite disappointed that the Commission apparently chose to ignore the comments it solicited in its original proposal to make no changes in Article 41. After all, we did go through three years of intensive participation in an FCC-created industry advisory committee — the Advisory Committee for Amateur Radio — a committee which recommended no change in the code requirement of Article 41. But now the Commission has proposed a change which would permit the elimination of the Morse code requirement below 144 MHz, a change which is not wanted by the Amateur Radio Service it affects, and we don't like it! And we don't like the fact that it has become part of the U.S. proposal.

There are a number of rumors beginning to float around, hopefully false rumors that have been caused by misunderstanding of public statements by Commission personnel. Some amateurs outside the government are concerned that the Commission may be contemplating using a portion of the 10-meter band for the hf-ers, that group of enthusiasts now operating *sans* license just below 10 meters. There are rumors that the Japanese 15-meter license, which has created a horde of phone-only amateurs on that band, causing consternation throughout the Far East because of their domination of the phone portions of the band, is going to be duplicated in the United States. And nearly everyone is concerned over the possibility that one of the strengths of the Amateur Radio Service would be eroded if these rumors are true.

This is the time to make yourself heard, because a strong expression of opinion now will not go unnoticed. If you believe, as we do, that there should be no change in Article 41 — if you believe, as Amateur Radio internationally does, that there should be no change in Article 41, speak up now. Write to Carlos Roberts, Chief, Personal Radio Bureau, FCC, Washington, DC 20554. Tell him that you don't want a change in Article 41, that you want the code requirement for the Amateur Radio Service retained below 144 MHz, that you don't want the standards for the Amateur Radio hf bands lowered.

Then write to your U.S. Congressmen and tell them the same thing.

And send us copies, please. — *R. L. Baldwin, W1RU*

League Lines...

The World Administrative Radio Conference is underway: Our team is there! Follow "WARC Countdown" in this and the next three or four issues of QST.

QST is putting together an article about Amateur Radio's role in providing emergency communications related to Hurricanes David and Frederick. Please send your contributions to the Communications Department, ARRL hq. Good-quality black and white photographs are needed, too.

As we go to press, Amateur Radio efforts continue in the aftermath of Hurricane David, which wreaked havoc mainly on the island of Dominica, the Dominican Republic and Puerto Rico. While hams performed outstanding services, some of the on-the-air conduct left much to be desired. A good opportunity to hone operating skills is provided by the ARRL Simulated Emergency Test, October 6 and 7. Contact your Section Communications Manager (see page 8) for information on the emergency organization in your area.

ARRL director and vice director elections are shaping up in the following divisions where there are two or more candidates for an office: Atlantic, Canadian, Delta, Great Lakes, Midwest, Pacific and Southeastern. At press time there were uncontested nominations for director and vice director in the Dakota Division. Ballots will be in the mail by October 1 to ARRL Full Members of record September 10, 1979, in those divisions where elections are being held. Ballots must be returned to Hq. by noon, November 20 to be counted. Eligible voters not receiving ballots by November 1 should notify Marge Tenney or Perry Williams at Hq.

Contrary to earlier published DXCC Notes, the DXCC Honor Roll will continue to be published twice a year. Honor Roll endorsement submissions must arrive at ARRL Hq. on or before December 31.

Attention instructors! Don't miss out on free FCC Form 610s, graduation certificates and other aids from Headquarters. Register your class with the ARRL Club and Training Department. Write to us today!

What ever happened to the Class of '79? League Hq. did not get its usual crop of spontaneous job applications. At this writing, we have several vacancies: in Membership Services for a jack-of-all-trades and for a public relations specialist.

The ARRL Technical Department has openings for experienced, capable and inspired technical editors and lab technicians. Career-minded persons may contact W1FB or K1TD at Hq. for details.

An assistant is needed in the Public Service Branch of the ARRL Communications Department. This position requires an amateur license, knowledge of traffic/emergency operating and good writing ability. Contact K1XA at Headquarters for details.

A reminder about the "Woodpecker," that wideband pulse-type signal causing harmful interference on the amateur (and other) bands, generally between 7 and 21 MHz: Despite numerous complaints to FCC by the users of several radio services in the U.S., and despite the fact that the U.S. State Department has been involved in the matter for nearly three years, the interference persists. The next time you experience the interference, don't give up in despair. Write the Watch Officer, Monitoring Branch, FCC, Washington, DC 20554.

The Winter Olympics Radio Amateur Network, WORAN, has been organized to provide public service communications during the 1980 Winter Olympic Games which begin February 13 at Lake Placid, NY. Amateurs will also supply communications on 2, 40 and 75 meters for the Olympic Torch Run January 31 to February 9. Section Communications Managers along the route from Langley Air Force Base, VA to Lake Placid have been asked to name coordinators to handle details for each section. Watch QST for more information.

A Grounded-Grid Kilowatt Amplifier for 432 MHz

Stable, linear operation for tropo or moonbounce DX . . . that's the end result of this project.

By Stephen J. Powlishen,* K1FO, ex-WA1FFO

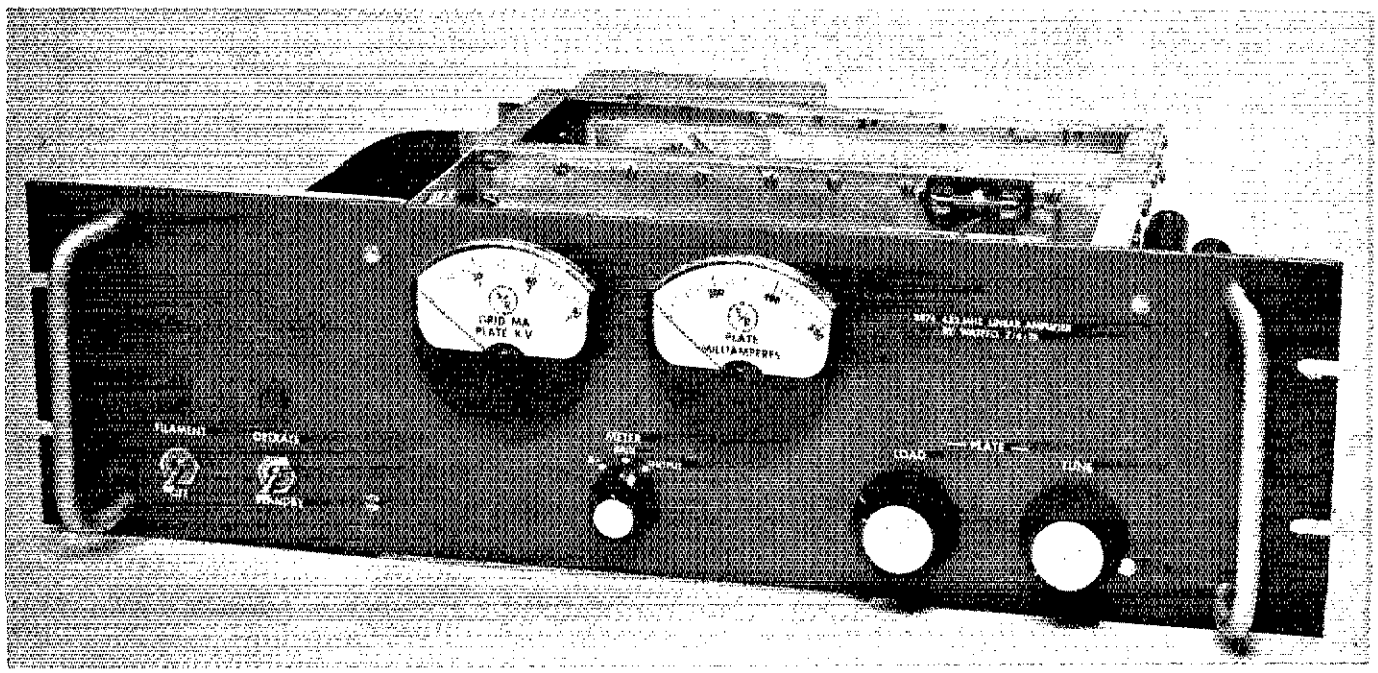
In the last few years I've built several high-power 432-MHz amplifiers that used tubes from the 4CX250 family. While they worked well in Class C, their performance when biased for linear operation left something to be desired. My previous experience with grounded-grid triode amplifiers on 2 meters was so good that I decided to try the same approach on 70 cm. An Eimac 8874 high-mu triode was selected for this design and a crude prototype was built in a few evenings. After the design was verified, the amplifier described in this article was built. It is stable, compact and delivers over 500 watts output while requiring only a high-voltage supply and a source of about 25 watts of drive. The amplifier has been trouble free in over three years of heavy usage.

*53 Oak St., East Hartford, CT 06118

Circuit Description

A schematic diagram of the 432-MHz kilowatt is given in Fig. 1. W1 is a half-wavelength stripline which is tuned and loaded by C6 and C7 respectively. Plate choke RFC4 is connected at the approximate electrical center of the plate line. C8 functions as the plate-bypass capacitor. The half-wavelength cathode line is comprised of W2, L2 and C2. L1 and C1 serve to match the tube input impedance to the amplifier 50-ohm input. As the grid is grounded for dc as well as rf, D1 is used to develop operating bias at the cathode. R3 is switched in to supply near-cutoff bias

The high-power uhf amplifier. The toggle switches control filament power and standby/operate functions respectively. Multimeter function is selected with the switch located between the meters, while the plate tuning and loading controls are at the right. Modern knobs and homemade meter faces give the amplifier a commercial appearance.



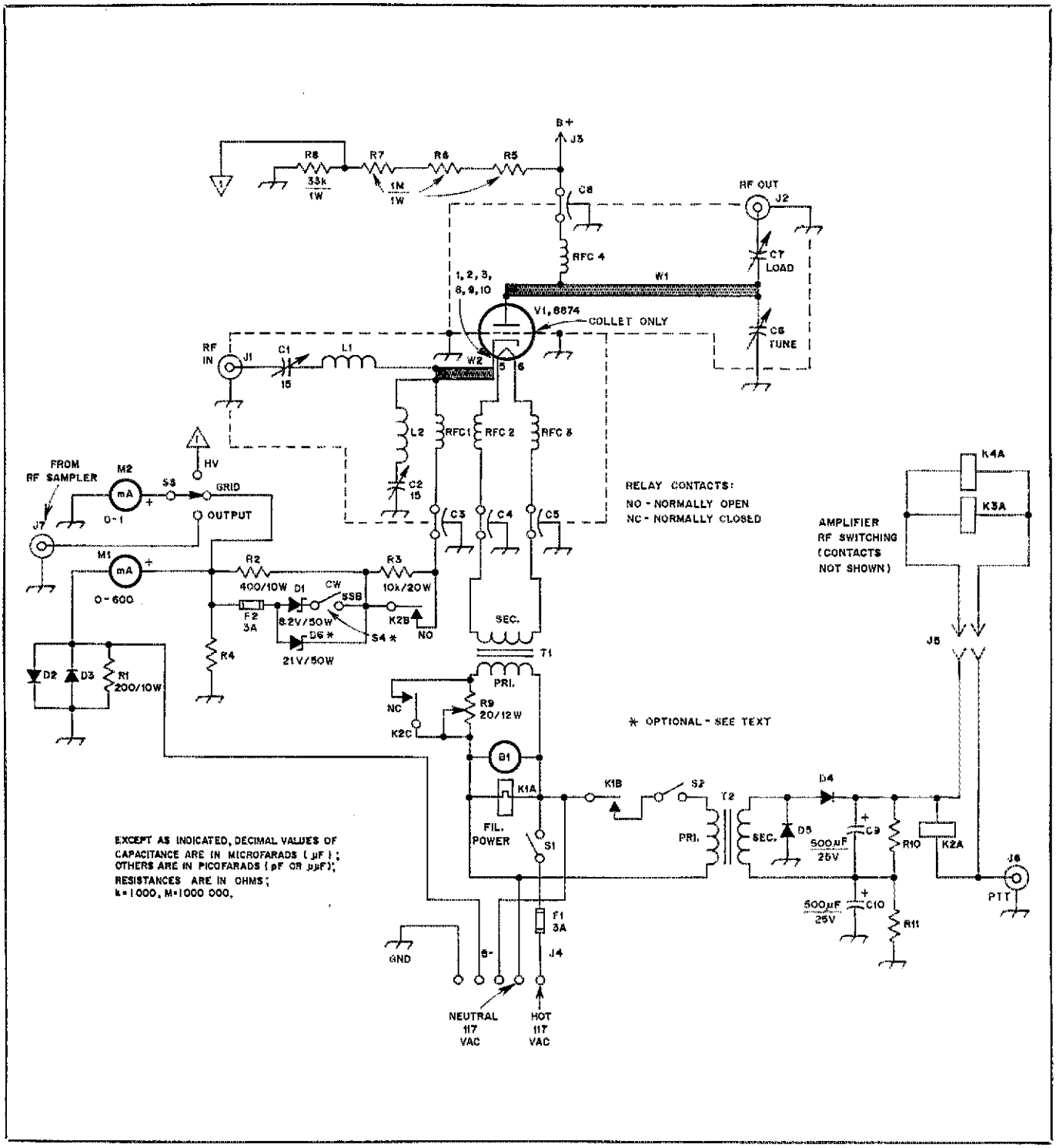


Fig. 1 — Schematic diagram of the amplifier.

B1 — 50-ft^3 (1.4-m^3)/min blower, Ripley Sk2754-2A or equiv.

C1, C2 — Air-variable capacitor, 15 pF, E.F. Johnson 189-0565-001, 160-0107-001 or equiv.

C3-C5, incl. — Feedthrough capacitor, 500 pF, 300 V.

C6-C8, incl. — Homemade "flapper" capacitor. Details of construction in text and Fig. 3.

C9, C10 — Electrolytic capacitor, 500 µF, 25 V.

D1 — 50-watt, 8.2-volt Zener diode, IR Z-3307-C or equiv.

D2-D5, incl. — 1-A, 1000-PIV diode, 1N4007 or equiv.

D6 — 50-watt, 21-volt Zener diode (optional — see text).

F1, F2 — 3AG fuses.

J1 — Chassis mount BNC female connector, UG-1094/U.

J2 — Chassis mount N female connector, UG-58A/U.

J3 — High-voltage connector, Millen 37001.

J4, J5 — Power connectors, as available.

J6, J7 — RCA phono jacks.

K1 — Time-delay relay, 90 second, normally open contact, Amperite 115N090T.

K2 — Control relay, 28-volt coil, 1-A 4pdt contacts.

K3, K4 — Coaxial relays equipped with suitable connectors. K4 should have N connectors, K3 may be BNC or N.

L1 — 3-1/2 turns no. 16 enam. wire, 3/4-inch (19 mm) long, 1/4-inch (6 mm) diameter.

L2 — 1-1/2 turns no. 16 enam. wire, 5/8-inch (16 mm) long, 1/4 inch (6 mm) diameter.

M1 — 1-mA meter movement with shunt to provide 600-mA full-scale deflection.

M2 — 1-mA meter movement with shunts to provide 90-mA (grid current) and 3-kV (plate voltage) full-scale deflection.

R4 — Grid-current shunt.

RFC1 — 10 turns no. 18 enam. wire, close wound, 1/4 inch (6 mm) diameter.

RFC2, RFC3 — 10 turns no. 16 enam. wire, close wound, 1/4 inch (6-mm) diameter.

RFC4 — 5 turns no. 16 wire, one inch (25 mm) long, 1/4 inch (6 mm) diameter.

S1 — Toggle switch, spst.

S2 — Toggle switch, spst.

S3 — Rotary switch, single pole, three position.

S4 — Toggle switch, spst (optional, see text).

T1 — Filament transformer, 6.3-volt, 3-A, Stancor P-6466 or equiv.

T2 — Transformer, 12.6 volts, 1 A.

during standby periods. M1 is used solely to monitor plate current in the high-voltage supply negative-return lead. M2 is switched to read grid current, high voltage and relative output. The latter function is by means of an external line sampler.[1] With the exception of the multimeter functions the metering and bias circuits are similar to those in a 220-MHz amplifier.[2]

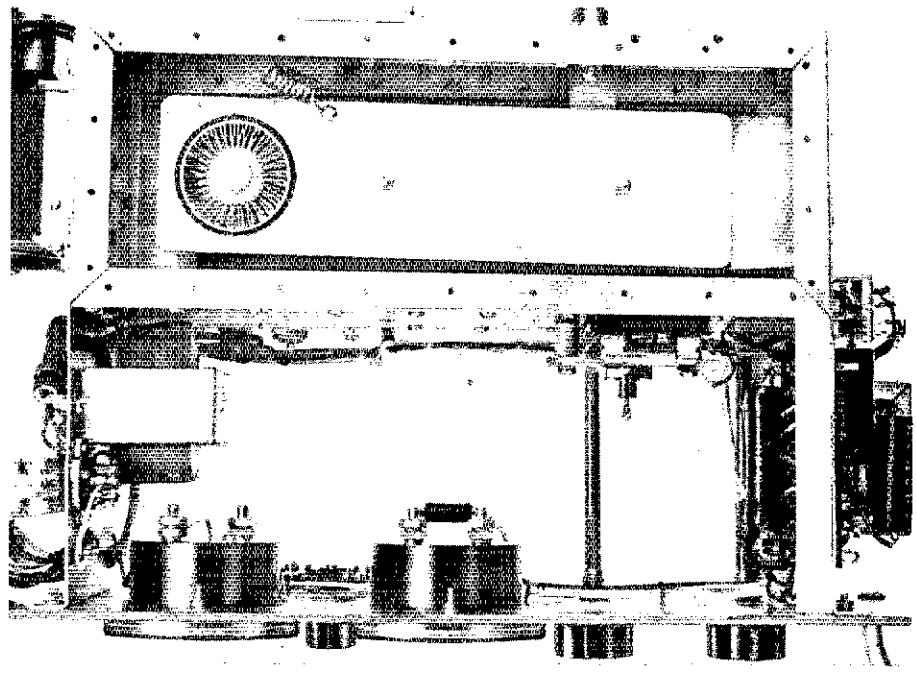
Separate coaxial relays attached to the input and output terminals allow the amplifier to be switched in and out of the line in a manner popular with hf amplifiers. Time-delay relay K1 prevents the amplifier from being switched into service for 90 seconds after the tube heater is energized, allowing the element to reach operating temperature. A normally closed contact of K2 applies full voltage to the heater during standby periods. The voltage is reduced during operation as recommended by the manufacturer.

Construction

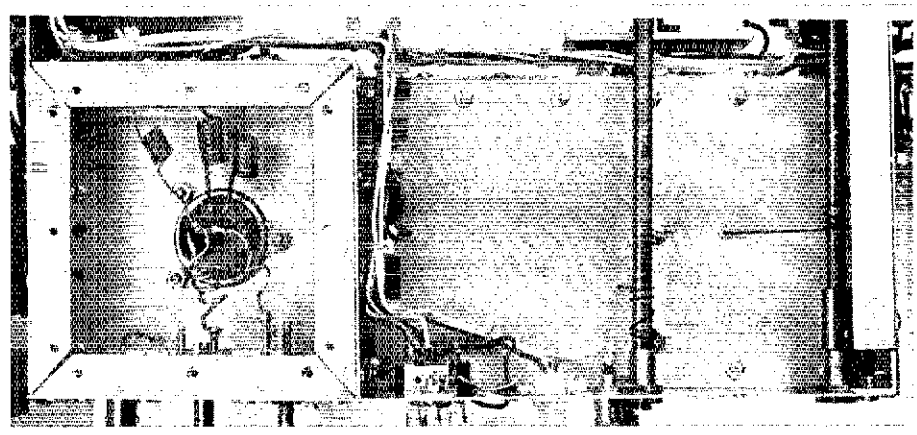
Plate and cathode-compartment construction is from 0.032-inch (0.8-mm) thick aluminum sheet attached to 1/2-inch (13-mm) aluminum angle stock. Some angle stock may be anodized, giving the surface a dull appearance. This material must be lightly sanded to remove the anodized metal, which is a poor conductor. Holes are drilled in the angle stock to allow attachment of the covers; these are tapped for no. 4-40 screws. Details of the 10.5 × 4 × 3-inch (267 × 102 × 76-mm) plate compartment may be seen in the top view photo. Construction of the cathode compartment is similar, and may be seen in the photo of the underside. It measures 4 × 4 × 1-3/4 inches (102 × 102 × 44 mm). The aluminum brackets holding the rf enclosures to the front panel also serve as end covers for the compartments. Compartment spacing from the panel is four inches (102 mm). A 5-1/4 × 19-inch (133 × 483-mm) rack panel is used.

The plate line was fabricated from a piece of 1/16-inch (1.6-mm) thick brass. Fig. 2 gives detailed information for making the line. In addition to brass, lines were made from copper, both unplated and silver plated, with no discernible difference in efficiency. Double-sided G-10 printed circuit board would probably work as well. Best thermal stability was obtained with the unplated solid-copper line. The line is supported by 1.5-inch (38-mm) long ceramic insulators, although standoffs made of Teflon will also serve. C6 and C7 are made from beryllium-copper sheet. Details of their construction appear in Fig. 3. These "flappers" are moved with fishing line which is tied to 1/4-inch (6.4-mm) fiber shafts. These shafts may be seen in the underside view.

[1]Notes appear on page 14.



Top view of the amplifier, with the plate compartment cover removed. The tube, plate line (W2) and RFC4 may be seen at the top of the photo. Note the large number of holes drilled in the plate compartment to receive the cover hold-down screws. A tight seal is required to prevent rf and air leaks.



This bottom view shows the cathode compartment and the shafts for C6 and C7. A cover is placed over the cathode compartment during tuneup and operation.

The anode collet (Eimac no. 008294) is secured to the bottom of W1 with standard 60/40 solder. Use no. 4-40 screws and nuts to hold the collet in place during the soldering operation. The grid collet (Eimac no. 882931) is attached to the chassis with eight no. 4-40 machine screws and nuts. A poor ground connection for the grid will greatly increase the amplifier drive requirements or make the unit totally inoperative.

C8, the plate-bypass capacitor, is made from two brass plates, one mounted on either side of the plate compartment. A 0.005-inch (0.13-mm) thick piece of Teflon sheet is used for the dielectric material. While this Teflon thickness may seem inadequate, it is rated at 1000 volts per mil (0.03 mm) thickness. It is necessary to coat the dielectric with Dow Corning type DC-4 silicone grease to fill in

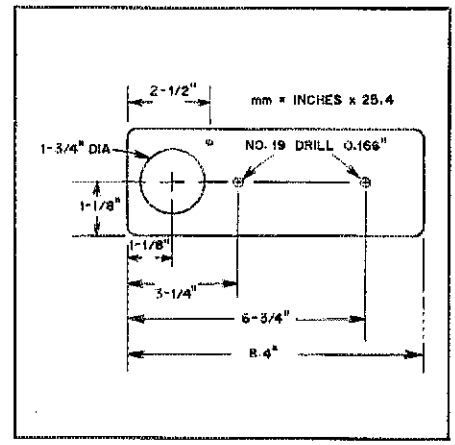


Fig. 2 — Dimensions of the plate line are given here. The line may be constructed from 1/16-inch (1.6-mm) thick copper or brass. Corners of the line should be filled to give a 3/16-inch (5-mm) radius.

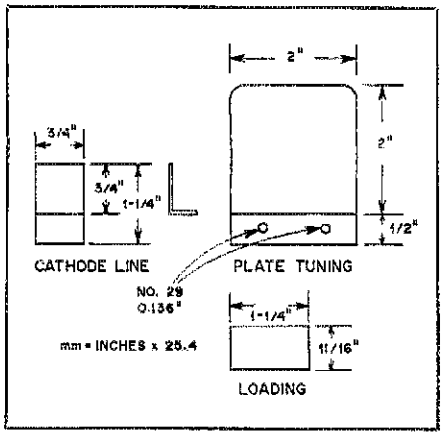


Fig. 3 — Dimensions of the cathode line and the flappers used to tune and load the plate circuit are given here. Additional information is contained in the text.

any imperfections in the surface that might allow a leakage path and subsequent capacitor breakdown. This silicone grease has dielectric properties similar to Teflon.* A no. 8 (4-mm) brass screw is used to hold the plates in place, and also acts as the high-voltage feedthrough terminal. A 3/8-inch (10-mm) diameter washer was sliced from a Teflon rod and used to center the screw in the hole. Fig. 4 gives details of the remaining metalwork.

An enclosure attached to the rear wall houses the meter dropping resistors and provides a protective hood over the high-voltage terminal. I made this cover 3 × 4 × 1.5 inches (76 × 102 × 38 mm) in size, but the dimensions are not critical. As a final note on construction, it is necessary to isolate the shaft of C1 from ground, if the rotor is connected to the shaft of the capacitor. Rf potential at this point is low, allowing the capacitor to be mounted on a small piece of plastic if an insulated unit is not available.

Cooling the Amplifier

This amplifier is thermally stable; that is, heat-induced warping of tuned-circuit components and the resulting decrease in power output is minimal. A major reason is no doubt the effective cooling system used. The cathode compartment is pressurized with a medium-sized blower. Any convenient unit capable of supplying 50 ft^3/min. (1.4m^3/min.) may be used. A piece of copper window screen is attached to the side cover with aluminum solder, to shield the air inlet. Air flows from the cathode compartment through the socket and into the plate compartment, providing some cooling of the grid area of the tube as well. A chimney is made of 0.01-inch (0.25-mm) Teflon sheet, 1.5 × 12 inches (38 × 305 mm) in size. A piece of 1-5/8-inch (41-mm) OD copper pipe was used as a form to make the chimney. The Teflon is held together with RTV (room-temperature vulcanizing) adhesive. Air in the plate compartment must now flow through the anode cooling fins to escape. The air outlet is built on a 2-1/4-inch (57-mm) square copper plate. A 1-5/8-inch (41-mm) diameter hole is made in the plate and a piece of copper window screening is soldered over it. On the side opposite the screening is soldered a 3/8-inch (9.5-mm) long piece of 1-1/2-inch (38-mm) copper pipe. This pipe has an outside diameter of 1-5/8 inches (41 mm) and should fit snugly into the hole. The Teflon chimney will be held firmly in place and no air should leak from the box without passing through the anode cooler.

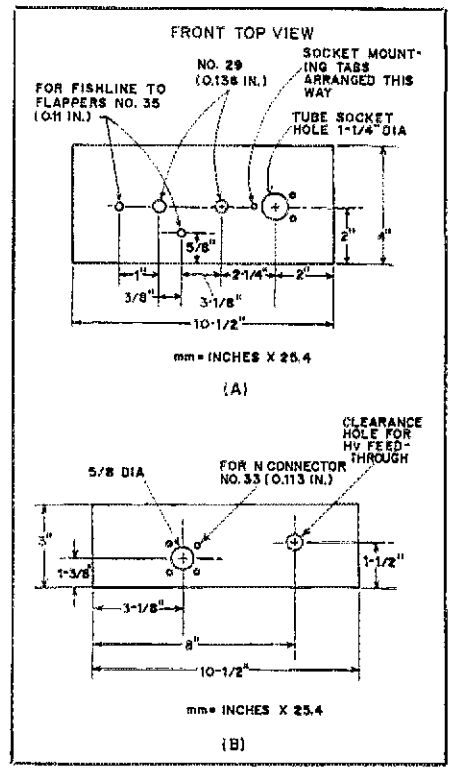


Fig. 4 — At A, dimensions of the plate compartment bottom cover. At B, dimensions of the rear panel of the amplifier.

Operation

Adjust R9 to place maximum resistance in series with the tube heater. Apply heater power and allow two minutes for the element to reach operating temperature. Now energize K2 and adjust R9 to place 5.7 volts at the socket pins. Apply plate voltage (about 2000 volts). Idling plate current should be approximately 30 mA. Apply drive and adjust its level to bring the plate current up to 150 mA. Adjust C6 (plate tuning) for maximum output. Input capacitors C1 and C2 may then be coarsely adjusted for maximum plate current. Simultaneously increase drive and adjust plate tuning and loading for maximum output until input power reaches one kilowatt or the desired level. The input circuit may be adjusted for minimum reflected power when the proper drive level is established.

An accurate wattmeter is strongly recommended for use during intitial adjustments. It is very easy to overload and underdrive an amplifier of this type, resulting in an efficiency of only 20 to 30 percent. If a wattmeter is not available, tune for maximum forward power as indicated on the line sampler. For one-kilowatt input, drive power must be at least 20 watts. Grid current will vary from 30 to 70 mA as a result of tube differences. Less grid current is a sign of insufficient drive and too much loading. Decreasing the load capacitance should result in reduced plate current and increased grid current. Slight readjustment of the plate-tuning capacitor should also be required. Table 1 contains a summary of amplifier operating conditions at the one-kilowatt level. If 40 watts or more of excitation are available, the cw plate efficiency can be boosted to about 59 percent by means of increasing the bias to 21 volts. I later installed a switch on the front panel to select another diode in place of D1 when operating cw.**

Conclusions

From a cold start, the amplifier reaches full output five seconds after drive is applied. After the first transmission, full output is obtained in one second, with no further drift noticed. This amplifier has been operated for several months without need for retuning. This amplifier represents one of the easiest, most reliable methods of becoming a big gun on uhf.

*Alternatively, an Erie 2498-001-X5U0-102M 1000-pF 4-kV feedthrough capacitor may be used. This component is available from ARCOS, P. O. Box 546, East Greenbush, NY 12061.

**[Editor's Note: When computing the input power of a grounded-grid amplifier, the rf drive power must be added to the dc plate power because some of the drive appears at the output. With 42 watts of drive, the unit can be loaded to a plate current of 496 mA for a power input of 1 kW at 1950 volts. The actual plate voltage is less than the value indicated by the meter by an amount equal to the drop across the cathode-biasing diode. The actual PEP input under the conditions listed in Table 1 is 1026 watts, which is suitable for ssb service.]

Table 1

Operating Conditions, 432-MHz Linear Amplifier

Plate voltage, key down:	1950 volts
Bias:	8.2 volts
Heater voltage:	5.7 volts
Plate current, key up:	30 mA
Plate current, key down:	515 mA
Power input:	1000 watts
Power output:	530 watts
Efficiency:	53 percent
Grid current	40 mA
Drive power:	26 watts
Input SWR:	1.2:1
Power gain:	13.1 dB

Notes

[1]McMullen, "The Line Sampler," *QST*, April 1972.
[2]Sutherland, "High Power Linear Amplifier For 220 MHz," *Ham Radio*, December 1971.

● *Basic Amateur Radio*

A Simple RF Sniffer

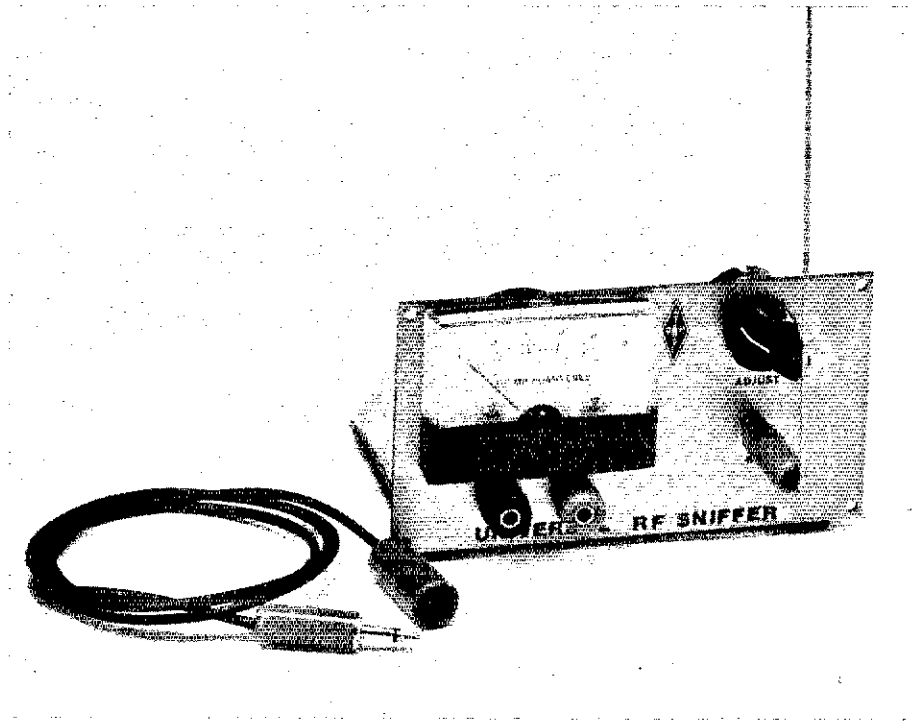
No ham shack is complete without a collection of test gadgets. This rf sniffer is the first of a series of simple, inexpensive circuits which have been designed for the beginner's workshop and station.

By Bob Shriner,* WAØUZO and Doug DeMaw,** W1FB

That "universal breadboard" described in *QST* for September 1979 just had to be a winner for the builder of simple projects! That's what the authors decided during a phone conversation concerning the pc-board foundation unit. It seemed appropriate to develop a group of projects such as test equipment, station gear and station accessories which could be built simply on the master breadboard. Not only would the projects be educational, but they would be useful and low in cost.

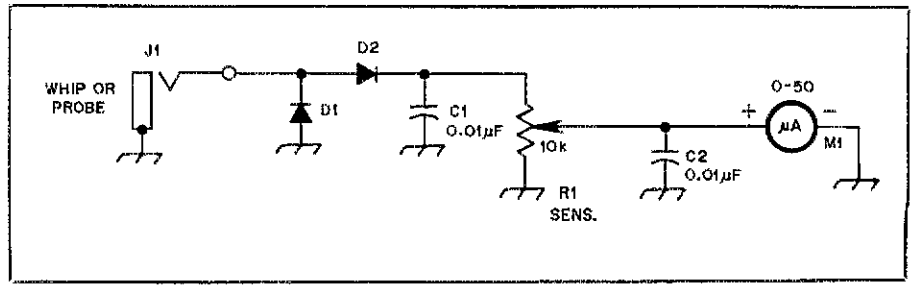
This little rf sniffer is the first of a series of beginner projects which will use the same basic building format.[1] What can one do with an rf sniffer? That's certainly a fair question, and the answer is multifaceted. Among the common applications for such an instrument are (1) antenna field-strength tests, (2) rf tune-up indicator, (3) shielding-integrity testing, and (4) rf signal tracing (equipment troubleshooting).

The front and side panels for the equipment in this series will be similar in appearance. The objective is to produce a group of matching projects which the builder can exhibit and use with pride! Although parts kits and pc boards for these projects are available (see footnote 1), there is no reason why the amateur can't use one of the alternative approaches given in September 1979 *QST* when building the foundation circuit board. Similarly, the front and side panels can be fashioned at home from pieces of double-sided pc-board material. Objective: Do your own thing and save bucks!



Front-panel view of the rf sniffer main frame. The two jacks at the lower left are unused in this project.

Fig. 1 — Schematic diagram of the main part of the sniffer. M1 is a 50-μA miniature meter. See text for mention of this and a description of the other circuit components. C1 and C2 are 0.01-μF, 50-V disc ceramic capacitors.



*P. O. Box 969, Pueblo, CO 81002
**Senior Technical Editor, ARRL

[1]Circuit boards and parts kits for this and other *QST* projects are available from author Shriner.

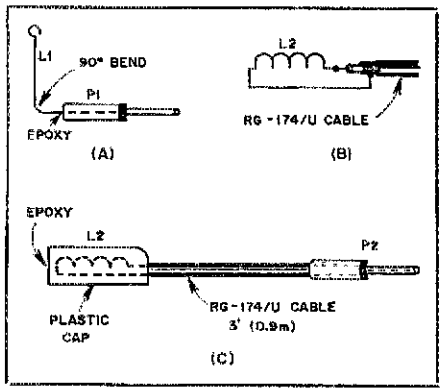


Fig. 2 — Pictorial details of the whip antenna (A) and the rf probe (B and C). See text for additional data.

A little *"learning by doing"* is good for the soul, too!

Sniffer Circuit

Fig. 1 is the schematic diagram for our project "main frame." The heart of the sniffer is a pair of germanium or silicon small-signal diodes. The germanium diodes will provide slightly greater signal sensitivity than silicon diodes can. This is because they conduct at approximately 0.3 to 0.4 volt, whereas most silicon diodes conduct at 0.6 to 0.7 volt. If germanium diodes are to be our choice, we can use 1N34As at D1 and D2. If silicon diodes are employed, 1N914s will be just fine. However, any small-signal rf type of diode will work satisfactorily in the circuit of Fig. 1.

D1 and D2 serve as a voltage doubler. The rf energy being sampled by means of the short whip antenna or rf probe (Fig. 2) is supplied to the rectifier/voltage doubler at J1. This rf voltage is converted to dc voltage through the rectifying action of D1 and D2. C1 filters the rectified voltage to smooth it out. R1 functions as a sensitivity control for the indicating meter, M1. C2 is also part of the filtering circuit. Two jacks on the front panel, visible in the photos, are not used in this project. They have been included for use in a different project of this series. However, if the builder does not wish to purchase a meter for use at M1, the two jacks can be connected to the circuit in place of the meter. This will permit the use of an external meter, such as that in a VOM or other piece of test equipment. The jacks may be deleted entirely from this project if the builder has no immediate use for them.

M1 is a 50-microampere instrument. It was chosen to permit maximum sensitivity of the sniffer. The higher the current rating of a meter the greater the amount of dc current needed to deflect the needle to full scale. Unfortunately, the greater the meter sensitivity the higher the cost. A 100-microampere meter can be used in place of the 50-microampere unit, and the sensitivity will be impaired only a little. A 1-milliampere movement can be installed at M1 of Fig. 1, but the rf sniffer will probably not respond to low levels of rf if this is done. The normal procedure when using 1-mA meters in circuits of this type is to include a one-stage transistorized dc amplifier between the rectifier diodes and the meter. Circuits of this kind are found in the test-equipment chapter of *The Radio Amateur's Handbook*, ARRL.

Instrument Probes

Components L1 and P1 of Fig. 2A comprise the small whip antenna which can be plugged into J1 of Fig. 1. The whip is used as an rf sampler when the sniffer serves as a relative (uncalibrated) field-strength indicator. L1 can be fashioned from a 10- to 15-inch (250- to 380-mm) length of 1/16-inch (1.6-mm) diameter brass welding rod or equivalent. A stiff piece of solid copper wire will serve as an acceptable substitute for the brass rod material. The length of L1 is not critical. The primary limitation for the length is a practical one: If it is too long it will be unwieldy. However, the longer the whip antenna, the greater the sensitivity of the sniffer, as the larger dimensions will result in greater rf signal pickup.

L1 is soldered to the tip contact of P1. The latter component is a miniature two-circuit (hot and ground) phone plug of the variety found in Radio Shack stores. Once the wire is soldered to the phone plug, the plastic cap is screwed into place and L1 is bent to a 90-degree angle just beyond the cap. Epoxy cement should be poured into the open end of the plastic cap and allowed to harden. This will enhance the strength of the whip assembly to ensure long life. It is important to bend an eye in L1 at the end opposite P1. This will prevent the sharp end of L1 from being a safety hazard.

The sniffer probe is shown in Fig. 2 at B and C. The "sampler" portion of the probe consists of a 20-turn, close-wound coil of no. 20 or 22 enam. wire. The outer diameter of the probe coil, L2, is 5/16 inch (8 mm). This coil is installed inside a plastic cap (1/2 inch or 13 mm) from a 1/4-inch (6.4-mm) phone plug, as shown. L2 is soldered to the conductors of a 3-foot (0.9-m) length of miniature coaxial cable, such as RG-174/U. Once more we shall fill the plastic cap with epoxy cement and allow it to harden.

A miniature two-circuit phone plug (P2) is connected to the opposite end of the coaxial cable as shown at C of Fig. 2.

Construction Tips

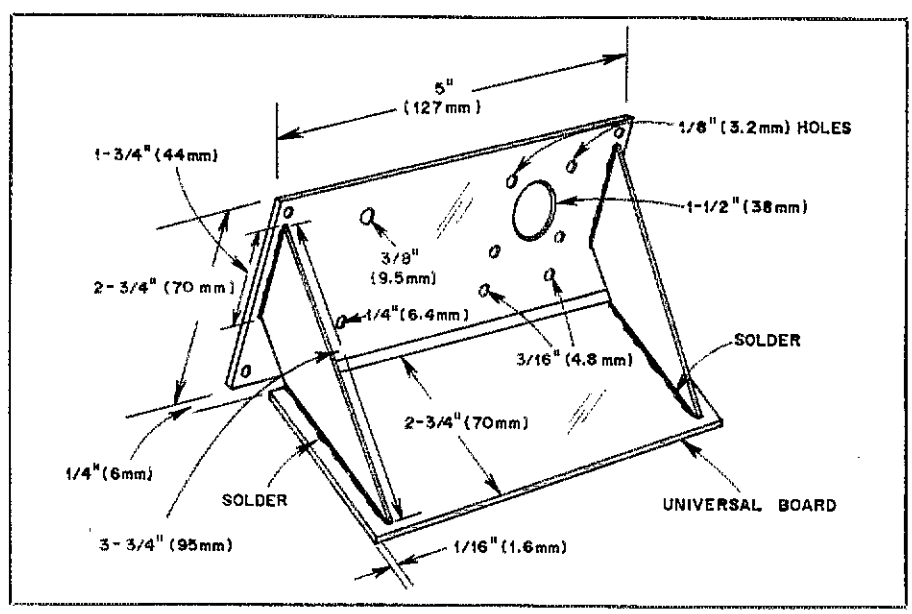
As we learned earlier, the framework for this project is made from sections of double-sided pc board (copper on both sides of the board). The dimensional data and layout information are provided in Fig. 3.

The various pc-board sections of the assembly are joined by soldering them together on both sides at each mating surface. A medium-wattage iron is best for this job. It is best to use an iron which is rated at 100 watts or more when soldering large conductive areas such as those in this project. A soldering gun is suitable for this work also.

The meter hole can be cut easily by means of a nibbling tool, drill-press fly cutter or 1-1/2-inch (38-mm) diameter socket punch. If worse comes to worse, drill tiny holes around the perimeter of the hole area, knock out the slug and smooth the edges of the hole while using a half-round file.

Insulated hookup wire is used for the

Fig. 3 — Construction details for the panel and side brackets of the rf sniffer.



connections between the main pc board and the front-panel components. Adhesive-backed plastic feet are affixed to the bottom four corners of the main pc board. This technique will prevent the assembly from sliding about on the table if it should be bumped or taxed by the probe cable.

A back-side view of the assembled sniffer is provided in Fig. 4. A plain piece of pc board can be substituted for the etched "universal" board shown. If this is done it will be necessary to provide three insulating terminals to which the diodes and capacitors can be soldered.

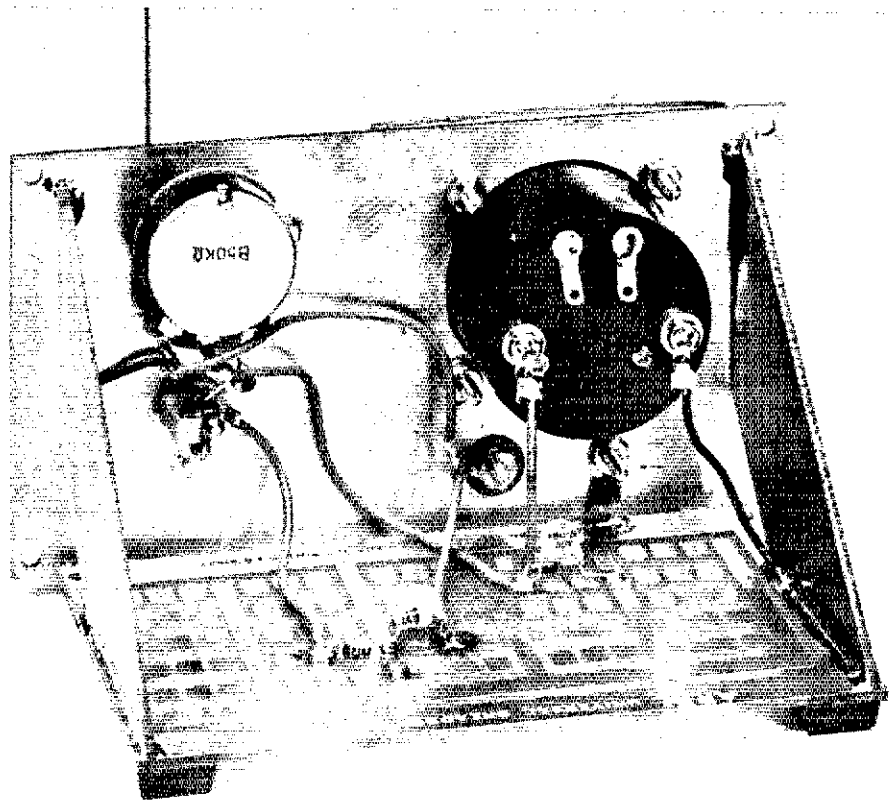


Fig. 4 — Rear view of the assembled sniffer. The front panel, side brackets and pc board are joined by means of solder. Plastic feet are attached to the bottom four corners of the pc board. See page 47 of September 1979 *QST* for a scale template of the etching pattern for the "universal breadboard."

How to Use the Sniffer

Now that we have completed our masterly work of art, let's learn about the ways in which it can be applied around the ham station. It should "play" nicely all of the way from 160 meters through the uhf bands. Since no tuned circuits are employed, only the meter sensitivity control needs to be twiddled.

Antenna Testing: Suppose we wanted to adjust the matching section of an antenna, but had no SWR meter available. Well, in the "good (?) old days" we didn't have SWR meters, and our peers often relied upon field-strength meters to indicate when an approximate match (maximum transfer of power) was obtained. A field-strength meter was placed a fair distance (the farther the better) from the antenna being tuned. All adjustments were made to provide maximum deflection of the meter in the test unit: The greater the transfer of power from the transmitter to the antenna, the higher the field-strength reading. During this kind of testing the sniffer with its whip antenna should be kept well away from the feed line, lest misleading results be obtained from line currents. In this case we are interested only in what the antenna radiator is sending out into the ether.

Circuit Tracing: When looking for faults in an rf type of circuit we can plug the rf probe into our sniffer and look for signal energy at each stage of a transmitter. The encapsulated coil is placed near the tuned circuit of each transmitter stage, starting with the oscillator and working through to the final amplifier. If the stage under examination is okay, the meter in our sniffer should deflect to the right. Typically, each transmitter stage should deliver more output power than the preceding one. Our sniffer can let us know if we're losing or gaining power, relatively speaking. If no meter deflection is observed, chances are that we've found the inoperative part of the circuit.

Circuit instability is often caused by rf ground loops (unwanted rf current flowing on the ground or B+ conductors of a circuit board or chassis). The sniffer with its probe is useful for finding these unwanted hot spots. The probe can be moved around on the ground or B+ bus in search of rf hot spots. Although toroid coils are inherently self-shielding (incapable of radiating rf energy), the probe will sample sufficient rf energy by virtue of capacitive coupling to provide meter deflection. This condition will become more pronounced as the operating frequency is made higher. As the operating frequency becomes lower, the sniffer probe becomes more and more dependent upon inductive coupling.

Tune-up Indicator: The sniffer and probe can be used when tuning up the various stages of a transmitter or local-oscillator chain in a receiver or converter. It must be remembered at all times that the sniffer is not frequency-sensitive. That is, it will respond to any frequency, which means that if a stage can be tuned to more than one frequency, the sniffer won't be able to tell which is which. So in tuning for maximum meter reading, we can be peaking a circuit just as easily for the wrong frequency as for the desired one. But once we're certain of the proper frequency, we can proceed by tuning the stages for maximum meter reading on the sniffer.

Shielding Tests: Some pieces of homemade and commercial transmitting equipment can cause TVI or fm-radio RFI by means of stray radiation from the transmitter cabinet. Many times there is unwanted radiation from the circuits where frequency multiplication takes place. In some instances those frequencies are just right for causing TVI. We can use our sniffer and probe to check around the transmitter cabinet for rf "leaks." A good place to look for leakage is near the panel meter, blower-fan opening, cabinet lid and joints, microphone cable, keying leads, ac cord and remote-control cables. If one or more hot spots are noted, additional shielding or filtering may be required at those points.

Closing Comments

This little project is anything but new in concept. It isn't even complicated or beautiful. But, it has so many uses around the amateur station that each of us should have one. It's even great for making sure your 2-meter HT is transmitting. The next time you can't key up a repeater with your HT, get out the sniffer, attach the whip antenna, and see if your hand-held unit is sending out rf. Meanwhile, keep an eye on this column in *QST* for more interesting beginner projects which can be built on the "universal breadboard." QST

Better Results with Indoor Antennas

Limited to an antenna hidden under the roof? Then make the most of it. The W6HPH approach can help you optimize that attic-bound aerial and even lead you to a coveted DXCC certificate!

By Fred Brown,* W6HPH

Beyond any question, the best place for your antenna is outdoors and as high and in the clear as possible. Some of us, however, for legal, social, neighborhood, family or landlord reasons, are restricted to indoor antennas, a consequence of being denied the privilege for so much as a flagpole vertical outside.[1] Alternatively, having to settle for an indoor antenna (IA) is certainly a handicap for the amateur seeking effective radio communication, but that is not significant enough reason to abandon all operation in despair. In fact, worldwide communication leading to the acquisition of the prized DX Century Club award has been accomplished with an IA.

This article goes into some of the fine points of IAs and shows how the best possible results can be obtained. Understandably an inside antenna will not enable a station to offer real competition against another that has a tribander at 60 feet (18 m), but a few hours spent on optimizing IA performance can add many decibels to your signal at the receiving end.

First of all, we should be aware of the reasons why indoor antennas *do not* work well. Principal faults are (1) low height above ground — the IA cannot be placed higher than the highest peak of the roof, a point usually quite low in terms of wavelength at hf; (2) the IA must function in a lossy rf environment that involves close coupling to electrical wiring, guttering, plumbing and other parasitic conductors, besides dielectric losses in such nonconductors as wood, plaster and masonry;

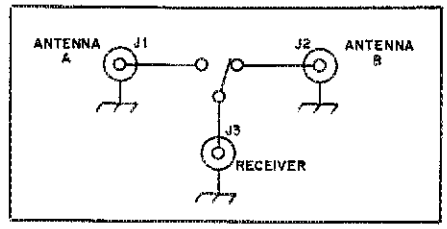


Fig. 1 — Certainly no one should be discouraged by the complexity of this circuit! When antennas are compared on fading signals, the time delay involved in disconnecting and reconnecting coaxial cables is too long for accurate measurements. A simple slide switch will do well for switching coaxial lines at hf. The four components can be mounted in a tin can or any small metal box. Leads should be short and direct. J1 through J3 are coaxial connectors.

(3) sometimes the IA must be made small in terms of a wavelength and (4) usually the IA cannot be rotated. These are appreciable handicaps. Nevertheless, global communication with an IA is still possible.

Some practical points *in favor* of the IA include (1) freedom from weathering effects and damage caused by wind, ice, rain, dust and sunlight (the SWR of an attic antenna, however, can be somewhat affected by a wet or snow-covered roof); (2) indoor antennas can be made from materials that would be altogether impractical outdoors, such as aluminum foil and thread (the IA need support only its own weight); (3) the supporting structure is already in place, eliminating the need for antenna masts and (4) the IA is readily accessible in all weather conditions simplifying pruning or tuning which can be accomplished without climbing or tilting over a tower.

Empiricism

A typical house or apartment involves such a complex electromagnetic environment that it is impossible to predict theoretically which location or orientation of the IA will work best. This is where good old-fashioned cut-and-try, use-what-works-best empiricism pays off. But to properly determine what really is most suitable requires an understanding of some antenna-measuring fundamentals.[2,3]

Unfortunately, many amateurs do not know how to evaluate performance scientifically or compare one antenna with another. Typically, they will put up one antenna and try it out on the air to see how it "gets out" in comparison with a previous antenna. This is obviously a very poor evaluation method because there is no way to know if the better or worse reports are caused by changing band conditions, different S-meter characteristics or any of several other factors that could influence the reports received.

Many times the difference between two antennas or between two different locations for identical antennas amounts to only a few decibels, a difference that is hard to discern unless instantaneous switching between the two is possible. Those few decibels are not important under strong-signal conditions, of course, but when the going gets rough, as is often the case with an IA, a few dB can make the difference between copy and no copy.

Reciprocity

A very common misconception in antenna work is that the use of a

[1]References appear on page 21.

*1169 Los Corderos, Lake San Marcos, CA 92069

transmitter is necessary in order to properly evaluate an antenna. This is not true and not even desirable. Testing with a transmitter can cause needless QRM. Because of reciprocity, only a receiver is needed.[4] An important consequence of the reciprocity theorem is that any given antenna will perform exactly the same whether receiving or transmitting. Gain is the same, impedance is the same, losses are the same and the radiation pattern is the same. In short, practically any antenna measurement can be carried out in the receiving mode.

Very little in the way of test equipment is needed for antenna evaluation other than a communications receiver. You can even do a qualitative comparison by ear, *if* you can switch antennas instantaneously. Differences of less than 2 dB, however, are still hard to discern. The same is true of S meters. Signal-strength differences of less than a dB are not usually visible. If you want that last fraction of a dB, you should use an ac VTVM at the receiver audio output (with the age turned off, of course).[5]

Ideally, the received signal should be a steady, unmodulated carrier from a source close enough to avoid fading. Now that a-m is obsolete, steady carriers are not so plentiful on our bands, but we do have cw and Teletype signals. Sometimes foreign broadcast carriers can be used. Sideband signals are not very useful because of their intermittent and fluctuating nature.

In order to compare two antennas, switching the coaxial transmission line from one to the other becomes necessary. No elaborate coaxial switch is needed; even a simple double-throw toggle or slide switch will provide more than 40 dB of isolation at hf. See Fig. 1. Switching by means of manually connecting and disconnecting coaxial lines is not recommended because that takes too long. Fading can cause strength changes during the changeover interval.

Whatever difference shows up in the strength of the received signal will be the difference in performance between the two antennas in the direction of that signal. For this test to be valid both antennas must have nearly the same feed-point impedance, a condition that is reasonably well met if the SWR is below 2.0 on both. If it is not, a matching device, such as any of many that have been described in *QST* or the *Handbook*, can be inserted in the coaxial line to bring the SWR down.

On ionospheric-propagated signals (sky wave) there will be constant fading and for a valid comparison it will be necessary to make an average of the difference between the two antennas. Occasionally, the inferior antenna will deliver a stronger signal to the receiver, but in the long run the law of averages will put the better antenna ahead.

Of course with a ground-wave signal, such as that from a station across town, there will be no fading problems. A ground-wave signal will enable the operator to properly evalute the antenna under test in the direction of the source and will be valid for ionospheric propagated signals at low elevation angles in that direction. On 10 meters, all sky-wave signals arrive and leave at low angles. But on the lower bands, particularly 80 and 40 meters, we often use signals propagated at high elevation angles, almost up to the zenith. For these angles a ground-wave test will not provide a proper evaluation of the antenna and use of sky-wave signals becomes necessary.

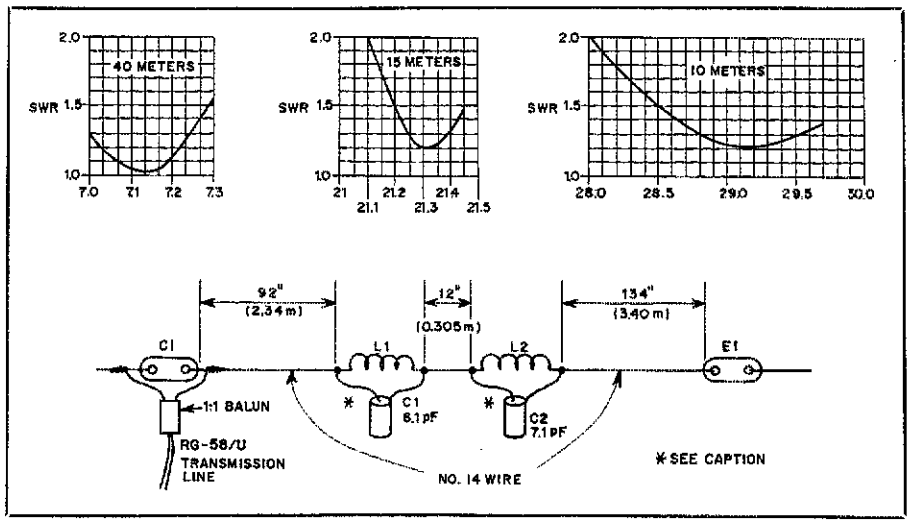


Fig. 2 — The author's attic antenna is a trap doublet designed for operation on 10, 15 and 40 meters. Only the right half of the doublet is shown here. The left half is identical to the right. C1 and L1 resonate at 29 MHz, while C2 and L2 resonate at 21.2 MHz. The graphs show the SWR behavior on the three bands.

C1 — 2.5-inch (64-mm) length of RG-8/U solid-dielectric cable.

C2 — 2.9-inch (74-mm) length of RG-8/U solid-dielectric cable.

L1 — 4.9 μH; 9-1/2 turns of coil stock having 2-in. (51-mm) dia and 10 turns per inch (0.39 turns per mm). Suitable stock is B&W 3907-1, Air-Dux 1610T or Polycoils 1771.

L2 — 7.6 μH; 13 turns of same coil stock specified for L1.

Trap Dipoles

At hf the most practical IA is usually the dipole. Any attempt to get more gain with parasitic elements will usually fail because of close proximity of the ground or coupling to house wiring. Beam-antenna dimensions determined outdoors will not usually be valid for an attic antenna because the roof structure will cause dielectric loading of the parasitic elements. It is usually more worthwhile to spend time optimizing the location and performance of a dipole than to try to improve results with parasitic elements.

The trap dipole, Fig. 2, is an easy way to get multiband performance. For good SWR bandwidth, the traps should have a high L-to-C ratio. The capacitors can be made from short lengths of coaxial cable. Tuning is accomplished by snipping the cable to the proper length.[6] The author's coils are wound on short lengths of 1-inch (25-mm) thinwall PVC pipe. PVC has a bad reputation as a dielectric.[7] At power levels up to 100 watts, however, the writer has experienced no problems with these coil forms.

In addition to providing multiband operation, the traps inductively load the dipole, making possible a resonant length shorter than a full half-wavelength on the lowest band of operation. Even with this loading, however, most attics are not long enough to accommodate a doublet for 75 meters. Many are not even large enough for a 40-meter aerial. This means some folding of the dipole will be necessary. The final shape of the antenna will depend upon the dimensions and configuration of the attic in which it is to be installed. Remember that the center of the dipole carries the most current and therefore does most of the radiating. This part should be as high and unfolded as possible. Because the dipole ends radiate less energy than the center, their orientation is not very important. They do carry a maximum voltage, nevertheless, so care should be taken to position the ends far enough from other conductors to avoid arcing. The dipole may end being L shaped, Z shaped, U shaped or some indescribable corkscrew shape, depending on what space is available.

In any event, some pruning to establish minimum SWR at the band center will be required. Tuning the antenna outdoors and then installing it inside is usually not feasible. The behavior of the antenna will not be the same when placed in the attic. Resonance will be somewhat affected if the antenna is bent. Even if it is placed in a straight line, parasitic conductors and

dielectric loading by nearby wood structures will affect the impedance. When properly tuned, the minimum SWR should be near the band center and well below 2.0. If the SWR does not drop below 2.0, it is advisable to use one of the aforementioned matching devices placed in the transmission line.

Orientation

Theoretically a vertical dipole is more effective at low radiation angles, but practical experience usually shows that the horizontal dipole is a better indoor antenna. Perhaps the theory fails because it assumes a perfectly conducting ground or because it does not take into account scattering from nearby structures in a typical urban environment. Also, of course, a given roof height permits the center of a horizontal dipole to be placed higher than the same dipole vertically polarized.

A horizontal dipole, however, exhibits directional effects. Theoretically there are nulls off the ends, especially at low radiation angles. Your dipole, therefore, should be broadside to directions in which you are interested in working. If you want 360-degree coverage, place two dipoles at right angles to each other with provision in the shack for switching between the two. In fact, this is a good idea even if you are not interested in 360-degree coverage, because the radiation patterns will inevitably be distorted in an unpredictable manner by parasitic conductors. There will be little coupling between the dipoles if they are oriented at right angles to each other as shown in Figs. 3A and 3B. There will be some coupling with the arrangement shown in Fig. 3C but even this orientation is preferable to a single dipole.

You may find that one dipole is consistently better in nearly all directions, in which case you will want to remove the inferior dipole, perhaps placing it someplace else. In this manner the best spots in the house or attic can be determined experimentally.

Parasitic Conductors

Inevitably, any conductor in your house near a quarter wave in length or longer will be parasitically coupled to your IA. The word *parasitic* is particularly appropriate in this case because these conductors will sap energy from your transmitter and leave less for radiation into space. Unlike the parasitic elements in a beam antenna, conductors such as house wiring and plumbing are usually connected to lossy objects such as earth, electrical appliances, masonry or other objects that can dissipate energy. Even where this energy is reradiated, it is not likely to be in the right phase in the desired direction.

There are, however, some things that can be done about parasitic conductors. The most obvious is to reroute them at right angles to the IA or close to the ground, or even underground — procedures that are usually not feasible in a finished home. Where these conductors cannot be rerouted, other measures can be taken. Electrical wiring can be broken up with rf chokes to prevent the flow of radio-frequency currents while permitting 60-Hz current (or audio, in the case of telephone wires) to flow unimpeded. A typical rf choke for a power line can be 100 turns of no. 10 insulated wire close-wound on a length of 1-inch (25-mm) dia plastic pipe. Of course one choke will be needed for each conductor. A three-wire line calls for three chokes.

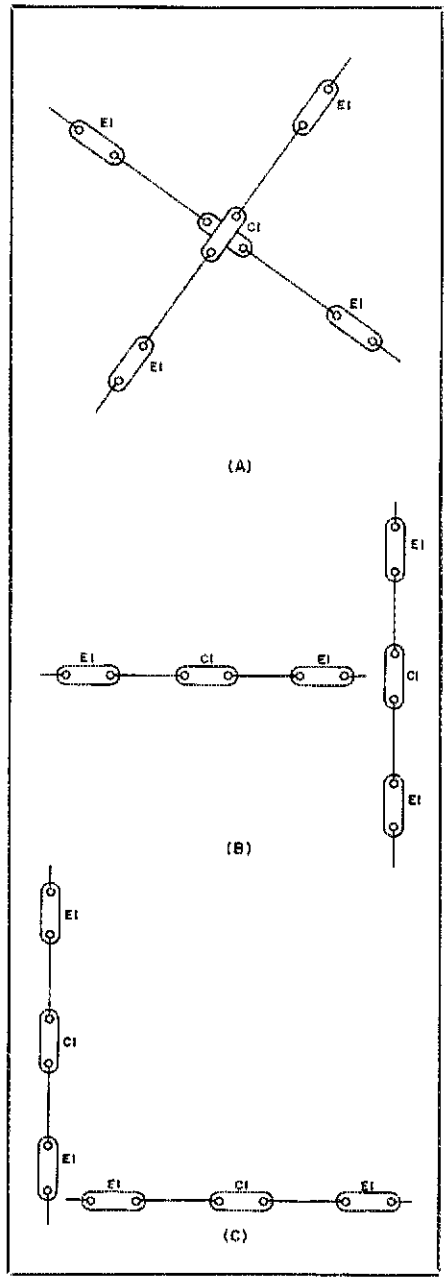


Fig. 3 — Ways to orient a pair of perpendicular doublets for 360-degree coverage. The orientations of A and B will result in no mutual coupling between the two dipoles, but there will be some coupling with the configuration shown at C. End (EI) and center (CI) insulators are shown.

The Resonant Breaker

Obviously, rf chokes cannot be used on conductors such as metal conduit or water pipes. But it is still possible, surprising as it may seem, to obstruct rf currents on such conductors without breaking the metal.

You may suspect there is a bit of legerdemain in resolving the problem of rf on those conductors. Fig. 4 discloses how this is done. A figure eight loop is inductively coupled to the parasitic conductor and is resonated to the desired frequency with a variable capacitor. The result is a very high impedance induced in series with the pipe, conduit or wire. This impedance will block the flow of radio-frequency currents. The figure-eight coil can be thought of as two turns of an air-core toroid and since the parasitic conductor threads through the hole of this core, there will be tight coupling between the two. Inasmuch as the figure-eight coil is parallel resonated, transformer action will reflect a high impedance in series with the linear conductor.

Before you bother with a "resonant breaker" of this type, first be sure that there is a significant amount of rf current flowing in the parasitic conductor. The relative magnitude of this current can be determined with an rf current probe of the type shown in Fig. 5.[5]

The current probe also uses a figure-eight coil. The principle of operation is very simple. Rf magnetic fields from *distant* conductors will induce equal voltages in the two loops of the coil. Because these two loops are wound in opposite directions, the resulting two induced voltages will cancel and not be detected by the germanium diode. But when the loop is placed against a conductor as shown in Fig. 5, the magnetic field surrounding the conductor will induce voltages in the two loops, which, instead of subtracting, will add in phase. As a consequence, presence of the field will be detected and indicated on the meter.

In this way measuring relative rf currents on parasitic conductors is possible with immunity from radiation that comes directly from the antenna. According to the rule of thumb regarding parasitic conductor current, if it measures less than 1/10 of that measured near the center of the dipole, the parasitic current is generally not large enough to be of concern.

The current probe is also needed for resonating the breaker after it is installed. Normally, the resonant breaker will be placed on the parasitic conductor near the point of maximum current. When it is tuned through resonance, there will be a sharp dip in rf current, as indicated by the current probe. Of course, the resonant breaker will be effective only on one

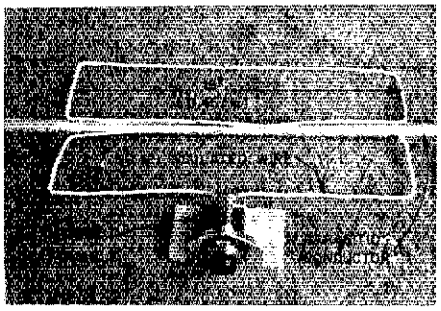


Fig. 4 — A "resonant breaker" such as shown above can be used to obstruct radio-frequency currents in a conductor without the need to break the conductor physically. A vernier dial is recommended for use with the variable capacitor because tuning is quite sharp. The 100-pF capacitor is in series with the loop. This resonant breaker tunes through 10, 15 and 20 meters. Larger models may be constructed for 40 or 80 meters.

band. You will need one for each band where there is significant current as measured by the probe.

The current probe is also handy for other uses such as a field-strength meter or wavemeter. To use it as a field-strength meter, the figure-eight loop is replaced with a large circular loop of wire. When employed as a wavemeter, the figure-eight coil is replaced with a calibrated parallel-tuned circuit.

Power-Handling Capability

So far, all our experiments have been limited to the IA as a receiving antenna, except for the current measurements where it is necessary to supply a very small amount of power (1 watt is more than enough) to the antenna. These measurements will not indicate the full power-handling capability of the IA. Any tendency to flash over must be determined by running full power or preferably somewhat more than the peak power you intend to use. The IA should be carefully checked for arcing or rf heating before you do any operating. Bear in mind that attics are indeed vulnerable to fire hazards.

VHF

At 2 meters and above, the IA is small enough to be rotated easily; it is also small enough to be readily mounted on a stick and moved around the house or attic. This makes probing for the best location possible. Often just moving the IA a few feet can make a 20-dB difference in signal strength. The optimum location will usually be optimum in only one direction. Therefore it should be determined for the most difficult direction or the direction you are most interested in working. To determine the best location will require a steady carrier in the direction of interest. This can be provided by a station across town or by a signal source in your car which can be parked a few blocks away in the desired direction.

By way of conclusion, I heartily recommend that if you are among the "underprivileged" amateurs who have relegated Amateur Radio equipment to the closet for want of an antenna, pull the heap from those dust-covered boxes and go IA. The world could be waiting for you! QST

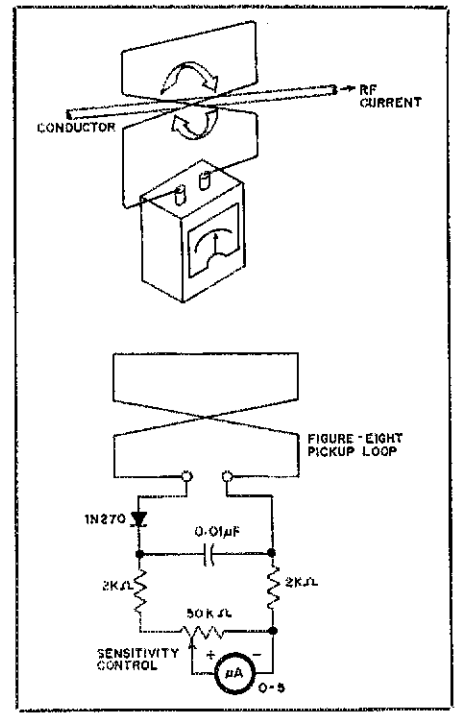


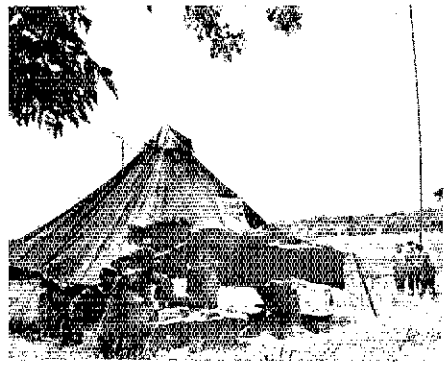
Fig. 5 — This current probe, constructed in a 3 × 4 × 5-inch (76 × 102 × 127-mm) enclosure, can be used to measure relative rf current in any conductor. The instrument may also serve as a field-strength meter or a wavemeter. Arrows show how the magnetic field surrounding the conductor threads through the figure-eight loop. The author's model contains a 5-μA meter but a less expensive meter movement, such as a 50-μA unit, may be employed. If a 0- to 1-mA meter is used, the sensitivity control should be changed to 10 kΩ.

References

[1]Schnell, "The Flagpole Deluxe," *QST*, March 1978.
[2]Brown, "How to Measure Antenna Gain," *CQ*, November 1962.
[3]Overbeck, "Measuring Gain with Amateur Methods," *QST*, October 1977.
[4]Jordan, *Electromagnetic Waves and Radiating Systems*, Prentice-Hall, 1950, p. 327.
[5]See ref. 3.
[6]Mathison, "Inexpensive Traps for Wire Antennas," *QST*, February 1977.
[7]"A Dielectric No-No," Hints and Kinks, *QST*, April 1977, p. 56.
[8]Brown, "RF Current Probe," *Ham Radio*, October 1968, p. 76.

Strays

Fred Hurteau, WD4SKH, designed the cabinets of his Ultimate Transmatch and Wattmeter to match his Drake R-4A. The cabinets were built out of sheet-metal scraps. The wattmeter was constructed as a complete unit instead of with a remote sensing head, so it could be placed inside the larger cabinet with the coax switch. The wattmeter can be removed from the cabinet, allowing it to be used remotely. *(WD4SKH photo)*

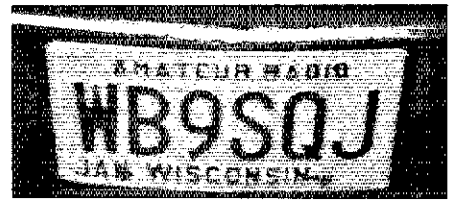


Elsewhere in this issue you'll find all the news that's fit to print about Field Day 1979. Here's a glimpse of Field Day 1946, the first postwar event. During the past 33 years, the ranks of those participating in Field Day have swelled from 1936 to 23,612, but some things have stayed about the same. Sam Arn, who was then W9KWX and president of the group in the photo, the Elgin (IL) ARS, is now K6TSD and president of Swan Electronics. Our thanks to him for the use of this photo.

I would like to get in touch with . . .

☐ anyone who has experimented in the 1750-meter band. Contact K1JDJ, P. O. Box 1003, Fairfield, CT 06430.

☐ chessplayers for check-ins to the international Chessplayers net every Sunday at 2100 UTC on 14.320. For info, send s.a.s.e. to Rick Wentworth, WB9ZJW, 100 St. Marys Blvd., Green Bay, WI 54301.



Wisconsin's new license plates, perhaps the first to state *Amateur Radio*, help Winfred A. Ross, WB9SQJ, proclaim his interest in the hobby. *(WB9SQJ photo)*

A Microprocessor-Based Morse Keyboard

Here's a good way to learn about microprocessors and make a worthwhile addition to the ham shack at the same time!

By C. A. Eubanks,* N3CA

I had just come back to ham radio after years of inactivity and had heard a lot about Morse keyboards. I decided that building one would be a worthy project for my microprocessor. In addition, it would give me the incentive to find out how the darned thing worked.

You can get into the microcomputer business at one of three levels.** You can build from scratch, selecting and buying the individual ICs, designing and fabricating the board and then trying to get the finished assembly to work. You can, alternatively, obtain a completed microcomputer board, or purchase a complete system like the Radio Shack TRS-80 or Apple II.

The trouble with starting from scratch is that you need to be an expert to begin with or you'll never get there. A top-of-the-line, completed system will certainly get you there, but it's so far removed from the chip level that you'll probably gain no insight into what's happening inside.

There is another way, however. If you're just after the Morse keyboard itself, you can buy a completed unit or kit. So why would you still be better off going to all the trouble described here? Well, aside from learning a good deal about microcomputers, the changes and improvements you can make with a programmable system are limited only by your time and ingenuity. You are working with a full-blown, albeit small, *computer*!

Before going any further, let's make a distinction between two important terms, *hardware* and *software*. The wires, ICs, circuit boards and other components are the system hardware. Software refers to the *program* information that is loaded into the system. The software can be changed easily by the programmer.

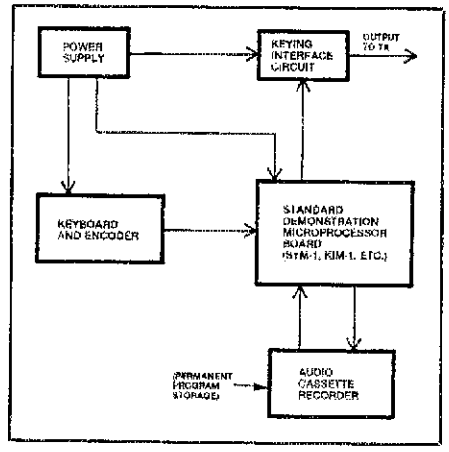


Fig. 1 — Block diagram of the keyboard system. Lest all of these blocks frighten you, I should tell you that the only scratch-built circuit is the keying interface. It consists of a single DIP IC.

What Do You Need to Get Started?

What sort of hardware is necessary to implement a microprocessor-based Morse keyboard? Fig. 1 shows a block diagram of the complete system. Assuming that you have a microcomputer board and a power supply to start with, there isn't much to it. If you don't here are some thoughts on selection.

First, the microprocessor should be able to communicate with the outside world. This requires a keypad and some sort of display, which will let you talk to it and see what it is doing. It needs an *I/O* (input/output) capability of at least nine *lines* of input and *latched* output. The term "line" refers to the solid-state equivalent of one contact-closure input or output. A latched output is like a light switch. Once you set it (turn it on or off) it stays that way until you change it. The microprocessor also requires an ability to *interface* to a cassette recorder for storing and reloading programs. This is essential because a power interruption will convert the erasable portion of memory into garble and some programming errors will give similar results. Happiness is being able to reload from tape rather than having to start from scratch!

Second, the microcomputer should have a reasonable amount of random access memory (RAM). RAM is a somewhat misleading term used to identify memory elements that can be changed during program execution. As such, RAM can be used for temporary storage of program instructions and calculations. One kilobyte (1024 eight-bit words) of RAM is more than adequate for Morse-keyboard software.

Third, the microprocessor should have a strong resident monitor program to control input to the keypad, handle the display and cassette-recorder interface, and simplify debugging. Such a program is usually supplied with the microcomputer board in read only memory (ROM). ROM, unlike RAM, is not *volatile*; that is, it doesn't "forget" when power is removed. As the name implies, you can read from ROM, but you can't write into it. Programming errors or power interruptions won't affect it.

Last, the microcomputer board should contain at least one programmable timer. The programmable timer can be thought of as the microcomputer alarm clock. A

*P. O. Box 127, Valencia, PA 16059

**[Editor's Note: The terms "microprocessor" and "microcomputer" are not used interchangeably, although it may seem so to one not familiar with the terminology. A microprocessor (μP) is a single integrated circuit in a simple microcomputer system. The μP interprets the program instructions and processes data or controls events as a result. The microprocessor is sometimes called the central processing unit (CPU).]

time delay can be programmed into the timer by software routines. When that programmed time has elapsed, the timer notifies the microprocessor.

Most of the "demonstration" microcomputer boards now on the market meet the above criteria. I found the second generation KIM-1 and the third generation SYM-1 boards to be particularly well suited to the task. The SYM-1 represents a considerable advance over the KIM-1 and lends itself to future expansion for more advanced projects. In addition to these, Rockwell and Ohio Scientific both have new boards and typewriter-key switches built into them. These units, while more expensive, require less interconnection to get the system up and running. All of these systems are based on the 6502 microprocessor. This chip has a powerful instruction set and is easily interfaced with 6500 and 6800 family support chips.

The KIM and SYM boards don't have keyboards so I did some fast shopping and discovered that Radio Shack had a discontinued keyboard kit. My local store still had one of these collecting dust. I bought the kit and the ICs that I didn't have in my junk box for $35. Parallel-encoded ASCII keyboards are available from several of the experimenter electronic supply houses. You can get them either as kits or wired and tested. Prices range from less than $50 to more than $75. One handy item included with some units is a set of LEDs connected to the output lines. These tell you what the keyboard is trying to say to the microprocessor and are a great help in initial debugging. My keyboard didn't have this feature so I wired LEDs and their accompanying series resistors on some unused terminals of the mating edge connector.

The only remaining hardware problem is one of interfacing the microcomputer board to the transmitter. One of the beauties of my Ten Tec Century 21 transceiver is that it can be keyed with an IC logic gate. The entire keying circuit (the only circuit that I had to design for this project) consisted of that single gate. For transmitters having other styles of keying, a Darlington circuit and a relay should be a simple solution. Interfacing a microprocessor I/O port to relays can be a bit tricky, so you should consult the instruction manual for the manufacturer's recommended techniques. Some of the latest boards have relay-driver transistors included on board.

With all that expensive electronics sitting around, you need something to protect it. Rather than buying a fancy (and relatively expensive) enclosure specially tailored for the microcomputer board, you can make two boxes out of wood scraps as I did. After I mounted the boards in their boxes, I covered them with plastic storm-window material. The final product looks nice and allows shack visitors to view all that impressive integrated circuitry.

Defining the Goals

The first step in designing software for a microprocessor-based system is the development of a set of specifications. Never mind that some of those specs turn out later to be impractical; at least you have an initial set of goals to guide your subsequent work. As further design details are worked out, you can get a bit more pragmatic and modify the original specs to meet reality (such as cost limitations, available project time, and so on).

Here are the original specifications that I drew up:

1) Programming should be straightforward. To get the system up and running quickly, I would not try to be subtle with my coding. Instead, I would use the easiest programming technique that came to mind. Frills could be added later if they turned out to be desirable.

2) The program should be broken down into a series of separate routines. Each routine would cover one keyboard operating function. This would separate the program into functional blocks both to facilitate coding and to simplify debugging.

3) Information (text) that is typed into the keyboard should be stored in a buffer, and transmission should be made from that buffer. Since this is going to be machine-synthesized code, it should sound that way and not contain operator-generated spacing glitches.

4) The system should continuously display the amount of unused buffer storage space and the transmitted code speed. Both of these displays should flash on and off as an alert when the buffer is nearly filled.

5) The system should have backspace and abort keys. The backspace would allow me to correct any typographical errors if I was far enough ahead of the character being sent to backspace and correct it. The abort key would allow me to correct really drastic blunders in typing, and would facilitate break-in operation.

Getting It All Together

Some three weeks of evenings later, I had about 15 pages of untried program written out. Hint: You should have one or two lines of explanation for every instruction you write down. My completed program had better than 500 instructions and data words. It's darned easy to come back a week later (or even the next evening) and not have the vaguest idea of what you were trying to accomplish in a particular part of the program.

Initial loading was complicated by tape-recorder troubles. I gather from some of my local friends that I'm not the only one to have such heartaches. After several evenings of hair tearing, I discovered that the microprocessor quite literally couldn't read its own writing. When I tried to record on a tape, the computer board drove the cassette recorder audio circuit into distortion so that it wouldn't read correctly during playback. Once I discovered the source of the problem, I cured it in five minutes by shunting a 10-Ω resistor across the record plug.

Debugging a program of this complexity is best done in pieces. Using the microcomputer resident monitor, I spent several evenings single-stepping through the various routines and testing each piece of decision-point logic. I found that in my original program I made all three of the classic errors several times over. First, there were a number of places where my original logic was faulty. Second, even when my logic was correct, I had often miscoded the instructions (used the wrong digits for a particular machine instruction). And last but not least, there were more than a few instances where I simply entered the wrong information into memory!

A word of warning: Once you've loaded the program, put it on tape before trying it out. Mistakes have a nasty habit of spreading "garbage" all through a beautiful program that you've just spent the evening entering by hand. Happiness, when this happens, is being able to reload from tape. It's a good idea to use high-quality tape and to record the program several times. This procedure will reduce the chances that a tape glitch will clobber you.

Finally the night arrived when I got everything working at the same time. I plugged the keying output plug into the transceiver key jack and tuned up on the low end of 40 meters. Wow! I'd never used a Morse keyboard before and it sure was nice! I originally started the keyboard project as an excuse to learn more about the microcomputer. Ever since I was a kid I've been involved in the age-old debate about how mechanical (and more recently electronic) gadgets depersonalize your fist. In the first five minutes on the air I realized that even though I had "depersonalized" myself, I sure sounded better on the air.

Probably the biggest change that I made in the system as a result of operating experience was to expand the buffer. The initial 64-character buffer grew to 96 and I'm now using 128! True happiness is being able to say what you want to say at the rate you want to type, without having to stop and wait for the transmission to catch up with you. Once I have the message typed into the buffer, I like to sit back and listen to my long-winded comments and typographical errors go out over the airwaves in perfect Morse.

Decimal, Binary and Hexadecimal Arithmetic

To be able to talk about the software, we're going to need some exposure to the

Table 1

Hexadecimal and decimal number systems compared.

Hexadecimal	*Decimal*
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
A	10
B	11
C	12
D	13
E	14
F	15
10	16
11	17
.	.
.	.
.	.
and so on	

counting technique used by the microprocessor. People usually count with a number system based on 10, and our numbering system contains 10 digits: zero through nine. With these 10 digits and multiples of 10, we can build any number we wish. For example, $9723 = 9 \times 1000 + 7 \times 100 + 2 \times 10 + 3 \times 1$. This is called the *decimal* system.

Rather than trying to equip electronic circuits with 10 fingers, the circuit designers found it easier to express things as combinations of *on* and *off*. This limits the circuit to two possible states, or what is called a *binary* system. By being limited to just these two possible states, we are forced to build a numbering system based on two digits, *zero* (off) and *one* (on).[1] As an example, if we wanted to express 27_{10} (the subscript indicates that the number 27 is expressed in the decimal system) in binary, we would write

$27_{10} = 2 \times 10^1 + 7 \times 10^0 = 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$.

Thus, $27_{10} = 1 \times 16 + 1 \times 8 + 0 \times 4 + 1 \times 2 + 1 \times 1 = 11011_2$.

Small microcomputers like the one I used in preparing this article usually work with eight binary *bits* or digits at a time. This set of eight bits is referred to as one *byte* or *word*. Note that if we were working with a 16-bit microprocessor each byte would consist of 16 bits. Anyhow, with our eight-bit byte, we can express a number between zero and 255_{10} with those eight bits.

Expressing a decent-sized number with the binary system can be quite cumbersome. Therefore, still another system was devised for use as a sort of shorthand for expressing binary numbers. This system is based on 16 and is referred to as *hexadecimal*. For a base-16 system we need 16 digits. The zero through nine numbering system is extended with the letters A through F so that we now have system shown in Table 1. Rather than subscripting hexadecimal numbers, they are typically prefixed with a dollar sign. For example, $\$13 = 19_{10}$. Confusing, isn't it?

You may be wondering why hexadecimal is even used. The answer is that four binary bits can be neatly expressed with just *one* hexadecimal digit. Our eight-bit binary byte is expressed as two hexadecimal digits having a range from zero to \$FF (255_{10}).

The Main Program

With software techniques, you have to start somewhere. While this may sound trite, for many people the initial steps in organizing the program are usually the hardest, even though they're fairly straightforward from a machine-instruction standpoint.

The main program is the backbone of the software. It serves to connect the functional elements together into a workable system. To get started, the first step is to ask yourself: "What general operations must be performed?" My answer to this, flow charted in Fig. 2, was:

1) Initialize the program. This initialization consists of setting up any constants that will be needed, telling the program what speed to start with, setting up the storage buffer, and initializing the main clock, which keeps time for the program.

2) Check the main clock. If it isn't timed out, "waste time" until it is. Once the clock *is* timed out, proceed into the functional blocks of the program that follow.

3) Reset and start the main clock.

4) Update the logic that causes the display to flash when the buffer is nearly filled.

5) Service the send-control routine, performing the steps that it requires during this time period. (This will be covered in more detail later.)

6) Service the keyboard routine to see if a character is being inputted from the keyboard.

7) Return to service the main clock, step two above.

Keyboard Input

From here, the next step is to write the keyboard routine. This must be finished next, because the results it produces will affect virtually everything else that follows. In order to block out the keyboard logic, you must consider several items.

First, the keyboard circuit feeds the microprocessor a *parallel* ASCII signal. This means that a numerical representation of the depressed key is fed to the microprocessor in the form of eight bits presented simultaneously. Seven of these bits represent the key character or function itself, and the eighth is a *strobe* bit. The logic value of the strobe bit tells the microprocessor whether the key is active (newly depressed) or simply a holdover from a previous keystroke. This keeps a key from being repeated when it is held down.

My keyboard has no provision for *debouncing* — that is, there is nothing to prevent a very brief intermittent contact (as the key switch is just closing or opening) from entering multiple characters. I had set the period for the main clock to be about five milliseconds, so I decided to require that a character be present for three *consecutive* periods for it to be entered. This meant that a key would have to be depressed for between 10 and 15 milliseconds.

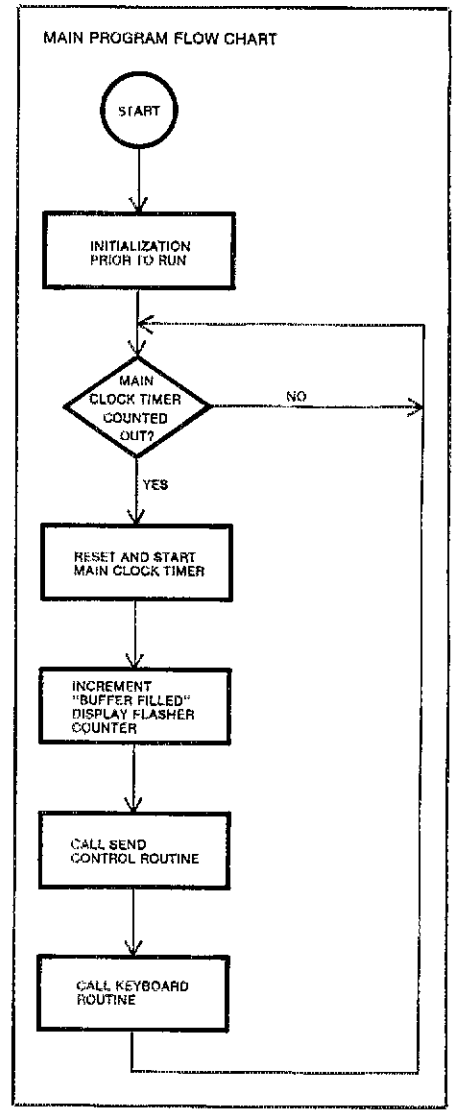


Fig. 2 — Flow chart of the main program showing major routines. Once initiated, this sequence is repeated continuously. An entry or absence of entries to the keyboard governs what happens in each routine.

[1]Notes appear on page 29.

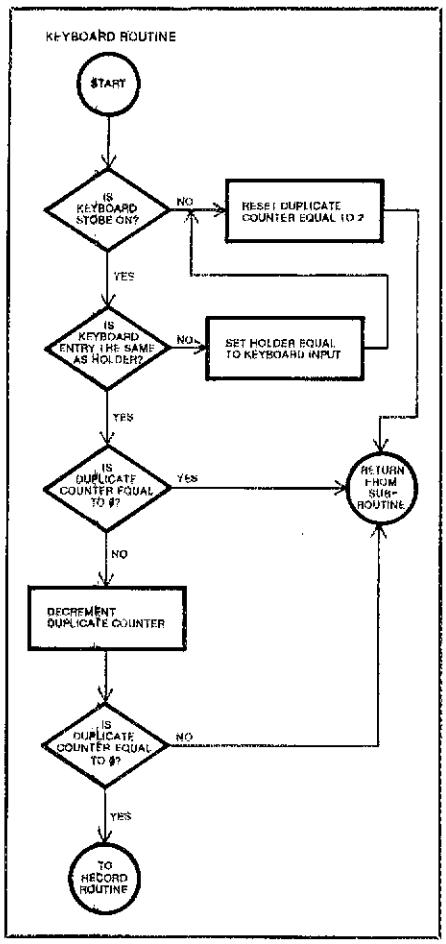


Fig. 3 — To eliminate noise and keybounce problems, the keyboard routine requires that the same ASCII input be present on three consecutive scans. If it isn't, the routine resets the duplicate counter (DUP CTR) and starts over. It also prevents multiple-character entries for one key depression.

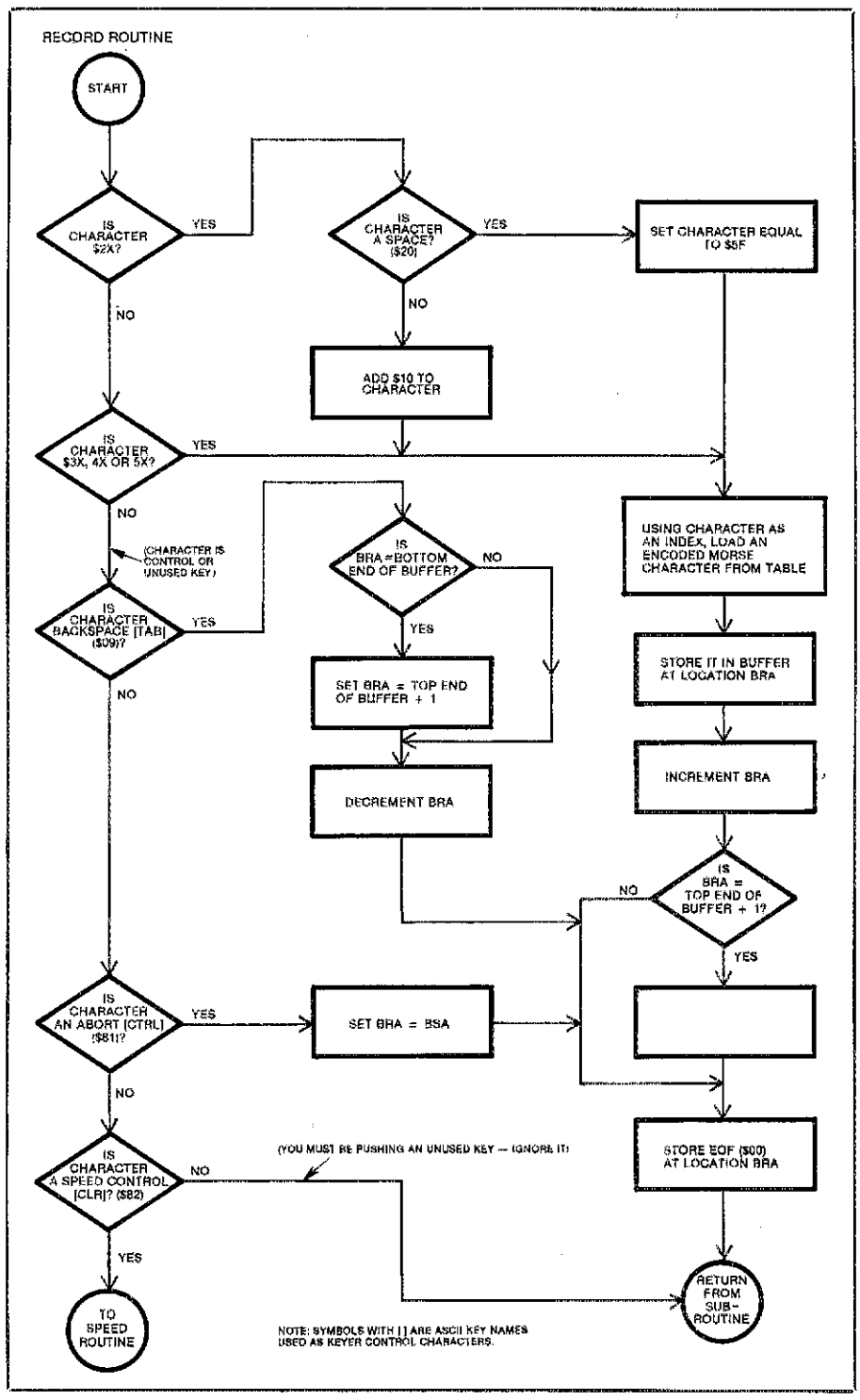


Fig. 4 — The record routine takes a valid keyboard input and either stores it in the buffer (if it is a character), or acts on it (if it is a control input).

This sequence, flow charted in Fig. 3, works as follows: If a character has appeared less than three times it is written into a scratch-pad memory location, called a *holder*, and the number of times it has appeared is updated. Then we leave the keyboard routine. If the character has been entered *more* than three times, the key hasn't been released yet so it is ignored and we leave the routine. If it has appeared just three times it is a valid input and the program goes to the *record routine*.

Recording into the Buffer

Before getting into the nitty gritty of the *record routine*, let's see what form a key input takes. I decided to limit the keyboard inputs to lower-case characters. Just to make sure I didn't confuse the microprocessor with my poor typing, I inserted cigarette paper between the contacts of the keyboard shift keys to disable them.

The inputted key data fall into two categories, *control characters* and *sendable characters*. The record routine examines the character supplied to it to see whether it is sendable or control. If the character is a control character, the program branches out to execute the steps dictated by that character. If it is a sendable character it is used as an *indirect address* to find the corresponding encoded Morse character. Indirect addressing is a type of microprocessor machine function that uses a number, in this case the numerical representation of the key input, to form the memory address of the information being sought. These steps are shown in Fig. 4.

To understand what happens next in the case of a sendable character, let's look at the character buffer depicted in Fig. 5. The buffer depicted there has space for 128_{10} ($80) characters. Characters to be sent are loaded into the buffer by the

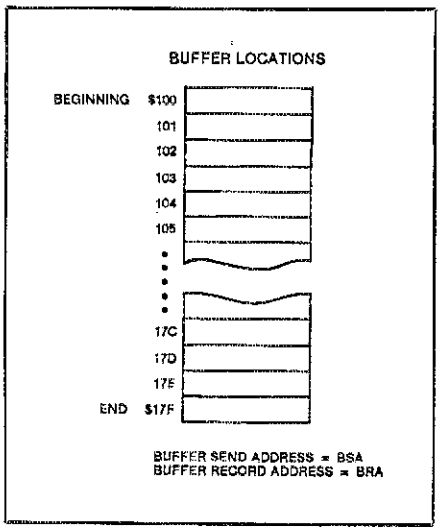


Fig. 5 — A representation of the recirculating storage buffer concept. This buffer is used to store keyboard input until it is ready for transmission. When the last byte is used (at $17F), the pointer that tells the program what comes next is reset to the beginning, and continues on from there. Thus, if you don't get too far ahead of what is being transmitted ($7F or 127_{10} characters ahead for buffer size shown), you can continue typing forever! Two pointers are associated with the buffer. The *buffer-send address* tells the program what location is next for sending, and the buffer-record address indicates the same for recording from the keyboard. BRA, which is the location *after* the last character recorded, has an *end of file* character written into it as part of every keyboard-entry operation. The send routine always checks for an EOF to prevent it from passing the latest keyboard entry.

record routine. When the program is ready to send the character, the send routine will take it from the buffer and perform the operations necessary to send it.

To keep track of what goes where, there are two *pointers*. The pointers are storage locations in memory. These contain the address of the next memory location into which a character is to be recorded (the buffer record address or BRA) and the address from which the next character is to be sent (the buffer send address or BSA). When either of these addresses reaches the top of the buffer, it is reset to point to the bottom. This effectively makes the buffer continuous or *recirculating* — it can be used over and over again.

If you stop typing, what keeps the BSA from passing the BRA and going on and on? Though we could play tricks with comparisons between BRA and BSA pointers, I chose to write an *end of file* (EOF) character in the next higher buffer location after a record operation. When we get to the send routine, we'll see that one of the first things it looks for is an EOF. If it finds one, it will exit from the routine.

In the case of an *abort key*, the BRA and BSA pointers are both reset to zero and an EOF is written into the number zero buffer location. For backspace, the BRA is *decremented* (reduced by one) and an EOF is written into the memory location it now points to in the buffer. Logic is included in the backspace routine for adjustment of the BRA if we've decremented it below zero. This correction is accomplished by adding the buffer size ($80) to the pointer. This prevents the pointer from showing an invalid address.

Sending a Character

In working through the *send control routine*, we need to look first at timing techniques. The main clock establishes the time base. Dits, dahs and spaces are integral-length multiples of the clock period. The basic multiplying element is provided by the *speed routine* which we'll look into later. This element is the number of main clock durations which will represent a dot interval. Each time a new dot interval is started, the *send counter* is preset to this multiplier. Every pass of the program through the send control routine causes the send counter to be decremented, as shown in Fig. 6. If it isn't zero after decrementing, the program sequence exits from the routine.

If the send counter is zero after decrementing, it is reset and a second counter, the dit-dah-space counter (DDSC), is decremented. The DDSC has been preset depending on what the send routines are doing. To send a dit, it would be preset to two; a dah gets a four preset. In both cases, the duration includes the time to send the dit or dah plus the time to send the *intra*character space following it. At the end of a character, the DDSC is set to two so that the total *inter*character space is equal in duration to a dah.

The DDSC is now decremented and tested. If it is zero, it is time to go looking for another character to send, causing action to shift to the *letter prep routine*. If the DDSC is a one, the transmitter is turned off and we exit from the send control routine. Note that the transmitter may not have been keyed to start with, but turning it off again won't hurt anything! If the DDSC is *greater* than one we're still in the process of doing something, so we simply exit from the routine.

Preparation for Sending

The letter prep routine is flow charted in Fig. 7. Much of this routine is taken up by steps used in the handling of buffer pointers and calculating the remaining buffer space.

We still have another counter to look after — the *letter counter*. To understand what this is, refer to the diagram shown in Fig. 8. In sending a character, the routine *left shifts*. This means that it moves each bit one place to the left, moves what was the left-most bit into the carry register and moves a zero into the right-most position.

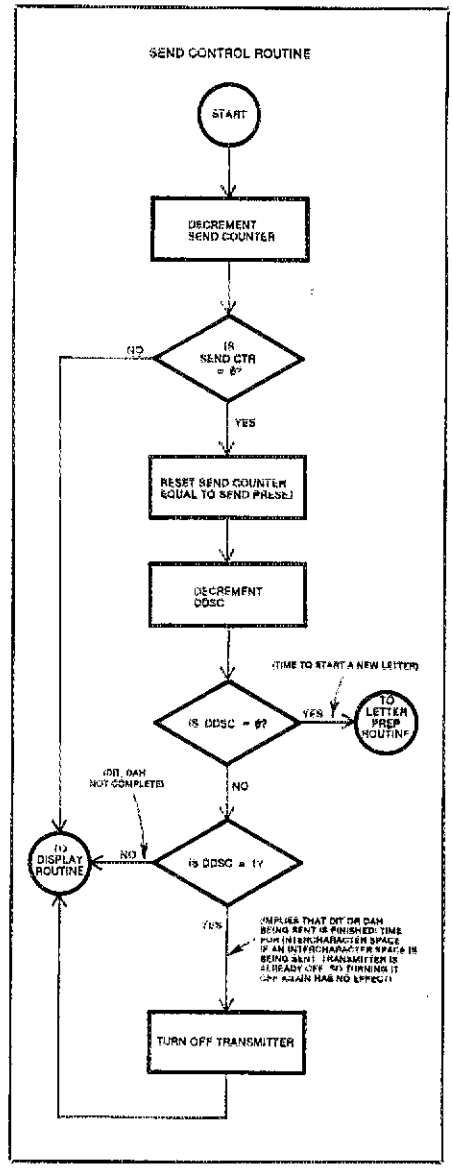


Fig. 6 — Flow diagram of the send-control routine. Note that anytime the send control doesn't require letter preparation, exit is via the display routine. This is done to make the seven-segment display as bright as possible. When letter preparation is required, the display is bypassed because there is insufficient time to perform both letter prep and display servicing before the main clock times out.

The bit that was shifted into the carry register is tested and action is taken depending on whether it is a zero or a one. The letter counter counts how many of these shifts have occurred on a given character. By definition, after eight shifts the character is finished because there were only eight bits to begin with.

So then, the first step on entry into the letter prep routine is to see if the letter counter is zero. If it isn't, we're already in the process of sending something, so we branch to continue that sequence. If it *is* zero, we use the BSA pointer to get the next character to be sent.

The new character is tested to see if it is an *end of file*. If it is, the send and dit-

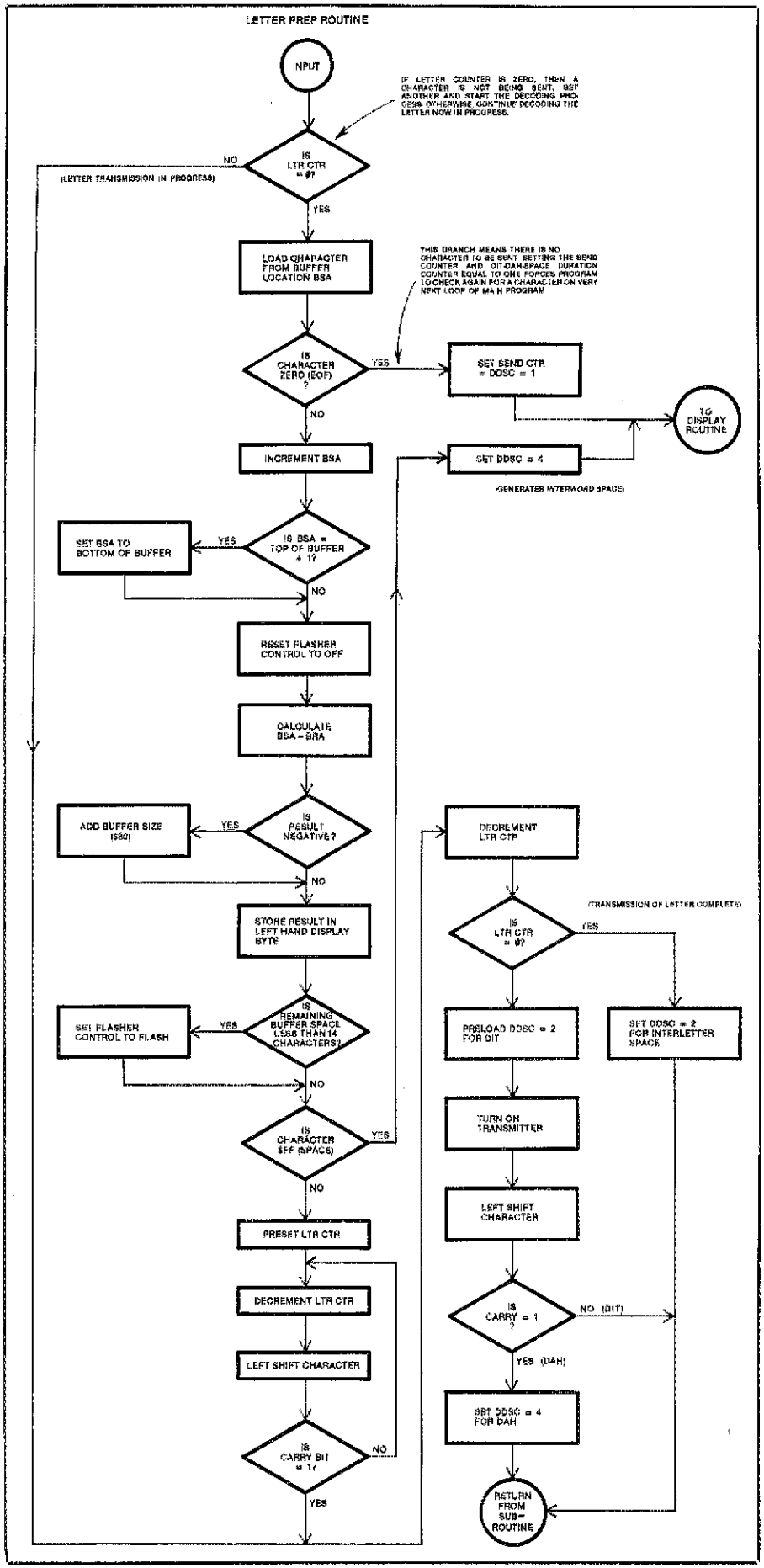


Fig. 7 — The letter-preparation routine decodes and sends a character from the storage location in the buffer.

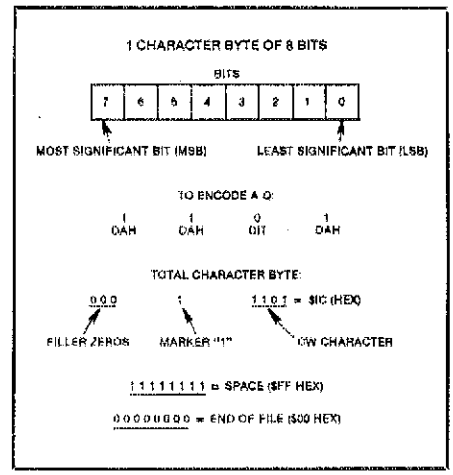


Fig. 8 — This diagram shows the Morse character coding used for buffer storage. The technique used here will handle any combination of up to seven code elements (dits or dahs) per character. The algorithm seeks the most significant (left-most) ONE bit. It discards this ONE "marker" bit and all bits to the left of it. Bits to the right are part of the stored character. Ones represent dahs; zeros represent dits. Since the algorithm won't handle more than seven code elements, you can't send an error sign — no mistakes are permitted!

dah-space counters are set to one and we exit from the sequence. Setting both of these to one will cause us to try for a new character again the very next time the main program goes through the send-control routine.

Assuming we don't have an EOF, the BSA is advanced and the remaining buffer space is calculated. To do this, the record pointer BRA is subtracted from the send pointer BSA, and the buffer size, $80, is added to the result. During the process, the flasher control word is set to off (zero). The remaining buffer space is then checked to see if it is less than 14_{10} characters. If it is, the flasher control word is set to on.

The character is tested to see if it is a space character ($FF). If so, the dit-dah-space counter is set to four and we exit. This four, together with the three dit intervals of space that we'll see occur at the end of every character gives a total of seven dit intervals of space for the *interword* spacing.

Now we're ready to start decoding the character for transmission. The letter counter is preset to nine to initialize the loop. Next we want to left-shift the character until we shift off the first one. This will indicate that the following bit is the first part of the character to be sent (see Fig. 8). To accomplish this we decrement the letter counter to keep track of where we are in the character, then left-shift it. If the *most significant* (highest positioned) bit of the character was a one *before the shift, it will be moved out into* the carry-bit register of the microcomputer. We then test the carry register to

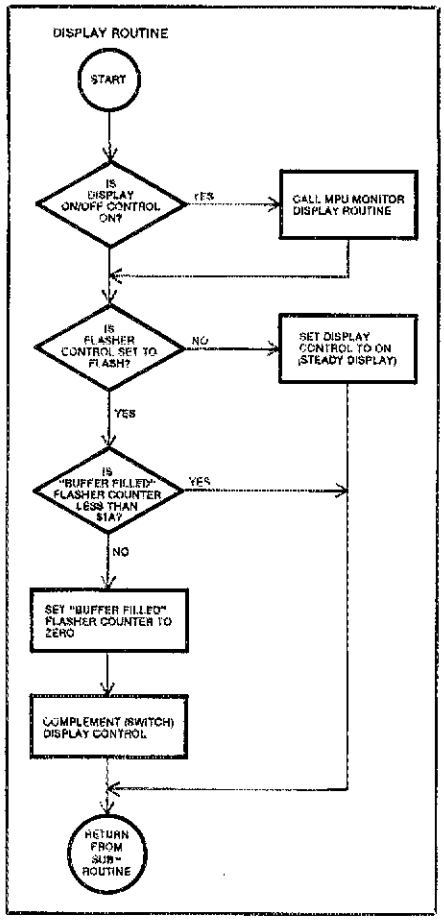


Fig. 9 — The display subroutine displays a two-digit speed in the right-hand display byte, and a two-digit hexidecimal count of the remaining buffer size in the left-hand display byte. When buffer space runs low (as calculated in the letter prep routine — Fig. 7), the display is flashed on and off at about 4 Hz as a warning.

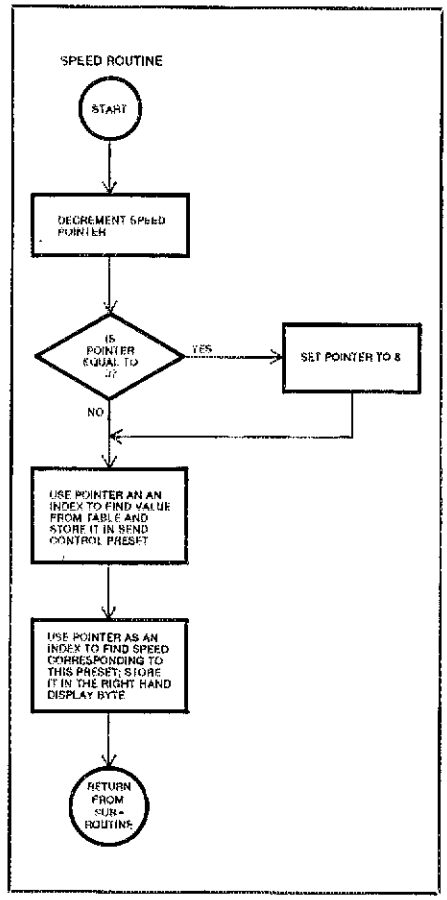


Fig. 10 — The speed routine is called only when the speed-control key is depressed. As shown here, eight speeds are available. Each time the speed control key is depressed, the speed is reduced one increment. When the speed has been decremented to the lowest allowable value and the key is depressed again, the speed reverts to the highest speed in the table.

see if it is *set* (equal to one). If not, we do another decrement, shift and test, repeating until we *do* get a set carry bit. When this occurs all that remains is the character, so we're ready to start sending.

At this point we again decrement the letter counter and check to see if it is zero. If it is, we've completed the letter and are ready for an intracharacter space so we set the dit-dah-space counter to two and exit. If it isn't equal to zero, then we are about to send something.

The dit-dah-space counter is preset to two (for a dit and intracharacter space) and then the transmitter is turned on. The character is then left-shifted and the carry bit is tested. If the carry is *clear* (zero) we're sending a dit, so we exit. If not, we're sending a dah, so the DDSC is reset to four and then we exit.

The Display Routine

There are places in both the send-control and letter-prep routines stating "exit via display routine." The display routine takes a long time to run, so it is only called when a major portion of the main clock period isn't going to be tied up doing something else. Upon entry, the display control word is tested to see if it is on as shown in Fig. 9. If so, the display subroutine in the microcomputer monitor is called to display the speed and the remaining buffer space. If it isn't, this step is skipped. Next, we test the flasher control (preset during the letter-prep routine) to see if it is set for a flashing or steady display. If it isn't flashing, we set the display control word *on* (whether it is already on or not) and return to the main program.

If the flasher control word is calling for flash, we have yet to determine whether the display should be on or off at this moment. Remember that one of the things we did when we went through the main program was to increment the buffer-filled flasher counter. Now we test that memory to see if it has reached $1A ($26_{10}$). If it hasn't, we exit. If it has, we *complement* whatever is in the display control word. In other words, if it is a one we make it zero and if it's zero we make it a one. Thus every 130_{10} milliseconds (5 milliseconds main clock period X 26_{10}) we go from off to on or vice versa when the flasher control is set to flash.

At this point you're probably wondering why this simple routine takes so long. So did I when I first got into it! It turns out, at least with the KIM-1 monitor routines, that the monitor lights one of the six display digits at a time. When the digit is lighted the monitor routine wastes about 500 microseconds so that the digit is on long enough to be visible to the eye. It then goes on to the next digit. If the monitor display sequence is used, it will light all six digits even though we only need four of them. This ties up the program for about three milliseconds *per call of the display routine.* If we get too involved with the display routine, we can lose more time than we have available so that the display duration controls the time per pass, rather than the main clock.

The Speed Routine

The speed routine gets called only as needed; that is, whenever the speed-control key is pressed. The method of speed adjustment I selected provides for eight different sending rates. I picked these to cover my normal operating range: 33, 27, 23, 21, 18, 15, 11 and 8 words per minute. I can usually manage to get burned out or at least slightly singed at 33 and my son can just barely copy the other end. The routine certainly isn't very elegant, but it meets the requirement of being quick and easy to program.

There are two tables and a pointer associated with the speed routine. You will remember that in the send-control routine we used the send counter to count down the basic dit interval for timing a character. After each countdown was completed, the send counter was reset with the send-counter preset. The first look-up table in the speed routine contains eight possible values that can be transferred into the send-counter preset memory location. The second look-up table contains eight decimal numbers that represent code speeds (in wpm) corresponding to the values in the first table.

The speed pointer is decremented as shown in Fig. 10 when the speed routine is called by the record routine. The result is tested to see if it is zero. If so, it is reset to eight. If not, the reset step is skipped. Then the pointer is used as an indirect address to find the required value in the first look-up table. This value is loaded into the send counter preset location. The pointer is used a second time to find the corresponding speed. This number is loaded into the microprocessor display area and will be displayed the next time the display routine is executed.

Software Afterthoughts

Once you've gotten your keyboard up and running, you'll be ready for more advanced tricks. An area worth reworking is

the display sequence. As I mentioned earlier, the monitor display routine is deathly slow. The speed steps became very coarse at higher speeds because the main clock duration is relatively long. You can't cut this duration because there won't be enough time to get through the display sequence.

Instead of using the resident monitor display routine, you can write your own. Do this in such a way that *only one digit* is completed during any given call of the display. Since the digit-drive lines are latched, you can leave the digit on while you return to the main program to do other things. This cuts the per-digit time from 500 to about 50 microseconds and doesn't string out six digits in a row before returning. It also makes the display brighter. Once you've done this, you can speed things up considerably by decreasing the main clock interval from five milliseconds to 500 microseconds or less. This in turn lets you resolve much finer increments of speed.

Pollock described a dedicated, microprocessor-based keyboard with final operation that is similar to this unit.[2] I'm sorry that I didn't see this article before starting software development, because I ended up reinventing some techniques that Pollock covered very nicely.

One of the features he incorporated that I thought was especially nifty was a keyboard-entry selectable code speed. With this you can simply type in the desired code speed. The operations involved are a bit beyond the scope of this article, but by the time you've plowed through this article and have designed your own display routine, you should find them fairly straightforward.

[Editor's Note: For those using 6500 series microprocessor-based systems, coding and documentation are available from the author. Send an s.a.s.e. to C. A. Eubanks, P. O. Box 127, Valencia, PA 16059 for details.]

Notes

[1][Editor's Note: When 0 and 1 are used to denote off and on respectively, this is termed *positive* logic. In some digital circuits, *negative* logic is employed, with 0 denoting an *on* condition, and 1 an *off* condition.]

[2]Pollock, "Microprocessors, A Microprocessor Controlled CW Keyboard," *Ham Radio*, January 1978.

Strays

High-Band Motel Operating

When motoring across the country, most of us bring only our 2-meter rigs, leaving the old standby, the hf unit, to gather dust in our shacks. After all, despite the frustration when we can't reach any repeaters or there is no one on simplex, working 2 meters is far easier than setting up on the high bands in a motel room. Isn't it? Well, don't knock on-the-road, high-band operation until you've tried it.

The major problem with high-band motel operation is deciding what type of antenna to use and where to put it. Time, material and permission are needed to install an effective antenna on a roof. Bypass such difficulties by using either a vertical or a simple dipole hung inside the room.

The type of antenna to use depends on the configuration of the motel room. If there is a balcony or private window with sufficient clearance and good ground, then a vertical antenna is ideal. Otherwise, since most rooms are 20- to 30-feet long, a high-band dipole can be fit inside, suspended by string or whatever room features are convenient. I use a 20-meter dipole which can either be folded for 10 and 15 meters when needed, or have pins (male and female) at each wavelength.

An indoor dipole will work, but you might encounter two major problems. One difficulty is that many motel rooms have low ceilings which can affect loading. Also, metallic beams in the walls of larger motels can bother reception. Some sort of vertical might improve signal reception.

A simple matchbox usually solves any matching difficulties resulting from using an antenna which is too low or is the multiband type. With a tuning device, many of the items already in the motel room can be used as antennas. Mike St. Angelo, WA2IMC, for instance, has been able to load his QRP rig into metal window frames and bed springs; he's worked DX doing it! However, remember that a matchbox zaps some of the power output.

Use a Filter

Be discreet! Use a low-pass filter on the rig and turn on the television set to see if any TVI exists. If the filter fails to minimize the interference, either lower the power or move to another band until the problem clears up. This will decrease the probability of interfering with TV sets in adjacent rooms. Even motels equipped with cable TV are not foolproof, because many TV sets have inadequate shielding. A pair of headphones prevents ssb and cw noise from seeping through thin walls and disturbing the neighbors, who might think some weird, covert activity is taking place.

My results have been satisfying. On trips to Maine and eastern Canada, I've worked DX and met many local hams on the high bands using low-to-moderate power. These local contacts have frequently led to friendly eyeball QSOs and visits to many ham shacks. Some of the locals have been amused by the motel setup, either a vertical leaning out of a back window or a dipole strung between two corners of the room and supported by light fixtures.

There is one key advantage to operating on the high bands: Whenever I hear a call sign from the area I'm in and the signal is fairly strong, I know the station is very close, within 10 miles or so. That is the nature of groundwaves on 10, 15 and 20 meters. A similar signal heard on the low bands could be from a station located hundreds of miles away.

Think Small

Carrying hf equipment on trips is not that difficult. A knapsack or carrying case can be used for the transceiver; the accessories fit in a clothes suitcase. Select the smallest gadgets you have, especially when deciding which filters and antennas to take.

Bringing the radio on trips has filled otherwise boring evenings with pleasant visits from local hams, even on overnight stops. I have gained a panoramic view of the world of Amateur Radio by experiencing different skip and band conditions. Anyone can set up a high-band station in a motel room. All it takes is some imagination and the ability to improvise. — *Ken Neubeck, WB2AMU*

● *Basic Amateur Radio*

Trigonometry for Beginners

If you're turned off when you see a "trig" function, maybe you don't know what it means. Trigonometric functions just change numbers to other numbers. Here's how.

By Stan Gibilisco,* W1GV

Trigonometric functions . . . the mere sound of this term is enough to intimidate almost any nonscientific person. Perhaps the mention of trigonometry stirs up unpleasant memories of high school math courses, the teacher scrawling alien-looking gobbledygook on a smooth black surface while you gaze out the window at a sun-drenched spring landscape, wanting to be anywhere but where you are! This isn't a very nice way to be introduced to any subject. But now, trigonometry may stand in the way of your understanding electronic principles. Trigonometry is used extensively in radio theory, and you'd do well to get acquainted with it if you're very serious about getting a higher class license! Let's push this roadblock aside. You might be surprised at how easily it'll move.

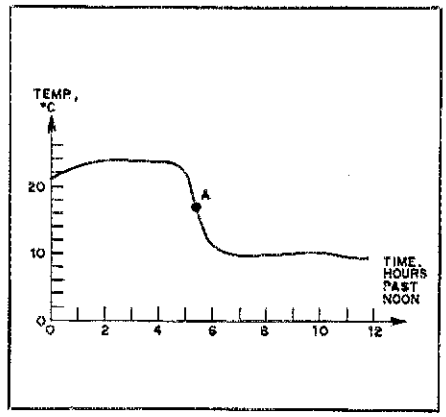


Fig. 1 — Graph of time versus temperature for a June afternoon in the Midwest. Note the sharp drop that takes place between 5 and 6 P.M. It's a pretty good bet that this period was accompanied by a storm!

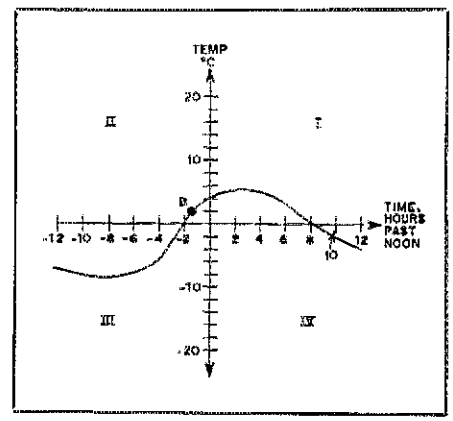


Fig. 2 — Graph of time versus temperature for a day in February. Here, all four quadrants of the coordinate plane are used. The quadrants are numbered in Roman numerals.

The Cartesian Plane

You have probably been exposed to the Cartesian coordinate system many times without having given it a second thought. Or maybe you didn't recognize it by its technical name. Fig. 1 is an example of the Cartesian system in use. We have a graph of the temperature between 12 noon and 12 midnight; the curve might be typical of a June day in the Midwest. Note the precipitous drop in temperature that occurred at around 5 P.M. This period was accompanied by considerable 2-meter fm activity, as well as lots of unplanned modifications to hf antenna installations!

The curve in this graph is a *relation* between the two variables on the axes, time and temperature. Each point on the curve has unique coordinates, one for time and the other for temperature. We can represent such points by means of *ordered pairs* of numbers. We denote such pairs by writing the numbers in the form (x, y), where x represents one variable and y represents the other. The point labeled A on the curve in Fig. 1 has coordinates (5.4, 17), meaning 5.4 hours past noon and 17 degrees Celsius. It is customary to list the variable on the horizontal axis first.

Fig. 2 is a different time-temperature graph, more typical of much of the continent in February. Here, we have extended the axes to accommodate negative numbers. The Roman numerals are quadrant numbers; the plane is clearly divided into four quadrants, which are customarily assigned numbers in the manner shown. In the first quadrant, both the x and y values are positive. In the second quadrant, the x values are negative and the y values are positive; in the third quadrant, both are negative; in the fourth quadrant, the x values are positive and the y values are negative. Point B is $(-1.5, 2)$, indicating that it was 2 degrees Celsius at 10:30 A.M.

In mathematics, relations between two quantities (or variables) are often illustrated as curves on a Cartesian plane. By making use of such illustrations, it is possible to make many otherwise difficult concepts clear (as well as to make unfathomable things merely difficult). Fig. 3 is a graph of the equation $x^2 + y^2 = 1$. This graph is called a unit circle, because it has a radius of one unit. Any point on this circle, of course, has two coordinate values. An example is the point $C = (\sqrt{2}/2, \sqrt{2}/2)$. The coordinates of every point on the circle will satisfy the equation $x^2 + y^2 = 1$. "Plugging" the values for C into the equation, we obtain $(\sqrt{2}/2)^2 + (\sqrt{2}/2)^2 = 2/4 + 2/4 = 4/4 = 1$. If a given point (x, y) satisfies the equation, then it lies on the circle. Hence we know that $(\sqrt{3}/2, 1/2)$ has to be on the circle

*9725 S. W. 182nd St., Miami, FL 33157

since these values, as the reader can verify, satisfy the equation.

We can divide this circle into 360 degrees. It is standard practice to assign the point (1,0) the value 0°, and then move counterclockwise around the circle, assigning 90° to the point (0,1), 180° to (−1, 0) and 270° to (0, −1). The point C in Fig. 3 would correspond to 45°. (Can you demonstrate the reason that this is the case?)

Sine and Cosine

There are many relations that can be graphed on the Cartesian plane, but for the moment we're going to be concerned only with the unit circle $x^2 + y^2 = 1$. This circle is calibrated in degrees in Fig. 4. Any angle thus corresponds to a unique point on the unit circle. If such a point has coordinates (a, b) — meaning $x = a$ and $y = b$ — then the sine of the angle is equal to b and the cosine is equal to a. That is, the y value is the sine of the angle, and the x value is the cosine of the angle. It's as simple as that. You can make your own chart for finding sines and cosines by drawing a large unit circle on a piece of graph paper and calibrating the circle in degrees with a protractor. (For great accuracy, however, it would be better to use a calculator equipped with trigonometric functions.)

A few observations can be made from Fig. 4. For angles of 45° and 225°, x and y equal each other, and hence sin (45°) = cos (45°) and sin (225°) = cos (225°). For angles of 135° and 315°, we have $x = -y$. Therefore, cos (135°) = −sin (135°) and cos (315°) = −sin (315°). Note also that for any angle except 0° and 180° there is another angle with the same cosine, and for any angle except 90° and 270° there is another angle with the same sine.

We have already said that $x^2 + y^2 = 1$ for any point (x,y) on the unit circle. Since any angle (which we'll call θ) corresponds to some point on the circle where $\cos\theta = x$ and $\sin\theta = y$, it follows that $(\cos\theta)^2 + (\sin\theta)^2 = x^2 + y^2$, and of course $x^2 + y^2$ is always equal to 1. Hence $(\cos\theta)^2 + (\sin\theta)^2 = 1$ for any angle θ. This is one of the most often-used relationships in trigonometry.

Tangent

The tangent of an angle can be represented geometrically in the following manner. Draw the line $x = 1$ [parallel to the y axis through the point (1, 0)], as shown in Fig. 5. Locate the point on the circle corresponding to the angle θ. (In Fig. 5, we have chosen $\theta = 135°$.) Then draw a line connecting this point with the origin (0, 0) and extend this line until it intersects the vertical line $x = 1$. The y value of the intersection point P is the tangent of the angle. In Fig. 5, we see that tan (135°) = −1. The line running through the point on the circle corresponding to 135° also goes through the point on the circle corresponding to 315°, indicating that tan (315°) is also −1.

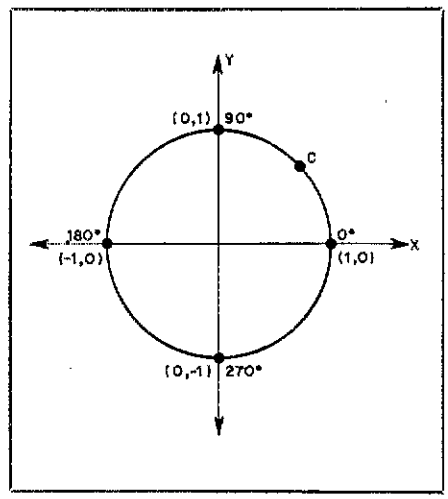


Fig. 3 — The unit circle on the Cartesian plane. This circle has a radius of 1 unit. The point (1, 0) represents 0°, and angles are measured counterclockwise from this point. Point C represents 45°.

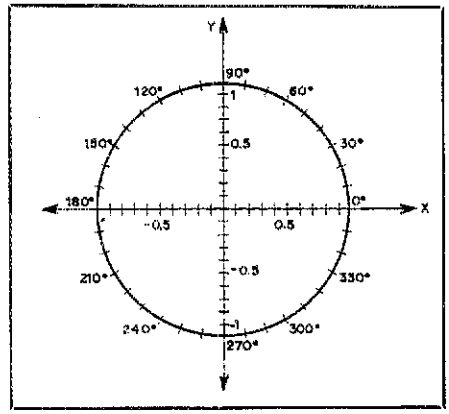


Fig. 4 — The unit circle calibrated in degrees. This chart may be used for determining approximate values for the sine and cosine of an angle.

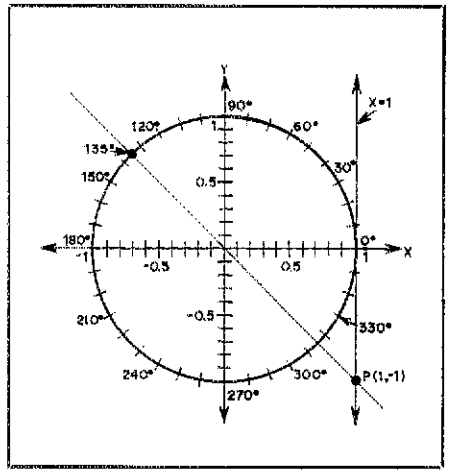


Fig. 5 — Geometric representation of the tangent of 135°. The tangent of an angle is found by locating the angle on the unit circle, and then drawing a line between the point on the circle corresponding to the angle and the point (0, 0) until the line intersects the vertical line $x = 1$. The point of intersection, P, has a y value that is the tangent of the angle.

The tangent of an angle can also be obtained by dividing its sine by its cosine; that is, $\tan\theta = \sin\theta/\cos\theta$. In Fig. 5, we are geometrically finding this ratio.

Note that if $\theta = 90°$ or $\theta = 270°$, it will be impossible to draw a line in the aforementioned manner that intersects the line $x = 1$. In these two cases, we'll just end up tracing over the y axis, because the angles 90° and 270° have no tangent. If you try to get the tangent by dividing the sine by the cosine, you will obtain either 1/0 or −1/0. These expressions are undefined. (Intuitively, it's tempting to suggest that they are "infinite," but let's stay away from that kind of speculation!)

There are three other trigonometric functions worth mentioning: cotangent, secant and cosecant. They are abbreviated cot, sec and csc respectively. We will not deal with them, except to mention that for an angle θ with point (x, y) on the unit circle, $\cot\theta = x/y$, $\sec\theta = 1/x$ and $\csc\theta = 1/y$.

Oddball Angles

Occasionally we might have to deal with an expression like sin (−75°) or tan (440°). The former type of situation is especially apt to crop up. You might guess that the angle −75° is found on the unit circle by going backward (clockwise) from zero by 75 degrees; if this were true, then −75° would correspond to the same point as 285°. And this is exactly the way it does work. You are also correct if you reason that 440° means one complete trip around the circle (360°) plus 80 extra degrees, in which case we can forget about the first 360 degrees and just say that 440° corresponds to the same point as 80°.

For most purposes, for any angle θ we can add or subtract 360° as many times as we want, and we'll still have the same angle. This is nothing profound; it's just a matter of definition. It is customary to reduce oddball angles to angles smaller than 360° and at least 0° so that for all angles θ, $0° \leq \theta < 360°$. (This means that the value of θ equals 0 or lies between 0 and 360°.) But sometimes there are exceptions to this rule. A little later we'll look at one such situation.

Graphs of Trigonometric Functions

Suppose we plot sin θ, cos θ and tan θ against the angle θ in degrees. The results are shown in Fig. 6. At A and B we have the familiar "sine wave." At C, the value of the function "blows up" at $\theta = 90°$ and at $\theta = 270°$. We can observe that the graph at B is 90 degrees out of phase with the graph at A; in fact, if we add 90° to an angle θ and then take the sine of the resulting angle, we will get the cosine of the original angle θ. *Mathematically, sin* $(\theta + 90°) = \cos\theta$.

If you have ever wondered why we

speak of phase *angles* in electronics, the reason should now be clear. Consider two points on the θ axis of Fig. 6A, say $\theta_1 = 45°$ and $\theta_2 = 90°$. The phase difference between these points is $\theta_2 - \theta_1 = 90° - 45° = 45°$. We can also plot θ_1 and θ_2 on the unit circle of Fig. 4, and if we then connect θ_1 and θ_2 with the origin or center (0, 0) by straight lines, the angle between these lines will be the phase difference $\theta_1 - \theta_2$ or 45°. The angle concept of phase derives from the unit circle; in fact, the sine wave is just a special representation of circular motion.

Inverses of Trigonometric Functions

Let's say we're given the number 0.64, and we want to find the angle that has this number as its cosine. We can do this by looking at Fig. 4 and checking to see what point or points on the unit circle have an x value of 0.64. There are two such points, and they correspond to angles of approximately 50° and 310°. We say that the inverse cosine or *arc-cosine* (abbreviated arccos) of 0.64 has two values, 50° and 310°.

But which of these two values would we choose if we were called upon to provide a single, definite answer? This dilemma is resolved by assigning one value or the other by convention: We say that the arccosine of a number must fall between 0° and 180°. In other words, we just forget about the bottom half of the unit circle. Eliminating this ambiguity elevates the arccos operation to the status of a mathematical *function*, and to indicate this, we capitalize the name of the function. Hence Arccos (0.64) = 50°. You can see that Arccos (1) = 0°, Arccos (0) = 90° and Arccos (−1) = 180°. Note also that only numbers between and including −1 and 1 have the distinction of having an Arc-cosine. It is meaningless to speak of Arccos (3.5) or Arccos (−7).

You might guess that there are inverse functions for the sine and tangent as well. They are called Arcsin and Arctan. The Arcsin function can only take angles on the right-hand half of the unit circle. Like Arccos, Arcsin can be applied only to numbers between, and including, −1 and 1.

Earlier, it was mentioned that there are occasions when it is useful to consider angles smaller than 0° or larger than 360°. The Arcsin function gives rise to the notion of negative angles. To make the Arcsin function smooth, we will say that this function can take values between and including −90° and 90°. This is nothing but a matter of convention. If we were to say that the function takes values between 0° and 90° and also between 270° and 360°, the function would have a gap, and mathematicians would rather not have this gap.

The Arctan function can take any angle *between* −90° and 90°, but *not* including these extremes. Arctan is different in that we can apply Arctan to *any* number: Every number is the tangent of some angle in the range from −90° to 90°, represented by the right-hand half of the unit circle.

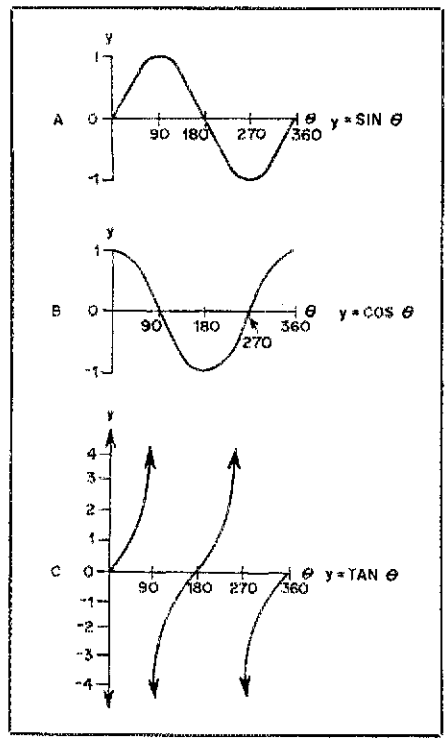


Fig. 6 — Graphs of three trigonometric functions. At A, the sine function; at B, the cosine function and at C, the tangent function. The tangent function is undefined at 90° and 270°.

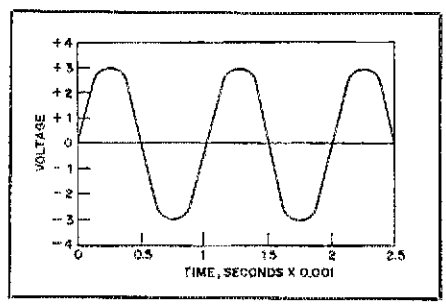


Fig. 7 — Graphic representation of a sine wave with a frequency of 1 kHz and a peak voltage of 3 volts. At the extreme left, it is assumed that the oscillator is turned on and the waveform starts at zero volts and rises. (In actual practice, this may not always happen.)

These inverse trigonometric functions will occasionally be seen in *QST* articles and other amateur publications. All you really need to know about them is that they change one number to another number. In this case, they change a number to an angle, at least the way we have portrayed these functions so far. We'll have more to say about this shortly.

Beware of one thing: There is some carelessness when it comes to capitalizing the names of the inverse trigonometric functions. If you see "arctan" in an equation, it's safest to assume that the author means to say "Arctan," unless otherwise stated. You may sometimes see Arcsin, Arccos and Arctan written as $\sin^{-1}$, $\cos^{-1}$ and $\tan^{-1}$ respectively.

Radians

Angles are generally thought of as being measured in degrees. Actually this is a rather unnatural way to measure angles for mathematical purposes. Have you ever wondered how 360 came to be chosen as the number of degrees in a circle? Why not 100 or 1000, which are so much more pleasant to deal with? Well, there *is* a better way, but at first you're probably going to think it's much worse than dividing the circle into 360 equal parts. You see, we're going to divide the circle into units that aren't even a whole-number fraction of a trip around! This unit is called the *radian*.

Suppose we start at the 0° point (1, 0) on the unit circle, and then travel counterclockwise along the circle until we have gone a distance equal to the radius of the circle. This point will correspond to an angle of approximately 57°. It also corresponds to an angle of exactly one radian. There are 2π radians in a complete circle (π is about 3.14). An angle of 90° is thus $\pi/2$ radians; 180° is π radians, and so on.

It turns out that the radian is a much more elegant unit of angle measurement than the degree, for mathematical purposes. There's no symbol for radians like the little elevated "o" for degrees. We can just say that $\sin(\pi/2) = 1$ or $\cos(\pi/4) = 0.71$. We can also say that Arccos (0) = $\pi/2$ and Arctan (1) = $\pi/4$. Our trigonometric functions can now operate on numbers to get numbers; there aren't any units like degrees to bother with. This difference is especially significant when working with the inverse functions Arcsin, Arccos and Arctan. If you run up against something like Arctan [Arccos ($\pi/12$)] in a calculation and say that Arccos ($\pi/12$) = Arccos (0.26) = 75°, you'll then be faced with computing Arctan (75°). But we don't apply Arctan to angles! It can operate only on plain, ordinary numbers. Does this indicate that Arctan [Arccos ($\pi/12$)] is a nonsense expression? Not on your life! Arccos ($\pi/12$) = Arccos (0.26) = 1.3 radians or simply 1.3. Therefore, Arctan [Arccos ($\pi/12$)] = Arctan (1.3), which is approximately 0.92 radian or simply 0.92.

Now I hope this doesn't get you upset about whether you should use degrees or radians every time you see a trigonometric function! The above sort of situation is rare. It's perfectly all right to use degrees, unless it appears that you have a nonsense expression when you shouldn't. It is best to use radians for the inverse trigonometric functions; you can always convert the radians back to degrees when you're all done. Radians are converted to degrees by multiplying by $180/\pi$, or about

57.30. To convert degrees to radians, divide by 57.30.

An Application

To conclude, let's look at one simple application of trigonometry to radio theory. Fig. 7 illustrates a sine wave with a peak amplitude of 3 volts and a period of 0.001 second, which is a frequency of 1000 Hz. Suppose we want to know the instantaneous voltage 0.0001 second after the signal starts. (Assume it starts at the zero-degree point.)

First, note that 0.0001 second is 1/10 of the way through the first cycle, or 36 degrees. The instantaneous voltage is thus 3 sin (36°) volts, or 3 × 0.59 = 1.8 volts. This is a positive voltage, as can be seen from the graph.

Finally, here's a problem just for fun. It's a little more involved than the previous one, but certainly not too difficult. Suppose a limiter is connected across the source of the voltage shown in Fig. 7, clipping the peaks at ± 2 volts. For what proportion of the time does clipping take place? QST

Strays

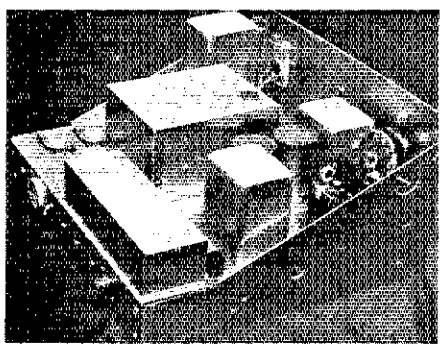
AERONAUTICAL MOBILE GUIDELINES

☐ Hams planning to operate aeronautical mobile must follow the Federal Aviation Administration's regulations for proper installation of Amateur Radio equipment aboard private aircraft. FAA circular AC 20-98, "Auxiliary Two-Way Airborne Radio System Installations," provides the information you need. To obtain a free copy, write to the U.S. Department of Transportation, Publications Section, M-443.1, Washington, DC 20590.

NEVER TOO OLD TO LEARN

☐ How often have we heard some post-establishment-age amateur lament about being "too old to learn about transistors?" Quite often, for us here at ARRL hq. The complainant usually follows up his or her tale of woe by saying that he or she was "brought up on vacuum tubes" (tough diet, eh?). Well, here's proof that it ain't necessarily so!

The photograph shows the masterly work of Charlie Dene, W3HZJ. He "married" parts of the W1FB solid-state receiver from June 1974 *QST* with the later version called "His Eminence, the Receiver." Charlie says, "I am 76 years of age and was licensed in 1933. Up until a few years ago I was a die-hard tube man." He goes on to say, "I never envisioned the day when I would be capable of building an all-solid-state receiver." A final note: The receiver performs very well, and he is quite satisfied with it. — *Doug DeMaw, W1FB*



This all-solid-state receiver is a marriage of two *QST* projects. W3HZJ, its 76-year-old builder, used to be "a die-hard tube man."

SRI SATELLITE PARAMETERS

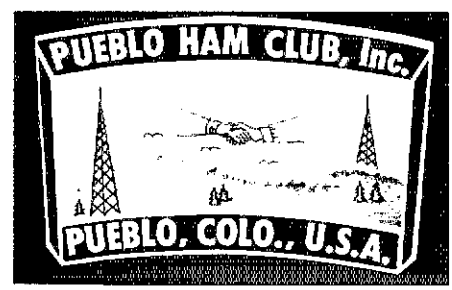
☐ The Stanford Research Institute Satellite P76-5 continues to function as a signal source on 70 cm. The latest orbital parameters for the ionospheric propagation satellite are period, 105.71 minutes; longitude increment, 26.43 degrees; inclination, 99.6 degrees; apogee, 1059 km; perigee, 993 km NASA reference orbit, June 1, 1979; orbit, 15,047; equator crossing, 0141.45 UTC at 211.15 degrees west. The spacecraft beacon frequency is 435.974 MHz ± Doppler. — *Bernie Glassmeyer, W9KDR*

AIRSHO '79 OPERATIONS

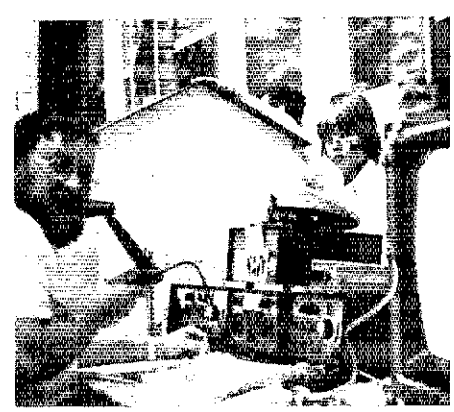
☐ The Confederate Air Force will operate aeronautical mobile, using call W5DX, from a Boeing B-29, the most famous of all World War II bombers, at the Ghost Squadron Airsho '79, October 4 to 7, in Harlingen, TX. Communications will be on 14.285 and 21.385 MHz, as propagation conditions permit, from noon to 5 P.M. (CDST) daily. Local fixed stations will act as liaison for amateurs interested in contacting the B-29. A commemorative photo QSL card will be issued for all contacts.

SEND US YOUR CLUB AWARDS/QSLS

☐ Does your club have a "worked 10 members" certificate or "checked into the club net 12 times," award? How about a club QSL card? We'd like to have you mail them to us. The Club and Training Department is going to work up a program involving clubs and their awards and QSLs. Please send us yours and tell us the details of how to win the certificates. — *Rosalie White, WA1STO*



Pueblo (CO) Ham Club's official QSL card is eye-catching and functional.



This Amateur Radio exhibit made a big hit at the Emmerson Junior High School (Bar Harbor, ME) Science Fair. The exhibit included a demonstration of ham radio, closed circuit TV and personal computers. The Amateur Radio exhibit was conducted by The Acadia Naval Radio Amateurs, K1NAN, and included members WA4RQK (in the photo), W1FAI, WA9NGD and Claude Roberts.

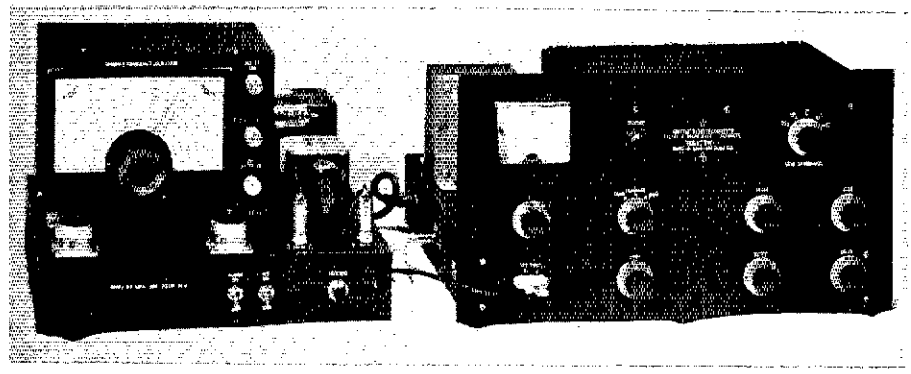
The CW-150 — A Classical Vacuum-Tube Transmitter

This medium-power band-switching cw rig, with differential keying and VFO, can be built at minimal expense with high-quality commercial and military specification parts obtainable at many hamfests and flea markets.

By Eric William Polk, M.D.,* WA1YIW

One of the attractions of Amateur Radio is that it can be so many different things to different people. For many of us, the very essence of Amateur Radio is found in the challenge of building our station from scratch. The honorable art of "homebrew" has roots in technological antiquity and indeed goes back to that first of amateur-experimenters, Guglielmo Marconi. However, it is no secret that in recent years things have changed for the home constructor. The "parts squeeze" and inflation have created a vicious cycle of astronomical prices, shortages and minimum order requirements that have virtually dried up the amateur's traditional sources of supply. This is especially so if the amateur wishes to use solid-state technique and build a band-switching type rig in the over-100-watt category using the highest quality components.

A partial solution to the above problem is found in the relative availability of some very high-quality components made during the final years of the vacuum-tube era. These parts, only recently obsolete in the military and commercial fields, are continuing to find their way, in ever-increasing numbers, onto the ham-auction and flea-market scene. The astute amateur constructor can build a remarkably high-quality rig at an incredibly modest price by tapping this fertile source for at least a segment of his parts requirements.



The CW-150 medium-power band-switching transmitter. The VFO unit is on the left; the main transmitter unit on the right. Along the front of the VFO power supply chassis is the VFO power switch (S8) and an auxiliary toggle which can be used to control an antenna changeover relay. The VFO pilot light, at the right, registers heater power to that unit alone. Along the left side of the main transmitter-chassis base can be seen the female power receptacle (J3) which supplies the VFO with ac; next is the jack for differential keying bias (J1) and, just barely visible, the key jack (J5). To the right of the meter on the main panel is the main pilot light (DS2) and tank band switch (S5). From left to right below the meter is the meter-function switch (S6) and keyer-function switch (S4), followed by the plate-tuning capacitor (C7) and loading capacitor (C8). Following the VFO input connector (P2) on the bottom row is the grid-tuning capacitor (C4), the buffer/multiplier/driver band switch (S3) and the drive-level potentiometer (R2).

This article describes a VFO-controlled 150-watt-input cw rig which covers 80 through 15 meters. For break-in capability with chirpless, clickfree signals, a built-in differential keyer is included. All circuits, including power supply, are contained within two interconnected units.

Circuit Details

A quick review of the circuit diagram of Fig. 1 will reveal a conventional and straightforward design with no trick circuitry or unusual components employed. An attempt was made to strike a balance

*144 State St., Portland, ME 04101

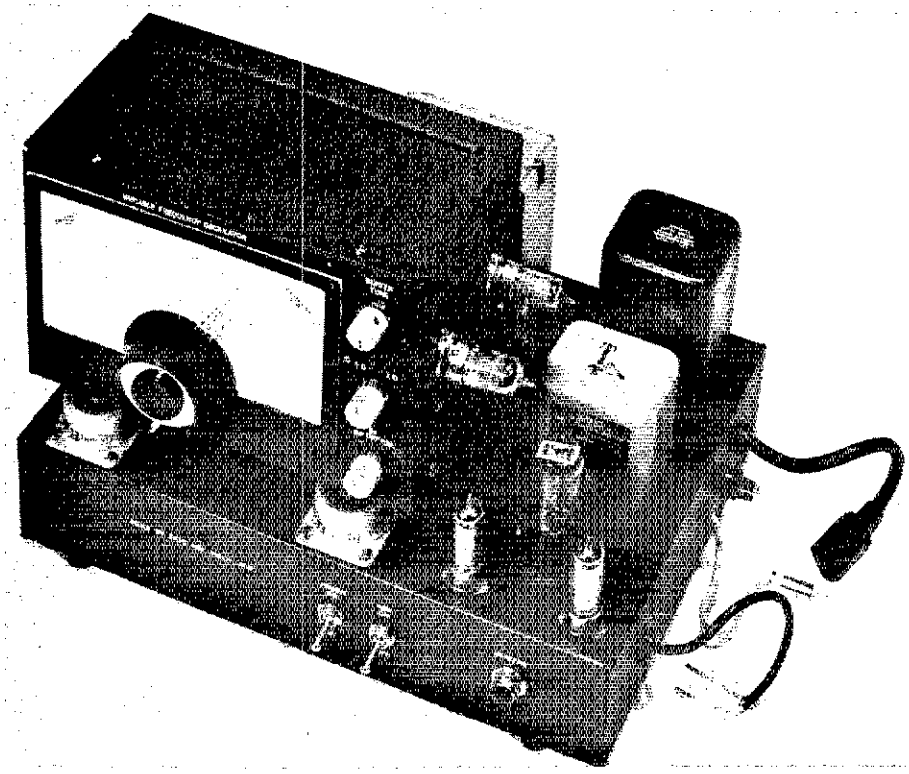
between economy of parts and simplicity of design on the one hand, and good performance on the other.

The rf section of the VFO is virtually lifted wholesale from Lew McCoy's adaptation of George Hanchett's "Stability with Simplicity" unit which appeared previously in *QST*[1,2] LC constants in the grid and plate circuits of the final amplifier stage, as well as the differential keyer layout, all hark back to well-proven previously published designs.[3,4]

Starting at V1, the first half of a 12AU7 dual triode is used as a high-C Colpitts oscillator providing output over 3.5 to 4.0 MHz. The signal is then fed to V1B, which is a cathode follower providing good isolation between the oscillator and succeeding stages. V2, a 6AU6, serves as a buffer/doubler fulfilling the triple functions of further isolation, amplification and frequency multiplication to 7.0 MHz. Up to this point, the signal has remained in the electrically and mechanically isolated VFO section. It is now transferred via coaxial cable to the grid circuit of a 6AG7 pentode which functions as a multiplier/driver. The 80-meter signals from the VFO are fed straight through the 6AG7 to the final amplifier for 80-meter output and doubled in the tuned plate circuit of the 6AG7 for 40-meter contacts. Forty-meter signals from the VFO are doubled in the 6AG7 plate circuit for 20-meter output and tripled for 15-meter contacts. The final amplifier thus operates straight through on all four bands.

L7 is provided to enable the rig to produce a moderate (though not full) amount of output on 10 meters. But for the 10-meter signal to meet FCC standards a high-pass filter should be inserted at the output of the transmitter to attenuate the 20-meter signal. On 10 meters, the final stage is operated as a doubler.

The final amplifier employs parallel 5933WAs with a pi-network output suitable for matching 50- to 70-ohm loads. The 5933WA is a premium military-specification type power tube which is electrically equivalent to a ruggedized and modernized 807. If you are unable to obtain the former at a ham flea market (they tend to be expensive through industrial sources), then by all means use the latter! The 807, a doughty veteran with years of proven transmitter service, uses the same socket as the more modern 5933 and will perform at the same power level without any modification to the CW-150. In neither case should neutralization be required in a correctly built CW-150.



Close-up of the CW-150 VFO unit shows main dial prior to calibration. From top to bottom along the right of the VFO mini-cabinet is the buffer tuning capacitor (C3), the buffer/doubler band switch (S2) and the VFO function switch (S1). The large tuning dial is attached to C1 which is mounted on rigid standoffs. C2 (not visible) is mounted directly on the rear wall of the mini-cabinet, as is L2 (see text for method of mounting). L1 is mounted directly on the front wall of the mini-cabinet at a 90° angle to L2. On the right side of the mini-cabinet from front to back is the 12AU7 oscillator/cathode follower (V1) and the 6AU6 buffer/doubler (V2). The voltage regulators (V11 and V12) can be seen at the front of the chassis followed by the 5Y3 rectifier (V13). The filter choke (L9) and power transformer (T1) are at the rear with filter capacitors (C9 and C10) just visible behind the mini-cabinet. From front to rear along right side of chassis are P2, P1, F1 fuse holder, and P3.

Power Supply

The ham who desires to use the highest quality components in power supply construction will have to spend a bundle if he utilizes commercial sources. Have you ever priced potted-type military-specification transformers and chokes? The long-lived oil-type filter capacitors used in the CW-150 would cost upward of $15 each today but were obtained for less than a dollar each at swap-fests. It bears repeating, then, that the amateur can make his greatest savings in the area of power supply components.

The main power transformer in the CW-150 is a husky Sartron designed to provide 775 volts at 230 mA in continuous commercial service. By utilizing a full-wave bridge rectifier with choke input, the unit literally loafs along in ICAS service while providing 660 volts under full load to the plates of the parallel 5933s. With key up the voltage is 760. There is, of course, no reason why solid-state rectifiers could not be used if the constructor has them available.

Voltage for the plate of the 6AG7 and the screens of the 5933s is taken from the center tap of T3. Screen voltage for the 6AG7 comes from the same source and is adjusted by means of a two-watt potentiometer and dropping resistor which gives effective control of drive level.

The VFO has a separate voltage-regulated power supply for maximum stability and isolation. The supply provides 75 regulated volts for the plate of the oscillator and 225 volts for the cathode follower. This capacitor-input supply, regulated by an OC2 and OA2, also furnishes the necessary voltage for the buffer/doubler stage. Components here are of the highest quality and are understressed in the extreme.

Negative voltage for key-up screen protection of the 5933s and for grid blocking in the differential keyer is supplied by an independent transformer using one-half of a 6H6 dual diode as a rectifier. The other half of the 6H6 is used to conduct negative blocking voltage to the grid of the oscillator when differential keying is employed. K1, a 6-volt spdt relay, keeps voltage at the key to a safe six volts. The keyer in the CW-150, whether used in the differential mode for break-in or keyed only in the amplifier, thus offers a safe and simple method for putting out an "elegant" cw signal having a pure dc note free of clicks or chirps.

Metering and Control

Provision is included for metering

[1]Notes appear on page 39.

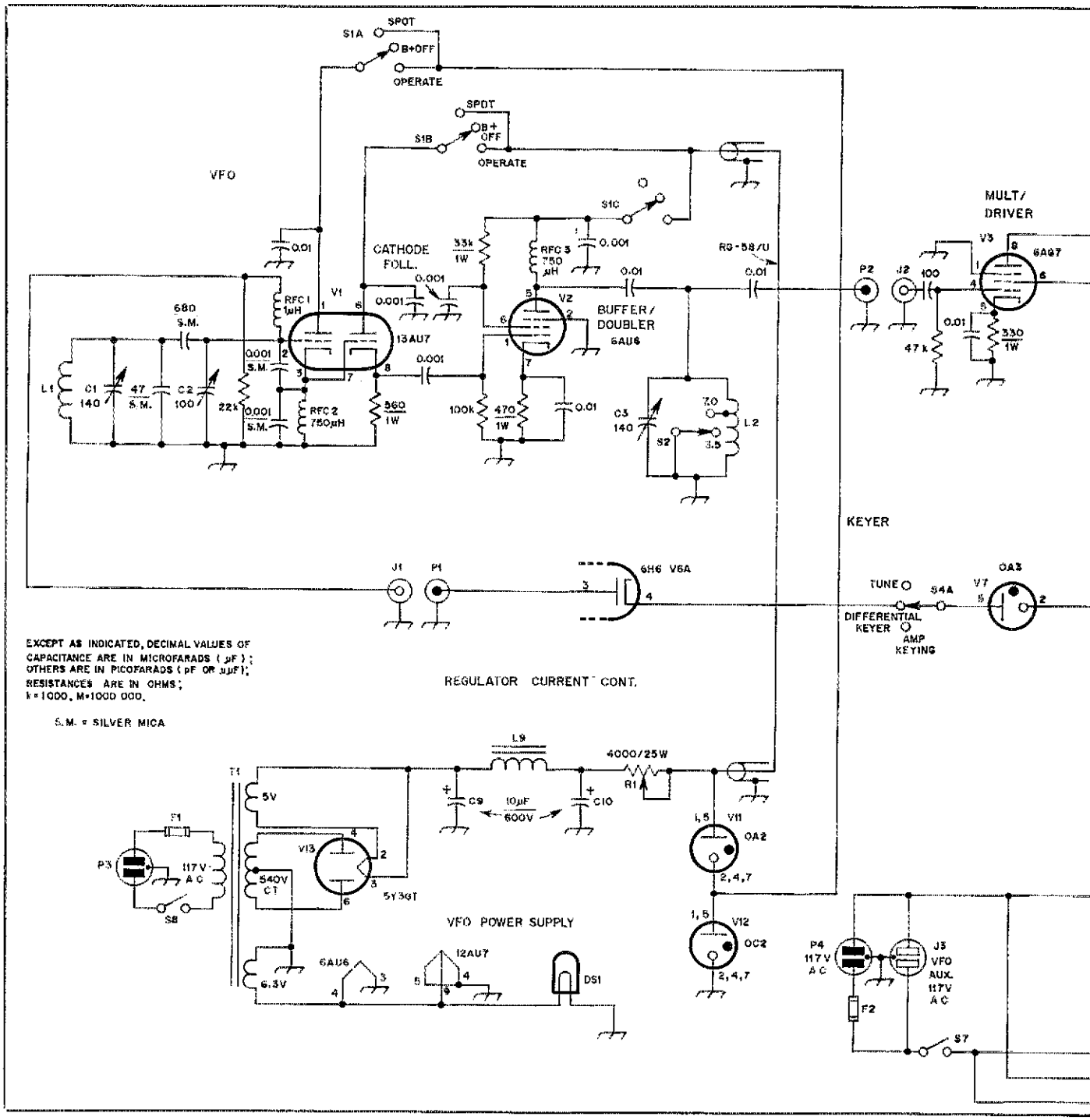
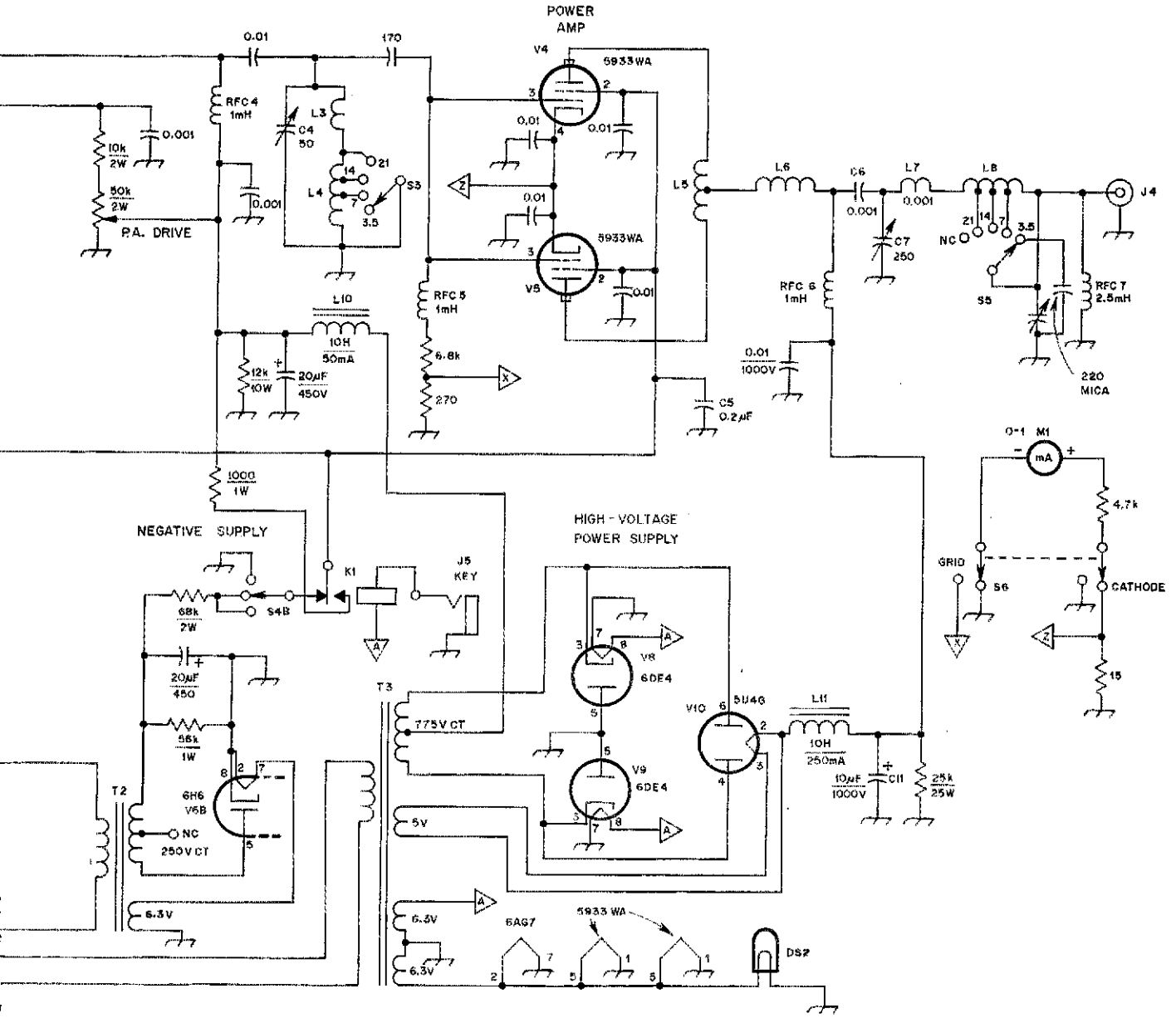


Fig. 1 — The CW-150 radiotelegraph-transmitter circuit. It covers 80 through 15 meters. All resistors are 1/2 watt unless otherwise marked. Capacitors with polarity marked are electrolytic. Capacitors marked "S.M." are dipped silver mica.

C1 — 140-pF variable (Hammarlund MC-140-S).
C2 — 100-pF air padder (APC-100).
C3 — 140-pF variable (APC-140-B).
C4 — 50-pF variable (Hammarlund HF-50).
C5 — 0.2-µF paper 600 V.
C6 — 0.001-µF mica 3000 V.
C7 — 250-pF variable, 850-V spacing (Hammarlund MC-250-M).
C8 — 1100-pF variable, triple-section broadcast type with stators connected in parallel.
C9, C10 — 10-µF oil type filter capacitor, 600 V.
C11 — 10-µF oil type filter capacitor, 1000 V.
DS1, DS2 — Dial lamp, 6 V, no. 47.
F1 — 3 A, type 3AG.
F2 — 5 A, type 3AG.
J1 — RCA type phono jack.
J2 — SO-239 coax plug or FT-243 pin jack.
J3 — 117-V ac receptacle.
J4 — SO-239 coaxial connector.
J5 — Open circuit phone jack.
K1 — Keying relay, spdt, 6-V ac coil (Potter and Brumfield KA5A).
L1-L8, incl. — See coil table.
L9 — 15-H 70-mA filter choke.

cathode and grid current in the final amplifier through a 0-1 dc milliameter. Use of cathode current, as opposed to direct measurement of plate current, enables the potential at the meter contacts to be a comfortable 6 volts and is justified from a safety point of view. Thus, full loading of the 5933s would represent a cathode current of about 220 mA, allowing 8-10 mA for the screens. With the dropping resistors employed, full-scale deflection when reading cathode current is



L10 — 10-H 50-mA filter choke.
L11 — 10-H 250-mA filter choke.
P1 — RCA-type phono plug.
P2 — PL-259 coaxial plug.
P3, P4 — 117-V ac plugs.
R1 — 4000-ohm wire wound, 25 watt, with slider.
RFC1, RFC2, RFC3 — 50-mA rf chokes.
RFC4, RFC5, RFC7 — 200-mA rf chokes.
RFC6 — 600-mA rf choke.
S1 — 3-pole, 3-position phenolic rotary switch.
S2 — Single-pole rotary switch (2 positions used).
S3 — Single-pole, 4-position phenolic rotary switch.
S4 — 2-pole, 3-position phenolic rotary switch.
S5 — 1-pole, 5-position ceramic rotary switch.
S6 — 2-pole, 2-position phenolic rotary switch.
S7, S8 — Spst toggle switch.
T1 — 540-V center-tapped transformer, 55 mA; 5 V, 2 A; 6.3 V, 2 A.
T2 — 250-V center tapped transformer, 40 mA; 6.3 V, 1.5 A; center tap not used.
T3 — 775-V center tapped transformer, 230 mA; 6.3 V, 9 A; 6.3 V, 2 A; 5 V, 3 A.

300 mA and in the grid-current mode 20 mA. The potentiometer in the screen lead of the 6AG7 should be adjusted for a drive level of about 7 mA to the 5933 grids.

The VFO has provision for tuning the output of the 6AU6 buffer and for frequency spotting by leaving the oscillator on and cutting plate voltage to V1B and V2. The same switch also enables all plate voltages to be switched off in the VFO unit during standby.

Table 1

Coil Dimensions

L1 — 14 turns no. 20, 16 turns per inch (tpi), 1-inch dia (B & W Miniductor 3015).
L2 — 33 turns no. 20, 16 tpi, 1-inch dia (B & W Miniductor 3015). 40-meter tap 21 turns from ground end.
L3 — 8 turns no. 20, 16 tpi, 1/2-inch dia (B & W Miniductor 3003).
L4 — 46 turns no. 24, 1-inch dia (B & W Miniductor 3016). 20-meter tap 5 turns from junction of L3-L4. 40-meter tap 17 turns from junction of L3-L4.
L5 — 18 turns no. 22 enam., wound on a 1-watt resistor (any value over 4.7 kΩ) as a coil form, tapped at center.
L6 — 12 turns no. 22 enam. on same type form as L5.
L7 — 4 turns no. 16, 4 tpi, 1-inch dia.
L8 — 30 turns no. 14, 8 tpi, 1-3/4-inch dia (B & W Miniductor 3022). 15-meter tap 1-1/2 turns from junction of L7-L8. 20-meter tap 5-1/2 turns from junction of L7-L8. 40-meter tap 17-1/2 turns from junction of L7-L8.

Inches × 25.4 = mm.

In addition to adjustment of drive level, provision is made for tuning in the grid lead of the 5933s by means of C4. For purposes of isolation and short leads, the driver/multiplier band switch and pi-network band switch are physically separated, below and above the chassis respectively. The plate tuning capacitor had adequate spacing for about 850 volts dc and no arcing will occur under full load. The loading capacitor is a triple-section broadcast-type supplemented by a 220-pF silver-mica capacitor on 80 meters.

A function switch allows preliminary tune-up to be done by removing negative bias while simultaneously grounding the 5933 screens with the key up. This allows the plates to draw just enough current for coarse tune-up. The function switch also enables the VFO to operate nonstop with all keying done in the screen circuit of the final amplifier.

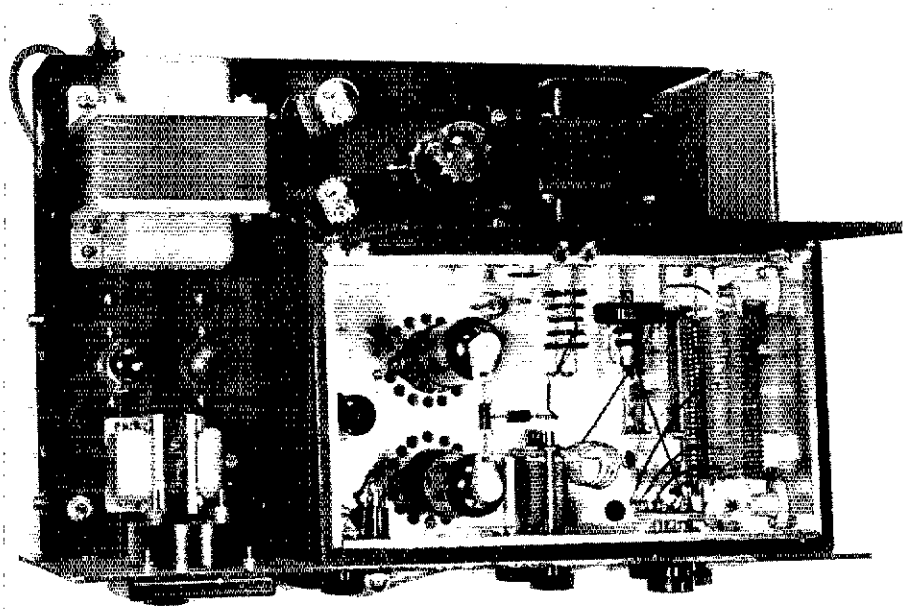
Construction

Parts layout is not especially critical as long as sound principles are observed. With the aim being maximum stability, the VFO is isolated mechanically and electrically from the main unit. The VFO rf section is constructed in a 9 × 5 × 6-inch (229 × 127 × 152-mm) mini-cabinet, shock mounted over the 14 × 10 × 3-inch (356 × 254 × 76-mm) VFO power supply chassis. A steel mini-cabinet and chassis are used for maximum rigidity. For thermal stability V1 and V2 are mounted on the outside of the VFO mini-cabinet. Isolantite sockets are used. Thus, no heat-generating parts or other active elements are physically within the frequency-determining compartment. The drift of a well-constructed VFO of this design is on the order of 20 Hz per hour.

The main transmitter unit is built on a 17 × 12 × 3-inch (432 × 305 × 76-mm) Premier aluminum chassis. Rf circuitry is housed in a chassis-mounted 12 × 7 × 6-inch (305 × 178 × 152-mm) Premier box. A suitable cover was made by attaching hinges to a piece of perforated aluminum stock which had been cut to size with shears. The 18 × 10-inch (457 × 254-mm) panel was cut from 1/8-inch (3-mm) aluminum stock obtained from a sheet-metal supply outfit. In keeping with the "classic" character of this rig, a black wrinkle finish was applied to visible portions of the sheet metal and baked in the family oven at 215°F for one-half hour — a maneuver which the XYL appreciated to no end!

Coils (with the exception of easily wound L5, L6 and L7) are all of prefabricated stock cut to size and tapped prior to mounting on appropriately cut Plexiglas strips obtained from a plastic-supply house. After fixing the coils to the snug-fitting Plexiglas with a bit of Duco cement, holes are drilled at either end of each assembly and the whole unit mounted on rigid porcelain standoffs. Coils sharing the same compartment should be mounted at right angles to each other. Care in layout at this point will lead to a neat workmanlike job. Note that components of the tuned circuit in the plate lead of the multiplier/driver are mounted below chassis while those of the pi network are above chassis. For efficient use of space, parts are mounted on the side walls of the rf shield as well as directly on the chassis.

No apology is offered here for the use of point-to-point wiring rather than printed circuitry. When we are dealing with a single unit of custom-built equipment, designed for frequencies below 30 MHz, there is no particular advantage to etched wiring, from my point of view. In addition, when using the husky components and fittings of a vacuum-tube design, the printed circuit board will often end up as a flimsy, mechanically overstressed element.

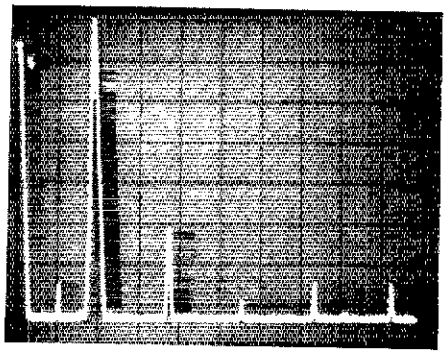


Above-chassis view of main transmitter unit. The bias transformer (T2) is mounted behind the panel on the left side of the chassis. To the left of T2 can be seen the main power switch (placement being prompted by the presence of a 5-year-old jr. op in the house). K1 (not visible) is mounted directly underneath the OA3 and 6H6 (V7, V6) which are located behind T2. The main power transformer (T3) is at the left rear corner of the chassis followed by the grouped components of the bridge rectifier (V8, V9, V10), the filter choke (L11) and filter capacitor (C11). Within the rf shield compartment can be seen, from left to right, the 6AG7 multiplier/driver (V3) and the two 5933 power tubes (V4, V5). The radial ventilation holes offer more than adequate convection cooling through the perforated shield compartment cover. The large plate choke (RFC6) is mounted horizontally on the rear wall of the compartment as is the safety choke (RFC7) and plate-blocking capacitor (C6). The four turns of a 10-meter coil, part of the original design, can be seen at the front-center part of the compartment between the chassis-mounted pi-network variable capacitors (C7, C8). The tank coil (L8) is mounted on the right wall of the compartment — see text for method of mounting.

Miscellaneous Hints

If you've gotten this far, it looks like you may go all the way so perhaps a few hints might be in order to smooth the path. When mounting the keying relay, place a soft rubber grommet underneath it to minimize mechanical noise and vibration. The VFO will benefit from short rigid leads and solidly mounted components. Be generous in the use of tie points. Note that the VFO mini-cabinet serves also as a rigid chassis.

The VFO receives ac power via a short removable cable connected to an accessory ac outlet on the main transmitter chassis. Make sure that when disconnected no live ac can be touched. A female socket on the main chassis and a male



The spectral output of the CW-150 on 80 meters, taken in the ARRL laboratory. Each horizontal division represents 2 MHz and each vertical division represents 10 dB. (The pip at the extreme left of the display is generated within the analyzer and represents "zero" frequency.) The most significant spurious output here is the 2nd harmonic, 51 dB down from the fundamental. Performance on 40 meters was the best of the four bands, with all spurious outputs down by 70 dB or more. The CW-150 as constructed by WA1YIW meets or exceeds current FCC requirements on all bands, 80 through 15 meters. (See August 1979 *QST* for more information about spectral analysis.)

plug on the VFO are what you want.

Blocking bias for differential keying is supplied to the VFO via a phone plug. With the constants chosen, there will be no less than −50 volts for cutoff of the 12AU7 with the key up.

The length of coaxial cable connecting the 6AU6 to the main chassis input should be held to about 24 inches (0.61 m), as it forms part of the tuned plate circuit of the 6AU6. Note that a classic National vernier dial (visible in the photograph) is used on the VFO. You can calibrate your dial using the station receiver and a 100-kHz crystal calibrator.

Adjustment and Tune-up

When the unit is finished, check the resistance, of the B+ lines to rule out shorts or open circuits. If everything seems in order, turn on the power and wait a minute for the "smoke test." If things still look good, proceed to adjust the tap on R1 in the B+ lead of the VFO. *Caution: Be sure the B+ voltage is shut off before moving the tap!* Place a dc milliameter in series with the resistance and adjust the tap for 30 mA of current. About 1000 ohms should do. Your voltage regulators should now glow on all settings of the VFO function switch.

Next, with the station receiver set at 3500 kHz, set C2, the VFO bandset capacitor, by zero beating your oscillator signal against that of a 100-kHz crystal marker. The 80-meter band should cover nearly the entire sweep of your dial. Check the rig for stability and freedom from parasitics using techniques described in *The Radio Amateur's Handbook*. If you have followed this layout fairly closely, you should find that neutralization is not required on any band and that there is total freedom from parasitics.

Next, connect a dummy load to the transmitter (a 150-watt light bulb will do) and load up on each band. Mark your panel controls in such a manner that tune-up becomes a pleasure, not a chore. Selection of correct coil taps for output on each band should be simple and automatic if your panel is appropriately labeled. I used the Letraset series of rub-on lettering with excellent results, even over black wrinkle.

As mentioned previously, preliminary tune-up should be done with the key up and the function switch set to TUNE. In this mode, the 5933 screens will be grounded. After you've obtained a dip, switch to transmit, depress the key and tune up in a conventional manner. When you hear that relay click, watch that meter jump and see that bulb light up, you will be privy to a very special satisfaction — ask any "homebrewer"!

A Final Word

The CW-150 may not be an ideal project for the beginning ham. But any amateur with even a very moderate amount of construction experience should have no trouble whatsoever in duplicating this rig or in producing a version based on personal design preferences and the parts that are available. All that is necessary is the desire to enjoy a few of the larger ham auctions and flea markets, keeping your eyes open for the parts you need. I was able to obtain about three-quarters of the necessary parts, brand new, by this route. Thus the overall cost of this particular CW-150 was $135. What it costs you will depend on what you find at flea markets and which parts you have to obtain through commercial sources. In any case, there is plenty of leeway for substitution in this design. No law says you need 660 volts on the plates. The 5933s will do as well with 450 volts as 750. If you've got a good buy on an 1100-volt transformer — fine! Forget the bridge rectifier and use a simple full-wave hookup. The possibilities for intelligent substitution in this design are endless and you will not be constrained by the inherent narrow operating parameters, fragility and heat sensitivity of solid-state equipment! So experiment to your heart's content and let the CW-150 prove to you that the art of homebrew in Amateur Radio is not dead yet.

Acknowledgement

Sincere thanks are expressed to N3VT, a generous and talented electronics engineer, who, although he has never seen the CW-150, meticulously went over the completed circuit diagram and advised the author of the ultimate workability of many of the circuits employed therein. QST

Notes

[1]Hanchett, "Stability with Simplicity," *QST*, October 1960.
[2]McCoy, "An Easy-to-Build VFO," *QST*, February 1962.
[3]*The Radio Amateur's Handbook*, "Keying and Break-In," 42nd Edition, ARRL, 1964, p. 245.
[4]*Understanding Amateur Radio*, "A 100-Watt Transmitter," Second Edition, ARRL, 1971, p. 179.

Strays

WHAT IS MPI?

☐ Electromagnetic interference expert W6OXX reports that *Electronic Engineering Times* predicts that up to 30 percent of 1980 cars will have microprocessor-controlled fuel metering, sampling such things as throttle position, speed, torque, air temperature, exhaust temperature, exhaust-gas oxygen, spark timing and idle speed. The idea is to reduce "G," thereby increasing miles per gallon, especially on larger cars. While he feels confident all those sensors can tolerate their own environment, he fears what 100+ watts of rf from a mobile rig will do. He has coined the new acronym — MPI, for Micro-Processor Interference. — *from Northrup CA Radio Club newsletter*

QST congratulates . . .

☐ John Pavao, WA1LPM, who is the first sightless graduate of Worcester Polytechnic Institute in Worcester, MA. The 24-year-old Dighton, MA, native received his B.S. degree in management and commercial data processing. John is also very active in Amateur Radio, especially in the National Traffic System, and is a holder of the Amateur Extra Class license.

I would like to get in touch with . . .

☐ radio officers and crew members at sea and in foreign ports who would like to help establish an international ham radio network to enable seafarers to make voice contact with their families at home, in countries where third-party traffic is permitted. Shore-based operators who would like to join this network are also needed. Contact Social and Educational Association for Seafarers, SEAS Institute, 45 DeGraw St., Brooklyn, NY 11231, Tel. 212-858-7327.

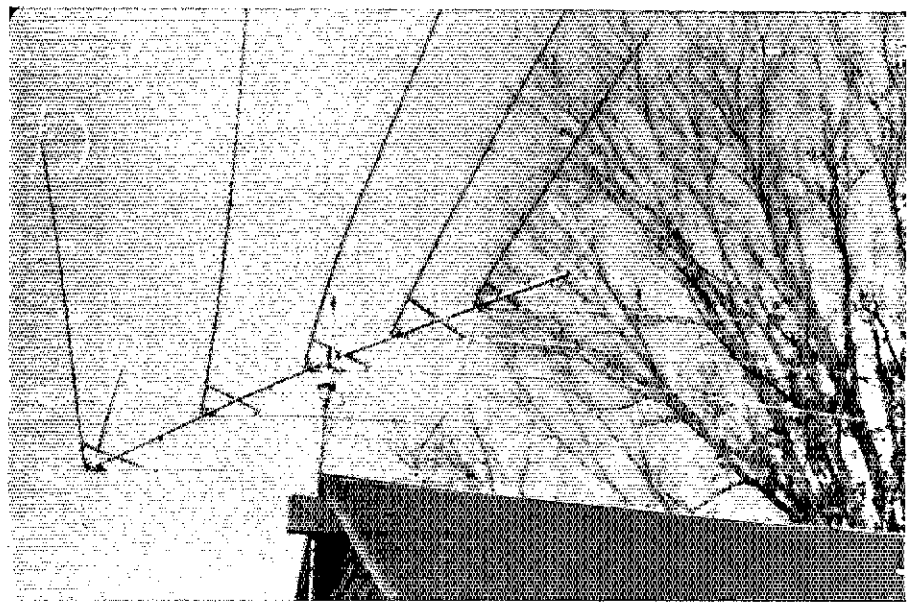
The Log-Periodic V Array

Here's a challenge — something to stimulate the investigative instincts of the serious antenna enthusiast.

By Peter D. Rhodes, P.E.,* K4EWG

The following presentation is designed to familiarize the radio amateur with another concept in antenna-array design using driven elements. In two earlier works, it has been shown that the log-periodic dipole array (LPD) is a useful, unidirectional, high-gain (7 to 10 dBd), frequency-independent radiator.[1,2,3] The log-periodic resonant V array (LPV) is a modification of the LPD array as shown in (Fig. 1). Dr. Paul E. Mayes and Dr. Robert L. Carrel at the antenna laboratory of the University of Illinois, found that by simply tilting the elements toward the apex, the array could be operated in higher resonance modes with an increase in gain (9 to 13 dBd) and a pattern with negligible side lobes (Fig. 2).[4]

A higher resonance mode is defined as a frequency that is an odd multiple of the fundamental array frequency. For example, the higher resonance modes of 7 MHz are 21 MHz, 35 MHz, 49 MHz and so on. The fundamental mode is called the $\lambda/2$ (half-wavelength) mode, and each odd multiple as follows: $3\lambda/2$, $5\lambda/2$, $7\lambda/2$, . . . etc., to the (2n-1) $\lambda/2$ mode. The usefulness of such an array becomes obvious when one considers an LPV with a fundamental-frequency design of 7 to 14 MHz that can also operate in the $3\lambda/2$ mode at 21 to 42 MHz. A four-band array can easily be developed yielding 7 dBd gain at 7 and 14 MHz and 10 dBd gain at 21 and 28 MHz, without traps. Also, using proper design parameters, the same array can be employed in the $5\lambda/2$ mode to cover the 35- to 70-MHz band. The 7- to 30-MHz LPV in use at K4EWG has been in service for one year and has performed well. However, minimum design



A pedestrian's view of the five-element 7- to 30-MHz log-periodic V showing one of the capacitive hats on the rearmost element.

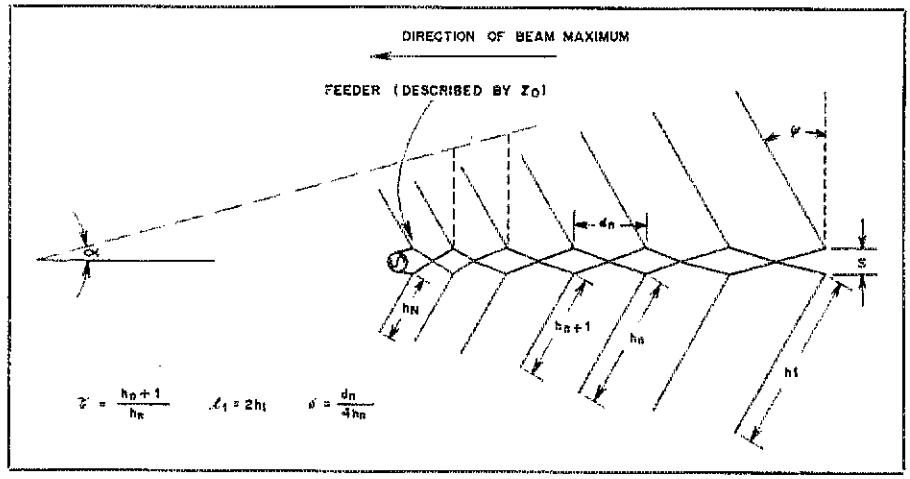


Fig. 1 — LPV schematic diagram and definition of terms.

