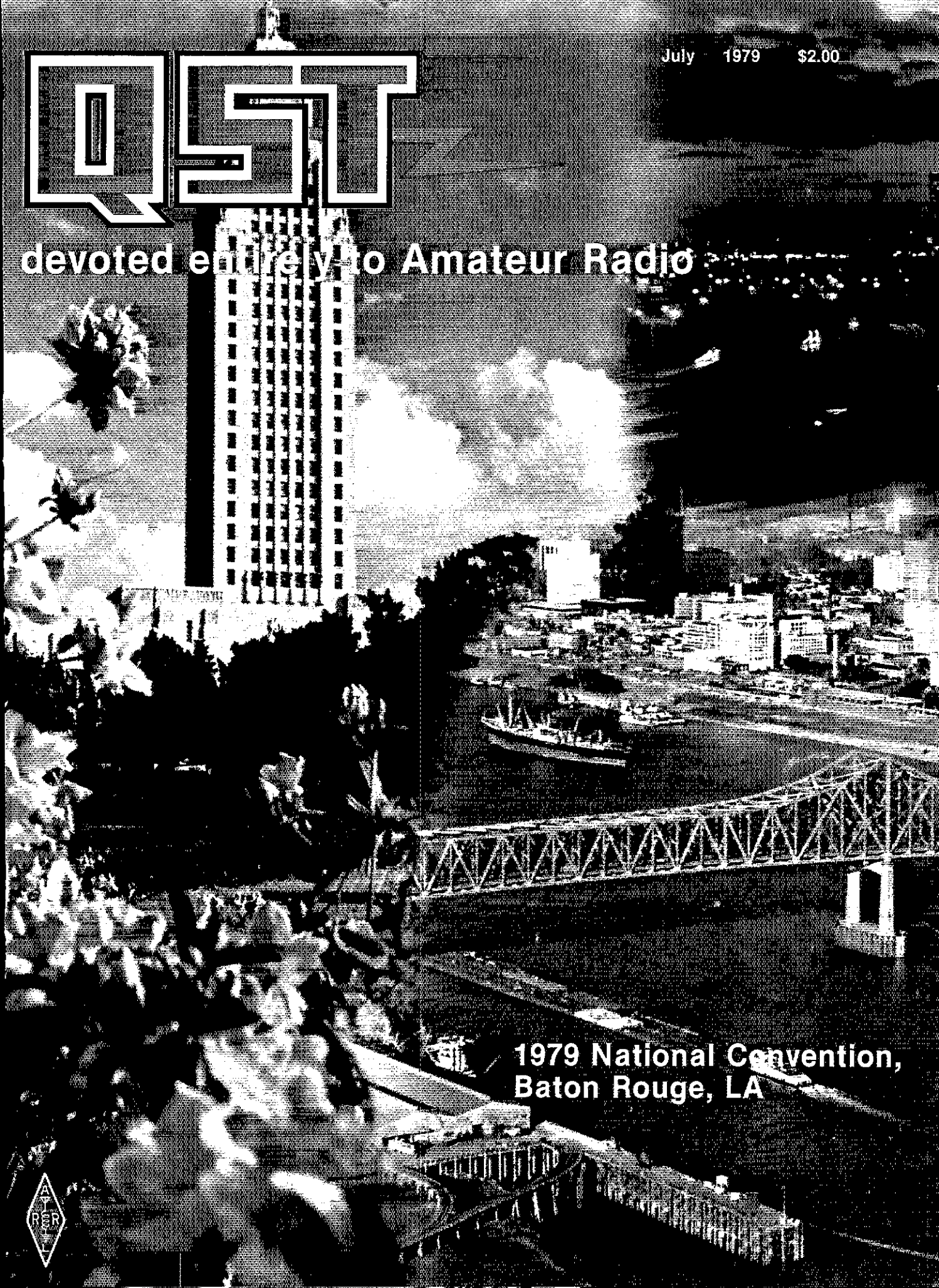
QST

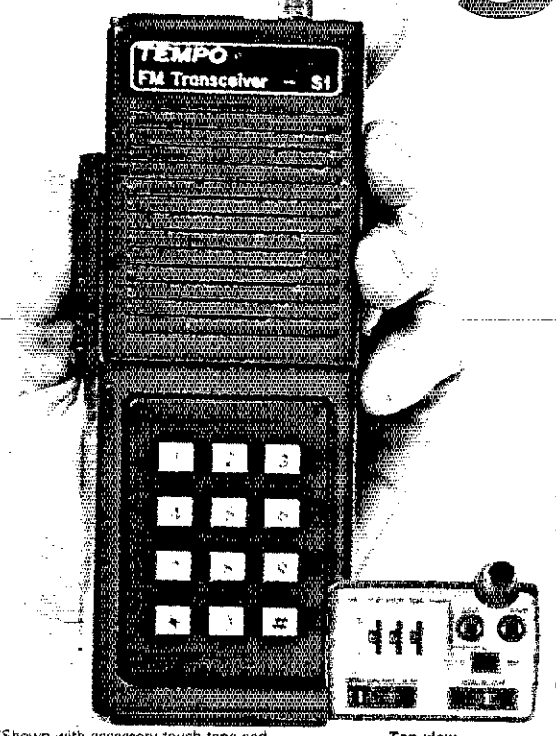
July 1979 $2.00

devoted entirely to Amateur Radio



1979 National Convention, Baton Rouge, LA

the praise is pouring in



*Shown with accessory touch tone pad

Top view

We have never enjoyed such an overwhelming response to a new product. Letters of praise for Tempo's S-1 are coming in daily. Words such as great, fabulous, and fantastic are common. In a few short months the S-1 has taken the Amateur world by storm. In addition to its unique features and its versatility, it has now proven itself to be an extremely rugged and dependable unit...qualities unmatched at any price, but unheard of at the S-1's low price.

This amazing pocket sized radio represents a major breakthrough in 2-meter communications. Other units that are larger, heavier and are similarly priced can offer only 6 channels. The S-1's price includes the battery pack, charger, and a telescoping antenna. But, far more important is its *proven* performance record as a fully synthesized 800 channel hand held transceiver.

The optional touch tone pad adds greatly to its convenience and the addition of a Tempo solid solid state amplifier adds tremendously to its power.

The proven TEMPO S-1 does it all... portable...mobile ...base station and gives you 800 channels in one of the smallest hand helds

SPECIFICATIONS

Frequency Coverage:	144 to 148 MHz
Channel Spacing:	Receive every 5 kHz, transmit Simplex or ±600 kHz
Power Requirements:	9.6 VDC
Current Drain:	17 ma-standby 500 ma-transmit
Batteries:	8 cell ni-cad pack 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

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

OPTIONAL ACCESSORIES
Touch tone pad: $55 • 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 30 watt output 13.8 VDC power amplifier (S30): $89 • Matching 80 watt output power amplifier (S80): $169

Price... $349.00 With touch tone pad... $399.00

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.

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.

51 YEARS OF SERVICE

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

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

We're convinced...we've built the world's finest amplifier in its class!

HENRY RADIO 51 YEARS OF SERVICE

HENRY RADIO'S

1KD-5

THE NEWEST MEMBER OF THE FAMOUS HENRY RADIO FAMILY OF FINE AMPLIFIERS

The 2KD-5 and 2K-4A linear amplifiers completely fulfill the needs of discriminating amateurs who want the very best and are willing to pay the price. But we have long felt that many amateurs would be satisfied with less power if they could still have the same high quality and dependability.

The 1KD-5 fulfills that need beautifully.

- **Quality that is unmatched in any other linear in its class. The same high standards of engineering and construction as the 2KD-5 and 2K-4A. Heavy duty components guarantee years of trouble free, dependable performance.**
- **Smaller and lighter. Weighs about 27 pounds less... easier to take along on vacation trips and DXpeditions.**
- **Less expensive. If your budget is limited, but you still want a GOOD quality linear to kick your signal way up, with sharp, clear signals, the 1KD-5 will give you just about everything you want... and without sacrificing quality.**

GENERAL INFORMATION

The 1KD-5 is a 1200 watt PEP input (700 watt PEP nominal output) RF linear amplifier, covering the 80, 40, 20 and 15 meter amateur bands. (10 meters on units shipped outside the U.S.)

Tube Complement: Eimac 3-500Z glass envelope triode operating in a grounded grid circuit.

ALC Circuit: ALC Circuit to prevent overdrive from high power exciters, also boosts average talk power.

Type of Emission: SSB, CW, RTTY or AM

Antenna Relay: DC relay system for hum-free operation, requires shorting contact to ground during transmit to key amplifier into transmit.

Power Output Indicator: Self-contained relative RF power meter.

Tank Circuit: Pi-L place circuit with a rotary silver plated tank coil for greatest efficiency and maximum attenuation of unwanted harmonics.

Input Circuits: Cathode Pi input matching circuits for maximum drive and linearity.

Power Supply: Conservative power supply with solid state rectifiers for reliable, long term operation.

Dimensions: 8.75" high x 14" wide x 15" deep. Weight: 48 pounds.

Price $695.00

2K-4A floor console linear amplifier... still the "workhorse" of Amateur Radio. Engineering, construction and features second to none. Provides a long life of reliable service while its heavy duty components allow it to loaf along at full legal power. $1195.00

2KD-5 desk model linear amplifer... lighter, more compact and less expensive, but still a heavy duty, high quality linear that will operate at full legal power month after month for years to come. $945.00

Tempo 2002 amplifier for 2-meter operation. 2000 watts PEP input on SSB or 1000 watts input on FM or CW. $795.00

Tempo VHF/UHF solid state power amplifiers for use in most land mobile applications. Call or write for list of models available.

Tempo 100AL10 VHF linear amplifier. Power output of 100 watts (nom.) with only 10 watts (nom.) in. $209.00

3K-A linear amplifier (for export and military use only) Superior quality, extremely reliable. At least three kilowatt PEP input on SSB... 2000 watt PEP output. $1595.00

4K-ULTRA linear amplifier (for export and military use only) For the most demanding operation... SSB, CW, FSK or AM. For general coverage operation from 3.0 to 30 MHz, but can be modified for operation on frequencies up to 100 MHz. 100 watts drive delivers 4000 watts PEP input. $3450.00

All of the above except the 2002, 3K-A & 4K-ULTRA are available at Tempo dealers throughout the U.S.

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.

July 1979
Volume LXIII Number 7

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.

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

A city of old-world charm, Baton Rouge welcomes you to the ARRL National Convention, July 20-22.