[1]References appear on page 44.
*3125 Keenan Rd., College Park, GA 30349

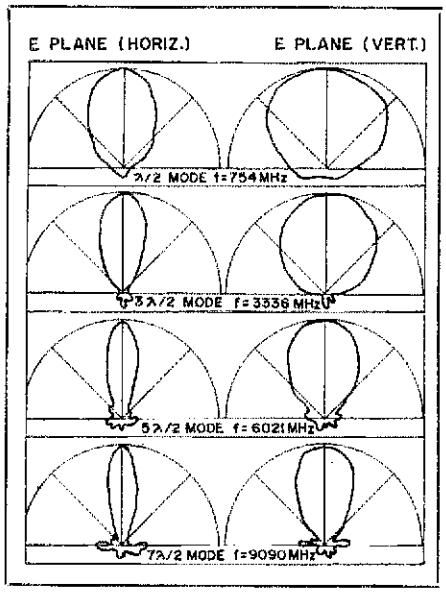


Fig. 2 — Typical radiation patterns from the Mayes and Carrel LPV in several modes. τ = 0.95, σ = 0.0268, ψ = 45° and N = 25.

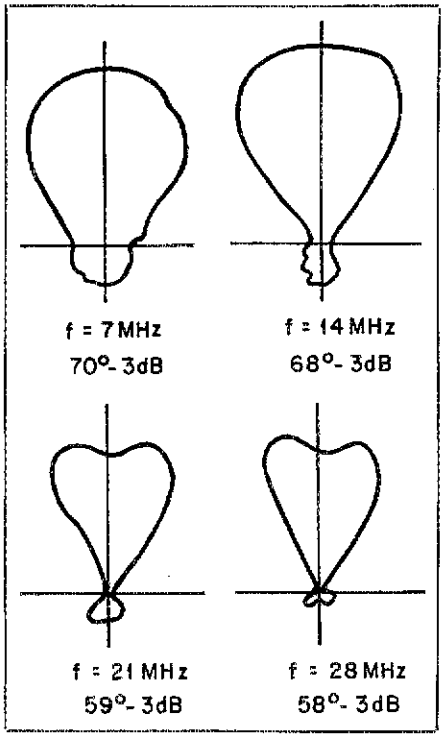


Fig. 3 — Horizontal radiation patterns of the K4EWG LPV array.

parameters were used and it is my opinion that a more conservative design (two additional elements) would yield a narrower half-power (3 dB) beamwidth on 40 and 20 meters. The author tested the LPV theory under the most extreme minimum design parameters (fewest elements and shortest boom), and the results confirmed the theory (Fig. 3).

Theory of Operation

The basic concepts of the LPD array also apply to the LPV array. The *Principle of Similitude*[5] is used in the LPD array design. That is, a series of interconnected "cells" or elements are constructed so that each adjacent cell or element differs by the design or scaling factor, τ (Fig. 4). That is, if ℓ_1 is the length of the longest element in the array and ℓ_n the length of the shortest, the relationship to adjacent elements is as follows:

$$\ell_1 = \frac{492}{f_1} \qquad \text{(Eq. 1)}$$

$$\ell_2 = \tau\ell_1$$
$$\ell_3 = \tau\ell_2$$
$$\ell_4 = \tau\ell_3, \text{ etc.}$$
$$\text{and, } \ell_n = \tau\ell_{n-1} \qquad \text{(Eq. 2)}$$

where

f_1 = lowest desired frequency and
n = total number of elements

Assume d_{12} is the spacing between elements ℓ_1 and ℓ_2. Then $d_{n-1,\,n}$ is the spacing between the last or shortest elements ℓ_{n-1} and ℓ_n, where n is equal to the total number of elements. The relationship to adjacent element spacings is as follows:

$$d_{12} = 1/2\,(\ell_1 - \ell_2)\cot\alpha$$
$$d_{23} = \tau d_{12}$$
$$d_{34} = \tau d_{23}$$
$$d_{45} = \tau d_{34}$$
$$\vdots \qquad \vdots$$
$$d_{n-1,\,n} = \tau d_{n-2,\,n-1} \qquad \text{(Eq. 3)}$$

where

α = 1/2 apex angle in degrees

It becomes obvious from an examination of the mathematical model that the elements, cells of elements and their associated spacings, differ by the design parameter τ. Each band of frequencies between any f and τf corresponds to one period of the structure. In order to be frequency independent (or nearly so), the variation in performance (impedance, gain, front-to-back ratio, pattern, etc.) across a frequency period must be negligible.

The "active region" is defined as the radiating portion or "cell" within the array which is being excited at a given frequency, f, within the array passband. As the frequency decreases, the active cell moves toward the longer elements, and as the frequency increases, the active cell moves toward the shorter elements. With variations of the design constant, τ, the apex half angle, α (or relative spacing constant σ), and the element-to-element feeder spacing, S, the following trends were found:

1) The gain increases as τ increases (more elements for a given f) and α decreases (wider element spacing).

2) The average input impedance decreases with increasing α (smaller element spacing) and increasing τ (more elements for a given f).

3) The average input impedance decreases with decreasing S, and increasing conductor size of the element-to-element feeder.

The LPV array operates at higher order resonance points, as described earlier. That is, energy is readily accepted from the feeder by those elements which are near any of the odd-multiple resonances ($\lambda/2$, $3\lambda/2$, $5\lambda/2$, etc.). The higher order modes of the LPV array are higher order space harmonics[6] and hence, when an

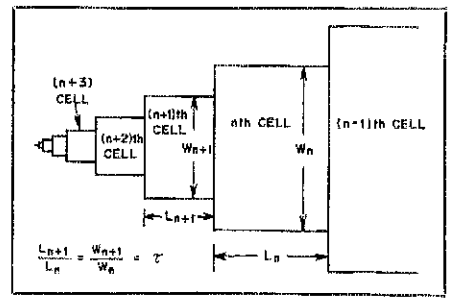


Fig. 4 — An interconnection of a geometric progression of cells.

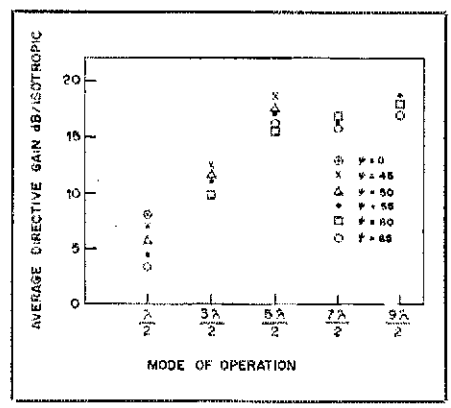


Fig. 5 — Average directive gain above isotropic (dBi). Subtract 2.1 from gain values to obtain gain above a dipole (dBd).

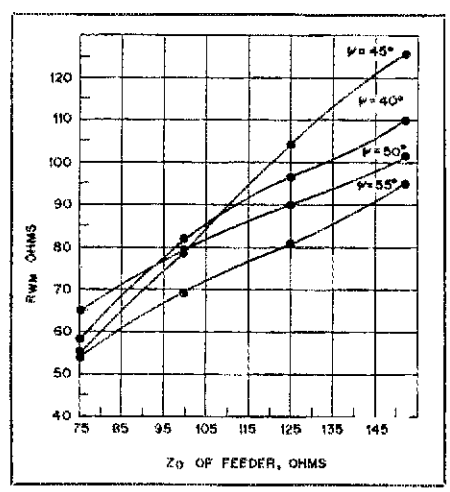


Fig. 6 — Weighted mean resistance level, R_{wm}, vs characteristic impedance of the feeder Z_o for various ψ angles.

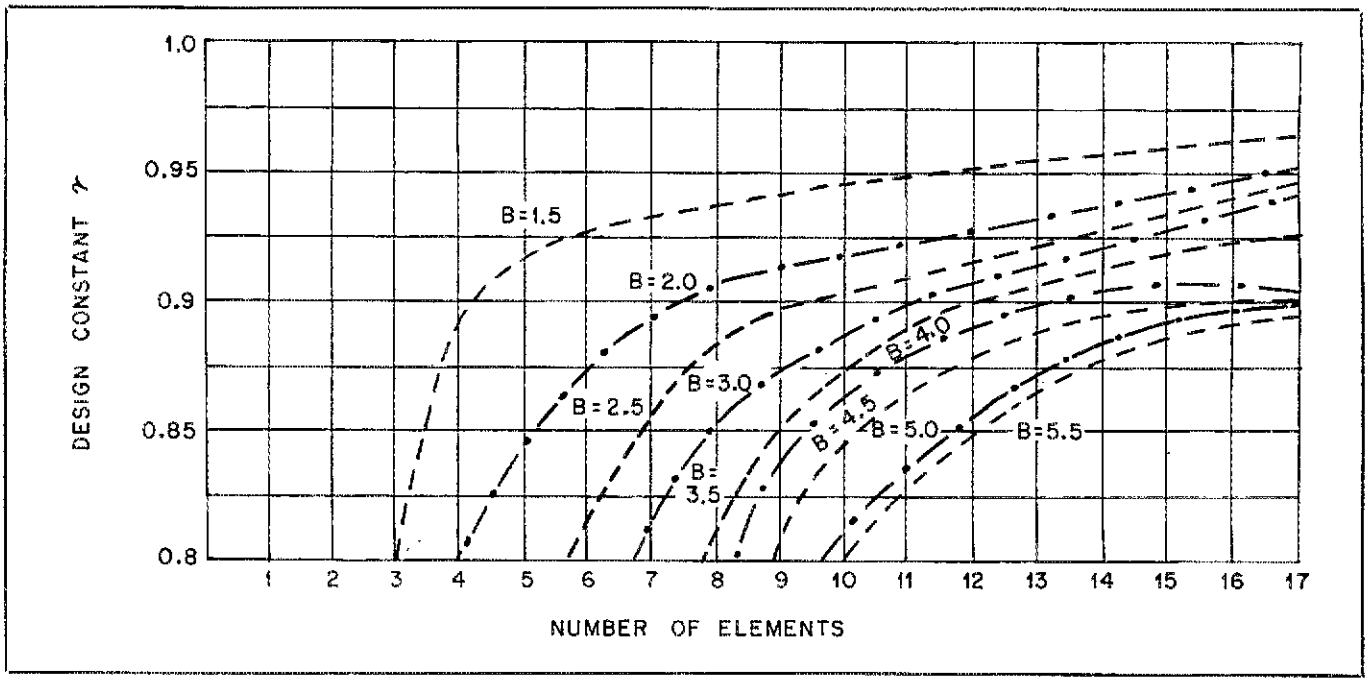


Fig. 7 — Design parameter, τ, vs number of elements, N, for various operational bandwidths, B.

LPV array is operated at a half-wavelength frequency shorter than the smallest element, the energy on the feeder will propagate to the vicinity of the 3λ/2 element and be radiated. (See ref. 4.)

The elements are tilted toward the apex of the array by an angle, ψ, shown in Fig. 1. The tilt angle, ψ, determines the radiation pattern and subsequent gain in the various modes. For each mode there is a different tilt angle which produces maximum gain.[7] Mayes and Carrel did extensive experimental work with an LPV of 25 elements with $\tau = 0.95$ and $\sigma = 0.0268$. The tilt angle, ψ, was varied from 0° to 65° and radiation patterns plotted in the λ/2 through 7λ/2 modes. The gain curves appear in Fig. 5. The E- and H-plane patterns are found in Fig. 2. Operation in the higher modes is improved by increasing τ (more elements) and decreasing σ (closer element spacing).

$$\sigma = 1/4\,(1 - \tau)\cot\alpha \qquad \text{(Eq. 4)}$$

When considering any single mode, the characteristic impedance is comparable with that of the LPD array; it is predominantly real and clustered around a central value, R_o. The central value R_o for each mode increases with Z_o (feeder impedance). Thus, control of the input impedance can be accomplished by controlling Z_o.

When multimode operation is desired, a compromise must be made in order to determine a fixed impedance level. The multimode array impedance is defined as the weighted mean resistance level, R_{wm}. Also, it can be shown that R_{wm} lies between the R_o central values of two adjacent modes. (See ref. 4.) For example:

$$R_{o1/2} < R_{wm} < R_{o3/2} \qquad \text{(Eq. 5)}$$

where

$R_{o1/2}$ = λ/2 mode impedance, center value

$R_{o3/2}$ = 3λ/2 mode impedance, center value

and:

$$R_o = \sqrt{R_{max} \bullet R_{min}} \qquad \text{(Eq. 6)}$$

$$VSWR = \sqrt{\frac{R_{max}}{R_{min}}} \qquad \text{(Eq. 7)}$$

The weighted mean resistance level between the λ/2 and 3λ/2 modes is defined by

$$R_{wm} = \sqrt{R_{o1/2}\, R_{o3/2}\, \frac{VSWR_{3/2}}{VSWR_{1/2}}} \qquad \text{(Eq. 8)}$$

where

$VSWR_{1/2}$ = VSWR in λ/2 mode

$VSWR_{3/2}$ = VSWR in 3λ/2 mode

Once Z_o and ψ have been chosen, Fig. 6 can be used to estimate the R_{wm} value for a given LPV array. Notice the dominant role Z_o (feeder impedance) plays in the array impedance.

It is apparent from the preceding data that the LPV is useful for covering a number of different bands spread over a wide range of the spectrum. It is fortunate that most of the amateur bands are harmonically related, and by choosing a large design parameter, $\tau = 0.9$, a small relative spacing constant, $\sigma = 0.02$, and a tilt angle of $\psi = 40°$, and LPV could easily cover the amateur bands from 40 through 6 meters!

Design Procedure

1) Determine operational bandwidth, B, in λ/2 mode:

$$B = \frac{f_n}{f_1} \qquad \text{(Eq. 9)}$$

where

f_n = highest freq. in MHz

f_1 = lowest freq. in MHz

2) Determine τ for a desired number of elements, n, using Fig. 7.

3) Determine element lengths ℓ_1 to ℓ_n using Eqs. 1 and 2.

4) Choose the highest operating mode desired and determine σ and ψ from Fig. 8.

5) Determine cell boom length, L.

$$L = \frac{2\,\sigma\,(\ell_1 - \ell_n)}{(1 - \tau)} \qquad \text{(Eq. 10)}$$

Note: If more than one LPV cell is to be driven by a common feeder, the spacing between cells can be determined by:

$$D_{1-2} = 2\sigma_1 \ell_{n1}$$

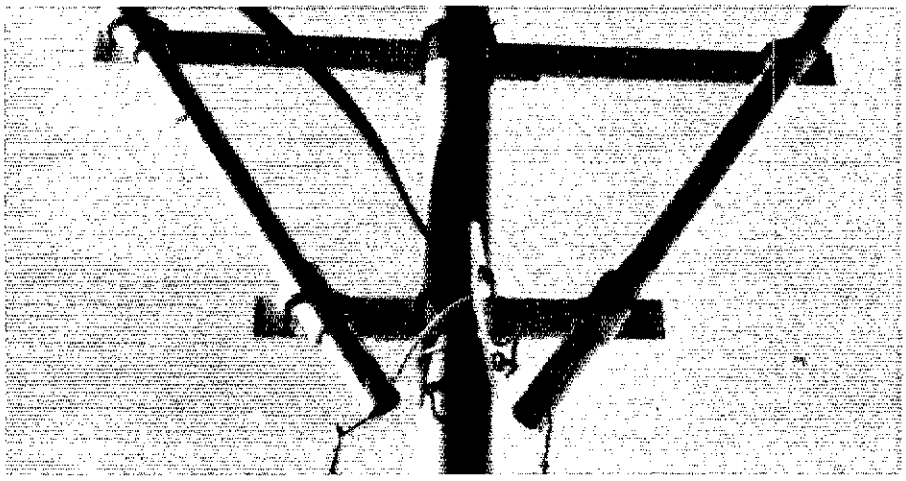
where

D_{1-2} = element spacing between cell 1 (lower frequency cell) and cell 2 (higher frequency cell).

σ_1 = relative spacing constant for cell 1

ℓ_{n1} = shortest or last element within cell 1

6) Determine the mean resistance level, R_{wm}, using Fig. 6.



The element-to-boom detail is depicted here. Aluminum angle brackets, U bolts, and sections of PVC tubing are shown securing each element to the boom at two points. The 300-ohm twin-lead, threaded through a piece of polystyrene and attached to the foremost element, may be seen entering the picture at the top/left. The end of linear loading line, ℓ_1, is visible near the bottom.

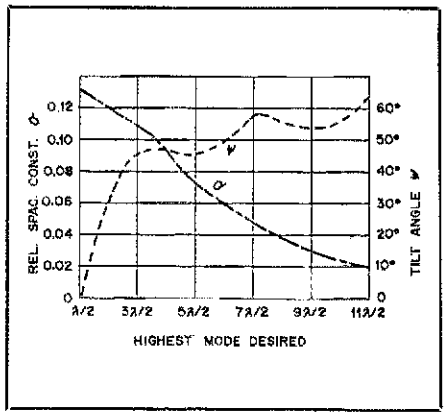


Fig. 8 — Optimum σ and ψ for an LPV when the highest operating mode has been chosen.

7) Determine the element spacings using equations 3 and 4.
This completes the design.

Construction Considerations

The 7- to 30-MHz LPV in use at K4EWG has given good results and construction data are warranted. However, exhaustive detailed drawings and material lists are omitted since it is my intent to stimulate interest, rather than produce the last word in amateur-band LPV electrical and structural design.

It may be of interest to note that both linear and capacitive loading were used on ℓ_1. The relationship in the appendix may be used in estimating linear loading-stub length and/or capacitive hat size if construction constraints prohibit a full-sized array. However, performance in higher mode operations was less than optimum when shortened elements were used.

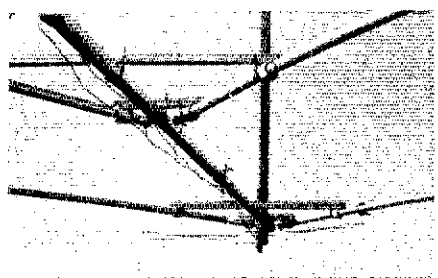
The structural details can be seen in the photos and more specific data can be found in Table 1. Array performance patterns can be found in Fig. 3. The array was fed directly with 300-ohm twin-lead.

Summary

The LPV provides frequency-independent coverage of each of several frequency bands. In higher mode operation, 2 to 3 dB of additional gain can be obtained from the same physical structure without degrading the pattern or characteristics of the array. It is my hope that this article will stimulate additional research by the amateur fraternity.

Appendix

The following linear loading-stub design equation may be used for approximating the stub length (one half of element, two stubs required):



A shot of the rearmost element looking at an angle to the boom. The linear loading line may be seen supported at various points along the boom and at the rear element by pieces of polystyrene.

$$L_s = \frac{2.734}{f} \arctan \left[\frac{33.9 \left[\ell_n \frac{24h}{d} - 1 \right] \left[1 - \left(\frac{fh}{234} \right)^2 \right]}{fh \operatorname{Log} \left(\frac{b}{a} \right)} \right]$$

where

L_s = linear loading-stub length in feet required for each half element
h = element half length in feet
f = element resonant frequency in MHz
b = loading stub spacing in inches
a = radius of loading stub conductors in inches
D = average element dia in inches

Note: The resonant frequency, f, of an individual element of length, ℓ, can be found using:

$$f = \frac{467}{\ell}$$

The capacitive hat dimensions for each half element can be found using the excellent data by W. Schulz, K3OQF.[8] QST

Table 1

Design Dimensions

Element Lengths, ft	*Element Spacings, ft*	*Design Parameters*
ℓ_1 = 56.22	d_{12} = 9.15	τ = 0.8
ℓ_2 = 56.22	d_{23} = 7.32	σ = 0.05
ℓ_3 = 45.0	d_{34} = 5.86	α = 38.2°
ℓ_4 = 36.0	d_{45} = 4.67	**L = 27'
ℓ_5 = 28.79		ψ = 45°

Feet (') × 0.3048 = m
Inches (") × 25.4 = mm

*ℓ_1 is a shortened element; the full size dimension is 70.28 ft.
**The total physical boom length is L plus the distance to the ℓ_5 cross bracing. The crossbraces are 3 ft. in length and ψ = 45°; hence, the total boom length is 27 ft + 1.5 ft = 28.5 ft.

Table 2

Basic Materials

Elements	1-1/2", 6061-T6, 0.047" wall aluminum tubing
Bracing	1-1/4" × 1-1/4" × 1/8" aluminum angle
Boom	2-1/2" OD, 0.107" wall aluminum tubing
U bolts	1/4" squared at loop to accommodate tilt angle, ψ
Feeder	no. 12, solid copper.
Cap. hat. for ℓ_1	no. 10 alum. wire, 24" dia
Linear loading for ℓ_1	4' loop, 3" spacing each half of ℓ_1.

References

[1]Rhodes, "The Log-Periodic Dipole Array," *QST*, November 1973.
[2]"The Log-Periodic Dipole Array," *The ARRL Antenna Book*, 1974, pp. 160-164.
[3]Rhodes and Painter, "The Log-Yag Array," *QST*, December 1976.
[4]Mayes and Carrel, "Log Periodic Resonant-V Arrays," I.R.E., Wescon Convention Record, Part 1, 1961.
[5]Stratton, *Electromagnetic Theory*, McGraw-Hill, New York, NY, 1941, p. 488.
[6]Mayes, Deschamps and Patton, "Backward Wave Radiation from Periodic Structures and Application to the Design of Frequency Independent Antennas," Proceedings of I.R.E., vol. 49, no. 5, May 1961.
[7]Kraus, *Antennas*, McGraw-Hill, New York, NY, 1950, p. 25.
[8]Schulz, "Designing a Vertical Antenna," *QST*, September 1978.

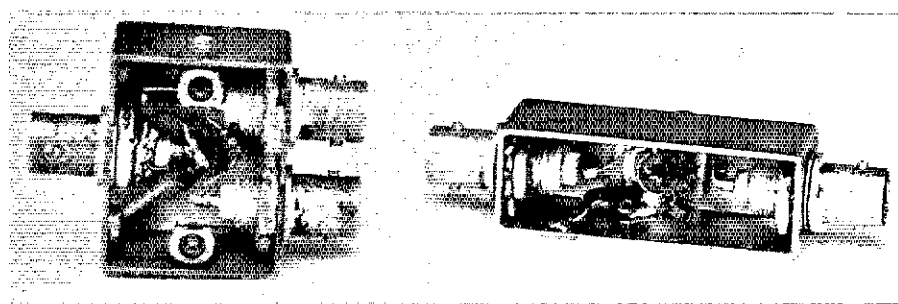
Broadband Hybrid Splitters and Summers

I don't multiply or subtract, but I can divide and add . . . what am I? No, not a calculator, but a splitter/summer. Here's an easy constructional approach featuring good input-output isolation and minimum loss.

By William R. Hennigan,* W3CZ

How many times have you had the need for a relatively simple, yet effective splitter/summer in the course of your amateur career? No doubt the occasion has arisen when you desired to sum two signals to feed a piece of test equipment, make an intermodulation measurement on a receiver or split the output of a generator to feed two pieces of equipment. Perhaps you've wanted to feed a receiver from two, four or eight elements of a phased array or feed several receivers from the same antenna and do all of this with relatively good port-to-port isolation (20 dB or more) and minimum splitting loss. If so, the possible variations discussed here are just what the doctor ordered!

The hybrid splitters described here have a splitting loss of 3 dB. In other words, half of the input power appears at each output port. The measured port-to-port isolation between the outputs appears in graphical form in Fig. 1. This isolation compares favorably with the measured isolation of a commercial splitter made for use between 1 and 50 MHz which was found to be 28 dB at 15 MHz.



Two of the splitter/summers constructed by the author are shown in the above photo. The type-1 unit is in the longer, narrow enclosure which measures approximately 2 × 11/16 × 11/16 inches (50 × 18 × 18 mm). The type-2 unit enclosure is approximately 1-3/8 × 11/16 × 1-1/8 inches (35 × 18 × 30 mm). Printed circuit board or other material may be used other than the brass boxes shown here.

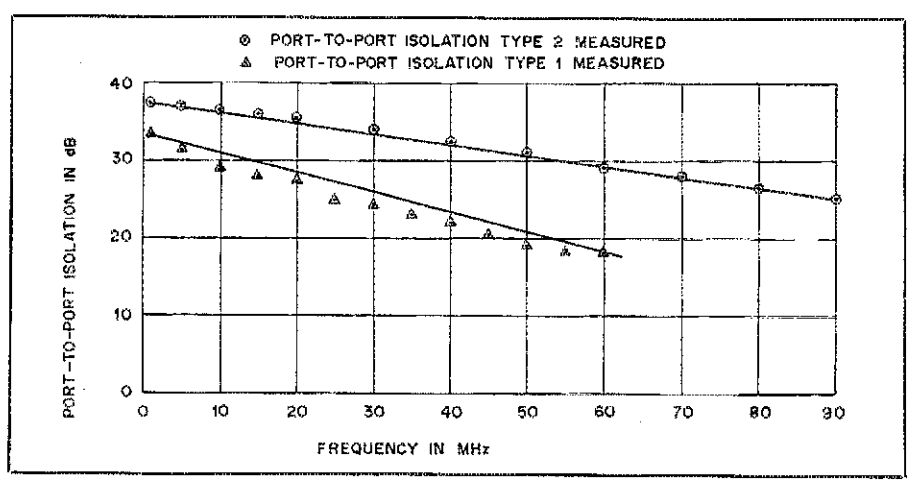


Fig. 1 — A plot of the port-to-port isolation vs. frequency for the two types of splitter/summers discussed in the text.

Frequency Response

The type-1 and type-2 devices shown in Fig. 2 have the following bandwidths: type 1, flat from 300 kHz to 40 MHz; type 2, flat from 100 kHz to 90 MHz. Above and below these frequencies, the loss departs from the 3-dB figure. In the case of the type 1, there is an additional 1-dB loss at 60 MHz, and with the type-2 unit, an additional 1-dB loss at 120 MHz.

C1 was added to improve the high frequency responses. For the type-1 unit, C1 is 82 pF. A value of 10 pF is used for the type-2 device. The value of C1 was determined in the following manner. One output port was terminated in 50 ohms and a 50-ohm detector was connected to the

*975 Clopper Rd., Apt. A2, Gaithersburg, MD 20760

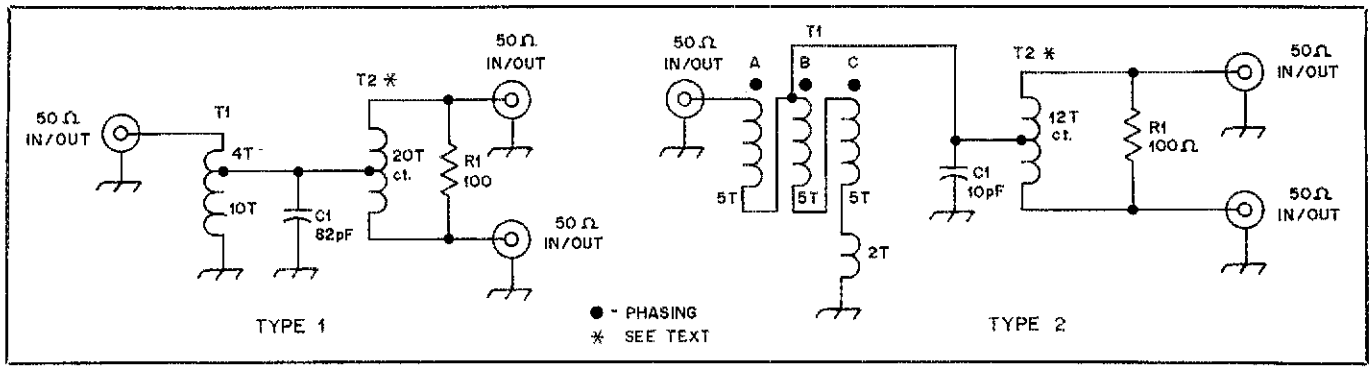


Fig. 2 — The two transformers of each type splitter/summer are wound on separate toroidal forms. The values of C1 and R1 are discussed in the text. R1 may be 1/8-watt. T1 for type 1 has a singularly tapped winding while T1 for type 2 has a 5-turn trifilar winding with an additional 2-turn winding on one leg. See Fig. 4 for further definition of the windings.

other output port. A sweep generator fed the input port. The dc output of the detector was applied to an oscilloscope to present a swept amplitude display. While sweeping from 1 MHz to 110 MHz, several values of capacitance were tried until the best high-frequency response was obtained. If the means for sweeping your splitter are not available, don't be concerned, for the type-1 unit will still be flat to 30 or 35 MHz and the type 2 to about 60 MHz without C1. See Fig. 3.

Design Considerations

For each device, two transformers are used, both of which are wound on ferrite cores. T1 transforms the input impedance of 50 ohms down to 25 ohms. T2, a bifilar-wound 4:1 transformer, steps up the 25-ohm unbalanced input to a 100-ohm balanced output. These ratios are *impedance* ratios, not *turns* ratios. Recall that the impedance ratio of a transformer is the square of the turns ratio. In this case, with the turns shown in Fig. 2,

$$\frac{(14)^2}{(10)^2} \text{ or } \frac{(17)^2}{(12)^2}$$

for ratios of 1.96:1 and 2.01:1, respectively, both of which are almost a perfect 2:1 transformation.

These splitters are not limited to use in 50-ohm systems, but if they are to be used at another impedance level, then R1 would have to be changed. In the case of a 75-ohm system, R1 would be 150 ohms. At a higher impedance, the low-frequency roll-off would be proportionately higher.

The low-frequency response of the splitter is determined by the inductance of the windings or the frequency at which their impedance is 50 ohms or greater. The inductance can be calculated using the following equation:[1]

$$L_{\mu H} = (0.0046\mu N^2 h \log_{10} \frac{OD}{ID})$$

[1]Notes appear on page 46.

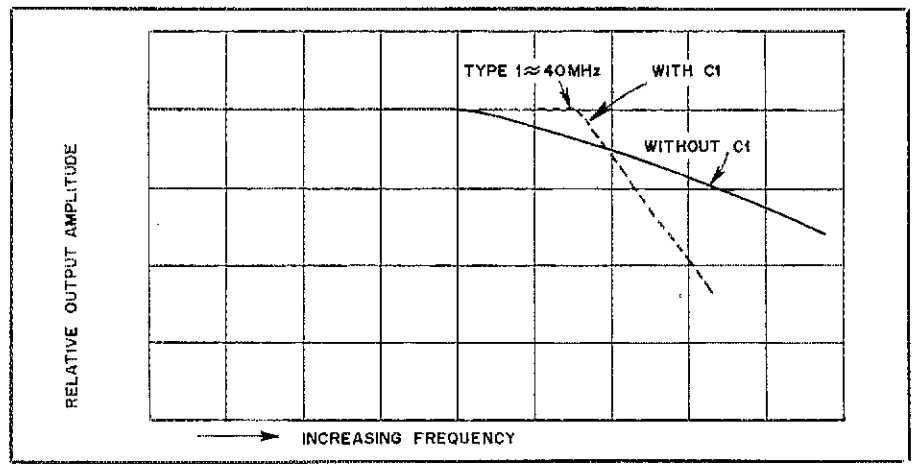


Fig. 3 — A graph of the frequency response of the type-1 unit showing the effect of the addition of C1.

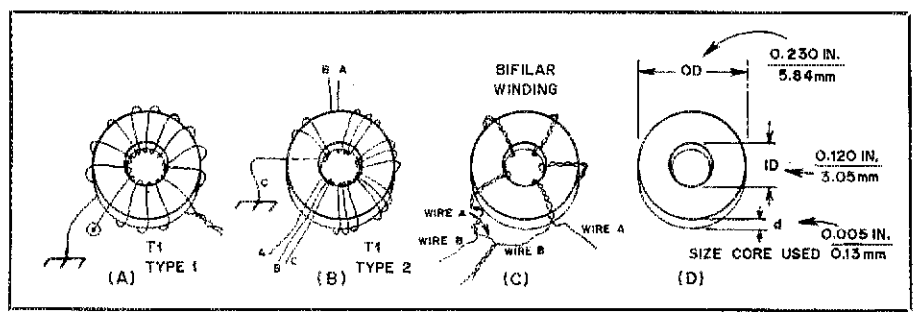


Fig. 4 — The pictorials show the manner in which the various cores are wound. At A, the singularly tapped winding of T1, type 1; at B, the trifilar-wound T1, type 2. T2 for both types is shown at C, while the core dimensions are at D.

where

$L_{\mu H}$ = inductance in microhenrys
μ = permeability of the material
N = number of turns
OD = outer diameter of core (cm)
ID = inner diameter of core (cm)
h = height of core (cm)

The calculated value of T1 for the type-1 circuit was 29.8 μH; the actual transformer measured 29 μH. The calculated value of T2 in the type 1 was 60.82 μH and the transformer measured approximately 60 μH. Both transformer inductances are very close to the computed values. Since the Q of the material used for the cores is very low at high frequencies, it is difficult to get a reading on a Q meter, and it is impossible to determine the inductance with a capacitor and a grid-dip meter for the same reason. Since the actual values are close to the computed values, it is not necessary to measure them.

The calculated low-frequency roll-off of the type-1 device was 270 kHz, which is very close to the quoted value of 300 kHz.

The type-2 device low-frequency roll-off was determined to be 68 kHz.

Construction

In order to obtain the widest bandwidth possible, you must use core material with a very high permeability. The cores used were Indiana General type H with a permeability of 850, and type 06 which has a permeability of 4700. From the results obtained, the latter is the better choice.[2,3] Amidon types 43, 72 or 75 ferrite cores should work equally well.[4]

The construction of T1 (type 1) is quite straightforward. It is wound with 10 turns of no. 30 enameled wire on a type-H core. An additional piece of wire is twisted onto one end and four additional turns added for a total of 14 turns; the tap is placed at the junction of the joined wires.

For the type-2 unit, three pieces of no. 30 enameled wire are twisted together to form a trifilar winding and five turns wound on a type-06 core. Then one leg is wound around two more times so that one wire has seven turns while the two remaining legs have five turns each. The windings are connected as shown in Figs. 2 and 4.

To achieve the best balance in T2, assuring the greatest port-to-port isolation, it is absolutely essential that a bifilar winding be used. Two pieces of no. 30 enameled wire approximately 15 inches (380 mm) long are wound tightly together with 5 or 6 turns per inch (1 turn every 4 or 5 mm). Ten turns of this twisted pair are wound around one type-H core for the type-1 device and six turns of a twisted pair are wound on two type-06 cores for a type-2 device. The windings are connected as shown in Fig. 4.[5]

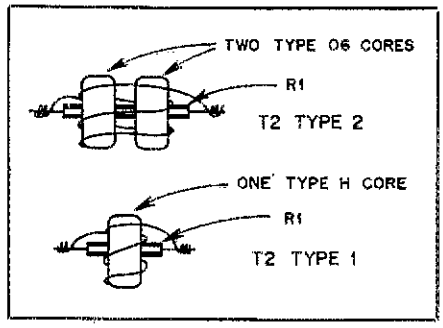


Fig. 5 — R1 is positioned in the center of the cores containing the bifilar winding. Wrapping the transformer leads around those of the resistor provides a convenient mounting for the assembly.

These units were constructed in small brass boxes with three BNC connectors, but the enclosures and connector types may be chosen to suit individual requirements.[6] Three of these units could be used for a 4:1 splitter and seven for an 8:1 splitter for use on a 4- or 8-element phased array.

Power Handling Capability

Since these units will only handle a few hundred milliwatts, they cannot be used with high-powered transmitters, but if such units are desired, they can be constructed using larger cores and larger wire sizes. The wattage rating of R1 would have to be increased; large carborundum resistors (as used in dummy loads) would be adequate for power levels of a few hundred watts to a kilowatt. R1 dissipates power only when there is an unbalance between the output ports. Otherwise, no power is being dissipated in it. If 1/8-watt resistors are used for R1, they may be positioned as shown in Fig. 5. Larger wattage resistors will probably have to be mounted outside the cores unless the cores used have a sufficiently larger inner diameter. QST

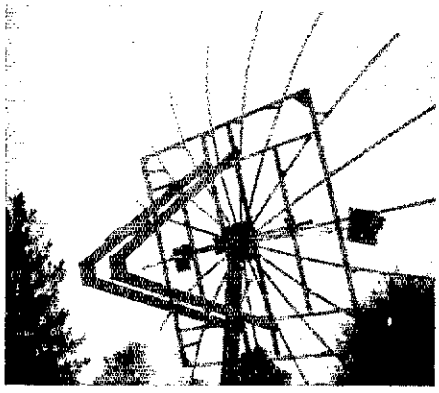
Notes

[1]DeMaw, "Toroidal Wound Inductors," *QST*, January 1968.
[2]Ruthroff, "Some Broadband Transformers," *Proceedings of the IRE*, August 1959.
[3]Indiana General Ferrite Products, Crows Mill Rd., Keasbey, NJ 08832. The Northeastern area distributor is Permag Northeast, 10 Fortune Dr., Billerica, MA 01865. A $10 minimum order is required. The toroids used by the author bear the part numbers F303-1-H and F303-1-06. They are listed in Indiana General catalog no. 209, p. 10.
[4]Amidon Associates, 12033 Otsego St., North Hollywood, CA 91607. No minimum order required.
[5]Turrin, "Broadband Balun Transformers," *QST*, August 1964.
[6][Editor's Note: Double-sided pc board is an economical, readily available material for enclosure construction.]
[7]Core dimensions will vary somewhat from unit to unit as shown in Table 4-16 on p. 47 of the *ARRL Electronics Data Book*. For precise inductance calculations, the coils should be carefully measured.

Strays

FIRST WAS FOR 70 CM

☐ Over 10 years of effort was required for Mike Vestal, WØYZS, of Kansas City, MO, to complete the first-ever WAS on 70 cm. On July 16 Mike completed an EME QSO with Wyoming for his elusive 50th state. Just a few weeks earlier he had contacted Delaware and Vermont for numbers 48 and 49. Since 70-cm stations are still few in number, especially in the less populated states, this is indeed a great technical accomplishment for Mike and his moonbounce partner, Tom Bishop, KØTLM.



The 24-foot dish that WØYZS and KØTLM built for moonbounce provided Mike Vestal with his 50th state for WAS on 70 cm. *(WØYZS photo)*

TELL AMSAT ABOUT PHASE III OPERATIONS

☐ Operational planning for AMSAT-OSCAR Phase III-A has been underway for several months now. User needs, desires and suggestions on several special-service channels, to be located at the edges of the passband, are needed now. If you have any suggestions on how you would like to see Phase III operate after launch in 1980, now is the time to let your voice be heard. Comments should be sent to the attention of the appropriate SSC coordinator in care of AMSAT, Box 27, Washington, DC 20044. The channels and coordinators are:

L1: Scientific — Dom Mallozzi, N1DM (serious research into phenomena and techniques).

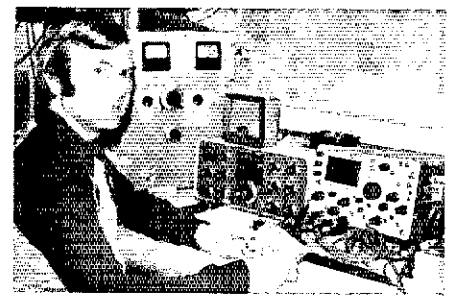
L2: Data — Vern Riportella, WA2LQQ (computer networking, digital data exchange).

L3: NTS — Bob Halprin, K1XA (scheduled, formal, cw traffic handling).

H1: Cw practice — Chris Schenck, W1EH (cw practice and cw/RTTY bulletins).

H2: Education — Steve Place, WB1EYI (OSCAR Education Program, Amateur Radio education, special mode and technique education).

H3: General bulletin — Pat Gowen, G3IOR (general information, one-way, multi-language phone bulletins and satellite-orientation information). — *Steve Place, WB1EYI*



Special *QST* congratulations to Connie Marshall, K5CM, who was awarded a special "combination WAS" in recognition of his fine work. He holds WAS number 12,311, WAS 50 MHz no. 140, WAS 2 meters no. 2, 5BWAS no. 542 and WAS on 160 meters.

Product Review

Conducted By Doug DeMaw,* W1FB

Heath VF-2031 2-Meter Hand-Held FM Transceiver

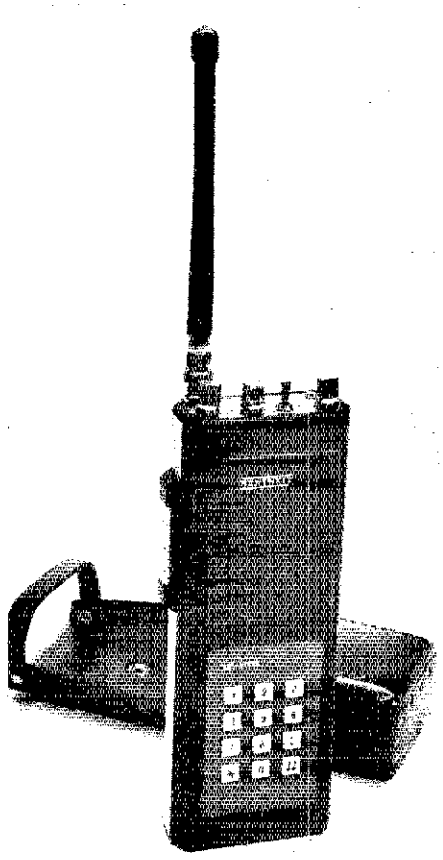
If 2-meter fm is of interest to you, and you've had thoughts about buying a hand-held transceiver for this mode, the new VF-2031 from Heath could be a likely candidate. This unit comes in kit form and can be assembled in one or two weekends, depending upon the builder's experience. Because of the miniature parts involved and the density of the components on the board, this kit should be considered only by those with prior building/soldering experience. It is not a difficult kit to build, but it takes a steady hand, good eyes and a little care to complete. The result is a durable rig that can be easily serviced by the owner — something that cannot be said for some of the hand-held transceivers currently being sold.

One thing you'll notice right away is that the VF-2031 *isn't* a synthesized rig . . . nor does it have a kind of price tag attached to those fancy boxes. Instead, Heath comes close to offering "any channel" operation by providing the VF-2031 with *eight* crystal-controlled channels — not the usual four or six. Add to this the fact that you only need *one* crystal (not two) to utilize a given repeater and the VF-2031 starts to look like a bargain.

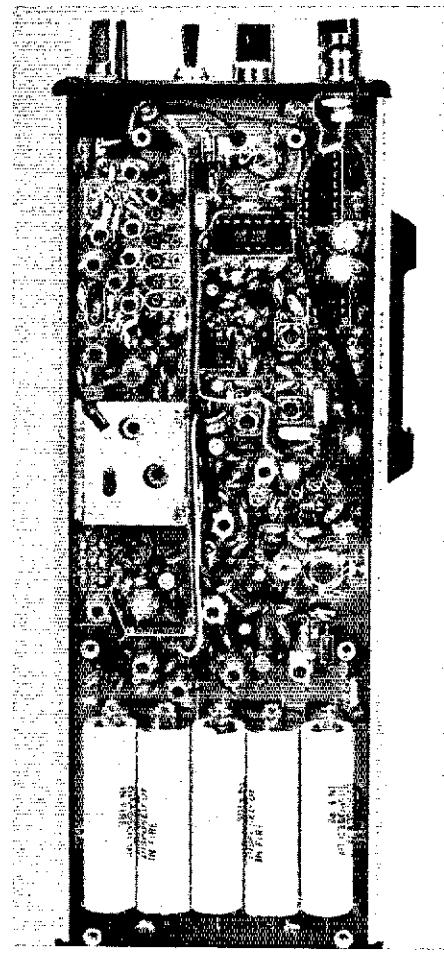
Why only one crystal? Well, the VF-2031 contains transmit-offset crystals (± 600 kHz) that are selectable by means of a three-position switch (the middle position is zero offset, or simplex) located on the top of the rig. Thus, a 146.94-MHz rock could give you 146.34 TX /146.94 RX, 146.94 simplex, and 147.54 TX /146.94 RX. (Don't ask me why *anyone* would want the last combination!)

As with most Heathkit products, the VF-2031 comes with an excellent manual. A two-page errata sheet was enclosed with the review unit, and I had to spend a few minutes transcribing this information into the assembly instructions provided in the manual. The next big chore was the sorting and arranging of parts in preparation for starting assembly. Muffin pans work well as temporary parts bins, and I usually trim off the "ears" of the packing box and use the holes in the corrugated cardboard to pigeonhole parts with long leads. A thorough job of pre-sorting and arranging the parts will pay off during construction, as parts will be easy to spot.

Construction of the kit was without a hitch. Alignment seemed to be going pretty well until I got to one of the i-f amplifier stages. Here, it seemed like one of the adjustments didn't make much difference. Additionally, the receiver exhibited extremely poor sensitivity. With a quick circuit trace, I found that one of the molded rf chokes was actually closer to being a 10-MΩ resistor! I removed the open choke, popped in a replacement and bingo! The receiver came alive and alignment was completed without further complications. That'll teach me to check all resistors *and chokes* with an ohmmeter before soldering them onto the pc board!



The Heath VF-2031 hand-held transceiver shown with Touch-Tone encoder option, rubber-duckie antenna and optional leather case. Controls on the top are (left to right) volume, squelch, transmit offset, and channel selector. The earphone jack is directly behind the channel-selector switch. Microphone and tone-burst accessories are available for the VF-2031. Holes are provided in the case top, making installation a simple job. The holes are hidden by the top-panel label sticker, which is replaced with a new one when either of these options is installed.



Inside the VF-2031 transceiver. Component density is not so great as to preclude user repair. Half of the NiCad batteries are attached to this side of the pc board, while the other five are soldered to the reverse side. The pc board is solder masked, plated, and screened with part numbers and other assembly information. This makes the kit easy for the experienced builder to assemble. Assembly time for this reviewer was about 25 hours.

The review sample was provided with the optional Touch-Tone encoder board. This was completed and installed without any problems. The VF-2031 comes with NiCad batteries and charger. The charger only took a few minutes to put together, and no problems were encountered.

Operation of the Heath "hand-held" is quite simple. The push-to-talk actuator is a microswitch type, not the multipin, slide-switch/spring combination that was used in many of the older hand-held rigs. The squelch is sharp, not mushy, and can be set quite accurately so that a signal will trip the squelch, but short noise pulses won't. The offset switch takes a little getting used to . . . especially if you've used other crystal-controlled hand-held transceivers. A quick switch from the local repeater to '52-simplex will have you transmitting on 145.92 MHz (or 147.12) if you don't remember to flip the offset switch back to the center position.

The VF-2031 has *lots* of audio, both on receive and transmit. The receiver audio can be cranked up so loud that everyone in a small auditorium can hear it clearly! I guess the engineers at Heath decided that the transmitter audio gain should be equal to that of the receiver, because the mic gain is higher than you would expect. In fact, with a regular

*Senior Technical Editor, ARRL

Heath VF-2031 2-Meter FM Hand-Held Transceiver

Claimed specifications	*Measured in ARRL lab*
Receiver sensitivity: 0.5 μV for 20 dB of quieting.	0.2 μV; 20 dB.
Audio output: 1 watt at 10 percent THD.	
Frequency stability: 0.005 percent or better.	
Adjacent-channel selectivity: 40 dB or greater.	
Receiver i-f: 10.7 MHz.	
Usable bandwidth: ± 7 kHz.	
Power output: 2 watts or more at 12.5 V dc.	2 watts at 12.5 V dc.
Deviation: 5 kHz or less; adjustable.	
Spurious output: −50 dB or better (at 2 watts output).	See photo.

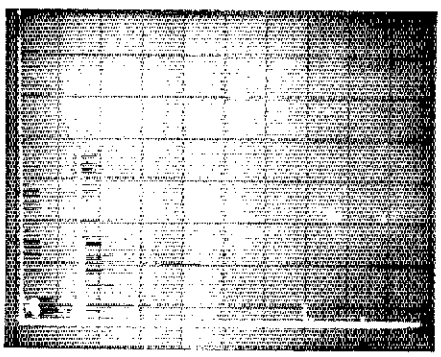
Transmitter offsets: ±600 kHz or simplex with supplied crystals.
Frequency coverage: 143.5 to 148.5 MHz (alignment good for ±1 MHz).
Operating voltage: 12.5 V dc nominal.
Channel positions available: Eight.
Antenna impedance: 50 Ω.
Speaker impedance: 8 Ω.
Dimensions (HWD): 9-1/8 × 3-5/16 × 1-7/8 inches (232 × 84 × 48 mm).
Weight: 2 lbs (907 g) VF-2031 transceiver with batteries.
Price class: VF-2031 transceiver with charger batteries, rubber-duckie antenna and one crystal (146.94 MHz) $190; auto-patch encoder option, $35; leather holster case, $18; crystal certificates, $7 each; external mic kit, $30; continuous tone encoder option, $35.

speaking voice you need to hold the hand-held at almost an arm's length to keep from overdeviating the transmitter. I cured this the way that took the least effort: I taught myself to speak *very softly* into the VF-2031 mic with the unit held above five inches away from my mouth.

The rubber-duckie antenna that Heath includes with the VF-2031 is a heavy-duty job. It's not likely to get bent up like some of the more fragile-looking ones. And they used a BNC-type antenna connector. Hurray for Heath! There are few things that turn a vhfer's stomach like seeing a phone-jack antenna connector on a 2-meter rig. The BNC is much nicer!

While I'm on the subject of antennas, I'll mention an interesting thing that happened when I decided to use a quarter-wave whip on the VF-2031. The whole thing started when I realized that perhaps it'd be worth trying a quarter-wave antenna if it would give me a better signal into some of the repeaters in the Greater Hartford area. I converted a length of brass rod and a BNC connector into a quarter-wavelength whip. I installed the new antenna on the VF-2031.

Immediately I was able to note an improvement in reception. However, I found that the rig seemed not to be transmitting. A quick switch back to the rubber duck caused the transmitter to work properly. "Strange," I thought. A transmitter that doesn't like quarter-wave whips? The problem apparently was that the whip presented a better-matched load to the transmitter than did the rubber-duckie antenna, and thus caused the transmitter to put out (or *try* to) more power. Since the batteries were somewhat low, the added current drain was enough to cause the voltage to drop below the critical point for some portion of the circuit. Thus, the transmitter wouldn't work. With a fresh charge on the batteries, the rig works fine with either antenna, and as expected the whip *does* outperform the rubber-duckie antenna.



ARRL lab spectral photograph of the output of the Heath VF-2031 transceiver. This photo was taken with the rig operating at 1.5 watts output on 146.52 MHz. Vertical divisions are each 10 dB; horizontal divisions are each 100 MHz. The fundamental frequency has been attenuated approximately 32 dB by means of a two-cavity notch filter to prevent overload distortion in the analyzer. The most significant spurious signal, about 10 MHz above the fundamental, is down approximately 55 dB with respect to the unnotched fundamental. All other spurious signals are −62 dB or lower. The VF-2031 complies with current FCC specifications regarding spectal purity.

Final Comments

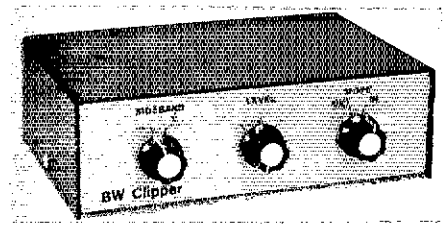
Overall, my impression of the VF-2031 is favorable. Crystals were obtained through the use of crystal certificates available from Heath. After the certificates were filled out, they were mailed to CTS Knights, who then supplied crystals by return mail. I was impressed with the fast service provided by CTS: It took only a week to receive the crystals! — *Jim Bartlett, K1TX*

BW RF CLIPPER

Strange. Asking a confirmed cw operator to do a product review on an rf speech clipper. But, if cream can be converted to butter, then it's possible that a cw enthusiast of the first magnitude could be persuaded to speak into a microphone. This is what happened, and the experience wasn't unpleasant in the least. In fact, it was enjoyable!*

At present, there are two models of the BW Clipper (made by BW Communications, Posen, IL) available: one for the Drake T4X transmitter and the other for the Drake TR4 transceiver. The latter was installed in the reviewer's TR4CW. The BW Clipper is housed in a matching gray cabinet with a black cover and is a very compact unit.

*[We had to get this reviewer on ssb *some* way, and besides — he is the only Hq. staff member who owns a TR4. — Ed.]



The BW Clipper: A more potent phone signal is just a knob twist away for the deserving DXer.

The BW clipper is said to be a "true rf clipper" because it is installed in the transceiver i-f and processes the signal at the transmitter i-f. The dsb signal from the transmitter i-f amplifier (following the balanced modulator) is fed to the BW clipper via coaxial cable from the plate transformer of the i-f amplifier. In the clipper, this dsb signal is filtered through an ssb crystal filter, identical to the one in the transceiver, to remove the undesired sideband and further attenuate the carrier, thus yielding a clean ssb signal. This signal is amplified, symmetrically hard clipped in a differential clipper, and emitter-follower matched to the ssb filter in the TR4. Here the clipper signal is again filtered and fed to the rest of the transmitting circuits. The amount of clipping is adjusted by the setting of the transceiver gain control. The clipper level control, when set per instructions, prevents overdrive.

Initial installation, which involves three coaxial cable connections inside the rig, took about 40 minutes. In the case of the TR4, a fourth connection is necessary, to the VOX-relay control circuit. Aye, there's the rub. An SB-200 amplifier is used in conjunction with the TR4CW, and as the amplifier has more than 50 V dc on the VOX-relay line, the BW Clipper instructions specifically state that an external relay is necessary. The clipper won't work without one. The manufacturer says that the present clipper will work fine with the L4 series and the SB-220 without any external relay, and that a new model will soon be available for use with the popular SB-200 with appropriate modifications.

Despite the inconvenience of having to play around with a relay and also having to throw a switch each time between the "barefoot" mode and full power, the clipper works like a champ.

BW Clipper

Claimed Specifications

Average power: Increase to 66 percent.
Installation: In i-f circuit of TR4 or T4X.
Circuit type: Rf processor.
Dimensions (HWD): 2 × 6 × 4 inches (51 × 152 × 102 mm).
Cabinet: Two-tone gray and black.
Power source: 12.6 V ac from Drake transmitter.
Price class: $195. for T4X, $200 for TR4.
Manufacturer: BW Communications Co. Inc., 2643 West 139th St., Posen, IL 60469.

On-the-air reports indicate no change in S meter readings with the clipper switched in, but the audio becomes much louder and has more punch, just the thing to attract attention in a pileup. The clipper increases the average power of the signal, so the ups and downs of normal modulation aren't as prevalent. The BW Clipper was also employed during a nonserious stint in the ARRL DX Competition, with satisfactory results.

The proof of the pudding, though, came on a more-or-less normal day on 10 meters, in attempting to work T2T on the island of Tuvalu (formerly VR8). Actually, working this station wasn't too hard; the difficulty was getting on the list taken by the W5. After several unsuccessful attempts, the clipper was cranked in and *boom*! This reviewer was on the list! Having that accomplished, it was a piece of cake to work T2T, who gave this operator a signal report that was an S unit stronger than any other W1 who worked him that afternoon. If one reflects on the daily scramble to work T2T, then the value of this product should be evident. — *Robert Halprin, K1XA*

VMOS POWER FETS BY SILICONIX

The power FET technology has moved ahead with giant strides in 1979. Siliconix Incorporated, the major U.S. pioneer in the power VMOS field, has released three new and significant power FET devices for use in the hf/vhf/uhf spectrum. The new part numbers are DV1006, DV1007 and DV1008.

All three transistors are rated for Class A, B or C service. Operating voltage is 28 and the gain of each is 10 dB at 175 MHz. Total device dissipation at a case temperature of 25°C for the DV1006, DV1007 and DV1008, respectively, is 40 W, 80 W and 160 W.

The salient features of VMOS power FETs, which set them apart from power bipolar transistors, are no thermal runaway, immunity to damage from infinite VSWR, high dynamic range and low noise figure. The small-signal noise figures for the three (at 100 MHz) range from 5 to 7.5 dB, with the higher numbers applying to the higher power units.

These new power FETs are contained in stripline packages (380 SOE and 500 JO). They are suitable for use in broadband or narrowband applications. For example, the DV1007 is rated at 50 watts output in narrow-band service and 40 watts output for use in a broadband amplifier.

Although the unit price is a trifle steep for amateurs, the application may in many instances justify the cost. In quantities of 1-29 the DV1006 sells for $25.50. The DV1007 markets for $45.90 and the DV1008 costs $91.80. No doubt the price will decline as the demand rises and production increases. Remember the days when we paid up to $150 for simple four-function electronic calculators? Then there was the early day CK722 transistor which sold for roughly $13 a copy at the beginning!

Data sheets for these and other Siliconix VMOS transistors can be obtained from Siliconix Incorporated, 2201 Laurelwood Rd., Santa Clara, CA 95054. Phone: 408-988-8000. — *Doug DeMaw, W1FB*

TRW 4-BIT A/D CONVERTER CHIP

Looking for a relatively low-cost, video-speed, 4-bit analog-to-digital LSI converter chip? If so, TRW may have just the device to handle that special design job you've been considering between band openings! They have just released the TDC-1021J, which at the time of this report was touted as the industry's only monolithic 4-bit A/D converter chip which is available "off the shelf."

This new IC converter can digitize an analog signal at rates from dc to 30 megasamples per second without requiring an external sample-and-hold circuit. This IC is TTL-compatible and contains 1000 closely matched bipolar devices. Just envision a similar circuit which utilizes 1000 discrete transistors; The value of our LSI technology becomes rather noteworthy.

The TDC-1021J is suitable for a vast number of tasks in which high speed, small size and moderate cost are important, but where high resolution is not. Such applications might be video data conversion, high-speed multiplexed data acquisition, image processing and facsimile systems.

A single "convert" signal controls the basic operation. The circuit consists of 15 sampling comparators, combining logic, and an output buffer register. The IC also offers binary or two's-complement output.

The power sources are needed for the TDC-1021J: +5.0 and −6.0 volts. Power dissipation is 250 mW. The operating temperature range is specified as −60 to +150°C. The package is a 16-pin ceramic DIP type with dimensions of 0.3 × 0.8 × 0.17 inch (7.6 × 20.3 × 4.3 mm). Linearity is rated at ± 1/8 LSB and aperture jitter is 30 psec.

The price class for this component is $29. Further information can be obtained from TRW LSI Products, P. O. Box 1125, Redondo Beach, CA 90278. Phone: 213-535-1831. — *Doug DeMaw, W1FB*

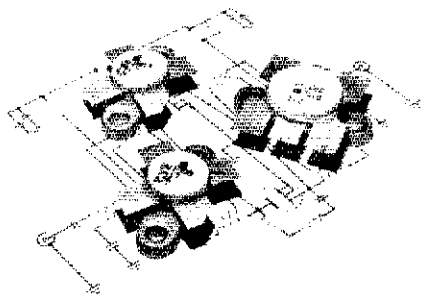
K5SMG CODE PRACTICE TAPES

Years ago, learning the code was a rather simple affair. Since there were no licensing requirements, on-the-air practice was quite common. Most operators simply tacked a chart to the wall of their shacks and started operating, ready or not! Today, the process is not as simple. A beginner must choose from a bewildering array of media and techniques. He can copy a friend's code-practice oscillator or a mechanical code generator using at least three varieties of paper tape. Records and tapes are also popular, not to mention W1AW code-practice transmissions. Unfortunately, there is no one preferred method for mastery of the language known as the Continental code. Like most skills, practice is the essential ingredient.

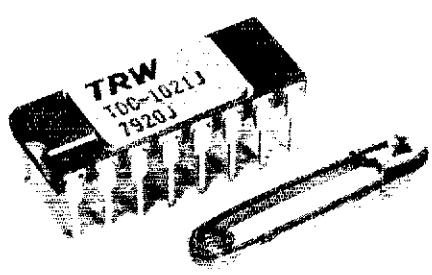
That is not to say that each of these various media don't have a place. If most of the letters are known and one has a good communications receiver, copying W1AW or even bits and snatches of chatter on the cw bands has the merit of providing continually fresh copy. But if a receiver is not available, cassettes can often be used with good results. The latest addition to the field is by K5SMG. The purist can copy randomly selected code groups from 7.5 to 25 wpm. There is also another method which has been used at W1AW for a number of years. Since most beginners have a tendency to copy characters in terms of dots and dashes rather than sound groups, it is often helpful to send each letter at around 20 wpm while increasing the spacing in order to bring the speed down to a manageable level. This is an excellent way of avoiding the "hump" which sometimes makes 13 wpm a seemingly impossible goal. Mr. Tarvin calls this HI/LO code and has a variety of cassettes from 2.5 to 13 wpm with either 22.5 or 15 wpm character speeds.

An argument could be made that such random-group code practice is much better than straight text because it is impossible to memorize the tapes or anticipate what will come next. Yet the examinee must not only copy what he or she hears, but must also answer multiple-choice questions based on sample QSOs, much like what will be encountered on the air. This reviewer found the series of QSO cassettes quite intriguing. Not only is it possible to check your copy against the printed text included with the tapes, one can also make up his or her own questions in order to get a "feel" for the FCC exams. Such a practice is especially valuable for the General, Advanced or Extra candidate. He can choose between cassettes at 15 or 22.5 wpm. Additional practice is available from two plain text cassettes at speeds from 15 to 50 wpm.

All the cassettes are 90 minutes in length and have been found to be of excellent quality. A free catalogue is available from John Tarvin, K5SMG, 810 Cardigan St., Garland, TX 75040. Each cassette costs approximately $6. — *Chris Schenck, W1EH*

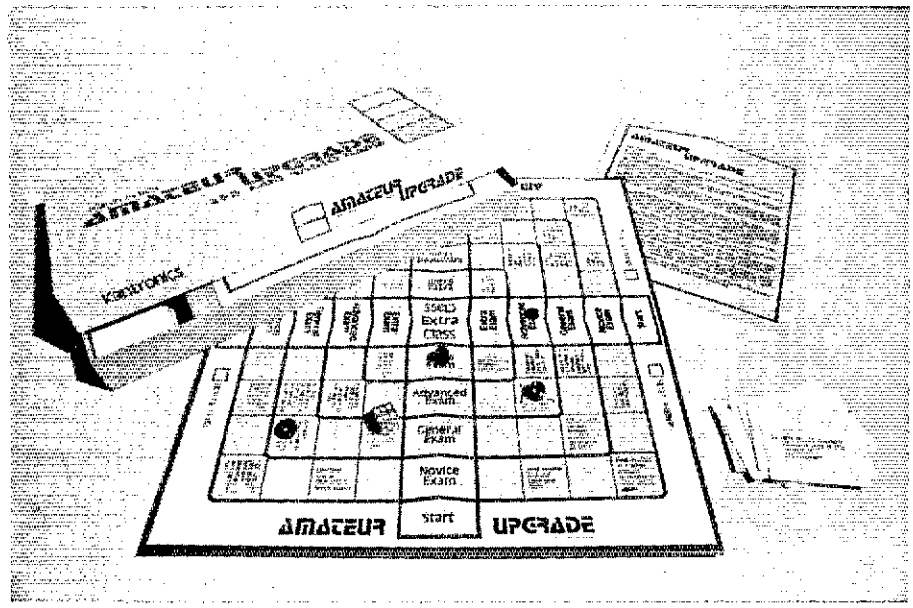


Photographic view of the three new VMOS power FETs. Each is built in a stripline package to enhance operation at vhf and uhf.



Photograph of the new TDC-1021J IC showing the package style and a size comparison with a safety pin.

New Books



Amateur Upgrade by Kantronics, 1202 East 23rd St., Lawrence, KS 66044. Educational board game. Price $9.95.

Who said learning can't be fun? That's the approach of this entry into the field of Amateur Radio training materials. *Amateur Upgrade* is a game that is played on a 15.4-inch (391-mm) square board with up to four players. Each player rolls a die to determine the number of spaces moved. When a player lands on one of 12 "exam" squares, an exam card is taken (as in "Community Chest" for *Monopoly*). After the player collects three such cards, he or she "takes" the exam. Each player begins on a Novice level and moves to successively higher levels upon passing an exam. The winner is the first person to pass the Extra Class exam.

Exam cards and answers are provided for each license class. The game can be made easier or harder by using only one or two categories of exam cards (example: use only Novice cards at all levels). The different grades of cards are color coded to match the level tracks on the board. One of the nicest features of the game is that blank cards are provided on which additional questions may be written. This is especially useful if the game is being used as an educational aid to upgrading.

This reviewer tried the game with a small Novice class (eight students) and the reaction was enthusiastic! Several students borrowed the game to use outside of class time. *Amateur Upgrade* is a fun way of reviewing Novice to General level material. However, the Advanced and Extra grade questions are not in sufficient number of depth to provide a comprehensive review for students of that level. Of course, all serious study aside, if you enjoy board games, *Amateur Upgrade* would be a lively addition to your collection. — *Jeanette M. S. Zaimes, AB1P*

☐ *The Shortwave Propagation Handbook*, by G. Jacobs and T. Cohen, Cowan Publishing Corporation, Port Washington, NY, 1979. 155 pages, illustrated. Price: $7.50.

Authors Jacobs and Cohen present in *The Shortwave Propagation Handbook* what they consider to be the more important contributions on high-frequency radio propagation published by *CQ Magazine* during the past 15 years. More than a simple collection of reprints, however, the book has been updated to reflect the availability of new material at the time of publication.

Chapter 1 is a primer on ionospheric propagation and introduces the reader to subjects such as ionization, formation of the ionosphere, ionospheric layers, variations of the ionosphere, path analysis, ionospheric disturbances and radio storms. This chapter provides the reader with the background and knowledge needed to understand the vagaries of the ionosphere.

The next two chapters deal with the sunspot cycle, a subject near and dear to all amateurs. Chapter 2 presents a history of sunspot observations and a detailed review of Cycles 19 and 20. Furthermore, the authors have included a complete listing of the 12-month running smoothed sunspot numbers since 1749 (which the authors believe is the first publication of these data in the popular literature).

If you prefer studying the sunspot cycle predictions prepared by the "experts," chapter 3 fills the bill. Up-to-date material in this chapter covers the prediction method developed by Sargent in 1978.

Chapter 4 covers do-it-yourself propagation predictions and master propagation charts. Included are charts which can be used to predict conditions from the U.S. and Canada to any place on the earth, given the frequency, time of day, season of year, and smoothed sunspot number.

While chapter 4 allows the reader to predict the more-or-less normal long-term variations of the ionosphere, these variations do not explain why reception on a particular path may be good one day, fair another, and sometimes not possible at all. Chapter 5 permits the reader to "fine-tune" his predictions and forecast day-to-day conditions for up to 27 days in advance, utilizing WWV broadcasts of solar and geomagnetic activity at 18 minutes past the hour.

Finally, just to show how perverse Mother Nature can be, chapter 6 is devoted entirely to unusual ionospheric propagation phenomena: sporadic-E, auroral and meteor ionization, transequatorial and ionospheric scatter, gray line, crooked path, and long-path propagation.

The material in *The Shortwave Propagation Handbook* is well presented, aimed neither too high for the beginner nor too low for the experienced amateur. The book is abundantly illustrated with pictures and diagrams, and equations are few and far between. As with many first editions, there is a sprinkling of minor typographical errors which in no way detract from the usefulness of the book. There is no index, but the three-page table of contents is quite detailed and should be more than adequate for most purposes.

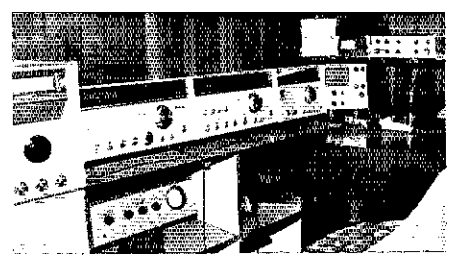
This reviewer concludes that *The Shortwave Propagation Handbook* would be a useful addition to the library of any radio amateur or SWLer wishing to learn about or increase his knowledge and understanding of shortwave radio propagation. — *Hal Steinman, K1FHN*

Strays

FIRST-CLASS HOMEMADE GEAR

☐ The accompanying photograph shows clearly that not everyone in Amateur Radio buys factory-made or kit equipment. This homemade station lineup was designed and built by Eric Kirchner, VE3CTP, of Agincourt, ON. It is as attractive (or more so) than some commercial ham equipment. Included in this lineup are a linear amplifier (far left), 400-watt transmitter, receiver, receiver accessory unit, commercial scope used for spectral display with the receiver and a homemade paddle. Below the transmitter is an RTTY control unit which includes an ASCII-Baudot converter. A homemade version of the Robot 400 SSTV system is visible at the upper right in the picture.

QST congratulates VE3CTP for rising to the occasion and proving that home construction of amateur gear is by no means a lost art. Now, if only we can talk him into writing up some of this apparatus for publication in *QST*! — *Doug DeMaw, W1FB*



Just about everything in this photograph was designed and built by an Ontario ham. Who says a homebrew station has to look like a homebrew station?

Hints and Kinks

Conducted By Stuart Leland,* W1JEC

A TWO-ELEMENT 144-MHZ ANTENNA

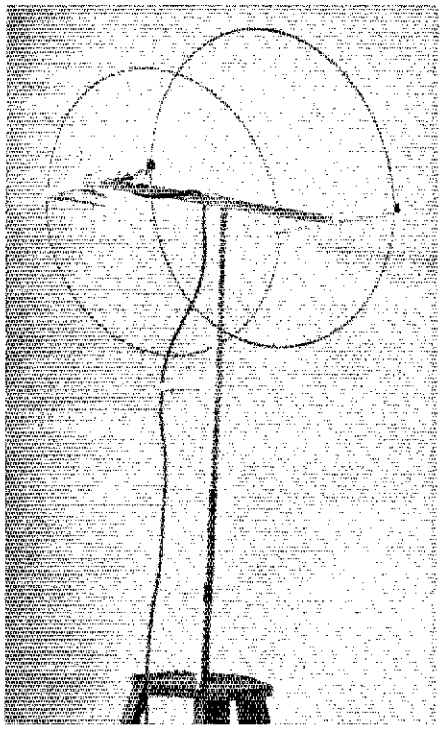
The two-element circular variation of the cubical-quad antenna for 144 MHz, shown in the accompanying photo and drawing, is well suited for an indoor antenna. It can be used for either vertical or horizontal polarization, gives a substantial amount of gain, yet it requires small space. Change of polarization is easy because of the simple construction detailed in the drawing. With vertical polarization, the coaxial transmission line should be brought out horizontally to a point behind the reflector before being dropped vertically. This arrangement avoids induced currents that could occur on the outside of the transmission line. The movable short on the reflector stub can be adjusted for maximum front-to-back ratio. The point of this maximum ratio is close to the position required for maximum gain. Without any matching device in the 50-ohm transmission line, the SWR of the writer's antenna measured 1.3.

Materials for this antenna are commonly available at many hardware stores and building supply dealerships with the exception of the cable and connectors. The PVC pipe can be stiffened by insertion of 5/8-inch (16-mm) hardwood dowel. With vertical polarization, the top two feet of the mast should be nonmetallic.

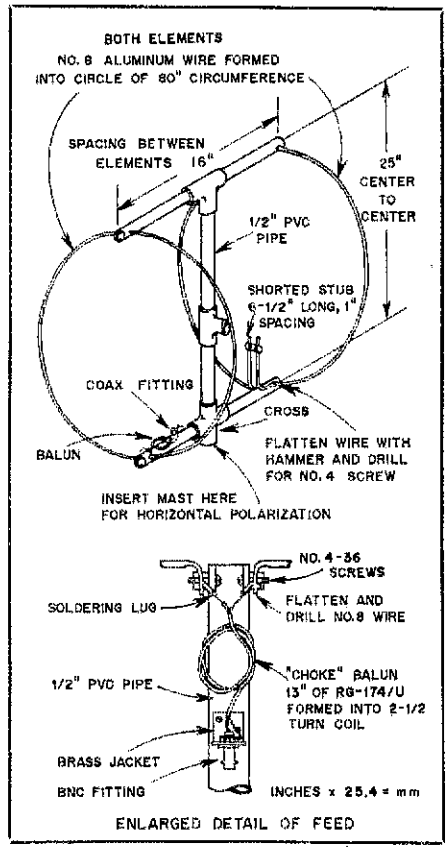
This antenna is not only simple to rotate, but also is easily moved about a house or attic. Often, just moving an indoor antenna a few feet can make a 20-dB difference in signal strength.

To determine the best location a steady carrier in the direction of interest will be required. This can be provided by a station across town or a mobile unit a few blocks away. — *Fred Brown, W6HPH, Lake San Marcos, CA*

*Assistant Technical Editor, *QST*



This 2-meter directional antenna can be constructed with PVC pipe and aluminum ground wire. The photo shows the "quad" vertically polarized. Note that the transmission line is supported behind the reflector.



Two circular elements are featured in this 144-MHz antenna which performs much like a cubical quad. W6HPH designed it primarily for indoor use. It can be vertically or horizontally polarized.

TVI FILTER RESONANCE

Attaching a TVI low-pass filter to a transmitter is not quite as simple as hanging a screen door. It may just happen that the transmitter output circuit will resonate with the first element of the filter at one of the operating frequencies. The chances are slim, perhaps, but it can occur.

It happened to my equipment. The first symptoms that I noticed were changes in operating characteristics because of abnormal heating of the transistors in my solid-state broadband final amplifier. With the filter and a dummy load attached, both the SWR at the input of the amplifier and the dc supply current to the amplifier would climb during steady keydown. The symptoms were absent with the filter removed. Exploration with a dip meter revealed a resonance at the operating frequency (on 15 meters) at the input end of the filter *only* when it was connected to the amplifier.

My cure was to remove one of the four turns from the secondary of the output transformer of the amplifier, but substitution of a filter of a different design or cutoff frequency probably would have sufficed. — *Phil Emerson, WD8IZA, Cleveland Heights, OH*

ELIMINATING RFI IN ELECTRONIC CHIMES

The hostile electromagnetic spectrum has yet another victim, the Heath TD-1089 programmable electronic chimes. The VF amplifier is the major culprit, responding even to passing mobiles! This problem, caused by input junction rectification, is readily cured by placing a 100- to 1000-pF capacitance across pins 2 and 3 of R28 (volume).

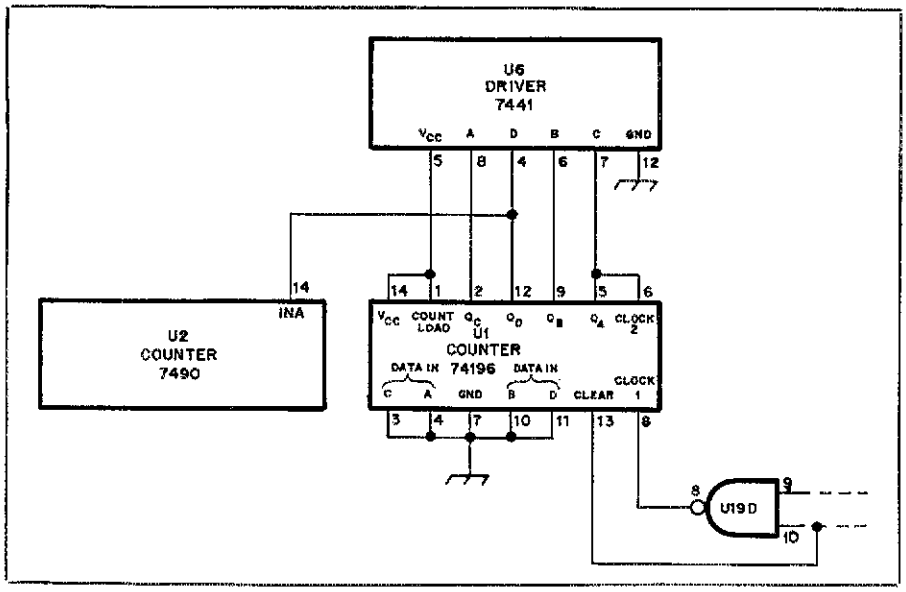
Because of the low fidelity of this unit, insertion of the high-frequency cutoff has little aural effect on the chimes. The last vestiges of Morse-keyed transmitter interference are removed by the application of 0.01-μF disc capacitors from the Vcc to Vee right at the cases of all integrated circuits (IC1 through IC5) and low-pass networks to the front and rear door-button circuits and the 16-V ac line. The 100-μH inductors respectively replace the orange, green and blue wires which are found at points A, B and D. From each of these points, to complete the filter, a 0.01-μF capacitor is connected to ground. Grounding of common terminal G may actually enhance RFI even when the isolation point of the unit is assured as above. — *J. Grigg, W9BK, Chicago, IL*

THIRTY-DOLLAR COUNTER MODIFICATION

Ralph Anderson's "Thirty-Dollar Counter," described in January 1974 *QST* (page 40), was a popular project but was a questionable performer above 20 MHz (being limited by the ability of U1, a divide by 2 or 5 counter [7490] to accept high-frequency count pulses). This can be remedied by replacing U1 with a 74196 which extends the frequency limit of the counter up to 60 MHz in most cases. The pinout is different and the reset pulse polarity is opposite. To accommodate the 74196, these changes for U1 are necessary before the new IC can be plugged in and expected to work. Remove the following jumpers:

Pin 1 to pin 12.

Pin 6 to pin 10.



KØWOP suggests the use of this modification of the "Thirty-Dollar Counter" (January 1974 *QST*) to extend the upper limit to 60 MHz.

Pin 6 to pin 7.
Pin 2 to pin 3.
Pin 5 to V_{cc} (+5 V).
Pin 8 to pin 7 on U6.
Pin 11 to point "b."
Pin 12 to pin 3 on U6.

Install jumpers or solder bridges as follows:
U19 pin 8 to U1 pin 8.
U1 pin 12 to U2 pin 14.
U6 pin 4 to point "b."
U1 pin 1 to U1 pin 14 and U6 pin 5.
U1 pin 2 to U6 pin 3.
U1 pins 3, 4, 10 and 11 to pin 7 (ground).
U1 pin 5 to U6 pin 7.
U1 pin 6 to U1 pin 5.
U1 pin 13 to U19 pin 10.

Incidentally, the logic diagram on page 41 of *QST* for January 1974 shows the top row of pins on U1 through U5 as 5, 8, 9, 11, 12 and 14. They should have been shown as 5, 12, 11, 9, 8 and 14. I mention this for the benefit of those who may refer to the article for the first time.

I have shared this circuit change with Bob Shriner, WAØUZO, who makes the boards. He expressed great interest. WØICR has informed me that the upper limit of the counter could be extended without any circuit changes by substituting a 74LS90 in place of the 7490. In such a case you pull out one IC and plug in the other. Where this modification is performed the new upper frequency limit would also be approximately 60 MHz. — *David W. Richardson, KØWOP, Northglenn, CO*

RECEIVER CRYSTAL TUNING FOR THE KENWOOD TR-2200A 2-METER TRANSCEIVER

The Kenwood TR-2200A transceiver, used by amateurs all over the world, is one of the best known radios on the 2-meter band. Because the set lacks tuning capacitors for the receiver crystals, tuning the receiver right on frequency seems impossible, even when using expensive 0.00025-percent tolerance crystals.

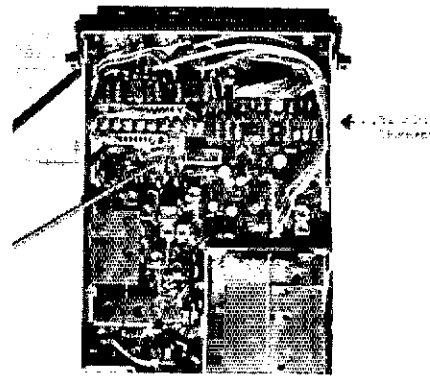
All these crystals work in the parallel resonance mode in which the crystal looks inductive to the circuit. Any change in the circuit reactance effects the frequency of the crystal. That means, if for any reason the circuit reactance changes slightly or the crystal drifts, the receiver will be off frequency.

For an expenditure of less than the price of an inexpensive crystal, I've made this modification to resolve the problem. After 20 months of operation, following the change, only a minor frequency correction was necessary. In addition, the sensitivity improved from 0.5 to 0.3 microvolt with 20-dB quieting.

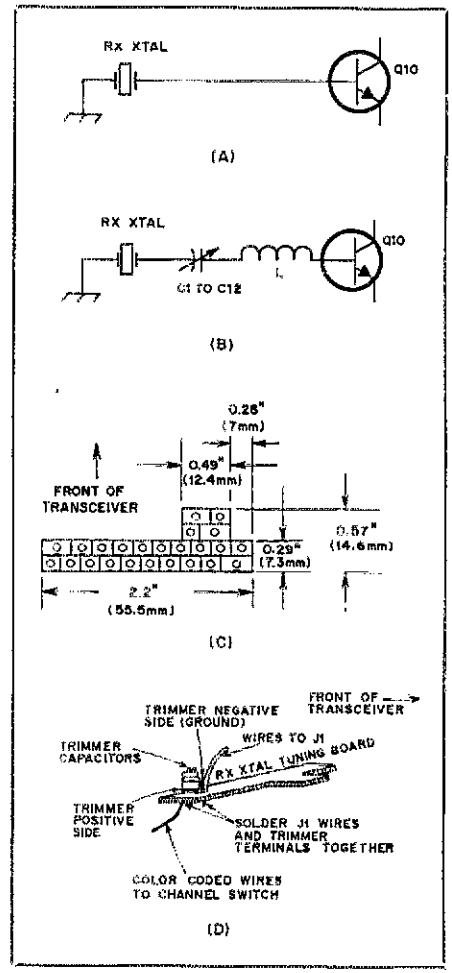
Basically, the modification consists of installing a separate trimmer capacitor in series with each receiver crystal and a choke between the channel switch and base of the oscillator transistor. (See drawing.) A sort of watchmaker's skill is needed to perform the job properly.

Removal of the receiver module to perform the modification is not necessary. Begin by cutting in half the jumper wire C-49 on the receiver module. This jumper, at the right of the Murata ceramic filter, interconnects pin 1 of J4 (the connector) to the base of the oscillator transistor Q10. Using the cut jumper ends as solder terminals, install a 0.68-μH inductor. Place the 12 trimmers, indicated in the parts list, on the new receiver crystal tuning circuit board with the negative (ground) side facing the receiver crystal bank. Solder only the positive side terminals.

Disconnect J1. Note the order of the 12 colored wires connected to it. Work carefully with a pin through the rectangular windows on the side of J1 to release the contact retaining tabs. Remove the contacts one by one, pulling each wire slowly up from the plastic connector body. Extract the colored wires from the contacts, replacing them with 2-inch (51-mm) lengths of no. 26 insulated copper wire. Improper handling of these delicate contacts may destroy them. Reinstall the contacts on J1 with the retaining tabs facing the rectangular windows on the side of the connector body.



CE3AB modified this Kenwood TR-2200A to provide improved tuning of the receiver section. A pointer stick indicates the location of L, the 0.68-μH inductor. Other details are shown in the drawing.



Electromechanical information for modifying the Kenwood 2200A transceiver. A simplified diagram of the original oscillator is shown at A. The modified oscillator is illustrated at B. The receiver crystal tuning board arrangement is depicted at C in a 1:1 scale drawing. Holes are 0.46-inch (1.2-mm) dia, 0.21 inch (5 mm) apart. The board is made of 0.05-inch (1.3-mm) thick G10 fiberglass. Detailed at D is the method of mounting the trimmer capacitors. Twelve ceramic trimmer capacitors, 5 to 25 pF, Erie type 518-000A-5-25 or equivalent are required. A single 0.68-μH miniature molded rf choke (Gowanda 8/680 or equivalent and 3-1/4 feet (1 meter) of no. 26 stranded Teflon insulated wire are also needed.

Next, adjust the length of the no. 26 wires from J1 to reach the unsoldered trimmers (negative side) on the receiver crystal tuning circuit board. Remove the insulation at the ends of the leads and feed the bare wire into the unsoldered circuit-board holes together with the capacitor negative terminals. Using a thin-tipped soldering iron, solder the wires to the circuit board.

Now, remove the insulation from the ends of the colored wires from the channel selector switch (formerly connected to J1). Solder the ends to the proper positive trimmer contact on the bottom of the receiver crystal-tuning circuit board. Connect colored wire no. 1 to the positive trimmer terminal no. 1 and, in order, connect the remaining wires to the respective terminals. Reinstall J1. Carefully maneuver the receiver crystal-tuning board between J1 and J4.

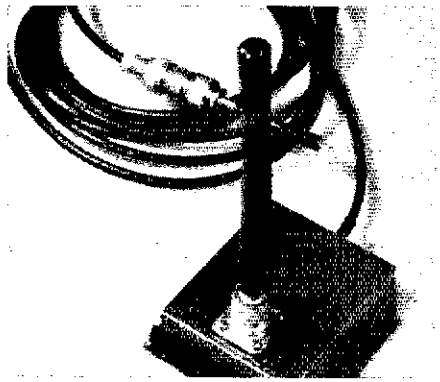
After completing the modification, tune each crystal trimmer following this procedure. Connect a frequency counter (capable of measuring at least 150 MHz) between test points TP and E on the receiver module. Turn on the transceiver. Read the frequency. This should be the selected channel frequency minus 10.7 MHz. To correct any discrepancy, tune the proper trimmer until the counter indicates the right frequency. The tuning range, thus obtained, is ± 4.5 kHz. If a counter is not available, a voltmeter with a zero center can be connected between pins 4 and 9 of the AUX terminal provided in the TR-2200A. While receiving a signal of well-known accuracy, adjust the proper trimmer until the meter indicates zero.

Laboratory tests performed before and after the modification on two TR-2200As show a slight voltage reduction across the crystals after the change. The series reactance introduced into the circuit caused a current reduction through the crystals. — *Manuel Urrutia, CE3AB, Santiago, Chile*

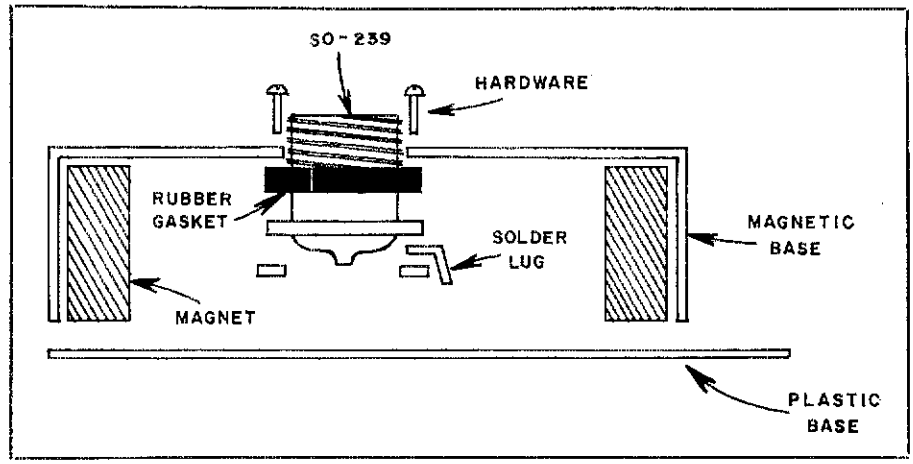
[Editor's Note: If the quality of the coils and capacitors used in this modification is substandard, drift will probably result.]

THE MAGNETIC RUBBER-DUCKIE ANTENNA

I recently came to the conclusion that I needed a simple, small and reasonably effective antenna for 2-meter activities. Even though my 5/8-wavelength magnetic-mount antenna has done a very good job, it is too large for quick setup and removal. The radiating element is nearly three feet long and a nuisance to use on short trips.



AD1B assembled this rubber-duck antenna atop a Larsen magnetic-mount antenna base for mobile use. It provides quick disconnection. He reports that favorite repeaters are easily accessed with this short antenna.



A modified Larsen magnetic mount. AD1B reworked this base to accommodate an SO-239 and rubber-duckie antenna.

Because I live close to a number of repeaters, compromises are possible in selecting an antenna system. My choice of a rubber-duckie antenna has proven satisfactory and may be of interest to other amateurs.

The mounting hardware of a newly acquired Larsen magnetic antenna base, being incompatible with the PL-259 connector on my only available rubber-duckie antenna, required some modifications. After removing the bottom from the base, unfastening the mounting stud and unsoldering the coaxial cable, I enlarged the opening to accommodate an SO-239 connector. Care must be exercised to provide a snug fit. A piece of rubber, serving as a gasket, ensures that the unit is waterproof.

My final preparations were to attach the coaxial cable to the new connector and replace the bottom surface. Rather than reusing the original metal foil, an oversized piece of plastic, having a 1/4-inch (6-mm) overlap, is epoxied to the base. The plastic eliminates the possibility of scratching car paint. Inside the base, electrical tape, wound around the coaxial cable, provides strain relief.

The SWR of my antenna, according to a Heath HM-2102 VHF SWR Meter, is an acceptable 1.5:1. If the selected antenna is not precut, very likely careful pruning may provide an even better match.

A comparison of the received signal strength from the magnetic-mounted duckie and a 5/8-wavelength magnetic-mounted antenna was arranged. Reception was provided by a Standard 826-M at a distance of 1.5 miles (2.4 km) on 146.52 MHz. The transmitter was a Standard 146-A, with a Volkswagen "Beetle" as a ground plane. In both cases Larsen magnetic mounts were employed. The signal from the 5/8-wavelength antenna registered 5 on the relative-signal-strength meter of the receiver while the rubber duckie gave a deflection of 2 under identical conditions. Both signals were easily copied.

The completed unit, shown in the photograph, may be stored easily in the glove compartment of a car. Another advantage is that different types of antenna elements can be mounted on the modified base for purposes of experimenting or band switching.

Many thanks to N1ADF for his patient assistance in the tests. I recommend to others that they consider the advantages of small antennas with short, helical radiating elements. — *Thomas Hart, AD1B, Westwood, MA*

NEW SUBBAND FOR THE ICOM 22-S

Many amateurs with relatively modern equipment seem to be left out in the cold when it comes to working more recent repeaters operating in the new 2-meter repeater band. For the amateur who owns an ICOM 22-S, providing a new subband is a solution to the problem. Locally, cooperation among the area amateurs has resulted in a number of ICOM 22-S radios operating on WD9GMZ/R (144.81/145.41 MHz) by using this approach.

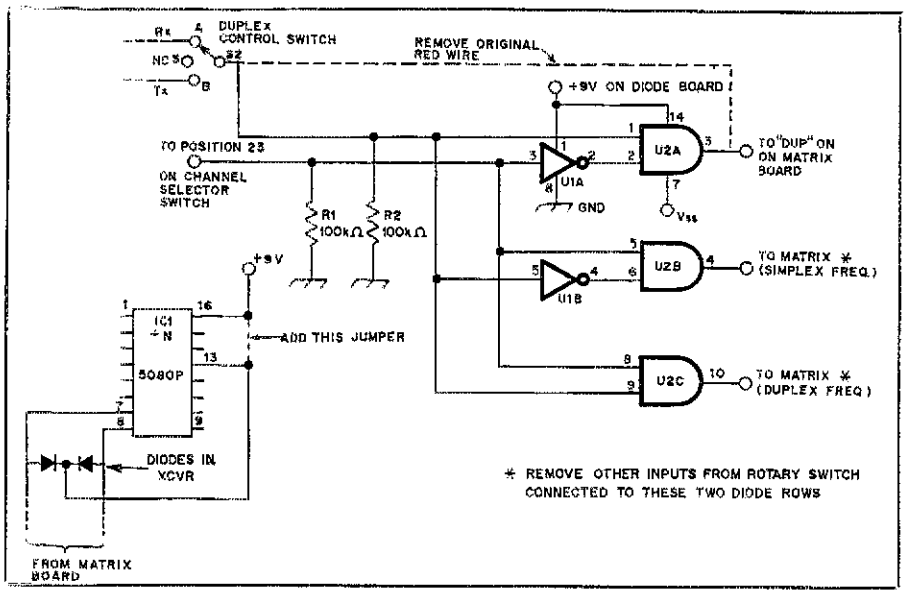
The ICOM 22-S is a diode-programmable PLL synthesized radio. The user installs diodes for the lower frequency. The duplex circuit adds 600 kHz to either the receive frequency (duplex A) or the transmit frequency (duplex B). See the owner's manual, page 4.

Addition of the subband is accomplished through a hard-wired logic circuit. Since the radio is intended to work the 146- to 148-MHz section of the band, either D7 or D6 is always in use. The "plus 600" circuit is designed on that premise. See page 21 and the schematic diagram of the owner's manual.

If the radio is operated in duplex without either or both D6 and D7, the resultant duplex is not 600 kHz. To avoid this erroneous offset, the divide-by-N circuit has been arranged so that it will not operate unless D6 and D7 are programmed. Use of the enable input (pin 13) of the divide-by-N IC provides the means for accomplishing this.

Although the ICOM schematic diagram shows pin 13 (enable) tied to pin 16 (+9 V), *this is not the case.* There are diodes connected from both pin 8 (D7) and pin 7 (D6) to pin 13, so that only when D7/D6 is in use is the counter enabled. This sets the bottom end at 145.35 MHz.

The first step of the modification is to unbolt the VCO board, turn it over and connect a wire from pin 13 to pin 16 of IC1, the divide-by-N chip (TC5080P). Several different schemes can be used to inhibit the add-600 function and



KA9CAR suggests this modification of the ICOM 22-S to provide a new subband covering some of the newer repeaters. Separate transmit and receive programming is accomplished with this circuit. To operate below 145.35 MHz, insert a jumper between pins 13 and 16 of IC1, the divide-by-N chip. (See owner's manual.) The two diodes at the lower left are contained in the ICOM 22-S but are not shown in the manual diagram. These are circumvented by the jumper when D6 and D7 are not in use. U1 is a type 4049 hex inverter. U2 is a type 4081 CMOS 2-input AND gate.

provide the proper offset. The author's goals were to avoid additional switches and maintain the normal function of the duplex/simplex switch for all channels.

The circuit can be built on a breadboard. The author's was mounted by using short pieces of wire soldered to the shield. Parts placement is not critical, but avoid placing leads too close to the rf output.

Remove the original wire from the duplex switch to the diode board. Any inputs from the channel switch to the two rows of diodes must be removed and replaced with the modification. The required +9 V is available on the diode board.

Regarding parts, the 4049 hex inverter, both 100-kilohm resistors, the circuit board and sockets were obtained from Radio Shack. The 4081 IC is no longer a Radio Shack part, but is readily available from most electronic supply houses. The total cost of components should stay under $5. Installation of sockets for the ICs and inserting the chips after all wiring is done will help avoid static damage to the CMOS devices.

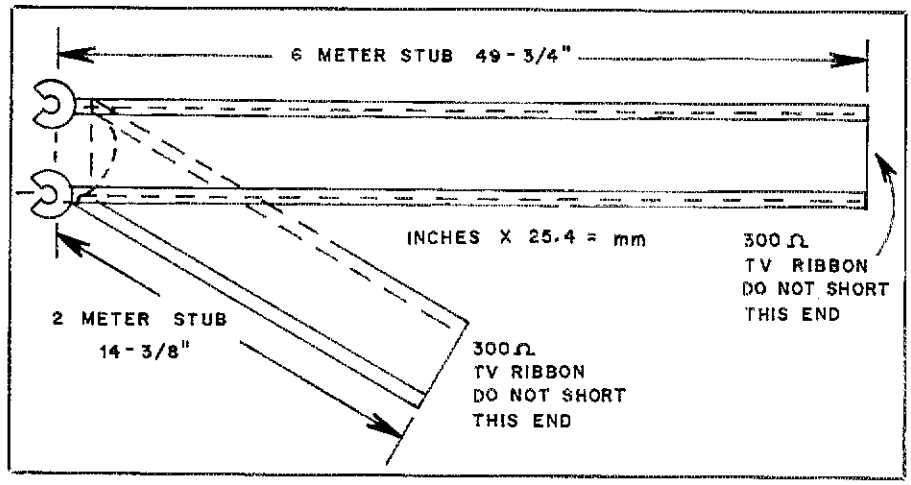
Spacing between channels on the ICOM-22-S is 15 kHz. In our area, repeaters are spaced 20 kHz apart. This means that only every 60 kHz will be usable in the new band with this modification. Power output and sensitivity of the 22-S remain satisfactory with no retuning needed for local repeater use. Because two rows of diodes are used for each low subband channel, the ICOM owner may have to breadboard diodes unless he or she has a VIP kit which leaves many unused rows.

Thanks go to WB9ICF, Lake Geneva, WI, who provided information on enabling the counter. Charles Schaefer, Crystal Lake, IL, takes credit for the logic circuit used. — *John C. Dewey, KA9CAR, Crystal Lake IL*

CURE FOR INTERFERENCE

A neighbor whose TV receiver is 300 feet from my station complained of interference affecting uhf channels on his set when I operated my transmitter on the 50-MHz band. His vhf TV antenna is pointed at my transmitting antenna while his uhf antenna is just a loop on the set located at ground level.

The interfering signal apparently was being picked up by his vhf TV antenna and then coupled into the uhf input leads on his receiver. Therefore, I prepared some open-end stub filters as shown in the accompanying drawing. I connected these to the vhf antenna terminals on the receiver. A follow-up check on all vhf and uhf channels disclosed that the problem had been solved. On none of the channels was there any interference while operating under these conditions: 200-watts a-m on 145.2 MHz; 200-watts a-m on 50.2 MHz; 800-watts ssb on 145.11 MHz; 800-watts ssb on 50.12 MHz. — *Joseph Kilgore, W2EIF, in the Philmont Mobile Radio Club bulletin,* The "Philmont" Blurb



W2EIF suggested this stub filter arrangement to fellow members of the Philmont Mobile Radio Club as a means of curing TVI. It is attached to the antenna terminals of the TV receiver. If 2-meter QRM is not a problem the 2-meter stub can be omitted.

CORDLESS-SOLDERING-TOOL BATTERY REPLACEMENT

If you own one of the Radio Shack cordless soldering tools and it refuses to take a charge or only goes to half charge, check the battery. One or both cells may be dead. Radio Shack stores carry the replacement tip but not the batteries. The General Electric NiCad battery, catalog no. 41B001BD53 or Weller no. 1371 will serve as a replacement. These replacements are rated at 2.4 V, 1.0 Ah. No modification is necessary. A simple removal and resoldering of the leads while observing polarity, plus a recharge, is all it takes. Cost of the battery is about half the original purchase price of the tool. — *W9KDR*

CHIPS FROM THE WORKBENCH

☐ I mount smaller parts on DIP mounting sockets. By pulling the pins out of the sockets from the bottom, the leads of diodes, resistors and transistors can fit through the holes. A drop of Krazy Glue will secure the parts firmly. Some of the pins of the socket can be left in place for micro tie points or wired as test points. By proper arranging, most of the wiring can be done right at the socket. — *Rick Dolinsky, WB3JZA, Tamaqua, PA*

☐ Having read Doug DeMaw's fine article, "The Practical Side of Toroids," I wish to suggest another method of identifying quadrifilar leads. Instead of investing in four cans of spray enamel, we wind the toroid according to Doug's instruction and then put a white mark on one end of a wire. After finding the other end of that wire with a VOM, a dot is placed near that end. In a similar manner the second wire is identified by two marks or dots at each end. The third wire would have three dots at each end and so on. A single color can be used for all wires. — *Harry Drummond, W8WX, Fairmont, WV*

☐ When antenna plans call for nylon monofilament line for supports, the constructor often is told to use fishing line. I prefer spooled line such as used in whirling grass cutters (Weed Eaters, for example). You can find it at local lawn and garden equipment dealers, hardware stores and nurseries. It's tough and strong! — *W. A. Monahan, K6KH, Manhattan Beach, CA*

Be a Big Brother (or Sister)

Enlist in the legion of Elmers for the time of your life.

By Rosalie White,* WA1STO

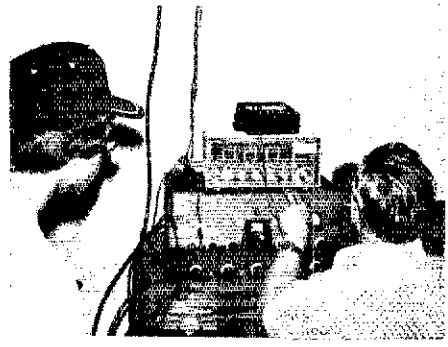
Are you burned out on Amateur Radio? Sick of working through horrendous pileups during contests? Bored with waiting for DX QSL cards? Tired of trying to copy those weak signals on traffic nets? No goals left to shoot for? Regain your enthusiasm for Amateur Radio and provide a valuable service by joining the legion of Elmers in the Big Brother/Sister Program.

In October 1978, the FCC reported that 1447 Novices let their licenses lapse even though a retest was not required for renewal. Are these souls completely lost? Maybe not. A Club and Training Department survey in 1976 (before the dawn of renewability) of license lapsers showed that most were interested in eventually getting back into Amateur Radio. That's good to know, but how can we keep them from quitting in the first place?

An important key to maintaining interest in any hobby is to have a friend or mentor who participates in the same activity. Nowhere is this more true than in Amateur Radio, where the number of potential problems is almost limitless. What turned the license lapsers off? Were their first contacts ruined because of nerves, untweaked secondhand receivers, poor antennas, TVI or some other problem? The license lapsers had enough gumption to study and take the exam. Probably the slightest amount of encouragement and advice would have kept them in their shacks. Future Elmers, that's your clue!

Elmer activities include answering questions, encouraging upgrading and providing motivation for the Novice. With a little imagination, many innovative methods can be used to inspire your Novice. Here are a few suggestions.

Novices deserve special recognition on the "big day" when their license arrives. Dig up an inexpensive picture frame for the license and have a ceremonial hanging of this important document in the newcomer's shack.



Sheboygan (WI) ARC's "Novice Buddy" program brings together youth and experience on a comfortable one-to-one basis.

The first stumbling block for many new hams is deciding what equipment to purchase. If your Novice hasn't chosen his gear or raised an antenna yet, plan a safari to local electronics stores to check their merchandise. Visit hams in your area to get other opinions on rigs and antennas. Help your club set up an equipment display for Novices to review, as the Nortown (ON) ARC did. Or, propose that your club purchase a rig to loan out to Novices until they buy their own equipment.

Do you remember your first QSO — knotted stomach, sweaty palms, all the signs of nervousness? Often, just a little encouragement is needed for new hams to overcome any initial nervousness and make their first contact. Help decipher that first nerve-racking QSO or even sked it for your Novice. The Greater Fairfield (CT) ARA sponsors "Get on the Air Night," when Novices make their initial QSOs. This is followed by an informal discussion covering transmitter/receiver hookup, station accessories, etc.

After your Novice has completed his first QSO, provide advice on QSLing procedures and choosing a QSL card. (See "The Art of QSLing," April 1976 *QST*, page 40 for a review of QSLing techniques.) Frame the first QSL received by your Novice. You also can present the Novice with a framed First Contact Certificate, available free from ARRL.

Your Novice now has equipment, antennas and his first QSO. Don't abandon him at this point. Join other Elmer-Novice teams at club meetings, auctions, flea markets, hamfests and conventions. Give a club talk on operating procedures, as did an Elmer from the Wheaton (IL) Community Radio Amateur Club. At flea markets, tell your Novice the history of that Super Skyrider.

Send ARRL an s.a.s.e. for free Operating Aids to give to your Novice. After the Novice's first DX QSO, how about giving him a world map ($3.50) and a free list of official DXCC countries? Dime store variety engraved call-letter pencils, log book, desk plate and a wastebasket decoupaged with amateur equipment ads are other inexpensive gift ideas.

Keep your Novice operating. Set up portable at a park to operate QRP. Ask your club to sponsor a "Work a Novice" contest, as Parma (OH) RC did. (Participants attempt to work as many Novices as possible during one weekend.) If your club has test equipment, assist new hams in peaking up their gear before and after meetings. Or, establish a contest similar to the Reading (PA) RC monthly award, which is given to the Novice with the most QSLs received from meeting to meeting; the ham with the highest total at the end of the year receives the Master Fuse Blower's Award. The Wichita (KS) ARC awards an annual trophy for the best Novice Roundup score in the area.

The rewards gained from joining the legion of Elmers are incalculable. What price can be placed on gaining a life-long friend? And they may reward you with an ARRL Elmer award! If you want to find a protégé, ask your club instructor. If you don't have a club instructor, send us an s.a.s.e.; we'll send the name of the nearest instructor in your area. Happy times, Elmer! QST

*Manager, ARRL Club and Training Dept.

● *Basic Amateur Radio*

The First One's Always the Hardest

This beginner overcame many obstacles to build a perfect sidetone monitor. Here's how he did it.

By Elio Zambrano,* WB7ESQ

After waiting eight weeks for my Novice license, I finally plugged in my rig and entered the world of Amateur Radio. Knowing I still had a lot to learn, I listened to the slowest operators I could find in an effort to gain confidence, increase my code speed and learn on-the-air procedures.

It took three days to build up enough courage, but I finally answered a CQ from a WAØ. The moment I hit the first "dit" I knew I was in trouble — I couldn't hear what I was sending! Somehow I managed to keep my head and complete the QSO. I was drenched with perspiration and suddenly realized I hadn't been breathing for what seemed like a very long time.

There must be a better way to do this, I thought. I did a half gainer into the *Handbook* to find out. Ah-ha! It's called a sidetone, or sidetone monitor. What's a sidetone monitor? Well, seek and ye shall find (I remembered reading that somewhere). I asked every ham I knew how a Novice like me could get one of those gizmos. Their answers ranged from "build one" to "there should be one in your rig."

Finally, the mystery started to unfold. One of the hams in town asked if I had a recent issue of *QST* because there was a "Hints and Kinks" article on just the deal I needed — a sidetone monitor which could be built from "ye olde junque boxe." It sounded like just the kind of project to instill confidence in a greenhorn like me. After obtaining the article, digging out some parts from the junk box and heading to the nearest Radio Shack, I was ready to start.

A careful comparison of the schematic and the pc board convinced me I wasn't as technically prepared as I thought. I decided right then and there to make an exact duplicate of the pc board shown in the article and plug in the parts. Carefully following the instructions on the bottle of etching solution, I etched a board in "only" two and one-half hours. Drilling holes with one of those tiny drills takes a very steady hand — I broke two of them. The third tiny drill was obviously much stronger than its predecessors because I drilled the board without breaking it. The next step consisted of soldering the parts onto the board. So far, so good. Then I tried it. Since I wasn't very confident, I wasn't surprised when the sidetone didn't work.

Back to asking questions, reading the *Handbook*, and crossing days off the calendar. After repeated attempts, I was able to cut my etching time from two and one-half hours to 30 minutes. But, I had used three complete sets of parts, because two more prototypes had failed the ultimate test. I even sent a letter to Jerry Arnold, WA6MBP, author of the "Hints and Kinks" item that started this educational enterprise. *Somebody* had to know how to make this simple little project succeed.

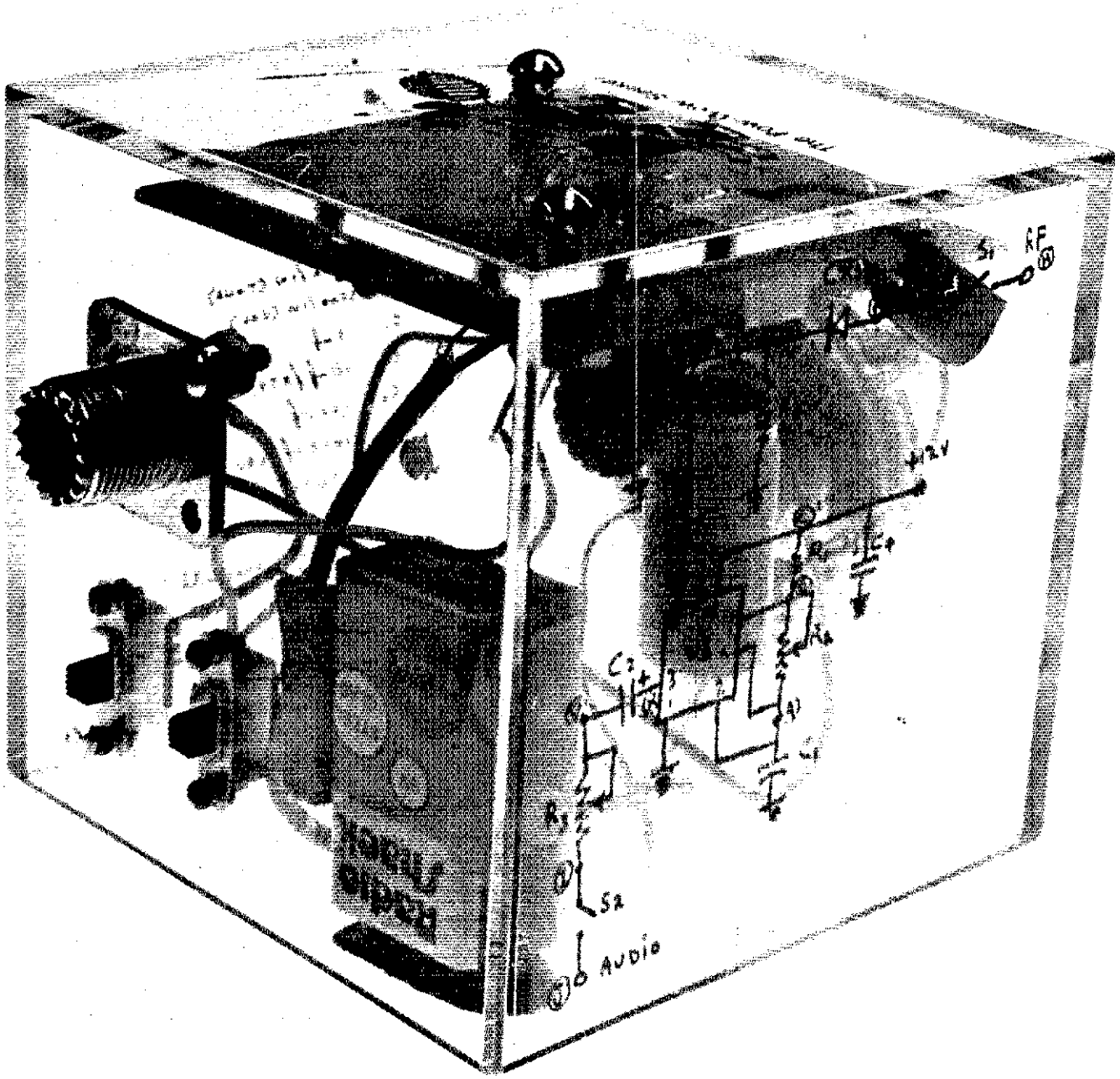
Armed with all this advice, I returned to the project with renewed confidence. The construction time for sidetone number four was only a couple of hours. With great pride, I carried it to my shack and put it on line. Look, everybody, I thought, listen to it! Then it stopped. Hmm, must be a small technical adjustment. I knew if I remained calm and thought logically I could find the problem. I started planning my own pc board

What Is a Sidetone Monitor, Anyway?

When Elio Zambrano first received his Novice license and fired up his station, he got a rude awakening. His transceiver didn't have a sidetone monitor, the device that lets you hear your code transmissions as you send them. Most transceivers have sidetone monitors built in, but many separate transmitters do not. It consists of an oscillator that produces an audible tone when the transmitter is keyed, similar to a code practice oscillator.

If your gear doesn't have a built-in sidetone monitor, you can construct one for very little money. The author told *QST* he is willing to share the insights he gained from the project with any interested Novices.

*2001 W. Wetmore Rd., Tucson, AZ 85705



The completed project sits in all its glory. Was it worthwhile? "I wouldn't trade the knowledge I gained from it for the world," says the proud builder. Why not try one yourself?

for number five from the schematic. Maybe this project had been dragging on for an unreasonably long time, I thought, but at least I was learning something about my chosen hobby.

Just as I completed sidetone number five, the latest *QST*, with the letter from the author, arrived, as did a note from Sam, WB5VML, a buddy from Baytown, TX. The *QST* described an error in the original schematic. Jerry's letter told me about it and suggested a few modifications to beef up the sidetone monitor a bit. Sam described in detail the exact troubleshooting procedure that Jerry referred to in his letter.

With all this expert help, what else could I do but start on sidetone monitor number six. Etching time — 15 minutes; construction time — one hour; running to the shack to try it out — 15 seconds; result — it worked!

Although the situation seemed hopeless at the time, I wouldn't trade the knowledge I gained for the world. At first I was leery about attempting another project. But I did decide to try again, and I was very gratified when, after a day and a night of work, I produced a perfectly working Tuna-Tin 2. It did wonders for my confidence, and I'm now constructing the Herring-Aid 5 because of it. Then there's the Codzila 1, that keyer in the *Handbook* . . . QST

Build Your Own!

Readers who would like to take a crack at one of the projects mentioned in this article can find plans in the following back issues of *QST* (photocopies of articles cost 25 cents per page): Sidetone monitor, August and October 1976 (50 cents); Tuna-Tin 2 (low-power, 40-meter transmitter), May 1976 (75 cents); Herring-Aid 5, simple 40-meter amplifier for Tuna-Tin 2, February 1977 (50 cents). *The Radio Amateur's Handbook*, 56th edition, contains many construction projects, some of which are suitable for beginners. It is available for $9.75 postpaid from the ARRL or your favorite local amateur dealer.

Not familiar with soldering and etching techniques? The ARRL's *Understanding Amateur Radio* ($5) covers them in easy-to-understand detail.

CARWRS

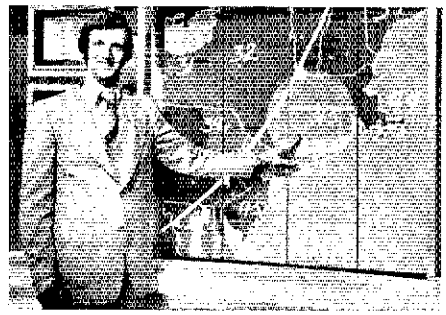
As in Star Wars — an out-of-this-world weather network.

By Chuck Motes, *K1DFS

Charles D. Warner, an editor of the *Hartford* (CT) *Courant* during the late 19th century, wrote that "Everybody talks about the weather, but nobody does anything about it."[1] Mark Twain is incorrectly attributed with this astute observation, perhaps because he too lived in Hartford at one time. But Mr. Warner notwithstanding, Mark Twain did have this to say about the variability of our weather: "There is a sumptuous variety about New England weather that compels the stranger's admiration and regret...In the spring, I have counted 136 different kinds of weather inside 24 hours."[2] Perhaps this is one of the many reasons that our corner of the world is so attractive to visitors. The many changes in one day might have given rise to the saying "If you don't like the weather here, wait 15 minutes and it'll change." I wonder who said that.

In any event, in Connecticut and many other areas in the U.S. and Canada, radio amateurs are indeed doing something about the weather. The CT ARRL section emergency coordinator has established the Connecticut Amateur Radio Weather Reporting Service — CARWRS — as a function of the section's Amateur Radio Emergency Service activity, with this author as the emergency coordinator who directs the program.

The purpose of CARWRS is to gather reports from trained amateurs, acting as observers, and quickly pass the data to government agencies, news media and the National Weather Service, for the information and safety of the citizenry. Because of the great variation and rapid change of weather conditions in the state, information concerning weather is an important commodity. The weather can change within minutes; it can be totally different from one side of town to the other. This is caused by differences in the state's geography and topography. The nutmeg state's weather is also influenced by its proximity to the Atlantic Ocean and Long Island Sound on the south and the higher elevations to the west and north.



Hilton Kaderli, weatherman for Hartford's Channel 3, refers to the CARWRS group as "Hilton's Hams." *(Kate Eisemann, WFSB-TV photo)*

Weather can impose hardship and suffering on citizens everywhere. Heavy snowfalls and ice storms have brought this state to a standstill in the past and have isolated people in precarious situations. These hardships are not restricted to the winter, though. Springtime rains and thaws have resulted in flooding conditions which have endangered some and driven others from their homes, while hurricanes and electrical storms have killed or injured people and caused widespread damage to property. (See related story.) Disturbed weather conditions have given rise to declarations of civil emergencies, necessitating that the state use special tools for the rescue and protection of its citizens and property.

One of these tools is emergency radiocommunication. Amateurs play a very important role here in establishing and maintaining communications. We have a tightly spun web of civil preparedness, ARES and NTS stations, as well as other groups, covering the entire state on hf and vhf. These are liaison points where the Amateur Service interfaces between state and local government and other agencies. The status of a locality is known at all times by the government and help is quickly dispatched if needed.

One of the most difficult areas on which to obtain timely and accurate data is weather. Data are gathered on a routine and continuing basis from only eight NWS monitoring stations in Connecticut and Long Island. These stations are located at widely scattered points and cannot accurately reflect the many varied weather conditions throughout Connecticut during a storm condition. Television forecasters have often received calls from viewers who have told them they have just received eight inches of fluffy "partly cloudy" on the sidewalks and that the forecaster should please come over and shovel it!

So, the public needs more, timely weather information. CARWRS responds to this need by providing direct observations. The gathering and transmitting of weather reports is performed by utilizing 2-meter fm repeaters, with both voice and RTTY employed. CARWRS currently uses two repeaters, covering 75 percent of the state, with a third soon to be added to complete the coverage in southeast Connecticut. There are over 100 hams involved in the system.

Weather reports are collected by control stations, on voice, following preset schedules during storms and weather emergencies, and during weekly training sessions. The collected reports are then relayed via RTTY stations with links to emergency services agencies and the media, for use in reporting and predicting weather for the community. The entire process, from system start-up to the end of relay, generally takes less than 30 minutes and can be repeated as often as the situation requires.

The great volume of local and timely reports, using the amateur system in support of the already established weather services in Connecticut, allows weather forecasters to monitor and forecast with much greater accuracy. This provides the public with a better knowledge of

*22 Woodside Ln., Plainville, CT 06062

[1]Notes appear on page 59.

What a Way to Start the Weekend

On Friday, August 17, at just about quitting time, the northeast corridor was racked by a heavy wind/rain storm which was magnified by its sudden intensity; power lines and trees came crashing down in many communities, even though this storm was of short duration. The CARWRS network activated at 4:30 P.M. local time and completed its information gathering in 20 minutes. These data were in the hands of authorities and news media by 5:00. This session was conducted on the WR1ABM repeater (28/88) which was operating on emergency power. Seventeen stations signed in, reporting heavy rain and power outages throughout central Connecticut. Among the check-ins was W1AW, also on emergency power.

conditions in their areas and emergency services with a very valuable method for planning and providing assistance for the safety and protection of state residents. It also provides hams with an opportunity to use their hard-won and finely tuned communications skills for public service, a part of the fundamental purpose of our hobby.[3]

By this time, some of you may be thinking about starting weather networks in your state. After all, bad weather isn't restricted to Connecticut; nor are ARES groups. CARWRS is essentially a less formal adaption of tornado watch programs in the Midwest and Southwest and is one type of service provided for in the recently signed addendum to the Connecticut Emergency Broadcast System plan.

We in Connecticut were aided in getting this program started when a television newsman approached ARRL hq. with the idea of establishing an Amateur Radio weather service, especially because so many amateurs can operate when commercial power sources are knocked out. He (the newsman) had seen the effectiveness of the tornado-watch nets elsewhere and asked if Connecticut amateurs could perform something like that, in cases of ice storms, blizzards, floods and hurricanes. Meetings and planning sessions were arranged with the SCM, SEC, net managers, the EBS coordinator and interested hams. Ultimately CARWRS was established under ARES; with official recognition and approval, the rest was easy.

A general training session for interested hams was held, during which the concept was explained, objectives defined and the observers were instructed in the important aspects of weather observation and reporting. Printed information was distributed to the class, along with a short standardized sheet to be used for weather observations. On-the-air training sessions were scheduled on the repeaters soon after the general training session, and regular sessions have been held since.

Sessions are started up by control or collector stations who make a general call-up, explain the purpose of CARWRS and list the information to be reported. Then, reporting stations are asked to check in, first by county and then by call sign. This allows the control station to write the call signs under the proper county headings. Once a number of stations have checked in, the control station has each reporting station give his or her report and records the data on the control sheet. When everyone has given a report, the control station calls for more check-ins and the process is repeated. At the end of the session, the control station, which usually has RTTY capability, punches the reports on tape and sends them to the Skywarn liaison station on another repeater. The Skywarn liaison then relays to NWS. Other people and government or weather services are able to monitor both voice and RTTY transmissions and use the weather reports if they wish. Since these reports are relayed to other amateurs, they are treated as third-party traffic and logged accordingly.

Having a local television "star" provide the initial push to get such a program started would have to be considered a fluke, a very fortuitous one! To get such a program started elsewhere, the section emergency coordinator will have to get the ball rolling. He must "coordinate" with the multitudes concerned. Once the initial planning is done, the SEC will probably want to appoint an emergency coordinator to direct the system. This frees the SEC for his many other duties while allowing the coordination and control through one identifiable individual. After that, standardized/accepted styles of reporting, procedures and relay routes can be set up, training sessions conducted and the system activated.

Amateur Radio has gained, too. There is the satisfaction of having used a personal hobby to help others and also of a skill gained and used. Hams have gained statewide recognition. One broadcaster acknowledges the Amateur Radio-provided information on the air. There is one drawback, however. Sometimes it's necessary to get updated reports from our observers in order to find out how fast a storm is moving, but no one is around to give the reports. They're all upstairs watching the weather on TV! QST

HAM RADIO WEATHER REPORT FORM

CALL_____

DATE_____

TIME of OBSERV. _____ local-24 hr. COUNTY _____ TOWN _____

PRECIP. YES-NO | PRECIP. TYPE: 1. SNOW 2. RAIN 3. FREEZING RAIN 4. DRIZZLE 5. FREEZING DRIZZLE 6. SLEET 7. HAIL

PRECIP. ACCUM.: SNOW DEPTH _____ RAINFALL _____ | PRECIP. RATE: LIGHT MODERATE HEAVY

TEMP. _____ | WIND DIRECTION _____ | ROAD CONDX. _____

VISIBILITY _____ | FOG: YES-NO | THUNDER LIGHTNING: YES-NO

OTHER OBSERVED CONDITIONS-COMMENTS: i.e.- DRIFTING SNOW, FLOODING, TREE LIMB DAMAGE & CAUSE, etc.:

DIRECTIONS: Circle one or more choices as necessary in each category. If item was not observed or measured--report as "NOT OBSERVED". Report each item in order from left to right--top line to bottom. Keep comments brief.

CARWRS CONTROL SHEET - '88'

CONTROL OP: KLDFS DATE: 1-17-79 START: 1700 E FINISH: 1720 E CHECKINS: 16

CALL	TIME	TOWN	PRECIP.	ACCUM.	TEMP.	WIND	VIS
COUNTY: Hartford							
KLDFS	1655	Plainville	Snow	3	20	-	½ mi
WB1DGR	1657	Berlin	Snow	3 in	25	-	⅝ mi
WA1UTQ	1700	Rocky Hill	Snow	2½ in	19		5 mi. Rds. slippy
WLXX	1700	Avon	Snow	3½ est	19		¼ mi

Notes

[1]Charles D. Warner, in the *Hartford Courant*, (c. 1890).

[2]Mark Twain, *New England Weather*; speech at a dinner of the New England Society, New York City, December 22, 1876.

[3]United States Amateur Regulations, Subpart A, Sec. 97.1(a).

The Genteel Art of Chewing the Rag

Bring your QSOs to life by helping to revive the lost art of ragchewing.

By Jim Conrad,* WA4PGA

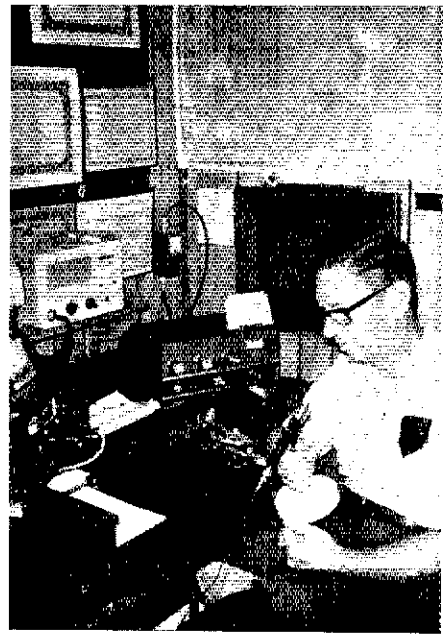
The Sweepstakes, USA-CA, designing new antennas, and the homebrew rig are fine ham institutions; I'm glad someone out there is paying attention to them. But when *my* dial lights up, I sit before my rig in happy anticipation of hearing new ideas, fresh gossip, tall tales, harangues . . . My passion is ragchewing, which flows from mellow philosophy to esoterica to down-home humbug.

Most ham activities seem to be getting easier to accomplish. DXCC is a cinch, relative to how it used to be. A kw on the shelf is normal; even Novices can use VFOs and 200 watts. But, during the last 10 years it has become harder to find new ragchewers on the bands. Most initial QSOs seem to be "six-point quickies": signal report, QTH, name, rig, weather and 73. "Quickies" are great if you're looking for new counties or a signal report. But to ragchewers, these QSOs might just as well be QRN crashes passing in the night. Ragchewing is an art which few apprentices seem to be learning.

Great artists are born with natural talents the rest of us lack. The masters of ragchewing are born with the gift of gab. In most arts, anyone can learn enough technique to get along, to do passably well (at least well enough to rub shoulders with the masters.) Any ham can learn certain "tricks of the trade" that will enable him or her to sound like a natural-born ragchewer.

The Mighty Atlas

I once QSOed a WØ in upstate Minnesota; it looked like another "quicky" until I found his QTH in the atlas I keep near my rig. Noting he lived near an Indian reservation, I asked him if he ever visited there. Yes, he replied, he often went to the reservation during hunting season to pick up his Indian guide. Hunting and Indians! For the next two hours, we traded nature lore and explored aspects of Indian culture. As he talked, I leaned back, sipped a glass of iced tea, and savored every minute.



Ragchewing, whether on phone or cw, is an art that should be cultivated if we are to get the most out of our operating.

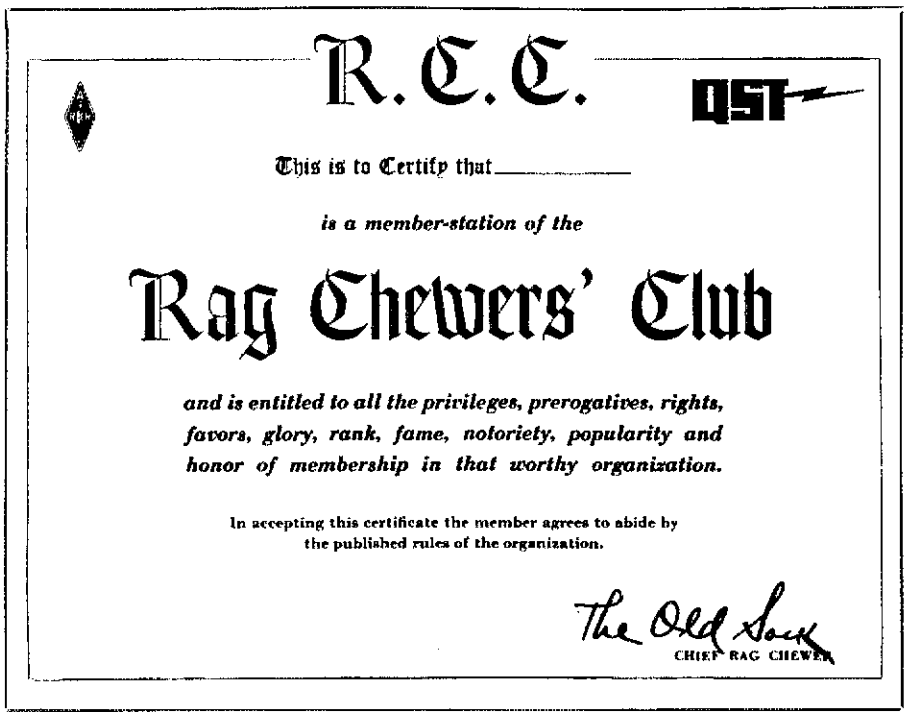
This 'chew blossomed only after I looked up his QTH in my atlas. I took the initiative in the hope of enlivening the QSO, and it worked. Across the continent there are parks, historical sites, military bases, swamps, forests, ski resorts, deserts — the list is endless. The atlas supplies geographical descriptions which often act as a catalyst for an interesting ragchew.

Another handy reference source is a world almanac which, among other offerings, provides up-to-date information about the major cities in the United States and Canada. I pick up many ragchew ideas by perusing these synopses during QSOs. Recently, the almanac has instigated 'chews about the Amon Carter Museum of Western Art in Fort Worth and the new subway system in Washington, DC.

Aside from showing enthusiasm for the other party's location, try to cultivate interest in your own QTH. I live in Nashville, so many hams ask me about the country music industry. Although not a fan of country music, I keep a pad of notes about it next to my rig. At the first sign of interest, I can offer anecdotes about Minnie Pearl, Dolly Parton and Roy Clark. I can talk about Elvis' Cadillac in the museum down the street or describe our famous honky-tonk section, Printer's Alley. This notebook also contains brief reminders of recent jokes I want to share and current events which merit discussion.

Through the years, I have gravitated to 40-meter cw, where, through a combination of geography, ionospherics and antenna orientation, more than 20 percent of my QSOs have been with hams in the Chicago area. I keep a large map of Cook County handy; through good ragchews

*406 Chesterfield Ave., Nashville, TN 37212



Anyone who informs ARRL Hq. that he or she has had an on-the-air conversation lasting at least a half an hour qualifies for this impressive certificate.

with "9s," I'm learning about the area's history, parks, museums, politics and its people's hopes and aspirations. I've never been to Chicago, but when I meet someone from Cook County, it's like running into someone from home.

Talk with Style

Expressing your thoughts with special on-the-air flair helps establish a conversational mood. I don't ask someone what he does for a living, but breezily ask him what his "line" is. When I give a weather report, instead of saying a storm seems to be coming up, I say that "it's growling up a dark cloud," or some similar phrase. You don't have to be a poet, but neither do words have to be used in the most expected, cut-and-dry manner. Of course, there is a point at which "speaking with a flair" fades into flapdoodle. Find a middle range; be on guard against going flat or too far overboard.

Hams talk about their involvement with the "new frontiers." We speak fondly of moonbounce, OSCAR, ATV and the super-high and super-low frequencies. My "six-point-quicky" QSO experiences during the last few years leave me wondering if ragchewing may not be "our forgotten frontier." Ragchewing allows us to explore the phenomenon of people getting to know one another on a personal basis via modern radio technology.

Only about one in five contacts develops into a full-fledged ragchew. However, the pleasure I derive from 'chewing would keep me tuning around if the ratio were one to 20.

I think it's beautiful when someone vibrates his electrons 7,055,000 times a second, bounces the resulting electromagnetic waves off the ionosphere, and really is interested in me down here in Nashville. A good ragchew is a proper fruit born of the marriage of technology with the healthy fellowship that sustains our hobby.

Strays

1979 JAMBOREE-ON-THE-AIR

☐ That time is upon us again! The 22nd annual BSA Jamboree-on-the-Air (JOTA) will be held on October 20-21, 1979. JOTA is not a contest; rather, it is an opportunity for unlicensed Cub Scouts, Boy Scouts and Explorers to talk with distant fellow Scouts via Amateur Radio. Interested hams are asked to contact their local troops and invite a group of boys into their shacks for a specified period of time during this two-day event.

	Phone		CW	
	U.S.	Int'l	U.S./Int'l	Novice
80 meters	3940	3740	3590	3750
40 meters	7290	7090	7030	7125
20 meters	14,290	14,290	14,070	---
15 meters	21,360	21,360	21,040	21,140
10 meters	28,990	28,990	28,190	---
6 meters	50,500	---	50,050	---

Control operators will monitor all the activity to prevent the boys from unknowingly engaging in illegal third-party traffic (conversations with others in countries not having third-party agreements with the U.S. or Canada).

To find other Scouts, look for stations around the Scout frequencies listed in the table and then QSY to an open segment nearby. (Note: These frequencies are used year-round and worldwide for a variety of Scouting activities — clip out or photocopy the table for future reference.)

All participants will receive certificates; unit leaders send a self-addressed envelope with sufficient postage to W2GND, 216 Maxwell Ave., Hightstown, NJ 08520. Hams and unit leaders also are asked to submit reports and pictures to this address for consolidation and report to the World Scout Bureau. — *Steve Place, WB1EYI*

This annual Down East ham get together is an adventure to get to but it's well worth it once you're there. This shows one of the flea-market tables at the Cornville, ME, Hamfest this summer. Shown from left to right are Steve, WA1PSJ; John, KA1BJE; Nancy, his XYL; Cathy, WA1REQ's YL; Bob, KA1AAJ; Horace, WA1DLX; Laird, W1CUT and Dot, W1TGY.

Moved and Seconded...

LIFE MEMBER APPLICANTS
January 23, 1979

Saul M. Abrams, K2XA; John V. Abbruscato, WB5WJT; Victor A. Abell, W9RGB; Judson L. Abernathy, WAØWHS; Robert P. Adams; Roger H. Adanich, K8UFW; Franklin W. Addis, KA7BPZ; Bolmar Aguilar, WB3AOP/HK1AMW; James I. Akins, Jr., WB4GYA; Nicholas Albano, WA1MYD; Dean L. Albertsen, KØTVJ; John D. Alden, Jr., K4HRY; Don W. Aldridge, WA7RLL; Kenneth B. Alexander, WB9VGS; Dean A. Alger, WD8ONL; Bruce E. Amrein, WA3SRL; Edwin C. Andera, WBØENX; Poul Andersen, K8JOF; Glenn Anderson, WB9YHO; Herbert Anderson, K7GEX; Jack G. Anderson, W1FDH; Larry G. Anderson, WBØPGT; Wayne C. Anderson, WDØADD; Fred A. Andreucci, WB5TQN; Paul J. Angelides, K2PE; J. Anthony Arnold, K6MC; Robert C. Ashby, K5JHR; Gary D. Ashe, K2RKW; Ron L. Ault, WBØCKS; Darwin S. Austin, Jr., K8PLZ; Jerry C. Aycock, WA4OHX; Fred L. Babbitt, W1DKE; David E. Babcock, WB7DNS; Palmer E. A. Back, WB6QLY; Leland L. Bahr, WØVT; Joe Keagy Bair, K4WS; Joe R. Baird, K9SC; Robert E. Baird, WA6TLG; Roy E. Baker, WB4WQE; Warren Baker, K2ECJ; Andrew John Balcom, W5DXM; Ray D. Baldwin, WA4WSM; Duane C. Ballew; Thomas G. Banks, N9ER; Doug Bard, WA2ING; Mark W. Barker, K3RZG; Ernest W. Barnes, WAØZAX; Sam Barrett, WA5RPP; Frederic N. Barry, K6RTU/WA7POZ; Robert E. Bate, K2CLD; Richard W. Bear, WA2COA; Robert E. Bedwell, WA6MLG; James O. Beedle, W9NIN; Lonnie T. Bennett, WB5PGI; Leslie J. Benton, Jr., W4ZQD; David W. Berglind, W1LMZ; Horst Bergmann, DL9SH; William L. Black, WB5QMY; Ronald S. Blair, W5WJB; Gary E. Blanken, WB3DAW; J. E. Blanton, Jr., WA4TLR; Ronald W. Blesun, AF7A; Tim R. Blumer; Otto Boerner III, WA2RQC; A. Robert Bogosian, K2VJE; Peter Bowers; Robert G. Bowser, W2IMZ; Ohlen R. Boyer, WD4DVB; Douglas Bradley; Jim Bradley, N7JB; Gerald D. Branson, AA6BB; Joan E. Branson, KA6V; William R. Breese, WA8HJC; Phillip W. Briggs, WDØAVK; Michael K. Brokaw, KL7IUT; Albert E. Brooks, Jr., WA9PBK; Arthur R. Brown, W9MSH; Patrick M. Brown, WB5JHG; John Carter Bruce III, WB5YVQ; John E. Bruckner, NØAJU; Richard G. Brunner, AA1P; Ernest R. Buck, WB5CDW; Roger B. Bullock, WBØOYW; David Bunte, K9FN; Ronald K. Burch, W4ZEE; John C. Burchard, Jr., K1TQH; Marshall Burgh, WB6YIZ; Rafael A. Burguet, KB4BD; Bruce Burnette, WA4PPX; Charles J. Burns, WA2GQL; W. D. Bushnell, WA5MJM; Robert Cain, WBØIBT; Mac Campbell, K9ZKX; Gerald E. Camus, WB5MLH; Barry H. Capell, WA3GSH/WA3TJR; Joseph A. Carchidi, WN1RSQ; John G. Carlson, WB9VPC; Paul E. Carlson Jr., WB4LCE; Gary D. Carmack, WA7GFT; Alfred K. Carr, WB4BRO; Robert P. Carson, WB4ZOY; Steve P. Chadwick, WB8FAB; Jack M. Chapman, VE4AE; Jerry W. Chapman, W5FY; Peter L. Chestney; Robert J. Chevako, WA2VSF; Michael Christie, K7RLS; Charles V. Clapsaddle II, WBØVXP; David A. Clark, K5PHF; Gerald B. Clark, K7KZ; Stanley E. Clark, W6MEM; W. G. Clark, W4LCB; Thomas A. Clarkson, W4GFY; Dana G. Cobb, K1RQ; Bernard Gene Cohen, K1SA; James A. Cohenour, WA3YVL; Daniel L. Colburn, W3UF; James M. Cole, K4HRO; Charles I. Coleman, Jr., WA8VGX; John C. Collins, K6HDM; Denny W. Colvin, WB2ECA; Robert L. Combs, K9FG; Charles E. Cook, N8BO; Robert G. Cook, WB2OHP; Stanley T. Cooke, W8MKO; Walter Cooney, WB7BLL; Dennis L. Cooper, K3NVI; William N. Copeland, Jr., WB6RVE; William P. Corcoran, WA9UNR; W. E. Cotherman, W5IA; Albert W. Cotterell, WA9CKU; Samuel E. Cowan, WA4LFL; Roderick W. Coward, W4ILM; John C. Cox, WB4DDS; Valcee Cox, K5RDV; Harry E. Craney, W3DTU; Charles W. Crocker, W5DWF; Kenneth W. Cronyn III, WA1UIG; Donald G. Curnutte, Jr., WB8SCG; William M. Curren, WA6JXJ; E. Manley Dahl, WB7FFV; John N. Daniel, WB6GFA; James J. Davenport, WA4HAR; Douglas D. Davidson, K8WUZ; Earl J. Davis, Jr., W5MIQ; Stephen George Davis, WA2NKP; Harold E. DeCanniere, KØHD; Robert E. DePierre, K8KI; Nunzio S. DeRobertis, K2PVH; Edward V. Dean, WB2LBI; Robert J. Delhommer, Sr., WA5UAP; Louis Delisio, WA2AEN; Arthur R. Delperdang, K4KBI; John M. Denison, KP4FAQ; William R. Detamore, WB9NYR; Phillip E. Devron; Jim Dietrich, WAØRDX; Victor W. Dobroth, WA7DXN; Howard T. Douglas, W7UCX; Thomas E. Downey, WB9JVE; Gary N. Dixon, N7IA; George E. Dominick, W4UWC; Gary L. Dorsey, WA3NWL; Paul Doswell, WØJRX; Larry D. Douglas, WB6BWC; Douglas C. Drake, W7HAN; Theodore E. Drake, W5TB; Weldon B. Drennan, Jr., K5LQL; Thomas D. Drennon, WØPJC; Michael S. Drooker, WA1PZQ; Clifford F. Drown, WB7TOL; Gary S. Drummond, KB9CG; Frank W. Dublin, WB5MFQ; Si Dunn, K5JRN; Stanley J. Dusza, WA6GGH; Robert J. Dvorak, WD8CPQ; Selman D. Eddings, W5TOV; Raymond L. Edwards, N9AGJ; Jerry R. Ehman; Joseph C. Elliott, K2LX; Doug Ellis; William B. Ellis, WB9CAC; Henry G. Elwell, Jr., N4UH; Sidney L. Emmons, K8ZES; Ronald D. Erickson, WBØGDA; Jack G. Evans, WB6HFJ; Claude L. Ewing, John R. Ewing, K7SHC; Ralph G. Fariello, K2PF; William A. Farone, N4NK; Kenneth E. Farr, W3EIW; Robert J. Farrell, Jr., WB2COY; Joe Felardo, WB6EGW; Allan Ferguson, K8GUE; James F. Ferguson, WB8TNT; Jesus Figueroa, KP4CQM; John R. Fisher, W9MAX; Mark T. Flavin, N5MF; Richard A. Fontaine, WB9UJL; Ross W. Forbes, WB6GFJ; Jerry Ford, Jr., WB2DFS; Thomas Stephen Forker, WA2UOQ; James R. Fort, WB4TMO; Alvan F. Foster, WAØBIP; Robert Foster, K3QIA; Richard L. Fowler, K8MEG; Howard E. Fox, WD8ENP; Ralph F. Frakes, WB2IXD; Dennis G. Franklin, WA6JVZ; Bob Frazier, WB8NRK; Paul M. Freeland, W5ZVB; Craig D. Fry, WBØNUC; John F. Gallagher, K2KN; John O. Galloup, W8PYQ; Charles L. Gardner, K6DY; B. Gayle George, WD6ASV; James K. George, Jr., N3BB; Jon A. Gerbracht, W3BPB; Bill Gierisch, WA7KHQ; Mark Gillis, WD5CLG; Peter H. Gilson, WA2TSF; Robert A. Gingras, WB4JMH; Milan S. Gluck; Ralph W. Goering, W9KQ; Raymond E. Goff, Sr., WB8CKV; Herschell Goldberg, VE3JBU; Harold J. Goldzung, Sr., WB2SFU; Bruce M. Gragg, AG4L; Ronald S. Grand, K6ZSB; Dennis L. Granger, WB9SIE; Philip B. Green, WB2RSD; Judson J. Greenwood, WD6AHJ; Roy Greenwood, WB5GZF; David Randolph Greer; Randolph W. Grigg, WB4KZI; David Paul Gross, WA4MOS; Gerald F. Gross, WA6POZ; Erik Jason Grossman; Richard P. Grotefend, W3ABW; Frank H. Grover II, K9CIT; Frank P. Gudicello, K2TVY; Carroll Neil Guin, Jr. WA4RBX; William J. Gunn; David O. Hachadorian, K6LL; James R. Hadlock, K7WA; Mark W. Hagestad, WA7ECU; Jerry Haigwood, WB7VIO; Orville E. Halley, WB5SQC; James C. Hamilton, W8BDG; Lester A. Handl, WB8NFD; Galen L. Haney, N9AN; Jacob Handwerker, W1FM; Julian Hanft, W2OTT; William P. Hannah, WA4QQI; Albert L. Hargis; WDØAFE; Robert B. Harrell, N4OL; Murray T. Harris, W5XH; Joe E. Harry, K5EUN; James A. Hart, Jr., N4SV; Richard D. Hartman, K7QQF; John P. Harton, N6QD; Tim Hastrup, WB6PZW; James Hathaway, W8SKC; Charles P. Hayes, WB9IFP; W. F. Haygood, Jr., WB7FCC; Roger M. Heard, WBØHOP; Jack D. Hegseth, K7DBU; John T. Heibel, WD8OMD; Paul R. Heller, W3CGJ/W3PH; Peter S. Hetzel, WD8IPI; William B. Hirst, Jr., W6IA; Charles I. Hodgson, W6HC; Burton C. Holden, W6MOJ; Albert W. Holland, K1PWD; James L. Holmes, WB8WNU; Robert L. Holt, WD4CEI; Joseph M. Hood, K2YA; Richard H. Houston, WØPK; Geoffry S. Howard, WØCG; Robert W. Howe, W7EP; Dale L. Howey, WB3DLN; Gary L. Huber, AB9M; Dale D. Huffington, AEØS; Michael S. Huhn, K3TEZ; Gordon P. Hulford; Clyde O. Hurlbert, W5CH; Donald W. Hussey, WA6LBO; William F. Hutchinson III, WB2GOJ; George D. Hvizdak, WB8RYE; Richard D. Imbordino, WD9AWE; Frank P. Insche, WA4KJA; Emory L. Jackson, K4KIZ; Lamert E. Jackson, WBØPVH; Laurence C. Jackson, Jr.; Arthur C. Jacobs, WA4LNK; Aubrey E. Jacobson, W9JOX; Richard C. Jaeger, K4IQJ; Thomas S. Jarzynski, WA8SIG; Carroll L. Jasper, W4NVV; Edward D. Jenkins, WB9EBJ; James A. Jenkins, AC4H; Phillip J. Jenkins, N6WC; Rodney W. Jensen, K7MA; James G. Jenson, K9BUI; Eugene Jernigan, WA4MRY; Leonard D. Jessup, WB1AOS; Dean C. Jeutter, K3GGN; Timothy T. Jobe, WB5FVT; Alexander C. Johnson, WB2EJV; Bruce R. Johnson, WB9UYG; Harry R. Johnson, WD8EIP; Lawrence R. Johnson, WB1FOF; Robert D. Johnson, WBØJFC; Terry Don Johnson, WD4FUE; W. Reeves Johnson, Jr., WB4SJL; Howard B. Jones, WA4ETX; Jack Jones, W3NTD; Leslie W. Jones, WB6JXV; Ned A. Jones, WD8CSP; Richard P. Jones, K5XE; Robert E. Jones, Jr., W3URJ; Vron A. Jones, WDØEFQ; Gary W. Kaehler, W7DCR; Alfonso A. Kalinauskas, Jr., WB8HVJ; Edward F. Kammer, WB8AXK; James V. Kane, K1VHS; Stephen D. Kappler, WBØYHN; William F. Kardas, N2BK; Steven G. Katz, WD8NWL; Danny Kayser, WA4MOM; Patrick D. Keating, WB8KWD; John M. Kell, W9LTU; George J. Keltner, Sr., K8SGM; Richard S. Kelvin, KØCCK; Claire A. Kennedy, Jr., W3MNU; Paul R. Kent, KØPK; Daniel P. Kern, WB6FDO; David L. Kersten, N8AUH; Dean C. Keune, WØMTG; Dallas L. Kibbe, WAØKJW; William H. Kibler, Jr., K8WMX; Roy J. Kidd, K4SLS; Allen Kier, WA2PEA; Lawrence D. Kiesel, WB7DVI; Nilan L. Kincaid, W6EIG; Ronald D. Klein, WØOSK; Paul L. Klingenmeier, W2FTY; John M. Knight, K5HGX; Michael Kolodchak, WA2DNW; Jordan Koltz, WITOU; Gordon C. Kordas, WB7DTX; Robert Y. Kosik, WB4YGM; Phillip D. Kothmann, N5AHI; Richard N. Kourey, WA8EHD; Joseph E. Kramer, Jr., W6HSR; Mac E. Kreuter, WØRNN; Albert G. Krieger, W8BXV; John T. Krofchok, W3VRB; Arnold Louis Krusemark, KØYVI; William J. Krusinski, K8IGA; William J. Kubisiak, K3YQA; Mike T. Kumagai, KB2CD; John M. LaFontaine, NØADJ; Edward E. LaPointe, W9JKH; James R. Lackore, AD9X; Ray W. Laffin, K6ERU; John E. Laird, WB6OXM; Linda L. Landers, WA6RWL; Douglas A. Lane, VE3EES; Douglas E. Langeland, WA6MFM; Daniel G. Langford, WA6VPJ; LeRoy D. Lambert, N6AXL; Charles D. Langlois, WB6RKP; Richard S. Larsen, K8MW; Robert M. Lathrop, W5ROE; Fred J. Lauridsen, WAØECN; Lester Lawrence, WB2AQU; James Randall Lawson, WA1SQY; Wayne LeBlanc, WAØNWR; Richard A. Lederman, K8SLB; Larry G. Ledford, KA4J; William F. Ledger, W3HBF; Carl E. Lee, W8TZJ; Victor K. H. Lee, WA2LYQ; Walter Y. Lee, WB2KNK; Scott A. Lehman, N9AG; T. W. Leithead, VE6CGY; Patrick J. Lennon, Jr., WA6QBT; Roy W. Lewallen, W7EL; Larry F. Lewis, KØRI; Fred Lieberman, N7AX; Edward C. Lebler, W8NRE; Roy E. Lilley, KØJJS; Fred Lindsey, WBØVHT; James W. Linthacum, W5LCN; John A. Linton, Jr., W8DKI; Kenneth F. Lloyd, WA3YTY; Robert F. G. Loll, WA6UPX; Michael M. Lombardo, W3FAE; Steven M. London, N2IC; Madison M. Long, N4MI; Reuben E. Long, K2OVH; Thomas C. Loock, K9VER; John F. Love, Jr., K5KNA; David E. Lucas, WB9GHI; Willis L. Lucas, WB4MSI; Kenneth R. Ludington, WB4RZW; John H. Lueck, KØSXR; John V. Lundberg, WØVU; Marion H. Lundrigan, W7OIH; Richard J. Lundstrom, WA7UEW; Paul Lux, K1PL; David C. Lynn, N9AGE; John M. Lyon, KA3BGY; Paul A. Maciel, WA1WXB; Melvin J. Malkove, K4DLR; Charles F. Mankus, WØVN; William C. March, WA2CER; Bruce E. Marsh, KH6JHH; Dan H. Marshall II, K5UTV; Mark Mason, WB7PIK; J. B. Mather, VE3HRM; Michael A. Maurer, WA6BMK; Max E. Maxwell, K5PP; Jack R. McCready, WA4FMS; James B. McDonald, WBØIQH; Patrick D. McFadden, WB8VWA; Loren R. McGinnis, WAØJCE; Larry R. McKay, K5MK; Richard W. McKay, K6VGP; John G. McLemore, WA4WOD; David L. McMecken, WD8IHN; R. H. McPhail, VE7AHZ; David D. Meacham, W6EMD; Douglas W. Medlock, WA4WKS; Carl H. Menne, WB9KYE; F. J. Mercer; Stephen F. Merchant, W6EMS; John W. Meredith, WØPQI; Albert A. Metz, WBØENY; Herbert A. Meyer, WB5CIA; Howard R. Miller, N2MM; James R. Miller, WBØQJE; Ralph P. Miller, W3FXE; William Miller, KØICM; William James Minor, Jr., WB4GTH; Richard T. Missman, WB5ORG; John D. Mitchell, W6XW; Robert W. Mitchell, W9IGB; Thomas F. Morehouse III, K4AEN/W1AZR; Toby D. Mort, W6PXD; Michael S. Mullaney, WA2IER; Norris J. Mundell, Sr., K2ARY; J. Edward Muns, WØYK; Joseph Mursec; Gerald L. Nadler, WA6FOU; Ladimer S. Nagurney, WA3EEC/WA1KIP; Laszlo Nagy, N4RQ; James C. Naugle, Jr., WB5QEV; James B. Navarre, K8DYZ; W. H. Near, VE3ACB; James B. Neiger, N6TJ; David W. Nelson, WB9NKH; Robert R. Nelson; Paul H. Newberry, Jr., W4YWX; Edward W. Nolte, W4CVT; Daniel E. Nordell, WAØLUV; Robert M. Norman, K7NWB; Robert D. O'Neal, WA4RJD; Gregory A. O'Neill, Jr., W8MGH; Ralph Vernon Oakes, KØCWD; Robert L. Oberhelman, WBØUNQ; Wallace H. Offutt, Jr., K8HVT; Arlen L. Olmsted, KØPFB; Otto Orive, WB7NBY; Walter W. Osborne, WA3IHW; Tommy Allen Otwell, WA4WXO; William V. Oxford; Frank M. Pacheco, WA6ZBI; Darrell D. Parham,

WB7BBH; Francis Passaro; Thomas M. Patten; Ronald Patterson, K6AYA; Wayne F. Paull, WB8YNS; Harvey A. Pearson, W6JGL/WB4IJX; Norman J. Pederson, WA7NSM; John L. Penrod, K3JP; William R. Peters, WB9MCZ; D. N. Peterson, VE5DP; Tommie L. Phelps, WA4EME; Ronald M. Philip, VE7BCP; George W. Phillips, WB2LXO; Bob Pinkham, WBØMTW; John P. Powell, WA5RWW; Daniel J. Pressede, WN8SAE; Michael D. Price, WA5ZWQ; Robert W. Prochorchik, WB1CCN; Harold E. Pruett, W4IGD; Donald M. Pyne, WD8EIO; Norbert G. Quella, Jr., WB9HVW; James G. Quiram, W9RML; Donald E. Quick, K7TDX; Larry L. Radcliffe, WD4AMZ; Pierre A. Radochonski, WA6VNM; L. H. Ragsdale; Edward Raichel, WA6MSW; Charles T. Ramey, WB8WHB; V. K. Ramsey, WØSBZ; Phillip A. Rand, W7XK; Kirk D. Rasmussen, WB7REO; Robert E. Ray, K3BS; Harold D. Reasoner, K5SXK; Paul Renwick, W8JYA; A. B. Rich, Jr., WA5YXS; John J. Richards, WA4IYB; Alfred Richardson, Jr., W1HVU; Harry C. Richmond, WB3BIC; Jerome P. Richmond, Jr., WB5PRV; Steven Ernest Riddle, WA4AFV; Robert W. Riley, K9AJP; Douglas Rittinger, VE5XH; S. Brooks Robertson, W4KOJ; Jean-Pierre Robitaille, VE2EKP; Ronald K. Rodewald, WA7TZD; Frank C. Rodski, K3MTT; Spurgeon G. Roscoe, VE1BC; Frank L. Rose, W3RO/W3OWU; Curtis O. Rosemann, WA7PNY; Daniel I. Rosenbaum, W2JCI; Karl Rosenbaum, N2KR; Paul H. Rossiter, WA6KMS; Claude Roy, VE3IVR; Barry J. Reuckert, WA9RMP; Harvey L. Sachau, WØXH; Michael J. Saladino, WB5LLI; Elwood H. Samson, Jr., WB4LKM; James C. Samuels, Jr., W3BG; David L. Scharra, WB8IUS; Lonnie L. Scheele, KØLS; Gerald D. Scheimberg, WD4GXN; Haskell R. Scheimberg, K8AT; Sam Schert, KØVLJ; Roger W. Schlagheck, W3US; Robert Schneider, N6MR; Richard F. Schoessow, WB9HSW; Eric Schott, WB3AGZ; Richard K. Scott, WB5UGD; Michael F. Seaver, WB5FJW; Edward A. Seay; Joel Seidman, W6UQC; Harold W. Seif, WD8CSB; Henry A. Sellers, W5UOS; Keith A. Seltzer, WB6YDM; Warren Semon, Jr., N7CW; William D. Sergeant, WA9BSL; Paul D. Sergi, WD8EFY; Keith M. Sevener, WB8OUT; Donald R. Shafer, K3COU; John A. Sharps, Jr., WB8RIH; Gerald A. Shaw, WA8UDX; James E. Shea, KB5FB; Vance E. Sheets, W8SGX; William C. Sheldon, WB6MJD; Robert L. Shenefman, WB8CCV; Danny L. Showalter, WB6POM; Kenneth F. Siadak, WB4DTI; Larry W. Sidor, WA9UZU; Paul S. Silinsky, K3PS; Richard G. Silverman, K8NKB; Roy V. Silvester; Francis M. Simonds, Jr., WB4FXD; Neil B. Sims, WA4MTX; William T. Skaggs, WB7BLD; Charles W. Skelton, Jr., K5ZAI; Eugene R. Smar, AD3F; Carter B. Smith, K6CWM; Donald R. Smith, WB2ZJF; Howard M. Smith, N5BP; James T. Smith, W8ESH; Lewis W. Smith, K6FA; Martin J. Smith, K6ZMI; Preston Harley Smith III WA4BSI; Robert C. B. Smith, WD9HTB; Vincent M. Smith, W5HOY; Donald Alan Snyder, WB9VFC; Steven D. Snyder, W9TI; Carl W. Somdahl, W7LYM; Kenneth J. Somers, Jr., WA2JVK; George L. Songer, K4TPO/W4YOD; William G. Sorg, Jr., WA4JNE; Denis M. Sousa, K8ACN; John E. Spangler, N3BH; James M. Spann, Jr., WB4SVH; George E. Speers, WA8WMS; Warren L. Spindler, K2IXN; Phillip Spinolo, Jr., WA4IPV; David L. Sprague, W6RHP; Robert C. Sprague, W1POP; Ashby W. Spratley, Jr., W5PGX; Wayne C. Spring, W6IRD; Chris Springer, W5ISS; Larry R. Stanton, N8US; Galen L. Steele, Jr., N5AMZ; William E. Steffey, WB9MOV; John R. Steinhoff, W5QGY; Brian M. Stephens, WA1HFC; E. D. Stephenson, W6MKM; William P. Stewart, WD5AEM; William D. Stigers, WD5IOW; Ricky M. Stillwell, WB5UFB; Tony A. Stitt, WA4KYS; Louie A. Stober, WA7GCS; Ronald J. Stockton, NØRR; Charles P. L. Stokes, WB4PVT; Eric D. Stoll, K2TO; Lynn D. Stolz, N8AJ; George C. Stone, Ph.D., WBØPJB; H. Fred Stone, W8LLY; Jack B. Storne, WA6CYR; J. Dean Stout, W2CDQ; David A. Stratton, WBØWKR; Charles H. Strauch, Jr., WA2MKY; John F. Stremme, WBØKHJ; Melvin L. Strommen, K9GB; George Sturgeon; Peter G. Stylianos, W6SRB; Joseph T. Subich, AD8I; Donald M. Sutherland; Kirk E. Swallow, W8QID; Peter O. Swanson, WA1TBA; Harold M. Switzer, W9YCF; Thomas W. Talley, W8HQQ; John W. Tarver, WA5FQA; Kenneth Tata, K1KT; Roger P. Tavella, K1BHY; George E. Taylor, WA4GUW; Grant D. Taylor, W1AIM; Terry A. Taylor, KL7HGJ; John E. Teles, WA9WDB; Kenneth D. Tendick, WA9FQT; Robert W. Ter Maat, WA5SCP; Edward E. Terrien, W5VAK; James TeStrake, WD4BYY; Donald B. Tener; James M Thomas, WB9FHV; William H. Thomas, WD4AFI; David L. Thompson, K4JRB; Dennis A. Thompson, WB6FUZ; Donald M. Thompson, W6SPT; Jim Thurber, K9KQ; Jack W. Thurman, WØRNE; Lloyd W. Thurman, Sr., KA9AYA; Michael W. Timmerman, WA4PCS; William R. Tippett, WØZV; John Lee Tolbert, Jr., N4AEO; William Toman, W8JPI; Charles A. Torbit, Jr., WD6GEV; Wallace H. Traver, Jr., W7UK; David A. Travers, W1FFH; Charles C. Trice, Jr., WA4RRB; Donald M. Trowbridge, WA2MBB; Louis Trubiani, WB3AAJ; Lauren J. Tudor, N6QP; Dalton H. Tunstill, WB4HOK; William C. Turner, Jr., WA4HAM; Robert C. Turvey, WD8EIR; Mark V. Tyler, W3GFJ; William H. Underwood, KA8AKR; Michael A. Urmie, WØSI; William G. Vanderhoof, WA2CRK; Bruce J. Veazie, N4LT; Tomas Villaverde, WB2FRM; Ronald A. Vivian, K6XE; Stephen L. Voelkel, K5SV; Edwin A. Vollrath, KØZGV; Charles P. Vorndran, WB2OZS; Bradford J. Voss, WB8ZPE; Paul S. Waechter, VE3BBB; Edwin E. Wagner, WA7RCR; Richard M. Wagner, K4MZE; Thomas F. Wagner, N1MM; William E. Waldschmidt, W9WA; Donald Walenta, WD5JYK; Frank W. Walker, W3MW; James V. Walker, W4RRE; Roy V. Wallace, Jr., WB4PSX; Lawrence E. Walter, Jr., K6IM; Albert T. Walters, Jr., K4QIP; Charles A. Walters, W9KR; Douglas G. Waltz, W5SBG; W. Ferrell Wamsley, Jr., W8LYX; Roger D. Ward, WA1ZRI; Frank G. Waring, III, AF4D; Robert F. Warren, K2OUB; Will E. Warren, WB5SZI; Dennis G. Warrick, WØXF; Jerrall V. Warwick, WB5PYD; James S. Washburn, W5ROX; Robert M. Wasylik, W8GYS; Micheal A. Waters, AA4MW; Daniel Waterstraat, WA2EKN; Andrew G. Watkins, WB4WCI/KL7ISB; Wayland M. Watts, WD4BPJ; Charles O. Webb, WB5UER; Edwin M. G. Webb, W9IPO; Robert F. Webb, WB6EUH; John H. Weber, Jr., WDØEWQ; Richard L. Wegman, WBØVGF; James R. Weigand, N9BW; Mark A. Weiss, K6HG; Stephen Weissman, WB2EVL; Linda L. Welch, WA7ZQV; W. Terry Welch, K4IQT; Alfred H. Wendelbo, Jr., WB6AMR; Roy W. Werner, K8VWX; George C. Werns, WA1UHH; Weldon E. Wheat, WA4MCB; Patrick J. Whelton, WD5DDI; E. Ann White, WB3HVE; Jerry A. White, WB3FPU; Ira F. White; M. Joel White, WA4YHX; Roger Dale Whitehead, WB4FDE; Jesse N. Whitfield, WB6KIC; James O. Whitson; Troy L. Wideman, AA6J; Niel Wiegand, WA5VLZ; John R. Wildman, WBØNLC; Robert E. Wiles, KAØBHJ; Alan Wilhite, KØHGR; Gordon G. Willard, WAØVNK; Alvestus Williams, Jr., WBØLCS; Franch Dale Williams, K3PUR; John R. Williams, K4BWS; R. Douglas Williams, III, WB4EGX; W. J. Williams, VE6BGU; Earl D. Wilson, Jr., K6GPB; Grady D. Wilson, WA4RGE; Raymond G. Wilson, WA6RPZ; Jay W. Wineberg, WB9GAW; Arnold L. Winters, KA2CAK; Gary B. Wit, WØLZ; Robert L. Witthar, WBØTPK; John P. Wolf, NØAOL; Orlen Leon Wolf, WA9TVH; Wells A. Woodley, III, WA8UKQ; James M. Wright, K5CDT; Michael T. Wright, N7MW; Steven C. Wuelfing, K8BZ; David W. Wygant, WAØUAS; Patsy K. Yamashiro, N6MS; Clarence E. York; Raymond E. Youmans, KØBOL; Leonard H. L. Young, KH6NFN; Robert B. Young, VE3CDJ; Gustave A. Zeissig, K2SJQ/KP4DIM; Lewis H. Zell, WA2PCF; Roger M. Ziegler, WA2ILB; Gary L. Zimmet, WA8FJ; Gregory Mark Zuk, WA4DNN; Edward Owen Zweiger, AD7D.

LIFE MEMBER APPLICANTS

From the minutes of Executive Committee meeting no. 374, April 21, 1979.List 2

Evillo Abreu, KH6DRT; William H. Altenberndt, WB8HSN; Richard E. Amundson, WAØJFS; Claude Jack Archer, WB4TUO; Willard C. Armintrout, W6TKM; F. Wayne Ashworth, K4CDZ/W4HG; Olan L. Atherton; Thomas F. Aug, WAØCCB; M. Claude Auger, VE2EWV; Dwight Aussieker, WD9HZK; Michael J. Baker, KL7HMO; Terry K. Barnett, K8EHE; Floyd R. Bauer, WAØLHZ; William R. Bauer, WB7PZJ; William J. Bayesa, WB2CCG; Robert Beiersdorf, WAØVKP; James P. Belanger, N1NH; Gerald S. Bernardo, WA7WMS; Melvin R. Berry, W7JEH; Robert Bertolozzi, N9BB; Ralph S. Bible, K4MIJ; Ronald W. Bishop, WAØHJU; Glen R. Blackburn, K7NQX; Billy A. Bloomhuff, K7NOF; Billy R. Boehme, WA5SOE; Guillermo A. Bonet, KP4BKY; Paxton Bowers, W9LSI; Lewis M. Brooks, WA4WII; Larry A. Brown, WA4SHK; Gilles G. Broy, Jr., WB5TIE; Clifford F. Brunk, Jr., K8BUW; Vernon D. Beurg, N6MG; John W. Bunnell, WA6SQK; Robert J. Burgermeister, WB9IJY; Jack J. Burke, WB5CMN; Stanley Burks, WD5BYE; Jeffrey P. Burmeister, WA8OMU; Douglas S. Burt, WB4UOU; Bobby G. Bynum, W4USM; Lou Caldwell, W7HX; Bruce W. Camphell, WA8OJR; Rick Cannada, WB4CVC; John E. Cannon, NØJC; Arthur M. Carlson, Jr., WB6RZM; Peter C. Carr, N4ASC; Leonard D. Cernuch, WD5CAY; William D. Chappell, WB8LPJ; William E. Charles, N4ADW; Ronald D. Childs, WDØCDJ; David C. Clark, Jr., K4PUV; Ted W. Colby, Jr., WØRA; Douglas A. Collings, VE1BAF; Robert A. Copella, WØPXY; Daniel W. Crowe, KB6AR; John R. Culleton, Jr., WB3CUM; Robert Thomas D'Amico, WB8WEN; R. Keith Dahlgren, WAØVEB; Steve Dahlgren, WBØYJH; Thomas F. Delano, WB1GDA; Robert J. DeLorenzo, WA6GGC; John G. DeMajo, K5HTZ; Larry A. DeSoto, WA5MLH/G5BWB; James E. Dokmo, KØFVF; Ronald E. Doolittle, Jr., K1EPX; William Doubleday; David N. Edger, KN5JBW; Joseph Eisenberg, WAØWRI; Philip H. Eisenberg, W6TBH; Charles Engelke, KC4L; Bruce E. Femmel, WB9ZME; Robert Ferguson, WB2RJN; James M. Ferrone, K2IR; Robert H. Fincutter, W9BJW; Thomas F. Fischel, KØPJG; John J. Fleet II, WA5OHG; James H. Ford, N6JF; James E. Fordham, WA4MYF; Barry L. Fox, WB9UCE; Richard Frankie, WA6BNZ; Stephen A. Friedman, WBØCHS; Gabriel Fritzen, VE3ILX; Carl A. Gauzens, W4DTJ; Kermit E. Gay, K4XI; James F. Gerritz, WA4FMA; Richard Gibbs, WB6RCP; Donald E. Gilbeau, N6OZ; Robert M. Glorioso, W1IS; Charles W. Gonzales, Jr., WA3VBJ; Richard L. Gorsuch, WB5TWF; James T. Gouras, WB6JOS; Robert Govoni, AE1P; Larry M. Gray, K5OUK; Clifford C. Green, WB4FGK; Carol Greenfield, WD8JEI; Henry B. Gregory, K7CEG; Robert W. Gregory, K7CEG; Phil Grippin, WD5HTB; Martin Grozinski, Jr., WB2FZS; Lawrence Gruner; Randy Gutentag, WA2RMZ; Michael D. Hagen, WØOQ; Carver F. Hall, WBØOOO; Richard Hall, WB4OEM; Lee Paul Hallin, WB7SND; Wallace W. Hammel, Jr., WA4RWO; Allan B. Hampshire, VE7OD; Robert F. Hanlon, WB4CYD; Eric R. Hardman, KØUR; William Mark Harger, WB4TOU; William H. Harrison, W5USP/DA1HW; John D. Hartman, WA3ZBI; Warren A. Hartman, Jr., WA1YFZ; Earl C. Harvey, Jr., KA5BGI; J. H. Harwood, W6QBD; Everett Hawley, K8JND; Gilbert L. Heller, W3CGZ; Marvin L. Helman, KØHUZ; Eiland Helms, W4WNY; Henry B. Henderson, Jr., WA4YRJ; Jay Hennigan, WB6RDV; Alfred J. Herrmann, WB2LGA; Kurt P. Herzog, W7IAL; Kenneth M. Hinkle, WA4WSE; William R. Hite, K4RHD; William D. Hocutt III, KC4P; David H. Hoehake, WB8RGI; David C. Hodge, AA6RX; Van Hodgden, K3ZMI; George R. Holbert, W5SFI; Paul E. Holmes, WBØRRE; John C. Howard, Jr., K4RKN; Theodore A. Huf, K4NTA; Jack L. Hunter, Jr., WB7ADC; Robert F. Hutchinson, W9LQI; Edwin J. Irizarry, KP4DNY; Nancy Iscaro, WA2GKC; Don Jarvis, VE2DWG; Weston H. Jenkins, W2WVL; Donald A. Johnson, Jr., N4DJ; Larry R. Johnson, K7LJ; William C. Johnson, WA7UYS; Hal B. Johnston, WA7GXM; Glen Scott Johnstone, WB8SIV; Patrick M. Jones, WA6EHM; Ragnar Julin, W7IUF; Daryl D. Juve, WA6IGL; Roger B. Keeney, W8LHL; Michael R. Keller, WA2LTS; Glen E. Kelly, WB6VQK; Kevin P. Kelly, WA1YHV; John P. Kern, WD8KQU; Billy Joe Kidd, WB5OYK; Stanley M. Kimel, WB6BIS; Thomas E. Knott, WA8LTX; Hank Kobler, K2ZEG; Henry D. Krabbenschmidt, K6RIK; Robert W. Kremkau, Jr., WD4FAL; Paul C. Kroll II, K2ZVA; Michael S. Kroot, K9BHM; Douglas K. Krucinski, WD8BJY; Julius M. Kulcsar, K8JK; Jasper E. Kump, W5SYR; Lewis Creede Lambard, WA7KPK; Frederick E. Lass, K2TR; Donald Lawrence, VE5LQ; Frank William Layton, KA6CPR; Steven Lazar, WB2NCA; William John Leahy, KØZL; Robert E. Learned; Peter K. Leather, AE2D; Milan Leggett, W5LRI/WA6TXR; Russ Leimbach, WBØTQW; Dick LeMassena, W6KH; Thomas D. Lesher, K3NCU; Gary L. Levy, WA8HPY; William G. Levy, WA2RUD/5Z4PI; Gary E. Lieberg, K7NLG; David R. Lievsay, K7UUH; Jeffrey R. Light, K9ISP/4Z4KT; Virgil K. Linke, Jr., WØMVR; Walter R. Lock, K9QMM; Larry R. Lockard, N7FM; Michael T. Logan, WA4FFS; George M. Long, WB4MLM; Carroll W. Lufcy, W3OU; Richard Maley, W1ZU; Robert Mallon, WA4ZDY; Bruce A. Martin, WB6LQJ; Paul B. Martin, WA3YZL; George S. Masny, WB2ZGF; Kevin Mathison, WB8AIZ; Rafael A. Matias, KP4GO; W. Wesley Matucha, WA9WDE; Edward W. Maxwell, NØAQZ; Hugh W. McCully, VE3AYR; Richard J. McGlinn, KØZSG; Michael L. McKay, WB4SDH; Thoran W. Menser, WB3CGK; William E. Mixon, K5SVD; Richard F. Mohr, WB6RAJ; Howard S. Moncton, W2GGQ; Kenneth J. Mongelluzzo, WA2MFT; Ronald L. Morefield, W8ILC; William C. Munday, VE5WM; Knut J. Myhre, LA1IF/W6; Stuart Nattboy, K2MSO; George Barr Newcomer, WA3MXG; Monte T. Nichols, KA5CXR; Thomas J. Norman, WA4AIV; Robert A. Norvell, WD8QCF; J. J. Nugnet, WB7EJM; James D. Nye; M. R. Oates, Jr., AA4VK; James A. O'Connor, K6SEX; Dennis O'Quinn, K4CXX; Eddie Oliver, Jr., WD4MNY; A. Irving Osser, WA6GOY; Robert B. Ostman, WB9OTN; Philip Ott, WAØNLK; Robert L. Packett, WD8KNH; John A. Pagliarini, Jr., W1YR; Robert A. Payne, K1BFG; Ron Pensa, WA3WBC; Frank Peronace, Jr., WA1YID; McCarroll Petersen, W7WKF; Bruce F. Petrarca, WBØOFC; Richard C. Pfohl, K6GSG; Harry A. Pierce, W1SXU; J. C. Place; H. E. Plet-

cher, Jr., WA2ZHU; Lynn C. Pochert, WB7ORM; Lawrence D. Pope, WB6JUC; Dale K. Porray, AD7K; Robert R. Potter, W4OKZ/W6UGF; Leonard Prescott, WA9CHG/KM6FC; Clayton W. Priest, Jr., WA6PVZ; Sterling D. Prophet, W8LZT; John Przybyszewski, W1HJO; Henry S. Psomas, WB6WDX; J. T. Pulliam, Jr., WB5OMB; James L. Purdie, WA0OBG; Kenneth M. Purdy, Jr., WB5RAQ; Martin Pyfer, WA1YVY; Thomas P. Quinn, WA4QQS; Greg H. Rainwater, WA7JEG; Lee Rautenberg, WA2HDL; Sidney J. Reade, W0WWH; Scott Renz, WB8JLT; Manuel Reyes-Otalora, WD4BQU; Amos R. Rhames, K4WQS; James L. Rice, WD5DFM; Larry R. Ridgeway, WB8QPU; Jim C. Ries, W6FNW; William C. Robbins, WA8ODU; James D. Robertson, K7KBD; Marc Robins, WA6NJR; Dennis E. Robinson, WA7YHT; Russell A. Robinson, WB3FQI; David I. Rodman, WA2FYA; Frank A. Romeo, Jr., W8MAR; Jim Roseman, WB0TCF; Kimble Ross, N5AWW; Hoyt S. Rountree, W1WN; Paul J. Rykaceski, WA3LCY; Michael J. Sacco, WA0UCV; K. M. Samuelson, WB8IEA; Franklin A. Sanor, WA8WHP; John Santoian, K1AUI; James D. Sasser, N4BCN; John L. Satterlee, K9LLT; Timothy A. Savage, WA4PTZ; William Schmall, WD6AFC; Kent R. Schmidt, Sr., KB4BW; Jonathan F. Schoemann, WA9LNA; John F. Schoengart, K7KPB; Robert L. Schrader, K0PVI; William B. Schuster; K. L. Schwertfeger, WD0CKB; John D. Scott, VE3EZU; James R. Seeley, WB8MTD; Steven R. Selley; Lynn Shaffer, K6MZL; Eddie V. Sheeks III, K5BS; Phil Simms, WB5LCM; Glen R. Shepherd, Jr., WB6AUQ; Donald E. Shipes, WB7OHC; Geraldine "Kittie" Shipes, WB7OHB; Landon E. Simpson, K4JCS; Steven S. Simpson, WN6YKH; Steven W. Siter, K1WGN; John P. Skubick, K8JS; Carroll E. Smith, K5DM; Owen W. Smith, WA3GNO; Robert W. Smith, WB4GAO; Peter Sobel, W1GIQ; John H. Spanton; Floyd L. Spencer, K5FS; Dennis J. Spranger, K9AEG; Alpheus H. Stakely, K4WC; Pete Stark, KB8DA; Marc Steuer, N1UN; David A. Stevens, VE3AZJ; Paul A. Stoner, W3FO; R. W. Straub, WD4KUI; Curtis R. Swenson, K0CVD; Robert A. Switzer, W6HAT; Kenneth W. Tabor, K2QQN; Charles E. Tallman, WB2GIP; John Tafft, WA2EGZ; John H. Thomas III, W3FAF; Henry E. Thompson; M. G. Throgmorton, WA9SCN; Patrick A. Thurman, WA9NGP; Hilton R. Tilley, Sr., WA4NIG; Randall W. Tonne, WB8TAH; Martin Tourigny; Ralph P. Trapper, WA9TWW; John R. Turner, WA3CDH; James E. Tweddle, WB9YNZ; Terry W. Tyler, K4AZL; James S. Ussailis, W1EQO; Francis R. Vadney, W2OVY/WA4HPY; Louis M. Valoppi, WA2SPA; Glenn T. Van Benschoten, K0SE; LeMar Van Heuvein, W0VH; J. Edward Vaughn, K7YLO; James Vernor, WA8SGR; William Waller, WD2HLM; John R. Walter, AA9Q; Charles S. Waltman, N0CW; Ellsworth F. Warmouth, Jr., WB9LGG/KL7IXC; Charles J. Waugh, K3NSN; James M. Weiler, WB3IMW; Jeffrey White, WD8OXK; Richard C. White, WB0WLX; Richard A. Whiting, W0TN/K6IYF; Clyde R. Wiggins, WB4GLI; David D. Wilcox, WB8YQX; Douglass F. Wiles, WB4WBQ; James F. Willard, KA4GWQ; Rush J. Williams, WB6LXG; Robert S. Winslow, K1LAG; David B. Woodson, Jr., WD4IDW; O. P. Yant III, WB5SKI; Richard T. Zdon, WA6QBN; J. David Zobel, WB2UTQ; Harold G. Zoll, W7QMW.

LIFE MEMBER APPLICANTS
July 17, 1979

Adrian W. Ainger, WD8MYF; Douglas W. Arntson, WB0HRX; Coca Astey; Robert Athanasiou; Charles Bailey, VE3KA; John W. Bailey, KB5AO; Donald M. Balsamo, WA6AJP; James D. Bartlett, Jr., K1TX; Allan R. Batteiger, WB5QNG; Thomas A. Bell, W1XS; John R. Benenson, WA4FPT; John W. Bennett, WD4HZO; Michael P. Berck, WA7OMP; Randy P. Berger, WB9QQA; Dennis J. Bird, W1GWA; James J. Bishop, Jr., WD4MFF; Sylvan C. Bloch, W5NIV/WA4DTG; Robert Botwin, N2FC; James D. Branum, WB6PFJ; Gary W. Bright, WA9WFK; David Brindle, K1WER; John W. Brosnahan, W0UN; Gary Brown, WB9POF; Ronald D. Brown, WB4TAK; Henry T. Brugsch; Joe Buckhaults, WD0BRT; Virginia Buckhaults, WD0BSB; Richard D. Burgett, III, N5RB; Patrick J. Burns, W6GUE; Paul J. Caputo, K1PKZ; Randall K. Carlson, WB0JJX; Earl I. Carmine, K6YL; Mark Chamberlin, WB2PKO; Charles Childress, W0MNK; James D. Clark, WA7JYT; Leonard H. Clark, W7LQY; C. Tatt Clenney, WD4GQL; Linda S. Cleveland, WB4CTR; Michael A. Conley, K6TCF; Jose L. Cordero, W5UEQ; Robert C. Couger, W6KPS; Peggy L. Counsman, WB4HTT; J. G. Courtney, K2UAT; Craig Coyle, VE3HVM; Robert C. Crawford, K8VFV; Fred D. Crowner, WD8OTO; William E. Crump, Jr., W8WI; John S. Curry, K4QDN; Jay M. Davis, WA6TBP; Andrew P. Denmark, WD4MIA; W. B. Ditmore, W5QNT; David W. Doremus, WA2SES; Gerald C. Dorman, K2GD; Lynn A. Doyal; William L. Eastburn, K3OZM; Edward C. Edwards, Jr., WA4SGH; George A. Engeman, WA6IMF; A. Browne Evans; Gary A. Fish, WB2UDS; William H. Flaherty, Jr., W1GY; Rita C. Fleming, KA8EJM; Dewayne Flint, WB0SSW; Lewis R. Friedman, K2RTM; Richard A. Frohman, KA4DGC; William M. Gaines, AD8P; Lloyd A. Gatling, WA4HMT; Peter H. Gillies, W6SBK; Mark A. Goecke, WB5VUY; Bill Gore, WB0FCS; Brad A. Greenspan, KA2FFC; Nelson Lee Griesheimer, AG4E; John S. Gustin, K1PZL; Raymond J. Harrington, W3MXJ; Herbert A. Harrison, KA4ANU; Davis A. Helton, W0PM; Bruce A. Heimlich, W2RU; Steve Hendrix, KA0DEK; Philip C. Henry, WA4WPW; Elizabeth A. Henson, WB5SPG; H. David Heumann, N7NR; William C. Higdon, WA5CGF; William H. Hock, WB0YLI; Dick A. Holihan, WD8KEN; William D. Hubbard, WD8MKG; David J. Hutchison, WB8LZD; John C. Irvin III, W4TSZ; Joan Jellison, WB8PAV; Harold E. Jones, WD4AMD; Paul A. Kasley, WA9VYB; Thomas Koppel, YV5FXZ; Christian Koppel, YV5GAM; Gary T. Kozinski, K1GK; Marco John Kreklo, VE7CKQ; Bob Kriegseis, WB9VGO; Hellmut Landolt, DF5FE; Jerome R. LeMon, N6JN; Spencer E. Leifheit, W7VC; George W. Luckin, W9KAC; Robert T. Main, KB4CL; Marc D. Manis, K5NO; Socrates A. Martinez, Jr., WB3JLF; Dan W. Marvin, WB6LCY; Fred Matos, W3ICM; Thomas Matus, WB1ACZ; Mary M. Maxwell, N0AQC; B. Roland McElroy, K4OCI; Stuart A. McFayden, K1QEN; Shizuka Minakawa, JH1EIG; Albert H. Morris, Jr., WB8FEQ; Sterling P. Newberry, K1XJ; David C. Norton, AB9O; William S. Opalka, WB1ECB; Vernon E. Orme, Jr.; Leif Ottosen, OZ1LO; Duane S. Park, WA6EIK; Martin J. Peshka, III, NIMP; Henry C. Pfister, Jr., WA6YLX; Lewis A. Pifer, Jr., KA9CDD; Franklin J. Phillips, AB5J; Forest J. Pinkerton, K4US; Walter N. Piper, W6SSC; Terry A. Posey, N4KT; Thomas L. Powler, WD8DBD; Jack E. Rathmell, WB4YTW; Hazard E. Reeves, K2GL; Edward C. Reinholtz, W6OSV; Ronald Remus, WB9PTA; Henry A. Riekels, WA8GVK; William A. Roberts, W6GSF; Kenneth Frank Robinson, WB4BMY; Patricia B. Rowe, KA4DWF; Harold C. Ryle, Jr., K8VBN; Jan Sager, WB9RKJ; Eric A. Santon, WB0PYD; Marshall A. Sax, WB9DNW; Cathy L. Scheele, K0LS; John D. Scheih, K3LWP; William T. Schick, WA6YSS; John R. Schiller, W5VTC; James J. Sell; Robert M. Shafer, VE2DHV; Robert L. Shohet, WB2SJG; Albert R. Sieg; Michael R. Sigelman, K0BUD; James L. Simpson, AD7N; Sue A. Simpson, N8AJU; Maurice Smith, WB0OKK; Dennis A. Sokol, W0JX/K9QNC; Lee A. Stanton, KA8AAU; Arthur J. Stattelman, W4MCY; Ken Steen; Sam E. Stewart, W5BKY; John E. Talipsky, K1AY; Jean E. Thesman, WB7OWG; David Allen Thurber; Morton R. Toussaint, N7AKQ; Bruno J. Trenkler, Jr., WA4HZT; Ellis L. Tucker, W7FHI; George D. Tucker; J. E. Turner, WA6PRP; Chester L. Uncapher, W8HA; Tim Vandagriff, WA5YOM; Basil G. Vice, WB4SVY; Richard E. Walton, K7CHY; Raymond B. Wangler, W5EDZ; Kenneth D. Warren, WB5OOH; Clyde Q. Webb, WB6CEC; Andrew C. Weiss, Jr., K3JDU; Richard D. Welch, WD4EGO; Leslie S. Wells, K4FFN; Richard G. Wells, K8SCI; Roger H. Wester, N6AVH; Robert E. Wick, W5HAQ; Frances D. Widmann, WA2NBE; Pieter Wielsma, PA0PWL; Thomas Wilson, VE3DHT; William M. Wray, K4BPH; Larry G. Wright, N4QY; J. Terrill Young, K4KJP.