Contents

Technical

19 **Putting the Quarter-Wave Sloper to Work on 160** *Dana Atchley, Jr., W1CF*
20 **Additional Notes on the Half Sloper**
22 **Vest-Pocket TTL Logic Probe** *E. H. Rogers, KØGKB and Garry Bartels, WB1CPM*
24 **The Imperfect Antenna System and How It Works** *Stan Gibilisco, W1GV*
28 **The Cornwall Collinear** *Vincent A. Quaresima, K2NE and Steven R. Houck, WA3RKM*
30 **Slippers for a QRP Transceiver** *Roy Usher, VE6EA*
33 **A Digital Morse Code Clock** *Roger M. Blood, WA4HBZ*
41 **Morse Code Transmissions of Computer Programs** *Phillip L. Emerson, WD8IZA*

Basic Amateur Radio

38 **The Weekender — A Simple Crystal Calibrator** *Ken Powell, WB6AFT*

General

11 **Amateur Radio: A Light in the Darkness** *Dave Baysinger, WBØBAE, Allen LeFohn, KA7CBV, Bill Standing, AC7G and Phil Bondurant, WA7ZWD*
14 **An Eclipse Study on 80 Meters** *Kenneth L. Johnston, W7LIX and Marvin E. Johnston, W7ACP*
16 **Beacons Provide Eclipse Propagation Data** *Roy E. Smith*

Operating

82 **Rules, 1979 ARRL UHF Contest**
83 **Results, 1979 Novice Roundup** *Bill Jennings, K1WJ and Tom Frenaye, K1KI*

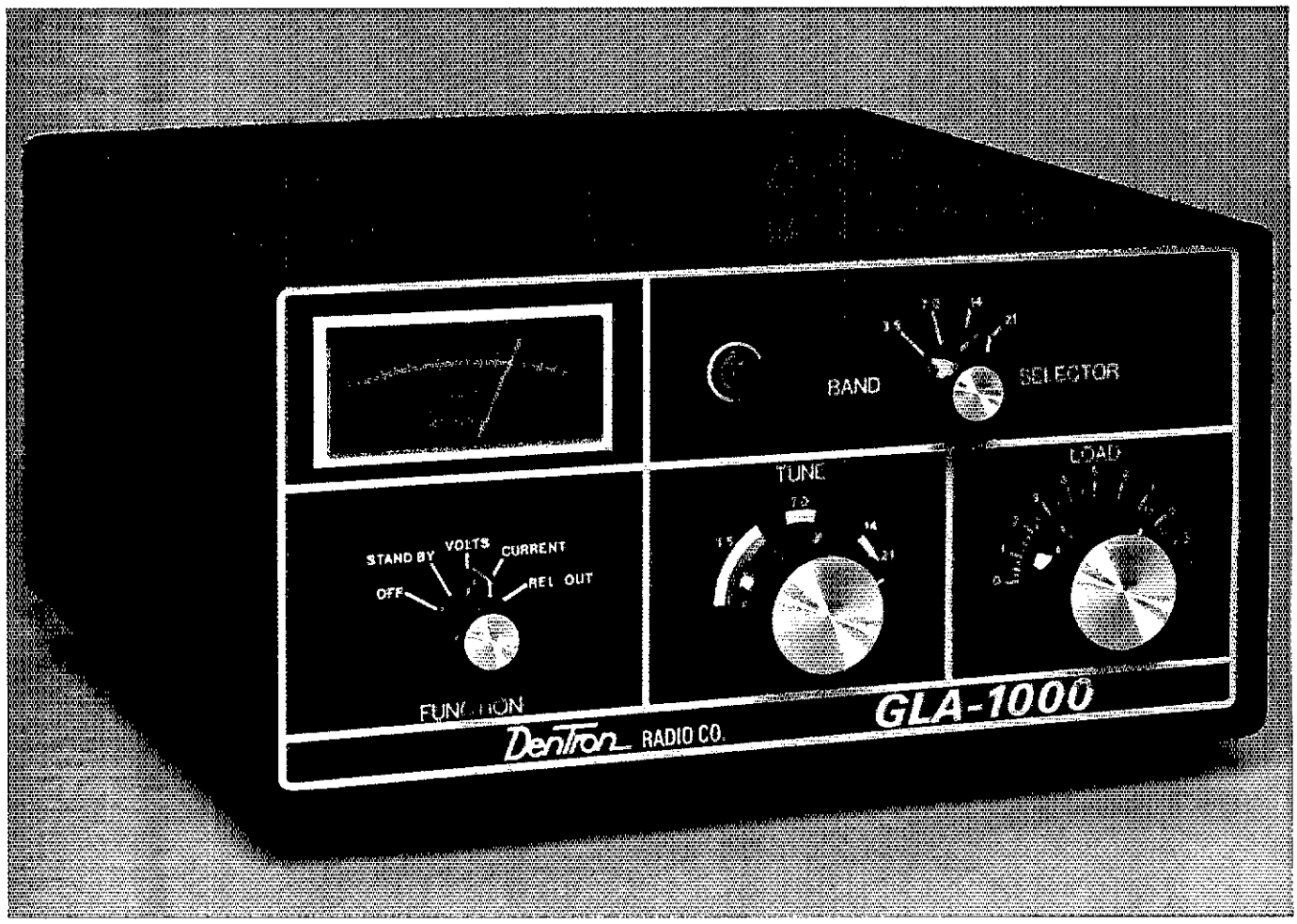
Organizational and Regulatory

9 **Participate, Eh?**
53 **Another Meeting with the Chinese . . .**
54 **HF WARC Proposals Leave Room for Optimism**
56 **Moved and Seconded . . .**
61 **Members Will Choose ARRL Policymakers**

Departments

59 Canadian NewsFronts
52 Circuit Board Etching Patterns
69 Club Notes
67 Coming Conventions
87 Contest Corral
65 Correspondence
23 Feedback
64 FM/RPT
66 Hamfest Calendar
61 Happenings
49 Hints & Kinks
72 How's DX?
182 Index of Advertisers
53 International News
9 It Seems to Us
10 League Lines
58 The New Frontier
80 Operating News
81 OSCAR/RS Operating Schedule
43 Product Review
77 Public Service
69 Silent Keys
89 Station Activities
54 WARC Countdown
60 Washington Mailbox
70 The World Above 50 MHz
68 YL News and Views
67 50 & 25 Years Ago

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.

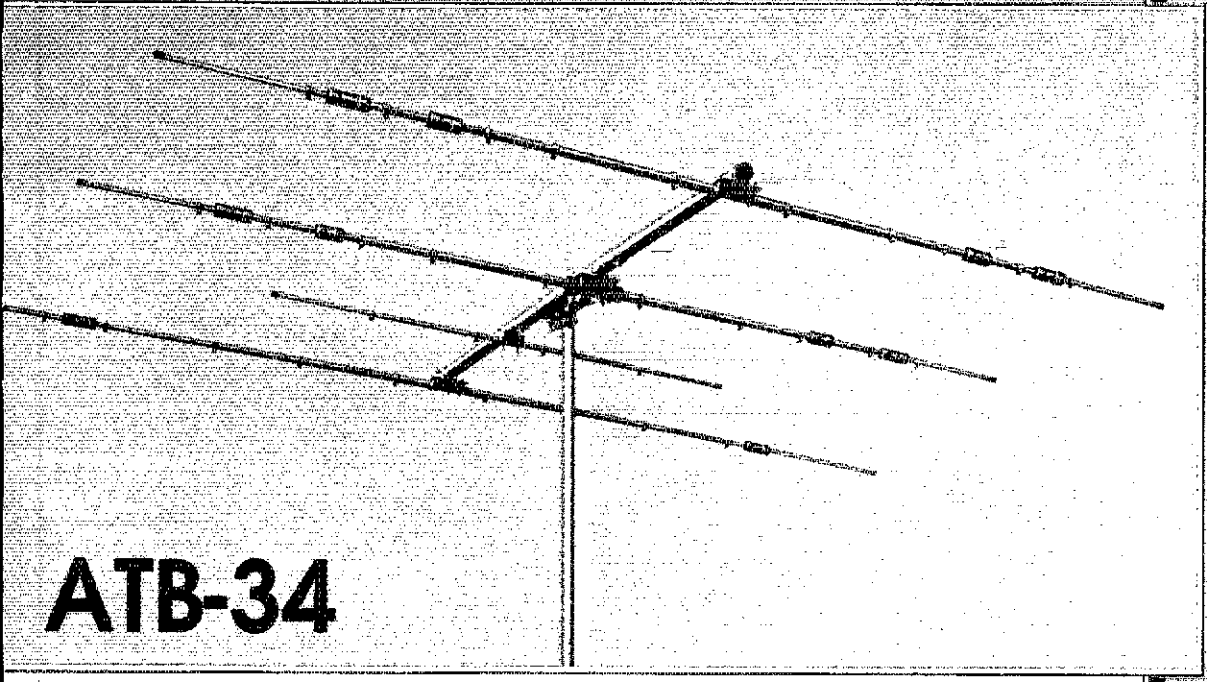
We did, and we're proud of it.

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

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

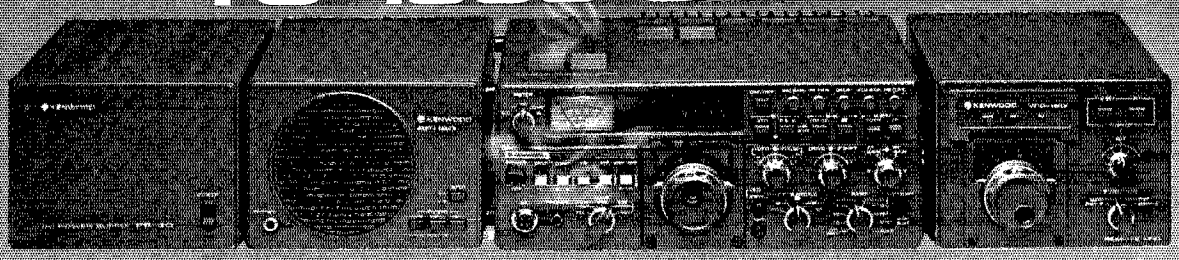
*Nominal height when set for phone operation.

IN STOCK WITH DEALERS WORLDWIDE **UPS SHIPPABLE**

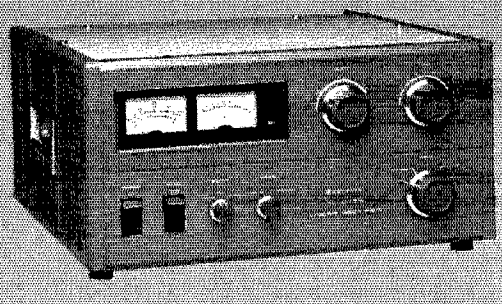
cushcraft CORPORATION

THE ANTENNA COMPANY

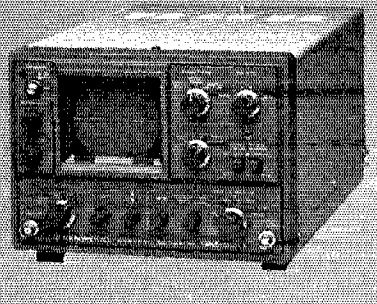
TS-180S SERIES



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; 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 14-3/10 (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

...pacesetter in amateur radio

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

WHERE RELIABILITY AND ACCURACY COUNT

INTERNATIONAL CRYSTALS 70 KHz to 160 MHz

CRYSTAL TYPES

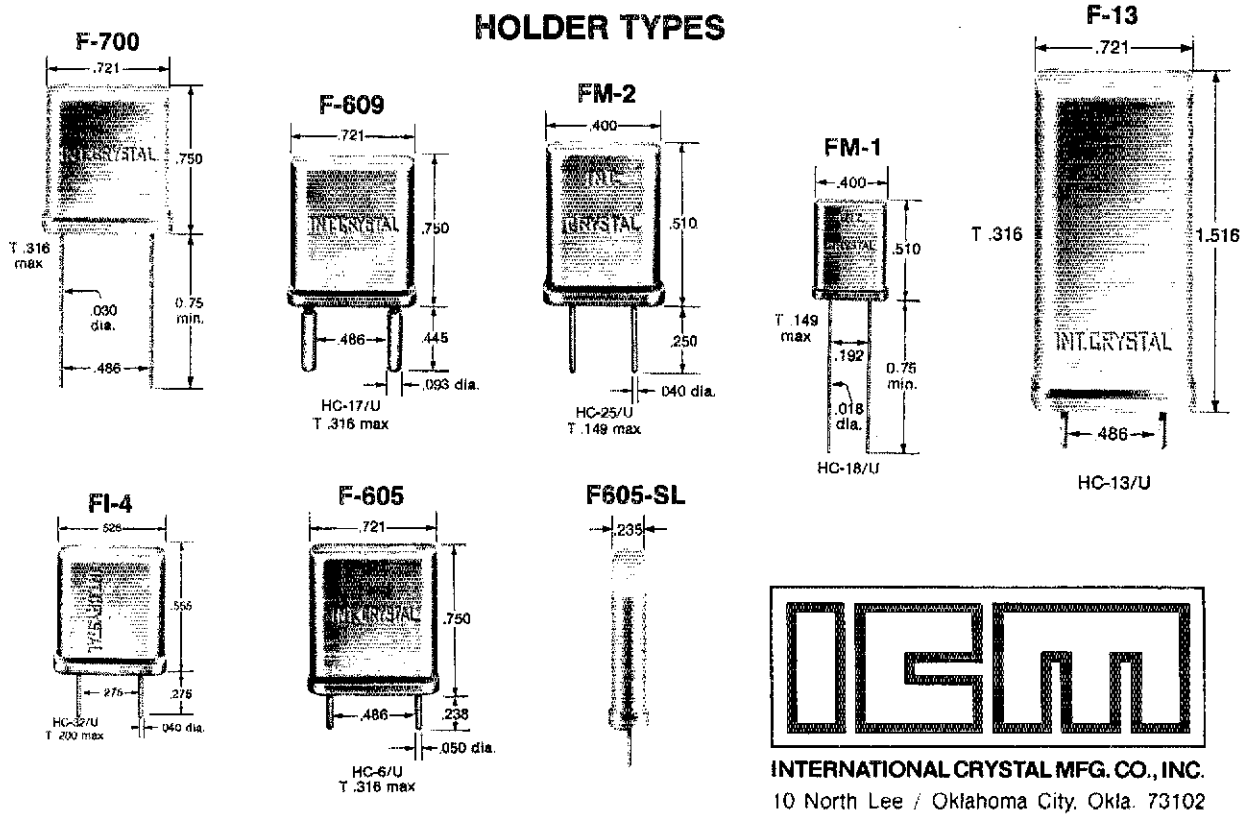
(GP) for "General Purpose" applications
(CS) for "Commercial" equipment
(HA) for "High Accuracy" close temperature tolerance requirements