LIFE MEMBERSHIP TOTALS

Charter Life Members	282
Full Life Members	12,717
Full Blind Life Members	36
Full Family Life Members	147
Associate Life Members	429
Associate Blind Life Members	2
Associate Family Life Members	7
Total Elected Life Members	13,620
Full Quarterly Life Members	2,591
Associate Quarterly Life Members	128
Total Quarterly Life Members	2,719
Total of Elected and Quarterly Life Members	16,339
Life Members being elected 7/17/79	340

LIFE MEMBER APPLICANTS
July 17, 1979
List 2

William A. Aiken, WB7AOB; Nels J. Anderson, K1UR; Phillip Arthur Bates, VE6CCK; Robert L. Baty, WB9PJT; Kenneth J. Bigelow, WB3EXX; Donald C. Blenden, WB0KUW; Robert Bloompott, WA9WZZ; Halsey C. Burke, WB6ZIT; Jay E. Camac, WB4QBB; George H. Carle, N7ARY; Willis H. Carrier, WA6HVX; Richard C. Carter, WB0IZY; Wayne A. Cheso, WB6GZT; Tom W. Childers, N5GE; Phil Clements, K5PC; William D. Colvin, WA3UDZ; Will A. Connelly, W6QID/W4AUY; Alex Cunningham, VE3CEB; John Paul Devereaux, WA3SMA; Ronald L. Dieselberg, W8PCK; Alan J. Donziger, N3AD; Robert E. Dorchuck, WA6QBD; Robert W. Eslaire, W9UI; Richard D. Ethington, WA0PZU; William B. Fageol, WD9DSU; Faniero Fiorini, WD9GJC; James L. Foelschow, WB6BEA; C. L. Fogleman, WB5WON; Emmett F. Freitas, AE6Z; Reidar G. Gabrielson, W7QEK; Jerry C. Garrett, W4FVV; Raymond P. Gascon, W7SJS; S. Marion Gaston, Jr., WB5HGQ; Ronald C. Gater, K0PNZ; George J. Gerard, AD2G; Billy Joe Gillespie, WB4FEV; Albert Goehring, KA4DHY; William Y. Golden, K9WG; Manuel R. Gonzalez, W2BFI; James F. Gordon, W6UCP; Louis S. Grand, K6TJX; Rex P. Greenwell, K0KP; Frank K. Griffin, WB4WUY; Arthur E. Hadden, WA4CEM; David J. Hahn, WB0UDM; Alan H. Hall, WA4IER; Ronald D. Halstead, WA6EKG; Gail B. Hamilton, Jr., WB8MZO; Dennis B. Haney, K7RHD; Ernest L. Hardin, Jr., W9ICK; David R. Harper, WB0WSK; Jan H. Harvey, WA6MGK; Lloyd K. Hashimoto, WA7SVH; Ronald E. Henderson, K3NFS; Ballard C. Herald, WA8MYX; Bob Hill, W4NIM; R. B. Hintenach, W2DNL; Yukio Hiramatsu, WB6MJA; Boyce G. Hoefer, WB0UWZ; Eugene D. Hoffman, WD8CVS; Edgar W. Hollingsworth, KB4LD; Paul F. Hultquist, WB0SEQ; Kenneth R. Huntsman, WA4OLJ; Ted B. Jahn II, K4YLX; D. R. Jenkins, VE7IU; Walter J. Johnson, Jr., W6MZQ/WA6NGB; Gordon G. Johnston, WB2PCL; Arnold J. Kalan, WB6OJB; John T. Kalenda, N9ALV; Robert Kawka, WB6ZDZ; Martin C. Kelsey, Jr., WD9ASU; Charles W. Kempe, VP9II; Edwin T. Kephart, W2SPV; Gordon R. Keifer, K6UFT; William T. Kiekenapp, K4GTE; Charles T. King, K7IJS; David R. Kishler, WB8ODK; J. M. Klausner, WD8KYK; Larry E. Kligman; Charles F. Kramer III; Lynn S. Kuluva, K0IMI; A. Ray LaRue, W4BYG; Brent J. Larson, WD0CCQ; Craig Randall Ledo, WA6RWP; Samuel C. Lester, WB5VML; J. Edward Lewis, WB2PRY; Melvin C. Lillicotch, WB7PFV; John F. Limbach, K8NN; Robert Livingston; Joseph F. Long, WA4QIL; Marvin M. Lowman, WB8NQB; John R. MacDonald, WD4COL; John E. Maier, WB8AUV; L. C. Maple, WB0ZAX; Elmer L. Marting, Jr., W0SFK; Robert Matthews, Jr., WB1ALL; Charles L. McCollum, W5PTJ; James A. McDowell, WN4FDI; Albert Meinster, K3EAX; Lawrence T. Mello, W1VQP; George A. Milburn, Jr., WA4PJW; Daniel P. Miller, WB7SXC; Bob Moelius, KA5EBL; Richard J. Morel, WB5CDN; David R. Morgan; Doyle W. Morgan, K5HMB; Roger L. Moss, W8UK; James Myers, WA6ICB; Alfred F. Nelson, Jr., K8OQB; James C. O'Connell, W9WU; Donald M. Patterson; Ralph E. Patterson, K8MHU; Ronald Pauze, WA2JVJ; William Glenn Pearson, WA4LBT; Frank Pezzio, N6ASZ; Robert Piekarski, WB9LJW; Walter H. Post, WA2TGJ; Paul C. Randolph, WB3HHO; Chris R. Read, WD9BGQ; Richard L. Rice, WD8LWI; George W. Richardson, WB6HQZ; Frank Rinaldo; Donald J. Risavy, Jr., WA4GYR; Charles O. Roberts, WB0HLW; Philip M. Roberts, K8UNV; Richard C. Roberts, W3TWQ; Jim Romelfanger, K9ZZ; James M. Roop, K0BI; Basil D. Rose, WB6HMB; P. A. Rosenberg, K6LXH; John C. Rumsey, WD5GOD; Charles O. Rustin, W6JLW; Richard P. San Antonio, K1MD; Stewart W. Schneller, K4JOP; James R. Sjoberg, Jr., AG9S; James V. Staples, WA4VCV; Robert Steinberg, WA2KHR; Anthony K. Straight; David J. Strout, Sr., W2YC; Robert S. Tarleton, WA2ICV; Don P. Tate, WD8JLK; William H. Thompson, Jr., K3UTQ; David S. Toki, WB2ACF; Fabius Toole, Jr., N4EZ; Ronald B. Twelves, W5QOZ; Marcy V. Ward, AA4KY; Charles A. Watson, WB4RZG; Charlie Edward Welcome, WB1CDQ; David L. Wheeler, WB9UUE; Clifford H. White, WB5DYA; James B. Wilhanks III, WA5DNR; Ned Wilde, W7DMH; Jesse M. Wilson, W8LDQ; Robert M. Wilson, WB5YWJ; Eugene F. Withrow; Bob Wolbert, N6IP; John C. Woodward II, WB4PWB; Richard T. Yerian, WB8WGD; Paul J. Yugovich, W3PEO; Joseph Zelle, W8FAZ.

QST Abbreviations

This annual updated list of abbreviations and symbols found in QST and other League publications will come in handy throughout the year. Why not clip it out for easy reference?

A — ampere
ac — alternating current
A/D — analog-to-digital
af — audio frequency
afc — automatic frequency control
afsk — audio frequency-shift keying
agc — automatic gain control
alc — automatic load (or level) control
a-m — amplitude modulation
A.M. — morning
AMSAT — Radio Amateur Satellite Corporation
anl — automatic noise limiter
AOS — acquisition of signal
ARC — Amateur Radio Club
ARES — Amateur Radio Emergency System
ARPSC — Amateur Radio Public Service Corps
a.s.a.p. — as soon as possible
ANSCII — American National Standard Code for Information Interchange (sometimes appears as ASCII)
ASSC — Amateur Satellite Service Council
ATV — amateur television
avc — automatic volume control
AWG — American wire gauge
az-el — azimuth-elevation

b — byte; a group of bits or binary digits, usually eight
bc — broadcast
BCD — binary-coded decimal
bci — broadcast interference
bcl — broadcast listener
BFO — beat-frequency oscillator
BPL — Brass Pounders League

CAC — Contest Advisory Committee
CB — citizens band
CCIR — International Radio Consultative Committee
CCS — constant current source
ccw — counterclockwise
c.d. — civil defense
CD — Communications Department (ARRL)
CMOS or COSMOS — complimentary-symmetry metal-oxide semiconductor
coax — coaxial cable or connector
COR — carrier-operated relay
CP — code proficiency (award)
CRT — cathode-ray tube
ct — center tap
cw — continuous wave (code); clockwise

D/A — digital-to-analog
dB — decibel
dBd — antenna gain referenced to a dipole
dBi — antenna gain referenced to isotropic; a dipole has a gain of 2.14 dBi
dBm — decibel referred to 1 milliwatt
dc — direct current
DF — direction finder
DIP — dual in-line package, 14 or 16 pins

DOC — Department of Communications (Canada)
dpdt — double-pole double-throw
dpst — double-pole single-throw
dsb — double sideband
DTL — diode-transistor logic
DVM — digital voltmeter
DX — long distance
DXAC — DX Advisory Committee
DXCC — DX Century Club

EC — emergency coordinator
ECAC — Emergency Communications Advisory Committee
ECL — emitter-coupled logic
ECO — electron-coupled oscillator
EME — earth-moon-earth (moon-bounce)
emf — electromotive force (voltage)
EMP — electrmagnetic pulse
EOC — emergency operations center
EUV — extreme ultraviolet radiation
EQX — equator crossing
erp — effective radiated power

f — frequency
F — farad
FAX — facsimile
FCC — Federal Communications Commission
FD — Field Day
FET — field-effect transistor
FF — flip-flop
fm — frequency modulation
FMT — frequency measuring test
fot — optimum working frequency
fsk — frequency-shift keying

GaAs FET — gallium arsenide field-effect transistor
GDO — grip-dip or gate-dip oscillator
GHz — gigahertz
gnd — ground

H — henry
HAAT — height above average terrain
hf — high frequency
HFO — heterodyne frequency oscillator
hpf — highest possible frequency
Hz — hertz

IARU — International Amateur Radio Union
IC — integrated circuit
i-d — identification, identifier
ID — inside diameter
i-f — intermediate frequency
IMD — inter-modulation distortion
in./s — inches per second
IRC — international reply coupon
ITU — International Telecommunication Union
IW — Intruder Watch

j — indicator for reactive component of an impedance (+j inductive; −j capacitive)
JAMSAT — Japan AMSAT Association
JFET — junction field-effect transistor

K — sometimes used alone in place of kb (kilobyte)
k — kilo, 1000
kHz — kilohertz
km/h — kilometers per hour
kW — kilowatt

LCD — liquid crystal display
LED — light-emitting diode
lf — low frequency
lhcp — left-hand circular polarization
LMO — linear master oscillator
LO — local oscillator
LO — League Official
Loran — long-range navigation
LOS — loss of signal
lp — log periodic
lsb — lower sideband
LSB — least significant bit
LSI — large-scale integration
luf — lowest usable frequency

m — meter (distance or band)
mA — milliampere

mAh — milliampere hour
MARS — Military Affiliate Radio System
mf — medium frequency
mH — millihenry
MHz — megahertz
mic — microphone
mini-DIP — dual in-line package, 8 pins
mi/h — miles per hour
mi/s — miles per second
mix — mixer
mm — millimeter
MO — master oscillator
MOSFET — metal-oxide semiconductor field-effect transistor
MOX — manually operated switching
ms — millisecond
m.s. — meteor scatter
m/s — meters per second
MSB — most significant bit
MSI — medium-scale integration
MSTV — medium-scan TV
muf — maximum usable frequency
MUX — multiplex; multiplexer
mV — millivolt
mW — milliwatt

nbfm — narrow-band frequency modulation
nbvm — narrow-band voice modulation
n.c. — no connection
NC — normally closed
NCS — net control station
NF — noise figure
NM — net manager
NO — normally open
NOI — notice of Inquiry
npn — negative-positive-negative
NPRM — Notice of Proposed Rule Making
NR — Novice Roundup (contest)
ns — nanosecond
NTS — National Traffic System (ARRL)

O7 — OSCAR 7
O8 — OSCAR 8
OBS — official bulletin station
OD — outside diameter
OES — official emergency station
OO — official observer
op amp — operational amplifier
osc — oscillator
OSCAR — Orbiting Satellite Carrying Amateur Radio
OTS — official traffic station
OVS — official vhf station
oz — ounce

PA — power amplifier
pc — printed or etched circuit
PEP — peak-envelope power
PEV — peak-envelope voltage
pF — picofarad
PIV — peak-inverse voltage
pk — peak
pk-pk — peak-to-peak
PL — private line
PLL — phase-locked loop
pm — phase modulation
P.M. — afternoon/night
pnp — positive-negative-positive
pot — potentiometer
ppd. — postpaid
PRA — public relations assistant
PRAC — Public Relations Advisory Committee
PRV — peak-reverse-voltage
PSHR — Public Service Honor Roll
psk — phase-shift keying
PTO — permeability-tuned oscillator
PTT — push-to-talk

QRP — low power

RACES — Radio Amateur Civil Emergency Service
R/C — radio control
RCC — Rag Chewers Club
rcvr — receiver
rf — radio frequency
rfc — radio-frequency choke
RFI — radio-frequency interference
rhcp — right-hand circular polarization
RIT — receiver incremental tuning
RM — route manager
RM-(number) — FCC rulemaking
rms — root-mean-square
RO — radio officer (c.d.)
ROM — read-only memory
RS — Radiosport Satellite
RST — readability-strength-tone
RTL — resistor-transistor logic
RTTY — radiotelephone

s — second
s.a.e. — self-addressed envelope
s.a.s.e. — stamped s.a.e.
SCM — section communications manager
SCR — silicon-controlled rectifier
SEC — section emergency coordinator
SET — simulated emergency test
shf — super-high frequency
S.M. — silver mica (capacitor)
SNR — signal-to-noise ratio
spdt — single-pole double throw
spst — single-pole single throw
ssb — single sideband
SSC — AMSAT Phase III-A Special Service Channels
SSTV — slow-scan TV
STM — section traffic manager
SWL — shortwave listener
SWR — standing-wave ratio
sync — synchronous, synchronizing
SYNCART — synchronous amateur radio transponder

TA — technical advisor
TCA — time of closest approach
TCC — Transcontinental Corps
TD — transmitting distributor
TE — transequatorial (propagation)
tfc — traffic
tpi — turns per inch
T-R — transmit-receive
T-T — Touch-Tone, trademark of Bell Telephone Co.
TTL or T²l — transistor-transistor logic
TTY — teletypewriter (from Teletype, trademark of Teletype Corp.)
TV — television
TVI — television interference

uhf — ultra-high frequency
UJT — unijunction transistor
UOSAT — proposed University of Surrey, educational/research satellite
usb — upper sideband
UTC — coordinated universal time

V — volt; voltage
VCO — voltage-controlled oscillator
VCXO — voltage-controlled crystal oscillator
VFO — variable frequency oscillator
vhf — very high frequency
vlf — very low frequency
VOM — volt-ohm-milliammeter
VOX — voice-operated break-in
VR — voltage regulator
VRAC — VHF Repeater Advisory Committee
VSWR — voltage standing-wave ratio
VTVM — vacuum-tube oscillator
VUAC — VHF-UHF Advisory Committee
VXO — variable crystal oscillator

W — watt
WAC — worked all continents
WARC — World Administrative Radio Conference
WAS — worked all states
wbfm — wide-band fm
wpm — words per minute
ww — wire wound

xcvr — transceiver
xmtr — transmitter
xtal — crystal

Z — see UTC

°C — degrees Celsius
°F — degrees Fahrenheit
°K — degrees Kelvin
α — alpha; angles; common-base forward current-transfer ratio of a bipolar transistor
β — beta; angles; current gain of common-emitter transistor amplifiers
γ — gamma; angles
Δ — delta; increments
d — delta; angles
ε — epsilon; base of natural logarithms
Z — zeta; impedance
θ — theta; angles
λ — wavelength; longitude
μ — mu; micro (10^{-6}); amplification factor; permeability
μP — microprocessor
π — pi; 3.1416
Σ — sigma; summation
τ — tau; time constant; time phase displacement
ϕ — phi; angles; latitude
ψ — psi; angles
Ω — omega; resistance in ohms
ω — omega; angular velocity

International News

Conducted By Bruce Alan Johnson,* WA6IDN

Tidbits from Overseas

We're writing on the light side this month — both because of the time required for WARC preparations (the Conference will have begun in Geneva by the time you read this) and because we feel that once in a while it's nice to take a break from all-serious writing.

Of course, that's not to say that we have no serious news to report! For example, this letter (edited for length) was received recently from Don Greer, A35DE, in Tonga. Those who have been following the progress of Project Goodwill should find this interesting.

"Dear Sirs: I don't know who to thank, but since the article on the Radio Club of Tonga appeared in this column [see June 1979 *QST*, page 57], I will address it to you.

"We have received four transmitter kits and three receiver kits. So far two of the transmitters and all the receivers have been built. Sione Maile, A35SM, and Etuate Kauenga, A35EK, each have a pair in their homes, and are quite active. This has been a great boost for them and for club morale.

"I have the remaining two kits with me here on remote Ninatoputapu island, with only a diesel generator for the island's power. I will be using the station with solar panels and nicad batteries kindly donated by W7EL."

In December Don will return to the large island and build up the Amateur Radio Club of Tonga even further out of the active amateurs now devoted to the hobby largely as a result of Project Goodwill. (Look at it this way: how active would *you* be if you didn't have a station?) He goes on: "Project Grab Bag you described in the article sounds good and would be immensely helpful to the Club. Already, by accident, A35SM blew out the keying transistor in his Project Goodwill transmitter. Luckily, there was an old VHF set around from which we were able to extract a transistor that did the job. But spares are quite limited here — so we look forward to your help. Many thanks again for all."

*International Services Officer, ARRL

You're very welcome, Don. But the folks who are really to be thanked are those who are reading this column right now, for they're the ones who have dug deep in their pockets and given selflessly to see this project launched. Project Grab Bag is also receiving support, and we're grateful. We've said it in these pages often enough: The radio amateurs of developing nations are desperate for parts and discarded gear of an older era. They need all the help they can get.

And from a different part of the world . . .

SOVIET AMATEURS GET 160-METER PRIVILEGES

The U.S.S.R. Ministry of Communications has announced that Soviet amateurs may now operate in the band 1850-1950 kHz on a secondary basis. Their reasoning is delightful: They want to attract school children and students of technical schools into Amateur Radio (or "radio sport," as it is more accurately rendered in Russian)! Says the Ministry, "The decision on making a new band of frequencies available encourages the further development of radio sport (Amateur Radio) in the country, and helps to more widely attract youth into amateur activities." Indeed. They're right.

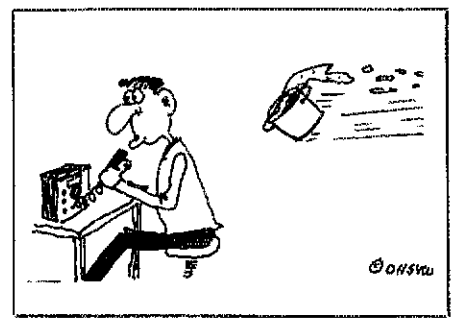
Specifically, the Soviets can operate cw throughout 1850-1950 kHz; on ssb from 1875-1950 kHz; and a-m from 1900-1950 kHz. There's a catch, though: these beginning radio amateurs operating in this band may only work other beginning radio amateurs. But the point is that the overall effect of this program is certainly going to produce new, qualified amateurs. And as we've mentioned before, the only communications service which thrives worldwide is one which is growing.

According to *Radio*, the official Soviet monthly publication, "A great deal of work has to be done among youth by amateur groups, short-wave committees, and councils of sports clubs — in publicizing radio sport (Amateur Radio), attracting all those wishing to go on the air to join sports clubs, and teaching them the rules of technical safety. Thought needs to be given to designing simple equipment for going on the air in this band. We should form construction groups for designing equipment for beginning radio amateurs, and we should describe our work in *Radio*, *Soviet Patriot*, and other journals."

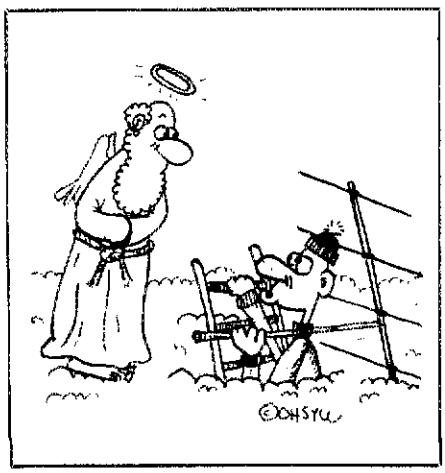
HAVE A LAUGH WITH THE FINNS

Elsewhere on this page you'll find some pretty clever cartoons taken from the monthly journal of the Suomen Radioamatooriliitto r.y., which is the national Amateur Radio society of Republic of Finland. My thanks to the resident Finn on the Hq. staff, John Lindholm, W1XX, for providing the translated captions.

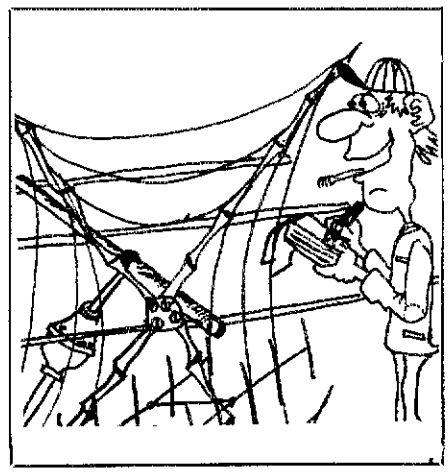
If you like the idea of seeing Amateur Radio humor through overseas eyes, drop us a line. If it's popular, we'll provide more of it in the future, from other countries.



"Must go and eat dinner, now . . . been called three times!"



"Pardon me. Looks like we're up a little too high . . ."



"Look here what the storm has brought me: 1 quad, 2 Yagis, six over six . . ."

"Now I'm working out well, since I got rid of the TVI!"

WARC Countdown

Conducted By David Sumner,* K1ZZ

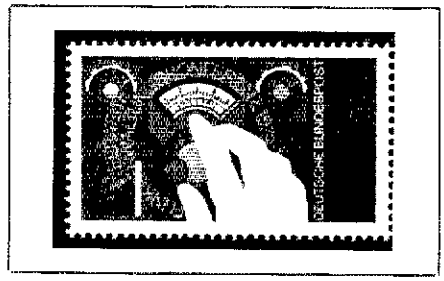
IARU Team Members (Continued)

Last month we began to introduce the members of the International Amateur Radio Union's team of observers who are attending WARC-79. The conference opens on September 24, so by the time you read this the team members already will be hard at work in Geneva. WARC-79 is scheduled to run for 10 weeks, but there are some indications that it may be extended a couple of weeks into December. The agenda is very ambitious, and the issues complex.

Tom Clarkson, ZL2AZ, will serve as special advisor to the president of the IARU, Noel Eaton, VE3CJ. Tom's duties will include the reviewing of conference documents for their relevance to amateur interests, and the chronicling of IARU team activities. His Amateur Radio experience dates to 1924, and Tom notes that in the 1920s, before separate allocations for amateurs were established, the best DX was to be worked near 10 MHz! He is still active, notably on 20-meter cw. Tom was on the committee that founded the New Zealand Association of Radio Transmitters and served as its president in 1930. He has been a director of the IARU Region 3 Association since its formation in 1968. His ITU experience dates to 1947, when he was a New Zealand delegate to the Atlantic City Conference. Tom has attended CCIR meetings regularly, serving as vice president of the 1951 meeting at Geneva and as a committee chairman on several occasions. He also served as a member of the IARU team at the 1971 WARC/ST.

Bruce Alan Johnson, WA6IDN, has been employed at ARRL/IARU headquarters for more than three years, most of that time specializing in international matters. His exceptional ability with languages, especially with some of the more difficult ones, has been a particular asset in WARC preparation and also will be useful at the conference itself. Bruce was first licensed 20 years ago, and since then has been active in NTS and other public service programs. Earlier this year, while on a trip through Africa for the IARU, he operated several stations with specially assigned "IARU" and "ARU" suffixes (see "International News" for March, April and May). In connection with that trip, Bruce attended the ITU WARC Preparatory Seminar for Africa and the Middle East in Nairobi to supplement earlier conference experience at the Broadcast-Satellite WARC in 1977. He has traveled extensively for the IARU, including attendance at the 1978 Region 1 Conference in Hungary. Bruce's wife Barbara, WB1GHT, will accompany him to Geneva.

Wojciech Nietyksza, SP5FM, brings to the team 25 years of professional experience in radiocommunication, especially in television translators and mobile systems. First licensed in 1954 and an SWL for five years before that, Wojciech was involved in much of the early vhf DX activities in Europe and has worked 25 countries on 144 MHz by tropospheric and meteor-scatter propagation. He still holds several vhf distance records for Poland. Wojciech has been a member of the IARU Region 1 Executive Committee since 1972, and its vice chairman since 1975. He served as liaison between the PZK, the Polish amateur organization, and the government on WARC matters and has been a member of the PZK Council since 1957. Wojciech also speaks several languages. He attended the 1974 Maritime WARC and the 1978 Aeronatuical WARC for the IARU and spent two weeks at IARU headquarters during August to gain additional background and to share his insight and perspective with other members of the IARU team.



The Postal Service of the Federal Republic of Germany issued this stamp to commemorate the 1979 World Administrative Radio Conference. Amateur Radio is only a small part of WARC concerns, but the designers of the stamp chose to depict a Collins KWM-2A transceiver tuned to 21.275 MHz!

David Rankin, 9V1RH, also comes to the team with 25 years of Amateur Radio experience, initially from his native Australia where he is licensed as VK3QV. David served on the Federal Executive of the Wireless Institute of Australia for more than 17 years, finishing as Federal vice president of the WIA. Since moving to Singapore he has lent this experience to the Singapore Amateur Radio Transmitting Society, serving on its council for five years and as its vice president for three. He was instrumental in the formation of the IARU Region 3 Association in 1968 and has served as its secretary since 1973. David also has held the calls 9M2QV and 9M8QV and is especially interested in the bands above 28 MHz. His travels have brought him to Europe and North America on a number of occasions, and he has taken advantage of these opportunities to visit IARU headquarters and the Region 1 office in London. David is taking a leave of absence from his employment to be present in Geneva for the second half of the conference.

Pedro Seidemann, YV5BPG, also will be in Geneva for the second half of WARC-79. Pedro has been licensed since 1962 and is well known on the DX bands, as his Five-Band DXCC Award will attest. Pedro has been active in IARU Region 2 since 1967, serving on its Executive Committee since 1973 and as vice president since 1976. He is vice president of the Radio Club Venezolano and also served as a member of its Special Committee for WARC Preparations. He was a member of the Aves Island DXpedition in 1970, served as general coordinator of the RCV National Emergency Net, and is an active member of AMSAT. Pedro speaks four languages, and his particular ability to translate from English to Spanish and vice versa has been demonstrated on numerous occasions at IARU Region 2 conferences.

Alberto Shaio, HK3DEU, will be in Geneva for the first half of the conference and for as much of the remainder as his business obligations will permit. Alberto attended the IARU Region 2 Conference in Miami in 1976 as president of the Liga Colombiana de Radio Aficionados, an office he still holds, and impressed everyone with his abilities and his willingness to work. He has organized a network of linked vhf repeaters which provides reliable communication throughout most of Colombia, has participated in DXpeditions to Serrana Bank and Malpelo, and has reorganized the LCRA to better represent the amateurs of the country. WARC participation includes service as an adviser to the Colombian delegation, discussions with officials of neighboring countries, and organizing the hospitality for government officials from throughout Region 2 who attended an important preparatory meeting in Bogota in July.

Carl Smith, WØBWJ, began his Amateur Radio career in 1934. A retired airline pilot, Carl's negotiating experience includes representation of the Air Line Pilots Association in legislative and air safety matters. He served as director of the ARRL Rocky Mountain Division from 1961 to 1970 and as a vice president of the League since then. Last year he attended the IARU Region 2 Conference in Panama for the League and was elected chairman of the conference's technical committee. One of the more recent additions to the IARU team, Carl earlier this year accompanied President Eaton on a familiarization trip to a Region 1 Executive Committee meeting and to Geneva. In retirement Carl has had to curtail his frequent trips to Hawaii, where he was active as KH6IPY whenever he drew the assignment to fly that route!

Roy Stevens, G2BVN, will be wearing two hats in Geneva this fall: one as an adviser to the British delegation on amateur matters, and one as manager of the IARU office across the street from the conference center. Steve was first licensed in 1937 and has served as a member of

*Assistant General Manager, ARRL

the Council of the Radio Society of Great Britain since 1962, also serving as chairman of the RSGB team which negotiated with the U.K. administration during WARC preparations. He has attended all IARU Region 1 Conferences since 1963, served as Region 1 vice chairman from 1966 to 1969, and has been secretary of Region 1 since 1969. In 1976 he came "across the pond" for the IARU Region 2 Conference and for a meeting of worldwide IARU representatives, the latter forming the basis for the team which is now in Geneva. He attended the 1971 WARC/ST and all subsequent ITU conferences, including the 1978 CCIR Special Preparatory Meeting for WARC-79. Steve's contributions to Amateur Radio through his RSGB and IARU work can scarcely be overstated, but through it all he has managed to stay well-up on the DXCC Honor Roll!

David Sumner, K1ZZ, began his League employment in 1968 and since 1976 has served as assistant general manager. Work with the IARU began in 1972 and became directly WARC-related in 1974 with attendance at the first of several ITU seminars and conferences. Dave was one of the IARU representatives at the CCIR Special Preparatory Meeting last year. During domestic WARC preparations, he drafted most of the ARRL comments in FCC Docket 20271 and regularly attended the meetings of two of the FCC WARC advisory committees. He attended the two most recent conferences of IARU Region 2 and the IARU West Africa Conference in 1977. Dave has been licensed since 1962, also holds K1ZND, and is active from home on all bands from 1.8 to 450 MHz. He is licensee of the OSCAR 8 satellite and is a Life Member of AMSAT.

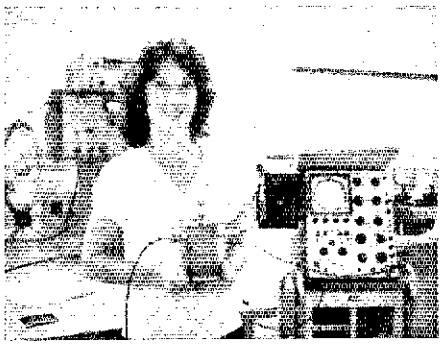
While we are making introductions, let's also introduce the members of the U.S. and Canadian delegations who are there specifically for the Amateur Service: E. Merle Glunt, W3OKN, and J. C. R. "Bud" Punchard, VE3UD.

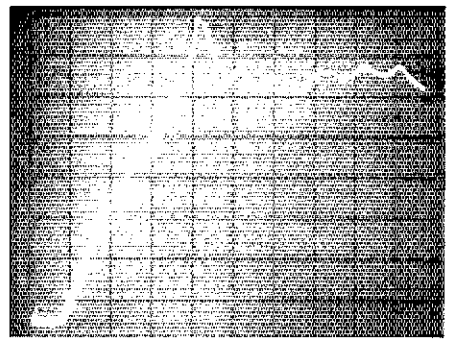
Eugene Fingall, telecommunications engineer for the Ministry of Communications and Works in Barbados, was a recent visitor to Newington. IARU team members Baldwin and Sumner met Mr. Fingall at an ITU seminar in Geneva back in 1974, and we have stayed in touch ever since. He will be in Geneva this fall to represent Barbados at WARC-79.

You met Merle in "Behind the Diamond" a couple of months ago (May *QST*, page 60). At that time we somehow failed to mention that Merle was serving as assistant chief engineer of the FCC when he retired. Merle will be a busy man in Geneva, because he is one of the more experienced members of the U.S. delegation. He was directly responsible for frequency allocation and treaty matters at the FCC from 1952 to 1974, and since his retirement he has been serving as consultant to the League on WARC matters. His intensive involvement in U.S. WARC preparations included attendance at most of the FCC and Department of State advisory committee meetings. Merle represented the IARU at the CCIR Special Preparatory Meeting last year and has shared his expertise with the members of the IARU team by conducting seminars on the operation of ITU conferences for their benefit.

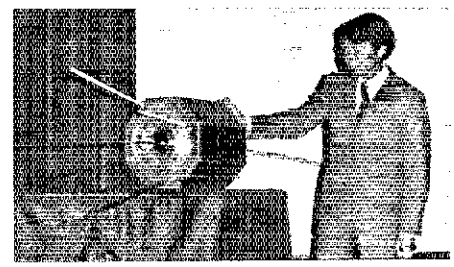
Bud Punchard has something in common with IARU President Noel Eaton: at one time he held the call sign VE3CJ! In fact, Bud started in Amateur Radio in 1926 as e3CJ, before prefixes were assigned internationally. Now retired, Bud is a professional engineer. He has been a member of the Canadian Radio Technical Planning Board since 1944 and was its president for six years. He spent five years in CCIR work, which included five weeks in Geneva in 1963. Bud is a fellow of IEEE and is past director of IEEE Region 7 (Canada). He served as chairman of the Canadian Amateur Radio Federation WARC Committee and received the unqualified endorsement of both CARF and the Canadian Radio Relay League for his position on the delegation. Bud is active on the air daily and is a *QST* author (see the March 1977 issue). QST

Strays





The 4 × 3 × 5 Mode J filter described in our new *Satellite Communications* package by W9KDR, ARRL's OSCAR 8 operations manager, has found acceptance beyond the Amateur Radio hobby. Dr. Van Bloch, a professor in the Department of Physics, University of South Florida, has been using the filter in his OSCAR Education Program ranging experiments. At the left, student Pat Small holds the filter next to an oscilloscope display of its swept-frequency response. The right-hand photo, taken from the ARRL's Hewlett-Packard spectrum analyzer, shows a calibrated representation of a similar capacitively coupled Mode J resonator. Each horizontal division represents 100 MHz and each vertical division is 10 dB. The high-pass nature of this Mode J filter is characteristic of capacitively coupled resonant cavities. Note that the OSCAR 8 ground station transmit frequency of 145.9 MHz is attenuated by about 60 dB, while the downlink frequency is attenuated by only 0.5 dB (insertion loss).



Jurgen Gressner, DJ7LY, shown here with a model of OSCAR 7, gave a very successful slide lecture at the German Institute of Regensburg entitled "Communications Satellites: A look at the Amateur Radio Service satellites as a connecting link between continents." Using the ARRL's OSCAR Demonstration Kit and slides of OSCAR supplied by AMSAT, Jurgen, a certified engineer and professor at the Advanced Technical School of Regensburg, illustrates the international involvement of the OSCAR Educational Program. This winter, a group of Jurgen's students actually will be involved in OSCAR communications.

Canadian NewsFronts

Conducted By Ron Hesler,* VE1SH

CRRL Incorporation Approved

For a vast majority of Canadian Radio Amateurs, *a dream come true* heralds the ARRL Board approval of the incorporation of the Canadian Radio Relay League . . . a *self-governing* and *self-administering* division of the ARRL!

At this historic point in time, we feel that it is of sufficient interest to look back to our official beginnings. In 1920, *at the specific invitation of Canadian amateurs*, the League organized the Canadian Division. So let's roll back the pages of time to the August 1921 issue of *QST* (page 33):

"There has been a little agitation in Canada about a separate relay league. It has been intimated that 'the Yanks are trying to run things for their own fun.' [Sound familiar? — Ed.] The flag has been waved and lurid talk made of the danger of continuing in the A.R.R.L. because of the possibility of war between Canada and the States, etc.

"Fortunately saner views have prevailed and the wild bolshevistic part of the movement has expired, so that it is assured that if Canada has a league of her own it will be hand in hand with A.R.R.L. We want to take this opportunity to clear our hook to our good Canadian friends on a few matters that are not as well understood as they should be:

"The A.R.R.L. Operating Department was expanded to take in Canadian work in cooperation with our own at the earnest request of some well-informed Canadian amateurs. The Division managers are Canadians, and always will be, and except in the broader observance of A.R.R.L. policies as universally known and approved these managers direct their divisions in complete accordance with their own peculiar local conditions. We have never really dared to hope that Canada would want always to remain with the A.R.R.L. organization, much as we would like to see such a permanent union. [Apart from several minority movements, this statement has been proven wrong. — Ed.] Our idea has been to give a helping hand to a land in which amateur radio is much younger than it is in our own, and in this we honestly believe we have been succeeding and that the well-posted Canadians agree with us. Let us say, if there be those who don't know it, that it isn't at all a case of the Yanks trying to run things to suit themselves. Such a policy is entirely contrary to basic A.R.R.L. ideas, which are founded on democracy and for that very reason have stood the tests of seven years. Whenever it is apparent that Canada needs a separate organization and a promising framework and supporting stations for that organization come into existence, the A.R.R.L. will be ready to recognize it and co-operate fully.

"But that time is not yet here. Canadian stations are as yet limited in number and in range, and for a season or two more the bulk of the relaying into and out of Canada will be north and south via various cross-overs from the States. The best minds in Canadian amateur work are agreed that until such time as Canada has east and west lines of its own it needs the supporting arms of the A.R.R.L. This is vastly wiser than any hasty proposal of separation, and after all we are all of us working to a single end: the furtherance of citizen relay communication.

"Let brotherly love prevail!"

What exceedingly wise men our forefathers were!

In 1937 the thoughts expressed editorially above were included in the ARRL Bylaws as follows:

"The policy of the League in Canada shall be that of a friendly hand for the amateurs of a sister country pending their growth to such numbers and strength that their ability to form and conduct a self-governing non-commercial amateur organization throughout the Dominion is evident. The activities of the League in Canada shall be regarded as a temporary stewardship undertaken at the request of Canadian amateurs. Whenever Canadian amateurs shall petition for their own organization, and it is manifest to a majority of the entire Board of Directors that the success of a separate Dominion organization is assured, the Board of Directors shall aid in establishing and proclaiming a separate all-Canadian organization to be known as the Canadian Radio Relay League to operate under a constitution similar in tenor to that of this League; and this League shall thenceforth relinquish all direct activity in Canada."

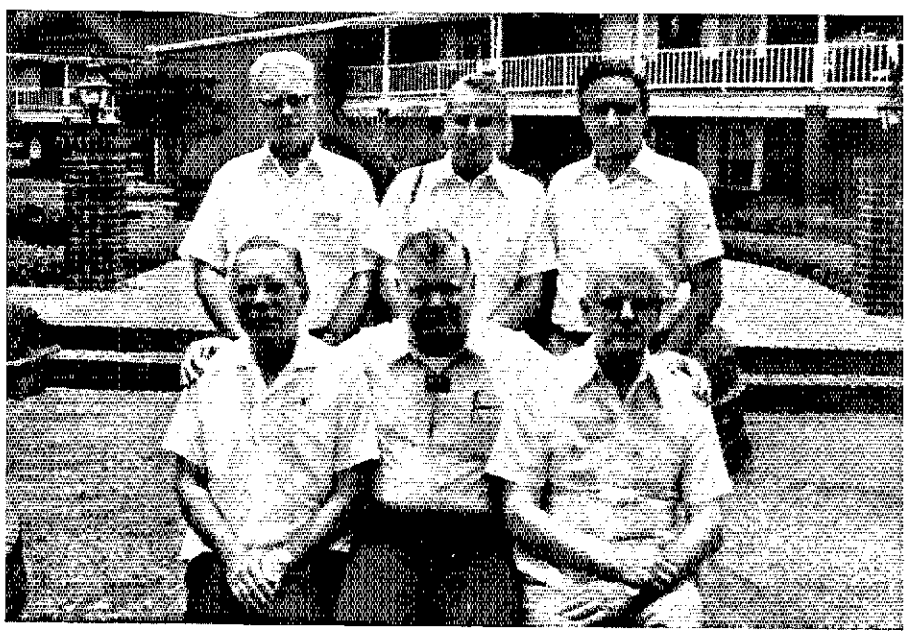
It is interesting to note that it has been this specific Bylaw which several other Canadian amateur organizations, over the years, have irresponsibly taken out of context as their "blank check" to assume all of the responsibilities of the League in Canada. Thankfully, for the welfare of the Canadian Radio Amateur, all such proposals were turned aside, for the key words in the Bylaw were: "pending their growth to such numbers and strength." Previous applicants to date have not been able to meet this requirement and even the latest (CARF) were never able or willing to submit substantiated *full* membership figures to indicate otherwise (CARF-published membership *claims*, at the most, have never been more than approximately two-thirds of that of the Canadian Division of the ARRL). Therefore, it remains today, as it always has been, that it is the League, in Canada, which has the majority support of the Canadian amateur. It is as simple as that!

One might then ask, why has not the Canadian Division long ago requested self-governing status? Responsibly the answer is equally simple. Previous directors of the Canadian Division never felt that the Division membership then met the "such numbers and strength" requirement of that 1937 Bylaw.

Wisely, our immediate past Director, George Spencer (VE2MS — now VE4IM) then saw the time rapidly approaching when the Canadian Division membership would meet that qualification and consequently, a few years ago, created with Board approval the alternate name of the Canadian Division: the Canadian Radio Relay League. Your present Director then gradually furthered the concept which he knew was in the mind of Spencer, by creating informal advisory boards of *Canadian* officials to assist him in governing the Canadian Division, while all the time carefully monitoring the League's Canadian membership figures vs. the total Canadian amateur population.

A few short months ago when our Canadian membership finally reached approximately the same percentage as that of U.S. League members vs. U.S. amateur population, coupled with the important consideration of the total number of Canadian *Life* Members of ARRL, the decision was democratically reached by *Canadian* League officials to petition the ARRL Board of Directors for self-governing status *while still retaining all the important membership services offered by the ARRL* as a Canadian Division. Let's face it . . . that

*Director, Canadian Division



Immediately following the affirmative vote on the question of CRRL incorporation, a group of League Officials involved with the decision posed for this photo. They are, l-r (back row): Vice Director Bill Loucks, VE3AR; Director Ron Hesler, VE1SH; Associate Counsel Bob Benson, VE2VW. Front row: Vice President and Chairman of the Canadian Ad-Hoc Committee Carl Smith, WØBWJ; President Harry Dannals, W2HD; and Vice President Noel Eaton, VE3CJ.

Marv Nash, VE3FON, RSO immediate past president, is shown here being presented with the ARRL/CRRL Certificate of Merit by Canadian Division Vice Director Bill Loucks, VE3AR, at a recent meeting of RSO delegates. Also presented with this certificate was George Davis, VE3BBW, who unfortunately was not available at the time this picture was taken.

concept was certainly asking a lot of any Board of Directors, for it could easily be considered as a case of "wanting one's cake and eating it too"!

To our mind, it is a tribute to the present ARRL Board and their continuing dedication to the binational society League policies that this Board by an overwhelming vote (14 affirmative, two negative) officially sanctioned the federal incorporation of the Canadian Radio Relay League, as a self-governing division of the ARRL! We are especially grateful for the active support extended to our incorporation by President Dannals, Vice Presidents Clark, Smith and Eaton, and General Manager Baldwin (all of whom had no vote in the motion itself).

As this article is being written (early August), CRRL General Counsel Bob Benson, VE2VW, is immediately proceeding with the official federal incorporation papers and it is expected that it shall be the Canadian Radio Relay League Incorporated, within six to eight weeks.

Following incorporation, a printed copy of the CRRL Constitution and Bylaws will be available to any League member (s.a.s.e. please). It is expected that this will be available for mailing by the end of October.

The CRRL Board of Directors shall consist of the following: President — Elected by the CRRL Board; Vice President — ARRL Canadian Division Director; Secretary — ARRL Canadian Division Vice Director; Director (Quebec and Atlantic Provinces) — membership elected; Director (Central) — membership elected; Director (West) — membership elected; ARRL President — Board member *without vote.*

It should be noted that the CRRL President will, in addition to the Canadian ARRL Division Director, now sit on the ARRL Board but, like the seat on our Board for the ARRL President, it will be without vote.

Commencing with the 1981 Canadian Division ARRL election (for the 1982-83 term), the election of the three CRRL regional directors shall also take place. Unfortunately, inasmuch as it was not officially possible to "piggyback" the election of these three directors with the Canadian Division election for the 1980-81 term (because the CRRL was not constituted in time for the current election call), the charter CRRL directors and officers shall continue in office until the end of 1981. The only possible changes could be in the offices of vice president and secretary which, of course, are dependent on the outcome of the current Canadian division election. Therefore, the following are your officers and directors of the CRRL Inc., from this date until 1200 hours, January 1, 1983: President — Ron Hesler, VE1SH; Vice President — Bill Loucks, VE3AR; Secretary — Gordon Steane, VE3BMG; Director — Albert Daemen, VE2IJ; Director — Tom Atkins, VE3CDM; Director — George Spencer, VE4IM; General Counsel — Bob Benson, VE2VW.

The Executive Committee will consist of the President, Vice President and Secretary. Board meetings shall take place once per year with the Executive Committee responsible for decisions between such Board meetings. The first Board meeting will take place in Ottawa this year, immediately previous to the RSO Convention.

The CRRL President will, to quote from Article 2 of CRRL Bylaw 4, "preside over all meetings of the Board of Directors. He shall, subject to instruction from the Board of Directors, represent the Corporation in its relationships with the International Amateur Radio Union, with the public and with the various governmental agencies and governments and officials with which the Corporation may be concerned and shall be the official spokesman of the Board of Directors in regards to all matters of Corporation policy." This shall then leave the ARRL Canadian Division Director free to attend to the normal corporate responsibilities of an ARRL Director plus, of course,

Caught gabfesting at the Maritime Old-Timers hamfest, held at Mount Allison University, Sackville, NB, were (l-r) Fred Rafferty, VE1AN (licensed in the early 1920s); Pat Solomon, XYL of VE1OC; Aaron Solomon, VE1OC (SCM, Maritime-Newfoundland); Max Ross, VE1QM; and Ron Hesler, VE1SH (CRRL president). *(photo by VE1BKD)*

any duties and/or responsibilities which may be assigned by the CRRL Board, in his dual capacity as the CRRL Vice President. The CRRL President will also manage the day-to-day administration of the CRRL.

In order to endeavor to clarify to whom you, as a member, should address a communication henceforth, permit us to make the following suggestion. If it is a matter strictly relating to Canadian affairs, you should direct your inquiry to the CRRL President. If it be a matter concerning any of the membership services of the ARRL (i.e. awards, QSL Bureau, membership/subscription problems, etc.), then it is the ARRL Canadian Division Director to whom you should refer. Normally, it will be the Division Director or his designate (i.e., one of the CRRL Directors) who will attend affiliated conventions and hamfests; although, of course, in the case of CRRL National Conventions, which shall soon take place, all CRRL officials will be in attendance. Likewise, in the case of large conventions, such as that of the Radio Society of Ontario, it could be expected that the CRRL President and other directors and officials will be present.

So there it is . . . the baby has been born, but not without the considerable legacy of experience and service which is more than 50 years as an ARRL Division affords. It's here . . . it's viable . . . it's strong and, it's here to stay. It's *your* organization . . . VEs and VOs.

It's a proud and historic day for Canadian Amateur Radio . . . a dream come true!

CRRL AMATEUR OF THE YEAR

The votes are all in and we are pleased to advise that well-known Guelph, ON, amateur Fred Hammond, VE3HC, has been elected CRRL Amateur of the Year for 1978. The presentation will be made to Fred by CRRL President Ron Hesler, during the October RSO Convention in Ottawa. Congratulations, Fred . . . you certainly deserve the honor.

THOSE NEW DOC EXAMINATIONS

A few months ago, we submitted for analysis and evaluation several of the recent examinations to the ARRL Club and Training Department. After careful study we were advised by that Department that, to all intents and purposes, they were very similar to the U.S. comparable class examinations. They further stated that, in comparison, the Canadian exams were neither harder nor easier than those of the U.S., and vice-versa. Therefore, we feel confident that Canadian class instructors could be well advised to fully utilize the professionally prepared U.S. examination training materials offered by the ARRL. As far as we have been able to ascertain, other than regulations, this material is now completely applicable in Canada. For further information, write the Club and Training Department, ARRL, 225 Main St., Newington, CT 06111.

A UNIQUE AMATEUR PUBLIC SERVICE

Oakville has a radio reading service (for blind and print-handicapped listeners) which broadcasts on a sub-carrier of Burlington's CING-FM and is Canada's only such service.

Jim Goodman, VE3FZG, tapes a weekly program about Amateur Radio, which is broadcast by the station. At a recent annual conference of such stations, a competition was arranged to judge which was the best program aired on the North American continent (there are 80 such stations in the U.S.). The VE3FZG programs, which were entered in the competition, were judged to be best!

Jim's programs open with a cw background and he then narrates selected readings from various Amateur Radio publications, with ad-lib comments interspersed here and there. The weekly tape fades out with cw, which gives the program an excellent documentary touch.

As a result of the aforementioned competition the radio-reading-service station in Birmingham, AL, has arranged to utilize the VE3FZG programs and it's believed that a second station, in Massachusetts, will soon be doing likewise.

Congratulations, Jim, for an extremely fine bit of Amateur Radio public service. As previously advised on this page, several months ago, Jim was recently awarded the ARRL/CRRL Certificate of Merit. Tnx *Hot Bananas* newsletter. QST

Correspondence

Conducted By Perry F. Williams, W1UED

FINAL RAPP-UP

☐ Should there be an April Fool quasi-technical story in *QST* each year? Yes! Re-install Larson E. Rapp, WIOU, and his most excellent technical discoveries posthaste. Ham radio is supposed to be fun, you know. Sometimes its published face seems to have the dreariness of undergraduate term papers or the grim pretense of a master's thesis.

Can anything be omitted to make room for Rapp? Yes, certainly. Practically anything. *QST* is a fine magazine (except occasionally, as noted in paragraph one!) but *somebody* objects to each department or article published. So just take a big swing and enjoy the Reason of Rapp.

How much warning is necessary to protect the innocent? Ye Gods! If the "innocent" can't figure out Mr. Rapp's philosophy then they can't understand much else in the magazine either.

I'm looking forward to next April's *QST* with Larson E. Rapp returned to his rightful throne. — *Leonard Dansby, W5VE, Kerrville, TX*

☐ Sure, let's have a little humor: put Rapp in the mag.

Yes. "It Seems to Us" can be omitted. We can do without your editorial opinion once in a while; after all, all of us hams are opinionated enough now!

No, don't warn anyone; that would delete from the honest humor. — *Ron Desautels, WD6AYM, Sun Valley, CA*

☐ Re the Rapp controversy now raging and threatening to blow apart the staid old ARRL, and answering the questions on page 66 of August *QST*: Yes. Yes. Yes. None! From an old admirer. — *Dick Liebe, K9GEL, Carmel, IN*

☐ Yes. Absolutely. Yes, anything. None. You can't remain innocent forever! — *Scott Davis, K5TA, Corrales, NM*

☐ I have never read any of the writings of this obvious pioneer of our art. Allowing him to grace the pages of *QST* once more is a grand idea. His detractors must have no sense of humor.

Surely you can allow Larson E. to steal a page or two once a year. The fellow needs an opportunity to express himself, and to deny him would be a crime. Let him have his day in court! — *Mike Donehoo, KB4DT, Marietta, GA*

[Editor's Note: Re your P.S., Mike, we did get a *charge* out of your second paragraph, but do the readers merit such pun-ishment?]

☐ Please bring back Larson E. Rapp, WIOU. I'm a newcomer, licensed less than two years, and have never read a technical (?) paper by Larson. He sounds great!

"Hints and Kinks" could be shortened, "Washington Mailbox" could be omitted for one issue, possibly making enough room to bring Rapp back for us newcomers to enjoy. — *Rick Dolinsky, WB3JZA, Tamaqua, PA*

☐ Rapp us once a year. — *Ronald J. Schwendt, N3AR, Douglassville, PA*

☐ This is a Yes vote for Rapp. — *Hasan B. Paksoy, WD5EWQ, Dallas, TX*

☐ Sad, indeed, is the chore, job, profession or hobby that cannot laugh at itself now and then. Bring Rapp back.

Delete a different thing each year, if need be, even to the extent (you should wash out my mouth with soap) of omitting an ad every decade or so.

The best craftsmen are those who were well kidded during their apprenticeships. Their mentors knew how to get attention and have a bit of fun in the process. There was the young cook who was chastised for pouring the pancake upside down, the carpenter who didn't know where to find the French-curved T-square, the machinist who was sent off to borrow a left-handed monkey wrench. Let the innocent stay that way: The letters to the editor will set things straight along in June or July! — *T. K. Riggen, W1HFZ, Centerville, MA*

☐ I am aware of how well written some of the April articles have been. I've been taken in by at least one or two myself. I might then suggest that somewhere in the article it be made clear that it is, in fact, fiction. An Alfred Hitchcock surprise ending might be one way. — *Jack R. Chichester, W9AMF, Milan, IL*

☐ The April issue, like any other, contains much that could be put off for one more month. One real technical article, or general interest story, or organizational item could be put in "to be continued" format. Make room for three or four pages of Rapp.

As for "protecting the innocent," who among us would admit to being "(1) One who has always resisted temptation, (2) A simpleton, (3) A blue flowered plant"?

Actually, merely placing an article which contains something appearing radically new in the April issue is due notice that the instructions may be out-of-square with the laws of physics. And the longer it takes me to figure this out, the more I enjoy it.

Bring back Larson in all his former glory, complete with circuit diagrams, parts lists, anything and everything necessary to fool most of us some of the time. — *James P. DeClercq, K8JUM, Fraser, MI*

☐ The April perennial has all the attributes of an historical artifact, sorely needed by new amateurs as a link to the early origins of this magnificent hobby. — *Doc Silvern, K6RXU, Los Angeles, CA*

☐ I have come to look forward to the April issue: "Authentic DX QSLs signed in the original ink . . . for display purposes only," "the final amplifiers placed on top the tower," and suchlike. My vote is Yes! Yes! Yes!

Of course, the April Fool articles would have to be carefully screened to ensure that some poor hapless Joe doesn't do something dangerous. But it's worth the effort. We've all been fooled a time or two and that is half the fun. — *Kirk Taylor, N6IU, San Francisco, CA*

☐ If the humor is too subtle to be generally detected, *do* issue a warning, at the end of the article. If the story is relatively blatant, let those who cannot detect it proceed. They'll learn, eventually. — *Gregory T. Playle, N5??? (just tested), Biloxi, MS*

[Editor's Note: *No* negative votes reached this desk! Editorial Board, I think you have an answer!]

RST FOREVER?

☐ During the early days of ham radio, the RST system was a useful means of giving information to the radio partner concerning his readability, signal strength and tone. All the equipment was homebrew. The performance and reliability of components and the achievable gain of vacuum tubes were low. Measuring techniques were primitive. The results you were getting could only be judged by the RST report from the distant station.

But, ham friends, honestly, is it still necessary? What equipment fails to provide T9 signals? What's the use of a signal-strength report, so long as I can copy the guy — especially when psychologically pleasing dBs are routinely added to the report?

I hereby put forth an idea — the final deletion of RST and substitution of a very simple system related to information loss, the only relevant parameter. "To copy or not to copy, that is the question." Let's have the Q-System (Q standing for quality, including tone, operator skill, QRM/QRN/QSB and so on). Q1 Overall quality too poor: no copy; Q2 Quality varies: partial copy; Q3 Quality good: solid copy. I think this system would result not only in a reduction in contest duties and logging chores, but also would avoid redundant or dishonest reports. How about it? — *Ralf Herzer, DL7DO, Berlin, FR Germany*

YOU'RE INVITED

☐ The fraternity of Amateur Radio is composed of worldwide friendships, some new, and some made many years ago. One of the joys of Amateur Radio is the personal meeting of these friends who have been met first on the air.

I extend an invitation to all amateurs to attend the 26th American Radio Relay League National Convention in Seattle, Washington, July 25-27, 1980.

"World friendship through Amateur Radio" is the theme of the "Seattle National Amateur Radio Convention 80" (SEANARC 80 for short), and programs are planned that will be of interest to all segments of the Amateur Radio community.

I would appreciate help in publicizing

*Manager, Membership Services Dept., ARRL

SEANARC 80 through club newsletters, bulletins, on the air, etc., so that as many interested amateurs as possible will have the opportunity to attend. — *John H. Brown, W7CKZ, promotion chairman, SEANARC 80, Seattle, WA*

[Editor's Note: And see the "Call for Papers," August *QST*, page 35.)

ENJOYED NATIONAL IMMENSELY

☐ I attended the 1979 National Convention in Baton Rouge, Louisiana, and enjoyed myself immensely! Congratulations to the Louisiana Council of Amateur Radio Clubs in presenting this wonderful experience.

WB5SRR and I arrived Saturday morning and spent the first session in the dealer-display area and the flea market. Incredibly frustrating — all that amazing array of hardware and me with no money to spend! Enjoyed the operational setup of one manufacturer, where you can actually get the rig on the air and evaluate it for yourself.

I attended the narrow-band voice modulation session. I had no idea that NBVM was so far along. I got the feeling from the speaker that straight ssb would soon go the way of a-m. The linear amplifier session was interesting, though cut somewhat short by the awarding of prizes.

The antenna forum was great! Lew McCoy, W1ICP, can sure spin a story, and he seems to know his antennas. Quite a bit of substantive material was covered in that forum, and I found it very interesting. The ATV presentation also tops: The state-of-the-art frontier is fascinating.

At the forums Sunday morning, FCC staff answered at great length questions which could have been handled in a sentence or two — true bureaucrats! I would have liked more discussion of the CB/hfer/Personal Radio controversy. It is clear that there are several fallacies in the thinking of some proponents of each side. Last but not least, I enjoyed the ARRL forum a great deal (despite the protracted introductions!). The new Dave Bell film is excellent. Now that we've got it, what are we going to do with it? It is obviously aimed at the nonamateur. Let's find the vast audiences of the general public to justify the production expense. Finally, the dialogue question and answer period was most interesting.

Thanks and my congratulations to those who helped to present this fine convention. — *Paul T. Williamson, KB5MU, Orange, TX*

[Editor's Note: Paul, we had to shorten your letter considerably — as no doubt you noticed. Some of the material omitted was constructive criticism; this has been forwarded to the people who can benefit from it — thanks! As for the film, its predecessor, *The Ham's Wide World*, has been seen by millions of nonamateurs and we intend similar distribution of this one. Watch for announcements of its availability for public showing in an early issue of *QST*.]

OPTIONAL CODE?

☐ Being only 14 years old, I feel I have a lot of hamming left in my life, at least 50 or more years of chewing the rag. I have recently become greatly disturbed about the FCC proposing to the World Administrative Radio Conference that an international Morse code test be merely requested instead of required in the worldwide Radio Regulations.

If the FCC should take away our traditional pride in being able to use Morse code, I'll hang down my head in sorrow, and hang up my brass key, never again proud of being an amateur. — *Dave Birken, N6AWU, Northridge, CA*

CODE IS ART; LET'S COMPROMISE

☐ I have long enjoyed cw, being at peaks capable of speeds in excess of 30 wpm. I have been a professional communicator for almost 30 years and a ham for 25. The code is an art form, not unlike woodcarving, painting or needlepoint. I deplore it being used as a deliberate stumbling block to an Amateur Radio license. Could you imagine your anger at being told you had to be proficient at driving a six-horse team with a wagon prior to obtaining a driver's license for a car?

The solution is simple. Each licensee learn a minimum of 5 wpm, this to recognize an SOS if heard, and to satisfy international treaty requirements. Next, treat licenses as basic with endorsements, much the same as commercial is now. All hams with a basic license could operate cw on the Novice portion of the cw band. If you wish to operate in the General cw band, obtain a 13 wpm endorsement.

A compromise would save cw for those who want it. — *Dennis D. Shirrel, K7DCG, Poway, CA*

ETHICS NEAR ALL-TIME LOW?

☐ The "No Shortcuts" letter by WA2DXJ in July *QST* "Correspondence" hit the nail on the head — Good Show! It's a sorry state of affairs and we can be assured it will get worse before it gets better. Ethics and observations of the regulations appear to be headed for an all-time low.

One does not have to spend much time on the bands to note that the past three years or so contesting to a considerable extent and DXing in general have gotten trashy.

It has been my good fortune on a number of occasions to have been modest DX myself. I try to observe to the letter the regulations of the country I'm operating in. I dare say not many W/K/N hams have ever given the matter much thought, but the U.S. rules are among the most unrestrictive in the world! And still we don't put on a decent show.

During one of my recent forays, I removed 47 idiots from my log for "funny" operating tactics; naturally, these hombres will get no card. I'll not comment on who these operators were, but suffice it to say they weren't all WDs or KAs.

Conversely, the overseas chaps have consistently been "on the money" year in and year out. Even under the most adverse conditions they hang in there and do an admirable job all things considered. We domestics have got to clean up our act or someone else will do it for us! — *G. L. Baker, W5QPX, Amarillo, TX*

ARROGANT ATTITUDE

☐ As a less-than-perfect gentleman, I can barely refrain from resorting to profanity when commenting on FCC's arrogant attitude toward amateurs who were issued violation notices for having contacted Thailand ("League Lines," July *QST*). The agency's action smacks of *1984* arrived several years too soon. One must reasonably and logically ask why FCC didn't simply admit its error and mail postage-exempt letters of apology to each of the falsely cited amateurs? — *James Simmons, W7KVV, La Grande, OR*

REPENTANT SINNER

☐ After reading the item in April *QST* under "Washington Mailbox" about accepting compensation, paid or promised, for having handled an amateur message, a terrible feeling of guilt welled up within me. I am almost 70, and have carried the stigma of professionalism since I was about 15. It's a sorry story, and I'm ashamed, ashamed, ashamed.

Back in those dear dead days I took a message that was to be delivered to the next town. Having no phone and no other means of transportation, I walked three miles or so and delivered the message. Obviously important because the man was overjoyed to receive it.

Then came the blackest day of my life: after a feeble attempt at refusal, I accepted compensation! The recipient of the message owned a neighborhood candy store; the compensation, an ice cream sandwich. Strawberry. — *William Fairclough, W2CHI, Blairstown, NJ*

[Editor's Note: Confession is good for the soul, Bill. And relax. The Statute of Limitations has run out.]

MORE ON SIMPLEX

☐ In reference to WB2JII, Mario Filippe's letter in July *QST*, and others in September, the Mobile Amateur Radio Club has on several occasions provided public service communications similar to the marathon setup. We have used 146.52-MHz simplex for several good reasons. It does not tie up a repeater for several hours. Some sites are not within the repeater coverage area, but are close enough to each other for good simplex work. Most times, hand-held rigs are used and with their limited channels, most are equipped with only one simplex frequency.

I agree that no one should completely monopolize any popular frequency, simplex or repeater, for long periods of time without breaks. As synthesizer hand-helds become more popular in time, using an odd frequency will become more practical.

The Mobile ARC has furnished communications for two popular races here. With the large number of participants and bystanders, there is the real possibility of a genuine emergency arising. We're there and ready, on .52 simplex. — *Les Cox, AA4F, Mobile, AL*

THANKS!

☐ I'd like to thank the staff of NN3SI, at the Smithsonian Institution in Washington, and especially Joe, W3IK, who made my operating time on July 3 a very pleasant occasion. I personally recommend visiting this station to any amateur who is in or near the nation's capital. You can start quite a pile-up on 15 cw! — *Rick Todd, KA8AKL, Newbury, OH*

☐ I want to thank AC8W for his part in creating goodwill and interest in a most fascinating hobby. When I heard him June 8 on 40 cw, I didn't even realize he was Stateside. We don't seem to have too many Extras in the Novice portion.

We chewed the rag for a half hour and I thoroughly enjoyed the QSO. And not much later, he also QSLed! I want to publicly thank Stan for taking the time to talk with Novices at their level. I plan to do the same when I've left the Novice ranks. — *F. Budd Kline, KA9COQ, Mt. Prospect, IL*

Washington Mailbox

Conducted By Stan Horzepa, J. D.,* WA1LOU

Clubs: Tax-Exempt Status and Incorporation

During the course of every Amateur Radio club's history, some member will raise his or her hand and suggest that the club should incorporate and apply for tax-exempt status. All of the fellow members will agree that it sounds like a good idea, even though the majority of them have no idea of the involvement and implications of such actions. This edition of "Washington Mailbox" will attempt to clear up some of the mystery and point out the advantages (and disadvantages) of incorporation and tax-exempt status.

Tax-Exempt Status

Q. What is tax-exempt status?

A. It is freedom from taxation of income which is allowed when certain prerequisites are met.

Q. Does this mean that our radio club would not have to pay income tax?

A. Yes. If your club had tax-exempt status, it would not have to pay federal tax on business-related income.

Q. What's that about "business-related income"?

A. Even though an organization is recognized as tax-exempt, it still may have to pay tax on its unrelated business income, i.e., income which is not *substantially* related to the purpose constituting the organization's tax-exempt status.

Q. What's the "purpose constituting the exemption"?

A. According to the Internal Revenue Code (Sec. 501[c][3]), an organization may qualify for exemption from federal income tax if it is organized and operated *exclusively* for one or more of the following purposes: charitable, religious, educational, scientific, literary, testing for public safety, fostering national or international amateur sports competition or prevention of cruelty to children or animals. And, any income substantially related to one or more of these purposes is tax exempt.

Q. Does this mean that our club does not have to be a charitable institution to attain tax-exempt status?

A. Correct. The educational purpose is the most likely choice of radio clubs trying to qualify. An example of a good educational ham organization may be one whose activities consist of operating a continuing series of classes aimed at training new amateurs and upgrading licensed amateurs, plus conducting seminars on advanced topics, as well as inviting experts in various fields to speak before the club.

Q. What if our club's purposes are not exclusively limited to those enumerated by the I.R.S.? What about social activities?

A. If the club's purposes are not limited to those enumerated by the I.R.S., other than as an *insubstantial* part of its activity, the club will not qualify for tax-exempt status. If one of the club's purposes is the carrying on of social activities, it will not qualify.

Q. What other activities will disqualify our club from tax-exempt status?

A. Attempting to influence legislation (lobbying) or participating in political campaigns will disqualify a club. Also, if any club income is used to benefit one or more individuals rather than to benefit the whole club, disqualification will result.

Q. Besides exemption from income taxation, are there other benefits to tax-exempt status?

A. Yes, a tax-exempt organization may solicit gifts and the donor may include the gift's value when computing his deductions for his federal income tax. In other words, the tax-exempt radio club is a tax shelter.

Also, if a club qualifies for tax-exempt status, generally, it will also qualify to bulk mail identical pieces of 200 or more at a reduced rate of 3.1 cents per item.

Q. How does our club go about obtaining tax-exempt status?

A. If your club's purposes are limited to those enumerated by the I.R.S., as outlined above, and your organization is not a private foundation and normally has annual gross receipts of not more than $5000, your club automatically qualifies for tax-exempt status. No forms or applications need to be completed and filed. Under automatic qualification, however, gifts or bequests to the organization are not tax deductible by the donor; the organization is not a tax shelter.

Q. Well, then how does our club go about getting the full benefits of tax-exempt status?

A. The club must file an application for recognition of exemption (Form 1023) with the I.R.S. district director for the district in which the club's principal office or place of business is located. After consideration of the application, a ruling or determination letter will be issued indicating whether or not the club qualifies for tax-exempt status.

Q. How do I obtain the necessary forms?

A. Telephone 1-800-225-0717. This is the I.R.S. federal tax form ordering service. Ask for Package 1023 and Publication 557 and you'll receive all of the information you'll need to apply for tax-exempt status.

Q. What about exemption from state and municipal income taxation?

A. Generally, the rules and regulations concerning state and municipal tax exemption parallel the federal rules; however, you'll have to consult the state or local tax authorities for full details.

Incorporation

Q. What is a corporation?

A. A corporation, in the eyes of the law, is considered an entity unto itself — an artificial person with certain rights and responsibilities.

Q. Why do radio clubs find incorporation advantageous?

A. Many clubs falsely believe that incorporation will completely insulate individual club members from legal responsibility in case a suit is brought against the club. In some situations, if an incorporated club is sued and loses, a court judgment can go beyond the club's assets, if those assets are insufficient to satisfy the judgment. The court may choose to reach into the pockets of individual members to make up for the deficiency.

Q. Are there any advantages to incorporation?

A. Under certain circumstances, incorporation may be beneficial. If the club owns substantial property and where the legal responsibilities of the club begin to approach large proportions, incorporation is advantageous. However, the average radio club does not own substantial property, nor is it legally involved to a large degree, so this advantage of incorporation is generally not applicable.

In some states, a membership corporation is considered a nonprofit organization and is exempt from filing state income tax returns. However, the average radio club's income is usually so low that the club is already exempt from filing. Another advantage is lost.

Q. Are there any alternatives?

A. To insulate individual club members from legal responsibility, a good liability insurance policy will accomplish the job at a lot less expense and bother.

Q. What if your club does own property and has a large income — how do we incorporate?

A. Each state has its own laws regarding incorporation and these are as varied as they are numerous. Generalities are futile. For information on incorporation procedures, contact the Secretary of State at your state's capitol.

[Editor's Note: Thanks to W6POU and the Santa Barbara ARC for some of this information.]

*Membership Services Assistant

FM/RPT

Conducted By Stan Horzepa,* WA1LOU

Repeater Refuge

You may have noticed that it is getting crowded on 2 meters. If you want to put a new repeater on the air these days, your frequency coordinator will be hard-pressed to find a clear frequency for you even with the FCC's expansion of repeater privileges into most of the lower half of the 2-meter band. In many areas, all of the 2-meter frequencies are either in use or will be in use shortly.

If you are a repeater user, you may find that trying to complete a meaningful conversation on 2 meters is an arduous task. Only in the wee hours may you succeed in finishing a long discourse; at other times, it seems that someone always breaks in and wants to use the repeater just as you are trying to make an important point. Even if you are able to make that point, you may feel restrained from making it too strongly because of the vast audience that may be listening; there may be numerous hams who are "reading the mail" as well as SWLs with scanners and public-service-band monitors who are eavesdropping. If you are going to put your foot in your mouth, you don't want everyone within earshot of the repeater to know what shoe size you wear, so you keep quiet instead.

What to do?

There is a band of frequencies assigned to the Amateur Radio Service between 2 meters and the 420- to 450-MHz ham bands. Maybe you've heard of it. It's 220 MHz and there are repeaters there waiting to be used!

How does that solve the 2-meter dilemma?

It's not crowded. If you want to put a new repeater on the air, your chances of garnering a frequency from the coordinator are vastly improved here as opposed to accomplishing the same feat on 2. (Only in the American megalopoli are 220 frequencies becoming difficult to obtain.)

If you are a repeater user, on 220 you may talk until you are blue in the face or until the repeater times out. Uninterrupted conversation is the rule rather than the exception. And you can put your foot in your mouth and get away with it. Of course, some hams may be listening, but you need not fear the ears of non-hams because scanners and public-service-band monitors do not cover 220 MHz. If you want to get away from the crowd, this is the place.

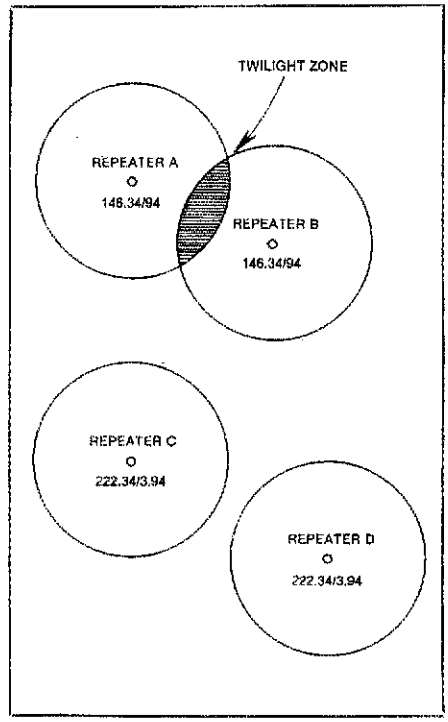


Fig. 1 — On 2 meters, repeaters on the same frequency are often close enough that their coverage areas overlap. This overlapping area, the twilight zone, is not very useful for communications because of interference from each repeater. On 220 MHz, the twilight zone rarely turns up because repeaters on the same frequency are spaced farther apart.

Because of the seclusion afforded by 220, special-interest groups have been attracted to the band. Here they can talk about their favorite topics of interest and need not worry about someone breaking in to change the subject. So on 220, you'll find computer hackers, DX hunters, contest testers and RTTY ratcheters, among others. RACES groups are also beginning to flock to 220 — the whole band is open to RACES operation. ARES groups are moving up, too.

What about repeater coverage?

Well, here's a real surprise! Contrary to some folks' beliefs, 220 coverage is very similar to that of 2 meters. And the antennas are smaller. So, when you move up to 220, you will lose nothing in coverage and you may even gain some territory.

How's that?

Because of the proliferation of repeaters on 2 and the demand for frequencies, repeaters on the same frequency are sometimes close enough that some of their coverage overlaps. Let me explain. As you move away from a repeater and find yourself in the fringe of its coverage area, you can still access that repeater, but you may also be approaching another repeater on the same frequency and find yourself on the fringe of the second repeater, too. As Rod Serling used to say, "You are now entering the twilight zone." In the twilight zone, you can access both repeaters simultaneously, but it is very difficult to communicate through one because of interference from the other. In effect, the coverage of both repeaters is reduced by the twilight zone.

On 220, this rarely occurs because you don't find repeaters on the same frequency as close together on 220 as they may be on two. This permits you to use the 220 repeater even on its fringe; you can utilize its coverage to its fullest and, in effect, gain some coverage over the 2-meter coverage that is deteriorated by the twilight zone. So, if you want to leave the crowds in the twilight zone behind, try 220.

MANITOBA AND NORTH DAKOTA COORDINATOR

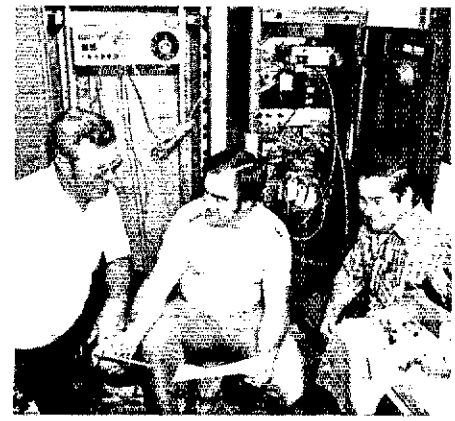
The CAN-AM Repeater Council should be contacted for repeater frequency coordination in Manitoba and North Dakota. The Council would like to see every club in the province and state represented in its organization.

For further information, write to either Bill Graham, VE4QG, 16 Frontenac Cres., Shilo, MB R0K 2A0, or Ken Larsen, KØPVG, R. R. 1, Devils Lake, ND 58301.

NET ACTIVITY

According to the new edition of the *ARRL Net Directory*, there are 240 active public-service nets on repeaters in the U.S. and Canada. The vast majority are on 2 meters (232), while there are seven on 220 MHz and one on 450 MHz. Also, there are 35 nets on 2-meter simplex (fm) and one on 220 simplex.

By the way, to obtain your own copy of the directory, send a self-addressed 9 × 12-inch envelope with 41-cents U.S. postage to ARRL Net Directory, 225 Main St., Newington, CT 06111.



Chicago's first RTTY repeater went into service recently on 144.71/145.31. Sponsored by the Chicago Area Radioteletype Repeater System (CARRS), the repeater features an on-board computer that provides a mailbox service permitting members to leave and retrieve messages on command. The photograph shows WB9RTX, K9WRL and WA9KEK putting the final touches on the system.

*Hq. Liaison, VRAC

Happenings

Conducted By W. Dale Clift,* WA3NLO

City Hall Can Be Beat!

"Have you heard about the new zoning code restricting ham towers to 50 feet?" asked K6NA, as I walked into the local radio store one Saturday morning. "What?!" was my incredulous response. Thus, I learned that the San Diego County Board of Supervisors had, in enacting a revision of the County Zoning Ordinance, slipped in a "zinger." As best as I could determine, the ordinance had completely escaped the attention of local amateurs in the pre-enactment consideration. The hams were never consulted. Fifty feet was chosen because it was a nice round number that seemed high enough to accommodate us.

Exceptions to the maximum height were available for, among other things, Amateur Radio antennas — provided a minor use permit could be obtained. This permit required payment of a $200 fee, a hearing upon notice and an environmental impact review, which cost a minimum of $250. A more dismal prospect could scarcely be imagined.

It was clear that this ordinance had been proposed and considered by people who had no idea of the disastrous impact of this type of regulation on our activities. Consequently, our first thrust was to educate. I prepared a brief draft explaining what Amateur Radio is, what we do and how and why we do it and also explained elementary antenna and propagation theory. The draft was reviewed by W6GIC, W6INI, N6LY and K6NA, and many helpful ideas were considered and incorporated. The report included FCC Regulations (Subpart A, Section 97.1), chapter one of the 1979 *Radio Amateur's Handbook*, copies of *QST* articles dealing with emergency communications and a representative set of plans and drawings for a free-standing tower.

Armed with this I made an appointment to see a staff member of the Department of Land Use and Environmental Regulation (LUER). He was at once receptive and discouraging. After listening for 45 minutes, he said he would be happy to review the report but felt that the prospect of LUER recommending an amendment was none too bright. A few weeks later I learned that the LUER director had decided not to recommend an amendment.

Initial research had led me to the conclusion that a court challenge was out of the question; this was not so much a legal problem as it was a political one. At the next meeting of the San Diego County Amateur Radio Council (SANDARC), I reported my activities and conclusions. I admitted having no political experience, but it seemed to me that the Board of Supervisors had to be shown that (1) this was a serious problem, (2) our reasons and proposals for an amendment were reasonable and in the public interest and (3) our views would have considerable public support.

One way to show support would be a petition signed by county residents. The SANDARC delegates directed me to prepare a suitable petition to be circulated among all the member clubs. Each club member would be supplied with petition forms and asked to obtain as many signatures as possible. I prepared the petition and delivered it to W6GIC, who distributed it to the local clubs. The word was passed on local repeaters and ARES nets. Announcements were made at club meetings and published in club newsletters. Petitions were distributed to local ham equipment outlets and were available at swap meets. Shortly, every active ham in the area was aware of the situation.

While all this was going on, LUER changed its mind and recommended an amendment of 75 feet to the County Planning Commission, which would consider it and make a recommendation to the Board of Supervisors. Seventy-five feet was not what we had in mind, but it gave us an opportunity to get our foot in the door. The hearing was set for March 25 and it seemed important to have as many hams as possible in attendance. A large turnout supporting our position would be persuasive. Again, word was passed on local repeaters and ARES nets. Everyone who could possibly take the time to come to the hearing was urged to go.

About a dozen hams turned out. I gave a presentation much shorter than planned because the chairman refused to allow more than five minutes to speak. WA6GDC spoke at the hearing to relate an incident which had occurred the previous evening. He is active in "Happy Flyers," an organization of ham pilots. An emergency locator transmitter (ELT) had gone off in the mountains east of San Diego and no one on the ground had heard it. It was reported by a jet plane passing over at 30,000 feet. Search and rescue teams had been dispatched and were combing the area. WA6GDC said that with higher antennas, the distress beacon would more likely to have been heard and rescue begun more quickly. His presentation was very effective by emphasizing in a direct way the life-or-death situations that occur and the value of ham activities in dealing with them.

The Planning Commission voted to recommend to the Board an amendment excluding ham antennas up to 100 feet in height, reasoning that a 100-foot threshold would exempt nearly all installations from the minor-use permit requirement. This was encouraging, but not entirely satisfactory. (I never mentioned our petitions to the Planning Commission because it is composed of citizens appointed by the Board of Supervisors. Petitions, it seemed to me, are most impressive to elected officials who run for office and who are more sensitive to public opinion.)

The Board hearing was set for May 16. An intensive effort was made to get a large turnout because we felt that the turnout of a dozen or so at the Planning Commission hearing was a factor in obtaining the 100-foot recommendation. WA6GDC came up with a great idea — inviting local hams to the "County's largest antenna raising party, at their (Board of Supervisors) place"; this was drawn up and published in several newsletters and posted in all ham equipment outlets. Our efforts were rewarded with the attendance of approximately 60 hams at the hearing.

WA6QQQ, WB6DPO, WD6GVR and W6VCE all made presentations at the hearing on technical and public service-oriented topics. One supervisor's late husband had been a ham and she had a very good idea of what we were talking about. Another supervisor indicated that he felt local government would do well to avoid regulating Amateur Radio in a manner inconsistent with FCC rules. After discussion among the Board members and questions about FCC rules, an exemption of 200 feet was proposed and unanimously accepted. Sustained applause and cheering greeted the outcome. We had won!

How had it happened? Three factors seem to account for our success. First, we had a fairly large turnout at the hearing. The supervisors could look out into the audience and see that, if nothing else, their action was going to be witnessed by a roomful of voters who were concerned enough to come out and who would probably remember this come next election and who were probably interested enough to tell their buddies how they were treated.

Second, the petition had a very important effect. The supervisors knew the exact number of signatures at the time of the hearing; they had a count made by their staff and when I mentioned the petition, they indicated that they had definitely reacted to it.

Third, we tried to present our arguments in a positive, rational manner. This was in contrast to another group that appeared prior to us. The thrust of their argument was negative. They even berated the supervisors for passing such "stupid laws and for being such stupid jerks" who couldn't see the justice of the change the group sought. Needless to say, this tact (or lack thereof) was poorly received and they went home empty-handed.

We tried to structure our presentation to emphasize the public interest, balancing the competing diverse interests in esthetics versus the importance of reliable public service communications. The function of the Board and any deliberative lawmaking body is to balance these competing values, and this seemed to strike a responsive chord.

Who says you can't beat city hall . . . we did!
— *Jim Allen, W6OGC*

FCC PROPOSES PARTIAL REFUNDING OF ILLEGALLY COLLECTED FEES UNDER $20

A proposal to partially refund licensing fees of $20 or less, collected by the Federal Communications Commission between August 1, 1970 and December 31, 1976, is the subject of a Second Notice of Inquiry in General Docket 78-316. For the sake of brevity, this article will describe the proposals for refunds of Amateur Radio license fees only. If, in the Commission's calculations, the expected refund would be $3 or less, the refund would not be processed.

*Deputy Manager, Membership Services, ARRL

Applicants who paid a $9 fee for new, renewal or new class of Amateur Radio license under the 1970 fee schedule would receive a $3.28 refund. Under the 1975 fee schedule, the fee for such applications was reduced to $4. No refund would be owed to persons paying the $4 fee.

Applicants who paid a $9 fee for modification with renewal of an Amateur Radio license under the 1970 fee schedule would receive a $6.95 refund. Under the 1975 schedule, the fee was reduced to $4. No fee refund would be owed to persons paying the $4 fee.

Under the fee schedules of 1970 and 1975, the original fee for modification of a license without renewal was $4 and $3, respectively. No fee refund would be owed under these schedules.

The purpose of this Second Notice of Inquiry is to solicit public input on these proposals. Written coments must be submitted by October 1, 1979. Section 1.419 of the Commission's rules requires that the original and five copies of comments be filed. Comments should be sent to: Secretary, Federal Communications Commission, Washington, DC 20554.

QST will carry more information about fee refunds in future issues. For more information on the background of the fee refund program, see August 1979 *QST*, page 68 and June 1979 *QST*, page 58.

FCC ACTS ON RFI POTENTIAL OF INDUCTION COOKING RANGES

A new technological development in cooking appliances, the induction cooking range, may be introduced in the marketplace in the near future. Because these devices are a potential source of serious rf interference to telecommunication devices, the Federal Communications Commission has adopted regulations which will apply to any induction cooking range using a frequency of 10 kHz or higher to develop the induction field used for cooking.

Here's how the ranges work: Alternating current at a frequency between 20 and 40 kHz is circulated in a coil under a smooth ceramic cooking top. When an iron pot is placed over this coil (which puts it in the induction field of the coil), eddy currents are induced in the pot causing it to become hot and cook the food within the pot. Induction cooking can only be carried out with pots in which significant eddy currents are induced; therefore, the pots must be of ferrous material.

This type of cooking has a number of desirable features. The induction range is considerably more economical than a conventional countertop cooking unit because the heat is developed directly in the pot. Moreover, there is no danger of fire from spilled cooking oil because the cooking surface is cold. Finally, the cooking top presents a smooth ceramic surface and is easy to clean.

FCC is amending Part 18 of its Rules to require certification before a unit may be put on the market. To be certified, the device must meet the following radiation and conduction limits: *Radiation limit* — Below 90 kHz, 1500 μV/m at 30 m; on or above 90 kHz, 300 μV/m at 30 m. *Conducted rf limit* — 10-100 kHz, 10-1 millivolts (linear interpolation); 100-500 kHz, 1 millivolt; 500-30,000, 0.25 millivolt.

The FCC noted that for a device operating at a frequency below 100 kHz, the difficulty is meeting the conduction limit, not the radiation limit. However, it feels that these limits on levels of conducted rf energy are necessary to protect the operation of a-m receivers in the home and to ensure that the induction cooking range is not likely to become a source of interference which will prevent putting into service other new developments using the domestic power lines as a transmission medium.

Though the Commission plans to completely revise Part 18 under the proceeding in Docket 20718, it has adopted these regulations, effective February 1, 1980, as a First Report and Order so as not to delay the marketing of these ranges. For further information, contact Herman Garlan, Office of Science and Technology, FCC, Washington, DC 20554, phone 202-632-7095.

IT PAYS TO SPEAK UP

U.S. Navy personnel who are also Amateur Radio operators faced a dilemma: Either they reported *every* QSO with an amateur in a Soviet-Bloc country or be in violation of rules set forth in the Navy's Security Manual. For some hams, that meant contacting the Naval Investigative Service several times per week. After several hams pointed out that this constant reporting would not be productive, the Office of Naval Intelligence changed its mind. Now all hams who are U.S. Navy personnel need only make an initial report, and reports thereafter will be required only if there is anything unusual about the contact.

COLLINS 312B-4 and 312B-5 NOW REGISTERED PHONE PATCHES

In March, 1977, the FCC granted registration status to the Collins 189A-3 Phone Patch. This unit is an integral part of the popular Collins 312B-4 and 312B-5 Station Consoles used by many hams. The consoles, themselves, were not registered, so amateurs could not lawfully connect them to the telephone system without the use of an FCC-approved coupler, usually rented from the user's local telephone company.

We're pleased to report that the Commission, in Public Notice 20040 dated August 3, 1979, has granted registration to the consoles as complete units under the "Grandfather" program (see "Happenings," June 1979 *QST*, page 58). Thanks to W6ITH, Reg Tibbetts, for passing the information on to us. — *Alexander N. Gerli, AC1Y*

FOUNDATION FOR AMATEUR RADIO ANNOUNCES SCHOLARSHIP WINNERS

The Foundation for Amateur Radio announces the 1979 winners of the six scholarships which it administers. The John W. Gore Memorial Scholarship ($900) — Alicia Ann Moore, WB9LAD, Rensselaer, IN. The Richard G. Chichester Memorial Scholarship ($750) — Philip R. Shaefer, WD8OKD, Wooster, OH. The QCWA Silent Key Memorial Scholarship ($750) — Katherine Hevener, WB8TDA, Franklin, WV. The Edwin S. Van Deusen Memorial Scholarship ($300) — Steven R. Harris, WD5GZL, Cabot, AR. The Young Ladies Radio League (YLRL) Scholarship ($300) — Linda J. Skjervem, WB5LMZ, El Paso, TX. The Radio Club of America, Inc. Scholarship ($250) — Charles M. Betz, NØAKC, Caledonia, MN.

John Hansel, WB9TIG, Baraboo, WI, a member of the Yellow Thunder ARC, received his Eagle Scout award at St. Paul's Lutheran Church in Baraboo. The pastor of the sponsoring church is The Reverend Phil Anderson, W9TP. John is 15. *(K9ZZ photo)*

These scholarships were open to all radio amateurs holding at least an FCC General class license or equivalent. The Foundation for Amateur Radio is a nonprofit organization representing 48 clubs in the Maryland, DC, and northern Virginia area. It is devoted exclusively to promoting the interest of Amateur Radio and to the scientific, literary and educational pursuits that advance the purposes of the Amateur Radio Service.

QST congratulates this year's recipients of the Foundation scholarships. Information regarding the scholarships to be awarded next year will appear in the May 1980 issue of *QST*. — *Foundation for Amateur Radio.*

FCC MANAGEMENT CRITICIZED; FERRIS RESPONDS

FCC Chairman Charles Ferris has agreed with a General Accounting Office (GAO) report that the FCC has suffered from inadequate management tools. Ferris noted that the GAO had focused on FCC deficiencies of long standing in management planning and information systems, and that he was currently seeking funds from Congress to remedy those needs. "The problems the GAO identified are the same problems our staff has identified and has been working to correct the past 21 months since I became Chairman," Ferris said. He specifically cited his emphasis on greater participation by the public in FCC activities, one area where the GAO report stated that more assistance was needed. Ferris said the FCC is also in the process of evaluating and improving its system of responding to public complaints and inquiries. He said the FCC's recently expanded Office of Plans and Policy is highly regarded in government circles because it "goes

about the task of implementing innovations rather than simply talking about them." Ferris stated that "basically . . . I endorse the GAO findings and believe we are well into the task of bringing about change that will bring the FCC updated management tools."

PETITION FOR RULEMAKING DENIED

The Federal Communications Commission has denied a petition filed by George Bonadio, of Watertown, NY. This petition, RM-2015, asked that the amateur rules be amended to declare that during an emergency, all transmissions on all amateur frequencies be restricted to emergency-related matters, and further that all subband assignments be suspended for the duration of the emergency. The Commission denied the petition on the grounds that it already had the authority under §97.107 to take such action.

PETITIONS RELATED TO AMPLIFIER BAN

The FCC has assigned rulemaking numbers to two petitions which seek relief from the Commission's ban on the commercial manufacture and sale of radio frequency power amplifiers capable of operation in the 24- to 35-MHz range. RM-3407, filed by the Allegheny County (PA) Fire Radio Advisory Board, seeks changes in the FCC Rules to allow commercial manufacture and sale of power amplifiers capable of operation in the frequency range of 33 to 35 MHz. RM-3416, filed by the Public Safety Communications Council, asks for similar relief for the frequency range 30 to 35 MHz.

The petitions are interesting to Amateur Radio operators because they seek relief from the same rules which prevent the commercial sale and manufacture of amplifiers capable of operation on the amateur 10-meter band (28-29.7 MHz). On March 20, 1978, FCC decided to ban the commercial manufacture and sale of rf amplifiers capable of operation between 24 and 35 MHz in order to prevent these devices from falling into the hands of CBers or unlicensed persons who use them illegally. ARRL has filed suit against the FCC, asserting that the ban penalizes law-abiding amateurs while doing little or nothing to stop the illegal use of these devices by CBers or other persons. For more information, see January 1979 *QST*, page 63.

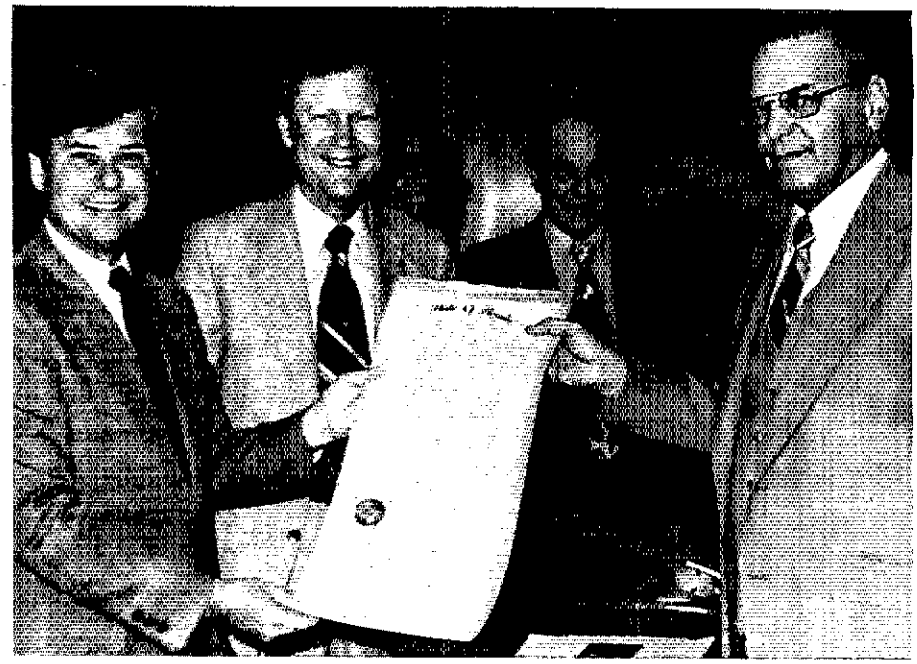
FCC LABORATORY DIVISION — CHANGE OF ADDRESS

The mailing address of the Commission's Laboratory has been changed to: Federal Communications Commission, Laboratory Division, P. O. Box 429, Columbia, MD 21045. All parties, including particularly those having to do with applications for equipment authorization, should direct their mail to the laboratory at the new mailing address above.

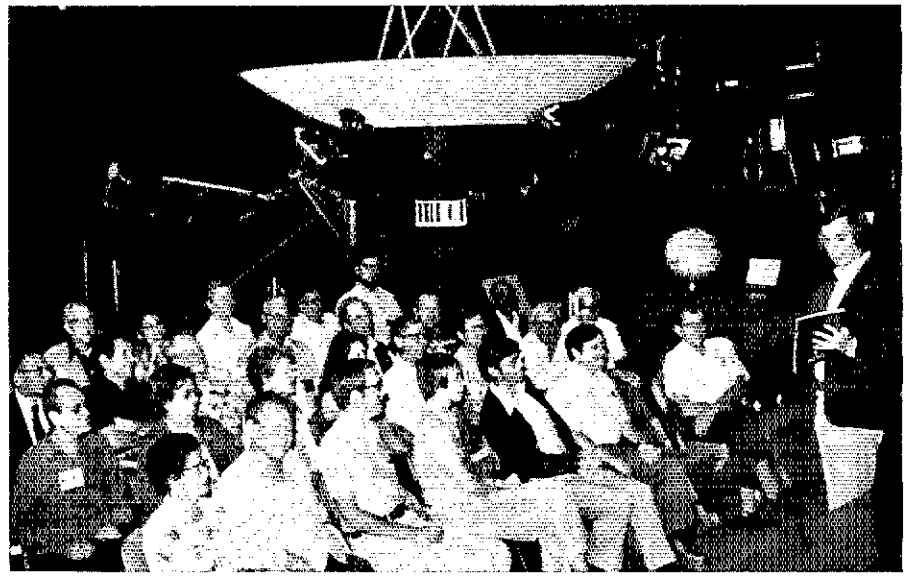
STAFF NOTES

Paul K. Pagel, N1FB, has recently joined the *QST* staff as assistant technical editor/product review editor in the Technical Department. Now, there are two FBs at Headquarters — the other one's Paul's boss, Doug DeMaw, W1FB, manager of the Technical Department. Paul hails from Enfield, CT, where he has lived for about 10 years. He was born in New York and raised in New Britain, CT. A graduate of the Ward School of Electronics in Hartford, Paul served a three-year tour of duty in the U.S. Air Force before joining the staff of WWLP-TV in Springfield, MA. He was technical supervisor there for 12 years before joining *QST*. A ham since 1958, Paul was first licensed as K1KXA. Paul is married and has one son. His other hobbies include scuba, fishing and swimming. Paul and his wife also participate in archery, which they have enjoyed for some time.

We'd also like to welcome Richard K. Palm, K1CE, to the official ARRL "family." Rick will be assuming various duties in the Membership Services Department, among them Rules and Regulatory information, coordination of the ARRL Blind and Handicapped Program, and serving as assistant secretary of the ARRL Foundation. Rick, or "Bones," as he is known to his many friends in his home area of Lexington, MA, is an active ham, indeed. He holds various ARRL Section, Region and Area Awards, and has been an NCS and net manager for the Heavy Hitters Traffic Net. First licensed in 1976 as WA1YIU, Rick has held the Extra Class callsign K1CE since June 1978. — *Alexander N. Gerli, AC1Y*



Charles Watters, W4RHE, has been honored with a resolution from the Florida Cabinet for maintaining the only communications link between the U.S. and its embassy in Teheran, Iran, during an attack by hostile forces. Pictured, left to right, are Governor Robert Graham, State Treasurer Bill Gunter and Chuck, W4RHE.



League officials, led by Southwestern Division Director Jay Holladay, W6EJJ (standing), met recently at the Jet Propulsion laboratory auditorium, Pasadena, CA. Also present were Vice Director Pete Matthews, WB6UIA, and Herbert (Pete) Hoover, III, W6ZH, who recommended on behalf of the Long-Range Planning Committee that "all hams promptly define problems first, submitting their solutions afterwards." *(photo by W6VGQ)*

The New Frontier

The World Above 1 Gig

Conducted By Bob Cooper Jr.,* W5KHT

All Airwaves Are Not Free!

This month's column will deal with the amateur's responsibility and, yes, obligation to both himself and his fraternity when he begins to dabble in reception of *non*amateur transmissions in the microwave region. The fodder for this subject comes from many sources. A recent letter to this column conductor from Carlos F. Gutierrez, KP4AA, is as good a place to begin as any. Carlos expresses concern, on behalf of the amateur fraternity, that those from within the fraternity who may be dabbling with reception from geostationary communication satellites may be running afoul of the law. Carlos' concern is well-founded.

Those of us who have grown up on a diet of Amateur Radio have grown accustomed, by our technical training and the equipment we have at our disposal, to the relative ease with which we can "dial in" various types of transmissions from throughout the world. Whether we are receiving amateur transmissions within one of our many assigned hf bands, or checking WWV, we tune with ease and scarcely any second thoughts any signal which our receivers can intercept. And we get away with this for the most part because very little of what we are likely to encounter on frequencies below 30 MHz and, yes, even below 500 MHz can be considered "private" in the usual sense of the word. Even in the vhf and lower uhf regions where public safety, business and industrial allocations are found, general reception "by the public" is at least encouraged by the proliferation of scanner type receivers. So it is with some degree of past experiences that we move into the upper uhf and even shf regions with the built-in second sense that "anything that is in the air is free to tune in."

Unfortunately, this is not true. And recent events suggest that at least some people (including perhaps some amateurs) are in the process of finding out just what the inside of a federal courthouse looks like because they thought (or misbelieved) that anything they could entice into their receiver was theirs to tune in and enjoy.

There is on the books of the Federal Communications Commission a rather obscure piece of regulatory law which makes it potentially a criminal matter if you tune in certain specified types of communications. That section of law is variously known as the "Privacy Act" or as "Section 605" and here is what it says: " . . . No person not entitled thereto shall receive or assist in receiving any interstate or foreign communication by radio and use such communication (or any information contained therein) for his own benefit or the benefit of another not entitled thereto. . . ."

*Rte. 5, Box 364, Guthrie, OK 73044

Now, what types of transmission are covered by this section? Virtually all of the common carrier transmissions for a start. A common carrier is a company licensed by the FCC to set up one or more radio transmitting facilities and the attendant receiving facilities required to provide point-to-point communications *for hire*. The key phrase here is "for hire." If the operator of the transmission system (and a system here includes the receivers as well as the transmitter since most common carrier systems are licensed at both ends of the circuit) is being paid money for his "transmission service," then he is in one way or another a common carrier. An hf example of this would be the various high-power transmitters that send news wire RTTY services to South America and the Pacific from the U.S.; yes, they are paid for their "transmission service" and, yes, tuning in such reception is potentially a violation of Section 605.

But what harm is done? Perhaps, in the hf example, none. The same is not necessarily true in the upper uhf and shf region. Let's look at a couple of examples.

One of the more popular and fast-growing common carrier transmission services in the United States these days is something called MDS; or Multi-Point Distribution Service. MDS operates in the 2.15-GHz region and during the last two years around 40 of these MDS companies have been established as over-the-air relay systems for premium movies and other specialized television fare. Several hundred thousand American homes, motel rooms and apartments now have MDS. And most of them pay for it; typically $10 to $15 per month. Most MDS system operators have relied on the frequency of their transmissions for security; after all, 2.15-GHz converter systems are not electronic emporium off-the-shelf items. Such reception packages typically cost the MDS operator (who provides both the transmitter and the receiving system equipment to customers) around $60 per installation and that ought to tell you just how simple the 2.15-GHz receiving system "converter" plus antenna really is. It is so simple, using the latest state-of-the-art microwave technology, that it can be duplicated for about the same price on a one-unit basis by anyone with even modest technical background. Which is precisely what is happening. Thousands of "illegal" (in the sense they are not authorized by the common carrier) receiving systems have sprung up all across America. And amateurs are already getting a black eye and a bad name because irate MDS system operators are misusing the term "Ham" when they recite their problems to local federal court judges and attempt to lay the blame for their losing control of their service to nonauthorized receiving systems. A recent offering in an amateur publication (*73 Magazine*, August 1979) brings the problem even closer to home, describing in explicit detail the construction of an MDS receiving system.

Interception of the geostationary (common carrier programmed) satellites is another case in point. Virtually every one of those 50 or 60 channels of television available throughout North America via satellite is on the satellite because one or more common carriers put them there.

So KP4AA's concern is valid. There *are* real problems associated with the interception of common carrier transmissions which you are not specfically entitled to receive. Under Section 605, you are violating someone else's "privacy" and in addition to this when you intercept a service such as HBO which is a "premium movie" service, you may also be running afoul of a revitalized law dealing with copyrights and the protection afforded to the owners of such "movie/entertainment" products.

As licensees of our respective national governments we have both an obligation and a legal responsibility that places us as amateurs in a different category from the normal man on the street. As a nonprofit, voluntary service of individuals dependent upon our own federal licensing authority for our frequencies and our operating rules, we also have a responsibility to one another not to misuse our special knowledge and skills to either indulge in illegal reception activities on our own or to encourage (as in "assist") others to do so.

Fortunately, there are legal and satisfying solutions to both the MDS and the geostationary satellite problems. Most MDS company operators will authorize your to receive their transmissions with your own (home-built) receiving equipment if you will agree to pay the monthly service charge like any other viewer. Since the MDS firms get an average of $150 each for the initial installation of their equipment (which they continue to own), there are both dollar incentives and technical incentives to putting your amateur skills to work in this way. But before you embark on such a project, talk with the MDS operator first! As a group they are very uptight these days about "bootleg" receiving systems and you may have to convince them of your sincerity.

The FCC is now routinely granting private (as in noncommercial) home satellite television earth terminal licenses. They cost no money to acquire, and the forms are relatively simple to complete. You owe it to yourself and your fraternity to "do it right." And remember, please, that permission, in advance, is required before you tune in any of these shf common carrier transmissions!

YL News and Views

Conducted By Jean Peacor,* K1IJV

No Generation Gap Here

How great it is to have the entire family interested in the same hobby. Amateur Radio's ranks increasingly show definite strides in this direction. Sharing the rig can be fun, as can sharing every exciting facet that hamming has to offer. The many radio clubs now offering code and theory classes have provided the inspiration for many new licensees. In many cases, whole families have attended such classes and have strengthened entire family relationships. Dinner-table talk takes on a new *zing*.

What prompts a great-grandmother of 10, grandmother of 40 and mother of seven to take and pass the Novice exam at the age of 82? Family!

Mary Greene, KA6FLO, of Bakersfield, CA, wanted to be able to talk with her son Lloyd, WB6PEL, in Fresno. Her son John, WA6YJV, lent her his Heath HW-16 — says she's doing fine — enabling all three to keep up with family news. You'll hear them every Saturday at 7 A.M. PST on 80-meter cw and Mary's enjoying every minute.

Bill, KA4GDF (life member, ARRL), and Phyllisan West, KA4FZI.

Proud dad David Bennett, K8YZ, writes about his daughter, Lisa, KA8EVU, who at age nine received her Novice a few months ago. Already a member of the Oakland County Amateur Radio Society, Lisa looks forward to meeting more YLs through YLRL. Both Lisa and her mother, Marcia, KA8EVV, are studying toward upgrading their licenses. Look for Lisa on 15 meters.

The mother-son team of Phyllisan, KA4FZI, and Bill West, KA4GDF, 15 years old, of Cape Coral, FL, took to the airwaves in January 1979. A local Novice class helped them to become airborne, as did the great encouragement of many fellow members of the Fort Myers Radio Club.

Their Heath SB-102 has hardly been silent a day since January. While one operates, the other pinpoints QTHs on the map. Having been introduced to the traffic net system, both Bill and Phyllisan are regulars on QFNS. (All Florida amateurs are welcome to join QFNS, a slow-speed training net, at 0000Z on 3.715 MHz, where you will now hear Bill as NCS Friday nights and Phyllisan as NCS on Fridays.) They look forward to General licenses soon and plan to continue with traffic handling. DXing on 15 meters has also intrigued them both.

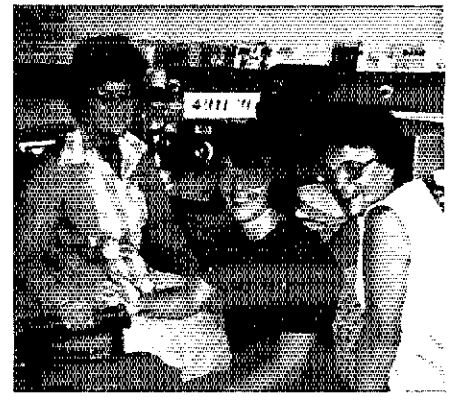
Another incentive for upgrading — they have spent hours listening for the OSCARs and can't wait to have the necessary license and equipment to communicate through them. Figuring time zones, orbits, latitudes and longitudes have proven excellent practical experience.

The family that perhaps beats all families hamwise is the McDades of Arden, NC, whose QSL card has become rather famous (see August 1977 *QST*, page 13). How many QSL cards do you have that picture nine family members? They include Dad W4DYW; Mom (Edith) WA4SRD, WA4BQY, WB4OMB, WA4BST, DL7SU, WA4BVF, WA4YMY and WA4AAK. Is that a record?

Four of the family spent an exciting time visiting 4U1ITU, the headquarters station of the International Telecommunication Union, in September 1978. They participated in the European DX Contest and made many other contacts, managing to run two stations simultaneously day and night from September 6 through 11. Being portable DL was a decided thrill but operating from 'ITU with three YLs in the shack seemed to cause an even greater sensation. Theirs is mostly a cw family, with much participation in traffic-handling nets.

Everest, W4DYW, was the first radio amateur in this family, licensed long before marrying Edith. His enthusiasm has not only rubbed off on the next generation; he and Edith have their eyes on their daughter Emily's children, Marcy and Sarah, as possibly increasing the number of hams in their family to 10 and 11.

How fine it is to find such strengthening bonds among family members. Do we all fully appreciate some of the extra bonuses that Amateur Radio provides?



At 4U1ITU (l to r): Ellen, WA4BQY; Elissa, DJØYL/WA4BVF; and Edith, WA4SRD.

YLRL'S BIRTHDAY

When Ethel Smith, K4LMB, wrote a letter to the editor of *QST* in 1939 appealing to all licensed YLs to please contact her, an even dozen replied. These same 12 women became the founders of YLRL (Young Ladies Radio League). In October 1939 they drew up a constitution and elected Ethel Smith their first president, and YLRL was born.

Fortieth Birthday

Forty years later, approximately 1300 YLs have joined YLRL's ranks. All of this was celebrated during their eighth YLRL International Convention in Philadelphia, PA, from June 29 to July 1. The Pennsylvania-Jersey YLRC hosted this event.

In honor of the occasion, Pennsylvania Governor Richard Thornburgh proclaimed the week of June 24 YLRL Week. The call of W3YL, belonging to Sandy Rutiser, was used for the convention Amateur Radio station.

Christine Haycock, WB2YBA, convention chairman, and her many committee members deserve the bouquets for the convention's success. Until you have served on such a committee, it can be difficult to understand just how large those bouquets should be.

Program Coordinator Rose Ellen Bills, N2RE, lined up an interesting group of speakers. At the Saturday morning session, Ethel Smith, K4LMB, spoke to the group. A panel of five YLs followed who discussed their individual operations and how they became hams. Speaking were Amy Young, WA2QYZ; Louisa Sando, W5RZJ; Eila Russell, WA8EBS; Eleanor Hammonds, W3BIW; and Valerie Milnes, G4BML. Also sharing their operating experiences were DX visitors S8AYL, 3D6AG, WA6QFO, LX1TL, JA1AEQ, JF1WMY and DK9ZL/W. Art and Madeline Greenberg, W2LH and W2EEO, concluded the morning program with an excellent presentation on antennas.

YLRL President Phyllis Shanks, W2GLB, presided over the YL Forum following lunch. Please make note of Phyllis' new address: 7 Lake Circle Dr., Vicksburg, MS 39180.

At the YL/OM banquet on Saturday evening, a very special occasion, a proclamation honoring YLRL was presented. Following entertainment, Louise Moreau, W3WRE, was the featured speaker. Her topic, "YLs in Ham Radio," proved of great interest to all. Prizes followed.

Sunday morning speakers were Beth Taylor, W7NJS; Beverly Williams, a TV newswoman; Liz Zandonini, W3CDQ, and Claire Bardon, W6TON. Following more prize drawings, Christine, convention chairman, presented her closing remarks at noon. This fun-filled weekend left many YLs with many new friendships and having restored many old ones.

YLRL Activities

Five different certificates are sponsored by YLRL: WAS-YL, WAC-YL, DX-YL, YLCC and DX-YLCC. Rules for these awards will be published in a future column. In addition, YLRL sponsors four contests each year: Howdy Days in September, YL Anniversary Party in October, the YL/OM Contest in February and March and DXYL to North American YL in April.

How to Join

All licensed YLs are eligible for membership. Members receive a bimonthly newsletter, "YL Harmonics." Dues are $4 per year, due March 1. Dues for DX YLs are $4.50 (or, $7.50 if airmail delivery of *YL Harmonics* is preferred). Dues should be mailed to Carrie Lynch, WA4BVD, Rte. 5, Box 46, Cochran, GA 31014.

Don't forget — YLAP is a great time for YLs to meet other YLs. (See "Contest Corral" for rules.)

*Country Club Drive, Monson, MA 01057

Silent Keys

It is with deep regret that we record the passing of these amateurs:

W1BCC, Emil J. Moticka, Stockton, CA
WA1FGE, Louis J. Gassmann, Belmont, VT
W1BGB, Henry O. Johnson, E. Longmeadow, MA
W1EM, Robert D. Houston, Portland, ME
W1GSW, Joseph Pastor, Newtown, CT
W1JCX, Herbert E. Cole, Scituate, MA
W1QT/W1JKO, Walter C. Newman, Braintree, MA
W1NQO, James H. Hanson, Haddam, CT
K1PPP, Henry O. Gobin, Attleboro Falls, MA
W1RLT, Frederick C. Welch, Haverhill, MA
W1VLR, F. Rudolph Hunziker, Norwalk, CT
K2GG, Rodney L. Dinsmore, Southampton, NY
W2IGE, Gunnar H. Anderson, Greenpond, NJ
K2KTJ, Lester M. Pembrook, Albany, NY
W2LEB, Ralph L. Lee, Southampton, NY
K2LIL, William G. Buntrock, North Bergen, NJ
WA2TFU, Charles Fischer, Brightwaters, NY
WA2UIH, Raphael R. Akey, Plattsburgh, NY
W3BCE, Frank P. Amsden, Harrisburg, PA
W3DGF, Amin Taliaferro, Philadelphia, PA
W3FUZ, Jackson R. Fisher, Frostburg, MD
W3NCM, William H. Glass, Pittsburgh, PA
*WA3OTZ, Howard B. Lawton, Baltimore, MD
W4BNI, Ralph F. Coady, Tampa, FL
WB4BWW, Jack J. Wayman, Berea, KY
WA4CIR, Charles H. Norton, Acworth, GA
WA4OOB, Jack D. Payton, Ocala, FL
W4PXX, Thomas E. Brewer, Paducah, KY
W4SBM, James L. Boles, Jamestown, TN

*Life Member, ARRL

WB4SEB, Earle W. Meredith, Sarasota, FL
K4TLI, Louis Wagner, Oviedo, FL
ex-W4YNQ, William E. Leatherman, Louisville, KY
W5BKN, Elmer L. Fields, Oklahoma City, OK
K5EKK, Bruce C. Ridley, Houston, TX
W5KPX, Herbert E. Hall, Weslaco, TX
WA5MVC, Elbert L. "Doc" Griffin, Nacogdoches, TX
W5PCN, Leland E. Gibbins, Marble Falls, TX
W5SBU, J. C. Porter, Irving, TX
WB5TCP, Douglas E. Decker, Dallas, TX
W5TL, Maj. Charles E. Harvey, Waveland, MS
W5WI, Oren B. Gambill, Tulsa, OK
WA5WJR, William H. Jordan, Kosciusko, MS
W5WVV, Charles D. "Jack" Smith, Abilene, TX
Ex-WA5ZGR/TF2WMA, Harry M. Kendall, Long Island, NY
W6ADA, Albert F. Hoeflich, Redding, CA
KA6CLT, Charles T. Watkins, Hemet, CA
WD6DNG, Herman L. Mittlehauser, San Diego, CA
*W6DSD, Howard H. Campbell, Panama City Beach, FL
W6DT, Oscar N. Schuwendt, Riverside, CA
K6FP, Frederick E. Kail, Van Nuys, CA
W6JFQ, Edmond H. Colliau, Pasadena, CA
WA6IBH, Gerald L. Jones, Covina, CA
K6JUB, Ervin R. Wiebe, Panorama City, CA
W6NAJ, Hedgmon J. Ebert, San Diego, CA
W6POM, Jay C. Taylor, Los Angeles, CA
AD6Q, Paul H. Maurer, California City, CA
WA6RFW, Walter B. Herron, Los Angeles, CA
W7BVB, George C. Howard, Spokane, WA

W7HXS, Lorenzo S. Foote, Black Canyon City, AZ
W7EKL, Clifford E. Coon, Sheridan, OR
W7FQV, Carl H. Hatch, Tucson, AZ
W7INJ, Henry Jenkins, Tacoma, WA
W7IT, Alfred Hansen, Stanwood, WA
W7JIG, Philip C. Fliss, Seattle, WA
WB7ONQ, Hugh A. Alexay, Oro Valley, AZ
K7SVN, Inez B. Bullock, Salt Lake City, UT
WB8ADY, Julius Bray, Cincinnati, OH
W8BXU, Robert D. McKinnon, Muskegon, MI
KA8EDA, Helene Rysenga, Lawton, MI
W8EUF, John W. Brean, Cincinnati, OH
W8GSC, Carl N. Bruning, Muskegon, MI
WD8KBB, William L. Jackson, Cincinnati, OH
W8YHQ, Neal E. Farrar, Columbus, OH
W9IMP, Col. Edward A. Timm, Danville, IL
WB9QDO, Norman B. Culp, Frankton, IN
W9RB, Robert B. Cooper, Pontiac, IL
W9TMC, Albert Roberts, Chicago, IL
W9UF, William A. Holmin, Rockford, IL
W9WX, Robert H. Winston, Geneva, IL
WØGBJ, Clarence L. Arundale, Springfield, MO
WØPVN, Emil J. Ciabattari, Nederland, CO
WØSX, Elmo W. Phillips, Omaha, NE
VE3AUR, John J. Williams, Agincourt, ON
VE3BDC, Dennis M. Couperthwaite, Markham, ON
VE3DH, John W. McCalla, Ridgeville, ON
VE3HDV, Donald A. Green, Pickering, ON
VE3YD, Ray S. Pellow, Scarborough, ON
VE6YZ, Donald H. Solley, Edmonton, AB
VO1BH, Eric S. Holden, St. John's, NF
IØAG, Giampiero Galligioni, Brugherio, Italy
ZE6JA, Maurice Cleave, Sanyatwe, Rhodesia

Club Notes

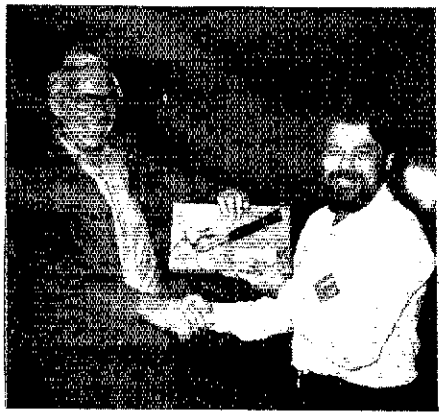
Is your club planning to run a code contest soon? We have Club Code Proficiency certificates you can use just for this purpose. Send us an s.a.s.e. for the number you'll need. (They are 8 × 11-1/2 in.)

Trident ARC (SC) members raised money through a raffle — a Grocery Give Away. Everyone needs groceries, so participation and profits were excellent.

Need humorous, short periods of time for your club meetings at which lots of business needs to be hashed out? Kansas City DX Club (MO) asked club members to bring QSL cards from OPEC countries (HZ, YI, 5A, etc., prefixes) dated after January 1, 1972. Whichever member brought the most won a quart of motor oil. One can think of all kinds of twists to this contest for other countries and continents.

Spice up your club meetings with a bit of humor. Mt. Airy VHF RC (PA) often presents honors for such things as the best excuse for not running up a big score in a contest (called "The Crying Towel" award) and other funny situations. In the photo, member W3HMU (r) accepts "The Broken Hammer" award from W3ZD.

A new twist to an old program idea: Iowa Illinois ARC ran a QRP DF Hunt.

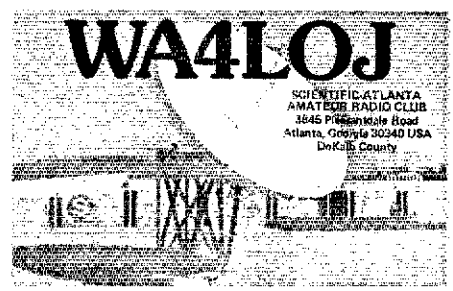


Kudos to Lockheed ERC ARC (CA) and Columbus ARA (OH), whose members voted to purchase narrow-band voice modulation boxes for on-the-air demonstrations and experiments.

Old clubs hold anniversary parties or Founder's Day gatherings. New ARRL-affiliated clubs plan charter parties where ARRL directors or area ARRL officials present the affiliation charter. Lockport ARA (NY) recently celebrated their 50th year of existence. The photograph shows (l to r) AE2T, secretary; WB2ZXV, treasurer; K2LWC, historian and longest-standing member (he joined in 1937); WA2ZVL, president and WB2BGA, vice president.

The next photograph shows members of newly ARRL-affiliated Wilderness Trail ARC (KY) at their charter party. Section Communications Manager K4DZM presented the charter. Members devoured cake, which quite appropriately was decorated with the ARRL diamond.

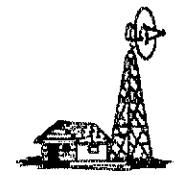
Clubs ask what activities to plan for these two types of parties. We say, "Let your imagination run wild." The club's history is summarized, or if the group is brand new, a rundown of its beginnings is read. Or a funny skit can be put on depicting the history, the beginnings or the founders. The founding members can be honored with certificates. Invite prospective hams, local old-timers, ARRL officials or a well-known amateur to give a congratulatory word or two. Decorate with a drawing of the club logo or anything that represents the club. And, of course, serve cake or whatever your crowd likes to celebrate with — have fun! — *Rosalie White, WA1STO*



A neat QSL card for members of Scientific Atlanta ARC (GA).

The World Above 50 MHz

Conducted By
William A. Tynan,* W3XO



Great Improvement in Weak-Signal Reception Possible

We pride ourselves on being weak-signal operators, but have we really developed the art of weak-signal communication to its fullest? True, we vhf/uhf amateurs have excelled in putting together efficient backyard antenna arrays to grab the last dregs of signal out of the ether and ultra-low noise preamplifiers to boost them to a point where, with reasonably good receiving systems, we have a chance of extracting something intelligible. We have also constructed stable high-power transmitters to propel our signals across vast terrestrial distances or even all the way to the moon and back. But, except for a few exceptions, that's where we have stopped. The methods we use to actually interpret the signals are out of the 30s. Yes, audio and i-f filters are used by some, including some quite advanced types boasting band-passes in the few hertz region, but most of us merely listen very hard with headphones clamped tightly to our heads. This approach is really not all that bad, as a well-trained ear/brain combination is capable of doing a pretty good job of extracting signals from noise. But, nevertheless, we can do much better and there's no time like the present to get to it. What is needed is for those who have the knowledge and know-how to show the rest of us the way. It's a natural for marrying the equally fascinating hobbies of Amateur Radio and computers in a union that should produce some really gifted offspring. For the ready availability of relatively small and inexpensive computers is the key that can unlock the door to greatly expanded capabilities for our vhf and uhf stations. Such feats as solid moonbounce contacts using 100-watt transmitters and 10-dB antennas and nightly 1000-mile terrestrial QSOs on 2 meters are distinct possibilities, if the proper techniques are brought to bear.

Why haven't these techniques been applied before now so we could already be enjoying this greatly expanded capability? There are several reasons. One is that computers have, only in the past few years, become practical for use by amateurs. Another involves the belief, or contention, on the part of some, that only contacts in which a human actually "hears" the signal should be considered valid QSOs for state and country credit. This attitude is somewhat surprising in the light of the many years of ham teletype operation. Although most RTTY contacts are initiated using headphones or speaker to acquire the signal, it is apparent that such an aid is not absolutely necessary to establishing communication. If two RTTY stations possess the necessary frequency accuracy and stability so that they don't need to listen in order to tune each other in, should that be used to claim that they are not actually working? What about the case of W3HCF, here in the Washington area, who is using his computer in conjunction with an alogrithm he developed to copy hf RTTY signals which he can barely hear. Is he not making contacts? I think that it would be difficult to claim that he is not. The other factor which has held up work in this area has, I am sure, been the attitude of FCC with respect to the use of codes other than Morse and Baudot. Certainly their steadfast refusal to allow amateurs to use other digital codes such as ASCII or schemes developed to accomplish particular jobs has hampered things. Individuals can usually get Special Temporary Authorities (STAs) to conduct certain experiments but there is paperwork involved and STAs are good only for six months at a time. Then there is always the concern that techniques arising out of such experimentation may not be transferable to the general amateur fraternity if they employ coding which is not authorized. There are increasing signs that a change in FCC position may be coming, however, so this obstacle may soon be eliminated.

One hint which can be used in pointing the way toward more optimum use of signals buried in noise is given in the June 1979 issue of the *AMSAT Newsletter*. It is a piece entitled "Digital Communications and the AMSAT Phase III Satellites," by Karl Meinzer, DJ4ZC, translated from an article in German appearing in *CQ-DL* by K3PNL. Although this article is concerned with the data communication between earth and this new generation of amateur satellites, and hence is not directly applicable to very weak signal work such as very long-haul terrestrial or EME communication, nevertheless Karl stresses one of the fundamentals of communication theory which should guide our thinking. This is the concept of matched filters. Put simply, this says that the bandwidth of the receive filter should be equal to the bandwidth of the signal being received. It sounds obvious and most of us would say that we're already abiding by it, but when you consider what some of the synchronous cw group are doing on the hf bands with their QRP and extremely narrow filters and master oscillators with stability to match, you can see that we're hardly scratching the surface. This technique in itself, offers very interesting possibilities for long-haul terrestrial work at vhf. W7LUX, AZ, put out a plea a number of months ago via this column for someone to try it with him on 2 meters. The last I heard, he had no takers.

But there are other and more effective techniques which we could use to greatly increase the capability of our vhf/uhf stations.

Let's take the earth-moon-earth problem, first because it offers the most in DX potential, and second because it involves more variables to worry about. If we can figure out how to cope with all of these, then terrestrial circuits should be easy. Before discussing more exotic techniques, let's first look at what we need to know in order to communicate with one another by the methods commonly used by moonbouncers today. This assumes that both parties already have working moonbounce stations. Of course, they must know the time and frequency of the sked. They need to establish a calling and listening sequence and agree on a reporting code, generally the TMO5 system. Both operators must know where the moon is with respect to their stations so that they can aim their antennas and compensate for Doppler. That pretty much takes care of it. To be sure of frequency they might check with a local standard calibrated to WWV. WWV is again used to set each station clock so that sequences are matched precisely at both ends. At the appointed time, the antennas are aimed, either manually, by running out into the backyard, or remotely by use of rotators. The transmitters and receivers are tuned to the proper frequencies, noting the Doppler shift which might affect the frequency of the received signal, and the sequence is begun. Normally, on 2 meters, each station transmits for two minutes. Transmission and reception periods are timed right down to the second in order to maximize the probability of hearing each other.

Surprisingly, application of mere extensions of this presently used technique could bring EME to within the reach of many more amateurs by lowering the power and antenna gain needed. Tom Clark, W3IWI, provides a few ideas as to possible approaches. He reports positive results in detecting his own moon echoes using moderate power and antenna gain in conjunction with computer techniques to accomplish signal processing. In fact, he has done so twice, once in 1961 as WØIUF using the crude computer hardware then available; and again a year or so ago as WA3LND employing a modern microprocessor based computer system. Tom is prevented from further work in this direction at present because of a heavy work schedule and involvement in hardware and software aspects of the AMSAT Phase III satellite program. But I will pass along some of his thoughts for others who may be inclined to take up the challenge. Some of Tom's ideas are as follows: Why not use frequency shift keying (fsk) instead of on/off keying? Fsk is recommended over phase shift keying (psk) for EME because of libration fading, which is at an approximate 50- to 100-Hz rate. This would completely obscure the intelligence on a received psk signal. With on/off keying, the transmitter is off approximately half the time. The off periods represent power lost. One can gain about 3 dB in power by keeping the transmitter running all the time but about half of that advantage is lost in making the decision whether a signal exists in one of two noisy passbands. This assumes that separate filters are used for the mark and space signals, as is common in modern RTTY practice. Even with this loss, it is still worthwhile to pick up 1.5 dB in moonbounce work. But we need much more if we are to improve greatly over our present capability. How can we bring about such an improvement? By extending the techniques we are already using. We can take advantage of the

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730 or call 301-384-6736 and record your message.

fact that the more we know about the signal we are looking for, the easier it is to find. In order to achieve a quantum improvement over our present techniques, we must apply them more rigorously and use something other than the human brain to accomplish signal detection and decoding. One requirement is that frequencies be controlled much more precisely than is currently our custom. This includes correcting for Doppler, another job for the computer in which can be stored information on the location of the station and the orbital parameters of the moon. If W5SXD could automatically correct for Doppler on OSCAR by typing into his computer the latitude and longitude of the station being worked, the moon correction job is certainly doable. Knowing when to expect the signal to appear can pay big dividends for computers, just as for humans using two-minute sequences on EME or 15-second sequences on m.s. But now we're talking about time accuracies reckoned in milliseconds and we're talking about each "bit" of signal not entire transmissions. Again, WWV and other standard time stations come to the rescue. With both communicating stations using precision clocks synchronized to UTC and an agreement on just when each element of the message is to begin and end, the computer has the information it needs to look for a signal buried well below noise.

Coding is another important consideration. Ideally, a code in which all letters and numbers occupy an equal length of time would be best since the computer is using time in its signal search. Both ASCII and Baudot codes fill this bill. ASCII would be preferable since computers normally use this to communicate with the outside world. Unfortunately, FCC won't let us use ASCII at present, and even with Baudot, it places restrictions on speeds that we can employ. Morse has the disadvantage of not being an equal time length code. The letter "E" occupies much less time than does the figure "0." Nevertheless, we are allowed to go as fast or slow as we want in Morse, so fsk Morse at some optimum slow rate is worthy of consideration.

It is hoped that this rather sketchy outline of techniques will spur a few experimenters into attempting these or similar ideas and informing the rest of us as to their approaches and results. Out of such work may evolve a new optimum standard system which can be applied by large numbers. Amateur Radio is due for another breakthrough akin to the development of cw in the 20s and ssb in the 50s. Possibly it can be found in the marriage of computer and radio techniques to greatly expand our horizons, particularly in the world above 50 MHz.

ON THE BANDS

6 Meters — By the time this appears in print, the first signs of that propagation mode most exciting to 6-meter devotees, F2, should be appearing. They may not be apparent in the form of 50-MHz signals just yet but that's coming. The first indications will probably present themselves in the form of very good 10-meter conditions including strong signals late into the evening and occasional stations popping up in the 40- to 50-MHz range. Remember, for up-to-date information on 6-meter conditions, monitor 28.885 MHz. That liaison frequency served well last year to tip us off to F2 breaks all over the world. It's been dormant over the summer but should be established again by the beginning of October. It will probably start with reactivation of the Six Meter Information Net at 1700 UTC each Sunday.

I'll have more to say about what's coming in next month's column, but will only remind one and all that it's still not too late, but will be soon, to make available any unused 6-meter equipment you might have to a DX station who can use it. Even low-power a-m/cw gear is welcome. Europeans can use converters as they are not generally allowed to transmit on 6 but can listen there and contact us on 10 meters (usually around 28.450). Perhaps you know a foreign amateur you can help directly. If so, fb, but, if not, contact K5ZMS of SMIRK. Ray can assist with arrangements. The more DX stations on, the more interesting it will be for all of us.

One country quite workable for most of the U.S. including the East Coast is Iceland. W1JR, who was there in March, says that there is interest in getting 6-meter permission and that if it is forthcoming TF3SG hopes to get on. It was emphatically stated by UA1OSM that the U.S.S.R. is one country that does *not* permit 6-meter operation. Serge wrote commenting on an item carried in the March 1977 column recounting a 52 MHz between a station in the eastern part of Russia and a VK3.

Apparently the 1979 Es season didn't like what people were saying about it and decided it would show us a thing or two. Good openings continued well into August with both single and double hop offering spice to the latter part of the season. The evenings of August 7 and 12 were two of the best. On the 7th between 2200 and 2315 UTC, this conductor QSOed AZ stations WB7OHF, WA7FPO and WB7VZN, as well as W6XJ in addition to a number of Øs and 5s. The W6XJ contact was a three-way which included K5CM. Later in the same evening, after completing some commitments on the hf bands, WA stations K7DPY, W7YOZ and W7UXH were worked with good signals around 0200 UTC August 8. The 12th (between 0200 and 0500 UTC August 13) brought Pacific Northwest stations again, including W7KNT, MT, with a booming S9 signal. Among those worked by this conductor was VE6OH, Medicine Hat, who was running 3 watts but nevertheless was putting in a S6 signal. Numerous 8s, 9s and Øs were also heard with considerable evidence of propagation assist from the Perseids meteor shower.

NØLL, KS, believes that July conditions were about normal, although Larry admits that he did not observe the band as closely as he usually does, having acquired an XYL June 23. K7ICW, NV, characterizes conditions during July as "not less than outstanding" and takes back everything he said about conditions earlier in the season. Al lists the band as open during 18 days of the month including eight days with double hop. He is dure that he missed a few. K6PHE submits a detailed list of his contacts for July with UTC times. Perusal of this data shows 21 days in which he observed single hop and 11 in which he noted propagation of two or more hops. This includes an opening to JA on the 5th and several to KH6.

WL7ACY, Fairbanks, AK, provides more details on the opening to the upper Midwest and East Coast July 4 (reported last month) as well as a JA session three days later. On that occasion, Dave and WL7AFA worked some 16 JAs in the 1st, 7th, 8th and Ø call districts between 0720 and 0830 UTC. Speaking of AK, those who may still need the state, as this conductor does, might be interested in a list of active KL7 6-meter stations and their phone numbers provided by AL7C. I'll send a copy to anyone providing an s.a.s.e.

In the QRP department, WA3GYW, near Baltimore, reports good results with his IC-502 and 5-element beam. Fran pleads for more cw activity, especially below 50.1.

News of several 6-meter beacons has been received. VE6NM says that VE6ARC is operating on 50.048. W7KMA informs me that his beacon is still going on 50.073 and WA6MHZ has settled on 50.040. K5SW reports that K4ERO/HC1 is now HC1JX and that his beacon, on 50.030, should be signing that call by now.

Before he departed for a new life in IA, WA3TIH was honored by his fellow 6-meter stalwarts from northcentral PA and southern NY. L to r, beginning at the end of the table, are Ron, WA2GBG; Mick, W3ILG; Althea, WB3FUR; Bill, K2YGF; Gord, W2ISB; John, WA3TIH; Earl, K2QWD; Bonnie, WB2WSV; K2QIE; WA2BPE's XYL, and WA2BPE.

2 Meters — This is being written at the height of the Perseids, so it will be anything but a complete report. Preliminary indications are, however, that the 1979 edition of this most productive of meteor showers is a bang-up affair. WB2DIN/8, WV, reports working KØALI, ND; WBØYQS, SD; N5KW, OK; WA5HNK, TX; WBØTEM, IA; WØRLI, MN and WA4CQG, AL, among others. That brings Bob's state total to 36. W3IWI, MD, grabbed WBØIUT, NE; AIØL, MO and WB4BSZ, FL. K5BMG, LA, found the shower much better than last year, which is not surprising when you learn that Charlie worked W1XJ, RI, for number 50. Another recently completed WAS is SD station WØSD. Good work, fellows. Not satisfied with working his last state, K5BMG went on to work another half dozen stations, including VE3FN and W2AZL without benefit of skeds. During the W2AZL contact, they caught a 90-second burst. From the West Coast, WB6ESQ characterized this year's Perseids as a "field day." Sitting on 144.2 he easily worked four stations. I am sure that a lot more rave notices will come in on this one.

As usual this time of year, our vhf bands are full of tricks. July 27 produced a fine tropo session through much of the eastern part of the country. WA8TTS, near Cleveland, reports working many East Coast stations on 2 meters as well as K4CAW, NC, on 2 and 70 cm. The evening of August 7 brought a widespread opening to the Midwest. WA8OGS, Cincinnati, notes hooking up with WD5CRK and K5CM, OK; WB5NBC, AR and MO stations WAØZNI and KØJXI. The evening of August 7 brought a hitherto unobserved type of 2-meter propagation to TX. WB5LUA reports that from 0130 until 0400 UTC August 8, K4GFG and WB4KGY, south FL, were being received with weak fluttery signals, peaking with beam offsets about 30 degrees to the north of the true path. Dallas area stations WB5LUA, K5GW and K5UGM made contact as did Houston stations WA5HNK and K5PTG. This sounds like the same kind of propagation reported earlier between FL and KP4. It should be noted that 6 meters was wide open that particular evening.

W1JR passes along word of a very interesting 2-meter contact over probably the greatest distance on record for Es. On June 28 at 1646 UTC, CT1WW, northern Portugal, worked OD5MR, Beirut, Lebanon, over a distance of 2434 miles (3916 km). This is apparently double-hop Es which is very rare on this band.

Also from the Mediterranean, SU1CR, Cairo, reports the establishment of communications with several Cyprus stations, both through the Cyprus repeater as well as direct. His principal interest is in ducting in that part of the world. He also plans some OSCAR operation now that he has returned to Egypt.

Many may think that weekday mornings are pretty

1-1/4-Meter Standings

Figures are states and call areas.*

K1PXE	CT	16	6
K1FO	CT	15	6
W1YTW	ME	14	6
W1HDQ	CT	13	5
W1QXX	MA	13	5
K1JIX	MA	12	4
W1JR	MA	10	4
W1GXT	MA	10	4
W1AZK	NH	10	3
K1BFA	MA	10	3
K2CBA	NY	19	7
K2DWJ	–	15	5
W2CRS	NY	14	5
K2RTH	NY	13	5
K2DNR	NY	13	5
W2SEU	NY	13	5
W3UJG	MD	14	5
W3HMU	PA	13	4
WA3JUF	PA	12	5
K3IUV	PA	12	4
W3RUE	PA	11	6
K4LHB	VA	13	7
K4IXC	FL	5	3
K4GL	SC	4	2
K5FF	NM	10	6
W5RCI	MS	10	5
K5JL	OK	7	4
W5HN	TX	6	4
WB6NMT	CA	7	3
W6WSQ	CA	6	4
W7CNK	WA	6	3
K7NII	AZ	6	3
W7JF	MT	5	3
K7ICW	NV	4	2
W7HSJ	—	3	2
K8AXU	OH	12	7
K8HWW	MI	11	6
W8IDU	MI	11	5
K9HMB	IL	23	10
WØPW	CO	14	6
WAØQLP	SD	4	2
VE2YU		8	3
VE2HW		5	2
VE3EMS		10	7
VE3AIB		10	7

*Call areas include all U.S. call areas, plus VE and XE call areas, plus countries not included above.

devoid of 2-meter activity but they should listen here on the East Coast. W3UN reports that a group is active from Cape Cod to Greensboro, NC, beginning about 1100 UTC. Rallying point is 144.2 and then they spread out from there. Those who haven't tried it may be missing out on some of the day's best propagation.

K9EID sends along information of a 2-meter beacon which the Marissa (IL) Amateur Radio Club has put on. The beacon is on 144.050 and runs 1 watt to a combination of horizontal and vertical dipoles at 250 feet. The emission is a mix of A1 and F1 copyable on cw or fm receivers. Marissa is located about 55 miles S.E. of St. Louis. Reception reports are urgently solicited. Address the club at 111 N. Main St., Marissa, IL 62257.

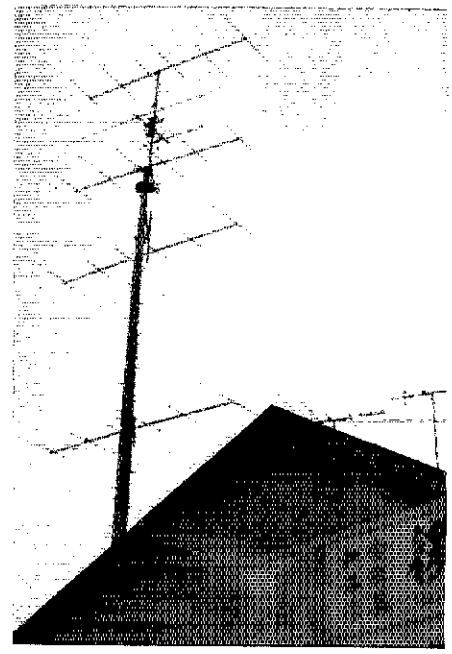
M.S. Worked on 1-1/4 Meters and 70 Cm — Perseids successes were not limited to 144 MHz and lower frequencies. K4LHB, VA, reports an early morning August 12 contact with WBØTEM, IA, for what must be new states for both. More devotees of this too-often-neglected band should try the m.s. route. It should not be that much more difficult than 2 meters. Incidentally, K4LHB runs just 50 watts.

A band on which m.s. *is* considered more difficult than on 2 meters is 70 cm. Only a few contacts of this type have been made over the years. But, the '79 Perseids provided one which should make a few of us take note. On a schedule beginning at 1100 UTC August 12, WB5LUA, TX, and W7LUX, AZ, made the grade on ssb! A few bursts up to 10 seconds in length were experienced during the attempt with signals running up to S6. This is a real accomplishment for Al and Joe and their ssb m.s. contact on this band may be a first. Does anyone know of a previous one?

23 Cm and Down — That tropo duct between Dallas and Corpus Christi first noted in late May and reported in the August column was not a fluke. It has been observed on 1296 MHz on a number of other mornings. On June 23, WB5LUA and WA5TBE worked over the 372-mile path for the best DX to date for both stations. W5HN notes that this path produces much stronger signals than does the shorter path to Houston. Leroy reports that on August 4 about 0930 CDT, while he was in QSO with W5GVE, he reduced his power to as low as he could measure, about 1 milliwatt, and was still S5 in Corpus. That figures out to 360,000 miles per watt!

The 23-cm band is beginning to show signs of life in AZ, according to W7LUX. Joe says that, during the June contest, he contacted W7GBI and K7GNV from his Flagstaff QTH. K7IS, Phoenix, has also been active but is temporarily off because of storm damage to his antenna.

It sounds like the "uhf" days of the 30s, treking to the tops of mountains with portable equipment to work 50- or 100-mile line-of-sight paths. New England witnessed some of the most intense work of this kind back in those early days, perhaps because of the density of population, and the ready availability of accessible mountaintops, or perhaps because the states are so close together that one could run up a pretty good



One of the many Japanese 6-meter stations poised to work the U.S. and rest of the world. The JE1RXJ array consists of four 6-element Yagis.

total with the simple low-power equipment then available. Well, history is repeating itself and again the scene is the slopes of New England. W2NSD, in conjunction with WA1KPS, has been reliving that adventure of 45 years ago, but this time familiar-sounding paths like Mount Monadnock to Mount Washington are being bridged via 3 cm rather than on 2-1/2 or 1-1/4 meters. Using Gunnplexer rigs, Wayne with the help of his traveling cohort has run his 3-cm state total to 7, all the New England states, plus New York. Can anyone top that?

Another interested in trying 3 cm is WAØJRI/5, Port Arthur, TX. Ward's address is 6142 16th St., ZIP 77640. That Gulf offers some intriguing DX possibilities.

In Training

ADVANCING TO EXTRA

"Oh, those new exams!" The new Advanced and Extra Class exams are much tougher than the old ones and, as a result, more amateurs are looking for classes in which to learn the theory. And many of those same amateurs are discovering that, while students abound, qualified instructors are scarce. What's the solution?

Study Groups! Study groups are nothing more than a number of students getting together on a regular basis to study theory. While it's true that this system can combine ignorance, it also pools knowledge. Chances are that each member of the group will have a special interest area that he or she can share with the group. For instance, if one of the group members is the trustee of a repeater, then that person can probably lead the group through the ins and outs of the study material on repeaters.

If the group has "holes" in its combined knowledge, then it can look around for a guest lecturer. Many amateurs with a "specialty" who haven't the time or the overall knowledge to teach the course would be happy to donate an evening or two to the cause.

Which books are recommended? Every member of the group should have a copy of the *License Manual*, and the *Handbook*. The group may also wish to obtain a copy of the *Advanced/Extra Course Guide* (cost, $1.50) from the Club and Training Department. This guide contains a referenced outline for each study session, experiments, questions, and a list of books to be used as additional sources of study. To keep costs down, the group can obtain just one or two of each additional book and everyone can share them at the study sessions.

Why so many different books? The key to studying on your own without the aid of a lecturer is to study from a *number of different sources*. Reading about the same topic three or more different ways usually ensures understanding instead of memorization. It's also important to write down those areas of which you are unsure and bring those topics before the whole group for discussion. Often, the group's collective knowledge will produce the "whole picture" where an individual could not. Just be careful and remember the fable of the blind men and the elephant! After the group discussion, go back to the text and check your new understanding with the written theory.

Take the time to do the experiments. Learning by doing has, on the average, a greater chance of being retained than learning by reading. There are many sources of experiments that would be helpful to try while studying the Advanced and Extra Class material. One of the best sources is *A Course in Radio Fundamentals*, and some of those experiments have been reprinted in the *Advanced/Extra Course Guide*.

While it may take some extra time and effort to set up the experiments, the end result will be well worth it. Mathematical formulas become much easier to remember when there is a working knowledge of the circuit to which they apply. For instance, if you have done an experiment on the effect of phase on voltages and currents and have *seen* the results, the mathematical formulas become a means whereby you arrive at an answer rather than an abstract set of numbers that simply have to be memorized. You also gain a "ball-park" sense of what the answer should be and have something against which to check your calculations.

Now, what about that code? Of all the licensing questions that come across my desk, the most common is, "How do I increase my code speed?" Here are some steps that we recommend.

1) *Practice* at least five minutes per day, up to a maximum of one hour per day. Any more than that is usually nonproductive.

2) Assuming your speed is now at 13-15 wpm, *never* listen to anything slower than 18 wpm (and preferably no less than 20 wpm).

3) Listen to the *fast* code sessions on W1AW. Start with the *35-wpm* session. You will only copy an occasional character but by the time the practice winds down to 20 wpm your speed will have increased over what it was before the practice.

4) Don't get on ssb again until after you've passed the test (with the exception of public-service activities and maybe really *rare* DX). But do get on the air every day on cw. Choose to answer stations that are sending at a speed that is slightly uncomfortable for you. Copying at a comfortable rate never increases speed.

5) With the new comprehension-style FCC code tests, two other factors are as important as your code speed. One is your ability to copy numbers "solid" at 20 wpm, at least. There's no guessing at what a number was — either you copied it or you didn't. And two, practice filling in the holes in your copy. While it is best to be copying solid at 20 wpm, the gist of the new style exam is that being able to figure out what was sent is the key to passing. You can copy four out of five minutes without any gaps but if you missed a minute of copy and at least three exam questions cover that minute, you won't pass. On the other hand, if you copy every other character and can fill in the gaps afterward, you have a good chance of passing.

Good luck; we'll be looking for you on the "bottom 25." — *Jeanette M. Stumbo Zaimes, AB1P*

How's DX?

Conducted By Clarke Greene,* K1JX

Outgunning the Competition

Some of today's greatest tales, on any given subject, can be heard on 2-meter fm. The world of DX is no exception. From hot DX tips to tall stories about the ones that got away, DX is a prime topic over the repeater-powered airwaves. One can clearly imagine monitoring a conversation like the one that follows.

"...listening double-oh."

"The station calling in; you were cut off. The repeater has a VOX actuation and won't key up unless you say something. Please try again. This is K1JX."

"Unnnh. K1JX, this is Whiskey-Elephant-four-Able-Able mobile, just south of downtown Washington. Name is Sherm, short for Sherman."

"WE4AA from K1JX. Nice to meet you, Sherm. Name here is Clarke; located in Greenbelt. Where are you headed?"

"Unnnh. Okay, Cliff. Well, I'm headed up north. Left Florida on Tuesday. Say, K1JX, K1JX; that call sounds familiar. Haven't I seen your call before, somewhere in a magazine, I think?"

"Perhaps so, Sherm. It does appear from time to time in *QST*. My name is Clarke."

"Unnnh. Oh, yeah, *QST*. I knew it. I never forget a call. You write the microwaves column, don't you, Cliff? I'm a big microwaves fan, ya know. I've worked 26 stations on 10 Gee-See. Got my gunnplexer with me here in the Land Rover. Sure sends the Smokies lookin' when I point that horn at their picture-taker. By the way, I don't have to work hams on 10 Gee-See to count 'em as new states, do I? K1AX, this is WE4AA standing by."

"I'm pretty sure that only contacts with ham stations count, Sherm. Name is Clarke, that's spelled C-L-A-R-K-E. And, I don't write the microwave column, W5KHT does.

"Unnnh. Was there a W5 breaker? WE4AA standin' by."

"No, Sherm, I was just saying that Bob Cooper, W5KHT, writes the microwave column. W4EAA from K1JX."

"Unnnh. Oh, okay, Cliff; just thought I heard a breaker. Well, I guess all the states on *10* Gee-See wouldn't count anyway, 'cuz they were all mobile here from the Land Rover. Wow! Hold on; I gotta get a picture of this. I've just passed the Jefferson Monument and want a picture of it. I'm gonna pull over. I'll be back in a minute. WE4AA be right back."

"K1JX from WD3CC."

"Hi, Bill, how are you today? WD3CC from K1JX."

"Fine, Clarke. Traffic's a little heavier than usual tonight. You going to the club meeting?"

"I hope so, Bill. Let's stand by for a second and see if Sherm's back. WE4AA from K1JX."

"Unnnh. WE4AA back. Boy, that Jefferson Monument really is something, isn't it, Cliff? Must be 400 or 500 feet tall. I'd love to put my 20-meter monobander up there. Ever been to the top, Cliff? K4JX WE4AA."

"I think you mean the Washington Monument, Sherm. A friend of mine, Bill, WD3CC, also is here now."

"Unnnh. Yup. I sure would like my monobander up there. I don't seem to get out like I used to. Don't know whether I told you, Cliff, but my two big hobbies are DXing and big-game hunting. The thrill of the hunt, I guess. That's where I'm going now, off on safari. I've got my Land Rover all packed and I'm ready to go."

"WE4AA from K1JX. Bill here is an outdoorsman and DXer to boot. You two must have a lot in common. I'll let him say a few words. WD3CC from K1JX."

"Very good. Nice meeting you, Sherm. As Clarke said, the name here is Bill. I'm sure I've heard you on 20-meter phone, Sherm. You really have a tremendous signal. I've taken a back seat to you many a time in a pileup. I guess I should expect that, since I'm only running a barefoot transceiver to a two-element tribander on my roof. I really shouldn't complain, though. I'm up to 162 worked, 146 confirmed now. Still need a lot of easy ones, like some of the Russians. Oh well, in due time. Did you say you were going on a safari, Sherm? I didn't realize there was any place around here for that kind of activity. Gee, I've been all around the area flyfishing and I've never seen an area for safaris. Maybe if I were a hunter like you, I'd know. WE4AA from WD3CC."

"Unnnh. Okay, Bill. Well, it's not like 10 or 15 years ago, I'll tell you that. Back then I used to take two trips a year to eastern Africa, mostly Kenya, to go hunting. I'd bring my high-powered rifles over there. Every trip I'd bring back a trophy or two. Just left most of them back there in Africa, though. The house can only hold so many trophies. Nowadays the governments over there won't even let you shoot their animals. 'Fraid the animals'll die out. I guess they don't believe in survival of the fittest. Don't understand it myself. You say you hunt whales, Bill?"

"No, not exactly, Sherm. I flyfish for trout. I really think it's a good sport. Don't get much to bring back, though."

"Unnnh. Nice fish, trout. Makes a good breakfast. I wonder who makes those Jefferson Monuments. Maybe I could get him to pour one in my backyard. I've really got to improve my 20-meter signal. The old pair of 4-1000s just aren't producing the signal they once had. Just the other day I was talking to my friend, Percy, over there in Sri Lanka. He said I was only 30 dB over S9. Hmph. I could hardly talk over the guys breaking. Must've been a hundred guys trying to call him. It was all I could do to keep talking to him for that last hour until the band shut down. You know, I've got friends like that all over the world. I try to keep in touch with them as much as I can. They're all too polite to tell me my signal is down from what it used to be. I can tell it is, though, 'cuz instead of embarrassing me with only a 30 dB-over signal report, they tell me there are a lot of guys calling or they'd like to work. I know they only say that to spare my feelings. I just apologize for the puny signal and cut my conversation to only an hour or two. WD3CC from Whiskey-Elephant-four-Able-Able."

"Ahh. Well that's interesting, ahh, Sherm. Where did you say you were going? On a safari?"

"Unnnh. Like I was saying, big-game hunting isn't like it was 10 or 15 years ago. Before, all I had to do was pack up my bags and head for Africa. Now, I gotta do all the work myself. First I went out and bought this Land Rover. Specially imported from England, just like the one I used to use in Kenya. Then I had the garage down the street install special lights on top. They hopped up the engine and put on these big chunky tires. I've always been scared of getting stuck in a swamp. Some alligator might have my name on his jaws. Anyway, I got the Land Rover reworked to carry the gun. I still use the same rifle like I used to use in Africa. Boy, they pack some wallop. One shot'll knock down a buffalo at 100 yards. Just to be on the safe side, though, you usually pump a half a dozen rounds into the beast. You can never tell when one of those animals might only be winged and turn on you. I even have the Land Rover partially armored just to be on the safe side. Never can be too safe. My friend, Pete McDuff, once was attacked by a crazed giraffe. In fact, Pete's the fellow I'm going up to see. He called just last Tuesday to come on up for a big safari in his neck of the woods. It seems the chipmunks are running..."

It is very rare for repeaters to time out at just the right moment like this.

DX PORTFOLIO

For those of you who haven't been near a radio in the last year, sunspot cycle 21 has arrived. Ten meters today is better than 20 was five years ago. And 20...

To prove the point about 10 meters, try listening to the beacons operating on the band. W1HDQ does just that and is able to pinpoint 10-meter propagation at any time of the day or night. Table 1 is a list of active 10-meter beacons that Ed has compiled.

Some of the beacons have been on the air for nearly 10 years. All have been logged by W1HDQ since May 1, 1979.

Other calls and frequencies appear on the IARU beacon list, mostly between 28.2 and 28.3 MHz, but none have been heard here. All the beacons in the table are heard daily, in season, at W1HDQ. Even 3B8MS was heard now and then, right through the bottom of the sunspot cycle. — *W1HDQ, contributing editor, QST, author of W1AW propagation bulletins*

The toughest zone for many people trying for the WAZ award is zone 23. A look at the zone map shows why. Most of zone 23 is filled by China, which has not had the most ham activity of late. Usually, Mongolian amateurs provide the zone-23 contacts for most of us.

There's another country located in zone 23 — the Soviet Union. Any UAØY station is located in this zone. Unfortunately, there aren't too many UAØY stations. But, from October 1 until November 30, UAØAAK will be on an expedition to this area. He will be active on all bands with large antenna arrays using the call UØY. The station will be active during both CQ Worldwide contest weekends. On 40 meters look

*7815 Mandan Rd., Apt. 102, Greenbelt, MD 20770

Table 1

Active 10-Meter Beacons

Call	*Location*	*Freq.*	*Keying*
VE3TEN	Ottawa, ON	28.175	fsk
DLØIGI	Germany	28.205	fsk
N4RD	Englewood, FL	28.2075	cw
3B8MS	Mauritius	28.210	fsk
GB3SX	England	28.215	fsk
5B4CY	Cyprus	28.220	fsk
VP9BA	Bermuda	28.235	fsk
A9XC	Bahrain	28.245	cw
EA2OIZ	Spain	28.2475	cw
DKØTE	Germany	28.255	fsk
ZS6DN	So. Africa	28.315	*
ZE2JV	Rhodesia	28.330	*
W6IRT	N. Hollywood, CA	28.888	cw

*Mostly fsk, but other emissions are used for propagation tests.

for them to be transmitting on 7090 kHz and listening on 7210 kHz, while on 80 meters the transmit frequency will be 3695 kHz and the receive frequency will be 3805 kHz. — *KTCC*

Many times you work a new prefix thinking it's a new country, only to find out that it's only the new assignment for a country you have so many cards for you had to rent a garage to store them. Worst is when you go to a radio club meeting bragging about the new country you just worked only to have a Novice tell you that not only has he worked the country three times, but he also has the cards to prove it.

Here is some information, courtesy of DL1FL, describing the new callsign system for the German Democratic Republic. The last letter of the call will continue to denote the location, but instead of stopping with "O" they are continuing through the rest of the alphabet to provide more options for the most populous areas. DM2 through DM9 will be replaced with Y2 through Y9, with one additional numeral 1 through 9 replacing the first letter of the present suffix. Y21A through Y29Z will be repeaters; Y31A through Y39Z, contest teams; Y41A through Y49Z, beacons; Y61A through Y69Z, bulletin stations; Y21AA through Y39ZZ, individual stations (present DM2s); Y31AA through Y29ZZ, and so on, stations of the GST (that is, "official" club stations); Y21AAA through Y99ZZZ, in reserve. Note that, for example, Y31ZQ, Y31YQ, Y31XQ, and so on, are all associated with the same club, in the same way that, for example, DM3TQO, DM3PQO, and so on, are all associated with the DM3QO club station now. QST

This is Max, IØPNM, a very active DXer from Rome.

QSL Corner

Administered by Joan Becker

Last month we talked about the use of the ARRL Membership Overseas QSL Outgoing Service. For all of you who would like to utilize the Incoming Bureau Service, here are a few 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 with a free but 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" 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.

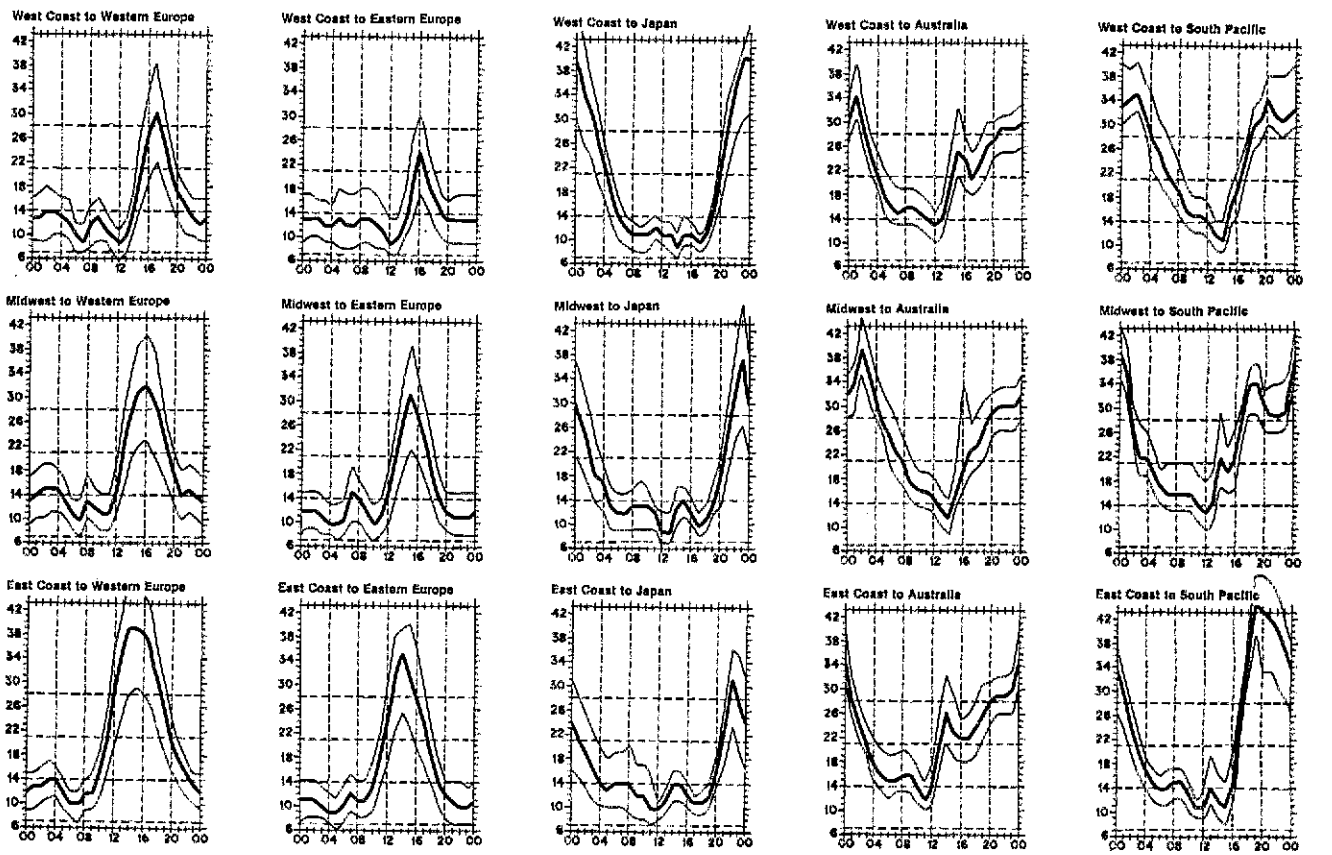
Do respond quickly to any bureau request for envelopes, stamps or money. Unclaimed card backlogs are the bureau's biggest problem.

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.



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

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 the bulletin, "ARRL — Membership Overseas QSL Service").

Don't send envelopes to your "portable" bureau. For example, WA1SQB/2 sends envelopes to the W1 bureau, *not* the W2 bureau.

Here is some QSL information for the eager ones who would like to QSL direct. It is passed along as we receive it, and therefore may not be accurate.

AI4R/KV4 (VE1ASJ)	HBØAYX (HB9MM)
A7XA (DJ9ZB)	JA8AQN/JD1 (JA8JL)
A9XBS (G4GOH)	KG6SW (W7OM)
CN8DK (Box 451, RABAT)	STØRK (DL7FT)
C31GF (F9RF)	TI2BEV (W4ZD)
DK7GF/5NØ (DK7GE)	VP2KT (WB2TSL)
EL7C (DL2GZA)	VP2VFC (VE1ASJ)
FYØEOO (F6DQM)	

This information was made available by VERON Radio Society, The Netherlands.

DX QSL MANAGER VOLUNTEERS

WB7UVB
WA4OMI
WB1CPW
KA2BWT
I6PQO — foreign stations only
K4AVU
WD9CIS
W4ODE
KA1DE

ARRL DX QSL BUREAU SYSTEM

The ARRL DX QSL bureau system distributes cards free of charge from DX stations to amateurs within the League membership area (see page 8). Every active DXer should keep several 5 × 7-1/2-inch envelopes on file with the bureau of his home district. Place your call sign in large block letters in the upper left corner, and attach a single first-class stamp, unless you normally receive more cards. Unclaimed cards are discarded after one year. For more details on the bureau system, write ARRL hq.

Please note that there are *two* bureaus for the fourth call area. The bureau in Boyce, VA, handles cards for single-letter prefixes only, while the bureau in Sterling Park handles cards for all other four-land stations.

☐ 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 07508.

☐ Third Call Area: all calls* — Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.

☐ Fourth Call Area: K4, N4, W4 — National Capitol DX Assn., Box DX, Boyce, VA 22620. (Single-letter prefixes only.)

☐ Fourth Call Area: AA4, WA4, WB4, WD4, WN4 — 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 Berlardo, KV4CF, P. O. Box 572, Christiansted, St. Croix, VI 00820.

☐ Canal Zone: all calls* — KZ5 QSL Bureau, Box 407, Balboa, CZ.

☐ 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.

☐ 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, P. O. Box 663, Halifax, NS B3J 2T3. 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. Daemen, VE2IJ, 2960 Douglas Ave., Montreal, PQ H3R 2E3.

☐ VE3 — The Ontario Trilliums, 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 5E3.

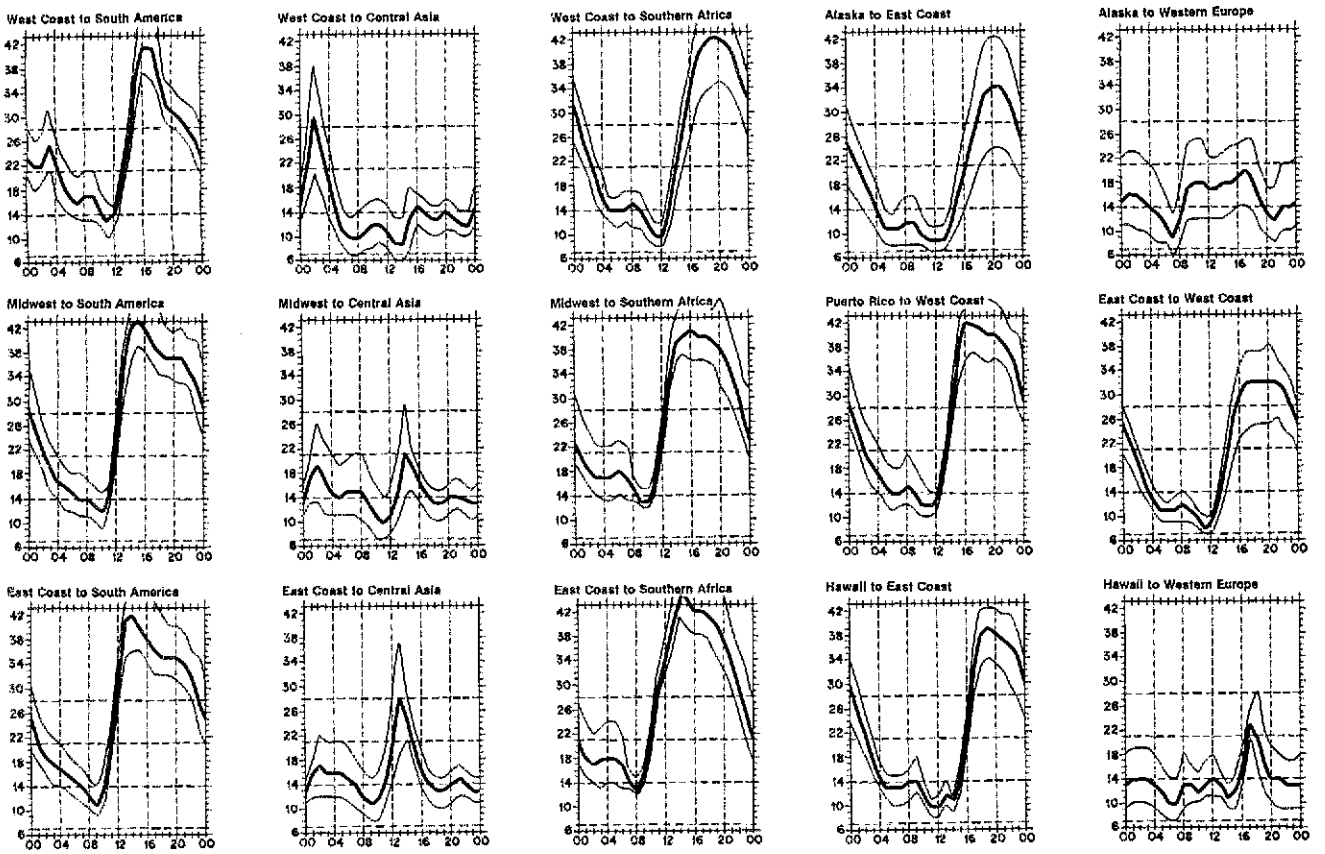
☐ VE6* — G. D. Holeton, VE6AGV, 4003 1st St., N.W., Calgary, AB T2K 0X2.

☐ VE7* — Howard Martin, VE7AFY, No. 45-9960 Wilson Road, Ruskin, BC V0M 1R0.

☐ VE8* — Al Sturko, VE8NS, P. O. Box 72, Fort Smith, NWT X0E 0P0.

☐ VO1, VO2 — CRRL VO QSL Bureau, P. O. Box 6, St. John's, NF A1C 5H5.

*These bureaus sell envelopes or postage credits. Send an s.a.s.e. to the bureau for further information. 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, CO. These predictions for October 15 to November 15, 1979, assume a sunspot number of 153, which corresponds to a 2800-MHz solar flux of 196.

DX Century Club Awards

Administered by Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmation for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 20-country increments through 240, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from June 1 through June 30, 1979. 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

DF4TD/109
DL7FT/338
DLØDS/109
EA1JO/101
HB9BGG/103
JH1IAQ/126
JJ1KUV/106
JR1WDE/130
JA2HMF/124
LA2GV/106
LZ1MH/105
ON6WV/109
OZ6YZ/109
VE2ECH/100
VE3JKZ/104
VE6AYI/139
YU3TUX/110
ZL3HI/C/102
8P6IB/106
K1VTM/240
N1QY/107
WA1ZLK/134
WB1ARC/104
K2XK/114
K2ZWI/145
W2TV/107
WA2DGS/100
WB2HIQ/100
WB2LUD/100
WB2UXS/106
AD3R/103
K3EGK/103
N3SJ/103
W3IW/100
W3MPN/110
WA3CKA/105
WA3VUE/100
WB3CQT/104
WB3JBF/103
AA4KT/219
AA4RC/158
K4AVU/118
K4HHM/101
K4JBY/105
KA4P/100
KC4U/210
N4CD/101
N4DA/152
W4FMY/109
W4OTX/301
WA4OMI/123
WA4QFK/110
WA4SOH/106
WA4VMZ/158
WA4YUU/102
WB4AGH/112
WB4SVU/103
WB4TLX/100
WD4CYN/104
WN4KKN/103
AB5J/109
K5HX/102
K5OG/210
K5YA/104
KA5ACC/109
N5UT/156
WB5IKX/103
WB5YJX/107
W6RDS/113
WB6BJD/102
WB6VSC/100
WD6AKQ/128
K7OXB/260
K7UT/234
N7KM/100
W7MY/109
W7RVQ/100
WB7OGZ/102
WB7RUV/102
K8WS/110
WA8COK/100
WB8HWF/103
WB8RJX/128
WB8TGS/102
WD8CBP/101
WD8KTO/110
WD8KWT/100
K9IJ/115
K9IU/110
K9WWW/102
W9GGN/105
W9IXD/111
W9UVM/101
WA9GQA/108
WB9PIR/105
KØDN/114
KØQMU/104
KØUS/102
NØAED/109
WBØAFO/126
WBØMCO/106
WBØUVG/100

Phone

DF5SL/118
F6AQX/102
FB8ZM/118
HB9BET/102
I1ZZL/128
I5JFG/120
I8KPV/143
IØNZA/174
JA2HMF/113
JAØKHO/126
KL7JFV/121
LU2DSL/107
LU4DLP/162
LZ1MH/104
PY2OB/255
VE3AC/112
VE3CXL/107
VE4IS/120
VK5WW/103
YN5JAR/107
9G1JI/103
9G1JU/203
9G1KK/106
K1UIC/103
KA1BFJ/104
W1GG/130
W1NED/100
WA1ZLK/128
WB1GDG/114
AG2K/103
K1BQW/105
W2NKC/103
WA2LTZ/101
WA2WYR/CX/144
WB2JEZ/115
WB2KCI/104
K3RX/241
W3EFA/175
W3MPN/108
WB3GPL/102
AA4KT/212
K4HHM/101
KC4U/204
W4OTX/300
W4OWY/184
WA4JEP/102
WB4SFM/101
WB4SVU/101
WD4CYN/103
WD4SKM/105
AE5H/118
K5OG/186
K5RMK/100
K5WZ/103
W5TJQ/100
WA5ZDZ/101
WB5DUT/110
WB5YJX/106
WD5DCD/105
WD5EWE/105
K6CID/109
KB6AE/127
N6AHU/182
WA6HGS/115
WD6AKQ/117
K7KDS/109
K7OXB/239
W7KEU/102
WB7RGN/103
AI8S/153
K8IXU/106
K8MG/120
K8RJI/134
KB8BN/116
W8DQB/102
WA8MPW/104
WB8KPW/101
WD8CBP/101
W9GGN/102
WB9IWN/103
KØDEQ/100
WØDXC/105
WØSL/114
WBØAFO/112
WBØMCO/105

CW

DK6CS/110
DK8SL/119
DL6MK/124
DL7WL/104
GW3INW/110
HB9HT/222
OH1EM/112
OZ1DYU/101
VE6AYI/125
W1GG/100
W1WLW/100
WA2EYA/110
WB3AXN/105
WB3CQM/108
AA4NA/100
AG4S/109
K4EFZ/109
W6QL/101
N7CW/100
W8AN/104
K9EVB/100
K9MFI/107

5BDXCC

W2MIG
N2MM
AE6U
VE3AKG
AA6AA
AE2A

Endorsements

Mixed

CEØAE/269
DA2DC/200
DJ2MN/261
DJ4XC/172
DJ5LA/331
DK6WA/239
DL1LD/300
DL6MK/307
HB9HT/250
HI8LC/271
I2MQP/240
I8MTQ/219
IØUCM/182
JA1IOA/202
JA1KF/311
JF1PJK/298
JH1BAN/207
JH1VRQ/303
JA2YKA/215
JH7LMZ/200
PA9WRR/152
PJ2FR/247
PY2DBU/270
PP5UG/319
SM6AYM/161
SM7BAU/272
SM7BOL/233
SP9AI/301
VK3YL/331
VE1AJP/153
VE3AKG/259
VE3BHZ/260
VE3BZ/284
VE3CEF/193
VE3DUS/170
VE3II/291
VE4IU/180
VE6LU/330
XE1PF/178
YS1RRD/301
YU3ZV/310
YU4JHI/185
4X4DX/249
9H4G/305
AA1K/229
K1FI/250
K1PMJ/173
W1DQH/242
W1ETV/200
W1GG/311
W1JDE/250
W1JZ/324
W1UQ/214
W1WLW/265
WB1BVQ/121
K2BXG/266
K2SP/249
K2UU/302
KB2EN/162
N2MF/159
W2AXZ/250
W2BTG/250
W2FHY/239
W2GND/188
W2HKE/160
W2HN/220
W2HUG/273
W2MIG/286
W2PD/259
W2REH/315
W2RS/300
W2TA/280
W2VAV/145
WB2AIO/301
WB2HPP/222
WB2MIY/240
K3AO/264
K3EW/184
K3RT/282
N3RL/262
N3US/223
W3EE/146
W3GOH/261
W3KA/330
W3UJ/264
WA3WIP/165
AA4CJ/311
AA4DR/271
AA4M/260
AA4MI/148
AA4NA/224
AB4H/316
AF4K/172
K4BVQ/325
K4IQJ/159
K4OD/265
K4PI/301
K4SE/258
K4WSB/254
K4XR/220
KD4M/180
KD4S/247
KD4Z/160
N4HH/280
N4IA/287
N4OL/307
N4OM/272
N4SA/317
N4SX/227
W4CEB/200
W4DXI/287
W4LVM/296
W4MGX/220
W4SNR/251
W4TJC/200
W4WBC/201
WA4DAN/181
WA4FVT/224
WA4HDD/252
WA4JTI/296
WA4MDS/150
WA4MFS/180
WA4OOM/261
WA4UBM/160
WA4VDE/271
WA4WPN/161
WB4CSW/230
WB4EQQ/274
WB4KSQ/142
WB4LFM/302
WB4SJG/290
WB4SXX/220
WB4VUA/178
AE5H/145
K5DEC/162
K5GL/171
K5KX/310
K5OS/316
W5GEL/315
W5IRG/290
W5UP/316
WB5SCI/155
AE6U/272
K6ASI/207
K6RSY/251
N6CR/248
N6GM/325
N6VF/220
W6HJ/224
W6IA/210
W6MPG/153
W6NNV/304
W6NPY/261
W6VD/289
W6YMH/204
WA6DZM/120
WA6YQW/220
WB6NJW/203
WB6ZPO/200
WD6ATC/140
K7AOZ/239
K7SZN/150
N7RO/310
N7SW/239
W7GXC/239
W7MI/320
W7TE/306
W7TVF/195
WB7WIM/227
K8LJG/310
K8MFO/326
W8AN/129
W8CTR/270
W8KNH/284
W8UVZ/244
WB8OBA/250
WB8SBH/120
WD8ILM/201
WD8IXV/200
K9BWQ/268
K9IW/241
K9QFR/219
N9OK/232
W9ABA/329
W9EB/334
W9MCR/290
W9NGA/266
W9TY/260
W9VA/291
WB9HIP/202
WB9KHK/120
WB9YXY/222
KØAL/160
KØRQF/202
KØSGJ/292
NØRF/186
WØMJA/180
WØSL/122
WØTJ/347
WØWP/285

Phone

DA2DC/197
DJ2AA/320
DJ5LA/324
DK1SE/224
DK1YP/223
DK6WA/235
F6BDG/142
G4BYK/201
HK3DDD/175
I2MQP/240
ISØBYR/165
JA1EOD/324
JA1KF/302
JA1MCU/314
JF1PJK/287
JH1BAN/203
JH1VRQ/299
JH8GWW/126
JY1/180
KC6GF/160
KL7D/250
KL7ITW/140
OZ5EV/280
PA9WRR/146
PJ2FR/246
PZ1BK/156
SM7BOL/230
VE3AKG/247
VE3II/291
VE6LU/298
VE7AFY/181
VK3AH/258
VK3OT/214
YS1RRD/301
ZL1AJL/262
ZL1AMN/290
9H4G/305
W1DO/314
W1EED/260
W1JNV/316
W1JZ/301
W1LTC/214
W1WKO/260
W1WXZ/260
K2BK/300
K2SP/246
K2UU/299
W2IOZ/282
W2MIG/281
W2NHV/196
W2PD/230
W2YTO/220
W2XN/335
WA2BDP/257
WA2CBB/149
WA2JTX/139
WA2OQM/256
WA2SRM/160
WB2AIO/256
WB2HPP/222
WB2MIY/239
WB2SZH/180
K3EW/165
K3HP/170
K3LRI/130
K3RT/256
N3RL/243
N3US/211
W3GG/316
W3KA/250
W3ZN/276
WB3EFC/140
AA4AR/277
AA4M/187
AA4CJ/275
AA4NA/131
AB4H/290
AC4B/253
K4BVQ/312
K4FJ/323
K4IEX/304
K4RSB/265
K4SE/233
K4VAA/141
KA4D/270
KD4M/180
K4DS/245
N4MM/322
N4SX/175
N4YD/302
W4BFR/269
W4LCL/240
W4LVM/278
W4NYN/302
W4TJC/201
W4UYC/172
WA4DAN/160
WA4HDD/251
WA4INQ/170
WA4NIB/270
WA4OOM/255
WA4SSU/267
WA4VDE/270
WA4VLB/168
WB4FQP/148
WB4KSQ/140
WB4LFM/258
WB4UVA/175
WD4EYD/210
WD4FFP/168
WD4NZC/120
K5DEC/162
K5OS/315
K5TSQ/183
N5AJW/159
W5JME/185
W5KC/323
W5TGU/125
W5UP/305
WD5DBV/179
K6AO/283
K6ASI/205
K6EV/322
K6LIK/262
K6MA/305
K6RMM/288
K6RSY/239
K6XP/309
N6CR/247
N6NA/325
W6FET/313
W6ISQ/329
W6KUT/323
W6NTX/302
W6QOG/320
WA6OET/295
K7UT/233
KA7AUH/179
N7RO/300
W7GXC/237
W7GYG/160
W7TE/251
WA7GQI/160
WA7TTM/222
WB7BQP/140
WB7ETJ/220
WB7WIM/227
K8ES/141
K8LJG/305
K8ONV/331
N8BO/260
W8ARH/327
W8GUS/220
W8KNH/282
WD8ILM/200
WD8MGC/188
K9BWQ/268
K9QFR/219
K9IW/219
N9AFY/210
W9BEK/330
W9DRL/220
W9LA/315
W9TY/127
W9VA/173
WA9FZQ/260
WB9HIP/201
WD9CLQ/150
KØHSC/176
KØSGJ/288
WØPSH/164
WØTJ/326
WBØOQV/150

CW

DL1HH/226
JA1BN/221
JA1KF/188
JF1PJK/257
JH1VRQ/256
JH7LMZ/200
JA8JL/267
SM5BHW/256
SM6AYM/161
VE1AJP/128
VE3AKG/148
VE3BX/200
VE7CNE/179
N1AC/222
W1WA/145
W2MIG/163
W2RS/166
WA2ORX/125
WB2KXD/162
N3RL/163
W3GRS/234
K4IEX/261
K4XO/259
N4SX/160
W4LVM/230
WA4DAN/180
WA4VMZ/143
W5TVX/122
AE6U/220
K6JG/254
N7RO/120
W7KVV/150
W7TE/128
K8LJG/200
K8ZH/163
W8UVZ/222
WB8OBA/221
K9IW/123
W9AG/141
W9TY/223
WØWP/265

HONOR ROLL

The DXCC Honor Roll is comprised of those call signs which have been credited with at least 310 countries of the 319 current countries on the DXCC list.

Mixed

319

DJ2BW/356
DL6EN/354
DL9OH/350
G3FKM/356
G3HCT/350
IØAMU/357
PY2PA/340
PY2PE/340
4X4DK/357
4X4JU/354
W1BIH/362
W1DGJ/343
W1HX/359
K2FL/355
K2LWR/353
K2TQC/346
W2AGW/363
W2AO/356
W2BXA/363
W2CR/356
W2NUT/355
W2OKM/357
W2PV/341
W2QM/354
W2SSC/355
W2TP/348
WA2DIG/348
WA2RAU/340
WA2RLQ/340
K3MO/352
W3AFM/352
W3GH/354
W3GRS/351
W3KT/362
W3NKM/356
K4YYL/339
W4DR/355
W4EX/363
W4SSU/346
W5MMK/360
K6DC/355
K6EC/353
K6ZO/363
W6AM/364
W6BZE/359
W6EL/344
W6ET/351
W6KZL/355
W6PT/356
W6REH/345
W6RT/356
W6ZM/349
W7AQB/351
W7MB/363
W7PHO/357
K8DR/350
W8AH/355
W8BF/360
W8GZ/362
W8LKH/358
W8OK/350
W8PHZ/354
W8RT/357
K9ECE/348
W9DWQ/352
W9HB/353
W9JUV/357
W9ZM/362
WØDU/361
WØMLY/360
WØPGI/355

318

DL1JW/350
DL7AA/359
DL8NU/334
G3FXB/355
IT9ZGY/353
LU4DMG/353
LU6DJX/362
OE1ER/360
OH2QV/343
OZ3Y/352
PY2CK/361
VE5RU/350
ZL1HY/362
W1AA/351
W1CKA/348
W1DK/357
W1JNV/353
W1JR/355
W1NU/352
W1OO/337
K2BK/352
K2BZT/355
K2FB/346
W2AG/358
W2AX/354
W2DOD/356
W2YY/346
K3GL/356
W3CWG/354
K4EZ/344
K4LNM/352
K4PDV/355
K4RPK/346
K4YR/354
W4BQY/359
W4OM/360
W4UG/341
W4WV/350
W5AQ/349
W5KC/361
W5PQA/356
W5QK/349
K6KI/350
K6LGF/350
K6WR/344
K6YRA/339
W6CHV/356
W6EUF/337
W6ISQ/345
W6KG/350
W6KTE/340
W6ONZ/349
W7DX/346
W7KH/361
W7LDC/356
K8DYZ/338
K8ONV/347
W8ARH/341
W8GT/361
W8MPW/356
W9BG/363
W9BZW/339
W9CH/346
W9RCJ/350
W9SFR/353
WØBW/359
WØELA/361
WØQGI/354
WØSYK/356

317

DL1HH/346
DL1KB/357
DL7FT/338
DL7HU/346
F9RM/347
HB9MQ/355
I1ZL/349
JA1BK/345
JA1BN/342
JA1BRK/340
OH2BH/339
ON4DM/354
ON4NC/357
PY1HQ/352
PY2CQ/338
PY2SO/338
SM3CXS/332
SM6CKS/333
SMØAJU/349
VE2NV/355
VE3MJ/336
XE1AE/346
YV5ANF/342
ZL3IS/350
W1FZ/355
W1HZ/355
W1MV/354
K2YLM/337
W2BMK/349
W2BOK/354
W2CP/343
W2FZY/350
W2GKZ/339
W2GQN/339
W2HTI/353
W2JVU/358
W2LV/356
W2QHH/358
W3DJZ/344
W3EVW/358
W3LMA/359
W3MP/359
K4IKR/335
K4JC/342
K4MQG/341
W4AAV/358
W4EEE/353
W4EO/351
W4NL/332
W4TM/358
W4VPD/354
K5YY/333
W5IO/356
W5QKZ/344
K6JG/337
K6OJ/358
W6BA/356
W6EE/358
W6KNH/333
W6RGG/338
W6RKP/351
W7GN/353
KBEJ/336
K8FF/341
K8OHG/342
W8DMD/358
W8ZCQ/351
K9AB/350
W9DY/349
WØLWG/347

316

DJ7ZG/337
DJØKQ/337
DL3RK/354
DL7HZ/341
G2BVN/354
G5VT/356
GI3IVJ/351
HB9MX/346
I2KMG/336
I8KDB/349
JA4ZA/337
OK1ADM/341
ON4UN/332
PY1APS/332
PT7YS/346
SM3BIZ/353
SM5BHW/332
SM6AEK/335
SM7ANB/344
VE3WT/336
YU2DX/332
YV5AB/354
W1GKK/361
W2AYJ/355
W2FXA/349
W2GC/350
W2GK/337
K4KQ/354
W4IF/347
W4QM/343
K5AAD/339
W5GO/349
W5HJA/345
W5UN/350
K6QH/336
W6FF/349
W6HX/359
W6ID/355
W6RJ/340
W6YK/353
W7OF/352
W8CUT/343
W9DC/333
W9GU/346
W9KRU/334
W9TKD/345
WØGKL/348

315

F3AT/346
G3JEC/333
HB9KB/349
IØJX/330
IT9TAI/351
JA1MCU/332
JA8ADQ/335
ON4QJ/338
SM6AFH/331
VK4QM/358
ZS6LW/348
K1IXG/342
W1CBZ/349
W1HH/346
W2BHM/349
W2PN/336
WB2HXD/336
K4ID/337
N4WW/331
W4AIT/358
W4ML/355
W4QQN/336
W4ZD/345
W5EJT/341
W5FFW/351
W5GJ/342
W5LCI/345
W5NO/345
W5NUT/348
K6GA/344
K6KA/330
K6MA/340
K6RN/344
N6AV/335
W6ANB/331
W6FW/338
W6HYG/347
W6KUT/354
W6ZO/355
WA6OET/334
W7QK/348
W8DAW/359
W8JBI/354
W9GIL/352
WØAX/354
WØBN/340

314

DJ5DA/335
DJ7CX/335
DL3OH/330
DL7EN/350
F8RU/328
F9IE/330
G3AAE/353
GM3ITN/342
HB9TL/350
IV3PRK/329
JA1MIN/332
JA1JRK/328
JA8JL/330
KV4FZ/329
LU5AQ/349
OH2BC/335
ON4NS/334
OZ1LO/332
PY2BKO/335
UA1CK/339
YS1O/348
YV5AIP/343
K1YZW/332
W1OT/325
K2PXX/338
W2GT/353
W2NC/335
K3RS/326
K5DX/351
K5RC/331
W5IR/329
K6CH/353
K6EV/336
N6FX/341
W6CAE/353
W6FET/332
W6QNM/343
K7ABV/331
W8KPL/351
W8QY/347
K9MM/329
W9BM/345
W9FKC/353
W9QLD/335
W9ZTD/341
WØAIH/349

313

DL3BK/346
G2BOZ/351
GI3OQR/337
HB9DX/340
JA2AAQ/329
KP4RK/343
LA1KI/332
OK1FF/351
ON4IZ/338
PY1HX/346
PY3CB/329
YV5BBU/331
K1DRN/332
W1YRC/328
K2JMY/336
K2LE/334
W2GLF/346
W2UE/349
W2XN/347
AA4MM/329
AE4X/345
K4CEB/328
K4DJ/331
K4KG/335
K4SM/351
W4BYU/351
W4DRK/338
W4GXB/354
W4MGN/341
WA4WIP/332
K5LIL/331
K5UC/354
K6LU/339
K6RQ/343
K6XP/327
N6AR/337
W6ABA/335
W6BS/350
W6GPB/354
W6KZS/335
W6QL/332
W6TZD/353
W6UQQ/345
W7JFO/328
K8FL/334
K8VUR/333
W8DA/341
W8EWS/357
W8JQ/333
W8YA/326
WB8EUN/326
K9BGM/333
WA9NUQ/331

312

DJ2AA/340
DJ4PI/327
DL1BO/349
DL1CF/336
I2DEZ/327
I5ARS/337
JA1ADN/339
JA1DMI/347
JA2JW/343
OH2QQ/345
PAØLOU/345
UR2AR/342
VE3HD/346
YV5AHR/334
W1MIJ/340
W1PM/347
W1RLQ/340
W1WY/343
K2CL/328
K2UVU/343
W2QK/336
K3II/346
K3ZR/325
W3CGS/351
W3PVZ/330
WA3HUP/327
K4FJ/335
K4IEX/337
K4MPE/332
K4XO/326
N4MM/328
W4BFR/340
W4NNH/345
K5UR/326
W5LZZ/330
W5MMD/350
W5TIZ/345
W5TO/331
W5UR/337
K6AO/333
W6CF/332
W6EPZ/353
W7ADS/350
W7CMO/342
W7JYZ/340
W8PR/332
K9KA/327
K9PPY/324
W9KNI/338
WØNVZ/344
WØPAH/329
WØZV/340
WAØOAH/327

311

DL7AP/344
HB9AHA/327
I7HH/323
JA1AG/344
JA1EOD/326
JA1UQP/326
JA8ZO/328
OZ3PO/333
SM6CVX/325
SM6CWK/329
UA9VB/335
VE2WA/341
ZL1AV/327
K1RM/327
K1DFC/326
W1GX/328
W1SD/338
K2BT/326
K2CM/326
K2LGJ/330
K2UR/333
W2MJ/342
W2MZV/331
W2PPG/328
W3ZN/325
WA3ATP/326
N4WF/326
N4XO/337
W4BAA/348
W4BBP/335
W4MCM/342
W5FT/348
W5GC/340
W5RDA/338
N6UC/325
W6MUR/343
W6QNA/341
W6YHT/324
W7DY/331
W7LFA/326
WB7ABK/334
N8DX/326
W8CNL/326
W8VHY/326
K9AWK/328
W9RKP/348
WØAUB/339
WØBK/340

310

DK3PO/325
JA1IBX/330
KH6CD/352
ON4PA/343
OZ6MI/325
PAØFX/350
PY4AP/328
VE3GMT/325
YU1BCD/332
YV5BZ/338
W1AZY/343
W1UU/337
W2DXX/336
W2HO/346
W2SAW/347
W2TQC/344
W3GG/323
K4AUL/326
K4CIA/332
K4RA/320
W4AUH/325
W4AVY/341
W4BRE/328
W4GTS/327
W4JVU/328
W4YN/332
W5HDS/346
W5SJ/326
K6PU/333
K6ZM/335
N6ET/325
W6KYJ/328
W6NJU/344
K8IFF/325
K8MFO/326
W8ZD/337
K9GM/324
K9RA/324
W9HJ/340
W9ZRX/324
WØGNX/325
WØKF/346
WØSD/325

Radiotelephone

319

DJ2BW/349
DL6EN/351
DL9OH/350
G3FKM/352
IØAMU/357
IØZV/346
ON4DH/354
PY2PA/340
PY2PE/340
4X4DK/357
4X4JU/350
W1DGJ/343
W1JFG/354
W2BXA/361
W2PV/341
W2TP/345
WA2RAU/340
W3GH/348
W3KT/353
W4EX/361
W5LZW/346
W6AM/362
W8AH/355
W8BF/360
W8GZ/362
W9ZM/350

318

LU4DMG/353

CW

299

W9KNI/302

LU9DAH/349
PY2CK/360
TI2HP/360
VE5RU/349
K2FL/345
W2YY/341
W3CWG/352
W3DHM/351
W3NKM/354
K4YYL/336
W4DR/350
W4UG/340
W6GVM/359
W6REH/340
W6ZM/343
W7PHO/356
K8DYZ/338
W8CUO/342
K9ECE/346
W9DWQ/341
W9NZM/342
WØBW/353
WØGAA/341

317

F9RM/347
G3JEC/333
ON4DM/354
SM5CZY/340
SM6CKS/333
VE3MJ/336

295

K6GA/297

291

K2TQC/291

XE1AE/346
YV5ANF/346
ZL1HY/360
W1AA/350
W2HTI/352
W2OKM/353
W3DJZ/343
W3GRS/341
K4HEF/356
W4EEE/353
K5YY/333
W5IO/355
W6EL/340
W6EUF/335
W6RKP/346
W9JT/336
WØCM/354

316

DL7FT/337
G5VT/356
I8AA/334
I8KDB/349
ON4UN/332
VE3MR/339
YV5AB/354
W2FGD/337
W2GK/336
W2NUT/338
WA2EOQ/336
W3AZD/339

K9MM/292

290

N4RJ/291

K4IKR/333
K4JC/337
K4MQG/336
W4OM/352
W4SSU/340
W5PQA/350
K6LGF/345
K6WR/342
K6YRA/337
W7DX/341
W8MPW/345
WA8AJI/337
W9KRU/334
W9RNX/351
WØGKL/347
WØMLY/348

315

DJ7ZG/336
DL7HU/342
DL8NU/331
GI3IVJ/348
IØJX/330
IØLLZ/330
JA1BK/341
JA1BN/331
SM3BIZ/351
VE3QA/350
VE3WT/335

N4WW/293

279

K3FN/280

ZS6LW/347
K1IXG/342
W2GQN/336
K6JG/331
W6KNH/331
W6KTE/336
W7GN/341
K8DR/334
W9SFR/341
WØPGI/341

314

DL1KB/346
G3NLY/333
HB9TL/349
I2AT/331
I2KMG/334
IT9GAI/330
IV3PRK/329
OZ3SK/339
VK5MS/353
YV5AIP/343
ZL1KG/349
ZL3NS/333
K2BZT/344
W2LV/344
W3JK/333
W4SKO/348
K5DX/346

277

JA1JRK/280
ON5NT/278

K5JEA/343
W5ACE/347
W5SZ/332
W6BAF/342
W6CHV/346
W6FW/336
K8CFU/341
W8JTD/329

313

CT1BH/324
EA2HX/337
EA4JL/328
G3TJW/325
I5TDJ/336
I5WT/335
JA1JRK/326
JA4ZA/333
OK1ADM/333
PY3BXW/327
PY4TK/347
YV5BBU/331
K1DRN/332
W1HX/345
W2GKZ/334
W2GLF/346
W3RX/328
W4LMX/344

276

W3KT/277
W9ZM/277

W4QAW/328
WA4WIP/332
K6EC/330
W6ARJ/328
W6PT/338
W7JFO/328
W8GKM/327
W9DC/328
W9HB/345
W9QLD/329
WA9NUQ/331

312

EA8JJ/325
F9IE/327
I5FLN/324
I8YRK/329
IT9JT/328
PY3CB/327
PT7YS/342
SM6AEK/327
YS1O/340
YV5AHR/334
YV5AXQ/334
K2JMY/335
W2QK/333
W2YYL/338
WB2HXD/333
AA4MM/328
W4DPS/326
W4UWC/334

275

DL6EN/276
W8AH/276

K5UC/349
W5JWM/343
W5LZZ/330
W6RGG/331
W7ADS/345
W7JYZ/340
W8GMF/336
W8KST/330
K9MM/327
W9ILW/338

311

F2MO/334
F5II/326
G3UML/330
I6FLD/338
I7HH/323
JA1ADN/331
JA1MIN/329
JA8ADQ/327
KV4FZ/324
OE2EGL/327
ON8AXA/327
OZ3Y/338
PY2PC/329
PY4KL/339
UR2AR/331
YV5AJK/338
5Z4ERR/352
6W8DY/325
W1FXD/326

272

K8MFO/273
W6PT/274

K2YLM/331
W5GC/340
WA5IEV/326
K6GA/326
W6CCB/323
WA6AHF/325
W7LFA/326
K8VUR/331
K9AB/328
W9WHM/348
WØQGI/337
WAØOAH/326

310

DL1JW/330
DL7AA/338
EA4LH/325
F8RU/324
I4ZSQ/324
JA2AAQ/326
VE3GMT/325
YV1KZ/324
W1ICU/326
WA3ATP/325
N4WF/325
W4JVU/328
N6UC/324
W6ZKM/327
WB8EUN/322
K9LKA/326
W9BZW/328

270

K4PI/272

Coming Conventions

October 5-7
Dakota Division, Sioux Falls, SD
October 5-7
West Gulf Division, Houston, TX
October 13-14
Tennessee State, Memphis, TN
October 19-21
Midwest Division, Cedar Rapids, IA
October 19-21
Southwestern Division, Anaheim, CA
October 20-21
Roanoke Division, Norfolk, VA
November 17-18
Florida State, Clearwater, FL

1980

January 4-6
North Florida Section, Orlando, FL
January 26-27
Southeastern Division, Miami, FL

ARRL NATIONAL CONVENTIONS

July 25-27, 1980
Seattle, WA
March 13-15, 1981
Orlando, FL

MIDWEST DIVISION CONVENTION

October 19-21, 1979, Cedar Rapids, IA

The Cedar Valley Amateur Radio Club invites you to the ARRL Midwest Division Convention, to be held in the new Five Seasons Civic Center located near the airport and Interstate 380. Cedar Rapids' newest focal point offers accommodations, recreation and entertainment facilities unparalleled in mid-America.

Registration opens at 12 noon on Friday, with exhibits only from 6 to 10 P.M. A busy day is planned for Saturday. Registration opens at 7 A.M.; exhibits and flea market open from 8 to 5. There will be ARRL and DX Forums in the morning as well as a tour of the Amana Colonies. The afternoon schedule includes technical talks on antennas, microprocessors, Novice/Beginners and an FCC Forum. There will also be a tour of the Rockwell/Collins Radio facilities. FCC exams will be given on Saturday, starting at 9 A.M. for all classes except Novice. (Written elements only: 9 A.M. - 12 noon. Code tests: 20 wpm — 9 A.M.; 13 wpm — 10 and 11 A.M.; 5 wpm — 12 noon.) Advanced registration required — send completed Form 610 and a copy of license to CVARC, P. O. Box 994, Cedar Rapids, IA 52406, by *October 1, 1979.*

The day's activities will wind up with a banquet at 7 P.M. and presentation of the Royal Order of the Wouff Hong ceremony at 11:59 P.M. Senator Barry Goldwater, K7UGA, will be the featured speaker at the banquet.

Registration will open again at 7 on Sunday morning, with exhibits and flea market running from 8 to 2. There will be a QCWA breakfast and church services at the local churches. The technical programs will include talks on the State of the Art, Modern Art of CW, antennas, 2-Meter DX-Finding Techniques, and OSCAR.

Reservations are required for the Collins Radio Tour (no charge for tickets) and the Amana Colonies Tour (tickets $5, meals extra). Hamfest tables (by reservation) are $5 each. Convention preregistration before October 1, $4; registration and banquet before October 1, $14; banquet only $10. Convention tickets are $5 after October 1, or at the door. Make checks payable to Cedar Valley Amateur Radio Club, Box 994, Cedar Rapids, IA 52406. For further information and hotel/motel info write to CVARC at above address.

ROANOKE DIVISION CONVENTION

October 20-21, 1979, Norfolk, VA

The Roanoke Division Convention will be held in conjunction with the Fourth Annual Tidewater Hamfest/Computer Show/Flea Market in the Norfolk cultural and convention center SCOPE.

Doors open at 9 A.M. Scheduled events include ARRL meetings, DX and Traffic Forums, plus a cw contest. FCC amateur upgrading exams will start at 9 A.M. Saturday. Bring a completed Form 610 to save time. In the evening a special feature will be a dinner cruise and banquet on the *Spirit of Norfolk* cruise ship.

Advance registrations $2.50 (s.a.s.e.), $3.50 at the door. Flea market tailgate spaces are $3 a day. Cruise and banquet, $16 per person, $30 per couple. For tickets and information, write TRC, P. O. Box 7101, Portsmouth, VA 23707.

Hamfest Calendar

***Florida:** The Ft. Myers ARC will hold a hamfest November 3-4 at the Ramada Inn, Fort Myers. Tickets $2 in advance, $3 at the door. For more info, contact Bob Sloat, K4VGN, P. O. Box 05-37, Tice, FL 33905, Tel. 813-334-6190.

Florida: The Hillsborough Amateur Radio Society will hold a hamfest on Sunday, October 7 from 9 to 5 at the Fort Homer Hesterly Amory on Howard Avenue and Cass Street, just south of I-275. Admission $2.50 (children under 12 free). Flea market, commercial exhibits and door prizes. More info from HARS, P. O. Box 2335, Tampa, FL 33601.

***Georgia:** The 1st annual Hostess City Hamfest will be held in Savannah October 20-21 at the National Guard Armory on Eisenhower Drive. Admission will be $2.50 in advance, $3.50 at the gate. Talk-in on 37/97, 10/70, and 63/03. For additional info and advance tickets write Hostess City Hamfest Committee, P. O. Box 1237, Pooler, GA 31322.

Indiana: Hoosier Hills Ham Club will hold a hamfest at the Lawrence County 4-H Fairgrounds, Bedford, IN, on October 14. Prizes, swap shop, refreshments and bingo will be available. Talk-in on 13/73.

Indiana: The Marshall County Amateur Radio Club will hold the 4th annual Plymouth Swap & Shop at the National Guard Armory. Electronic items only. Admission $2 at the door. $3 per 6-ft. table advance reservation allows set up between 6:30 and 8 A.M. Prizes. Advance tickets $1.50 from Marshall County Amateur Radio Club members. Send table, space, or ticket requests to MCARC, P. O. Box 151, Plymouth, IN 46563, or Paul DeVox, 109 Maple Ave., North Liberty, IN 46554.

Massachusetts: The Quannapowitt Radio Association's annual auction will be held at the Knights of Columbus Hall in Reading on October 20. Doors open at 10 and the auction will start at 11. Food and refreshments. Talk-in on 52. For info call Bob Reiser, AA1M, 617-272-6219.

Michigan: Ham Fair 79, sponsored by the Central Michigan Amateur Radio Club and the Lansing Civil Defense Repeater Association, will be held Sunday, October 14 at the Grand Ledge High School, seven miles west of Lansing. Fly-in service, shuttle service, cafeteria, prizes, computer programs, free parking, women's activities. Talk-in on 34/94, 22/82 and 52. More info from Ham Fair 79, P. O. Box 138, Bath, MI 48808, Tel. 517-641-4533.

Michigan: The third annual RADAR hamfest and swap and shop will be held Sunday October 7, Kennedy High School, Taylor, MI. Admission $2. Computer displays and loads of ham gear. Talk-in on 93/33 and 52. Info from WB8MER, Box 1023, Southgate, MI 48195.

Minnesota: The Viking Amateur Radio Society will hold its 9th annual swaptest Saturday, October 13, from 9 to 4 at Waseca High School. Further info from VARS, Box 3, Waseca, MN 56093.

Mississippi: The Gulf Coast ham/swap fest will be held Saturday and Sunday, October 20-21, at the International Plaza, located at the west end of the Biloxi/Ocean Springs Bridge on Highway 90, Biloxi. Tickets are $1 or 6 for $5. Tables $3 for one day or $5 for both. Talk-in on 13/73 and 52. For advance info, tickets or tables contact Al Williams, WD5GNR, 311-1/2 DeMontluzin Ave., Bay St. Louis, MS 39520.

New Jersey: The Greater Delaware Valley hamfest, Cherry Hill, NJ, will be held October 28 at the Camden Catholic High School, Rte. 38 and Cuthbert Road from 8 to 5. Reserved indoor flea market, $4/table. Commercial displays, outdoor flea market and seminars. Admission $3. Talk-in 22/82 and 52. Set-up late Saturday night; RV parking. Write GDV Hamfest, 15 East Camden Ave., Moorestown, NJ 08057. Tel. 609-234-3926.

New York: The Radio Amateurs of Greater Syracuse will host their 15th annual hamfest at the New York State Fair Grounds, Arts and Home Center, Syracuse, on Saturday, October 13, from 9 to 6. There will be exhibitor booths, indoor and outdoor flea markets, awards, films and ladies programs. Tickets before October 1 at reduced rate. Children under 12 free. Overnight and trailer parking available. For tickets or info write R.A.G.S., P. O. Box 88, Liverpool, NY 13088. Talk-in on 90/30 and 31/91. Refreshments on the grounds.

***New York:** The Yonkers Amateur Radio Club is holding Westchester's third annual flea market and hamfest Sunday, October 14 (rain date October 21), at Redmond field, Yonkers, from 9 to 5. Admission $1.50 (children under 12 free). Sellers $3 per space; bring your own table. Prizes, refreshments. Giant Auction starts at 2 P. M. Talk-in on 265/865, 52 and CB channel 4.

***New York:** Hamfair '79, sponsored by the Long Island Mobile Amateur Radio Club, will be held Sunday, October 14, from 9 to 4 at the Islip Speedway, Rte. 111 (Islip Avenue) one block south of Southern State Parkway exit 43, or come south from LIE exit 56. Free parking, room for 3000 cars. Loads of prizes, contests. Admission $1.50, $3 per sellers space. Sellers space permits one person to enter. All hams must pay admission; others are free. For info call Hank Wener, WB2ALW, 516-484-4322 or Sid Grossman, N2AOI, 516-681-2194, evenings.

New York: The Northeast States 160-Meter Amateur Radio Association annual election and banquet will be held on Sunday, October 14, at Kozel's Restaurant, Rte. 9H, West Ghent, NY. Flea market in rear parking lot at 1 P.M. Roast beef dinner at 5 P.M. All hams and spouses welcome. For reservations and details, contact William Derby, WA5IOD, 14 Plain St., Medfield, MA 02052.

***North Carolina:** The Western Carolina Amateur Radio Society presents Asheville Autumnfest, October

*ARRL Hamfest

13, 9 to 6 at the Asheville Civic Center. Prizes, dealers displays, large indoor flea market ($3/eight-foot table), concession stand. Social get-together 7:30 to 10:30 P.M. in civic center, light refreshments. Admission $2 (children under 12 free). Additional tickets at Autumnfest $2 each or 3/$5. Advance tickets $2. This is a busy time in Asheville, so make your motel reservations early. Talk-in 31/91 and 16/76. For info or assistance, send an s.a.s.e. to WCARS, P. O. Box 1488, Asheville, NC 28802.

North Carolina: The 2nd annual Eastern North Carolina Hamfest of the Brightleaf ARC, New Bern ARC and Onslow ARC will be held October 7 from 9 to 5 at the New Bern Fairgrounds. Registration is $3. Prizes and programs. Additional info from Eastern North Carolina Hamfest, P. O. Box 7311, Greenville, NC 27834.

Ohio: The Northwest Ohio Amateur Radio Club will hold its annual hamfest at the Allen County Fairgrounds in Lima, OH, on October 14. Two large heated buildings, with tables available at $3, will house the hamfest. Outside flea market space will be available at no charge. Advance tickets $2. For info send s.a.s.e. to NOARC, P. O. Box 211, Lima, OH 45802.

***Ohio:** The 4th annual Heart of Ohio Ham Fiesta will be held October 28 at the National Guard Armory in Marion. Flea market, prizes, forums. Talk in on 90/30 and 52. Dealer spaces available. For more info, contact Paul Kilzer, W8GAX, 393 Pole Lane Rd., Marion, OH 43302.

Oklahoma: Beaver hamfest will be held October 14 at the Fairgrounds building, Beaver, OK. Doors open at 8; registration at 10. Tickets $2.50 each. Covered-dish luncheon. Short program at 1:30 P.M. for everyone. Swap tables. Prizes following program. Airport, camper hookup nearby. Talk-in on 01/61 and 52. Details from Stella Shaw, WB5VUN, Box 310, Beaver, OK 73932, Tel. 405-625-3368.

Ontario: The London Amateur Radio Club will hold its 2nd annual Swap & Shop on October 28 from 8 to 4 at Lord Dorchester High School in Dorchester, just off the 401. Lots of displays, prizes, etc., with a talk-in on 78/18. Tables are $2, admission is $2. For more info write VE3CSK, R. R. #1, Ailsa Craig, ON NØM 1AØ.

Ontario: The Radio Society of Ontario's 11th Annual Convention is being held on October 12-14 at the Skyline Hotel, Ottawa. Friday evening buffet and dance. Saturday technical sessions, demonstrations, forums, displays and women's program. Saturday night banquet and dance. Sunday indoor flea market. Info from Convention Committee, P. O. Box 5076, Station F, Ottawa, ON K2C 3H3.

***South Carolina:** The York County Amateur Radio Society will hold its 28th annual hamfest on Sunday, October 7, beginning at 8, at Joslin Park in Rock Hill, SC. Registration is $2.75 each or 2/$5 in advance, or $3 at the gate. Prizes. A barbecue dinner is available at the park. Talk-in on 43/03 and 52. For more info write P. O. Box 4141 CRS, Rock Hill, SC 29730.

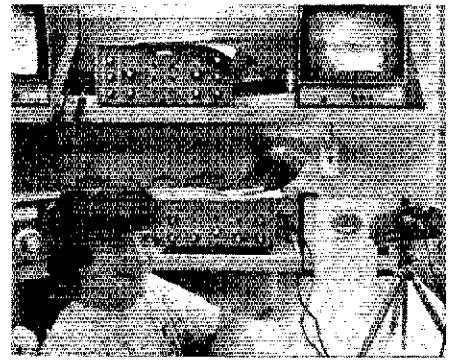
***Tennessee:** Hamfest Chattanooga will be held on October 27-28 at the Chattanooga State Technical Community College. Events include FCC exams, prizes, contests, exhibits, forums and ladies programs. Indoor dealer area is $15 per table and outdoor paved flea market area is $2 per space each day. Talk-in on 19/79 and 3980. Preregistration with info is $1 to HAMFEST, P. O. Box 95, Chattanooga, TN 37401.

Virginia: The 4th annual Tidewater Hamfest/Computer Show/Flea Market will be held in the Norfolk Cultural and Convention Center SCOPE October 20-21. 60,000 square feet of air-conditioned exhibit and flea market tailgating space available. Doors open at 9. ARRL meetings, DX, traffic forums, plus a cw contest are scheduled. FCC exams are planned Saturday from 9-12. A special feature will be a dinner cruise on the *Spirit of Norfolk* cruise ship Saturday night. Advance registrations $2.50 (s.a.s.e.), $3.50 at the door. Flea market tailgate spaces $3/day. Cruise and banquet $16/person, $30/couple. Tickets and info from TRC, P. O. Box 7101, Portsmouth, VA 23707. QST

Strays

WD6FFV VISITS JET PROPULSION LABORATORY

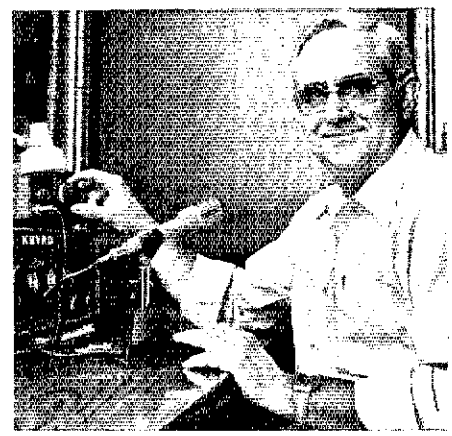
The *Los Angeles Times* carried a front-page story in April about Mike Davis, WD6FVV, a 13-year-old amateur, who had maintained contact with a sinking fishing vessel in the Caribbean. Mike kept the Coast Guard informed by telephone so that search aircraft could locate and rescue the people on the sinking vessel. He was invited to visit JPL and operate the JPL Amateur Radio Club station, W6VIO, during the Voyager II fly-by of Jupiter and its moons.



Mike Davis, WD6FVV, 13-year-old amateur hero of a sea rescue operates on 20 meters from W6VIO during Voyager II commemorative activity. *(K6PGX photo)*

K8YRD WEATHER WATCH

Dale Moore, K8YRD, director of a spotter network designed to give early warning of a tornado's approach to the Lansing, MI, area, has been awarded a special public-service award by the director of the National Weather Service for dedicated and unselfish public service performed during severe weather watches in the mid-Michigan area. "Dale's Tri-County weather watch, which is made up of members of the Central Michigan Amateur Radio Club, is a vital right arm of the National Weather Service in emergency weather situations. "We value them greatly. Someday those men might save thousands of lives around here," commented Robert Jacobson, meteorologist in charge of the National Weather Service office in Lansing.



Amateur Radio operators, like Dale Moore, K8YRD, help the National Weather Service keep an eye on weather conditions. *(The Lansing State Journal photo)*

50 Years Ago

October 1929

Advances in commercial radio are following line similar to those in the amateur field, so Technical Editor Lamb takes us on a tour through WTIC's new 50-kw. installation, hoping we can glean some ideas for our own setups.

The description this month of station G5BY underscores the parallel between amateur and commercial technique; WTIC is many times more elaborate and powerful, but the design and construction qualities are about identical.

Editor Warner reviews the principles of how international conference agreements affect amateur privileges in this country, since there seems to be still some misunderstanding among us on the results of the 1927 world meeting.

Warner is off to The Hague to represent the amateur service as a member of the U.S. Delegation to C.C.I.R., the technical standards arm of the international regulatory body.

Back home, W2AEC has designed a combination of lightweight receiver, monitor and frequency meter, and still kept it easy on the pocketbook.

We never get enough public relations results, and President Hiram Percy Maxim points out many areas of amateur activity where we should be careful not to hide our lights under a bushel, but to let the world know what we are doing.

W1AY suggests that equally important with a clean, strong signal is the skill and courtesy of the operator; he wants us to be individuals, and add some "it" to our image.

W9CP, W9UZ and W9AAS are winners in the Chicago *Tribune*'s competition for most effective communications with the amphibian flight to the Arctic which the paper sponsored.

25 Years Ago

October 1954

Laid up in the hospital, WØCO made excellent use of the time by a prodigious job of indexing early issues of *QST*, finding many unusual tidbits of information which otherwise might be lost to researchers. (The valuable reference material is still in use at Hq.)

Always pushing for more v.h.f. activity, W1HDQ has designed a basic rig for beginners to work at 50 and 144 Mc. Next month he will describe an amplifier to boost the power.

W5BSU has a novel volume-compression circuit which varies the actual signal input rather than the stage gain.

Bandspreading the Clapp VFO is not a simple task, but G3BHJ shows us some approaches to help solve the problem.

The League is asking the Commission to assign more frequency space to both Novices and Technicians.

Announcement is made of a new League publication, *Single Sideband for the Radio Amateur*, largely a compilation of material previously in *QST*, yet a complete reference volume for anyone using the "new" mode.

W1JEQ never seems to run out of new ideas for transmitting equipment, and this month describes an r.f. assembly for mobile or fixed station work, of course with multiple-circuit tuners.

W4GMY achieves compactness in his 14-Mc. two-element beam by loading the ends of the driven element.

If you don't want a separate bias supply but still wish to protect your transmitting tetrode, use W9AEI's novel dual-triode circuit, an advancement over the usual clamp tube arrangement. — *W1RW*

Public Service

Conducted By Robert J. Halprin,* K1XA

Strange Magic

It's a magical, even mystical experience, to communicate with an unseen person without wires. This has to be the basic appeal of Amateur Radio, which keeps us coming back for more. You'd think that handling a few messages or making a few DX contacts would be enough, like the guy who worked Australia his first day on the air and then purged all his low-band equipment with the thought that he had communicated as far as he ever would. A curious attitude. It's obvious that amateurs who are inactive by choice have no conception of how much fun it is. You don't have to do it every night or every week, but either the desire is there or it isn't. Those hams who have lost it (or never had it) aren't any better than the six-pack and Laverne/Shirley crowd. Their brains will be turned into mush with the rest.

Item three in "The Amateur's Code" says that the amateur is balanced. Even in these cynical times, this statement has the ring of truth. One of the problems in our society is that we don't have a wide enough variety of interests to occupy our leisure time. Hamming is one of the more constructive avocations, but, of course, only one. Yet, it is a legitimate one.

While the cobwebs grow larger in Joe Six-pack's radio shack, WB2TOM, for one, is getting the most out of his hobby. George or Tom, or whatever you want to call him, is just 13, but already a well-respected traffic handler. He is active in at least seven nets, including the responsible position of assistant manager of the Second Region Net of the National Traffic System. His modest station doesn't prevent him from contesting either. "It's technique not signal," he says. Presently Advanced class, George may have upgraded to the Big E by the time this is read. George also devotes some time to homebrewing and radio club doings. But traffic handling is his first love. Why? "It gives me a chance to help people, to meet a lot of good people and to hear so many super fists." George-Tom also participates in the more traditional aspects of teenage life but it's safe to say that he is a lot more sophisticated than his peers.

The operating season convenes this month in a big way, with the Simulated Emergency Test on tap for the first weekend and later, the CD Party and the CQ Worldwide DX Contest. There's stuff there for everyone. One thing to ponder is that if you have no intention of operating, why not send your license back to Gettysburg? The FCC even has a special form for this purpose. Oh, by the way, don't persist with this stuff about 2-meter fm to and from work. That ain't operating.

Getting on the air is fun. It's good therapy, too. Hamming is a legal and nontoxic escape from an uptight world. An individual can immerse himself in a completely different world, consisting of electronic signals, the exchange of specialized information in a unique language all wrapped up in positive reinforcement through accomplishments of various types.

Enthusiasm and time available are in a constant state of flux. Especially from this vantage point, it's hard not to join the ranks of the burnouts. While the activity has leveled off, some of us are still in there, hitting fungoes for ham radio. You just have to pick your spots.

The mystic traveler through the realm of the amateur bands locks into many different emotions and responses. One can enjoy high-speed code like a good piece of music, because it is music. Or it's the feeling of pride and respect that a trafficker draws from the smooth running of the net, of which each net member is a part owner. It's the "good tired" that one feels after an honest contest effort. It's the adrenalin charge and the exquisite feeling of relief swirling inside after making it through a massive pileup just when it seemed oh so hopeless. Good, honest feelings. It's even the taste of watermelon after Field Day is done.

Still crazy after all these years.

REACTION TO JUNK FOOD

Many letters were received about "Junk Food for the Ears," which led this column in July. Here's one of the more lucid ones:

"In the smaller populated sections, such as NH, ME, VT, etc., the average number of messages handled per session is such that the net would last only about 10 minutes. Many messages would have to be held if no station able to handle them had checked in by that time. Many stations check in for the fraternalism of the informals and only incidentally handle traffic. These stations would not get exposed to traffic handling if only traffic was handled on the net.

"It is important for the NCS to have frequent call-ups so stations with traffic can check in, pass their traffic and depart as soon as they wish.

"Net controls should also realize that if a heavy load of traffic plus informals would make the net too lengthy, they can excuse stations that check in without traffic and are unable to handle any of the traffic listed.

"It is also important that stations realize they are not required to give an informal or to stick around to listen to them. They may *request* to be excused at any call-up.

"Some phone nets on hf that list traffic as a purpose in the Net Directory do have lengthy informals, preventing stations from checking in with traffic, due to the long periods between call-ups. These nets are also usually the ones that are reluctant to take traffic." — *John McKeen, W1TN, Nashua, NH*

NEW HOOSIER NET PLANNED

Any Novices in Indiana wanting to help get a traffic net started? The net is tentatively planned to be in session on Monday, Wednesday and Friday evenings on 3710 kHz at 0130 UTC. If you're not familiar with traffic handling, then join the net anyway and learn the basics. If interested, write Jim Stanley, WD9CIS, 649 Monroe Ave., Evansville, IN 47713.

SOME QUESTIONS ABOUT PSHR AND THEIR ANSWERS

A number of questions have been raised about the new Public Service Honor Roll criteria. We'll attempt to answer them.

Q. Can a Net Control Station claim check-in points for the same net sessions in which he serves as NCS?

A. No, he cannot. Actually a NCS doesn't really "check in" himself. He checks in the other stations.

Q. What is meant by "pre-assigned liaison"?

A. It applies mostly to the National Traffic System, most of the nets of which have liaison stations with the

No, it's not one of the Bee Gees or even a biblical prophet. It's K1XA doing his number on the Eastern Area Net; Thursday night is all right for traffic handling. *(K1WJ photo)*

*Asst. Communications Manager, ARRL

next higher (or for that matter lower) level net, assigned by the net manager on a regular basis. However, the points are not available even to NTS nets unless the net manager makes the assignment in advance. They *are* available to non-NTS nets, if such assignments are made. No such assigned liaison is eligible for these points if it "short circuits" any NTS channels, unless it is an emergency overload hotline situation. Assigned alternates who assume the function in the absence of the regular are eligible, but stations who are "spot assigned" are not. And again, pre-assigned liaison may be either to the next higher *or lower* echelon net.

Q. Can a Section Emergency Coordinator or Section Traffic Manager qualify for five points in the EC/NM category (number eight)?

A. Yes.

Q. When will an individual qualify for the PSHR certificate?

A. A ham will be eligible for a PSHR certificate if he qualifies for PSHR 12 months consecutively or 18 months out of 24, as reported in the PSHR listings in *QST*. Late reports will not be included. The certification is not retroactive. That is, it came into being with the revised PSHR criteria which went into effect June 1979. So, the earliest a ham can qualify for a certificate is June 1980, activities which will be reported in the September 1980 issue. Incidentally, if anyone has any suggestions for what a classy looking PSHR certificate should look like, let us know.

Q. What would be considered an "emergency message," category seven?

A. It is a communication by Amateur Radio in a situation involving the life or death of an individual or group of individuals, or the wholesale destruction of property, in the absence or overload of commercial communications necessitating the use of Amateur Radio. This includes official messages of relief agencies during emergencies requesting supplies, materials or instructions vital to relief of stricken populace in emergency areas.

Any further PSHR-related questions will be gladly answered in these pages.

PUBLIC SERVICE DIARY

☐ Lansing, MI — June 28. A three-year-old boy had both his feet sheared off by a hay cutter. His father, WD8DDW, used his 2-meter transceiver to call 911 via the WR8AFZ autopatch. With this information, a police escort was arranged for the trip to the hospital and medics were awaiting the arrival. (K8ZJU)

☐ Carlisle, PA — July 15. At 10:09 P.M., a plane carrying four passengers plunged into the peak of Long Mountain, about seven miles south of here. The crash occurred about 300 yards from the newly built house of WB3BTU, a member of the South Mountain Repeater Association. He used the repeater's autopatch to direct authorities to his location. 'BTU attempted to rescue the victims but the fire and heat were too intense. (WB3GRT, secretary, SMRA)

☐ Rosenberg, TX — July 16. HR1PMR/W5 smelled gas while passing a pair of 10,000 gallon LPG storage tanks and noted a bad leak in the header connecting the tanks. The Fort Bend County Emergency Net was in session and HR1PMR checked in and reported the situation. The Net alerted sheriff's officers, who, with fire department officials, brought the situation under control in a short time, before a fire or explosion could occur. (W5UBD)

☐ Greenville, TX — August 2-3. The Sabine Valley Amateur Radio Association and E-Systems Radio Club furnished communications during a 20-hour telephone outage at the Citizens General Hospital. The effort used the W5UDQ repeater to provide communications among hospital, physicians and other local emergency services. Members of both clubs organized into a single roster of operators to provide hospital emergency communications over the weekend. (WD5FMQ, president, Sabine Valley ARA)

AMATEUR RADIO EMERGENCY SERVICE REPORTS

☐ Kentucky — June 29. A tornado touched down on the Shelby-Franklin County line and moved eastward. The District 13 Emergency Coordinator WA4KKV activated the severe weather net on the Lexington repeater (16/76). Stations were activated at the Weather Bureau, the Metro Police Department and at strategic locations mobile for funnel cloud observations. A tornado watch for the entire state was in effect for several hours. In Lexington, trees were toppled, causing power outages. Georgetown, 12 miles north, suffered the worst damage. The tornado caused considerable damage to the downtown area, including Police headquarters. Amateur Radio was the only form of communications there for nearly six hours. There was excellent coordination between the Lexington repeater, the Frankfort Repeater on 84/24 and the 295/895 repeater at Hall's Gap. A total of 104 stations checked in to the net, representing 22 cities and 20 counties in the central Kentucky area.

BGARC members and many other hams provided up-to-the-minute reports on weather conditions, which was an invaluable service to the weather bureau, as well as to the cities involved. (W4TPB, publicity chairman, Blue Grass Amateur Radio Club)

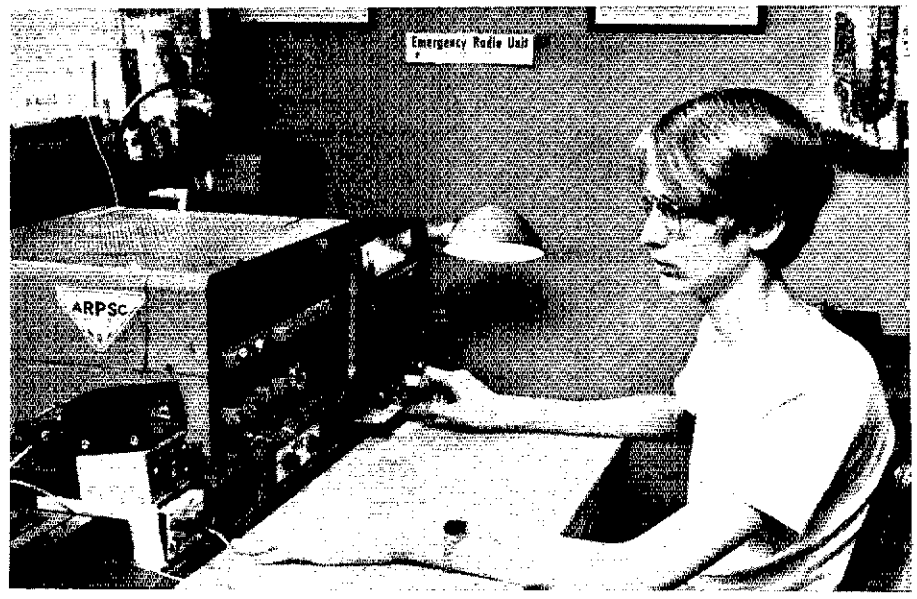
☐ Sackville, NB — July 8. Ground search and rescue teams were called out at 1400 hours for the search for a four-year-old child. The amateur emergency communications section immediately responded. Each search team was accompanied by an amateur communicator. The mobile control station had Amateur Radio links with each team. The successful search was terminated at 1531 hours. (VE1ASW, SEC Mar/NFld)

☐ Ohio — August 4. Civil Aviation-Ohio is a group of pilots who have organized to assist the State and the State Disaster Services Administration with air transportation in the event of a major emergency. This was their first statewide test. Mission particulars were transmitted from CAO mission control to the state DSA via 2 meters and relayed to the appropriate originating counties via W8SGT at the DSA on 3972.5 kHz. Mission acceptance and departure times were relayed back to mission control. Most missions involved flying from the originating county to an intermediate airport, picking up designated cargo (simulated) and transporting it to the destination airport in Carroll County, where a critique was held. The communications links functioned satisfactorily, although some improvements are being considered, and the learning experience was excellent for CAO. (W8BKO, EC Delaware Co.)

☐ ARRL Section Emergency Coordinator Reports. For July, 3 SEC reports were received denoting a total ARES membership of 13,840. This represents a 9-percent decrease as compared with reports received last July 1978 (33), and an 18 percent decrease in ARES membership (16,815). Sections reporting were Ariz, Del, EBay, EMass, ENY, Ind, Iowa, KY, Mar/NFld, Mich, Mo, NFla, NTex, Ohio, Okla, Ont, Ore, Que, SDgo, SF, SFla, SJV, SBar, SCV, Sask, SNJ, Va, WVa, WPa, Wis.

COMMUNICATIONS SERVICE OF THE MONTH

Laguna Beach, CA — July 1979. A 75-acre brush fire broke out on a hillside in Laguna Canyon, endangering the many hillside and canyon homes. The annual Festival of Arts, along with several art fairs, was in progress in the canyon, adding many times the normal amount of traffic on the busy canyon road. More than 250 fire fighters from the county and state Forestry Division, aided by fire bombers, fought flames leaping as high as 45 feet. ARES members responded to the call of Emergency Coordinator WA6TLE and AEC WD6AQK and within a few minutes, amateurs from the South Orange Amateur Radio Association were at the fire camp, ready to provide emergency communications. W6TIO/rpt was kept very active with many messages into and out of the fire camp. At 9 P.M., the vhf session of the Southern California Net handled traffic into and out of the four Southern California sections. Twenty-one hours after the fire was spotted, the weary workers began mop-up operations. The South Orange Amateur Radio Association maintains both 144- and 220-MHz repeaters on top of Temple Hill in Laguna Beach with emergency power available. (WB6QBZ)



Who says you can't become a ham radio superstar with just an HT-37, a 2B and a tuned wire? Not WB2TOM, that's for sure. His superior operating ability sets him apart from the multitude.

REPEATER LOG

According to reports received between July 20 and August 20, 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	Miscellaneous	Total
WR1ABU				1				1
WR1ADF		1						1
K3PSP	1							1
WR4ACY		2		27				29
WR4AEX					1			1
WR5AAA	1							1
WR5ABA				3				3
WR5ABE				1				1
WR5ABY				17				17
WR5AMX	1							1
WR5ANT	1							1
N5DD				1				1
WR6AOX					1	1		2
KH6IAA						1		1
WA6VNV					1			1
K8ZIS		1			1			2
WR9AFF	1							1
N9AHP	1							1
WRØACD	1							1
WRØAEV	1							1
Simplex				1	1			2
Total	8	4		51	5	2		70

NATIONAL TRAFFIC SYSTEM

The upcoming combined NTS Area Staff Meeting at Headquarters (to be attended by delegates from each of the three area staffs) will address many of the concerns and problems of our system and improvements therein. This summit is scheduled for November 10 and 11. Observers welcome. Speaking of meetings, the 2RN picnic had a turnout of nearly 50 hams despite the monsoon rainstorm(s). In fact, a quorum of the Eastern Area Staff was present; a spirited and marathon-like confab ensued. Minutes will appear later. WB2TOM has been appointed assistant manager of 2RN-D, with specific duties for the conduct of the 1200 local session. 1RN-D certificates went to WB1ACA K1AQE K1BA K1BQB WB1BYR KA1CC WB1CPF K1EIC WB1EHS W1FJI W1GUX WA1HOB W1HMJ W1ISO W1JTH WA1JZP W1KK W1KUE W1KX WA1LPM WA1MJE WA1MUX WA9NEW/1 ADIO K1PAD W1PEX W1TN K1TUT W1UKR W1XX WA1ZGK. 2RN-E certificates to WB2EAG WA2GXU (first annual) and N2EF (second annual).

July Reports

Area Nets

1	2	3	4	5	6	7
EAN	93	2933	31.5	.918	95.2	
CAN	93	1682	18.1	.508	99.5	
PAN	62	1634	26.4	.640	97.5	
Region Nets						
1RN	112	720	6.4	.380	83.1	97.8
2RN	157	757	5.6	.397	86.9	100.0
3RN	93	535	5.8	.499	98.2	96.8
4RN	124	1251	10.1	.409	73.5	100.0
RN5*	56	683	12.2	.461	95.8	100.0
RN6	124	1195	9.6	.363	97.3	95.7
RN7	124	778	6.3	.585	99.1	98.9
8RN	91	624	6.9	.346	86.4	98.9
9RN	93	641	6.9	.408	92.0	100.0
TEN*	62	413	6.7	.318	73.8	98.4
ECN	55	308	5.6	.498	63.4	77.4
TWN	90	477	5.3	.240	79.8	97.8
TCC						
TCC Eastern	184[1]	984				
TCC Central	207[1]	912				
TCC Pacific	109[1]	728				
Sections[2]	5295	21,449	4.1			
Summary	6724	38,704	5.8			
Record	5989	30,696	15.2			

*Incomplete report

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (169): ASN (AK), AENB AEND AENJ AENM AENS (AL), ARN OZK SCARC (AR), ATEN HARC SWN (AZ), SCN SCN/RTTY (CA), CN CWN HNN (CO/WY), CN CPN NVTN RTN WESCON (CT), DEPN DTN (DE), FAST FMTN FPON FPTN GN NFPN PBTN PEN QFN QFNS SPARC TPTN (FL), GSN GTN WGARES WGN (GA), I75MN TLCN (IA), ILN ILPN (IL), QIN (IN), KPN KSBN KWN QKS QKS-SS (KS), 2STN 5DARES KNTN NRN KTN MKPN SEKEN (KY), LAN LRN LTN (LA), EM2MN EMRI EMRIPN EMRISSN HHTN WMPN (MA/RI), MEPN MMN, MSN MTN WRIN (MB), MDD MEPN (MD/DC), AEN SGN SPSN (ME), MACS MITN MNN QMN UPN (MI), MSN (MN), ACE MON NEMOE (MO), APN (MR/NF), JCARCEN MSN MTN (MS), NCSSBN THEN (NC), WNN (NE), GSFM (NH), MCN NJN NJPN NJSN OBTTN UCETN (NJ), NMRRN SWN (NM), BAVTN NYS WDN (NY), BN BNR OSN OSSBN (OH), NOSN OAN OLZ ONON OPEN OTWN STN (OK), CMN LN ODN OPN OSN (ON), 16/76 AREST BSN JCARES OSN PDXARES (OR), EPA EPAEPTN LVN PTTN WPA WPA2MTN WPAPTN (PA), WQV/UHF (PQ), CMN CNN SCSSBN (SC), NJQ SDMN SDN SDSSBN TSEWN (SD), SATN (SK), MCRN RCARESN TLC TN TNN WTVHFN (TN), DFW TEX TTN (TX), BUN UCN (UT), SVEN VN VNTN VSBN VSN (VA), WARTS WSN (WA), BEN BWN WIN WNN WSBN (WI), WVN (WV).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

TCC-E (E) certificates sent to K1BA (4th annual) and K4KNP (10th annual).

1	2	3	4	5
TCC Eastern	189	97.4	2514	984
TCC Central	217	91.4	1817	1423
TCC Pacific	124	87.9	1450	728
Summary	530	92.2	5781	3132

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (July): Eastern Area (N2YL/K3KW, Directors) — W1s KX NJM, WA1ZAZ, K1s BA EIR GN SSH XA, W2s CS CQB FR GKZ MTA RQ, WA2s ICB SPL, W3s FAF PQ, WA3WQP, K3s KW NGN, W4s JK MEE SQO UQ, WA4CCK, WB4PNY, K4s BKX KNP, N4s KB NK, W8PMJ, WB8WTS, K8KMQ, VE3s GOL SB. Central Area (W5GHP/W9JUJ, Directors) — W4ZJY WD4HIF, WN4KKN, N4MD, W5s KLV RB, WA5s BHF INJ IQU RKU, WB5s FDP MVR NKC NKD OXE SDD, K5s GM MC, N5s TC TS YL, W9s CXY DND HOT JIJ JUJ NXG, N9TN, W0s AM HI, WA0TNM, K0s CW EZ. AF0O. Pacific Area (W5KH, Director) — N5s MR NG, W5KH, K5MAT, N6s GW PZ WP, W6s EOT OA VZT YBV ZRJ, WA6UAZ, WB6PVH, W7s AK DZX EP GHT LYA VSE, K7HLR, AD0A, W0KON, K0s BN DJ, VE7ZK.

Independent Nets (July 1979)

1	2	3	4
Amateur Radio Telegraph Society	31	1486	487
Central Gulf Coast Hurricane	31	268	2278
Clearing House	31	163	542
Empire Slow Speed	27	51	256
Hit and Bounce	31	347	589
Hit and Bounce Slow	35	54	188
IMRA	26	376	978
New England Novice	31	49	242
North American SSB	26	256	201
Washington Region PON	18	20	315
West Coast Slow Speed	31	108	312
20-Meter ISSB	26	407	540
75-Meter ISSB	31	376	884
7290 Traffic	46	560	3481

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll July 1979

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.

213
K4TH
204
WB5YDD
147
W7VSE
146
WB8YRY
136
W5KLV
131
N4CCT
129
WA2SPL
WA4PFK
126
WD4ISN
124
WB5LAT
121
WB1DXR
120
W2RQ
WA6UAZ
AF0O
117
WA3WQP
116
WB4PNY
115
WD8KZX
114
KB2KW
112
AA2H
W2ZOJ
N4NK
W9JUJ
111
W8VPW
110
WB2RMI
WD8NKA
108
WD8LRT
107
K4SCL
K8AAZ
106
K2GCE
105
K4DZM
WA4VKD
WB6PVH
104
WA3NAZ
KB4OZ
103
WB2EAG
WA4YIU
W6NTN
102
WA1TBY
WA2MFV
KB4N
101
AF2L
W2MTA
WB8YDZ
K0PIZ
100
WB1CPF
W2SQ
W2UEZ
WA4CCK
99
WB2TOM
K4BKX
WA4JDH
WD4LUG
98
N2APB
VE3GOL
VE3GT
N5TC
97
WB5MMI
96
WB3JYZ
KK4M
AA5J
WB5NKC
K7GXZ
95
KA1CC
94
WB2PJU
K5OWK
93
WD4AWN
K5TL
W7GHT
92
W9NXG
91
N4PQ
90
WB4WYG
WB5LBR
WA8HGH
89
WA3PXA
W4ANK
KL7HSF
WA0TNM
87
WB1BYR
K2VX
WD4HIF
N4WA
WB4ZOJ
KB8EQ
86
VE3JIR
VE3KK
K4XE
W5DTR
WB5MVR
W5VMP
85
KA1BJY
W2XD
VE3DPO
WB5NKD
84
WB3JZA
WA4STO
WB8MTD
83
AA3S
KA4BUI
W4JK
82
WB6QBZ
81
W4CKS
WA5RVT
K0EZ
80
W1RWG
VE1WF
KA4BGX
W8GGX
78
K3JL
VE5NJ
77
AF4T
WB4ZSZ
N5RB
N6GW
76
N2CR
N3EE
W5HMR
75
N3AIU
WB0RIQ
74
WB3JGP
73
WA2MVQ
WA4LGT
KB6FR
WB0HOX
72
K4EV
71
WD4CNQ
WA4EYU
WB5CIT
K8DL
WA8GMT
W9XD
70
WB1CGK
WA1VAB
KA2CNN/T
N8CW
69
WA1LOU
VE5AE
67
K1JHC
WA7IHS
AF8V
66
W1TM
K5ARH
WB8WTS
KA0AIT
W0FT
65
WA4NBE
K4VHT
K5DPG
WD5JYI
WB8OMQ
W0OPX
64
WA2ZJP
N3APS
N5BA
VE5WM
63
WB3GZV
W9IEM
62
KA1FJ
WA4CNY
KM4G
N8ABA
W9JIJ
61
WB1FZX
W3DP
WA4AAV
W4FMN
WB7OEX
W0OTF
60
W1HL
WB3JRW
WD0BMR
WB0ZBJ
47
WA2MEE/T
43
KA2BGX/N

Brass Pounders League July 1979

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: N3AIU, W7AK, KL7P.

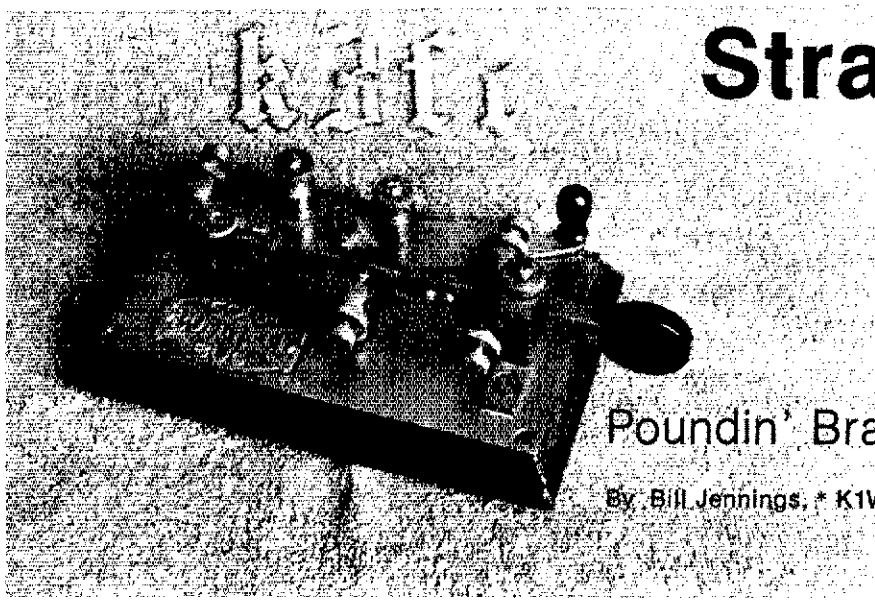
The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

1	2	3	4	5	6
W0WYX	34	994	345	649	2022
WA0HJZ	59	965	12	609	1645
W9JUJ	15	515	532	6	1068
KA9CPA	20	673	71	302	1066
WA3WQP	5	464	493	23	985
W3CUL	253	212	306	9	780
WA2SPL	5	366	372	33	776
WB4PNY	3	398	340	10	751
KB6FR/3	230	185	278	52	745
WA4JDH	1	333	356	3	693
N4MD	1	321	342	1	665
W5TI	5	360	290	9	664
W7VSE	4	311	297	46	658
W4MEE	4	301	299	22	626
KB4N	38	260	317	6	617
WA4CCK	2	272	318	6	598
K8AAZ	8	311	258	18	595
W5KLV	37	280	259	17	593
VE3GOL/3	2	270	317	2	591
WA6UAZ	12	290	273	14	589
WB5SDD	36	217	271	53	577
K5OWK	207	63	285	1	556
WD4HIF	20	263	243	20	546
WB5MVR	121	123	262	23	529
W4JK	1	271	246	2	520
K9BVE	28	213	261	18	518
W0BMA	143	111	181	71	506
W8CUP/3	150	100	150	100	500
KB6FR (June)	188	101	209	36	534
Multioperator station:					
K3NSN	1906	1708	614	93	4321

BPL for 100 or more originations plus deliveries:

WA3ATQ	287	WB8YRY	115
W3BBN	234	W3VR	111
W0FIR	155	K1BCS	110
K4TH	144	K9PNG	109
VE3KK	140	N4CCT	106
WD9CIS	124	K7NTS	105
WA2MVQ	115	WA4CRI	103

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL



Straight-Key Night

Poundin' Brass is Poetry in Motion!

By Bill Jennings,* K1WJ

K3FR uses this old Bunnell. Ron would appreciate any information that anyone can supply on this particular model.

Guess we'll have to start the report of Straight-Key Night for July 4, 1979, with that old routine — got some good news and some bad news.

First the good news. The latest running of the semiannual SKN brought in reports of participation from 84 individual stations. In those logs were 652 QSOs with 481 different stations.

Clearly the front-runner in the competition for "Best Fist" with five votes was W4BT. Close on 'BT's heels with three votes was K2LY. One notch down, tied for third with two votes apiece were W2LYH, WB5NBC, K6OS and W8GP. The "Most Interesting" QSO honors also go to W4BT, who got three votes in this category, with second placers W2LYH and W7ITJ at two votes each. In recognition of his "winning" both categories, Ben, W4BT, is crowned "King of SKN" for the July 1979 event.

Stations that received at least one vote in *both* categories were WB1CEG, K2LY, W2LYH, WA2STM, WA3UNY, N4BIS, W4BT, W4DNX, W5WE, WB5NBC, WA6YQU, W8GP, NØCY/7 and WBØYWP. Congrats to all.

One SKN participant was heard to say that "copying good hand-sent cw was poetry to his ears." Obviously, this op was not alone in his observation. We'd like to share the poetic efforts of several of the SKN crowd.

It never ceases to amaze
What *QST* can do.
Just flip the pages any time
And find a bunch that's new.
There is one thing that ain't quite clear
And somehow don't seem right —
In January and July
They call day a "night."

— W5JOV

"You should have stayed down on the farm!"
My orthopedist exclaimed with alarm.
"A biological mutation
Is my explanation.
You have SKN glass for an arm!"

— W5WE

Those great dim days are bright again
And everything is grand.
You hear straight keys with little pain
Up on the old top band.
I use one almost all the time
And prime the pump just right,
So I say with awful rhyme
Every night is SK night.

— W2CHI

I started out fresh as a daisy
To make cw contacts like crazy.
With a straight key to sendit,
Now my arm, I can't bendit.
SKN is not for the lazy.

— W5WE

Now for the bad news. This was the last running of the July SKN. The participation for the July gathering is typically much less (vacations, good WX for picnics, etc.) than that for the January SKN. Therefore, SKN will revert to its former status as an annual event to be conducted on the original January 1 date. So limber up those fists and stand by for a super Straight Key Night on January 1!

Key Clix

Whoever thought up *S*ore *K*nuckles *N*ight is to be congratulated. This is grass-roots hamming as I know it. My kinda contest (KA5BXC). The 24-hour period was a blending of *S*kill, *K*nowledge and *N*ostalgia. That is the heart of SKN (W3CEI). Had a 1920 Bunnell brass key that, among other things, was stolen several years ago. I would appreciate it if anyone, who knows where I could pick up one of these keys at a reasonable price, would contact me. Tnx (W4DN). Now, we gotta get some SKNs on 160 meters (W1BB). I'm glad to know that there are some authentic ragchewers left on the bands (W1DV/4). My activity on SKN was curtailed by thunderstorms, but it was enjoyable. It brought back the memories of the first QSOs I had when I was first licensed back in 1930 (WA4BSG). Used a key that was made for the British Navy in 1940 (N5BC). I cut my eyeteeth on an old Sears Roebuck marble base key with silver contacts and a "navy knob," which I bought back in 1921 (WØEG). A straight key hits a sweet nostalgic cw note with me. I have had an old Speed-X model 310 key that my mother gave to me in 1937 (WA6JHC). Celebrated my 65th birthday by participating in my first SKN (W4BT). I think my right forearm grew about three sizes today. You must have heard me on the air. I was the one sending only dashes. Well, back to the keyboard. Hi! (N5FC). Already told the XYL not to make any plans for New Year's so that I can get in on the next SKN (N9ACD). I'll admit that I had to take a hot shower to loosen up my arm midway through the SKN! (WB6IYS). This was a great way to unwind from Field Day (K3CML). I brought back a piece of Missouri walnut from my home QTH to use as a base for my Johnson Speed-X key, but it didn't help the fist at all!! (WØVJD/3). All the ops had solidly readable fists that sounded like a real live person was sending you a message. Generally these days, one gets the impression that one is communicating with a programmed robot that sounds the same as every other robot, which makes a QSO somewhat less than what it was in past years . . . SKN hopefully will bring back once or twice a year the art of communication between people, not a QSO between two pieces of gear, a kW and a tribander on a 200-foot crank-up tower . . . All in all, it seems that for many, Amateur Radio has become another extension of the competitive rat-race . . . the individual seems to be of less importance than the inventory of equipment . . . Once or twice a year, SKN shifts things back to what Amateur Radio should be every day of the year . . . (WØZM).

SKN is a good time to share good QSOs with good friends. Tommy (left), AJ8X and Gary, N8AYY, teamed up for a good ole time on SKN.

*Communications Assistant, ARRL

46th ARRL November Sweepstakes Announcement

Cw, November 3-5 . . . phone, November 17-19.

Following the Sweepstakes rules, you'll find a table of record SS scores, painstakingly put together by K5RC. While the division record may be out of your reach, your section record may not be as difficult.

When looking through the records, note that they are from the last 10 years. The low-power multiplier was dropped in 1969, and the exchange was shortened in 1971. Some of the records from the 40-hour SS of the 1950s may never be broken in 24 hours.

Here's how to request forms and prepare your entry. Be sure to allow plenty of time to request the forms you will need to participate: One log sheet per 100 contacts and one each dupe sheet (Operating Aid 6) and summary sheet per mode operated (weekend). Send your request with an s.a.s.e. (15 cents for the first five sheets, 13 cents for five more).

In order to minimize interference to non-contest stations, suggested frequency ranges are shown in Table 1.

After the SS, be sure to postmark your entry by December 10, 1979; send it first-class mail! (Those that *arrive* after December 31 may not make *QST* listings.) If you want to make sure it arrived at Headquarters, enclose a self-addressed postcard which we will mail back to you. For a list of high claimed scores, enclose an s.a.s.e. with your entry. Club secretaries are requested to send a list of *call signs only* of all club members who were eligible to participate for the club in the SS. Good luck!

Rules

1) *Eligibility:* This contest is open to all radio amateurs in (or officially attached to) sections listed on page 8 of this issue of *QST*. U.S. possessions in the Pacific are part of the Pacific section. KP4, KV4/KP2 and KG4 are all part of the West Indies section.

2) *Object:* To exchange QSO information (as explained in section 5) with as many amateurs in (or officially attached to) ARRL sections.

3) *Conditions of Entry:* Each entrant agrees to be bound by the provisions as well as the intent of this announcement, the regulations of his licensing authority and the decisions of the ARRL Awards Committee.

4) *Contest Period and Time:* All contacts must be made during the contest period indicated elsewhere in this announcement. *No more than* 24 hours of operation are permitted during the 30-hour period. "Off" periods may not be less than 15 minutes at a time. Times on and off and QSO times must be entered in your log. *Listening* time *counts* as operating time.

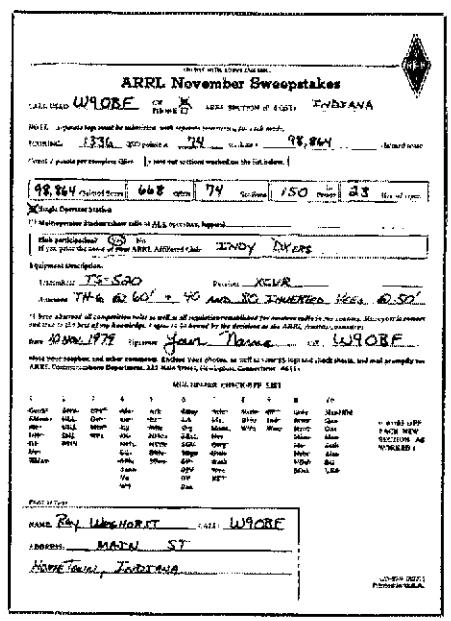
5) *Valid QSOs:* Contacts must include certain information sent in the form of a standard message preamble, as shown in the example. Cw stations work only cw stations and phone stations only other phones. Valid points can be earned by contacting stations not working in the contest upon acceptance of your preamble and receipt of a preamble.

6) *Scoring:* Each station from which a preamble is received and to whom a preamble is sent and acknowledged, results in two points. Partial QSOs do not count for scoring purposes. No additional points can be earned by recontacting the same station, regardless of the frequency band (i.e., repeat QSOs, even if on different bands, are not allowed). The total number of ARRL sections (plus VE8/VY1) worked during the contest is the section multiplier — maximum possible total of 74.

The final score equals the total points times the section multiplier.

7) *Entry Classification:* Entries will be classified as single or multioperator stations. Single-operator stations are those in which one person performs all transmitting, receiving, spotting and logging functions. Multioperator stations are those obtaining any form of assistance, such as from spotting or relief operators, or keeping the station log or records. The use of any type of "spotting" or "multiplier" net places the entry in the multioperator class.

8) *Reporting:* Contest forms (log sheets, summary sheets, Operating Aid 6) are available free from ARRL hq. or you may use forms of your own design provided they closely follow the indicated format; every competing entry



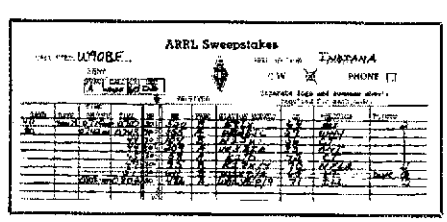


Table 1

CW	Novice	Phone
3550-3650	3710	3850-3950
7050-7100	7110	7200-7250
14,050-14,100		14,250-14,300
21,050-21,100	21,110	21,300-21,400
28,050-28,100	28,110	28,550-28,650

Contest Periods

Starts	*Ends*
CW	
Saturday, Nov. 3 2100 UTC	Monday, Nov. 5 0300 UTC
Phone	
Saturday, Nov. 17 2100 UTC	Monday, Nov. 19 0300 UTC

Explanation of Exchange

	NR	Precedence	Call	Ck	Place
Exchanges	Consecutive serial number	Power input less than 200 watts dc	Send your station call	Ck (Last two digits of year first licensed)	Your ARRL section
Sample	NR1	A	N8II	70	WVA

claiming 200 or more QSOs must have cross-checking sheets (Operating Aid 6 or similar) attached. *Any log omitting times on and off, or omitting QSO times, or omitting cross-check sheets (when required), or omitting a summary sheet or any information requested therein (see sample) will not be considered for competitive* QST *listings or awards.* Such logs will be classified as "check-logs" and will be processed accordingly. All entries become the property of ARRL and none can be returned. Each competitive entry submitted must include date, QSO times, times on/off, exchange sent, exchange received, band and mode. Entries must be postmarked by December 10, 1979.

9) *Miscellaneous Rules:* A transmitter used to contact one or more stations may not be subsequently used 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). And even then, one operator may *not* use more than one call sign from any given location during the contest period.

If your power is 200-watts dc or less, send "A" as your precedence; otherwise send "B."

The operation of two or more transmitters simultaneously is not allowed.

10) *Awards:* Certificates will be awarded in both the cw and phone contests to the highest scoring class "A" and "B" entrants in each section, provided that *either* (1) there are at least three single-operator competing entrants from that section in that power class, *or* (2) the top single-operator score from that section in that power class has 10,000 points or more.

Multioperator entries are not eligible for certificate awards.

11) *Club Competition and Disqualifications:* See January 1979 *QST*, page 85.

Sweepstakes Records (1969-1978)

CW				*Phone*		
Call	*Score*	*Year*	*Canadian Division*	*Call*	*Score*	*Year*
VE1MX	105,376	77	Maritime-Newfoundland	VO1CA	75,628	71
VA2UN (WA3HRV)	115,200	71	Quebec	VA2UN (WA3HRV)	148,296	71
VE3AKG	121,656	78	Ontario	VE3GAS	176,976	76
VE4OY	135,648	78	Manitoba	VE4OY	145,950	78
VE5DX	160,650	77	Saskatchewan	VE5DX*	289,050	78
VE6MP	83,860	74	Alberta	VE6CGY	148,950	78
VE7CC*	173,550	78	British Columbia	VE7CNY	234,450	78
VE8NWT (VE8BB)	61,560	69	Yukon-Northwest Terr.	VE8CB	59,754	70
			Atlantic Division			
W3DA	81,030	77	Delaware	WA3OTV	115,500	71
W3RJ	165,020	77	Eastern Pennsylvania	K3ZA	186,628	78
W3LPL	175,528	77	Maryland-DC	K3NA*	227,700	77
W2REH	145,405	77	Southern New Jersey	K2YY	178,650	78
N2MF (K2ZJ)	158,410	78	Western New York	K2IGW (WA2LCC)	208,350	78
K3UA*	177,450	78	Western Pennsylvania	K3UA	224,250	78
			Central Division			
W9RW*	155,550	78	Illinois	K9CT*	238,800	78
W9TG	150,900	78	Indiana	W9RE	225,450	77
W9YT (K9ZSE)	154,800	74	Wisconsin	W9YT (K9LBQ)	198,900	72
			Dakota Division			
KØKX	166,204	77	Minnesota	WAØVKP	180,560	76
WBØBCZ (WAØOVW)	92,655	72	North Dakota	AEØE	191,512	78
KØZZ*	171,828	78	South Dakota	KØZZ*	274,800	78
			Delta Division			
K5GO*	171,600	78	Arkansas	WA5RTG	222,300	75
W5WMU	166,294	76	Louisiana	W5WMU	227,550	76
W5VSZ	137,376	77	Mississippi	W5VSZ*	228,450	77
K4PUZ	164,396	75	Tennessee	N4ZZ	226,800	77
			Great Lakes Division			
K4GSU*	169,488	76	Kentucky	WB4OSS	187,960	76
K8LX	153,150	78	Michigan	K8LX (WA8ZDT)*	223,200	78
K8NZ	161,320	78	Ohio	W8KIC (WB8MZZ)	219,450	78
			Hudson Division			
W2PV (K1DG)	161,250	78	Eastern New York	K2TR*	276,150	78
N2NT	166,944	78	NYC-Long Island	N2NT	179,080	77
W2GD*	180,264	78	Northern New Jersey	W2RQ	193,800	77
			Midwest Division			
NØGA*	156,300	78	Iowa	KØGXR	180,310	76
KØXR	143,372	78	Kansas	K5JZN/Ø*	182,800	78
NØSS	140,160	77	Missouri	WØZLN (WAØCWV)	177,900	77
KØUP	133,298	78	Nebraska	KØSCM	170,400	77
			New England Division			
K1PR	172,350	78	Connecticut	K1VTM*	259,950	78
K1AR	171,000	78	Eastern Massachusetts	W1CF (K1OME)	220,500	76
K1OT (K1OME)	134,640	77	Maine	K1RQ	177,750	77
K1GQ*	177,304	78	New Hampshire	K1GQ	231,150	78
K1AO	130,608	78	Rhode Island	WA1TFF	196,200	78
W2RQ/1	152,352	78	Vermont	WB1GQR (WB2JSJ)	182,400	78
K1BW	162,450	78	Western Massachusetts	WA1ABW	214,500	76

			Northwestern Division			
KL7HRP	75,024	74	Alaska	KL7HCC	121,800	78
K7NHV	161,550	74	Idaho	WA7WXY	261,900	76
K7QA	136,200	78	Montana	W7JYW	183,224	78
W7NI	161,476	78	Oregon	W7NI	233,544	78
K7RI (K1UA)*	169,608	78	Washington	K7SS*	286,950	77
			Pacific Division			
N6RO	166,056	78	East Bay	N6IG	249,300	78
WA7NIN (N6SF)*	172,950	76	Nevada	WA7NIN (N6SF)*	262,950	76
KH6RS (K2SIL)	151,700	71	Pacific	KH6WF	152,700	78
N6JV	118,500	78	Sacramento Valley	K6SG	152,292	78
W6NUT	153,750	74	San Francisco	N6BV	246,300	78
K6CQF (W6PAA)	152,850	74	San Joaquin Valley	WA6IVN	167,018	71
N6BT	167,700	78	Santa Clara Valley	K6OQ (WB6DSV)	252,750	78
			Roanoke Division			
N4AA	146,520	78	North Carolina	N4AA	179,968	77
K4FJC	95,046	73	South Carolina	WA4ALC	144,448	77
K4VX (WB4SGV)*	168,900	78	Virginia	K4VX (K3EST)*	229,350	78
N8II	140,014	78	West Virginia	N8II	193,050	78
			Rocky Mountain Division			
WØUA*	185,400	77	Colorado	WØTR (WØUA)*	285,900	76
WA5YTX	137,048	77	New Mexico	K5FPO	177,098	76
W7CYH	119,280	71	Utah	W7OAD (W7MWR)	164,280	71
K7IO	112,858	78	Wyoming	W7ZQ (KØUK)	273,450	78
			Southeastern Division			
K4TIG (W8FAW)	126,432	75	Alabama	K4TIG (W8FAW)	195,300	75
KZ5FR	138,262	78	Canal Zone	KZ5NO (K1MM)	163,950	78
K4BAI	150,516	77	Georgia	WD4HXC	182,354	78
N4SA	150,380	78	Northern Florida (1)	WB4SKI (WB4QBB)	214,850	78
N4RR	175,346	78	Southern Florida (1)	WB4AEX	223,628	75
KP4RF (N6CJ)*	193,732	77	West Indies	KP4RF (N6CJ)*	333,600	78
			Southwestern Division			
W7KW (K7GM)	177,098	78	Arizona	W7KW (W6TPH)*	306,150	78
W6AM (N6TJ)*	182,646	77	Los Angeles	W6HX (N6NT)	290,250	78
K6RR (N6CJ)	176,712	78	Orange	K6LL	209,850	76
K6NA	167,608	76	San Diego	K6NA (WA6ELX)	242,400	77
N6TR	177,008	78	Santa Barbara	K6BCE (WA6NNJ)	162,750	72
			West Gulf Division			
N5AU	173,250	77	Northern Texas	K5JA*	257,400	78
K5OCX	116,362	73	Oklahoma	K5CM	190,050	78
AA5LES*	182,780	76	Southern Texas	K5TM (K5ZD)	253,650	78

*Division Record

(1) Records only to 1973 when Eastern and Western Florida were changed to Northern and Southern.

Strays

Motor City Radio Club President James Besancon, K8SIA (right), presents the Michigan Field Day Award to Elvis Allen, W8CYO, representing the Cherry Land ARC. The ARRL-Affiliated club scored the highest total in Michigan during the 1978 Field Day. *(W8MPD photo)*

EXPOSITION OPERATION

☐ The Colquitt County Ham Radio Society will be operating from the Sunbelt Agricultural Exposition in Moultrie, GA, October 9 to 11. Listen for club call WD4KOW from 0900 to 1600 EDST daily on 7.250 and 14.300 MHz and on local repeater 19/79. Special QSL cards will be available.

I would like to get in touch with . . .

☐ any West Coast teenage ham interested in becoming a coordinator for the new Message-15 cw net. Contact James C. Veatch, 83 N. Main St., Ellenville, NY 12428.

☐ amateurs working in naval architecture or marine engineering. Contact Kip Lester, WD8LFQ, Box 626, Gary WV 24836.

☐ others interested in starting a fly-fishing enthusiast net. Richard Wagner, K4MZE, 1015 Haber Dr., Brentwood, TN 37027.

☐ amateurs working with rural and agricultural development projects, especially farmers' cooperatives. Contact Steven D. Jones, N2AMY, 510 N. Albany St., Ithaca, NY 14850.

☐ WW II communications collectors and ex-military operators. H. Miller, WB7QVY, 11206 First NE, Seattle, WA 98125.

☐ hams in the Hazleton, PA area to arrange skeds for future phone QSOs. Contact R. B. Grontkowski, WA2JBZ, 2855 University Ave., Bronx, NY 10468.

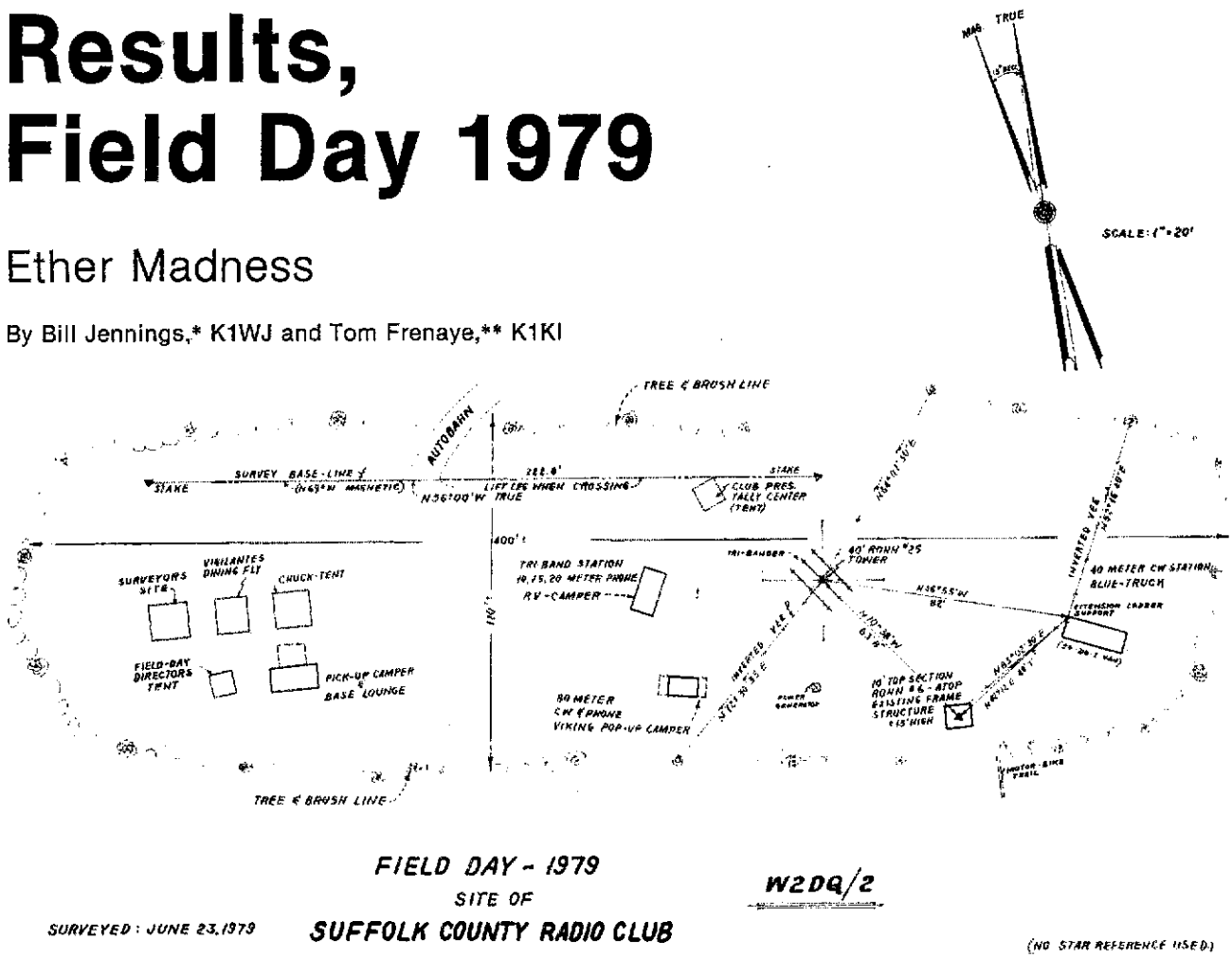
☐ amateurs interested in long-distance running who would like to start a phone net. Bill Hanrahan, KA8EUE, 808 Westminster Way, Charleston, WV 25314.

John Branegan, GM4IHJ (ex-GM8OXQ), adjusts his antenna during a recent portable mode J expedition to England. His four and one-half day operation netted John 33 QSOs with 22 stations in DB, G, GM, I, OZ, PE, VE and W, including one portable-to-portable with DB4SP/P. John used an FT-221R to a 5XY 2-meter beam rhcp, FT-101E with JAMSAT 435/28 converter and 12-element antenna. He did not mention the reason for the call sign change from the familiar GM8OXQ to GM4IHJ. A check with the Communications Department revealed that the change indicates an upgrade to a Class A license. Congratulations, John!

Results, Field Day 1979

Ether Madness

By Bill Jennings,* K1WJ and Tom Frenaye,** K1KI



Field Day is like that spoonful of sugar that helps the medicine go down. Amid the soothing sounds of finely tuned generators, the sighs of satisfaction in operating a smoothly running rig, the comforting presence of the local flora and fauna, a pleasing array of Mother Nature's finest weather displays, and the camaraderie of friends and club members working toward a common goal, it's hard to believe that Field Day is more than a lark, a mini-vacation. Field Day *is* all those things *and more*, but with one basic underlying purpose. Field Day is an exercise to train operators for the time, the emergency situation that everyone hopes will never happen — happens. Not just to be able to say "We can put a radio on the air," but to be able to do what we, as amateurs, even under less than optimum conditions, do best — communicate.

The weekend of 23-24 June 1979 saw a new phrase added to our FD vocabulary. Insects, animals, rain, snow, hot, cold, poison ivy, Murphy, etc., were joined by "energy crunch." Extra gas cans and siphon hoses are now a part of the standard Field Day equipment. FD ops from coast to coast, hoping to obtain enough gasoline to fuel the generator for the full FD period, spent hours in long "gas lines," siphoned from the fuel tanks on their own autos, and more importantly, explored nonfossil-fuel-burning power sources.

Battery-powered stations were more in evidence than in previous years. Solar and wind power were also explored. The smart money would be on a dramatic increase in the number of stations in Field Day 1980 that at least augment their generators with "natural (nonfossil fuel) power sources" and on a larger number of FD groups that elect to go the low-power/battery route.

As they have since '75, the "FD numbers" continue to grow at a healthy rate. Number of reports received — up to 1706 (a 10 percent increase). A record 23,612 ops put a record 4552 transmitters on the air (that's 5.18 ops per transmitter for all the "statistics freaks").

For next time, a couple of quick notes on submitting the FD entry. *Make sure the mailing deadline is met.* Our production schedule is too tight to allow very much leeway in being able to include *late* reports. *Make sure that the entry is complete in every detail* before *submitting* it. Again, there is not enough time to be able to track down information that is missing on a FD report. The standard ARRL Field Day summary sheet, when properly filled out, supplies all the necessary info (you still have to include the dupe sheets and the proofs of bonus points claimed with the summary sheet) and is available from Hq. for only an s.a.s.e. *please.*

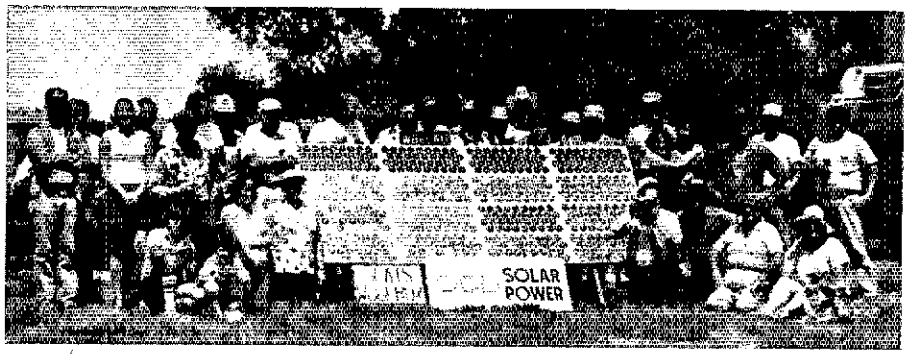
Field Day — 1980? Yes, indeed, there will be a Field Day held in 1980, but we have a few things to discuss on that subject and will do just that at the end of this report.

The following excerpts of narratives were received with the entries and highlight the FD efforts of various clubs/individuals. Bet more than one of them will strike a familiar note.

Alumni of the New York Institute for the Education of the Blind (K2LY/2 3A)

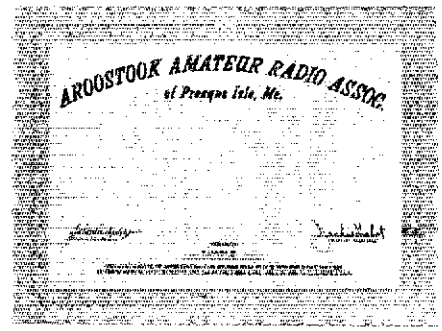
Amateur Radio *Feel* Day. No! this isn't a misprint, although this annual event is more correctly called Field Day. In this instance,

*Communications Assistant, ARRL
**Assistant Communications Manager, ARRL



The SCATS FD crew shown with their solar-panel array. This pix might appropriately enough be titled: "A ray of hope in the fight for freedom from foreign oil dependence." (WB6LRU/6 5A)

The poster gets you to the FD site of the Aroostook ARA and the certificate is what you gets if you participated in the club's '78 FD effort. (K1JK/1 5A)



however, all of the operators operated the equipment, made circuit adjustments, and kept the station logs by the sense of touch — these folks all have impaired sight, ranging from total blindness to very limited vision.

Stations were set up for 2-meter fm, with a wide-spaced 8-element, 2-meter beam supported on a mast which was mounted in an umbrella table, just in front of the equipment so that it could be oriented by the operator. A piece of tape placed on the north side of the pole provided the starting point for antenna orientation. The beam's VSWR was checked by means of a conventional standing-wave ratio bridge along with an auditory indicator connected in place of the visual meter. Increased output is indicated by increased audio pitch in the speaker. A low VSWR yields a low-pitched signal with the instrument set to read reflected power.

The 40/20-meter transmitter was set up in a two-man tent with just enough room for the operator's position plus space for the logger and the Braille writer used for logging. Again "audio" meters were used to check the VSWR and the input power. Antennas here were 40-and 20-meter inverted Vs, both supported on a 25-foot mast and tripod, with the antennas serving as guys.

The 75-meter phone transmitter was set up in a gazebo some distance from the other two stations. The dipole antenna was strung between two buildings and fed with open wire line through an antenna tuner located in one of the other buildings. The tuner was fed with low-impedance coaxial line and the tuner was adjusted using more of the auditory gear plus a couple of 2-meter Handie-Talkies — one at the gazebo and the other at the tuner. One operator keyed the transmitter while the other tuned the gear for minimum reflected power.

The ac generator was located in the center of the site and was refueled by one of the ops using a siphon and a one-gallon gas can. The generator was connected to a line voltage regulator and an auditory line voltage monitor that was designed to emit a tone if the line voltage goes above or below 117 volts by more than four volts.

The FD operations went off very well, the equipment remaining on the air for the full allotted period. The coffee pot was kept full by one of the XYLs and food was supplied by the Institute.

As the former radio instructor for these ops, I can say that I'm extremely proud of them. — *W2JIO*

Southern California Amateur Transmitting Society (WB6LRU/6 5A)

SCATS participated in Field Day 1979 placing special emphasis on ecology. SCATS is an ARRL-chartered, 65-member club, centered in the San Gabriel Valley, a suburban area east of Los Angeles.

By Thursday, June 21, members had begun arriving to set up the four towers used for 6-, 10-, 15- and 20-meter beams and the two pushups used for a three-element, 40-meter inverted-V beam, which was aimed slightly north of east. A 75-meter inverted-V beam was suspended between the 10-meter tower and our truck.

All members brought their own transceivers. Due to high ambient daytime temperatures, each station had a backup rig to minimize possible equipment failure down-time. The high local water table permitted the use of only 6-foot ground rods, which were wet upon removal.

Thanks to WA6IVO, a SCATS member who is also in Navy MARS, we had use of a 10-kilowatt diesel generator which delivered 120 volts. This generator burned only two-thirds of a gallon of fuel per hour and supplied all the electrical needs other than those of personal air conditioners [Hope those personal air conditioners were run on emergency power also! — Ed.] and our 20-meter solar-powered station.

We have a pretty-well-oiled system for installing the beams and erecting the towers, always with an eye toward ease and safety. For three consecutive years, our towers have withstood the gusty afternoon winds, which daily attempt to rearrange the Mojave Desert landscape.

Our solar-powered effort was on 20 meters, using either a Kenwood TS-120 or Swan 100MX powered directly from our solar-panel arrangement. No batteries were used. The solar panels were loaned to us by a commercial manufacturer, as an experiment. Sixteen panels were installed on an angle iron rack, built by

Pete, K2PM, of the Cherryville Repeater Association in a demonstration of Murphy's Law — antenna rotator style. (K2NT/2)

Class A Call-Area Leaders

1A	*2A*	*3A*	*4A*
W1MJ/1	W1XX/1	K1IU/1	W1TR/1
WA2VZW/2	K2DB/2	W2SEX/2	W2RI/2
K3MT/3	N3IC/3	K3SSC/3	K3WD/3
N4ND/4*	W4JD/4	W4UC/4	K4KS/4
W5RU/5	K5LG/5	K5DX/5*	N5RR/5
WB6ITM/6	N6NB/6*	W6SF/6	K6YT/6*
K6LL/7	AA7A/7	K7AUO	W7FR/7
K8IF/8	W8NR/8	WB8JBM/8	W8KGG/8
W9TG/9	W9SM/9	K9NO/9	W9LT/9
KØTK/Ø	WØUA/Ø	KØWA/Ø	WØMXW
VE3FOX/3	VE1FO/1	VE7SAR/7	VE3RC/3

5A	*6A*	*7A*	*8A*
W1OP/1	--	K1WEW/1	--
W2RQ/2*	K2YNT/2	W2MMD/2	K2AZ/2
W3PT/3	W3PIQ/3	W3SK/3	W3CWC/3
W4CUE/4	K4BFT/4*	W4IZ/4*	--
W5TI/5	K5GT/5	K5CB/5	W5SC/5
K6AA/6	K6QEZ/6	W6TRW/6	W6HE/6*
K7TR/7	WB7QIW/7	K7LED/7	--
AI8P	W8LC/8	W8VPV/8	W8QLY/8
K9RO/9	W9AIU/9	W9AXD/9	K9BY/9
WØEQU/Ø	WØMG/Ø	WØAJY/Ø	--
VE7FG/7	VE3BA/3	VE3MRC/3	--

*indicates overall class leader

Class B Call-Area Leaders

1B	*2B*
W1ECH/1	N1JW/1
W2RR/2	W2CRS/2
K3VW/3*	WA3QKA/3
W4OO/4	N4FD/4
W5VBO/5	WA5OOB/5
W7CB/6	WA6OTU/6*
K7FF/7	K7BBO/7
K8ZH/8	N8AGK/8
W9DY/9	WB9JDL/9
KØQA	KØTG/Ø
VE1TL/1	VE2EGH/2

*indicates overall class leader

Jay, WB8SQJ (at the mic) and Ron, WA8UMZ, think that an antenna in the hand is worth two on the tower, at least when it comes to tracking OSCAR. The Grand Rapids ARA. (W8DC/8 2A)

Dan, WD8NZV, of the Beaches ARS, (W4DU/4 2A) super operator. If he's going to change into the blue suit with the big red "S" on the chest, we really think he ought to find a telephone booth.

A pair of Jacks, VE2DPF (l) and VE2DAW, slug it out for the CRA De Valleyfield. (VE2CEV/2 3A)

Three of the XYLs at WB4AIN. See how happy they are! See them having fun! See them enjoying themselves! See how happy they are to cook for the gang! Run generator, run! The Ten Four Good Buddies. (2A)

K8MR (l) and WD8ALG of the Mad River Radio Club splicing the rotator cable.

WB6HBG. Each panel was rated at 6 volts and 3.9 A. A jury-rigged regulator gave no less than 12.6 volts at a full 16-A dc loading with either rig. We noticed a slight fuzziness in the audio of both rigs, as monitored 400 feet away, and decided that it was caused by the use of switching transistors in the regulator. Idling voltage was 14.2 volts. We elected not to use a battery as a "buffer" so as to stay pure solar power with a calculated 200 watts input on phone. Our solar array was manually aimed at the plentiful desert sunshine via the "armstrong" method. Our solar station worked quite well in making over 90 QSOs (none of those stations worked mentioned the fuzzy audio). Next year, we'll try it again with a smoother regulator and operate strictly on solar power during the 12 FD hours that have sufficient sunlight for full panel output. Solar power is here to stay.

We used two ops at each position; one to operate and one to copy only. The non-operating wives/husbands and harmonics were kept busy bringing a variety of chilled beverages to the open air operating positions during the 95-100 degree days. If you've never been to a desert, you'd probably never believe that a heavy coat is needed during the early morning hours.

Field Day 1979 was an absolute success as we had new members bringing new ideas and skills to what has already been a most satisfying effort. FD is the best "ability sharpener" we've seen yet. We all hope that we never see a disaster that requires a full-blown low-band communications effort, but if it ever comes, we're readier than ever! — *WD6BKY*

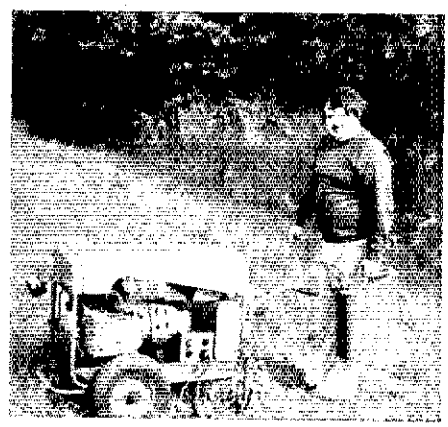
The North Texas High Frequency Association (WB5TSB/5 2A)

The NTHFA is a new club and this was our first Field Day . . . we got a lot to learn. Thought we were all set until we discovered that the big generator that we had borrowed was drinking gasoline at the rate of about one gallon per hour (and this on one of the worst gas weekends we've had in the area . . . no gas stations open). What we thought was a misfortune turned out to be a blessing in disguise when the generator conked out about midnight and we put the backup on line. To our surprise, the new power plant supplied ample power at about one-fourth the gas thirst of the other. We got overly ambitious, trying to run too many rigs with too few people . . . spread ourselves way too thin . . . but we had a good time.

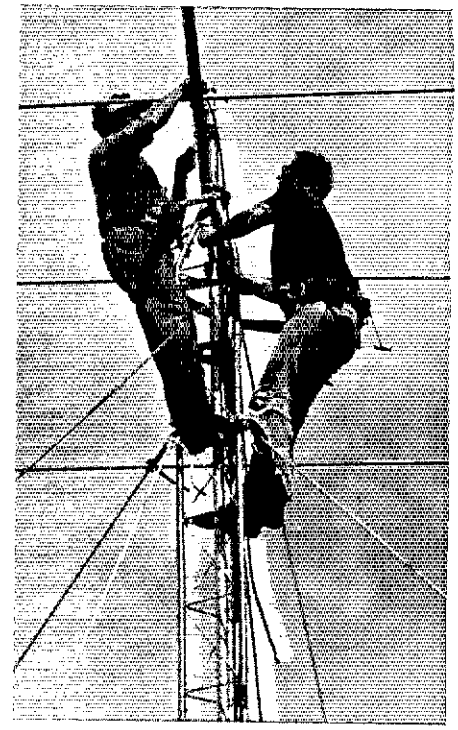
And now an opinion. I am sure that I am not the first to have this thought, but if Field Day is supposed to be an exercise and/or test of emergency preparedness and ability, then I don't think that it fills the bill. Seems if you *really* wanted to test preparedness, it should

Number of Entries per Transmitter Class

Class	No. Entries	Class	No. Entries
1A	220	2B	41
2A	362	1C	22
3A	298	2C	1
4A	173	1D	90
5A	124	2D	5
6A	49	3D	2
7A	34	4D	1
8A	14	5D	2
9A	7	1E	17
10A	5	2E	1
11A	3	3E	1
12A	2	4E	1
13A	1		
14A	1	Check Logs	16
16A	2	Incomplete	64
21A	1	Late	22
1B	124	TOTAL	1706



K1WXK is a gas at the Wallingford ARS FD location. (W1SY/1 2A)



W7GPW (l) and K7YR, putting up the first of two five-element Yagis for 10 phone. The Mike and Key ARC, K7LED/7, 7A.

The ops of the Texas Chigger Growers Association plus their cooks and the head armadillo chaser. (K5MW/5 2A)

Yup, gang, that's *snow* under the feet of KA3BLO. He and 1B-battery partner, W6JTH/6, spent three days carrying 60-pound packs to get to the top of 14,018-foot Mt. Tyndall for Field Day.

run like the practice alert situations that we did in the Army. Announce FD is coming within a certain week or month, then actually kick it off unannounced except through regular WIAW bulletins or traffic/service nets. Like to see it announced for sometime in the month of June, for example, then actually call if for about midnight (possibly not even on a weekend). Have a rule that no advanced setup be allowed. *Then* I'd like to see some of those groups thrashing around in the dark trying to put up those monster towers and beams. My guess is that there would be some "pip-squeak" stations that were really and truly emergency organized and would have logged a couple of hundred contacts before some of the "big guns" ever got their guy wires sorted out. Oh, well, it's a thought. [And a darned good one, too. — Ed.] — *WD5ICY*

The Mobile Amateur Radio Club, Inc. (K4ZM/4 2A)

Hats off to all the operators and loggers who participated in the MARC Field Day '79, for a job well done. It should be noted that even though it was vacation time, and just two weeks previous to FD we had held our annual hamfest (an outstanding success), *and* we were to provide communications for the National Collegiate Air Competitions, held in Mobile (AL) *on FD weekend*, we were still able to set up and operate in our normal 2A Field Day classification. This was no small feat when you consider how much our ranks had been depleted by other attractions here on the Gulf Coast at this time of year (string bikinis, filled with beautiful YLs, etc.).

The weather was picture perfect. Once again, we were spared afternoon thundershowers (five years in a row — knock wood) *during* FD. However, two hours after we had left the FD site, a big storm with high winds, heavy lightning, and about an inch of rain hit the area. The mid-day temperature reached 96 degrees, but we operated in the comfort of two air-conditioned travel trailers (a must to obtain operators in this area).

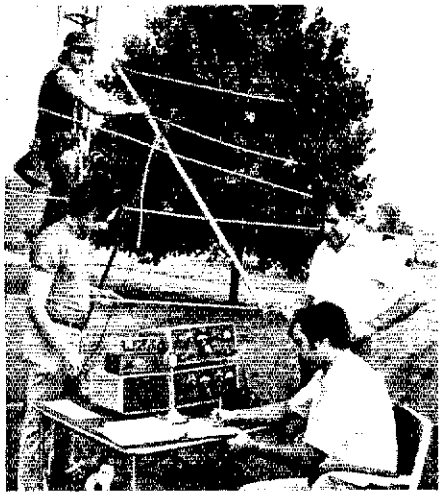
The cw station was once again proud to report that they had not only out-pointed the phone station, but had out-QSOed them by 60.

Our 1979 FD outing was an unqualified success. Everyone who participated had a great time, we scored our highest ever point total, and many new operators were introduced to portable-emergency communications. — *WD4KMB*

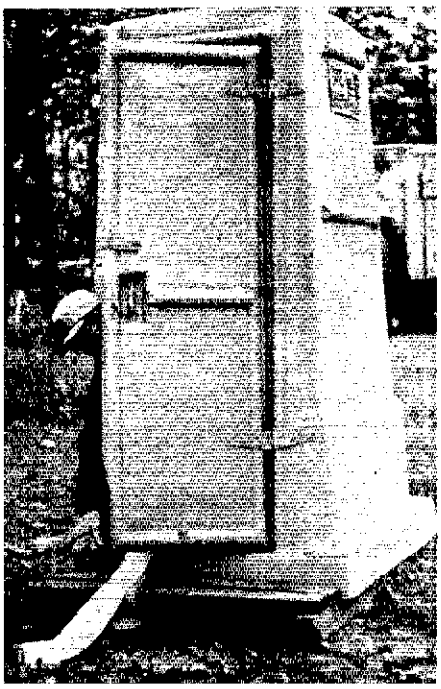
Cobweb City Contest Group/Bloomingdale, NJ, CD (WA2VZW/2 1A Batt)

Our first club attempt at Field Day. We operated from High Point State Park (1802-ft elevation) in Sussex County, NJ.

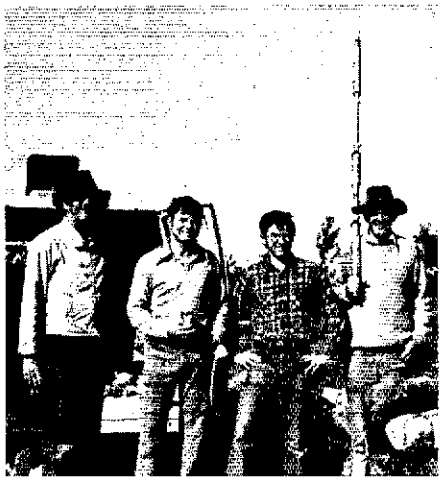
The Hogtown hammers. (W4WJ/4 9A)



"Are you sure the instructions say that we must mount the antenna like this?" The Wayne AR Tech Society, AI8P/8, 5A.



Everyone likes to play Field Day, but no one likes to do the *paperwork* on the club entry. WA1VCU is no exception with the Provin Mt. Amateur Repeater Group, N1AV, 10 A. Maybe the logs take up less space when they are rolled up like that.



The VE3JRT/3 ops: from left VE3JRT, VE3FQX, VE3FRB, VE3JRO and missing from the photo is VE3KKB.

The antennas were held aloft by helium-filled weather balloons. An inverted V with a movable parasitic reflector does wonders, especially when it's 150 feet in the air. Everything went smoothly during setup except when a slight wind came up, causing WB2WAB to test its direction by loosening his death grip on one of the weather balloons.

Temperature on Sunday morning was about 45 degrees, causing KA2BNF to devise a method of sending cw from a sleeping bag. WA2VZW had a little trouble during the night when he was awakened to tend the battery recharger. He fell over what appeared to be a 350-pound tent caterpillar (actually WB2YMW in a sleeping bag) and fell into a patch of poison ivy. All in all, a great time was had by all and we are anxiously awaiting next year's Field Day. — *WA2VZW*

Lassen Amateur Radio Club (KC6M/6)

Our club rallied to the 1979 Field Day with one of our best turnouts ever. In the last year, our little club, which is located in the sparsely populated Sierra-Nevada Mountains in northeastern California, has added to its membership many Novices and quite a few others who aspire to earn their amateur tickets.

With nearly every member of our organization taking a hand in some part of the planning or procurement, we went into the hills with 10 operators and a considerate support crew. Starting our setup at 1900 UTC, we were able to overcome most of the little "snags" in short order. Applause rang out when the Novice station — using a rig, which was totally "foreign" to our Novices — finally managed its first contact.

The highlight of our adventure was a huge potluck supper and barbecue on Saturday evening attended by 45 people. Families and visitors enjoyed the get-together and capped the feast with a marshmallow roast and a successful SkyLab sighting. Visitors departed and the kids were put to bed under the stars as our operators returned to the airwaves with sticky fingers and bleary eyes. It was such a good time that plans have already been made for next year's Field Day. — *WB6AGM*

Where Did Field Day Go?

Where *did* Field Day go? Conceived in 1933 as "a test of our ability to carry on portable/emergency communications," Field Day is an entirely different animal 46 years later in 1979. Now *weeks* are spent in advance of Field Day, setting up the site for the "Big Day." Logistics and equipment are handled that would boggle the minds of the planners of the D-Day invasion of Normandy. Lot of good this type of operation would be in the event that emergency/Field Day-type communications ever became necessary. It's all well and good to get the exercise of spending several days in disassembling someone's home station to spend several more days reerecting it in a cow pasture somewhere else. Great for the cardiovascular system, but does nothing for an individual's or club's ability to react quickly with good solid communications systems in times of disaster.

But don't you need to erect the "giant-killer" station to be competitive in the contest? Brings us to another sore spot in the evolution of the Field Day of 1979. *Field Day is not a contest* (in the normal use of the word contest), although the rules of fair play, scoring and contest disqualification criteria apply. Field Day is an emergency preparedness exercise and a time for good friends/club members to get together and work toward a mutual goal and have a good time in the process.

There are contests that favor just about any interest group in Amateur Radio today. Contests for DXers, vhfers, SSTVers, monoband operators, different fraternal club members, members of industrially sponsored radio clubs, etc. ad infinitum. So, although a little healthy cross-town rivalry/competition might stimulate interest in Field Day operations, we don't need the intense competition that drives a group to take an operator off a given band because his/her rate is not high enough. We (the amateur community) don't need the type of operators who'll use kilowatts from their home stations and claim the low-power emergency-power bonus to add a few points to their score to be able to "win." Probably as much to blame as the unsavory ops are the rules and guidelines for FD that have remained unchanged for too long. Is there enough incentive to explore using nonfossil-fuel power sources on FD? How about making low-power operation more attractive?

Where Is Field Day Going?

Let's keep in mind what we should try to accomplish in "going out" to Field Day every year and see if we can come up with some suggestions for rules changes and improvements that would help us more clearly define our goals. Let's define the goals of Field Day as being the following:

1) To train operators to be able to establish communications under less than optimum conditions.

2) Encourage versatility in operating procedures — innovation being the key word.

3) Advocate the acquisition of construction of Amateur Radio equipment solely for use during emergency situations.

4) Instill club, group and individual pride in being able to work together toward a common goal.

5) To provide a vehicle for amateurs to get together and display to the public their communications skills in an informal, relaxed setting.

6) Allow sufficient time for club members,

The Novice ops of Post 599 lent a hand to the Palo Alto ARA. (K6YT/6 4A)

The South Lyon Area ARC, WB8QXB, was honored by a visit from Jules, LX1TJ (standing center) and Lea, LX1TL (seated center). Dorothy, AF8E (standing left) club president, Birnie, WD8DOX (sitting left) and Steve, N8AR, complete this pix.

family members, amateurs and nonamateurs alike a chance to *enjoy* an early summer outing.

Are there any "Goals of Field Day" that we've forgotten? Let us know how you feel.

The Field Day rules ARE going to change. How much or how little just is not certain at this point. If you have *any* suggestions, ideas, thoughts or whatever in the way of constructive comment on how the FD rules can be changed for the better, take the time *now* to convey your thoughts to us here at ARRL hq. (Call on the landline, write, or drop in. Why not devote a club meeting to a discussion of Field Day, get someone to record any suggestions and send 'em in?) *Your* input *will be used* by the appropriate advisory committee in making decisions on revamping the FD rules. If you don't bother to convey your input, someone else will be making the decisions for you.

Look for the revised Field Day rules to show up in the pages of *QST early* in 1980. C U on Field Day 1980.

SOAPBOX

Murphy showed his face like never before on Friday night. While we were setting up, a dozen or so weirdos, dressed in black robes and hoods with white-painted faces and dark sunglasses, crept up on our hilltop site and surounded us. They were chanting "Omega, Omega" over and over. They eventually slithered away (W2RQ/W2SQ). Sorry to say that our score is not as high as usual, this year. We had to shut down the generator from midnight to 6 A.M. because of a gasoline shortage (W2DMC). It has been said that the perfect Field Day is when the organization makes a good score and all the participants have plenty of time to party. In the near future, with computers operating the stations, this may be a reality (W9OJ/9). We at N4FE/4 discovered another corollary to Murphy's Law: Water is always attracted to the most expensive equipment and the most important log sheets (WA4WAR). The most difficult problem we faced was trying to coordinate the delivery of the Port-A-John on Friday afternoon so that its location would be *down wind* from the Field Day site (K8CQ/W8VPV). Site was an eight-acre island in northeastern Minnesota. All went well until the only light that we had for nighttime operation (a Coleman lantern) fell and broke at midnight. No way to see to fill the generator until dawn! The area was too remote to return with more lighting equipment (AA0U). The highlight of this Field Day was, of all things, the crosscheck sheet! We had an HP-9825A desk-top computer next to each of the four rigs to provide instantaneous checking for duplicate contacts. Our perennial log checker, WA6NIL, had no complaints about being replaced by a machine (K6YA/AA6PZ). After 23 years of solo Field Days (my XYL has always helped with the antennas and the chow), I found someone who has the same FD (W6OUL) philosophy that I do. We had a ball. The phonetics used were quite creative. A couple that stick in my mind are WA7 Weird Old Wino and W9 Jock Itch (W7CB/W6ANB/W6OUL). Our third FD effort was staged on the same 100-foot hill that we had used in '78. We should have been ready for anything. After all, this is Michigan and we who have lived here long enough expect anything in the way of weather. But, it was a little surprising to have a continuous 15-30 mph wind from 8 A.M. Saturday until 4 P.M. Sunday. What really shocked us was the 36-degree temperature overnight on the first full weekend of summer! We eventually looked like the Big Rapids Snowmobile Club and one fellow (WD8PKC) commented that he'd actually been out here on his snowmobile when it was warmer. Anyway, the survivors (we all made it, but we seem to have lost a few along the way) all agreed that it was "fun" and we'll do it again next year (WD8NKA/WB8TVB). A landmark in history: first Field Day without rain (K1JNQ/1). Thought we would try VE8 this year. Haven't heard many of them on in all my years of operating during Field Day. Total round trip was almost 4000 miles! Is that dedication to FD or what? Condx sure aren't very gud from that location (W9JOO/VE8). Does anyone remember the multiplier for mosquito contacts? (W5AC/WB5LCU). We operated from the Space Needle near downtown Seattle. Many folks think that it is hard to raise their 14-element 2-meter beams above the TV antenna at home. But, just let them try to get a 4-element 15-meter beam (monobander) up on the roof of the Space Needle (especially in high winds). The elements did not fit in the elevator, so they made the journey (a 17-minute climb) courtesy of our feet. All in all, the "Roasted Turkey Guts on the Space Needle FD" was worth it . . . see you next year from the Cascade Mountains (WB7RTG/WB7PSP). We do not claim the highest score, but we do claim the largest number of generators used on FD. The Northeast Mississippi ARC club generator started getting oil in the cooling water, due to a cracked block. A second generator was fired up but the output was so unregulated (from 75 to 180 volts) that it was decided not to use this power source in order to protect the rigs. The third generator, removed from the shipping carton that very day was put into service, but it raced wide open until it could be quickly shut down. A fourth generator was borrowed from a repair shop and ran for several hours until it refused to restart after a routine gas and oil stop. The club found out just how ready for a disaster we really were (K5DGL/5). Even though we have just a small group, we had a really great time. The only thing that we can say to the "real big setups" is wait 'til next year (Hi!) (KA2BSC/KA2BSD). Though the QRM was fierce, especially on phone, we encountered many fine operators. The level of activity seemed as good as I have heard it for many years. Hope that everyone had as good a time as we did (AA9D/9).

FEEDBACK

From the 1978 Field Day writeup in the 1978 November issue of *QST*; some corrections to note. A few of your mistakes, our mistakes, some additions, deletions, etc.

In Class 1-A, at 3260 points, the Norwood ARC should have been listed with the same line-score + 100 points in the 2-A classification. Class 2-A Mid-Willamette Valley ARC at 2454 points should be moved to the 2-A battery listings while keeping the same total score. The BC Contest Club, VE7CC/7, listed in the "unable to determine which category" department, advises us that they had three transmitters in simultaneous operation and should be listed in the 3-A category with 6392 points. The Lincoln Trail ARC (4-A) at 2642 points inadvertently counted their Novice transmitter toward their transmitter total and should be listed under 3-A at 2542 points.

We misfiled the FD entry of the Jacksonville ARC (4-A), who had a total of 2194 points, 685 QSOs, nine folks participating, and ran 200 watts (dc) or less at all times.

A slip up in the mails was the reason that WA5IPS (WD5COV) did not appear in the 1-B commercial listings. OLE and David made 56 contacts, 6 watts (dc input) for a total score of 560 points.

A blank space left on the FD summary sheet resulted in the South Hills Brass Pounders and Modulators, W3PIQ, being listed in 6-A as a nonclub group with 5676 total points.

Finally, in 1-A battery, the name of the club at 6160 points was the Mara Juana Field Day Party. Finis.

SCORES

Class A stations are clubs or groups operating portable, with more than two operators. Score listings are grouped according to the number of transmitters in simultaneous operation at each station. The scores list club or group name, total number of contacts, letter indicating power classification (determined by the dc input power where A is 10 watts or less, B is greater than 10 watts but less than or equal to 200 watts, and C is greater than 200-watts input), number of participants (if known), and total score — listed in descending order from highest to lowest score.

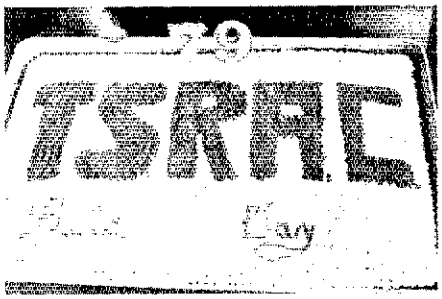
Class B stations are those portable stations manned by one or two operators. Where two persons participated, the call of the other operator (if known) is shown following that of the amateur whose call was used. Figures following the calls indicate number of contacts, power (same as class A), and final score.

Class C are mobile stations. These are listed by call (number of operators), number of contacts, power (same as class A) and final score.

Class D are home stations using commercial power sources. These are listed by call, number of contacts, power and final score.

Class E stations are home stations utilizing emergency power sources. The listings include call, number of contacts, power and final score.

Asterisks (*) denote stations, which did begin setup operations prior to 1800 UTC on Saturday.



In Adena, OH, at least, Field Day takes the cake. In annual tradition with the Triple States RAC, the FD cake baked by the YF of WD8CBC.

Fred, VE7CJG, twiddles the knobs for the Surrey ARC. (VE7SAR/7, 3A)

Mike (foreground), WD9HMY, logs for Dave, K9DC, at the FD site of the Fort Wayne RC.

1A - Battery

Central Virginia Contest Club N4ND/4*	897	A-	8-7850
Hamburg Helpers K8IF/8	723	A-	3-7430
Morrice,Minnis,Goldman & Barthelow W8GITM/6*	749	A-	5-5865
Konehead Kontest Klan W8XY/8	503	A-	5-5130
2 Man Port Plus 1 Woman K9TK/9*	478	A-	3-4980
Marijuana FD Party W1MJ/1*	474	A-	9-4810
Massillon ARC W8NP/8	548	A-	24-4490
Colorado Traffikers W9GO/9	446	A-	5-4340
Quarts K8SYH/4	592	A-	6-3825
Midland ARC QRPP Group AE5J/5*	378	A-	10-3665
Guam's Fools KG8JIC/KG6	597	A-	5-3475
Cobweb City Contest Group/ Bloomingdale,N.J.C.D. WA2VZW/2	508	A-	4-3345
Dirty Birds K3MT/3	718	B-	3-3058
Michigan QRP Club W8LCU/8*	282	A-	8-3015
N7DM/7 Contest Group N7DM/7*	277	A-	4-2970
University RC W7SF/7*	460	A-	9-2915
Carol,Don and Bob W8BTMI/8*	262	A-	3-2715
Armageddon ARC N8AQJ/8	312	A-	4-2380
Beacon R.A. W3AA/3*	700	B-	9-2334
Gunnison Valley ARC W9GYV/9	798	B-	9-2076
Non-Club Group VE3JRT/3	184	A-	5-1990
Penn-Mar RC,Inc. W3MUM/3*	351	A-	13-1955
Non-Club Group K6XM/6*	615	B-	3-1896
Seldom Heard AR Keying Society W3TA/3	172	A-	4-1870
CW Operators W6NL/6	161	A-	8-1710
Huron ARC W8NOZ/8*	630	B-	16-1510
Five Lousy Watts W8RSR/7*	171	A-	3-1315
Trinity ARA WE7URE/7	184	A-	3-1285
West Glen ARC K9FD/9	133	A-	3-1100
F Troop AA7O	376	B-	5- 976
Non-Club Group N5BIN/5*	122	A-	4- 865
REEAR WB9ITH/4*	377	B-	7- 864
Saco Valley FM Assoc. K1MON/1	184	B-	4- 836
Worldradio Staff ARC N6WR/6	249	B-	10- 734
Northern Colorado ARC W9UPS/9*	91	A-	6- 695
Non-Club Group N1KE/1	58	A-	3- 680
Macon Co. ARC WA9JKJ/9	225	B-	6- 604
Black Flagers W8PYD/8*	160	B-	4- 474
Field Day's Finest N9OD/8	54	A-	5- 460
Beausejour RC VE4BRC/4*	152	B-	5- 404
Belly Acres WA2CJS/2*	56	A-	3- 380
Arkansas Valley ARC N9FS/9*	108	B-	8- 366
Orilla ARC VE3ORC/3	25	B-	- 150
Nutty Net WB9EUS/9*	8	A-	2- 140

1A

Wyoming County ARC K8BT/8*	2118	B-	8-4938
Delta DX Assoc. W5RAB/5	1230	B-	12-4865
Yuma Arizona Hot FD Team K6LL/7*	1535	B-	4-4838
Hollywood RC N4UM/4	1772	B-	4-4768
Utah DX Assoc. K7UA/7	1887	B-	6-4524
Motor City Contest Operators K8CC/8	1447	B-	6-4380
Bozo and the Lids W9TG/9	1029	B-	4-4088
Mad River RC W8TK/8	1190	B-	10-4008
Tennessee Telegraphers ARC N4NT/4*	1443	B-	-3948
Ozark Contesters W5TNT	1024	B-	7-3910
Spark Gap Wonder Boys N9NO/9	1127	B-	6-3896
Idaho Falls Mavericks W7RH/7	1380	B-	12-3856
Thibodaux ARC W5YL/5	1228	B-	32-3744
Belleville AR Foundation K9BGL/9*	1239	B-	3-3719
Eastern IA DXA AD9F/9*	858	B-	4-3582
Bell AR Contest Club N5HD/5*	1116	B-	5-3424
Glen Gates Gang W9MO/9	1063	B-	15-3382
Union Parish Contesters K5MC/5	805	B-	5-3378
Caledon Sidehill Gougers VE3FOX/3	918	B-	8-3154
W1QK/1 FD Group W1QK/1	738	B-	10-3102
CRA Soret-Tracy VE2CBS/2*	730	B-	20-3070
Tri-County Radiotelegraph Soc. N8VV/8*	723	B-	7-2992
Central Illinois QX and Contest Club K9SC	819	B-	6-2898
Varian Alumni and Field Day Society AC6T/6	908	B-	4-2870
Cedar Valley ARC W9GQ/9*	661	B-	3-2844
South Florida Ham-sters WA4IQJ/4	1085	B-	12-2830
Northern 4-Ida Wouff-Hong Assn. N4WA/4*	704	B-	8-2816
Charlie's Cheapies WA2SON/2	857	B-	4-2798
Lebanon ARC K9DEW/9*	671	B-	11-2684
Back to QRPP Club K7FD/7*	1263	B-	3-2678
Duluth Guns Cast Offs' AF9Q/9*	704	B-	5-2654
Opelousas Area ARC W5TKV/5	1220	B-	12-2640
Utah ARC W7SP	1077	B-	34-2626
N3DF Field Day Team N3DF/8*	1235	B-	3-2620
York County ARS K4YTZ/4	1070	B-	14-2588
West Branch ARC W3AVK/3	830	B-	28-2586
Denton County ARC W5NGU/5*	906	B-	20-2552
Patrick Henry ARA AB4L/4	934	B-	12-2522
Great Salt Lake Rotting Brine Shrimp Inhaling Assn. N7IE/7	937	B-	5-2516
Dr. Loomis Memorial Junior Mechanics League N4FM/4	732	B-	11-2489
Rutgers Univ. ARC WA2NPP/2	753	B-	6-2480
Pikes Pique ARC W6JI/6	593	B-	10-2472
Orangeburg ARC K4QO/4*	866	B-	10-2442
Society Radio Operators W9EJ/9*	578	B-	16-2412
Non-Club Group W9PSN/9	570	B-	5-2394
Signal Hill ARC K9HP/7*	1013	B-	7-2384
Murphy's Law-yers N6JF/6	938	B-	6-2320
Belden Employees ARS N9AG/9*	764	B-	6-2320
Livonia ARC and Chowder Soc. K8SS/8*	716	B-	15-2254
Tri-County Repeater Assoc. W8YEK/8	994	B-	-2236
Chigger Mtn. Scratchers N4WH/4*	1061	B-	12-2230
Carrollton Wireless Society K5NL/5	974	B-	13-2220
Texas Chiggers and Itchy Undrewear FD Assoc. K5IU/5*	639	B-	9-2218
Non-Club Group W8FN/8	563	B-	4-2154
Spectrum Radio Group W9YD/9	894	B-	6-2146
J-J-D-B-G-WA1ODD/1*	592	B-	5-2070
S'Port City CW-ers K5SL/5*	536	B-	3-2068
Maui Beach Boys KH6NO/KH6	648	B-	4-2050
West Nebr. Tech. ARC W0AFG/9	938	B-	11-2026
Quad City ARC W9YCR/9*	520	B-	25-2000
Lake Shore ARA W3ALD/3*	947	B-	6-1994
Mile Hi-DX Assoc. W8QRI Z/0	935	B-	7-1970
Gallatin Ham RC W7ED*	739	B-	17-1960
Butte ARC W7FO/7	1755	C-	25-1960
RCA ARC N9RJ/9*	674	B-	22-1938
Green Hills Field Dayers W3MN/3*	460	B-	3-1930
The 4 Qs AA4Q/4*	483	B-	5-1892
Winona ARC W9NE/9	669	B-	15-1866
Non-Club Group WB8UCW/8	806	B-	6-1838
Principia College ARC W9VM/9*	408	B-	17-1782
Tee Gap ARC N5EY/5*	578	B-	3-1782
York Repeater Club VE3YRC/3	421	B-	12-1776
Gulf Coast ARC WA4GDN/4*	708	B-	25-1756
Coast Guard Commsta S.F. RC K7SV/6*	600	B-	4-1744
ARAC - 2 KØET/Ø*	500	B-	6-1739
Detroit's Undisputed Contest Kings AC8P/8	442	B-	3-1736
Non-Club Group WØTU	456	B-	6-1732
Pottstown Repeater Team N3WW/3*	522	B-	4-1708
EDD ARC WB6DNR/6	507	B-	3-1650
Pictou County ARC VE1JV/1	633	B-	20-1650
Sullivan County ARS K2RP/2*	424	B-	7-1642
Lima Area ARC W8EQ/8	395	B-	24-1636
Pocono ARK WØPM/3	422	B-	8-1626
Chateauguay ARC VE2CAR/2*	465	B-	10-1608
Georgian Bay Amateur Club VE3BSF/3	537	B-	20-1608
Non-Club Group WA8VFA/8*	493	B-	4-1594
Imperial Valley ARA W6NST/6*	601	B-	8-1588
Humboldt ARC KØGP/Ø	486	B-	25-1558
Booga-Booga RC K8ZRH/8*	480	B-	10-1540
U. of Houston ARC WB5FND/5*	427	B-	3-1536
Chuweis Mountain Boy's VE7AAE/7*	501	B-	3-1528
Cloverleaf Farms ARC WD4IIO/4*	399	B-	6-1510
Pair-A-Docs Plus K2OID/2*	449	B-	3-1508
Beginners WAØERW/Ø	449	B-	4-1502
Montreal ARC VE2BG/2	498	B-	7-1502
Non-Club Group KB5GK/5*	515	B-	6-1496
Red River Valley ARC WB5RDD/5*	446	B-	11-1496
Montgomery ARC W4AP/4*	464	B-	7-1468
Lake Geneva Repeater Group WB9ICF/9*	598	B-	7-1428
Big Spring ARC W5AW/5	503	B-	10-1414
Sabine Valley ARA N5ANN/5*	559	B-	9-1410
Callaway ARL WØDD/Ø	476	B-	14-1400
Non-Club Group W4QO/4*	450	B-	6-1396
Westside ARC W5ARD/5	428	B-	11-1392
International Harvester ARC WB4HPC/4	595	B-	14-1390
Emerson El. ARC WØPEV/Ø*	470	B-	-1384
AI7H-KA7CGN-WA7ARK AI7H	629	B-	3-1358
Non-Club Group N1EOT/1*	492	B-	3-1334
Treaty City ARA W8UMD/8	1174	C-	8-1331
Hart House ARC,University of Toronto VE3UOT/3*	528	B-	7-1320
Rotten Radio ARC W9QJ/4	942	C-	10-1291
Carrollton TX ARC KB5A/5*	569	B-	20-1290
St. Peter's Prep ARC K2OGJ/2	347	B-	4-1262
Bruce ARC VE3KVA/3	417	B-	12-1262
Franklin ARC K4JA/4	410	B-	9-1248
Lower Yellowstone ARC KB7AO/7	484	B-	12-1245
John Brown Univ. ARC WA5YJV/5*	428	B-	8-1240
Pinawa Amateurs VE4FK/4	433	B-	7-1222
Satellite ARC WEAB/6	323	B-	3-1214
Seacoast Wireless Assn. AD1E	399	B-	9-1212
The Long Tailed Lizards W7LTL/7	515	B-	4-1202
Frodo's Freaks WA4NNG/4*	550	B-	6-1200
Warrensburg Area ARC WDØAYC/Ø	648	B-	12-1196
Non-Club Group W3VQ/3	370	B-	6-1192
H.A.R.E.S. N5ALV/5	515	B-	6-1180
Rockdale ARA AF5C/5*	512	B-	8-1174
Indian Hill RC K9US/9*	351	B-	30-1152
Sky Walkers N3AEM/3*	403	B-	3-1122
Huron,Waterloo and Kanto ARS VE3AOD/3*	416	B-	4-1106
Non-Club Group W6SOV/6	499	B-	4-1098
Hastings ARC WØWWV/Ø	442	B-	20-1088
Jackson ARC W4TM/4	385	B-	8-1068
Non-Club Group K8TK/8	959	C-	3-1059
Northeast Phila. ARC WA3YVY/3*	478	B-	9-1056
Paducah ARES Club AI4T/4*	365	B-	23-1004
Hopkins County ARC WB4JRO/4	343	B-	20- 974
Non-Club Group VE1DX/1	688	C-	4- 938
Theodore Rosevelt ARC K9ND/Ø	406	B-	10- 930
Stanley County ARC W4EAT/4	658	C-	12- 908
Post 640 A R and Badmitton Group WBØYOU/Ø*	263	B-	4- 896
Maui ARC KH6RS/KH6*	279	B-	8- 884
Richmond ARA K9QAN/9	190	B-	7- 860
Last Mountain RC VE5LM/5	262	B-	8- 831
Wake Tech ARC WB4TOP/4*	250	B-	5- 830
Warrick CTY CD & Communications Club WB9JHD/9*	313	B-	5- 824
Electron Club of Denver WØICR/Ø	353	B-	11- 806
Santiam RC W7FSP/7	232	B-	7- 802
Central Vermont ARC W1BD/1*	317	B-	12- 796
Midland ARC KB5OVV/5*	319	B-	15- 788
Non-Club Group WB1GOO/1	328	B-	3- 756
Coun Valley ARC NØBD/Ø	266	B-	10- 752
Non-Club Group WA1PMA/1*	370	C-	6- 733
Gila ARS WB5TGL/5*	250	B-	5- 700
Montague County ARC KB5AD/5	272	B-	4- 694
The Does VE7AED/7*	262	B-	4- 674
Montreal ARC VE2AAC/2	168	B-	3- 648
Chilliwack ARC VE7AFA/7	260	B-	8- 620
Limestone ARC K4KJD/4*	220	B-	7- 590
Ed Savela and Friends K8EA/8	128	B-	4- 548
Northeast Mississippi ARC K5DGL/5*	117	B-	15- 474
Empire ARS WA2ZJL/2	315	C-	8- 465
University of Central Florida ARC WB4TCW*	97	B-	10- 442
Highland Park Comm. Assoc. WILFOP/1*	107	B-	7- 430
Cardboard-Shack Gang WA2ZZX/2	156	B-	3- 412
Parksville ARC VE7DFD/7	141	B-	6- 396
Non-Club Group WB1EGT/1	142	B-	3- 384
Kirkland Lake ARC VE3NES/3	43	B-	5- 318
Almona A R Operators WBØNPR/Ø*	30	B-	4- 270
Cedar Valley ARC KAØAZU/Ø*	27	B-	3- 258
Hettinger ARC WØVWJ/Ø	137	C-	6- 237
University of Kansas ARC KØKU/Ø	33	B-	2- 214

1A - Commercial

University of Va. ARC W4UVA	1227	C-	-1554
Forsyth ARC W4NC/4*	422	B-	10-1100
Non-Club Group VY2SMH/2*	260	B-	6- 920
Highland Park H.S. ARC WB9LDH/9	222	C-	9- 311
Schaumburg ARC WB9TXO/9*	27	B-	2- 106

2A - Battery

Southern Calif. CC N6NB/6	3247	A-	7-15,550
Conn. Wireless Assoc. WIXX/1(+KA1BUQ)	1151	A-	18-11,410
Oakland County ARS WB1TNO/8*(+KA8EXZ)	1558	A-	-5405
Wilton RA W2LZ/2	500	A-	7-5260
Great River ARC KØVH/Ø*	863	A-	20-4615
Ham Creek Contest Club KB8CC/8	437	A-	3-4510
Mid-Willamette ARC W7SO/7	1047	B-	28-3150

Southcentral Connecticut ARA
K1RH/1* 777 B-25-2378
Harrison County Amateur Group
N8TF/8 195 A- 4-1980
Smitty's Field Non-Club Bunch
N8ANB/8(+WD8DQM) 163 A- 7-1830
New Mexico State Univ. ARC
W5GB/5* 260 A- 8-1770
Northen Panhandel Radio
W8ZO/8 256 A- 8-1550
Lincoln County ARC
K7PQ/7 425 B-10-1492
Non-Club Group
WB9IPH/9* 498 B- 4-1400
Nirvana Seven Flights Up
N7FU/7 301 B- 7-1360
Brush Mountain Repeater Assn.
N4APK/4*(+N4BTZ) 360 B- 7-1322
Lakeway ARC
KB4GH/4 438 B-17-1242
QRP Rock Rats
WA7ZBL/7* 166 A- 4-1160
Yardley/Willingboro Wireless Assn.
WB2ENJ/3 150 A- 9-950
Southeast Mo. ARC
K0CEA/9* 220 B- 6- 650
Kodak Park Assn. RCC
N2AL/2* 120 B-10- 502

2A

Colo. Contest Conspiracy
W0UA/0 2850 B- 9-8704
Arapahoe RC
K0NA/0(+KA0DGV) 2585 B-22-7644
W. Va. DX Assoc.
W8NR/8* 2779 B-10-7290
Logan County ARC
N8RR/8 2961 B-11-7193
Mad River RC
K8MR/8* 2025 B-19-6902
Flyweight DX Group
W4JD/4*(+WB4PAT) 2180 B-27-6686
Wisconsin Valley RA
W9SM/9* 2009 B-30-6398
No Ark ARS
K5LG/5*(+KA5ETD) 1744 B-22-5890
Heart of America RC
W0RR/8*(+KA9AGC)1645 B-15-5814
Grand Rapids ARA
W8DC/8*(+WB8GIC) 1597 B-25-5804
Texas Chigger Growers Assoc.
K5MW/5 2025 B-16-5774
West Valley ARA
W6PIY/6*(+W6TWO) 1913 B-19-5758
Ten Eight Our Good Buddies
WB4AIN/4* 1788 B- 8-5716
Buffalo AR Group
K2DB/2*(+WB2OWS) 1782 B-10-5664
Mobile ARC
K4ZM/4*(+WD4SMQ)1718 B-45-5664
Red Ant Annihilators
N6KN/6 1955 B- 8-5622
Tippecanoe ARA
N9JG/9* 1642 B-14-5618
Kanawha ARC
W8GK/8*(+KA8BMH)
1786 B-30-5548
Windsor Mountaineers
W1IM/1+ 1698 B-14-5444
AR Transmitting Society
W4CN/4*(+AC4A) 1642 B-30-5302
ARC of Ohio State Univ.
W8LT/8 1319 B-11-5294
Dit-Dah-Ders of the American Revolution
W8LVN/8* 1603 B- 7-5294
Non-Club Group
AA7A/7* 1645 B- 4-5244
Mecklenburg ARS
W4BF B/4(+KA4EFL) 2136 B-38-5228
Ames ARC
N0GA/0(+KA0DNI) 1651 B-12-5206
Broward ARC
W4AB/4*(+KA4AET) 2241 B-30-5156
Halifax ARC
WE1F O/1 1500 B-25-5144
Spartanburg ARC,Inc.
K4JLA/4*(+WD4RNU)
1430 B-16-5124
Kingsport ARC
W4TRC/4(+WA4MOS)
1484 B-32-5014
Black Jack Mtn. Gang
W9OC/8 1585 B-10-5000
HP RC + Assoc.
K6FB/6 1649 B-10-4964
Motor City RC
W8MRM/8*(+KA8DSJ)
1563 B-31-4956
Central Wis. R.A.
WWNN/9*(+KA9ACC)1404 B-24-4956
Meriden ARC, Inc.
N1AN/1*(+W1NRG) 1467 B-30-4824
Ozarks ARS
K0FA/0*(+WD0HCT) 1522 B-25-4742
Escondido ARS
N6WB/6* 1557 B-25-4724
Wallingford ARS
W1SY/1* 1269 B-15-4640
Charlotte ARC
W4CGQ/4* 1472 B-16-4618
Los Alamos ARC
W5PDQ/5 1849 B-24-4566
South Kansas DX Assoc.
W0WU/0* 1427 B- 7-4512
Last Bay Amateur Wireless Assoc. &
Brown Univ. ARC
N1RI/1*(+WB1DEU) 1425 B-15-4500
River City Chill Chompers
WB1Z/9* 1468 B- 9-4496
Overlook Mtn. Arc
K2HA/2* 1404 B- 8-4468
Douglas Cty ARL
W0XI/0 1431 B-15-4440
Edison R. A. Assoc.
WB1K/8*(+KB5SB) 1359 B-20-4360
Idaho Contest Conspiracy Group
K7TM/7* 1528 B- 4-4358
Prairie Dog ARC
W0OJV/0*(+WD0BWH)
1456 B-20-4354
Findlay ARC
W8FT/8* 1321 B-30-4298
Milacron ARC
WB8SN/8(+WD8SOL) 1463 B-25-4296
Amherst(N.H.)ARC
K1KA/1* 1586 B- 8-4236
Smokey Valley ARC
W0CR/0*(+KA0BAQ) 1160 B-21-4213
Union Metropolitane Sans Fillsts De Montreal
VE2UMS/2* 977 B-20-4208
Opequon R S
N8II/8* 1349 B- 8-4152
Fossil Creek Wireless Society
K5GD/5*(+WB5CDO) 1230 B-10-4151
Westpark Radiops
W8VM/8* 1295 B-19-4144
Aurora Repeater Assoc.
W9LJF/0 1414 B-20-4136
Randallstown ARC
N3IC/3* 1363 B- 7-4130
Medina 2 Meter Group
K8TV/8* 1469 B-32-4090

Beaumont AR and Repeater Club
W5RIN/5* 1051 B-18-4088
Jackson County ARC
W8WA/5* 1810 B-20-4088
Bicentennial ARC
K5GI/5*(+WD5IAJ) 1182 B-31-4074
Eastern Michigan ARC
K8DD/8(+KA8DFJ) 1215 B-18-4056
Raleigh ARS
W4DW/4 1389 B-27-4055
One To Few ARC
AI8O/8* 958 B- 3-4048
Mitre-Bedford ARC
W1UI/1*(+W1ZF) 1403 B-13-4040
York Elephant's Dirty Underware FD
Group
W3EDU/3*(+KA3ATH)
1259 B-20-4038
ARA of Southern New England
W1AQ/1*(+WB1GMI) 1426 B-21-4020
Tampa ARC
W4UDU/4* 1496 B-15-4000
Bolted Owls of New York
W2AD/2* 1211 B-12-3948
Southern Ill. ARS
AA9D/9(+KA9EWN) 1251 B-12-3928
Signal Propagators ARC
K4EJJ/4* 1213 B-17-3924
Dallas ARC
W5FC/5* 1423 B-27-3920
Sevier County ARC
K4XU/4*(+WD4PPW) 1258 B-13-3914
Northoast Georgia ARC
N4HH/4* 1243 B-24-3910
Beaches ARS
W4DU/4* 1385 B-38-3840
Fort Pierce RC
W4AKH*(+KA4DAM)1218 B-21-3768
Tupelo ARC
K5JG/5(+KA5FIQ) 1292 B-20-3762
Delaware ARA
K9NN/9*(+N9AHC) 1156 B-19-3760
South Jefferson Co. ARC
W5SS/5(+N5ABG) 945 B-26-3740
Old Pueblo RC
W7GV/7*(+KA7CKS) 1225 B-25-3738
Johnson City RA
K4SE/4 1258 B-25-3726
GBARC
W1VW/1*(+KA1DCM)
1160 B-20-3722
East Alabama ARC
KE4T(+KA4DWK) 1250 B-15-3712
W/K ARC of Greater Milwaukee
N9AW/9 1101 B- 7-3654
County College of Morris ARC
K2CW/2 1108 B- 9-3624
Racine Megacycle Club
W9UQ/9 1165 B-20-3598
Central Washington ARC
W7GB/7* 1128 B-10-3592
Central Michigan Contesters
W8HW/8*(+KA8EUV) 987 B-12-3574
Saline County RC
W9ZX/9*(+N9ASN) 1511 B-21-3570
Syntonic Technology ARC
AB3A/3* 1409 B- 4-3556
Northern Illinois AR Contest Oprs.
K9SA/9*(+KA9EMK) 1049 B-20-3528
Huron County ARC
N8VT/8*(+W8ADJ) 1012 B-21-3512
C.R.E.S. ARC
W8ZBF/8* 1130 B-25-3504
Field Day Dipoles
W9JKN/9* 1097 B- 5-3476
Missouri Valley ARC
W0NH/0 1105 B-23-3466
South Lyon Area AR
WB8QXB/8 1062 B-16-3458
Cape Fear ARS
WB4YZF/4*(+KA4JKW)
1348 B-10-3416
Hoosier Lakes RC
K9RD/9*(+KA9ESM) 1261 B-14-3402
Morton ARC
W9AQA/9*(+WB9VEU) 933 B-18-3396
Indiana Bell RC
W9LTU/9* 1095 B- 3392
Non-Club Group
AA7Z/7* 1114 B- 6-3322
Motorola ARC
N7RF/7*(+N7BCH) 1027 B-10-3322
Iowa-Illinois ARC
W9LAC/9(+KA0EIW) 1113 B-25-3316
Syosset H.S. A.R. and T.V. Club
WA2JAS/2 1255 B-14-3292
S.W. Michigan Rat Pack
N8BB/8* 964 B-11-3276
Non-Club Group
K6ZH/6* 983 A- 7-3266
Kachina AR
WA7FDN/7*(+KA7ARZ)
1378 B-20-3264
Telco ARC
W6MPH/6*(+WB6TAE)
1347 B-15-3250
Parsons ARC
W0RT/0 979 B-11-3235
Holland ARC
K8DAA/8* 1011 B-12-3222
Deluccaville Raiders
N2SB/2 998 B- 3-3200
Shenandoah Valley ARC
W4RKC/4* 913 B-12-3142
Alamogordo ARC
N5LBW/5* 1179 B-21-3142
Lubbock ARC
K5LIB/5(+KA5ERP) 1281 B-34-3134
Northeast Missouri ARC
W0CBL/0 901 B-15-3120
Muck-Rakers
K8OM/8 1296 B- 4-3108
Rowan ARS
AA4T/4* 1250 B-15-3090
Valley ARC
W0PI/0* 928 B-12-3088
Green Bay Mike and Key Club
K9EAM/9(+WD9EGE) 984 B-15-3069
MSC Radio Committee
K2GAC/2* 923 B-15-3030
Hebron Allstar Wireless Gang
W1PE/1*(+WB1CCF) 834 B-10-2994
Bristol ARC
W4VS/4*(+N4BDQ) 921 B-19-2978
Yellowstone RC
K7EFA/7* 1339 B- 8-2978
Joplin ARC
W9OFR/9* 1106 B-15-2976
Rideau ARC
VE3BPC/3* 851 B-13-2964
Rappahannock Valley RC
K4TS/4(+WA4PAS) 937 B-14-2944
Libertyville & Mundelein ARS
K9UW/9*(+KA9AKC) 982 B-20-2944
McDonnell Douglas Astronautics West ARC
W6VLI/6* 1142 B-14-2942
State Line RC of N.Y. & N.J.
K2LSA/2* 943 B-10-2934
Alaska RC
W0EG(+WB0TRL) 1074 B- 9-2932
Valley ARA
W4XD/4* 908 B-21-2928
Robert Moses JHS RC
WB2RCJ/2 1334 B- 3-2918
Carmine A1 Group
K5DL/5*(+KA5ALE) 663 B- 6-2902

Klamichi Kontest Klub
W5RBO/5 1343 B- 8-2892
Motorola Schaumburg RC
W9VV/9* 963 B- 5-2876
Santa Fe Trail VHF Club
K0KS* 978 B-10-2872
Waterton ARS
W0NT/0*(KA0HMU) 828 B-10-2872
Brazosport ARC
N5FN/5*(+WD5IPI) 838 B-25-2856
Nanaimo ARA
VE7NA/7* 867 B-30-2822
Morris Cty ARES/RACES
W2UH/2* 989 B-14-2802
Land of Lakes ARC
K8RDJ/8* 941 B-12-2792
Holmdel ARC
K2DR/2* 892 B-14-2782
Tuscaloosa ARC
W4KCQ/4 911 B-28-2782
Indianapolis Power & Light ARC
K9FC/9* 871 B- 9-2782
Muscle Shoals ARC
W4JNB/4* 1182 B-10-2780
Coconino County ARC
W7YS/7 733 B-10-2758
Central Missouri RA
W0RKU/0*(+KA0BXA)
743 B-14-2750
North Augusta-Belvedere ARC
KD4DJ/4* 782 B-20-2748
South East ARC
K8EMY/8* 789 B-25-2724
Washington County ARES/RACES
K9SK/9* 816 B-23-2694
Explorer Post 73
W0HEP/0(+WD0ADR) 842 B-15-2690
Neenah-Menasha ARC
W9ZL/9*(+WD9HID) 792 B-10-2674
AC - Arts
N9GT/9*(+WD9HRP) 1054 B-30-2662
Sacramento ARC
W6AK/6* 1197 B-10-2652
Iowa City ARC
W9UV/0* 2316 C-29-2627
KSU/Manhattan Area ARC
W0QQQ/0 775 B-18-2616
Lehigh Valley ARC
W3OI/3* 814 B-25-2614
Brandon ARS
N4BZ/4 1037 B-15-2608
Rockingham County ARC
WD4FVP/4(+WA4FSC) 826 B-27-2605
North Central W.V. F.D. Assoc.
K8TW/8 789 B- 7-2604
Three Rivers ARC
W0BRN/0* 938 B-18-2580
Univ. of Ottawa ARC
VE3UOA/3 752 B- 5-2560
Explorer Post 296
WB5FIL/5* 754 B- 8-2548
Battelle Columbus RC
W8CQK/8 926 B-13-2530
Mon Valley ARA
WA3WMB/3(+WB3LTR)
944 B-10-2525
Middlesex ARC
W1HEB/1*(+KA1DEI) 849 B-15-2502
Hermiston Repeater Assoc.
WB7AEF/7*(+KA7BRR)
895 B- 8-2450
Lockport ARA
W2RUI/2* 357 A- 6-2420
Lower Columbia ARA
W7DG/7*(+KA7BWF) 790 B-12-2412
Rip Van Winkle ARS
W2FSL/2*(+KA2DLB) 850 B-40-2374
Gaston County ARS
K2AJ/4* 921 B-16-2352
Ottumwa Iowa ARC
N0SM/0* 883 B-12-2350
Northern Union of Traffic Stations
AF0O/0 655 B- 6-2336
Silverwings Communications Group
KA5CCP/5*(KA5DTO)892 B- 5-2326
Explorer Post 73
W8TF/8*(KA8BIM) 714 B-18-2314
Flambeau ARC
AC9C/9 833 B-15-2314
Laredo International ARC
KB5GX/5 1056 B-12-2312
Eventdale ARS
W8LAC/8(+KA0EIW) 1113 B-25-3316
Syosset H.S. A.R. and T.V. Club
WA2JAS/2 1255 B-14-3292
S.W. Michigan Rat Pack
N8BB/8* 964 B-11-3276
Non-Club Group
K6ZH/6* 983 A- 7-3266
Kachina AR
WA7FDN/7*(+KA7ARZ)
1378 B-20-3264
Telco ARC
W6MPH/6*(+WB6TAE)
1347 B-15-3250
Parsons ARC
W0RT/0 979 B-11-3235
Holland ARC
K8DAA/8* 1011 B-12-3222
Deluccaville Raiders
N2SB/2 998 B- 3-3200
Shenandoah Valley ARC
W4RKC/4* 913 B-12-3142
Alamogordo ARC
N5LBW/5* 1179 B-21-3142
Lubbock ARC
K5LIB/5(+KA5ERP) 1281 B-34-3134
Northeast Missouri ARC
W0CBL/0 901 B-15-3120
Muck-Rakers
K8OM/8 1296 B- 4-3108
Rowan ARS
AA4T/4* 1250 B-15-3090
Valley ARC
W0PI/0* 928 B-12-3088
Green Bay Mike and Key Club
K9EAM/9(+WD9EGE) 984 B-15-3069
MSC Radio Committee
K2GAC/2* 923 B-15-3030
Hebron Allstar Wireless Gang
W1PE/1*(+WB1CCF) 834 B-10-2994
Bristol ARC
W4VS/4*(+N4BDQ) 921 B-19-2978
Yellowstone RC
K7EFA/7* 1339 B- 8-2978
Joplin ARC
W9OFR/9* 1106 B-15-2976
Rideau ARC
VE3BPC/3* 851 B-13-2964
Rappahannock Valley RC
K4TS/4(+WA4PAS) 937 B-14-2944
Libertyville & Mundelein ARS
K9UW/9*(+KA9AKC) 982 B-20-2944
McDonnell Douglas Astronautics West ARC
W6VLI/6* 1142 B-14-2942
State Line RC of N.Y. & N.J.
K2LSA/2* 943 B-10-2934
Alaska RC
W0EG(+WB0TRL) 1074 B- 9-2932
Valley ARA
W4XD/4* 908 B-21-2928
Robert Moses JHS RC
WB2RCJ/2 1334 B- 3-2918
Carmine A1 Group
K5DL/5*(+KA5ALE) 663 B- 6-2902

Northern Virginia RD
K4FD/4*(+KA4BQA) 696 B-12-1938
Non-Club Group
W3GH/3* 848 B- 7-1930
Regina ARA
VE5NN/5 704 B-18-1911
Bayou ARC
W5SWS/5 849 B- 4-1898
Magnificent Seven Less Three
W6WIA/6 806 B- 4-1890
Clark County ARC
(W9WWI/9*(+WB9WDW)
482 B-12-1890
Friendship ARC
W3GR/3* 625 B-14-1870
Bay Area ARC
K8UE/8 487 B-20-1852
Turtle Mountain ARC
VE4LB/4* 520 B-12-1850
Thatuna ARC
WB7TBM/7* 721 B-15-1846
Eau Claire ARC
K9EC/9* 728 B-20-1844
Non-Club Group
W7MDK/7* 482 B- 6-1822
University of Miss. ARC
W5VE/5 625 B-13-1810
Cedar Hill ARC
K9VP/9 527 B- 6-1786
Straits Area RC
W8GQN/8* 441 B- 6-1776
Kings RC
W6IYY/6 754 B-12-1758
KY. - Col. ARS
KB4K/4* 578 B-15-1756
Broken Arrow ARC
W5DRZ/5* 595 B-27-1750
Cross Timbers ARC
K5TC/5 540 B- 5-1748
Supelco Park ARC
WB3IVP/3*(+KA3BFM)
440 B- 7-1699
TRW Radio Club
WA8WSO/8* 451 B- 9-1692
Smith County Hams
KM4M/4* 616 B- 7-1680
Williamson County ARC
N8TT/8* 656 B-13-1680
Suburban RC
W9DCW/9* 584 B-30-1666
Sun City ARC
K5WPH/5* 560 B-13-1652
USAF MARS of Virginia
WD4LKV/4* 707 B-15-1646
Black River ARC
W8IGV/8*(+KA8DVV) 588 B-28-1628
Grayson County ARES
K8QQG/5* 434 B-10-1611
Pilgrim Amateur Wireless Assoc.
K1BL/1*(+KA1AAT) 625 B-16-1598
Never Again
N5SS/5* 465 B-14-1598
North Texas High Frequency Assoc.
WB5TSB/5*(+WD5HYD)
474 B-20-1594
Hillsdale County ARA
K8GK/8*(+WD8RKN) 455 B- 9-1588
Story County ARC
W0YL/0* 539 B-12-1580
Kings County Repeater Assoc.
N2KO/2* 894 C-20-1878
Alexandria RC
W4HFH/4* 131 A-46-1560
Pleasants County ARC
WB0I/8 496 B-15-1540
Fulton County ARC
K9TLU/9* 633 B-15-1530
Staten Island ARC
WA2OGV/2* 618 B- 8-1516
Non-Club Group
WB1GVQ/1* 395 B- 4-1505
Murray State Univ. ARC
KJ4W*(+WD4IEC) 667 B- 7-1502
Ohio Valley Hagchewers & Contesters
WD8KKF/8 556 B- -1500
Lumberton ARC
K4NUG/4* 479 B- 8-1484
Fidelity ARC
K1NQG/1* 458 B-10-1456
Over the Hill Gang/Ruston Area ARC
W5WG/5* 509 B-12-1456
Anaconda ARC
WB7QBQ/7 390 C- 6-1445
Non-Club Group
WA4SJS/4 564 B- 4-1428
Honolulu ARC
KH6WO/KH6 430 B-30-1424
Parkland ARC
VE5II/5* 500 B- 9-1420
Mancorad ARC
W9DK/9* 552 B- 8-1412
Stoughton Civil Defense
WI9SN/1* 493 B- 6-1392
Rainy Lake ARC
VE3BRZ/3* 432 B-12-1390
Reelfoot ARC
N4FE/4(+WB0YXA) 497 B-12-1388
General Dynamics Rec. Assoc. RC/Ft.Wor
AK5R/5* 563 B- 9-1378
Chickasaw ARA
K5VV 589 B- 9-1378
Non-Club Group
W0II/0 816 C- 9-1360
Americus ARA
K4VBH/4* 545 B-15-1350
Fargo-Moorhead CW Club
W0CZ/0*(+KA0FBH) 361 B-20-1334
Austin Area ARC
W0AZR/0 527 B-30-1322
NAVCAMS EASTPAC ARC
KH6UL/KH6 317 B- 4-1310
North Country ARC
W2LCA/2 417 B- 9-1296
Greenwood ARC
VE1WN/1* 428 B-12-1260
Calhoun County ARA
W4NTI/4* 428 B-11-1254
Wichita ARC
W0SOL/0* 426 B-15-1250
Shy-Wy RC, Inc.
W7FT/7 412 B-12-1234
Rock River RC
W9TCH/9(+WD9TGM) 329 B- 9-1230
Ashtabula County ARC
W8CV/8* 1024 C- 6-1224
Emerald ARS
WA7FQD/7* 442 B-19-1216
Longmont ARC
WB0WFB/0* 365 B-12-1216
Humboldt ARC
N4EH/4 924 C-25-1199
Storm Lake ARC
K0EVC/0 490 B-11-1188
Acadia Naval RA
W1FAI/1* 289 B- 6-1184
Newago Country Radio Group
WA8UAN/8* 296 B- 8-1178
Explorer Post 204
WA2OYR/2 466 B-14-1170
Chippewa ARC
WB8AAA/8*(+KA8FOH)
305 B-31-1138
Rome RC, Inc.
W2OF Q/2*(+KA2DAI) 370 B-19-1132
Covington County ARC
K4TGU/4 330 B-10-1098

Southern Counties ARA
K2BR/2* 418 B-25-1096
Capilla Peak RFI Assoc.
K5ESB/5* 798 C- 5-1088
Walla Walla Valley RAC
W7DP/7* 334 B- 9-1058
AREES
WA6KCR/6 367 B- 4-1054
Albert Lea Spiderweb ARA
W9FIT/9* 319 B-13-1044
Totem ARC
VE7FS/7 285 B- 8-1040
Brenham ARC
W5ZM/5*(+WB5CKO) 450 B-15-1038
Comox Valley Wireless Club
VE7CVW/7 311 B- 6-1038
South Arkansas ARC
WB5QHI/5* 291 B-12-1030
Non-Club Group
KB9AP/9* 651 B- 6-1010
Colorado State University ARC
W9GEY/9*(+KA9EEG) 689 C- 5-1003
Hazel Park ARC
W8JKU/8 393 B-10- 996
Miami County ARC, Inc.
W8FW/8* 341 B- 9- 984
Vermilion ARC
AA9U/9* 261 B- 7- 982
Kay County ARC
W5HZZ/5 229 B- 6- 978
Sam Houston ARK
AA5EJ/*(+KA5ENG) 583 B-11- 972
River City ARCS
WA6VLS* 382 B-20- 964
Bullitt ARS
WA4AGH/4* 256 B-16- 950
Non-Club Group
VE4TRC/4* 259 B- 7- 936
Southwest Minnesota ARA
WB0AJV/0 272 B- - 934
Mesabi Wireless Club
K9MK/9 300 B-10- 914
Tuboro RC
W2BMW/2 322 B- 6- 894
Non-Club Group
W4WAB/4 170 B- 2- 880
F.A.R.C.E.
K0AQO/0 217 B- 5- 868
WCARC
WB4HIP/4 345 B- 6- 846
Matanuska ARA
KL7JF U/KL7* 271 B- 5- 842
East Shore ARA
KB9NPY/9* 318 B-10- 836
Lassen ARC
KC6M/6*(+KA6AWT) 432 C-10- 822
WB6ZQZ FD Group
WB6ZQZ/6* 233 B- 5- 754
Twin Bridges Area A R Ops
WA5ZSH* 214 B- 6- 736
Brass Pounders ARC
WB3IVO 143 B- 5- 726
Oddensburg ARC
N2MD/2* 218 B- 9- 720
Jamestown ARC
W0FX/0* 185 B- 8- 674
Soc for Preservation of AR in Kodiak
KL7FKL/7 306 C- - 672
Grand Funk Radio Network
WA6EN5/6 313 B- 8- 664
North Pocono Relay League
K1UJ/3 191 B- 8- 648
NAC ARC
W9FBZ 181 B- 8- 630
Upper Muskegon River DX Soc.
WA8WPI/8* 185 B- 4- 620
Grady/Caddo ARES Group
WD5GLO/5(+WD5IRL) 127 B- 4- 603
Cow Knob Meadow Muffins
WB3KAS/8 148 B- 3- 596
Okla. City AR & Elect Club
WA5ZAA/5* 132 B-13- 594
Lake Martin ARC
WA4KIK/4* 284 B- 6- 568
Adams County ARS
WA3VXV/3 115 B-10- 566
Montrose ARC
WA0ALX/0*(+KA0AIA) 197 B- 7- 556
VE2CRG Club/2
VE2CRG/2 86 A- 9- 544
Kelleys Island Group
WD8MHR/8* 167 C- 3- 498
North Franklin ARC
WB2DCM/2* 40 B-17- 396
Colquitt County Ham RS
WD4KCW/4 180 C-12- 380
Whatstraw ARC
WA5IPE/5 47 B- 6- 344
Benecia ARC
K2GMY/6 36 C- 8- 244

2A - Commercial

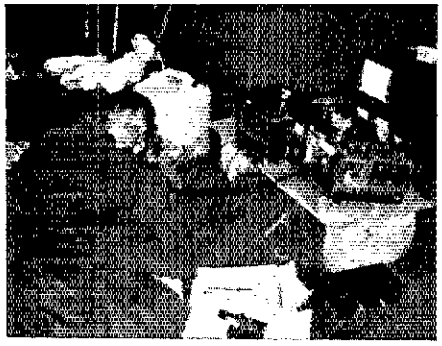
Frog Pond Five
K2HVR/2* 747 B- 5-1946
NCCC B Team
WB8ZGY/8 677 B- 3-1354
Wilsonville Wireless Wizards
N4VZ/4*(+KA4HDU) 367 B- 7- 926
McDowell ARC
N8ACQ 300 B- 9- 706
Knickerbocker ARC
WA2OEG* 97 B- 6- 244
New River ARC
KB4AE/4* 104 C-15- 208

3A - Battery

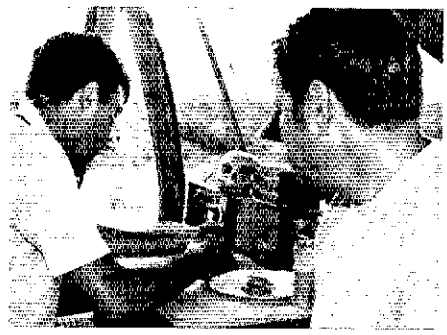
TERAC
K7AUO/7*(+N7ATN) 1073 A-19-9090
Beach Cities Wireless Society
K6ZP* 776 A-12-5710
Fongo Hill Radio Group
AA6T/6 741 A- 6-5410
Southern Mich. ARC
WB1DF/8*(+KA8CQM) 648 A-40-4950
Williamsburg Area ARC
K4RC/4*(+KA4GAV) 1214 B-23-4050
Associated Amateur Wireless Soc.
N9TW/9* 332 A- 5-3645
Burlington Amateurs
W9NM/9* 226 A- 9-1695
Five Four FD
WB2RIH/4 210 B- 5-1140
NCR ARC
WA4ZCT/4 276 B- 9- 882
Dead Battery Group
N9AEI/9*(+KA9CVZ) 125 B- 3- 748

3A

Texas QX Society
K5DX/5*(+WB5WHR) 3660 B-28-11,850
Richardson Wireless Klub
K5RW/5*(+N5BCX) 4013 B-50-11,068
Northern Illinois FD Soc.
K9NO/9*(+KA9DDK) 3230 B-12-10,690
Central Kansas ARC
K0WA/0*(+KA0ANT) 3186 B-43-10,612
N.Ridgeville Pond Swimming,Creek Stomping, Mud Sliding,Tree Climbing,Operator Drowning, Crop Destroying Renegade RC
WB8JBM/8*(+KA8EAJ) 3150 B- 6-9312
Five Flags ARA
W4UC/4*(+KA4IMM) 3255 B-25-8710
ARA of Tonawandas, Inc.
W2SEX/2(+WB2WUB) 2341 B-30-8194
Plastin ARK
N5JB/5*(+WD5GRS) 2747 B-25-8068
Delmont ARC
K3SSC/3*(+WB3KWO) 2779 B-30-7884
Columbia ARA
K3EF/3(+WB3QDA) 2466 B-35-7868
Austin ARC
W5KA/5*(+N5AMQ) 2673 B-75-7828
Surrey ARC
VE7SAR/7 2708 B-14-7814
R. A. Technical Society
W9RW/9*(+WB9SIO) 2510 B-20-7684
Tamaqua Area Sideband ARA
K3MW/3 1245 B-10-7508
Old Barney ARC
N2OO/2(+K2MOH) 2347 B-20-6964
Yankee Clipper Contest Club Rhode Island Contingent
K1U/1* 2281 B- 9-6852
Ms. Coast ARA
K5OS/5* 2563 B-23-6586
St. Charles ARC
K9BM/9*(+WB9VEL) 2165 B-26-6460
Stockton ARC, Inc.
W6SF/6*(+WA6ZAZ) 2125 B-43-6386
Norwood ARC
K1JMR/1* 2054 B-20-6380
A R Mavericks
K8KL/8*(+WD8JTM) 2232 B-22-6282
Virginia Century Club - F Troop CC
Splinter Group
K1ER/4*(+KA4DPW) 1853 B-21-6250
Bellflower ARA
WA6SFM/6*(+WD6BRJ) 2073 B-10-6212
Jackson ARC
AG5J/5*(+WD5GAE) 2458 B-32-5974
Santa Barbara ARC
K6TZ/6*(+KA6ENP) 2146 B-52-5904
Azalea Coast ARC
K4UWH/4*(+KA4GTO) 1819 B-25-5786
UCLA ARC
W6YRA/6 1973 B- 6-5692
HESEA ARC
W6DL/6*(+KA6FAP) 1807 B-25-5558
Foothill H S ARC
K6CVX/6* 1587 D- 9-5540
DEC Field Day Club
W1IS/1* 1659 B- 9-5536
Lake County Amateur RC
W9LJ(+KA9CWV) 1471 B-35-5496
New Providence ARC
W2SE/2*(+KA2DDG) 1543 B-25-5468
St. Louis ARC
K9LIR/8* 1845 B-17-5266
BC Contest Club
VE7CC/7* 1630 B- 9-5232
Wisc. Rapids ARC
W9DQA/9* 1719 B-25-5198
Club RA De La Vallee Du Richelieu
VE2CVR/2 1326 B-13-5155
Southern Peninsula AR Klub
N4DJ/4*(+WD4HZE) 1570 B-34-5152
Gopher Creek Group
VE4GF/4* 1613 B-20-5137
Rockwell ARC
W8TFZ/8* 1619 B-14-4996
Shreveport ARA
K5WS/5*(+KA5AXY) 1346 B-52-4946
Cherryland ARC
W8GI/8(+WD8PAC) 1505 B-30-4896
ARINC - ARC
W3ZH/3 1618 B-12-4888
MARCOM
K3CZ/3* 1350 B-10-4874
Biltierica ARS
N1RR*(+WB1GST) 1391 B-30-4850
Carroll County ARC
K3PZN/3*(+WB3KQW) 1841 B-14-4790
Orlando ARC
W4PL/8/4* 1338 B- 8-4752
Alvin Community College RC
N5RU/5*(+KA5DGR) 1673 B-52-4654
Pike's Peak RA Assoc.
N0DV/0(+KA0DNO) 1351 B-60-4590
Acton Boxboro ARC
W1EKO/1*(+KA1BZN) 1264 B-20-4458
Ole Virginia Hams ARC
N4RA/4* 1583 B-18-4406
Peel ARC
VE3PRC/3* 1253 B-25-4380
Shiawassee ARA
WB8QQQ/8(+WD8JJM) 1328 B-18-4372
Johnson County RAC
W0ERH*(+WD0DZE) 1360 B-40-4346
Old Natchez ARC
K5OCM/5*(+KA5BSJ) 1834 B-18-4296
Utica ARC
K2IQ/2* 1420 B- -4262
SEMARA
K8FC/8*(+WD8NKC) 1268 B-17-4216
Mesquite Horned Toads
N5WS/5 1356 B-15-4204
The Black Sheep
N3GP/3 1178 B- 8-4122
Orange Park ARC
K4SP/4* 1265 B-15-4102
West Seattle ARC
WA7/7 1159 B-18-4038
Champlain Lookout F D Group
VE2CV/2 1132 B-14-4009
Wichita ARS
WA5CTD/5*(+WD0HHI) 1299 B-25-3999
Ellsworth Amateur Wireless Assoc.
W1TU/1*(+KA1CIB) 1293 B-15-3940
Laurel ARC
W5NRU/5*(+WB5TSR) 1664 B-20-3930
South Ga. ARC
WD4LRD/4(+WB4ZLL) 1547 B-11-3892
North Hills ARC
N3FM/3* 1368 B-17-3830
Altus Area ARA
W5KI/5* 1080 B-20-3748
Blossomland ARA
W8MAI/8*(+KA8AES) 1017 B-50-3720
Warminster ARC
K3KT/3*(+WA3CNC) 1113 B-20-3618
Band Dit-Dahs
K2MP/2* 1078 B-10-3612
Jones County ARC
W0GN/0(+KA0EIY) 1148 B-16-3576
Ten J and Indep FM and SF PARC
W0QWS(+K0QAF) 1117 B-15-3572
Western Illinois ARC
W9AWE/9* 1213 B-20-3550
Denver RC
W0TX/0 1470 B-35-3545
Northern Virginia Contesters
W4YE/4* 874 B- 5-3514
Davenport RAC
W0BXR/0* 1207 B-27-3508
Independant ARC
N0II/0* 1182 B-15-3452
Redwood Coast ARC
W6OS/6* 1117 B-10-3440
Vancouver ARC
VE7ARV/7 1025 B-17-3434
Lake Area R K
WB0MWJ/0(+WD0ELT) 1460 B-14-3430
Delaware-Lehigh ARC
W3OK/3* 1449 B-18-3415
Collier County ARC
K4FA/4* 1203 B-19-3320
Non-Club Group
K2DEG 531 A- 4-3310
Elkhart Red Cross ARC
AD9V/9*(+KA9CZO) 1205 B-15-3300
Kaw Valley ARC
W0CET/0(+KA0DOR) 1085 B-36-3268
Burnaby ARC
VE7BAR/7* 1041 B-20-3216
Vero Beach ARC
W4OT/4* 1488 B-12-3152
Saline County ARC
AE6L/5* 1039 B-26-3076
Framingham ARA
W1FY* 867 B-15-3004
Arizona ARC
W7IO/7* 1185 B-40-3002
Great South Bay ARC
AB2S/2*(+WA2HQB) 891 B-33-2988
Green Country Chapter 10-X International
W5NNL/5* 1143 B-12-2970
Blackstrap RC
K1ME/1* 1245 B-16-2956
Keuka Lake ARA
K2GK/2*(+KA2CRV) 707 B-16-2948
Lancaster F D Operators Club
N3AY/3 1075 B-15-2946
CRA De Valleyfield
VE2CEV/2 661 B-11-2944
Anne Arundel RC
W3VPR/3*(+WB3KIW) 907 B-20-2936
Moo Meadow QTV ARCS
W7XI/7* 1011 B-12-2928
Lafayette ARC
W5DDL/5 1000 B-26-2924
Albany ARES/RACES
KB2AQ/2*(+KA2FAS) 794 B-11-2912
Valley ARA
AA1Z/1 1049 B-25-2898
Goose River ARC
W0KZU/0* 1027 B- 8-2888
10/70 Repeater Assoc.
K2TK/2* 919 B-31-2882
NCO DX Society
K8CW/8*(+KA8FQI) 679 B- 8-2876
Arrowsmith ARC
VE7EMO/7 776 B-20-2864
Springhill ARC
N5II/5*(+KA5FDI) 1345 B-20-2840
Rock River RC
W9KZ/9(+KA9DVT) 1040 B-20-2818
Enfield RA Group
N1SR/1*(+KA1CEC) 914 B-14-2812
Lake Success RC
W2YKQ/2* 944 B-12-2738
Des Moines RA Assoc.
W0AK/0* 967 B-13-2786
Westchester Emergency Communications Assoc., Inc.
N2EF/2*(+KA2ENA) 778 B-26-2760
Lockheed Employee's Rec. Assoc. ARC
WA6GFY/6* 842 B-19-2760
Hughes Fullerton Employees Assoc. ARC
K6QEH/6*(+KA6FZN) 897 B-20-2736
Bunker - Ramo Westlake Village ARC
WB6OBQ/6* 954 B-10-2722
Adirondack ARC
K2KO/2*(+KA2BIX) 665 B-10-2678
Greenville Amateur FD Group
WB3INS/3*(+KA3AED) 775 B- 6-2640
Comm Club of New Rochelle
W2XV/2*(+WA2VQE) 1051 B-40-2622
Some Kinda Nuts
WB6SKN/6*(+KA6DYI) 1111 B-12-2620
Falmouth ARA
W1HQH/1*(+WB1DSG) 751 B-12-2596
Twin City Hams ARC
W5EA/5*(+WD5CEU) 621 B-20-2582
Moose Jaw ARC
VE5MA/5* 893 B-12-2550
Granite State ARA
W1TF/1* 1009 B-13-2520
Roasted Turkey Gut Group
WB7RTG/7* 964 B- 8-2506
Menominee Falls RC
K9RI/9*(+KA9CFC) 879 B-16-2500
San Gabriel Valley RC and Aero Jet-Electro Systems Employees RC
K6CLZ/6*(+KA6EZX) 951 B-41-2488
Santa Clarita ARC
W6JW/6 867 B-31-2480
Bluff ARC
WD0AXV/0 913 B-12-2478
Old Field ARC
N4OH/4* 979 B- 5-2460
Petaluma DX and Experimenters Soc.
N6QC/6*(+KA6AHK) 844 B-10-2452
ARES/RACES Kalamazoo ARC
K8TIW/8 688 B-10-2444
Detroit Metropolitan RC
W8RJI/8* 863 B-10-2442
Navarro ARC
N5ALA/5*(+KA5FKS) 886 B-18-2438
Northern Kentucky ARC
K4CO*(+WA4NXD) 889 B-24-2422
Lawton-Fort Sill ARC
W5KS/5* 731 B-27-2414
Welland County ARC
VE3WCA/3 677 B-26-2414
Boeing Employees ARA
K7NWS/7*(+WB7PFT) 665 B-43-2398
Club Amateur Maskouth
VE2CAM/2 642 B-10-2396
ARC of Mt. Vernon
W9BFO/9* 1162 B-10-2374
Skyview R S
K3MJW/3* 743 B-26-2368
Hillsborough ARS
WA4GJJ/4*(+WD4JSD) 1192 B-11-2313
Very Fine Operators
N6KG/6 534 B- 7-2304
Estero ARC
W6KW/6* 726 B-12-2282
Bedford County ARS
K3NQT/3* 778 B-14-2256
BJ-DX
KA6BCC/6 900 B- 6-2254
Florence ARC
W4ULH/4 790 B-15-2228
New River Valley ARC
W4CBM/4* 585 B-12-2212
Indianapolis Red Cross RC & ARES
WA9LGQ/9* 850 B-40-2194
San Mateo RC
W6LMN/6* 785 B-12-2182
HDL RC
WA5IBA/3* 640 B-13-2158
Port City ARC
W1WQM/1* 990 C-14-2128
Alumni of the New York Institute for the Education of the Blind
K2LY/2* 635 B-16-2122
Smoky Mtn. ARC
W4OLB/4*(+KA4DLA) 708 B- -2120
Worthington ARC
W0QEJ/0 910 B- 9-2120
Virginia ARA
W4FEG/4* 761 B-14-2112
Great Falls Area ARC
N7AGP/7*(+KA7DPA) 661 B- 9-2112
Panoramaland ARC
K7DU/7* 494 B-10-2100
Catalpa ARA
W8CQ/8* 690 B-20-2094
Socorro ARA
KA5CNE/5 786 B-15-2092
Bismarck ARK
W0ZRT/0* 828 B-12-2090
High Plains ARC
K7YPT/7* 844 B- 8-2088
Fresno ARC
W6TO/6* 693 B-20-2081
Aero ARC
W3PGA/3* 773 B-14-2074
Crawford County ARC
WA9ISV/9* 586 B- 9-2074
Easton ARS, Inc.
WA3GVI/3*(+WA3RCH) 649 B-20-2060
Chattahoochee Valley ARC
AA4J/4* 1004 B-12-2058
Mid Range ARC
W0EL/0* 616 B-20-2050
Munroe Falls F D Club
WA8LRI/8*(+KA8CGF) 762 B- 7-2032
Griffiss AFB ARC
W2TPB/2 617 B- 9-2030
Wilderness Trail ARC
KI4B/4 643 B-15-2014
Lincoln Trail ARC
WB4BEJ/4* 694 B-21-2012
Livingston ARC
K8PJ/8(+WD8MNU) 510 B-15-1996
Copper Country R. A. Assoc.
W8CDZ/8*(+WD8ODN) 609 B-18-1996
Grande Ronde RA
W7KVV/7* 479 B-16-1978
Fargo Repeater Assoc.
WD0CCL/0* 758 B- 7-1978
Manatee ARC
K4GG/4*(+WD4CRS) 1477 C-15-1969
American Red Cross E. C. Service
WB2QBP/2 672 B- -1964
The Guys & Gals of .69/.09, Miami
KB4ES/4 734 B-11-1950
Mount Baker ARC
K7SKW/7* 1445 C-70-1947
Lancaster Radio Transmitting Society
W3AD/3 652 B-15-1924
York North ARC
VE3YNA/3* 587 B-30-1896
East River ARC
W8MOP/4* 430 B-12-1876
Peach Mountain Group
W8DU/8* 846 C- 5-1876
Colonial Wireless
N1AU/1(+KA1BTJ) 568 B-16-1864
Runestone RC
WA0VVM/0 598 B-13-1844
St. Cloud ARC
W0SV/0 542 B-12-1820
McKean County ARC
W3VV/3* 598 B- 7-1808
Sussex Co. ARC
AC2A/2* 583 B-12-1788
Club Sans Filiste Port Neuf
VE2C5P/2 454 B- 8-1772
West Side RC
VE3JJJ/3* 570 B- 6-1770
Luna County ARC
K5DR/5* 557 B-12-1752
ARA of Bremerton
W7VE/7 469 B- 5-1748
Mid Atlantic ARC
WB3JOE/3* 548 B-14-1738
Murphy's Radio Class
W6MK/6* 640 B-156-1722
Brazos Valley ARC
N5HF/5*(+KA5FBU) 567 B-11-1714
Jefferson County ARES/Tri-County RC
W9MQB/9(+KA9DZE) 427 B-10-1702
San Angelo ARC
W5QX/5* 571 B-10-1696
Saskatoon ARC
VE6AA/5* 529 B-10-1690
Key City ARC
N5XU/5* 391 B-12-1688
Coastside ARC
WA6TGW/6 585 B- 9-1686
Southeast ARC
W5SPD/5* 642 B-12-1658
Non-Club Group
K8CA/8* 343 B- 4-1646
Walton Hills ARC
WD8IRE/8* 580 B- 4-1596
Carson ARC
W6UDE/6(+WB6ROQ) 543 B-18-1582
Augusta Emergency A.R. Unit
W1TLC/1* 528 B- 5-1580
Twin State ARC
W1FN/1* 455 B- 6-1574
Lakes Area ARC
N5BJ/5* 558 B- 3-1572
York RC
W9PCS/9 786 B-14-1572
Anchorage ARC
KL7AA/KL7 480 B-75-1569
Upper Valley ARC
N8ED/8* 541 B-12-1546
Minot ARA
K0AJW*(+WD0BMA) 428 B-12-1526
Cambridge ARC
W8VP/8 439 B-25-1516
Jackson County ARC
WA4PJP/4*(+WD4FVV) 502 B-14-1510
Brookings Radio Research Club, Inc.
K0TA/0* 1093 C-10-1493
Wantagh ARC
W2VA/2*(+KA2DXM) 516 B-20-1492
Hualapai ARC
WA7LAZ/7* 503 B-19-1492
Hernando ARA
K4ZC/4* 342 B- 8-1486
WR6ABW Repeater Group
N6ZH/6* 517 B- 9-1472
Barstow ARC
N6GS/6 479 B- 8-1432
Wide Area Data Group
W7CNC/7 452 B- 7-1398
Conyers AR Group
N4CI/4* 396 B- 9-1394
Desert Waves ARC
W6GUP/6* 400 B- 5-1384
South Waterloo ARC
VE3SWA/3* 391 B-15-1364



Got 6 meters covered? It's in the *bag* with WD8AXP at the helm for the Monongalia Wireless Association. (K8LG/8 6A)



Left to right, Brian, WA4WYN; the Ghost of FD past (on top of the rig next to the keyer) and John, WB4ZKN. The Splinter Group. (K1ER/4 3A)

The age of the computer arrived at the Field Day site of the South East ARC. WB8TTP computes, WD8KIS works 'em, and WB8YXU keeps the logs. .

Keowee-Toxaway ARC
WD4FQW/4 444 B-10-1362
FAARA
WB1DD/8* 382 B-12-1360
Hocking Valley ARA
WB8LGX/8* 438 B-15-1360
Tri-City RAC
W9VQR(+KA9EPN) 488 B- 4-1348
Hams of Rutland
N1VT/1* 448 B- 9-1342
Chattooga Walker County ARC
WB4REX/4 512 B- 9-1334
Northern Lakes ARC
K9EL/9* 492 B-10-1326
Delaware County ARA
AB3L/3 459 B-10-1316
North Okaloosa ARC
W4OCG/4 409 B-12-1316
Winnipeg ARC
VE4BB/4 413 B-20-1303
North Platte ARC
W9CXH/9 448 B-17-1296
Gratiot ARA
WA8AWE/8*(+KA8CZO) 425 B- 7-1286
Valley RC
W7KL/7(+WB7VQQ) 462 B-16-1276
Pueblo Ham Club, Inc.
W9ES/9(+KA9CPH) 436 B-15-1274
Clear Lake Emergency ARS
K5BV/5*(+WD8PHK) 349 B-12-1272
Santa Cruz County ARC
K6BJ/6 411 B- 6-1270
Non-Club Group
AA9Q/9 294 B- 9-1258
Clallam County ARC
W7FEL/7 379 B- 6-1254
Peterborough ARC
VE3AEA/3* 368 B-12-1232
3M ARC
K9XV/9* 447 B- 9-1198
Lincoln County ARC
W9BLZ/9(+KA9DQG) 604 17-1197
Choctaw ARC
K5UV/5*(+KA5EOS) 273 B- 9-1184
Glasgow ARC
K3NI/3 204 B- 5-1166
Lake Region ARC
K9QIK/9* 384 B-14-1152
Emporia ARS
K9SPF/9 237 B-10-1148
Coastal Plains ARA
K4GAT/4 357 B- 4-1114
Gold Coast FM Assoc.
K4JAU/4* 333 B-15-1112
Black Hills ARC
W9BLK/9* 723 B-30-1109
U. of Mo. Rolla ARC
W9EEE/9* 312 B- 7-1098
Danville ARS
W4XQ/4 632 C-14-1094
Juneau ARC
KL7GPG/KL7 242 B-12-1092
C. Q. RC
K1BCI/1* 510 B-18-1078
Merrimack Valley ARC
W1FW/1* 616 C- 7-1068
Gabillan ARC
KB6IT/6* 692 C-16-1056
Vienna Wireless Soc.
K4HIA/4* 327 B-12-1054
Highlands County ARC
WB4QQK/4 370 B- 8-1050
Foothill ARC
N9ALN/9 273 B- 1012
Starved Rock RC
W9MKS/9 555 C- 6- 977
The Linleys
WB9EQ/VE3 265 B- 3- 898
ICARS
K5ES/5* 369 C-20- 892
Allendale ARC
WD8PNG/8 204 B- 6- 888
Western Ariz. RC
K7JU 203 B- 3- 872
Pucatello ARC
WA7PWT/7*(+KA7ASY) 196 B-15- 860
Teays ARC
K8ABI/8 493 C-20- 849
SCARS/QU Clubs
W5QU/5* 483 C-11- 833
6 Pack ARC
W9GPR/9* 217 B- 7- 832
Hartford County ARA
W1NEM/1* 239 B- 6- 828
Tri County ARA
K6AGF/6 120 B-11- 793
Tube & Shutter Club
W8GVJ/8* 420 C-12- 770
Waxaukee ARA
KB8FN/8* 153 B-10- 768
Tri-County ARC
W9KQF/9* 157 B- 6- 746
Emmett ARS
WB7FDM/7 149 B- 6- 736
Tillamook Radio Communications Club
K7GPS/7 212 B- 4- 728
Non-Club Group
W4FLW/4(+KA4BNI) 138 B- 4- 688
Non-Club Group
WA4PPL/4 182 B- 8- 664
Rock Point ARC
VE5TT/5* 135 B- 3- 594
Non-Club Group
WD9GWI/9* 252 3- 552
Coastal Area Repeater Soc.
AB4B/4* 79 B-10- 486
Drumlins ARC
WA2AAZ/2* 126 C- 3- 442

3A - Commercial

Pennsylvania ARC
WA3RCA/3*(+KA3AEE) 881 B-16-2266
West Allis RAC
W9FK/9* 1967 C- 9-2144
Deep East Texas ARC
W5PI/5* 555 B-20-1446
Fountain County ARC
K9YKX/9* 504 B- 8-1052
Loudon County ARC
W4WVJ/4* 334 B- 7- 846
Humber ARS
VO1OB/1 217 B- 25- 496
FLTAC ARC
AE6N/6* 212 B- 8- 378

4A - Battery

Western Washington DX Club
W7FR/7*(+KA7BXX) 2096 A-27-14,500
Ringgold ARC
W4ABZ/4* 936 A-17-7600
Quad County ARC
W3FF/3* 452 A-23-3145
Stark RTTY Group
WB8RVM/8* 601 B-13-2714
Durango ARC
N0AO/0 353 B-16-1470
ARC of Central Wisconsin
K9FYM(+KA9APW) 273 B- 8-1030

4A

Palo Alto ARA
K6YT/6*(+KA6BEU) 4284 B-49-12,582
Foothills ARS
K6YA/6*(+WD6CIO) 3754 B-32-11,272
Fort Wayne RC
W9LT/9*(+WD9DGA) 3598 B-53-10,876
Manzano Mountain Moonshiners
N5RR/5*(+KA5EHI) 3553 B-12-10,798
Pottawatomie ARC
W2RI/2*(+N2ADJ) 3057 B-56-8950
Columbus ARC, Inc.
K4KS/4(+KA4CHA) 2637 B-30-8374
Oak Ridge ARC
K4PJ/4 2461 B-50-7810
Ozaukee RC
W9LO/9*(+WD9JHP) 2538 B-31-7362
Hamfesters RC
W9AA/9(+KA9OXZ) 2172 B-27-7262
Baton Rouge ARC
N5DP/5* 2239 B-37-6856
Intercounty ARC
W2DMM/2 2366 B-12-6814
Alamancepsie ARC
K4EG/4*(+KA4ISU) 2269 B-27-6668
Saratoga County RACES
K2QE/2*(+KA2APN) 1937 B-25-6446
Natchaug ARA
W1TRJ(+WB1CCL) 1914 B-20-6350
Fair Lawn ARC
WB2RLO/2* 2625 B-23-6330
Nevada ARA
W7YN/7* 1996 B-30-6268
Gwinnett ARS/Scientific - Atlanta ARS
N4TM/4*(+WA4DDL) 1902 B-27-6256
Ottawa ARC
VE3RC/3 1757 B-35-6194
Humboldt ARC/Far West Rptr Assoc./
Redwood Country C.C.
AA6DX/6* 2165 B-54-6170
Kettle Moraine RAs
W9HE/9* 2090 B-38-6106
Nashua Area RC
K1HI/1*(+WB1DYV) 1713 B-45-5651
Maryland Mobilers ARC
K3WD/3* 1969 B-15-5582
M & M ARC
AB9F/9*(+W9CNV) 1695 B-18-5488
Indian River ARC
K4YS/4*(+WD4OFC) 1862 B-36-5440
Gram ARC
K2OS/2*(+WA2JRR) 1637 B-35-5392
Carthage Amature R S
N0ES/0(+KA0DTK) 1359 B-20-5364
Auburn ARA
W2PI/2* 1267 B-28-5179
Reading R.C.
WU3B/3(+KA3BHQ) 1627 B-30-5052
Rochester ARC
W9MXW/9(+KA9CRO) 1496 B-35-5024
Tombigbee ARC
K5BX/5*(+WB5UWG) 1553 B-25-4984
RCA Astro Electronics ARC
WB2UQR/2* 1594 B-18-4978
Citrus Belt ARC
W6JBT/6* 1467 B-10-4878
Arlington ARC
N4GA/4* 1779 B-20-4856
Clinton ARC
W0CS/0 1447 B- 7-4816
Irwin Area ARA
WB3JSI/3* 1670 B-17-4802
Huron Valley ARA
W8KGG/8* 1137 B-15-4786
Fullerton RC
W6ULI/6*(+KA6CAL) 1503 B-35-4760
Cochise ARA
W7MES/7* 1440 B-10-4698
Elgin ARS
W9IKN/9*(+KA9BND) 1463 B-27-4698
West Jersey Radio Amateurs
W2JUG/2*(+WA2QJI) 1414 B-20-4643
Umpqua Valley ARC
AE7Q/7* 1829 B-11-4598
Heart O'Texas ARC
WD5IAF/5* 1666 B-30-4474
Pasadena RC
W6KA/6(+WD6BES) 1536 B-25-4460
Central Michigan ARC
W8MAA/8*(+WD8CEN) 1190 B-20-4414
Salem ARC
W7SAA/7 1245 B-40-4382
Cowichan Valley RC
VE7CVA/7 1389 B-47-4372
North Shore ARC
VE3NSR/3* 1389 B-32-4214
Hopatcong Emergency Radio Operating
System
WB2RTF/2*(+KA2DNP) 1390 B-12-4170
Non-Club Group
K6MRK/6* 1169 B- 9-4090
Yuba-Sutter ARC
N6DM/6* 1595 B-33-4090
Marshall ARC
W0BMJ/0*(+KA0AEG) 1400 B-28-3922
William Penn RC
W3FPC/3* 930 B- 7-3890
Middle Tennessee ARS
W4UOT/4*(+KA4CHE) 1242 B-20-3878
Decatur ARC
W4TDY/4*(+KA4CKR) 1144 B-30-3854
Tri Town RAC
W9VT/9(+KA9DES) 1223 B-75-3854
The Farout ARC
WB8SMC/8*(+N8BFC) 1292 B-20-3741
Harmonic Hill R.L.
W2AAO* 1405 B-15-3732
Whitman ARC
W1XE/1*(+KA1CXX) 1165 B-12-3729
Central Georgia ARC
AA4TT/4* 1193 B-15-3708
Stanford Linear Accelerator Center ARC
W6CB/6* 1279 B-17-3702
Martin County ARA
K4ZK/4* 1584 B-23-3690
Chippewa Hills ARC
WD8PWJ 1110 B-14-3588
Suffolk County RC
W2DQ* 1255 B-15-3526
Southwest Dallas County ARC
KA5V/5*(+WB5WYQ) 1102 B-25-3486
550 ARC
WA2SNA/2* 1102 B- 3442
Albany ARA
K2CT/2* 1136 B-20-3418
Stonewall Jackson ARA
W8PV/8 1179 B-17-3408
NARC
AC3N/3(+KA3CKK) 1037 B-10-3353
Chattanooga ARC
W4AM/4* 1130 B-25-3342
Eastern Ohio Amateurs Assoc.
N8NR/8*(+KA8AAV) 934 B-20-3287
New Bern ARC
WD4JAS/4* 1119 B-25-3256
Naval Post-Graduate School ARC
K6LY/6* 1036 B-40-3240
Southeastern DX
W4NT/4* 1133 B-12-3222
Piqua ARC
W8SWS/8* 1053 B-41-3174
Middle Country ARC
W2WW/2*(+WB2YUJ) 835 B-10-3170
B.R.D. Area ARC
AE8T/8(+KA8ATL) 899 B- 7-3122
Algonquin RAC
W1BK/1* 1139 B-18-3100
Miami Country ARC
K9ZEV/9(+KA9BAL) 802 B-10-3098
Schuylkill Amateur Repeater Assoc.
W3EEK/3* 2032 C-10-3016
St. Clair County ARC
W8GXU/8* 979 B-33-3012
Monsanto ARA
WB8BBN/8* 978 B-31-2976
LaPorte ARC
K9JSI/9* 1193 B-10-2972
Greensboro-Guilford Co. ARES
N4XB/4* 953 B-44-2964
McHenry County Wireless Assoc.
K9XI/9* 950 B-20-2958
NIHRAC
K3YGG/3* 805 B-12-2728
Riverside County ARA
W6TJ/6* 986 B-24-2720
Great Bay RA
WB1CAG/1*(+KA1BQL) 748 B-17-2700
Queen City Emergency Net
WRVVL/8* 813 B-25-2668
Lewiston-Clarkston ARC
W7FM/7 1129 B-14-2658
Rock Creek Critters ARA
K2TM/2* 893 B- 5-2620
Central La. ARC
K5AG/5* 855 B-10-2608
Two Rivers ARC
W3OC/3* 820 B-21-2558
Kent County ARC
W3HZW/3 663 B-10-2508
Southeast Volusia ARC
KD4Z/4* 746 B- 8-2508
Cabarrus ARS
W4DSU/4* 864 B-15-2508
Abington ARC
K3CSG/3 901 B-17-2496
Pioneer ARC
VE3NA/3 888 B-22-2496
Lake Country ARC
AE5B* 913 B-11-2476
Newport County RC
W1SYE/1(+WB1FMB) 697 B- 7-2444
Briarpatch ARC
N4VL/4 917 B-10-2408
Thomaston Area ARC
W4OH/4 817 B-20-2400
Old Post ARS
W9EOC/9*(+KA9EJC) 949 B-46-2352
Big Island ARC
KH6AL/KH6* 521 B-11-2348
PHD ARA Liberty, Missouri
WA0UGL/0* 781 B-35-2334
Eastern Ozarks-Jeffernson Co.
A10H/0*(+WD0HRE) 760 B-50-2324
Mercer County ARC
W3LIF/3*(+KA3GCD) 849 B-19-2308
Albany ARC Inc.
W4MM/4 821 B-15-2222
Thunder Bay A R
W8UR/8 677 B-10-2198
Ocean Monmouth ARC
WH2HIC/2* 864 B-12-2184
Lancaster County ARC
W4PAX/4 576 B-11-2181
Twin City Repeater Club & Auxiliary
With Happy Flyers and Ramsey County
Emergency Services
KB0BU/0* 804 B-20-2170
Ft. Myers ARC
W4LX/4*(+KA4FZH) 787 B-13-2160
Greater Toledo ARA
K8ALB/8 726 B- 8-2128
Susquehanna Valley ARC
WB3GCH/3* 374 B-12-2100
Chicopee Mass ARA
N1CM/1* 758 B-20-2082
Olympia ARS
WB7UPF/7* 534 B-13-2076
Stanislaus ARA
W6XK/6*(+KA6CXR) 701 B- 9-2074
Catalina R Assoc.
K1TU/7 569 B- 2050
Morganton ARC
K4AI/4* 646 B-15-2046
Muscatine ARC
K9FXM/9* 625 B-45-2031
SOBARS
K6QHQ/6*(+KA6FGE) 634 B-15-2014
Pioneer ARC
W9RCH/9 542 B-16-1996
Monroe County ARC
K8HS/8* 737 B-10-1982
Jackson County ARC
K3RC/8(+KA8DUE) 686 B-14-1960
Minn Valley Hammers
KB9HN 706 B-13-1934
Grant County ARC
W9EBN/9(+KA9EOD) 588 B-15-1924
Branch County ARC
WD8KAF/8 1149 C-20-1881
McDonnell-Douglas ARC
WA0CGV/0* 493 B-23-1746
East Aurora DX Club
K2ZUW/2 392 B-10-1733
Michigan City ARC
W9CSF*(+WB9RXF) 959 C-36-1724
Jersey Shore ARS
W2DOR 447 B-15-1709
Alleghany Highlands ARC
W2IMO/2*(+KA2CGV) 401 B-14-1666
Hams of Western Labrador
VO2ML/VO2 436 B- 9-1660
Sabine Parish ARC
K5ABA* 381 B-31-1650
Central Kentucky ARC
WA4UXJ/4* 498 B-20-1620
Cape Ann ARA
W1RK 485 B-14-1616
Riverfront Wireless Assoc.
K3HP/2* 412 B-12-1598
Non-Club Group
AI7J/7(+N7AAC) 531 B- 9-1578
KS-NEB R.C.
W9TLD/9 632 B-20-1541
Layton ARA
W8BI/8 1012 C-15-1537
Thumb ARC
W8AX/8* 427 B-18-1536
Dade RC
W4NVU/4* 750 C-20-1494
Staten Island ARA
W2CWW/2* 426 B-16-1402

NØCP (l) and WØUA, as well as the rest of the Colorado Contest Conspiracy, made big sounds with big antennas in the 2A category.