International Crystals are available from 70 KHz to 160 MHz in a wide variety of holders.

WRITE FOR INFORMATION

International Crystal Manufacturing Co., Inc. guarantees every crystal against defective materials and workmanship for an unlimited time, when used in equipment for which they were specifically made.

HOLDER TYPES



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, 822 Wanona Trail, Portage, WI 53901

Dakota Division

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

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

Delta Division

MAX ARNOLD,* W4WHN, 612 Hogan Rd., Nashville, TN 37220 (615-331-4556)

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 (402-432-2438)

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: Lvs 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

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 39440 (601-425-2381)
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 (313-675-6248)
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 (816-965-8953)
Nebraske — Rex P. Greenwell, KØKP, 1534 "E" St. Apt. 11, Lincoln 68508

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 Laroe St., Swanton 05488 (802-868-4944)
Western Massachusetts — William T. Lowe, W1TM, Commonwealth Ave., Great Barrington 01230

Northwestern Division

Alaska — Roy Davie, 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, K7WW, 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 (415-537-6704)
Nevada — Ralph E. Covington, Sr., W7SK, P. O. Box 11874, Reno, NV 89510
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 — Mark L. Nelson, AA6DX, 2023 Kent Ct., Arcata, CA 95521 (707-822-9674)
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 (704-365-1150)
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 — Karl S. Thompson, K8KT, 5303 Pioneer Dr., Charleston 25312 (304-776-4352)

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, UT 84532
Wyoming — Chester C. Stanwaity, 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 — Alvin Sholk, KZ5AS, Box O, Balboa Heights
Georgia — Edmond J. Kosobucki, K4JNL, 5525 Perry Ave., Columbus 31904
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 Driftwood 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, W6RHS, 485 S. Euclid Ave., Pasadena, CA 91101 (213-793-8557)
Orange — Roy C. Zukerman, AC6H, P. O. Box 8305, Fountain Valley, CA 92708
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 — Arthur R. Ross, W5KR, 132 Sally Ln., Brownsville 78521 (512-831-4458)

THE AMERICAN RADIO RELAY LEAGUE, INC.

"It Seems to Us..."

Participate, Eh?

The League *is* your organization, you know, but how effectively you are a part of it depends entirely on you. Don't be like the dog who got promoted to sales manager, and just sat there and barked. Participate!

Right now there are two opportunities for your active participation in the policy-setting mechanism of the League: the July Board meeting and the fall elections for director.

The League's Board of Directors meets twice a year, in January and July. The Board meeting will be held on Wednesday and Thursday, July 18 and 19. At that meeting the 16 directors, with the support and nonvoting participation of officers and staff, will review the current status of the League, membership trends, WARC-79 preparation, needed membership services, improvements to existing membership services and a host of other topics. Based on membership input, regulatory patterns, environmental pressures and their best judgment, they will make decisions that will be important not only to every member of the League but also to every licensed radio amateur.

Politically, the League is divided into 16 geographical divisions in Canada and the United States. You can determine which division you are in by looking at the listings on page 8 of this issue of *QST*. Surely, you have some opinion on some aspect of Amateur Radio and the League. Voice these opinions — communicate with your ARRL director; let him know your constructive suggestions for the future.

Each ARRL director is responsive to such constructive suggestion, and will appreciate your input. However, because this editorial will reach you in the third or fourth week in June, and the Board meets the third week in July, do it now!

This fall, in accordance with an official notice which appears on page 61 of this issue, and which will appear again in the August issue, director elections will be held in eight of our 16 divisions. Are you happy with the work done by the present director? Then nominate him for another term. Would you like to see a change? Then nominate the person of your choice.

For a person to be nominated as a candidate for election to director, he must be at least 21 years of age, a member of the League and the holder of at least a General class amateur license or a Canadian Advanced Amateur certificate. A nominating petition must bear the signatures of at least 10 Full Members of the League, and must be received at Headquarters by noon of September 10th. Again, see that election notice elsewhere in this issue.

By the way, if you need to know more about the structure of the League, send an s.a.s.e. for a free copy of the Articles of Association and Bylaws. If you'd like to know more about what the League did in 1978, including a copy of the audited financial statements, send $1 for a copy of the 1978 annual reports.

ARRL Board Meetings, ARRL Director Elections — they are political action in Amateur Radio. They are *your* chance to play a role in that political action. It's your move. — *R. L. Baldwin, W1RU*

League officials are "all business" during the January 1979 board meeting in Miami. This month's meeting — and the director elections this fall — will have important repercussions for the future of Amateur Radio.

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.

League Lines...

The FCC monitoring station in Anchorage, AK, has been issuing notices of violation to American amateurs contacting Thailand. These notices have been issued in error. There is no banned countries list. American amateurs may presently communicate with other amateurs in any country without violating FCC rules. Amateurs who have received these notices are urged to respond in writing to the FCC within 10 days, as required by § 97.137 of the FCC rules and regulations. They should return the notice, retaining a copy for themselves, along with a letter which includes the date of the alleged violation and the names of the officials who signed the notice. They should add that there is no banned list; therefore, no violation of the rules has taken place. The reply should be sent via certified mail, return receipt requested.

A number of amateurs were at the forefront of propagation studies related to the total eclipse of the sun on February 26th. Our thanks to all who submitted material. Several eclipse-related articles, exploring the public-service aspects as well as the experimental, appear on pages 11-18.

The ARRL Board of Directors will meet in Baton Rouge, LA, on July 18 and 19. This is the policy-making group for the League; each Division has its own representative on the Board to speak for it. Now is the time for you to tell your director what's on your mind -- names and addresses on page 8.

Speaking of directors, nominations are now open for directors and vice directors in the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions. See "Happenings", page 61 of this issue, for full information.

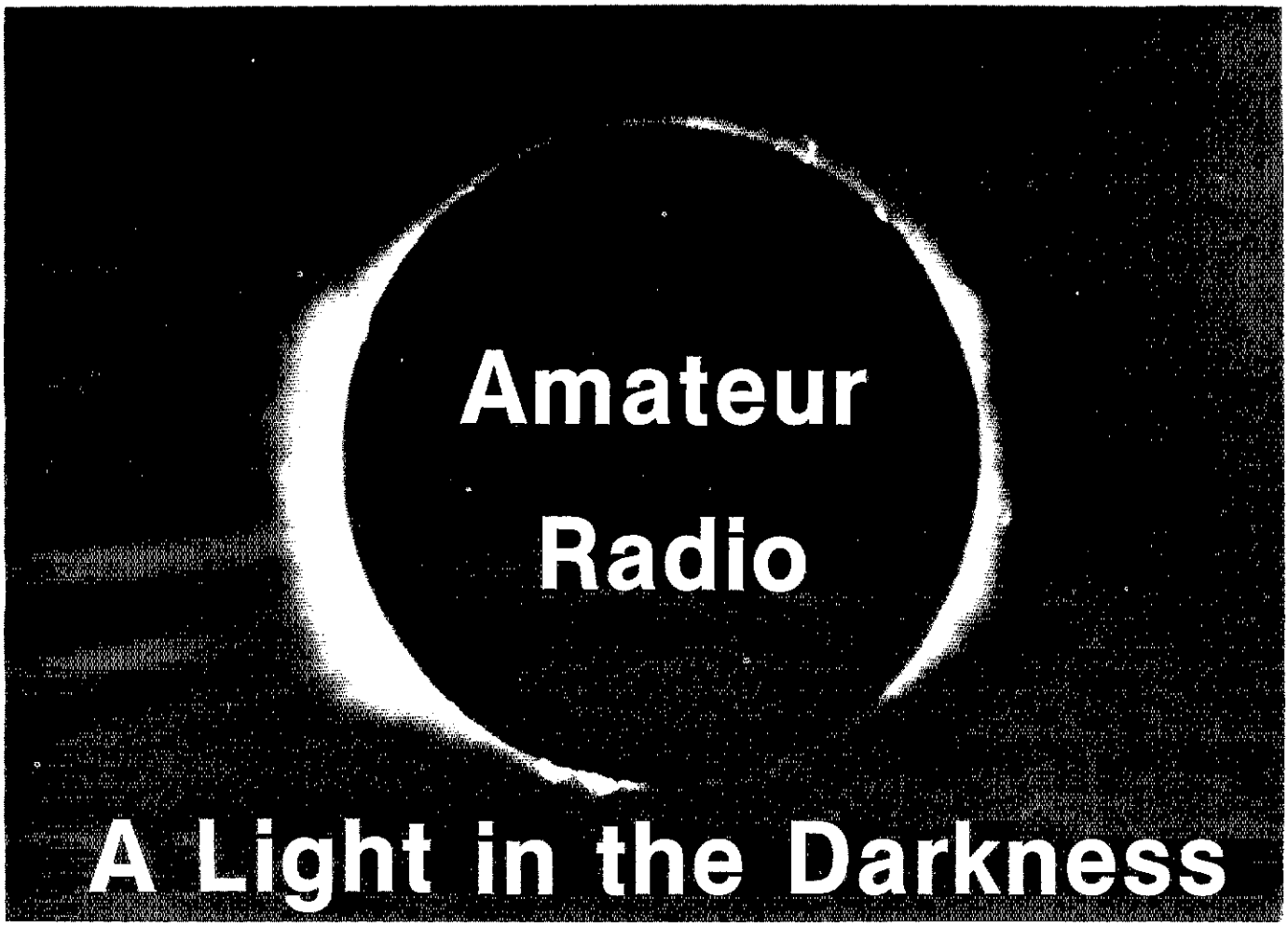
And speaking of Baton Rouge, the clubs in Louisiana have started early (more than four years ago) and worked hard to bring you a great National Convention July 20 through 22. Do come -- not only for the Amateur Radio activities, but as a fine vacation opportunity for the whole family, with New Orleans only a short distance away to further sweeten the pot!

The position of ARRL film librarian has been reinstated. Amid sorting and cleaning of films and slides, our new film librarian, Cindy Tisdale, is now accepting training-aid applications from members. For further information write to Cindy Tisdale, Film Librarian, ARRL.