Laid back and mellow, that's the WAØUOS philosophy on FD. Don was with the Worthington ARC. (WØQE/Ø.3A)

The Marijuana FD Party off loads their stash of FD gear for their stay on Peddocks Island in Boston Harbor. Do you *still* wonder why they call it dope? (W1MJ/1 1A — battery)

Madison County ARC
W9VCF/9*(+KA9DJE) 712 -16-1384
Chicago ARC
W9CAF/9* 615 C-20-1366
North Shores ARC
K6HAI/6* 481 B-12-1362
Columbus(Ind) ARC
WD9EME/9(+WD9DWH) 408 B-12-1317
Jacksonville ARC
WB9VIH* 378 B- 8-1274
Terry County ARC
K5LSQ/5 313 B-15-1264
ARC of Savannah
W4HBG/4* 374 B- 4-1212
Patrick AFB
WB4QFC/4*(+KA4JRY) 351 B-13-1192
Black Diamond
K8BO/8 295 B-10-1096
General Telephone of Penn. ARA
K3OC/3* 278 B-12-1092
Non-Club Group
K9IQH/9 289 B- -1078
Tulare County ARC/Porterville ARC
WA6BAI* 274 B- 7-1048
Cascade RC
W7EK/7* 198 B- 6- 942
Golden Empire ARS
W6RHC/6 460 B- 7- 920
Brush Country ARS
K5TK/5 233 B-12- 916
Paynesville ARA
WDØDKW/Ø* 312 C- 4- 866
Chautauqua County A.F.M. Assoc.
K2HF/2 359 C-20- 827
Non-Club Group
AD7F/7* 164 B- 6- 778
Oakland RC
W6OT/6(+WD6BGL) 176 B- 7- 766

4A - Commercial

Telephone ARC of Manhattan
W2FWG/2 584 B-20-1730
Mich. Bell ARC
K8FA/8* 639 B-12-1524
Non-Club Group
N2UA/2 1150 C- -1497
Chippen Repeater Assoc.
K1DII/1 330 B- 8- 970
Iroquois County ARC
WB9TIC/9 274 B- 8- 548

5A - Battery

Fusion ARC
W2PU/2* 802 A-13-6715

5A

Wireless Institute of the Northeast
W2RQ/2*(+KA2FGD)5481 B-31-16,276
United RAC
K6AA/6*(+KA6CAD)4008 B-45-11,510
Motorola Engineers-Schaumburg
K9RO/9* 3860 B-15-11,267
Birmingham ARC
W4CUE/4*(+KA4DTU) 3733 B-68-10,122
Northwest ARC
W9LM/9 3043 B-36-9652
Cherryville Repeater Assoc.
K2NT/2*(+WA2VUX)2932 B-28-9470
Southern Maryland ARC
W3PI/3*(+KA3BWS) 2801 B- -8342
Schenectady ARA
K2AE/2(+WB2OKK) 2470 B-20-7916
Litton Data Systems ARC
K6FM/6*(+KA6BLS) 2908 B-25-7634
The Providence RA Does It Again
All Worked Contest Group, Inc.
W1OP/1 2782 B-17-7437
Eastern Connecticut ARA
K1MUJ/1*(+WB1EAT) 2162 B-15-6932
Southern Calif. Amateur Transmitting Soc.
WB6LHU/6* 2917 B-25-6780
Schaumburg ARC
W9KT/9(+KA9CZZ) 2018 B-35-6636
Midsouth VHF Assn/Raleigh Club
K4AP/5* 2302 B-109-6374
Kilocycle Club of Fort Worth
W5TI/5*(+KA5EAQ) 2155 B-100-6365
Southern Skiland Contest Gp.
N6PE/6* 1676 B-10-6345
Radio Central ARC
K2KI/2* 1859 B-50-6156
Grumman ARC
WA2LQO/2*(+WA2RMN) 1837 B-36-5980
Scottsdale ARC
K7IR/7*(+KA7AFW)2006 B-33-5956
AK-SAR-BEN ARC
WØEQU/Ø(+KAØEBD)2044 B-50-5750
Wayne AR Tech Society
AI8P*(+KA8FXU) 1769 B-17-5718
Polk County Civic Defence ACS
W4TJM/4* 2258 B-16-5622
Orange County ARC
W6ZE/6* 2189 B-25-5484
Saginaw Valley ARA
K8DAC/8*(+KA8ETI) 1676 B-30-5306
Mt. Tom Amateur Repeater Assn.
WIJP/3*(+WB1FIQ) 1770 B- 9-5188
Garland ARC
K5QHD/5* 2103 B-63-5178
Wheaton Community RA
W9CCU/9*(+WD9CIM) 1463 B-42-5148
Muskegon AR Council
W8ZSO/8(+WD8JWI) 1470 B-60-4874
Broome County All Stars
N2HR/2*(+WA2HGE)1467 B-22-4800
Tri-City ARC
N1RW/1*(+KA1ATP) 1313 B-22-4724
Klamath Basin ARA
W7VW*(+KA7DAA) 1474 B-14-4713
Rio Hondo ARC
W6GNS/6* 2013 B-35-4678
Confederate Signal Corps
W4VTA/4* 1600 B-60-4630
Quanapowitt RA
W1EKT/1* 1343 B-32-4622
Illiana Repeater System
K9PD/9*(+WB9LRS) 1885 B-32-4584
Katamazoo ARC
W8VY/8* 1201 B-30-4416
Bergen ARA
K2ZO/2*(+KA2EUK) 1635 B-21-4394
Aroostook ARA
K1JK/1* 1409 B-25-4292
Manchester RC
W1KKS/1(+KA1CUR)1589 B- -4268
Montgomery ARC
WA3EWJ/3*(+KA3BWT) 1355 B-38-4210
Harrisburg RAC
W3UU/3* 1118 B-50-4158
West Island ARC
VE2CW/2 1203 B-30-4152
Sioux Falls ARC
WØZWY/Ø(+KAØEKQ) 1145 B-39-3992
Fort George ARC
VE7FG/7* 1180 B-27-3984
C WE Group
W9WU/9* 1337 B-13-3828
East Whittier RC
W6VR/6* 1448 B-15-3822
Daytona Beach ARA
K4BV* 1324 B-18-3792
Blue Ridge ARS
W4NYK/4* 1139 B-40-3734
Massanit ARA
W1MV/1 1128 B-19-3704
Indian Hills RC
W8ICS/8* 1223 B- -3614
Sangamon Valley RC
W9DUA/9* 1101 B-42-3594
Monroe County Radio Communications Assn.
WA8MTX/8 2132 B- -3567
North Bay ARA
K6LI/6*(+WD6DVP) 942 B-25-3558
South Pickering ARC
VE3SPC/3* 1050 B-14-3552
Poway ARS
K6CD/6* 1156 B-30-3534
Warren ARA
W8VTD/8* 1025 B-40-3356
CRANOG
VE2BLW* 1987 C-24-3291
Kennebouchee ARC
W4BTI* 1138 B-40-3260
Kingston ARC
VE3KAR/3 1074 B-23-3240
Lebanon Valley Society RA
W3RE/3* 907 B-22-3192
Bellevue ARC
WØWYV/Ø*(+KAØEJX) 1184 B-15-3150
Ft. Smith Area ARC
W5JE/5* 989 B-30-3144
Stamford ARA
K1GF/1* 887 B-18-3018
Seneca RC
W8ID/8* 1015 B-16-3014
Parkersburg ARK
WA8JE/8 787 B-20-2914
Champlain Valley ARC
W2UXC/2* 875 B-15-2898
Elmira Area Amateurs
N2HG/2* 1570 C-30-2792
Fredericton ARC
VE1ND/1* 941 B-25-2758
Van Wert ARC
W8EFY/8(+KA8ARO) 923 B-30-2754
Clinton-Highland County ARA
W8WMQ/8* 827 B-18-2708
Tidelands ARS
K5BS/5* 894 B-50-2668
London ARC
VE3LON/3* 792 B-23-2600
Kanakee ARS
W9AZ/9 548 B-11-2588
San Antonio Telephone Pioneers ARC
WD5CYX/5* 936 B-25-2536
Cumberland Valley ARC
KB4BS/4(+WD4IEK) 789 B-22-2514
Roanoke Valley ARC
W4CA/4* 700 B-30-2504
Hampden County RA
W1NY/1* 519 B-18-2446
Corning ARA
W2GJ/2(+KA2DPY) 584 B-15-2436
Chelmsford ARA
W1LUS/1*(+WB1GZR)663 B-13-2410
FORX ARC
WAØJXT/Ø 672 B-15-2392
Okaw Valley ARC
W9GQ/9* 863 B-14-2362
Oakville ARC
VE3HB/3* 725 B-22-2340
Spokane Dial Twisters ARC
K7LRD/7* 772 B-28-2336
Sweetwater ARC
WB7AMP/7(+WB7QBC)808 B- 8-2292
Silver Springs RC
K4GS/4 649 B-14-2198
Delta ARA
WB5FD/5* 706 B-15-2156
Ashland Area ARC
W8OD/8*(+KA8FYO) 640 B-15-2134
Sourland Mountain ARC
K2WM/2* 659 B-14-2132
Crescenta Valley RC
W6HS/6*(+WB6VWL) 556 B-18-2124
Spokane RAs
W7NBR/7* 615 B- 7-2098
Macon ARC
W4BKM/4 676 B-10-2068
Western Carolina ARS
W4MOE/4* 562 B-15-2062
Marion ARC
W8GVB/8*(+KA8CNC)376 B-41-2042
Big Rapids Area ARC
WD8NKA/8* 523 B- 8-1900
Sheridan ARC
W7GU(+WB7QIL) 513 B-15-1894
Kishwaukee ARC
WA9CJN/9*(+KA9ELA) 437 B-17-1877
Rogue Valley ARC
W7QEK/7*(+KA7CYA) 406 B- 5-1874
Foothills ARC
W3LNW/3* 1192 C-23-1867
Mid-Michigan ARC
N8AR1/8 643 B-24-1836
Kings Point Killers
AE2E/2 503 B- 7-1750
Southern Sierra ARS
N6OR/6*(+WD6FOP) 520 B-13-1722
Orange County ARC
N2CF/2*(+WB2LQI) 484 B-22-1696
Silverado ARS
W6CO/6* 387 B-12-1682
Hiawatha Valley R C
KØDEG/Ø* 506 B-11-1644
Nassau County ARC
WB2NWP/2 499 B-35-1634
Binghamton ARA
W2OW/2* 887 C- 8-1624
Non-Club Group
K4GFY/4* 385 B- 6-1574
Milwaukee RAC
W9RH/9* 711 C-17-1540
Playground ARC
W4ZBB/4* 456 B-15-1530
Naval Research Lab ARC
W3NKF/4* 775 C-10-1401
Union County C D and D C
K2IH/2* 341 B-49-1374
Waupaca ARC
WB9FSD/9*(+KA9ELK) 277 B-15-1270
Ambassador ARA
WB6ZOT/6* 326 B- 5-1266
Squaw Island ARC
K2BWK/2* 361 B-18-1256
Greensboro ARA
AE4N/4* 357 B-10-1218
Huntingdon County ARC
W3VI/3* 256 B-10-1080
Sterling Rock Falls ARS
W9MEP/9 255 B-20-1074
Onalaska ARC
K9VQR/9 276 B- 6-1030
Whitewater Hills ARC
WB9SBI/9 272 C-20- 915
Indian Foothills ARC
WBØWMM/Ø 235 C-14- 735

5A - Commercial

Brightleaf ARC
W4AMC/4* 1066 B-16-3132
Laurel ARC
K3LDE/3* 798 B-17-2370
Mountain ARC
WA4YZY/4* 613 B-15-1866

6A - Battery

Northeast Iowa R A Assoc.
WØMG/Ø*(+WBØZIZ) 840 A-30-7960
Gould ARC
K6OR/6* 312 A- 8-2680
Rorer ARC
K3QQ/3 325 A- 6-2420

6A

Huntsville ARC
K4BFT/4*(+WB4HUC) 4172 B-36-12,574
L'anse Creuse ARC
W8LC/8*(+KA8DRX)3792 B-63-11,746
Cary ARC
N4NC/4* 2913 B-48-8562
Portsmouth ARC
W4POX/4* 2798 B-27-8522
AMPEX ARC
K6QE/6* 2858 B-18-8512
West Palm Beach ARC, Inc.
W4HAW/4* 3246 B-24-7606
Corpus Christi ARC
K5GT/5* 2460 B-29-7522
Metuchen YMCA RC
K2YNT/2*(+KA2DRT) 2344 B-58-7474
Woodbridge Wireless
W4IY*(+KA4DUU) 3230 B-43-7174
Hoodview ARC
WB7QIW/7*(+KA7EEO) 2459 B-46-6974
South Orange ARA
W6TM/6*(+KA6GEE)2141 B-36-6250
Kootenai ARS
K7MM/7* 1795 B-22-5746
Northrop RC
W6CN/6 1797 B-32-5398
Sterling Park ARC
K4UW/4*(+KA4FZY)1630 B-18-4836
South Hills Brass Pounders and Modulators
W3PIG/3* 1459 B-22-4574
Lake County ARA
K8BL/8* 1536 B-20-4274
Central Iowa ARC
AIØQ/Ø 1238 B-20-4236
Midland ARC, Inc.
W8KEA/8 1448 B-21-4202
Livermore ARK
W6OA/6* 1190 B-20-4130
Tioga County ARC
WB3IPW/3* 1011 B-40-3708
Cranford ARS/ARES
N2NS/2* 1128 B-15-3576
Monongalia Wireless Assoc.
K8LG/8* 946 B-28-3374
Simi Settlers ARC
W7OW/6* 1278 B-19-3318
Egyptian R C
W9AIU/9 1134 B-20-3206
Stu Hockatellow ARS
W8NJH/8*(+WD8LAP) 1059 B-16-3140
Crystal RC
W2DMC* 919 B-14-3134
Clark County ARC, Inc.
W7AIA/7* 937 B-20-3128
Solano County ARS
K6BJK/6* 1226 B-15-3116
Toledo Mobile R A
W8HHF/8* 1154 B-21-2908
Academy RC
W7WR/7* 1069 B-14-2790
Western Oregon Amateur Wireless Assoc.
W7IVX/7*(+KA7DRN) 999 B-14-2778
Bill Gremillion RC
K4SEX/4* 847 B-21-2394
Monterey Park ARC
K6GIP/6* 752 B-17-2362
Wenoca Twin City ARC
WB4KIF/4* 660 B-14-2328
Brantford ARC
VE3HA/3* 1004 B-35-2200
Shasta Cascade ARS
K6TPX/6*(+KA6CLR) 679 B-26-2100
Univ. of Colorado(Denver)ARS
WDØAYA/Ø* 544 B-10-1936
Butler County(PA)ARA
W3UDX/3*(+KA3BVP) 630 B-17-1920
Jayhawk ARS
WØLB/Ø* 476 B-15-1614
Southside ARC
KØDUT/Ø 400 B-18-1482
Cedar Mountain ARC
W7PT/7*(+KA7ANQ) 386 B- 9-1470
Mobile Sixers RC
W3AWA/3* 331 B-10-1318

6A - Commercial

D.A.R.D.S.
K9IJ/8* 1289 B-12-3136
Raritan Bay RAs
K2GE/2*(+WB2ONA) 682 B-22-1908
Faribault Area ARC
WAØIYI/Ø* 638 B-12-1334
Gaudalupe Valley ARC
N5CN/5* 512 B-31-1072

7A

North Florida ARS
W4IZ/4*(+WD4KHI) 4170 B-65-12,582
Penn Wireless Assoc.
W3SK/3* 3813 B-46-12,164
Mike and Key ARC
K7LED/7* 3967 B-55-11,426
TRW ARC
W6TRW/6* 3530 B-34-10,452
Submarine Signal Division ARC
K1WEW/1*(+KA1BWB) 2423 B-25-8278
Metro ARC, Inc.
VE3MRC/3 *2467 B- 7-8092*
RAS of Norwich
AD1N/1* 2598 B-29-7332
Datapoint Amateurs & Technicians Assoc.
K5CB/5* 2441 B-21-7186

Cuyahoga Falls ARC
W8VPV/8* 2602 B-35-7028
Delaware ARC
W3SL/3* 2067 B-45-6584
Lake Monroe ARS
AJ4L*(+WD4ILF) 2174 B-46-6408
Gloucester County ARC
W2MMD/2* 1764 B-30-6378
Long Island Mobile ARC
W2VL/2* 2384 B-25-6005
Capeway RC
AA1A/1* 1720 B-20-6970
Middlesex ARS
WIEOH/1*(+WB1ARF) 1818 B-36-5852
Windsor ARC
VE3OW/3 1888 B-45-5768
Genesee County RC
W8ACW/8*(+KA8EPK) 1774 B-105-5502
Triple States ARC
W8YA/8*(+KA8CDE) 1424 B-40-5348
Rockford ARA
W9AXD/9*(+KA9BTA) 1010 B-30-3966
AVCO ARA
WB1FUN/1 893 B- -3834
Tri-County RA
W2LI/2* 1091 B-24-3796
Peoria Area ARC
W9UVI/9* 1483 B-25-3682
Moncton Area ARC, Inc.
VE1EV/1* 1003 B-20-3200
WACOM
N2GL/3* 991 B-15-3156
Empire RC
W9AJV/9*(+WD9HHN) 907 B-13-3104
Iredell County Amateur Soc.
AI4O/4* 823 B-20-3032
Iroquois Ford ARC
WB9TAH/8(+KA9EPO) 805 B-15-2952
Pampa ARC
W5TSV/5* 1011 B-20-2820
Willmar Area E.A.R.
W9SW/9* 958 B-12-2679
R A of Greater Syracuse
W2AE/2*(+WA2DEZ) 807 B-22-2556
Yadkin Valley Wireless Assoc.
WD4CZW/4* 638 B-14-2377
Beloit ARC
W9DLJ/9 649 B-16-2164
Rantoul ARA
W9ZK/9* 390 B-10-1530
Shoreline ARC
W1XI/1 303 B-14-1356

8A

Chicago Suburban RA
K9BY/9(+KA9BIO) 3986 B-80-11,822
Morris RC
K2AZ/2*(+KA2DNJ) 2834 B-28-9470
San Antonio R C, Inc.
W5SC/5* 3124 B-150-8324
Mahoning Valley ARA
W8QLY/8*(+KA8AUA) 2276 B-67-7626
Twin City ARC
W9KQ/9 1751 B-35-5864
Parma ARC
K8UZW/8(+WD8NCQ) 1835 B-38-5042
Turlock ARC
W6BXN/6*(+KA6AJM) 1617 B-22-4644
Antietam R A , Inc.
W3CWC/3 1869 C-20-3353
Grunt and Duck ARC
WH6ACP/KH6 993 B-10-3274
Metropolitan ARC
K8NOW/8* 866 B-12-3152
Fox River R.L.
W9CEQ/9*(+KA9AKV) 954 B-30-3116
Chelsea Communications Club
WO8IEL/8* 751 B-13-2592
Michigan Robbins Chptr 10-X
K8BDV/8*(+WD8ECU) 848 B-18-2588
Silver Creek ARC
WD8PNF/8* 668 B-21-2260

9A - Battery

Canelo Valley ARC
W6HE/6*(+KA6AMX) 2037 A-21-14,650

9A

The Hogtown Hammers
W4WJ/4*(+KA4DVH) 3884 B-32-13,166
Tioga County ARC
N2NW/2* 1763 B-18-5858
Sierra Foothills ARC
K6CBP/6* 1194 B-26-4402
South Texas ARS
K5FFO/5* 1056 B-19-3986
Radio Assoc. of Erie
W3GV/3*(+KA3CKW) 1022 B-30-3650
Everglades ARC
W4SVI/4*(+WD4CGJ) 877 B-15-3608

10A

R C of Tacoma
W7DK/7* 3370 B-50-10,114
Mugas ARC
K3YTL/3*(+KA3CEM) 2773 B-36-8488
Skywide ARC
VE3ORT/3* 2147 B-36-6946
Provin Mtn ARA
N1AV/1* 1709 B-23-5668
North Hills RC
K6IS/6*(+WD6DZR) 1882 B- -5494

11A

South Jersey Radio Assoc.
K2AA/2*(+KA2BEW) 4155 B-50-13,476
Four Lakes ARC
W9JZ/9*(+KA9BKS) 2587 B-40-7942
Oh-Ky-In VHF ARS
K8SCH/8*(+WD8BUF) 3708 C-67-9575

12A

Adrian ARC
W8TQE/8*(+KA8FFC) 1432 B-25-5108
Beaver Valley ARA
W3SGJ/3 1754 C-34-3571

13A

San Francisco RC
W6PW/6*(+WA6IZB) 2751 B-35-8720

14A

R F Hill ARC
W3AI/3*(+KA3ABDI) 3685 B-27-12,350

16A

Nortown ARC
VE3NAR/3* 3049 B-55-10,390
Scarborough ARC, Inc.
VE3WE/3* 2741 B-60-9470

21A

Englewood ARA, Inc.
K2KX/2(+KA2EMS) 1419 B-25-5641

1B - Battery

K3VW/3*(+K3WW) 658 A- -6780
W1ECH/1(+K3NW) 558 A- -5715
W6VBG/6(+K6TE) 557 A- -5710
W4QO/4*(+WB4OUH) 430 A- -4500
WA6EUZ/6(+WB6OVV) 407 A- -4220
AA1K/1*(+AB1P) 428 A- -3980
AF5B/5(+W5SOD) 463 A- -3275
W9DY/9*(+WB9TZM) 778 B- -3200
VE1TL/1*(+VE1AZW) 286 A- -3055
N4VL/4(+N4NZ) 262 A- -2720
AA8SA/8* 265 A- -2690
AC4X/4*(2 oprs) 294 A- -2585
W9XT/9(+WB9EGZ) 313 A- -2465
W9LNQ/9 203 A- -2180
AJ6T/6 207 A- -2170
N6DN(+WA6HAM) 287 A- -2170
K6TG/6*(2oprs) 233 A- -2155
VE3WA/3*(+VE3DAS) 341 A- -2135
N3IK/3*(+WA2EPT) 99 A- -2130
N6BAJ/6 812 B- -2120
N4DP/4(+W4NNU) 200 A- -2100
WB5KIJ/5(+WB5MTU) 198 A- -1970
K7FF/7*(K6RLY,K6ZBV,oprs) 663 B- -1938
WB6NAC/6(+WA6VPH) 240 A- -1860
W6JTH/6(+KA3BLO) 165 A- -1750
W7EL/7(+WA7VCL) 162 A- -1720
WA2DFI/7*(2 oprs) 166 A- -1710
AG7U/7(+W6RHB) 187 A- -1545
WD5BKO/5*(+K5DDJ) 287 A- -1535
VE2OJ/2(VE3HJV,opr) 141 A- -1505
WD4IYS/4 277 A- -1485
W9VJD/9 341 B- -1464
W9ZSI/9(+K9BCM) 117 A- -1320
K7BFL/7* 133 A- -1315
WA6REN/8(+WA6RQU) 120 A- -1300
N8ASI/8(+N8AGQ) 214 B- -1250
WA9NLK/9(+WA9SLU) 115 A- -1250
N3CA/3(+WB3IWW) 123 A- -1225
W9NAX/9*(+WD9GXW) 109 A- -1190
VE7CKF/7* 112 A- -1160
VE2XL/2*(+VE2XG) 191 A- -1095
VE7DT/7*(+VE7DUP) 186 A- -1030
K7CPC/7* 86 A- - 960
W9JKF/9*(2 oprs) 85 A- - 930
VE2AOZ/2 103 A- - 925
WA2HSQ/2*(+WB2AMU) 82 A- - 910
WA4UQA/4(+WB4UQI) 76 A- - 910
K6HJU*(+K6TCN) 360 B- - 820
KA5AMD/5 35 A- - 800
WA6OZD/6*(+WB6MZS) 301 B- - 768
WA7NNH/7(+WB7ALP) 302 B- - 704
K1TH/1 207 B- - 652
WB9LKC/9(2 oprs) 51 A- - 650
WB9REO/9* 33 A- - 475
AB3W/6(+WB3JHU) 33 A- - 430
AC3I/3 64 A- - 420
WB3JWG/3(+KA3BQJ) 30 A- - 400
WD9AIT/9*(+WB9ZQG) 57 B- - 378
WB6BYO/KL7* 28 A- - 340
WD4MPN/4(2 oprs)) 156 B- - 332
WB9UKI/9* 72 B- - 312
WB2DLA/2 14 A- - 240
VE3EIM/3 13 A- - 230
WB5WWU/5(+WB5VUD) 22 A- - 210
WA1RRA/1(2 oprs) 6 A- - 160
WD6CSW/6 5 A- - 125
N8AXA/8 16 B- - 32

1B

K3LR/3(2 oprs) 1503 B- -6358
W7CB/6(+W6QUL) 1599 B- -4474
K8ZH/8(+K8WW) 1088 B- -4124
WB1Z/8(+K8HHZ) 1181 B- -4076
W2RR/2(WA2SADG ECA,oprs) 1408 B- -3620
K3VK/3*(+KBCX) 1061 B- -3568
K0QA*(2 oprs) 885 B- -3000
K8MP/9* 697 B- -2024
WA3VPT/4*(+WA4ROM) 882 B- -1904
N2AE/2*(+WA2ORS) 478 B- -1798
WA7KLK/7(+KA7CAI) 674 B- -1668
W1WP/1*(+AD1O) 418 B- -1574
KA4GCN/4* 711 B- -1522
KB7CQ/7(+KB7CR) 633 B- -1366
K1LOM/1*(+K2RCH) 385 B- -1236
KB2JF/2*(WA3PKU) 285 B- -1220
WB0NCR/0*(+WA0JYF) 1117 C- -1217
AC8Y/8* 716 C- -1211
WB9QVQ/9*(+WB9YDR) 421 B- -1208
WA0NSY/0 96 A- -1060
W8CBR/8*(+WD8CQP) 457 B- -1014
KA5EFF/5* 270 B- - 998
W3EAN/3(+WE3EBY) 327 B- - 990
WD9CUP/9(+WA9ANN) 409 B- - 970
KA8EHA/8(+WD8QMP) 265 B- - 968
WA7BT2/7(+WB7UQR) 314 B- - 944
N9WA/9(+N9WA) 201 B- - 888
DK5WV/5* 364 B- - 828
WA9BEP/9*(+WD9IRQ) 238 B- - 818
WB7NNA/7(+WB7QOY) 298 B- - 774
W7ZLW/7*(+W7KCX) 332 B- - 764
N4QP/4(+WD4ASTI) 230 B- - 748
W9RF/4* 298 B- - 696
AC6B/6*(+WD6GSB) 275 B- - 688
K9RJL/9 276 B- - 658
WD4NQE/5 242 B- - 642
WA8VDJ/4* 257 B- - 618
N6BLN/6*(+KA6CDO) 248 B- - 596
WD8MKG/8*(+WD8NHC) 217 B- - 536
W7JBN/7(+W7FOS) 103 B- - 534
KLRIF/1*(+N1AAX) 137 B- - 474
WD4GBG/4N(2 oprs) 85 B- - 390
W6LC/VE7* 127 B- - 354
KA9BPO/9* 63 B- - 352
KA9BYR/9* 98 B- - 346
KB2KK/2*(+KB2GG) 103 B- - 340
K7DH/7 23 A- - 330
W8ZARN/8N* 62 B- - 307
WD8OSE/9*(+WD9EAQ) 56 B- - 294
K6EA/9 53 B- - 284
WD6OXH/6 12 A- - 220
WA1MTI* 89 B- - 190
WD4EED/4*(+WD4EEC) 131 C- - 131
W1BB/1 17 B- - 68

WB2YIX/2* 32 B- - 64

1B - Commercial

WB9TBI/9*(+WD9ANB) 300 B- -1024
W5UNK/5(+WD5JLJ) 219 B- - 750
K4ZET/4*(+WA4FCM) 736 C- - 736
WB2RAL/2 50 B- - 120

2B - Battery

W2CRS/2(+WA2FSV) 374 A- -3350
W2XS/2(+N2GC) 280 A- -3000
W2UVQ/2*(+K2YAZ) 251 A- -2755
WA6POC/6(+W6TZA) 254 A- -2430
WA3QKA/3(+WA3QMJ) 235 A- -2070
W7KJ/7* 140 A- -1005
WB8RRQ/8*(+WD8NMP) 74 A- - 935
K7QML/7*(+KA7CFH) 248 B- - 920
WB6AJZ/6*(+WB6LBR) 212 C- - 435
WA6IUR/6(+WB6BUY) 71 B- - 348

2B

WA6OTU/6(+AA6RX) 1440 B- -5116
N1JW/1*(+W1WEF) 1468 B- -3954
N4FD/4*(+WB4YHF) 1105 B- -3606
WB9JDL/9*(+WI9EI) 583 B- -2564
K9IL/9*(+K9LAE) 691 B- -2404
WA5OOB/5(+WD5HIO) 700 B- -2364
K9CDB/9(+WA9FUD) 1000 B- -2200
WA1ZAU/1*(+WB1DXR) 618 B- -2074
WA2UKY/2(+WB2IOB) 376 B- -1646
K3VIZ(+WA3FTL) 499 B- -1518
K9TG/4*(+WB9LZR) 456 B- -1486
WB9RRU/9*(+WB9RRT) 392 B- -1427
KB6CC/6*(+AA6R) 559 B- -1418
W1ET/1(N1ADJ,WA1RLP,oprs) 613 B- -1376
WB5ZRO/5*(+WD5GQC) 939 B- -1284
K7BBO/7*(+KA7DEV) 371 B- -1194
WA3KEY/3(+WB3CUU) 309 B- -1164
WB5UYV/5(+WB5SHH) 267 B- -1088
WA6SUV/6*(+WA6OTZ) 201 B- -1054
WD5ETD/5(+WD5CIG) 290 B- -1028
VE2EGH/2*(+VE3HXF) 304 B- -1010
N8AQK/8*(+WA8WOU) 301 B- -1002
N6ATP(+KA6DLX) 386 B- - 972
W9JOO/VE8(+WD9BDZ) 163 B- - 748
WA0NVT/0(+KA0CGY) 200 B- - 706
N4YX/4(+WD4DHG) 172 B- - 638
W0BEV/0(WB0QSEZ WZE,oprs) 132 B- - 612
WB0NVB/0*(+WB0RWM) 363 C- - 547
WB0VGC/0(+N0AJM) 155 B- - 510

2B - Commercial

AA4VV/4*(+WA4SWY) 513 B- -1456
WD0FGV/0*(+KA0CGQ) 504 B- -1320

1C

K3ZMI/5 595 B- -2480
W6MXO/M 211 A- -2110
K9EEA/MM(4 oprs) 375 B- -1500
WB2VYA/MM 143 A- -1280
KB5CA/M 601 B- -1202
N6AWO/M(2 oprs) 199 A- - 995
W3AOH/MM(3 oprs) 89 A- - 960
N6SL/MM 263 B- - 950
W6SUJ/M 99 A- - 910
K7FC/M 110 A- - 650
N4RI(5 oprs) 472 C- - 610
WA4EQW/M(2 oprs) 182 B- - 498
WA5ZIB/M(2 oprs) 164 B- - 338
WA7STA/M 145 B- - 290
W6FRE/M 104 B- - 208
WA6KHD/M 41 A- - 205
W9JZE/M 92 B- - 184
WA4LJI/M(2 oprs) 60 B- - 120
W2HAE/M4 32 B- - 114
K1DS/M 50 B- - 100
K4UK/M 26 B- - 52
WB6PHQ/M 4 B- - 8

2C

W8CRR/M(5 oprs) 235 B- - 602

1D

N7US 1912 B- -4620
W9SI(2 oprs) 1112 B- -3292
WA5ZUP 1588 B- -3190
N2MF(2 oprs) 2191 C- -2555
W2SQ(Multiop) 1023 B- -2292
AA4AK 515 B- -2060
VE3NG(2 oprs) 421 B- -1684
KB4AS(2 oprs) 455 B- -1566
W7TC 369 B- -1476
VE3AUI(2 oprs) 547 B- -1476
K9SH 1131 C- -1433
WA6KMW 692 B- -1410
WB2UKT 336 B- -1344
WA4RDH(5 oprs) 549 B- -1280
WB2FGZ 280 B- -1120
WB5QFB(2 oprs) 438 B- -1084
WB3GZV(3 oprs) 400 B- -1056
WA6IPS(2 oprs) 249 B- - 996
WB8TRW(2 oprs) 249 B- - 942
KM4O(2 oprs) 433 B- - 866
WB9ZDI/6(2 oprs) 404 B- - 858
W0AWB 214 B- - 842
W8UPH 550 C- - 803
WA1DPX 400 B- - 800
KA4CPL 201 B- - 746
N0ABA 178 B- - 712
K9QDF 176 B- - 696
KB9EW 187 B- - 644
W2TI 144 B- - 576
K2ZMZ(2 oprs) 528 C- - 538
WB2ZDI(2 oprs) 266 B- - 532
WB6BBQ 266 B- - 532
W1CNU 134 B- - 516
KA8ESD 125 B- - 500
N4BP 423 C- - 486
K9WFH 121 B- - 484
KA8AZN/n 119 B- - 476
WD5JRG 214 B- - 428
K6KSI 97 B- - 388
WA6KMS 178 B- - 356
K5XI 170 B- - 346
W7NE 159 B- - 318
WA9SVZ(2 oprs) 156 B- - 312
KB5Y 82 B- - 310
WB5NCM 308 C- - 308
WA9AGM 84 B- - 304
KA4ANG/4 74 B- - 296
W4LEP 146 B- - 292
WD8OKJ/5 93 B- - 288
WD8RGK 142 B- - 284
WA4TNI 67 B- - 268
K3QWG 133 B- - 266
N4NK 141 C- - 244
WD8HMF(2 oprs) 116 B- - 236
WA4JJH 84 B- - 234
KA8DWB/N 57 B- - 228
W1EQF 62 B- - 192
KA6DTN 55 B- - 176
WD8LTP 61 B- - 162
WA8QPN 68 B- - 158
W5NR 76 C- - 156
WA6DUB 55 B- - 145
N6AGT 140 C- - 140
WA1CPT 66 B- - 132
KB5HP 62 B- - 124
WA5IYX 121 A- - 121
KA1BSZ/N 30 B- - 120
W1NH 30 B- - 120
K3MRT 54 B- - 108
K8KIR 27 B- - 108
N9AUY 54 B- - 108
WA1LOU 106 C- - 106
WA2FVL 106 C- - 106
WB1ANT 80 C- - 86
W6PFE 42 B- - 86
WB1HCT 42 B- - 84
AA8E 20 B- - 80
KB9AX 38 B- - 76
KB3DS 18 B- - 72
K8UFW 34 B- - 68
WB5WAJ 32 B- - 64
WA6HAD 13 B- - 59
W1CTR 25 B- - 50
K3RXK 21 B- - 42
W3GN 22 C- - 38
WA5NPP 19 B- - 38
N5BA/4 37 C- - 37
KA5BNH/N 9 B- - 36
W3FQE 27 A- - 27
KA0BTH 9 B- - 10

2D

K9VHF(2 oprs) 508 B- -1016
WA7RQS(2 oprs) 167 B- - 662
WD8KAO(2 oprs) 203 B- - 574
W5JMN(3 oprs) 189 B- - 378
W8BAP(4 oprs) 284 C- - 292

3D

K1AR/1(6 oprs) 3097 B- -8644
WD8KTO(3 oprs) 342 B- -1210

4D

W9UB(12 oprs) 299 B- - 660

5D

K0AA(15 oprs) 3613 C- -4150
WB9FZN(7 oprs) 737 B- -1564

1E

K3RA*(10 oprs) 1428 B- -4368
N2US 453 A- -3255
W5UDR/5(5 oprs) 468 A- -3025
W4OOV 262 A- -2620
W2FTY 354 B- -1416
WB4SYC 135 A- -1045
WD8PUH 157 B- - 678
W8YO 53 B- - 530
W7LNG 58 A- - 485
N6ABW 210 B- - 420
WD8OEP/8 89 B- - 356
N4ATN* 134 B- - 268
KA2CDJ 32 A- - 165
W1SMD 118 C- - 151
K3VY 66 B- - 132
WB0UBL 23 B- - 92
WD4KDZ 3 A- - 15

2E

WA4PVI(3 oprs) 296 B- - 592

3E

W7BU(15 oprs) 871 B- -1850

4E

W6UNB(5 oprs) 782 B- -2520

Check Logs

N1NN,K1TN,W2UGB,W3GQC,
N4AJD,WA4EAV,WB4MFA/4,
W7DMD,W7TO/M,WB/PEK/7,
W8VUV,W8YNY,N9PS,W9NTO,
WH0INN,VE3SPR

Incomplete

K1BQ,W1BIM/1,W1OC/1,W1VL/1,
N2ALB/2(+KA2ENK),KZ1B/2,
W3TS,KA4CYP,N4EE/4,WD4EOL/4,
WB4ERO/4,K4HEX/4*,K4JMC/4,
KB4RA/4,K4VHB/4,KS0L/5,
WA5L,DL/5*,W5NS/5(+WD5CFP),
AJ5P/5,K5PA/5,W6LFJ/6,W6LS/6,
W6RO/6,W6SG,K6SYU/6,K6TNC,
AF7I/6*,N7AWJ/7,K7BUY/7,
W7EVI/7,W7KYC/7,W7PN/7,
W7UGE/7,W7VNJ/7,WA7WDJ/7,
W8AL,N8AS/8,KB8QXF/8,KE8N/8,
WD8IGN/8,W8JI/8,WD8KVR/8,
W8OG/8,K8OHC/8,WD8OOM/8,
K8PTZ/8,WA9ALV/9,K9DDM,
K9FEI/9,W9MZA/9,W9OP/9,N0AOF,
W0DK/0,K9GFM/0,W0GU/0,
WB0RWR,K0SG/0,VE2MO/2,
VE3SDH,VE3IBM/3,VE3NBC/3,
VE3SHQ/3*,VE3UT*

Late Entries

K1EL,W2MO/2,WA2IUC/2,N4AA/4,
WD4EDM/4,W4LEN,N8GQ/4,KB5B/5,
WB5ZBX/5,N5GL,W5PMK,AG7M,
K8KRG/8,K8ZAS/8,WA8YJE/8,
WD8DPX/8,WD8KAC,KA9BJO/9,
N9NC/9,K9UXZ/9,K2QC/9,W9FF/0,
WB0ICY/0,K0ZF/0,VE3AK/3

Disqualifications

N3DG (2A).

Operating News

Conducted By John F. Lindholm,* W1XX

Blinders and DX

Are the opinions of amateurs outside North America really important? You bet your frequencies they are. Wagering does not exactly run in my blood, but betting two bucks on a straight flush is almost as good as working a ZA. But, can we gamble away the valued opinion of our fellow amateurs abroad?

Pursuing this gambling thought a bit further: At the track, canines and nags wear blinders to keep from straying off course. Think about it. It's not too difficult for us as amateurs to also wear blinders. I confess I've been as guilty as anyone. Listening to the DX bands, it may sound to some as though Amateur Radio exists for North Americans only. But there is a whole world out there.

It was on a recent four-week sojourn to Scandinavia that I was introduced to both slot machines and the European viewpoint of what's happening on the bands. There is a European point of view concerning contests and DX that we North Americans, including myself, find hard to understand. As an aside, however, I must first acknowledge how gracious my hosts were to me during my Nordic visit. It was a lesson in hospitality to the nth power for which this visitor was most appreciative. The wide recognition and respect for the ARRL DXCC program was a good point of discussion. It amazed this observer to learn of the number of DX amateurs who have qualified for DXCC (and the Honor Roll!) who prefer to receive only national acclaim through the more local QSL checking by the IARU society's DX managers. And it's big-time participation. DXCC has universal acceptance as a prestigious award for the entire world; it is *the* standard for DX operating throughout the world. In Europe, it is even the basis for vhf contests and individual country totals amassed on vhf.

So the thoughts, input, feelings and expressions of amateurs throughout the world are sorely needed to govern the truly international pastime of working DX. ARRL must not be callous in the disposition of decisions relating to DXCC. It affects too many people. Stateside amateurs cannot view the rules and direction of DXCC with a provincial view. The eye must be on the horizon. With many overseas societies basing their awards program on the DXCC country criteria, it's a chain reaction, a weighty responsibility.

Likewise with contests. Our DX contests require worldwide participation to be successful. Are we meeting the needs of *all* amateurs or just the selfish interests of those stateside? Since ARRL is the IARU society for the United States and Canada, those binational considerations must be of prime importance. But let's not forget the interests of our friends overseas.

How to do this? Certainly, international friendship can permeate our day-to-day operating procedures on the DX bands. Furthermore, at the formal level, input to our Advisory Committees, like the DXAC, from overseas amateurs through membership or liaison from each continent may be desirable. Can we afford not to tap the voice of experience right on or near the DX scene? After all, we can't possibly have all the answers.

Blinders have their uses, but Amateur Radio is too international to tolerate them. Let's not gamble, but instead attempt to see clearly into the future of Amateur Radio and tune in the voices of our fellow amateurs the world over.

W1AW Schedule

October 28, 1979-April 26, 1980

W1AW code practice and bulletin transmissions are sent on the following schedule:

MTWThFSSn = Days of Week Dy = Daily

UTC	Slow Code Practice	MWF: 0300, 1400; TThS: 0000, 2100; Sn: 0300, 2100
	Fast Code Practice	MWF: 0000, 2100; TTh: 0300, 1400; S: 0300; Sn: 0000
	Cw Bulletins	Dy: 0100, 0400, 2200; MTWThF: 1500
	RTTY Bulletins	Dy: 0200, 0500, 2300; MTWThF: 1600
	Voice Bulletins	Dy: 0230, 0530
EST	Slow Code Practice	MWF: 9 A.M., 7 P.M.; TThSSn: 4 P.M., 10 P.M.
	Fast Code Practice	MWF: 4 P.M., 10 P.M.; TTh: 9 A.M.; TThSSn: 7 P.M.
	Cw Bulletins	Dy: 5 P.M., 8 P.M., 11 P.M.; MTWThF: 10 A.M.
	RTTY Bulletins	Dy: 6 P.M., 9 P.M., 12 P.M.; MTWThF: 11 A.M.
	Voice Bulletins	Dy: 9:30 P.M., 12:30 A.M.
CST	Slow Code Practice	MWF: 8 A.M., 6 P.M.; TThSSn: 3 P.M., 9 P.M.
	Fast Code Practice	MWF: 3 P.M., 9 P.M.; TTh: 8 A.M.; TThSSn: 6 P.M.
	Cw Bulletins	Dy: 4 P.M., 7 P.M., 10 P.M.; MTWThF: 9 A.M.
	RTTY Bulletins	Dy: 5 P.M., 8 P.M., 11 P.M.; MTWThF: 10 A.M.
	Voice Bulletins	Dy: 8:30 P.M., 11:30 P.M.
PST	Slow Code Practice	MWF: 6 A.M., 4 P.M.; TThSSn: 1 P.M., 7 P.M.
	Fast Code Practice	MWF: 1 P.M., 7 P.M.; TTh: 6 A.M.; TThSSn: 4 P.M.
	Cw Bulletins	Dy: 2 P.M., 5 P.M., 8 P.M.; MTWThF: 7 A.M.
	RTTY Bulletins	Dy: 3 P.M., 6 P.M., 9 P.M.; MTWThF: 8 A.M.
	Voice Bulletins	Dy: 6:30 P.M., 9:30 P.M.

Code practice and cw bulletin frequencies: 1.835, 3.58, 7.08, 14.08, 21.08, 28.08, 50.08, 147.555 MHz.

RTTY bulletin frequencies: 3.625. 7.095, 14.095, 21.095, 28.095, 147.555 MHz.

Voice bulletin frequencies: 1.835, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

Slow code practice is at 5, 7-1/2, 10, 13 and 15 wpm.

Fast code practice is at 35, 30, 25, 20, 15, 13 and 10 wpm.

Code practice texts are from *QST* and the source of each practice is given at the beginning of each practice and at the beginning of alternate speeds. For example, "Text is from February 1979 *QST*, pages 9 and 82" indicates that the main text is from the article on page 9 and the mixed number/letter groups at the end of each speed are from the contest scores on page 82.

Cw bulletins are sent at 18 wpm, Teletype bulletins are sent at 60 wpm with 170 Hz shift.

W1AW is open for visitors Monday through Friday from 7:30 A.M. to 1 A.M. EST and on Saturday and Sunday from 3:30 P.M. to 1 A.M. EST. If you desire to operate W1AW, be sure to bring the original copy of your license with you. W1AW is available for operation by visitors between 1 and 4 P.M. Monday through Friday.

In a communications emergency, monitor W1AW for special bulletins as follows: voice on the hour, RTTY at 15 minutes past the hour, and cw on the half hour.

W1AW will be closed on November 22, December 24-25, January 1, February 18 and April 4.

Station staff: Chief Operator/Asst. Communications Mgr. C. R. Bender, W1WPR; Chris Schenck, W1EH; Charles Chadwick, K8AXL.

SCM ELECTION NOTICE

To all ARRL members in the Eastern New York, Eastern Pennsylvania, San Diego, South Dakota, Louisiana, North Carolina, Virginia, Pacific and Maritime-Newfoundland 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 St., Newington, CT 06111

We, the undersigned full members of the . . . ARRL

*Communications Manager, 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 . . .)

SCM candidates 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, December 7, 1979.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on January 2, 1980, returns counted February 19, 1980, and SCMs elected as a result of the above procedures will take office April 1, 1980.

If only one valid petition is received for a section, that nominee shall be declared elected, without opposition, for a two-year term beginning April 1, 1980.

If no petitions are received for a section by the specified closing date, such section will be resolicited in April *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
Communciations Manager

REPEAT SCM NOMINATING SOLICITATION

Since no petitions were received for the Colorado section as a result of notices in April and May *QST*, nominating petitions for this section are herewith resolicited. See the above notice for details on how to nominate.

SCM ELECTION RESULTS

The following election was conducted for a two-year term of office beginning October 1, 1979.

Balloting Results: In the Washington Section, Robert L. Klepper, W7IEU received 1056 votes and Steve Twiggs, WB7FGC received 371 votes. Mr. Klepper is declared elected.

Strays

Dr. Gerald Blankfort, WA6GTT, examines 10-year-old Paulino Freire of Ecuador while the boy's mother looks on. WA6GTT arranged to have Paulino flown to Los Angeles, where surgery to remove a tumor the pharynx was performed successfully. To express his gratitude to all the hams who helped, Paulino is now studying for his ham license. *(Los Angeles Herald-Examiner photo)*

	OSCAR 7			OSCAR 8			SOVIET RS		
DATE (UTC)	*Ref. Orbit*	*Time (UTC)*	*Long. W.*	*Ref. Orbit*	*Time (UTC)*	*Long. W.*	*Ref. Orbit*	*Time (UTC)*	*Long. W.*
1 Oct.	22304	0111:01	83.9	8012A	0133:41	67.6	4065	0101:13	48.7
2 Oct.	22316	0010:21	68.7	8026AJ	0138:53	68.9	4077	0105:54	51.4
3 Oct.	22329	0104:38	82.3	8039X	0000:51	44.3	4089	0110:36	54.1
4 Oct.	22341	0003:58	67.2	8053A	0006:03	45.7	4101	0115:19	56.8
5 Oct.	22354	0058:15	80.8	8067AJ	0011:15	47.7	4113	0120:01	59.5
6 Oct.	22367	0152:32	94.3	8081J	0016:27	48.3	4125	0124:44	62.3
7 Oct.	22379	0051:52	79.2	8095J	0021:39	49.6	4137	0129:27	65.4
8 Oct.	22392	0146:09	92.8	8109A	0026:51	50.9	4149	0134:09	67.7
9 Oct.	22404	0045:29	77.6	8123AJ	0032:03	52.2	4161	0138:52	70.4
10 Oct.	22417	0139:46	91.2	8137X	0037:15	53.5	4173	0143:34	73.2
11 Oct.	22429	0039:06	76.1	8151A	0042:27	54.8	4185	0148:17	75.9
12 Oct.	22442	0133:23	89.7	8165AJ	0047:39	56.1	4197	0153:00	78.6
13 Oct.	22454	0032:44	74.5	8179J	0052:51	57.4	4209	0157:42	81.3
14 Oct.	22467	0127:01	88.1	8193J	0058:03	58.7	4220	0002:01	53.8
15 Oct.	22479	0026:21	73.0	8207A	0103:15	60.4	4232	0006:44	56.6
16 Oct.	22492	0120:38	86.6	8221AJ	0108:27	61.3	4244	0011:26	59.3
17 Oct.	22504	0019:58	71.4	8235X	0113:39	62.6	4256	0016:09	62.5
18 Oct.	22517	0114:15	85.0	8249A	0118:51	63.9	4268	0020:52	64.7
19 Oct.	22529	0013:35	69.9	8263AJ	0124:03	65.2	4280	0025:34	67.5
20 Oct.	22542	0107:52	83.5	8277J	0129:14	66.5	4292	0030:17	70.2
21 Oct.	22554	0007:12	68.3	8291J	0134:26	67.8	4304	0034:59	72.9
22 Oct.	22567	0101:29	81.9	8305A	0139:38	69.1	4316	0039:42	75.6
23 Oct.	22579	0000:50	66.7	8318AJ	0001:37	44.6	4328	0044:25	78.4
24 Oct.	22592	0055:06	80.3	8332X	0006:49	45.9	4340	0049:07	81.1
25 Oct.	22605	0149:23	93.9	8346A	0012:01	47.2	4352	0053:50	83.8
26 Oct.	22617	0048:44	78.8	8360AJ	0017:12	48.5	4364	0058:32	86.5
27 Oct.	22630	0145:01	92.4	8374J	0022:24	49.8	4376	0103:15	89.2
28 Oct.	22642	0042:21	77.2	8388J	0027:36	51.1	4388	0107:58	92.2
29 Oct.	22655	0136:38	90.8	8402A	0032:48	52.4	4400	0112:40	94.7
30 Oct.	22667	0035:58	75.7	8416AJ	0038:00	53.7	4412	0117:23	97.4
31 Oct.	22680	0130:15	89.3	8430X	0043:12	55.9	4424	0122:05	100.1
1 Nov.	22692	0029:35	74.1	8444A	0048:24	56.3	4436	0126:48	102.9
2 Nov.	22705	0123:52	87.7	8458AJ	0053:36	57.7	4448	0131:31	105.6
3 Nov.	22717	0023:12	72.6	8472J	0058:48	59.4	4460	0136:13	108.3
4 Nov.	22730	0117:29	86.1	8486J	0104:00	60.3	4472	0140:56	111.8
5 Nov.	22742	0016:49	71.0	8500A	0109:12	61.6	4484	0145:38	113.8
6 Nov.	22755	0111:06	84.6	8514AJ	0114:24	62.9	4496	0150:21	116.5
7 Nov.	22767	0010:27	69.4	8528X	0119:36	64.2	4508	0155:04	119.2

Have you listened to OSCAR 8 yet? It is available to anyone with a good-quality, 10-meter or 70-cm receiver. To track it, you'll need an OSCARLOCATOR and the above reference-orbit information (also available on W1AW bulletins). It orbits the earth every 103 minutes; the morning and evening passes occur at approximately the same times each day. Decoding the telemetry from the beacon is a simple matter using the ARRL OSCAR telemetry forms, available from Hq. for an s.a.s.e. When you return it, we'll send you a colorful OSCAR 8 QSL card.

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).

Notes

1) The times and longitudes are for the satellites' first equator crossing each day, which is called the reference orbit.
2) Due to spacecraft problems, OSCAR 7 will not be maintained in any specific mode.
3) All Monday orbits are reserved for QRP use only. Use a maximum of 10 watts erp. Wednesdays are reserved for special experiments. Schedule O 7 experiments through AMSAT, O 8 experiments through ARRL. At no time exceed 10 W erp using Soviet RS.
4) The OSCAR 7 Mode B and OSCAR 8 Mode J transponders invert signals. Upper sideband into the uplink becomes lower sideband on the downlink.
5) O 7 progresses an average of 28.737739° W. per orbit in a period of 114.944783 minutes. O 8 progresses an average of 25.804838° W. in a period of 103.219352 minutes. RS period is 120.3894 minutes. RS progresses 30.227° W.
6) O 8 modes of operation are Mondays and Thursdays — Mode A. Tuesday and Friday — Mode AJ. Saturdays and Sundays — Mode J. Wednesdays are for experimental use on Mode A or J or recharge Mode D.

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
RS			
Mode A	145.880-145.920 MHz	29.360-29.400 MHz	29.401 MHz

Further information on the radio amateur satellite program can be obtained free of charge from ARRL hq. OSCAR locators for O 7, O 8 and Soviet RS are available in the new *Satellite Communications* package at your dealer or direct from ARRL; $4.75 U.S., $5.50 elsewhere.

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Tom Frenaye,* K1KI

OCTOBER

4

West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate). 10-35 wpm at 0400Z. The run takes place at 9 P.M. PDT on October 3. Frequencies are approximately 3590/7090 kHz. 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/endorsements.

6-7

ARRL Simulated Emergency Test, September *QST*, page 103.
VK/ZL Oceania DX Contest, phone, September *QST*, page 107.
California QSO Party, September *QST*, page 108.
October QRP QSO Party, September *QST*, page 108.

10

W1AW Qualifying Run, 10-35 wpm at 0200Z (10 P.M. EDT October 9). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. The complete W1AW schedule of code practice and bulletins appears in the "Operating News" column of this issue, or send an s.a.s.e. to ARRL for a copy. Other details per the October 4 listing.

10-11

YL Anniversary Party, phone, sponsored by the YLRL from 1800Z October 10 until 1800Z October 11 (cw from 1800Z November 1 until 1800Z November 2). All bands 160 through 10 meters. No cross band. Only one contact with each station. YLs only, contacts with OMs do not count. Exchange serial number, signal report and ARRL section or country. Log must show time, band, date and transmitter power. Log must be signed. Call CQ YL. Dupe sheets required if score is more than 100 points. Score one point for QSOs in your own ARRL section, two points for QSOs outside your section. Score one point for DX QSOs. Multiply QSO points by sum of ARRL sections plus countries worked. Awards. All entries must show ARRL section. Mail before November 15, 1979. Entries must be received before November 20 by Margaret Williams, KI4W, 5 Redwood Circle, Virginia Beach, VA 23462.

13-14

ARRL CD Parties, Fall *QCD*, page 8.
VK/ZL Oceania DX Contest, cw, September *QST*, page 107.
9-Land QSO Party, September *QST*, page 108

20-21

Worked All DM Contest, sponsored by the Radioclub of the German Democratic Republic, from 1500Z October 20 until 1500Z October 21. Phone and cw, single or multioperator. 80-10 meters. Do not use first 10 and last 25 kHz of 3.5 and 14 MHz. DM stations send signal report and two-digit number indicating "Kreiskenner." Others send signal report and serial number. Score three points per DM QSO. Multiply by sum of different DM districts worked on each band (phone and cw separate). Maximum of 15 per band. DM districts are indicated by the last letter of the call sign (letters A through O). DM 7, 8 and Ø may be used for missing districts. Include statement (signed and dated) that all contest and licensing rules were followed. Awards. Mail before November 20 to DM-Contest-Bureau, RKDDR, Hosemannstr.14, DDR 1055 BERLIN, German Democratic Republic.

22nd Jamboree-on-the-Air, sponsored by the World Scout Bureau/Boy Scouts of America. Look for activity on the following frequencies: phone — 3740 3940 7090 7290 14,290 21,360 28,990 50,500; cw — 3590 7030 14,070 21,040 28,190 50,050; Novice — 3750 7125 21,140. Not a contest, but more information can be obtained from Harry A. Harchar, W2GND, JOTA Coordinator, Boy Scouts of America, North Brunswick, NJ 08902.

21-MHz CW Contest, sponsored by the Radio Society of Great Britain from 0700Z to 1900Z October 21. Special category for QRP operators (less than five watts output). Exchange signal report and serial number. Score three points per QSO. Multiply by number of G, GD, GI, GJ, GM, GU, GW prefixes worked. Contacts with GB stations do not count. Awards. Entries must be received by December 31 by J. Bazley, G3HCT, Brooklands, Ullenhall, Solihull, West Midlands, B95 5NW, England.

19th WW RTTY DX Sweepstakes, sponsored by the Canadian Amateur Radio Teletype Group, from 0200Z October 20 to 0200Z October 22. 80-10 meters. Only 30 hours of operation permitted. Single operator or multioperator, single transmitter. Exchange signal report, time (UTC) and zone (CARTG zone chart available at address below for s.a.s.e.). Multiplier is number of countries plus continents worked. Add 200 points for each VE/VO QSO to final score. Separate logs for each band. Logs must be received by January 1, 1980, by CARTG, 85 Fifeshire Rd., Willowdale, ON M2L 2G9, Canada.

Missouri QSO Party, sponsored by the St. Louis ARC, from 1100Z October 20 until 0600Z October 22. Exchange signal report and county (MO only) /state/province/country. Extra point for each band worked with same station. Multiply QSO points by MO sections worked. MO stations multiply QSO points by sum of states/provinces/countries for final score. Awards. Participation award. Mail entry by December 1, 1979, to St. Louis ARC, KØLIR, 645 Marshall Ave., St. Louis, MO 63119.

21

W1AW Qualifying Run, 10-35 wpm at 2300Z (7 P.M. EDT). See October 10 for more details.

27-28

CQ World-Wide DX Contest, phone, sponsored by *CQ Magazine*. 48-hour period UTC. 160 through 10 meters. Single op both single band and multiband, multiop (all-band operation only) with single transmitter and multitransmitter. Exchange report plus CQ zone. A station in a call area different than that indicated by its call sign is required to sign portable. A multiplier of one for each different zone on each band and a multiplier of one for each different country contacted on each band. You may work your own country and zone for multiplier credit. CQ Zone Map. ARRL Countries List. WAE country list and IARU WAC boundaries are standards. Contacts between stations on different continents are worth three points, between stations on the same continent but in different countries one point. Note: For North Americans only contacts between stations within the N.A. boundaries count two points. Contacts between stations in the same country are permitted for zone or country multiplier credit but have zero point value. Final score is the result of multiplying total QSO points by the sum of your zone and country multiplier. Single ops must show a minimum of 12 hours of operation to qualify for an award, multiops a minimum of 24 hours. A single-band log is eligible for a single-band award only. Awards. Usual log format and summary with all info and signed declaration. All entrants are required to submit cross-check sheets for each band on which 200 or more QSOs are made. All entrants are encouraged to do likewise. Each dupe found by the committee will result in a penalty of three additional contacts being removed. Logs, summary and zone maps available from CQ, send a large s.a.s.e. with sufficient postage. Postmark entries no later than December 1 for the phone section and January 15, 1980, for the cw section (cw event scheduled for November 24-25). Logs go to CQWW Contest Committee, 14 Vanderventer Ave., Port Washington, LI, NY 11050.

NOVEMBER

1-2

YL-AP, cw, see October 10-11 listing.

1-7

HA-QRP Contest, cw, 3500-3600 kHz only. Exchange call sign, signal report, name and QTH. Count one point for QSOs in your own country, otherwise two points. Multiply QSO points by DXCC countries worked. Single and multioperator categories. Your transmitter must run less than five watts input. Log must contain date, time, complete exchange and description of transmitter. Awards. Participation awards. Mail by November 21, 1979, to Radiotechnika Szerkesztosege, Budapest, Pf.603. H-1374, Hungary.

2

ARRL Frequency Measuring Test, begins with a call-up at 0300 and 0600Z November 3 (10 P.M. EST November 2 and 1 A.M. EST November 3). W1AW transmitters will be on the air simultaneously on 20, 40 and 80 meters for the duration of the test but in order to correlate your readings with those of the umpire, measurements should be made during the specified periods. Approximate frequencies and measuring periods for the early run are 14,105 kHz between 0307 and 0312Z, 7075 kHz between 0315 and 0320Z and 3545 kHz between 0323 and 0328Z. For the late run, 14,080 kHz between 0607 and 0612Z, 7065 kHz between 0615 and 0620Z, and 3535 kHz between 0623 and 0628Z. Submit your averages for each period to be compared with the umpire, a professional frequency measuring laboratory. Indicate how many readings you took to form your averages. Your report must be received by November 15. W1AW will transmit official results in an ARRL Bulletin beginning November 16.

3-4

ARRL Sweepstakes, cw, this issue, page 96.

7

West Coast Qualifying Run, 10-35 wpm at 0500Z (9 P.M. PST November 6). See October 10 for more details.

9

W1AW Qualifying Run, 10-35 wpm at 0300Z (10 P.M. EST November 8). See October 10 for more details.

10-11

OK-DX Contest, sponsored by the Central Radio Club, 24-hour period November 11. Phone and cw, 160-10 meters. Exchange signal report and ITU zone. One point per QSO, except OK QSOs count three points. Contacts with your own country count for multiplier only. Multiply QSO points by sum of ITU zones worked on each band. Categories: Single operator, all bands; single operator, single band; multioperator. Separate logs for each band. Usual declaration. Awards. Mail by December 31, 1979, to Central Radio Club, P. O. Box 69, Praha 1, Czechoslovakia.

International Police Association Contest, sponsored by the French section of the IPARC, from 0800-1000,

*Asst. Communications Manager, ARRL

1400-1700, 1800-2000Z November 10 and 11. Phone and cw. Exchange signal report and serial number. IPA members send "IPA" also. Score two points for 80 and 40 meter QSOs, four points for 20, 15 and 10 meter QSOs. Multiply by sum of IPA countries worked per band. Suggested frequencies: phone — 3650 7075 14,295 21,295 28,650 kHz; cw — 3575 7025 14,075 21,075 28,075 kHz. More info for an s.a.s.e. (28 cents) to Vince Gambino, WB4QJO, 7606 Kingsbury Rd., Alexandria, VA 22310. Mail logs by December 31 to Bureau International IPA, Section Francaise, CNAS, Gerard Dupuis, 15 Rue Cambaceres, 75008 Paris, France.

17-18

ARRL November Sweepstakes, phone, this issue, page 96.

24-25

CQ World-Wide DX Contest, cw.

26

W1AW Qualifying Run

DECEMBER

1-2
ARRL 160-Meter Contest

EA-DX Contest, phone
A.V. RTTY DX Contest
North Carolina QSO Party
Connecticut QSO Party

8-9
ARRL 10-Meter Contest
EA-DX Contest, cw
HA-DX Contest, cw

22-23
Teenage A R Contest
HA5 DX Contest

JANUARY

1
Straight Key Night

12-13
ARRL VHF Sweepstakes
ARRL CD Party

FEBRUARY

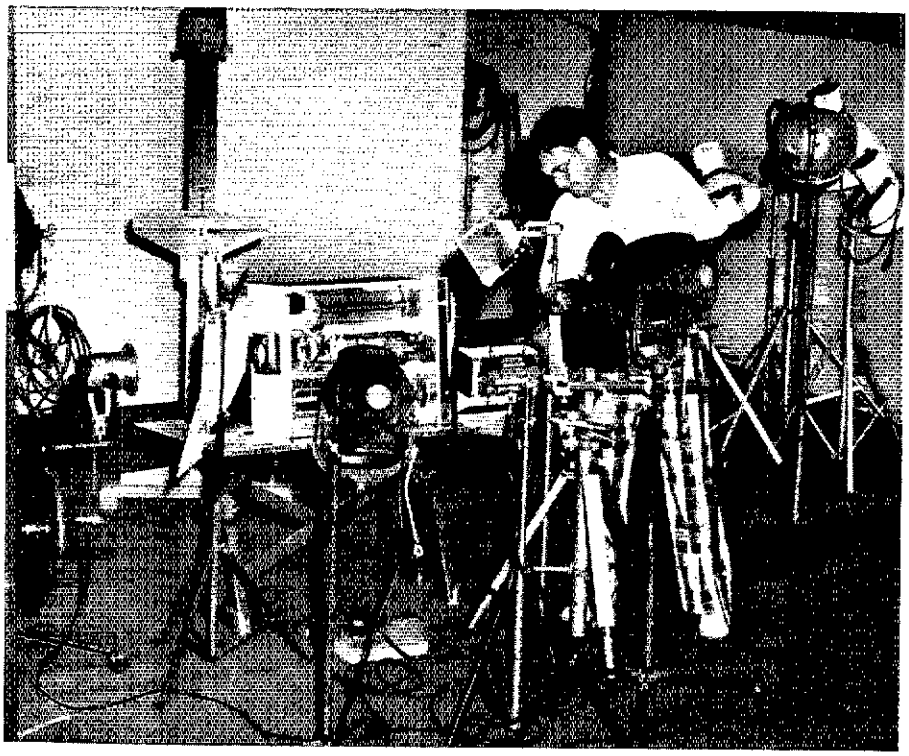
1-10
Novice Roundup

16-17
ARRL DX Competition, cw

MARCH

1-2
ARRL DX Competition, phone

Strays



What's in a cover? Shooting a cover for one of our publications is no easy task. We usually leave this up to a professional photographer. We thought you'd find this view interesting since it is typical of a setup for a cover shot. Here, Ray Hope of Meyers Studio adjusts a spot on an rf amplifier to be depicted in and on the 1980 ARRL *Handbook*.

50TH ANNIVERSARY OF SIMULATED FLIGHT

☐ The Link Amateur Radio Group special-event station W2JV will operate on 7.235 and 14.280 ssb and 14.040 and 7.040 cw beginning at 1200 UTC October 14 to commemorate the 50th anniversary of simulated flight. A certificate of commemoration will be sent to all stations making contact with W2JV. Send QSL and large self-addressed envelope to E. P. Yost, W2DDJ, Box 261 RD no. 1, Port Crane, NY 13833.

W3LWW TO CELEBRATE 20TH ANNIVERSARY

☐ The Foothills ARC of Greensburg, PA, will celebrate their 20th anniversary by holding a mini-Field Day from 1400 UTC on Saturday, October 20, until 1400 UTC on Sunday, October 21. Phone and cw operation will take place on 10 through 80 meters, 5-10 kHz up from the bottom of the General class portion of each band. Certificates will be awarded to anyone working W3LWW (s.a.s.e. required).

20TH ANNUAL CQ-WE CONTEST

☐ Bell Labs and Western Electric ARC, Columbus, OH, will host the 20th annual CQ-WE contest on November 10 and 11 UTC. This year's contest is open to all Bell System employees and retirees, including Western Electric, Bell Labs, AT&T Co., AT&T Long Lines and Bell System operating companies. For complete contest details and rules contact your local coordinator or send s.a.s.e. to Host Chairman Ed Kowalski, Bell Labs-RM-1K227, 6200 E. Broad St., Columbus, OH 43213.

CRAZY EIGHT QSO PARTY

☐ The Crazy Eight net of Pittsburgh, PA, will hold their first annual QSO Party on 10 meters for 24 hours beginning at 0000 UTC on October 28. All stations are welcome to participate, but only certificate holders may submit logs. Contest manager is Jim Lundberg, WB3ICC, 571 Washington St., McKeesport, PA 15132.

CENTER OF THE WORLD OPERATION

☐ "Expedition to the Center of the World," operated by the Warren Amateur Radio Association, will work 28.625, 21.360, 14.285, 7.235 and 3.900 MHz ssb, and 21.125 MHz cw, from The Center of the World, just outside Warren, OH, on October 13-14. Certificate available from W8VTD, P. O. Box 809, Warren, OH 44483. Send a large s.a.s.e., please.

QSL CARDS, PLEASE

☐ Bill "Hawkeye" Rundle collects QSL cards. Unusual? Not really. But Bill is confined to bed, and is an avid Amateur Radio enthusiast. Since he was introduced to message handling a year ago by WB1ASX, Bill has gained so much more interest in life. He sends messages all over the country to pen pals, and collects QSLs as a hobby. How about sending yours to Bill "Hawkeye" Rundle, Essex County Geriatrics Hospital, Belleville Ave., Belleville, NJ 07109.

LOOK FOR GERITOL

☐ Those Extra Class amateurs who are addicted to Geritol, the Geritol net that is, return to 3787 every Friday evening from 0100 to 0700 UTC from September 30 to April 30. See *QST*, February 1978, page 80, and December 1978, page 82, for details.

Station Activities

A-1 OPR ✗ EC ✗ DXCC ✗ RCC ✗ WAS ✗ STM ✗ OES ✗ OTS ✗ NM

SCM ✗ ARES ✗ OVS ✗ SEC ✗ QBS ✗ TCC ✗ OO ✗ NTS ✗ WAC ✗ CP ✗

CANADIAN DIVISION

ALBERTA: SCM, Sydney T. Jones, VE6MJ — SEC: VE6XC. Net Manager (APSN): VE6AFO Net Manager (ACWN) VE6BBL. VE6RY has been on vacation in BC and has been working the gang back home on forty meters. The Northern Alberta Radio Club members were active with communications for the Alberta Summer Games at St. Albert. I regret to have to report the passing of VE6SB in Calgary. He was well known and was highly respected and will be particularly missed in DX circles. Traffic: VE6CHK 69, VE6BBL 45, VE6ABC 32, VE6WV 2.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst. SCM: VE4JP. SEC: VE4TR, STM: VE4RO, NMs: VE4s NM TE IZ VJ AGB. The Skyhook Project got off the ground July 26. A National Research Council balloon carried Amateur Radio gear exploring the possibility of improving 2-meter antennas. More details on this when all the information is in. More than 500 contacts were made. Could be that Gimli will end up as second NASA for amateurs. Skylab on the other hand had many amateurs on standby for the best part of the day. This report will be in QST under public service. Among the Amateurs now with Advanced tickets are VE4s AEJ AED ACX AEA plus a few others that I don't have info on. Again congratulations. VE4IG is coming along well after a auto accident. VE4IF back from the hospital and checking into the nets again. VE4TT is undergoing surgery and we wish him well. MEPN: QNI 815, QTC 50, Sess 31. MMN: QNI 407, QTC 36, Sess 31. MTN: QNI 89, QTC 21, Sess 18. WRIN: QNI 61, QTC 2, Sess 5. MSN: QNI 4, QTC 18, Sess 7. Traffic: (July) VE4PG 89, VE4OJ 42, VE4TE 29, VE4AEJ 17, VE4NE 14, VE4LB 9, VE4NM 8, VE4AED 7, VE4GB 6, VE4JA 6, VE4AAU 4, VE4CR 4, VE4DS 4, VE4FK 4, VE4AAD 2, VE4MG 2. (June) VE4IX 51.

MARITIME-NFLD: SCM, Aaron D. Solomon, VE1OC — A/SCM: VO1FG. STM: VE1WF. SEC: VE1ASW. NMs VO1JN VE1WF. Silent Key: VE1XW. Hospital: VE1AOH. HARC mem. part. Gr. Search for 2 boys missing nr. Waverley, also for miss. child nr. Lr. Sackville, NS. 25 Am. part. in Skylab re-entry watch. HARC mem. provided comm. for Highland Car Rally. VE1s AAB BLO IG RI YO handled 250 mess. NS Skeet Shoot. SARC prov. comm. for Parade & Canoe Races at Myra. New PEI ARA: VE1BPX, ex pres.; VE1BHP, vice pres.; VE1BPY, secy. VE1BSU/VE0MBT ret'd safely Bermuda in Mouette II. VE1FQ on trip Gr. Lakes courtesy CAF for PS work. MAARC rpts. best FD yet with 7 trans in operation. At Camperdown (VCS) VE1s AIG ASR AWC BFV BC GE ex. YW. At Chebuct Head: VE1BJR VE1ZL. Many out-of-section visitors operating on 75 M and 2-M mobile. APN: Sessions 31, QNI 150, QTC 106/98. Traffic (July) VE1WF 273, VE1RI 105, VE1IG 62, VE1YO 60, VE1LCR/RO 49, VE1BLO 46, VE1AAB 34, VE1OC 23, VE1XF 11, VE1AUL 6. (June) VE1BSE 37.

ONTARIO: SCM, Larry Thivierge, VE3GT — SEC: VE3APK. STM: VE3GOL. As we head back to our fall on the air activities I want to extend my sincere thanks to all the hard working club bulletin editors and their assistants for the many excellent bulletins that I receive each month. Your help makes this column possible. I would like to hear of club activity from London, Burlington, Hamilton, Thunder Bay and some of the Toronto clubs, namely Nortown and Skywide. If you have a spare copy of your club bulletin, I'll put it to good use. VE3XL, a retired and very popular RI became a Silent Key. Our sincere sympathies to his family. The Ont. Trilliums are preparing to celebrate their 15th anniversary party in May 1980. Their annual Weekend Contest is slated for Nov. 3rd and 4th. VE3AIZ is now active on the Black Fly repeater. The CARTG 1979 Contest named the "Canada 79 Sweepstakes" will be held from 0200Z Oct. 20th to 0200Z Oct. 22nd. VE3DUK took part in Skylab one. VE3ILN won a D-104 desk mike while in the process of mastering a KR50 keyer. VE3INQ has a 160 meter quarter wave vertical erected and would like to hear from other Ont. 160 meter enthusiasts regarding their antenna systems. Special thanks to VE3PO for the excellent job he did holding down the OPN while long time NM VE3EWD was changing QTHs. There are many interesting forums and technical sessions planned for the RSO Convention in Ottawa, Oct. 12, 13 and 14th. Plan to attend. VE3s GOL and KK made BPL for the 16th and 9th times respectively. VE3JHE and his ARES group provided communications for the Kirkland Lake Diamond Jubilee parade and family day. VE3QEH is active again after moving to a new wing in the hospital. A special certificate celebrating Queen Elizabeth Hospital's 100th anniversary is available. VE3s ARY, CNZ and SD are the latest additions to CARTG. Congratulations to the Oakville ARC for their participation in "Project Goodwill." Traffic: VE3GOL/3 591, VE3KK 353, VE3JIR 222, VE3GT 147, VE3ISW 147, VE3DPO 113, VE3HGJ 84, VE3FZG 61, VE3HCS 50, VE3AAI 40, VE3SB 37, VE3GJG 34, VE3GYD 28, VE3FHZ 26, VE3JRO 24, VE3EWD 21, VE3BVG 17, VE3DUK 16, VE3IMR 16, VE3FRG 15, VE3GCE 13, VE3ANJ 10, VE3APK 10, VE3EBC 8, VE3DVE 6, VE3GNW 5, VE3JHE 4. (June) VE3GYD 26.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. The Montreal Hamfest was attended by a great number from all parts of the province also from VE3 land and south of the border. Congrats to VE2FFE, a new OTS who is now an Advanced Amateur. Silent Key VE2RI, well known to all the Oldtimers. VE2s AJD AGP et EMY sont tres actifs sur le 20 metre en cw et phonie. Traffic: VE2EC 36, VE2EKC 15, VE2FFE 13, VE2APT 3.

SASKATCHEWAN: SCM, Norm Waitho, VE5AE — The Moose Jaw ARC is to be congratulated on a successful Particifest '79 held July 27, 28 and 29. A ham radio display was set up at the Moose Jaw Home Town Fair during the second week of July by members of the MJARC. Contacts with VE4NRC, Gimli Manitoba, via a hot air balloon at 102,000 feet provided 2 meter interest to SK hams the last week in July. The MJARC took top honors in SK during Field Day activities. Amateur Radio will be providing communications at the Western Canada Summer Games to be held in Saskatoon during the week of August 12th through 19th. Traffic: VE5HG 25, VE5BO 20, VE5WM 9, VE5OL 4, VE5NJ 2, VE5RB 2.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ. STM: W3QQ W3WD. PSHR: K3JL 78. Many thanks to Del. Hams for the cards, calls, & visits during my second major surgery. The Sept. column was courtesy of W3WD. WA3EWK WB3FUO WB3EOU WB3GKD WB3FUP WB3JUZ WB3LPN WB3LGC WA3CFZ and N3ADT of the DARC provided communications for the Dual State Motorcycle Enduro on July 29th. New AWARE club XYL licensees N3AYD/WA3DPJ, N3AYE/AC3T, N3AYS/WA3TPD, KA3DXM/AC3U also extra AI3S. Contact K3JL for info on the new Sussex Amateur Radio Association. DTN: QNI 319, QTC 43; DEPN: QNI 50, QTC 1; PSHR for May: N3AKC 50, K3UL 46. W3FEG reports the following participants in the Spring Delaware Ham Campout at Tuckahoe Acres: W3FEG W3WYO W3BSS WB3FEF WB3KSR WB3LBM K3YET WB3LGC K3NVV WA3QLS WB2JGP WB3GXD KA2CRL KA3CFZ W3ARM with K3YQL W3WD K3JL and WA3VIT as visitors. Unwelcome news that K3NVV is moving west, but we wish him the best. Traffic: (July) W3PQ 218, N3AKC 81, W3QQ 38, WB3GXD 22, WA3WIY 21, WB3DUG 19, W3WD 16, K3JL 16, W3KDX 16, WB3GOI 4. (May) N3AKC 86, W3QQ 82, WB3GXD 26, W3DKX 25, WA3WIY 24, W3WD 21, WB3DUG 18, AC3T 12, WB3GOI 10, K3JL 10. (April) WB3GXD 23.

EASTERN PENNSYLVANIA: SCM, Geo. S. Van Dyke, Jr., W3HK — SEC: WA3PZO. STM: K3NGN. NMs: K3KW K3NGN W3VA W3IAZ. Net repts EPAEP&TN: QNI 336, QTC 118; PTTN: QNI 283, QTC 79; PFN: QNI 274, QTC 382; LVN: QNI 10, QTC 19; LV2M: QNI 4; EPA: QNI 514, QTC 279; AREC (2): QNI 13; Luzern Co: QNI 69, QTC 7. OVS repts W3GOA WA3BJQ W3CL W3KEK K3YD. OO repts W3KEK. OBS repts WB3JZA WB3JYZ W3VA W3CL K3EBZ N3AIU K3NGN. PSHR: WA3WQP KB6FR/3 WB3JZA WB3JYZ W3DP WB3JGP WB3GZV N3AIU WB3FEH WB3CAI. BPL: K3NSN WA3WQP KB6FR/3 WA3ATQ. K3SWZ made 5BWAS now working on 5BDXCC! WA3ATQ says now you should be at her QTH, COOL! WB3JZA now Extra and waiting for new call. New EPAEP&TN News looks good. Traffic holding up fairly well. Now we know why W3CUL & W3VR had that garage sale! N3AIU visiting SV land. W3ID's new antenna is working. WA3CKA says his new tribander should get the DXCC credit. Several report energy prob hitting attendance at hamfests. W3WRE busy on her writing, still off due to rig probs. Hope the outside work is all done and the summer storms didn't do any real damage. MURGAS ARC busy in TVI committee work, have one family with all hams and Big As at that. This is result of the tests that were given at the TamaquaFest. WB3HVS did a fine job getting medical help for his camp. New Off: Schuylkill AmRptr Assoc: WB3INT, pres.; WB3CRM, vice pres.; KA3AVN, secy.; N3ANX, treas.; W3EEK, tech dir.; WB3JYX, pr. Club papers still vy professional, nice work. Remember the PSHR has new rules, disregard Form 1 count. Don't forget work a Novice! Traffic: (July) K3NSN 4321, WA3WOP 985, KB6FR/3 745, K3KW 413, WA3ATQ 410, WB3JZA 340, W3FAF 222, WB3JYZ 186, W3IPX 137, AA3B 113, AG3R 88, W3DP 86, WB3JGP 76, WB3GZV 74, N3AIU 73, W3VA 73, WB3FEH 45, K3EIP 41, N3CD 37, W3ID 18, WB3CAI 12, W3CL 12, WA3VIL 12, WA3YOG 12, WA3CKA 11, W3ADE 5, WB3KZZ 5, W3KEK 4, K3AI 3, K3EBZ 3, W3HK 3, WA3BJQ 2, W3EU 1, W3GMK 1, W3GOA 1, W3WRE 1, K3YD 1. (June) W3FAF 100, K3EIP 14, W3KEK 2, W3WRE 1.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — TNX to BARC for inviting W3SW and W3FA and their XYLs to the BARC Annual Dinner. Happy to include BARC and ARRL affiliate after all these years! Many awards for service, and the Fried Transistor award to N3IC, BARC's Repeater Master. See him for details. Send EC reports to W3FA until further notice. EC W3ZNW reports regularly. W3WBY sez some of the offspring play with the 2-meter rig while the OM is at work. Watch it! W3ECN keeps liaison skeds on weekends. W3CDQ won 2 cook books at the YLRL convention! Met KB3AP and N3EB at the BARC do, and saw N3IT W3VBM K3RA N3IC and many many others. WB3JRW caught on quick as NCS. W3EPN starts his 3rd and final year at Antioch Law School. N3APS will be at W4VSV Vanderbilt — catch him there. W3HJH is now N4CIJ in Florida. WB3KDQ has a new antenna and is now on both fone and cw. W3FZV combined his June-July reports. K3IU finds it very busy at work. K1BCS says K3EVB and K3IOG vacationing in NH. N3SJ is hard to find sometimes. AA3S says the ARES group in Frederick provided communications for a bicycle rider group. WA3ZAS did not make out as expected in Florida. Look for him again soon from here. W0JVD/3 continues loaded with WDC traffic. N3AQV is taking on new net jobs. N3QA still at the old QTH. WB3HCW/TI7 is active on the TG9 border 15 meter phone says W3VBM. Who will win FAR's LOGO Contest? K3RXX and WB3AIQ missed my June activities by one day, but I lost N3AQV and WB3GZU's May report without any help from anyone! With the Nets: Net/Mgr Sessions/Traffic/QNI Avg. Hagerstown 2-mtr/WB3GEJ 4/2/14. WA3LMW and N3ARZ and new NCS. MEPN/ AA3S 30/89/21.6. WB3BFK 100 percent. Others W3ADQ N3AGM WA3IHW K3OMN and AA3S. WRPON/W3DFW 18/20/17.5. MDC PON/W3OYY 4/19/21.5. MDD/W3PQ Apr 60/345/10.4 Brass W3FA N3AKC W3QQ. MDD/May 62/266/8.1 Brass N3AKC W3QQ K3IU. MDD/Jun 57/289/7.7 Brass W3QQ N3AKC WB3GZU. Traffic: (July) W0VJD/3 119, K3IU 99, N3AQV 74, N3SJ 72, N3APS 66, WB3JRW 62, W3FZV 36, N3QA 21, AA3S 20, KB3AP 16, W3WBY 4, W3ZNW 4, WB3KDQ 3, W3ECN 2. (June) K3RXX 4. (May) WB3GZU 312, N3AQV 9.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, WB2LCC — SEC: W2HOB. STM: WB2LCC. In response to many negative comments, the net listings that regularly appear here will be discontinued. In place we will run a combined listing after each calendar quarter. It will reflect the net's totals for the entire quarter instead of for just one month. This will permit the inclusion of 8 more lines of text for 2 out of every 3 months. For those of you who missed last months column or have somehow forgotten, K1XA will be speaking at the October 10 meeting of the West Jersey Radio Amateurs. He is public service coordinator (or something like that!) for the ARRL, and we have promised him a large turnout from all over the area. Also in October is the second SET for 1979. Many will recall that the first one in January was quite successful. The SET will occur every year in October from now on, and thus the reason for the October one this year. If you haven't signed up with you local EC, please do so pronto. The whole ARES team is rapidly making plans and we want you aboard. Traffic: AA2H 138, N2ALS 67, N2AJG 56, WA2ONW 47, N2AFN 43, WA2GXU 40, WB2LCC 36, K2UL 35, WA2HEB 27, WB2GTW 12.

WESTERN NEW YORK: SCM, Lonnie J. Keller, WA2AOG — SEC: WB2FTX. STM: W2MTA. No BPL this month. PSHR to W2ZOJ WA2MFV W2MTA N2APB WA2ZJP and Novice KA2BGX for the second month in a row. Traffic: (July) WA2ELD 293, WA2MFV 213, W2MTA 167, W2ZOJ 138, N2APB 117, W2RUF 108, WA2HSB 104, WA2ZJP 67, WB2OMZ 59, W2RQF 50, WA2AOG 46, K2GWN 42, W2TZ 39, WB2QTC 30, WB2EOX 28, AF2K 20, KA2BGX 18, WA2AIV 3, K2VR 3, WB2NAO 1. (June) WA2ELD 264, K2GWN 50, WA2MFU 15, WB2NAO 6.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — ASCM: N3FM, STM: W3YQ. SEC: WA3VUP. Ass't SECs: WA3LJW & WA3JBQ. NMs: W3NEM W3KUN W3MML WA3PXA.

Net	Sess.	QNI	QTC	kHz	Time Day
WPACW	31	157	335	3585	7:00 P Dy
WPAPTN	31	92	345	3983	6:30 P Dy
WPA2MTN	31	93	514	146.28/88	8 P Dy
PATTN				3610	6:30 P Dy
WPARACES				3990.5	9:00 A S

Silent Key is W3UD (was W8AIH 1927-39, and WA3JFI 67-68) he was W3JX and other hams Elmer. New Novices are KA3DVI KA3CPS KA3DGM KA3DOB KA3CUX KA3DLJ KA3DRM KA3DRL KA3DRN and KA3DRK. New Tech's WB3KRI and KA3CUY. New Generals are WB3KAK and KA3AWL. To Advanced are WB3JQD N3AKW and WB3GAB. New extra is N3ANB. Congratulations to all. Bedford will soon have a new repeater on Kinton Knob, call is K3SAK/R frequency is to be 144.89/145.49. WR3AFZ has a TV Beacon on 439.25. It can be turned on for testing by contacting W3DGK or K3SMB. The Breezeshooter officers for 1979-80 year are K3CHD, pres.; WA3PHY, treas.; K3GP, checker; WB3CEW K3KSY WB3JGO WA3LUM and W3OVM, directors. Any Amateurs participating in public activities providing communications or aiding in emergencies etc. should report it to ARRL in Newington as soon as possible, if you delay it may be forgotten. Form #CD-157 is available for this report. If you send it to me it can take too long to get there. Traffic: (July) WA3PXA 265, W3EGJ 249, N3EE 224, N3FM 186, W3SMV 134, K3SMB 55, W3NEM 47, W3MML 47, W3NEM 47, WB3JDI 38, AC3N 38, K3HCT 36, W3RUL 26, W3EXC 25, WA3UNX 25, W3EXG 18, K3VQV 16, N3ASB 15, W3UHL 14, WB3KAF 11, W3SN 11, W3KUN 10, W3LOD 8, WA3ATQ 7, WB3BOB 6, WB3IAB 6, K3HT 4, AF3B 3, K3UA 3, WB3KAC 2, N3KB 2. (June) WB3BOB 12.

CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PRN — Asst. SCM: W9RYU. SEC: W9AES. NMs: WA9KFK W9JSR. Cook County EC: W9HPG.

Net	Freq.	Times/Days	Tfc.	Sess.
ILN	3690	2330/0300 Dy	325	62
ILL phone	3915	2245 Dy	70	31
NCPN	3915	1300/1800 Dy	93	52
IEN	3940	1400 Su		
W9VEY (MEMStn)		2000 Mon	12	5

Our sympathy to the family and friends of WA9KZV of Walnut, who recently passed away and joined the ranks of the Silent Keys. W9HOT reports that the 9RN net had 60 sessions and passed 184 messages with Illinois participation 100 percent with W9JIJ W9NXG W9YCE and W9HOT checking into the Net. W9MCH has moved his QTH to Cincinnati, Ohio. KA6GVI and his Skokie Aviation Enthusiasts provided communications for the Experimental Aircraft Association Fly-in in Oshkosh. KB9BY has upgraded to Amateur Extra class with a new call AI9O. The McHenry County Wirelaess Association and the Winnenago Amateur Radio Club were voted ARRL affiliated clubs by the Executive Committee of the League at their latest meeting. KA9CUB now a General. ExW9JUI is now AI9P with an Extra class license. New Novices are KA9EYB and KA9EYT. The CAND report for July: 579 messages during 62 sessions and Illinois stations participating were K9UMP W9NXG W9HOT and W9JIJ. K9IZO now Extra Class and KA9BBK is an Advanced licensee. W9TZ was praised by the Quincy Herald Whig for the help he gave a stranded couple at the Quncy airport. WB9KDX is recuperating from a hospital stint in Peru. K9BVE and K9PNG are BPL recipients for the month. Traffic: K9BVE 518, K9PNG 338, W9NXG 337, W9JIJ 260, W9HOT 221, N9TN 166, W9OK 143, WB9JSR 115, WA9KFK 93, W9KR 74, WB9PUK 72, K9SW 70, W9OBS 63, N9MX 42, K9DAC 41, W9LNQ 32, K9EEA 31, WA9AQN 18, KA9ALR 14, W9PRN 14, WB9YJF 14, K9BK 1.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9OAK. NMs: W9AYK W9IEM WB9ICH WB9ZRE W9DM K9LGU K9EN. Nets freq time QNI, QTC, Mgr. BWN: 3985 1145Z M-Sa 725-742 W9AYK. BEN: 3985 1700Z Dy 673-130 W9IEM. WSBN: 3985 2230Z Dy 952-195 WB9ICH. WNN: 3725 2215Z Dy (52-22 June) 45-13 WB9ZRE. WIN-E: 3662 0000Z Dy 310-117 W9DM. WIN-L: 3662 0300Z Dy 237-69 K9LGU. WI EXPO 3925 1701Z M-F 452-22 WA9NIX. OO class I WB9PCQ. KA9EWL KA9FAS new Novices. KA9EHI has General. KA9EEW has General and is now K9EEW. All from Stevens Point area. WD9ESM has her Novice and is getting married July 20 from Sturgeon Bay. WB9FSD is now AI9K. From Peoria, IL to Bessemer MI hams gathered at the QTH of WB9s YPY YPZ in Rhinelander for annual get together mainly of BWN. Total count was 104, with eyeballs, horsehoes, food hospitality was outstanding. All nets in Wisconsin could use more checkins and Traffic, lets all pitch in. Any tidbits of info would be most welcome for this column.

FREE PHONE! 800 854-6046

CALIF. CUSTOMERS PLEASE CALL OR VISIT STORES LISTED BELOW

PLUS FREE SHIPMENT U.P.S. (Brown).

(Except where otherwise noted)

SERVING HAMS BETTER!

North...south...

Bob Ferrero, W6RJ/K6AHV, Jim Rafferty, N6RJ other well known hams give you courteous, personalized service.

NEW KENWOOD TS-180S/DFC

Special deal!

① SEND US $1149.95

② WE'LL SEND YOU A TS-180S/DFC PLUS YOUR CHOICE OF ANY ONE OF THE FOLLOWING:

Ⓐ PS-30,30A SUPPLY. $139.00 value.

Ⓑ BIRD "43" WATTMETER. $125.00 value.

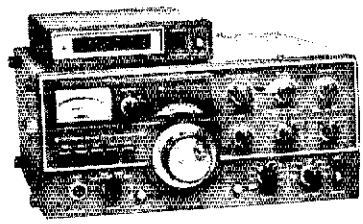
Ⓒ YK-88SSB I-F FILTER plus 500 Hz CW FILTER (2). $119.90 value.

FREE SHIPMENT ALL ABOVE ITEMS (UPS Brown).

TS-180S/DFC, superlative new HF transceiver for DXers, contesters, discerning amateurs who want top performance, 160 through 10M (also ±50kHz above, below bands).

- Digital freq. control (DFC) • Four memories (usable in transmit and/or receive modes) and manual scan.
- All solid state including final • No dipping or loading, just dial up, peak the drive, operate.
- High power. 200W p.e.p./160W DC input, 160-15M, 160W p.e.p./140W DC input, 10 meters.
- Digital frequency readout • SSB, CW, FSK • Dual RIT (VFO or memory/fix) • Single conversion • Improved dynamic range • RF AGC prevents strong signal overload.
- Speech processor • 13.8VDC operation.

KENWOOD TS-520 SE *new*



- 200W p.e.p. input SSB, 160W DC on CW.
- 160 through all of 10 meters • Noise blanker.
- RIT • 8 pole xtl filter • 25kHz calibrator.
- VOX/PTT/MANUAL operation
- Speech processor • 20db RF attenuator.
- CW Wide/Narrow bandwidth sw. For use with the optional CW-520, 500Hz CW filter.
- TUNE position for LP tuneup.
- Built-in speaker

ECONOMICAL VERSION OF THE POPULAR TS-520S

Regular price

$629.95

(Less digital readout)

ASK FOR SPECIAL INTRO-DUCTORY PRICE

KENWOOD

TR-7625

CDE ROTORS

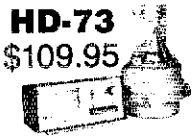
T2X

CALL FOR PRICES

TS-120S

HAM IV

HD-73 $109.95



ALLIANCE ROTATORS

U-100 $39.95

OVER THE COUNTER (Mon. thru Sat. 10 AM to 5:30 PM) MAIL ORDER, Phone, Write.

ANAHEIM, CA 92801
2620 W. La Palma
(714) 761-3033 (213) 860-2040
1 mile east Knotts Berry Farm

SAN DIEGO, CA 92123
5375 Kearny Villa Road (714) 560-4900
Highway 163 & Clairemont Mesa Blvd

OAKLAND, CA 94609
2811 Telegraph Ave. (415) 451-5757
Hwy 24. Downtown. Left 27th off-ramp.

BURLINGAME, CA 94010
999 Howard Avenue (415) 342-5757
5 miles south on 101 from S.F. Airport

VAN NUYS, CA 91401
6265 Sepulveda Blvd. (213) 988-2212
San Diego Fwy at Victory Blvd.

HAM RADIO OUTLET

VISA master charge

• ALDA • ALLIANCE • ALPHA • AMECO • ATLAS • BIRD • CDE • COLLINS • CUSHCRAFT • CURTIS • DENTRON • DRAKE • EIMAC • HUSTLER • HY-GAIN • ICOM • KENWOOD • KLM • MFJ • MOSLEY • PALOMAR • ROHN • ROBOT • SHURE • SWAN • TELEX • TEMPO • TEN-TEC • TRISTAO • TELREX • TRI-EX • WILSON • YAESU • more

Prices/specs subject to change without notice Calif. residents add sales tax

New Novices Stevens Point area KA9EVG KA9EVH. New Novice La Crosse KA9FNY. Northwoods traffic net (NTN) had 516 checkins handled 55 messages. BPL to KA9CPA. WNA picnic was very poorly attended. The WNA is your association, support it. Traffic: (July) KA9CPA 1066, W9CXY 274, WB9YPY 163, AE9H 125, W9IEM 123, W9YCV 119, W9DND 100, K9FHI 82, WD9DHF 81, W9DM 53, W9UCL 53, K9LGU 46, W9FDY 45, WB9YPZ 44, WD9ESZ 43, WA9DXW 42, K9AKG 41, WB9ICH 38, K9UU 38, WB9ESM 36, K9CPM 35, K9JPS 32, K9AQ 30, W9GKO 28, WB9ZRE 26, N9CP 25, W9LDO 24, WB9RRU 24, KB9FM 20, K9HDF 19, WB9JSW 19, W9SOJ 18, K9UTQ 18, WD9EAQ 14, W9UW 13, K9ANV 7, KA9CYG 6, KB9CT 5, WD9AJA 2. (June) K9HDF 11

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX — SEC: WAØQIT. STM: AFØO.

				QNI	QTC
MSPN N	3945	12:05 P	WØOPX	54	92
MSPN E	3929	5:45 P	KAØAIT	283	117
MSN 1	3685	6:30 P	AFØO	126	101
MSN 2	3685	10:00 P	KØPIZ	122	32

Early meteor activity in July leaves two-meters activity for KØSE with seven new states and WØHU with three new states. All states worked by both were on the east coast. WØVBIS now on 220 MHz ssb and cw. He also states that EME antenna is back in operation. NØADQ is now settled in his new location and job. Welcome to Rochester. Please note the new editions to the leadership appointments. WBØZBJ is the net manager of the MSSN. KAØAIT is the net manager for the MSPN E. WAØQIT is the newly appointed SEC. It is their hope that you will check into the nets and volunteer for the county EC position. Yours truly would like to say to the LA section that the convention was superb. The food, forums, and fellowship were top notch. WBØNZB upgraded to Advanced. Congratulations. This column should be written by more then myself, so how about news everyone. When you are reading this, fall will have settled in, and Hallowe'en will be just around the corner. Watch out for the goblins and take care of the tricks-n-treaters. Traffic: WAØTFC 319, AFØO 250, WBØHOX 138, WØRIO 69, WBØZBJ 68, KAØAIT 53, WØPX 52, KAØBZP 48, WBØNZB 24, WØROJ 18, WBØUKI 11, KØZBI 10, KØCSE 9, KØFLT 8, KØRMX 7, NØJP 5.

NORTH DAKOTA: SCM, Lois Jorgensen, WAØRWM — SEC: WBØTEE. OBS: WØDM. NM: WAØCRH, VHF: WAØCSL. Peace Garden Hamfest was a great success. The Ham of the Year was WAØWBU. Congratulations. Karl Silverman gave a mini seminar on severe weather also on what how when and where to help at right time. WBØWIB has new call, KBØIP. KAØDYP has new call, NØBDR. KAØFBH is now a General. Congratulation KAØBAV KAØBOA and WDØDAF are DXing on 2-M ssb with stacked beams. We are getting new 1980 vehicle license plates. If you wish for one on you vehicle send you recent FCC license photocopy to Ruth at Motor Vehicle Dept. Bismarck or to SCM, so no delays.

Net	kHz	CDT/Day	Sess	QNI	QTC	Mgr.
Goose River	1990	0900 Su	5	85	0	WØCDO

Traffic: WAØRWM 69.

SOUTH DAKOTA: SCM, Lydia S. Johnson, WØKJZ — Ass't SCM: WØDVB. NMs: WØs WE HOJ MZI NEO WAØsTNM VRE WDØBMR. SEC: WAØTNM. For Oct. SET contact SEC, WAØTNM or your county EC listed here: WAØBZD WAØCUL KØJM KØJV WØHOJ WBØBMF KØTVJ Still recruiting ECs for Pennington, Minnehaha, Codington, Brown, Hughes, counties. Please notify your SEC or me if you are interested. We need you! WØMZI and WØZWL received the Community Service Recognition Award, given by the telephone Pioneers for 100 hours plus public service via WX Net. WØDVB WØOZJ active in Cheyenne tornado traffic. WDØBMR and WAØTNM made PSHR. Nets: Morning: QNS 553, QTC 71; NJO: QNS 505, QTC 47; Evening: QNS 688, QTC 38; Tri-State: QNS 36, QTC 1; SDN: QNS 44 QTC 28. Traffic (July) KØFRE 117, WAØVRE 115, WAØTNM 107, WØHOJ 78, WDØBMR 72, WØDVB 65, WØKJZ 41, WBØOMF 37, WØMZI 25, WØIG 15.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC: WD5IRB. NMs: AD5D W5MYZ W5POH WA5ZWZ. Nets Freq time/day QNI QTC Mgr. OZK: 3760 0000/Dy 174 19 W5MYZ. ASN: 3745 0030/T-Th-Sa 34 3 K5BIL. SCARC: 28.765 0130/Su 0030/M 96 11 WD5HJC. APN: 3.937 1100/M-Sa 807 53 W5POH. M-Bird: 3.928 2130/M-F 768 23 WA5ZWZ. ARN: 3.995 2330/Dy 993 97 AD5D. WB5GZR now KB5KM. WD5AEA now KC5X. KB5BO now KC5E. KB5BML now Advanced. At July meeting of Jacksonville ARC your SCM presented a certificate of Merit to WA5VNV. HEY GANG, how about sending your monthly station activity reports by a radio message on one of the Ark. nets?? There are more than half dozen stations active. W5KL & WA5WAR spent two weeks in Florida where their ICOM 230 rig was stolen from car. WD5ENG now KB5HV. OBs WB5WWA 1 W5UAU 1. Traffic: AD5D 42, W5BLP 28, W5UAU 21, WB5WWA 5, WD5CAA 2, WB5GQH 1.

LOUISIANA: SCM, S. T. "Tom" Losey, Jr., K5TL — Asst SCM: K5DPG. SEC: WB5IYH. STM: N5YL. NMs: N5RB K5ARH WB5LBR. W5YZL N5EK K5DPG WD5CWK all active on DRN5. The '79 ARRL National Convention is now history. The LCOARC, for their years of planning and preparing, to K5SVD and all the different committees for their super efforts and dedication, a well deserved pat on the back for a job well done from the Section. The SELARC is planning a repeater user education class. Congrats to you. I hope other Clubs in the Section will do the same thing, and get started cleaning up our act. N5ARU new intern director of NOCD. K5OA received the Delta DX Assoc. DX-ER OF THE YEAR AWARD, congrats. SARA Hamfest for '80 to be in July. WD5BEB appointed chairman. WD5ELM upgraded to General. The LRN, RTTY NET, needs more participation. Crank up those old noise makers and join in the fun Sun. at 6:30 P.M.

Net	Freq.	Time(PM)/Day	QNI	QTC	Mgr.
LAN	3615	7 & 10 Dy	367	135	N5RB
LTN	3910	6:30 Dy	468	119	K5ARH
LSN	3703	7:30 M-F	69	7	N5IB
LRN	3587.5	6:30 Su	8	4	N5RB
RACES	3993.5	8:00 AM Su			WB5IYH
LEN	3910	9:00 AM Su			WB5IYH

Traffic: W5GHP 133, WB5LBR 101, K5TL 96, N5RB 90, N5ES 65, K5ARH 50, N5EK 44, WD5GJB 15, K5DPG 11, KA5EDB 10, WB5JZP 9, W5YN 8, WB5IKT 2.

MISSISSIPPI: SCM, E. Ed Robinson, W5XT — SEC: WB5FXA. Congrats to Delta area ARA establishing a

Wilson...

has your needs well in hand.

Today's Amateur demands rugged, rapid and accurate communications between Hams in the know. That's why they choose the Wilson Mark Series of hand-held radios. With exceptional qualities like these . . . why not choose the most popular radio available for yourself?

FEATURES

Advantages such as solid state circuitry, rugged Lexan® case, removable rear panel (enabling easy access to battery compartment) and compact mini-size enhance the Mark Series portable radio's versatility. In addition, Wilson carries a full line of accessories to satisfy almost any of your requirements.

SPECIFICATIONS

The Mark radios offer: • 144-148 MHz range • 6 Channel operation • Individual trimmers on TX and RX xtals • Rugged Lexan® outer case • Current drain: RX; 15 mA, TX; Mark II: 500 mA, Mark IV: 900 mA • A power saving Hi/Lo Switch • 12 KHz ceramic filter and 10.7 monolithic filter included • 10.7 MHz and 455 KHz IF • Spurious and harmonics, more than 50 dB below quieting • Uses special rechargeable Ni-Cad battery pack • LED battery condition indicator • Rubber duck and one pair Xtals 52/52 included • Weight: 19 oz. including batteries • Size: 6" x 1.770" x 2.440".

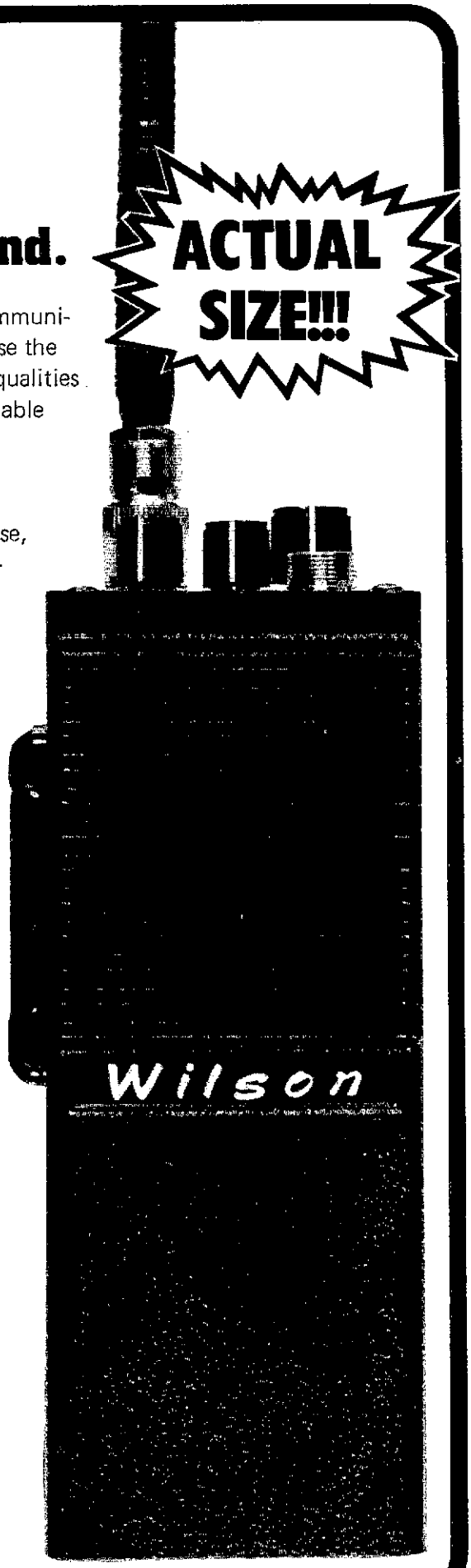
OPTIONS

Options available, include Touch Tone Pad, CTCSS, Leather Case, Chargers for Desk Top, Travel or Automobile, Speaker Mike and large capacity, small size batteries.

For more details and/or the name of your nearest dealer, contact: Consumer Products Division, Wilson Electronics Incorporated, 4288 So. Polaris Ave., P. O. Box 19000, Las Vegas, Nevada 89119. Phone 702/739-1931.

Wilson Electronics Incorporated

A Subsidiary of REGENCY ELECTRONICS, INC.



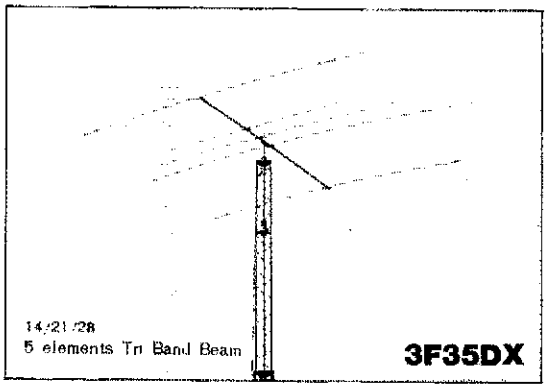
Prices and specifications subject to change without notice.

TET®

ANTENNA SYSTEMS

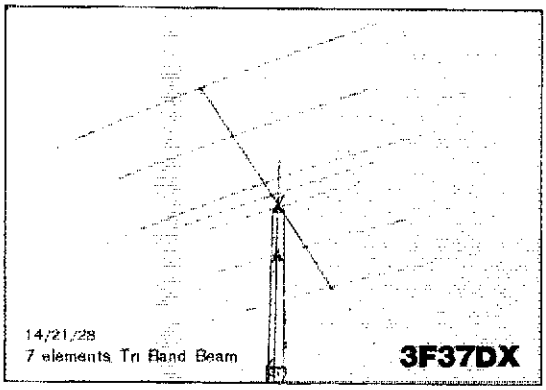
Multi Band Beam Super DX Series

These beams employ a hybrid system which is a combination of separate full-size driven elements for each individual band and Hi-Q-trap parasitic elements. These features result in high radiation-efficiency, high power-rating, and excellent VSWR over the entire bandwidth.



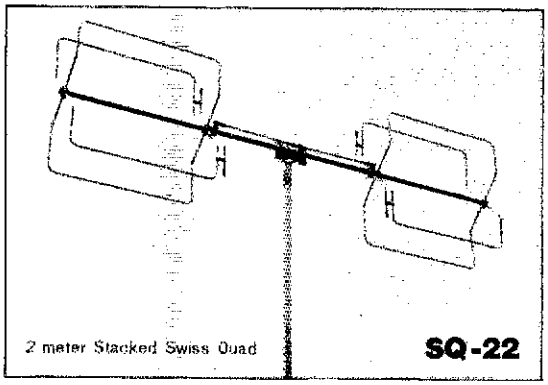
14/21/28
5 elements Tri Band Beam

3F35DX



14/21/28
7 elements Tri Band Beam

3F37DX



2 meter Stacked Swiss Quad

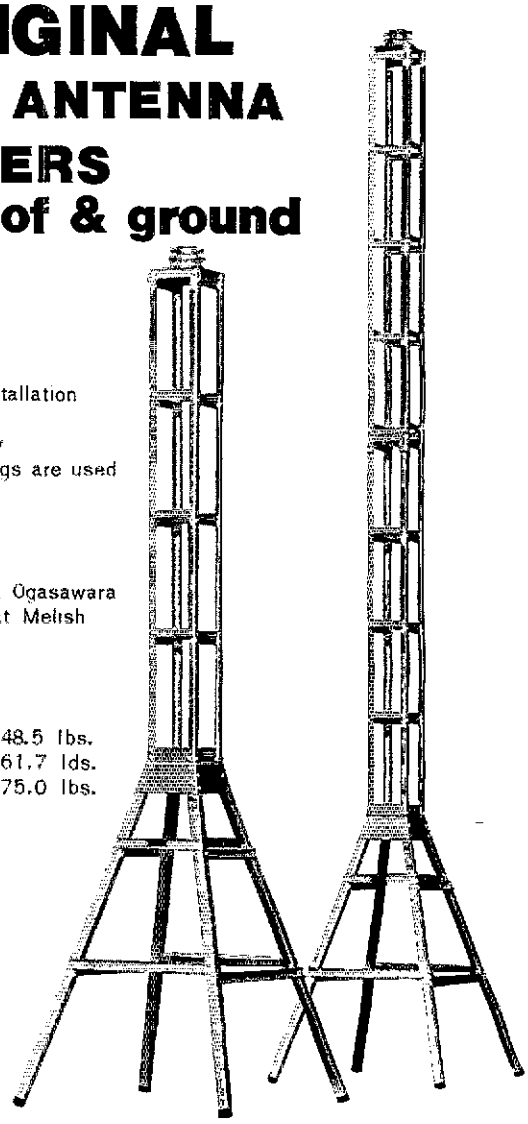
SQ-22

TET ORIGINAL
MODULAR ANTENNA TOWERS
Ideal for roof & ground mounts

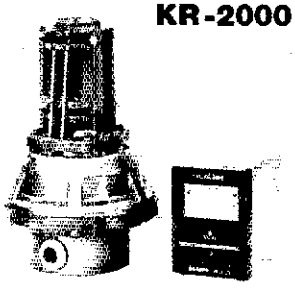
- one man assembly and installation
- Light weight
- High quality aluminum alloy
- High stability (square tubings are used as base section)

Has been used by JD1YAH at Ogasawara island and DX peditionning at Melish Reef (VK9ZR)

Model	TE-35A	11.6ft.	48.5 lbs.
Model	TE-55B	18.0ft.	61.7 lds.
Model	TE-75C	25.0ft.	75.0 lbs.

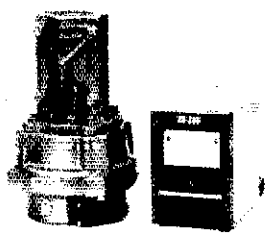


KR-2000



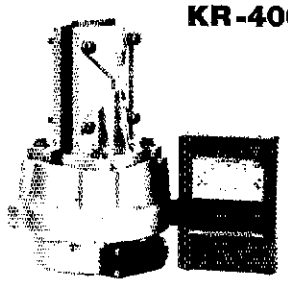
KR 2000—Designed for 360° rotation. Brake holds up to 10,000kg/cm (8680lbs/inch) torque.

KR-600



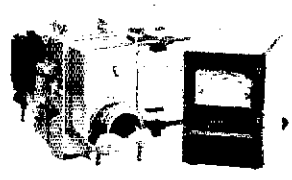
KR 600—Designed for360° rotation. Brake holds up to 4000 kg/cm (3470 lbs/inch) torque.

KR-400



KR 400—Designed for 360° rotation. Rated to support up to 200 kg or 440 lbs. Read out tolerance +5 degree max

KR-500

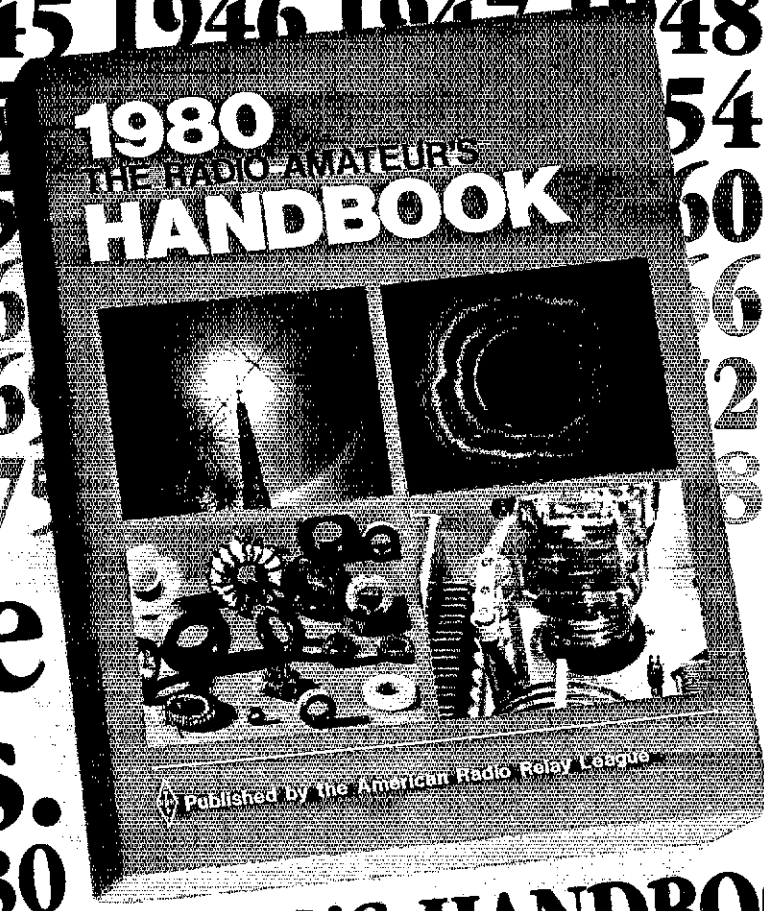


KR 500—Designed for 180° rotation. Brake holds up to 2000 kg/cm (1750 lbs/inch) torque.

425 Highland Parkway, Norman, Oklahoma 73069
Tel. (405) 360—6410

TET U.S.A., INC.

1926 1927 1928 1929 1930 1931
1932 1933 1934 1935 1936 1937
1938 1939 1940 1941 1942 1943
1944 1945 1946 1947 1948 1949
1950 1955
1956 1961
1962 1967
1968 1973
1974 1979



Here it is.

Your 1980 RADIO AMATEUR'S HANDBOOK...

Since 1926 it has been the STANDARD MANUAL OF AMATEUR RADIO COMMUNICATION. Each year it is revised and updated to incorporate the latest, most usable technological advances in all aspects of Amateur Radio.

In its 576 pages (32 more than last year) you will have:

- Reinstated tube and semiconductor tables
- New larger section on Advanced Receiver design
- New satellite operations techniques and antennas
- New keying circuits
- Design tables for Chebyshev filters
- Revised digital logic IC section
- Expanded list of parts suppliers
- Updated frequency allocations chart
- Practical information on discone antennas
- Expanded index and Improved paper

SOFT COVER	CLOTHBOUND
$10.00 U.S.	$15.75
$11.00 Canada	$18.00
$12.50 elsewhere	$18.00

Enter the world of state-of-the-art.
You'll find what you need in the 1980 RADIO AMATEUR'S HANDBOOK. Pick up a copy at your local dealer today, or order direct from ARRL, 225 Main Street, Newington, CT 06111.

2-meter net on 146.22/82 Dy at 0000Z and fine Tfc report see below (TnxWD5BEV) Recent hidden xmtr hunt in Jackson Metro area spearheaded by WD5IKD-new different and enjoyed by all. News from MS Coast ARA includes DX tidbits from N5FG. DX info net Sun. nites 8:30 P.M. CDT @ 28.750; also on 14.240 nitely with WA2JUG. Congrats to new net managers: Central Gulf Coast Hurricane net-K5UPN; and Ms. Net WA5OPT. All net Tfc activity and count down-summer is almost over and all should pick up. CGCHN (K5UPN): Sessions 31, QNI 2278, QTC 268. MSBN (K5MK): Sessions 31, QNI 2094, QTC 108. MTN (K5OAF):Sessions 31, QNI 99, QTC 31. MSN (WD5GNR): Sessions 13, QNI 40, QTC 17. MN (WA5JWD): Sessions 31, QNI 555, QTC 16. MsRACES (N5AMK): Sessions 5, QNI 208, QTC 0. Capital AEN (WD5IKD): Sessions 5, QNI 95, QTC 4. JCARCEN (WD5DCI): Sessions 22, QNI 279, QTC 18. Ms Delta 2-M Net (WD5BEV): Sessions 30, QNI 480, QTC 6. Traffic: N5AMK 222, K5OAF 95, WD5IKD 76, WB5SNB 32, WB5TRZ 30, W5WZ 25, W5XT 21, WA5OPT 16, WB5UPN 14, N5XA 3.

TENNESSEE: SCM, O. D. Keaton, WA4GLS — SEC: WB4DYJ. Asst. SCM: WB4PRF. STM: W4ZJY. Everyone plan to attend the Memphis Hamfest on Oct. 13 & 14 and the Chattanooga Hamfest on Oct. 27 & 28. The Short Mountain Repeater Club held their annual picnic on July 8 at Cedars of Lebanon State park, a wet one but everybody enjoyed the fellowship. The Oak Ridge Hamfest was a very successful one even though the location was changed. Congrats to KA4FLD N4BGL & WA4DEP who walked away with the goodies. The ARRL National Convention was enjoyed by all those who attended at Baton Rouge LA. The DELTA Division is fortunate to be able to sponsor such an event. Thanks to all LA amateurs who made it a great Convention and the hospitality which all enjoyed. Congrats to "Q. R. MARY" for bringing some of the goodies back to Tenn. Officers of Clarksville ATS are: K4VM, pres.; N4UC, v. pres.; WB4SWO, secy/treas., and Tenn. CDARC are: N4BHN, pres.: N4AWB, secy.; WA4BOC, treas. WB4NFI has been appointed OES. The following stations have been awarded the Certificate of Merit for their participation in Drexel Chemical Co. accident in Memphis on July 5, 1979: WB4RHO WB4MMI WB4SJK W5RJJ KA4ACO WB4RNN WA4OYI WA4VIP WA4OUU WB4OER WA4KHN. Please get your CVRA ballot back to me so I will know your wishes. W4NZW has been appointed OES. WB4PHW has been appointed OES. Traffic: WA4CNY 339, AF4T 187, WA4NIF 147, WB4BKF 129, N4UC 89, WB4ZSZ 71, WA4FMR 61, K4XE 59, K4WOP 34, W4PFP 32, WA4GLS 15, W4TYV 12, W4RUE 11, W4VJW 10, WD4NJR 9, WA4WVW 9, W4PSN 6, WA4EAV 5, W4EWR 5, K4VM 5, K4UMW 4, N4BBB 1.

GREAT LAKES DIVISION

KENTUCKY: SCM, Joseph Miller, K4DZM — STM: K4HRF. SEC: WB4ZML. NMs: W4BEJ WA4JTE WA4AVV KB4OZ WA4UIH WA4WSM WB4NPD. Nets Reporting:

Net	QNI	QTC	Net	QNI	QTC
KRN	409	44	MKPN	881	145
KTN	985	164	KNTN	390	179
KYN	289	132	KSN	218	67
KPON	51	3	SEKEN	27	1
CARN	212	25	5 D ARES	30	10
PAWN	320	14	4 D ARES	24	3
D-9RN,KY 100%	184		2MSSB	8	1

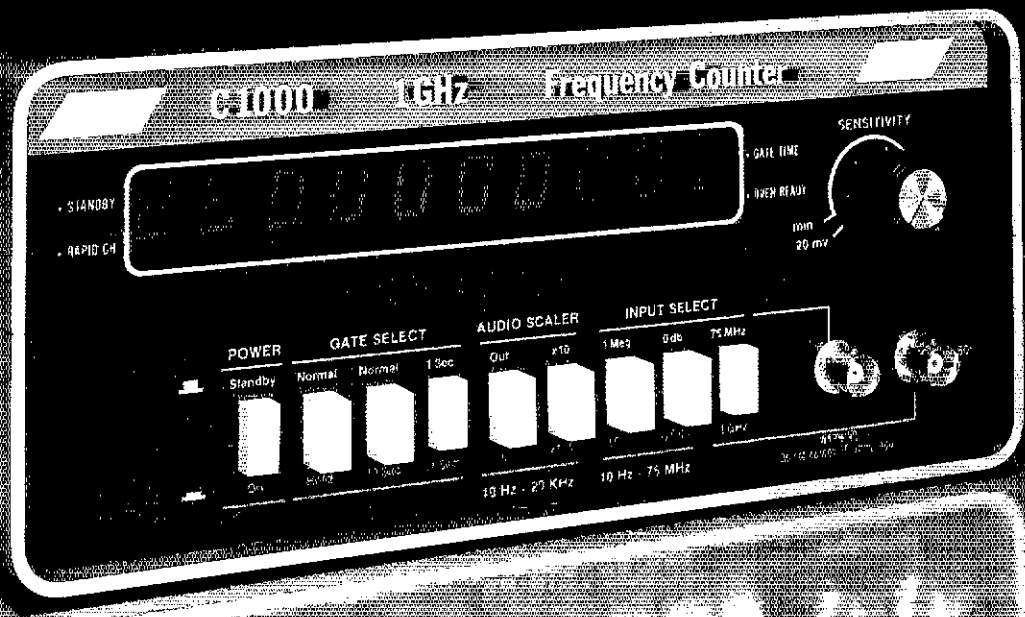
New Appts: STM K4HRF; NM: WA4WSM; OTS: K4JLX; OVS: WA4IPI WB4AOE WA4SWF; EC: K4GFY; OTS: WB4APC PSHR: KB4OX K4DZM, AA4KY K4KAK KF4O has DXCC. WA4QEJ getting RTTY. WD4CTT upgrade to General. WB4AOE has new 2-MTR. array. Hope all in KY is coming to the Louisville Hamfest. KNTN again is top net. Traffic: K4DZM 239, KB4OZ 227, WA4AVV 156, WB4APC 130, WB4NPD 84, K4JLX 66, WA4JAV 59, W4RHZ 55, WA4WSM 53, WA4EBN 41, K4HRF 38, WA4JTE 33, KA4AZT 33, WA4FAF 28, WB4KDP 25, WB4QCA 25, W4CDA 24, WD4COF 24, WB4AUN 21, N4CCJ 18, WA4GAL 16, WA4YPO 15, K4AVX 12, W4BAZ 12, W4CID 12, WA4SWF 12, WA4RCD 11, WB4RIT 9, K4AML 8, W4HKT 7, KA4GFU 7, WA4AGH 6, WD4KDG 5, KA4ENG 4, WA4IGD 4.

MICHIGAN: SCM, Stanley J. Briggs, W8MPD/K8SB — Asst. SCMs: WA8DHB W8SOP. SEC: WA8EHK. STM: WB8MTD NMs: K8LNE K8KMQ KB8AI WB8YDZ WA8DHB WB8ZNS, N8ABA.

Net	Freq.	UTC/Day	QNI	QTC	Sess
QMN*	3663	2300/0300 Dy	923	425	62
MITN	3953	0000 Dy	718	359	31
MACS*	3953	1600 Dy	880	261	31
GLETN	3932	0200 Dy	1075	200	31
MNN*	3722	2230 Dy	370	123	31
UPN*	3922	2200 Dy	535	91	34
WSSBN	3935	0000 Dy	591	37	30
BR	3930	2230 M-Sa	365	33	22
MEN	3930	1400 Su	151	11	5
ARES	3932	2230 Su	101	10	5
VHF LOCAL NETS(11 reports)			742	36	49

*NTS Section Nets. W8CUP sailed for two weeks aboard the Sea Cadet ship In July. He provided communications between the Cadets and crew on the ship and their families back home. The message traffic count totaled 500. Alpena area amateurs provided communications for the International Sarnia-Alpena Race. A boat was stationed at the finish line positioned so as to be able to see the sail numbers and relay same to the Race Committee. WB8ZIQ coordinated the project. Three OTS appointments have been issued since last month: KB8EQ KA8GMJ and W8PDP. OBS reports received from: WB8DJS AC8Y & AF8V. OO reports: W8GQ K8AIT K8JH W@MVR/8 K8RCT. OVS report: W8NOH. WA8DHB was again elected to serve as net manager for the Upper Peninsula Net at the U.P. Hamfest in Marquette. I am sorry to report the following Silent Key: WA8ENA. Each year the K. I. Sawyer Amateur Radio Club presents the U.P. Novice of the Year Award in honor of Joe Faucher, WN8NWT a Silent Key Novice from U.P. This year's award is to Ginny Olson, WD8PCX of Marquette. Some upgrades: WD8DNK, Extra: K8SAK K8WUJ. ADV: KA8EBZ KA8ECA WD8BHM KA8FBB WD8BHM, General. Traffic: W8CUP 500, W8VPW 483, WB8MTD 373, WD8NKA 342, WB8YRY 337, K8KMQ 203, WD8KZX 192, WB8YDZ 162, WD8LRT 120, N8ABA 96, KB8EQ 93, KB8AI 89, K8LNE 87, W8NOH 87, W8MPD 84, W8PDP 83, W8IHX 75, W8YIQ 70, K8RV 66, W8SOP 61, K8UPE 57, KA8DMT 48, WD8LSV 47, WD8MCN 46, KB8GC 45, WB8ITT 42, K8DYI 41, WA8PIM 40, K8DTG 35, W8HIN 34, WB8MJB 32, WD8OFE 32, K8GXV 31, WA@TAQ/8 30, KA8CPS 26, WA8WZF 26, W8WVL 25, K8ZJU 25, WB8SYA 21, W88-QYI 21, WA@UPL/8 21, AC8Y 19, KA8GMJ 18, W8LDS 18, WB8ZIY 17, WB8DJS 15, W8VIZ 13, WA8FXR 12, K8JED 11, W8FSZ 9, W3GQJ/8 9, WB8AFO 8, WD8EIB 8, WD8NJQ 8, W8WOJ 8, KB8FK 7, WD8IXZ 7, W8JUP 7, K8OCP 7,

More accuracy
More range
Less money



C-1000

- Includes audio scaler
- Auto zero blanking
- Auto decimal
- 10 MHz proportional oven time base

The C-1000 gives you greater accuracy and wider frequency range than many frequency counters that cost much more. Accuracy to .1 PPM (.00001%) from 0° to 40°C. Full frequency range from 10Hz to 1GHz. Plus sensitivity to 10MV in the 75MHz to 500MHz range. Selectable .1, 1 and 10 second gate times. Standby feature allows oven to remain ready.

$499.95

Guaranteed Specifications	
Frequency Range	10Hz to 1GHz
Frequency Accuracy 0° to 40°C	1 PPM
Sensitivity	
50Hz to 75MHz	20MV
75MHz to 500MHz	10MV
500MHz to 1GHz	50MV
Number of Digits	9
Size of Digits	.5 in.
Power Requirements	115VAC or Battery Pack (optional)

All units are factory calibrated, fully tested and carry a full 5-year limited warranty.

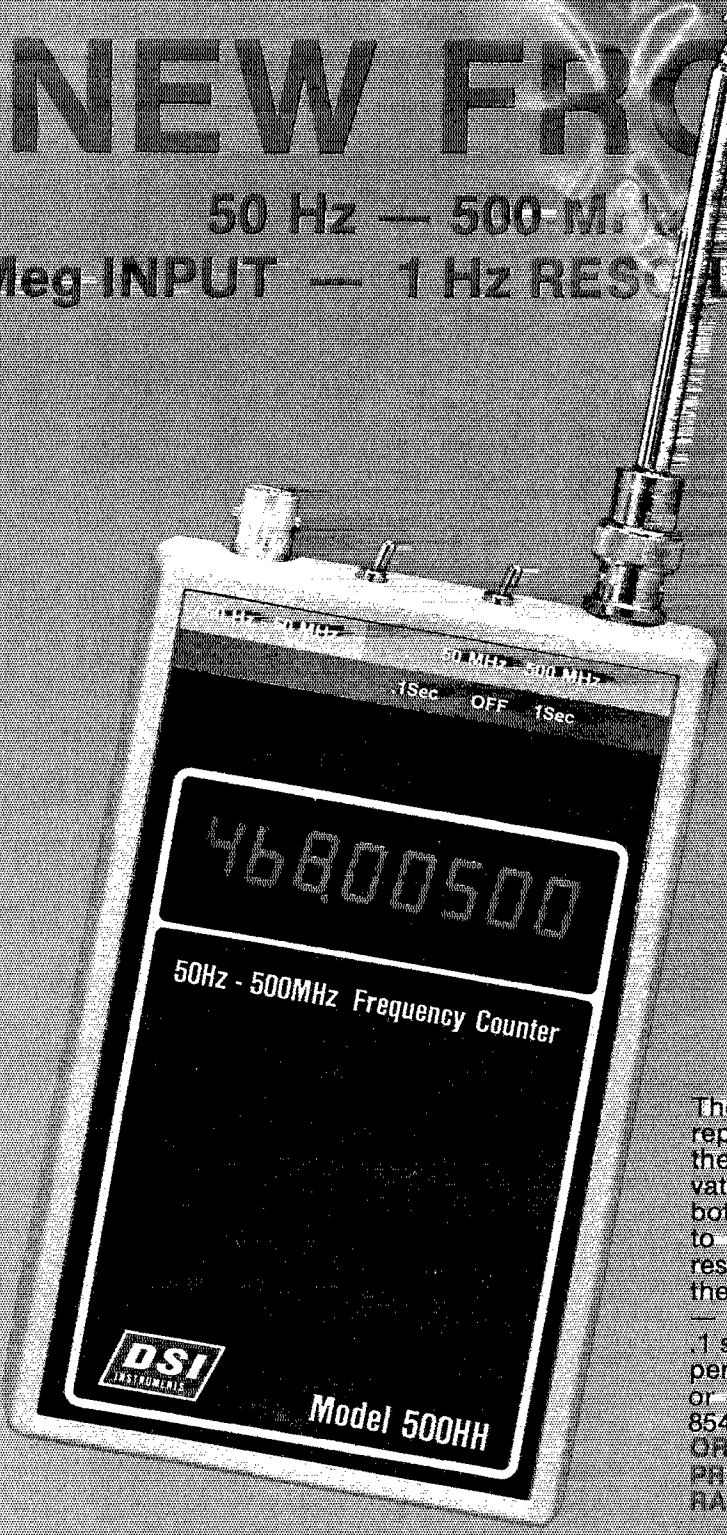
BEC BRIGHT ELECTRONICS CORPORATION
1685 Phill Scopp, Bright Electronics, Anne

For information about the C-1000 and other Bright frequency counters, call Toll Free (800) 241-3939. Georgia Exchange call collect (404) 393-9494.

NEW FROM DSI!

50 Hz — 500 MHz 8 DIGITS

1 Meg INPUT — 1 Hz RESOLUTION — 1 PPM TCXO



- AC—DC Operation
- BNC Inputs 1 Meg Direct 50 Ohms Prescaled
- 8 Large .4" LED Readouts
- Auto Decimal Point & Zero Blanking
- 1 Year Limited Warranty Parts & Labor
- 100% Factory Assembled in U.S.A.

$149.95

MODEL 500 HH
50 Hz — 500 MHz
Without Battery Capability

SAVE $5.00
With Battery Capability

MODEL 500 HH . . $169.95
MODEL 100 HH . . $119.95
Includes AC-9 Battery Eliminator

MODEL 100 HH
50 Hz — 100 MHz

$99.95
Without Battery Capability

The 100 HH and 500 HH hand held frequency counters represent a significant new advancement, utilizing the latest LSI design . . . and because it's a DSI innovation, you know it obsoletes any competitive makes, both in price and performance. No longer do you have to sacrifice accuracy, ultra small readouts and poor resolution to get a calculator size instrument. Both the 100 HH and 500 HH have eight .4 inch LED digits — 1 Hz resolution — direct in only 1 sec. or 10 Hz in .1 sec. — 1 PPM TCXO time base. These counters are perfect for all applications be it mobile, hilltop, marine or bench work. **CALL TODAY TOLL FREE:** (800—854-2049) **Cal. Res. CALL** (800—542-6253) **TO ORDER OR RECEIVE MORE INFORMATION ON DSI'S FULL PRODUCT LINE OF FREQUENCY COUNTERS RANGING FROM 10 Hz TO 1.3 GHz.**

FREQUENCY COUNTER CONSUMER DATA COMPARISON CHART

MANUFACTURER	MODEL	SUG'STD. LIST PRICE	FREQUENCY RANGE	TYPE OF TIME BASE	ACCURACY OVER TEMPERATURE		SENSITIVITY			DIGITS		PRE-SCALE INPUT RESOLUTION	
					17° - 40°C	0° - 40°C	100 Hz - 25 MHz	50 MHz - 250 MHz	250 MHz - 450 MHz	No.	SIZE IN INCHES	.1 SEC	1 SEC
DSI INSTRUMENTS	100 HH	$ 99.95	50Hz-100MHz	TCXO	1 PPM	2 PPM	25 MV	NA	NA	8	.4	100 Hz	10 Hz
DSI INSTRUMENTS	500 HH	$149.95	50Hz-550MHz	TCXO	1 PPM	2 PPM	25 MV	20 MV	30 MV	8	.4	100 Hz	10 Hz
CSC‡	MAX-550	$149.95	1kHz-550MHz	Non-Compensated	3 PPM @ 25°C	8 PPM	500 MV*	250 MV	250 MV	8	.1	NA	1 kHz
OPTOELECTRONICS	OPT-7000	$139.95	10Hz-600MHz	TCXO	1.8 PPM	3.2 PPM	NS	NS	NS	7	.4	1 kHz	100 Hz

* 1 KHz - 50 MHz ‡ Continental Specialties Corp.

The specifications and prices included in the above chart are as published in manufacturer's literature and advertisements appearing in early 1979. DSI INSTRUMENTS only assumes responsibility for their own specifications.

100 HH . . $ 99.95 **W/Battery Pack . . $119.95**
500 HH . . $149.95 **W/Battery Pack . . $169.95**
Prices and/or specifications subject to change without notice or obligation.

These prices include factory installed rechargeable NiCad battery packs.

DSI INSTRUMENTS, INC.
7924 Ronson Road, Dept. G
San Diego, California 92111

T-500 Ant. . . . . $ 7.95
AC-9 Battery Eliminator . . . . . $ 7.95

TERMS: MC - VISA - AE - Check - M.O. - COD in U.S. Funds. Please add 10% to a maximum of $10.00 for shipping, handling and insurance. Orders outside of USA & Canada, please add $20.00 addition to cover air shipment. California residents add 6% Sales Tax.

The new Heathkit® Hand-held DMM

–every feature you need at a GREAT LOW PRICE

- Measures voltage, current and resistance
- Easy one-hand operation
- Big, easy-to-read LCD display
- Separate voltage and current inputs for circuit protection
- Single PC board for simple, quick assembly

EASY ONE-EVENING KIT ASSEMBLY
only $94.95
Mail Order Price

Top performance and easy operation make the Heathkit IM-2215 your best buy in a solid-state, hand-held multimeter!

The new IM-2215 brings you features you would only expect in hand-held digital multimeters costing much more! Take measurements with outstanding accuracy – DC voltage, ±.25% – AC voltage, ±.5% – DC current, ±.75% – AC current, ±1.5% and resistance, ±.25% (basic)! Alternating high-low resistance test voltage makes measuring semiconductors or in-circuit resistance easy! One-hand operation, a large 3½-digit LCD display and built-in calibration references make the IM-2215 ideal for field use. A pivoting stand adapts it to bench use. The low-drain circuitry stretches typical alkaline battery life to 200 hours! Battery condition is monitored, and a LO-BAT indicator warns you of the last 20% of battery life.

You can easily assemble the IM-2215 in just one night, with the help of the clear, concise Heathkit assembly manual. And if you need advice or service, experts are as close as your telephone! It operates on 9-volt battery (not included), or on 120 or 240 VAC with optional cords. The latest technology and traditional Heathkit value is now built into a new hand-held digital multimeter weighing only 14 ounces!

HEATH
Schlumberger

If coupon is missing, order from:
Heath Company, Dept. 009-580
Benton Harbor, MI 49022

ORDER YOURS TODAY!

For fastest delivery, use the Heathkit Hot Line **CALL (616) 982-3411**

For faster service on VISA or Master Charge orders call (616) 982-3411

Send to: Heath Company, Dept. 009-580
Benton Harbor, MI 49022

Please send me...

___ Heathkit Hand-Held DMM(s) (IM-2215) @ $94.95 plus $1.75 shipping and handling each.

___ Rugged Leather Carrying Case(s) with Belt Loop for IM-2215 (IMA-2215-1) @ $14.95 plus $1.60 shipping and handling each.

___ 120 VAC Outlet Cord(s) for IM-2215 (PS-2350) @ $4.95 plus $1.75 shipping and handling each.

Total before shipping & handling _____ $_____

Michigan residents add 4% sales tax _____ $_____

Add shipping & handling _____ $_____

Total _____ $_____

☐ check ☐ money order ☐ VISA ☐ Master Charge: Code # _____

Acct. # _____ Exp. Date _____

Signature _____
(Necessary to send merchandise)

Name _____
(Please Print)

Address _____

City _____ State _____ Zip _____

Prices are mail order and subject to change without notice. GX-370

K8OBZ 7, K8TIY 7, WD8IYA 6, W8QFQ 6, K8RDN 6, WB8UUJ 6, WA8VBF 6, WA8AXF 5, WA8GTG 5, WB8IEK 5, W8SDB 5, N8AQA 4, WA8MDK 4, WA8QAF 4, W8TBP 4, K8DD 3, WA8FJF 3, AC8F 2, WD5JKQ/8 2.

OHIO: SCM, Harold C. Chapman, WB8JGW — Asst. SCMs: AF8O W8TP. SEC: K8AN. NMs AF8A K8AAZ WD8KBW WB8KWD WB8OMQ WB8YGW. Net reports

Net	QNI	QTC	Sess.	Time (Local)	Freq.
BN	520	214	62	6:45/10 PM	3.577
BNR	74	12	31	6 PM	3.605
ONN				6:30 PM	3.708
OSN	252	89	31	6:10 PM	3.577
OSSBN	2968	753	94	10:30 AM/ 4:15 & 6:45 PM	3.9725
06mN	329	29	28	9 PM	50.160

How many of the approximately 20,000 hams in the Section participate in any public service related activity including: local activities such as parades, bikeathons etc., formal traffic nets whether local, section or higher, or the annual SET exercise? Keep in mind that all such activities are "controlled," therefore the basic training of one is related to the other. I would be interested in hard figures if they were available but in lieu of those figures I estimate 1500 or 7 1/2 percent and that's probably high. What can we do to stir interest and get the very capable non-participants involved? Would you local club be a good place to start? Is your club ARRL affiliated and anxious to participate? If your group is not affiliated and desires to affiliate, please drop me a note. In addition, those ARRL affiliated clubs who are not presently members of the Ohio Council of Amateur Radio Clubs please consider joining. It's an ideal pipeline to and from League Headquarters as well as a podium from which your group can express its ideas to others in the Section. Keep in mind that "people can be divided into three groups: those who make things happen, those who watch things happen, and those who wonder what happened." I hope you are among the first group and can entice some of the inactive individuals to participate. Appointments: EC: KA8CGE/Fayette WA8ERQ/Clinton, K3RC/Jackson, WB8YTI/Butler. OO: WB8JKR. OTS: W9NJP. OVS: WD8DVD. Upgrade: WB8TTP/AK8V.

Local Net Reports	QNI	QTC	SESSIONS
BRTN	345	79	31
COARES	48	28	2
EOTN	155	43	31
TSRAC	824	65	30

Traffic: (July) K8AAZ 595, W8PMJ 330, WB8WTS 240, W8ENI 199, WA8GMT 168, WA8HGH 157, WB8MEK 97, W8GGX 86, WB8UBR 86, W8MOK 85, WD8QMP 85, N8CW 73, K8PE 71, WB8KWD 67, K8FE 66, WB8JGW 62, WD8DTG 61, W8WEG 54, W8TH 53, K8AN 50, W8QZK 49, K8DL 46, WB8SRC 44, WB8SIO 41, WA8SSI 40, WB8TRK 39, K3RC 34, W8TP 34, KA8BOE 31, WD8KBW 30, WD8OZM 29, WD8LPP 26, AB8P 25, WD8DIP 24, W8BHL 23, N8TM 23, WB8CJU 22, WB8YGW 21, N8AJD 20, WD8JTT 19, WB8YTI 19, AF8A 18, W8LZE 18, WD8PPQ 18, WD8OYK 17, WB8WNH 16, K8IDA 15, W8MGA 15, WB8WHF 15, K8CYX 14, WB8OMQ 13, WB8PIY 13, N8AKS 12, WB8QHV 12, W8RG 12, W8IM 11, WA8MAZ 11, WD8PEI 11, WB8VZX 11, WD8INK 10, WB8MRL 10, WB8NHV 10, KB8KV 9, WB8QHU 9, WB8VLR 9, K8DHJ 8, WB8YTD 8, W8KDK 7, WB8LWY 7, WB8MRU 7, KB8FU 6, K8IOW 6, WD8OYO 6, WA8TSX 6, WB8UPA 6, WA8BOV 5, WD8KFN 5, W9NJP 5, W8ZM 5, N8AUH 4, K8CKY 4, W8DYF 4, N8FU 4, WB8INY 4, WD8OTO 4, K8CMR 3, WB8NTR 3, WB8OFR 3, K8RT 3, WB8YIJ 3, N8AHK 2, WB8YTQ 2, WB8YUS 2, WD8EKI 1, WB8RUW 1, W8XT 1. (June) WA8MAZ 10, N8AUH 8, K8CMR 6, WB8VLR 5.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Guy L. Olinger, K2AV — SEC: WB2VUK. STM: WA2SPL. ASCM: WB2VUK WB2COY W2IT WB2KDG. NM: W2CS W2WSS KB2JG WB2QOH WB2ZCM WB2EAG. Nets: NYPON 5 PM, 3913; ESS (slow) 6 PM, 3590; NYSPTEN 6 PM, 3925; NYS 7 & 10 PM, 3677; NETN (slow) 8 P.M. M/W/F/ 3732; CDN (Troy) 6:30 PM, 34/94; HVN (Beacon) 7:30 PM M-F, 3797; SDN (W. Plains) 6:45 & 9:30 PM S/T/T 66/06 M/W/F/, 615/015. Note new NM's WB2EAG (NETN) and WB2ZCM (CDN). Good luck, fellas. Glad to see W2YJR recovered from his bout with Pneumonia. Annual summertime drought of gossip in the mailbox. Enjoyed visit with all the folks at W2MTA's annual bash. The month-long drought up there broke just in time to rain a lot, tho. Still trying to tigger out who the meanie wuz that told Murph about the picnic. Once more, there are new rules for PSHR. Think maybe ten stations ought to make it from ENY in a given month based on activity I think I hear. See me or SPL if questions. Am missing some reports I normally get. Suggest BOTH orig. msg. & mail card. PSHR: WB2EAG WA2SPL K82KW. Traffic: WA2SPL 776, WB2EAG 132, KB2KW 115, W2YJR 79, W2EFU 78, WA2EOW 56, K2AV 41, AD2X 40, WB2ZCM 38, WA2CJY 25, KB2JG 17, AA2Y 16, W2IQK 14, WA2YSM 11, WB2KHK 9, WB2SON 7, WA2MZJ 7, W2SZ(WB2PID) 6.

NEW YORK CITY — LONG ISLAND: SCM, Paul A. Lindgren, WA2UWA — Asst. SCM: Steve Bloom, WB2IDP. STM: WB2BNY. NM/ASCM: WB2EUF. The following are traffic nets in and around the section.

Net	Time/Day	Freq.	Mgr.
NLI*	1900 Dy	3710	WB2EUF
NLI*	2200 Dy	3630	WB2EUF
NLIPN*	1730 Dy	3928	WA2UWA
BAVTN*	2100 M-F	146.40/00	KA2CNN
Clear House	1100 Dy	3925	WB2EAG
MikeFarad	1300 M-S	3925	WA1LAD
ESS	1800 Dy	3590	W2WSS
NETN	2000 MWF	3732	WB2EAG
NYSPTEN	1800 Dy	3925	W2GLH

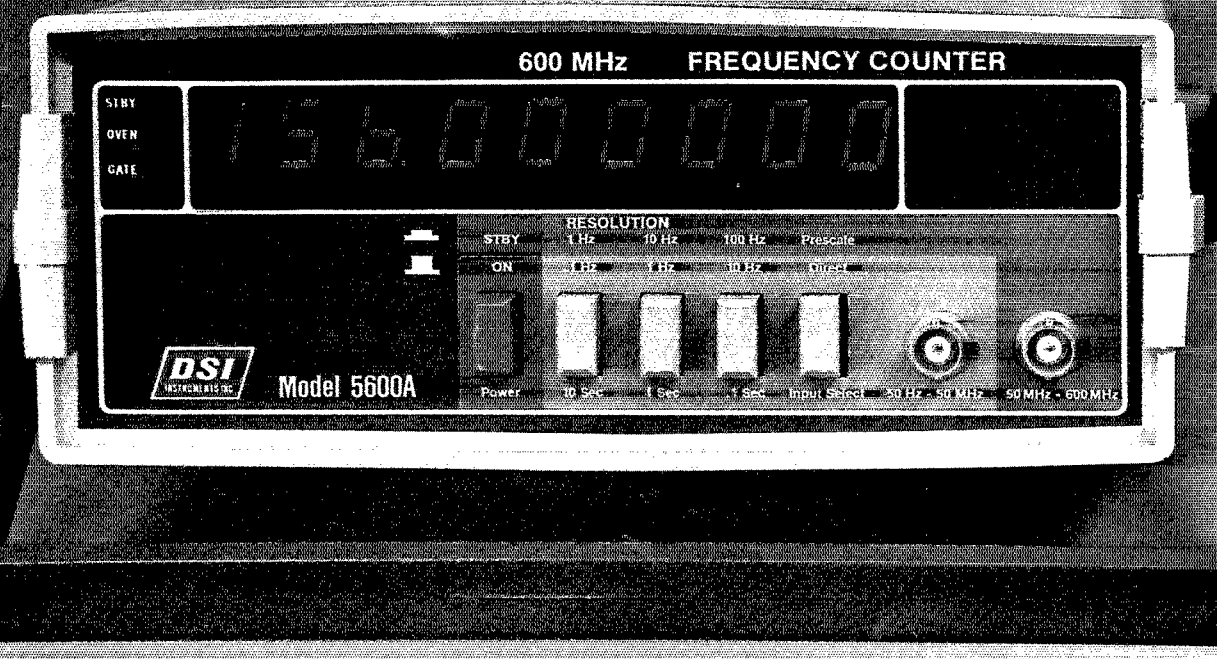
*Denotes section net, all times local. Correction on BAVTN. It is the Big Apple VHF traffic net and it meets Mon through Fri at 2000 local on WR2ACD. This is a very fine traffic net and all VHF operators are encouraged to check in and learn proper traffic handling procedures. For more information contact KA2CNN. W2GKZ built optical electronic midget counter, sez it is big help. Congratulations to K2GCE KA2CNN and WA2MEE on making PSHR for July. The last two made it strictly by VHF which is a fine accomplishment. Congratulations to N2AJZ on new OTS appointment and to WB2IDP for renewed OTS. Crack OO N2NT working on Wall Street observig ARRL mutual fund! Attention former appointees: if you did not report within the last six months your appt. was cancelled. Attention current appointees: no reports for three months and your appointment will be canceled. Congratulations to K2NO and Janet on their engagement. BAVTN had 236 QNI and 116 QTC in 23 sessions in July. Summer doldrums have seem to have hit the section with a bang as their are almost no

DSI HAS DONE IT AGAIN

QUIK-KIT II®

INCLUDES PROPORTIONAL OVEN TIME BASE

- 9 VDC BATT-AC (9V-AC9)
- 95% Factory Assembled
- 100% Factory Tested
- .2 PPM 10° to 40° C Accuracy
- 9 Digits .5 Inch LED's
- 0.1 HZ Resolution
- Auto Zero Blanking



$149.95

MODEL 5600A KIT

WHY BUY A 5600A: Because 95% of the assembly is completed by DSI and you are only one hour away from solving all those difficult bench problems, from setting the frequency of a audio signal to within 1/10 of a HZ, to checking the frequency of a 486 MHZ mobile radio. Whether you are servicing a VTR, trouble shooting a PLL circuit, the 5600A is the right counter with accuracy that will meet any FCC land mobile, broadcast, or telecommunications requirements. On the bench or in the field the 5600A will do the job you need. The 5600A includes a self contained battery holder providing instant portability or we offer a 10 hour rechargeable battery pack option. Other options include a audio multiplier which allows you to resolve a 1/1000 of a HZ signal and finally a 25db preamplifier with an adjustable attenuator making the 5600A perfect for communications, TV servicing, industrial testing or meeting your QSO on the correct frequency every time.

FACTS ARE FACTS: With the introduction of the 5600A. The sun has set on the competition. This may sound like a bold statement on the part of DSI BUT FACTS ARE FACTS. No counter manufacturer except DSI offers a Full Range 50 HZ to 600 MHZ counter with — 9 Digits — 0.1 HZ resolution — .2 PPM 10° to 40 ° C proportional oven — RF pre-amp — 600 MHZ prescaler — three selectable gate times — oven ready, standby and gate time indicator lights as standard features — For only **$149.95** kit and **$179.95** factory wired.. In fact the competition doesn't even come close unless you consider **$200.00** to **$800.00** close. With DSI having the best price to quality features ratio in the industry, no wonder we've become one of the world's largest manufacturers of high quality frequency counter instrumentation.

FOR INFORMATION — DEALER LOCATION — ORDERS — OEM

CALL 800-854-2049 CALIFORNIA RESIDENTS CALL 800-542-6253

Model	Price	Frequency Range	Accuracy Over Temperature	Sensitivity @ 100Hz-25MHz	Sensitivity @ 50-250MHz	Sensitivity @ 250-450MHz	Number of Readouts	Size of Readouts	Power Requirements	Size H W D
5600A-K	$149.95	50Hz-600MHz	Proportional Oven .2 PPM 10°-40°C	10MV	10MV	50MV	9	.5 Inch	*115 VAC or 8.2-14.5 VDC	3¼" x 9½" x 9"
5600A-W	$179.95									
3550	99.95	50Hz-550MHz	TCXO 1 PPM 17°-40°C	25MV	25MV	75MV	8	.5 Inch	*115 VAC or 8.2-14.5 VDC	2⅛" x 8" x 5"
500HH	$149.95	50Hz-550MHz	TCXO 1 PPM 17°-40°C	25MV	20MV	75MV	8	.4 Inch	*115 VAC or 8.2-14.5 VDC or NICAD PAK.	1" x 3½" x 5¾"

5600A wired factory burned in 1 year limited warranty. 5600A kit 90 day limited warranty.
Prices and/or specifications subject to change without notice or obligation.

*With AC-9 Adaptor.

$99.95

MODEL 3550K

3550 OWNERS
You can add the 35P.2 .22 PPM 10° to 40° C proportional oven to your existing 3550

AMERICAN EXPRESS — master charge — VISA

DSI INSTRUMENTS, INC.
7924 Ronson Road
San Diego, California 92111

5600A Kit	$149.95
5600A Wired	179.95
AC-9 AC Adaptor	7.95
T600 BNC Ant.	7.95

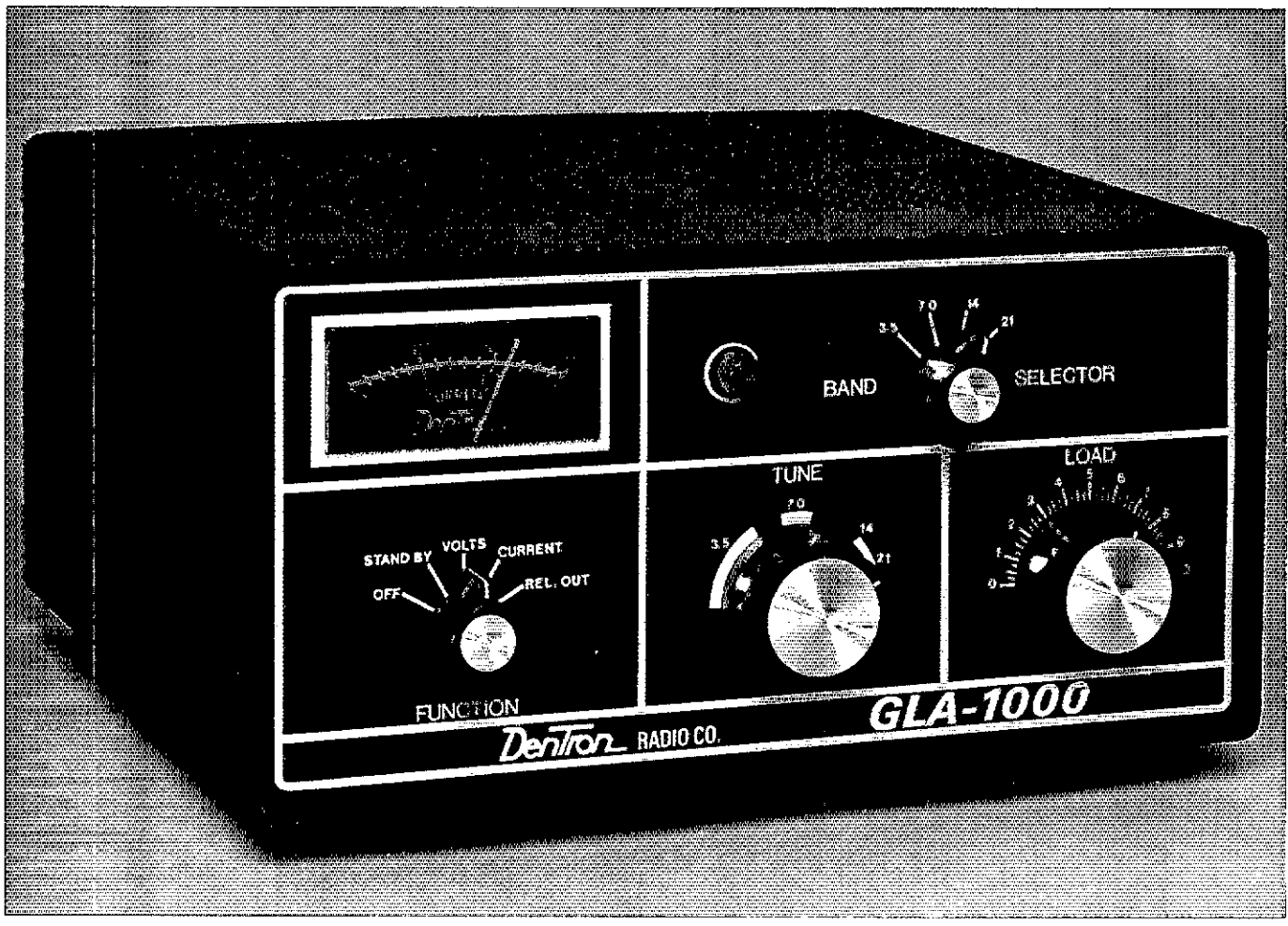
BUILT-IN OPTIONS

BA56 Rechargeable 10 Hr. Bat. Pack	24.95
AM56 Audio Multiplier .001Hz Resolution	34.95
PA56 25dB Preamplifier with Attenuator	59.95

T101 Ant.	$3.95
AC-9 AC Adaptor	7.95
35P.2	29.95
Factory Installed	49.95

TERMS: MC - VISA - AE - Check - M.O. - COD in U.S. Funds. Please add 10% to a maximum of $10.00 for shipping, handling and insurance. Orders outside of USA & Canada, please add $20.00 addition to cover air shipment. California residents add 6% Sales Tax.

ANOTHER FIRST FROM DENTRON
more power for less.



In January, 1978, our engineers developed a unique linear amplifier. The GLA-1000 was to be the smallest amateur linear to offer 1200 watts SSB PEP input, and 1000 watts CW input, with a built-in power supply, at the lowest possible price, $379.50 sugg. retail.

How would it perform? Could a unit this small (5⅜"H x 11"W x 11"D) and economical measure up to high standards set by "professional" amateurs across the country? We decided to let a group of amateurs tell us.

The GLA-1000 was field tested for 1 month by the following amateurs: Robert Allen W8IO, Harold Unger WA2EQN, Robert Schiers NØAN, Jim Turle WA8RCN, Alan Applegate KØBG, Howard Townsend WA5MLT, Mickey LeBoeuf K5ML, Tom Lutman WB8ZWY, Ed Clegg W3LOY and Andy Calandria K5MVP. The group was instructed to "use the prototype under tough operating conditions, not to baby it in any way."

What was the response? Some on the air comments received by W8IO, *"Fantastic signal, 12 db over barefoot exciter"* (75SSB). *"Excellent keying, no change in wave form, 5-9 +30 db in Kentucky"* (40CW). From NØAN, *"Overall quality excellent and up to the standards DenTron has come to stand for."* From K5ML, *"Finally a high quality amplifier that everyone can afford."*

Response was unanimously positive. Build a powerful linear with special features like full metering of essential voltages and currents, a back-lit, black-out meter that even includes a relative, power output function. Keep it small and economical so that it is within the reach of all amateurs, and you've got a winner!

In inflationary times like these, it's important to find ways to do more for less.

We did, and we're proud of it.

Great Size, Great Power, Great Price. Great Little Amp

DenTron Radio Co., Inc.

2100 Enterprise Parkway
Twinsburg, Ohio 44087
(216) 425-3173

$379.50 Sugg. Retail
FCC Type Accepted

Heathkit® service is at the other end.

(616) 982-3296 WA8ZVO

Heathkit Service Techs know their stuff and you can count on them for answers on any Heathkit HAM gear. Most problems can be solved right over the phone. Those that require hands-on service can be brought to one of the 55 Heathkit Electronic Centers throughout the U.S. or sent in to the Heathkit factory. Either way, you'll find reliable, experienced people who know what they're doing. And that's a very good reason to consider Heathkit when you're considering amateur radio gear.

free catalog

For all the newest in Heathkit Amateur Radio, send for the latest, free Heathkit Catalog. It's loaded with nearly 400 exciting kits for your home, work or pleasure. Send for yours today or pick one up at your Heathkit Electronic Center.

Heathkit®

Heath Company, Dept. 009-580, Benton Harbor, MI 49022

Heathkit Products are also sold at Heathkit Electronic Centers
(Units of Schlumberger Products Corp.) in major cities throughout the U.S.
See your white pages.

HEATH
Schlumberger

AM-397

reports of activity from the troops this month. With cold weather returning hope to see more of you on the air especially in the many public service activities. N3AIU in Pennsylvania is proposing a Youth Amateur Standing Committee for the ARRL similar in makeup to the present DX and Contest committees etc. The function of this committee would be to plan and coordinate youth activities in Amateur Radio and to help keep HQ in touch with youth needs and wants. This sounds like a good idea and for more info contact N3AIU. Don't forget SET coming up. Hope you plan to be active. Traffic: W2GKZ 114, K2GCE 108, WA2UWA 102, W2MLC 83, K2LIE 78, KA2CNN 71, WB2IDP 65, WB2RVA 37, WA2MEE 15, WA2YUS 9.

NORTHERN NEW JERSEY: SCM, Robert Neukomm, WA2MVQ — SEC: WB2VUF, STM: W2XD. NM: AF2L K2VX WA2LHV WB2RMI WA2OPY W2PSU W2UEZ.

Net	Mgr	Freq.	Time/Days	Sess.	QNI	QSP
NJN	AF2L	3695	7 PM Dy	31	586	219
NJN	AF2L	3695	10 PM Dy	31	438	150
NJPN	K2VX	3950	6 PM Dy	31		
			9 AM Su	4		
UCEN	WB2RMI	146.085/685	Dy	31	274	75
OBTTN	WA2OPY	147.12/72	Dy	31	313	63
NJSN	W2UEZ	3735	6:30 PM Dy	31	60	36
NJVN	WA2LHV	146.49/49	Dy	31	210	85
NJRTTY	W2PSU	145.7	Dy	31		

W2GWS has not missed NJN/L for eight consecutive months! W2CQB is finally on 2-meters again. AF2L has issued the Sectional Net Certificate to the following: WA2OVE W2GD W2RQ WB2TOM N2NS WB2RMI AF2L. W2UEZ has also issued Sectional Net Certificates to the following: WB2PKG WB2TOM K2WM WB2STN WB2NSV AF2L W2QNL WA2ZYU. The July highlite for amateur radio for this section was the SKYLAB reentry on July 11. Participants were the operators in NJVN, as well as the ARES, RACES and MARS groups. The amateurs planned well and again proved their PREPAREDNESS. Briefly, several groups and repeaters worked together with one primary, one secondary and several stand-by repeaters. The following repeaters were alerted: AR2ANF WR2ACH WR2AHD. On stand-by were: WR2ADB WR2AIX AF2L/R. WR2AHD was WA2DSY and KA2CNN acted as NCS's and WB2RMI relayed W1AW SKYLAB bulletins several days prior to reentry. On reentry more than 60 QNIs from YLs, XYLs & OMs - great show! Fairlawn ARC is conducting courses for all grades of licenses. The following stations sent in a very large amount of OO reports: N2VA W2TPJ WA2MVQ. Mostly chirpy sigs and harmonics! Sure could use a lot more OOs and those that are, where are your reports? New calls and upgrades: N2BGU Novice to General, N2BGS Novice to Technician and KA2FWB Novice to Technician. WA2HSO Tech to Advanced. WA2UDT copying lots of telemetry from Oscar 8 and is a new Life Member. KA2FKU not Tech with new TX700A. WB2RMI Got a new tower and the permit to go with it. KA2FXA new Novice in Wayne and need of an "Elmer!" K2RZ in Allendale got a clearance from the town to erect a 51 foot tower. W2LOP vacationing in NH. Excellent Newsletters received from the 550 Club and Tri-County Radio Assn. Where are others? TRCA graduated 85 new Novices! The 550 Club had an excellent picnic and Flea Market. WB2QPC has new antennas 80-10. The following QRPp'ers worked FD at High Point under the call WA2VZW: WB2WAB KA2BNF WA2VZW and they used hellium balloons to keep their antennas up! NJ Radio Club Info net reports that 5 clubs now represent NNJ with 18 ONIs and the DVRA fishing trip may be coordinated through this net. The net has 6 regular members. They meet every Sat at 10 AM EDT on 3950 - check-in! Traffic: (July) W2RQ 275, W2CQB 244, WB2RMI 221, N2CR 216, WB2TOM 214, WA2MVQ 152, AF2L 127, W2SQ 127, K2VX 124, W2UEZ 91, WB2RMJ/T 95, N2IC 78, WB2KTR/T 74, N2BC 71, W2XD 57, AG2R 56, WA2OVE 54, W2ZEP 48, WA7DPK/2, 41, KB2HM 30, WA2QWR 26, W2TCA 26, WB2KLS 25, W5DTR/2 22, K2WM 22, WB2CNF 17, N2NS 16, WD2AKR 11, W2CC 4, WA2DLZ 4, K2ZFI 4. (June) WB7UQP/T 53, KB2HM 21.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, WØLFF — SEC: WØIYW

WØWDC advises that the Iowa 75M Net received letter of appreciation from the Mayor of Algona for emergency communications after their tornado. WØLFH handled 152 H & W requests. WBØNSS had some shack damage and lost all sky hooks, but was unhurt. Barry Goldwater will be the banquet speaker at Midwest Convention in Cedar Rapids October 19-21. WBØOFR working for RCA worldwide and WBØYOW is now with Motorola, Mt. Pleasant Club worked a ZL at FD. Fairfield repeater will be on 7.93/33, RTTY repeater on 146.70 moving to Blue Grass. WØQGI has DXCC with 355 confirmed using 100W and tri-bander. WØBW has DXCC with 360 confirmed. Congrats for upgrades go to: KAØBBO KAØCFD KAØEGG KAØFGK to Tech. WAØPHW WDØFLD WDØAQJ to General. KØAAR KØTFT and WAØGQK to Extra. Sooland Repeater Assn. has 97 members and running three satellites. New equipment: KØKOJ Standard HT, WDØEIF TA-33 with Ham IV on new 40' tower. WBØRAT has Wilson II. NØAHJ ATB-34, Cushcraft 11 on 2m and a Boomer on 2ssb plus FT-221. WAØEQC is new in Laurens. WBØTXL using doppler found fox in 10 minutes. WDØEJQ reports 12 out of 18 in the Novice Class received licenses.

Net	Freq.	Time(Z)/Days	QNI	QTC	Sess.
Iowa 75M	3970	1730 M-S	1140	82	25
Iowa 75M	3970	2300 M-S	785	63	26
TLCN 75M	3560	2330 Dy 0300	292	88	62
ICN (June)	3713	2359M-W-F	37	9	11

Traffic: (July) WAØAUX 414, WØSS 252, KØGP 183, WØYLS 161, WØLFF 30, WBØAVW 24, WBØUPF 22, KØOFI 19, WØBW 8. (June) WAØAUX 333, WBØNSS 26, WDØHND 3.

KANSAS: SCM, Robert M. Summers, KØBXF — SEC: WØKL. Net Managers: cw: WØFT; phone: WØOYH, VHF Activity: WBØSZS. Slow Speed Net: WDØESF. Congratulations are in order to WØOYH our phone activity co-ordinator for his efforts that have resulted in his being named 'The Kansas Amateur Of The Year.' This is an award given the past 15 years as the Raymond E. Baker WØFNS Memorial Award, presented at the Kansas Nebraska Hamfest, Concordia. Net activity for July: KPN: QNI 256, QTC 20; KSBN: QNI 1031, QTC 194; QKS: QNI 345, QTC 132; QKS-SS: QNI 102, QTC 30; KWN: QNI 754, QTC 350. All Kansas amateurs continue to do a real fine job. A special thanks is due WBØOBH for his faithful ONI to TEN. KANS ARES standing at 879 membership. ECs reporting are WØOAG WØTQ WDØCFZ WDØEPX

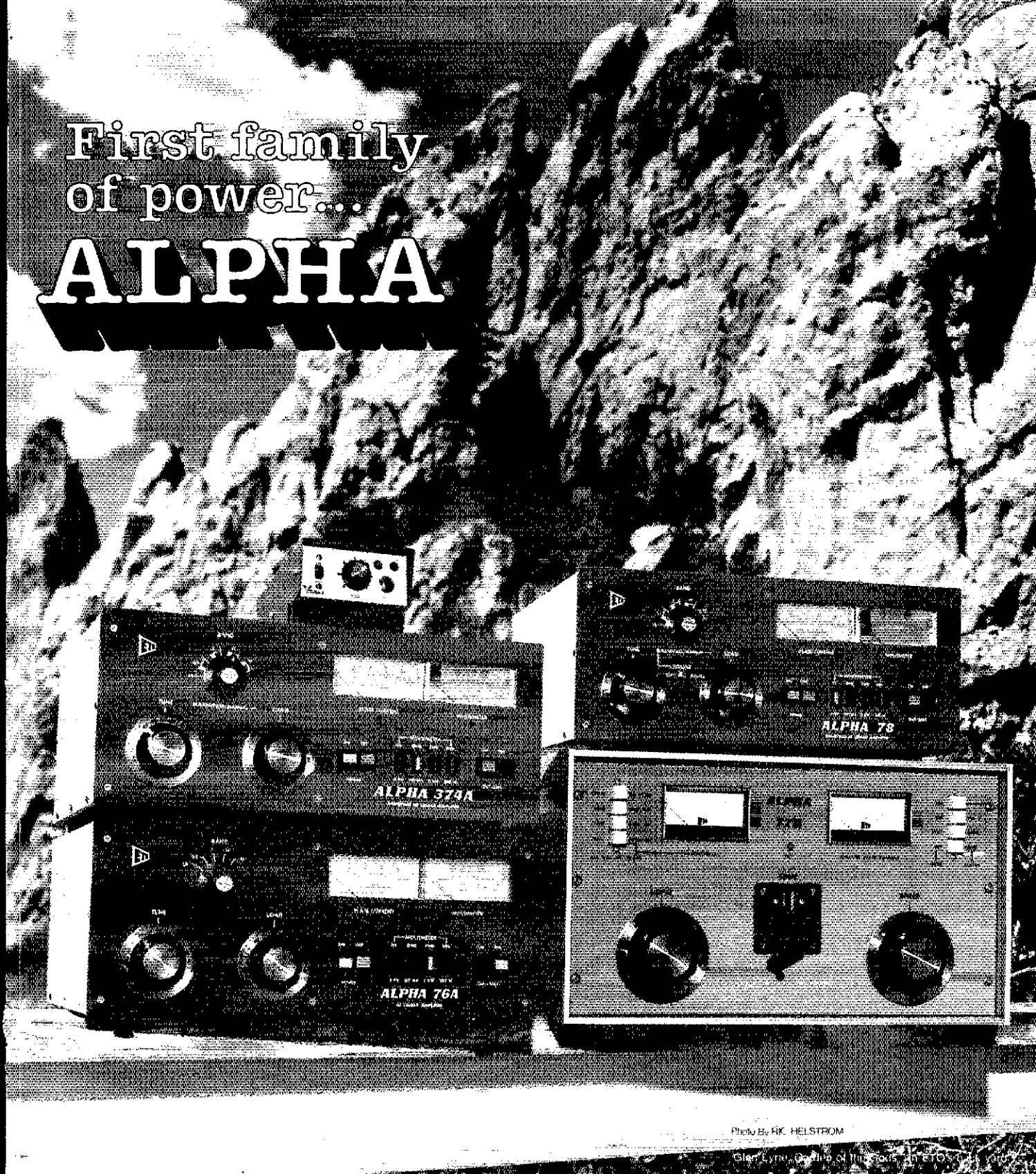


Photo By RIC HELSTROM

Glen Lyne, Outline of Illinois, on ETO's [illegible]

THE VERY FINEST ANSWER TO YOUR NEED for one to two kilowatts of solid HF power, a superlative ***ALPHA*** linear amplifier – FIRST in performance, in convenience, in quality and durability.

Brute RF power without time limit, whisper-quiet operation, instant no-tune-up bandchanging, high speed break-in (QSK), the ability to cover any newly-assigned HF band – there's an ***ALPHA*** perfectly suited to YOUR requirements.

ALPHA: power in a class by itself. For complete details, contact your ***ALPHA*** dealer or ETO direct.

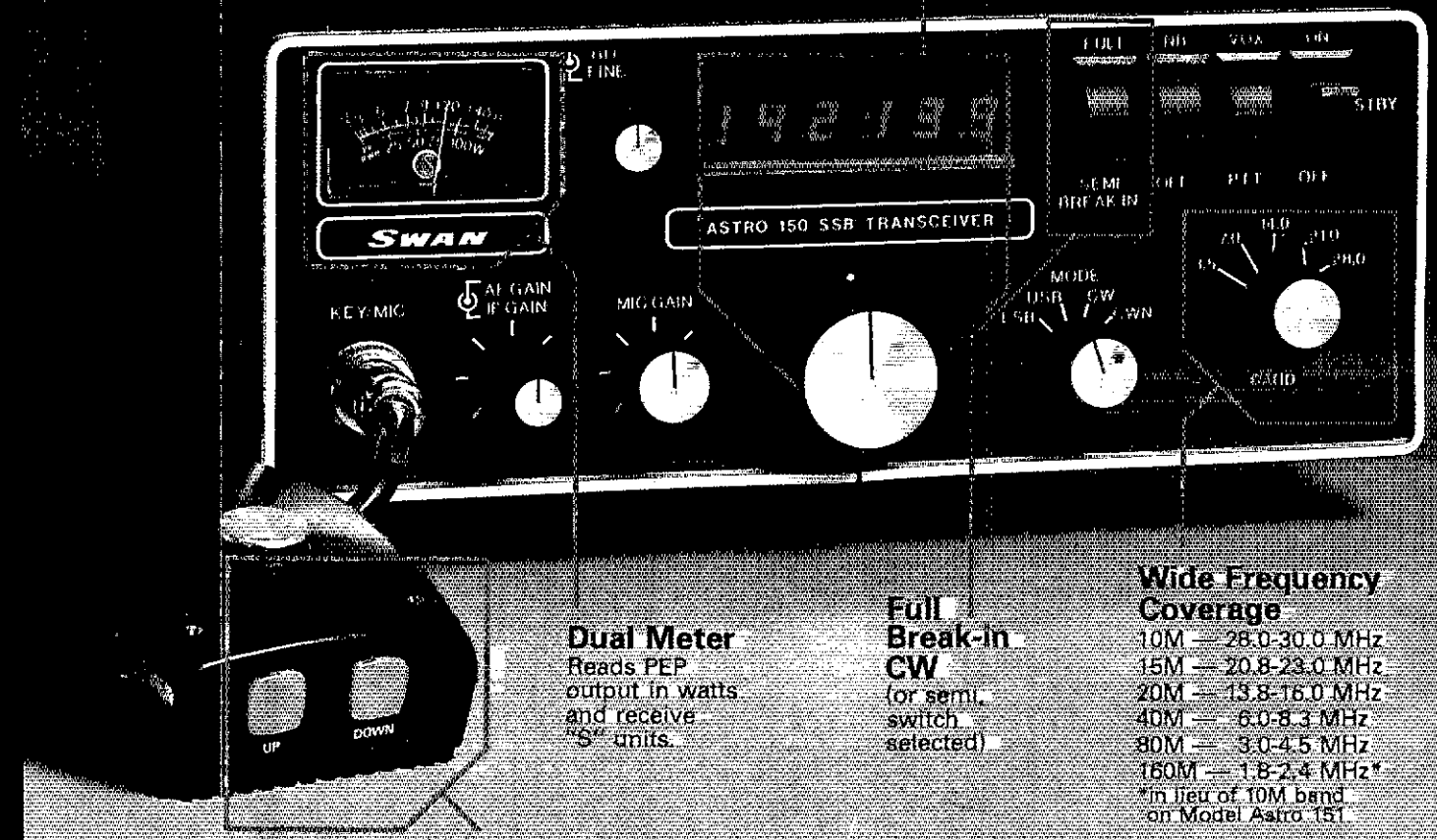
ETO

EHRHORN TECHNOLOGICAL OPERATIONS, INC.
BOX 708, CAÑON CITY, CO 81212 (303) 275-1613

A Knob with a new twist "VRS™"

Swan Astro 150 Exclusive Microprocessor Control w/memory gives you over 100,000 fully synthesized frequencies, and more!

- VRS — Variable Rate Scanning, a dramatic new technique for unprecedented tuning ease and accuracy
- POWER — 235 watts PEP and CW on all bands for that DX punch
- Advanced microcomputer technology developed and manufactured in the U.S.A.
- Price? See your authorized SWAN dealer for a pleasant surprise!



Dual Meter
Reads PEP output in watts and receive "S" units.

Full Break-In CW
(or semi, switch selected)

Wide Frequency Coverage
10M — 28.0-30.0 MHz
15M — 20.8-23.0 MHz
20M — 13.8-16.0 MHz
40M — 6.0-8.3 MHz
80M — 3.0-4.5 MHz
160M — 1.8-2.4 MHz*
*In lieu of 10M band on Model Astro 151

Mike Tuning
For accurate 100 Hz steps or fixed rate scan.

THE MOST ADVANCED HF SSB TRANSCEIVER AVAILABLE.
FULLY SOLID-STATE **SWAN ASTRO 150**

SWAN ELECTRONICS
A member of the Cubic Corporation family of companies
305 Airport Road / Oceanside, CA 92054 / 714-757-7525

Discover the unrivaled ASTRO 102BX with Dual PTO's

Plus IF Passband Tuning/Full Band Coverage, Speech Processing, 235 Watts PEP All Bands and Much More.

4-Function Meter
reads "S" units in receive, and selects forward power, reflected power, or ALC in transmit.

Visual Display of Passband Tuning
A series of 8 LED's indicate the equivalent band width and position of the passband from 0.6 to 2.7 KHz as the passband tuning knob is rotated.

300Hz Crystal CW Filter
Cascaded with the passband filters and tunable through the passband. Combined with notch filter yields unrivaled CW performance.

Full or Semi CW Break-in
A must for the avid CW operator!

2 Position CW Wave Shaping
Your choice of soft or hard CW rise and decay time!

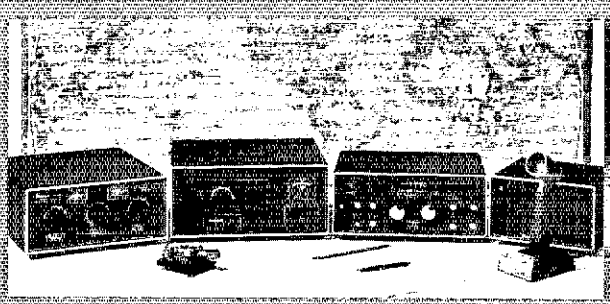
Variable AGC Decay
Continuously variable to suit your preference.

Passband Tuning with 16 Pole Filters
Two 8-pole crystal filters in cascade provides a 1.4:1 shape factor at -100dB! The ultimate in selectivity.

Tunable Notch Filter
Provides the ability to "notch out" QRM. When used in conjunction with the passband tuning, provides the ultimate in removing interference.

Dual PTO's
Two independent high stability PTO's provide true split band operation. The digital counter reads the PTO selected, or in split band reads the PTO used for receive, then switches to the transmit frequency selected when the mic is keyed.

All Band Coverage using PLL and Synthesizer for Band Selection
Full coverage of 160 meters through all of 10 meters in 9 ranges — diode matrix programmed for now — or for the future!



The ASTRO 102BX with it's companion PSU-6 Power Supply, 1500Z Linear Amplifier and ST-2A Antenna Tuner provides a matched and highly efficient 1500 watt PEP or 1000 watt CW complete station to be complemented by a great Swan antenna.

All Solid State Quality American Construction

ASTRO 102BX

SWAN ELECTRONICS
A member of the Cubic Corporation family of companies
305 Airport Road / Oceanside, CA 92054 / 714-757-7525

WBØYWZ and WAØIXI. If your EC is not listed in the above, perhaps he or she needs your help. Was glad to receive the July issue of KVARC TRANSCEIVER after hearing that it might be terminated. Officers are WBØRZ, pres.; WBØRZC, vice pres./treas.; WDØCOV, secy.; WBØSTH WBØQFV WBØOOK KØOLC WAØKIO WAØARO, board members. Traffic: (July) WØFIR 192, WØOYH 182, KØEZ 132, WØAM 89, WØHI 86, WDØFBP 71, WDØACG 57, WØFDJ 57, WØFT 51, KØBXF 49, KØFPC 47, WØCHJ 42, WØPB 18, WDØESF 21, WØKL 10, NØIN 9, WØRT 8, WØRBO 7, WAØSEV 7, WØOAG 6, KØKD 2, KØGZL 1.

MISSOURI: SCM, L. G. Wilson, KØRWL — ASCM: Joe Flowers, WØOTF. SEC: WBØFKY. Several outstanding scores were submitted by members of the Kansas City DX Club during the recent WPX cw contest. A rough score of one million points for their efforts. It is hoped that ABØI has his amplifier repaired from the mishap that occurred during field day when he blew the power transformer.

Nets	QNI	QTC	Nets	QNI	QTC
MON	186	129	MON2	164	82
ACE	27	0	NEMOE	88	1
HBN	348	37	MOSSBN	822	62

I am sorry to report that WØBAU has passed onto the ranks of the Silent Keys. The Heart of America Radio Club of Kansas City is now boasting an all time high in membership. WØYZS has just worked Wyoming on 432 MHz. This should mean he has qualified for WAS on 432 MHz. Well, MO has lost another good cw operator to the state of KS with KØVBU moving across the state line about two miles. Plans for the 1981 Convention in Kansas City are now being made and it appears the ball is really rolling. At the present time the organization does not have a post office box so, if any information concerning the event needs to be passed along, please forward to me. Congratulations to the following new licensees and upgrades and yours truly finally made it to Advanced. Novice: WBØSFY, KAØs DNP DNT DPE through DPG DPU DQE DQI DQW DQY DRB DRJ DRK DSU DWQ DWR DWT DWY DXI DXL DXT DXU DXY DXZ DYB DYF DYJ DYU DZE DZF DZL EHF ELV ELY EME EML EMP ENV EQD EQN EQR ERG ERI ERM ERZ ESS ETF through ETH ETL ETR ETT EUE EUF EVE EVJ EVT EVY EVZ EWB EWG through EWO EWS through EWZ EXA EXC EXH EXK EXM EYC EYU EZG EZL EZP EZR EZS EZU FAD FAH FAI FAQ through FAU FBA FBD through FBG FBI FBM FCK through FCM FDA FDC FDG FDO through FDQ FDZ FEE FEG through FEJ FES FEV FFI FFK FGJ FGM FGR FHE FHF FHI FHJ FHQ FHW FHZ FII FIU FJA through FJH FKC FKE FKF FKL FLK FMB FMH FML FMM FMS FMU FNL FNQ FNS through FNZ FOA through FOC FOE FOF FOX FOY FPH FPI FPL and FPM. Tech: NØs ATH ATJ ATM AUY AZL AZQ BAL BAX BBC BBH and BBI. General: KØCJO NØs AUZ AZH AZJ AZK AZQ AZX BBB BBD BBF BBG BBK BBQ and BBZ. Advance: WØQXT KBØ's GP HC and IE. Trafic: WØBMA 506, WØBV 208, KØSI 156, WØOTF 102, KØONK 97, KØCW 93, WDØFZJ 34, WØVTF 23, WDØCPS 11, KØPCK 10, KØRWL 10 and WØQUA 2.

NEBRASKA: SCM, Rex P. Greenwell, KØKP — SEC: WAØASM. The Central ARC outdid themselves with the Victoria Springs Hamfest! 250 hams agreed the steaks were yummy and fun was had by all. WØERW won the "cow chips" counterpoise, and WØZNI won the 2-meter "barbed wire" ground plane. Our new frequency coordinator is WAØWRI. He is experienced and promises a good job. Lancaster EC KØGND published ARES plan in Lincoln Log club paper, looks good! WØVEA received a plaque for his work collecting weather data in the North Platte area. Nets: Cornhusker: QNI 986, QTC 31; Mid-Nebr 2-Meter: QNI 295, QTC 6; Platte Valley: QNI 30, QTC 4; Western: QNI 406, QTC 46. Traffic: KØAIE 77, WØNIK 67, WØVEA 60, KØODF 44, WØVYX 30, WØHTA 16, WØFQB 8, WBØGMO 7, WBØULH 5, WBØGAK 3, WAØQOQ 3, WØFZ 1, WAØLOY 1.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, William J. Pace, W1ID — SEC: W1SY. STM: WB1AIU. NMs: WA1LOU K1EIR K1EIS WA1ELA WB1CPF/K1CD.

Net	Freq.	Time/Days	Sess.	QNI	QTC
CN	3640	1900/2200 Dy	61	293	221
CPN	3965	1900 M-S	31	421	147
		1000 Su			
RASON	13/73	2100 MWFSu	13	116	29
NUTMEG	28/88	2130 Dy	31	355	62
WESCON	78/18	2030 Dy	31	533	82
NENN	3720	1815 Dy	31		49
(novice net)					

Hi QNI; CN: WB1CFD WB2PJU/1 K1EIR W1WP. Hi QNI; CPN: WB1FZX K1CD AD1O WB2PJU/1 Hi QNI; RASON, WA1FSM WB1DJD. Hi QNI NEN: KA1ADZ WA1IGL KA1DDJ WB1ESJ WA1WRS. Congratulations to WB1CPF on his New England Novice net! It looks like he has made a fine state in organizing a net for Novices which should do much to provide the rest of the net with trained operators. There is no question but such a training net is the way to keep a continual supply of traffic-interested hams! W1WEE reports getting good 40 meter results with his vintage Johnson Ranger II. WB1FZX reports the soft-ball battle of the repeaters was won by WR1AIE(NEW CANAAN) defeating WR1ABR (STAMFORD)! KA1CMX using a new 80 meter helically wrapped 80 meter dipole. W1DFT says C.P. and CARWARS activity progressing nicely in his area. WA1LOU picked up a number of new countries in IARU RADIOSPORT in addition to breaking 100k points! K1TXG DX activities temporarily slowed down with the arrival of harmonic number 3! Word from K1OOG indicates his inactivity due to change in QTH from Pomfret to Jewett City. Landlord questions keeping him listening at the moment. Both K1EB and WB1AIU sporting plaster leg casts acquired within a couple days of each other. Broken legs are apparently contagious! WB1DQP tuning an air-conditioner and an indoor dipole for 80 meters! K1FHR ecstatic about the results of his new Telrex tri-bander! W1PJZ tuning up his cw for the hi-speed contest at the Hartford convention this fall. Traffic: WB1CPF 243, K1GF 213, WB2PJU/1 99, W1EFW 84, W1HMJ 69, W1DFT 62, W1BDN 51, WA1LOU 45, KA1CMX 39, WB1FZX 38, WA1UHB 35, K1XA 32, W1GVT 31, W1KV 11, K8AXL 5, W1CUH 5, W1JTD 2.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — SEC: WA1BLG. STM: WA1TBY. EC reports received from K1PNB K1FMM W1ALP W1XA W1LE. OO report from W1EGE. OVS reports from W1JR W1GXT. Anyone interested in Emergency Communications should consider the new Official Emergency Station (OES) appointment. Send note or radiogram to SCM or SEC. Our SEC, WA1BLG, finally settled into new home after many pro-

WHEN QUALITY COUNTS.....

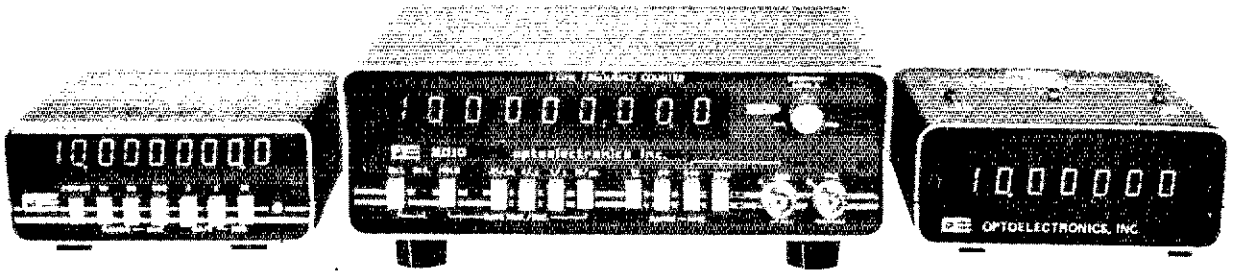
COUNT ON OPTOELECTRONICS FOR STATE-OF-THE-ART, TOP QUALITY FREQUENCY COUNTERS AT PACE SETTING PRICES.

NEW Model K-7000 [Kit]	7 Digits	550 MHz	$ 79.95
NEW Model 7010	9 Digits	600 MHz	$145.00
NEW Model 8010	9 Digits	1 GHz	$325.00

Note: Model K-7000 is available "KIT FORM" only, other models factory assembled only. Model K-7000 requires #AC-70 Adapter ($4.95) for 115VAC Operation, AC Adapters are included with the other models. See chart below for NI-CAD Battery Pack Option, etc.

ALL MODELS HAVE MANY STANDARD QUALITY FEATURES INCLUDING:

- ANODIZED ALUMINUM CASES - PROVIDING RF SHIELDING
- 1 MEG AND 50 OHM INPUTS - WITH EXCELLENT SENSITIVITY
- AUTO DECIMAL PLACEMENT AT Hz AND MHz
- AC-DC or NI-CAD BATTERY PORTABLE OPERATION
- FULL YEAR 100% GUARANTEE [PARTS ONLY ON K-7000 KIT]
- NBS TRACEABLE CALIBRATION
- MADE IN U.S.A.
- COMPACT SIZES: 8010 = 3" H x 7½" W x 6½" D
  K-7000/7010 = 1¾" H x 4¼" W x 5¼" D



7010/7010.1
600 MHz
9 DIGITS

8010/8010.1
1 GHz
9 DIGITS

K-7000 KIT
550 MHz
$79.95

MODEL	$ PRICE	RANGE 10Hz to	LED DIGITS	SENSITIVITY 50 OHM INPUT 25-250 MHz	250-450 MHz	450 MHz-1GHz	HI-Z INPUT 10Hz - 60 MHz	GATE TIMES	RESOLUTION 12 MHz	60 MHz	MAX FREQ	TCXO TIME BASE 20°-40°C	FREQ.	EXT CLOCK INPUT	NI-CAD BATT PACK
K-7000 kit	79.95	550 MHz	7	5-20 mV	10-30 mV	20-50 mV to 550 MHz	1-10 mV	(2).1,1 SEC	10 Hz	10 Hz	100 Hz 550 MHz	1.6 PPM	5.24288 MHz	NO	YES OPTION $15.
7010 *7010.1	145.00 225.00	600 MHz	9	5-20 mV	10-30 mV	20-40 mV to 600 MHz	1-10 mV	(3).1,1.10 SEC	.1Hz	1 Hz	10 Hz 600 MHz	1 PPM 0.1 PPM	10 MHz	YES OPTION $25.	YES OPTION $15.
8010 *8010.1	325.00 405.00	1 GHz	9	1-10 mV	5-20mV	10-35 mV	1-10 mV	(8).01-20 SEC	.1 Hz	1 Hz	10 Hz 1 GHz	1 PPM 0.1 PPM	10 MHz	YES STD	YES OPTION $39.

*Has precision (0.1PPM) TXCO Time Base

Enjoy the great looks and ruggedness of the RF shielded metal case. Discover unsurpassed quality throughout for years of trouble free operation. Call or write for additional information or quick delivery of your order.

OPTOELECTRONICS, INC.
5821 N.E. 14th Avenue, Fort Lauderdale, Florida 33334

PHONE ORDERS
(305) 771-2050

master charge
VISA

TERMS: Orders to U.S. and Canada add 5% for shipping, handling and insurance, to a maximum of $10.00. All other orders add 10%. C.O.D. collection fee $1.00. Orders under $15.00 add extra $1.00 handling. Regular checks must clear before order is shipped. Florida residents add 4% sales tax.

blems. His new and hopefully permanent address is 41 Birchwood Rd. Wilmington 01887. ECs please start sending your monthly reports to him now that he is settled.

Net	Freq.	Time/Dy	QNI	QTC
EMRI	3.66	19/2300 Dy	575	276
EMRIPN	3.898	1730 Dy	383	200
HHTN	04/64	2230 Dy	393	120
EM2MN	90/30	2000 MWF	125	41
EM2MN	145.8	2000 TTh		
NEEPN	3.945	0830 Su	62	22
EMRISS	3.715	1915 Dy	64	17

STM, WA1TBY, has set up a New England Traffic Seminar to aid those interested in learning a bit about cw traffic handling. The sessions are on Sundays just after EMRIPN and start about 6 P.M. It is informal and procedures are explained on phone and demonstrated on cw. By the time you are reading this the Simulated Emergency Test will be right around the corner. All stns are encouraged to participate locally and/or sectionally. Contact your local EC for local info and listen to the nets listed above for when the section nets will be meeting in extra sessions. I'll be looking for your radiograms. There is a new Teletype net. It is the New England Teleprint Net and it meets on 3.620 at 7 P.M. local. K1DFS (Conn) is the net manager but stations from all over are welcome. This is something that we have needed for some time in NE so come on teletypers try on some Public Service operating. Beware, its fun and can be habit forming. CLUB NEWS: W1ALP reports in response to a question in this column that the South shore ARA was formed in 1931 with W1WK as first president. Is this the oldest club in EM? Capeway Radio Club Net meets on Mondays 8 P.M. on 28.8 and Sat at 10 A.M. on 3.980; Massasoit Club signed agreement with CD to use their 18/78 repeater; New officers of Chelmsford Club are: K1OKE, pres.; W1LUS, vice pres.; KA1CX, secy.; K1PD, treas.; W1HH, trustee; and WA9NEW, Officer-at-Large. Wellesley Club Officers are: WA1PQY, pres.; K1UR, vice pres.; N1ADY, corr. secy.; WA1YAU, rec. secy.; WA1TBY, treas.; WA1JIR, op. act.; WA1YHV, fund rais. Traffic: (July) WB1DXR 385, WA1TBY 341, KA1CC 294, K1BA 281, WA1EYY 232, WA1VAB 209, WA1YWK 190, K1GN 153, KA1BJY 118, W1DMS 103, K1BSO 78, W1PEX 75, W1FJI 48, KH6JNO 45, W1CZB 40, K1LCQ 38, WB1EZT 37, WB1ABM 30, KA1BMJ 25, WA1IFE 25, W1HL 21, WB1GEX 18, WB7TPY 15, AD1F 14,KA1AHD 11, K1BZD 11, W1AEC 6, W1ALP 6, N1EE 6. (June) WB1DXR 379, WA1VAB 253, KA1BMJ 9, K1LCQ 8, N1AFO 2, K1PNB 2. (May) WB1DXR 345.

Maine: SCM, Ed Bristow, WA1MUX — Amongst summer visitors were WD4MDX of St. Pete FL, N3AQQ of Silver Springs MD & WA1GDN who canoed the Saco R. PSHR; WB1BYR W1RWG, WCARA set up display station at Broiler Day festivities, Belfast. YARC furnished communications at Friendship Day Sloop Races. Plans: SRARC new repeater (146.37/97) in Sept.; AARC comm. for Hydroplane Races in Aug.; SARA same for Log Driving Days in Sept. Sess/QNI/QTC: SGN (Jun) 26/904/110; SGN (Jul) 26/974/99; AEN 5/42/0; MPSN 5/67/10; PTN 31/198/94; SPSN 8/38/15. See you all at Abbott. Traffic: (July) W1KX 97, W1RWG 85, WB1BYR 82, W1ISO 54, W1HDC 40, WA1JZP 40, AF1L 31, W1BJ 28, WA1MUX 25, K1GUP 21, N5YX/1 17, WA1YNZ 15, KA1DDJ 14, W1BMX 10, W1OTQ 10, W1IXC 3. (June) W1ISO 90, W1JTH 25, W1BMX 8.

NEW HAMPSHIRE SCM, Robert G. Mitchell, W1SWX/W1NH — SEC: K1HSC. NMs: W1TN N1NH. Heard on the New England Novice Net: KA1ADE KA1ADZ KA1BQE WB1CSJ WA1WRS. This net meets Dy at 6:15 P.M. on 3720 W1JB's daughter Linda is now KA1BQE. Granit state FM Net certificates issued to: WA1SRU KA1BJ WB1HGQ W1ALE, WB1ELP is home from the hospital and monitors 85 at noon Dy. W1BYS glad to be back in NH. W1TN visited N1NH. Changes by K1OIQ to Mt. Washington Repeater have increased coverage. WA1VWL vacationed in Carolina's. The GSFM Net had 564 check-ins & 142 traffic. NH Net certificate to W1GUX. This report originates from Daytona Beach, FL. The GSPN had 359 check-ins & 163 traffic. W1KGZ turned to antique car buff. K1HEI & WB1DYV have a new Is-520S. K1JUL has new TR-2200A. The Nashua club Field Day was successful due to good food and hard work by all. W1GUX traffic counts are soaring but he says we still need more help from Vermont, KA1FJ & K1BQB being the only traffic handlers. Its hard to believe, but summer is over. Get ready for contest season & snow. Traffic: (July) K1BCS 289, W1GUX 251, W1TN 220, WB1HFI 25, WA1SRU 17, WB1HGQ 13, K1OIQ 13, WA1PEL 11, W1NH 10, N1ALM 9, K1UQX 8, W1JB 6, W1BYS 4. (June) K1BCS 372, W1GUX 225, W1TN 242, N1NH 103, WB1HFI 35, K1ACL 28, WA1PEL 19, K1UYX 19, K1OIQ 13, WA1SRU 10, WB1HGQ 9, W1BYS 8, N1ALM 4, W1NH 3.

RHODE ISLAND: SCM, J. Titterington, W1EOF — SEC: K1DT. STM: N1RI. Another good month for the RIEM 2-M tfc net, WA1CSO, net mgr.,sessions 22 QNI 255 and tfc 72. WA1YUH undergoes major surgery but seems to be recovering well. W1YNE has teletype traffic on the increase. Logs are coming in on RI QSO party. WB1DEU comes in 7th nationally in Novice Roundup. WB1DGD is now Extra with new call AG1K also. WB1DEZ and KA1AIR make General, congratulations to all. Ex-W1GYX, is Silent Key. K1DT needs net controls for his 2-Mtr ARES net. N1RI needs net controls for his 2-Mtr ARES net. N1RI needs cw people to check into the EMRI cw nets-contact him and get dope on how to get your feet wet. Hope to see many of you at the NE Division Convention at Hartford. Traffic: W1YNE 48, WA1CSO 40, W1EOF 34, AE1S 4.

VERMONT: SCM, Bob Scott, W1RNA — SEC: W1VSA. This will be shorter than usual this month. Input has been normal for this time of year - zilch! With the real summer wx I think activities hamwise has been shelved, so to speak. I do not feel lonesome in this respect. KA1FJ says he made the Public Service Honor Roll for July. Carrier: 26/437/39; VTSSB 28/421/109; GMN 26/372/40; VTPN 5/56/5; those missing - not rcvd. K1YLB has been in hosp. and now at home on the recovering list. New NCS for VT ssb net are KA1BXY WB0RSD/1 and N1ALX. WB1BZR reports he attended Rochester Hamfest and passed Advanced exam along with N1ALB. Traffic (June) KA1FJ 25, W1RNA 6. (May) WB1BZR 27, W1RNA 5.

WESTERN MASSACHUSETTS: SCM, Bill Lowe, W1TM — SEC: WA1DNB, STM: W1KK, NM: W1UD and WA1MJE, NOBARC Hamfest in Cummington enjoyed by many. K1SF reports 50 MHz openings to west coast, WA1RFA and W1KZS both report successful 50 MHz QSO with KH6IAA in Hilo, HI. Each of them now need only Alaska for 50 MHz WAS. WB1CGK now OTS, WB1GTR winner of Freedom Foundation Award. WB1DLE now Ad-

TUFTS RADIO

STOCKS **Vhf engineering** PRODUCTS

SAME DAY SHIPMENT ON MOST ORDERS

RECEIVERS

RX28C Kit	28-35 MHz FM receiver with 2 pole 10.7 MHz crystal filter	$ 64.95
RX28C W/T	same as above—wired & tested	129.95
RX50C Kit	30-60 MHz rcvr w/2 pole 10.7 MHz crystal filter	64.95
RX50C W/T	same as above—wired & tested	129.95
RX144C Kit	140-170 MHz rcvr w/2 pole 10.7 MHz crystal filter	74.95
RX144C W/T	same as above—wired & tested	131.95
RX220C Kit	210-240 MHz rcvr w/2 pole 10.7 MHz crystal filter	74.95
RX220C W/T	same as above—wired & tested	131.95
RX432C Kit	432 MHz rcvr w/2 pole 10.7 MHz crystal filter	84.95
RX432C W/T	same as above—wired & tested	142.95
SRX150 Kit	High performance, single board, 144 MHz rcvr w/4 pole crystal filter	94.95
RXCF	accessory filter for above receiver kits gives 70 dB adjacent channel rejection	9.95
RF28 Kit	10 mtr RF front end 10.7 MHz out	13.50
RF50 Kit	6 mtr RF front end 10.7 MHz out	13.50
RF144D Kit	2 mtr RF front end 10.7 MHz out	18.50
RF220D Kit	220 MHz RF front end 10.7 MHz out	18.50
RF432 Kit	432 MHz RF front end 10.7 MHz out	29.50
IF 10.7I Kit	10.7 MHz IF module includes 2 pole crystal filter	29.50
FM455 Kit	455 kHz IF stage plus FM detector	18.50
AS2 Kit	audio and squelch board	16.00

TRANSMITTERS

TX50 Kit	transmitter exciter, 1 watt, 6 mtr	44.95
TX50 W/T	same as above—wired & tested	71.95
TX144B Kit	transmitter exciter—1 watt—2 mtrs	34.95
TX144B W/T	same as above—wired & tested	65.95
TX220B Kit	transmitter exciter—1watt—220 MHz	34.95
TX220B W/T	same as above—wired & tested	65.95
TX432B Kit	transmitter exciter 432 MHz	49.95
TX432B W/T	same as above—wired & tested	87.95
TX150 kit	300 milliwatt, 2 mtr transmitter	24.95
TX150 W/T	same as above—wired & tested	43.95

POWER AMPLIFIERS

PA2501H Kit	2 mtr power amp—kit 1w in—25w out with solid state switching, case, connectors	69.95
PA4010H Kit	2 mtr power amp—10w in—40w out—relay switching	69.95
PA50/25 Kit	6 mtr power amp, 1w in, 25w out, less case, connectors & switching	59.95
PA144/15 Kit	2 mtr power amp—1w in—15w out—less case, connectors and switching	49.95
PA144/25 Kit	same as PA144/15 kit but 25w	59.95
PA220/15 Kit	similar to PA144/15 for 220 MHz	49.95
PA432/10 Kit	power amp—similar to PA144/15 except 10w and 432 MHz	59.95
PA9610 W/T	144 MHz, 100 w, repeater amp. incl. power supply	549.95
PA9611 W/T	220 MHz, 90 w, repeater amp. incl. power supply	549.95
PA9612 W/T	432 MHz, 70 w, repeater amp. incl. power supply	579.95

Blue Line — RF power amp, wired & tested, emission—CW-FM-SSB/AM

Model	Band	Power Input	Power Output	
BLC 10/70	144 MHz	10W	70W	159.95
BLC 2/70	144 MHz	2W	70W	184.95
BLC 10/150	144 MHz	10W	150W	269.95
BLC 30/150	144 MHz	30W	150W	249.95
BLD 2/60	220 MHz	2W	60W	189.95
BLD 10/60	220 MHz	10W	60W	169.95
BLD 10/120	220 MHz	10W	120W	269.95
BLE 10/40	420 MHz	10W	40W	169.95
BLE 2/40	420 MHz	2W	40W	219.95
BLE 10/80	420 MHz	10W	80W	289.95

POWER SUPPLIES

PS15C Kit	15 amp—12 volt regulated power supply w/case, w/fold-back current limiting and overvoltage protection	99.95
PS15C W/T	same as above—wired & tested	134.95
PS25C Kit	25 amp—12 volt regulated power supply w/case, w/fold-back current limiting and overvoltage protection	139.95
PS25C W/T	same as above—wired and tested	169.95
PS25M Kit	same as PS25C with meters	159.95
PS25M W/T	same as above—wired and tested	189.95
O.V.P.	adds over voltage protection to your power supplies, 15 VDC max.	14.95
PS3A Kit	12 volt—power supply regulator card with fold-back current limiting	11.95
PS3012 W/T	new commercial duty 30 amp 12 VD regulated power supply w/case, w/fold-back current limiting and overvoltage protection	274.95

REPEATERS

RPT50 Kit	repeater—6 meter	599.95
RPT144 Kit	repeater—2 mtr—15w complete (less crystals)	599.95
RPT220 Kit	repeater—220 MHz—15w complete (less crystals)	599.95
RPT432 Kit	repeater—10 watt—432 MHz (less crystals)	649.95
RPT50 W/T	repeater—6 meter	899.95
RPT144 W/T	repeater—15 watt—2 mtr.	899.95
RPT220 W/T	repeater—15 watt—220 MHz	899.95
RPT432 W/T	repeater—10 watt—432 MHz	949.95
DSC-U	double shielded duplexer cables with PL259 connectors (pr.)	29.95
DSC-N	same as above with type N connectors (pr.)	34.95

REPEATER BASE STATIONS

RB50 W/T	50 MHz repeater base station w/autopatch & duplexer	2,355.00
RB144 W/T	144 MHz repeater base station w/autopatch & duplexer	2,085.00
RB220 W/T	220 MHz repeater base station w/autopatch & duplexer	2,085.00
RB432 W/T	432 MHz repeater base station w/autopatch & duplexer	2,105.00

AUTOPATCHES

RA300 W/T	Amateur autopatch w/power supp.	299.95
RA500W/T	Full duplex, same as above	895.00

ATV TRANSMITTER

TVX10 W/T	UHF fast scan tv transmitter w/power supply	399.95

OTHER PRODUCTS BY VHF ENGINEERING

CD1 Kit	10 channel receive xtal deck w/diode switching	$ 8.95
CD2 Kit	10 channel xmit deck w/switch and trimmers	16.95
CD3 Kit	UHF version of CD1 deck, needed for 432 multi-channel operation	14.95
COR2 kit	carrier operated relay	23.95
SC3 Kit	10 channel auto-scan adapter for RX with priority	21.95
CWID Kit	159 bit, field programmable, code identifier with built-in squelch tail and ID timers	42.95
CWID	wired and tested, not programmed	59.95
CWID	wired and tested, programmed	64.95
TD3 Kit	2 tone decoder	39.95
TD3 W/T	same as above—wired & tested	64.95
HL144 W/T	4 pole helical resonator, wired & tested, swept tuned to 144 MHz ban	34.95
HL220 W/T	same as above tuned to 220 MHz ban	34.95
HL432 W/T	same as above tuned to 432 MHz ban	34.95

Name _____ Call _____

Address _____

City _____ State _____ Zip _____

Order _____

☐ Check enclosed ☐ Visa ☐ Master Charge ☐ American Express

Credit Card No. _____

Signature _____ Card expiration date _____

Prices FOB Medford MA. MA residents add 5% sales tax.

Minimum $3.00 for shipping & handling on ALL ORDERS.

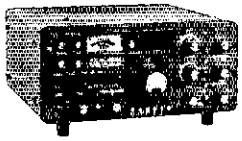
TUFTS RADIO ELECTRONICS

206 Mystic Avenue
Medford MA 02155
1-800-225-4428
Mass. residents only
(617) 395-8280

OPEN DAILY 9-9 SATURDAY 9-6

THOMAS COMMUNICATIONS SPECIALS!

ORDER YOURS TODAY!



YAESU
FT-901DM
All Mode
HF Transceiver

Covers 160 thru 10 meters. Variable IF bandwidth, reaction tuning, CW audio peak filter, built-in Curtis keyer, RF speech processor, 10 narrow tune audio filter, 6146 finals, auto mic gain control, 25 kHz calibrator and ±1 kHz clarifier, built-in VOX, 180W DC input for SSB/CW, 80W RM/FSK/AM. DC DC converter

Call for Quote! $1459.00 list

DRAKE
TR7/DR7
Solid State
synthesized
HF transceiver

Covers 160 thru 10 meters, reception from 1.5-30 continuous, 0-30 MHz with optional RTA-7. modes: USB, LSB, CW, RTTY, AM, front panel tuning, HR1 built in RF wattmeter/SWR bridge, SSB 250 watts PEP, 240 watts AM, 80 watts. Power supply required for AC operation, PS-7 120/240V power supply available

$1395.00 *List. Call for quote*

TEN-TEC
Omni D
HF Transceiver

Totally solid state, 200W all bands. Covers 160 thru 10 meters, digital readout, built in VOX and PTT, adjustable squelch, 4 position CW/SSB filter, 8 pole crystal SSB filter, 3 range offset tuning, crystal calibrator, zero beat switch, SWR bridge and more. 12 VDC for mobile use, external power supply needed for fixed use

$1669.00 List. Call for quote

ICOM
IC-701
All Mode
HF Transceiver

All solid state, 100W continuous duty on all bands, all modes, 160 thru 10 meters, dual built-in digital VFO's for split freq. operation, VOX, semi-break-in CW, RIT, AGC, noise blanker and built-speech processor. IC 701PS needed for AC operation. Power supply requirements, DC 13.8V negative ground

$1,332 LIST—*Call for quote!*

ICOM
IC 211
2 meter
Transceiver

144-148 MHz coverage, modes: SSB, CW, FM, LSI synthesizer PLL, 7 digit LED readout, pulse type noise blanker, Vox with adjustable gain, SWR bridge, CW monitor, Adj. power level, AC/DC power supply, antenna impedance 50 ohms unbalanced, TX output 11.5 VDC at 3 amps continuous

$899.00 List. Call for quote.

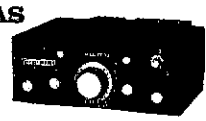
YAESU FT-7B

Frequency coverage, 10-80 meters. Emissions: USB, LSB, CW & AM. 100 Watts DC. 25 Watts AM. Single knob tune-up. 100 KHz Calibrator, built-in semi-breakin with sidetone – receiver offset tuning.

A Great Portable Solid State Rig!
$875 List
CALL FOR QUOTE!

YAESU
FT-625RD
All Mode
6 Meter
Solid State
Transceiver
$895 List
Call for quote

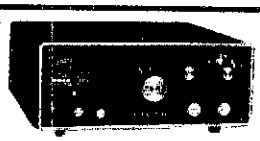
SSB/CW/FM-25 watts, AM-8 watts, digital plus analog display, noise blanker, built in AC/DC supplies, 50-54 MHz coverage. Variable power output, 3 way metering, much more!



ATLAS
210X

160-10 meter fully solid state transceiver. Final protected, 100 watts, USB/LSB/CW. No tuning required (RX or TX) with noise blanker. Deluxe mobile mount. Mars operation available. ***SUPER RECEIVER! Very Compact. Great for Mobile.***

List $899 **Special Price – $679.00**



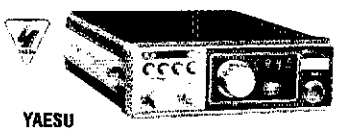
SWAN
100 MX

80-10 meters fully solid state portable transceiver. CW/LSB/USB, 235 watts all modes. RIT, one knob tune-up, calibrator, noise blanker, Vox. 13.8 VDC@18A xmit. List: $699.95

CALL FOR QUOTE!

KDK
THE NEW KDK FM2016A TWO METER TRANSCEIVER (AT $299) IS FOR YOU!

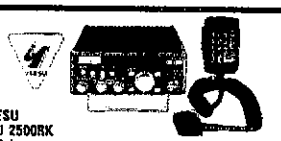
1000 channels. Built-in Mars, cap frequency coverage, big bright 3/8" LED digital readout display, 4 channel Ram memory, any offset, any split, 16 Watts output and much more.



YAESU
FT-127RA **220 MHz** **FM TRANSCEIVER**

Up/Down scanning capability, scanner will search for a 'clear' or busy channel, four memory channels, available, Freq. coverage: 300-225 MHz, 600 channels, 2 simplex memories, 3 repeater memories and 1 odd split memory, RF output 25W, 1000 Hz toneburst, repeater split ± 1.6 MHz, 13.8 VDC at 2.5A transmit.

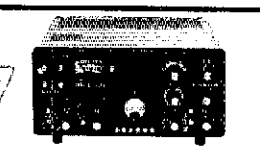
$479.00 List. *Call for Quote*



YAESU
GPU 2500RK
2 Meter
FM Transceiver

With 800 PLL channels, automatic scan over entire 2m band, 4 memories, toneburst, 25W HI/3W Lo, 13.8 VDC at 8A continuous. Freq. coverage: 144-148 MHz. Comes with a key-board mic that allows remote input of memory or dial freqs., up/down scanning, aux. repeater selection to ± 4 MHz, 9 tone input for autopatch.

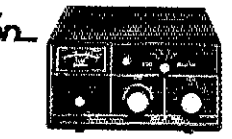
$$$.00 list. Call for quote.



YAESU FT-101ZD High performance HF Transceiver

Covers 160 thru 10 meters plus WWV, modes: USB, LSB, CW, built-in power supply, input power: 180 WDC, digital and analog frequency readout, 6146 final tubes, RF speech processor, variable IF bandwidth (300 Hz to 2.4 KHz), noise blanker, VOX, attenuator 10 dB or 20 dB, 160-23AV operation, TX/RX freq. offset.

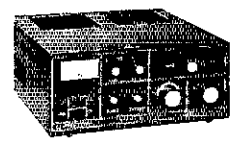
Call for Quote $$$$ list.



Dentron
GLA-1000
LINEAR
AMPLIFIER

Freq: 80 to 15 meters, covers most Mars frequencies, RF drive: max 125 watts, power consumption: 117 VAC 50/60 Hz 12.5 Amps, factory fused at 15 Amps, 234 VAC 50/60 Hz 7 Amps, DC input 1 KW CW and 1200W PEP SSB. Final tubes: 4 D-36A tubes (6LQ6).

$879.00 *Call for Quote*



DENTRON
Clipperton L

160 thru 15 meters, 200 watts PEP on SSB, 1000 watts DC on CW, RTTY, or SSTV, covers most MARS frequencies just outside Ham bands, and easily changed (1) 6 or 254V AC 50-60 Hz

$$$$.00 *Call for Quote.*

ALPHA
76A

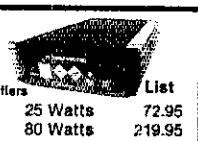
Alpha 76A by ETO offers full power with desk top convenience, is rated up to 2.5 kW PEP SSB, 1KW average, CCS. Tunable 1.8–2MHz, 3–24MHz. Nominal drive is 100W PEP, 50 W carrier. Used 2-Eimac 8874 ceramic/metal triodes in GX3. Full cabinet-ducted air cooling.

List $1,395—Call for Quote.

YAESU FT-207R
144–148 MHz FM Synthesized Hand-Held. Four memories plus offset, Auto Scan, Keyboard entry, 3 watts output, automatic battery saver, LED Display, BNC Antenna Connector, speakermic, and MUCH MORE!
Get your order in to insure delivery by late fall!
List $399
Call for Quote!

MFJ

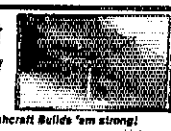
For compact antenna tuners, CW keyers and audio filters—
It's MFJ!
Give us a call to quote your needs!



KLM

Call for Quote!

KLM 2 Meter Mobile Amplifiers		List
PA-2-25 B	25 Watts	72.95
PA-4-80 BL	80 Watts	219.95
PA-4-160 BL	160 Watts	281.95
PA-15-40 BL	40 Watts	129.95
PA-15-80 BL	80 Watts	189.95
PA-15-160 BL	160 Watts	289.95
PA-45-160 BL	160 Watts	229.95



Call for Quote!

CUSHCRAFT ANTENNAS

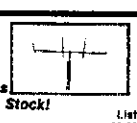
H.F. - VHF - UHF - Cushcraft Builds 'em strong!

	List		List
A10-3S	259.95	A147-11	96.95
ATV-4	99.95	A147-22V	109.95
ATV-5	109.95	A144-10T	42.95
ARX-2	39.95	A144-20T	69.95
AR-6	59.95	A147-20T	54.95
ARX 220	39.95	A436-11	54.95
ARX 450	39.95	A432-20T	59.95
A144-11	36.95	*And Much More!*	

VHF ENGINEERING

We've got an in-depth stock of kits and assembled VHF and UHF TX/RX Boards.

Let Us Quote Your Needs!



Hy-Gain Antennas
In-Depth Hy-Gain Stock!

	List
TH3JR	169.95
TH5DX	289.95
TH3MK3	229.95
TH6DXX	329.95
TH2MK3	149.95
18AVTAWB	86.30
14AUQ	67.85
12AUQ	42.09

Call for our special prices!

ROHN TOWER

Rohn 25G Products in stock...
Also, full line of Rohn accessories to put up a great tower / antenna system! Call for further info!

BIRD MODEL 43
Thruline Watt Meter

50 Ohms nominal impedance. VSWR with UHF connectors 1.05 max —Expanded scales of 25, 50 & 100 permits direct reading from 100 Mw to 10,000 watts

$125.00
Call for yours today.

ROBOT
All Units and Accessories

	List
Model 400 Scan Converter	795.00
10M915 Monitor	259.00
TC-1000 Camera	279.00

Call for your quotes and slow scan needs!

ARRL PUBLICATIONS

All ARRL Books, Maps, etc. in stock!!

Tune In the World	7.00	ARRL Logbook	1.75
Hints and Kinks	4.00	Understanding Amateur Radio	5.00
License Manual	4.00	ARRL Codekit	8.00
Antenna Handbook	5.00	*And...*	
Radio Amateur Handbook	9.75	*Much More!*	

AMECO, 73 AND CALLBOOK PUBLICATIONS

Map Library	3.75
U.S. Callbook	15.95
DX Callbook	14.95
Ameco Novice Guide	5.95
Ameco Code Course	4.95
Radio Amateur Theory Course	4.95
73 VHF Antenna Book	4.95
73 Novice Study Guide	4.95
73 General Study Guide	4.95

Plus Much More! Call Us!

SAXTON WIRE / DABURN INSULATORS

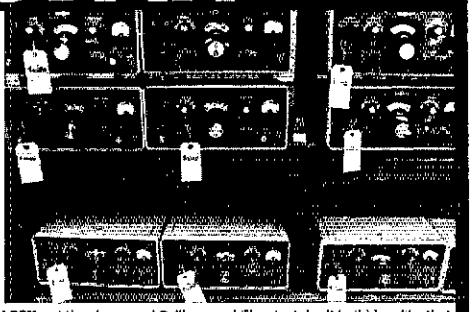
Antenna Wire	
18 gauge solid copperweld 50'	1.09
14 gauge solid copperweld 50'	3.29
12 gauge solid copperweld 50'	3.99
14 gauge stranded	3.98
16 gauge stranded	2.69
Dipole Insulators	
4" porcelain end	.96
4" porcelain center	1.41

Call Toll Free 1-800-243-7765

ORDER YOURS TODAY!

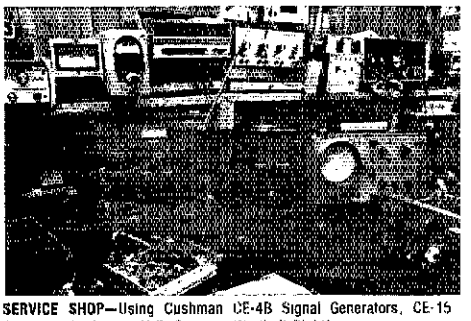
USED EQUIPMENT—We have a great selection of clean, used gear. We bring it up to normal specifications in our Service Shop before resale.

OUR 2 METER CORNER—Seems a lot of the local hams like this spot the best... Must be the free coffee pot.



LOOK—at the clean used Collins gear! They just don't build 'em like that anymore. Now you can afford to own an "S" line!

We have a great selection of used gear ready to demonstrate. All new gear for sale is in factory sealed cartons in our warehouse.



SERVICE SHOP—Using Cushman CE-4B Signal Generators, CE-15 Spectrum Analyzers, H.P. Scopes—We fix it Right!

INVENTORY WAREHOUSE—Our large volume assures you the best prices and latest stock!

Call for New Retail Catalog & Monthly Used Equipment List!

AUTHORIZED DEALER . . .
. . . FOR OVER 50 MAJOR LINES

NEW AND USED EQUIPMENT *"Get on our used equipment mailing list."*

TRADES WELCOME *"The best allowances anywhere"*
"We buy good used SSB gear"

OUR EVERYDAY LOW PRICES *"remain the same for cash or trade-ins!"*

24 HOUR U.P.S. SHIPPING *"Just a phone call away"*

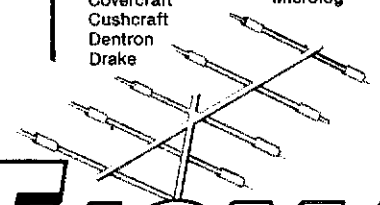
COMPLETE RADIO SERVICE SHOP *"Mail Order Repair Service"*

- **Fast Efficient Service**
- **We Repair All Brands**
- **All Work Guaranteed**
- **Most Repairs Done and Shipped Within 14 Days**
- **Amateur Extra/First Class Licenses**
- **Include Manuals and Power Supply**
- **Send Us Your Defective Equipment Prepaid Shipping**

OUR FINE REPUTATION SPEAKS FOR ITSELF . . . "YOU SHIP IT — WE FIX IT"
WE TAKE PHONE ORDERS OR SHIP C.O.D.

We Sell and Service the Following New and Used Equipment:

Alda
Alliance
Ameco
ARRL
Atlas
Bencher
Bird
B & W
Callbook
CDE
CES
Covercraft
Cushcraft
Dentron
Drake
DSI
ETO Alpha
Ham Key
Hustler
Hy-Gain
ICOM
JW Miller
KDK
KLM
Larsen
MFJ
Microlog
Mirage
Mosley
Murch
PIPO
Robot
Rohn
Saxton Wire
Shure
SST Electronics
Swan
Telex
Ten Tec
TET Antennas
Trac
Unadilla
VHF Engineering
Vibroplex
Wilson
Wilson Commercial
Yaesu



Call or Write for your super quote today!

master charge

VISA

WE EXPORT (Sub-Dealers wanted in foreign countries)

THOMAS COMMUNICATIONS

95 Kitts Lane, Newington, Conn. 06111
"Near ARRL Headquarters"
Connecticut Residents Call: 203-667-0811
OPEN MON.-FRI. 10-6 • THURS. 10-8 P.M. • SAT. 10-4
EASY DIRECTIONS: Rt. 15 South — 2 blocks past McDonald's (Berlin Turnpike)

SUB-DEALER INQUIRIES INVITED! (Send letterhead for complete package)

vanced. NOBARC repeater WR1AEY on MT; Greylock, now using new solid state equipment. WA1MJE while on vacation in Colorado/New Mexico reports 2-mtr. Activity from Pike's Peak using battery operated HT. W1ZPB reports from vacation in South Pacific. Traffic: (July) W1TM 112, K1JHC 59, WB1CGK 53, W1KK 44, K1NWE 38, W1EFC 35, K1IJV 29, WA1MJE 24, WA1OPN 22, W1BVR 15, K1BE 9, W1ZPB 6, K1SF 4, W1DOY 3. (June) WA1MJE 417, N1CW 9, N1CQ 6.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davis, KL7CUK — It appears that every one is on vacation this month from the amount of reports I received. KL7HOV is still working on his new acquired boat. KL7P and KL7Q provided communications for a special events Olympics mileage event from the bridge over the Yukon River to Valdez. We have had some maritime visitors to the waters around Alaska. K6QOT is one of those with his beautiful vessel. The Alaska Snipers Net had 819 ckins, Alaska Bush Net had 1277 and The Alaska Pacific Net had 1,110. As my term of office is drawing to a close I want to thank all of the amateurs in this section and visitors to the section for their support over the past five years. Traffic: KL7P 48, AL7O 18, KL7Q 14.

IDAHO: SCM, Lem Allen, Jr., W7JMH — SEC: WA7UHW. Remember and prepare for the SET in October. Its picnic time among the clubs. What an opportunity to check out portable gear, antennas, etc.! Talk other hams in to the site, and have fun gathering info on what your emergency gear will do. This could be important. Congrats to K7ETJ, new EC for Kootenai County! He just applied for ARRL Life Membership. W7JMH has new Dentron linear and is learning about feedback, SWR, grounding, etc -HI. He hopes it will improve his skeds with family in Alaska. W7HZL just got back from 6000 mile motorcycle trip nearly everywhere and back with new cycle - now plans cw portable to ride piggy-back. W7IWU had car trouble at Warm Lake, contacted W7FTN on 34/94 repeater (100 miles away), got him to bring a new spark coil (4 AM), still would not start, stretched out weak distributor spring, ran ok. Another case where repeaters were comforting in an emergency.

Nets	Freq	Time/Day	Sess.	QNI	QTC
FARM	3935	8 P Dy	31	1056	43
IMN	3635	9 P M-F	22	148	58
CD	3990	8:10 A M-F	22	448	22

Put a ring on your finger - remember the SET! Traffic: W7GHT 164, WA7CTS 68, W7JMH 33.

MONTANA: SCM, Robert Leo, W7LR — WA7OBH reports new 2-mtr rig, WB7SSG moves to ranch. WA7JNA moves to Red Lodge. Red Lodge 01/61 rptr FB coverage. IMN: QTC 56, QNI 148. WA6GQF new 15 mtr beam. WB6BHW new 901. W7TGU many new DX countries, 225 at Glacier Hamfest, congrats K7WNE. Nice newsletters from Gt Falls & Bozeman. WR7ANC Eaglehead repeater moved to Steamboat Mountain. Traffic: W7TGU 96, W7IXD 47, W7NEG 3.

OREGON: SCM, Dale T. Justice, K7WWR — SEC: W7HLF. Section net reports:

Net	Time(Z)	Days	Freq.	QNI	QTC	Sess.	Mgr.
AREST	0000	Z Dy	3993.5	459	95	31	W7HLF
BSN	0045	Z Dy	3908	810	28	31	WB7PQU
JCARES			147.06	122	15	9	W7VSE
OSN	0145	Z Dy	3585	156	92	31	N7NO
PdxAARES	0230	Z Dy	147.32	175	47	22	K7WWR
WCN	0200	Z Dy	3702	312	108	31	K7ZIG
1676	0200	Z Dy	146.76	756	91	31	K7KVV

K7WPC and WB7PQU made the local paper with an article on their station and activities with pix — do something in your local paper, it makes good PR. WB7AFD is BSN ham of the month. The BSN picnic was held with a good turnout and an excellent meeting about improvements for the net. The Eugene Hamfair was held with about 500 Oregon hams present. Traffic: (July) W7VSE 658, K7NTS 211, WA7IHS 180, W7MW 110, WB7OEX 81, W7HLF 72, K7WWR 51, K7QPW 37, KA7AUZ 36, W7LNE 11, W7LT 10. (June) WB7OEX 80.

WASHINGTON: SCM, Bob Klepper, W7IEU — Nets reporting this month are: NTN: QNI 1483, QTC 56; WARTS: QNI 3002, QTC 157; NWSSBN: QNI 642, QTC 39; WSN: QNI 385, QTC 129. EC WA7TWB and San Juan Cty ARES members received very good publicity in local paper on the ARES Skylab preparation. Kitsap Cty EC, WA7KGT, operating local ARES net on his 145.31 rptr on Mon nights. West Seattle ARC making plans for 1980 FD after a very successful one this year. WB7QWC making changes in antenna system to improve his emergency communications capabilities. W7ERH served as EC for Snohomish Cty while W7ADM was on a trip. WB7FGC reports 35 participated in Skylab Skywatch in the Spokane area. W7XT built new hamshack, but son WA7VXB uses it as a bedroom. Radio Amateurs of Skagit Cty (RASC) new repeater, W7IXF/RPT, went into operation July 21 on Lyman Hill at the 4270 ft. level on 144.56/145.19. K7NZV reports 6 meter AM net discontinued the end of July due to lack of checkins. WB7FDE and OM AE7P enjoyed vacation traveling and giving YLSSB net members contacts in rare 7-Land states. KA7ANF and her 3 stepchildren (WA7VXB, N7ADO and Harmony) made a successful bicycle trip to San Francisco and back. Oak Harbor area recent upgrades are WB1DAL, N7AAC, WB7WOY, WB7BFM, WB7WOW, WB7WNF. WB7NVM is now AI7J. KA7AWK is in Japan as an exchange student. W7ZEV is experimenting with windmill power to charge his 12 volt system. WA7RWK reports 1080 ARES members and reminds us that the ARES-EC net meets on 3900 kHz at 8 P.M. Mon. LCARA members KA7BWF and KA7BLA have upgraded. WA7ILC has worked YB9 stations on 6 bands, having recently worked YB9ADE on 160 meters. BEARS club has participated in FD since 1959. Clark Cty ARC did an outstanding job of communication for 4th of July fireworks display. West Seattle ARC is discussing an ongoing project like constructing and operating a repeater. HAMS Club annual pancake feed October 7 is giving away a hand held 2-mtr rig if your a ham, cash if you are not. Traffic: W7DZX 359, W7AK 317, KL7JEB 163, W7KZ 130, N7AJ 124, K7GXZ 115, WA3WPY 71, WA7BDD 68, W7IEU 65, W7EBU 33, N7AFZ 27, W7BUN 27, W7ZEV 15, W7FJZ 14, K7AJT 12, WB7CFH 10, N7AFY 9, K7VNI 8, W7APS 7, K7NZV 7, WA7OJI 5, W7ERH 2.

PACIFIC DIVISION

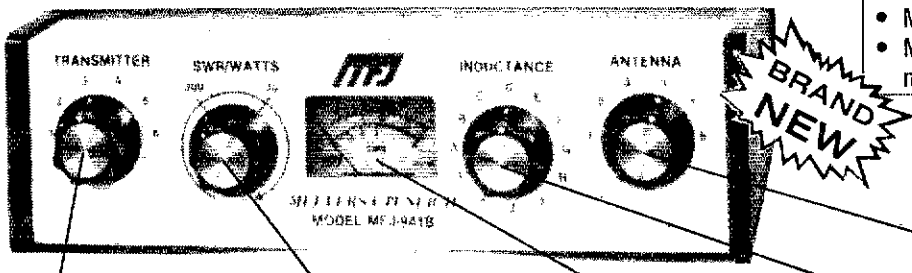
NEVADA: SCM, Ralph E. Covington, Sr., W7SK — Policy is to refrain from mentioning names in this column but I cannot resist from paying due respect to Leonard M. Norman, our past SCM. He is first listed in the November 1962 issue of QST as our SCM. In the interim 17 years he has served well as SCM for almost 13 of those years. During that time he never missed getting the column in for Nevada. Of course, he made many other contribu-

This NEW MFJ Versa Tuner II . . .

has SWR and dual range wattmeter, antenna switch, efficient airwound inductor, built in balun. Up to 300 watts RF output. Matches everything from 1.8 thru 30 MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.

MFJ LOWER PRICES!

NEW, IMPROVED MFJ-941B HAS . . .
- More inductance for wider matching range
- More flexible antenna switch
- More sensitive meter for SWR measurements down to 5 watts output



NEW LOWER PRICE

$79.95

Transmitter matching capacitor. 208 pf. 1000 volt spacing.

Sets power range, 300 and 30 watts. Pull for SWR.

Meter reads SWR and RF watts in 2 ranges.

Efficient airwound inductor gives more watts out and less losses.

Antenna matching capacitor. 208 pf. 1000 volt spacing.

Only MFJ gives you this MFJ-941B Versa Tuner II with all these features at this price:

A SWR and dual range wattmeter (300 and 30 watts full scale) lets you measure RF power output for simplified tuning.

An antenna switch lets you select 2 coax lines direct or thru tuner, random wire/balanced line, and tuner bypass for dummy load.

A new efficient airwound inductor (12 positions) gives you less losses than a tapped toroid for more watts out.

A 1:4 balun for balanced lines. 1000 volt capacitor spacing. Mounting brackets for mobile installations (not shown).

With the NEW MFJ Versa Tuner II you can run your full transceiver power output — up to 300 watts RF power output — and match your transmitter to **any** feedline from 160 thru 10 Meters whether you have coax cable, balanced line, or random wire.

ANTENNA SWITCH lets you select 2 coax lines direct or thru tuner, wire/balanced line, dummy load.

You can tune out the SWR on your dipole, inverted vee, random wire, vertical, mobile whip, beam, quad, or whatever you have.

You can even operate all bands with just one existing antenna. No need to put up separate antennas for each band.

Increase the usable bandwidth of your mobile whip by tuning out the SWR **from inside your car.** Works great with all solid state rigs (like the Atlas) and with all tube type rigs.

It travels well, too. Its ultra compact size 8x2x6 inches fits easily in a small corner of your suitcase.

This beautiful little tuner is housed in a deluxe eggshell white Ten-Tec enclosure with walnut grain sides.

SO-239 coax connectors are provided for transmitter input and coax fed antennas. Quality five way binding posts are used for the balanced line inputs (2), random wire input (1), and ground (1).

NEW 300 WATT MFJ VERSA TUNER II'S: SELECT FEATURES YOU NEED.

NEW MFJ-945 HAS SWR AND DUAL RANGE WATTMETER. NEW LOWER PRICE

$69.95

Same as MFJ-941B but less 6 position antenna switch.

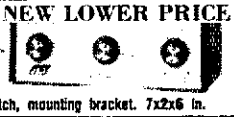
NEW MFJ-944 HAS 6 POSITION ANTENNA SWITCH ON FRONT PANEL. NEW LOWER PRICE

$69.95

Same as MFJ-941B but less SWR/Wattmeter.

NEW MFJ-943 MATCHES ALMOST ANYTHING FROM 1.8 THRU 30 MHz. NEW LOWER PRICE

$59.95

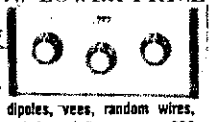


Same as MFJ-941B, less SWR/Wattmeter, antenna switch, mounting bracket. 7x2x6 in.

ULTRA COMPACT 200 WATT VERSA TUNERS FOR ALL YOUR NEEDS.

MFJ-901 VERSA TUNER MATCHES ANYTHING, 1.8 THRU 30 MHz. NEW LOWER PRICE

$49.95



Efficient 12 position air inductor for more watts out. Matches dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax. 200 watts RF, 1:4 balun, 5x2x6 in.

MFJ-900 ECONO TUNER MATCHES COAX LINES/RANDOM WIRES. NEW LOWER PRICE

$39.95

Same as MFJ-901 but less balun for balanced lines. Tunes coax lines and random lines.

MFJ-16010 RANDOM WIRE TUNER FOR LONG WIRES. NEW LOWER PRICE

$29.95

1.8 thru 30 MHz. Up to 200 watts RF output. Matches high and low impedances. 12 position inductor. SO-239 connectors. 2x3x4 inches. Matches 25 to 200 ohms at 1.8 MHz. Does not tune coax lines.

For Orders Call toll-free 800-647-1800

Order any product from MFJ and try it. If not delighted, return within 30 days for a prompt refund (less shipping).

Order today. Money back if not delighted. One year unconditional guarantee. Add $2.00 shipping/handling.

For technical information, order/repair status, in Mississippi, outside continental USA, call 601-323-5869.

Order By Mail or Call TOLL FREE 800-647-1800 and Charge It On VISA | master charge

MFJ ENTERPRISES, INC. P. O. BOX 494 MISSISSIPPI STATE, MISSISSIPPI 39762

AZDEN ★ NEW! ★ AZDEN ★ NEW! ★ AZDEN ★ NEW! ★ AZDEN

AZDEN

REVOLUTIONIZES THE STATE OF THE ART

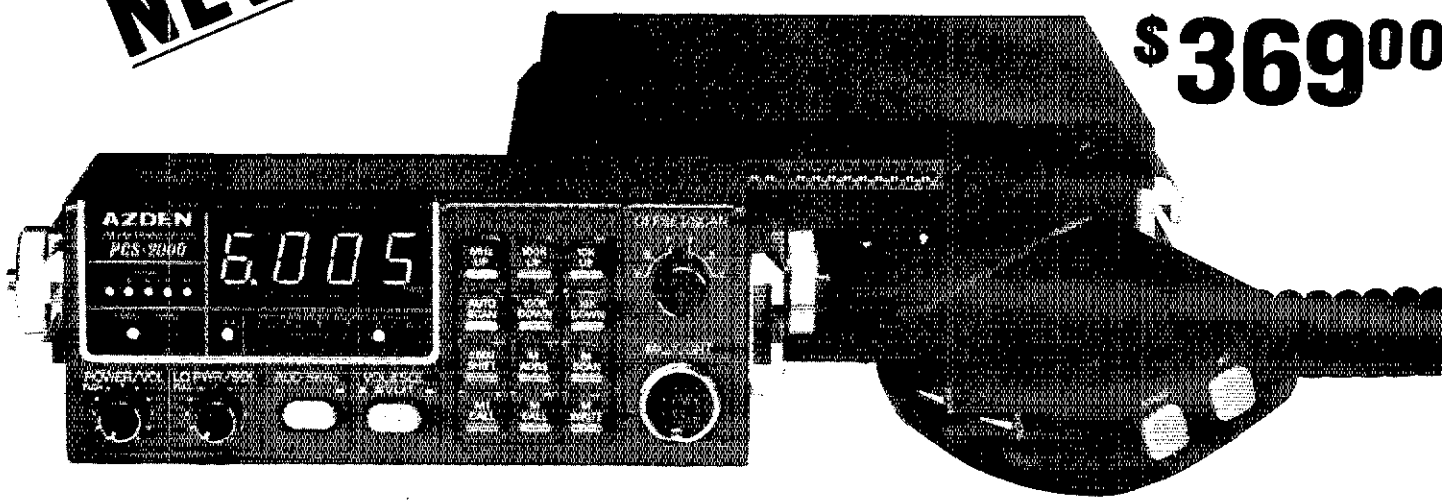
AWE AND AZDEN INTRODUCE THE BRILLIANT NEW PCS-2000

MICROCOMPUTER CONTROLLED

2 METER FM TRANSCEIVER

NOT $550.00
INTRODUCTORY
PRICE
$369.00

NEW!



COMPARE THESE FEATURES WITH ANY UNIT AT ANY PRICE

- **FREQUENCY RANGE:** Receive and transmit: 144.00 to 147.995 MHz, 5Khz steps + MARS-CAP* and MULTIPLE OFFSET BUILT IN.
- **ALL SOLID STATE-CMOS PL DIGITAL SYNTHESIZED.**
- **SIZE:** UNBELIEVABLE! ONLY 6¾" x 2⅜" x 9¼". COMPARE!
- **MICROCOMPUTER CONTROLLED:** All scanning and frequency-control functions are performed by microcomputer.
- **DETACHABLE HEAD:** The control head may be separated from the radio for use in limited spaces and for security purposes.
- **SIX-CHANNEL MEMORY:** Each memory is re-programmable. Memory is retained even when the unit is turned off.
- **MEMORY SCAN:** The six channels may be scanned in either the "busy" or "vacant" modes for quick, easy location of an occupied or unoccupied frequency.
- **FULL-BAND SCAN:** All channels may be scanned in either "busy" or "vacant" mode. This is especially useful for locating repeater frequencies in an unfamiliar area.
- **INSTANT MEMORY-1 RECALL:** By pressing a button on the microphone or front panel, memory channel 1 may be recalled for immediate use.
- **MIC-CONTROLLED VOLUME AND SQUELCH:** Volume and squelch can be adjusted from the microphone for convenience in mobile operation.
- **ACCESSORY OFFSET:** With one optional crystal, three non-standard offsets become available.
- **25 WATTS OUTPUT:** Also 5 watts low power for short-distance communication.
- **DIGITAL S/RF METER:** LEDS indicate signal strength and power output. No more mechanical meter movements to fall apart!
- **LARGE ½-INCH LED DISPLAY:** Easy-to-read frequency display minimizes "eyes-off-the-road" time.
- **PUSHBOTTON FREQUENCY CONTROL FROM MIC OR FRONT PANEL:** Any frequency may be selected by pressing a microphone or front-panel switch.
- **SUPERIOR RECEIVER SENSITIVITY:** 0.28 uV for 20-dB quieting. The squelch sensitivity is superb, requiring less than 0.1 uV to open. The receiver audio circuits are designed and built to exacting specifications, resulting in unsurpassed received-signal intelligibility.
- **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:** 15' REMOTE CABLE... $29.95. *MARS-CAP KIT... TBA. PCS-6R A/C POWER SUPPLY... $49.95.

---

master charge

VISA

AMATEUR-WHOLESALE ELECTRONICS

8817 S.W. 129th Terrace, Miami, Florida 33176
Telephone (305) 233-3631 ● Telex: 80-3356
U.S. DISTRIBUTOR DEALER INQUIRIES INVITED

800 ORDER NOW TOLL-FREE 800
Credit card holders may use our toll-free ordering number
Ask for operator 701
(800) 824-7888
In California (800) 852-7777
Alaska and Hawaii (800) 824-7919

800

tions but space keeps us from listing all of them. There is no doubt that should the need arise again he will be there to give us his all. Thank you, Leonard. W7KKM home from hospital and we wish him a speedy recovery. Nevada Sagebrush Net is reactivated and meets Daily 3.898 MHz, 0230Z. K6MQX back on the air with new antenna farm. KA7AGM really working out as EC in Clark County. Traffic: N7AKX 258, W7BS 111, W7SK 3.

PACIFIC: SCM, Pat Corrigan, KH6DD — SEC: KH6CKJ. EC: Honolulu, KH6ILR. Congrats to KH6HME on his historic breakthru with the first ever Hawaii - W. Coast 432 MHz contacts. The KH6DD Amateur News Broadcast and the Swap Shop have been changed to Tues. nites at 8 P.M. All old QSL's at KH6 Bureau were disposed of this month. QSL mgr. KH6DO requests everyone keep current and provide SASE's if you expect cards. Let's help him in his tough job. Pac. Tfc. Net meets daily on 14110 at 0330Z with weekend sessions at 0000Z. Everyone is welcome and you might find cw tfc handling fun. KH6HDA visited from Seattle in July; C2IKM & ZK1BS in Aug. KG6JIC is EC Guam - contact him to volunteer help in Guam. Sim. Emerg. Test this month. Contact your local EC. Contact Hono. ARC to help with next years ARRL Conv. in Hawaii. Traffic: KH6JJP 12, KH6H 10, KH6DD 8.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: WB6GFJ. ASCM: W6NJU. Division Director, W6ZM, was the guest speaker at the meeting of the Sierra Foothills ARC in Auburn. N6WR shared the bill as banquet speaker with W2HD, the President of the ARRL, at the Division Convention in Reno. The amateur radio newsline phone, (916) 484-7388, sponsored by the J.I. Sabin Pioneer RC, is being well received and is a great service for the Section. The El Dorado Co. ARC held a meeting/picnic at the Coloma State Park. WB6TXC has his Rohn 25G tower up with 3 element beam in place. W6GO has trained his computer to keep his log and keep track of his QSLing. Congratulations to KA6EZG and KA6EZN on passing their General class tests and to KA6s GFH and HFF on their new Novice calls. Traffic: W6SX 36, W6DEF 21, W6RSP 15.

SAN FRANCISCO: SCM, Mark Nelson, AA6DX — SEC: N6KM. W6VV, new SCM for SF, is writing this and future columns. Many TNX to Mark for his help in the changeover. Please bear with us until we get organized. SFRC and HARC were active on FD. W6RNL active in Tfc and Public Service, W6GGR as OBS. Are you signed up with your EC to help in case of emergency? There was a good representation of SF section at Pacific Division Convention. FWRA planning repeater improvements. K6GWE/R had successful breakfast meeting. Traffic: (July)W6RNL 164, W6GGR 9. (June) WB6AMP 202, W6RNL 107.

SAN JOAQUIN VALLEY: SCM, Charles Mc Connel, W6DPD — SEC: WA6YAB. Asst SCMs: W6TRP WA6HIN WA6YAK. Appointments renewed: W6BWM, EC; K6YK, OVS; and W6XK W6NTK and N6AM OBS. The Southern Sierra Amateur Radio Society in Techachapi is an ARRL Affiliated Club. W6SF (Stockton ARC) and W6BXN (Turlock ARC) had a challenge on FD points scored, and W6SF won. CARS was active in FD. It is my sad duty to report N6VZ as a Silent Key. W6DPD has joined the 6 Meter 600 Club. N6AWH KA6AOV W6DBH W6DPD WA6WDL and WA6YAB made NCN Honor Roll for June. KB6DK is KE6U. NCN Scoreboard, for June and/or July

I	QNI	383	QTC	256	QNI	392	QTC 370
II	QNI	332	QTC	99	QNI	NR	QTC NR
VHF	QNI	1269	QTC	251	QNI	1120	QTC 327

KA6CKX and KA6EKW made General. KA6FYD N6BKF KA6FQB KA6FIZ KA6GER KA6GEI and KA6HHJ are new Amateurs in Kern County. Traffic: (July) N6AWH 218, W6DPD 15, WA6YAB 12, WA6JDB 3. (June) N6AWH 113, W6BWM 18, K6RAU 5.

SANTA CLARA VALLEY: SCM, Jettie Hull, W6RFF — SEC: WB6IZF. K6DYX will talk on RTTY to the Naval Postgraduate School ARC. KB2ID sends code practice on Sun 8 P.M. 7160 kHz. NPSARC had booth at Monterey County Fair, and officers are KB2ID K6TST WD4LUN KBØIW. W6RFF was guest speaker at Geo. Ladd Pioneer RC in SF. Topic was traffic. W6PDD in hospital. K6DEZ was awarded an ARRL 40 yr pin by W6ZM. KA6ACK visited YO-Land. SCCARA reports they will host Pacific Div Convention Labor Day weekend 1980 with WA6RXB as chairman, Marriot/Santa Clara is a possible site. WR6AOK is back on the air from new site in Ben Lomond, the San Lorenzo Valley ARC is the owner. A breakfast meeting was held in Capitola by the SLVARC and SCCARC. WA6KFA is in Mexico aboard the Agua Alegre. SCCARC/ARES net meets Mon 1930 local on 146.52 simplex. New member SCCARC is KA6FKC. WVARA had a picnic and an auction during Aug and has sked events for remainder of the year. SPARK and SRI club members are keeping WR6AIS on the air. AG6D spoke on the Opticon-Communications Aid to the Blind before PAARA. New licenses, KA6DLL-Tech. and KA6CUG-Gen. and KA6GZG-Gen, KA6EWX now Advanced. W6ASH EC coordinated communications for semi-annual MEDEX 80-I (Operation Hot Foot). He keeps the ARES group busy with drills and nets! Northern Calif Net reports new Editor for the RELAY, it is N6IU, and many thanks goes to K6TP for his work in publishing 42 issues in the last 3 1/2 years!! NCN Honor Roll includes: WD6AFR KA6ETB KA6FAZ WD6GUA WB6HDO WA6JWK WA6KRA W6KZJ WA6NMQ W6RFF W6YBV N6YE K6YKG W6YTV WA6ZFK all of SCV. W6YBV leads the section traffic total as usual. WB6IZF reports "Just hanging in there" with activity on 2-mtrs. WB6VWK reports a slow month. WA6HAD busy with OBS in Novice bands. W6OIl busy with phone nets. W6AUC with large tfc total many nets and keeps sked with bros W6JAO and W6BEU. W6KZJ checks into NCN nearly every night. N6XI also busy on NCN and NCCCN. W6ZRJ took TCC sked for W6VZT. Traffic: (July) W6YBV 284. W6AUC 91, W6RFF 53, WA6HAD 42, W6KZJ 18, W6OIl 12, W6ZRJ 12, N6XI 6. (June) WB6IZF 2.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Bill Parns, AA4R — STM: N4UE. SEC: K4CJZ. Congrats to all the members of the New River ARC of Jacksonville, now an affiliated club. Sorry to have N4ALE moving to GA. Tnx for the good effort as S/T of THEN. Congrats to K4VHT the new S/T of THEN. K4VHT was recent speaker at Iredell Co ARS and AA4R at the Gaston Co ARS. WD4SKH reports a demo station set up in Whiteville with good public response. K4FTB reports Blue Ridge OCWA Chapter demonstrated Amateur Radio at the Henderson Co. Apple Festival on both HF and OSCAR. New Extras include WB4VVL and W4WCG, who is now KO4P. WB4BUK reports Charlotte ARC was recently presented an award by the March of

Amateur Radio Supply of Nashville, Inc.

615 South Gallatin Road – Madison, Tennessee 37115

Sure, we take trades on new equipment! Call or write.

CALL A.R.S.O.N. NOW!

We're Burning to Make "Hot" Deals!!

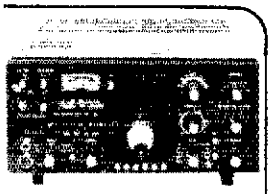
615 868-4956

for the Best DEALS

VISA master charge

Accepted at slightly higher prices!

YAESU

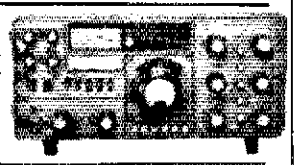


NOW IN STOCK!

FT101ZD

Digital 160M-10M Deluxe Features

Check the others then get our price!



YAESU FT 901 DM

Call for yours today!

NEW! YAESU FT207R

Synthesized Handi-Talkie. 2 Watts

CALL NOW FOR OUR PRICE!

We stock the complete YAESU line!

KENWOOD

NEW! TS 520 SE

A new version of the FAMOUS STANDARD!

Call or write for our price!

NEW! TS 180S

All Solid State with Digital Frequency Control. 200W P.E.P. Memory.

Best Price Anywhere!

NEW! TS 120S

ALL SOLID STATE HF TRANSCEIVER PLUS A FULL LINE OF ACCESSORIES!

TR 7600

TR 7625

10 or 25 Watt FM 2 meter xcvr synthesized with memory. Get our best price!

NEW! Ask us about the new Kenwood 2 Meter Handi-Talkie!

NEW! KENWOOD OWNERS! We have the new Kenwood Phone Patch!

IN STOCK! Ask about the RM 76 Micro Processor for the 7600/7625.

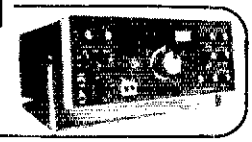
We stock the full KENWOOD line and provide warranty and after-warranty service. BUY WITH CONFIDENCE!

TEN-TEC OMNI

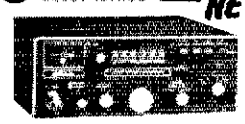
D&A

UNBEATABLE PRICES

Full TEN-TEC Line in stock!



SWAN ELECTRONICS



NEW! SWAN ASTRO 150

HF SSB Transceiver featuring "VRS"

Fully Synthesized 235 Watts PEP & CW.

See the Swan ads and Call us or write for BEST PRICES ANYWHERE!

NEW! 102BX

Dual PTO's SYNTHESIZED 1.8–30 MHZ 235 Watts PEP

SWAN 100 MX P.S. and ANT. TUNER.

Call or write for quote– ideal for home OTH or mobile!

DATONG

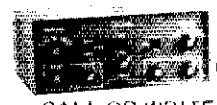
We have in stock the amazing Datong FL-1 active audio filter. Also now have the ASP, Automatic speech processor . . . plus the Code tutor . . . Fantastic additions to your station. Call or write for information and prices.

ICOM

Compare our PRICES!

701, 211, 215, 280, 30A–All in stock!

ROBOT



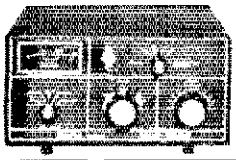
SSTV – ROBOT

PUT YOURSELF IN THE PICTURE!

Get in on the latest in Ham Radio!

CALL OR WRITE NOW FOR PRICES!

DENTRON

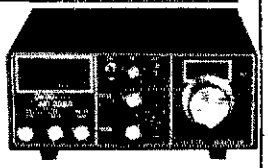


Dentron GLA 1000

1 KW DC INPUT! 1200 W. PEP! LOW PRICES!

NEW! Dentron HF 200A

Fixed or Mobile! 200 WATTS P.E.P.

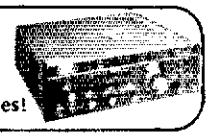


We have the New Dentron AF-1A Audio Processor, Dentron Antenna Tuners, Antennas and SWR Meters.

CLIPPERTON L •MLA 2500 B •DTR 2000L

CHECK OUR LOW PRICES!

DRAKE



TR/DR-7

Now in stock!

Full 7 line of accessories!

SPECIAL! Cushcraft ATB34–$220.00 Delivered anywhere in the Cont. U.S.A.

MIRAGE

MP2 VHF SWR MTR

B108 2M AMP • MP1 HF SWR MTR

IN STOCK! Call or write for prices!

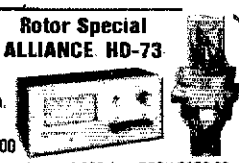
B&W

ANTENNA SWITCHES in stock!

ALLIANCE

SPECIAL OFFER!!

Rotor Special ALLIANCE HD-73



$105.00 including Shipping in U.S.A.

HD-73 with 100 feet rotor cable $120.00

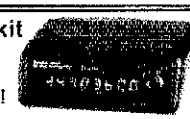
HD73 with 100 feet rotor cable and 100 feet RG8U $150.00

Cashiers check or M.O. please.

DSI Counter Semi-kit

Get On Frequency!

WRITE OR CALL FOR SPECIAL PRICE!



ANTENNAS

CUSHCRAFT – HYGAIN

LARSEN – HUSTLER – AVANTI

DAIWA

J. W. Miller

Call or write for SUPER LOW prices!

CDE ROTOR SPECIALS

The NEW HAM IV Rotor

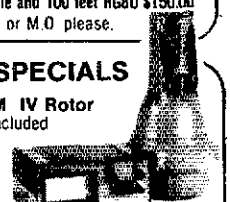
Shipping included

HAM IV Rotor $147.00

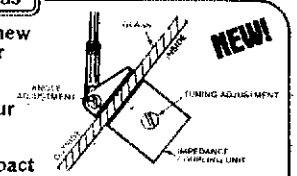
HAM IV Rotor with 100 ft. rotor cable $162.00

HAM IV Rotor plus 100 ft each rotor cable and first grade RG8U $185.00

Send cashiers check or M.O. please.



avanti antennas



NEW!

The fantastic new Avanti 2 meter Mobile Antenna– mounts on your car window glass! Neat and compact installation–

GET OUR LOW PRICE NOW!!!

MFJ ENTERPRISES, INC.

TUNERS – FILTERS – We've got 'em! CHECK US FIRST!

USED EQUIPMENT? OUR STOCK TURNS FAST. WRITE OR CALL YOUR SPECIFIC NEEDS.

SEND S.A.S.E. FOR OUR PINK SHEET SPECIALS!

USED AND CLEARANCE GEAR!

Fast UPS Delivery. Place your order then STAND BACK! We ship your order the same day we get it. Best prices and quick handling of your order.

STORE HOURS – Monday thru Friday, 9 AM to 5 PM

Amateur Radio Supply of Nashville, Inc.

HAMTRONICS USED GEAR • TEST EQUIPMENT • SPECIALS

30-DAY GUARANTEE ■ 90-DAY FULL CREDIT TRADE-IN ■ FREE SHIPPING VIA UPS ONLY

Limited quantities. First come, first served. *(if weight or size exceeds UPS max., we will ship freight collect)*

Allied
AX-190 Receiver	$159

Ameco
PV-50	$ 9
CN-50	29
CN-144	39
TX-62	79
621 VFO	45

B&W Waters
Nuvertor 2+6 Conv.	$ 75
6100 SSB Xmitter	395
670 SSB Adaptor	39
Co-Dax Keyer	95

Central Electronics
100V Transmitter	325
MM-2 Scope	69
20-A SSB Adaptor	79

Clegg
22'er FM	$129
66'er 6M Xcvr	115
99'er 6M Xcvr	59
Interceptor BRCUR	275
Ant Pre Amp	22
All Bander	69
HT-146	125
2 Vess	259
FM-27-B Xcvr	325

Collins
75 A4 Receiver	$395
75S3B Receiver	695
75S1 Receiver	349
KWM-2 Xcvr	595
32S1 Xmitter	349
PM-2 AC Supply	95
516 F2 AC Supply	139
312B5 Console	425
361D2 Mount	29

Drake
2A Receiver	$149
2B Receiver	189
2AQ SPKR QMULT	29
R4 Receiver	289
R4-B Receiver	349
R4-C Receiver	399
MS-4 Speaker	19
2NT Transmitter	125
2NT Transitter	99
TR-6	695
TR-22 2 Meter	140
T-4X Transmitter	339
TR-72 2 Meter FM	225
AC-4 AC Supply	95
TR-4-C Transceiver	449
CC-1 Console	
CPS-1 Supply	
SC-2 Conv	
SC-6 Conv	
SC-1 Calibrator	
The above all assembled complete pkg.	Only $200

Dycomm
10-0 2 M Ampl	$125
35-0 401N 110 Out	130
470-25 450 MC	120
P-1416 16 Amp Supply	95

Eico
720 Transmitter	$ 49
722 VFO	39
730 Modulator	39

Elmac
AF-67 Transmitter	$ 45
PMR-8 Receiver	79

Genave
GTX22M FM	$165
GTX-200 2M FM	149

Globe/Galaxy
VHF 6+2 Transm	$ 39
Chief Transmitter	39
Galaxy III Xcvr	159
Galaxy V Xcvr	189
Galaxy V Mk II	239
GT-550 Xcvr	279
GT-500A Xcvr	329
AC-400 Supply	79
FM-210 2M FM	95

Gonset
Com II 2M	$ 75
Com II 6M	69
Com IV 2M	129
GC-105 2M	115
G-28 Xcvr	149
G-50 Xcvr	149

Hallicrafters
S-108 Receiver	$ 99
SX-101 Receiver	159
HT-32 Transmitter	179
HT-32B Transmitter	269
SX-99 Receiver	79
SX-115 Receiver	349
HT-37 Transmitter	159
HT-40 Transmitter	49
SX-99 Receiver	99
SX-117 Receiver	189
SR-150 Xcvr	259
SR-160 Xcvr	159
SX-146 Receiver	175
HT-44 Transmitter	159
SX-111 Receiver	149
SX-122 Receiver	249
S-36 UHF Receiver	125

Hammarlund
HQ-110 A VHF Receiver	$189
HQ-110C Receiver	119
HQ-110AC Receiver	149
HQ-145X Receiver	169
HQ-170C Receiver	159
HQ-180 Receiver	379
HQ-215 Receiver	259
SP-600 Receiver	179
HX-50 Transmitter	169

Heathkit
SB-300 Receiver	$199
SB-301 Receiver	229
HR-10-B Receiver	69
SB-303 Receiver	269
SB-220 Linear Amp	449
SB-102 Trivcvr	379
DX-60B Transmitter	69
HW-32 Transmitter	85
HW-100 Transceiver	249
SB-100 Transceiver	299
SB-401 Transmitter	249
SB-101 Transceiver	349
SB-650 Digital Freq. Display	149
HW-30 Twoer	79
Also Sixer	79
H-10 Monitor	69
VHF-1 Seneca	79
HW-12 Transmitter	75
HP-23 AC Supply	49
HP-23B AC Supply	59
HW-202 2M FM Xcvr	159
SB-620 Spectrum Analyz	120
SB-102 Xcvr	369
SB-610 Scope	95
HA-20 6m Linear	125
SB-634 Console	175
SB-604 Spkr	29.50
SB-644 VFO	129.50
SB-230 Linear	359
SB-104 Transceiver	625

ICOM
IC-21 2M FM Xcvr	$299
IC-230 Demo	369
IC-22A 2M FM Xcvr	185
IC-30A 432 MCFM	269

Johnson
1-KW Matchbox/SWR	$195
Courier Linear	139
Ranger I Transmitter	85
Ranger II Transmitter	139
Valiant I Transmitter	129
Invader 2000 Xmitt	495

Kenwood
T-599 Transmitter	$289
R-599 Receiver	289
TS-520 Tranc	625
QR-666	259
QR-666 Receiver	239
TV 502 Transvertor	179

Knight
T-60 Transmitter	$ 39
R-100 Receiver	59
TR-108 Trancur 2M	79

Lafayette
HA-800 Receiver	$ 89
HP-350 Receiver	149
HE-45 Transceiver	49

Midland
509 H.T.	$149

Millen
92200 Transmatch	$149
90651-A Grid Dipper	95

National
NC-270 Receiver	$119
NC-300 Receiver	129
NCX-5 Transceiver	279
NCX-5MK11 Transcvr	299
NC-303 Receiver	199
AC-500 AC Supply	69
NCX-500 Transceiver	199
NCX-3 Transceiver	169
NC-190 Receiver	149
NC-105 Receiver	69

Regency
HR-2B 2M FM	$169
HR-220 FM 220 MC	185
AR-2 2M Amplifier	85
HR-25 2M FM	225
HR-6 Meter FM	189

SBE
SB-34 Transceiver	$249
SB-33 Transceiver	189
SB-144 2M FM	175
SBZ-LP Linear	179

Standard
SRC-146 HT	$149
826 M Trnscvr	195
SRC-144	395
SRC-851T	750

Swan
700-CX Xcvr	$459
260 Cygnet	289
279 Cygnet	329
500 Xcvr	
500 CX Xcvr	389
117-XC AC Supply	95
14X DC Module	39
MK II Linear	475
K-K V1-6 Meter	550
250 C 6M Xcvr	349
FM-2X2M Xcvr	169
FM-1210A 2M	249
350 Transceiver	269
350C Xcvr	299
600R Receiver	339
600T Transmitter	399
410 VFO	79

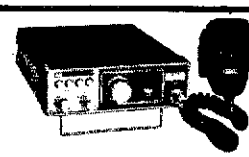
Tempo
Tempo one Xcvr	$299
AC One Supply	79
FMH 2M H.T.	149
CL-220 Trncur 220 MC	179
FMH 2M w/Talkie	149

Ten Tec
PM-3 Trnsur	$ 49
KR-40 Keyer	79
RX-10 Receiver	49
S-30 Signalizer	29
Triton II	479

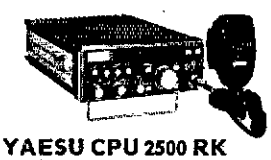
Yaesu
FT-401 Xcvr	$499
FRDX 400SD Rec	325
FT 2 Auto 2M FM	249
FT-101B Xcvr	549
FL-2100B Linear	295
FV 101 VFO	79
101E Xcvr Demo	695

Test Equipment Bargains
Boonton "Q" Meter	$295
Tektronix 5140	249
Tektronix 545A	950
5 3/54A Plug-in wide band preamp	75
Hickok 695 Generator	69
Bendix BC221 Freq Meter	39
Polarad Spectrum Analyzers A84T	1695
Hewlett Packard 400C	75
Precision E-400 Signal Generator	125
Electro Impulse Spectrum Analyzer	395
Dyna/Sciences Model 330 Digital Multimeter	195
Hewlett Packard 4905A Ultra Sonic Detector	550
Hewlett Packard 120A Scope	250
TS-323/UR Frequency Meter	175
Hewlett Packard 4910B Open Fault Locator	650
General Radio 650A	150
Measurements Mod 80	195
Nems Clark 1400	495
Ballantine 300H	175
PACO Scope Mod-S-50	75
Singer FM-10C	3495
Simpson 260 V.O.M.	49.50

The inventory quantities of the items shown in this list vary. There may be one or several of any item. Some items may be sold by the time you read this ad. It is also likely that we have items in stock that are not listed, as a result of the many trades we make each day. We reserve the right to sell accessories and power supplies with matching transceivers and transmitters. Please allow up to 10 working days to ship your order so that we may check and service the gear you purchase.

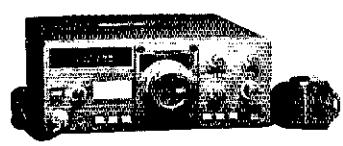


YAESU FT227RA
Regular $399.00
Cash (no trades) $339.15



YAESU CPU 2500 RK
(With Keyboard MIC)
Reg. $585.00
CASH (No Trades) $497.25

KENWOOD TS 180S
Retail $1,149.95
w/D.F.C.



KENWOOD TS 120S
Retail $699.00

KENWOOD TR7625
Regular $425.00
Cash (No Trades) $375.00

MAIL & PHONE ORDERS WELCOMED. BANK AMERICARD ACCEPTED. ALL UNITS GUARANTEED

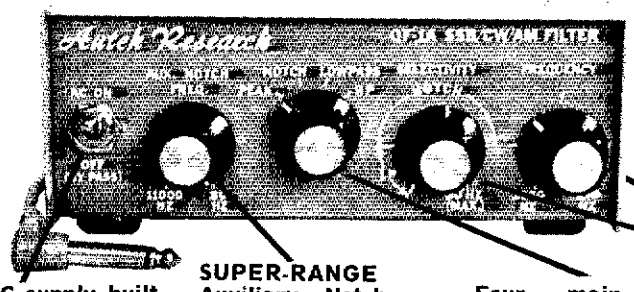
HAMTRONICS
DIVISION OF
Trevose Electronics

4033 BROWNSVILLE ROAD
TREVOSE, PA. 19047
Telephone:
(215) 357-1400

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.)

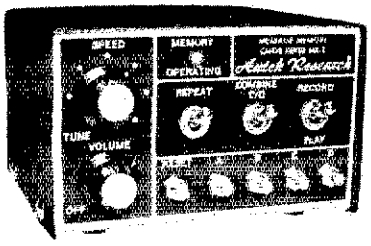
AUTEK pioneered the **ACTIVE AUDIO FILTER** way back in 1972. Today, we're still maintaining that engineering leadership. Our **QF-1A** evolved from suggestions from thousands of owners, and years of dedication to making the "ultimate" filter. No gimmicks — just something that really "works" like the 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 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.

Order by mail or call our TOLL FREE order operator:

NATIONWIDE 1-800-854-2003 ext. 842

CALIF. 1-800-522-1500 ext. 842

CALL 24 HOURS, 7 DAYS A WEEK.

Important: Operator can only take your order. For other information, you must write.

Autek Research **Box 5127E Sherman Oaks, Ca. 91403**

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 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 5127E, Sherman Oaks, Ca. 91403.

Dimes for their continued support of the annual Walk-a-thon. Mecklenburg ARES group recently participated in mock air plane disaster in cooperation with the local airport. WB4KOH is EC of the group. DX activities are now being publicized in a number of club bulletins including the Brightleaf ARC, Azalea Coast ARC and Raleigh ARS. looks like a subject that appeals to most. Recent ARRL appointments include: K4DHX(OTS), W4FMN(OES), WA4WHJ(OO), WA4AAV(EC Wake Co), WA4IER (EC Yadkin Co), WA4FSC(OVS). Remember the SET scheduled for the first weekend in October. What has your ARES group got planned? See you at the Eastern NC Hamfest on October 7 and the Asheville Hamfest on October 13. Traffic: AB4V 248, WD4CNQ 180, AB4S 163, WD4NYN 154, WB4MXG 100, WD4EPO 98, K4VHT 86, K4FTB 85, KK4M 77, K4MC 62, WD4AIE 59, W4EAT 58, WB4WII 58, N4ZH 55, N4UE 52, AA4R 50, W4OFO 40, WB4VVL 40, W4FMN 39, WA4AAV 34, KB4IZ 34, N4ALE 30, WD4ABZ 28, WB4CES 27, K4DHX 26, WA4SRD 25, N4AJS 23, W4ACY 21, WA4CUD 19, WD4NAO 15, WB4CYN 14, WB4VQZ 12, W4RVE 11, AA4NC 10, N4BEX 10, K4AI 8, WD4HYM 6, AI4D 4, W4IZI 1, WD4LOO 1.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — Asst SCM: WB4UDK. STM: W4ANK. NMs: WA4SJS N4PO KA4BGX W4OCX. Check-ins/traffic July SC SSBN 1386/176, Anderson 2-M Net 562/29, CNe 304/144, (CMN) 232/67, Lancaster 2-M Net 172/25, CNN 98/34, Dixie 6M Sideband Net 39/0, Dillon City, ARES 17/2, Dillon City, 10M Net 7/0. Congrats to all known up-grades: KA4IPM WD4NUM KA4CPR WD4BUL Rock Hill Hamfest Oct. 7. Sorry to hear K4FRX in hospital. Glad to be a guest at the OCWA luncheon at the Charleston Hamfest. A lot of activities by all clubs this summer. Traffic: N4PQ 362, WD4AWN 225, W4ANK 171, K4ZN 161, W4NTO 100, W4FMZ 87, WB4UDK 51, W4MTK 49, KA4AUR 43, W4FVV 34, KA4BGX 13, WB4JNE 30, WA4SJS 27, W4OCX 25, WB8TCT/4 20, AF4E 15, WD4DOL 13, N4BCD 12, W4DRF 10, K4PFC 10, K4VIA 9, WD4EDM 8, WD4HBX 8, WB4AFP 6, WD4BUM 6, N4AKO 5, N4EE 5, WA4VYS 4, WD4FJP 3, WD4LLC 2, KB4SC 2, WA4YAF 2. (June) KA4BGX 34.

VIRGINIA: SCM, Rick Genter, K4BKX — ASCM: Buddy Smith, W4YE. STM: W4SQQ. SEC: N4NK. Chief OO: W4HU. Chief OVS: WA4PGI.

Net	kHz	Time(PM)	Sess.	QTC	QNI	Mgr.
VNTN	3907	Noon	31	263/243	343	N4LE
VSBN	3947	6/10:15	62	588/524	1405	W4JK
VSN	3680	6:30	31	149/130	316	WA4YIU
VN	3680	7/10	61	535/472	316	WB4FLT

By popular demand, the individual news is back. Many thanks to all of you for letting me have views on this column. WD4JEK, advises of new interest in a Novice net. Our STM, W4SQQ, (RFD 1, Box 313-A, Gainesville, 22065) would like to hear from anyone interested in a Novice net. K8WV and W8LYW gave us their views on the Quiet-Zone in Winchester. ASCM, W4YE, attended the National in Baton Rouge! W4UQ is sailboat racing in Cape Cod. Vopex 79/3 was conducted and preparations are now under way for Vopex 79/4 (Oct-SET). N4OT now has DXCC CW 180 Mixed 200; no beam, no linear, no lists. WB4LAB KB4OH KA4GAV active with James City/Williamsburg Expo. W4ZM traded "C Line" for Omni D. Many thanks to W4WWQ and the Lynchburg ARC for the Vopex 79/3 scenario; great job! K4BAV active FD with Alexandria's emer. van and generator. WB4DBK getting ready for UVA in the fall. WA4NTP has new tower and beams up. W4KFC and K4LMB attended National conv. N4RF is back after a "southern" vacation. N4SD working with Red Cross. XYL and I enjoyed our visit to Southern Peninsula ARC. Traffic: (July) WB4PNY 751, KB4N 617, WA4CCK 598, W4JK 520, N4NK 475, W3BBN 472, W4SQQ 293, WB4FLT 219, K4KNP 214, WA4LJI 207, WB4DBK 195, K4BKX 187, WA4STO 180, K8LGA 137, W4WWQ 133, N4BJX 99 N5BA 96, K4EJ 95, AA4CK 90, N4LE 88, K4JM 85, WA4YIU 85, KF4R 83, W3BBQ 79, W4UQ 77, N4AZI 59, WA4UYD 46, W4OKN 45, KB4OG 42, WB4MAE 40, N4UY 40, W4NWM 39, WB4NEE 36, N4IF 35, W4KXE 31, N4FM 30, AG4D 28, WB4FDT 26, K4GR 26, KB4OF 26, KA4ETG 25, N4ATT 23, KA4GIO 22, K0JH 22, WD4GVU 21, WB4LAB 21, WB4RWY 21, WB4DOZ 20, K4HBE 20, WD4IDF 20, WB4UHC 20, N4YQ 20, W6YVG 20, WB4ZWT 20, WA4FDV 18, KB4OB 18, W4CEU 17, WB4ODZ 17, N4RF 17, WD4NEI 16, WA4ONR 16, W4JUJ 14, KJ4J 13, WA4ISA 12, WD4POZ 12, K4VWK 12, WD4FTK 11, W4SUS 11, W4YE 11, WB2JAY 10, W4SHJ 10, WB4SHK 10, WB4RWY 9, N4SD 9, N4BHI 8, K4DHB 8, WB4KIT 8, WA4LTO 7, K4ITV 6, AF4B 4, K4BAV 4, N3RC 4, WA4JUO 3, W4LXB 3, KM4X 3, WA4YJF 3, W4ZM 3, W4CFV 2, W4DM 2, WA4EGW 2, AB9I 2, AF4O 2, WD4EUV 1, K4MLC 1, N4OT 1, WB4QAX 1, KI4W 1. (June) KF4R 121, N4UY 9, W4LXB 7, K4BAV 4, W4ZM 2, WB2JAY 1.

WEST VIRGINIA: SCM, Karl Thompson, K8KT — SEC: K8QEW. NMs: K8MHR WD8JYM WB8AKQ. STM: WA8WPW. Successful hamfests held at Ripley, Morgantown and Bluefield. WV QSO Party was operated by an increased number of stations this year, both in and out of WV. Winners in WV: 1st place: WB8SAW; 2nd place: WD8EAV; 3rd place: WB8BMX. Field Day was operated by 12 clubs around the state. Good band conditions produced relatively high scores. Black Diamond traffic net meets every Monday night at 9:00 on 25/85, Beckley, with WD8EAV net control. Station installed at NWS in Charleston under direction of N8AJC. W8JCK now a Silent Key.

Net	Freq.	Time (Z)	Ck-In	Tfc.	Sess.
Hillbily	14290	1700 Su	189	62	5
Novice	3730	2215 Dy	124	24	29
Phone-MD	3990	1600 Dy	388	76	30
Phone	3990	2200 Dy	780	109	31
CW	3567	2300 Dy	157	44	31

Traffic: WD8JYN 92, WD8JYM 55, WB8AKQ 53, W8GNF 29, W8HZA 28, WD8DHC 26, K8MHR 24, K8KT 20, N8AJC 17, WD8LDY 17, W8YP 14, WB8FER 10, WD8EAV 7, WD8JGS 7, WB8VAZ 7, WD8PQF 6, WD8JGN 5, K8MS 5, WB8SAW 5, K8ZDY 5.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Robert W. Poirier, KØDJ — SEC: WØGOW. STM: WBØMCL. NM: KØCNV WBØZOG. WØLAE off for several weeks due to stay in hospital. WBØHZL off to Ft. Hood, TX as he recently received officer's bars. ADØA to remain in CO due to illnes on the part of his XYL. WØWYX attended International Hamfest in Manitoba and met several old friends. Colo. Springs new 37/97 machine was operational from NØKV's QTH during the National Sports Festival. The problem with the Micor's identifier have been solved and transfer to the hilltop location should be forthcoming. Several amateurs from around the state provided communica-

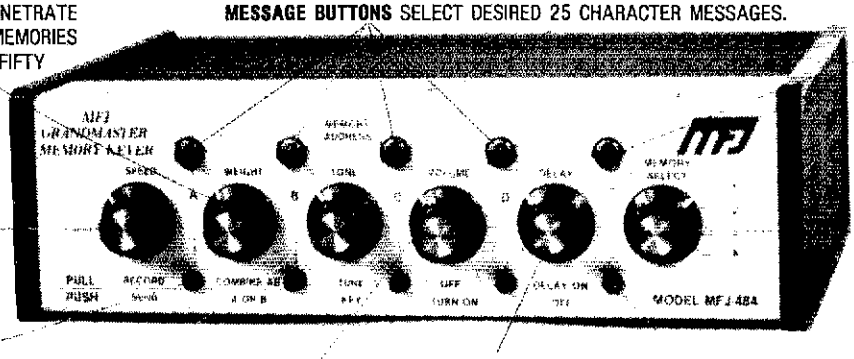
NEW! MFJ INTRODUCES THE GRANDMASTER MEMORY KEYERS

At $139.95 this MFJ-484 GRANDMASTER

memory keyer gives you more features per dollar than any other memory keyer available — and Here's Why . . .

WEIGHT CONTROL TO PENETRATE QRM. **PULL** TO COMBINE MEMORIES A AND B FOR 1, 2, OR 3 FIFTY CHARACTER MESSAGES.

MESSAGE BUTTONS SELECT DESIRED 25 CHARACTER MESSAGES.



RESETS MEMORY IN USE TO BEGINNING.

SPEED CONTROL, 8 TO 50 WPM. **PULL** TO RECORD.

MEMORY SELECT: POSITIONS 1, 2, 3 ARE EACH SPLIT INTO MEMORY SECTIONS A, B, C, D (UP TO TWELVE 25 CHARACTER MESSAGES). SWITCH COMBINES A AND B. **POSITION** K GIVES YOU 100, 75, 50, OR 25 CHARACTERS BY PRESSING BUTTONS A, B, C, OR D.

LEDs (4) SHOW WHICH *MEMORY* IS IN USE AND WHEN IT ENDS.

TONE CONTROL. PULL TO TUNE.

VOLUME CONTROL. POWER ON-OFF.

DELAY REPEAT CONTROL (0 TO 2 MINUTES). **PULL** FOR AUTO REPEAT.

LED INDICATES DELAY REPEAT MODE.

NOW YOU CAN CALL CQ, SEND YOUR QTH, NAME, ETC., ALL AUTOMATICALLY.

And only MFJ offers you the MFJ-484 Grandmaster memory keyer with this much flexability at this price.

Up to twelve 25 character messages plus a 100, 75, 50, or 25 character message (4096 bits total).

A switch combines 25 character messages for up to three 50 character messages.

To record, pull out the speed control, touch a message button and send. **To playback,** push in the speed control, select your message and touch the button. That's all there is to it!

You can repeat any message continuously and even leave a pause between repeats (up to 2 minutes). **Example:** Call CQ. Pause. Listen. If no answer, it repeats CQ again. To answer simply start sending. LED indicates Delay Repeat Mode.

Instantly insert or make changes in any playing message by simply sending. Continue by touching another button.

Memory resets to beginning with button, or by tapping paddle when playing. Touching message button restarts message.

LEDs show which 25 character memory is in use and when it ends.

Built-in memory saver. Uses 9 volt battery, no drain when power is on. Saves messages in memory when power loss occurs or when transporting keyer. Ultra compact, 8x2x6 inches.

PLUS A MFJ DELUXE FULL FEATURE KEYER.

Iambic operation with squeeze key. Dot-dash insertion.

Dot-dash memories, self-completing dots and dashes, jamproof spacing, instant start (except when recording).

All controls are on front panel: speed, weight, tone, volume. Smooth linear speed control, 8 to 50 WPM.

Weight control lets you adjust dot-dash-space ratio; makes your signal distinctive to penetrate QRM.

Tone control. Room filling volume. Built-in speaker.

Tune function keys transmitter for tuning.

Ultra reliable solid state keying: grid block, cathode, solid state transmitters (−300 V, 10 ma. max., +300 V, 100 ma. max.). CMOS ICs, MOS memories. Use 110 VAC or 12 to 15 VDC. Automatically switches to external batteries when AC power is lost.

OPTIONAL SQUEEZE KEY

for all memory keyers. Dot and dash paddles have fully adjustable tension and spacing for the exact "feel" you like. Heavy base with non-slip rubber feet eliminates "walking". $29.95 plus $2.00 for shipping and handling.

THIS MFJ-482 FEATURES FOUR 25 OR A 50 AND TWO 25 CHARACTER MESSAGES.

- **Speed, volume, weight, tone controls**
- **Combine memory switch**
- **Repeat, tune functions**
- **Built-in memory saver**

$99.95

Similar to MFJ-484 but with 1024 bits of memory, less delay repeat, single memory operating LED. Weight and tone controls adjustable from rear panel. 6x2x6 inches. 110 VAC or 12 to 15 VDC.

THIS MFJ-481 GIVES YOU TWO 50 CHARACTER MESSAGES.

- **Repeat function**
- **Tune function**
- **Built-in memory saver**

$79.95

Similar to MFJ-482 but with two 50 character messages, less weight controls. Internal tone control. Volume control is adjustable from rear panel. 5x2x6 inches. 110 VAC or 12 to 15 VDC.

For Orders Call toll-free 800-647-1800

Order any product from MFJ and try it. If not delighted, return within 30 days for a prompt refund (less shipping).

Order today. Money back if not delighted. One year unconditional guarantee. Add $2.00 shipping/handling.

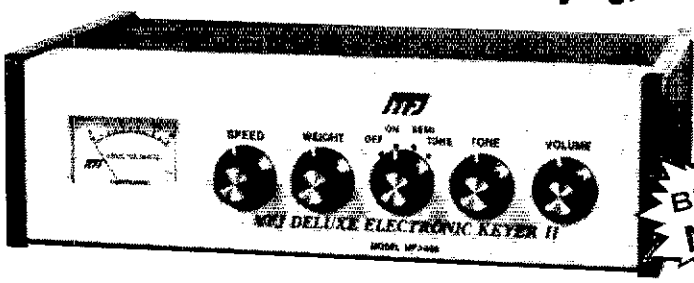
For technical information, order/repair status, in Mississippi, outside continental USA, call 601-323-5869.

Order By Mail or Call TOLL FREE 800-647-1800 and Charge It On VISA MasterCharge

MFJ ENTERPRISES, INC. P. O. BOX 494 MISSISSIPPI STATE, MISSISSIPPI 39762

NEW MFJ Deluxe Keyer has Speed Readout

Socket for external Curtis memory, random code generator, keyboard. Uses Curtis 8044 IC. Gives you dot-dash memories, weight, speed, volume, tone controls, speaker. Sends iambic, automatic, semi-automatic, manual. Reliable solid state keying, RF proof.



BRAND NEW

Speed Readout Meter lets you read to 50 WPM.
Socket for Curtis memory, random code generator, keyboard.

$79.95

The new MFJ-408 Deluxe Electronic Keyer II is based on the proven Curtis 8044 IC keyer chip. **Speed readout meter** lets you read sending speed to 50 WPM. **Socket** (optional cable with plug, $3.00) lets you use external Curtis memory, random code generator, keyboard (available from Curtis Electro Devices).

Sends iambic, automatic, semi-automatic, manual. Use squeeze, single lever or straight key. **Iambic operation** with squeeze key. Dot-dash insertion. **Semi-automatic "bug" operation** provides automatic dots and manual dashes.

Dot-dash memory, self-completing dots and dashes, jam-proof spacing, instant start. **RF proof.**

Ultra-reliable solid-state keying: grid block, cathode, solid state transmitters (-300 V, 10 ma. max, + 300 V, 100 ma. max).

All controls are on front panel: speed, weight, tone volume, function switch. Smooth linear speed control. 8 to 50 WPM.

Weight control adjusts dot-dash space ratio; makes your signal distinctive to penetrate QRM.

Tone control. Room filling volume. Built-in speaker. Ideal for classroom teaching.

Function switch selects off, on, semi-automatic/manual, tune. Tune keys transmitter for tuning.

Completely portable. Operates up to a year on 4 C-cells. 2.5 mm phone jack for external power (6 to 9 VDC). Optional AC adapter $7.95.

Eggshell white, walnut sides. 8x2x6 inches.

Stereo phone jack for key, phono jack outputs. **OPTIONAL BENCHER IAMBIC PADDLE.** Dot and dash paddles have fully adjustable tension and spacing. Heavy base with non-slip rubber feet eliminates "walking." $39.95.

Order from MFJ and try it — no obligation. If not delighted, return it within 30 days for refund (less shipping). One year unconditional guarantee.

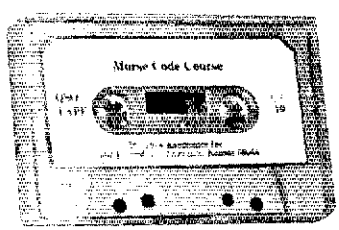
Order today. Call toll free 800-647-1800. Charge VISA, MC or mail check, money order for $79.95 plus $3.00 shipping for MFJ-408 keyer and/or $39.95 plus $3.00 shipping for Bencher paddle.

CALL TOLL FREE . . . 800-647-1800

For technical information, order/repair status, in Miss., outside continental USA, call 601-323-5869.

MFJ ENTERPRISES, INC.
BOX 494, MISSISSIPPI STATE, MS 39762

New! General Theory Tapes and simulated on-the-air QSOs



Cassette yourself! Upgrade! only $4.95 each

Start upgrading today with **Kantronics Super 5 WPM**, QSO, **Super QSO**, QXX or Q-signal code tapes or **theory** tapes:

New **Super 5 WPM Morse Course,** message at 5 wpm, characters at 13. Introduces characters in small groups and builds from there.

QSO series, simulated exam type "on-the-air" messages, including simulated exam questions too.

QSO or QSO-2, contain 7½, 10, 13 & 15 wpm QSOs.

QSO-13, contains all 13 wpm QSOs.

New **Super QSO-13,** contains all 13 wpm QSOs, characters sent at 20 wpm.

QXX or QXX-2, contain all 20 wpm QSOs.

Q-Signal Tape, contains common Q signals and short words at 22 and 40 wpm.

Novice Study Cassette, rules and regulations, basic theory too.

New **General Theory Cassettes,** a two tape set, including rules, regs., and general theory. Two tape set is $8.95.

KANTRONICS
The Training Company

1202 East 23rd Street
Lawrence, Kansas 66044
Phone 913 842 7745
We accept Visa, Master Charge, check and money orders.

ALUMA TOWERS

EXCELLENT FOR AMATEUR RADIO
HIGHEST QUALITY ALUMINUM & STEEL

Over 36 types aluminum and steel towers made—specials designed and made—write for details

60 Ft. Alum. Crank-Up Model T-60-H

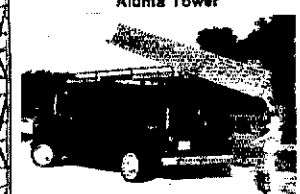
40' Steel Crank-Up Model SHD-40

★TELESCOPING (CRANK UP)
★GUYED (STACK-UP)
★TILT-OVER MODELS

Easy to install. Low Prices. Crank-ups to 100 ft.

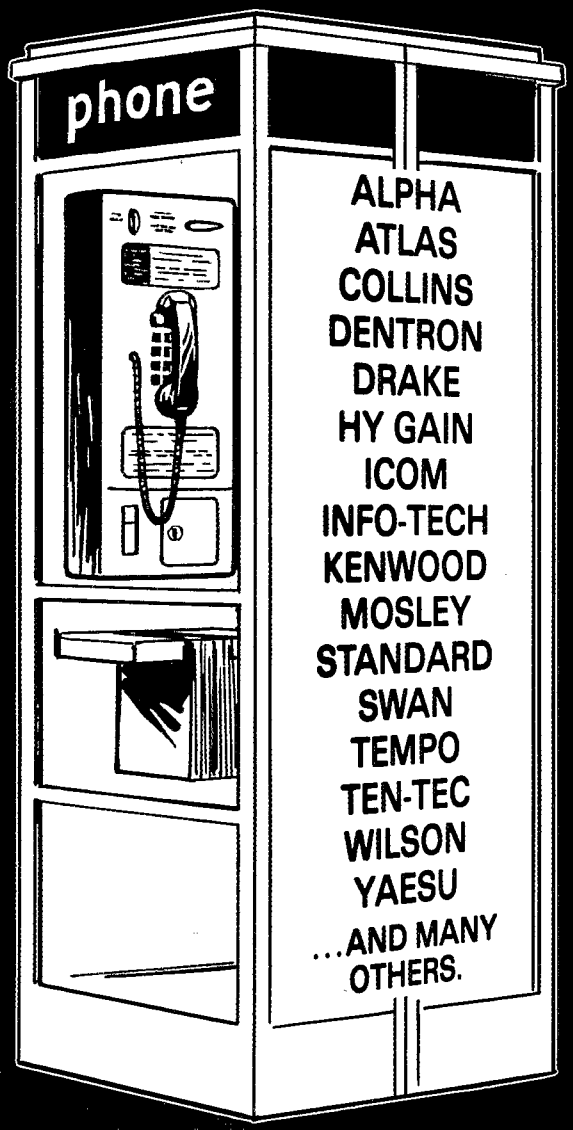
EXCELLENT TOWERS FOR PERSONAL COMMUNICATIONS

SPECIAL
Four Section 50 Ft. Van Mounted Crank-Up Aluma Tower



ALUMA TOWER COMPANY
BOX 2806QST
VERO BEACH, FLORIDA 32960 U.S.A.
PHONE A/C 305-567-3423

Ham Radio Center has a Branch Store on the corner.



NEW!
HAM-KEY*
*TM trade-mark

Model **HK-3M**

With anti-tip bracket even a heavy-handed key pounder cannot tip. All the features of the HK-3.

- Deluxe straight key
- Heavy base
- Navy type knob

$19.95

Add $2.00 shipping & handling per unit (USA)

CALL TOLL FREE

BEST PRICE

FAST DELIVERY

1-800-325-3636

(Cut on dotted line and keep next to your radio equipment)

arma amateur radio manufacturers / storefronts

HAM RADIO CENTER

8340-42 Olive Blvd. • P.O. Box 28271 • St. Louis, MO 63132

master charge THE INTERBANK CARD

VISA

tions for the Sports Festival. W2NSD of 73 magazine was among some of the amateur dignitaries to attend the week long affair. NØACW and his ARES group provided two-meter support at the Gerald Ford golf tourney in Vail. Severe weather provided amateurs on the eastern plains with plenty of excitement in July. Net tfc. July: Columbine: 31 sess, QNI 858, QTC 144, informals 198, QNF 1145; CWN: 31 sess, QNI 179, QTC 221, QNF 1062; Hi-Noon: 30 sess, QNI 1341, QTC 61, informals 193, QNF 1396. Traffic: (July) WØWYX 2022, WAØHJZ 1645, WDØHNF 183, WDØDEX 162, ADØA 120, WØLAE 114, KØDJ 106, WØEJD 103, WØMDT 100, KØTER 76, WBØHZL 71, WØGO 52, WØNFW 44, WØLQ 34, WBØYKH 32, WØGW 32, KØCI 4. (June) WØNFW 41.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NMs: K5KPS & WD5AHH. Southwest Net (SWN) meets daily on 3585 kHz, at 1915 local time and handled 144 msgs with 181 stations reporting in New Mexico Roadrunner Net (NMRRN) meets daily on 3939 kHz at 1800 local and handled 172 msgs with 1002 stations reporting in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 112 msgs with 760 checkins. Yucca 2-Mtr Net handled 11 msgs with 234 checkins. Had a nice visit with the Socorro ARA and they have several new and interesting projects in the works. Several from NM attended the Flagstaff Convention and reported a good time. Others are looking forward to the Amarillo and the El Paso Conventions. FB Traffic: W5UH 351, W5DAD 258, N5NG 233, WD5AHH 131, KL7HSF 121, W5ENI 103, K5KPS 78, W5JOV 44, WA5MIY 38, W5BWV 16.

rds Manager. Many nets and organizations held meetings at the ARRL Section Convention in Jacksonville. WA4FAJ passed her Extra Class at the FCC exams. WB4BTQ and WD4LLE moved up to Advanced Class. WD4LLE now KB4TJ. AA4ES, pres.; and KA4FDF v.p. of Hernando County ARA. K4ZC starting a new course for those interested in a General ticket. Traffic: (July) WD4HIF 546, AA4FG 277, N4WA 225, WA4CRI 152, WD4LUG 143, WB4TZH 124, WD4HXS 107, WD4NYY 98, N4PL 93, W4LDM 71, WA4EYU 70, WD4PDK 64, W4MGO 48, W4KIX 44, K4RNS 44, W4JL 36, W4RH 34, WB4ADL 28, W4MVG 24, WB4FJY 22, KF4U 22, WB4DTS 14, WB4GHU 14, WD4IIO 12, WA2GIN/4 11, N4BZH 6, WB4WOO 6. (June) WB4RIS 79, WA2GIN/4 52, KF4U 26.

UTAH: SCM, Royce Henningson, K7QEQ — STM: W7OCX. WA7ZBO appointed EC for Salt Lake county and W7GWK appointed EC for Davis county. It has been reported that WA7GTU and N7KM are on RTTY. WA7JRC has a new TS120S. N7DF active with AREC on 2-meters to assist with UBIC. WA7MEL reports that the UARC Steak fry at Brighton was a great sucess with a large turn out and lots of fun and good food. W7OCX received an Armed Forces Day special military to amateur QSL card and certificate for 25 WPM cw test. Beehive Utah net meets Dy on 7272 kHz at 1830Z had 31 sess, 1442 check-ins and 59 msgs. Utah code net meets Dy on 3710 kHz at 0115Z had 31 sess, 181 check-ins, 52 msgs. Traffic: K7HLR 260, NØAHA 77, WA7MEL 65, WA7JRC 42, W7OCX 28, W7BE 10, W7UTM 11.

WYOMING: SCM, Chester C. Stanwaity, W7SDA — Congratulations to the Amateur Radio operators of Cheyenne for a great job of handling emergency and other trafic for civil defense and other agencies following the tornado that struck part of Cheyenne. The 1979 Wyoming Hamfest was well attended with about 145 total in attendance and 95 registered amateurs. Congratulations K7KSA Story and KB7HS formerly WB7THK Sheridan new Advanced, WB7SSV, XYL K7KSA, Story new General, KA7FIT, XYL NØCY, Rock Springs and KA7SAR Lander new Novices, N6BGJ now resides in Cody. Wyoming Cowboy net report 20 sess, 556 QNI, 6 QTC. Jackalope net 308 QNI, 1 QTC. Sheridan AREC net 24 QNI, 1 QTC. WB7QQA charter member of Wyo. Ten-Ten club. Shy-Wy ARC had 12 operators and 467 contacts June Field Day. Traffic: W7LYA 429, W7SQT 121, WA7GYQ 57, WA7SGG 36.

SOUTHEASTERN DIVISION

ALABAMA: SCM, William F. Scates, WA4JYU — SEC: K4WYT. STM: WA4JDH. Congratulations to MARS Amateur Radio Club, Marshall Space Flight Center and Huntsville Area Young Ladies ARC on their recent receipt of their charter. Both these additions will be a boost to North Alabama. I would like to mention this month the University of Alabama in Birmingham Club Station. This club is a bit over two years old and until recently has not found its true place in amateur radio. Under the direction of WA4HMM and a lot of help from WB4VNH, the club station, WB4TJX, has at last got its act together. As you know UAB contains a very large medical center. With this in mind and its 15 operators, WB4TJX has more or less specialized in medical emergencies. During the past few days 5 such emergencies have been handled. The UAB station members are listed with the campus police station, the central operator on the telephone exchange, and with MIST — Medical Information Service via Telephone. This club works closely with W5CUE, the BARC station, and is indebted to its many members for their able assistance. Congratulations to the new AENK on 31/91 and WA4YCM for cranking that emergency net off. We'll put that net to good use during the upcoming SET. Traffic: WA4JDH 693, N4MD 665, WA4VKD 310, N4CGT 241, KA4BUI 108, WA4ZPZ 49, K4AZO 46, W4CKS 34, W4IBU 30, WA4JYU 26, WA4FXO 22, WD4LMJ 20, WA4RCF 19, KA4EWD 16, WA4JPK 15, KA4IVO 11, K4UMD 8, WB4OZN 8, W4MHO 6, WA4YCM 1.

CANAL ZONE: SCM, Alvin Sholk, KZ5AS — Many thanks to HP1RD & HP1BS (President of Liga Panamena de Radioaficionados) and the other Panamanian hams who attended the August meeting of the CZARA and offered assistance in helping us obtain Panamanian call signs. KZ5OJ is the first central/southern American station to earn the 5BWAZ award. He has confirmed 125 zones.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — Asst SCM: K4VHC. SEC: K4SWJ. Asst SEC: WB4HXE. STM: WA3NAZ/4. NMs: K4DMK W4HON K4VHC W4WXA WB4ZOJ.

Net	Freq.	Time
GCN	3995	0700 M/S 0800 Su
GTN	7118	1815 Dy
GSN	3595	1900 & 2200 Dy
GSSBN	3975	1930 Dy
ARES	3975	1700 Su

Enjoyed seeing the fine group of amateurs and their families at Madison. New Harris County ARC repeater now on 146.835/146.235. The range on this machine is excellent. Columbus ARC new officers are N4BGN, pres.; WD4LBD, vice pres.; W4AHA, treas.; N4ATI, secy.;

These Low Cost SSB TRANSMITTING CONVERTERS

Let you use inexpensive recycled 10 or 11 meter SSB exciters on VHF!

- Linear Converter for SSB, CW, FM, etc.
- A fraction of the price of other units
- 2W p.e.p. output with 1 mW drive
- Use low power tap on exciter or attenuator pad
- Easy to align with built-in test points
- Link with VHF RX converter for transceive

KIT ONLY $69.95

MODEL	INPUT (MHz)	OUTPUT (MHz)
XV2-1	28-30	50-52
XV2-2	28-30	220-222
XV2-3	28-30 (26-28)	222-224 (220-222)
XV2-4	28-30	144-146
XV2-5	28-30	145-147
XV2-6	26-28	144-146
XV2-7	144-146	50-52

FAMOUS HAMTRONICS PREAMPS

Let you hear the weak ones too!

Great for OSCAR, SSB, FM, ATV. Over 14,000 in use throughout the world on all types of receivers.

P9 Kit $12.95
P14 Wired $24.95
Specify band when ordering

- Deluxe vhf model for applications where space permits
- 1½" x 3"
- Models available to cover any 4 MHz band in the 26 to 230 MHz range
- 12 Vdc
- 2 stages
- Ideal for OSCAR
- 20 dB gain

P8 Kit $10.95
Specify band when ordering

- Miniature vhf model for tight spaces – size only ½ x 2¾
- Models available to cover any 4 MHz band in the range 20 to 230 MHz
- 20 db gain
- 12 Vdc

P15 Kit $18.95
P35 Wired $34.95

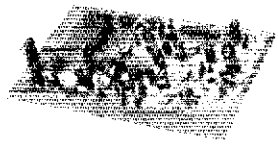
- Covers any 6 MHz band in UHF range of 380 to 520 MHz
- 20 dB gain
- 2 stages
- 12 Vdc

Easy to Build FET RECEIVING CONVERTERS

Let you receive OSCAR and other exciting VHF and UHF signals on your present HF or 2M receiver

VHF KIT STILL ONLY $34.95

MODEL	RF RANGE	OUTPUT RANGE
C28	28-32 MHz	144-148
C50	50-52	28-30
C50-2	50-52	144-146
C144	144-146	28-30
C145	145-147	28-30
C146	146-148	28-30
C146	144-146	26-28
C220	220-222	28-30
C220-2	220-222	144-146
C110	Any 2 MHz of Aircraft Band	26-28 or 28-30
C110-ELT	121.5 (121.6)	CB Chan 9 (17)

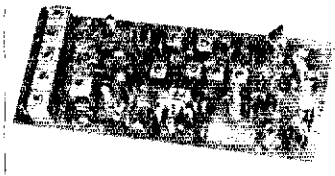


UHF KIT ONLY $34.95

MODEL	RF RANGE	OUTPUT RANGE
C432-2	432-434	28-30
C432-5	435-437	28-30
C432-4	432-436	144-148
C432-7	427.25	61.25
C432-9	439.25	61.25

Professional Quality VHF/UHF FM/CW EXCITERS

- Fully shielded designs
- Double tuned circuits for spurious suppression
- Easy to align with built-in test aids



T50-50	6-chan, 6M, 2W Kit	$49.95
T50-150	6-chan, 2M, 2W Kit	$49.95
T50-220	6-chan, 220 MHz, 1½W Kit	$49.95
T40/T20	11-chan, 450 MHz, 200mW Kit	$49.95

See our Complete Line of VHF & UHF Linear PA's

- Use as linear or class C PA
- For use with SSB Xmtg Converters, FM Exciters, etc.

LPA 2-15 VHF PA, 2W in/15-20W out. Solid-state t/r switching. Kit only $59.95

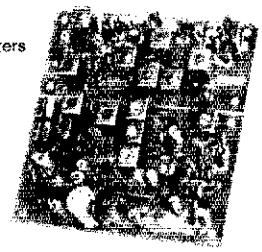
LPA 2-45 VHF PA, 2W in/40-45W out. Can also be used with 8-10W drive. Kit price $109.95

LPA 4-10 UHF PA, 200-500mW in/6-10W out. Kit price only $79.95

New R75 One Channel VHF FM RECEIVER

Offers Unprecedented Range of Selectivity Options!

- New generation
- More sensitive
- More selective
- Uses crystal filters
- Smaller
- Easy to align



R75A Kit for monitor or weather satellite service. -60dB at ± 30 KHz. $69.95

R75B Kit for normal nbfm service. -60dB at ±17KHz, -80dB at ± 25 KHz. $74.95

R75C Kit for repeater service. -60dB at ± 14 KHz, -80dB at ± 22 KHz. $84.95

R75D Kit for split channel operation. Uses 8 pole crystal filter! -60dB at ± 9 KHz, -100dB at± 15 KHz... $99.95

Specify band: 10M, 6M, 2M, or 220 MHz. May also be used on adjacent commercial bands. Use 2M version for 137MHz WX satellite.

HAMTRONICS SIX CHANNEL VHF & UHF FM RECEIVERS

In use by the hundreds throughout the world. Unlimited applications.

- Commercial grade design
- Easy to build & align
- 70 or 100dB selectivity options
- Low system cost
- Compartmentized shielding

R70 VHF Receiver kit for 10M, 6M, 2M, 220 MHz or adjacent commercial bands $74.95
Optional xtal filter for 100dB adjacent channel... $10.00

R90 UHF Receiver kit for any 2MHz segment of 380 to 520 MHz band $89.95

IT'S EASY TO ORDER!

- Write or phone 716-392-9430
(Electronic answering service evenings & weekends)
- Use Credit Card, UPS COD, Check, Money Order
- Add $2.00 shipping & handling per order

Call or Write to Get
FREE 1979 CATALOG
With Complete Details

(Send 4 IRC's for overseas mailing)

hamtronics, inc.

65B MOUL RD · HILTON, NY 14468

DEALER INQUIRIES INVITED

The World's biggest Bearcat® scanner sale!

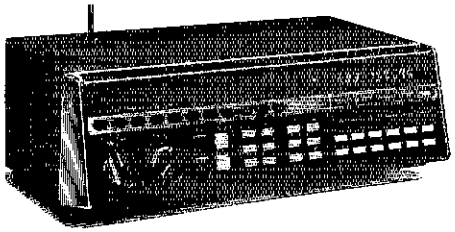
Communications Electronics,™ the world's largest distributor of radio scanners, celebrates the introduction of four new *Bearcat* brand monitors with the world's largest scanner sale. From now, until January 31, 1980, you can save hundreds of dollars during our ***two-million dollar Bearcat sale.*** Even the new *Bearcat* models 300, 220 and Eight Track scanners are on sale. If you've previously purchased a *Bearcat* scanner from **Communications Electronics,** then you *already* know you're getting all the real, live excitement that a television program or newspaper can't provide. If you don't have at least one *Bearcat* scanner, the time to buy is now! Since we distribute more scanners worldwide than *anyone* else, we can sell the newest factory production models with the *latest* engineering updates, at rock bottom prices. Our warehouse facilities are equipped to process over 1,000 *Bearcat* orders per week and our order lines are always staffed 24 hours. We also export *Bearcat* scanners to more than 300 countries and military installations. Almost all items are **in stock** for **immediate shipment,** so **save now** and get a *Bearcat* scanner during the ***world's largest*** two-million dollar scanner sale!

NEW! Bearcat® 300

Available February – March, 1980
List price $499.95/**CE price $329.00**
7-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, 420-512 MHz.
The new *Bearcat* 300 is the most advanced automatic scanning radio that **Communications Electronics** has ever offered to the public. Since the *Bearcat* 300 has over 2,100 active frequencies in memory, you can touch one button and search any of many preprogrammed services such as police, fire, marine and government. Of course, you still can program your own frequencies and monitor up to 50 channels at once. Since the *Bearcat* 300 uses a bright green flourescent digital display, 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 and a new vacuum fluorescent digital display. Reserve your *Bearcat* 300 now for February – March, 1980 delivery.

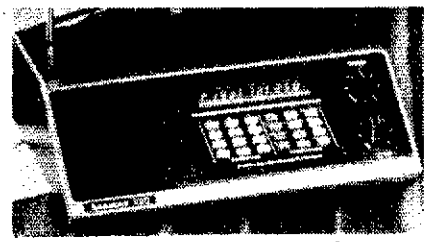
Bearcat® 250

List price $399.95/**CE price $259.00**
50 Channels • Crystalless • Searches Stores • Recalls • Self-Destruct • Priority channel • 50 Channel • 6-Band.
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. Automatic "count" remembers how often frequencies are activated by transmission–so you know where the action is. Decimal display shows the channel, frequency and other programmed features. The priority feature samples your programmed frequency every two seconds. Plus, a digital clock shows the time at the touch of a button. This is the only monitor radio that has received the **Communications Electronics** quality control approval rating #1. Our highest quality grade for technologically sophisticated equipment. The *Bearcat* 250. Scanning like you've never seen or heard before. Now in stock!



NEW! 50-Channel Bearcat 300

NEW! Aircraft Bearcat 220



Aircraft Bearcat® 220

List price $399.95/**CE price $259.00**
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 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. These frequencies are already stored in memory so no reprogramming is required. The *Bearcat* 220 also features a Priority channel, Dual scanning speeds, Patented track tuning and Direct channel access and AC/DC operation.

New! Bearcat® 211

List price $339.95/**CE price $229.00**
Frequency range: 32-50, 146-174, 420-512 MHz.
The *Bearcat* 211. It's an evolutionary explosion of features and function. 18-channel monitoring. With no-crystal six-band coverage. Dual scan speeds. Color-coded keyboard. Even a digital clock. All at a modest price. More scanning excitement than you bargained for.

Bearcat® 210

List price $299.95/**CE price $199.00**
10 Channels • 5 Bands • Crystalless
Frequency range: 30-50, 146-174, 416-512 MHz.
Use the simple keyboard to select the 10 channels to be scanned. Automatic search finds new frequencies. The 210 features patented selectable scan delay, push button lockout, single antenna, patented track tuning, AC/DC operation. With no crystals to buy. Ever!

NEW! Bearcat® 8 Track

List price $99.95/**CE price $79.00**
4 Channels • 2 Bands • Plays off any AC or DC Powered 8 Track Tape Player. *Frequency range: 33-49, 151-165 MHz.*
The *Bearcat* 8 Track Scanner. It converts any 8 track tape player into a live-action scanning radio instantly.

This incredibly compact 4-channel/2-band crystal scanner plugs into the tape player where an 8 track cartridge normally goes. Police, fire, emergency calls—as-it-happens scanning excitement—from an existing home entertainment center, in-car/in-boat system or portable 8 track tape player. The *Bearcat* 8 Track Scanner plugs live-action into any 8 track player. Anywhere. Crystal certificates **# A-135cc** are $4.00 each.

Bearcat® Four-Six

List price $169.95/**CE price $109.00**
The first 4 Band, 6 Channel, Hand-Held Scanner.
Frequency range: 33-47, 152-164, 450-512 MHz.
The *Bearcat* Four-Six offers "hip pocket" access to police, fire, weather and special interest public service broadcasts. Lightweight. Extremely compact. The *Bearcat* Four-Six—with its popular "rubber ducky" antenna and belt clip—provides "go anywhere/hands-off" scanning.

NEW! Aircraft and UHF Bearcat® ThinScan™

List price $149.95/**CE price $99.00**
World's smallest scanner!
The *Bearcat* ThinScan.™ High-performance scanning has never been this portable. There are **now three models** available. The **BC 2-4 L/H** receives 33-44 and 152-164 MHz. The **BC 2-4 H/U** receives 152-164 and 450-508 MHz. The new high-performance Aircraft ThinScan model **BC 2-4 AC** receives 118-136 and 450-470 MHz. Go ahead, size it up. *Bearcat's* ThinScan™ measures 2¾ " across. Just 1" deep. And 5⅝" high. Four crystal-controlled channels are scanned every ½ second providing immediate access to police, fire, weather and other special-interest broadcasts.

NEW! Bearcat 8 Track scanner

INCREASED PERFORMANCE ANTENNAS

If you want the utmost in performance from your *Bearcat* scanner, it is essential that you use an external antenna. We have four 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 and **#A70** is an all band base station antenna. All antennas are $25.00 and $3.00 for UPS shipping in the continental United States.

OTHER BEARCAT ACCESSORIES

SP50 AC Adapter $12.00
SP51 Battery Charger $12.00
SP55 Carrying Case for Four-Six $15.00
SP57 Carrying Case for ThinScan $15.00
SM210 Service manual for *Bearcat* 210 ..... $15.00
SM220 Service manual for *Bearcat* 220 ..... $15.00
SM250 Service manual for *Bearcat* 250 ..... $15.00
B-31 2 V AA Ni-Cad's for Four-Six (Pack of 4) $15.00
B-41 2 V AAA Ni-Cad's for ThinScan (Pack of 4) $15.00
B-5 Replacement memory battery for Bearcat 210 ..... $5.00
A-135cc Crystal certificate $4.00
Add $3.00 shipping for all accessories ordered at the same time.

TEST A BEARCAT SCANNER FREE

Test any *Bearcat* brand scanner from **Communications Electronics**™ for 31 days before you decide to keep it. If you do, you'll own the most sophisticated and technologically advanced scanner available. If for any reason you are not completely satisfied, return it in new condition with all accessories in 31 days, for a courteous and prompt refund (less shipping charges).

NATIONAL SERVICE

With your *Bearcat* scanner, we will send all accessories, a complete set of simple operating instructions and a one-year limited warranty. If service is ever required on any *Bearcat* scanner purchased from **Communications Electronics,**™ just send your receiver to a CE approved *Bearcat* national service center. Another *Bearcat* service is the frequency information hotline. After you get your scanner from CE, you may call 317-894-1230 and get up to the second information on active frequencies in your area. If you ever need engineering assistance, feel free to call the factory during the day at 317-894-1440.

BUY WITH CONFIDENCE

All *Bearcat* scanners are extraordinary scanning instruments. They provide virtually any scanning function that the most professional monitor could require. To ***get the fastest delivery*** of any *Bearcat* 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 well rated firms at a 10% surcharge for net 30 billing. All sales are subject to availability. Prices and specifications are subject to change without notice. Out of stock items will be placed on backorder automatically unless CE is instructed differently. International orders are invited with a $10.00 surcharge for special handling in addition to shipping charges. All shipments are F.O.B. Ann Arbor, Michigan. No COD's please. Cashier's checks will be processed immediately and receive an order priority number. Personal checks require three weeks bank clearance. Mail orders to: **Communications Electronics,**™ Box 1002, Ann Arbor, Michigan 48106 U.S.A. Add $5.00 per scanner for U.P.S. *ground* shipping, $9.00 for faster U.P.S. *air* shipping or $30.00 for *overnight delivery* to most major U.S. cities via Airborne Air Freight. If you have a Master Charge or Visa card, you may call anytime and place a credit card order. **Order toll free** 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.

Since this ***two-million dollar Bearcat sale*** is the world's largest, please order today at no obligation to assure a prompt order confirmation and delivery.

When you follow the leader to real excitement, your journey ends at Communications Electronics.

Autoprogramming,™ Scanner Distribution Center™ and CE logos are trademarks of Communications Electronics.™

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.℠

N4BJZ, act mgr. K4WC spending time in Germany. Local 2-meter nets continue on the increase. Please advise W4GH of your net skeds. WB4FAS ready for RTTY. K4VHC formulating RTTY net & should be operating by the time you read this. Colquitt County and Albany Clubs active in local civic activities. Get involved in your local community projects, makes good PR for our hobby. W4KI vacationing in New Hampshire this month. GSSBN report for June: QNI 1731, QTC 257. Welcome a new ARRL affiliate club: Pickens ARC in Jasper. July net reports: GSN: QNI 565, QTC 268; GTN: QNI 249, QTC 63; WGARES: QNI 64 & QTC 6. The section is prepared for a good SET so get with your EC now. Traffic: W4PIM 191, WD4ADV 190, WB4ZOJ 167, W4WXA 156, WA3NAZ/4 136, W4CMX 74, W4GH 51, KB4LA 50, N4BHX 45, W4HON 39, N4UZ 33, K4EV 28, W4BIA 22, WB4RUJ 22, WD4LYV 19, AA4TT 15, W4DGN 10, K4JNL 8, W4AAY 7, WB4FAS 6, WA4PUP 4, K4WC 2.

NORTHERN FLORIDA: SCM, Frank M Butler, Jr., W4RH — SEC: AA4FG. STM: N4WA. NM: WD4LUG/WD4PDK. WD4LUG apptd. new NM of QFN. Sorry to report WA4FJA of Jax, a Silent Key. SNCs earned by KA4DTO on AL Emerg. Net "M" and by W5TKQ/4 on FMTN. Escambia County EC WA2GIN/4 coordinating on Skywarn Net in NW FL for WX Bureau. He also has a new County ARES Plan. New officers of Playground ARC are KA4HWW, pres.; W4ODW, vice pres.; KA4HWX, secy.; WD4JEJ, treas., K4VZO, activities, WD4HDT, trustee. Eglin AFB has a new repeater, WD4JEJ/R, operating on 222.34/223.94 MHz. JEJ also has a 450 repeater in the works. WN4IIV/KA4DCA are new Editors of the Tallahassee Newsletter. AA4US named TLH "Member of the Year." WB4ANA's XYL now N4BZO. Hidden xmtr. hunts are popular in Tallahassee and Jax. Jax RANGE holds theirs each 4th Tues. on .49 simplex; KA4FPO won the latest one. WB4RIS acquired an emergency power generator. FMTN planning a statewide call-up system for members in emergencies, using 2-m fm. New asst. NMs for FMTM AF4R and W4PPC. N4UF now CQ DX Awards Manager. Many nets and organizations held meetings at the ARRL Section Convention in Jacksonville. WA4FAJ passed her Extra Class at the FCC exams. WB4BTQ and WD4LLE moved up to Advanced Class. WD4LLE now KB4TJ. AA4ES, pres.; and KA4PDF v.p. of Hernando County ARA. K4ZC starting a new course for those interested in a General ticket. Traffic: (July) WD4HIF 546, AA4FG 277, N4WA 225, WA4CRI 152, WD4LUG 143, WB4TZR 124, WD4HXS 107, WD4NYY 98, N4PL 93, W4LDM 71, WA4EYU 70, WD4PDK 64, W4MGO 48, W4KIX 44, K4RNS 44, W4JL 36, W4RH 34, WB4ADL 28, W4MVG 24, WB4FJY 22, KF4U 22, WB4DTS 14, WB4GHU 14, WD4IIO 12, WA2GIN/4 11, N4BZH 6, WB4WOO 6. (June) WB4RIS 79, WA2GIN/4 52, KF4U 26.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCI — Asst SCM: W4KGJ. SEC: AA4WJ. New Appointment: KB4OW. OBS. Endorsement: K4TH. OBS. Upgrading reported: KA4BBA to Technician and enjoying 2-meters with a new WE-800. BPLs issued: W3CUL 780, W4MEE 626, K4TH 144 Orig. Plus Del. W3VR 111 Orig. plus Del. New PSHR program (See QST April, page 76) is going great with 8 stations reporting: K4TH WA4PFK WD4ISN K4SCL WB4WYG WA4LGT WA4NBE and KM4G. WD4COL, with XYL N4APZ, vacationed in Bermuda about 10 days and sent out over 800 QSL cards for contacts from there. WA4FWI in Vermont per K1BCS. W4BK going to Chicago for QCWA National Convention. W4MEE reports he is back in TCC with liaisons between EAN and CAN. W4IYT reports Dade Emergency Net doing a fine job training new amateurs. Welcome to NBEN, Northern Brevard Emergency Net, kind of new to our growing family of local emergency nets. AA4G, hot on the DX trail, reports working new countries No. 294, 295 and 296 as well as 115 other DX QSOs. Congrats. W4JM visited his son in Biloxi, Miss., and attended weekly breakfast meetings there. St. Petersburg group still having excellent turn-outs for weekly Saturday morning breakfasts K4SCL, with Asst ECs W4GPL and W4DPH, explained Pinellas Emergency Plan to meetings of SPARC Repeater Team and Metropolitan Repeater Assn. Pinellas County CD/RACES has a reorganizational meeting scheduled for Aug. 21. Fort Myers club is planning Hamarama for Nov. 3 and 4 while Sarasota club is planning Hamfest for Jan. 19 and 20. Let's not forget Simulated Emergency Test scheduled for Oct. 6 and 7. In the meantime, keep your emergency equipment in readiness, for this is the season. See you at Clearwater, State Convention, Nov. 17 and 18. Traffic: (July) W3CUL 780, W4MEE 626, K4TH 456, K4SCL 416, WA4PFK 271, WA4LGT 252, W3VR 261, WB4WYG 243, WD4ISN 234, WD4COL 215, WB4FVV 153, W4NFK 149, K4AK 141, WA4NBE 114, K4EUK 106, KM4G 92, WA4EIC 91, WB4AID 88, W4IRA 85, W4KMN 85, W4NTE 67, WB4SNX 60, WA4SCK 58, W4GPL 54, WB4PIB 49, WD4CHO 46, W4DVO 40, WA4HXU 35, WA4FKE 12, WB4NJU 32, WD4HMC 25, W4ESH 22, KA4FZI 22, N4AUO 21, KA4GDV 15, WB4GSV 15, KE4O 13, W4KGJ 11, W4SMK 11, W4MNZ 7, WB4ZVD 7, W4MML 4, WD4PUV 4, W4TJM 4, W4BK 2. (June) WD4CHO 63, WB4NJU 34.

SOUTHWESTERN DIVISION

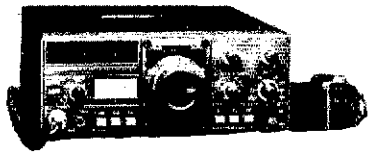
ARIZONA: SCM, Willard L. Haskell, AC7D — Some of our ARRL members may wonder why this section report (July) is being printed in Oct. QST. Be advised that my report to ARRL is due NLT Aug 15 and reflects items of interest reported to me during the month of July. In other words we have a two month delay before publication. The Ft. Tuthill Hamfest was as great as ever with top prizes (Kenwood TS-520-S's) going to K7KI and W7KGB. The "Ham of the Year" Award for 1979, sponsored by ARCA, was awarded to Sen. Barry Goldwater, K7UGA. The plaque was presented by K7UHW, Chairman, ARCA. My personal appreciation is extended to K7JKM and K7VDG for their assistance in providing me with net information and also, W7KAX who continuously supplies me with data covering the northern part of AZ. Their assistance, while I was on vacation in Maine, sure helped in providing me with data for my reports to QST. Congratulations to WB7UVT who recently upgraded to General and KA7CYC and KA6CYD, now Tech's. K7DI was vacationing in New Hampshire just around the corner from me (in Oakland, Me.), but we never did get together, maybe next year. A-10 Net: QNI 858, QTC 139. Cactus Net: QNI 1150, QTC 99. SWN: QNI 187, QTC 144. Traffic: K7MC 144, W7EP 141, WA7KQE 40, K7NMO 19, N7EH 14, K7UXB 14, K7JKM 12, WB7NJY 10, WA7WEB 8, WA7NXL 7, WB7QOM 6.

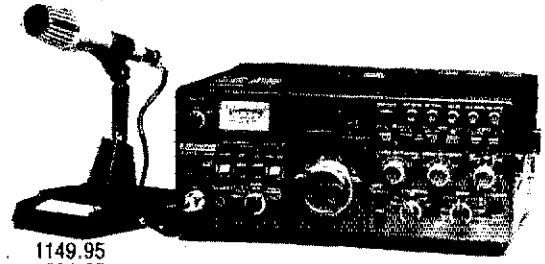
LOS ANGELES: SCM, Perry Masterson, KD6C — The few reports received for the month of July indicate that summer is the time for doing or catching up on the antenna work that has taken all winter to plan. As an example,

GET THE BEST QUOTE FIRST– CALL BOB'S STORES

1-704-636-7959 or 1-305-592-2788

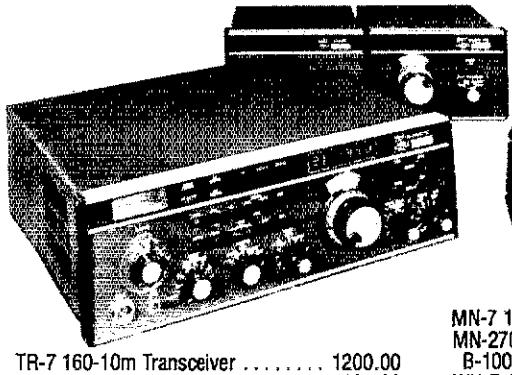
KENWOOD Transceivers/Accessories

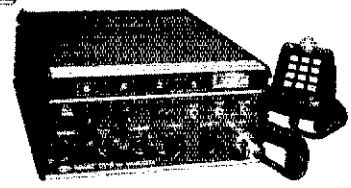




TS-120S Xcvr	$ 699.95
VFO-120 remote VFO	159.95
ST-120, ext. speaker	39.00
AT-120 ant. tuner/SWR Mtr	99.95
TS-30 AC power supply, 13.8VDC, 20A	139.00
MB-100 mobile mt. bracket	29.00
YK-88CW 500 Hz CW filter	59.95
TS-180S Xcvr w. D.F.C.	1149.95
TS-180S w/o D.F.C.	984.95
TS-30 AC power supply, 13.8VDC, 20A	139.00
ST-180 ext. speaker w. selectable audio filters	69.95
DF-180 Dig.Freq.Control module	164.95
YK-88SSB IF Xtal SSB filter for dual filter system	59.95
YK-88CW 500 Hz CW filter	59.95
VFO-180 Remote VFO	179.95
AT-180 Ant. Tuner/SWR-RF Pwr Mtr/Ant. Sw	179.95

DRAKE® Transceivers/Accessories





TR-7 160-10m Transceiver	1200.00
DR-7 Digital/gen cov board	195.00
TR-7/DR-7 Xcvr w/dig, gen coverage	1395.00
PS-7 120/240V ac supply	249.00
MS-7 Speaker	36.00
RV-7 Remote VFO	195.00
FA-7 Fan for TR-7 or PS-7	25.00
NB-7 Noise blanker	90.00
SL-300 300 Hz crystal filter	52.00
SL-500 500 Hz crystal filter	52.00
SL-1800 1.8 KHz crystal filter	52.00
SL-6000 6 KHz crystal filter	52.00
MMK-7 Mobile mounting kit	49.95
MN-7 160-10m 250w matcher	165.00
MN-2700 160-10m 1Kw matcher	279.00
B-1000 4:1 balun	24.95
WH-7 160-6m wattmeter	89.00
7073 Hand microphone	19.00
7077 Desk microphone	45.00
Aux-7 Range program board	45.00
385-0004 TR-7 service manual	30.00
R-7 160-10m receiver	1100.00
DR-7 Digital readout/gen cov board	195.00
R-7/DR-7 Rcvr w/dig, gen coverage	1295.00
MS-7 Speaker	36.00
NB-7A Noise blanker	90.00
SL-300 300 Hz crystal filter	52.00
SL-500 500 Hz crystal filter	52.00
SL-1800 1.8 KHz crystal filter	52.00
SL-4000 4 KHz crystal filter	52.00
SL-6000 6 KHz crystal filter	52.00
Aux-7 Range program board	45.00
DL-300 300 w dry dummy load	19.95
DL-1000 1kw dry dummy load	39.95
DSR-2 10 KHz-30 MHz dig. receiver	3200.00
L-7 2Kw PEP 160-15m linear	1099.00
Optional crystals each	7.50
Fixed frequency crystals each	9.50
TV-42-LP 100w low-pass filter	14.60
TV-5200-LP 1Kw (100w/6m) low-pass	26.60
TV-3300-LP 1Kw 80-10m low-pass	26.60
TV-75-HP 75 ohm high-pass filter	13.25
TV-300-HP 300 ohm high-pass filter	10.60
1340 UV-3 2m FM Xcvr	595.00
1343 UV-3 2m/220 MHz FM Xcvr	795.00
1344 UV-3 2m/450 MHz FM Xcvr	795.00
1346 UV-3 2m/220/450 MHz FM	995.00
220 MHz add-on, factory installed	200.00
450 MHz add-on, factory installed	200.00
1504 PS-3 AC power supply	89.95
1330 UMK-3 Remote trunk kit	69.95
1339 Control head	90.00
385-0002 UV-3 service manual	25.00
1525EM Microphone w/touch tone	49.95

Prices subject to change without notice.

Bob Stocks All The Famous Brands Of Amateur Radio

• Ten-Tec • Kenwood • Drake • Swan • Icom • Alpha • Dentron • Kantronics • Wilson • Sprague • Bird • Telrex • Mosley • Mirage • Lunar • Alliance • Vibroplex • Shure • Telex • HyGain • Hustler • Taylor • B&W • Trac • Consolidated Towers

- We stock tubes and parts.
- Need more technical info before deciding which rig to buy? Call us!
- Got a service problem? We service what we sell.
- Got a trade-in? We'll take it in and give you a good price.

VISA® master charge

Look For Our New Second Location Near The Miami Airport

BOB'S AMATEUR RADIO CENTERS

318 N. Main, Salisbury NC 28144 Hours: M-Sat 9am-7pm, Wed to 9pm Call 1-704-636-7959

7322 N.W. 46th St., Miami FL 33166 Hours: M-Sat. 9am-7pm Call 1-305-592-2788

OCTOBER 13 & 14

Treat yourself to the many displays, seminars, exhibits and other activities at the annual **MEMPHIS HAMFEST** and ARRL TENNESSEE STATE CONVENTION, Saturday & Sunday, October 13 & 14, at the Mid-South Fairgrounds.

And...if you have something to sell, treat yourself to the thousands who gather each year at our **GIANT FLEA MARKET.**

For more information including Flea Market Tables, Exhibit Booths and Special Motel Accomodations, write to: **MEMPHIS HAMFEST** P.O. Box 3845 Memphis, TN 38103.

MEMPHIS HAMFEST

SOUTH CENTRAL ALABAMA'S MOST COMPLETE SELECTION OF ELECTRONIC ACCESSORIES IN STOCK FOR IMMEDIATE DELIVERY

ANTENNA SPECIALISTS & CUSHCRAFT ANTENNAS
AMPHENOL & GOLD LINE CONNECTORS
ALLIANCE & CDE ROTORS & PARTS
ROHN TOWERS, MASTS & ACCESSORIES
JERSEY SPECIALTY WIRES & CABLES
ASTATIC, SHURE & TURNER MIKES
BEARCAT SCANNERS & M-TRON CRYSTALS
BUSS & LITTELFUSE FUSES & HOLDERS
GC & SPECO PRODUCTS SAMS PUBLICATIONS
THORDARSON & TRIAD TRANSFORMERS & CHOKES
SPRAGUE & CENTRALAB CONDENSORS
GE & SYLVANIA TUBES & SEMI-CONDUCTORS
MOTOROLA MRO SEMI-CONDUCTORS
MAGNECRAFT & CDE RELAYS & SOCKETS
LEADER, TRIPLETT & VIZ TEST EQUIPMENT
J. W. MILLER PRODUCTS & UNADILLA BALUNS
WELLER/XCELITE HAND & SOLDERING TOOLS

BONUS

EXTRA 3% DISCOUNT FOR MONEY ORDERS OR CASHIERS CHECKS. FREIGHT EXTRA.

master charge VISA

WHOLESALE ELECTRONIC SUPPLY COMPANY
817 RIVER FALLS STREET P.O. BOX 1437
ANDALUSIA, ALABAMA 36420 205-222-5100

NEW FROM GLB ELECTRONICS:

A complete line of QUALITY 50 thru 450 MHz TRANSMITTER AND RECEIVER KITS. Only two boards for a complete receiver. 4 pole crystal filter is standard. Use with our CHANNELIZER or your crystals. Priced from $69.95. Matching transmitter strips. Easy construction, clean spectrum, TWO WATTS output, unsurpassed audio quality and built in TONE PAD INTERFACE. Priced from $29.95.

SYNTHESIZER KITS from 50 to 450 MHz. Prices start at $119.95. Now available in KIT FORM — GLB Model 200 MINISIZER. Fits any HT. Only 3.5 ma current drain. Kit price $159.95. Wired & tested $239.95.

Send for our FREE 16-page catalog.

GLB ELECTRONICS
1952 Clinton St., Buffalo, N.Y. 14206
VISA MASTERCHARGE

Govt. SURPLUS ELECTRONIC EQUIPMENT CATALOG

New ITEMS . . . New BARGAINS!
FREE UPON REQUEST!
Send today for FREE copy of NEW CATALOG WS-79 — and Supplement!
Address Dept. QST • Phone 419/227-6573

FAIR RADIO SALES
1016 E. EUREKA • Box 1105 • LIMA, OHIO • 45802

FOR VHF'ers ONLY!!!

If you spend more than 50% of your hamming hours on frequencies above 28 MHz you'll want to be on our circulation list for a new semi-monthly publication.

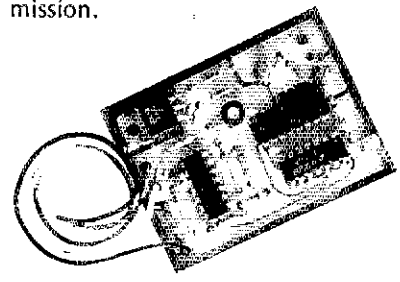
Each FREE issue contains (in addition to our advertisements) a NEW PRODUCT REVIEW, a TECHNICAL TOPIC article and a GUEST EDITORIAL each of general interest to VHF'ers.

To become a subscriber merely send your QSL (or a postcard) with your Call Letters requesting "FOR VHF'ers ONLY".

Clegg Communications Corp.
P.O. Box 5250
Lancaster, PA 17601

PROUD OF YOUR CALL? . . WORRIED ABOUT THEFT?

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

WARRANTY
Returnable for full refund within ten day trial period. One year for repair or replacement.

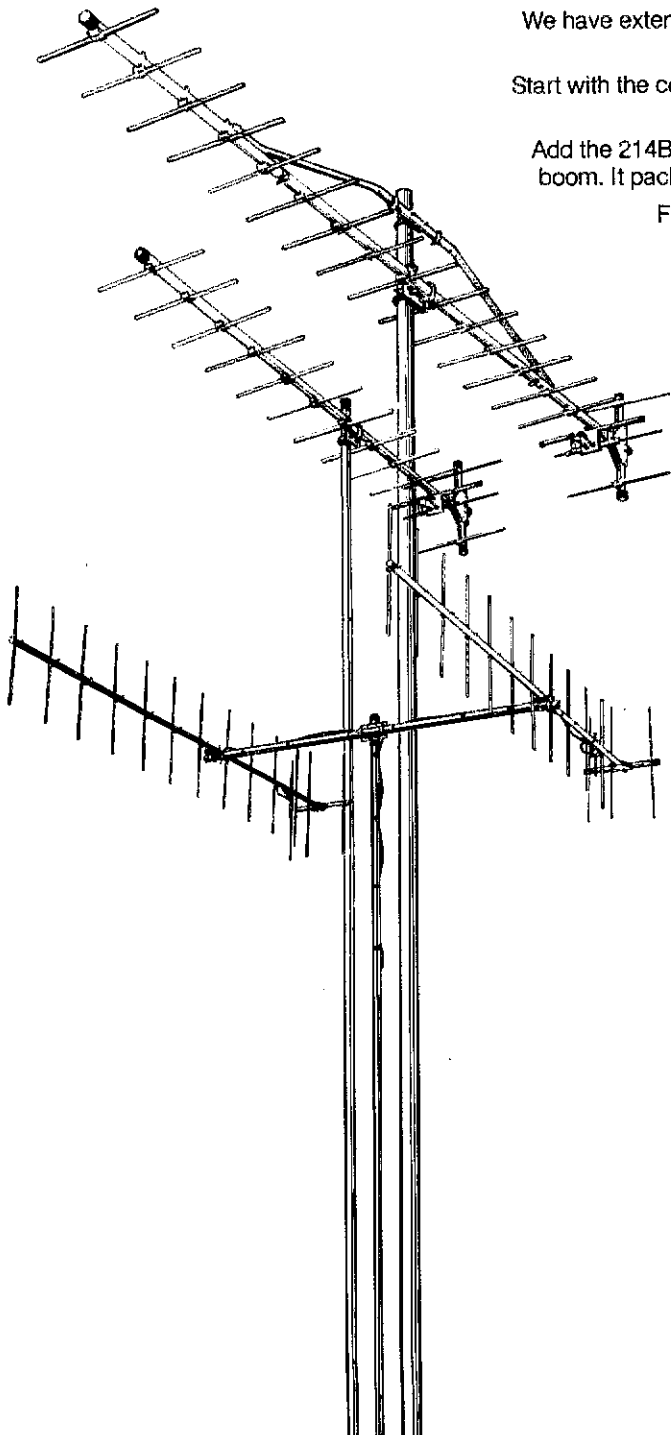
PRICE $39.95 Ppd
+$2.40 for CA address

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

B=DX



We have extended the Boomer formula for fun and excitement with three new models.

Start with the contest winning A32-19 Boomer. The best commercial 2-meter Yagi available today.

Add the 214B CW/SSB Junior Boomer with 14 elements on a 2.2λ boom. It packages performance in a size that every ham can use.

For the FM enthusiast add a vertically polarized Junior Boomer with 14 elements on a 2.2λ boom and the ultimate Power Pack 28 element 228FB FM Boomer.

The formula for 6-meter DX success is the all new 617-6B, a 33-foot long 6-element Yagi with gain that disproves all of the old formulas.

For maximum front to back ratio, the 2-meter antennas include a trigon reflector. All Boomers feature high efficiency balanced feed systems with integral KW balun for a clear precise pattern; a large diameter round boom for more endurance with less wind load; all stainless steel hardware and easy installation. Boomers have the right combination of features which will give you long path DX capability or allow you to participate in tropo, sporadic E, meteor scatter and EME fun.

When you're ready to move up to even higher gain, complete stacking kits are available with everything necessary to assemble two, four and larger arrays.

See your dealer today anywhere in the world for more ham radio fun.

cushcraft
CORPORATION

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

W6INH reports that his 20 meter antenna is down, and a Hy-Gain 205 B is in the process of going up. W6RIQ has been conducting experiments with the old faithful Windom vs dipole vs the loaded dipole. Perhaps by the fall season we can have some conclusions on the new antennas. The OO's have again been active in this section. You might be interested in some of the reasons that an OO will send a card to an amateur, a few are: No Phonetics in call, Chirpy clicks in keying, splatter, hum on phone patches, sidebands out of band authorized, using the amateur bands to conduct business, broadcasting in violation of amateur rules, signal distortion, signal fm-ing, No ID within the time limit, spurs, dialing the telephone while on the air, resulting in excessive bandwidth, RTTY no ID and many others. Some complaints received from the OO's clearly point out the need for all amateurs to re-read the regulations that govern amateur radio. There seems to be a lack of understanding or with some an intentional bend on rule violation. The OO card is only a reminder, a citation from the FCC is something else. In follow up reports with our OO's many who receive the friendly card appreciate the reminder, but there are some who feel their freedoms have been infringed upon. Think about it. This section needs many more dedicated amateurs to qualify for OO appointments. My thanks to them. Traffic: W6INH 186, N6PZ 156, W6BRO 38, WB5EKU 33, WA6LVO 31, K6CL 11.

ORANGE: SCM, Roy C. Zukerman, AC6H — SEC: WA7WZO. Southern Six-Land Contest Club, newly affiliated with ARRL started off with a bang by winning the Orange County Council Plaque for the best 3-band showing on Field Day, with 4,684 points. Other new affiliated clubs are Interstate Electronics Corporation ARC and Western Amateur Radio Assn. WB6DCC, pres of the Fullerton ARC, which hosted this year's activities at the Orange County Fair in costa Mesa July 13-22, and No. 1 asst. N6AUA, report that about 60 members of the Fullerton, So. Orange County, Anaheim, Orange County St. Jude Hosp., Hughes Employees, SCATS and ATV groups put on a great show for the public. 54 messages handled, and good demos of RTTY and ATV attracted hundreds of fair goers. 300 of them picked up ham class flyers! Multiple shifts were worked by W6IBR and XYL W6IBP K6LJA WD6EBT WA6JFP and XYL WA6OPS. With 2 months (at this writing) until the SW Div Convention in Anaheim Oct 19-21 all exhibit space is sold, and a great lineup of tech sessions, entertainment, etc., has been lined up by W6RE and his helpers too numerous to mention. KB6II reports hearing new parts of the world with his new TS180S and ATB34. Traffic: WB6QBZ 127, W6RE 127, K6WI 64, W6NTN 62, K6XI 59, W6CPB 10, WA6QCA 10.

SAN DIEGO: SCM, Arthur R. Smith, W6INJ — STM: N6GW. Asst SEC: N6RD. NM: WA6UAZ. ECs: W6INI (Central) WB6HFE (Northern) W6OGC (Eastern) WD6CSS (Southern). San Diego Repeater Assn sponsors a swap meet on first Sat of each month, at the Santee Drive In Theatre, 10990 Woodside Av, from 0700 to 12 noon. Correction: OTS appointment should be for WB6MLB not WB6LMB. Call sign changes: KA6FBF to N6BSY, KA6EQW to KB6PW, N6AGT to KB6PI. WB7SUA upgraded to Advanced. New appointment: N6AWC to OTS. WA6ZKC reported 49 msgs handled on Palomar ARC's traffic net. This net provides opportunity to learn formal msg handling. Net meets nightly at 2000 on WR6AII (146.13/73). Southwestern Division ARRL Convention in Annaheim on Oct 19, 20, 21 at the Annaheim Sheraton Hotel. San Diego SET will be held on Oct 27 with coordinated exercise with San Diego County American Red Cross WA6COE back on 2-mtrs with TR7400A. W6IJQF is active with RACES in San Marcos. Traffic: (July) WA6UAZ 589, WB6PVH 431, N6GW 256, N6AT 119, N6AWC 44, W6HJJ 34, WA6COE 19, WB6FTY 16, WA6SKU 14, WA6UFY 5, W6IJQF 3, WB7SUA 2. (June) W6IJQF 6.

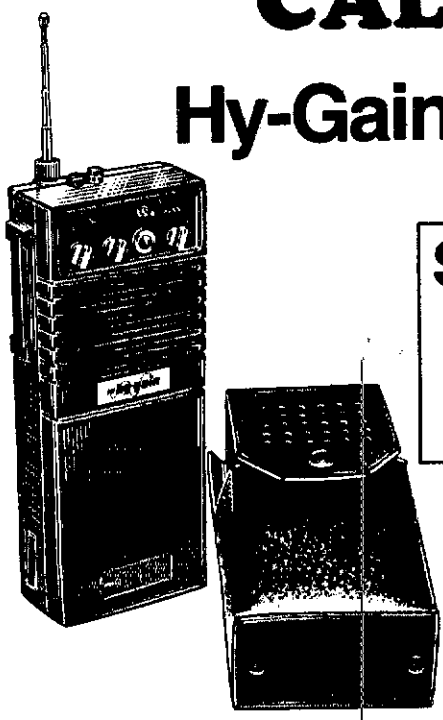
SANTA BARBARA: SCM, D. Paul Gagnon, N6MA — W6RIC has been traveling for the Gov't on a ship in San Diego. WB6BHT now in Arroyo Grande, a transplant from Huntington Beach. WA6LBO has completed working all counties, 3074 of them, from Lompoc. He did it in just under 4 years. Congrats. N6MB had a busy month. His DXCC total is now 281 confirmed, he has a new TR-7, he joined QCWA, and completed 2 X SSB Worked All Zones! W6KON made an emergency move back to Hawaii. He will be missed because he was our Region Six Net Manager and was a major mainstay for our traffic activities. WD6EEN is attending college in Fresno. WD6ADW is teaching a Novice class at Moorpark College. WB5RVA and WB6QKF attended a week long Red Cross Disaster Training Course to further their Asst EC capabilities. NM, K6DZT, reports the Sunday Section Net is growing fast on 3935 Sun. Ventura Cty ARES helped with the Castaic Junction fire with WA6ARU K6QBF WB6RVA W6RIC and WB6QKF assisting thru WR6VNV. Satellite ARC now meets only the first Thurs of the month. Santa Barbara Club Electronic Bazaar was again a huge success. The Simi Settlers have ratified their constitution and had over 40 in attendance in July. They meet in the B of A Levy building. New Equipment: WA6REA TR 7600, K6SZS Tempo S-1, WB6MIM and W6ZRR 220 rigs, K6DZT TS-600, W6ZRR sent 116 bulletins. His bulletins are now linked to northern Cal on 6 Meters. Remember, there are new counting procedures for PSHR. PSHR: K6DZT 12, K6YD 39, N6YH 37, W6KON 41, WD6EEN 29, N6MA 22. Traffic: (July) W6KON 328, N6MA 110, N6YH 91, WB6TRP 27, K6YD 26, K6SZS 4, K6DZT 2. (June) WD6EEN 31.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — Asst. SCM: AE5C. SEC: N5WB. NMs: AA5J & AE5I. Two new OBS stns: W5RYA will cover Garland RACES and 2-mtr RTTY, W5IAR will cover the Texas PO Net and several MARS skeds. Does your net have an OBS? New OO in Greenville K2SCU; welcome to NTX. W5TI is now ARTS Net Mgr, congrats. Abilene rptr. had lightning strike; now back in tip shape! Albany now has 5 licensed hams, who wants to be EC of Shackelford Co.? Contact SEC/N5WB. New directors Dallas QCWA chapter, W5CP and W5VKH. Carrollton ARC meets second Thurs. @ 7:30 @ Rec. Ctr; see WB5NOB for info. This Club really excels in public service work! A late FD rpt. from Motorola Engrs/K5GD; set up @ Azle with 10 ops this yr. EC/WA5KZA rpts. antennas for 80, 40 & 2-mtrs. have been installed @ Paris P.D. where emer. pwr. is available for future use as EOC. W5TAH new EC for Mc Clennan, Hill, and Bosque Co's. Remember, our NTX Section Emergency freqs are 7290/3961; ssb and 3770 cw. If you have or hear of a communications emergency, please set up on one or more of these freqs; originate

1-800-228-4097

CALL TOLL FREE



Hy-Gain 3806

2-Meter Hand-Held Amateur Transceiver

SPECIALLY PRICED ONLY $119.95

- Low cost, 6-channel hand-held provides superb voice transmission over short to medium distances
- Sharply tuned on-frequency selectivity in the RF amplifier stages plus FET's in the 1st and 2nd mixers for virtual immunity to out-of-band signals intermodulation distortion and cross-modulation
- Separate microphone and speaker elements for enhanced audio
- Internally adjustable mic preamp—a Hy-Gain exclusive
- Specially gasketed case seals out water, dirt and corrosive salt air
- Watertight, high-impact ABS plastic case—ribbed for non-slip grip
- Top-mounted controls for instant access

Accessories:

Model No.	Description	Price
3807	Nicad Battery Pack	$31.95
1104	Touch Tone Pad	$44.95
1106	AC Battery Charger	$ 9.95
1107	Cigarette Lighter Adaptor Cord	$ 9.95
1108	Antenna Adaptor Cord	$ 9.95
1110	Carrying Case (Leather)	$17.85
1111	Carrying Case (Vinyl)	$ 9.95
269	Rubber Duck Antenna	$ 5.95
	Crystal Certificates	$ 3.95

PLEASE ENCLOSE $2.50 FOR SHIPPING AND HANDLING PER UNIT

CALL TOLL FREE

1-800-228-4097

for Quality Ham Radio Products at Discount Prices

KENWOOD	DENTRON	TAYLOR	E.T.O. ALPHA
YAESU	HY-GAIN	SWAN	VHF ENGINEERING
DRAKE	MOSLEY	TEMPO	BERK-TEK CABLE
ICOM	CUSHCRAFT	TEN-TEC	CONSOLIDATED TOWER
STANDARD	WILSON	MIDLAND	SAY
PANASONIC	HUSTLER	CDE	SHURE
AEA	LARSEN	AUTEK	TELEX
	BENCHER	MIRAGE	ROBOT-SSTV

Our Mail Order Hours (CST)

M-F	8 am to 12 Midnight
Saturday	8 am to 6 pm
Sunday	Noon to 8 pm

Call and Talk to

Don	WBØYEZ	John	WBØMTS
Denny	WØQR	Blaine	WBØQLH
Bill	KA7CDF	Bob	WBØRQZ
Joe	WAØWRI	Jim	KAØCRK

VISA

Communications Center

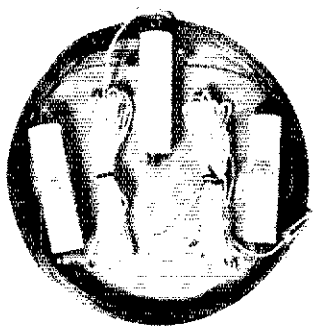
443 N. 48th, Lincoln, Nebraska 68504 In Nebraska Call (402)466-8402

master charge THE INTERBANK CARD

BASSETT HELIUM TRAP ANTENNAS

BASSETT HELIUM MOBILE ANTENNAS

The result of nearly two years of continuous development and nearly fifty years of amateur and commercial antenna design and manufacture Bassett helium filled antennas are for the amateur who demands the very best in American made automatic bandchange systems and mobile antennas that are compatible with all transceivers including the new "no tune"units. Trap systems are fundamental dipoles on each band and do not require antenna tuners.



- Helium filled traps impervious to all weather
- Maintains precise resonance and efficiency
- Systems easily handle legal amateur power
- Multiband amateur and MARS with one coax
- Fully compatible with"no tune" transceivers
- Short enough to fit on a small 50'by 100' lot
- Rugged white traps only 1"diameter, 5" long
- Uses your RG-8 or RG-58 coax in any length
- Center"isolator" equipped to accept a PL-259
- Solid Copperweld, stainless, nylon end lines

Multiband Broadside Dipoles

VAC-40/75--$54.50 VAC-20/40/75--$74.50 VAC-10/15/20/40-----$104.50
VAC-20/40--$54.50 VAC-15/20/40--$74.50 VAC-15/20/40/75-----$104.50
VAC-15/20--$54.50 VAC-10/15/20--$74.50 VAC-10/15/20/40/75--$134.50

- Helium filled for a lifetime of high efficiency
- Completely adjustable to precise resonance
- Power handling capability to 750 watts PEP
- Beautiful white 32" Fiberglass lower section
- Stainless 38" 17-7 tapered top whip section
- Very low weight. VAC-20 weighs 6.5 ounces
- Low wind drag. Holds vertical at high speed
- All chrome plated polished brass hardware
- Models for all bands with a 2 meter collinear
- Mates with any standard 3/8-24 mobil mount

Single-Band Mobiles

VAC-2 collinear for 2 meter mobile---$29.50
VAC-6, VAC-10, VAC-15, VAC-20---$29.50
VAC-40, VAC-75 (40 and 75 meters)--$34.50

Postpaid UPS delivery in 48 States. Florida residents add 4% Florida sales tax to above prices. Special models are available for any use, commercial, security, utility, military, or marine.

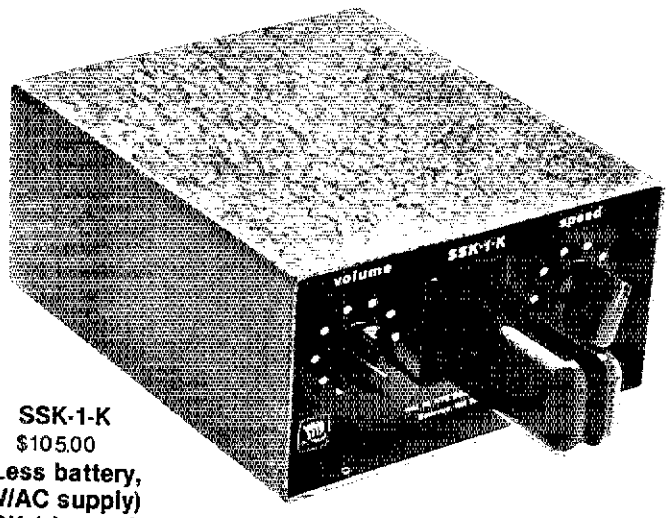
master charge

your BANKAMERICARD welcome

REX BASSETT ELECTRONICS, INC.

BOX 4163 FORT LAUDERDALE, FLORIDA 33304

TEL: 305-561-1400



SSK-1-K
$105.00
(Less battery, W/AC supply)
SSK-1 key only
$26.95

The Key to PERFECT SENDING

NYE VIKING IAMBIC KEYER

For faster, surer sending, here's a whole new kit of tools in one compact, handsome cabinet! The NYE VIKING Iambic Keyer gives you all the action features of the Super Squeeze Key ... Plus! Keys either negative-, or postive-keyed transmitter up to 200 Ma at 250 volts ... operates on internal 9V battery, or 115 V AC. The NYE VIKING 404 audio oscillator and speaker are for monitoring and practicing. Flip a switch and you can use the "dash" paddle for tuning or to simulate old-fashioned "bug" keying.

Nye Viking

Available at leading dealers throughout the U.S.A. or Call 1-800-426-2742.

WM. M. NYE COMPANY, INC.
1614 - 130th Ave. N.E., Bellevue, WA 98005 * (206) 454-4524

TRS-80 OWNERS!

MACROTRONICS PROUDLY INTRODUCES

M800
Deluxe RTTY System for the TRS-80

The M800 is a machine language program which converts a Level II 16 K (or more) TRS-80 into an advanced RTTY communications terminal. It uses the M80 hardware as the electrical interface between the computer and your radio equipment. A plug-in hardware module is included which adapts the M80 board for use with the M800 program (you may continue to use the M80 program for MORSE). The M800 has the same standard RTTY capabilities as the M80 plus these additional spectacular features:

- Split-screen display. Compose and edit messages while receiving.
- Save received or keyboard entered messages on cassette and play them back at a later time.
- *Instant Replay* -- Repeat entire last transmission or retransmit received messages.
- Instant break operation - respond to a direct question *(Still Copy OK? BK)* without sending the transmit buffer. Then resume typing into the buffer where you left off.
- WRU--receive only messages directed to you, acknowledge *Station ready to receive,* then save message on cassette - all automatically. No operator intervention required. Receive messages while away.
- Provision to call subprograms from the M800 operating system. This feature allows for future expandability of the M800 software. As a demonstration of its potential, you will receive a subprogram on cassette which will send either of two different real-time pictures (Custom PIX!).
- Instant callsign insertion. Enter other fellow's call just once, then press a single key to send entire ID exchange: W9XYZ HERB DE RON N6EE
- Select output to your line printer.
- Auto line numbering.
- Auto ID in RTTY and CW, CW only, or RTTY only.
- Auto left margin labeling.
- Auto carriage return/line feed-selectable carriage width.
- Auto suppress carriage returns and line feeds on receive to compact display.
- Output speed control-like the UT4-set as slow as you like to ensure uniform output rate and realtime editing.
- Four programmable messages of 255 characters each plus one *big* message limited only by RAM available (around 2.5 K on a 16K TRS-80). Save brag tapes, pix, etc. on cassette.
- Additional built-in RY, FOX, and CQ messages.
- Four Baudot speeds (60, 66, 75, and 100 WPM) plus ASCII at 110 baud.
- Auto transmitter control-keys PTT line. Fail-safe time-out circuitry for WRU.
- Continuous display of mode, options selected, buffer available, no. characters typed, no.characters ahead of buffer, and more.

M800 $99

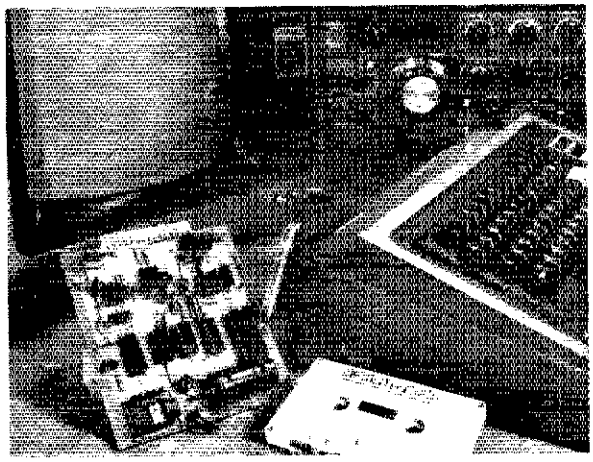
Requires the M80 Ham Interface

Also recommended
MLK-1 Loop Keyer Module **$29**
FSD-1 Demodulator **$99**

Similar systems available for the **PET, APPLE** and **EXIDY SORCERER.**

M80
Ham Interface

Send-Receive RTTY & CW



- **Auto send. & receive: RTTY & CW**
- **Complete hardware & software.**
- **Connects to TRS-80 User Port & Key / headphone jacks.**
- **10 message memories - 255 char. ea.**
- **Keyboard buffer - allows typing ahead.**
- **Uses built-in PLL or external TU.**
- **Includes hardware, cassette & manual.**
- **Morse trainer - random 5 letter words.**
- **Requires Level II Basic & 16K RAM.**

NEW FEATURES★

- **MORSE tutorial-10 lessons-corrects mistakes-simplest, fastest way to learn the code!**
- **Auto-numbering contest keyer.**
- **Interactive Graphics-Custom PIX.**
- **Auto-Transmitter control-PTT.**

Assembled & Tested $149

Write or Call for Complete Catalog.

MACROTRONICS, inc. ®
P.O. Box 518 (Q) Keyes, CA 95328
(209) 634-8888 / 667-2888

We are experiencing telephone difficulties, please keep trying.

California residents add 6% tax

master charge VISA

status rpt and requirements msg to N5WB or K5PC ASAP. BPL for July: W5TI WB5SDD. PSHR: W5VMP WB5LAT W5HMR WD5JYI AA5J WB5SDD. As you saw in August QST, emergency work here in NTX is an ARES operation. Sign up with you local EC now, so your services can be fully utilized when disaster strikes. Thanks to all the fine clubs for your newsletters each month. Two new repeaters in Wise Co.; 147.375/.975 and 144.79/145.39; filling in a vital gap in NTX rptr coverage. New officers in Wise Co. club-WD5GBH, pres.; KA5BTS, vice pres.; WB5URD, secy/treas. WD5EYW sends tfc rpt from Navarro Co. during W.F. disaster. Navarro Co. EC/W5ZNN elected Mayor of Corsicana! Our two Section tfc nets need your help with holiday tfc: Texas Tfc Net; 3961 kHz Dy @ 1800 CST and Texas cw Net; 3770 kHz Dy @ 0100Z and 0400Z. Many alternate liaison slots to region and day-time nets will also be open. Contact K5QEW/TTN and W5VMP/TEX to volunteer your services. D/FW Metro Tfc Net for July: QNI 421 QTC 178 QSP 136. EC/AE5U rpts Wills Point rptr has been improved (146.955/.355) located on city water tower. Traffic: (July) W5TI 664, WB5SDD 577, AA5J 231, WD5JYI 125, N5BT 90, W5VMP 83, N5CY 64, WB5BKM 63, WD5HHK 61, WD5EUE 59, K5PC 48, K5MC 45, WA5QFD 44, N5AWG 40, W5HMR 39, AE5I 40, WB5JCT 32, KA5Q 24, W5CTZ 20, AJ5F 20, WB5YYK 20, KB5DR 16, W5IAR 14, KA5EAQ 13, WD5JDA 8, K5LHL 6, WD5GFP 2, K9MX 1. (June) N5CY 87, WB5YYK 15, KA5EAQ 6, WD5JDA 5.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Woodward has slo-speed cw net going nitely on 28,120 at 8:30. New repeater at Laverne, no other info yet. Ardmore has a new repeater on 146.19/79 WB5OVT had 3 weeks vacation? at Marine camp. WB5MVR doing a FB job helping the W5OSL Bureau. WB5s NKC & NKD keeping OAN going and growing. This is the place to break in handling traffic. WA5MLT has numerous openings in the EC ranks. Contact him and get on board. Daylight time, summer storms, sunspots, you name it, it has been causing plenty of QRN and other problems on our evening nets. Getting through 'in spite of' is the mark of a good operator. However I cannot blame those who pull plugs and ground antenna when the lightning gets too close. Ham Holiday 79 is history, bigger and better than ever. Some paperwork out of Texoma Hamarama. In between will be W. Gulf Convention at Houston. CU there. Now is the time to get all the groundwork done for Operation Skywarn. This is a year round operation and needs all of our help. We should have had many more PSHR Reports under the new rules. Traffic: K5OWK 556, WB5MVR 529, K5JGZ 378, WB5NKC 326, W5REC 320, WB5NKD 170, W5RB 142, WB5ELG 73, W5BYC 62, WA5OUV 49, W5SUG 38, WA5FSN 36, W5UYH 34, K5TEY 30, K5CAY 25, WD5ETB 25, W5VOR 24, K5MGD 23, KA5DRD 18, W5VXU 13, W5IFB 12, W5FKL 10, KA5DLV 6, WA5UTO 5, KB5EK 4, W5HGH 4.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W5KR — Asst SCM: N5TC. SEC: AK5N. Net Mgrs-at-large: N5TC (phone) WA5RKU (cw). OO's reporting this month: WB5CIT. OVS reporting this month: WB5CIT WA5QCP WD5JJS. WD5IEB moved up to Extra Class; also busy being MC at USAF Security Service Command annual "dining out." Congratulations on both counts! OTS AC5R has been nominated to "Who's Who in the South and Southwest." Again: Congratulations! WB5YDD worked the flood emergency with the Houston FD and PD as ARES liaison; plenty H&W plus 4 medical emergencies. OVS/OO WB5CIT announced a new Novice Op in San Antone: KA5FOS. The new SEC, AK5N, vacationed on South Padre Island; he and his Mrs. visited our Saturday Kaffee Klatch. New Hams in the Rio Grande Valley: KA5FND KA5GDP KA5FNE KA5FCZ. KA5DMH passed General, is now N5BJV; ditto for KA5DRP, now N5BJX. KA5DMH/N5BJV crossed the Gulf from Ft Myers to Brownsville in 32 ft sail boat using Maritime Mobile Net all the way; National Wx Svc Meteorologist KA5DRP/N5BJX kept him up to date on weather. WB5IJR gave excellent rundown on ARES activities during East Texas floods; Galveston EOC operated continuously Wed through Sat with Galveston County repeater primary link for official traffic; N5FO manned Red Cross EOC with WB5BMB; 146.04/.64 NASA machine handled its own Traffic plus large portion of Galveston H&W with K5BY quite active; WB5VIP operated from refugee shelter; K5RYD and AE5P worked hours in EOC; K5CA worked at refugee shelter; there should be much more information coming out as the ops find time to write up their experiences. A job well done, fellas! Traffic: (July) W5KLV 593, WB5YDD 290, N5TC 135, WB5MMI 93, K5HZR 92, W5TQP 52, W5EGE 35, WB5CIT 37, WA5RVT 30, W5KR 17, AC5R 10, K5RVF 6, WD5IEB 6, WB5UYV 3. (June) K5PE 54, AK5N 28, WB5UYV 10, AE5X 6.

INDIANA: SCM, J.M. Kell, W9LTU — SEC: W9UMH. STM: W9JUJ. NMs: IGN: N9AEI; QIN: WB9UYU; ITN: open. June net reports time in UTC and Freq in kHz.

Net	Freq.	Time/Days	QNI	QTC	Sess.
ITN	3910	1330/2230 Dy	2040	173	62
QIN	3656	1430/0100/0400 Dy	856	508	93
IPON	3910	0015 Dy	129	40	31
IGN	3708	2130 Dy	1057	72	31

VHF Nets: Three nets reporting, QNI 1004, QTC 40. Ind was 100 percent on D9RN in July. The Indianapolis hamfest was a huge success with over 3,000 in attendance. Hats off to WA9FUD and crew for another outstanding job in putting together another winner. Rain, rain and more rain. First, Hurricane Bob came up the Ohio River and dumped up to seven inches of rain on southern Indiana, then tropical storm Claudette followed with five more inches of rain. Twelve inches in about two weeks. Every river and stream in southern Ind went out of its banks. The town of English IN found itself under water. Hams were there providing emergency and auxiliary communications. The State EOC in c.d. headquarters was manned for two and a half days. Also the Ipls Area Chapter Red Cross communications center for many hours. A lot of assistance was provided by many amateurs. However, three amateurs deserve special mention for their efforts in the affected area. They are WA9TJS WB9JHD and N9AHP. A new net has been formed to filled the 2130Z slot vacated when the section phone net combined its two afternoon nets into one. This new net is called the Indiana Phone Net and the net manager is W9HUF. W9EIV now a Silent Key. Traffic: W9JUJ 1068, WB9UYU 345, W9OLW 233, WD9CIS 180, W9FC 161, W9TG 120, W9EI 94, W9XD 87, N9AEI 80, N9PS 73, WB9VJE 71, WA9QCF 67, K9FZX 53, W9DLF 38, W9HUF 37, K9WWJ 37, W9IOH 17, W9UEM 17, W9KT 15, W9PMT 15, K9TKE 13, W9CMT 10, W9RTH 10, WA9OHX 8, W9WEI 7, WA9OKK 6, WA9GJZ 5, W9ENU 4, W9BDP 3, K9DIY 3.