Do you have a topic you'd enjoy discussing at local club meetings? Clubs write us asking for area speakers -- we need your help. We should know your name, address, phone number, the topic, equipment you'd need (projector?), how far you'd travel, what it'd cost to reimburse your gasoline costs. Write WA1STO in C&TD here at Hq. Thanks!

Serve the amateur community through pictures. The Public Information Office is continuously called upon to supply slides and photographs to our members who are seeking to introduce the public to the services performed by hams. If you have any pictures you could donate for this "revolving" file, please send them to Michele Bartlett, N1AGD, at Hq.

Occasionally we at Headquarters receive a complaint from one of our members concerning a chain letter being circulated among radio amateurs. The Post Office has this to say about such activities: "Chain letters which request money, books, bonds, or other items of value, and promise a substantial return to the remitter, which is dependent upon the activities of those who follow in the chain, are regarded as nonmailable under the postal lottery and fraud laws, Title 18, U.S. Code, Sections 1302, 1341." If you should receive a chain letter, we advise turning it over to your postmaster.



A Light in the Darkness

Ham nets supplied the up-to-date information needed to insure the success of joint U.S. and Canadian expeditions during the solar eclipse.

On February 26, 1979, a total solar eclipse darkened a 170- to 190-mile wide path across the northwestern United States, central Canada and Greenland. The last total solar eclipse in North America until 2017, the event attracted hundreds of astronomers and thousands of those just curious. A major problem faced by the scientists and other "eclipse chasers" was how to get up-to-date weather information. Amateur Radio provided the solution. Two separate nets were formed, one in conjunction with Denver's Gates Planetarium, the other with the Goldendale Observatory in Washington state. Once again, in this "hour of darkness," Amateur Radio proved its ability to serve the public.

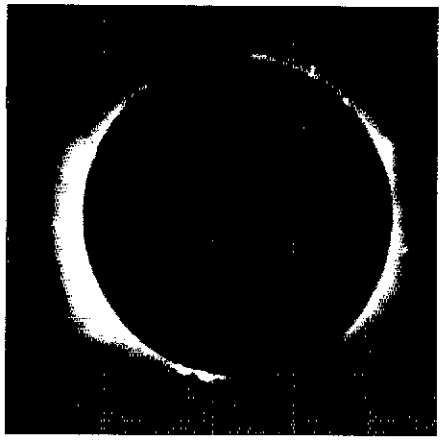
The Colorado Net

By Dave Baysinger,* WBØBAE

Successful solar eclipse viewing and photography is a highly calculated, often-frantic attempt to be at precisely the right place at precisely the right time. The most important (and least controllable) factor for eclipse chasers is the weather. Thousands of dollars and hundreds of experiments depend on clear skies, if only for 158 seconds. Instant, accurate weather communications are vital to the success of an eclipse expedition.

In an effort to speed weather reports to its staff, the Gates Planetarium of the Denver Museum of Natural History requested help from the Denver Radio Club. An eclipse net was organized to connect the planetarium staff at sites in Montana (in the path of totality) with the National Weather Service office in Denver, the museum, and a NOAA-GOES weather

*1040 E. 112th Pl., Northglenn, CO 80233



The total eclipse of the sun as seen from Helena, MT. The almost-equal distribution of the light of the inner corona is a good example of solar activity during the upward swing of solar sunspot Cycle 21. The "fire curtains," called prominences, are crimson sheets of glowing hydrogen which burst from the sun, lofting radiation and particles into space. The double-pointed curtain near the sun's south pole is more than 40,000 miles long, a distance which would hold five Earths side-by-side. *(Gates Planetarium, Denver Museum of Natural History, photo)*

An eerie darkness falls on Helena, MT, as the solar eclipse approaches totality. *(Becky Hanson photo)*

satellite receiver and computer station at Colorado State University in Fort Collins. Fifty-seven hams from the Denver Radio Club and the Northern Colorado ARC joined the net, which worked on 80, 40 and 20 meters.

The net began operation three days before the eclipse. As members of the Montana eclipse expedition started to check in, Murphy struck. The amateur frequencies crackled with the news that the weather satellite receiver in Fort Collins was inoperable and might not be repaired until noon Monday, two hours *after* the eclipse.

While work began on the ailing microwave preamplifier, a steady, vital stream of weather data was fed through the net to Montana from the NWS office in Denver. Only 16 hours before the eclipse, WØUPS in Fort Collins announced to net control, WBØIWL, that the satellite receiver was functioning and weather photographs would be available. Through an unusual 40-meter to 2-meter interconnect, nearly 600 eclipse chasers received up-to-the-minute satellite weather information the night before the eclipse.

As "the big day" began, the two ham clubs continued to provide the latest, most detailed information on sky conditions over Montana and states to the west. With the help of aerial cloud surveys supplied by WØNBP, photographers in the eclipse expedition decided to stay in Helena, MT, to view the event.

20-Meter Enhancement[1]

Besides supplying vital weather information, hams in this net found the eclipse had remarkable effects on propagation. Shortly before the eclipse shadow entered Montana, radio operators noticed an apparent 10- to 15-dB enhancement on 20 meters. The mobile signal from Montana seemed to peak at 30 dB over S9. Only four minutes after the darkness left Helena, the 800-mile skip path suddenly, within 30 seconds, collapsed. The signal strength of Denver Radio Club net control apparently dropped from +30 dB to less than S1. Band recovery from the blackout took nearly 25 minutes. Subsequent reports seemed to verify that the path collapsed as the shadow passed the point in the ionosphere which seemed geometrically responsible for the 20-meter reflection. Operators in Colorado and Montana reported the 20-meter signal enhancement and subsequent blackout to be much like "nighttime band enclosure," except that it seemed faster by a factor of at least 10.

The very first American eclipse expedition reportedly was organized during the Revolutionary War, as British and Colonial forces halted hostilities so the scientific work could proceed. However, the scientists missed the event because improper calculations had the team situated outside the eclipse's zone of totality. Thanks in part to dozens of tired, red-eyed radio amateurs, eclipse 1979 will be recorded as one that didn't get away from scientists at Gates Planetarium.

[1]Corroborating data were found by others. The articles that follow provide other perspectives on propagation experiments.

The Solar Eclipse Net

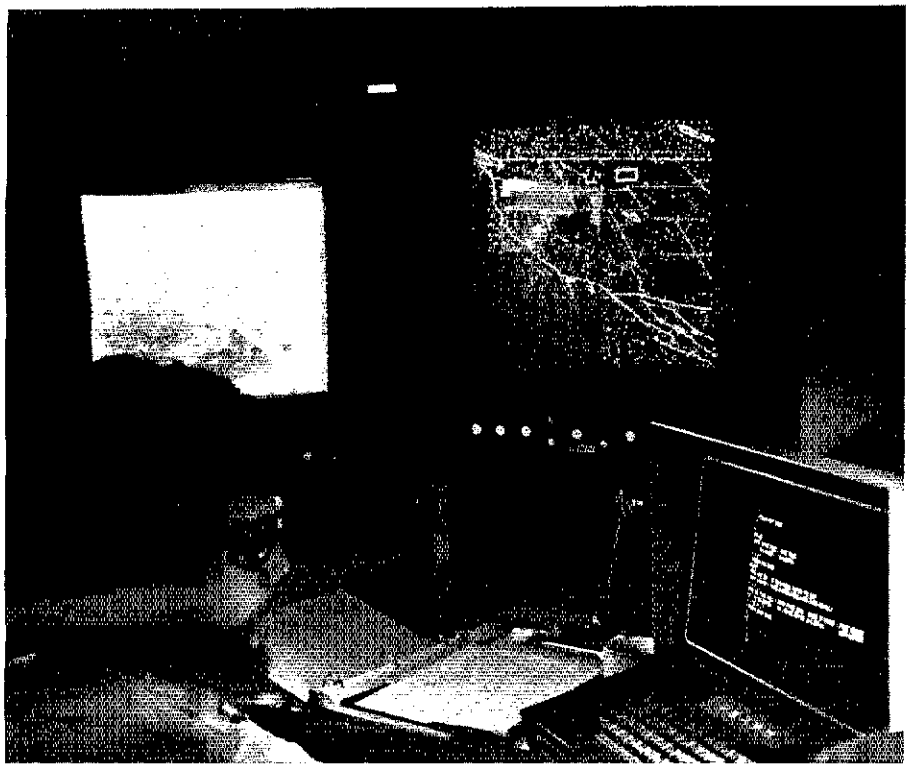
By Allen Lefohn,* KA7CBV, Bill Standing,** AC7G and Phil Bondurant,** WA7ZWD

More than 150 Amateur Radio operators in the United States and Canada participated in another Solar Eclipse Net, manning their stations for 26-1/2 hours before, during and after the total eclipse.

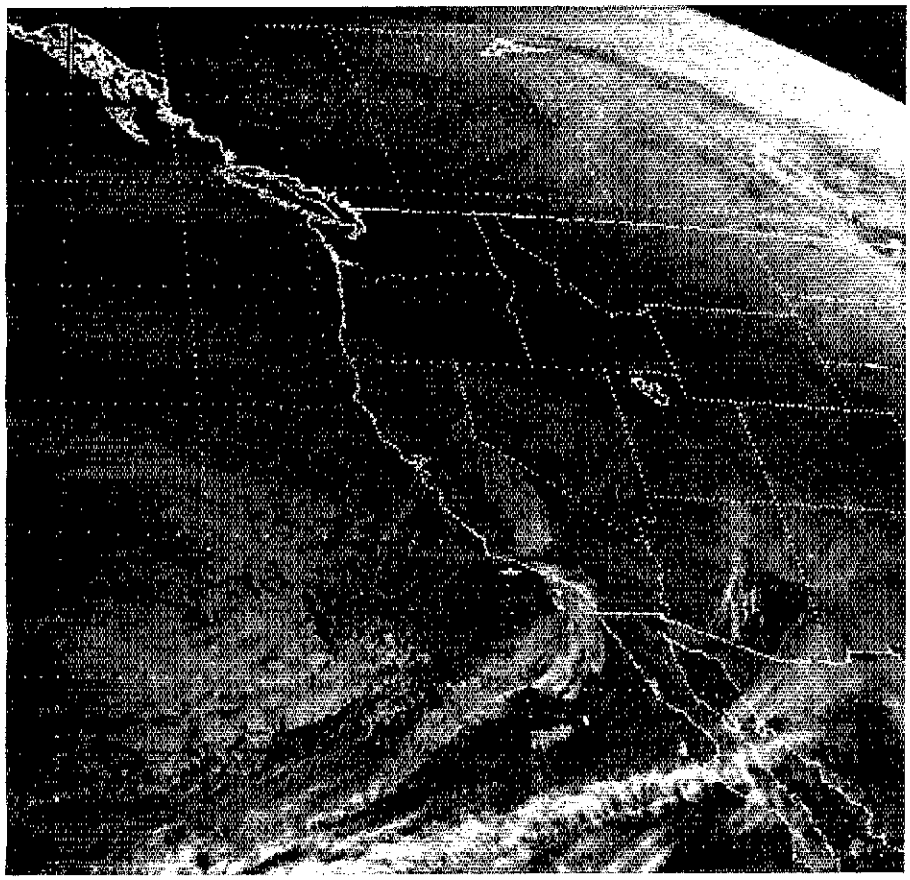
Plans for the net were developed in the summer of 1978 by Bill Standing, AC7G, and Phil Bondurant, WA7ZWD, members of the Oregon State University Amateur Radio Club. The cofounders established three goals: to supply weather information to eclipse chasers looking for clear skies, to provide two-way communication between scientists in the United States and Canada, and to conduct propagation experiments on "eclipse day."