AMATEUR ELECTRONIC SUPPLY USED GEAR

★ *10 day Trial (pay only Shipping Charges)* 8-28-79
★ *30 day Guarantee*
★ *Send Payment-in-Full or a 20% C.O.D deposit*
★ *Send Check or Call and use Mastercharge/VISA*
★ *Full Trade-in within 6 mo. on Higher Priced New Gear that is not Discounted or on Special Sale*

ALDA	
103 80,40,20m Xcvr	$299
103A 80,40,15m Xcvr	299
AMCOMM	
S-2-25 2m FM Xcvr	$249
ATLAS	
350XL Xcvr	$799
350XL/DD6 Digital	899
350XL/DD6/305	995
350PS AC supply	149
350PS/302 Console	299
210 Xcvr	399
210X Xcvr	439
210X/NB Xcvr	479
DD-6 Dig display	79
200PS AC ps	69
220CS AC ps	99
ATRONIX	
Code Reader	$199
CIR	
BPS-200 AC ps	$ 89
CLEGG/SQUIRES-SANDERS	
22'er FM series 25	$139
FM-27A 2m FM Xcvr	149
FM-27B 2m FM Xcvr	179
HT-146/charger	99
COLLINS	
75A-4 Rcvr (3880)	$399
75A-4 Rcvr (4838)	475
75S-1 Ham Rcvr	299
75S-3 Ham Rcvr	450
75S-3B Ham Rcvr	675
75S-3B Rcvr (round)	750
51S-1 Rcvr (round)	1395
32S-1 Transmitter	325
32S-3 Transmitter	675
32S-3 Xmtr (round)	750
62S-1 VHF conv	695
312B-2 Speaker	19
312B-4 Console	199
KWM-1 20-10m Xcvr	199
516E-1 KWM-1 DC ps	75
KWM-2 Xcvr	595
KWM-2A Xcvr (round)	995
351D-2 Mob mount	75
PM-2 Port AC ps	95
516F-2 AC supply	149
MP-1 DC supply	99
CC-1 Carrying case	69
COMDEL	
CSP-11 Speech proc	$ 79
DENTRON	
160-AT 160m tuner	$ 39
160-10AT Tuner	99
160-10AT-3kw tuner	159
MT-3000A Tuner	269
MLA-2500 Linear	589
MLA-1200/AC ps	349
DRAKE	
2B Ham Rcvr	$179
2C Ham Rcvr	189
R-4 Ham Rcvr	269
R-4A Ham Rcvr	289
R-4B Ham Rcvr	339
R-4C Ham Rcvr	439
FL-500 Filter	35
FI-4000 Filter	35
SPR-4 SW Rcvr	349
SPR-4/blanker	369
SD-2 2m conv	69
SD-6 6m conv	69
CPS-1 Conv ps	19
TR-3 Xcvr	299
TR-4 Xcvr	389
TR-4C Xcvr	449
TR-4C/blanker	499
2NT Transmitter	99
T-4X Transmitter	339
T-4XB Transmitter	375
T-4XC Transmitter	449
AC-3 AC supply	65
AC-4 AC supply	89
DC-3 DC supply	65
DC-4 DC supply	85
TR-7/DR-7 Xcvr	1049
TR-7/dig/CW filt	1099
PS-7 AC supply	179
MN-4C Matcher	119
MN-2000 Matcher	175
WV-4 VHF meter	49
TR-22C 2m FM Xcvr	149
AC-10 AC ps	39
AA-22 2m FM amp	99
GALAXY/GLOBE/WRL	
GT-550 Xcvr	$279
AC-400 AC ps	75
SC-550 Speaker	19
R-530 SW Rcvr	695
AC-210 AC ps/amp	19
GONSET	
GC-105 2m AM Xcvr	$ 69
901A AC supply	39
HAL	
RVD-1005 Video conv	$295
DKB-2010 Keyboard	319
ST-6 Demod/keyer	249
HALLICRAFTERS	
SX-122 SW Rcvr	$225
HT-44 Transmitter	159
PS-150-120 AC ps	69
SR-400 Cyclone II	399
SR-400 Cyclone III	475
P-500AC AC ps	75
HA-1 Keyer	49
HAMMARLUND	
HQ-150 SW Rcvr	$139
HQ-170A Ham Rcvr	179
HK-1B Keyer	29
HEATHKIT	
HG-10B VFO	$ 49
HR-1680 Ham Rcvr	199
IB-1100 Freq counter	149
IM-17 Utility VOM	29
HY-GAIN	
3750 Xcvr	$995
R-1530/spkr Rcvr	795
ITC	
Multi-2000 2m Xcvr	$299
ICOM	
IC-211 2m Xcvr	$539
IC-245/SSB 2m Xcvr	379
IC-245 2m FM Xcvr	299
IC-21A 2m FM Xcvr	179
DV-21 Dig VFO	149
IC-230 2m FM Xcvr	229
IC-202 2m SSB Xcvr	199
RM-2 Programmer	99
IC-3PA 12v supply	49
JOHNSON	
275w matchbox/SWR	$119
kw matchbox/SWR	199
KLM	
PA2-140B 2m FM amp	$149
KENWOOD	
TS-820 Xcvr	$689
TS-820S Dig Xcvr	799
VFO-820 VFO	149
TS-520 Xcvr	499
TS-900 Xcvr	450
PS-900 AC ps	89
TS-600 6m Xcvr	549
TR-7400A 2m FM Xcvr	289
TR-2200A 2m FM Xcvr	139
MFJ	
941 Tuner	$ 49
MIDLAND	
13-500 2m FM Xcvr	$119
13-510 2m FM Xcvr	269
MOTOROLA	
T 1670A AC ps	$ 79
NATIONAL	
NC-300 Ham Rcvr	$169
NC-303 Ham Rcvr	199
NC-300-C2 2m conv	29
NC-300-C6 6m conv	29
NCX-3 Xcvr	169
NCX-A AC supply	69
NYE VIKING	
SSK-1K Keyer	$ 69
PANASONIC	
RF-4900 SW Rcvr	$349
REALISTIC	
DX-160 SW Rcvr	$ 89
SP-150 Speaker	9
REGENCY	
HR-2B 2m FM Xcvr	$129
HR-2MS 2m FM Xcvr	129
HR-220 220 FM Xcvr	199
P-110 AC ps	39
AR-2 2m FM amp	69
EC-175 Counter	199
ACT-T-16K Scanner	189
ROBOT	
60 Viewfinder	$139
61 Viewfinder	189
70 Monitor	229
70A Monitor	249
80 Camera	229
80A Camera	249
SBE	
SB-34 Xcvr	$239
SPECTRONICS	
DD-1 Dig (Yaesu)	$ 99
DD-1K Dig (Kenwood)	99
SC-30 Counter	88
SC-250 Counter	99
STANDARD	
146A 2m FM HT	$149
SWAN	
MB-80A 80m Xcvr	$189
P 1215 AC supply	49
PS-20 AC supply	95
260 Cygnet Xcvr	289
270B Xcvr	299
350 Xcvr	249
350C Xcvr	299
500 Xcvr	309
117C AC supply	65
117XC AC supply/spkr	95
HF-700S Xcvr	499
PSU-3A AC ps	129
510X Xtal osc	39
600T Transmitter	399
600R Custom Rcvr	349
600R/SS-16B Cus	399
600SP Patch	59
250C 6m Xcvr	275
VX-1 VOX	19
1200Z Linear	349
Mark II Linear	695
WM-6200 VHF meter	49
WM-3000 Wattmeter	59
TPL	
502 2m amp	$ 69
502B 2m amp	99
TEMPO	
2020 Xcvr	$499
Tempo One Xcvr	289
AC One AC ps	75
SSB One SSB adapt	139
TEN-TEC	
Triton II Xcvr	$399
Triton IV Xcvr	499
244 Dig display	139
252G AC supply	99
252 AC supply	75
262 AC supply	99
215P Microphone	19
670 Keyer	24
KR-40 Keyer	75
KR-50 Keyer	89
VARITRONICS	
PA-50A 2m amp	$ 49
WILSON	
1402 2m FM HT	$129
Mk II/batt HT	179
WE-800 2m FM Xcvr	349
T-15NC Charger	24
WC-14 Charger	12
YAESU	
FT-301D Xcvr	$599
FP-301 AC ps	99
YO-301 Scope	179
FT-401B Xcvr	489
FT-101B Xcvr	499
SP-101B Spkr	19
FT-7 Xcvr	379
FP-4 AC ps	29
FT-7B Xcvr	499
YC-7B Dig disp	79
FP-12 AC ps	99
FRDX-400 Rcvr	249
FRG-7 SW Rcvr	249
FR-101 Dig Rcvr	450
FL-101 Xmtr	399
FL-2100F Linear	299
FC-901 Tuner	139
YD-844 Microphone	19
FT-620B 6m Xcvr	329
CPU-2500R 2m FM	389
FT-227R 2m FM Xcvr	259
FT-2 Auto 2m Xcvr	129
200R 2m FM Xcvr	179

(1) This list was prepared from an inventory taken on the date shown left. The quantities vary. In some cases there are several of one item, others, maybe only one. Due to the lead and distribution time of this publication some of the items may have already been sold by the time you see this ad. But, due to the number of trades we are involved in each day, some items are in stock that are not listed. When ordering state more than one choice, if possible. (2) AES reserves the right to sell power supplies and accessories only with matching transmitters or transceivers depending on our stock situation. (3) To insure quality, our used gear is serviced **after** we receive your order. Please allow 5 to 10 working days delay in shipping your order. (4) No trades on used gear. (5) Used gear policies do not apply to New Equipment specials, closeouts, etc. shown on this page

The following are NEW Close-outs, Overstock merchandise, New displays, Demos, etc. Most are factory-sealed, all carry New warranties. Limited quantity. First come, first served. Most Close-outs available at Milwaukee only. Terms of sale: Payment in full with order, Mastercharge, or Visa (Bankamericard); no trades.

	reg.	NOW
ALDA		
103 80-20m Xcvr	$495	349
103 80-20m Xcvr/nb/cal/mic	573	399
103A 80/40/15m Xcvr/cal	514	349
105 80-10m Xcvr/nb/cal/mic	673	499
PS-115 15A power supply	84	79
PS-130 30A power supply	149	129
ALLIANCE	reg.	NOW
HD-73 Rotor	$154	109
ATLAS	reg.	NOW
350-XL Xcvr	1195	995
350-XL/DD6-XL Dig Xcvr	1424	1199
350-PS Power supply	229	199
350-PS/302 Console	458	359
DMK/XL Mobile mt	65	49
311 Xtal oscillator	135	119
210X Xcvr	765	519
210X/NB Xcvr/blanker	810	549
215X Xcvr	765	519
215X/NB Xcvr/blanker	810	549
220-CS AC supply	155	129
B & W	reg.	NOW
373-6 6m coaxial filter	$ 45	25
CDI	reg.	NOW
AM filter for FT-101	$ 39	29
CES	reg.	NOW
800-YS Scanner, FT-227R	$ 99	69
225 Encoder mic	44	29
CIR	reg.	NOW
Astro 200 Xcvr	$995	699
Astro 200/CW filter	1045	749
Astro 200A Xcvr	1095	749
Astro 200A/CW filter	1145	799
BPS-200 AC supply	135	108
SPR-200 Speaker	30	24
SPS-200 AC ps/speaker	165	139
SOC-200 Stn console	295	236
MIC-STA Desk mic	38	29
DENTRON	reg.	NOW
160-10AT Ant tuner	$129	99
160-10AT-3Kw Ant tuner	229	159
Super Tuner Plus Tuner	149	135
MT-2000A Ant tuner	199	159
MT-3000A Ant tuner	349	299
PS-10 VOM/wattmeter	49	39
GLA-1000 Linear	379	319
Clipperton L Linear	699	519
MLA-2500B Linear	899	769
DTR-2000L Linear	1199	999
DRAKE	reg.	NOW
R-4C Receiver	$699	575
T-4XC Xmtr & AC-4 ps	849	699
MS-4 Speaker	33	25
L-4B Power supply only		395
7072 Hand microphone	19	9
AN-5 Shortwave ant	8	5
MN-4C tuner/B-1000 balun	189	129
MN-7 tuner/B-1000 balun	189	139
WH-7 Wattmeter	89	69
1525EM Encoder mic	49	39
GALAXY	reg.	NOW
R-1530 Rcvr w/spkr	1610	795
HY-GAIN	reg.	NOW
3750 Xcvr DEMO	1895	1195
ICOM	reg.	NOW
IC-701 Xcvr/ps/mic	1699	1249
IC-280 2m FM Xcvr	469	349
IC-245 2m FM Xcvr	579	499
IC-211 2m Xcvr	899	669
IC-202 2m SSB port Xcvr	289	239
ITH-230 Touch tone handset	99	69
IC-21A 2m FM Xcvr	399	199
IC-3PA Power supply/spkr	99	59
KLM	reg.	NOW
Force 5 Xcvr/AC ps	1344	795
Multi-2000 2m Xcvr	679	479
KENWOOD	reg.	NOW
TR-7400A 2m FM synth Xcvr	$449	349
Phone for Special Prices on other Kenwood		
MIDLAND	reg.	NOW
13-510A 2m FM synth Xcvr	$399	349
MOTOROLA	reg.	NOW
PK-770 PL kit	$ 29	19
PK-710 Dimmer kit	16	9
PK-736 Tone encoder kit	45	29
NYE	reg.	NOW
250-25-3 500w tuner/relay	$212	129
250-25-4 500w tuner	202	129
REGENCY	reg.	NOW
DFS-5K Dig selector - Whamo	$199	89
EC-175 175 MHz counter	449	299
SILTRONIX	reg.	NOW
FC-1 5 KHz-40 MHz counter	$169	89
SPECTRONICS	reg.	NOW
DD-1K Kenwood display	$169	99
SC-30 30 MHz counter	169	99
SC-250 250 MHz counter	219	149
SWAN	reg.	NOW
100MX Xcvr	$699	579
ST-1 Antenna tuner	189	129
WM-6200 6 & 2m wattmeter	87	59
WM-1500 Wattmeter	74	59
PS-20 AC supply	179	129
FC-76 40 MHz counter	169	99
14C DC module	119	89
TPL	reg.	NOW
802B 2m 1-4/50-80w amp	$259	159
1202 2m 5-15/80-120w amp	239	139
PS3-A12D 12v 20A supply	136	86
TEN-TEC	reg.	NOW
Omni-D Xcvr (old model)	1069	869
252M/O Power supply	119	99
262G Power supply w/VOX	139	99
252G Power supply	109	89
251 12v 10A power supply	85	69
WILSON	reg.	NOW
1402 2m FM HT	$254	189
1402/TTP HT w/touch tone	316	239
The following model 2m HT's are without the high/low pwr. switch & batt. LED.		
Mk II HT/batt/wall cgr/TTP	332	259
Mk IV HT/batt/wall cgr/TTP	362	299
Note:High/low switch may be installed on Mk II/IV by AES for $20.00.		
System 1 5 el 20-10m beam	299	199
System 2 4 el 20-10m beam	249	179
System 3 3 el 20-10m beam	199	149
DB-43 4/3 el 15/10m beam	179	149
M-320 3 el 20m beam	149	119
WV-1 40-10m vertical ant	79	59
M-68 8 el 6m beam	139	99
M-66 6 el 6m beam	104	79
M-64 4 el 6m beam	69	49
M-211 11 el 2m beam	33	29
M-29 9 el 2m beam	54	39
M-27 7 el 2m beam	26	19
YAESU	reg.	NOW
FT-901DM 160-10m Xcvr	1459	1149
FT-901D Xcvr	1259	959
FT-901DE Xcvr	1259	959
SP-101B Speaker		25
FV-101B Remote VFO	137	129
FTV-250 2m transverter	275	239
FT-7 20w PEP Xcvr	499	429
FR-101S Receiver	599	449
FR-101 DIG Receiver	749	549
FL-101 Transmitter	649	499
FL-2100F 80-15m Linear	515	369
SP-401PB Speaker/patch	59	49
FT-227R 2m FM synth Xcvr	385	299
FT-227RA 2m FM synth Xcvr	399	329

AMATEUR ELECTRONIC SUPPLY®
4828 W. Fond du Lac Ave. • Milwaukee, WI 53216 • Ph. 414-442-4200
Nationwide WATS line: 1-800-558-0411
In Wisconsin (outside Milw. Metro area): 1-800-242-5195
STORE HOURS: Mon, Tues, Wed & Thurs 9-5:30; Fri 9-9; Sat 9-3

ATTENTION:

TO: All Amateurs
FROM: Wilson Systems, Inc.

Inflation . . . gas shortages . . . etc., all leading to higher prices each week, and cutting into the amount that we have to spend on our hobby. And face it, our hobby is what keeps us sane in this runaway inflation period, our escape from the hustle and hectic grind of working to make a living. We know — we see the same price increases at the grocery store, the same increases in the gas prices. Wilson Systems, Inc., is going to do something to ease the purchase of your new tower and antenna.

As you may know, in January of 1979, Regency Electronics, Inc., purchased Wilson Electronics Corp. What you may not know is that in August, 1979, Jim Wilson purchased back the antennas and towers. There is now a new name to look for — WILSON SYSTEMS, INC. — With the new name and new company comes new ideas, methods, products and prices. Yes, prices. But not what you might expect. Wilson Systems is LOWERING the prices to where you will find it hard to believe. Check them out in the following pages of this issue. You will be surprised and pleased at what you will find.

What are we doing that will enable us to lower the prices? Well, we are Hams, too. We like to pay the lowest price possible and will spend much time assuring ourselves this is accomplished. We feel the same higher demands on our money for the house, food, and bills. And as this demand increases, the amount of money left for our hobby decreases. So when money is spent, we want the best quality for the best price.

There are a number of ways to bring the cost of a product down. By using a cheaper grade of material, buying raw materials in larger quantities to obtain a better discount, by cutting the profit ratio, and by eliminating the middle man. Wilson Systems will not lower the quality of the product. In fact, we have improved the strength and quality of almost every antenna in the line. The newly designed monobanders will stay up under heavy icing conditions when others are falling apart. Wilson Systems is currently purchasing at the lowest price possible from the aluminum companies, so these methods of cost reduction are eliminated. The third method mentioned is one that we have decided to consider as a part of the overall cost reduction plan, yet leaving room for research and development expense, so we may bring you the products you want and at a price you will like.

The last method mentioned is always a risky one. The dealers do not want their profits cut back just as you do not want your pay check cut. If you cut the dealers' profits back, some of them will just push the product that will tend to give them the most profit, rather than the one that will be the best performing for you. A rather drastic form of this method is the one that Wilson Systems will be choosing. You will not be able to find the Amateur products of Wilson Systems in stock at the dealers, nor will they probably recommend them. (After all, as long as they're not handling them and making a profit, why should they promote or even recommend them?) No, you will only be able to enjoy the most product for the least money by dealing with Wilson Systems factory direct. We will be offering you the amateur antennas and towers at prices that are below, in most cases, what the dealers pay for the products of other companies. And to make it even easier, we have a toll-free number for you to place your order. Now isn't this what you've been looking for? The best product for the least money!

Just remember these four points:
1. Highest Quality 2. Lowest Price 3. Toll-Free Order Number

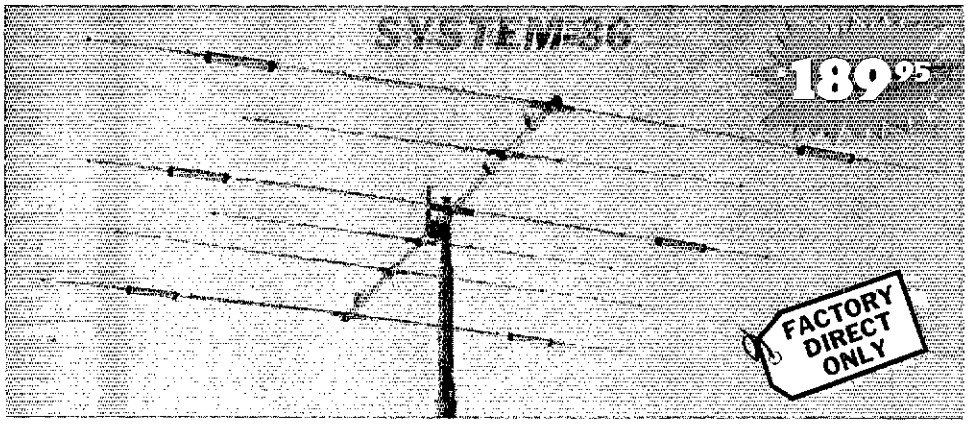
The fourth point? Remember the name . . . WILSON SYSTEMS, INC.

Yours Truly,
Jim Wilson
Wilson Systems, Inc.

WSI WILSON SYSTEMS, INC.

4286 S. Polaris Ave., Las Vegas, Nevada 89103
(702) 739-7401 — Toll-Free Order Number 800-634-6898

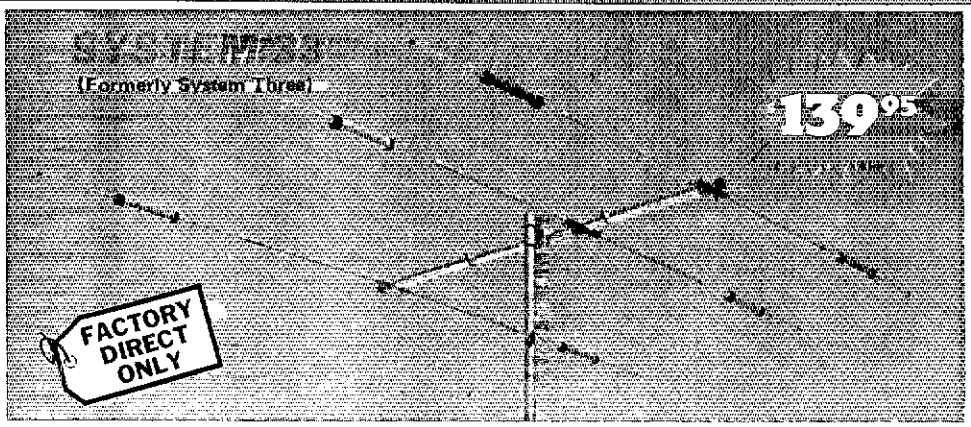
WILSON SYSTEMS INC. MULTI-BAND ANTENNAS



A trap loaded antenna that performs like a monobander! 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 weather-proof 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 24'2½"	Wind loading @ 80 mph . . 215 lbs.
Maximum power input . Legal limit	No. of elements. 6	Maximum wind survival . . 100 mph
Gain (dBd) . . . . . Call Factory	Longest element . . . . . 28'2½"	Feed method . . . . . Coaxial Balun (supplied)
VSWR @ resonance . . . 1.3:1	Turning radius . . . . . 18'6"	
Impedance . . . . . 50 Ω	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.



Capable of handling the Legal Limit, the "SYSTEM 33" is the finest compact tri-bander available to the amateur.

Designed and produced by one of the world's largest antenna manufacturers, the traditional quality of workmanship and materials excells 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 ¼" thick aluminum plate for boom to mast mounting.

The use of large diameter High-Q Traps in the "SYSTEM 33" makes it a high performing 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 at 80 mph . . . . 114 lbs.
Maximum power input . Legal limit	No. 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 ohms	Maximum mast diameter. 2" O.D.	maximum wind survival . . . . 100 mph
F/B ratio . . . . . Call Factory	Surface area . . . . . 5.7 sq. ft.	

WILSON SYSTEMS, INC.

4286 S. Polaris Avenue
Las Vegas, Nevada 89103
(702) 739-7401
Factory Direct Toll Free 1-800-634-6898

44.95

WV-1A

4 BAND TRAP VERTICA (10 - 40 METERS

No bandswitching necessary with this vertical. An excellent low cost DX antenna with an electrical qua wavelength on each b and low angle radiati Advanced design provides low SWR an exceptionally flat response across the fu width of each band.

Featured is the Wilso large diameter High-C traps which will main resonant points with varying temperatures humidity.

Easily assembled, the WV-1A is supplied wi a hot dipped galvaniz base mount bracket to attach to vent pipe to a mast driven in th ground.

Note:
Radials are required fo peak operation. (See GR-1 below).

SPECIFICATIONS:

- Self supporting—no gu required.
- Input Impedance: 50 Ω
- Powerhandling capabil Legal Limit
- Two High-Q Traps with large diamater coils
- Low Angle Radiation
- Omnidirectional performance
- Taper Swaged Aluminu Tubing
- Automatic Bandswitch
- Mast Bracket furnished
- SWR: 1.1:1 or less on Bands

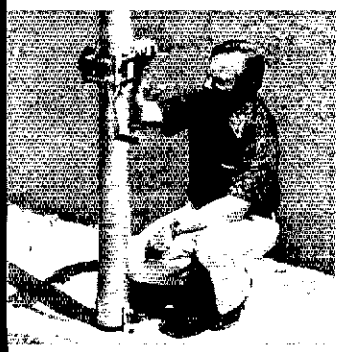
GR-1

9.95

The GR-1 is the comp ground radial kit for the W 1A. It consists of: 150' of 7 stranded copper wire heavy duty egg insulators, structions. The GR-1 will crease the efficiency of GR-1 by providing the cor counterpoise.

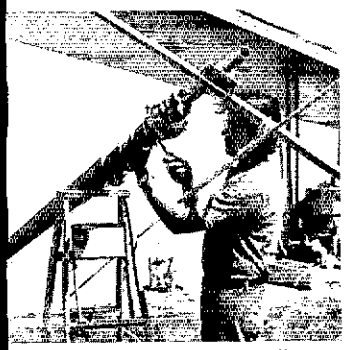
Prices and specifications subject to change witho

New, Improved Wilson Towers



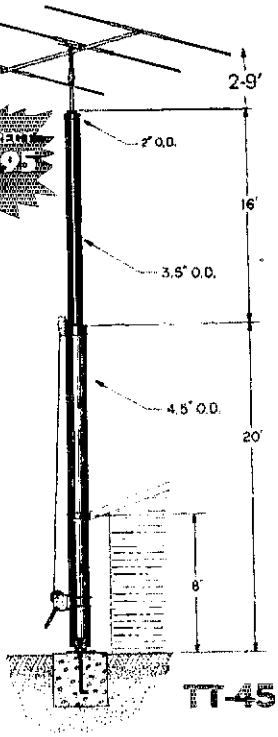
Hinged Base Plate - Concrete Pad, Heavy Duty Winch

Mounting the House Bracket



The Hinged Base Plate allows tower to be tilted over for access to antenna and rotor from the ground.

FACTORY DIRECT $219.95



TT-45A

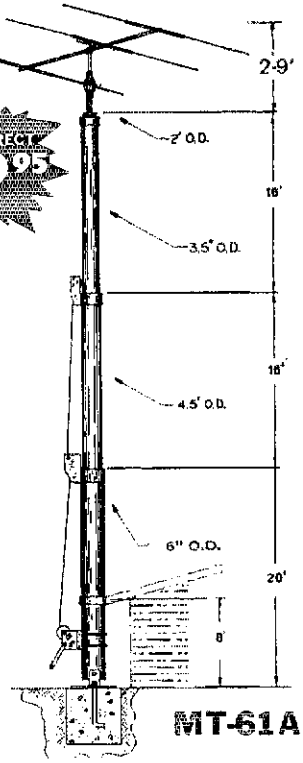
FEATURES:
- Maximum Height 45' (will handle 10 sq. ft. at 38') @ 50 mph
- 800 lb. winch
- Totally freestanding with proper base
- Total Weight, 189 lbs.

The TT-45A is a freestanding tower, ideal for installations where guys cannot be used. If the tower is not being supported against the house, the proper base fixture accessory must be selected.

NEW IMPROVED FEATURE

Heavier wall tubing greatly increases the stress capabilities over the older TT-45 and MT-61.

FACTORY DIRECT $399.95



MT-61A

FEATURES:
- Is freestanding with use of proper base
- Maximum Height is 61' (will handle 10 sq. ft. at 53') @ 50 mph
- 1200 lb. brake winch
- 4200 lb. raising cable
- Total Weight, 350 lbs.

Recommended base accessory: RB-61A, FB-61A.

The MT-61A is our largest and tallest freestanding tower. By using the RB-61A rotating base fixture the MT-61A is ideally suited for the SY33 or SY-36. If you plan to mount the tower to your house, caution should be taken to make certain the eave is properly reinforced to handle the tower. If not, one of the base accessory fixtures should be used.

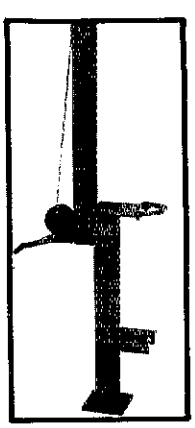
GENERAL FEATURES

All towers use high strength heavy galvanized steel tubing that conforms to ASTM specifications for years of maintenance-free service. The large diameters provide unexcelled strength. All welding is performed with state-of-the-art equipment. Top sections are 2" O.D. for proper antenna/rotor mounting. A 10' push-up mast is included in the top section of each tower. Hinge-over base plates are standard with each tower. The high loads of today's antennas make Wilson crank-ups a logical choice.

TILT-OVER BASES FOR TOWERS

FIXED BASE

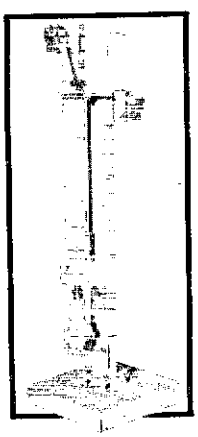
The FB Series was designed to provide an economical method of moving the tower away from the house. It will support the tower in a completely free-standing vertical position, while also having the capabilities of tilting the tower over to provide an easy access to the antenna. The rotor mounts at the top of the tower in the conventional manner, and will not rotate the complete tower.



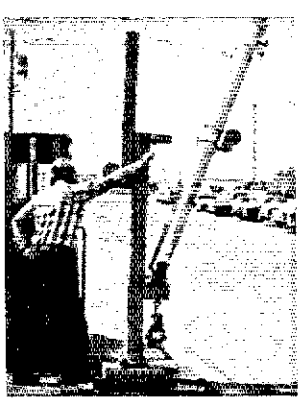
FB-45A . . . $ 79.95
FB-61A . . . 109.95

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-45A . . . $119.95
RB-61A . . . 179.95



Tilting the tower over is a one-man task with the Wilson bases.
(Shown above is the RB-61A.)

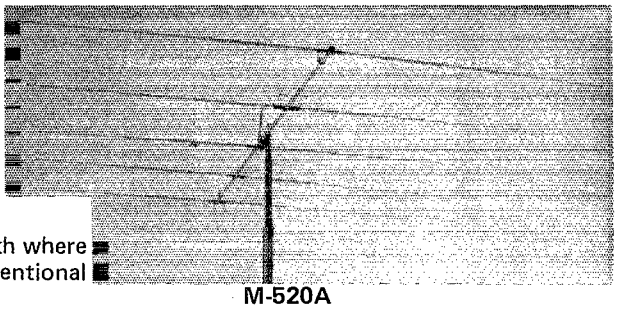
WSI WILSON SYSTEMS, INC.

4286 S. Polaris Avenue
Las Vegas, Nevada 89103
(702) 739-7401
Factory Direct Toll Free 1-800-634-6898

Prices and specifications subject to change without notice.

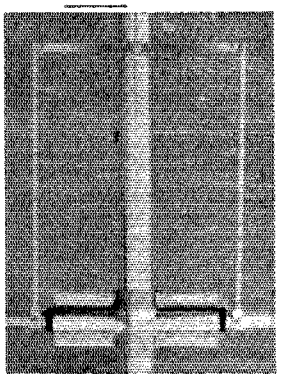
WILSON MONO-BAND BEAMS

At last, the antennas that you have been waiting for are here! The top quality, optimum spaced, and newest designed monobanders. The Wilson Systems' new Monoband beams are the latest in modern design and incorporate the latest in design principles utilizing some of the strongest materials available. Through the select use of the current production of aluminum and the new boom to element plates, the Wilson Systems' antennas will stay up when others are falling down due to heavy ice loading or strong winds. Note the following features:



M-520A

1. Taper Swaged Elements – The taper swaged elements provide strength where it counts and lowers the wind loading more efficiently than the conventional method of telescoping elements of different sizes.
2. Mounting Plates – Element to Boom – The new formed aluminum plates provide the strongest method of mounting the elements to the boom that is available in the entire market today. No longer will the elements tilt out of line if a bird should land on one end of the element.
3. Mounting Plates – Boom to Mast – Rugged 1/4" thick aluminum plates are used in combination with sturdy U-bolts and saddles for superior clamping power.
4. Holes – There are no holes drilled in the elements of the Wilson HF Monobanders. The careful attention given to the design has made it possible to eliminate this requirement, as the use of holes adds an unnecessary weak point to the antenna boom.



Wilson's Beta match offers maximum power transfer.

With the Wilson Beta-match method, it is a "set it and forget it" process. You can now assemble the antenna on the ground, and using the guidelines from the detailed instruction manual, adjust the tuning of the Beta-match so that it will remain set when raised to the top of the tower. The Wilson Beta-match offers the ability to adjust the terminating impedance that is far superior to the other matching methods including the Gamma match and other Beta-matches. As this method of matching requires a balanced line, it will be necessary to use a 1:1 balun, or RF choke, for the most efficient use of the HF Monobanders.

The Wilson Monobanders are the perfect answer to the Ham who wants to stack antennas for maximum utilization of space and gain. They offer the most economical method to have more antenna for less money with better gain and maximum strength. Order yours today and see why the serious DXers are running up that impressive score in contests and number of countries worked.

SPECIFICATIONS

Model	Band Mtrs	Gain dBd	F/B Ratio	Bandwidth @ Resonance 2:1 VSWR Limits	VSWR @ Resonance	Impedance	Matching	Elements	Longest Element	Boom O.D.	Boom Length	Turning Radius	Surface Area (Sq.Ft.)	Windload @ 80 mph (Lbs.)	Maximum Mast	Assembled Weight (Lbs.)
M520A	20	CALL FACTORY		500 KHz	1.1:1	50 Ω	Beta	5	36'6"	2"	34'2½"	25'1"	8.9	227	2"	68
M420A	20			500 KHz	1.1:1	50 Ω	Beta	4	36'6"	2"	26'0"	22'6"	7.6	189	2"	50
M515A	15			400 KHz	1.1:1	50 Ω	Beta	5	25'3"	2"	26'0"	17'6"	4.2	107	2"	41
M415A	15			400 KHz	1.1:1	50 Ω	Beta	4	24'2½"	2"	17'0"	14'11"	2.1	54	2"	25
M510A	10			1.5 MHz	1.1:1	50 Ω	Beta	5	18'6"	2"	26'0"	16'0"	2.8	72	2"	36
M410A	10			1.5 MHz	1.1:1	50 Ω	Beta	4	18'3"	2"	12'11"	11'3"	1.4	36	2"	20

WILSON SYSTEMS, INC. – 4286 S. Polaris
Las Vegas, NV 89103 – (702) 739-7401

FACTORY DIRECT ORDER BLANK

Toll-Free Order Number
1-800-634-6898

WILSON SYSTEMS ANTENNAS

Qty.	Model	Description	Shipping	Price
	SY33	3 Ele. Tribander for 10, 15, 20 Mtrs.	UPS	$139.95
	SY36	6 Ele. Tribander for 10, 15, 20 Mtrs.	UPS	189.95
	WV-1A	Trap Vertical for 10, 15, 20, 40 Mtrs.	UPS	44.95
	GR-1	Ground Radials for WV-1A	UPS	9.95
	M-520A	5 Elements on 20 Mtrs.	TRUCK	199.95
	M-420A	4 Elements on 20 Mtrs.	UPS	139.95
	M-515A	5 Elements on 15 Mtrs.	UPS	119.95
	M-415A	4 Elements on 15 Mtrs.	UPS	79.95
	M-510A	5 Elements on 10 Mtrs.	UPS	84.95
	M-410A	4 Elements on 10 Mtrs.	UPS	64.95
	WM-62A	Mobile Antenna: 5/8 λ on 2, ¼ λ on 6	UPS	19.95
		ACCESSORIES		
	HD-73	Alliance Heavy Duty Rotor	UPS	109.95
	RC-8C	8/C Rotor Cable	UPS	.12/ft.
	RG-8U	RG-8U Foam-Ultra Flexible Coaxial Cable. 38 strand center conductor, 11 guage	UPS	.21/ft.

WILSON SYSTEMS TOWERS

Qty.	Model	Description	Shipping	Price
	TT-45A	Freestanding 45' Tubular Tower	TRUCK	$219.95
	RB-45A	Rotating Base for TT-45A w/tilt over feature	TRUCK	119.95
	FB-45A	Fixed Base for TT-45A w/tilt over feature	TRUCK	79.95
	MT-61A	Freestanding 61' Tubular Tower	TRUCK	399.95
	RB-61A	Rotating Base for MT-61A w/tilt over feature	TRUCK	179.95
	FB-61A	Fixed Base for MT-61A w/tilt over feature	TRUCK	109.95
	STB-50	Thrust Bearing	UPS	18.95

Note: On Coaxial and Rotor Cable, minimum order is 100 ft. and in 50' multiples.
Prices and specifications subject to change without notice.
Ninety Day Limited Warranty. All Products FOB Las Vegas, Nevada.

Nevada Residents Add Sales Tax

Ship C.O.D. ☐ Check enclosed ☐ Charge to Visa ☐ M/C ☐

Card # _____ Expires _____

Bank # _____ Signature _____

Please Print

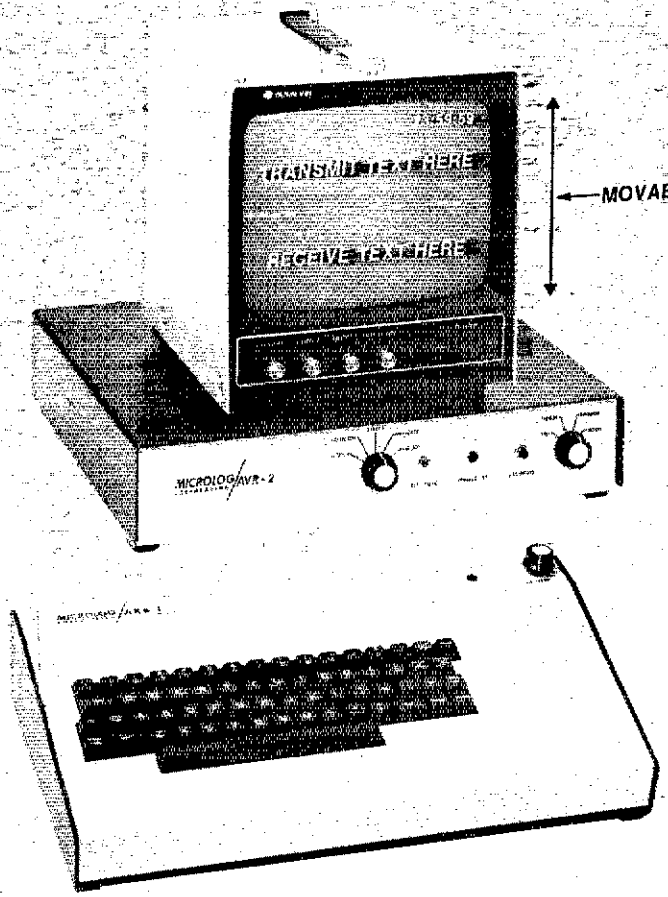
Name _____ Phone _____

Street _____

City _____ State _____ Zip _____

SPLIT SCREEN

TRANSCEIVE MODE
Type and Edit Your Text Even While Receiving



Pace Setting Features:

• Mode and Speed Readout • 24 Hour Clock • Normal and Zoom Display
• Normal or Inverted Video • Computer Trainer • "Brag Tape"
• Digital or Analog Selection of Morse Speed • Automatic T/R Switch
• Expanded Text Buffer to 1950 Characters • Automatic CW Identification
• Up to Ten Message Memories

Complete CW/Baudot/ASCII Split Screen System from $999 with your T.V.
(Includes AKB-1 Keyboard and AVR-2 Decoder.)
Direct hookup to your transceiver - nothing else to buy.
Upgrade your existing MICROLOG system with our Split Screen field mod kit only $99.

One year warranty on all products. Add $4.00 shipping per item. MD residents add 5% sales tax.

Prices Subject to Change

master charge THE INTERBANK CARD

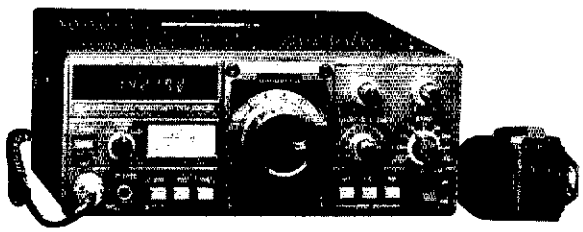
VISA

MICROLOG CORPORATION

4 Professional Drive – Suite 119
Gaithersburg, Maryland 20760
Telephone (301) 948-5307

Call or Write for Delivery or Quote

KENWOOD TS-120S



MADISON

ELECTRONICS SUPPLY, INC.

1508 McKINNEY • HOUSTON, TEXAS 77002

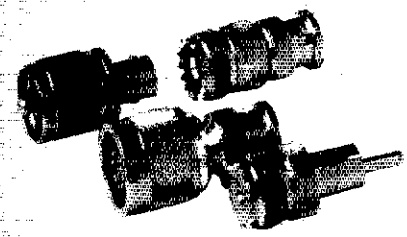
713/658-0268

MASTERCHARGE • VISA

LEAVE A MESSAGE & WE'LL CALL YOU BACK!

DLA!

Series go-betweens.

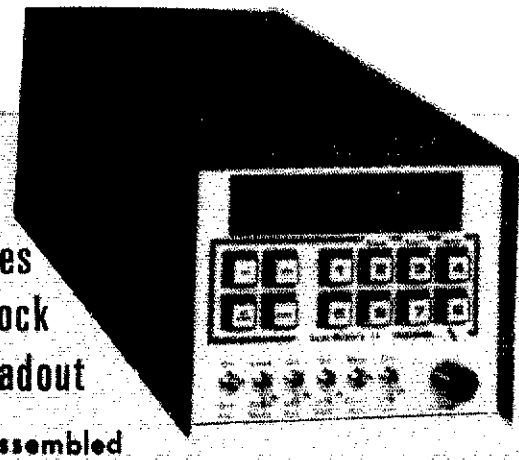


Amphenol® between-series adapters. Make the transition from one connector series to another—quickly, easily. And keep electrical discontinuities to an absolute minimum. Almost unlimited combinations possible. Examples: UHF to BNC. UHF to N. N to BNC. Whatever the combination, you get the same precision tolerances and quality found in Amphenol coax connectors.

Buy these adapters at your Amphenol dealer.

BUNKER RAMO AMPHENOL NORTH AMERICA
Bunker Ramo Corporation

Accu-Memory II



Featuring...

- 8-512 Bit Messages
- 6 Digit-24 Hr. Clock
- Digital Speed Readout

Price....$229 assembled

- 1 Year Warranty
- Size 4x5x13 in.

Terms: Money order or bank check. Personal checks require three weeks clearance. Florida residents add 4% sales tax. U.S. funds only. Shipping prepaid in the U.S.

Accu-Circuits, Inc.
P.O. Box 13287
Orlando, Fla.
32859

MFJ SPEECH PROCESSOR

Punch thru QRM with up to 400% more RF power

$59.95

MFJ Super Logarithmic Speech Processor plugs between your microphone and transmitter to give you up to 400% more RF power.

IC logarithmic amplifier strengthens weak valleys, reduces peaks of speech. Active filter concentrates power, gives clean audio for maximum punch. RF filtered. 9 V battery.

Two models. LSP-520BX II (pictured) $59.95, 4x2x6 inches, deluxe cabinet. LSP-520 BX (not shown) $49.95, standard MFJ cabinet, 2x3x4 inches. One year unconditional guarantee.

Try it. If not delighted, return within 30 days for refund (less shipping). **Order today.** Call toll free 800-647-1800. Charge VISA, MC. Or mail check, money order. $3.00 shipping.

CALL TOLL FREE ... 800-647-1800

For technical information, order/repair status, in Miss., outside continental USA, call 601-323-5869.

MFJ ENTERPRISES, INC.

BOX 494, MISSISSIPPI STATE, MS 39762

AUTOMATIC TRANSMITTER OUTPUT MONITOR

ACCURATE & CONTINUOUS DISPLAY OF RF POWER & VSWR AS INDEPENDENT PARAMETERS

- 1.8-30 MHz • 250 & 1000 Watt Models • Self Check
- Battery Operated with Automatic On/Off Feature
- Unique Patented Design • $185 Plus Shipping

GOLDEN "L" ELECTRONICS

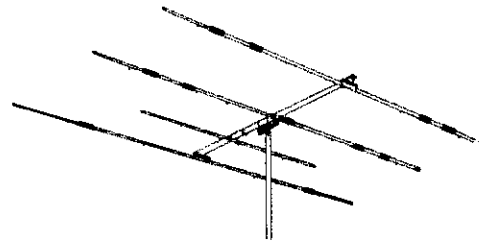
1007 West 30th • Loveland, Colorado 80537 • (303) 667-5649

CALL TOLL FREE

1-800-228-4097

Communications Center

443 N 48th Street
Lincoln, Nebraska 68504
In Nebraska Call (402)466-8402



Antenna Sale!

HY-GAIN

		Regular	Special			Regular	Special
TH6DXX	Super Thunderbird	$329.95	$259.95	18HT	Hy-Tower 80-10M vertical	$359.95	$289.95
TH3MK3	3 el. 10-15-20M beam	222.95	179.95	18AVT/WB	80-10M Trap vertical	105.95	84.95
TH3JR	3 el. 10-15-20M beam	169.95	139.95	14AVQ/WB	40-10M Trap vertical	69.95	57.00
Hy-Quad	2 el. 10-15-20M Quad	274.95	219.95	12AVQ	20-10M Trap Vertical	42.95	34.95
205BA	5 el. "Long John" 20M beam	329.95	259.95	14RMQ	Roof Mounting kit (verticals)	33.95	29.95
155BA	5 el. "Long John" 15M beam	199.95	159.95	5BDQ	80-10M Trap doublet	109.95	89.95
105BA	5 el;"'Long John" 10M beam	129.95	109.95	2BDQ	80-40M Trap doublet	59.95	49.95
204BA	4 el. 20M beam	249.95	199.95	66B	6 el. 6M beam	119.95	99.95
204MK5	5 el. conversion kit	99.95	79.95	203	3 el. 2M beam	15.95	
153BA	3 el. 15M beam	89.95	79.95	205	5 el. 2M beam	21.95	
103BA	3 el. 10M beam	74.95	59.95	208	8 el. 2M beam	29.95	
402BA	2 el. 40M beam	239.95	189.95	214	14 el. 2M beam	34.95	
BN-86	Balun for beam antennas	15.95	15.95	LA-1	Deluxe lightning arrestor	59.95	49.95
TH2MK3	2 el. 10-15-20M beam	149.95	119.95	TH5DX		269.95	209.95

MOSLEY

		Regular	Special
Classic 33	3 el. 10, 15, 20 Mtr. beam	304.75	209.95
Classic 36	6 el. 10, 15, 20 Mtr. beam	392.75	249.95
TA-33	3 el. 10, 15, 20 Mtr. beam	264.00	189.95
TA-36	6 el. 10, 15, 20 Mtr. beam	392.75	249.95
TA-33 Jr.	3 el. 10, 15, 20 Mtr. beam	197.00	149.95
TA-40KR	40 Mtr. Add On	119.95	89.95

CUSHCRAFT

ATB-34	4 ele. 10, 15, 20 Mtr. beam	289.95	219.95	A147-11	11 ele. 146-148 Mhz. beam	36.95	30.95
ATV-4	10, 15, 20, 40 Mtr. Vertical	89.95	69.95	A147-22	22 ele. Power Pack	109.95	89.95
ATV-5	10, 15, 20, 40, 80 Mtr. Vertical	109.95	89.95	A144-10T	2 Mtr. "Twist" 10 ele.	42.95	34.95
ARX-2	2 Mtr. Ringo Ranger	39.95	32.95	A144-20T	2 Mtr. "Twist" 20 ele.	62.95	52.95
AR-6	6 Mtr. Ringo	36.95	32.95	A147-20T	2 Mtr. beam	62.95	52.95
ARX-220	220 Mhz. Ringo Ranger	39.95	32.95	A430-11	432 Mhz. 11 ele. beam	34.95	29.95
ARX-450	435 Mhz. Ringo Ranger	39.95	32.95	A432-20T	430-436 Mhz. Beam	59.95	49.95
A144-11	11 ele. 144-146 Mhz. beam	36.95	30.95				

HUSTLER

3-TBA	3 ele; 10, 15, 20 Mtr. beam	259.95	189.95
4-BTV	10-40 Mtr. Vertical	99.95	79.95
5-BTV	10-80 Mtr. Vertical	134.95	99.95
RM-75	75 Meter Resonator	16.95	14.50
RM-75S	75 Meter Super Resonator	31.95	27.50
G6-144B	2 Mtr. Base Colinear	79.95	59.95
G7-144	2 Mtr. Base Colinear	119.95	89.95

ROTORS

HAM 4 $149.95 T2X Tailtwister $199.95 Alliance HD 73 $109.95

Call for prices on rotor cable, Coax, Towers, and Accessories. All prices do not include shipping.

18HT

We carry all major brands of ham radios AT DISCOUNT PRICES

VISA

Kenwood — Yaesu — Drake — ICOM — Dentron —
Ten-Tec — Swan — Tempo — Midland — E.T.O. — Wilson

master charge

NEW FROM MURCH ELECTRONICS

MODEL UT-2000A ULTIMATE TRANSMATCH

Similar to the one in Lew McCoy's article July 1970 QST
- Use with any coax or end fed random wire antenna, ideal for apartment dwellers.
- 80-10 continuous, including MARS.
- Rotary inductor with turns counter for precise and rapid tuning.
- Full legal power, 4,000 volt capacitors.
- Use with any SWR/wattmeter.
- 12"W x 12"D x 5½"H, 12 lbs. shipping wt. $139.95 + shipping.

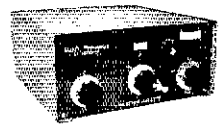
NEW — MODEL UT-2000B

- Continuous coverage 160-10 meters.
- Rotary inductor with turns counter.
- Three core balun, 4,000 volt capacitors, full legal power.
- Built-in line sampler for precise tuning.
- No external meter required.
- Use with any antenna.
- Function switch — in, out, dummy load (not supplied), ground.
- 12"W x 15½"D x 5"H, 13 lbs. shipping wt. $218.50 + shipping.

MODEL 68A MULTIBAND ANTENNA 10-80M

- Field proven 4 years.
- Sealed center insulator, 102 ft. wire, 30 feet heavy duty twin lead.
- Coax fitting to connect twin lead to 52 ohm transmission line (68 feet or more, not included)
- Ready to use. Great on all bands when used with the Ultimate Transmatch.
- 2000w P.E.P. $44.50p.p.

NEW — MODEL UT2000A-LS ULTIMATE TRANSMATCH



- With all the features of the popular UT-2000A.
- Plus built-in LINE SAMPLER for precise tuning.
- No external meter required.
- 12"W x 12"D x 5½"H, 12 lbs. shipping wt. $168.50 + shipping.

NEW — MODEL UT-160M & UT-160MB

- 160-10 meters.
- CERAMIC inductor tapped every turn each band, no burn out.
- Heavy duty switch.
- Built-in line sampler for precise tuning, no external meter required.
- Function switch — in, out, dummy load (not supplied), ground.
- Full legal power.
- 12"W x 15½"D x 5"H, 13 lbs. shipping wt.
  UT-160M (less balun) $164.50 + shipping
  UT-160MB (with balun) $179.50 + shipping

MURCH ELECTRONICS, INC.

BOX 35
FRANKLIN, MAINE 04634
PHONE 207-565-3312

SEE YOUR DEALER OR ORDER DIRECT

SEND FOR LITERATURE

ANTENNA SYSTEMS/TOWER HARDWARE

HY-GAIN ANTENNAS

TH5DX	New 5-Element Triband Beam	$195
TH6DXX	6-Element Triband beam	$225
TH3MK3	3-Element Triband beam	$165
TH2MK3	2-Element Triband Beam	$109
TH3JR	3-Element Triband Beam	$119
205BA	5-Element 20-mtr "Long John"	$235
155BA	5-Element 15-mtr "Long John"	$145
105BA	5-Element 10-mtr "Long John"	$94
203BA	3-Element 20-mtr beam	$99
204BA	4-Element 20-mtr beam	$175
204MK5	204BA to 205BA kit	$79
153BA	3-Element 15-mtr beam	$64
103BA	3-Element 10-mtr beam	$54
402BA	2-Element 40-mtr beam	$175
DB1015A	3-Element 10-/15-mtr beam	$115
Hy-Quad	2-Element 10-/15-/20-mtr quad	$199
64B	4-Element 6-mtr beam	$42
66B	6-Element 6-mtr beam	$89
18HT	Hy-Tower 80-10 mtr vertical	$255
18V	80-10 mtr vertical	$26
18AVT/WB	80-10 mtr trap vertical	$75
14AVQ/WB	40-10 mtr trap vertical	$55
12AVQ	20-/15-/10-mtr trap vertical	$39
RMQ	Roof mount kit for verticals	$29
203	3-Element 2-mtr beam	$14
205	5-Element 2-mtr beam	$18
208	8-Element 2-mtr beam	$23
214	14-Element 2-mtr beam	$26
2BDQ	80/40 mtr trap dipole	$44
5BDQ	80-10 mtr trap dipole	$79
GPG2	⅝ Wave 2-mtr ground plane	$18
J-Pole	4-Bay 2-mtr stacked J-Pole	$59
LA1	Heavy duty Lightning Arrestor	$45
LA2	Coax in-line arrestor	$7
BN86	kW balun	$12

TIMES WIRE COAX

RG-213/u MIL SPEC RG-8/u replacement	$0.25/ft
1/2" 50-ohm polyjacketed hardline	$0.65/ft
Male hardline connector (PL-259)	$8.00
Female hardline connector (SO-239)	$9.00
Male hardline connector (Type N)	$10.00

CUSHCRAFT ANTENNAS

A3219	New 19-element 2-mtr 'Boomer'	$66
214B	New 14-element 'Jr Boomer'	$53
214FB	New 14-el vertical 'Jr. Boomer'	$53
228FB	New Jr. Boomer FM power pack	$165
A617B	New 6-element 6-mtr Long Boom	$150
A50-5	5-element 6-mtr beam	$53
A50-10	10-element 6-mtr beam	$90
ATB34	4-Element triband beam	$209
20-3CD	New 3-element 20-mtr beam	$135
20-4CD	New 4-element 20-mtr beam	$225
15-3CD	New 3-element 15-mtr beam	$77
15-4CD	New 4-element 15-mtr beam	$89
10-3CD	New 3-element 10-mtr beam	$55
10-4CD	New 4-element 10-mtr beam	$67
ATV4	40-10 mtr vertical	$78
ATV5	80-10 mtr vertical	$85
ARX2	2-mtr 'Ringo-Ranger'	$30
ARX-450	450 MHz 'Ringo Ranger'	$30
A147-11	11-Element 147-148 MHz beam	$30
A147-22	22-Element 'Power-Pack'	$90
A144-10T	10-Element 2-mtr Twist	$37
A144-20T	20-Element 2-mtr Twist	$53
A220-11	11-element 220-MHz beam	$30
A432-11	11-element 432-MHz beam	$28
A432-20T	20-element 432-MHz Twist	$49
DX120	20-Element 2-mtr EME building block	$44
DXK140	Stacking kit for pair DX120	50

Alliance HD73 Rotor Special $99

CDE ROTORS

CD45 (9 ft² rating)	$110
HAM 4 — (New model - 15 ft² rating)	$139
Tailtwister — (Now rated at 30 ft²)	$189
8-Conductor Rotor Cable	$0.15/ft

For a quote on your antenna system or tower needs write or call:

TEXAS TOWERS
1309 Summit Drive ● Plano, Texas 75074
Open 9 AM to 6 PM Monday thru Saturday
Telephone: (214) 423-2376
A Texas Communications Products Company (TEXCOM)

ROHN TOWERS

20G/$27.50	25G/$35.50 45G/$61.50 55G/$104.50	
HDBX48	Free-standing 48-ft tower (18 ft² ant)	$305
HBX56	Free-standing 56-ft tower (10 ft² ant)	$335
FK2548	48-ft 25G foldover tower	$595
FK2558	58-ft 25G foldover tower	$660
FK2568	68-ft 25G foldover tower	$725
FK4548	48-ft 45G foldover tower	$835
FK4558	58-ft 45G foldover tower	$920
FK4568	68-ft 45G foldover tower	$999
(freight paid on all foldover towers)		
100-ft 25G tower (complete)		$649
100-ft 45G tower (complete)		$999

GALVANIZED STEEL TOWER HARDWARE

3/16" EHS (3990 lb rating)	$9.50/100 ft $90/1000 ft
1/4" EHS (6000 lb rating)	$12/100 ft $111/1000 ft
5/32" — 7 × 7 Aircraft cable(2700 lb)	$8/100 ft
3/16 CCM cable clamps (3/16" or 5/32" cable)	$0.30
1/4 CCM cable clamps(1/4" cable)	$0.40
1/4 TH Thimble (fits all sizes)	$0.25
3/8 EE (3/8" Eye and eye turnbuckle)	$5.50
3/8 EJ (3/8" Eye and jaw turnbuckle)	$6.00
1/2 EE (1/2" Eye and eye turnbuckle)	$7.50
1/2 EJ (1/2" Eye and jaw turnbuckle)	$8.00
3/16" Preformed guy deadend	$1.45
1/4" Preformed guy deadend	$1.65
6"-dia 4-ft long earth screw anchor	$10.50
2"-dia 10-ft long heavy duty mast	$30.00
500D Guy insulator (5/32" or 3/16" cable)	$0.85
502 Guy insulator (1/4" cable)	$1.55

BERKTEK
RG-8X Full braid, low-loss 50-ohm coax (SPECIAL) $0.15/ft

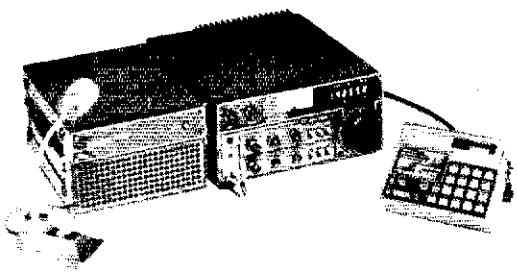
Rohn 20G, 25G, 45G and 55G Prices FOB Peoria, IL. Slightly higher for local shipments. Write or call for quote on $1800 freight paid orders.

Write or call for our SUPER PRICE on Hy-Gain and Towermaster crank-up towers!

CALL TOLL FREE:
1-800-426-7741
The Northwest's Largest Ham Store

AUTUMN ICOM AND YAESU SPECIALS

POPULAR HF TRANSCEIVER



C-COMM SPECIAL PACKAGE

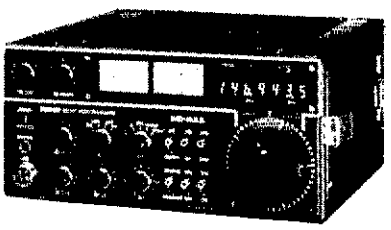
1. Complete 701 System w/base mic, AC supply/ spkr	$1,499.00
2. Computer Controller RM2	199.00
3. ICOM Matching Headset - HP-1	49.50
	1,747.50
Your Cost	1,499.00
Save	248.50!

NEW IC-551 6M TRANSCEIVER

INTRODUCTORY PRICE
538.46

We Pay Shipping
Complete stock of 6M antennas - available at 15% off when purchased with the IC-551

IC-211 2M ALL MODE

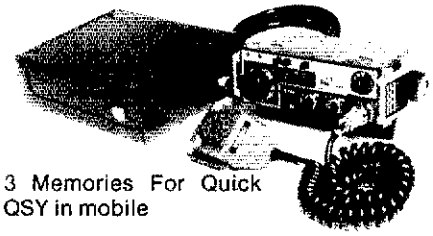


2M BASE PACKAGE

1. IC-211	$767.00
2. Computer Controller, RM2	199.00
3. SM2 Base Mic	49.50
	1,015.50
Your Cost	859.00
Save	156.50

NEED RADIO ONLY? Call C-Comm toll free for your rock bottom price.

ICOM IC-280
The most compact 2 meter rig on the market. Ideal for today's new compact cars.



3 Memories For Quick QSY in mobile

Package Price **399.00**
Includes your choice of remote mounting kit (CK-28) or Touchtone microphone.

ICOM IC-215
The low cost approach to 2 meter FM.

5 popular channels included. Portable or mobile.

SALE 199.00

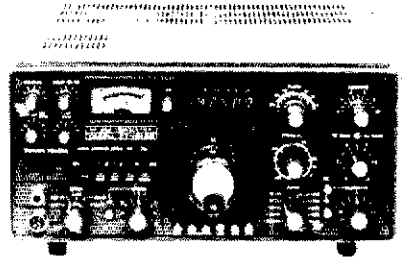
Accessories available: Mobile Mount, Touch-tone Mic, Base Supply, Nicads, Charger.

NEED IC-280 only? Give us a call for your rock bottom price.

YAESU FT-901DM

FULL STOCK OF OPTIONS ALSO AVAILABLE

and the new FT-101ZD



CALL TOLL FREE FOR YOUR DISCOUNT PRICE.

Also Dealers For: AEA, ALLIANCE, ATLAS, B&W, CDE, CUSHCRAFT, DENTRON, DRAKE, HUSTLER, HYGAIN, KLM, LARSEN, LUNAR, MFJ, NPC, ROHN, SURE, TEN-TEC, TRI-EX, WILSON AND MORE.

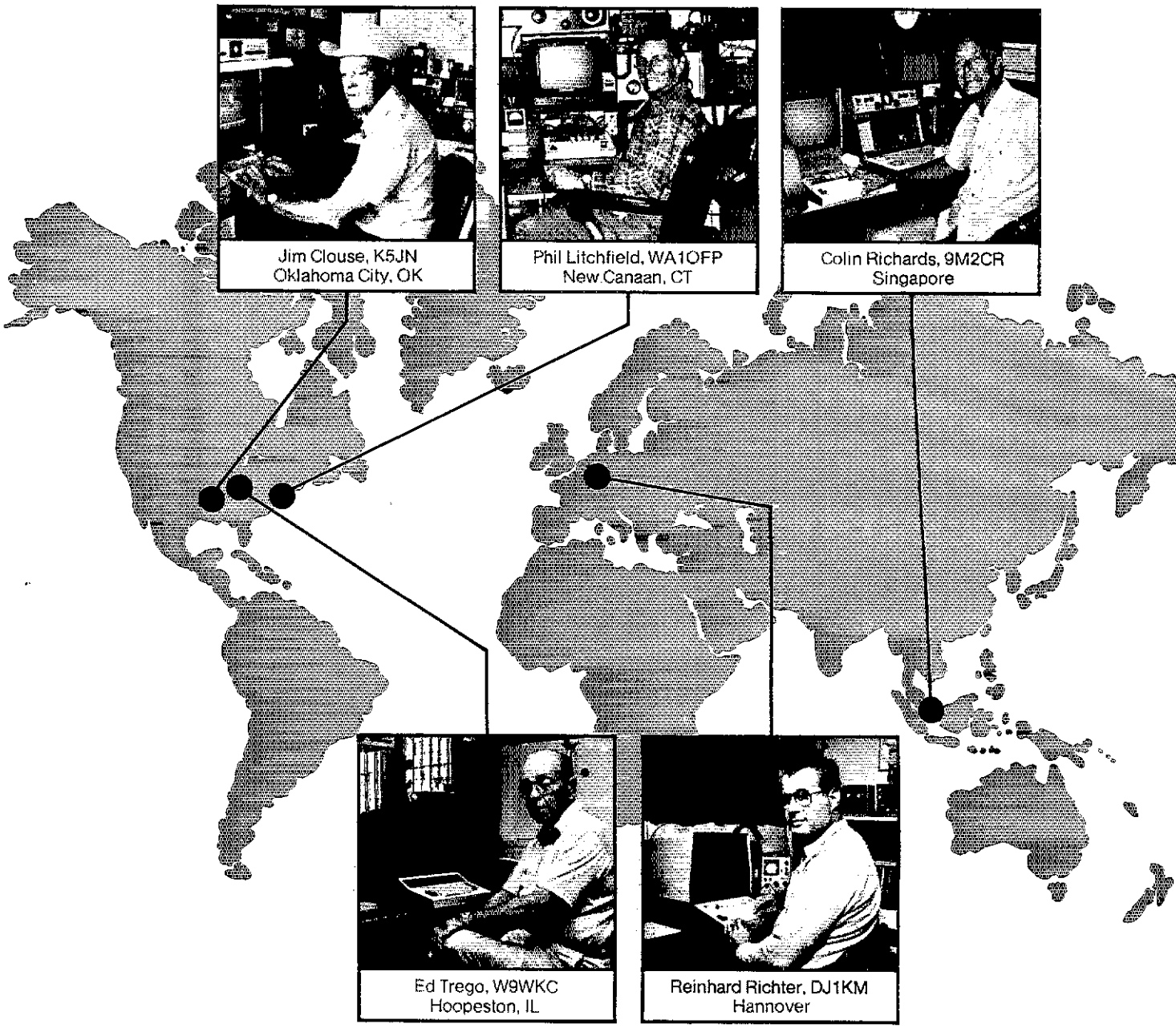
6115 15th N.W.
Seattle, WA 98107

We accept VISA

Washington residents call (206) 784-7337

Mon thru Sat 9:30 a.m. to 6:00 p.m.

WHEN OUR CUSTOMERS TALK... WE LISTEN.



From around the world their RTTY messages read loud and clear.

At HAL we *want* to hear what our customers have to say about RTTY practices, problems, and possibilities. So when they talk . . . we listen . . . and respond.

The result is that HAL Communications equipment stays at the leading edge of RTTY design with . . . features that open up new capabilities for greater enjoyment of RTTY operation. And with performance reliability so certain, we offer a full one-year warranty.

Write or give us a call. We'll be glad to send you our new RTTY catalog.

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

For our European Customers Contact:
Richter & Co., D3000 Hannover 1
I.E.C. Interelco, 6816 Bissone/Lugano

Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 70 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. Any currently licensed Amateur who was first licensed 25 or more years ago is eligible for membership. Members receive a membership call book and quarterly news. Write Q.C.W.A. Inc. 1409 Cooper Dr., 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.

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 Greater Delaware Valley Hamfest, Cherry Hill, NJ, October 28, 1979 at the Camden Catholic High School, Rt. 38 and Cuthbert Rd., 8 A.M. to 5 P.M. Reserved indoor flea market $4/table, commercial displays, outdoor flea market, and seminars. Admission $3. Talk-in 22/82 and 52/52. Set-up late Saturday night and RV parking. Write GDV Hamfest, 15 East Camden Avenue, Moorestown, NJ 08057. 609-234-3926.

ARRL Roanoke Division Convention & Hamfest. Fourth Annual Tidewater hamfest-computer show-flea market will be held in the Norfolk, VA. Cultural and Convention Center SCOPE October 20 & 21, 1979. Open at 9:00 AM. ARRL meetings, DX, Traffic forums, plus a cw contest are scheduled. FCC exams are planned for amateur upgrading Saturday 9-12 AM. A special feature will be a dinner cruise and banquet on the Spirit of Norfolk Cruiseship Saturday Night. Advance registrations $2.50 (s.a.s.e.), $3.50 at the door. Flea market tailgate spaces $3 day. Cruise and banquet $16 person, $30 couple. Tickets and information — TRC P. O. Box 7101, Portmouth, VA 23707.

HAMFAIR '79 sponsored by LIMARC, Sunday Oct. 14 at the Islip Speedway, Route 111 (Islip Ave.) 1 block south of Southern State Pkwy Exit 43 or come south from the LIE Exit 56. Open from 9 A.M. til 4 P.M. Free parking, room for 3000 cars. Over 300 sellers at the last show. Loads of prizes with special catagorie such as furthest distance. Several contests planned, you need no preparation. This ARRL Hamfest admission is $1.50 and $3 per seller's space. Seller's space permits one person to enter. All hams must pay admission, others are free. Info call Hank Wener, WB2ALW nites at 516-484-4322 or Sid Grossman, N2AOI, nites at 516-681-2194.

LIMA, OH — Northwest Ohio Amateur Radio Club Annual Hamfest October 14 — Doors open 7 A.M. Dealer tables available — talk-in 52/52, 07/67 Allen County Fairgrounds — Rte 309E — 1 mile off I-75. For info. Write N.O.A.R.C. P. O. Box 211, Lima, OH 45802.

QST and CQ 1950-1975 issues for sale. Send s.a.s.e. if ordering 73, Ham Radio, or other QST and CQ issues. One dollar minimum order and all issues cost 25c each, including USA shipping. Send chronological list and full payment to W6LS, 2814 Empire, Burbank, CA 91504. Available issues and refund sent within one month.

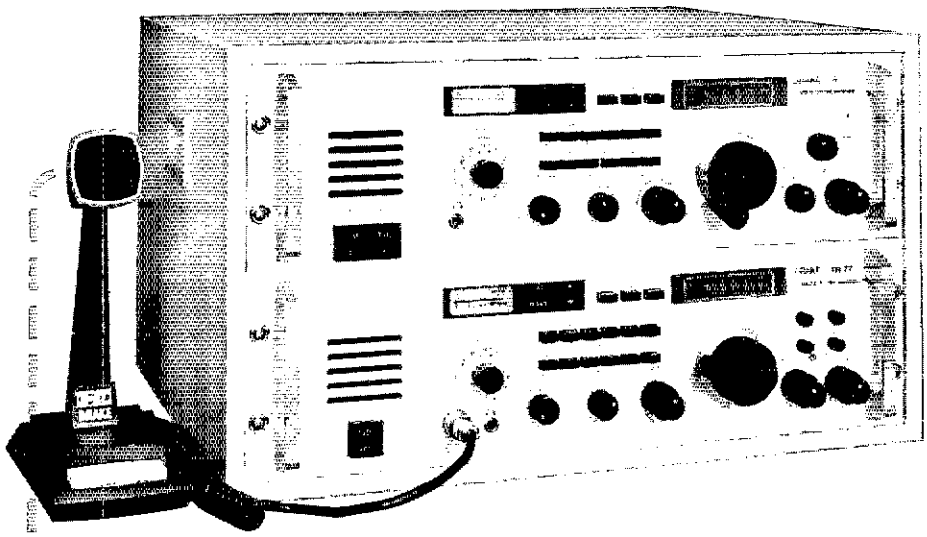
HAMFEST Chattanooga October 27th & 28th. See Hamfest Calender elsewhere in this month's issue of QST.

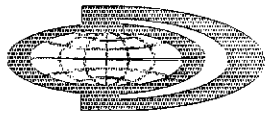
THIRD annual RADAR Hamfest and Swap & Shop Sunday, October 7, 1979, Taylor Michigan. Kennedy High School Talk-in 147.93/.33 and .52 simplex. Computer displays and loads of ham gear. WB8MER, Box 1023, Southgate, MI 48195. Admission $2.

MISSOURI QSO Party — Every station who makes one or more QSOs on the MO QSO Party Oct. 19, 20 and 21st receives a professionally printed four color certificate — See Contest page this months QST for details. Novice

DID YOU KNOW?...

The R.L. Drake Company is a leade



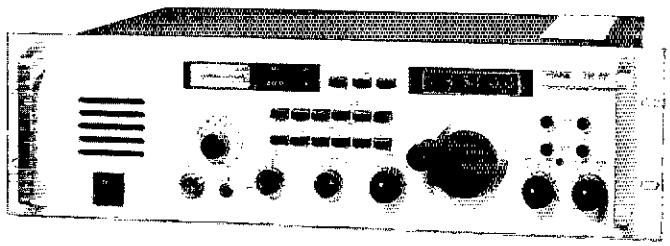


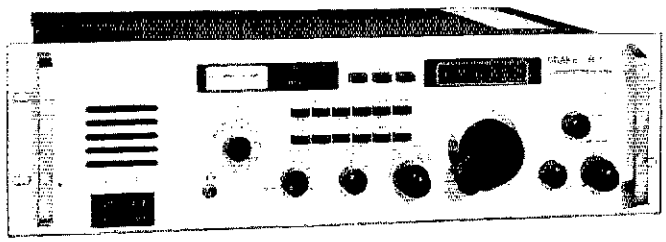
Drake 77 Console Station

• 10 kHz thru 30 MHz continuous tuning receive • 1.8 MHz thru 30 MHz continuous tuning transmit/receive • Simultaneous dual receive on two separate frequencies • Unique shaft encoder system features better than 10 Hz tuning resolution and continuously variable tuning rate for high stability and smooth VFO-type tuning.

Drake TR-77 Transceiver

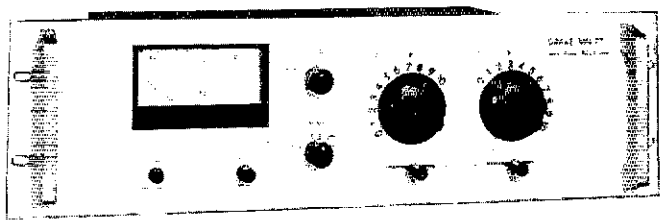
• 10 kHz thru 30 MHz continuous tuning receive • 1.8 MHz thru 30 MHz continuous tuning transceive • Unique shaft encoder system features better than 10 Hz tuning resolution and continuously variable tuning rate for high stability and smooth VFO-type tuning.





Drake R-77 Receiver

• 10 kHz thru 30 MHz continuous tuning receive • Advanced operational and performance features • Unique shaft encoder system features better than 10 Hz tuning resolution and continuously variable tuning rate for high stability and smooth VFO-type tuning.



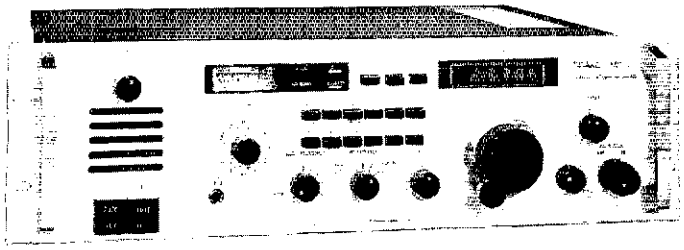
Drake MN-77 Impedance Matching Network

• 1.8 MHz thru 30 MHz continuous antenna matching • Matches antennas fed with coax, long wire, or balanced line • Rf Power/VSWR measurement and antenna selection.

Known throughout the world for quality..

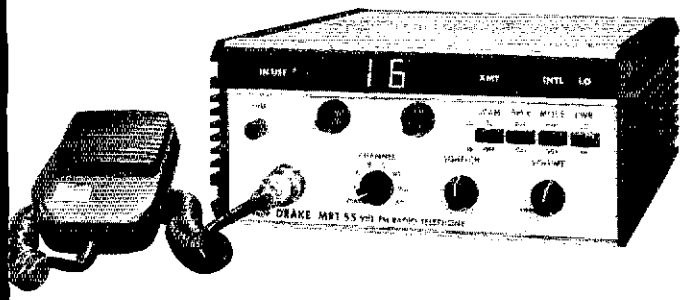
in communications technology...

FOR GOVERNMENT, MARITIME, EMBASSY, AND COMMERCIAL RADIO SYSTEMS...



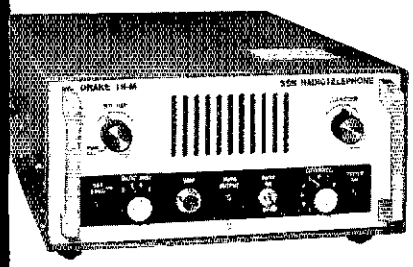
Drake MR-3 Marine Reserve/Mains Receiver

• 10 kHz thru 30 MHz continuous tuning receive • Advanced operational and performance features • Unique shaft encoder system features better than 10 Hz tuning resolution and continuously variable tuning rate for high stability and smooth VFO-type tuning. • Designed especially for high seas maritime communications.



Drake MRT-55 Marine Vhf-Fm Transceiver

• Work boat/fishing boat/pleasure craft operation • U.S.A. and European frequency plan • FCC type approved—submitted for CEPT/MPT approval.



Drake TRM Marine Hf Ssb Transceiver

• 150 watts PEP output
• Wide range integral antenna coupler and power supply included
• FCC type approved

Specifications and prices subject to change without notice or obligation.

and we have been for many years.

Most radio amateurs know what the R. L. Drake Company has done for the amateur bands in the spectrum. But, did you also know that...

- Drake manufactures and brand names equipment for many other major producers of marine/commercial radio systems, located from Asia to Europe.
- Drake's own marine reserve and mains receivers are in use on ocean-going ships and other marine installations worldwide, and are type-approved in major European countries.
- Our equipment is in use by a number of embassies around the world for direct communication with their home countries.
- The Drake TR-M Hf Ssb Marine Transceiver is in use on work boats and fishing boats on U.S. and international waters.
- The Drake MRT-55 Vhf-Fm Marine Transceiver has found applications from commercial shipping to pleasure craft. It is designed for both U.S. and European frequency channel plans.
- From television network news teams to African governments, Drake communications systems are at work.

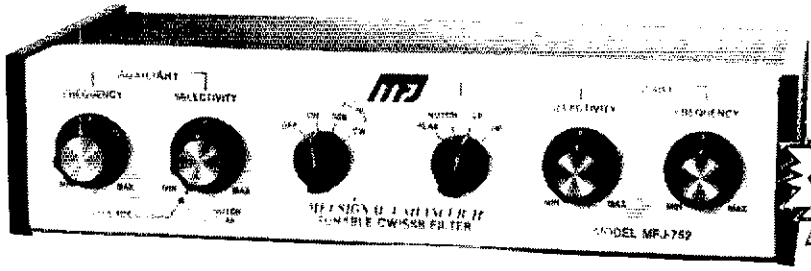
R. L. DRAKE COMPANY

DRAKE®

540 Richard Street, Miamisburg, Ohio 45342 • USA • Phone (513) 866-2421 • Telex 288-017

NEW MFJ Dual Tunable SSB/CW filter

lets you zero in SSB/CW signal and notch out interfering signal at the same time.



Ham Radio's Most Versatile Filter

BRAND NEW

$79.95

The MFJ-752 Signal Enhancer is a dual tunable SSB/CW active filter system that gives you signal processing performance and flexibility that others can't match.

For example, you can select the optimum Primary Filter mode for an SSB signal, zero in with the frequency control and adjust the bandwidth for best response. Then with the Auxiliary Filter notch out an interfering heterodyne . . . or peak the desired signal.

For CW, peak both Primary and Auxiliary Filters for narrow bandwidth to give skirt selectivity that others can't touch. Or use Auxiliary Filter to notch out a nearby QSO.

The Primary Filter lets you peak, notch, low-pass, or highpass signals with double tuned filter for extra steep skirts. The **Auxiliary Filter** lets you notch a signal to 70 db. Or peak one with a bandwidth down to 40 Hz.

Tune both Primary and Auxiliary Filters from 300 to 3000 Hz. Vary the bandwidth from 40 Hz to almost flat. Notch depth to 70 db.

MFJ has solved problems that plague other tunable filters to give you a constant output as a bandwidth is varied. And a linear frequency control. And a notch filter that is tighter and smoother for a more effective notch.

Works with any rig. Plugs into phone jack. 2 watts for speaker. Inputs for 2 rigs.

Switchable noise limiter for impulse noise; trough clipper removes background noise.

Simulated stereo feature for CW lets ears and brain reject QRM. Yet off frequency calls can be heard.

Speaker and phone jacks. Speaker is disabled by phones. OFF bypasses filter. 110 VAC or 9 to 18 VDC, 300 ma. 10x2x6 inches.

Every single unit is tested for performance and inspected for quality. Solid American construction, quality components.

The MFJ-752 carries a full one year unconditional guarantee.

Order from MFJ and try it — no obligation. If not delighted, return it within 30 days for a refund (less shipping).

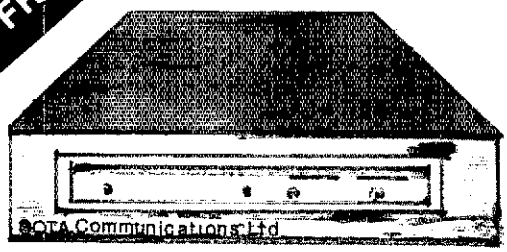
To order, simply call us toll free 800-647-1800 and charge it on your VISA or Master Charge or mail us a check or money order for $79.95 plus $3.00 for shipping/handling.

Don't wait any longer to use Ham Radio's most versatile filter. Order your MFJ Dual Tunable SSB/CW Filter at no obligation, today.

MFJ ENTERPRISES, INC.
P. O. BOX 494
MISSISSIPPI STATE, MS 39762
CALL TOLL FREE 800-647-1800
For technical information, order/repair status, in Miss., outside continental USA, call 601-323-5869.

NEW FROM M & M

Linear Transverters for 1296 MHz



M&M has been appointed the exclusive U.S. distributor for these new products from SOTA Communications Systems Ltd. These units are produced by SOTA under a license agreement from UKW, and are the commercial versions of some products previously in issues of VHF Communications.

SIMILAR TYPE UNITS AVAILABLE FOR 432 MHz

- RX - NF 2.5 dB
- TX - Power 15W
- Dual/Freq 432/435

NEW FOR 144 & 220 MHz
10 and 11 element YAGI's from the original 220 EME design of WB6NMT. Call or write now for information.

1296 TRANSVERTER

- Receive NF under 3 dB
- Image Rejection 20 dB or better
- Output Power 2½W min
- Covers 1296-1298 with 28-30 MHz input. 144 MHz available soon.

1296 CONVERTER

- Receive portion of transverter only with same specs

1296 POWER AMPLIFIER

- 50W output
- Built-in AC Supply
- Compatible with transverter

Contact M&M for price and availablity of all items.

M&M RF DISTRIBUTORS

P.O. Box 82183 • San Diego, CA 92138 • 2785 Kurtz St. Suite 4 • San Diego, CA 92110
Call (714) 299-9741

EXCLUSIVE U.S. DISTRIBUTORS

MONOLITHIC CRYSTAL FILTERS

for a professional NBFM rig

Building or modifying your FM Rig? We've got the highly selective, state-of-the-art monolithic and tandem monolithic crystal filters you need.

- Over 60 Stock Models
- Center Frequency: 10.7 and 21.4 MHz
- 6 dB Bandwidth: 13, 15, and 30 kHz
- Two, Four, Six, and Eight Poles
- 10.7 and 21.4 MHz monolithic crystal discriminators.
- Front-end filters for 2 meters, two pole and four pole.

Monolithic crystal filters are smaller, simpler, and less expensive than old-fashioned discrete-element (lattice) crystal filters. Our wide selection lets you choose just what you need.

Write for data sheets and amateur net price list.

Piezo Technology, Inc.
P. O. Box 7859
Orlando, Florida 32804
(305) 298-2000
The Standard in monolithic crystal filters.

PACE-TRAPS

Multi-band antenna traps patterned after those detailed in the ARRL Handbook, Antenna Book, and several other periodicals. Mechanically solid and weather-proofed. Handle full power (max. 3000 watts PEP). 5-band and 4-band models available, 80-10 . . . 40-10.

FG-5 80 through 10 meter KW traps.. $19.95
FG-4 40 through 10 meter KW traps.. $19.95
Stranded copper-weld cut to length:
5-band ..... $ 7.50
4-band ..... $ 4.50
PS-2 Weather-proof center insulator $ 5.95
Complete trap-dipole systems available. Write for quotes.

All prices plus $1.50 UPS charge.

Check or MO to: Pace-Traps
Box 234 Middlebury, CT 06762
203-758-9228
Pace-Traps

MORE FEATURES FROM ALLIANCE!

HD-73 HEAVY-DUTY ROTATOR

with exclusive Dual-Speed Control!

For antennas up to 10.7 sq. ft. of wind load area. Mast support bracket design permits easy centering and offers a positive drive no-slip option. Automatic brake action cushions stops to reduce inertia stresses. Unique control unit features DUAL-SPEED rotation with one five-position switch. SPECIFICATIONS: Max. wind load bending moment—10,000 in.-lbs. (side-thrust overturning); Starting torque—400 in.-lbs.; Hardened steel drive gears; Bearings—100-⅜" diameter (hardened); Meter—D'Arsonval, taut band (backlighted). There's much, much more—so get the whole story!

YES! **Mail this coupon for complete details!**

☐ **Send me complete details on the HD-73!**
☐ **Give me the name of my nearest dealer!**

NAME _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

The ALLIANCE Manufacturing Co., Inc., Alliance, Ohio 44601
A NORTH AMERICAN PHILIPS COMPANY

Maker of the famous Antenna Rotator . . . Alliance Tenna-Rotor® . . . "TV's Better Color Getter!"

also. MO hams — please get on the air this week-end. Certificates and awards for you too. St. Louis ARC — KØLIR, 645 Marshall AVe., St. Louis, MO 63119.

LOW POWER Club Join QRP A.R.C. International. Info: W8JKB. 2359 Woodford St., Toledo OH 43605. New and former members invited.

SAROC — January 10-13, 1980 at Dunes Hotel and Country Club, Las Vegas NV. Exhibits, technical sessions. Advance Registration $15. per person, your check is your receipt, the number we place on your check is your SAROC registration number. We will make refunds to those who request same in writing and if postmarked on or before January 9. SAROC special room rate is $33 plus room tax per night, single or double occupancy. Dunes Hotel accommodations request will be sent to SAROC registered delegates. SAROC, P. O. Box 945, Boulder City, NV 89005.

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. Fast service, economical prices. Little Print Shop, Box 9848, Austin TX 78766.

$2.70 per 100 (1000 order). 30 original two-color styles. 125 cards minimum. We ship 2-weeks after your check clears or you may have your money back! Satisfaction guaranteed. Send 30c stamps for catalog. VP5QED Press: Box 1523-Boca Raton, FL 33432.

DISPLAY and protect your QSLs with 20 frame plastic holders. Seven for $3.00 prepaid. TEPABCO, Box 198T, Gallatin TN 37066.

FREE Samples — Stamp appreciated. Samcards, 48 Monte Carlo Dr., Pittsburgh, PA 15239.

CUSTOM printed and photo QSLs, very economical, free samples. Stamps appreciated. 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, 1472 SW 13th Street, Boca Raton, FL 33432.

QSLs Second to none. Same day service. Samples 50 cents. Include your call for free decal. Ray, K7HLR, Box 331, Clearfield, UT 84015.

QSLS — Variety, value, quality, custom, samples and catalog 45c. Alkanprint, Box 3494, Scottsdale AZ 85257.

QSLs — The KØAAB collection plus many new custom designs. Send No. 10, 28c, s.a.s.e. for free samples and prices. Marv WØMGI, 2095 Prosperity Ave., St. Paul, MN 55109.

CREATIVE QSL Cards — Personal attention. Imaginative new designs. Send 50c. Receive catalog, samples. Wilkins Creative Printing, P. O. Box 787-T, Atascadero, CA 93422.

BE SURPRISED — Get a variety of cards — 100 for $5. or 200 for $8. 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.

NAMETAGS — 1-1/2 × 2-1/2 One line $2.50. Each additional line $0.50. 12 colors. Tag-it Co., Box 2062, Indianapolis, IN 46206.

RUBBER stamps $3.50 includes postage. NJ residents add tax. Clinton Hoar, W2UDO, 32 Cumberland Ave., Verona NJ 07044.

NAMETAGS 1" × 3" $3.25. Engraved with name, call letters, QTH. Limit 20 letters per line. Red, blue, yellow black, walnut with white letters. Other colors available. Nielsen Communications Inman, NE 68742.

QUALITY QSLs, Samples 35c. Kleinheinz, 1313 Willow, Chippewa Falls, WI 54729.

QSL cards — Eyeball cards — Rubber stamps — Name tags — Emblems — gift items — free catalog — Rusprint, Box 7575, Kansas City, MO 64116.

QSLs & rubber stamps. All top quality merchandise. QSL samples and stamp catalog 50c. Ebbert Graphics D-3, Box 70, Westerville, OH 43081.

ENGRAVED call pins by AC2P. 1-1/4" × 2-3/4" 2 lines, $1.25; 1-1/4" × 3-1/4," 3 lines, $1.50; 1-1/2" × 3-1/4," 4 lines, $1.75. Assorted colors. Richard Tygar, 5 Chelmsford Drive, Wheatley Heights, NY 11798.

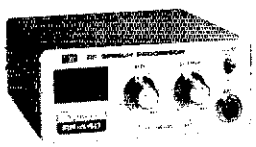
QSLs — Finest Quality. Many colors and cards to choose from. Samples 50c. Specialty Printing, Box 361, Duquesne, PA 15110.

QSL cards. Free samples/brochures. Name tags, 2 lines $2.75. Red, blue, green, black, walnut. Rubber stamps, 4 lines $5. Antenna bearing chart 350 locations (your QTH) $3.50. Red Shed 7603 Ensign, Ft. Wayne, IN 46816.

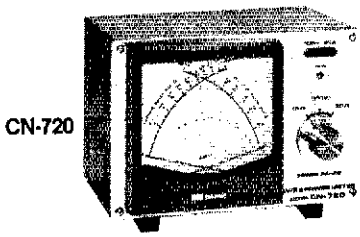
QSLs — Printed from your design — samples 25c. Custom QSLs — 1301 Geil, Des Moines, IA 50315.

QSLFILE is the only way to protect and display your QSLs. Working on DXCC or 5BWAS? QSLFILE shows the countries/states you still need, too. For details, write: QSLFILE, 1472 SW 13th St., Boca Raton, FL 33432.

Now These DAIWA CORPORATION Communications Essentials



RF-440

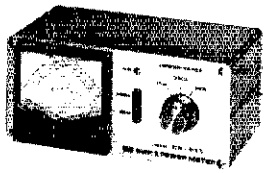


CN-720

SWR & Power Meters Models CN-720, CN-620 and CN-630

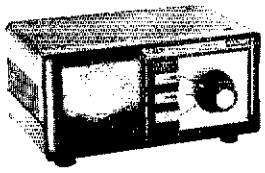
Simultaneous direct reading SWR, Forward Power and Reflected Power.
Tolerance: all units ± 10% full scale
Connectors: SO-239

CN-720 and CN-620
Frequency Range: 1.8—150 MHz
SWR Detection Sensitivity: 5 Watts min.
Power: 3 Ranges (Forward, 20/200/1000 Watts)
(Reflected, 4/40/200 Watts)

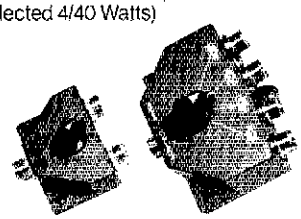


CN-620

CN-630
Frequency Range: 140—450 MHz
Power: 2 Ranges (Forward 20/200 Watts)
(Reflected 4/40 Watts)



CN-630



RF Speech Processor Models RF-440 & RF-660

RF-660

Increases talk power with splatter free operation. RF clipping assures low distortion. **Simply install between microphone and transmitter.**

Talk Power: Better than 6 dB
Frequency Response: 300-3000 Hz at 12 dB down
Distortion: Less than 3% at 1 kHz, 20 dB clipping
Power Requirement: RF-440 self contained
AC power supply: RF-660 13.5V DC external supply.

Coaxial Switches

2 Position/Model CS-201
4 Position/Model CS-401

Professionally engineered cavity construction.
Power Rating: 2.5 kW PEP, 1 kW CW
Impedance: 50 Ohms
Connectors: SO-239
Insertion Loss: Less than .2 dB
VSWR: 1:1.2
Maximum Frequency: 500 MHz
Isolation: Better than 50 dB at 300 MHz; better than 45 dB at 450 MHz; adjacent terminal
Unused Terminals grounded

Available from these authorized distributors...

ARKANSAS
Lavender Distributors
Texarkana (501) 733-4631

CALIFORNIA
Ham Radio Outlet
Anaheim (714) 761-3033
Henry Radio Company
Anaheim (714) 772-9200
Ham Radio Outlet
Burlingame (415) 342-5757
Henry Radio Company
Los Angeles (213) 477-6701
Tower Electronics
Mission Viejo (714) 768-8900
U-do Electronics
Mountain View (415) 968-8894
Conway Electronics
Poway (714) 566-5090
Zakit/Sacramento
Sacramento (916) 446-3131
Ham Radio Outlet
San Diego (714) 560-4900
Omega Radio & Electronics
San Diego (714) 578-3324
Western Radio
San Diego (714) 239-0361
Quement Electronics Inc
San Jose (408) 998-5900
Hauer Electronic Supply
San Francisco (415) 621-0552
H.E.M.E.C.
Santa Barbara (805) 963-3765
Lombards Electronics
Santa Barbara (805) 964-6706
Ham Radio Outlet
Van Nuys (213) 988-2212

COLORADO
CW Electronics
Denver (303) 893-5525

CONNECTICUT
Thomas Communications
Newington (203) 667-0811

DELAWARE
Delaware Amateur Supply
New Castle (302) 328-7728
Amateur & Advanced Communications
Wilmington (302) 478-2757

FLORIDA
Hialeah Communications
Hialeah (305) 887-5936
Quad Electronics
Pensacola (904) 438-3319

GEORGIA
Ack Radio Supply
Atlanta (404) 351-6340

HAWAII
Honolulu Electronics
Honolulu (808) 949-5564

ILLINOIS
Tri-State Electronics Corp.
Mount Prospect (312) 255-0600
Spectronics, Inc
Oak Park (312) 848-6778

IDAHO
Ross Distributing Company
Preston (208) 852-0830

INDIANA
Graham Electronics
Indianapolis (317) 634-8202
The Ham Shack
Evansville (812) 422-0231
Rodefeld Company, Inc
Richmond (317) 966-3505

IOWA
Mid-State Distributing
Des Moines (515) 244-7231

KANSAS
Associated Radio Communications
Overland Park (913) 381-5900
Electronics, Inc
Salina (913) TA 7-7377
Radio Supply
Salina (913) 823-5353
Amateur Radio Supply
Wichita (316) 264-9166

MASSACHUSETTS
You-do-it Electronics
Needham (617) 449-1005
Tufts Radio & Electronics
Medford (617) 395-8280

MICHIGAN
Purchase Radio Supply
Ann Arbor (313) NO 8-8696
Radio Supply & Engineering
Detroit (313) 435-5660
Radio Parts, Inc
Grand Rapids (616) 459-0247

MINNESOTA
Northwest Radio
Duluth (218) 727-1565

MISSOURI
Ham Radio Center
St. Louis (314) 993-6060

NEVADA
Communications Center West
Las Vegas (702) 647-3114

NEW JERSEY
C.H. Electronics Distributing
Clifton (201) 478-9700
Route Electronics 46
Totowa (201) 256-8555

NEW YORK
Genesee Radio & Parts
Buffalo (716) 873-9661
Harrison Radio Corp.
Farmingdale (516) 293-7990
B. C. Communications, Inc.
Huntington Station (516) 549-8833
Barry Electronics
New York (212) WA 5-7000
Harvey Radio
New York (212) 575-5200
S & S Accessories & Parts
New York (212) 354-5889
T & M Electronic Supply
Patchogue (516) 289-2520
Radio World
Oriskany (315) 337-2622
Harrison Radio Corp
Valley Stream (516) 872-9565

OHIO
Universal Amateur Radio
Reynoldsburg (614) 866-4267
Strepco Electronics
Dayton (513) 224-0871

OKLAHOMA
Radio Inc.
Tulsa (918) 587-9123
Kryder Electronics
Oklahoma City (405) 789-1951

OREGON
Portland Radio Supply
Portland (503) 228-9647
Portland Radio Supply
Medford (503) 773-5815

PENNSYLVANIA
Trevose Hamtronics
Trevose (215) 357-1400
"Ham" Buerger, Inc.
Willow Grove (215) 659-5900

TENNESSEE
Amateur Radio Supply
Madison (615) 868-4956
Germantown Amateur Supply
Memphis (901) 452-4276

TEXAS
Wholesale Electronics Supply
Austin (512) 478-9568
Douglas Electronics
Corpus Christi (512) 883-5103
AGL Electronics
Dallas (214) 241-6414
Hardin Electronics
Fort Worth (817) 429-9761
Tracy Electronics
Fort Worth (817) 292-3371
Electrotex
Houston (713) 526-3456
Madison Electronic Distributors
Houston (713) 658-0268
Space Radio Supply
Houston (713) 688-4594
Appliance & Equipment Company
San Antonio (512) 733-0334

UTAH
Ballard Supply
Salt Lake City (801) 972-2430

VIRGINIA
EEB
Vienna (703) 938-3350

WASHINGTON
ABC Communications
Seattle (206) 364-8300
Amateur Radio Supply
Seattle (206) 767-3222

Exclusive USA agent for these units; inquiries invited.

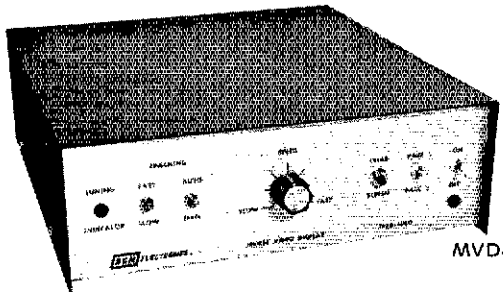
Write for literature.

J. W. Miller Division
BELL INDUSTRIES

19070 REYES AVE. ■ P.O. BOX 5825
COMPTON, CALIFORNIA 90224

MORSE VIDEO DISPLAY

NEW!



MVD-1000 ONLY $350.00 ppd.
(Wis. Res. add 4%)

MORE FEATURES FOR YOUR MONEY

*Copies Morse Code directly from your receiver
*Automatic speed tracking with self calibration, 6-60 WPM
*Manual speed tracking to give operator more control
*Active filters and digital sampling for increased noise rejection
*Operates with any TV set, no expensive monitor needed
*Two 16 line 32 character selectable displays
*1 year warranty on parts & labor
*RTTY, ASCII Options
*Attractive anodized brushed aluminum and gray wrinkle finish case, only 3x10x10 in.

Send For Free Information **Order Yours Today**

Ask About Our MKB-2000 Keyboard

DGM ELECTRONICS

787 Briar Lane, Beloit, Wis. 53511 (608) 362-0410

PREAMP

FOR 2 METER TRANSCEIVERS

MODEL QSA 5

ONLY $41.95

The QSA 5 preamp is a high performance, low noise preamp for improving the receiving sensitivity of 2 Meter transceivers. This preamp features easy installation with no modification to the transceiver required. Can be used with virtually all 2 Meter transceivers and on all modes—FM, SSB, CW or AM. Relays in the QSA 5 automatically bypass the preamp when transmit power is sensed. Available with BNC or SO-239 connectors.

- **Now available from leading dealers.**

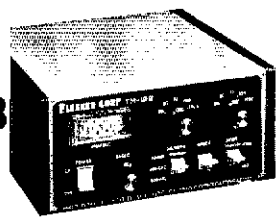
Please add $1.40 shipping and handling on all orders. Prices shown are for USA ONLY. Write or call for FREE CATALOG showing our full line of Preamps, Converters, and Precision Oscillators. Export inquiries (except Canada) should be sent to Extech Ltd., 5319 S.W. Westgate Dr., Portland, OR 97221

JANEL LABORATORIES

33890 EASTGATE CIRCLE•CORVALLIS, OR 97330•(503) 757-1134

FLESHER CORP.

RTTY made easy !



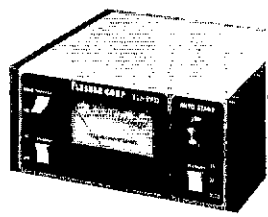
TR-128 NEW FROM FLESHER

***RTTY REGENERATIVE BAUD RATE CONVERTER**

TTL compatible connections for direct hook-up to the TU-170, also adaptable to other units.

- Five standard baud rates
- Stable crystal-controlled oscillator
- 128 Character storage capacity with storage status meter to show buffer fill
- Continuously variable character rate

WIRED $239.95 **Kit $179.95**



TU-170 TERMINAL UNIT

Connect to your receiver speaker, transmitter microphone jack, and teletype machine and you're on the air. Ideal for HF and VHF auto start operation.

- Autostat with threshold control and solid state relay
- Stable audio frequency shift oscillator produces phase coherent sine wave tones
- TTL compatible inputs and outputs for auxilliary equipment
- High level output for scope tuning

WIRED $234.95 **KIT $159.95**

Flesher products . . . the critics choice!

FLESHER CORP.

P.O. Box 976Q Topeka, Ks. 66601 913/234-0198
Add $3.00 for postage and handling.

ANTENNA SALE

WILL EXPORT TO CANADA

HY-GAIN ANTENNAS

TH5DX - New 5-Element Triband Beam	$195
TH6DXX - 6-Element Triband Beam	$210
TH3MK3 - 3-Element Triband Beam	$170
TH3JR - 3-Element Triband Beam	$115
18AVT/WB - 80-10 mtr trap vertical	$ 72

Hy-Gain prices subject to current inventory.

CUSHCRAFT ANTENNAS

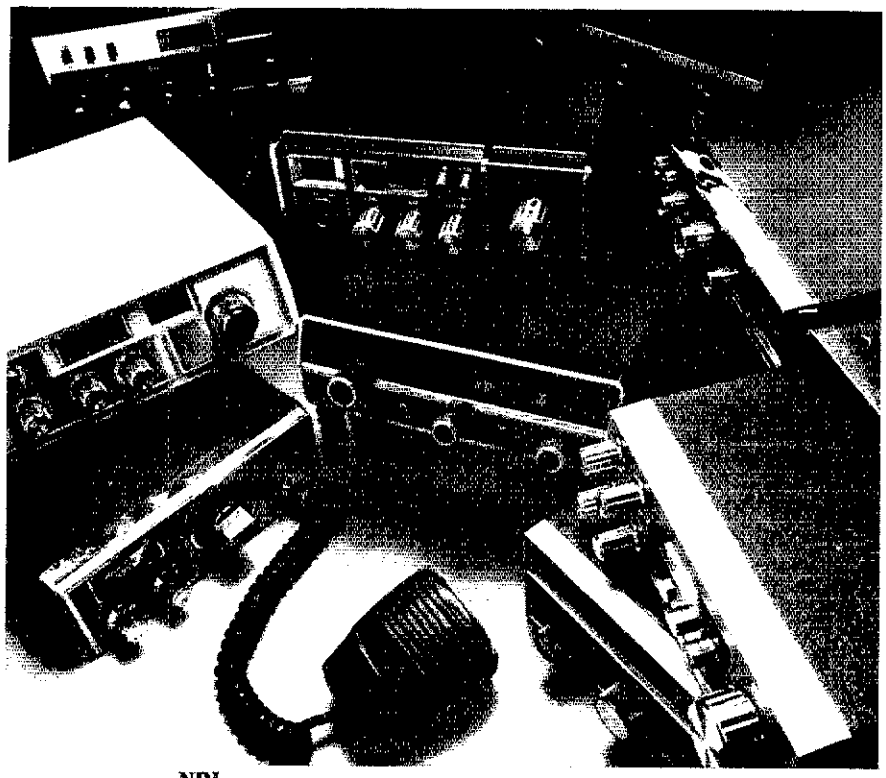
A3219 - New 19-Element 2-mtr 'Boomer'	$ 69
ATB34 - 4-Element Triband Beam	$215
ATV4 - 40-10 mtr vertical	$ 67
ATV5 - 80-10 mtr vertical	$ 85
ARX2 - 2-mtr 'Ringo-Ranger'	$ 30
A147-11 - 11-Element 146-148 MHz Beam	$ 29
A147-22 - 22-Element 'Power-Pack'	$ 86
A144-10T - 10-Element 2-mtr Twist Oscar Antenna	$ 33
A144-20T - 20-Element 2-mtr Twist Oscar Antenna	$ 50
DX120 - 20-Element 2-mtr EME building block	$ 40
CDE HAM II	$115

Price does not include shipping or export duty.

EAGLE ELECTRONICS

(716) 693-9326
MARTY KB2DD
1476 MASTER ST.
N. TONAWANDA, NY 14120

25 million reasons why you should look into NRI training in CB and Communications Servicing.



The CB boom means big opportunities for qualified technicians... learn at home in your spare time.

There are more than 25 million CB radios out there, plus two-way radios, walkie-talkies, and other communications apparatus in use by business and industry, government, police and fire departments. And it all demands qualified technicians to maintain and repair it. In addition to knowing what you're doing, you must have an FCC Radiotelephone License to service most of it. NRI can help you get both... the training and the license.

Learn on your own 2-meter, digitally synthesized VHF transceiver or 40-channel CB.

With NRI, you learn by doing. You build and test a whole series of typical communications circuits, even assemble your own professional transistorized volt-ohm meter and a CMOS digital frequency counter. You also assemble your own 2-meter transceiver for experiments in trouble-shooting and servicing. If you want to go on the air, we'll help you get your amateur license. As an alternate choice, you may elect to receive and experiment with a 40-channel CB to get more experience in this booming area.

You learn in your own home, in your spare time, at your convenience.

NRI's bite-size lessons and carefully matched practical experiments combine theory and bench work to give you the most effective training for your money. No need to quit your job or take night classes.

NRI guarantees FCC license.

The law requires that technicians hold an FCC Radiotelephone License to work on broadcast equipment. NRI training in Complete Communications Electronics or our CB Radio Specialist course is carefully designed to give you the special coaching so helpful in passing FCC license exams. If you fail to pass the FCC examination for radiotelephone license after graduating, *NRI will refund your tuition in full.* The money-back agreement is valid for six months after completion of your course.

Send for free catalog, no salesman will call

NRI can make such a guarantee because we're confident of the quality of our training. Since our founding in 1914, over a million students have chosen NRI technical training as the way to get ahead. You owe it to yourself to see if this new and exciting field holds your future.

Find out the facts about NRI's Communications or CB course. Or look into other areas of opportunity like TV and audio servicing, digital computer electronics, mobile communications, and more. Mail the coupon today... there are more than 25 million good reasons why. If coupon has been removed, write: NRI Schools, 3939 Wisconsin Ave., Washington, D.C. 20016.

NRI McGraw-Hill

NRI Schools
McGraw-Hill Center
for Continuing Education
3939 Wisconsin Avenue
Washington, D.C. 20016

Please check for one free catalog only.
NO SALESMAN WILL CALL

All career courses approved under GI bill
☐ Check for details.

- ☐ TV/Audio Servicing. Choose from 5 courses.
- ☐ Complete Communications Electronics with CB • FCC Licenses • Aircraft, Mobile, Marine Electronics
- ☐ CB Specialists Course
- ☐ Amateur Radio • Basic and Advanced
- ☐ Digital Computer Electronics • Electronic Technology • Basic Electronics
- ☐ Small Engine Repair Course
- ☐ Electrical Appliance Servicing
- ☐ Automotive Mechanics
- ☐ Auto Air Conditioning
- ☐ Air Conditioning, Refrigeration, & Heating including Solar Technology

Name (Please Print) Age

Street

City/State/Zip

Accredited by the Accrediting Commission of the National Home Study Council 19-109

POLY PAKS "SHOP BY MAIL" WITH ITS NEW INFLATION FIGHTIN'

1¢ "ONE CENTERS"

SALE

*Buy any item on this page and get 2nd item of the same cat. no. for only one penny!

1-LASCR OPTO COUPLER, type H11C3, mini dip, (#5700)	1.29	2 for 1.30
3-LINE CORDS, 6 ft. 18 gauge, 2 cond. white w/plug, (#3787)	1.29	4 for 1.30
13-SINGLE PIN MICRO RED LEDS, 100% material, 3 volts @ 10 mils, (#5896)	1.29	30 for 1.30
40-FEEDTHRU CAPACITORS, used for hams, RF, UHF circuitry, (#5847)	1.29	80 for 1.30
40-PLASTIC TRANSISTORS, asst'd untested and hobby, (#2604A)	1.29	80 for 1.30
6-6V INDICATORS, w/leads, test lamp manufacturers excess, (#5893)	1.29	12 for 1.30
40-METAL CAN TRANSISTORS, asst'd types, hobby, untested, (#2603A)	1.29	80 for 1.30
10-UPRIGHT ELECTROS, 100% asst'd values and voltages, (#5900)	1.29	20 for 1.30
40-SEMI-CON SUPRISE, zeners, rectifiers, transistors, etc, U-test, (#2226)	1.29	80 for 1.30
65-STABISTORS, axial, for regulators & computers, U-test, (#3140)	1.29	130 for 1.30
40-SQUARE PC COILS, uprights, assorted values, for PC applications, (#3188)	1.29	80 for 1.30
50-1 WATT ZENERS, 3.3,8,10,12,15V, etc., double plug, untested, (#1964)	1.29	100 for 1.30
4-ROCKER SWITCHES, DPDT, solder eyelet terminals, (#3302)	1.29	8 for 1.30
60-LONG LEAD DISCS, 100% prime, marked capacitors, (#5899)	1.29	120 for 1.30
6-MINI TRANSFORMERS, asst'd outputs, interstage & audio, 1" sq. (#3293)	1.29	12 for 1.30
1-TV/AUDIO SHIELDED CABLE, 2 cond. 15 ft. w/RCA phone plugs, (#5812)	1.29	2 for 1.30
25-DATA ENTRY KEYCAPS, ¾" sq. #'s & functions, asst. colors, (#4013)	1.29	50 for 1.30
2-GE 3W AUDIO AMP, type PA-263 IC chip, mono, (#1522)	1.29	4 for 1.30
1-MERCURY TILT SWITCH, N.C. rated 24VDC @ .05A, w/leads, (#5686)	1.29	2 for 1.30
6-POWER TAB TRIACS, 100% prime, 100V, TO-220, (#5888)	1.29	12 for 1.30
6-POWER TAB SCR's, 100% prime, 100V, TO-220, (#5904)	1.29	12 for 1.30
2-WATCH LCD's, 3½ digit, asst. types, size: 1" x 1½" (approx.) (#3066)	1.29	4 for 1.30
4-TV INTERLOCK JACKS for TV/power mt. ctr, solder tab terms., (#5519)	1.29	8 for 1.30
4-MOS FETS, 3N128, by Fairchild & RCA, TO-18, some duals, (#1686)	1.29	8 for 1.30
4-PHOTO ELECTRIC DARLINGTON TRANSISTORS, 2N5777, (#3276)	1.29	8 for 1.30
6-AC "UTILITY" OUTLETS, for 1¼" mt. ctr., solder lugs, (#3582)	1.29	12 for 1.30
15-NE-2 LAMPS, neon red, for 110VAC, less resistor, (#1435)	1.29	30 for 1.30
20-1N4148 SWITCHING DIODES, 4nS, 100V @ 10mA, axial 100%, (#3000)	1.29	40 for 1.30
2-4 AMP SILICON BRIDGE RECTIFIER, 200V, block style, (#5928)	1.29	4 for 1.30
4-VARACTOR DIODES, var. tuner capacitance, 20-50 pf. (#5887)	1.29	8 for 1.30
50-PRECISION RESISTORS, ½, 1, & 2 watts, 1%, assorted types, (#363)	1.29	100 for 1.30
60-CERAMIC CAPS, asst'd val. & styles, incl; tubulars, NPO's, etc., (#590)	1.29	120 for 1.30
25-PLASTIC SCR's, incl; 200V, untested, high yield, TO-92, (#3192)	1.29	50 for 1.30
40-MOLDED CAPACITORS, tubular, asst'd volt. to 1 mf. axial leads (#3486&2)	1.29	80 for 1.30
60-MICRO ZENER & RECT. KIT, asst'd voltages, only 1/8" sq. U-test, (#1251)	1.29	120 for 1.30
1-LINE CORD, 8 ft. 2 cond, 16 gauge, vinyl molded plug & grommet (#3661)	1.29	2 for 1.30
6-SPDT MICRO SLIDE SWITCH, only 3/7" cube, for PC mount, (#3429)	1.29	12 for 1.30
10-PR.-RCE PLUGS & JACKS, for audio, speakers, etc., (#402)	1.29	20 for 1.30
5-2N3055 HOBBY TRANSISTORS, 100%, TO-3, (#3771)	1.29	10 for 1.30
10-ZENERS, 1 watt 9.1 volts axial leads 100% (#3370A)	1.29	20 for 1.30
40-1N4148, 4 NANO, SWITCHING DIODE, axial leads untested (#5923)	1.29	80 for 1.30
2-RELAYS, BABCOCK 6VDC, SPST, plastic case (#5807)	1.29	4 for 1.30
1-25 AMP BRIDGE RECTIFIER, 50 volts, 100% (#5948)	1.29	2 for 1.30
2-QUADRACS, 10 amp 200 PRV, TO-220 100% (#5915)	1.29	4 for 1.30
60-MINI RESISTORS, 30-1/2W, 30-1/4 watt, axial, color coded, (#5922)	1.29	120 for 1.30
12-SCRS-TRIAC-QUADRACS, asst. volts. TO-220 case (#2087)	1.29	24 for 1.30
10-BULLPLATES, asst. resistor/capacitor networks, various styles, (#5880)	1.29	20 for 1.30
2-AIR TRIMMER CAPS, alum. plates, ½" shaft, panel mt. solder lugs, (#5658)	1.29	4 for 1.30
30-MOLEX CONNECTORS, nylon, asst'd styles, colors, & # of cond. (#5835)	1.29	60 for 1.30
1-3 COND. LINE CORD, 8 ft. flat, w/ring terminals, 2 AC, 1 GND, (#5703)	1.29	2 for 1.30
4-12 VOLT LAMPS, w/leads, popular voltage, 100's of uses, (#5942)	1.29	8 for 1.30
25-TTL IC's, untested, asst'd gates, flip flops, etc. 14-16 pin, (#5955)	1.29	50 for 1.30
20-1000 PIV GLASS AMPS, micro-mini, axial, silicon, rated @ 1A, (#5903)	1.29	40 for 1.30
1-12 VCT 200 mA TRANSFORMER, 115 V prim., PC mount, (#5977)	1.29	2 for 1.30
20-400 mW 15V ZENERS, micro-style, asst. epoxy & glass, 100%, axial, (#5914)	1.29	40 for 1.30
100-UNMARKED CAPS, popular values, mylars & polystyrene, 100%, (#5892)	1.29	200 for 1.30
60-ONE WATT ZENERS, assorted voltages, glass pak, dbl plug, U-test, (#5947)	1.29	120 for 1.30
50-MICRO ZENERS, 1 watt, 2-30V, DO-7 & micro epoxy, axial, 100%, (#5905)	1.29	100 for 1.30
580pc-HARDWARE SURPRISE, asst screws nuts & washers, (#5891)	1.29	1000 for 1.30
60-GLASS AMPS, up to 1KV, 1N4000 series, glass encased, untested, (#5982)	1.29	120 for 1.30
200-PC BOARD PARTS, boards loaded w/100% parts, hobby bonanza, (#5946)	1.29	400 for 1.30
6-RF NPN TRANSISTORS, type-2N1059, BVcbo: 40V, TO-22, 100%, (#5895)	1.29	12 for 1.30
2-BRASS DOOR LOCKS, w/key, for doors windows, etc. 2-1/8" mt. ctr. (#5949)	1.29	4 for 1.30
1-PUSH-PUSH CB SWITCH, DPDT, 1 x ¾ x 3/8", 100's of uses, (#3463)	1.29	2 for 1.30
30-"CRIMP-ON" TERMINALS, rings and spades, for # 12-20 wire, (#3955)	1.29	60 for 1.30
5-CALCULATOR KEYBOARDS, multi-function, 17 keys and up, (#3774)	1.29	10 for 1.30
50-ONE-WATT RESISTORS, popular assort, some 5%ers, 100's of uses, (#3844)	1.29	100 for 1.30
50-METALLIC FILM ½ WATTERS, asst. values, marked, axial leads, (#1605)	1.29	100 for 1.30
4-RIBBON CABLE CONNECTOR, single-sided, 9 contacts, PC leads, (#5967)	1.29	8 for 1.30
3-"SUPER" 2N222's, NPN, ICBO:60V, hfe:100 1W @ 2A, TO-92, 100%, (#5952)	1.29	6 for 1.30
1-12 VDC MINI BLOCK RELAY, spdt, 1 x 3/4 x 5/8", 175 ohm, 1A, (#5937)	1.29	2 for 1.30
10-1.5V GRAIN-o-WHEAT LAMPS, 5/16", w/10" leads, lens: RED, (#6002)	1.29	20 for 1.30
10-IF-FM OP AMPS, by RCA, FM-UHF circuitry, TO-5, 10 leads, (#3951)	1.29	20 for 1.30
10-NPN SWITCHING TRANSISTORS, asst'd gen. audio & switching, (#2595)	1.29	20 for 1.30
1-12 VDC SOLENOID, similar to Guardian 16-P, w/plunger, ¾" stroke, (#6015)	1.29	2 for 1.30
10-HUMBUCKER CONTROLS W/KNOB, for TV vertical, horiz., etc. (#5882)	1.29	20 for 1.30
50-CAPACITOR SPECIAL, discs, mylars, and more, (#3775)	1.29	100 for 1.30
4-HOBBY VOLTAGE REGULATORS, LM-309, 320, 340's, TO-3, (#3330A)	1.29	8 for 1.30
12-PANEL SWITCHES, assorted slides, rotaries, modulars, etc. (#295)	1.29	24 for 1.30
60-RESISTOR SPECIAL, ¼ to 1 watt, carbons, carbo-films, etc. (#35896)	1.29	120 for 1.30
65-HALF WATT RESISTORS, asstd. carbons, carbo-films, various values, (#454)	1.29	130 for 1.30
6-LM340T VOLTAGE REGULATORS, 5 to 24 volts, TO-220, (#5897)	1.29	12 for 1.30
40-POLYSTYRENE CAPACITORS, asst'd values and voltages, (#1052)	1.29	80 for 1.30
15-THERMISTORS, resistors that change with the temperature, (#2048)	1.29	30 for 1.30
65-¼ WATT RESISTORS, asst'd values, metal film, marked, (#5797)	1.29	130 for 1.30
1-12VDC SPDT RELAY, 180 ohm coil, 25 mA, 1x1x1⅛", (#5937)	1.29	2 for 1.30
15-VOLUME CONTROLS, asst. values, audio, and switch too! (#592)	1.29	30 for 1.30
60-PREFORMED DISC CAPS, handy assortment of values, marked, (#1181)	1.29	120 for 1.30
10-AXIAL ELECTROS, assorted values and capacitance, (#5901)	1.29	20 for 1.30
60-GLASS ZENERS, 400mW, untested, better than 50% yield, (#5889)	1.29	120 for 1.30
10-PC TRIMPOTS, screwdriver adjust, assorted values, (#3346)	1.29	20 for 1.30
25-4" CABLE TIES, plastic, like Ty-wrap style, (#5217)	1.29	50 for 1.30
5-CRYSTALS, may include: CB, ham various shapes and sizes, (#5716)	1.29	10 for 1.30
40-POWER RESISTORS, assorted types, includes 2 to 10 watters, (#228)	1.29	80 for 1.30
40-TWO WATT RESISTORS, carbo-films, carbons, some 5%ers, (#436)	1.29	80 for 1.30
50-TERMINAL STRIPS, asst'd solder and screw types, 2 lugs & up, (#334)	1.29	100 for 1.30
1-WATCH GUTS, LED, who knows how good, micro-digital bonanza, (#5115)	1.29	2 for 1.30
10-1000V 1A RECTIFIERS, 1N4007, epoxy case, axial leads, (#5926)	1.29	20 for 1.30
5-MULTI-DIGIT LED READOUTS, bubble magnifier, 2 to 6 digits, (#3624)	1.29	10 for 1.30
10-POWER TAB TRANSISTORS, NPN, plastic, TO-220, (#5629)	1.29	20 for 1.30
6-PRECISION TRIM POTS, asst'd singles and multi-turns, untested, (#3389)	1.29	12 for 1.30
50-1N4000 RECTIFIERS, epoxy, axial leads, untested, (#2594)	1.29	100 for 1.30
30pc.-HEAT SHRINK, Thermo-fit, useful asst. of sizes, shrinks 50% (#5248)	1.29	60 for 1.30
10-SLIDE SWITCHES, SPST, SPDT, etc. all shapes and sizes, (#5927)	1.29	20 for 1.30
25-DTL's, 100% prime, asst'd flip flops, etc., marked, (#3709)	1.29	50 for 1.30
4-HOBBY OPTO COUPLERS, 1500 VOLT ISOLATION, U-test, (#2629A)	1.29	8 for 1.30
8-TAPE RECORDER EARPHONE, for radios, recorders, 8 ohms, (#2946)	1.29	16 for 1.30
5-MICRO-MINI JACKS, in a block, for 2mm sub-mini plugs, (#1437)	1.29	10 for 1.30
5-PL-55 PHONE JACKS, standard bushing, for hams, communications, (#5868)	1.29	10 for 1.30
40-RED DEVIL CAPACITORS, handy assort. of pop. values, axial leads, (#3823)	1.29	80 for 1.30
50-MICAS asst. sizes-n-shapes, incl. "silvers" too! (#373)	1.29	100 for 1.30
10-TRANSISTOR SOCKETS, for npn and pnp types, (#5944)	1.29	20 for 1.30
12-LED DRIVER IC's, similar to 75491, (#3890)	1.29	24 for 1.30
10-MODULAR SWITCHES, Centralab "push-on" type, up to 8PDT, (#3150)	1.29	20 for 1.30
5-"MOTORS MOTORS", small, high speed, asst'd sizes, 3-6VDC, (#2551)	1.29	10 for 1.30
2-HEAVY DUTY LINE CORDS, 8 ft., 2 cond., 18 gauge, black insulation, (#5803)	1.29	4 for 1.30
10-LED SOCKETS, "snap-in" minis, for LEDS, and transistors, too! (#5745)	1.29	20 for 1.30
10-MV-54 MICRO-MINI LEDS, flat top style, diffused red lens, (#1789)	1.29	20 for 1.30
30-WIRE NUTS, twist-on's, for #20-24 gauge wire, (#3724)	1.29	60 for 1.30
2-ALUM. HEAT SINKS, 2¾"x3", for power tabs, innumerable uses. (#5338)	1.29	4 for 1.30
1-"MICRO MINI" METER, ½" dia. 0-1 basic movement (#5858)	1.29	2 for 1.30
2-DOUBLE-SIDED PC BOARDS, 3"x12" high quality G-10 glass, (#5694)	1.29	4 for 1.30
60-TUBULAR CAPACITORS, asst'd 100mmf to .1mf to 600 WVDC, (#35A219)	1.29	120 for 1.30
6-MICRO MINI REED SWITCHES, 1" long, for alarms, relays, etc., (#1258)	1.29	12 for 1.30
10-TANTELUM ELECTROS, asst'd mini, axial, hermetically sealed, (#5848)	1.29	20 for 1.30
50-DISC TYPE CAPS, incl; NPO, hi-Q, mylar, ceramics, asst'd values, (#437)	1.29	100 for 1.30
60-COILS & CHOKES, asst'd RF, OSC, IF, parasitic types. (#35A297)	1.29	120 for 1.30
6-SWITCHCRAFT PHONO JACKS, hi-Q, chasis mount, teflon base, (#5119)	1.29	12 for 1.30
1-TO-3 HEAT SINK, heavy duty aluminum, prepunched for TO-3, (#4083)	1.29	2 for 1.30
65-MOLEX SOCKETS, "on-a-strip", for multiple pin dips, (#1609)	1.29	130 for 1.30
6-PAIRS 9V BATTERY CLIPS, w/red & black color-coded leads, (#2852)	1.29	12 for 1.30
1-UHF TUNER, 3 gang, uhf TV unit, 300 ohm, pos. direct drive, (#2927)	1.29	2 for 1.30
15-HUMBUCKER CONTROLS, assorted values, manufacturers dump, (#3807)	1.29	30 for 1.30
30-SUBMINI IF TRANSFORMERS, slug tuned, shielded, (#35A9)	1.29	60 for 1.30
15-"POP" OPTICAL LENSES, plano-convex, 1" dia., plastic, (#5643)	1.29	30 for 1.30
40-ADJUSTABLE FERRITE CORES, center cut for hex adjust, (#5701)	1.29	80 for 1.30
3-1.5V MINI LAMPS, only 3/32" dia., draws 15mA, w/1" wire leads, (#5693)	1.29	6 for 1.30
30-FT. WIRE-WRAP WIRE, 30 guage, insulated, continuous length, (#3803)	1.29	60 for 1.30
4-MONO TAPE HEADS, may incl; cassette, 8-track, reel to reel too! (#5789)	1.29	8 for 1.30
5-DUAL DIGIT "BUBBLE" READOUTS, HP5082 style, red, dip type (#5748)	1.29	10 for 1.30
40-METAL & PLASTIC TRANSISTORS, asst'd sizes (#1965)	1.29	80 for 1.30
2-HI PWR. TRANSISTORS, Motorola type, MJ3201, NPN 15W, TO-66, (#2797)	1.29	4 for 1.30
60-GERM. GLASS DIODES, similar to 1N34, axial leads, untested, (#642)	1.29	120 for 1.30
40-1N914 SWITCHING DIODES, silicon, 4nS, glass, untested, (#143)	1.29	80 for 1.30
4-AM/FM VARIABLE COND., 2 bands, "poly-con" ¾" square, (#2924)	1.29	8 for 1.30
3-MICRO SWITCHES, SPST, NO contacts, plunger style, solder tabs, (#5785)	1.29	6 for 1.30
10-MULTI-GANG POTS, audio 2 gangs and up, asst'd types and values, (#5326)	1.29	20 for 1.30
10-MAN-3's, 7 segment, w/bubble magnifier, 100% material, (#3842)	1.29	20 for 1.30
3-PL-259 COAX PLUG, mates to SO-239, Amphenol, (#5221)	1.29	6 for 1.30
1-LITE SENSITIVE UNIJUNCTION TRANSISTOR, programmable, (#5719)	1.29	2 for 1.30

FANTASTIC? YOU BET IT IS! LOOK WHAT YOU GET FOR 1¢ MORE!

"TIE-PIN" CONDENSER MIKE 2 for $3.96

It's a little giant in sound quality. Metal encased, and omnidirectional. Frequency response 20-20,000 Hz. Less tie pin or tapel clip. 600 ohm impedance. 1.5 VDC. Cat. No. 87J0

¾" dia. x ½"

$3.95

25 AMP BRIDGE RECTIFIERS

	PIV	SALE	2 FOR
☐	25	1.25	1.26
☐	50	1.95	1.96
☐	100	2.25	2.26
☐	200	2.95	2.96
☐	400	3.50	3.51

Order by Cat. No. 2272

Sorry, no cheating — ¾ voltage

HOW TO ORDER When ordering, always use catalog number, type no., the name of the magazine you are ordering from and the month

HY - GAIN ONE ARM BANDIT MIKES

Only $14.99

2 FOR $15

Take one hand command of your mobile or base rig with Hy-Gain's One Arm Bandit Mike. ON/OFF, VOLUME, SQUELCH, CHANNEL SELECTOR, SPEAKER, and DIGITAL DISPLAY are all conveniently located where your fingers do the talking. Comes with 8 ft. multi-conductor, color-coded, coiled cable, (separate) for easy integration into any type of rig. Size: 4¼" x 2¼" x 1¼". Wt. 9 oz. No. 92CUS866

ULTRASONIC TRANSDUCER 2 for $7.98

$3.98 $3.99

Perfect for dozens of projects, including remote control devices, alarms, etc. Sends and Receives! 1" diameter, ¾" deep, with standard RCA type phone jack. Wt. 2 oz. Cat. No. 92CUS878

40 CHANNEL CB ON A BOARD

$12.50 2 FOR $12.51

WITH SWITCH

Poly Paks buys up factory close-out from Hy-Gain . . . so you gain! Boards have: Heatsinked 9 Watt Amp Chip, RF and Mod. Transistors, and Motorola MC series PLL. May be used for 10 meter conversion, (see continuing series "CB to 10" in 73 magazine) The parts alone make it an offer you can't refuse. Wt. 9 oz. Cat. No. 92CUS854

"SKINNY-TRIMS" POTENTIOMETERS

3/8" square single turn style screwdriver adjust. 20% tolerance. 0.5 Watt ratings. cermet construction. PC leads. ORDER BY CAT. NO. AND VALUE

Cat. No. 92CUS868

6 for $2.49

12 for $2.50

Types-62

	SINGLE	TURN FLAT
1Ω	100	1K
5K	25K	200K
20	200	2K
10K	50K	500K
50	500	2.5K
20K	100K	1 Meg

POLY PAKS®

COD's MAY BE PHONED!

P.O. BOX 942-MIO
SO. LYNNFIELD, MA
01940

Terms: Add Postage Rated: Net 30

Phone: (617) 245-3828

Retail: 16-18 Del Carmine St, Wakefield, MA

MINIMUM ORDER: $8

LEDS! LEDS! LEDS!

YOUR CHOICE 5 for $1.29
1¢ SALE 10 for $1.30

Cat. No.	Type
1788	MICRO TOPHAT RED
1802	MICRO SINGLE PIN RED
1948	MICRO YELLOW
2138	JUMBO RED
2136	JUMBO TAPER RED
2137	MICRO RED
1944	Jumbo Yellow
2138	Jumbo Green

1N4000 Epoxy Rectifiers

Cat. No.	Type	Volts	Sale	1¢ SALE!
2377	1N4001	50	10 for $.75	20 for $.76
2378	1N4002	100	10 for .85	20 for .86
2379	1N4003	200	10 for .95	20 for .96
2380	1N4004	400	10 for 1.19	20 for 1.20
2381	1N4005	600	10 for 1.39	20 for 1.40
2382	1N4006	800	10 for 1.49	20 for 1.50
2383	1N4007	1000	10 for 1.59	20 for 1.60

$12.50 2 for $12.51

DIAL DESK TELEPHONE

less hall and control

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.

General

CANADIAN surplus catalogs. Jam packed with goodies. Rush $1. Etcox Electronics 183G Hymus, Pointe Claire, Quebec H9R 1E9.

CANADA'S NEWEST — October opening special Tempo S1 — $469.00. Low, low prices on all amateur lines 506-652-5753. Ham Radio Atlantic, P. O. Box 755, Saint John N.B. E2L 4B3.

SPIDERS for boomless quads. Heliarc welded aluminum. Al's Antennas, 1339 South Washington Street, Kennewick, WA 99336.

NOVICES: Need help for General Ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License instruction, P. O. Box 6015, Norfolk, VA 23508.

WE Buy Electron tubes, diodes, transistors, integrated circuits, semiconductors. Astral Electronics, 321 Pennsylvania Ave., Linden, NJ 07036. 201-486-3365.

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 interesting! Next 7 issues $2. Ham Trader Yellow Sheets, 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, 1-8th St., Pelham NY 10803.

ARCOS — Amateur Radio Components Service. Parts and assemblies for transmitting converters and power amplifiers for OSCAR and vhf-uhf. Elmac, DowKey, Bird, Amphenol, KLM. S.a.s.e. for catalog. Fred Merry (W2GN) 35 Highland Drive, East Greenbush, NY 12061.

RALPH Hicks, W5BCO, Dealer: Motorola, Atlas and Magnus ssb. P. O. Box 15633, Tulsa, OK 74112. 918-582-1333.

MANUALS for most ham-gear made 1937/1970. Send 25c coin for 16 page "Manual Catalog" postpaid. H. I. Inc., Box Q864, Council Bluffs, IA 51501.

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.

KEYER Kits $12.95 to $24.95. Iambic, dash override, dot/dash memories. S.a.s.e. for information. MSC, 1304 Toney Drive, Huntsville, AL 35802.

TEST Equipment Catalog listing used Tektronix, HP and GR equipments at bargain prices. PTI, Box 8699, White Bear Lake, MN 55110. Price $1 refundable with first order.

MOTOROLA Wanted: I need Micors, Motracs, HT 220's, "MX's" or any Motorola equipment and parts. Radios must have serial plates. Len Rusnak, WA3TJO, 9605 Dubarry Avenue, Seabrook, MD 20801. 301-441-1221.

HAM-BONE Radio. See us last for your best price on all Yaesu, Drake, ICOM, Midland, Swan, Ten-Tec, Mini-products. Amcomm, KLM, HyGain, Cushcraft, Dentron, Nye, Telco, Lindsay, MFJ, W2AU, Larsen, Hustler. Complete in House 2-Way Service Shop. 73, Lee, WA2ACF; Art, WB2YPP. Ham-Bone Radio, 3206 Erie Blvd. East, Syracuse, NY 13214. 315-446-2266.

PREPARING for FCC exams? You need Posi-Check. Has been getting the job done for 15 years. Expertly devised multiple choice questions and diagrams covering last study materials released by FCC for current exams. IBM sheets for self testing, keyed answers with explanations. Same day service! First class mailing prepaid USA. Send check or money order with order. Novice, $4.95; General, $5.95; Advanced $6.10; Extra, with addendum for previously unscheduled questions, $6.95. Addendum alone, $1.25, also Radiotelephone Third Class, Elements 1, 2 and 9, $7.95. Posi-Check, P. O. Box 3564, Urbandale Station, Des Moines, IA 50322.

WANTED: Hallicrafters receivers, transmitters, parts, accessories and manuals for private collection. C. Dachis, WD5EOG, 4500 Russell, Austin, TX 78745.

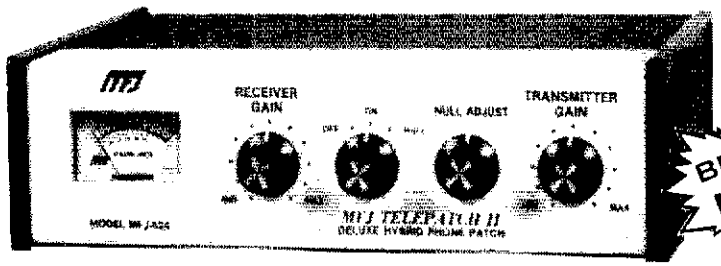
BUY-Sell-Trade. Send $1 for catalog. Give name, address and call letters. Complete stock of major brands — New and reconditioned amateur radio equipment. Call for best deals. We buy Collins, Drake, Swan, etc. Associated Radio, 8012 Conser, Overland Park, KS 66204. 913-381-5900.

WANTED: Early spark gap transmitter, 1915-1925, complete, or parts for wireless museum. Jim Kreuzer, 1428 Main Rd., Cortu, NY 14036. 716-752-8472.

NEW MFJ-624 Deluxe Hybrid Phone Patch

Feature Packed: VU meter for line level and null. Has receiver gain, transmitter gain, null controls, bypass switch. Beautiful hum-free audio. RF filtered. VOX or push-to-talk. Works with any rig. Simple patch-in-patch-out installation.

Crisp, clear hum-free audio is what phone patching is all about and MFJ has it.



BRAND NEW

$59.95

This new MFJ-624 Telepatch II hybrid phone patch gives you a combination of performance, features, and quality that you won't find in other phone patches.

PERFORMANCE: Gives you crisp clear, hum-free audio which is what phone patching is all about. Use automatic VOX or push-to-talk. RF pi-filters and PC board construction eliminates RF feedback. Works with any rig.

FEATURES: VU meter monitors telephone line level to prevent crosstalk between telephone channels. Also lets you adjust null depth for maximum isolation between receiver and transmitter.

Separate transmitter and receiver gain controls eliminate readjusting rig's controls after patching.

Null control for maximum isolation.

Function switch: OFF for normal operation. **ON** connects your rig to phone line for patching. **NULL** switches VU meter to let you adjust for maximum null.

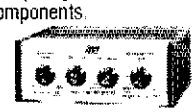
Simple 2 cable installation (plus phone line) when rig has patch-in-patch-out jacks. Connects easily to **any** rig.

Phone jacks for patch-in-patch-out, speaker, microphone. Screw terminals for phone lines.

Eggshell white, walnut sides. 8x2x6 inches.

QUALITY: Every single unit is tested for performance and inspected for quality. Solid American construction, quality components.

MFJ-620 TELEPATCH HYBRID PHONE PATCH. Same as MFJ-624 but less VU meter. 6x2x6 inches. $49.95 plus $3.00 shipping and handling.



One year unconditional guarantee.

Order from MFJ and try it — no obligation. If not delighted, return it within 30 days for refund (less shipping).

Order today. Call toll free 800-647-1800. Charge VISA, MC or mail check, money order for $59.95 plus $3.00 shipping for MFJ-624 and $49.95 plus $3.00 shipping for MFJ-620.

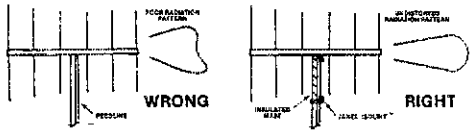
CALL TOLL FREE ... 800-647-1800

For technical information, order/repair status, in Miss., outside continental USA, call 601-323-5869.

MFJ ENTERPRISES, INC.
BOX 494, MISSISSIPPI STATE, MS 39762

JANEL ISOLINE™

2 Meter Feedline Isolator



Now, eliminate losses and pattern distortion caused by coupling between the feedline and beam . . . the ISOLINE's™ unique double balun arrangement breaks the feedline into a non-resonant section allowing single vertical beams to feed with coax line down the center . . . without interaction.

Specifications

Frequency	144-174MHz
Power	150 Watts
Impedance	50 Ohms
Cable	PTFE Coax
Connectors	SO-239

- **Now available from leading dealers.**

ONLY $14.95

Plus shipping and handling includes. Mounting brackets. Insulated mast not included.

JANEL LABORATORIES

Please add $1.40 shipping and handling on all orders. Prices shown are for USA ONLY. Write or call for FREE CATALOG showing our full line of Preamps, Converters, and Precision Oscillators. Export inquiries (except Canada) should be sent to Extech Ltd., 5319 SW Westgate Drive, Portland, OR 97221.

VISA

33890 EASTGATE CIRCLE•CORVALLIS•OR 97330•(503) 757-1134

LARUE ELECTRONICS ICOM HEADQUARTERS

ICOM ACCESSORIES: BC-15 NI-CAD BATTERY PACK AND AC WALL CHARGER FOR IC-202S AND IC-402 $49.95. BC-20 NI-CAD BATTERY PACK AND DC/DC CHARGER FOR IC-202S, 215, 402 AND 502 $49.95. EX-1 EXTENSION TERMINAL FOR IC-211/701 $39.00. HP-1 HEADPHONES FOR IC-211/701 $38.00. MOBILE MOUNTS: IC-202S, 215, 402 AND 502 $16.95; IC-22S AND IC-280[W/EXTRA DC POWER CORD] $19.95; IC-211 AND IC-701 $16.95. SM-2 ELECTRET CONDENSER GOOSENECK BASE MICROPHONE FOR ANY ICOM 4-PIN MICROPHONE RADIO $39.00. WC-215 AC WALL CHARGER FOR IC-202S, 215, 402 AND 502 [IF BC-20 IS USED] $14.95. BIRD MODEL 43 AND 4431 WATTMETERS, TABLE-1 ELEMENTS AND CC-1/EC-1 CARRYING CASES. CUSHCRAFT ANTENNAS. ANTENNA SPECIALISTS 2-METER AND 450 MHZ. MOBILE AND FIXED STATION ANTENNAS. CDE ROTATORS: T2X TAILTWISTER $219.00, HAM-IV $149.00, CD-45 $109.00, AR-22-XL $59.00. W2AU/W2VS ANTENNA PRODUCTS: BALUN [1:1] OR [4:1] $14.95; ANSULATOR $9.75; ENDSULATOR $3.50/PAIR; KW-10, KW-15, KW-20 AND KW-40 ANTENNA COILS $21.95/PAIR; 10 THROUGH 80 METER DIPOLE KIT $48.25. BELDEN COAX AND ROTOR CABLE. BARKER & WILLIAMSON COAX SWITCHES AND DIPOLE KITS. VHF ENGINEERING BLUE LINE AMPLIFIERS FOR 2-METERS [AM/FM/SSB/CW]: BLC-2/70 $184.95; BLC-10/70 $159.95; BLC-10/150 $269.95; BLC-30/150 $249.95. VHF ENGINEERING 2-METER FM AMPLIFIER [10W IN, 40W OUT] PA4010H W/T $74.95. VHF ENGINEERING POWER SUPPLIES: PS-15C W/T $134.95; PS-25C W/T $169.95; PS-25M $189.95. MANY OTHER VHF ENGINEERING KITS AND W/T UNITS ALSO AVAILABLE. HAM-KEYS: HK-1 $29.95; HK-2 $19.95; HK-3 $16.95; HK-4 $44.95; HK-5A ELECTRONIC KEYER $69.95. CES 230A MICROPAD $39.95 and 235 MICRODIALER $69.95. SHURE 444 MICROPHONES $39.00. RADIO AMATEUR CALLBOOKS. ARRL PUBLICATIONS. AMECO BOOKS AND CODE TAPES. ALL PRICES QUOTED IN THIS AD WILL INCLUDE UPS/INSURANCE CHARGES.

LaRue Electronics, 1112 GRANDVIEW STREET, SCRANTON, PA. 18509 - Ph. [717]343-2124

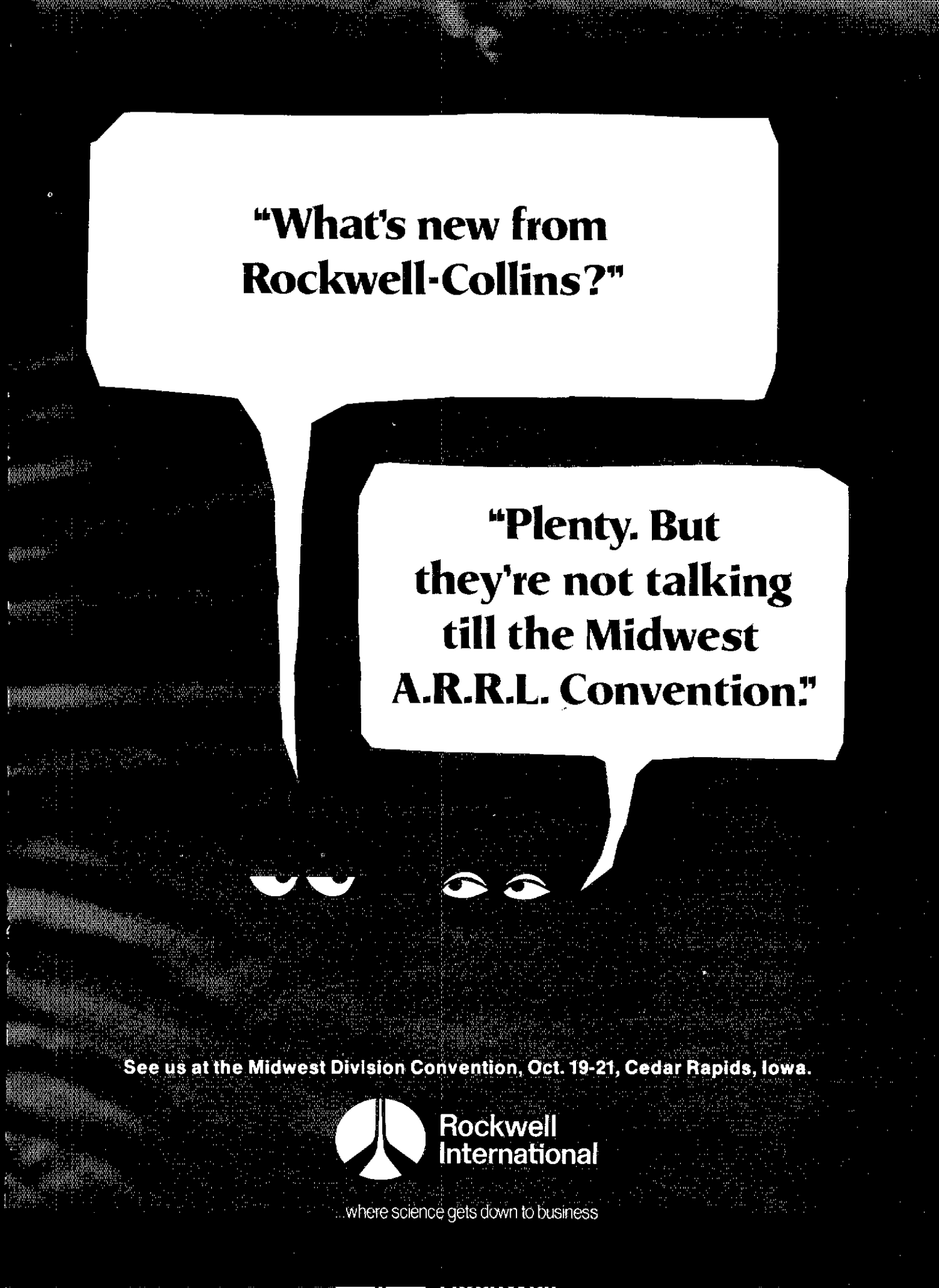
ege, inc.

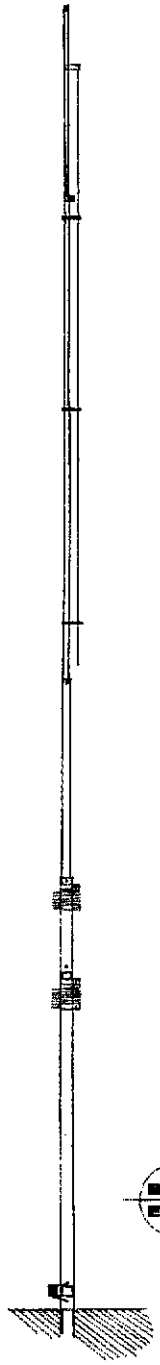
OCTOBER SALE

HY-Gain Antennas		
TH6DXX Triband Beam		$231.33
TH3MK3 3 Element Beam		166.04
TH5DX 5 Element Beam		187.71
18AVT/WB 10-80 Vertical		74.52
14AVQ/WB 10-40 Vertical		50.74
"Long John" Mono Banders		Write
Cushcraft Antennas		
ATB-34 Triband Beam		213.19
ARX-2 Ringo Ranger		29.38
A32-19 2m "Boomer" DX Beam		66.90
A147-11 11 element 2m		27.16
Mini Quad HQ-1		129.95
Alliance HD73 Rotor		97.35
MFJ Products — Tuners		
984	3KW Deluxe Tuner	263.37
982	3KW Tuner - switch	175.22
981	3KW Tuner - mtr	175.22
980	3KW Tuner	148.94
962	1.5 KW Tuner mtr/sw	140.17
961	1.5 KW Tuner switch	122.64
949	300 watt deluxe	104.50
Other MFJ Items 12% off list.		
Cable - RG8/U Foam 95% Shield		18.9c/Ft.
RG58 A/U Foam		5.8c/Ft.
8 wire Rotor		11.1c/Ft.
CES - Microdialer 235A		$ 62.97
Micencoder 230A		36.21
Bencher paddles - Black		34.33
Telex Headsets - Headphone		
C610 Headphone		8.46
C1210 Headphone		22.94
C1320 Headphone		32.01
CM610 Headset w/mic.		36.04
CM1210 Headset w/mic.		47.69

Hustler and Taylor antennas also. Write or call for a flyer. Terms: Prices do not include shipping. VISA and MasterCharge accepted. 2.5% discount for prepaid orders (certified check or money order). COD fee $2.00 per order.

2410 Drexel Street
Woodbridge, Va. 22192
(703) 494-7949


"What's new from Rockwell-Collins?"
"Plenty. But they're not talking till the Midwest A.R.R.L. Convention."
See us at the Midwest Division Convention, Oct. 19-21, Cedar Rapids, Iowa.
Rockwell International
...where science gets down to business



WHY PAY

FULL PRICE FOR AN 80-10 METER VERTICAL...

. . . if you can use only 1/3 of it on 10?
. . . or only 1/2 of it on 20?
. . . or only 3/4 of it on 40?

Only Butternut's new HF5V-III lets you use the entire 26-foot radiator on 80, 40, 20 and 10 meters (plus a full unloaded quarter-wavelength on 15) for higher radiation resistance, better efficiency and greater VSWR bandwidth than conventional multi-trap designs of comparable size.

The HF5V-III uses only two high - Q L-C circuits (not traps!) and one practically lossless linear decoupler for completely automatic and low VSWR resonance (typically below 1.5:1) on 80 through 10 meters, inclusive.

And for completely automatic operation on 160 through 10 meters, simply install the TBR-160 M unit at the base of the HF5V-III ! (What other vertical offers you a "top band" option plus simultaneous resonances on 80 through 10 meters?)

For further information, including complete specifications on the HF5V-III and other Butternut antenna products, ask for our latest free catalog. If you've already "gone vertical" and are happy with your present system, ask for one anyway - - there's a lot of information in it about vertical antennas in general, ground and radial systems, plus helpful tips on installing any vertical on rooftops, on mobile homes, etc.

Suggested Amateur Net: HF5V-III - - $98.00* (available 15 Oct.)
TBR-160 - - $34.50

*An export/DXpedition version suitable for surface parcel post shipment outside the USA - - or as "hand luggage" - - is available at a slight additional cost.

BUTTERNUT ELECTRONICS COMPANY
Route 1 Lake Crystal, Mn. 56055 Phone: (507) 947-3126

VISA

"CHOICE OF THE DX KINGS"

the CUBEX **Skymaster** FIBERGLASS QUAD KITS

2 ELEMENT— 3 BAND KIT SPECIAL

ONLY **$159.95** FOB Calif.

CONTENTS

- 8 Fiberglass Arms, 1 pc. White 13 ft.
- 2 End Spiders (1 pc. castings)
- 1 Boom/Mast Coupler, 2" to 2"
- 16 Wraplock Spreader Arm Clamps
- 1 CUBEX QUAD Instruction Manual (Boom and wire not included)

MK III 2 EL COMPLETE "PRE-TUNED" QUAD ONLY $209.95!

2-3-4 or more element Quads available. Send 25¢ (cash or stamps) for complete set of catalog sheets, specs & prices.

CUBEX COMPANY
P.O. Box 732, Altadena, California 91001
Phone: (213) 798-8106 or 449-5925

YOU CAN'T SAY "QUAD" BETTER THAN "CUBEX"

ALDELCO ELECTRONICS COMPANY

RF DEVICES

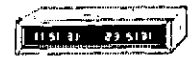
2N5913 1.7W 175 MHz	$1.70	2N6080 4W 175 MHz	5.40
2N3866 1W 400 MHz	1.25	2N6081 15W 175 MHz	8.45
2N5589 3W 175 MHz	4.75	2N6082 25W 175 MHz	10.95
2N5590 10W 175 MHz	7.80	2N6083 30W 175 MHz	12.30
2N5591 25W 175 MHz	10.95	2N6084 40W 175 MHz	16.30

OVERVOLTAGE PROTECTION. OV-12 Provides protection from runaway Power Supply Voltage. Triggers @ 16V. 25 Amp rated. 1 piece moulded unit for 12 Volt DC fused Power Supply **$7.95** OV-5 for 5 Volt PS triggers at 7V **$8.95** Other Voltages **$9.95**

ACCUKEYER KIT. Similar to Handbook version. Includes PC Board, IC's, Sockets & all parts. Includes sidetone on board, iambic operation dot dash memory. **Still Only $19.95**

NEW MEMORY KIT. 1056 bit memory expandable to 4224 bits. 1 2102 supplied. Additional chips $1.25 each. Led indicator. Adaptable to other keyers. Uses 5VDC. **Still Only $19.95**

Dual digital 12 or 24 HOUR CLOCK KIT. NOW WITH A NEW WALNUT WOOD GRAIN CABINET. Model ALD 5-W. Six Big 0.5 Displays. Only **$49.95** 12 or 24 Hour Operation — Each Clock controlled separately. Freeze Feature for Time Set — Easy assembly for clock and Cabinet.



5 Pin Din Accessory Cord and Plug. Fits KDK	$4.95
Eight position crystal socket holds HC25U type	$ .79

ALARM CLOCK KIT. Six 0.5 LED Display Readouts. Elapsed Time indicator. 12 Hour Format with 24 Hour Alarm Snooze feature. AM/PM indicator. Power Supply power failure indicator. Only **$21.95**

12 or 24 Hour Clock Kit. 0.5 Display LED's	$19.95
Wood Grain Cabinet	$4.95

TUNABLE AMATEUR TV CONVERTER. Receive Fast Scan ATV in the 420 MHz Band with any TV Set. Low noise high gain Amplifier stage with Varactor Tuned input and output. Built-in 110 VAC Supply. Two Tone Walnut & Beige Cabinet measuring 1-7/8" × 4-1/4" × 4-1/8". Factory Wired & Tested. 2 Year Guaranty **Only $59.95**

Lunch Counter Kit (boards & front panel only)			$12.50
11C90 Prescaler	$14.50	1 MHz crystal	$ 7.95
74C925 Multiplex	$ 9.95	10-60 PF trimmer	$ .60
F9368 Drivers (2)	$ 7.90	704 displays, each	$ 1.25
Resistor Kit	$ 1.75	Capacitor Kit	$ 6.00

Add 6% for Shipping. Min. Order $10.00. Out of USA send Certified Check or Money Order. Include Postage.

ALDELCO
2789Q Milburn Avenue, Baldwin, NY 11510
(516) 378-4555
Send 1st class stamp for our catalog.

NEW UPDATED EDITION

PASS FCC EXAMS

TESTS-ANSWERS FOR FCC FIRST AND SECOND CLASS COMMERCIAL LICENSE

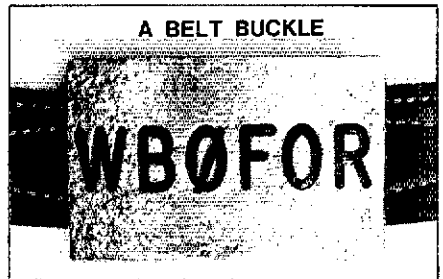
The Original FCC Tests-Answers exam manual that prepares you at home for FCC First and Second class Radiotelephone licenses. Newly revised multiple-choice exams cover all areas tested on the actual FCC exam. Plus "Self-Study Ability Test." Proven! $9.95 Moneyback Guarantee.

COMMAND PRODUCTIONS
RADIO ENGINEERING DIVISION
P.O. BOX 26348-T SAN FRANCISCO, CA 94126

Please rush me Tests-Answers for FCC First and Second Class Commercial License. My $9.95 is enclosed.

Name _____
Address _____
City _____ State ___ Zip _____

A BELT BUCKLE



APPROX. SIZE 2¼ x 3¼ INCHES
CAST IN SOLID BRONZE
ENGRAVED WITH CARE

This buckle can be yours for only $12.50, plus $1.00 for postage.
COLO. RES. ADD 3%
COLORADO SILVER CO., DEPT. B
P.O.BOX 1755, ASPEN, CO. 81611

FREE-Fascinating Electronics Idea Book — hundreds of unusual parts & surplus items unavailable in stores or catalogs anywhere. Bargain prices on everything. Write today for latest issue. ETCO Electronics, Dept. 075, Box 762, Plattsburgh, NY 12901.

FREQUENCY Allocation Chart. See how the entire radio spectrum is used. 2 kHz to 200 GHz. Send $3. Collins Chart Co. Box 935 Coronado, CA 92118.

QUAD Kits, $16.25 to $30. Send s.a.s.e. for information. WAC, 404 Sanders Rd., SW, Huntsville, AL 35802.

REPLACE rusted antena bolts with stainless steel. Small quantities, free catalog. Elwick, Dept. 353, 230 Woods Lane, Somerdale, NJ 08083.

MOBILE Ignition Shielding gives more range, no noise. Kits and custom systems. Literature. Estes Engineering, 930 Marine Dr., Port Angeles WA 98362.

TRS-80 programs, DXCC, WAS tracking. Dup-search, log contests. List $1.00 refundable. WA4PYF Box 145, Lithonia, GA 30058.

B&K TEST equipment. Free catalog. Free shipping. 15 percent discount. Spacetron-BZ, 948 Prospect, Elmhurst, IL 60126.

OWNER Repair of Amateur Radio Equipment book, $7.95. One repair easily recovers cost. K6RQ, 14910 LG Blvd, Los Gatos, CA 95030.

WANTED: Telrex ants. State model, condition, price, etc. W5WMU, 305 Silverbelle, Lafayette, LA 70501.

SSB Linear amp 1.6-32 mc. final 4CX3000 with filament, screen supply. Required HV supply. Send for information 1.00 John Link (W4BME), 1081 Aron St., Cocoa, FL 32922.

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, Atlas, ICOM, Dentron, MFJ, Tempo, Regency, Hy-Gain, Mosley, Alpha, 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 2001, Terre Haute, IN 47802. 812-238-1456.

HOSS-Trader Ed says "We refuse to be undersold: Big-Sale, the Hoss needs folding money. Shop around for the best price then telephone the Hoss last." New Atlas 210X transceiver $489. New Drake C-Line, T4XC, R4C and AC-4, regular $1548, cash price $1295. New Rohn 50 foot fold over tower, prepaid, $595. Used Mosley TA-33 beam $149. Used Ham-4 rotor $109. New Kenwood transceiver: 120-S, regular $699, cash $629. New Alpha linear $1209. Specials: New DenTron 2000 watt linears $509. Drake R4C $569. New Drake TR-7 transceiver $1219. New Dentron GLA-1000 linears $299. RG8-U coax 19c foot. Used Kenwood 120-S $595. Alliance HD-73 ham rotors, regular $165, cash $99.95. Moory Electronics Company, P. O. Box 506, DeWitt, AR 72042, Tel: 501-946-2620.

WANTED: R390, R-390A radio receivers. New or used. Parts, manuals, etc. Trade for new amateur equipment. Communications Technology Group Inc., 448 Merrick Road, Oceanside, N.Y. 11572. 516-536-5724.

HAM Radio Repair. Expert repair and alignment in our modern full-time lab. Prompt, reasonable. "Grid" Gridley, W4GJO, 3824 Malec Circle, Sarasota, FL 33583. 813-922-1781.

AMATEURS Buy/sell exchange — Quickly buy/sell used amateur radio gear! Send $2., long s.a.s.e, for latest classified flyer. Buy, sell, trade equipment fast! Nationwide advertisers pay only $1 for each item listed. Write: ABSE, Box 374-A, Visalia, CA 93279.

HRO-500 mint $900. 51S1 $900 or trade. AC4R, P. O. Box 570949, Miami, FL 33157.

TR-7, IC-701, Omni, Swan Astro-150, Wilson Mark II/IV, IC-211, UV-3, Clipperton-L, DSI counters, Exidy computers, and on and on. Call toll free Tues. Thru Sat. 1-800-638-4486. Comm Center, Laurel, MD 20810.

SWAN 500, 117XC P.S. $400. Collins R-388 $200. Genave GTX-800 synthesized 2-M $200. Military Tektronics scope, 545 A with preamp $300. C.L. Henderson, 5546 Kentucky Ave., Indianapolis, IN 46241. 319-858-5558.

TOROIDS — Five 88 or 44 mh for $5. M. Buchanan, Box 74, Soquel, CA 95073.

COMPLETE four-publication bibliographies — your gear, special topics. Details, s.a.s.e.: Savage, POB 251, New Castle, VA 24127.

PITTSBURGH Hams: Hy-Gain, Rohn, CDE, Alliance, Bird, Amphenol and others. Tom, K3WT 412-653-3880.

SWAN 100MX Solid State Mobile. 100 watts out. Practically new with Shure 404C mic and quick disconnect mount. W1GWA Dennis Bird 144 Golden Hill St., Bridgeport, CT 06604 203-334-4837.

TRS-80 cw program on disk or cassette. Send/practice. $20. WBØQNT, Box 86, Douglass, KS 67039.

BUY or sell your used amateur gear. We match buyers with sellers nationwide. Write or call. State name, address, make, model number, price and telephone number. Fee: $1. s.a.s.e. Shaver Radio, 3550 Lochinvar Ave., Santa Clara, CA 95051. 408-247-4220.

RTTY — Bandpass active filter 2125/2295 Hz. kit $11.95, W/T $16.95. NS-1A PLL Demodulator W/T $26.95; kit $19.95; board only $4.95. All postpaid. S.a.s.e. for info. Nat Stinnette Electronics, Tavares, FL 32778.

QST Collector looking for ARRL 1914 and 1915 List of Member Stations and map, QST March — September

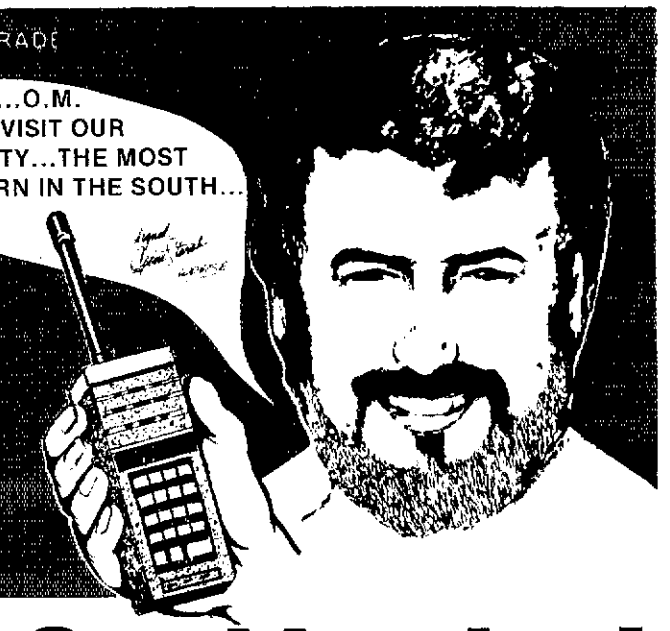
SPECIALIZING IN CENTRAL AND SOUTH AMERICAN TRADE

N&G

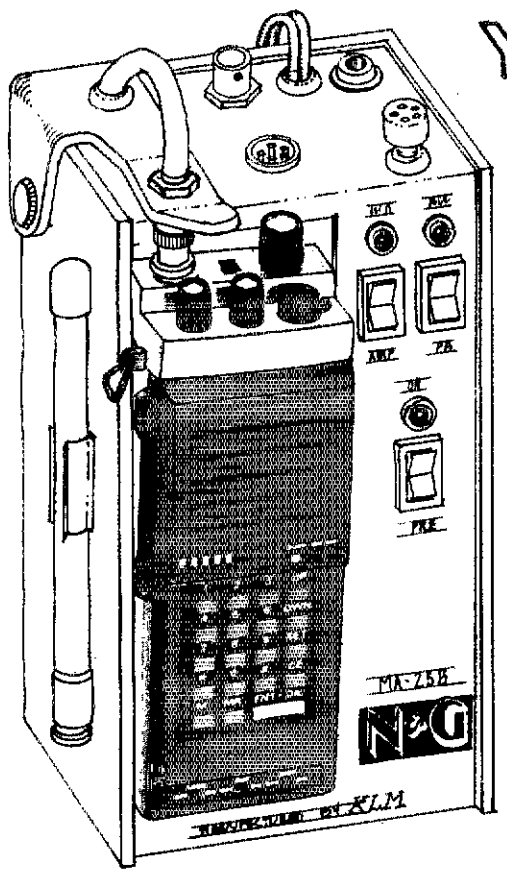
DIRECT FACTORY DISTRIBUTORS

Wilson • Info-Tech • NyViking
Shure • Yaesu • Larsen • Midland
CDE • Callbooks • Dentron • B&W
VHF Engineering • Hustler • Swan
Bird - Cushcraft • HY-Gain • TenTec
Icom • KLM

Ride our YAESUMOBILE FREE to and from Miami Int'l. Airport. We offer lots more than price.



An Unbeatable Combination!



YAESU, *KLM*, N&G

Yaesu's hot new **FT-207R** synthesized handie is ready for the road with **KLM's CUSTOM-MATCHED MA-25B MOBILE POWER AMPLIFIER.**

You get the fabulous features of the FT-207R **PLUS** KLM's integrated 25 watt power amplifier, 5 watt audio/PA amplifier, and receive preamp . . . **ALL IN ONE COMPACT PACKAGE — a N&G exclusive!**

KLM/N&G MA-25B Power Amplifier
SPECIFICATIONS

Freq. of Operation: 144-148 MHz	Mode: FM
Power in: 3 watts	Amps @ 13.5 VDC: 5
Power out: 25 watts	Audio/PA amp: 5 watts
Preamp: 2.5 dB N.F., 11 dB gain	@ 8 ohms

Custom designed and built for N&G by KLM for use only with the Yaesu FT-207R.

AVAILABLE ONLY AT N&G

YAESU FT-207R $399 KLM/N&G MA-25B $279

AT OUR NEW MAIN HEADQUARTERS ADJACENT TO MIAMI INT'L AIRPORT
7285 N.W. 12th ST., MIAMI, FLA. 33126 *SE HABLA ESPANOL*

SUPPORT YOUR LOCAL AMATEUR RADIO DEALER

When buying Yaesu equipment remember that equipment is responsible for the warranty service.

SPECIAL EXPORT PRICES

UPS (BROWN)

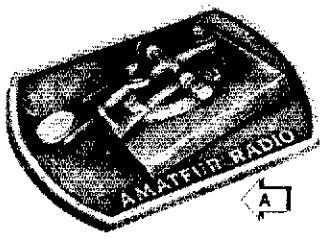
master charge

VISA

DADE: (305) 592-9685 BROWARD: (305) 763-8170

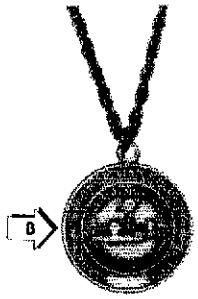
X-MAS GIFTS FOR THE HAM

Rusprint



(A) **Belt Buckle** — Brass key motif in 3-dimensional bronze finish. Size 2¼" x 3½".

Order No.	Each
510	$10.00



(B) **Pendant** — Straight key design in 3-dimensional bronze. 1½" diameter.

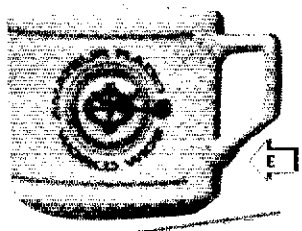
Order No.	Each
505	$ 9.95

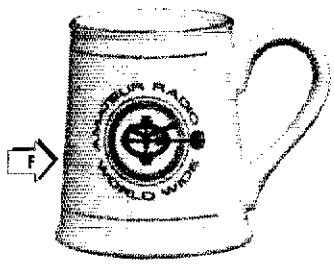
(C) **Key Ring** — Straight key design in 3-dimensional bronze. 1½" diameter.

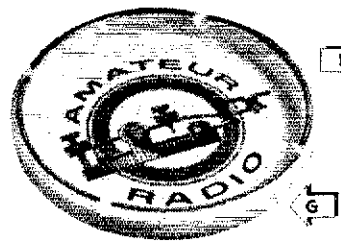
Order No.	Each
507	$ 5.95

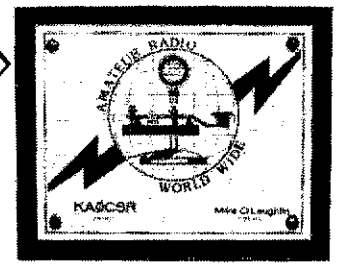
(D) **Money Clip** — Straight key design in 3-dimensional bronze. 1½" diameter.

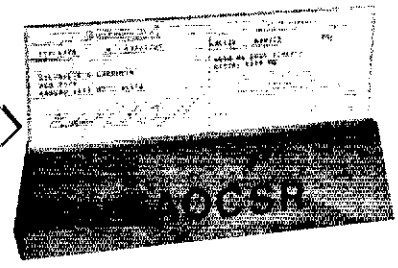
Order No.	Each
511	$ 6.95











(E) **Coffee Cup** — Fine white porcelain. Gold and black brass key design. 11 oz. size.

Order No.	Each
501	$ 9.95
501 w/call imprint	$14.95

Allow 30 days for delivery with imprint.

(F) **Stein** — Gold and black brass key design. Big 20-oz. capacity.

Order No.	Each
502	$ 9.95
502 w/call imprint	$14.95

Allow 30 days for delivery with imprint.

(G) **Ashtray** — Big 7" diameter tray of white ceramic with black and red straight key design. 14K gold trim on edge.

Order No.	Each
503	$10.95

(H) **Plaque** — 8" x 10" solid walnut base with hanger. Name and call printed on parchment which is mounted under plexiglass. Blue and brown design with black imprint.

Order No.	Each
506	$19.95

(I) **1st QSL Card Holder** — Card visible from both sides. Bronze commemorative medallion and words "1st QSO" embedded in solid walnut base.

Order No.	Each
812	$12.95

(J) **Cap** — White mesh cap is adjustable to fit all head sizes. Distinctive gold braid on black bill with gold, red and black amateur radio emblem.

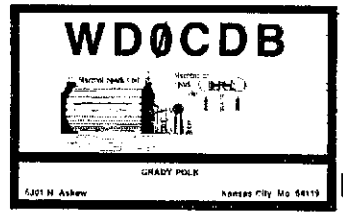
Order No.	Each
601	$ 9.95

(K) **Stocking Cap** — Bright red cap with colorful red and black emblem on the front.

Order No.	Each
604	$ 6.95

(L) **A/R License Holder** — Solid walnut base with call letters imprinted. License is held between plexiglass.

Order No.	Each
814	$ 9.95



(M) **QSL Cards** — Bright and colorful card featuring the "Marconi Spark Coil" design. Name, address and call printed in black ink.

Order No.	Per 100
407	$14.00
Add'l. 100	$ 5.00

(N) **X-Mas Card** — Bright and colorful, full-color Christmas card.

Order No.	
905	(25 Cards) $ 6.95
905	(100 Cards) $19.95

Add **$10.00** for call and name imprint.

Call _____ Name _____

Address _____

City & State _____ Zip _____

☐ Master Charge

☐ Visa # _____ Expiration Date _____

Qty.	No.	Item	Price
____	501	Cup	$ 9.95
____	501	Cup w/call	14.95
____	502	Stein	9.95
____	502	Stein w/call	14.95
____	503	Ash Tray	10.05
____	505	Pendant	9.95
____	506	Plaque	19.95
____	812	1st QSL Card Holder	12.95
____	407	QSL Card (100)	14.00
		Additional 100	5.00

Qty.	No.	Item	Price
____	507	Key Ring	$ 5.95
____	510	Belt Buckle	10.00
____	511	Money Clip	6.95
____	601	Cap	9.95
____	604	Stocking Cap	6.95
____	814	License Holder	9.95
____	905	X-Mas Card (25)	6.95
____	905	X-Mas Card (100)	19.95

Add $10.00 for call and name imprint.

Mail Check or Money Order to: RUSPRINT®
Box 7575 - North Kansas City, Mo. 64116

Dealer Inquiries Welcome

1916. Ed Kalin, K1RT, 75 Tumblebrook Lane, West Hartford, CT 06117. 203-233-9915.

ETO amps, KLM amps and antennas — Big Discounts! KDK 2016A $330. Bearcat 250 $259. Write for other hot specials! Ben Franklin Electronics, 115-1/2 N. Main, Hillsboro, KS 67063.

WANTED: Heath HA-14 linear, any condition. Jim, WA5ZVB, 611 Woodvale, Lafayette, LA 70503. 318-984-3711.

TEN-TEC, Wilson, Cushcraft, Hy-Gain, Anteco, Weatheralert, KLM, Nye-Viking, Vibroplex, Bencher, MFJ, B&W, DB Products, and many others. Call or write for quote Mon-Sat, 10 AM till 8 PM. 10-5 PM Wed & Sat. Sidewalk Sale last Saturday of each month. J-T Electronics Supply, Inc., 14 Jupiter Place no. 117, Plano, TX 75074, 214-424-0515.

WANTED: Cushman plug in modules for Cushman Service Monitors, also will consider taking over payments on service monitor you cannot pay for, Cushman or IFR only; WB8IJX, Fred Slaughter, 5844 Grisell Rd., Oregon, OH 43618.

FOR SALE: 8 room — 2-1/2 baths — colonial, excellent condition all carpeted, gas heat, corner hill in beautiful Glen Cove, Long Island — 3rd floor radio room complete — 40 ft. tower, concrete base — 2 element 3 band quad. Zoned for two families. Phone after 6 P.M. — 516-671-4997. Bert Shapiro.

SALE: 75A4 no. 1473 $385; Regency HR2B $149; Swan Mark 1; Swan 350C $249; write for list. WØEWN, 612 Hillcrest, Scottsbluff, NE 69361.

WANTED: International Crystal Model FM-2400CH frequency meter. Also Drake RV-4 VFO and vhf marine radios. State condition and price in first letter. WB8IJX, Fred Slaughter, 5844 Grisell Rd., Oregon, OH 43618.

WANTED: Collins mechanical filter No. F-455J-05 for 75A4. Will pay $100 W1ELR 802-295-3210 collect.

WANTED: 1920s battery radios, horn speakers and catalogs. W6THU, 1545 Raymond, Glendale, CA 91201: 213-242-8961.

FAST professional ham repair service New York City area. Amateur Extra; FCC Commercial license. Fully equipped shop. Reasonable. Rich Tashner N2EO 212-352-1214.

DRAKE T4XC, R4C, AC-4, MS-4. Also 3-1000Z, 4-1000A, socket, chimneys, vacuum variables. John, K5SB, 417 W. 1st Street, Sonora, TX 76950. 915-387-3831. 8-5 P.M.

SALE: Collins, Late round emblem KWM2A, 312B-5 VFO console, Spectronics digital display DD1C, 516F-2 powr supply, SM-3 desk microphone, dummy load DL1, DX Engineering rf speech processor — with all manuals, like new, excellent condition $3500, or best offer, cash sale only. No trades. Will not separate. Will prepay shipment. WB5RNC, P. O. Box 5566, Corpus Christi, TX 78405. 512-883-8511 days only.

SHURE Microphones — have 100 brand new 4 wire high impedance handheld mics, fraction original cost, only $12.95 postpaid. Bruce Burkhardt, WA3MAS, Box 1, Royal Oak, MD 21662. 301-745-2826.

TEST Instruments — Buy and sell microwave test instruments, waveguide components, late HP, GR, etc. test equipment. Lectronic Research 1423 Ferry, Camden, NJ 08104.

VHF Amplifier kits, SSB-FM, 75 watt, solid state, $99.95 post paid. Communication Concepts, Inc. 2648 North Aragon Ave., Kettering, OH 45420.

DX? You bet! The DX Bulletin, best weekly DX info in world! Send for free sample copy: K1TN, 306 Vernon Ave., Vernon, CT 06066.

KW Rotary Inductors for amplifiers and antenna tuners. Thompson Electronics, 1555 Bellefontaine, Indianapolis, IN 46202.

WANT To Buy: Technical material BAC-1 and BAC-2 antenna couplers; Eimac 1000T triodes, Rohn crank-up tower mounted on trailer; Telrex or KLM 80 meter beam, Vesto, etc., 100-300 foot tower; Collins 51J4. Sell: Greve Synchrophase Console with built-in horn, $300.; RCA AR-88, $75; BC610E, $175; HQ170AC, speaker $200; HQ120X, $75. F.O.B. K8CCV 216-427-2302 6 to 9 P.M. weeknights.

BATTERIES: New GE 12 V 2.5 A.h. sealed lead-acid rechargable, 3" x 4", $22. WØPOQ, 2755 Rigel Dr., Colorado Springs, CO 80906.

CENTURY 21 $285. Hy-Gain 18-AVT $82. TH6DXX $235. All new. Supina, 525 Ridge, State College, PA 16801.

DRAKE TR-72, all 146 repeater crystals and more; mint; never used mobile — base station only. Make offer over $125. WD4REH, 6206 Fernwood Terrace Apt 202 Riverdale, MD 20840. 301-459-6228.

SELL Drake T4XC, R4C, with 500, 1500, AC4, MS4, ETO Alpha 374, KLM 6 EL. 20 M All mint. $2700. N4UT, 804-853-9330.

WANTED: Copy of QST Nov. 1978 Don LaFAvor 511 E. Belvidere St. Paul MN 55107.

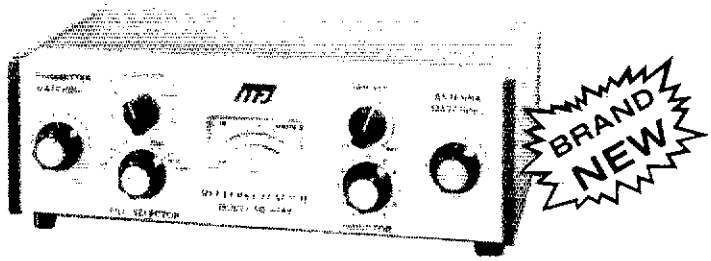
WILSON handhelds at big discount. Bill Gerhardt, 2700 Greenlee, Austin, TX 78703.

SPECTRUM Analyzer TS-148UP — $60 2-Comm IV — 2 mtrs — $35 each. Heathkit 6-2 xmitter — $35. Eico Audio-osc $20, TS-13AP — $40 pick up only, K2JSO 212-338-3313.

UHF Amplifier Kits, FM-SSB-ATV, 420-450 MHz 100 watt, solid state, $94.60 post paid. Communication Concepts, Inc., 2648 North Aragon Ave., Kettering, OH 45420.

NEW MFJ *DELUXE* Versa Tuner II

$119.95 buys you one of the world's finest 300 watt antenna tuners with features that only MFJ offers, like . . . dummy load, SWR, forward, reflected power meter, antenna switch, balun. Matches everything from 1.8 thru 30 MHz: coax, random wires, balanced lines.



MFJ's Best Versa Tuner II . . . Solid American Quality

$119.95

This is MFJ's best Versa Tuner II. And one of the world's finest 300 watt (RF output) tuners.

The MFJ-949 *Deluxe* Versa Tuner II gives you a combination of quality, performance, and features that others can't touch at this price . . . or any price.

PERFORMANCE: You can run your full transceiver power output — up to 300 watts RF output — and match your transmitter to any feedline from 1.8 thru 30 MHz whether you have coax, balanced line or random wire.

FEATURES: A 200 watt 50 ohm dummy load lets you tune up for maximum performance.

A sensitive meter lets you read SWR with only 5 watts and both forward and reflected power in two ranges (300 and 30 watts).

A flexible antenna switch lets you select 2 coax lines direct or thru tuner, random wire or balanced line and dummy load.

A large efficient airwound inductor 3 inches in diameter gives you plenty of matching range and less losses for more watts out.

1:4 balun. 1000 volt capacitors. SO-239 coax connectors. Binding post for balanced line, random wire, ground. 10x3x7 inches.

QUALITY: Every single unit is tested for performance and inspected for quality. Solid American construction, quality components.

The MFJ-949 carries a full one year unconditional guarantee.

Order from MFJ and try it — no obligation. If not delighted, return it within 30 days for a refund (less shipping).

To order, simply call us toll free 800-647-1800 and charge it on your VISA or Master Charge or mail us a check or money order for $119.95 plus $3.00 for shipping/handling.

Don't wait any longer to tune out that SWR and enjoy solid QSO's. Order your *Deluxe* Versa Tuner II at no obligation, today.

MFJ ENTERPRISES, INC.
P. O. BOX 494
MISSISSIPPI STATE, MS 39762
CALL TOLL FREE 800-647-1800
For technical information, order/repair status, in Miss., outside continental USA, call 601-323-5869.

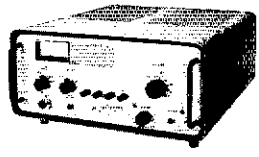
SYNTHESIZED AT CHANNELIZED PRICES

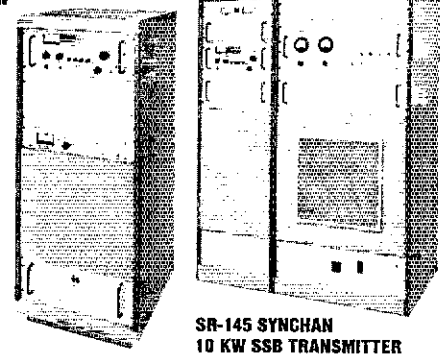
The New SYNCHAN Family of Synthesized / Channelized HF SSB Communications Equipment

- Synthesizer to generate up to 10 channels (20 frequencies)
- 1.6-30 MHz in 100 hertz increments
- LSB, USB, AME, FSK, CW
- 3pp 10^{-8} standard, 1pp 10^{-8} and 1pp 10^{-6} optional stability

SR-140 SYNCHAN 1 KW HF SSB TRANSCEIVER

SR-240 SYNCHAN 150 W HF SSB TRANSCEIVER





SR-145 SYNCHAN 10 KW SSB TRANSMITTER

Companion Programmable Antenna Couplers Are Available For The SR-240 and SR-140 Transceivers

Operating frequencies are programmed to the front panel switch by entering the desired frequency into a solid state memory using the internal keyboard and display. The channel frequencies can be changed in the field by entering the new frequencies into the memory from the keyboard. Operation on all frequencies is inherent within the equipment. Changing frequencies does not require any crystals, other components, or test equipment.

REMOTE CONTROLS

SR-1650A DIGITAL TELEPHONE LINE REMOTE CONTROL

- Telephone Line Or Microwave Link
- Full Remote Control of All Functions
- Noise and Cross Talk Immune

SR-1601

HARDWIRE REMOTE CONTROL

- Cable Remote
- Full Remote Control Of All Functions
- Can Be Located Up To 500 Ft. From Transmitter

SR SYSTEMS

Scientific Radio Systems Inc.
367 ORCHARD ST. ■ ROCHESTER, N.Y. 14606
CABLE SIRAD ■ TELEX 978-368 ■ PHONE (716) 458-3733

EMPLOYMENT OPPORTUNITIES AVAILABLE, PLEASE CONTACT PERSONNEL DEPT.—EQUAL OPPORTUNITY EMPLOYER

QUESTION: Who has Advanced Electronics, Alpha, AMECO, Amphenol, Antenna Specialists, Astatic, Atlas, Bencher, Bird, Bomar, B&W, CDE, CES, CSC, Cushcraft, Daiwa, DGM, Drake, ETO, F9FT, Finco, Ham Key, Henry Hustler, Hygain, JMR, KLM, Kenwood, Larsen, MFJ, Microwave Filter, Morgain, Mosley, Newtronics, NPC, Nye Viking, Regency, Robot, Rohn, Sharp, SST, TPL, YAESU, more? ANSWER: TUFTS RADIO ELECTRONICS. Send for our fabulous radio catalog today.

PALOMAR ENGINEERS

R-X NOISE BRIDGE $49.95

- Learn the truth about your antenna.
- Find its resonant frequency.
- Find R and X off-resonance.
- Broadband 1-100 MHz.
- Simple to use. — Self contained.

VLF CONVERTER $55.00

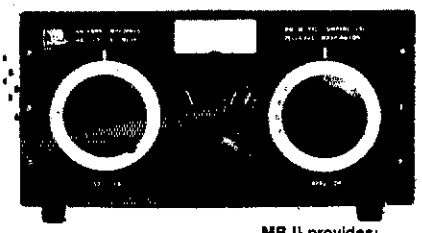
- New device opens up the world of VLF radio.
- Converts VLF to 80 meters. For use with any shortwave receiver covering 3.5-4 MHz.
- Advanced design for simple operation, high performance.
- Gives reception of the 1750 meter band.
- Also covers navigation radiobeacons, WWVB, ship-to-shore, and LF broadcast band.

LOOP ANTENNA
Loop Amplifier $67.50
Plug-in loops $47.50 ea.

- Plug-in loops available for: 1600-5000 KHz (160/80 meter amateur bands) 550-1600 KHz (Broadcast Band) 150-550 KHz (VLF, 1750 meter band) 40-150 KHz (WWVB, Loran) 10-40 KHz (Omega)
- Nulls out interference

ALL BANDS PREAMPLIFIER $89.50

- Tunes 1.8 to 54 MHz. Covers ALL amateur bands 160 to 6 meters. ALL shortwave broadcast bands.
- For receivers AND transceivers.
- Up to 20 db gain.
- Pegs up that tired receiver.
- Reduces image and spurious response.



Nye Viking

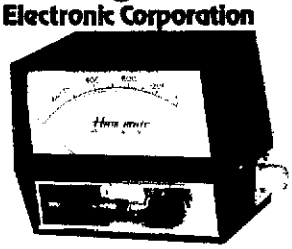
Model MB II $295
(with Balun) $325

MB II provides:
*Constant SWR monitoring. * Precision tuning of final amp * Harmonic suppression * Receiver input impedance-matching. * Maximum power transfer to antenna. *Continuous frequency coverage 1.6 to 30 MHz * Precision tuning of any wire ½ wavelength or longer, with SWR of 1.1

MB II features:
*Finest quality, made-in-USA components*Large, precision, easy-to-read dials with 360 readout*Optional 3000 watt Balun for twin lead antennas*Rotary induction.

BIRD Electronic Corporation

$94 VHF model 4362 (140-180 MHz)
$94 HF model 4360 (18- 30 MHz)



The 4360, 4362 HAM-MATE Directional Wattmeters are insertion type instruments for measuring forward or reflected power in 50-ohm coaxial transmission lines. They are direct descendants of the model 43 THRULINE® Wattmeter — the professional standard of the industry—and will accurately measure RF power flow under any load condition. Each wattmeter is made up of a precisely machined section of 50-ohm line, a rotatable sensing element and meter calibrated in watts, all mounted in a high-impact plastic housing. It is this type of solid construction and the directional THRULINE coupling circuit, without toroids, that account for the superiority of the HAM-MATE Wattmeters.

the indispensable BIRD 43 THRULINE WATTMETER

Power Range	Frequency Bands (MHz) 2-30	25-60	100-250	200-500	400-1000
5 watts		5A	5F	5D	5E
10 watts		10A	10C	10D	10E
25 watts		25A	25C	25D	25E
50 watts	50H	50A	50C	50D	50E
100 watts	100H	100A	100C	100D	100E
250 watts	250H	250A	250C	250D	250E
500 watts	500H	500A	500C	500D	500E
1000 watts	1000H	1000A	1000C	1000D	1000E
2500 watts	2500H				
5000 watts	5000H				

MODEL 43 $125.00
Elements (Table 1) 2-30 MHz 45.00
Elements (Table 1) 25-1000 MHz 38.00
Carrying case for Model 43 & 6 elements 27.50
Carrying case for 12 elements 17.00

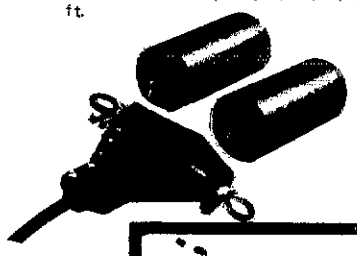
READ RF WATTS DIRECTLY! (Specify Type N or SO239 connectors) 0.45 – 2300 MHz, 1-10,000 Watts ±5%, low insertion VSWR — 1.05. Unequalled economy and flexibility. Buy only the element(s) covering your present frequency and power needs, add extra ranges later if your requirements expand.

B&W Barker & Williamson

5 –BAND TRAP DIPOLE (80 thru 10 Meters)

Power rated 2k WPEP, approx. 110 ft. span

Complete with: wire, traps, end insulators, 50 ft. RG-8/U, PL-259 connector, heavy-duty cast aluminum and steatite center connector. 4 Band (40 thru 10M) 55 ft.



Pre-assembled:
Model 370-11 — $59.95

Kit (illustrated):
Model 370-12 — $49.95

BOMAR Crystal Company

TWO METERS
CRYSTALS IN STOCK

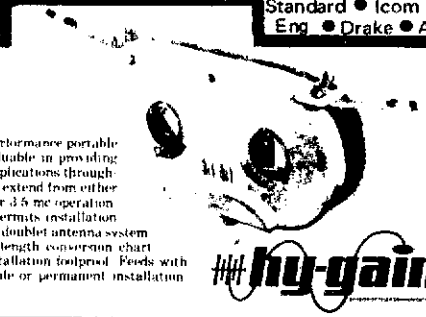
Motorola HT 220 Crystals In Stock!