Because of differences in weather patterns, the hams decided to divide the

*P. O. Box 196, Clancy, MT 59634
**c/o Oregon State University ARC, Corvallis, OR 97331



Dave Reynolds, research associate with the Department of Atmospheric Science at Colorado State University, monitors the satellite receiving terminal screens at CSU. Dave relayed this up-to-the-second weather information to Montana via WØUPS. *(CSU photo)*



A geostationary satellite parked 22,300 miles above the equator (at 135° longitude) caught this view of the eclipse shadow as it moved across North America. *(National Environmental Satellite Service photo)*

OSUARC Solar Eclipse Net. Al Lefohn, KA7CBV, coordinated the Montana Solar Eclipse Net, which also included operators in the Rocky Mountains and Canada. The OSUARC portion of the net was composed of hams in Oregon, Washington and Idaho.

The OSUARC net was based at the Goldendale Observatory in Washington, since it was the center for astronomers planning to observe the total eclipse in the Northwest. The hams provided up-to-date weather information to the scientists through liaison with the National Weather Service in Portland, OR. The OSUARC net also transmitted weather data to the news media, general public and hams on 80 and 2 meters.

The NWS uses satellite photographs to discern weather patterns. Since the difference between Montana's cloud cover and ground snow is often indistinguishable in satellite photos, the Montana net sent firsthand observations of weather conditions to the NWS. The meteorologists used these "ground truths" to verify the satellite shots. The finalized NWS weather reports then were transmitted through the net to more than 1500 visitors who came to Montana to watch the eclipse. Within this group, there were 500 people from around the world who gathered near Bozeman, MT, to view the event. This "safari of 500" depended on the hams for weather information so it could locate a patch of blue sky to observe the eclipse successfully. The Montana net also maintained two-way contact between Canada, Clancy, MT, and Goldendale, WA. Kevin Munson, VE4MR, coordinated the Canadian activities and provided researchers there with advance notice of a solar flare which was observed at totality on the West Coast.

Propagation Tests

Another important objective of the Solar Eclipse Net was to conduct propagation experiments. In a January 1979 *QST* article, David Lewis, W2HMT, discussed D-layer depletion and enhancement of transmissions on 160, 80 and 40 meters during an eclipse. The OSUARC net set out to test Lewis' conclusions by conducting propagation experiments on the three bands. Each of the stations involved in the tests operated, in turn, as beacons, issuing 15-second cw transmissions; measurements were taken at half-hour intervals. Although the results still are being collated, initial conclusions indicate that D-layer depletion did occur and that signals were increased greatly over the normal range of 80 meters during the day. The information gathered during the propagation experiments is expected to help scientists understand the effects of a solar eclipse on the ionosphere.

The Solar Eclipse Net was highly successful in accomplishing its three objectives. Two-way communication between

the U.S. and Canada was maintained during the eclipse, and propagation experiments were performed. Most importantly, because of the up-to-date weather reports supplied by the net, eclipse chasers found that elusive patch of blue sky needed to observe the event. In thanking members of the net, U.S. Solar Eclipse coordinator Ronald La Count, of the National Science Foundation, said: "Largely through [the hams'] efforts in providing weather information on a timely basis, a considerable number of people were able to move into cloud-free areas to observe the eclipse." In turn, OSUARC wishes to extend thanks to the personnel at the Goldendale Observatory, without whose help the solar eclipse net could not have operated successfully.

The next total solar eclipse will occur in February 1980 in India and Africa. What part Amateur Radio plays in the event depends on the interests and requirements of the scientists and countries involved. But in light of the assistance hams gave in 1979, it is likely that Amateur Radio once again will make a substantial contribution to the observation and study of the next eclipse. QST

An Eclipse Study on 80 Meters

A group of amateurs in the northwestern U.S. found that the solar eclipse had both predicted and unpredicted effects on propagation.

By Kenneth L. Johnston,* W7LIX and Marvin E. Johnston,** W7ACP

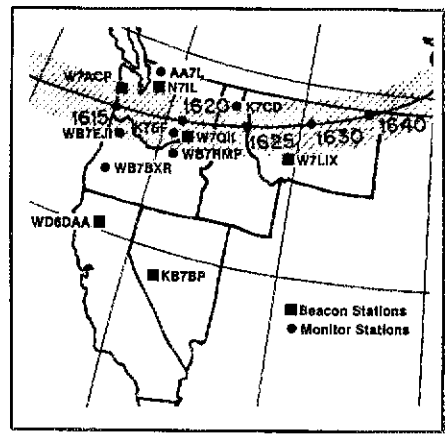
Amateur Radio operators are close to and, in many cases, part of the scientific community. Since the February 26, 1979, solar eclipse provided a perfect opportunity to study the effects on propagation during totality, the authors decided to try a simple two-station test of propagation conditions.

Both stations were within the path of totality — W7ACP at Grayland, WA, and W7LIX in the mountains of western Montana, near Helena. The separation of 560 miles (900 km) meant that, under non-eclipse conditions, the 80-meter band would be usable until shortly after sunrise when the signal would begin to deteriorate. Since the eclipse was to occur approximately two hours after sunrise, 80 meters was the ideal band to test for signal enhancement. Plans were made to conduct an alternating transmission program with measurements of signal strength and anomalous conditions.

When the proposed test was mentioned on the air one evening, many amateurs were willing and eager to participate. Within a few days, the plan had changed from conducting an informal two-station test to a near-research grade experiment involving 12 stations.

The group decided to use a rapid-rotation scheme with six beacon stations. Three of them, W7ACP on the West Coast, W7QII about 190 miles inland, and W7LIX in Montana, were within the path of totality. Two beacon stations were assigned to the south of the path — WD6DAA at Helena, CA, and KB7BP at Hawthorne, NV. N7IL in Seattle, WA, was to be the beacon station on the northern fringe of the totality path.

The number of beacon stations was limited to six so that a two-minute, rotating cycle could be established. Each station was to send an i-d, requiring about five seconds, a two-second quiet period for noise-level determination, and a 12-second key down signal for measurement of signal strength and fluctuations. All stations would coordinate timing with WWV. WB7EJI, WB7BXR, K7CD and AA7L would record signal strengths (maximum and minimum), noise level and unusual notations. WB7RMP, who obtained and calibrated a strip chart recorder, planned to station himself at Klondike, OR, a tiny town located at the center of the path of totality just across the Columbia River from the Goldendale Observatory.



Twelve stations participated in the propagation experiment conducted by W7LIX and W7ACP. Those marked with a box (■) were beacon stations. Monitor stations are designated by a circle (●). The path of totality is inside the shaded area.

With this arrangement, we hoped to make signal-strength measurements for paths parallel, angular and perpendicular to the eclipse path. We planned to operate for three hours, 1400Z to 1700Z, on each of three days, February 25, 26 and 27, thereby bracketing eclipse day with two normal test periods. In addition, a dress rehearsal was scheduled for February 24.

The Experiment Begins

On the morning of the 25th, after completing a successful dry run the day before, the group held a short ssb meeting, ironed out a few bugs, and went to the chosen frequency, 3.545 MHz.

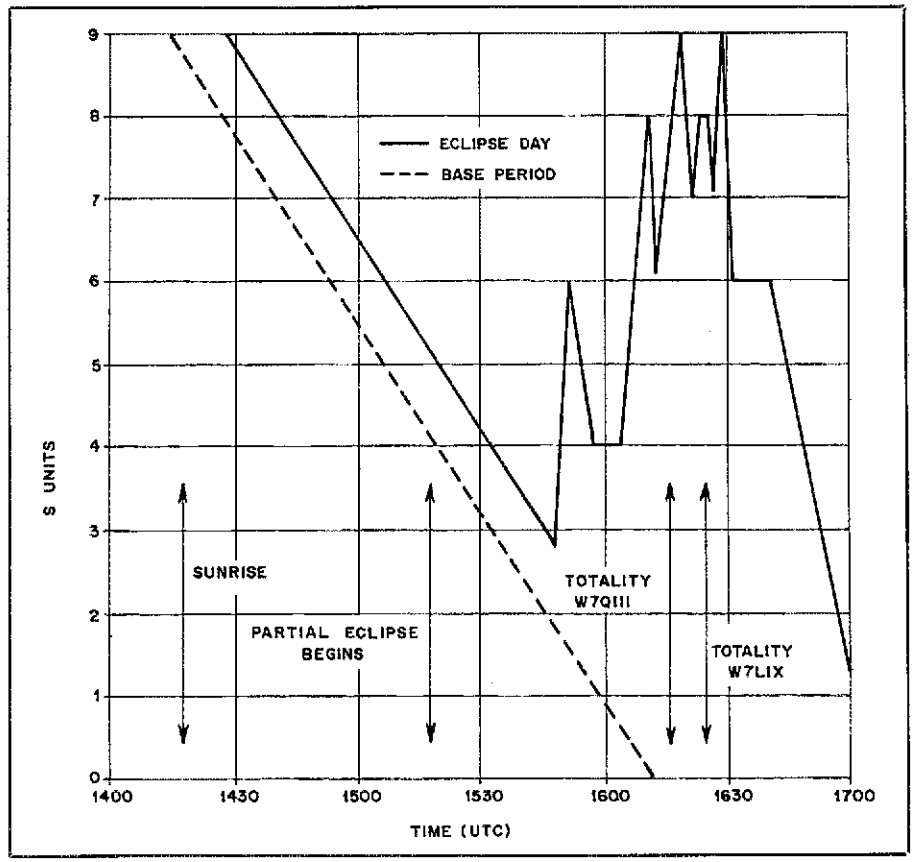
*P. O. Box 307, Augusta, MT 59713
**P. O. Box 1200, Grayland, WA 98547

Every 20 seconds there was a different beacon to measure; the cycle of six transmissions was completed in two minutes. The downward trend of signal strength on the 80-meter band as daylight arrived occurred exactly as expected. The only difference was that now it was being recorded in terms of S-meter readings at several locations and on strip charts at Klondike. By 1600Z, W7ACP had lost KB7BP and W7LIX in the high noise level, W7LIX was barely audible at WD6DAA and the more distant paths had died before the conclusion of the test. Old Sol had succeeded in rearranging the ionospheric layers into their normal daylight patterns.

February 26, 1979, was eclipse day. W7ACP still was bothered by high noise levels from gale winds; WB7RMP was ready to record with clear skies. WD6DAA checked the water-powered generator at his California mountain location. K7EF at Wapato, WA, having discovered that a propagation test was in progress, joined the group as a volunteer monitor. At 1400Z, the same monotonous beacon operation was started. As expected, the signals became progressively weaker as the sun rose. The pattern was similar to the previous two mornings, with perhaps slightly stronger readings, until at 1554Z there was a sudden and unexpected burst of signal strength! It was still broad daylight, although partial covering of the sun was in progress. It was obvious, at some stations, that something was happening. W7ACP's signal (i-d) jumped from a weak S2 up to S4-6 at W7LIX. W7QII became noticeably stronger on the next cycle. As eclipse time approached, some signals began wild fluctuations as if a storm were generating waves in the ionic seas overhead. Each beacon developed its own pattern of enhancement as the moon gradually blanketed the sun. The pattern seemed dependent upon location and distance from the monitoring station.

At 1613Z, the West Coast was in darkness. WB7EJI was only 60 miles (96 km) from W7ACP and both were in total eclipse. WB7EJI noted that signals from W7ACP jumped from S2 to S8; in another few minutes, they plummeted to S3. Yet W7LIX, at a distance of 560 miles, continued to copy W7ACP at a comparatively steady S4-5 for 30 minutes. This compared startlingly to a weak S-1/2 to S1 at the same time on the previous day.

As the moon's shadow approached W7QII, his signals began fluctuating wildly. At 1617Z and 1619Z, W7QII's beacon was erratic at W7LIX in Montana. Two minutes later, as the shadow crossed midway between stations, the beacon became briefly rock solid and strong. WD6DAA, whose signals had been swinging wildly, became steady and then very unsteady again. The shadow moved eastward at more than 2000 miles per hour (3600 km/h); W7LIX's beacon became strong and steady at W7QII in Washington, hit S6 at WB7EJI in Astoria, and nearly S9 + 20 at WB7BXR near Eugene, OR.



This graph represents signal strengths of W7QII (south-central Oregon) as copied at W7LIX (western Montana) on a normal day (dashed line) and on eclipse day (solid line). Note the sharp signal burst at 1554Z. Two major peaks occur immediately following totality at the transmitter and at the receiver. The period of enhancement was about 30 minutes.

The shadow traveled across the 375 miles (600 km) to Montana in about eight minutes. The countryside took on the appearance of a dark but moonlit night. The sky was mostly overcast, but to the south, where there was a break in the clouds, it resembled a sunrise with a pinkish amber glow of light from outside the total eclipse path. The view was brief, however, as the beacon stations continued to send with WWV-like regularity. The darkness lasted only a couple of minutes before daylight began to reappear. The total solar eclipse had passed.

In some cases, signal strength started to decay almost immediately after eclipse maximum. In others, enhancement continued for another 10 minutes before decay was evident. WB7BXR copied W7LIX at strong levels until 1635:50Z, a full 10 minutes after total eclipse at the beacon and 20 minutes after maximum sun coverage in western Oregon. The rate of signal decay was different for each of the transmission paths. Some beacon stations exhibited a steady decline in strength lasting 20 minutes while others dropped quickly. By 1700Z, conditions were nearly at normal 80-meter daytime levels and the test was terminated.

The group met again on the morning of February 27 to confirm with another run that the strange happenings were not a simple quirk of conditions, but were caused by the eclipse. Readings on the day after the eclipse were nearly identical to those taken the day before the eclipse.

Some Difficulties

The tests were not without problems; the data are not all perfect. The group was organized hastily and too late to mail logging instructions and uniform log sheets. As a result, logs are not all the same. S-meter readings varied widely between receivers; some ran high and some were stingy. Therefore, the data cannot be compared between different S meters, but only at the same meter at the same location. That was the reason for making two base period runs. High noise levels tended to blank out some of the enhancement. There also was a little trouble with frequency drift.

The project developed a large amount of data. With six beacon stations plus four monitors recording two or three readings every 20 seconds for three hours a day for four days, the number of numbers became tremendous. According

to WB7RMP, the strip chart recorder ran enough paper "to cross the Columbia River."

What did we learn from this test? After all, it is common knowledge that solar radiation has a direct effect upon radio wave propagation. All hams know that darkness improves the 80-meter band and that it goes dead during daytime, except for local communication. Why would a test of anything that is so widely known be of special interest? There are still many unanswered questions concerning the formation and decay of ionic layers. Within itself, the information obtained from these tests will not answer all the questions. But, when combined with other data, it may fill in the missing "links" and help to confirm, or refute, theories that our brothers in the scientific community hold. Without tests such as these, a precious opportunity would have been lost.

Enhancement Is Real

In his January 1979 *QST* article, Dr. David Lewis suggested that signal enhancement from a transmitter located west of the receiving site occurred some minutes before totality at the receiving site. He asked the question, "Was the enhancement real?" From these tests, we can answer that question with a definite *yes*. Enhancement of signals at 3.545 MHz is real. These tests not only confirm that question, they also determine when the enhancement begins, how long it lasts, the degree of enhancement, the degree and type of flutter or swing to the signal, the rate of increase in signal strength and rate of decay. These conditions are determined within and across the edges of totality. As to whether the maximum enhancement occurs *before* totality at the receiving site, there is evidence that indicates that maximum propagation occurs when the totality is midway between the transmitter and receiver, which seems logical. The data also suggest that two peaks may occur: one closely tied to the totality at the transmitting site, the other related to totality at the receiving site. Between these two peaks, there is a period of lesser signal strength.

With such a mass of data, it is difficult to generalize. As soon as we find a phenomenon that appears to be present, it can be dispelled as quickly by further study. For instance, we thought we detected a cyclic behavior of signal strength readings during the base period runs before and after the eclipse. Whether such a cyclic behavior is real or imaginary is a question we will leave to someone who can computerize the entire data. It is true that there are peaks of signal strength during the morning hours, but whether they are significant or not, we do not know at this time.

In many cases, before the start of signal enhancement, there appeared a sudden burst of signal strength followed by a return to near-normal level, then a relatively steady climb for a period of perhaps 15 minutes. Movement of the eclipse shadow also affected propagation. As totality approached a beacon station, and again as it left the beacon, the station exhibited very unstable signals. For two to four minutes while a total eclipse was passing, the unstable signal stabilized.

Stations close enough to carry by ground wave (20 miles W7QII-K7EF) appeared to show very little change because of the eclipse. Signals from stations on the fringe of ground wave propagation (60 miles W7ACP-WB7EJI) showed highly erratic behavior.

The two stations south of the path, WD6DAA and KB7BP, reported very little, if any, enhancement from the station to the north of the path, N7IL. They did, however, show some enhancement from the beacons within the total eclipse. Conversely, N7IL showed a fair amount of highly erratic enhancement from both WD6DAA and KB7BP on the return path.

It is not the intent of this group to analyze the data in detail. None of us claim special expertise in the field of propagation. We have simply done the leg work for those who may find it useful. (The data obtained from this test are available from the authors for the cost of copy and postage.[1])

The enthusiasm and cooperation shown by the amateurs who devoted their time, equipment and support to this project were most heart warming. In the true spirit of Amateur Radio, they gave up the opportunity to view the eclipse in order to increase our understanding of the ionospheric environment. Another eclipse is due in this country in the year 2017. We all are hoping to be here to try it again! QST

[1]Editor's Note: In addition, raw data from a computer study of eclipse propagation conditions are available from Albert S. Woodhull, N1AW, Hampshire College, Amherst, MA 01002.

Beacons Provide Eclipse Propagation Data

Some puzzling questions were answered, but others remain, following a beacon-monitoring experiment during the solar eclipse.

By Roy E. Smith*

In "Effects of a Solar Eclipse on the Ionosphere" (January 1979 *QST*, page 26), D. K. Lewis suggested that short-term changes in the ionosphere should enhance propagation during an eclipse. Lewis theorized that as the shadow of the moon sweeps along the path of totality, nighttime ionospheric conditions should occur for a brief interval. The rationale for this hypothesis assumes that the moon's interruption of the sun's energy should cause a rapid and extensive depletion of the D-layer electron density. This would permit hf signals, normally absorbed during daylight, to pass up to the E layer and refract to earth, similar to nighttime conditions. Changes also are expected in the E and F1 layers within the

*Section Head, Electronics Department, Southern Alberta Institute of Technology, Calgary, AB T2M 0L4.

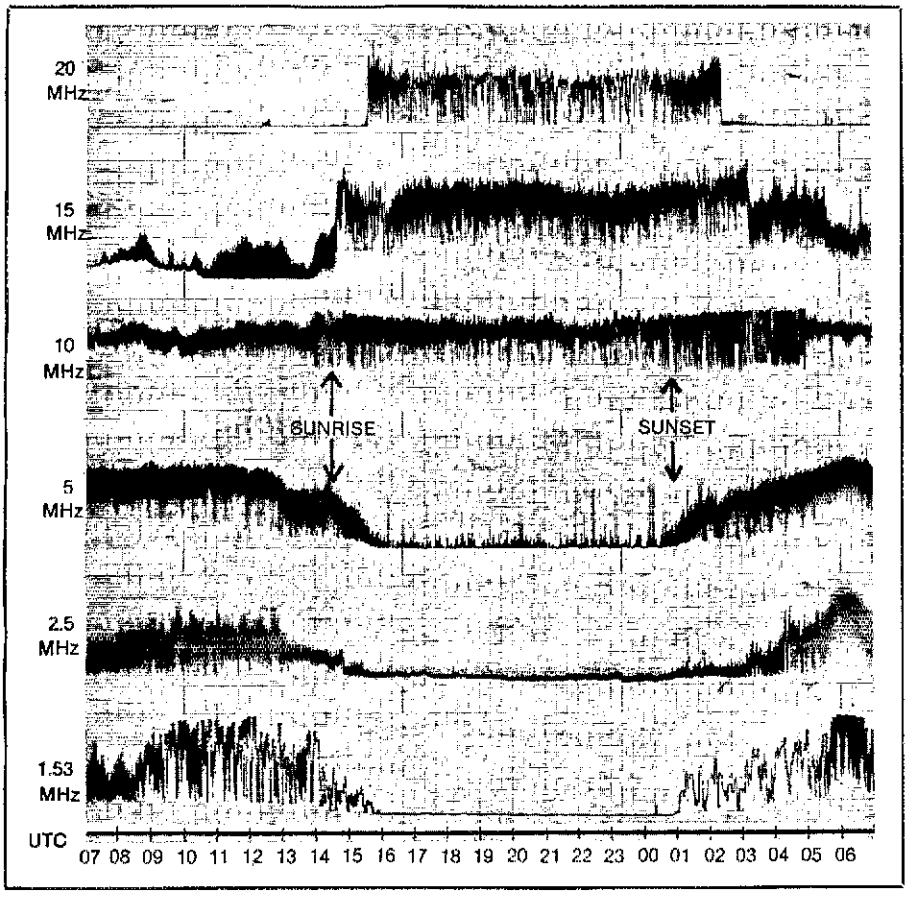


Fig. 1 -- Strip recording of normal propagation conditions for six frequencies over a 24-hour period. Note where local sunrise and sunset are indicated.

shadow of the solar eclipse.

The solar eclipse which darkened part of North America on February 26, 1979, provided an excellent opportunity to examine the event's effects on ionospheric propagation. Lewis appealed to radio amateurs to organize schedules to attempt to propagate signals along the path of the eclipse. We took a somewhat different approach to test the principle. Rather than depend on schedules, we turned to a system of monitoring a number of beacon transmitters.

Ideal Location

Our location (51°N 114°W) in Calgary, AB, Canada, some 450 to 600 km north of the path of the eclipse, provided an ideal opportunity to observe the behavior of the ionosphere during the solar eclipse. The beacon transmitters used, belonging to WWV, Fort Collins, CO (41°N 105°W), have a 1350-km long propagation path. If the normal point of refraction in the ionosphere is midway along this path, there is a reasonable correlation between the zone of total eclipse and the ionospheric refraction area.

The WWV transmitters, operating on 2.5, 5, 10, 15 and 20 MHz, provided a wide range of frequencies for the test. Also, since the transmitters operate 24 hours a day, an extensive amount of data upon which to make comparisons was collected. Lewis suggested that frequencies near 1.8 MHz (160-meter band) should be included in the test. However, since no suitable beacon transmitter was available in this range, a medium-wave signal was monitored. The signal selected was the 50-kW transmitter of KFBK in Sacramento, CA, operating 24 hours a day on 1.53 MHz. This station operates on a clear nighttime channel, but shares the frequency with a number of 1- to 5-kW transmitters at other locations during daylight hours. The signal path for KFBK is about 1500-km long and the ionospheric refraction zone is 600-km west of the refraction zone for the signal from Fort Collins.

Equipment to conduct the experiment was made available at the Electronics Laboratories of the Southern Alberta Institute of Technology. The procedure involved continuous recording of the voltages of six receivers, each tuned to one of the beacon frequencies, for a two-week period centered on February 26, eclipse day. This extended recording period provided an account of normal propagation conditions so that any anomalies occurring during the eclipse would stand out.

The six receivers and the frequencies at which each was used were Hallicrafters SX-62A (1.53 MHz), Beckman WWV Receiver model 905 (2.5 MHz), Eddystone model 830 (5 MHz), Hallicrafters SX-62A (10 MHz), Hallicrafters SX-62A (15 MHz) and Hammarlund HQ-145A (20 MHz). All receivers were connected to a 75-meter long wire antenna 45 meters above ground, oriented in a north-south direction. The recorder was an HP Sanborn 6-channel model 7700. The age voltages were delivered to the recorder through a 100-ms low-pass filter. The signal strength represented by the recorded age voltage was set to 100 percent for approximately +15 dB over S9.