Standard ● Icom ● Heathkit ● Ken ● Clegg ● Regency ● Wilson ● VHF Eng ● Drake ● And Others! **Lifetime Guarantee! Now only $9/pair.**

Hy-Gain REEL TAPE PORTABLE DIPOLE for 10 thru 80 Meters Model 18TD

The most portable high performance dipole ever...

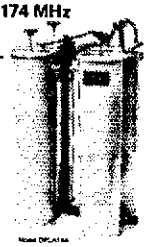
The Model 18TD is unquestionably the most foolproof high performance portable doublet antenna system ever developed. It has proven invaluable in providing reliable communications in vital military and commercial applications throughout the world. Two stainless steel tapes, calibrated in meters, extend from either side of the main housing up to a total distance of 132 feet for 3.5 mc operation. 25 ft. lengths of polypropylene rope attached to each tape permits installation to poles, trees, buildings. Whatever is available for forming a doublet antenna system. Integrated in the high impact housing is a frequency to length conversion chart calibrated to meter measurements on the tapes, makes installation foolproof. Feeds with 52 ohm coax. Delivers outstanding performance as a portable or permanent installation. Measures 10x5½x2 inches retracted. Wt., 4.1 lbs.
Order No. 228. Price. $94.95



hy-gain

BANDPASS-REJECT DUPLEXER DPLA-144 FOR 144-174 MHz

Also available for 54, 220, 450 MHz.



$409.95

Name _____ Call _____
Address _____
City _____ State _____ Zip _____
Order: _____

☐ Check Enclosed ☐ Visa ☐ Master Charge ☐ Send for Free Catalog

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

Card no. _____ Card exp. date _____
Signature _____

Prices FOB Medford, MA. MA residents add 5% sales tax.
Minimum $3.00 for shipping and handling on ALL ORDERS.

TUFTS

Radio Electronics
OPEN DAILY 9-9
SATURDAY 9-5

206 Mystic Avenue, Box Q10, Medford Mass. 02155, 1-800-225-4428, (Mass. residents: 1-617-395-8280)

THE GREAT TEN-TEC ACCESSORY GIVEAWAY

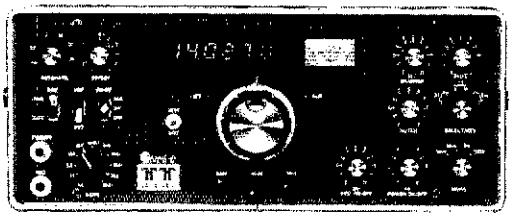
Buy your TEN-TEC transceiver by Nov. 1, 1979* and receive these accessories absolutely FREE!

- **FREE—Up to $85.00 in Accessories with an OMNI purchase**
- **FREE—Up to $69.50 in Accessories with a 540 or 544 purchase**
- **FREE—Up to $29.50 in Accessories with an ARGONAUT purchase**
- **FREE—Up to $29.00 in Accessories with a CENTURY/21 purchase**

(See accessory choices below)

*The TEN-TEC Accessory Giveaway offer applies to any new TEN-TEC transceiver purchased between Sept. 15 and Nov. 1, 1979 from any franchised TEN-TEC dealer. Just pick up a TEN-TEC Merchandise Coupon at the time of your purchase, have the dealer fill it out for you and return it with your transceiver Warranty Card to the TEN-TEC factory before Nov. 15, 1979. We will ship your FREE accessories to your home.

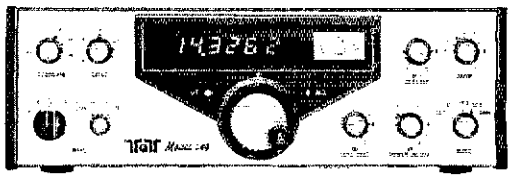
Buy TEN-TEC OMNI 160-10M Transceiver
Choose up to $85 in FREE accessories below



Model 545 Series B OMNI-A Analog Dial $949
Model 546 Series B OMNI-D Digital Dial $1119

FREE:
1. Model 645 Keyer ($85), or:
2. Model 215P Microphone ($29.50) and Model 217 500 Hz 8-Pole CW Filter ($55), or:
3. Model 215P Microphone ($29.50) and Model 218 1.8 kHz 8-Pole SB Filter ($55).

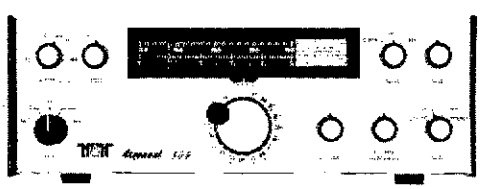
Buy TEN-TEC 540 or 544 80-10M Transceiver
Choose up to $69.50 in FREE accessories below



Model 540 Analog Dial Transceiver $699
Model 544 Digital Dial Transceiver $869

FREE:
1. Model 247 Antenna Tuner ($69), or:
2. Model KR-20A Keyer ($69.50), or:
3. **Choice of Two:** Model 249 Noise Blanker ($29), Model 245 CW Filter ($25), Model 215PC Microphone w. coiled cord ($34.50).

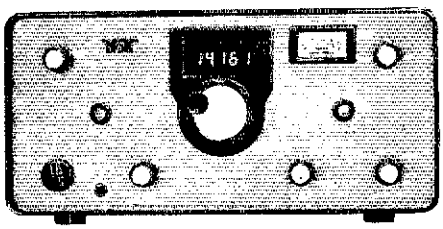
Buy TEN-TEC ARGONAUT QRP 80-10M Transceiver
Choose up to $29.50 in FREE accessories below



Model 509 Argonaut $389

FREE
1. Model 215P Microphone ($29.50), or:
2. Model 206A Crystal Calibrator ($29), or:
3. Model 208 CW Filter ($29).

Buy TEN-TEC CENTURY/21 CW Transceiver
Choose up to $29 in FREE accessories below



Model 570 Analog Dial Transceiver $349
Model 574 Digital Dial Transceiver $449

FREE:
1. Model 670 Keyer ($29), or:
2. Model 276 Crystal Calibrator ($29).

See your TEN-TEC dealer before Nov. 1, 1979. Get the best deal you can, get FREE accessories, and get the best performance in Amateur Radio.

TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862
EXPORT: 4715 LINCOLN AVE., CHICAGO, IL 60646

DX Life stainless, small quantities and U-bolts. Send s.a.s.e. for current list. Stainless Kits for: TH5DX $27.95; 14 AVQ/WB $14.95; 18 AVT/WB $15.95; TH3 MKIII, 204 BA, 155 BA, 105 BA $26.95; (TH6DXX $37.95 — send copy of parts list), 205 BA $39.95. DX Life Stainless Co., 7 Alta Place, Yonkers, New York 10710.

SELL 75S2 SSB filter. K4IG.

SELL: KDK FM-2015R with touchtone mic. Manual, mounting bracket and power cord. Splendid 2 metre rig, fully synthesized. $275. AC1Y 203-673-3662. Keep trying, til midnite EST.

QRP HW-7 $75. W2CRW 201-686-1177.

COAXIAL cable RG8U foam 80 percent shield, or 8 conductor cable for CDE rotators, $17/100 ft. RG58U or RG59U $6.95/100 ft., shipping $2./100, free catalog, Nemal Electronics Box 402712, Miami, FL 33140.

WANTED — Pilot power pack K-111 or K-112. W@GUX, 3957 Minnehaha Ave., Minneapolis, MN 55406.

SELL: Heathkit HW-8 transceiver; absolutely mint; carefully built, but never used. $100. AA1U 1-203-379-1729.

MOTOROLA — Micom HF-SSB consolette base station. 2-18 MHz, 125 watts 100-242 Vac (±20 percent) 50/60 Hz condition: perfect, factory cert. Reg. $3800 — sell at $2300. Tektronix 1401A spectrum analyzer module, portable, use w/oscilloscope for spectrum surveillance, RFI testing, etc., built in rechg. batteries & 90-272 VAC 48-440 Hz cond: factory new. Reg. $4200 — sell at $1900. Commodities Recovery Crop., 250 W. 99 St., New York City 10025. Tel. 212-222-3050, intl. tlx 420925 (Recov).

HEATH DX-60B, HG-10B VFO, HR-10B, manuals, mint, factory-tuned. $225. E. M. Trayner, WB2ELS, 9 Royden Rd., Tenafly, NJ 07670.

HALLICRAFTERS SX-110, recently realigned, $90. Hammarlund HQ-140X with matching speaker, $125. Will trade for HF or VHF gear. Call 918-782-2247 after 5 CDST or write WB5AXH Box 146, Ketchum, OK 74349.

HEATH frequency counter, 500 MHz, period and totalize, $90; solid state bench VTVM $40. WD4CKA 615-453-1892.

HQ-1 Miniquad, up since Oct. 78, factory repaired coils, with balun, $70. Fred, KB2FS, 914-679-8469.

HEATH HO-10 Monitor Scope, $75; Atronics Code reader, $125; MFJ 16010ST tuner, $35. WA5GQT, no. 2 Tern, New Orleans, 70124. 504-288-0439.

CLEGG FM-27B 2 meter fm transceiver, 25 watts, 146-148 MHz, fully synthesized, TouchTone pad $250. WB8YTQ, John Slavik, 906 Broadway, Bedford, OH 44146. 216-232-8132.

SELL — Heath 401 transmitter with filter kit, factory aligned, Electro-Voice 638 mike, 303 receiver with 600 speaker, both mint, not over ten hours, manuals, all $500. WA4BUV, Daytime 804-245-4221.

DRAKE R-4C, FL-500, FL-1500, six extra range crystals, T-4XC, extra crystal for ten meters, AC-4, MS-4, RFE-100 digital display for Drake. Superb condition, cables, manuals, dust covers, $1,250 includes UPS. Gary, WB3DAW, 1804 Ladd Street, Silver Spring MD 20902. 301-649-3932.

FOR SALE: Atlas 210X with noise blanker — mint condition — $545 W1LMJ — 617-599-1984.

HW-101 with HP-23A, Magnum Six RF processor, blanker, cw and ssb filters, mike: $360. Free 14-AVQ if you fetch rig. Also SB-33, low output in LSB, spare finals: $90. Paul Kalkstein N1PL, Phillips Academy, Andover MA 01810. 617-475-2572.

SELL factory aligned HW-8 w/p.s. $110. Stephen Gingery WA2IEZ 276-2112.

HEATH HW-8, p.s., mint. $125; Eico 720 transmitter, a-m modulator, Allied VFO, fair. All manuals. Collectors items. $110. Offers welcome. N4AWZ, P. O. Box 699, Lilburn, GA 30247. 404-469-1789.

CENTURY 21 with calibrator, keyer $250. KA4DKH, 102 Westridge, Tallahassee, FL 32304.

SB-303 receiver, all filters, excellent condition, $240 plus shipping. Roger Ison, 2127 South Douglas Ave., Loveland CO 80537.

HEATH SB-230 linear $310 w/UPS. Excellent condition. R. W. Hogan, WB8JIR, 517-750-3805 after 1800 EDT.

NC-303, $125; Viking Ranger I, $65. Both units work well; with manuals. E-V 664 mike, $20. Pick-up only on large units. WA2OAX, Ira Lipton, 620 Dale Ct., River Vale, N.J. 07675. 201-391-2831.

HP-97A like new, will give personal warranty. Includes std. accessories, 2 boxes paper rolls, 120 new mag cards, etc., ship via UPS. $480. Brewer, WB4MGA, 121 Hearthstone Dr., no. 2, Blacksburg VA 24060. 703-951-0539.

QUAD — 10/15/20 meters, never used, $65 W2HKE 201-838-8143.

NEED manual for cosmophone 35 transceiver. Borrow for copying and return, or will pay cost for copy. K2AOQ 716-482-5919.

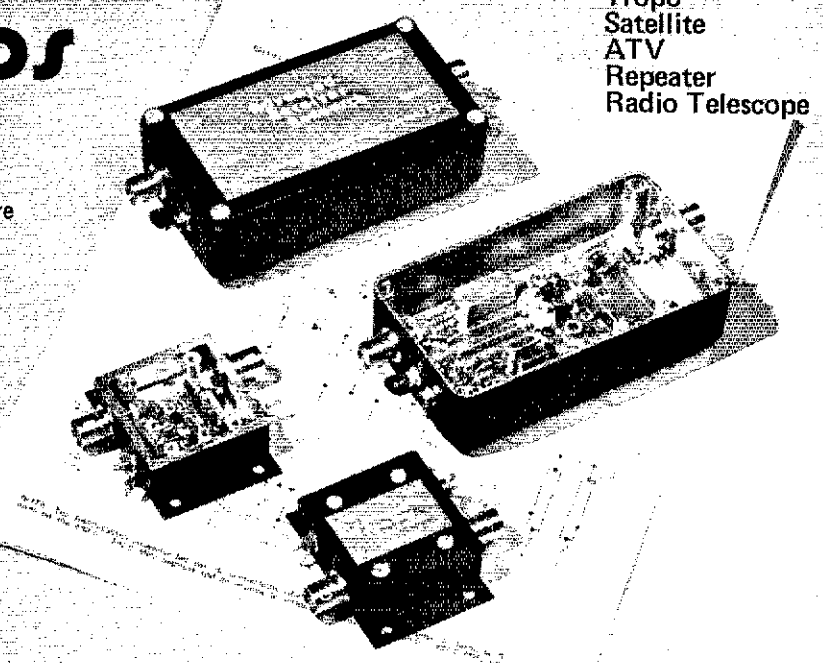
COLLINS KWM2, ac & dc power supplies, auto mounting rack, all connecting cables, $955. K4TG.

TRANSCO-Y 432mc ant relay low-SWR high-isolation kW $75. Preamp — Janel 432-PC 30 dB 1.5-2.0 dB S/N $45. Wattmeter/SWR Tempo RBF-1 0-200W, 0-200W $35. Power supply, 2000V 500Ma Fil-Sg-Bias (Home Built) $95. Spec. Int. MMC-432 Conv. 28 mc i-f $45. Nuvistor Conv. CN-50, CN-144. $15 Ea. Amp Tubes: 813 $15. 811A $5.50. CX250B $25. 4X150A $10. 4X150G $10. W6RQZ.

vhf/uhf converters & preamps

EME
Scatter
Tropo
Satellite
ATV
Repeater
Radio Telescope

- Factory aligned for optimum noise figure
- Full one year warranty
- Rugged aluminum enclosures
- Quality components and construction
- Converters feature 28 - 30 MHz i-f



CONVERTERS	FREQ. RANGE (MHz)	N.F.(dB)	PRICE
50VD	50-52	< 1.5	49.95
144VD	144-146	< 1.8	49.95
220VD	220-222	< 2.0	49.95
432VD	432-434	< 2.2	$9.95
435VD	435-437	< 2.2	59.95
432/435VD	432-434 & 435-437	< 2.2	69.95
PREAMPS			
P28VD	28-30	< 1.1	24.95
P50VD	50-54	< 1.3	24.95
P144VD	144-148	< 1.5	24.95
P220VD	220-225	< 1.8	24.95
P432VD	420-450	< 1.8	27.95

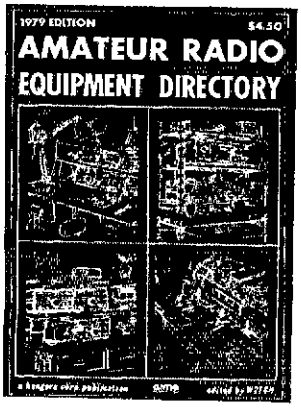
Postpaid for U.S., Canada and Mexico (First Class Mail or UPS). CT residents add 7% sales tax. C.O.D. orders add $2.00.

Request our detailed catalog!

Advanced Receiver Research

Box 1242 Burlington, CT 06013

ALL NEW 1979 EDITION



THIRD BIG EDITION! The most complete directory of Amateur Radio Equipment — over 1600 products — over 100 manufacturers/distributors. Includes prices, specifications and pictures of transceivers, transmitters, receivers, amplifiers, power supplies, transverters, antennas, tuners, towers, meters, microphones, keyers, VFO's, pre-amps, test gear, etc. etc.

BONUS — Included with each directory is a free newsletter containing the latest price and product information. No ham library is complete without a copy of the 1979 Edition!

Order your copy today! Only $4.50 postpaid (U.S.), $6.00 First Class Mail (U.S.) — Canada $5.50 — Foreign (air) $8.00.

KENGORE CORP. Dept. B

9 James Ave. Kendall Pk., NJ 08824

Special offer — a complete set of 77, 78 and 79 Directories is available for $9.00 (U.S. only).

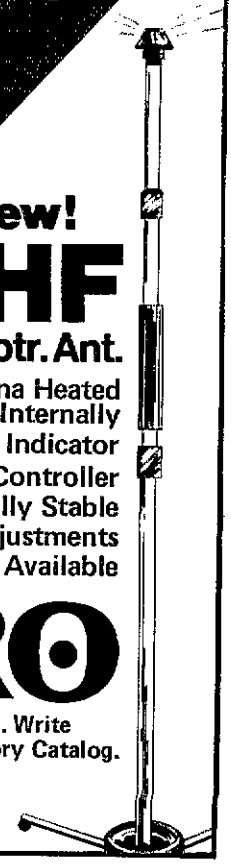
New! Hydraulic

Telescoping Tubular Tower

Adjustable (Tuneable) Vertical Antenna
Extends to 50', Retracts to 22'
Tilt-Over-Base
Avoid Wind and Lightening Problems
Automatic Retract and Guying Kits Available
Motorized Hydraulic System
Easy Assembly Kit
RV Models Too

New! VHF De-Icer Rptr. Ant.

Entire Antenna Heated Internally
Beacon Light Heater Indicator
Bi-Metal or Solid State Controller
Electronically Stable
Securely Locked Adjustments
Wind Trussing Kit Available



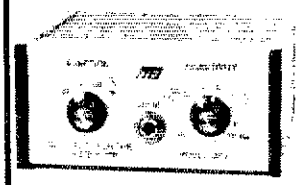
N-PRO

HIGHEST Quality Materials and Parts Used. Write or Call for FREE BROCHURE and Accessory Catalog.

VISA master charge

P. O. Box 604
Oregon City, Oregon 97045
(503) 656-5500

MFJ SUPER CW/SSB FILTERS



$59.95

MFJ-721 SUPER SELECTOR CW/SSB FILTER gives 80 Hz BW, steep SSB skirts, noise limiting.

CW Filter gives 80 Hz BW. No ringing. 8 poles give super steep skirts (60 dB down one octave from center freq. of 750 Hz). No tunable filter can match performance. BW: 80, 110, 150, 180 Hz. Reduces noise up to 15 dB.

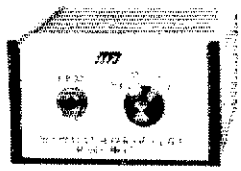
SSB Filter improves readability. Reduces splatter, hiss, static, noise, hum. IC active filter has 375 Hz highpass cutoff; 2.5, 2.0, 1.5 KHz (36 dB/octave) lowpass cutoffs.

Works with any rig. AM, SSB, CW. Plugs into phone jack. 2 watts for speaker. Inputs for 2 rigs. Speaker and phone jacks. Phones disable speaker. OFF bypasses filter. 9-18 VDC, 300 ma. 10x2x6 in. Optional AC adapter, $7.95.

Switchable noise limiter for impulse noise; trough clipper removes background noise.

Simulated stereo for CW lets ears, brain reject QRM. Yet, hear off frequency calls.

$44.95



THIS NEW MFJ-720 DELUXE SUPER CW FILTER gives you 80 Hz BW that is 60 dB down one octave from center frequency. 8 poles give super steep skirts with no ringing for razor sharp selectivity that no tunable filter can match.

Bandwidths: 80, 110, 180 Hz. Center freq.: 750 Hz. Up to 15 dB noise reduction.

Noise limiter. Plugs in phone jack. 2 watts for speaker. 2x4x6 inches. Requires 9-18 VDC, 300 ma. Optional AC adapter, $7.95.

$29.95 EACH

THE CWF-2BX SUPER CW FILTER AND SBF-2BX SSB FILTER are same as in the MFJ-721, less speaker amplifier, noise limiter. Plus in rig to drive phones or connect between audio stage for speaker operation. 9 V battery. 2x3x4 in.

Try it. If not delighted return within 30 days for refund (less shipping). One year unconditional guarantee. **Order today.** Call toll-free 800-647-1800, charge VISA, MC. Or mail check, money order. Add $3.00 shipping.

CALL TOLL FREE ... 800-647-1800

For technical information, order/repair status, in Miss., outside continental USA, call 601-323-5869.

MFJ ENTERPRISES, INC.
BOX 494, MISSISSIPPI STATE, MS 39762

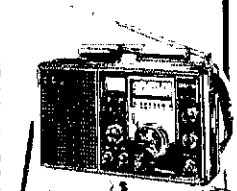
SHORT-WAVE VALUE CORNER

PANASONIC "COMMAND" SERIES

RF-2200

RF-2200 8 BAND AM/FM, SW Irecs from 3.9 to 28 MHz ... Double super heterodyne ... Precise calibrated tuning to 10 kHz ... Double-check xtal marker at 500 kHz and 125 kHz ... RF gain control for AM/SW BFO switch for SSB & SW Plus many more features such as ext jacks for AC ant & spkr. ... Big radio features at low price.

Plus $2.50 Shipping

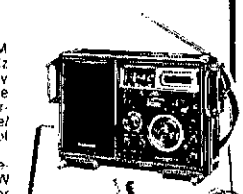


LIST ~~$179.95~~ NOW ONLY **$139.95**

RF 2900

RF 2900 DIGITAL AM/FM SW Irqm 3.2 to 30 MHz ... 5 digit LED display reads all bands ... Double superheterodyne ... PL circuitry ... FM AFC & wide/narrow bandwidth control ... Fast/Slow tuning ... Built in AM ant ... Telescoping whip for TM/SW ... BFO pitch control for SSB/CW ... And much, much more for the price

Plus $2.50 Shipping

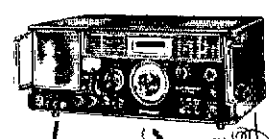


LIST ~~$279.95~~ NOW ONLY **$239.95**

RF-4900

FULL SW COVERAGE FROM 1.6 to 31 MHz. ALL DIGITAL

Plus $5.00 Shipping



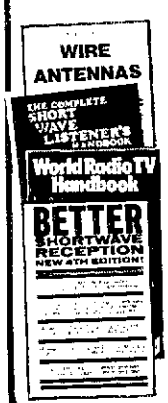
LIST ~~$499.95~~ NOW ONLY **$429.95**

RF-4900 DIGITAL AM/FM, SW coverage from 1.6 to 31 MHz • Full digital readout on all bands • 5 digit fluorescent readout • Premix double superheterodyne • Fast/slow tuning • AFC on FM. Narrow-wide selectivity switch for AM/SW • BFO Pitch control • Calibration control • ANL switch for AM • FET RF circuit • RF Gain control • Inc. ants for FM & SW and more

IMPROVE YOUR RECEPTION WITH AN AMECO ALL-BAND PREAMP!
- 6-160 Meters
- 20+ dB Gain
- Low Price

MODEL PLF-2 ... Improves weak signals as well as image and spurious rejection of most receivers. Direct switching to rec. or preamp. Includes pwr. supp. 117 VAC wired & tested ... ppd **$44.95**

SWL BOOK VALUES



SIMPLE, LOW COST WIRE ANTENNAS All New! How to build low cost antennas for short wave listening ... invisible antennas for tough locations. New data ... **$4.95**

THE COMPLETE SWL HANDBOOK Everything explained about SWL in one volume. Easy to understand sections on receivers, antennas, reporting & verifications ... **$6.95**

1979 WORLD RADIO TV HANDBOOK Full details on every shortwave & TV station in the world, frequency, call letters, programs, language address, etc. THE reference ... **$14.95**

BETTER SHORTWAVE RECEPTION Loaded with tips on improving your listening power. How to adjust receivers for best performance, how to buy receivers & antennas ... **$4.95**

SPECTRONICS, INC. — 1009 GARFIELD ST., OAK PARK, ILL.-60304
PHONE: (312) 848-6777

OCTOBER SPECIALS

Bonus: Extra 3% discount with cashier's check or money order.

Beam Antennas

Hy-Gain TH6DXX, 6 el. Tribander	$239.95
Hy-Gain TH3JR, 3 el. Tribander	124.50
Mosley TA-33, 3 el. Tribander	169.00
Cushcraft ATB-34 Tribander	215.00
Hy-Gain 105BA, 10M Monobander	95.00
Hy-Gain 155BA, 15M Monobander	146.00
Hy-Gain 205BA, 20M Monobander	241.00
Cushcraft A147-11, 11 el. 2M	29.50

Verticals

Hy-Gain 14AVQ/WB, 10-40 Meters	48.50
Hy-Gain 18AVT/WB, 10-80 Meters	77.50
Hustler 4-BTV, 10-40 Meters	68.25
Hustler 5-BTV, 10-80 Meters	92.00
Cushcraft ARX-2, 2M Ringo Ranger	31.00

Towers
Hy-Gain crank-up towers — Write!

Rotors

Alliance HD-73, 10.7 Sq. Ft. Load complete with 100 ft. control cable	$115.00

Coax
Order in 50 ft. steps only!

RG-8/U Foam, 95% Braid, 11 ga. Non-Contaminating Jacket, Low Loss	20.4c/ft.
RG-58A/U Foam, 95% Braid, Low Loss	7.5c/ft.

PL-259's: 10 for $4.50

MC & VISA welcome! Sales to USA only. Prices do not include shipping. Prices are subject to change without notice. Send stamp for price sheet.

COMMUNICATIONS SERVICES
326 A WEST MAIN STREET
PHILADELPHIA, MS 39350
Phone: 601-656-5345 Hours: 8-5 Mon.-Fri.

THE RADIO AMATEUR'S LIBRARY

Special money saving offer! This set of 17 of the most popular League publications includes: THE RADIO AMATEUR'S HANDBOOK (paper edition), A COURSE IN RADIO FUNDAMENTALS, THE ARRL ANTENNA BOOK, THE RADIO AMATEUR'S VHF MANUAL, ARRL ELECTRONICS DATA BOOK, THE RADIO AMATEUR'S LICENSE MANUAL, SOLID STATE DESIGN FOR THE RADIO AMATEUR, *SINGLE SIDEBAND* FOR THE RADIO AMATEUR, HINTS AND KINKS, FM AND REPEATERS FOR THE RADIO AMATEUR, UNDERSTANDING AMATEUR RADIO, ARRL HAM RADIO OPERATING GUIDE, SATELLITE COMMUNICATIONS, REPEATER DIRECTORY, RADIO FREQUENCY INTERFERENCE, SOLID STATE BASICS and ANTENNA ANTHOLOGY.

Editions sent will be those available at the time the order is received. This special offer applies only to orders sent to ARRL Headquarters. Only complete sets of these publications are available at the special price of $60.00 per set postpaid (including Canada and foreign).

THE AMERICAN RADIO RELAY LEAGUE
225 MAIN STREET
NEWINGTON, CT 06111

ROHDE & Schwarz XUA frequency synthesizer. 30 Hz to 30 MHz, 0.1 mv. to 1.0 volt, $595. Tektronix 547/1A1 50 MHz dual-trace, dual-timebase, alternate-sweep scope, $895. Telonic HD-1A 1 to 900 MHz sweeper, $245. All units in good condition with manuals. WBØJGP, 303-722-2257.

SOL-20 in original box complete with monitor and cassette recorder $1495. 8Kra RAM Board $100. GPM Prom Board $60. Uses 2708 Proms Mountain Hardware 100,000 day clock $100. Bob Haworth, Box 92, Boring, OR 97009 or 503-663-6206

SWAN rcvr 600R, custom 500 cw filter, also ST16 filter build in $300. Serial no. 1608. Unique tuner 80-10 meters $60. All equipment bought new. Money order, cert. check or UPS C.O.D. Leo R. Comer, Rte. 1, Box 370, Shenandoah, VA 22849.

33ASR Teletype for sale. Excellent working condition. $600. Call Stan Horzepa, WA1LOU, weekdays at 203-666-1541, weekends and evenings at 203-755-1516.

FOR SALE: Heathkit DX-20 $35; Multi-Elmac PMR-8 with power supply and manuals $60; also HG-10B VFO with manual $40; all good cond. KA1AMF Matt Mildrum 203-828-0733.

WANTED: Drake L4B amplifier w/10 meters. Mint only please. Write: Nickle, 5th Prev. Med. Unit, APO San Francisco, CA 96301.

NEED: Sync motor and other parts for TXC1-FAX. W5NWN, 3921 Simpson, New Orleans, LA 70114.

HEATH HR-1680 receiver, mint, expertly constructed and aligned, $145. WØUK, W. Hall, 557 Lindley Drive, Lawrence, KS 66044.

SELL KLM Echo 70 ssb/cw xcvr 430 MHz. $360 includes UPS. W2YTO, Box 2516, Hendersonville, NC 28739.

WANTED: Thunderbolt, Chippewa or equivalent linear using 4-400A's. Jon Kohn, N3AJB, 717-532-3175.

GOING out of business used equipment sale — Hammarlund, Hallicrafters, Drake, REM, SBE, National, Swan, EICO, Clegg, Gonset, Heath, Palomar and many more. Over 50 bargains, priced to go. For list write Jim West, 1306 Merriam Lane, Kansas City, KS 66106. 913-588-7238.

FOR SALE: Ten-Tec 574 digital xcvr, 276 xtal cal, 670 kayer, 277 ant. tuner/SWR bridge. All brand new, $475 *firm*. Cashier check only! Will ship UPS. Crowell, 904-244-0307 after 4:30 P.M. CST.

70 FOOT Tri-X Sky Needle Tower Model TM-370 $3600. Less base. Price includes Hy-Gain TH6DXX antenna and Ham-M rotor plus cables. Sacramento, 916-456-8073 for complete details. E. Rosano.

QSTs 1924-1975 '35 & '39 thru '43 in hard back. Make offer — U ship. S.a.s.e. for full list. WBØYOD.

WANTED: SB-650 in excellent condition. Paul Cooper, K6PY, 9845 Oakdale Ave., Chatsworth, CA 91311. Day: 714-540-9979, evenings 213-993-8459.

DON and Mike guaranteed buys: Icom IC701/AC/MIC $1249 complete; IC28D $349; Omni-J 2 meter antenna $39.95; Tonnna F9FT 144/16EL $69.95; Bird 43, slugs — stock, UPS paid; Telrex TB5EM $415 — stock; New Telrex TB5ES $315; Janel QSA-5 $41.95; Ham-4 $139; Ham-X $189; Alliance HD73 $109.95; Cetron 572B $29.50; Amphenol PL259, silverplate 69c; Times 1/2" foam hardline 65c/ft; Berktek RG8X 16c/ft; Bearcat 220, 250 $299; Teletowr 55'w breakover $549; Dentron Clipperton L $499; Rohn Tower — 20 percent off dealer prices. Prices subject to change without notice, prior sale. All items FOB Houston, guaranteed. Madison Electronics, 1508 McKinney, Houston, TX 77002. 713-658-0268.

COLLINS 388/URR receiver excellent condition $250. Yaesu FT 221R, speaker, YC 221 readout, excellent $500. Cert Check or m.o., UPS chgs COD. WB9YJF 217-267-2734.

HALLICRAFTERS HT32A $195. HQ-180 general coverage receiver $245. TMC GPR90 general coverage receiver mint condition $195. Collins 75A4 2.1 filter $275. SX101A $160. NCX 1000A needs some work $395. HW-16 Novice rig $100. W2FNT, 18 Hillcrest Terr., Linden, N.J. 07036. 201-486-6917.

FIBERGLASS vaulting poles. Perfect Quad spreaders or VHF/UHF booms. S.a.s.e. for info. K5WSE, Box 1032, Cedar Park, TX 78613. 512-259-2164.

SWAP — Drake TR4CW, RIT, Cw filter, N. Blanker, AC-4, Speak, MFJ-941 tuner, extra finals, perfect condition. Want Drake L-4B or similar with 10 meters. Must be mint. Gene, WD4CRQ, P. O. B. 5824, Bradenton, FL 33507. 813-758-8584.

YAESU station FT301-D xcvr, FP-301 ps, YO-301 scope, FC-301 transmatch. Excellent condition. $1200 or best offer takes all. WB9VVV 1016 Maxwell Lane, Bloomington, IN 47401. 812-339-4966 evenings.

WANTED: UCSL-250, UCSL-300, UCSL-1000, UCSL-1500. All 5kV or less. All with drive and mounting head. WD5GKW, 3114 Cambridge, Arlington, TX 76013.

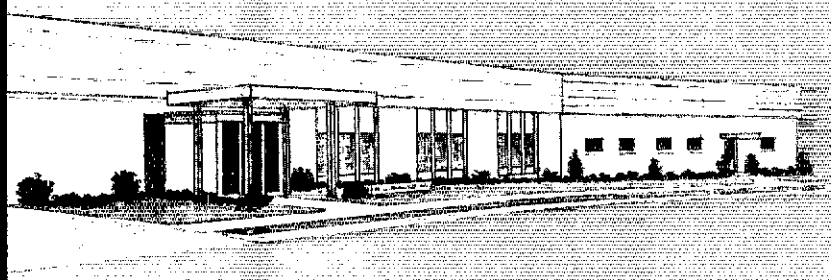
HEATH — SB110A — 6 meter transceiver with PS, SB200 converted to 6 meter KLM432 MHz SSB transceiver, like new Hank Samplin — 4432 W. Larkspur, Glendale, AZ 85304 602-938-8643.

HEATH 104A with blanker and filter, SB604 speaker and power. SB230 linear, SB634 station console $1050. New linear tube. Catalogue kit price $1730. Original Heath cartons Reason 85 years and sickness. Cope, 5011 F St., Little Rock, AR 72205. 501-666-7504.

HEATHKIT SB-220 2 kW linear, very little use, $575. Steve Armeros, WB8GUA, 1730 Erskine, Hemlock, MI 48626.

Known throughout the world for quality...

DRAKE® Equipment for Radio Communications



R. L. DRAKE COMPANY
540 Richard Street, Miamisburg, Ohio 45342
Phone (513) 866-2421 • Telex 288-017

Specifications, availability and prices subject to change without notice or obligation

Drake TVI Filters

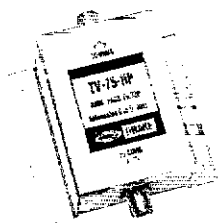
High Pass Filters for TV Sets

provide more than 40 dB attenuation at 52 MHz and lower. Protect the TV set from amateur transmitters 6-160 meters.

Model No. 1603

Drake TV-300-HP

For 300 ohm twin lead. New terminals for easy installation.



Model No. 1610

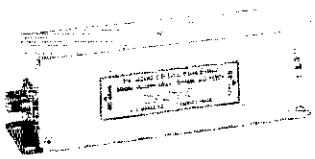
Drake TV-75-HP

For 75 ohm TV coaxial cable; TV type "F" connectors installed.

Low Pass Filters for Transmitters

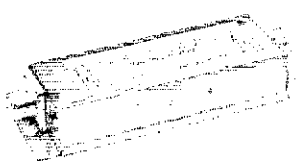
have four pi sections for sharp cut off above the hf amateur bands and to attenuate transmitter harmonics falling in any TV channel and fm band. 52 ohm. SO-239 connectors built in.

Model No. 1608 **Drake TV-3300-LP**



1000 watts max. below 30 MHz. Attenuation better than 80 dB abov 41 MHz. Helps TV i-f interference, as well as harmonic interference.

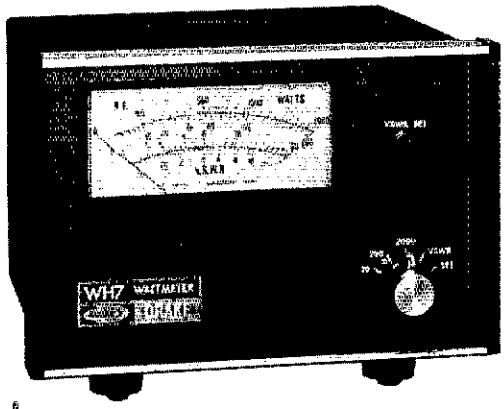
Model No. 1605 **Drake TV-42-LP**



is a four section filter designed with 43.2 MHz cut-off and extremely high attenuation in all TV channels for transmitters operating at 30 MHz and lower. Rated 100 watts input.

Drake TVI Filters help you keep peace with your neighbors

Model
1514



Drake WH-7 Directional RF Wattmeter

1.8-30 MHz

Drake directional, through line wattmeters, using printed circuits, toroids, and state of the art techniques, permit versatile performance and laboratory accuracy, yet at a lower cost.

Removable coupler provides remote metering, and allows convenient positioning of coaxial cable.

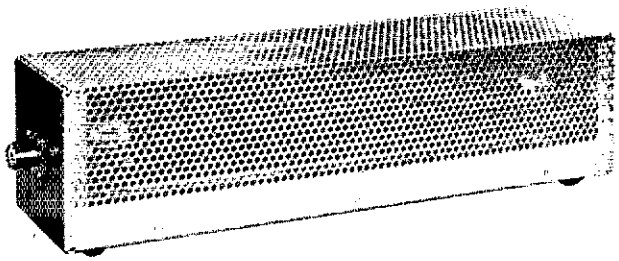
WH-7 wattmeter makes possible quick, accurate adjustments of antenna resonance and impedance match, when placed between transmitter and matching network.

Drake WH-7: Designed for user convenience and high accuracy. This instrument includes three calibrated scales for rf power to satisfy applications from QRP to high power (0-20, 0-200 and 0-2000 watts full scale) A fourth calibrated scale provides direct reading VSWR information, and is switch selected from front panel. The WH-7 is styled to match the 7-line.

Specifications

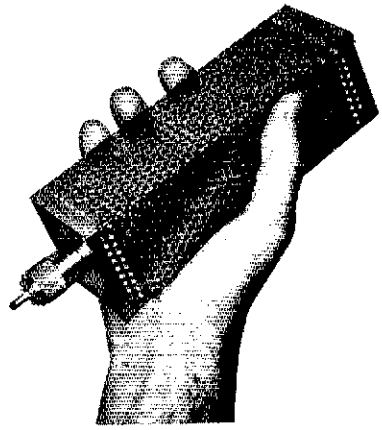
Frequency Coverage	1.8-30 MHz
Line Impedance	50 ohm resistive
Power Capability	2000 W continuous
Jacks, Removable Coupler	Two S0239 input and output connectors
Semiconductors	Two power meter rectifiers
Accuracy	± (5% of reading + 1% of full scale)
VSWR Insertion	Insertion of wattmeter in line changes VSWR no more than 1.05:1
Shipping Weight	3 lbs (1.4 kg)
Dimensions	5.3"H x 6.9"W x 7.5"D (13.5 x 17.5 x 19 cm)

Drake "Dry" Dummy Loads—no oil required



Model 1551 Drake DL-1000

- **1000 watts** for 30 seconds, with derating curve to 5 minutes. Designed to accept Drake FA-7 cooling fan for extended high power operation.
- **VSWR of 1.5:1 max.** 0-30 MHz.
- Provided with SO-239 coax connector, and rubber feet for desk or bench use.
- **Size** 14" x 3.6" (35.6 x 9.1 cm). Wt. 2 lbs (910 g)



Model 1550 Drake DL-300

- **300 watts** for 30 seconds, with derating curve to 5 minutes.
- **Built-in PL-259** coax connector for direct connection to rear of transceiver or transmitter-no jumper coax necessary.
- **VSWR of 1.1:1 max.** 0-30 MHz 1.5 max. 30-160 MHz.
- Ideal as bench test device for amateur or commercial hf and vhf gear.
- **Small size** fits conveniently in any field service tool box. 6.7" x 2.08" (17.0 x 5.3 cm). Wt. 11 oz (310 g)

A remarkable engineering breakthrough...

DRAKE TR-7

0-30 MHz

continuous coverage reception—no gaps—no range crystals required †

60-10 Meters*

Amateur Band transmission, including capability for MARS, Embassy, Government, and future band expansions*

The Drake TR-7 System significantly advances the technology of worldwid radio communications and unfolds an entirely new state of the art.

Models shown are Drake TR-7/DR-7 with RV-7 and MS-7

Designed and manufactured in U.S.A.

In 1963 Drake led the way by producing the first commercially available amateur transceiver that employed the now widely copied 9 MHz i-f frequency. Even today, many major competitive transceivers are still being introduced using i-f's in this range.

Now, Drake leads the way again by developing the first commercially available amateur transceiver that uses a 48 MHz i-f, through the technique of "Up-Conversion." This system greatly improves image and general coverage performance, and will be copied in the years to come. With Drake, you can join the new state of the art today!

solid state continuous coverage synthesized hf system Model 1337

DRAKE®

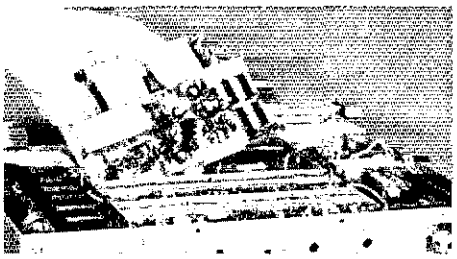
The design philosophy behind the new Drake "7 system" has created a most sophisticated system concept, extending from engineering to the visual appearance of the system and each of its parts.

The TR-7 System is the result of one of the most extensive engineering and development programs in the history of the R. L. Drake Company, and provides the user with many innovative design features.

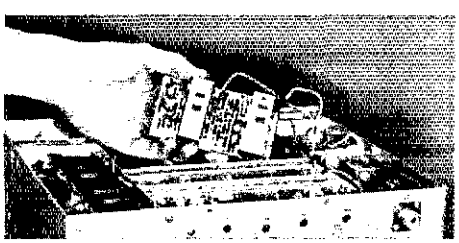
With the excellent design of its front panel and controls, the system is simple and straightforward to operate–makes state of the art performance a pleasure.

Broadband, Solid State Design—100% solid state throughout. All circuits are broadbanded so there is no need for preselection tuning or transmitter adjustments of any kind.

Synthesized/PTO Frequency Control—A Drake exclusive: Special high performance synthesizer, combined with the famous Drake PTO, provides smooth, linear tuning with 1 kHz dial and 100 Hz digital readout. 500 kHz up/down range switching is pushbutton controlled.



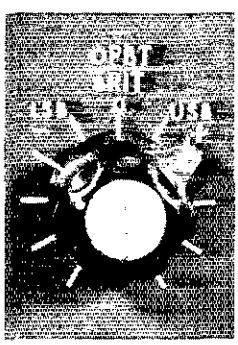
† **Continuous, Wide Range Frequency Coverage**—The TR-7/DR-7 provides reception from 1.5 thru 30 MHz—continuously, and **zero** thru **30 MHz** continuously with the optional Aux-7 Range Program Board. No gaps or range crystals required. The highly advanced Drake Synthesizer makes this possible, and is an industry first. The TR-7/DR-7 provides transmit coverage for all Amateur Bands 160 thru 10 meters. With the optional Aux-7 Range Program Board, diode-programmable



out-of-band transmit coverage is available for MARS, Embassy, Government, and future band expansions in the range 1.8 thru 30 MHz.* The Aux-7 Board also provides 0 thru 1.5 MHz receive coverage and crystal-controlled fixed channel operation for Government, Amateur, or semi-commercial applications anywhere in the hf range. The TR-7 w/o DR-7 provides coverage of the Amateur Bands 160 thru 15 meters and the 28.5-29.0 MHz range of 10 meters. The Aux-7 Range Program Board is also useable in the standard TR-7 for extra range coverage as noted.

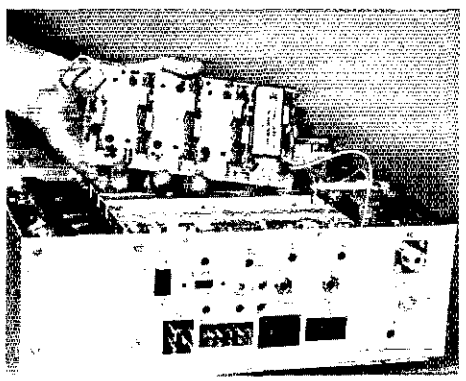
State of the Art Receiver Design—The Drake TR-7 introduces another industry first for amateur transceivers: "Up-Conversion," in combination with a special high level double balanced mixer for superior strong signal handling, spurious and image response performance. The first i-f of 48.05 MHz places images well outside the receiver passband, and provides for true general coverage operation without i-f gaps.

True Passband Tuning—The TR-7 employs the famous Drake Full Passband Tuning instead of the limited range "i-f shift" found in some other units. The Drake System tunes from the top edge of one sideband, through center, to the bottom edge of the other sideband. In fact, the range is even wider to accommodate RTTY. Full passband tuning greatly improves receiving performance in heavy QRM.



Unique Independent Receive Selectivity—Optional receiving selectivity filters can be installed internally and pushbutton-selected from the front panel. These may be selected independently of transmit mode and provide optimum response for various conditions of ssb, cw, RTTY, and a-m. You may also transmit cw while receiving ssb, or vice versa, or even transmit one sideband while receiving the other. The standard filter is 2.3 kHz for ssb. You may choose from optional 300 Hz, 500 Hz, a special 1.8 kHz for crowded ssb, or 6 kHz filter for a-m. Any three may be installed in addition to the ssb filter.

Effective Noise Blanker—This accessory is custom engineered to provide true impulse-type noise blanking performance.



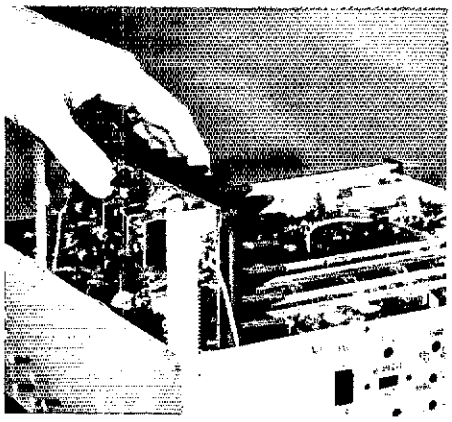
Special High Power Solid State PA—A Drake custom-designed diagonal heat sink provides for an internally mounted power amplifier with nothing mounted outboard subject to physical damage. The unique air ducting effect of this amplifier allows an optional rear-mounted fan to provide continuous duty on SSTV/RTTY. Continuous ssb/cw

(TR-7 features continued on next page)

*Note: Out-of-band transmitter coverage for MARS, Government, etc. is available only in ranges authorized by the FCC, Military, or other government agency for a specific service. Proof of license for that service must be submitted to the R. L. Drake Company, including the 500 kHz range to be covered. Upon approval, and at the discretion of the R. L. Drake Company, a special range IC will be supplied for use with the Aux-7 Range Program Board. Prices quoted from the factory. See operator's manual for details. (Not available for services requiring type acceptance.)

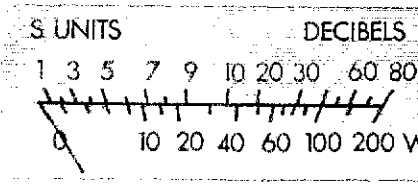
(Continued from preceding page)

DRAKE TR-7 solid state continuous coverage synthesized hf system

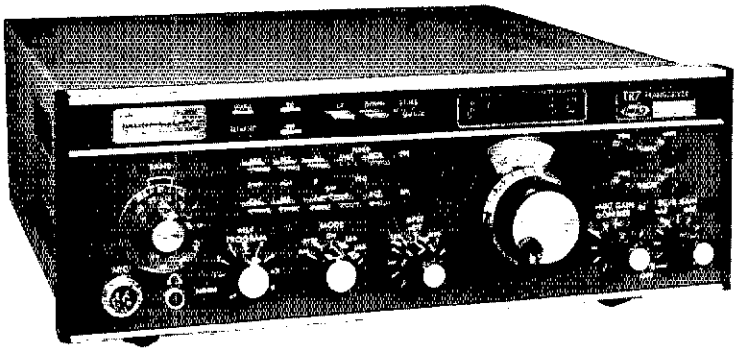


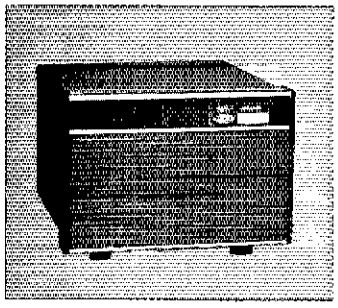
operation is available without the fan, due to the excellent heat sink design. The optional Drake PS-7 Ac Supply is rugged, rated for continuous duty, and will easily handle power requirements. The System is rated 250 watts input—in any of its modes. Fully VSWR protected.

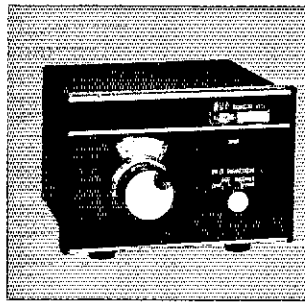
TR-7 Internal Test Facilities—As well as the standard "S" meter function, the TR-7 metering includes a built-in rf Wattmeter/VSWR Bridge. Also, the DR-7 digital counter reads frequencies to 150 MHz for test purposes. Access to the counter is from the rear panel.



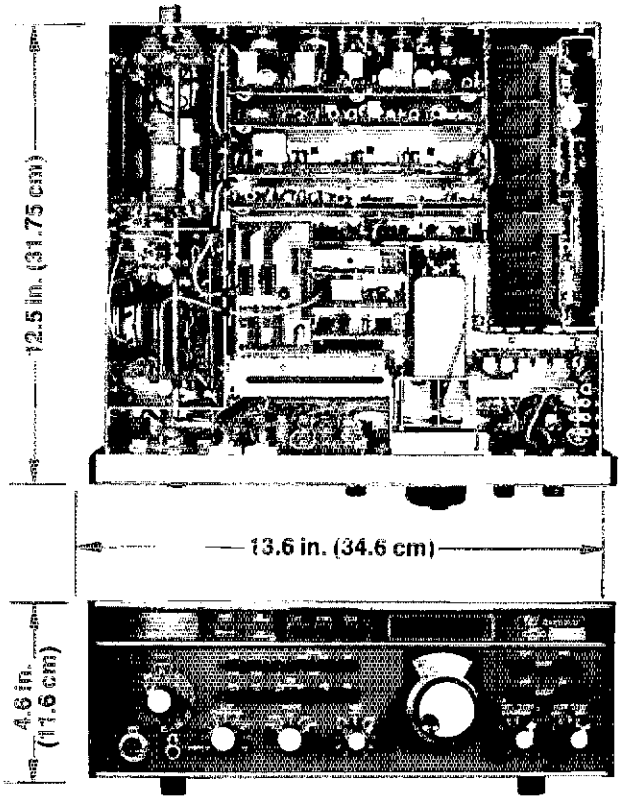
Receiver Incremental Tuning (RIT)—Complete RIT Flexibility is provided for both the TR-7 and RV-7 remote VF for maximum convenience. The RV-7 also includes a special "spot" functio for easy zero beating.







Model 1337 Drake TR-7 Transceiver
Model 1530 Drake DR-7 General Coverage/ Digital Readout Board
Model 1336 Drake TR-7/DR-7 General Coverage Digital R/O Transceiver
Model 1338 Drake RV-7 Remote VFO
Model 1502 Drake PS-7 120/240V Ac Supply includes special wide range voltage and frequency capability. Operates from any nominal line voltage (90-132 V/ 180-254 V; 50-60 Hz) ideal for overseas
Model 1536 Drake Aux-7 Range Program Board†
Model 1531 Drake MS-7 Matching Speaker
Model 1537 Drake NB-7 Noise Blanker
Model 1529 Drake FA-7 Fan
Model 7021 Drake SL-300 Cw Filter, 300 Hz
Model 7022 Drake SL-500 Cw Filter, 500 Hz
Model 7023 Drake SL-1800 Ssb/RTTY Filter, 1.8 kHz
Model 7024 Drake SL-6000 A-m Filter, 6.0 kHz
Model 1335 Drake MMK-7 Mobile Mounting Kit
Model 7037 Drake TR-7 Service Kit/Extender Board Set
Model 385-0004 Drake TR-7 Service/Schematic Book



DRAKE TR-7 SPECIFICATIONS

GENERAL

Frequency Coverage
(with DR-7 Digital R/O Gen. Cov. Board)

Receive
Without Aux-7 ... 1.5 to 30 MHz, continuous, no gaps
With Aux-7† ..... Same, plus 0 to 1.5 MHz at reduced performance in this range

Transmit
Without Aux-7 ... 1.8-2.0, 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5, 28.0-30.0 MHz
With Aux-7† ..... Above ranges, plus any eight 500 kHz segments from 1.8 to 30 MHz

Frequency Coverage
(without DR-7 Digital R/O Gen. Cov. Board)

Receive/Transmit (Transmit above 1.8 MHz only)
Without Aux-7 ... 1.5-2.0, 3.5-4.0, 7.0-7.5, 14.0-14.5, 21.0-21.5, 28.5-29.0 MHz, plus Receive only on 2.5-3.0 MHz and 5.0-5.5 MHz
With Aux-7† ..... Above ranges, plus any eight 500 kHz segments from 0 to 30 MHz, (0 to 1.8 MHz Receive only)

Modes of Operation ... Usb, Lsb, Cw, RTTY, A-m equiv. (A-3H)

Frequency Stability ... Total drift is less than 100 Hz after warm up. Total frequency change is less than 100 Hz over the 11-16 V-dc input supply range

Frequency Readout Accuracy
Analog ..... Better than ± 1 kHz when calibrated at the nearest marker point
Digital ..... 15 ppm ± 100 Hz

External Counter Mode
Maximum Input Frequency ... 150 MHz
Input Level Range ... 50 mV to 2 V, rms

Power Supply Requirements .... 11-16 V-dc (13.6 V-dc nominal), 3A receive, 25A transmit

Dimensions
Depth ..... 12.5 in. (31.75 cm), excluding knobs and connectors.
Width ..... 13.6 in. (34.6 cm)
Height ..... 4.6 in. (11.6 cm), excluding feet
Weight ..... 17.1 lb. (7.75 kg)

RECEIVER

(1.8-30 MHz, reduced specs 0-1.8 MHz)

Sensitivity
Ssb, Cw ..... Less than 0.5 μV for 10 dB (S+N)÷N
A-m (30% Mod.) ..... Less than 2.0 μV for 10 dB (S+N)÷N

Selectivity ..... 2.3 kHz at −6 dB and 4.1 kHz at −60 dB (1.8:1 shape factor)

Ultimate Selectivity ... Greater than 100 dB

Agc ..... Less than 4 dB output variation for 100 dB input signal change, referenced to agc threshold

Intermodulation ..... Intercept Point, +20 dBm
Two-tone Dynamic Range, 99 dB
(at tone spacings of 50 kHz and greater)

I-f Frequency ..... First I-f ..... 48.05 MHz
Second I-f ..... 5.645 MHz

Image and I-f Rejection Greater than 80 dB

Spurious Response ... Greater than 60 dB down

Internally Generated Spurious ..... Less than 1 μV equivalent, except 3 μV equivalent from 5 to 6 MHz. (Reduced specs on internal osc frequencies)

Audio Output ..... 2.0 watts @ less than 10% THD (4 ohm load)

TRANSMITTER

Power Input (Nominal)
Ssb ..... 250 watts PEP
Cw ..... 250 watts
A-m equiv. ..... 80 watts (carrier), plus upper sideband

Load Impedance ..... 50 ohms, nominal

Spurious Output ..... Greater than 50 dB down

Harmonic Output ..... Greater than 45 dB down

Intermodulation Distortion ..... 30 dB below PEP (24 dB below one of two tones)

Undesired Sideband Suppression ..... Greater than 60 dB @ 1 kHz

Duty Cycle
Ssb, Cw 100%
Tune, SSTV, RTTY, A-m w/o 1529 FA-7 Fan: 33%, 5 min. transmit, max.
with 1529 FA-7 Fan: 100%

Wattmeter Accuracy ... ±5% @ 100 watts (50 ohm load)

Carrier Suppression ... Greater than 50 dB

Microphone Input ..... High impedance

VSWR Turndown (Nominal) (Percent rf power turndown)
@ 1:1 ..... 0%
@ 2:1 ..... 10%
@ 3:1 ..... 25%
@ 4:1 ..... 50%
@ 5:1 and above 90%

† Aux-7 must be used with either Model 1546 RRM-7 Range Receive Module, or Model 1547 RTM-7 Range Transceive Module. Use one module per 500 kHz range. Modules plug directly into Aux-7.

R. L. DRAKE COMPANY

DRAKE®

540 Richard St., Miamisburg, Ohio 45342
Phone: (513) 866-2421 • Telex: 288-017

October 1978

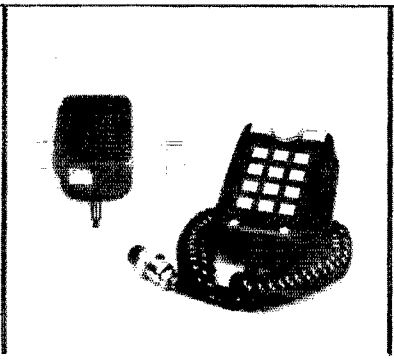
DRAKE® UV-3 uhf-vhf fm

Optional Drake 1525EM Encoding Mike

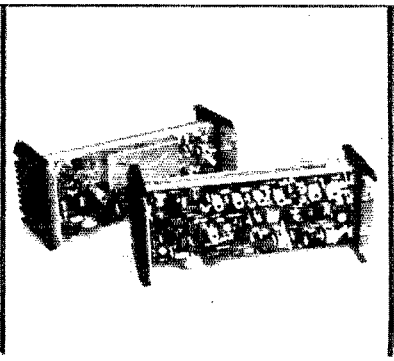
Designed and manufactured in U.S.A.

- Fully synthesized on each band, 5 kHz steps, digital read-out.
- Fm coverage on complete 144, 220 and 440 Amateur Bands, depending on model purchased. Completely band-switched from front panel.
- Four extra diode programmable fixed channels, with offsets, available for each band, in addition to the synthesizer.
- Diode programmable non-standard offsets available for each band.
- Separate SO-239 Antenna Connector for each band.
- Outstanding receiver front-end performance. Ideal for use in metropolitan areas where many repeaters are in use.
- Squelch.
- Hi-lo power, with lo-power adjustable.
- Priority scan feature:
  —scan a programmed fixed channel from any synthesizer frequency.
  —scan any synthesizer frequency from a programmed fixed channel.
  —scan a specific programmed fixed channel from another programmed fixed channel.
- Plug-in modular construction.
- Remote operation. Removable control head will operate radio in trunk compartment from driver seat. (remote kit optional)
- No frequency mixing in transmitter. Transmitter frequency derived directly from VCO frequency. Provides extremely low spurious output.
- Companion ac power supply (PS-3).
- Operate mobile or fixed station. (13.8 V supply required)
- Small, compact, rugged construction utilizing aluminum extrusion sides and panel.
- Transmit audio custom tailored for maximum communications "punch."
- Choice of one, two, or three band coverage in a single transceiver. Basic models may be purchased, with factory installed add-on modules added later.

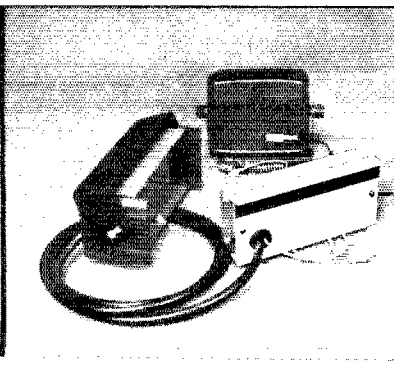
PS-3 Ac Power Supply



1525EM Encoding Microphone



220 and 440 Add-on Modules



UMK-3 Remote Trunk-Mount Kit

3-band system

Fully synthesized on each band

144 220 440 MHz

DRAKE UV-3 SPECIFICATIONS

GENERAL

Frequency Coverage: 144 ..... 144-148 MHz*
220 ..... 220-225 MHz
440 ..... 440-450 MHz

Mode: Fm (5 kHz deviation)

Supply Voltage: 11.5-15.0 V dc negative ground

Supply Current: Receive ..... 0.9 A Standby
Transmit ..... 6 A High Power
1.3 A Low Power

Dimensions: Length (single unit) ..... 9" (22.86 cm)
(two unit) ..... 11.5" (29.2 cm)
(three unit) ..... 14" (35.56 cm)
Width ..... 8.1" (20.6 cm)
Height ..... 3.5" (8.9 cm)

Weight: (One unit) ..... 7 lbs. (3.17 kg)
(Two unit) ..... 7.3 lbs. (3.31 kg)
(Three Unit) ..... 7.6 lbs. (3.45 kg)

Operating Temperature: 0°C to 60°C

*Band overlap allows tuning of most Mars frequencies

FREQUENCY SYNTHESIZER

Type: Directly programmable, digital phase locked loop, 5 kHz steps

Reference: 5 MHz crystal oscillator

Frequency Accuracy: ±.0005% over a temperature range of 0°C to 60°C with a supply voltage variation of 11.5 to 15 V dc

RECEIVER

Type: Double conversion, 1st i-f @ 10.7 MHz, 2nd i-f @ 455 kHz, 6 pole crystal filter @ 10.7 MHz and 8 pole ceramic filter at 455 kHz

Selectivity: 12 kHz @ −3 dB

Sensitivity: 146-148 MHz, 222-225 MHz, 442-447 MHz } Typically less than .35μV for 12 dB SINAD
144-148 MHz, 220-225 MHz, 440-450 MHz } .5 μV (max.) for 12 dB SINAD

Adjacent Channel Rejection: 144 ..... greater than 80 dB min. @ ± 30 kHz
220, 440 ..... greater than 70 dB min. @ ± 30 kHz
144, 220, 440 .. greater than 60 dB min. @ ± 15 kHz

Intermodulation Attenuation (EIA RS-204-A): 144 ..... 80 dB (referenced to 12 dB SINAD)
220 ..... 75 dB (referenced to 12 dB SINAD)
440 ..... 65 dB (referenced to 12 dB SINAD)

Image Rejection: 144 ..... 80 dB
220 ..... 60 dB
440 ..... 50 dB

I-f Rejection: Greater than 95 dB

Audio Output: 2.5 watts @ less than 10% THD, 2 watts @ less than 5% THD

Squelch Sensitivity: Less than 0.2 μV

Meter: Indicates relative signal level

TRANSMITTER

Power Output (13.8 V dc): High Power: 144 ..... 25 watts nom. (144-148 MHz)
220 ..... 10 watts min. (220-225 MHz)
440 ..... 10 watts min. (440-450 MHz)
Low Power: Approx. 10% of high power (adjustable)

Harmonic and Out of Band Spurious: 144, 220 ..... 60 dB (min.) referenced to carrier
440 ..... −40 DB (min.) referenced to carrier

Spurious in Band: −75 dB (min.) referenced to carrier

Modulation: Direct fm, pre-set to ±5 kHz deviation

Hum and Noise: Greater than 40 dB below maximum deviation

Model 1346 Drake UV-3 (144-220-440)
Model 1344 Drake UV-3 (144-440)
Model 1340 Drake UV-3 (144)

(Models above include factory installed modules for bands as listed, standard dynamic mike, and mobile mounting bracket.)

Add-on modules expand band coverage of models which may have been purchased in a single band or two band configuration. Prices include factory installation which is necessary to meet FCC receiver certification requirements.

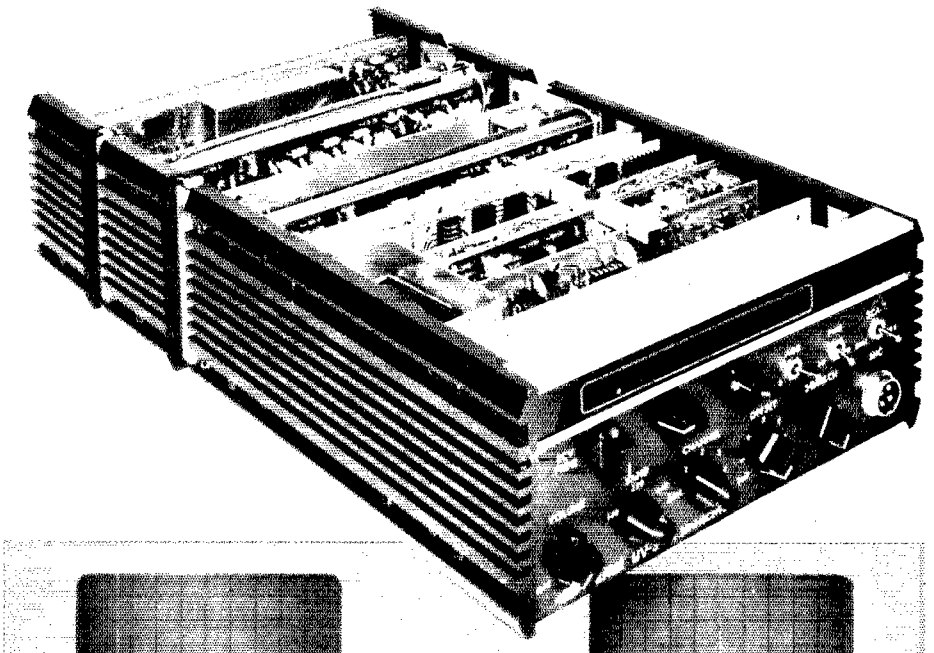
220 Add-on Module
440 Add-on Module
144 Add-on Module

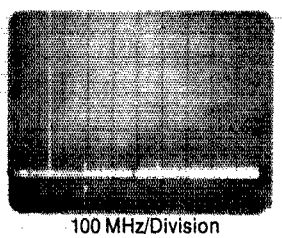
Model 1504 Drake PS-3 AC Power Supply

Model 1525 Drake 1525EM Encoding Mike (see next page)

Model 1330 Drake UMK-3 Remote Trunk-Mount Kit

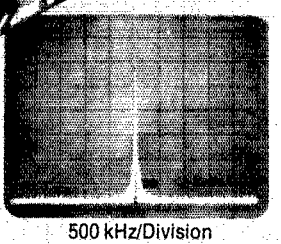
Model 385-0002 Drake UV-3 Service/Schematic Book





100 MHz/Division

UV-3 Frequency Spectrum
146.520 MHz
25 Watts



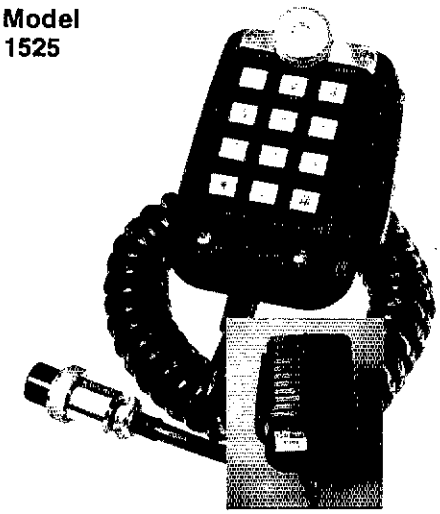
500 kHz/Division

DRAKE® MICROPHONES

Drake 1525EM Push Button Encoding Mike

- Microphone and auto-patch encoder in single convenient package with coil cord and connector. Fully wired and ready for use.
- High accuracy IC tone generator, no frequency adjustments.
- High reliability Digitran® keyboard.
- Power for tone encoder obtained from transceiver through microphone cable. No battery required. Low current drain.
- Low output impedance allows use with almost all transceivers.
- Four pin microphone plug: directly connects to Drake UV-3 without any modification in transceiver. Compatible with all previous Drake and other 2 meter units with minor modifications.
- Tone level adjustable

Model 1525



Drake 7077 Dynamic Desk Microphone

- **Audio and level characteristics** custom designed to match the transmit audio requirements of the Drake TR-7.
- **Features both VOX and PTT** operation without modification.
- **High Impedance**
- Includes coil cord and plug wired for direct installation to the Drake TR-7.
- Style and color provide a beautiful match to the Drake 7-Line.
- Size 4.3"W x 5.8"D x 9.3"H (10.9 x 14.7 x 23.6 cm). Wt. 1 lb. 7 oz (650 g).

R. L. DRAKE COMPANY DRAKE®
540 Richard St., Miamisburg, Ohio 45342
Phone: (513) 866-2421 • Telex: 288-017

Drake L-7 Continuous Duty 160-10* Meters 2kW Linear Amplifier

Model 1528

Temperature controlled design for "key-down" operation over a wide frequency range. Newly engineered for coverage of any new or expanded hf amateur bands within FCC amplifier rules. Also features wide frequency coverage for MARS, and other services authorized for this type of amplifier.

2 kW PEP, 1 kW cw, RTTY, SSTV operation—all modes, full rated input, continuous duty cycle.

160-10* meter amateur band coverage, plus expanded ranges for any future hf band expansions or additions within FCC rules. These ranges also include increased coverage for MARS, embassy, government, or other such services.

The Drake L-7 utilizes a pair of Eimac 3-500 Z triodes for rugged use, and lower replacement cost compared to equivalent ceramic types. Tubes are included.

Accurate built-in rf wattmeter, with forward/reverse readings, is switch selected. Calibrated 300/3000 watt scales.

Temperature controlled two speed fan is a high volume low noise type and offers optimum cooling.

Adjustable exciter agc feedback circuitry permits drive power to be automatically controlled at proper levels to prevent peak clipping and cw overdrive. Front panel control.

By-pass switching is included for straight through, low power operation without having to turn off amplifier.

Bandpass tuned input circuitry for low distortion and 50 ohm input impedance.

Amplifier is comprised of two units—rf deck for desk top and separate power supply.

Operates from 120/240 V ac, 50/60 Hz primary line voltage.

DRAKE L-7 SPECIFICATIONS

Frequency Coverage*: Ham bands 160 through 15 meters. Non-amateur frequencies between 6.5 and 21.5 MHz may be covered with some modification of the input circuit.

Plate Power Input: 2000 Watts PEP on SSB and 1000 Watts DC on CW, AM, RTTY, and SSTV.

Drive Power Requirements: 100 Watts PEP on SSB and 75 Watts on CW, AM, RTTY, and SSTV.

Input Impedance: 50 Ohms. (Bandpass tuned input)

Output Impedance: Adjustable pi-network matches 50 Ohm line with SWR not to exceed 2:1.

Intermodulation Distortion Products: In excess of −33 dB.

Wattmeter Accuracy: 300 Watts forward and reflected, ± (5% of reading + 3 Watts). 3000 Watts forward, ± (5% of reading + 30 Watts).

Power Requirements: 240 Volts 50-60 Hertz 15 Amperes, or 120 Volts 50-60 Hertz 30 Amperes.

Tube Complement: Two of 3-500Z or 8802/3-500Z or 8163 or 3-400Z.

Dimensions: Amplifier 13.69"W x 6.75"H x 14.25"D (34.8 x 17.1 x 36.2 cm). **Power Supply** 6.75"W x 7.88"H x 11"D (17 x 20 x 28 cm).

Weight: Amplifier 27 lbs (12.25 kg). **Power Supply** 42.5 lbs (19.3 kg).

*Export model includes coverage of the 10-meter Ham Band.

Drake R-7 Synthesized, General Coverage Receiver

Model 1240

Full general coverage recepti
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 the Drake TR-7.

100% solid state broadband design, fully synthesized with a permeability tuned oscillator (PTO) for smooth, continuous 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 a 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 TR-7 transceiver are included, along with separate R-7 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 TR-7. 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 R-7 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, 20 240 V-ac, 50/60 Hz, or nominal 13.8 V-dc.

The R-7 includes a built-in speaker, or an external Drake MS-7 speaker may be used.

Built-in 25 kHz calibrator for calibration of analog di

Low level audio output for tape recorder.

Up to eight crystal controlled fixed channels can be selected. (With Drake Aux-7 installed.)

Optional Drake NB-7A Noise Blanker available. Pro vides true impulse type noise blanking performance

DRAKE

R. L. DRAKE COMPA

Optional accessories available

Model 1531 Drake MS-7 Speaker
Model 7021 Drake SL-300 Cw Filter, 300 Hz
Model 7022 Drake SL-500 Cw Filter, 500 Hz
Model 7023 Drake SL-1800 Ssb/RTTY Filter, 1800 Hz
Model 7024 Drake SL-6000 A-m Filter, 6.0 kHz
Model 7026 Drake SL-4000 A-m Filter, 4.0 kHz
Model 1532 Drake NB-7A Noise Blanker
Model 1536 Drake Aux-7 Range Program/Fixed-Frequency Board

DRAKE R-7 SPECIFICATIONS

Frequency Coverage, continuous tuning (With Drake DR-7 Digital R/O, General Coverage Board)
0 to 30 MHz continuous (With or without Aux-7 board) (No gaps in frequency coverage)

Frequency Coverage, continuous tuning (Without DR-7 Board installed)

0.01 to 0.5 MHz 0.5 to 1.0 MHz 1.0 to 1.5 MHz 1.5 to 2.0 MHz 2.5 to 3.0 MHz 3.5 to 4.0 MHz	Without Aux-7 Board	5.0 to 5.5 MHz 7.0 to 7.5 MHz 14.0 to 14.5 MHz 21.0 to 21.5 MHz 28.5 to 29.0 MHz

Plus any eight additional 500 kHz segments between 0 and 30 MHz when programmed into Aux-7 Board.

Crystal Controlled Fixed Frequencies: Up to eight crystal-controlled fixed frequencies within the 0-30 MHz range with Aux-7 Accessory Board. Proper 500 kHz range for desired fixed frequency is also programmed into Aux-7.

Frequency Stability: Less than 100 Hz drift after temperature stabilization including ±10% line voltage variation.

Digital Readout Accuracy: (DR-7 installed) 15 PPM ± 100 Hz

Analog Dial Accuracy: Better than ±1 kHz when calibrated to nearest calibrator marker.

Modes of Operation: Ssb, cw, RTTY, SSTV, a-m.

Sensitivity (ssb): 1.8-30 MHz Less than .20μV for 10dB S+N/N with preamp on (typically .15μV) (Noise floor typically −134 dBm) Less than .50μV for 10 dB S+N/N without preamp (typically .30μV) (Noise floor typically −128 dBm). .01-1.5 MHz Less than 1.0μV for 10 dB S+N/N

Sensitivity (a-m): 1.8-30 MHz Less than 1.2μV for 10 dB S+N/N @ 30% modulation, preamp on. Less than 2.0μV for 10 dB S+N/N @ 30% modulation, preamp off. .01-1.5 MHz Less than 4.0μV for 10 dB S+N/N @ 30% modulation.

Selectivity (2.3 kHz filter supplied): 2.3 kHz at −6 dB, 4.2 kHz at −60 dB (1.8:1) shape factor. Optional 300 Hz, 500 Hz, 1800 Hz and 4 kHz filters are available as follows:

Ultimate Selectivity: Greater than 100 dB

Accessory Crystal Filters

SL-300 cw filter: 300 Hz @ 6 dB, 700 Hz @ 60 dB
SL-500 cw, RTTY Filter: 500 Hz @ 6 dB, 1100 Hz @ 60 dB
SL-1800 ssb/RTTY Filter: 1800 Hz @ 6 dB, 3600 Hz @ 60 dB
SL-4000 a-m Filter: 4 kHz @ 6 dB, 8 kHz @ 60 dB
SL-6000 a-m Filter: 6 kHz @ 6 dB, 12 kHz @ 60 dB

Strong Signal Handling

Two-tone dynamic range: 99 dB* Third order intercept point: +20 dBm — 1.8-30 MHz preamp off
Two-tone dynamic range: 95 dB* Third order intercept point: +10 dBm — 1.8-30 MHz preamp on
Blocking: >145 dB above noise floor

**(At tone spacings of 50 kHz and greater)*

I-f and Image Rejection: Greater than 80 dB (48.05 MHz 1st i-f) (5.645 MHz 2nd i-f) (50 kHz 3rd i-f)

Agc Performance; Less than 4 dB audio output variation for 100 dB input signal change above agc threshold. Agc threshold is typical .8μV with preamp off and .25μV with preamp on.

Attack time: 1 millisecond. Three selectable release times: Slow—2 seconds; Med—400 m sec; Fast—75 m sec. Also, "Off" position is provided.

Antenna Input Impedance: Nominal 50 ohms

Audio Output: 2.5 watts with less than 10% T.H.D. into nominal 4 ohm load.

Power Requirements: 100/120/200/240 V-ac ±10%, 50/60 Hz, 60 watts or 11.0 to 16.0 V-dc (13.8 V-dc nominal), 3 amps

External Counter Mode (DR-7 installed): Readout: to 100 Hz. Accuracy: 15 PPM ±100 Hz. Maximum input frequency: 150 MHz. Input level range: 50 mV to 2 V rms.

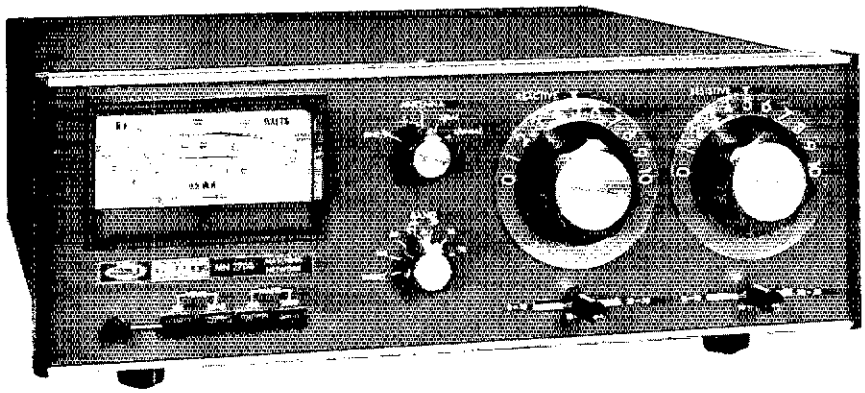
Dimensions/Weight:

Depth— 13.0 in (33.0 cm) excluding knobs and connectors.
Width— 13.6 in (34.6 cm)
Height— 4.6 in (11.6 cm) excluding feet
Weight— 18.4 lbs (8.34 kg)

540 RICHARD STREET, MIAMISBURG, OHIO 45342 • TELEPHONE (513) 866-2421 • TELEX 288-017

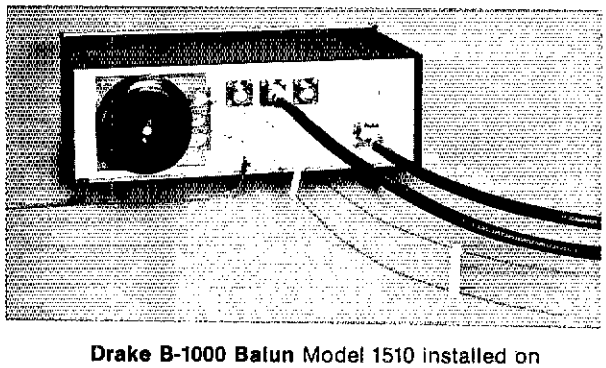
DRAKE® MATCHING NETWORKS

Precision instruments providing
rf radiation control and measurement
for your communication system

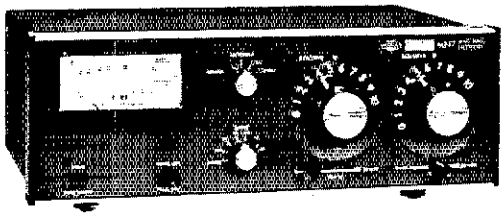


Drake MN-2700 2kW Matching Network

Model 1539



Drake B-1000 Balun Model 1510 installed on Matching Network.



Drake MN-7 Matching Network Model 1538

Same features and specifications as the Drake MN-2700, but rated at 250 watts continuous. Same width and height, but only 8.5" (21.6 cm) in depth, and weighs 10 lbs. (4.55 kg). Meter reads 0-300 watts forward power or VSWR.

The Drake MN-2700 manages rf radiation in the areas of impedance match to the antenna, rf power measurement, VSWR measurement, reduction of harmonic radiation, and antenna selection.

DRAKE MN-2700 FEATURES

160 thru 10 Meters Frequency Coverage—With out-of-band coverage for MARS, future band expansions and other applications.

Antenna Choice—Matches antennas fed with coax, balanced line or random wire. (For balanced line use optional Drake B-1000 Balun which mounts on rear panel of MN-2700.)

Antenna By-pass Switching—Unique design allows unit to be switch-by-passed regardless of which antenna is in use, whether coax or wire type. No need to manually disconnect feedlines. Switch also selects various antennas.

Extra Harmonic Reduction to help fight TVI—Drake Matching Networks employ special "pi-network" low-pass filter type circuitry for maximum harmonic rejection. This feature alone makes the MN-2700 a worthwhile investment; it is a Drake exclusive.

Built-in Metering—Accurate rf wattmeter/VSWR bridge is pushbutton controlled from front panel.

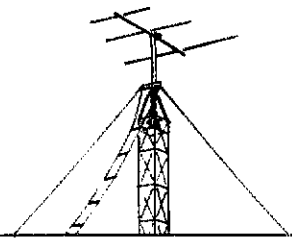
Power Capability—2000 watts PEP, 1000 watts average. Continuous Duty.

Dimensions—13.09"W x 4.53"H x 13"D including connectors (33.26 x 11.5 x 33 cm); **Weight** 11 lbs. (5 kg).

DRAKE MN-2700 SPECIFICATIONS

• **Frequency Coverage:** 1.8 to 30 MHz. Band Switch marked for 160, 80, 40, 20, 15, and 10 meter amateur bands; however, frequency coverage between amateur bands is possible by using the nearest band positions with a small reduction in matching capability. • **Input Impedance:** 50 ohms (resistive). • **Load Impedance:** 50 ohm coaxial with VSWR of 5:1 or less at any phase angle (3:1 on 10 meters). 75 ohm coaxial at a lower VSWR can be used. • **Balanced Feedlines:** With the Drake B-1000 accessory balun, which mounts on rear panel, tunes feed point impedances of 40 to 1000 ohms, or 5:1 VSWR referenced to 200 ohms (3:1 on 10 meters). • **Long-Wire Antennas** Feed point impedances up to 5:1 VSWR referenced to 50 ohms. Also, 5:1 referenced to 200 ohms with the Drake B-1000 accessory balun (3:1 on 10 meters). • **Meter:** Reads VSWR or forward power, 0-200 watts or 0-2000 watts. • **Wattmeter Accuracy:** ±5% of reading ±1% of full scale. • **Insertion Loss:** 0.5 dB or less on each band after tuning. • **Front Panel Controls:** Provide for the adjustment of resistive and reactive tuning, antenna switching, band switching, VSWR calibration, and selection of watts or VSWR functions of the meter. • **Rear Panel Connectors:** The rear panel has four type SO-239 connectors (one for input and 3 for outputs), three screw terminal connections (for long-wire and open-wire feeder systems), and a ground post.

really a "secret weapon" for 160 meter enthusiasts!



The Drake MN-2700 and MN-7 Matching Networks have a truly unique antenna feed switching design

Both matching networks will completely change the mode of a balanced-line fed 135 foot doublet to a special configuration that provides very effective 160 meter performance. And best of all, it's done with the simple flip of a switch on the front panel.

Consider a typical all-band antenna set-up—a 135 foot doublet, center-fed with 60 to 70 feet of balanced line at a height of 45 to 60 feet. The Drake MN-2700/B-1000 or MN-7/B-1000 will match this as a true balanced system on 80 thru 10 meters. (Fig. 1)

But what about 160 meters? Many amateurs recommend tying the feeders together and using the antenna as a vertical with a "top-hat." In fact, we suggest this ourselves in our manual.

However, the use of this, or any vertical, assumes you have a good ground or radial system for efficient operation. If you do not have enough room or do not wish to install such a radial system, performance may suffer. And if you do have radials, you still have to change the feeder connections each time you operate 160 meters.

On the other hand, when you use the MN-2700/B1000 or MN-7/B-1000 simply leave the feeders in the balanced connection as you would for 80 thru 10, and move the special antenna selector switch to Position No. 4. This automatically converts half of the antenna and feedline to an inverted "L", fed through a 4:1 impedance transformer, with the other half operating as a counterpoise. (Fig. 2)

This system offers the convenience of "stay in your chair" operation, while providing an effective means of operating 160 meters with a relatively small antenna.

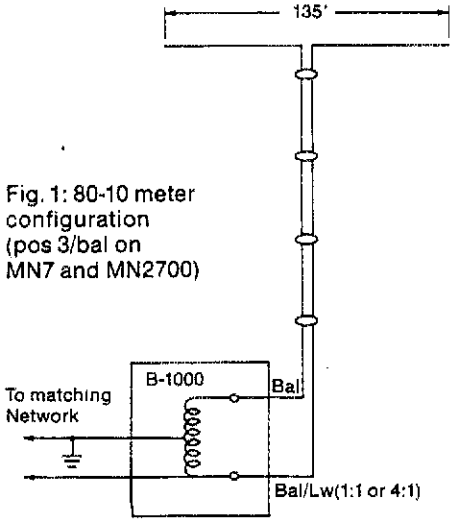


Fig. 1: 80-10 meter configuration (pos 3/bal on MN7 and MN2700)

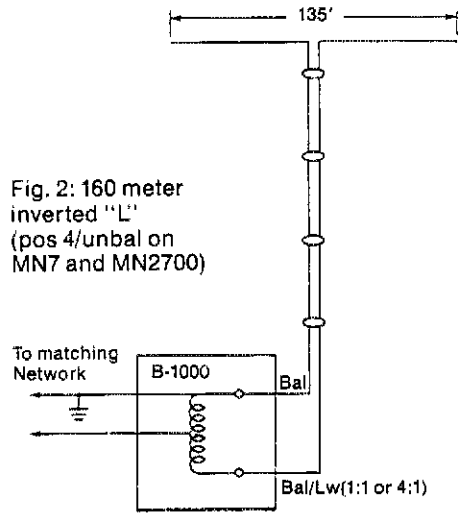
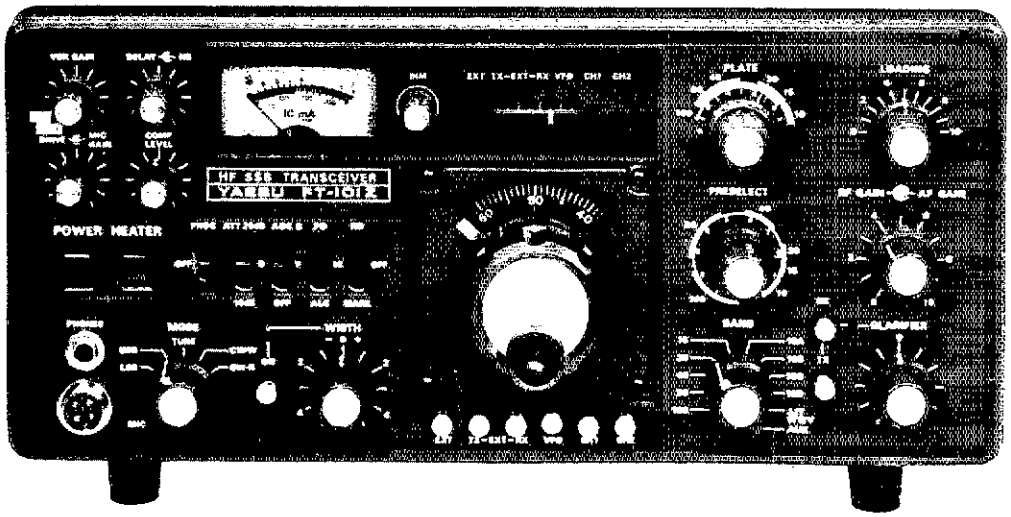


Fig. 2: 160 meter inverted "L" (pos 4/unbal on MN7 and MN2700)

"THE INFLATION FIGHTER"

Top Performance For The Budget-Minded Amateur

Analog Model FT-101Z



If economy is an important consideration, and you don't need the frequency counter and digital display, then choose the FT-101Z. The precision VFO gear mechanism is coupled to an easy-to-read analog display, providing resolution to greater than 1 kHz. All other features—the variable IF bandwidth, RF speech processor, superb noise blank VOX—are identical to the FT-101ZD. Yaesu gives y greater choice, so that you don't have to pay for what y don't need! The counter and digital display can be added your FT-101Z at a later date, if you wish.

Specifications : FT-101Z

GENERAL

Frequency coverage: Amateur bands from 1.8–29.9 MHz + WWV/JJY (receive)
Emission types: LSB, USB, CW
Power requirements: AC 100/110/117/200/220/234 volts, 50/60 Hz, DC 13.5 volts, negative ground (with optional DC–DC converter installed)
Power consumption: AC 85 VA receive (73 VA HEATER OFF) 330 VA transmit, DC 5.5 amps receive (1.1 amps HEATER OFF) 21 amps transmit
Case size: 345(W) x 157(H) x 326(D) mm
Weight: Approx. 15 kg.

RECEIVER

Sensitivity: 0.25 μV for S/N 10 dB
Selectivity: SSB 2.4 kHz at –6 dB, 4.0 kHz at –60 dB. CW (with optional CW filter: 600 Hz at –6 dB, 1.2 kHz at –60 dB)
Image rejection: Better than 60 dB (160–15 m), better than 50 dB (40 m)
IF Bandwidth: Continuously variable from 2.4 kHz to 3 Hz, using two 8-pole IF filters
Audio output: 3 watts at 10% THD into 4 ohms.

TRANSMITTER

Power input: 180 watts DC
Carrier suppression: Better than 40 dB
Unwanted sideband suppression: Better than 40 dB (14 MH 1 kHz modulation)
Other spurious radiation: Better than 40 dB down
Third order distortion products: Better than 31 dB down
Transmitter frequency response: 300 – 2700 Hz (–6 dB)
Antenna output impedance: 50–75 ohms, unbalanced.
Microphone input impedance: 500–600 ohms (lo impedance)
Note: FT-101Z (analog) cannot be used with the F 901DM, as there is no frequency display.

Price And Specifications Subject To Change Without Notice Or Obligation

YAESU
The radio.

YAESU ELECTRONICS CORP., 15954 Downey Ave., Paramount, CA 90723 ● (213) 633-4007
YAESU ELECTRONICS Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246

1/2" HARDLINE — 39c/ft. October special for in stock 1050' thru 1250' rolls. 500, with jacket. Solid copper center conductor. 500' to 1000' rolls. 45c/ft. Freight collect. Connectors available. Info. S.a.s.e JRS Electronics, WA8OGS, P. O. Box 1893-B, Cincinnati, OH 45201

SELL: 2el Gem Quad $100. Bell & Howell Electronics Operations and Computer Control Course, Q&A sheets, $50. Eico 324 rf signal generator $40. F.O.B. WA4JCS, 919-693-5309.

T4XB and power supply $390. Datong rf clipper, also Microlog AVR-1, best offers. W4JMD Box 686 Plymouth, N.C. 27962. I will phone.

QST — August 1916 through September 1917 — will quote. 1924 through 1930 — $3 each, 1931 through 1940 — $2 each. Call W3ZD, 215-675-4539.

QUAD Builders — blizzard/hurricane proof your antenna. Fiberglass vaulting poles. Incredible strength. S.a.s.e. for info. K5WSE, Box 1032, Cedar Park, TX 78613. 512-259-2164.

NCX-5, MKII xcvr. 10-80 mtrs. Matching spkr/p.s. and manual. $325 plus shipping. WA6RXB, 19150 Portos Dr., Saratoga, CA 95070. 408-867-2883.

COLLINS 32S1, 75S1, 516F-2 with all cables and manuals. No mods, like new appearance. $1,000 or best offer. K5RIS, Box 555, Ozonz, TX. 76943. 915-392-2083.

DRAKE: R-4C, T-4XC, AC-4, MS-4, xtals. Like new. $950. K8CV, 4612 Woodland, Royal Oak, MI 48073. 313-549-1846.

SALE: Dentron linear amplifier, brand new, GLA-1000, 1200 watts ssb PEP input, 1000 watts cw input. Built in power supply. $285 + ship. Plane, 42 Pennsylvania Ave., Niantic, CT 06357.

SIGNAL/ONE CX7B $1295. Like new. Improved power supply, new audio, LEDS, counter — by Cunningham. Thomas Manual, all issues newsletter. 203-245-7520, W1OTU, 72 Laurel Crest, Madison, CT 06443.

LUNAR vhf amps/preamps 13.8 VDC (115 VAC input) continuous duty power supplis; 6 amp thru 30 amp models — $44.95 to $124.95. Coax — Times RG-213/U, 50Ω MIL type. 21c/ft (400' or more). Towers — Universal aluminum, self supporting. 25 percent off. Add shipping; COD accepted. S.a.s.e. for info. JRS Electronics, (WA8OGS), P. O. Box 1893-B, Cincinnati, OH 45201.

NOVICE rigs, Eico 753 200 watt SSB-CW Tri-Bander. $100. Heath DX-60, HG-10 VFO, HR-10 rcvr $150. N7AXA, 711 9th Ave. No., Buhl, ID 83316. 208-543-8341.

RARE QSTs for sale: December 1915, August 1916, November 1916, August 1921, February 1922, March 1922, and June 1922. Best offer. Gertrude D. Barnett, 341 South Cannon Dr., Beverly Hills CA 90212.

ATLAS 210X-NB mint $495; Kenwood DG-5 Digital-Display $145. mint. W1ABJ, 617-232-7080.

SELL: Telrex 20M326, $175; 220 MHz 70W amp, $110; tower, 45G, $45; 25G, $30; 75 ohm 3/4" hardline; HD-15 patch, $35. K1RO (203-266-7478).

FOR SALE: HT-41 linear amplifier 10 through 80 meters $195. Transmatch, Murch Electronics, built in meter, like new $120. W2DPP, evenings 212-288-7714.

WILSON MK-II with TTP, nicads, charger, 5 sets xtals, leather case, $275 plus shipping. WA6RXB, 19150 Portos Dr., Saratoga, CA 95070. 408-867-2883.

QSTs, some 1933 and 1934, all 1935 thru 1940, all 1941 except Aug., 40th anniversary, 50th anniversary, 1963 thru 1976. Offer. Jean Stotz, 5323 N. 42nd Place, Phoenix, AZ 85018. 602-959-3586.

CODE tapes, theory tapes, books. Kantronics' newly expanded selection of simulated exam-like "on-the-air" C60 code tapes: QSO (7-1/2-15 wpm), QSO13, Super QSO13 (message 13 wpm — characters 20 wpm), QXX — 20 wpm. EAch $4.95. Theory tapes include Novice, $4.95, and General Set, two $8.95. Books: Novice Manual, $3.95, General, 160 pages, $6.50. Kantronics, 1202 East 23, Lawrence, KS 66044. 913-842-7745. Catalog/dealer list upon request, see Ads.

FOR SALE: Kenwood TS-520S, 1 kW amplifier, cleaning out shack. Details, s.a.s.e. Charles Cragle, 612 W. Mulberry Street, Shamokin, PA 17872. Phone: 717-648-2447.

WOW!! Ten-Tec giveaway plus our prices. All Ten-Tec xcvrs 18 percent off. Dentron GLA-1000 $303; HF200A and HFAcs $619; Hustler and CushCraft 25 percent off; Janel QSA-5 $37.50; Bencher paddles $34.50; KDK-2016A $335; KLM Echo 70 cm $289.95; Kenwood TV-502 $219.95; MFJ-900 $34.50. All new FOB Ferris Radio, 21738 John R, Hazel Park, MI 48030. 313-398-6645. Cashier's check or M.O. We care about you.

FOR SALE: Yaesu FT-620B — $325. Hallicrafters SX-100 — $125. Knight TR-108 — $50. K1EM — 203-583-3111.

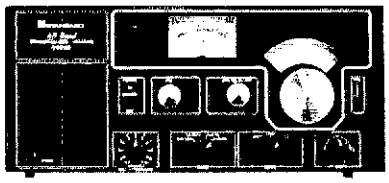
WANTED: 4D32 xmtr tube, reasonable. W6WI, 19292 Junipero Serra, Sonoma, CA 95476.

DRAKE R4C/MS4 factory checked to specs, 6 extra xtals $435. Filters: 500 and 250 Hz $35 each. Sherwood 125 Hz $85. Package price $570. Collins 500 Hz filter F455FA05 $75. MFJ CWF-2 filter $15. Rohn 25AG-3 top section $25. Dwyer wind speed indicator $25. FOB. W1SD, Sebago Lake, ME 04075. Tel. 207-787-2442.

TWO new 8873 Eimac ceramic tubes with Beryllium plates. Build that conduction cooled 2 kW amplifier from Radio Amateur's Handbook, or use as new replacement for SB-230 linear. $85 per tube. $15 per Beryllium plate. Free sockets. Call WB3JZO, 612-566-4401.

HAMMARLUND HQ129X. Excellent condx. $90. Collectors item. W1CJN, 203-887-6649.

Standard
C-6500 Closeout
SAVE $130



STANDARD C-6500 General Coverage Communications Receiver. All Solid-State and Synthesized. Covers .5 to 30 mHz, in 30 one mHz ranges. Modes: AM (diode detector), CW, USB and LSB (product detector). Sensitivity: .3 to 1.0 uV depending on frequency range and mode. Attenuator control to prevent overload by extreamely strong signals. Selectivity: 5.5 kHz (AM); 3 kHz (SSB & CW). Peaking preselector to manually achieve maximum sensitivity and interference rejection. Dial accuracy: within 5 kHz on all bands. Clarifier control for fine tuning varies reception ±4 kHz from dial reading. Image rejection: greater than 50 dB. Operates on 117 VAC, 12 VDC with (8) internal D cells (not supplied) or external source (less than 100 mA current drain). Automatically switches to internal or external DC in event of AC power failure. Self-contained telescoping whip antenna with rear panel connections for an external 52-75 ohm antenna. Built-in speaker and phone jack for headphones or external speaker. Separate jack for audio output to recorder. Large S meter indicates RF signal strength. External muting jack. SIZE: 13½"w x 6"h x 12¼"d. WT: 14 lbs.

• Mfg. Closeout • All New • Full Warranty

Reg. $379 - ***Closeout $249***

Quantity Limited. Order Direct from this ad. Send Check, Money Order or CALL TOLL FREE and use your Mastercharge or VISA. Allow $6.00 for UPS shipping in the 48 States.

master charge — 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

IMPORTANT! The following Branch and Associate Stores are set-up for WALK-IN or TELEPHONE business only. They do not have facilities to respond to written inquiries, etc. Please direct all mail to the Milwaukee address shown above.

BRANCH STORES

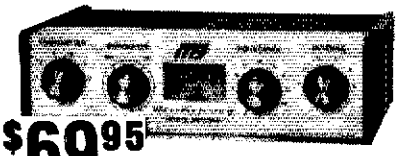
28940 Euclid Avenue; Wickliffe, Ohio 44092
Phone: (216) 585-7388
OHIO in-state WATS: 1-800-362-0290

621 Commonwealth Ave; Orlando, FL 32803
Phone: (305) 894-3238
FLORIDA in-state WATS: 1-800-432-9424

1072 N. Rancho Road; Las Vegas, NV 89106
Phone: (702) 647-3114
Outside Nevada WATS: 1-800-634-6227

AES STORE HOURS:
Mon, Tues, Wed & Thurs 9-5:30; Fri 9-9; Sat 9-3

MFJ
ANTENNA TUNERS



$69.95

NEW MFJ-940 VERSA TUNER II matches coax and random wire 1.8 to 30 MHz.

Up to 300 watts RF OUTPUT. SWR, dual range wattmeter (300 and 30 watts full scale).

Six position antenna switch on rear. Select 2 coax lines direct or thru tuner, random wire, and tuner bypass for dummy load.

New efficient airwound inductor (12 positions) gives you less losses than tapped toroid for more watts out. 8x2x6 inches. SO-239 coax connectors. 208 pf, 1000 volt capacitors.

Optional mobile mounting bracket, add $3.00.

Beware of imitators. When you buy MFJ you buy proven MFJ quality . . . and a one year unconditional guarantee.

$39.95

MFJ-900 ECONO TUNER matches coax, random wires. Full band coverage 1.8 to 30 MHz. Up to 200 watts RF OUTPUT. Efficient airwound inductor gives more watts out than tapped toroid.

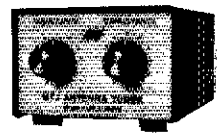
SO-239 coax connectors. 5x2x6 inches. One year unconditional guarantee.

MFJ-901 Versa Tuner available. Same as MFJ-900 but has 4:1 balun for balanced lines, $49.95.

Beware of imitators. Some are still copying our earlier models. MFJ has made improvements.

For example, a new efficient airwound inductor gives you less losses than a tapped toroid for more watts out and plenty of inductance for full band coverage 1.8 to 30 MHz.

$29.95



MFJ-16010 RANDOM WIRE TUNER lets you operate 1.8 to 30 MHz with random wire. Up to 200 watts RF OUTPUT. Small enough to carry in your hip pocket. Ultra compact 2x3x4 inches.

Match low and high impedances by interchanging input and output. SO-239 coax connectors.

One year unconditional guarantee.

Order from MFJ and try it. If not delighted, return within 30 days for refund (less shipping).

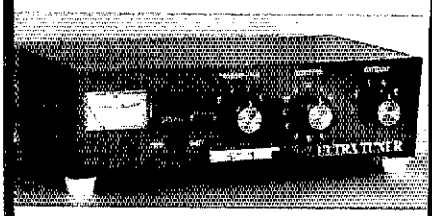
Order yours today. Call toll free 800-647-1800. Charge VISA, MC. Or mail check, money order. Add $3.00 each for shipping.

CALL TOLL FREE . . . 800-647-1800

For technical information, order/repair status, in Miss., outside continental USA, call 601-323-5869.

MFJ ENTERPRISES, INC.
BOX 494, MISSISSIPPI STATE, MS 39762

SST T-4
ULTRA TUNER DELUXE



ULTRA TUNER DELUXE Matches any antenna—coax fed or random wire on all bands (160-10 meters). Tune out the SWR on your antenna for more efficient operation of any rig. Home, mobile, portable—only 9"x3½"x8" • 300 watt RF **output** capability • **SWR meter** with 2-color scale • **Antenna Switch** selects between two coax fed antennas, random wire, or tuner bypass • Efficient **Airwound inductor** • 208 pf, 1000V. Capacitors • Attractive bronze finished enclosure.

only $64.95

SST T-2 ULTRA TUNER

Tunes out SWR on any antenna—coax fed or random wire (160-10 meters). Any rig—up to 200 watts RF output. Rugged, yet compact: 3¼" x 2¼" x 3½".

only $37.95

SST T-3 MOBILE IMPEDANCE TRANSFORMER

Matches 52 ohm coax to the lower impedance of a mobile whip. Taps between 3 and 50 ohms. 3-30 MHz. 300 watts output. 2¾"x2"x2¼".

only $19.95

SST T-1 RANDOM WIRE ANTENNA TUNER

All bands (160-10 m.) with any wire • 200W **output** • Any transceiver • Home or portable • Neon tune-up indicator.

only $29.95

SST DL-1 K4RLJ DUMMY LOAD. 1000W PEP 1.5:1 1-225 MHz. Sealed. 3-1/8"x4-3/8".

only $17.95

SST CL-1 24 HR. CLOCK. Giant red **LED** numerals. Month and day also at push of button. Beautiful for your desk. 110VAC.

only $22.95

SST B-1 BALUN for balanced lines. 300W.

only $5.00

Call (213) 376-5887 to order C.O.D., VISA, or Master Charge.

To Order:
Send a check or money order—or use your M.C. or VISA. Add $3 shipping and handling. Calif. residents, add sales tax.

Guarantee: All SST products are unconditionally guaranteed for 1 year. In addition, they may be returned within 10 days for a full refund (less shipping) if you are not satisfied for any reason.

SST ELECTRONICS
P.O.BOX 1 LAWNDALE, CALIF. 90260 · (213) 376-5887

COLLECTORS: Attention. Mint National HRO-7 receiver. All coils, 50 kHz to 30 MHz (H inoperative — 100 to 200 kHz), speaker, power supply, no scratches. Pick-up only. $350. 1936 Radio Handbook $5. Notes on Amateur Radio Transmitter Design (compiled by James Millen — 1938), 123 pages, $5. General Radio Catalog K, 1939, 216 pages, $5. 1942 ARRL The Radio Amateur's Handbook, $5. General Radio Catalog P, 254 pages, 1959 $5. Lee Aurick, W1SE, 283 Tremont Street, Newington, CT. Days — Tues-Friday, 203-667-2494; Mondays and evenings 6-9 PM, 203-666-8048.

3" MONITOR Scope, transmit/receive, 455 kHz i-f, Central Electronics MM-2, instruction book, $55. Stu Cowan, W2LX, Box 596, Rye, NY 10580.

KANTRONICS QRP 2-watt 40-meter Rockhound cw Transmitter, $25.95, crystal $3.95. Freedom VFO, $64.95. New ham game teaches rules and regulations as you play, called Amateur Upgrade, $9.95. Free catalog/dealer list on request. Kantronics, 1202 East 23, Lawrence, KS 66044. 913-842-7745. See ads.

SELL: Kenwood TS-520S $595 — Drake TR-4, AC-4 $445 — Yaesu FT-227R $290 — Hallicrafters SX-122 $215 — Hallicrafters SX-96 $90 — Drake 2-NT $85 — all "excellent" to "mint." With manuals. J. Bradley, Box 253, Cedargrove, NJ 07009.

FOR SALE: Collins S/Line winged good condition. Includes 32S3 recently realigned — DX Engineering processor — 516F-2 — 75S3 — 312B-4 — 30S1, manuals, connecting cables, used spare tubes including one 4CX1000A, some spare parts. Will deliver within 200 miles of Winston-Salem. Firm price $2400. K4CKA, Jim Whittenton, 126 Cedar Cove Lane, Winston-Salem, NC 27104. 919-768-2084.

DRAKE UV3-144 2M Fm xcvr $425., Atlas RX-110 80-10M rcvr $190., Yaesu YO-100 monitor scope $120., Icom IC3PE desk supply $55. Mint Cond., with manuals. W6HVN, Box 833, Altaville, CA 95221.

CE-200V $300, IC-22S with V.I.P. switches $225, 25W Metrum-II fully crystalled plus PL $200, Motorola T-1035 fm generator $325, Measurements 80R $175, Singer-Metrics SB-12B Panalyzer $450, HR-220 $100, Standard marine HT $100. More equipment, parts, old magazines — s.a.s.e. for list. K9MM/K9WEH, 312-255-5366 evenings.

CLEAN Yaesu FT-227R $230, Wilson HT; 1402 with ac charger, T-T pad $135. Tom, WA8URE, 1-616-247-7519.

TEN-TEC 544 Digital w/blanker, filter, 262G supply (spkr VOX), remote VFO, 160 converter. $900. Heath 2036 $200. K8PUJ, 616-459-8722.

KENWOOD TS-520S — Like new, in original box, less than one year old, $599 plus shipping. W3PI, 814-825-6305.

DIGITAL Group Basic Box with PWR-12 and PWR-0; never used, new price is $270 sell for $180. Sanyo VC-1600L video camera; excellent condition $160. Call Tom Bosscher 1-616-247-7519. Write WA8URE, 2608 Blaine, Grand Rapids, MI 49507.

HEATHKIT DX-100, mint $70. Pickup only. W2JTP 431 Woodbury Road, Huntington, NY 11743. 516-692-2862.

GERMAN WWII receiver, Tornister Empanger B, eight bands, 97 to 7,050 kHz, with spare tubes. $125. Pickup only. W2JTP 431 Woodbury Road, Huntington, NY 11743 516-692-2862.

TREMENDOUS List. Antiques, moderns, tubes, books, meters, sets, dials. Everything. 30c s.a.s.e. W4BLQ, B158, Edgewater, FL 32032.

ATLAS 180 — $385, VOX/cw break-in $35, Standard SR-C826M 2M FM with 12 channels — $140, Collins 500 cycle filter for S/Line $75. Bill Patrie, 516-698-1024, 7 Chevy, Centereach, NY 11720.

HEATHKIT HR-1680 good cond. $200 or best offer. Also HM-102. KA3CCT, 10713 Lancewood, Cockeysville, MD 21030.

SX-101-A, $125, DX-60-A, $55, HR-10-B, $50, 20-A w/458, $95; all manuals. Thurtell, 404 S. Kimmel, Berrien Springs, MI 49103.

WANTED: Kenwood TS-900, PS-900 K2EGI/N2EG RD8, Box 552, Flemington, NJ 08822.

QUALITY Stainless, threaded, washer, hardware fasteners! Insulators! List 20c. Walt — W8BLR, 29716 Briarbank, Southfield, Mich. 48034.

YAESU FT-101ZD, YD-148 mic, fan, 4 mos old, mint, $845. Drake 2-NT, $90 WA2UOI. 212-TR9-6580.

PANASONIC RF-4800 new original carton $275. Heath SB-610 $80. N2EG/K2EGI Jarvis RD-8 Box 552, Flemington, NJ 08822.

BUY — Sell — Trade in "Trade-A-Rig." Free advertising for subscribers. Information: Box 845Q Longwood, FL 32750.

SELL: Unused Telrex 20M546, new Eimac 4CX1500B. WB9BCL 312-743-5563.

SELL or Trade: National SW-54 Communications receiver, $50; portable typewriter, $25; Heathkit "VOX" $25; Relaxacisor (electric exerciser), $25; VTVM, $50; Bell and Howell 16mm sound movie projector, self-threading, $350; Precise audio generator, $35; Polaroid colorpack, $10; QSTs, CQs, 50c each; transformers, chokes, meters, power supplies, microphones, etc. (s.a.s.e. for list); shipping additional. Want oscilloscope, mutual conductance tube tester. Hein, 418 Gregory, Rockford, IL 61108.

HENRY 2K with improvements $650. Also list of parts for homebrew. S.a.s.e. for details W5VJG/4, Rte. 4, Box 600, Gadsden, AL, 35904. 205-442-1962.

800-325-3609

THE PHONE CALL THAT GETS THE BEST PRICE AND QUICKEST SERVICE AROUND.

MID COM ELECTRONICS, INC.
2506 S. BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144

CODE OF ETHICS

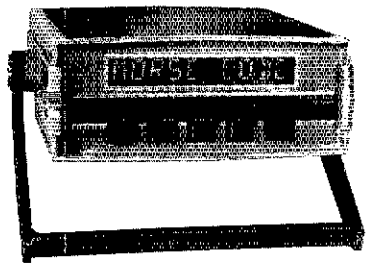
VISA

master charge

Missouri Residents
Call Collect
314-961-9990

Kantronics' Field Day™

Morse/radioteletype reader & speed display



only
$449.95

Kantronics' Field Day morse code/teletype reader reads code signals right off the air. Its powerful microcomputer system picks out signals, computes their speed and even reads sloppy copy up to 80 words per minute.

The **Field Day** is simple to use. You plug it into your station receiver just as you would a set of headphones. Code and teletype conversations are converted from dots and dashes to standard alphanumerical text. The text advances from right to left across ten big ½ inch displays.

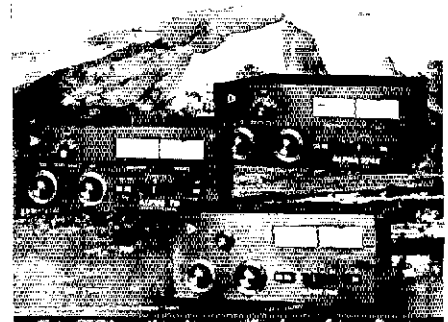
The **Field Day** displays incoming or outgoing code speed for you at the touch of a button, right on the front panel. The **Field Day** is enclosed in a compact, lightweight package including speaker. HWD 3.44" by 8.50" by 9.25". The **Field Day** has the features that make it a truly great code reader. Write us for a complete **Kantronics** authorized dealer list.

KANTRONICS
The Lightweight Champs.

1202 East 23rd Street
Lawrence, Kansas 66044
We accept Visa, Master Charge, check and money orders.
Phone: 913-842-7745

EN ESPAÑOL

GUIA DE EQUIPOS RADIOAFICION



Esta GUIA contiene las especificaciones, fotografías y precios de más de 1000 equipos y accesorios destinados a la radioafición. Antenas, rotores, receptores, transmisores, transceptores, amplificadores, repetidoras de VHF, codificadores, microprocesadoras, micrófonos, fuentes de poder, equipos para radioteletipo, procesadores, filtros y todo cuanto pueda interesar al radioaficionado.

INTERNATIONAL BUYERS GUIDE
OF AMATEUR RADIO EQUIPMENT
(in the Spanish language)

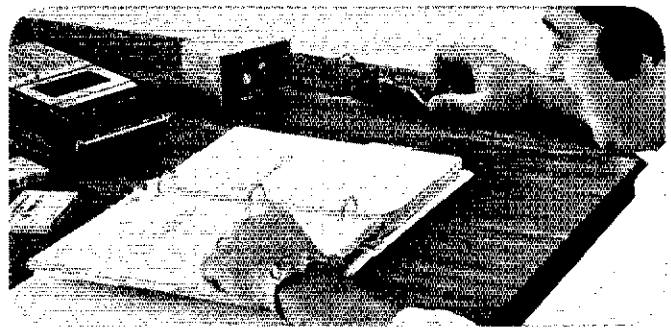
Esta publicación trimestral contiene las especificaciones, fotografías, gráficos y precios de más de 1,000 equipos fabricados por más de 100 empresas. Antenas, rotores, receptores, transmisores, transceptores, amplificadores, frecuencímetros digitales, repetidoras de VHF, codificadores por tono, microprocesadoras, micrófonos, fuentes de poder, RTTY, procesadores, filtros, baluns, tubos, transistores, cristales y todo cuanto necesita el radioaficionado. Solicite su ejemplar al distribuidor local o a la

PAN AMERICAN PUBLISHING COMPANY
252-35 Leeds Rd. Little Neck, New York 11362, U.S.A.

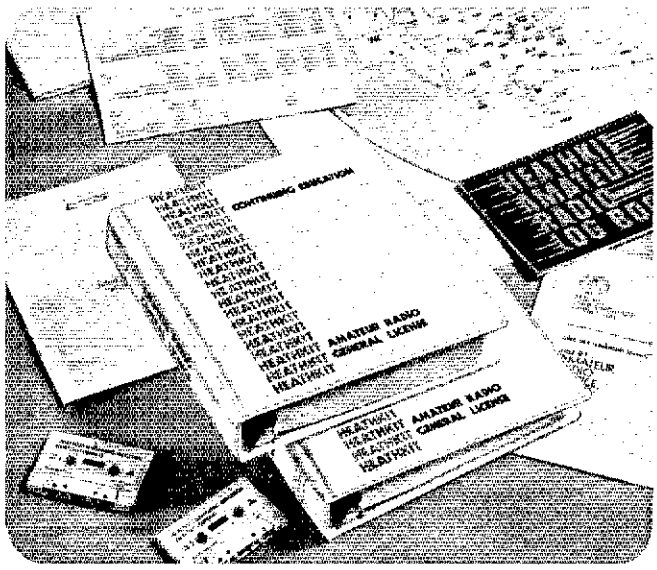
Precio de la GUIA: US$8,00 únicamente por giro bancario u orden de dinero internacional. El precio incluye vía aérea. U.S.A., México y Canadá: US$7,00

Earning your FCC Amateur Radio License was never easier than with these great Heathkit self-instruction programs

You're as good as on the air. Heath gives you everything you need to pass your Novice, Technician or General Class License exam. The text, audio tapes, workbook and other supporting materials for each program form a well-organized, complete self-instruction plan. When you complete your program, you can approach your FCC exam without worry...because these programs are good!



How good? We're so confident of our Programs that we guarantee you'll pass! That's right! You must pass your FCC Amateur exam after completing your Heath Program or we will refund your money when you return the Program materials along with a copy of your FCC notification of exam failure.



The General Class Amateur License Program

helps you move up to the added privileges of more frequencies, voice transmission, radioteletype, Amateur television and more. Two audio cassettes give you extra Morse code practice to bring your code speed up to 15 words per minute, two words more than the FCC requires. An informative text covers the subjects for the FCC written exam. Simulated FCC exams are included to give you test-taking experience.

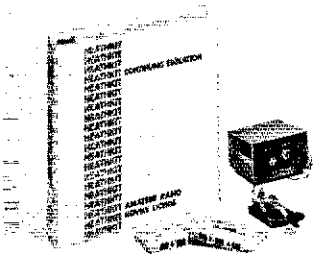
You also receive a code practice workbook, a booklet of FCC Amateur Radio rules and regulations, an Amateur Radio log book, a booklet on solving radio and TV interference, a 31" x 41" world call area map, FCC Form 610 required to apply for your license, and an FCC schedule of Amateur exam locations and dates.

The Program text includes these 10 units:

1. Amateur Radio Operations
2. Direct Current
3. Alternating Current
4. Active Devices
5. Electronic Circuits
6. Measurements
7. Transmitters
8. Receivers and Station Operation
9. Antennas
10. Practice Exams

Your General Class License Program will help you even after you get on the air. For easy reference, all materials are contained in two attractive matching vinyl binders. Order your Program now.

Novice Amateur Radio Program



Now Heath makes it easy for you to join the fun of two-way Amateur Radio. Our Novice License Program not only prepares you for the FCC exam, but gives you guidelines for setting up and operating your own station, too. The package includes our handy code practice oscillator kit, complete with telegraph key. An audio cassette tape teaches you Morse code up to the five words per minute required to pass your FCC Novice test. A second tape introduces you to Amateur Radio and explains RST signal reporting and circuits. The text materials are organized into 9 separate modules, with an exam at the end of each module to check your understanding.

You also receive a complete set of operating aids, plus a 31" x 22" Frequency Spectrum Chart and matching U.S. Call Area Map. All materials come in an attractive vinyl binder for reference after you're on the air. **You even get a 10% discount on your first $100 order of Ham gear from the big Heathkit Catalog!**

FOR FASTEST ORDERING, NIGHT OR DAY – 7 DAYS A WEEK, PHONE THE HEATH HOT LINE

(616) 982-3411

If coupon is missing, write:
Heath Co., Dept. 009-582, Benton Harbor, MI 49022

GET STARTED THE RIGHT WAY TODAY Use this handy order form

HEATH
Schlumberger

Heath Company, Dept. 009-582
Benton Harbor, Michigan 49022

☐ Please send me your latest FREE catalog. I am not now receiving your catalogs.

Please send me the Amateur Radio Programs I've indicated below:

☐ **ER-3702 General License Program** at $49.95 each plus $3.15 shipping and handling.

☐ **ERS-3701 Novice License Program and Oscillator package** at $39.95 each plus $2.60 shipping and handling.

Total, before shipping and handling ..... $ _____
Michigan residents add 4% sales tax ..... $ _____
Add shipping & handling ..... $ _____
Total enclosed ..... $ _____

☐ check ☐ money order ☐ VISA/BankAmericard
☐ Master Charge Code No. _____
Account No. _____ Expiration Date _____
Signature X _____
(Necessary to send merchandise)
Name (Please print) _____
Address _____
City _____ State _____
ED-132 Zip _____

Prices are mail order; subject to change without notice

Why pay retail when you can get dealer prices?

Here's a straight offer. Place your antenna and rotator order with Long Path. We'll ship your order the same day we receive it provided the items are in stock. And, you'll be quoted the lowest prices around. In fact, most of the time, we sell at the same price your local dealer buys his antennas and rotators for.

Sound too good to be true? Take a look at a few examples:

HYGAIN		CDE	
TH6 DXX	— $219.00	HAM IV	— $133.00
TH3 MK3	— $153.00	TAILTWISTER	$174.00
TH2 MK3	— $ 99.00		
105 BA	— $ 86.00	**CUSHCRAFT**	
155 BA	— $133.00		
205 BA	— $219.00	A1B-34	— $217.00
204 BA	— $166.00	ATV-4	— $ 65.00
402 BA	— $159.00	ATV-5	— $ 79.00
14AVQ/WB	— $ 46.00	BOOMER	— $ 67.00
18AVT/WB	— $ 70.00		

Convinced? All items F.O.B. Dallas. Call 8:30 to 5:00, Monday through Friday. 1-214-369-3401. Ask for Long Path Radio.

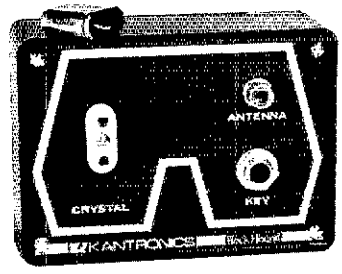
LONG PATH RADIO, INC.

P.O. Box 29682 • Dallas, Texas • 75229 • 1-214-369-3401

Cashier's Check, money order, traveler's checks accepted. C.O.D. OK.

New! Two full watts output!

Throw rocks on 40 or 80 for $25.95*



only **$25.95**

Kantronics Rockhound transmitter

Jump into QRP!

The **Kantronics Rockhound QRP transmitter** now generates a two-watt CW signal anywhere on 40 or 80 meters, depending on your model choice. With the right crystal and a little luck, Granite Falls, MI is just a stone's throw from Boulder, CO.

Slip the Rockhound into your pocket for mountain hikes or camping trips. It's only 3½" by 4" by 1½"! Our 8040-C receiver makes a lightweight companion. For power, just hook 12-15 Vdc in line with your key. A simple dipole puts your **Rockhound** on the air!

Start throwing today, our address is below.

• $29.90 with crystal. 7.125 or 3.725 MHz available.

KANTRONICS

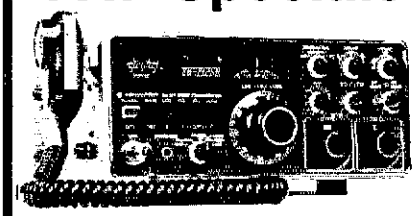
The Lightweight Champs.

1202 East 23rd Street
Lawrence, Kansas 66044
We accept Visa, Master Charge, check and money orders.

Phone. 913-842-7745

KENWOOD

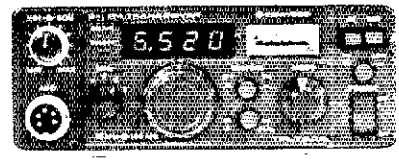
VHF Specials



TS-700SP 2m all-mode transceiver. SSB/FM/CW & AM. Continuous tuning 144-148 Mhz. Includes built-in AC and DC power supplies, digital frequency readout, receiver preamplifier, VOX, side tone & Mike. (Reg. $799) . . . . . **Special $599**

SP-70 Ext. Speaker (Reg. $33) . . . **Special $25**

VFO-700S VFO (Reg. $135) . . . . **Special $115**



TR-7625 2m FM Transceiver. 13.8 vdc. RF power output: High, 25 watts (min); Low, 5 watts, adjustable to 10 Synthesized. 800 channels in 5 kHz steps 144-147.995 mhz. LED readout, memory circuit, ±600 kHz offsets, or any offset using memory. (Reg. $425) . . . . . **Special $339**

TR-7600 2m FM transceiver. Same as TR-7625 except RF output: High, 10 watts (min); Low, 1 watt, adj to 10. (Reg. $375) . . . **Special $299**

RM-76 Microprocessor control unit for TR-7600 and TR-7625. (Reg. $125) . . . . **Special $109**

Quantity Limited. Order Direct from this ad. Send Check, Money Order or CALL TOLL FREE and use your Mastercharge or VISA.

master charge

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

IMPORTANT! The following Branch and Associate Stores are set-up for WALK-IN or TELEPHONE business only. They do not have facilities to respond to written inquiries, etc. Please direct all mail to the Milwaukee address shown above.

BRANCH STORES

28940 Euclid Avenue; Wickliffe, Ohio 44092
Phone: (216) 585-7388
OHIO in-state WATS: 1-800-362-0290

621 Commonwealth Ave; Orlando, FL 32803
Phone: (305) 894-3238
FLORIDA in-state WATS: 1-800-432-9424

1072 N. Rancho Road; Las Vegas, NV 89106
Phone: (702) 647-3114
Outside Nevada WATS: 1-800-634-6227

AES STORE HOURS:
Mon. Tues. Wed & Thurs 9-5:30; Fri 9-9; Sat 9-3

SALE: Heathkit HG-10 VFO mint condition $42 ppd. Jim, KA4EBW daily 7-9 PM EST 704-633-9183 Salisbury, NC.

COLLINS: Collins: Collins: KWM2A, KWM2, 51S1, 55G1, 30L1, 312B5, 312B4, 180S1, 3253A, 75S3C, CP1, DL1, SM3, Write/call Thomas, W2UK, 9 Emmons Ave., Farmingdale, NJ 07727.

ATLAS 215-X mint condition $460. WB6FBM 714-831-9288.

HALLICRAFTERS SR-160 xcvr 80-40-20 ssb/cw 200W; RIT w/ps & spkr: $250. Jim Bay WD8AVY, 2732 Woodford Drive, Springfield, OH 45503.

VIKING Ranger II am/cw transmitter, 75 watts, 160-6m w/T-R switch, $65. Jim Bay WD8AVY, 2732 Woodford, Springfield, OH 45503 — You pay shipping.

WANTED — ICOM DV-21 digital VFO must be mint K2OKB. 901 9th Ave., Troy, NY 12182. 518-235-6997.

GLB Channelizer Model 400B with/Genave GTX-2, $200 as package/$110 each, or will trade. WA2NCO 835 Bradt St., Schenectady, NY 12306.

HY-TOWER 18HT 80-10 meter vertical, pick up only, $100, WA2PAB.

REALISTIC DX-160 Receiver mint. Make offer. N2AOK, 609-723-6258.

WANTED — Swan 742 or 45 mobile antenna W9VYW.

TAKE in Trade 2-meter mobile on B-Line, Drakes or sell. WD4NCF. 502-465-8763.

MINT HQ145E w/spkr $175. Hallicrafters SX99 $100. Very clean. WØKX 402-488-0896.

FOR SALE: Kenwood Twins, I-599D, R-599D, S-599. Absolute mint condition $775. Call — David AJ2M ex-WB2MAV 516-466-3021.

DRAKE R4C, T4XC, MS-4, AC-4, NB, crystals $1,100. WB5OCL 713-498-0194.

COMPLETE Station For Sale! Swan 700 CX Transceiver, PSU-3 power supply, WA-2000 watt meter, 1040-V 40-10 meter vertical trap plus 75 meter add on kit. Also Mike, key, 100ft. RG-8U coax, all guying, insulation, radial material needed. Kelly White 405-867-5230.

THEORY: New General-Class Amateur-License Study Guide by WØXI. 160 pages, SAMS 21617, $6.50. Also, Novice Class Amateur Radio License Manual. $3.95. Order by check/M.O. to WØXI, 3005 W 19th Street, Lawrence, KS 66044.

SIGNAL/one CX7B late California modified by Cunningham and equipped with CX11 4 digit improved counter/keyer board. Excellent condition $1395. Both standard and deluxe CW filters available $100 each if purchased with radio. ICOM 245-SSB new display model only $520. IC-3PA Power Supply/Speaker $55, Kenwood PS-5 supply with digital clock $50. Practically new TS820S with digital $780, Regency HR2MS six channel mobile scanner with crystals and mike $100., Wilson WR-500 Rotator/Control, $80, KLM KR-500 Elevation Rotor $100 — Visa Master Charge Bob Douglas, Douglas Electronics, 1118 South Staples, Corpus Christi, TX 78404 512-883-5103.

SELL-TRADE ICOM 211, late model, new in April 79, immaculate, $595; Collins MP-1 DC supply, mint $75. Don Burns, 4410 Reading Rd., Dayton, OH 45420 513-256-0345.

SELL: Long Wave Receiver 15-600 kHz with p/s and extra tubes, needs work. DB-22A rf amplifier and preselector, make offer W4OF 4746 Dudley Lane, NW, Atlanta, GA 30327.

MOBILE home with city lot, eighteen months old. Two bedroom, fourteen by fifty six, 50' tower, Mosley CL33 and rotator, near city swimming pool, beaches and shopping. Completely furnished, many extras. Owner leaving country $21,000. KA4EIN 1013 Tralee, New Port Richey FL 33552 813-842-2267.

TRS-80 plus Macrotronics Ham Interface. S/R Morse/RTTY on CRT thru your radio. Computer, CRT, recorder, M-80, programs, all manuals. Flexible RTTY system plus computer for your hobby/business. Excellent $1020. WB4KSP 919-793-4325.

TUBES. Selected and matched driver/finals sets for: Yaesu FT101, FL101, Tempo One $21. Kenwood, Drake, Heath, FT901, FT101ZD, Collins $19. Dentron GLA $33. Complete tube sets available for most rigs: Heath SB102, HW101 $51. Collins 32S3 $47 Tempo One $48. Power tubes: Cetron 572B $33 Amperex 4CX250B $35. All ppd US SST, Ltd. 423 Cornelia Street, Boonton, NJ 07005.

TR7/DR7, PS7, RV7, FA7, SL300, SL500, SL1800, Aux7 with three RRM7 for continuous reception 0 to 30 MHz plus Service Manual and Service Kit $1750. W2VV 609-235-1850.

2 GE pocketmates 2M HT's Ultrathin, Multi-charger, $450. TX62 6 & 2 M xmtr, am, fm, cw OSCAR VFO $85 KB6LW ex-W6OSZ 213-352-6478.

DRAKE 2C, 2NT Elco and Heath VFOs $310 KA1BD! 203-264-8323.

20 METER two element CushCraft A14-2 beam, excellent, $40. W2ETB.

JUNK box special. Clare mercury wetted relays HGS-1003 $6, all ten $40. BNCs UG-1094U, UG-306B/U, UG-535U 60 cents each, 10 for $5. Everything brand new. WB2CRX, 10 Crestwood, Fairfield, NJ 07006.

PRIOR year(s) call books; old radio books; buy/sell, s.a.s.e. WB1ASX.

HW-101, accessories, $400. Dentron MT-2000A tuner $150. WD9CJG, Dave, 311 Highway 135, Oconomowoc, WI 53066.

This MFJ RF Noise Bridge . . .

lets you adjust your antenna quickly for maximum performance. Measure resonant frequency, radiation resistance and reactance. Exclusive range extender and expanded capacitance range gives you much extended measuring range.

- **Exclusive range extender**
- **Expanded capacitance range**
- **Series Bridge**

BRAND NEW

$49.95

This new MFJ-202 RF Noise Bridge lets you quickly adjust your single or multiband dipole, inverted Vee, beam, vertical, mobile whip or random system for maximum performance.

Tells resonant frequency and whether to shorten or lengthen your antenna for minimum SWR over any portion of a band.

MFJ's exclusive range extender, expanded capacitance range (±150 pf) gives unparalleled impedance measurements, 1 to 100 MHz. Simple to use. Comprehensive computer proven manual.

Works with any receiver or transceiver. SO-239 connectors. 2 x 3 x 4 inches. 9 volt battery.

Other uses: tune transmatch; adjust tuned circuits; measure inductance, RF impedance of amplifiers, baluns, transformers; electrical length, velocity factor, impedance of coax; synthesize RF impedances with transmatch and dummy load.

Order from MFJ and try it — no obligation. If not delighted, return it within 30 days for a refund (less shipping). This bridge is unconditionally guaranteed for one year.

To order, simply call us toll free 800-647-1800 and charge it on your VISA or Master Charge or mail us a check or money order for $49.95 plus $2.00 for shipping and handling.

Don't wait any longer to enjoy maximum antenna performance. Order today.

MFJ ENTERPRISES, INC.
P. O. BOX 494
MISSISSIPPI STATE, MS 39762
CALL TOLL FREE 800-647-1800
For technical information, order/repair status, in Miss., outside continental USA, call 601-323-5869.

Save Big $$ on TEN-TEC

Sales Promotion

AMATEUR ELECTRONIC SUPPLY is participating in The Great TEN-TEC Accessory Giveaway Promotion. This means that you can get the Best AES Deal on a TEN-TEC OMNI, CENTURY 21 or ARGONAUT and recieve the following free accessories direct from the factory. What a bargain!

buy an OMNI and get free -
645 Keyer **or** *215-P Microphone & 217 Crystal Filter* **or** *215-P Microphone & 218 Crystal Filter.*

buy a 540/544 and get free -
247 Antenna Tuner **or** *KR-20A Keyer* **or** *215-PC Microphone & 245 CW Filter* **or** *215-PC Microphone & 249 Noise Blanker* **or** *245 CW Filter & 249 Noise Blanker.*

buy a CENTURY 21 and get free -
670 Keyer **or** *276 Crystal Calibrator.*

buy an ARGONAUT and get free -
215-P Microphone **or** *206-A Crystal Calibrator* **or** *208 CW Filter.*

Remember! - **Our Best Price** *plus Freebies from TEN-TEC*

Call TOLL FREE: 1-800-558-0411 & ask for our DISCOUNT DESK

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

IMPORTANT! The following Branch and Associate Stores are set-up for WALK-IN or TELEPHONE business only. They do not have facilities to respond to written inquiries, etc. Please direct all mail to the Milwaukee address shown above.

BRANCH STORES

28940 Euclid Avenue; Wickliffe, Ohio 44092
Phone: (216) 585-7388
OHIO in-state WATS: 1-800-362-0290

621 Commonwealth Ave; Orlando, FL 32803
Phone: (305) 894-3238
FLORIDA in-state WATS: 1-800-432-9424

1072 N. Rancho Road; Las Vegas, NV 89106
Phone: (702) 647-3114
Outside Nevada WATS: 1-800-634-6227

AES STORE HOURS:
Mon, Tues, Wed & Thurs 9-5:30; Fri 9-9; Sat 9-3

ASSOCIATE STORE

ERICKSON COMMUNICATIONS, INC.
5456 N. Milwaukee Ave. Chicago, Il 60630
Phone: (312) 631-5181
Outside Illinois WATS: 1-800-621-5802

ERICKSON STORE HOURS:
Mon Tues Wed & Fri 9 30-5 30; Thurs 9 30-9 Sat 9-3

RCA GLOBCOM

has openings for

Radiotelegraph Operators

RCA Global Communications, Inc. offers opportunities at its Coastal Stations, WPA in Port Arthur, Texas and WOE in Lantana, Florida, for Radiotelegraph Operators.

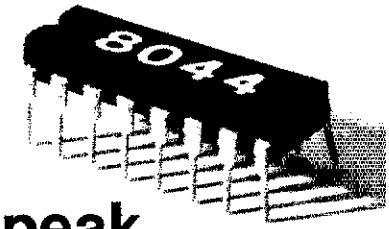
Positions require 2nd Class FCC radiotelegraph license. Applicants must provide own transportation. RCA offers attractive starting salaries plus a full range of company-paid benefits.

Please send resume including salary history to:
RCA Global Communications, Inc.
60 Broad Street
Box 11NC
New York, N.Y. 10004

Equal opportunity employer F/M/V/H

RCA
Global Communications

CURTIS LSI's help you



speak MORSE

- ★ 8044; Keyer-On-A-Chip* (Replaces 8043). $14.95
  Apr '75 HR, Feb '76 QST, Radio Hdbk '75, Apr Hdbk '77-78
- ★ 8044-3; IC,PCB,Socket,Manual 24.95
- ★ 8044-4; Semi-Kit 54.95
- ★ 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 above for postage and handling)

EK-430; CMOS Keyer* (Feb '76 QST) 124.95
IK-440A; Instructokeyer* (Mar '76 QST) 224.95
*now with dash memory as standard

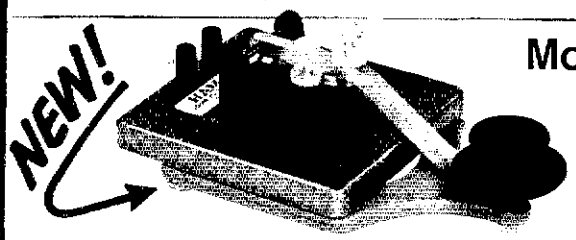
System 4000 Ham Computer (see Jan '76 QST) (write)

VISA
Curtis Electro Devices, Inc.
Dept. Q (415) 964-3136
Box 4090, Mountain View, CA 94040
master charge

HAM RADIO CENTER

for the famous HAM-KEY* and KEYER!

*TM trade-mark



Model HK-3M

With anti-tip bracket even a heavy-handed key pounder cannot tip. All the features of the HK-3.

$19.95

- Deluxe straight key
- Heavy base — no need to attach to desk
- Navy type knob

CC-3 shielded cable w/plug for HK-3M $3.95

Model HK-1

- Dual-lever squeeze paddle

$29.95

CC-1 shielded cable w/plug for HK-1 $4.49

Model HK-2

- Same as HK-1 less base for incorporation in own keyer

$19.95

Model HK-5A Electronic Keyer

- New Cabinet Colored-Keyed to match most modern radio equipment
- Iambic Circuit for squeeze keying
- Self-completing dots and dashes
- Curtis 8044 IC Keyer Chip

$69.95

NEW! Model AT-B Anti-Tip Bracket

Converts any HK-3 to HK-3M

$2.99

Prepaid

Model HK-4

- Combination of HK-1 and HK-3

$44.95

CC-1/3 shielded cable w/plugs for HK-4 $7.95

Order today direct or from your favorite dealer • Add $2.00 shipping & handling per unit (USA) Same day shipment . . .

HAM RADIO CENTER

JUST DIAL
8340 OLIVE BLVD.
P.O. BOX 28271

1-800-325-3636

TOLL FREE
ST. LOUIS, MO
63132

These CRYSTAL FILTERS are for you!

600 Hz 6-Pole First-IF Filter for Drake R-4C

Optimum bandwidth, low loss. Improve the early-stage selectivity. Eliminate those high-pitched beat notes from signals that leak around the switchable second-IF filter. Minimize the chance of strong signals overloading the second mixer, causing intermodulation and desensitization. Both the existing filter and our CF-600/6 can be mounted in the receiver and relay switched to retain phone capabilities. CF-600/6: $80.00. Relay switch kit: $33.00.

125 Hz 8-Pole Second-IF Filter for R-4C

Still sharpest available! 275 Hz at -60 dB! Cuts QRM. Ideal for DX and contest work. Unexcelled under crowded band conditions. More selective than audio filters. Puts selectivity in AGC loop. Unlike with audio filters, receiver gain not reduced by QRM outside passband. CF-125/8: $130.00.

Superior 8-Pole CW Selectivity for TR-4s

350 Hz at -6 dB, 860 Hz at -60dB. Cuts QRM. More selective than 6-pole CW filter in TR-4Cw. For all TR-4s S/N 26,000 and above. CF-350/8: $120.00. Switch and mounting kit: $10.00.

Signal/One CX-7, CX-11 8-Pole CW Filter

All-purpose CW bandwidth, low-loss, 350-Hz, Ideal for RTTY. CS-350/8: $120.00.

16-Pole R-4C SSB!

Reduce QRM, leakage, overload, blanker false-triggering. Overall shape factor 1.4. 2kHz at -6dB, 2.8kHz at -60dB. CF-2K/8 pair: $120.00. Relay switch kits start at $33.00.

3kHz 8-Pole Filter for R-4C, R-7, TR-7

Sharpest AM filter, also wideband SSB in 7-line. Optional two AM filter relay switch kit for R-4C: $33.00. CF-3K/8 for R-4C, CD-3K/8 for R-7, TR-7: $80.00.

R-4C FRONT-PANEL DC CONTROL/AGC DUAL-FUNCTION ROTARY SWITCH: $19.00 Can switch relays for CF-600/6, CF-2K/8, CF-3K/8, and existing 8-kHz first-IF filter.

Sherwood Engineering Inc.
1268 South Ogden St.
Denver, Colo. 80210
(303) 722-2257

Money back if not satisfied
Add $3 per order shipping;
$6 overseas air
Dealer Inquiries Welcome

VISIT OUR N.J. SHOWROOM

10 MINUTES FROM G.W. BRIDGE
SAME DAY SHIPPING VIA U.P.S.

24 HR. DIGITAL CLOCK

25.95 Reg. 29.95

Limited time offer

Huge 1¾ in. digits that you can keep set to GMT. Alarm & snooze functions let you use it as an ID Timer. Assembled.

ADD 2.50 SHIPPING AND HANDLING

AMS 147 cushcraft FM ANTENNA

⅝ wavelength mag. mt. antenna for 2 meters. Unique tuning system makes cutting unnecessary for tuning.

ADD 2.50 SHIPPING AND HANDLING. Reg. 34.95 **27.95**

AMECO PRE-AMPLIFIER

Model P1-2 continuously tunable 6-160 meter receive PRE-AMP is designed specifically for use with transceivers. Features adjustable gain fet dual gate transistor w low noise figure. Easy no tool installation. No wiring necessary.

Reg. 74.95 **59.95**

ADD 3.00 SHIPPING AND HANDLING

DRAKE LOW PASS FILTER

TV-3300-L.P. 1000 watts max. below 30 MHz. Attenuation better than 80 dB above 41 MHz. Helps T.V. i-f interference, as well as TV front-end problems.

Add $2 shipping & handling. Reg. 26.60 **22.95**

Limited time offers.

People-to-people communications

radiomasters

3 Tenafly Rd., Englewood, N.J. 07631
(201) 568-0738 (at the monument)
Master Charge & VISA Accepted

In times like these . . .

Don't risk it.

Dust Covers increase reliability. Increase resale value.

Try our low-cost protection for ALL your equipment . . . before it's too late.

only **$4.95**

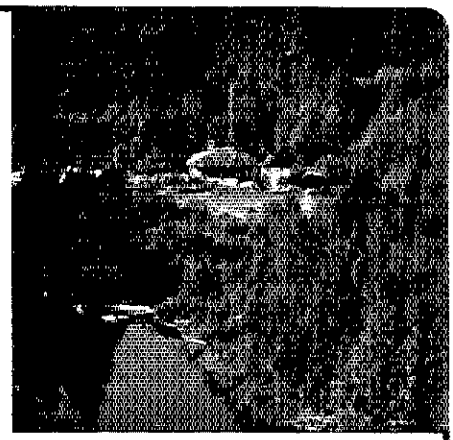
- Protects equipment and investment.
- Great looking.
- 100's of designs.
- Extra strength heavy gauge vinyl.
- Machine stitched.
- Satisfaction guaranteed.

See your dealer or contact:

COVER CRAFT
Box 555 • Amherst, NH 03031 • (603) 673-8592

QTH EXCHANGE SERVICE

A Totally New Concept



For your next holiday, imagine

arriving somewhere across the country or across the ocean at another ham's QTH, while your own home is being cared for by an amateur who shares your interests and concerns. QTH Exchange Service provides listings, with photos, of numerous locations whose owners are looking for a unique holiday experience. Not limited to exchanges, listings might include spare rooms, guest cottages, boats in marinas, grass huts, summer homes, etc. All arrangements handled privately by owners.

First edition available March 1980; Fall supplement in October.

Special Charter Subscription rate until Dec. 31 includes listing, directory and supplement for $20.Can, $18.US funds.

For more information, please write;

QTH EXCHANGE SERVICE, BOX 3329, MISSION, B.C. CANADA V2V 4J5

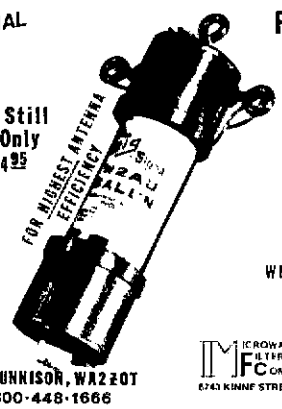
THE BIG SIGNAL

UNADILLA
"W2AU" Baluns

Still Only $14.95

DEMANDED BY PROFESSIONALS WORLD-WIDE
OVER 12 YEARS

- The Original Lightning Arrest
- 650# Strength
- Stainless Hardware
- Sealed
- GUARANTEED



ASSISTANCE? Call: HUGH GUNNISON, WA2ZOT
Toll-Free 800-448-1666
[NYS Collect 316-437-3953]

FULL-POWER, QUALITY HAM ANTENNA PARTS

AT YOUR DEALER

- BALUNS-TRAPS-INSULATORS
- QUAD PARTS-ANTENNA KITS
- BOOM/MAST MOUNTS-WIRE
- CABLE-CONNECTORS

WRITE FOR FULL CATALOG
[Enclose 30¢ Stamps]

MICROWAVE FILTER COMPANY INC
UNADILLA/REYCO DIVISION [Dept. QST]
6743 KINNE STREET EAST SYRACUSE, NEW YORK 13057

DEALERS WANTED - OVER 300 WORLD-WIDE

FOR BEST PRICE AND FAST DELIVERY

CALL

1-800-325-3636

TOLL FREE

HAM RADIO CENTER
8340-42 Olive Blvd • P.O. Box 28271 • St. Louis, Mo. 63132

CHECK OUR LOW PRICES!
Original Japanese Transistors FET, IC, Diodes

(See Partial List Below)

Ask About Our Quantity Discounts

2SA 102	.38	2SC 1014	.78	HA 1338A	3.98
2SA 234	.69	2SC 1018	.82	HA 1366	2.90
2SA 473	.59	2SC 1030C	2.49	HA 1366W	2.90
2SA 484	1.95	2SC 1061	.96	HA 1366WR	2.90
2SA 495	.49	2SC 1078	2.90	LA 4031P	2.25
2SA 497	1.38	2SC 1096	.66	LA 4032P	2.25
2SA 509	.49	2SC 1096	.78	LA 4400	2.49
2SA 561	.49	2SC 1111	2.88	LA 4400Y	2.59
2SA 562	.49	2SC 1124	1.09	LA 4428	2.59
2SA 564A	.39	2SC 1172B	3.85	M65513L	2.59
2SA 634	.59	2SC 1173	.65	STK 011	6.48
2SA 643	.45	2SC 1226	.59	STK 012	8.90
2SA 673	.45	2SC 1226A	.69	STK 015	4.90
2SA 678	.45	2SC 1239	2.90	STK 438	5.68
2SA 682	1.09	2SC 1306	1.69	TA 7045M	2.58
2SA 683	.49	2SC 1307	2.49	TA 7060P	.99
2SA 684	.45	2SC 1318	.45	TA 7061P	1.29
2SA 695	.59	2SC 1383	.49	TA 7062P	1.49
2SA 699A	.75	2SC 1384	.45	TA 7089P	2.58
2SA 706	1.19	2SC 1415	.89	TA 7202P	2.98
2SA 719	.49	2SC 1675	.59	TA 7203P	2.90
2SA 720	.49	2SC 1678	1.49	TA 7204P	2.58
2SA 733	.59	2SC 1728	.99	TA 7205P	2.00
2SA 747	4.90	2SC 1730	.59	TA 7310P	1.69
2SA 818	.99	2SC 1740	.99	TBA 810BH	2.49
2SA 841	.59	2SC 1815	1.98	TC 5060P	5.80
2SB		2SC 1856	.78	TC 5061P	2.49
2SB 22	.49	2SC 1908	.49	TC 5062P	3.99
2SB 54	.59	2SC 1909	2.25	UHIC 002	4.90
2SB 75	.45	2SC 1945	5.60	UHIC 004	4.90
2SB 175	.59	2SC 1957	.80	UHIC 005	4.90
2SB 186	.70	2SC 1978	2.80	UPC 29C	2.98
2SB 324	.49	2SC 2028	.79	UPC 563	2.49
2SB 337	.99	2SC 2029	2.89	UPC 575C2	1.98
2SB 405	.69	2SC 2075	.79	UPC 576	2.49
2SB 407	1.66	2SC 2091	1.29	UPC 982HZ	.99
2SB 434	1.09	2SC 2092	2.25	UPC 1001	2.49
2SB 435	1.29	2SC 2166	1.59	UPC 1008C	4.90
2SB 463	1.29	**2SD**		UPC 1020H	2.49
2SB 473	1.66	2SD 72	.79	UPC 1025H	2.49
2SB 474	.99	2SD 234	.99	UPC 1154	2.98
2SB 492	.89	2SD 235	.80	UPC 1155	2.98
2SB 507	1.09	2SD 261	.49	UPC 1156	2.49
2SB 528D	.99	2SD 287	2.90	UPC 1430G	3.49
2SB 595	1.59	2SD 313	.99	UPD 861	9.58
2SB 596	1.59	2SD 315	.80	UPD 857	9.58
2SC		2SD 325	.80	UPD 858	7.00
2SC 281	.49	2SD 427	2.25	PLL 01A	4.68
2SC 372	.39	2SD 525	1.20	PLL 02A	5.99
2SC 373	.39	2SD 526	.99	PLL 03A	8.98
2SC 380	.59	**FET**		**DIODES**	
2SC 384	.39	2SK 19BL	.69	1S 84	.55
2SC 458	.39	2SK 25	.99	1S 332	.45
2SC 495	.69	2SK 30	.59	1S 953	.29
2SC 509	.45	2SK 33	.80	1S 1007	.45
2SC 515A	1.09	2SK 55	.99	1S 1208	.45
2SC 517	2.00	2SK 22Y	1.85	1S 1211	.45
2SC 535	.49	2SK 39	1.39	1S 1556	.25
2SC 634A	.45	2SK 40	1.29	1S 1588	.25
2SC 686	1.58	2SK 41	1.69	1S 1885	.29
2SC 710	.39	2SK 45	1.69	1S 2076	.35
2SC 711	.39	2SK 48	2.99	1S 2902	.45
2SC 730	3.49	2SK 49	1.69	1S 3473	.29
2SC 732	.99	**IC**		1N 34	.15
2SC 735	.39	AN 214Q	1.99	1N 60	.15
2SC 756	2.99	AN 239	4.99	100 1	.49
2SC 756A	2.00	AN 247	3.99	100 10	.69
2SC 781	2.48	AN 274	1.95	VC68	.49
2SC 784	.49	AN 313	3.49	**ZENERS**	
2SC 799	2.58	AN 315	3.25	WZ 071	.25
2SC 828	.39	BA 511A	3.25	WZ 075	.25
2SC 839	.49	BA 521	2.49	WZ 090	.25
2SC 867	3.79	HA 1151	1.99	WZ 120	.25
2SC 867A	3.79	HA 1156	2.00	WZ 192	.25
2SC 897	2.98	HA 1306W	2.98	**MISC**	
2SC 930	.39	HA 1322	3.99	BG 613	5.95
2SC 945	.39	HA 1339	7.00	78L05	0.19
2SC 983	.79			MPS U31	1.99
2SC 959	1.39				
2SC 1000BL	.45				

IMMEDIATE SHIPMENT WITHIN 48 HOURS
Minimum order $5.00 — Add $1.00 postage
Quantity discount prices — Mfg. Inquiries Welcome

Ask For Our Complete Price List

FUJI - SVEA ENTERPRISE
a Division of Fuji-Svea Incorporated

P.O. Box 40325 Cincinnati, Ohio 45240

TOLL FREE TELEPHONE: Nationwide 800/543-1607
Ohio 800/582-1630

Hours: Mon.-Fri. 10-7; Sat. 11-5

KENWOOD R-599, T-599 and speaker. Very good condition with operating and service manuals. $425. WB7VOO. 602-298-4820.

SELL National NCL-2000 linear, 80 through 10 (pair of 8122's) $550 and Johnson KW Matchbox $135. W9EQQ, 1327 Monroe, River Forest, IL 60305. 312-366-8270.

WANTED — MARS circuit board 142.155 T — 143.46 R for Brimstone 144 or information where board may be purchased. Col. E. K. Lindsay, 210 Gilchrist, Warner Robins, GA 31093 Tel. 912-922-7237. WB4MJO.

HEATH 202 and 202-1. 2-Meter transceivr/power supply. 12 SETS quality crystals. Manuals. Excellent condition. $185. Budd Meyer, 6505 Yellowstone, Flushing, NY 11375. 212-459-3491.

OMNI-D, 252 M/E supply, 215P mike $850. Don, AC1W, 203-729-0863.

SELL: Hallicrafters HT-37 transmitter and SX-146 receiver with antenna relay and speaker $300. Dennis Smith, WB5SRM, Rte. 2, Box 473, Atlanta, TX 75551. 214-796-2794.

DRAKE TR-4, RV-4, AC-4 with manuals, excellent cond., one owner, never used as mobile, $475. K4GLA 804-793-3469.

ICOM IC-245SSB 2m xcvr, perfect, $490. Wilson 1405SM HT 1/5 watts, with external mic and battery charger, very good, $215. Autek QF-1 audio filter, perfect, $30. Glen, AH6BF, 5197 Iroquois Dr., Ewa Beach, HI 96706. 808-499-2825.

CENTURY 21 Digital xcvr with calibrator and key, 6 months old. Excellent condition $325. WBØOQR Gregg Tarara, 716 East Rose Ave., St. Paul, MN 55106. 612-771-7801.

NCX-5MKII, VX-501, no p.s. — $350. WB6RSE 213-648-3455.

HEATH SB-303 receiver with cw, am, ssb filters, SBA-104 noise blanker plus extra 100 kHz on 80, SB-600 speaker $325. Marauder HX-10 transmitter $175. Mint Condition. W3PZ, 412-884-1859.

ICOM IC-202 2 meter transceiver $185, and Janel 432 CA converter $50, both mint. K9CA 1-219-926-1546.

SPEECH processor, complete kit per ARRL ssb manual, $45 PPD. P. Perrello, K2VAH, 4 Pinewood, Hamburg, NY 14075. 716-649-4897.

COMPLETE station sale — Kenwood TS-520S — Kenwood TS-700 A — Heath SB-200 — Dentron Super Tuner — scope freq. counter 2 meter amp: call for details, Bridgeport, CT 203-576-1360. Geo. Abbott.

TR-3 wiac supply, excellent, $300. Wilson WE-800 w/nicads, charger, strap, duckie, mint $390. Also SB-144 and HR-2B ?? WB4EMK, 402 E. Cleveland, Dillon, SC 29536.

WILSON WE-800 with Pipo TTP and batteries. Mint. $385. W2UP, Barry, 175 Elizabth, Blackwell St., Apt. 611, Syracuse, NY 13210. 315-473-5940.

IS progress better? Read back in time and compare. 167 issues CQ 1958-1975, 198 issues QST 1948-1975. Make offer. KA3BDE, 7907 Eton La., Clinton, MD 20735.

HEATH SB-102, AC, DC. Hustler whips, $400. W1GIH, 617-263-3634.

COMPLETE collection of QST for sale. Dec. 1915 to date. Contact KA1AIK, 226 Conway St., Greenfield, MA 01301.

CASH for SB-LA linear amplifier. K4BHV, Box 399, St. James City, FL 33956.

SELL: Hallicrafters HT-46, $160. MFJ — 900 tuner, $30. KVS — 40. ant. traps, $15. Dow-Key relay, $20. WA2ILG 518-465-2880 after 6 P.M.

HEATH HR-1680 factory aligned and tested, 6 mo. old, $175. Radio Shack DX-160 general coverage receiver, 1 month old, $130. Will ship next day by UPS. B. Eiselt, 517 South Lakeshore, Spirit Lake, IA 51360. 712-336-1354.

PACKAGE Sale Only — SB-102, HP-23A, SB-600, SB-650, SB-610, SB-630, mike, manuals excellent condition, $720. WA1PJY. 203-792-5447.

SIGNAL/ONE CX7B, LED readout, mint, warranty. $1495. Wanted: Eimac vapor tube. Payne Radio, K4ID, 615-384-2224.

KENWOOD TS-900 transceiver, remote VFO supply, cw filter, excellent condition $700. Heath SB-220 amplifier with 10 meters, like new, $520. DenTron Super Super Tuner $140. Icom IC 230 $200. Two meter Motorola HT-220, 4 channel, PL, case, nicad, charger excellent condition $500. Shure 444 microphone $15. You ship. W7ND, Box 656, Gearhart, OR 97138. 503-738-9644 days.

YAESU FL-110 QRP amplifier 160-10 $200. SB-630 station console $75. IG-245 ssb $475. WD5GNL, 214-475-1341. Cashier, COD.

WANTED: Yaesu FT-227R. WD9ION, 3872 Greenridge, Decatur, IL 62526.

YEASU FTV-250 purchased new 3/10/79, gift from wife (she didn't know what I wanted). Never been on the air. Yours for $200. Will ship to first response with check or money order enclosed, or give me a call. Tom Bradley, WD9IAS, 309 N. Johnson, Rankin, IL 60960. 217-283-6611.

FOR SALE: TenTec Triton IV, model 262G supply-speaker mic. $535. drake MN-4 antenna tuner $65. All postpaid. George Konnick, Apt. C-5, 1750 West Main Street, Riverhead, NY 11901.

DRAKE TR4CW, AC4, MS4, W4, Dentron 106-10AT tuner all in good condition. Will ship UPS Pre-paid anywhere in

MICROWAVE

GUNNPLEXERS & ACCESSORIES

• Modulator / PS Board • Receiver Board

Amateur microwave communications is fascinating and challenging . . . and now available to virtually anyone at a remarkably low cost!

WHITEHOUSE offers the entire GUNNPLEXER line and all the necessary support systems.

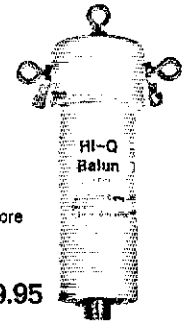
Send 25¢ for introductory booklet and catalog.

Whitehouse + Co.

Newbury Drive, Amherst, NH 03031, (603) 673-7724

HI-Q BALUN

- For dipoles, yagis, inverted vees & doublets
- Replaces center insulator
- Puts power in antenna
- Broadbanded 3-40 MHz.
- Small, lightweight and weatherproof
- 1:1 impedance ratio
- For full legal power and more
- Helps eliminate TVI
- With SO 239 connector



$9.95

HI-Q ANTENNA CENTER INSULATOR

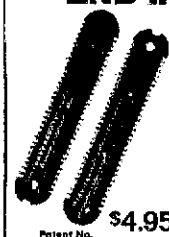
Small, rugged, lightweight, weatherproof

Replaces center insulator

Handles full legal power and more

$4.95 With SO 239 connector

HI-Q ANTENNA END INSULATORS



Rugged, lightweight, injection molded of top quality material with high dielectric qualities, and excellent weatherability. End insulators are constructed in a spiral unending fashion to permit winding of loading coils or partial winding for tuned traps.

May be used for

- Guy wire strain insulators
- End or center insulators for antennas

$4.95

Patent No. 4,991,350

- Construction of antenna loading coils or multiband traps

DIPOLES

MODEL	BANDS	LENGTH	PRICE WITH HI-Q BALUN	WITH HI-Q CENTER INSULATOR
Dipoles				
D-80	80/75	135'	$74.95	$94.95
D-40	40/15	66'	74.95	91.95
D-20	20	33'	44.95	61.95
D-15	15	22'	24.95	19.95
D-10	10	16'	22.95	18.95
Shortened dipoles				
SD-80	80/75	90'	81.95	97.95
SD-40	40	45'	29.95	24.95
Parallel dipoles				
PD-8010	80,40,20,10/15	135'	94.95	75.95
PD-4010	40,20,10/15	66'	53.95	29.95
PD-8040	80,40/15	135'	85.95	81.95
PD-4020	40,20/15	66'	54.95	29.95

Dipole shorteners - only, same as included in SD models

S-80	80/75	$11.95/pr
S-40	40	$10.95/pr

All antennas are complete with a HI-Q Balun or HI-Q Antenna Center Insulator, No. 14 antenna wire, ceramic insulators, 100' nylon antenna support rope (80 models only 50') rated for full legal power. Antennas may be used as an inverted V, and may also be used by MARS or SWLs.

Antenna accessories – available with antenna orders

Nylon guy rope, 450# test, 100 feet	$14.49
Ceramic Dogbone Type I antenna insulators	.75/pr
SO-239 coax connectors	.75

All prices are postpaid USA 48

Available at your favorite dealer or order direct from

Van Gorden Engineering

BOX 21305, S. EUCLID, OHIO 44121

Dealer Inquiries Invited

Quality Quads & Towers from Skylane.

Quads:
Pretuned and ready to use 10-15-20 meter quads. 2, 3, 4, or 5 elements from $125.00. Three kinds of spreaders to choose from either telescoping or one piece. Extremely high wind and ice load stability. Separate parts also available.

High Performance Assured. Ask the ham who owns one!

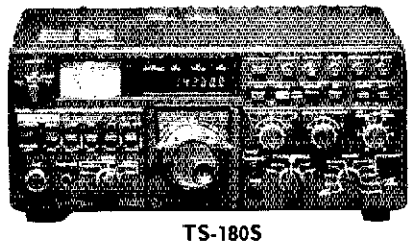
Towers:
Do you wish you could buy a crank-down 40' steel tower for $259.10? Or an aluminum tower for $192.00? Well you can! Either type also available in tilt-over models. Get our quotation on ALUMA TOWERS or TELE TOW'R.

Send 30¢ cash or stamps, for literature and prices, or call 1-813/988-4213, day or night.

Skylane Products

W4YM 400 Bon Aire Ave. Temple Terrace, FL 33617

SPECIAL OFFER



TS-180S

This month's special:
Kenwood SP-180 for $49.95 with the purchase of a Kenwood TS-180S at our special price.

ROSS DISTRIBUTING COMPANY
78 SOUTH STATE STREET
PRESTON, IDAHO 83263
208-852-0830

FOR BEST PRICE AND FAST DELIVERY

CALL

1-800-325-3636

TOLL FREE

HAM RADIO CENTER amq

cont. US. $600. M. Robbins WD8IPC 216-921-9450 or 623-0123.

SCHEMATICS: Complete set (a few gaps exist) SAMS photo facts: #29 thru 1790 (1949 thru 1978) Perpetual Trouble Shooters Manual by John F. Ryder, Volume 4 thru 23 (1933 thru 1951). Mail bid or inquiry to: Director of Education, Denver Institute of Technology, 7350 N. Broadway, Denver, CO 80221.

SELL: Heath HW-7 QRP rig with HWA-7 p.s. $80. postpaid. WBØPTO, 612-636-1967.

COLLINS: 30L1, $595; 32S1, $325; 75S3C, $850; 516F2, $150; F455FA21, $50; 312B3, $30; 312B4, $195. R. Schaaf, Box 301, DePere, WI 54115. 1-414-532-6643.

SB-220 2 kW linear. Mint, $525. Laver, W2GVK, 516-499-7958.

5 KILOVOLT 1 ampere variable power supply including 28 ampere variac. 3 foot rack. Make offer or trade. N1IF, 203-846-1758.

SELL: TS-520S — WB4YFW 615-535-3153.

51S1 #7097 $1500. KWM2-A, 516F2 (3 yrs!) $1500. HRO-500 $850. NCX-1000 $595. R390-A $300. R220 $250. IC245/SSB $509. 30L-1 (new!) $850. 312B-5 $500. 399C-1 $275. ITT-3010-C (0.7-30 MHz) $750. SB220 $600. 210-X/NB, DMK, mike $525. 120-S, ACPS, mike $595. TS820-S, CWF, VFO820, SP820 $1050. DTR-2000 $950. IC202 $150. TR7400A $300. 351D-2 $65.

HALL Effect dc current monitors. The latest in integrated circuit and magnetic technology. Voltage isolated method to detect presence or absence of dc currents. Protect your diodes, transistors and PC boards. Digital outputs compatible with TTL, CMOS or can drive relays. Available current ratings 1 to 10 amperes. Tolerance ± 10 percent Size 1.25 × 0.4 × 0.5 inches. Ready to mount on your PC board. Specify trip current required and send $9.90 to Energy Science, P. O. Box 152, Goleta, CA 93017.

SELL: HT-37 $99, HQ-170 $60, Ham-M rotor & Box guts/cable $40, Precision rf generator $25, Heath rf generator $10, Simpson 260 $25, HB GG 813's/p s. $50. All for $220. No shipping. Norwich, CT 203-887-0572, K3KO.

ROSS Specials: With the purchase of a TS-180, you can buy the SP-180 speaker for $49.95. We have the TS-120S for $598.29, the Atlas 350 w/digital display and power supply for $995. Also, we have the Atlas 110X with noise blanker and mobile mounting bracket for $539. Ross Distributing Company, 78 South State, Preston, Idaho 83263. 208-852-0830 Close Mondays at 2:00.

FOR SALE: Heath SB-104, factory adjusted and power supply $350. Call, 714-279-6540 or write F. D. Craig, 4525 Berwick Drive, San Diego, CA 92117.

RG-214, 8268, low-loss coax, 20-50 foot lengths, 45c/foot. WB5ZPV.

SELL. Hamarlund HX-50/8236 final, $175. HQ-170AC, factory installed noise blanker, speaker, recently aligned, $200. Both for $350 and I ship. Motorola 2m or H23-1, ac/dc $60 your ship. Rich Lochner, WD9CIV, Box 155, Idaville, IN 47950 219-943-3561.

KDK — 2015R new. $269. WD4NCF. 502-465-8763.

WILL trade Atlas 210-X with N/B and a.c. power supply, 8 months still left on warranty. In mint condition. Looking for a good vlf Communications receiver. Irwin Swain, 40 Albion Street, Melrose, MA 02176.

FOR SALE: Gonset G-76 w/ac supply, good condition. Tom or Frank Vesci, 203-667-1905 or 136 Nicholson Street, Newington CT 06111.

HEATHKIT HW-2036A with inline mic connector, manual, spare parts. Built and aligned by first class commercial. Will tune your CTS. Will ship UPS. Mint. $225. WD8QWR. 3475A Beachworth Dr., Columbus, OH 43227.

QSTs 1938 to 1978 complete, some earlier. Best offer by Nov. 1, specify pickup or ship. W9NLO.

FREE retail catalog and monthly used equipment list. We have lots of used Collins, Drake, etc. Over 50 major new lines in stock! Call Toll Free 1-800-243-7765 — Thomas Communications, 95 Kitts Lane, Newington, CT 06111. 203-667-0811. Sub-dealer inquiries invited.

ICOM-502 six meter transceiver; mint, with manual. $195 firm. Brit Hill, Box 427, Booneville, MS 38829 601-728-4839.

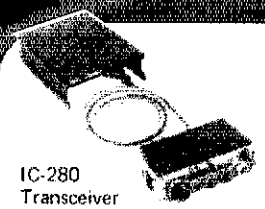
SB-200 $300, Collins 32S-3 (winged)/516F-2 $650, Drake TR-6 $625, Wilson 6-el 6M beam, B + W 560 watt-meter/dummy load, B + W low pass filter, Hallicrafters HT-41 kW amplifier. Call 6-8 P.M. EDT, Tom, K1KI, 203-673-5429.

SALE: FT101-B 160-10M, ac-dc, cw filter, $485 UPS firm. Bob, WA4AXH, 615-684-7604.

Got a problem with your rig or antenna? Let the *1980* RADIO AMATEUR'S HANDBOOK help you solve it. See page 121 of this issue.

Index of Advertisers

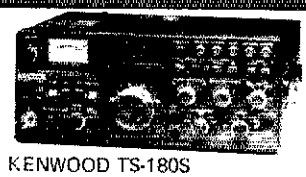
Call Webster FREE



IC-280
Transceiver

PRICE TOO LOW TO PRINT

KENWOOD Transceiver TS-520SE
160 thru 10M
List $629.95 *PRICE TOO LOW TO PRINT*

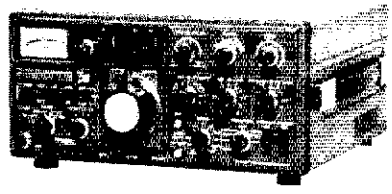


KENWOOD TS-180S
160 thru 10M
List $984.95 *DIAL FOR YOUR DISCOUNT*

Call or write for FREE SUPER DISCOUNT CATALOG!

YAESU

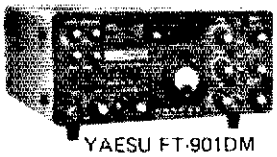
YAESU FT-227RB *Dial for your discount!*
2 Meter FM $425.



KENWOOD Transceiver
TS-820S 160 thru 10M
List $1299.

PRICE TOO LOW TO PRINT

KENWOOD R-820
List $1099.



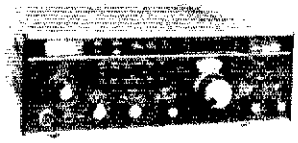
YAESU FT-901DM
160 thru 10M $1459.
Dial for your discount!

YAESU FT-101ZD
160 thru 10M $895.
Dial for your discount!

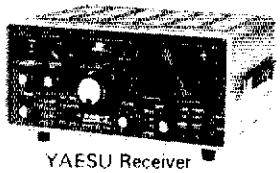
Super Signal Savings!

ROTORS
CD44 $154.95 - SALE $94.95
Ham X $349.95 - SALE $199.95

DRAKE



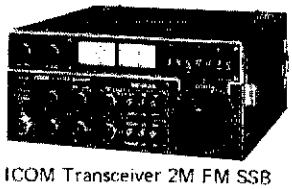
DRAKE TR-7 / DR-7 $1395.
PS-7 $249.
Dial for your discount!



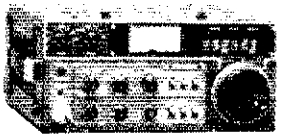
YAESU Receiver
FRG-7 Broadcast to 30 Mhz $370.
Dial for your discount!

Total Tower lines available.
Call for info.

ICOM



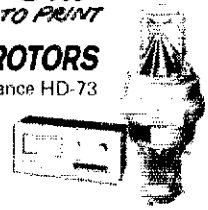
ICOM Transceiver 2M FM SSB
IC 211 List $991
Dial for your discount!



ICOM IC 701S, 160 thru 10M

PRICE TOO LOW TO PRINT

ROTORS
Alliance HD-73

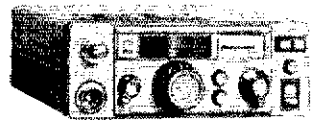


Prices subject to change without notice!

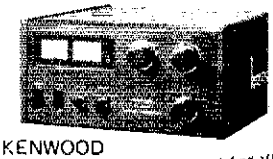
FT-207 Hand-held Transceiver
Also available FT-202
Dial for your discount!

Books Available:
ARRL Handbook
US & Foreign Call Books

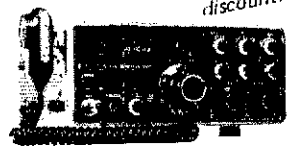
KENWOOD



KENWOOD 2M FM
TR-7600 List $375. *Dial for your discount!*



KENWOOD
TL-922 List $1199. *Dial for your discount!*



KENWOOD FM/SSB
TS 700SP List $799. *Dial for your discount!*

KENWOOD RM-76
List $125. *Dial for your discount!*

KENWOOD TS120S
80 thru 10M List $699.
Dial for your discount!

New **NOW AVAILABLE**
KENWOOD
PC-1 PHONE PATCH
Call for price and information.

Webster
For shipping information call:
(209) 224-5115
For technical and service information call:
(209) 224-5117

Webster radio, inc.

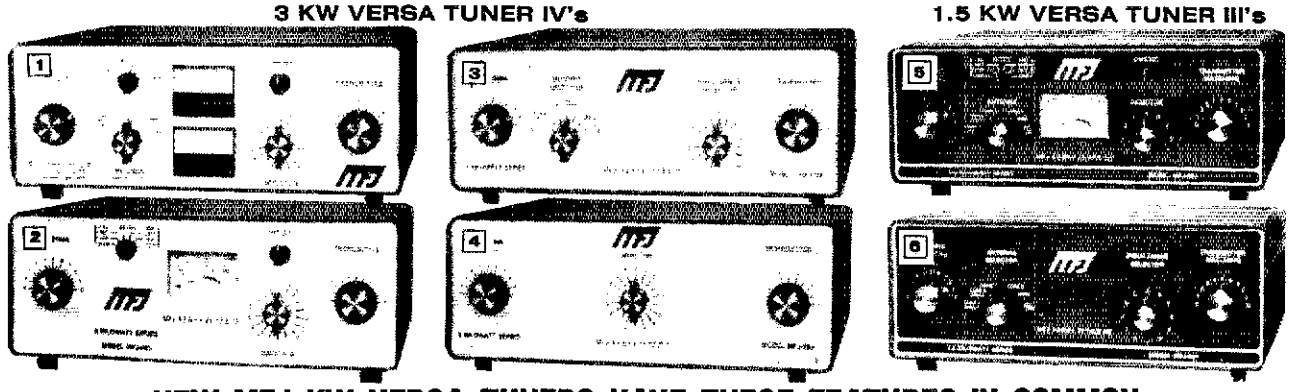
2602 E. Ashlan Fresno, CA 93726 Ph. (209)224-5111
HOURS: 9 a.m. to 5:30 p.m. Mon. thru Fri. 9:30 a.m. to 5:30 p.m. Sat.

New MFJ 3 & 1.5 KW Versa Tuners

Run up to 3 KW or 1.5 KW PEP and match everything from 1.8 thru 30 MHz: coax, balanced line, random wire. Built-in balun.

3 KW VERSA TUNER IV's

1.5 KW VERSA TUNER III's



NEW MFJ KW VERSA TUNERS HAVE THESE FEATURES IN COMMON

These 6 new MFJ KW Versa Tuners let you run up to 3 KW or 1.5 KW PEP (depending on the model) and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire. Gives maximum power transfer. Harmonic attenuation reduces TVI, out of band emissions.

All metal, low profile cabinet gives RFI protection, rigid construction, sleek styling. Black. Rich anodized aluminum front panel. 5x14x14 inches. Flip down stand tilts tuner for easy viewing.

Efficient, encapsulated 4:1 ferrite balun. 250 pf, 6000 volt capacitors. 18 position dual inductor, 17 amp, 3000 V ceramic rotary switch (3 KW version). 12 position inductor, ceramic rotary switch (1.5 KW version). 2% meters. SO-239 coax connectors, ceramic feedthru for random wire and balanced line. One year limited warranty. Made in U.S.A.

3 KW VERSA TUNER IV's

[1] MFJ-984 3 KW VERSA TUNER IV

$299.95 ***EXCLUSIVE RF AMMETER insures maximum power to antenna at minimum SWR. Built-in dummy load.***

This is MFJ's best 3 KW Versa Tuner IV. The MFJ-984 Deluxe 3 KW Versa Tuner IV gives you a combination of quality, performance, and features that others can't touch at this price.

An exclusive 10 amp RF ammeter insures maximum power to antenna at minimum SWR. A separate meter gives SWR, forward, reflected power in 2 ranges (2000 and 200 watts).

Versatile antenna switch lets you select 2 coax lines thru tuner and 1 thru or direct, or random wire, balanced line or dummy load.

A 200 watt 50 ohm dummy load lets you tune your exciter off air for peak performance. Efficient, encapsulated 4:1 ferrite balun.

[2] MFJ-981 3 KW VERSA TUNER IV

$199.95 ***Accurate meter gives SWR, forward and reflected power in 2 ranges: 2000 and 200 watts. 4:1 ferrite balun.***

The MFJ-981 3 KW Versa Tuner IV is one of MFJ's most popular Versa Tuners. An accurate meter gives you SWR, forward and reflected power in 2 ranges: 2000 and 200 watts. Encapsulated 4:1 ferrite balun.

[3] MFJ-982 3 KW VERSA TUNER IV

$199.95 ***Antenna switch lets you select 1 coax thru tuner and 2 coax thru tuner or direct, or random wire and balanced line.***

The MFJ-982 3 KW Versa Tuner IV gives you a versatile 7 position antenna switch that lets you select 1 coax thru tuner and 2 coax thru tuner or direct, or random wire and balanced line. Encapsulated 4:1 balun.

If you already have a SWR/wattmeter, the MFJ-982 is for you.

[4] MFJ-980 3 KW VERSA TUNER IV

$169.95 ***Heavy duty encapsulated 4:1 ferrite balun for balanced lines.***

The MFJ-980 is MFJ's lowest priced 3 KW Versa Tuner IV but has the same matching capabilities as the other 3 KW Versa Tuner IV's.

Features an efficient, encapsulated 4:1 ferrite balun for balanced lines.

1.5 KW VERSA TUNER III's

[5] MFJ-962 1.5 KW VERSA TUNER III

$169.95 ***SWR, dual range forward and reflected power meter, 6 position antenna switch, encapsulated 4:1 ferrite balun.***

The MFJ-962 1.5 KW Versa Tuner III is an exceptional value.

An accurate meter gives SWR, forward and reflected power in 2 ranges (2000 and 200 watts).

A versatile six position antenna switch lets you select 2 coax lines thru tuner or direct, or random wire and balanced line. Encapsulated 4:1 balun.

Black front panel has reverse lettering.

[6] MFJ-961 1.5 KW Versa Tuner III

$149.95 ***6 position antenna switch lets you select 2 coax lines thru tuner or direct, or random wire and balanced line.***

The MFJ-961 1.5 KW Versa Tuner III gives you a versatile six position antenna switch. It lets you select 2 coax lines thru tuner or direct, or random wire and balanced line. Encapsulated 4:1 ferrite balun.

If you already have a SWR/wattmeter, the MFJ-961 is for you.

Black front panel has reverse lettering.

FOR YOUR NEAREST DEALER OR FOR ORDERS

CALL TOLL-FREE 800-647-1800

Why not visit your dealer today? Compare these 3 KW and 1.5 KW Versa Tuners to other tuners. You'll be convinced that its value, quality and features make it a truly outstanding value. If no dealer is available, order direct from MFJ and try it. If not delighted, return it within 30 days for a prompt refund (less shipping). Charge VISA, MC. Or mail check, money order plus $10 shipping/handling.

For technical information, order/repair status, in Mississippi, outside continental USA, call 601-323-5869.

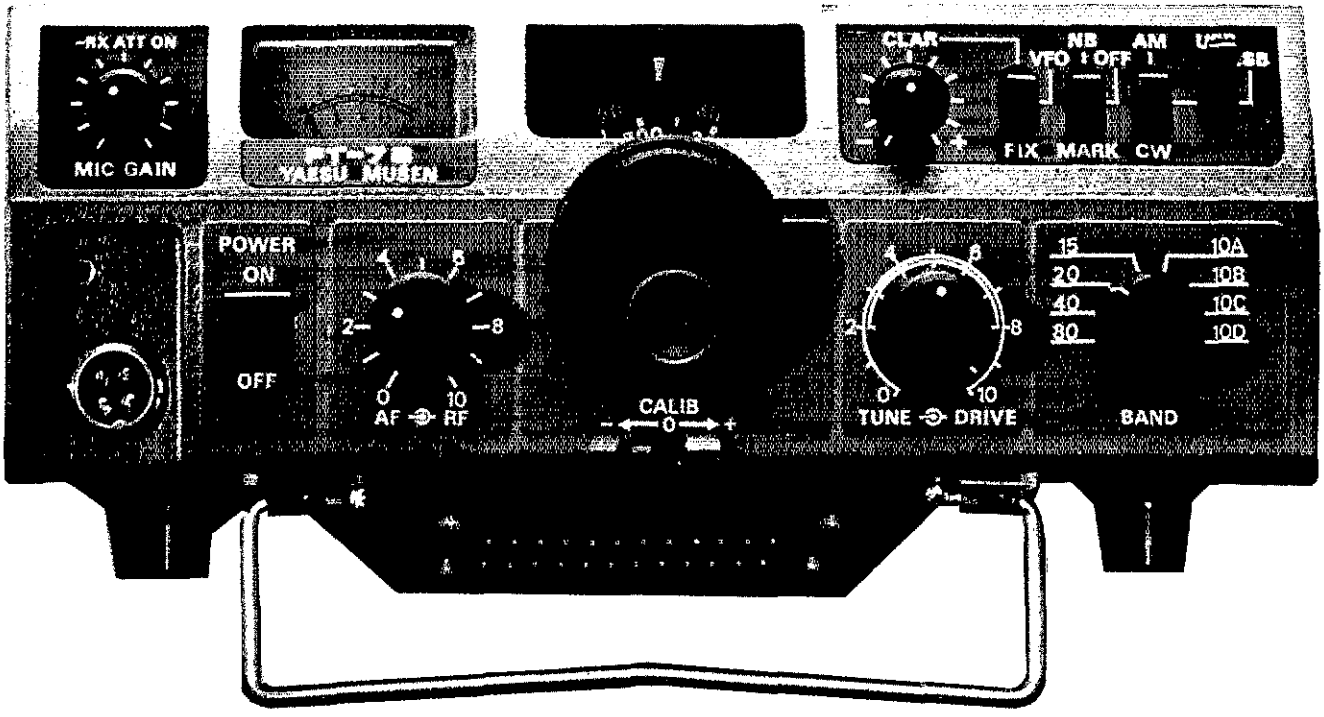
Order By Mail or Call TOLL FREE 800-647-1800 and Charge It On VISA mastercharge

MFJ ENTERPRISES, INC.

P. O. BOX 494
MISSISSIPPI STATE, MISSISSIPPI 39762

NEW FT-7B 100 W MOBILE/BASE HF TRANSCEIVER

Enough power to drive those linears! The FT-7B is the high powered version of the popular 20 watt FT-7 that so many hams are running mobile in cars, boats, and planes around the world. Use the FT-7B as a top quality base station. New improvements include an audio peak filter (like our FT-901DM) to give you super CW selectivity, drive control, four 10M positions, full 80-10M coverage, 28.5-29.0 MHz crystal supplied (other crystals available as options), optional YC-7B Plug-in Remote Digital Readout, optional FP-12 Speaker/Power Supply Console.



RECEIVER

Sensitivity: 0.5uV for S/N 20 dB
Image rejection: Better than 50 dB
IF rejection: Better than 50 dB
Selectivity: -6 dB: 2.4 KHz, -60 dB; 4.0 KHz
Cross-modulation: Better than 60 dB immunity at 20 KHz off a 20 dB input signal typical
Audio output: 3 watts @ 10% THD

TRANSMITTER

Emission: LSB, USB (A3j), CW (A1), AM (A3)
Input power: A1, A3j; 100 watts DC
Carrier suppression: Better than 50 dB below rated output
Unwanted sideband suppression: Better than 50 dB @ 1000 Hz
Spurious emission: Better than -40 dB
Distortion products: Better than -31 dB

arma

Price And Specifications Subject To Change Without Notice Or Obligation

YAESU

The radio.

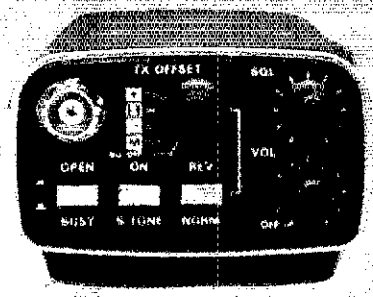
579X

YAESU ELECTRONICS CORP., 15954 Downey Ave., Paramount, CA 90723 ● (213) 633-4007
YAESU ELECTRONICS Eastern Service Ctr. 9812 Princeton-Glendale Rd. Cincinnati, OH 45246

KENWOOD'S TR-2400

...synthesized, BIG LCD, 10 memories, scanning...and more!

Kenwood TR-2400...it's a synthesized 2 meter hand-held transceiver...the answer to any Amateur's operating requirements! Its many advanced features include:



CONVENIENT TOP CONTROLS

- **LCD digital readout**
  - Readable in direct sunlight (better than LEDs)
  - Readable in the dark (with lamp switch)
  - Virtually no current drain (much less than LEDs) and display stays on
  - Shows receive and transmit frequencies and memory channel
- **10 Memories** (always retained with battery backup)
- **Automatic memory scanning** (for "busy" or "open" channels)
- **Mode switch for the following operations:**
  - Simplex
  - Standard repeater by offsetting the transmit frequency + 600 kHz or – 600 kHz
  - Repeater with nonstandard splits by offsetting the transmit frequency to any frequency stored in memory 10
- **REVERSE** momentary switch for the following applications:
  - Checking signals on the input of a repeater
  - Determining if a repeater is "upside down"
- **Built-in Touch-Tone generator** using 16-button keyboard
- **Keyboard selection** of 5-kHz channels from 144.000 to 147.995 MHz
- **UP/DOWN manual scanning** and operation from 143.900 to 148.495 MHz in single or fast continuous 5-kHz steps. Even operates on MARS repeaters within this range by using memory 10 for transmit offset frequency.
- **LCD "arrow" indicators**
  - "ON AIR"
  - Memory recall
  - Battery status
  - Lamp switch on
- **Two lock switches** to prevent accidental frequency change and accidental transmission
- **Subtone switch** (subtone module not Kenwood-supplied)
- **BNC antenna connector**
- **1.5 watts RF output**

The TR-2400 comes with the following standard accessories:

- Flexible rubberized antenna with BNC connector
- Nicad battery pack
- Battery charger

Optional accessories include:

- Leather case
- Base Stand (for quick charge and easy base-station operation)
- DC (automobile) quick charger

ST-1 BASE STAND (OPTIONAL)

(Subject to FCC approval)

SEE YOUR AUTHORIZED KENWOOD DEALER FOR MORE INFORMATION ON THE TR-2400.

KENWOOD

...pacesetter in amateur radio

TRIO-KENWOOD COMMUNICATIONS INC.
1111 WEST WALNUT/COMPTON, CA 90220