Results of Experiment

Fig. 1 is a reproduction from the chart recording for a typical 24-hour period beginning at 0800 UTC. Local sunrise and sunset are shown. The results are quite predictable, with the lower frequencies peaking at night and higher frequencies peaking during daylight. The 1.53-MHz signal fades to zero at 1600, about an hour and a half after sunrise. The 2.5- and 5-MHz signals follow this trend very closely. The 10-MHz signal, while present through 24 hours, makes a transition in point of origin. Between 1350 and 0315 WWV is heard; but outside this time, the WWVH Hawaii signal becomes dominant. The 15-MHz signal from WWV is received from local sunrise to two hours after sunset. The record depicts signal conditions for a typical day when the ionosphere is fairly quiet. The sharp peaks recorded during daylight on lower frequencies are a result of local noise bursts. The 2.5-MHz recording suffers from a high noise level in this location.

The signal conditions during the eclipse are shown in Fig. 2. To monitor the eclipse, the chart recorder's speed was increased by a factor of 10, from 0.25 mm/min to 2.5 mm/min. Analysis of the data indicates that the 1.53-MHz signal followed a normal decay to daylight conditions until 1605, when a dramatic increase began. This enhancement was sustained until 1655, coinciding with the period of the eclipse. Monitoring of the audio provided positive identification of KFBK. A signal beat with a second station was present from 1625 until 1639. No identification was given during this interval, but we suspect the interfering station was KRYT in Colorado Springs, CO (1 kW daytime), which shares the same frequency. This is supported by the appearance of the 2.5-MHz WWV signal at 1627, which continued to 1645. The two sharp peaks at 1705 and 1735 were caused by local interference. The 5-MHz signal, which normally drops to the noise level at 1600, peaked at 1635 but persisted to 1730, indicating a general improvement. The early appearance of the KFBK signal relative to the WWV signals is consistent with the more westerly refraction point in the ionosphere referred to earlier.

No change was indicated in the 10-MHz signal compared to a normal day. The 15-MHz signal changed dramatically between 1637 and 1705, during which time

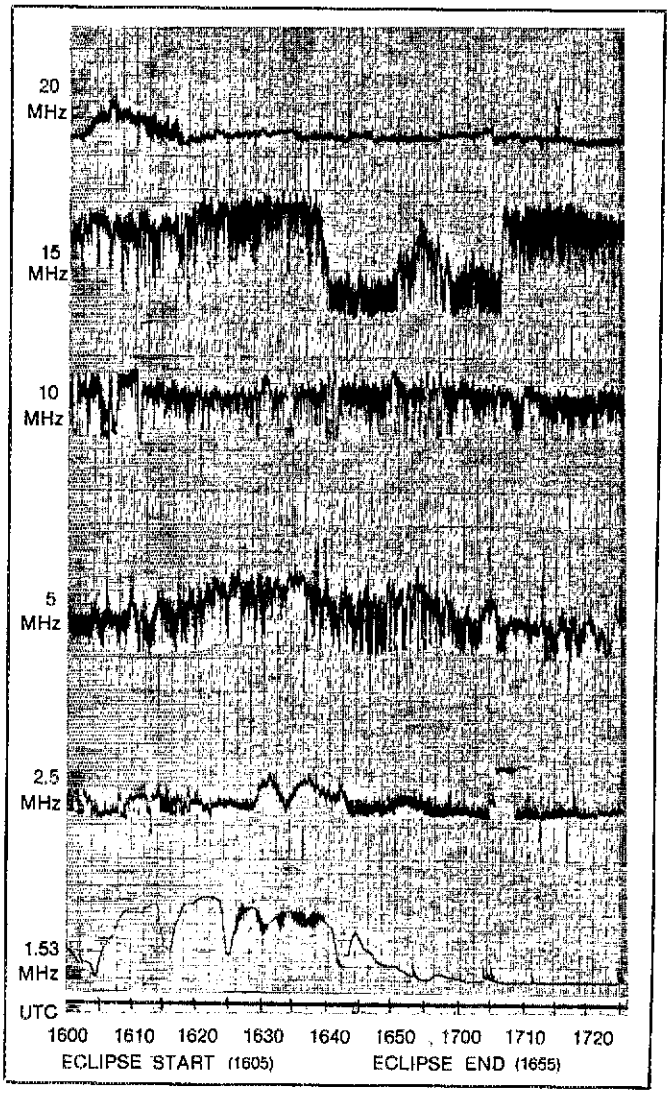


Fig. 2 — The six signals as received in Calgary during the solar eclipse. The recorder speed was increased by a factor of 10 for this measurement.

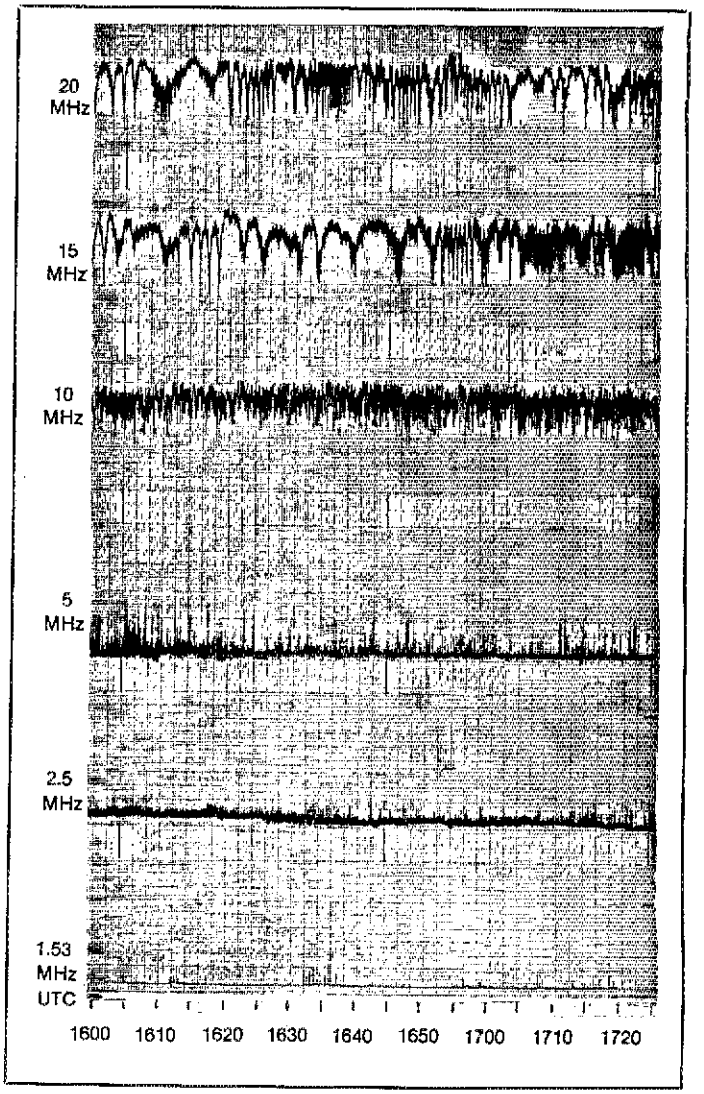


Fig. 3 — Repoduction of the record made between 1600 and 1730 on February 28, a typical, normal day. Compare with Fig. 2 to see effects of a solar eclipse on propagation.

the WWV signal dropped out and the WWVH signal, normally in the background, was recorded reaching a peak at 1655. The 20-MHz signal did not appear until 1800, three hours later than normal, except for a brief weak period at 1605. Fig. 3 has been included to show typical propagation conditions on a normal day during a similar period beginning at 1600.

Nighttime Conditions

The results indicate that nighttime conditions do, in fact, occur during a solar eclipse. Lower frequencies are affected most dramatically, with propagation being enhanced for periods of up to one hour. The effects on higher frequencies are less explainable. Examination of the data for the two-week period did not indicate a significant departure from normal on any occasion except during the eclipse. The delay between enhancement of signals from WWV and KFBK conclusively points to the solar eclipse's effects.

Examination of the records indicates a number of questions remain to be answered. Why were there changes, compared to a normal day, for the 15- and 20-MHz signals? Are they eclipse related or caused by another ionospheric disturbance? Why was there an extended change in the 5-MHz signal relative to the 2.5-MHz signal? Why was there a weak signal at 2.5 MHz? Since the same conditions will not reoccur at this location for about 300 years, I must leave it to others to expand on these results. QST

Strays

AMATEUR RADIO IS GOOD THERAPY

☐ Amateur Radio has proven to be good therapy for patients at the Craig Rehabilitation Center in Englewood, CO. For the past four years, members of the Arapahoe Radio Club have taught classes at Craig and have acted as trustees for the Craig station, WBØVXJ. Tim Armagost, WBØTUB, says Morse code exercises have helped promote eye-hand coordination for patients at the hospital. For more information about the program, write to WBØTUB, c/o Craig Rehabilitation Hospital, 3425 S. Clarkson, Englewood, CO 80210.

Sparky Ullmer, KAØDPC (left), explains a finer point of Amateur Radio to Neil Harte at the Craig Rehabilitation Hospital. *(photo by C. Alan Bierbaum, WØRIZ)*

Putting the Quarter-Wave Sloper to Work on 160

Want a 160-meter signal that has real DX capability? This half-sloper antenna will put your station in the heat of competition. The cost is next to nothing!

By Dana Atchley, Jr.,* W1CF

Many of us older amateurs have not used the 160-meter band for years. The reason lies not in a lack of interest. Rather, our failure to participate in 160-meter activities stems from the fact that the typical ssb transceiver manufactured in the United States from the late 1950s to the middle 1970s did not provide 160-meter coverage.

In the past two years, more than just a few of us have traded in our tried and true transceivers that had served us well for some 15 years. A deciding factor in the purchase of the replacements is that many new transceivers have excellent coverage of 160. Hence, as the urge to acquire new equipment gets stronger, the repopulation of 160 increases at a rather steady rate.

Moving to the top band raises the question of what to do about an effective antenna. A conventional half-wave horizontal antenna, popular through the years on this band, has limitations. Frequently, amateurs do not have room to put up 260 feet of wire. Moreover, the high angle of radiation from this type of antenna does not make it perform well as a DX chaser. What alternative then?

The writer, like many vintage DXers, is the proud possessor of a high, guyed steel tower festooned with monoband Yagis. I considered the several approaches to putting this combination to work without a major investment of time and money in order to have a *competitive* top-band signal.

My solution led to the construction of a quarter-wave sloper (also referred to as a half sloper[1]) strung from the top of the tower and fed with 50-ohm coaxial cable connected through an existing six-position coaxial switch. (See Fig. 1.) The switch is remotely controlled from the operating position, allowing quick selection of other slopers which I plan to add. There is a directional effect produced by this type of sloping antenna which makes it desirable to have additional wires sloping in different directions.

Provided that an amateur has a tower, the incremental cost of adding the half sloper is negligible. A single antenna of this type involves just the purchase of two insulators and 130 feet (39.6 m) of copper-clad wire. The relays for a system having more than one radiator would, of course, be an additional expense, but a modest one.

A 45-Degree Slant

The author's antenna slopes away from the tower in a southwesterly direction at an angle of 45 degrees to the tower. The bottom end of the radiator is fastened to a tree at a point 15 feet (4.6 m) above ground.

Rf is fed to the top end of the 130-foot

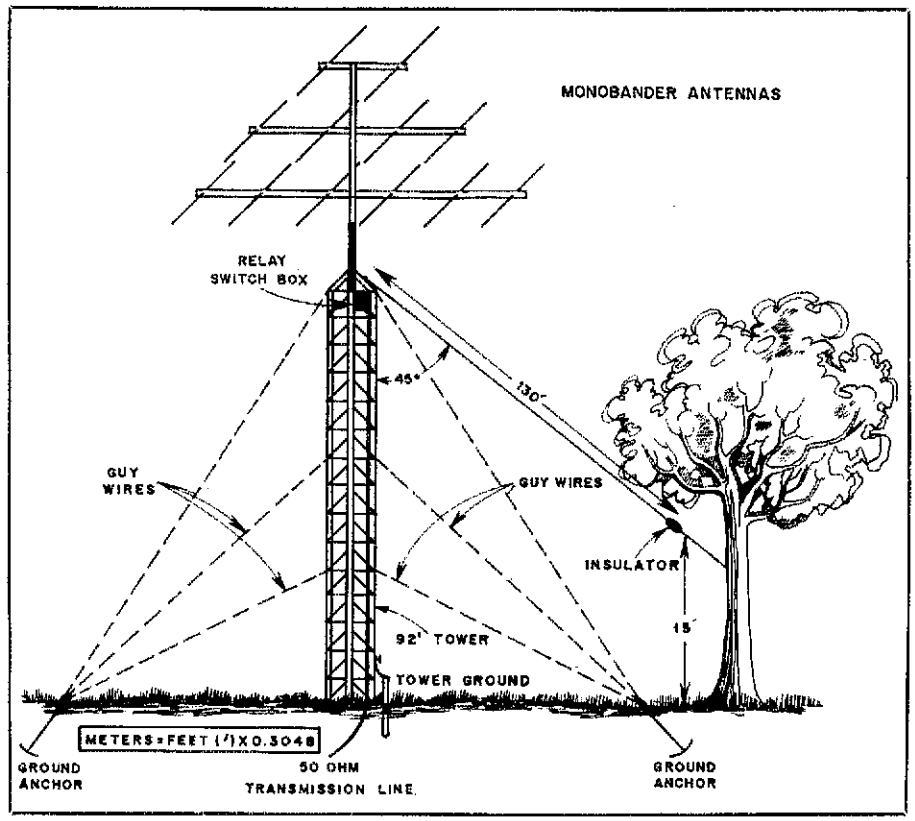


Fig. 1 — The W1CF sloper is arranged in this manner. Three monoband antennas atop the tower provide some capacitive loading.

*M/A-Com, Inc., South Ave., Burlington, MA 01803
[1]Notes appear on page 20.

wire by means of coaxial cable. From the end of the transmission line, rf is passed through one of the relay-operated coaxial switches to the antenna as shown in Fig. 2. A short length of copper wire connects the antenna to the center pin of one of the switches. The body of the relay enclosure is electrically grounded to the tower by means of the attachment plate and to the RG-17/U cable braid through the input cable connectors.

How Does It Perform?

The whole process of putting up a single antenna consumed one hour. But unlike many endeavors performed in haste in the middle of the winter, this one was very successful. Without taking time to trim the antenna, the full massive power of the TS-820 (90 watts key down!) was applied to the half sloper through a Bird wattmeter having a 250-watt element. The reflected power was less than one dial division over the 160-meter band. It virtually was unreadable.

With only two weeks of operating under my belt at the time of writing this article, I can give little more than a qualitative opinion on the operation of the antenna. However, in a recent 160-meter contest, my station seemed to be reasonably competitive, both on domestic and overseas contacts. I held a frequency for about an hour while chaining contacts using CQs and QRZ without being blown away by the competition. On overseas calls, the first or second try provided the wanted contacts. Most of the reports were RST 569.

Conversations after the contest with KØRF, who shares many of my antenna and operating thoughts, indicated that although my signals were down approximately 5 dB compared to K1PBW, who uses two top-loaded, quarter-wave radiators driven in quadrature (90 degree separation), my signals were well near the top of the New England pileup at his Colorado location. All this with a barefoot TS-820S — sigh!

The quarter-wave sloper "listens" well. I have heard K6SE (in the direction of the slope), and, surprisingly, PAØHIP and G3SZA with S9 signals. I do feel that this antenna is not the equal of a 1000-foot terminated Beverage receiving antenna, but it will bring in most of the multipliers that are on the air for the one night stand of an ARRL DX contest.

A 92-Foot Tower Helps

Inasmuch as this quarter-wave sloper appears to perform well, it is worthwhile to explore why. The W1CF 92-foot tower provides an advantageous height for putting out an attention-getting signal. Remember, the shield of the coaxial feed line is connected to the top of the tower. Although the ruggedness of the structure has little to do with radiating ability, I will mention in passing that it is made of heavy-duty galvanized steel. The bottom is bolted to a concrete base. Guy wires of 3/8-inch (10-mm) cable without insulators are placed at three levels. The guy anchors are buried to a depth of 6 feet (1.8 m).

Atop the tower, three monobanders staggered at 5-foot (1.5-m) intervals on a 2-inch (51-mm) OD pipe act as capacitive loading. This large assembly must provide a fair amount of capacitance to ground, even at 160 meters. The "fat" tower and the parallel-connected guy wires provide relatively low inductance to ground.

Of course, each tower arrangement is found to be different. Several other amateurs using the quarter-wave sloper on the 40- and 80-meter bands have been enthusiastic about individual performances even though their masts were much shorter (50 feet). A detailed analysis of the actual antenna circuit is beyond my capabilities. What is apparent, however, is the following: (1) my particular tower provides a reasonably good ground return (counterpoise?), (2) the maximum-current point of the antenna is high, where it can do some good, (3) the measured feedpoint impedance is close to 50 ohms, (4) the match is relatively broadbanded, and (5) the sloper provides an appreciable amount of vertically polarized radiation.

The writer feels that the quarter-wave sloper lends itself to many existing U.S. amateur installations with almost zero increase in cost. It seems to be reasonably competitive and is easy to erect. My guess is that an eager amateur with three spare positions on a relay-operated antenna switching circuit could string three quarter-wave slopers from his tower at 60 degree intervals and probably obtain some worthwhile directivity at low radiation angles.[2]

The writer is indebted to Dr. James Lawson, W2PV, for helpful suggestions concerning this article. Words of appreciation also go to "Duke" Brown, W1ZA, for his installation assistance, and to Phil True, W7AQB, for filling me in on his extensive experience on 75-meter phone with a similar installation.

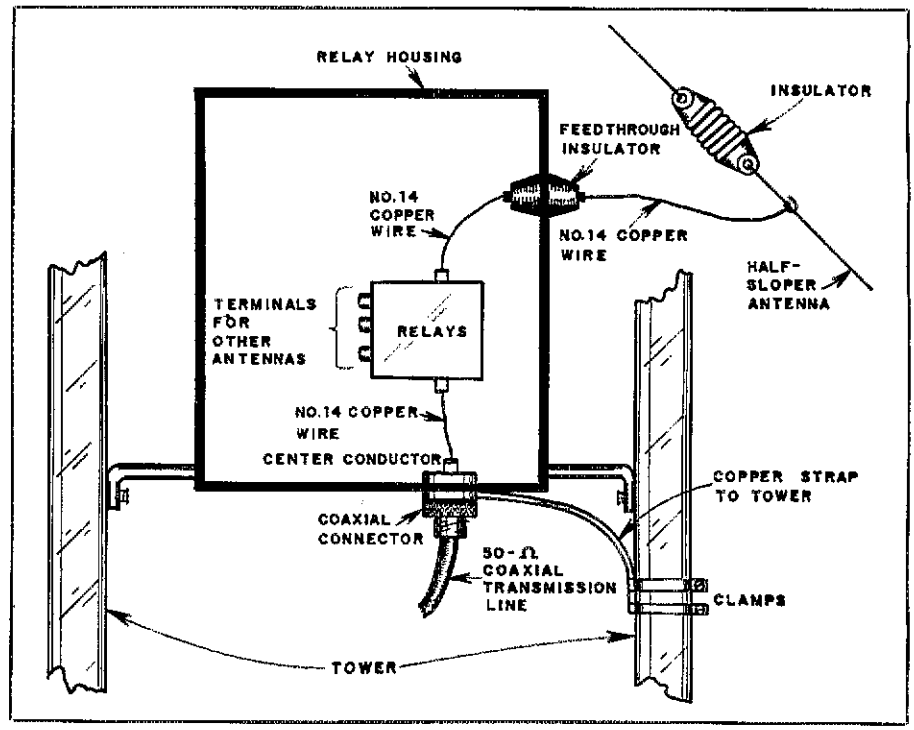


Fig. 2 — This drawing illustrates how the half-sloper antenna is fed at the top of the tower. The use of remotely controlled relays permits the choice of two or more slopers in order to take advantage of the individual directional effects.

Notes

[1] *The Radio Amateur's Handbook*, ARRL, 56th Edition, 1978.

[2] The quarter-wave sloper working against a good water-pipe ground suggests itself as being of use to a "cliff dweller" who wishes to drop a reasonably unobtrusive wire out a window of a high condominium or apartment.

Additional Notes on the Half Sloper

My first rhetorical exposure to "half-sloper" antennas left me feeling that the person who lauded the concept belonged to some secret voodoo cult. The technique appeared to be laced with "black magic" with respect to the DX capabilities and simplicity of installation. At the time, I was entirely happy with my 40-meter

"full-sloper" antenna, which had given superb DX performance over a three-year period. With change sometimes being good for the soul, I decided to look further into the matter. So during an "eyeball" QSO with Rush Drake, W7RM, I asked his opinion of the half-sloper antenna. He had used them on 80 and 160 meters with very good results. Not being of a mind to dispute a DX baron like Rush, I decided to "put up" (if I may resort to a pun), then "shut up" if need be.

The 40-meter full sloper was taken off the tower. The high end of the dipole was at 50 feet (15 m) and the low end was 7 feet (2 m) above ground. A 50-ohm coaxial feeder came off the center of the sloper at approximately 90 degrees. A TA-33 Jr. triband Yagi was located above the sloper, and a system of 16 buried radials (varied lengths of 60 to 110 feet — 18 to 33.5 m) was fanned out below the tower.

With all things remaining the same, exclusive of the 40-meter antenna just discussed, W1VD climbed my tower and "implanted" the new 40-meter half-sloper antenna. It had been cut to the traditional $L_{(feet)} = 234/f_{(MHz)}$. The shield braid of the coaxial cable was made common to the tower top near the driven-element insulator (Fig. 1). Then the feed line was taped to a tower leg at intervals all the way to the ground. It was then routed along the surface of the earth to a feedthrough panel which is used as an rf service entry to the shack. It should be mentioned that my purpose in having the buried radials has nothing to do with the 40-meter antenna. They were laid for use on 80 and 160 meters because the tower is employed as a vertical antenna (shunt fed) on those bands.

Antenna Adjustment

I had been told that it was a simple matter to adjust the half sloper for an SWR of 1. All that was supposed to be necessary was the pruning of the radiator length until an SWR of 1 was observed in the chosen part of the band. I made my adjustments for 7025 kHz. It took nearly two hours of adding wire, removing wire, and hoofing it into and out of the shack before the SWR bottomed out at 1.6:1. Bandwidth between the 2:1 SWR points was approximately 100 kHz. This was determined by readjusting the radiator for the lowest attainable SWR at 7100 kHz. In my installation, the radiator length was somewhat greater than 1/4 wavelength. The best match was secured when the radiator was 3 feet (0.9 m) longer than the formula dictated. The enclosed angle between my unguyed tower and the half sloper is roughly 45 degrees. RG-8/U cable is used as the feeder.

Others who have worked with this type of antenna, but on 80 and 160 meters, tell of conflicting results with the radiator length. Two amateurs who erected 160-meter half slopers on 50-foot towers reported that the radiator had to be considerably shorter than 1/4 wavelength, and that an SWR of 1 was obtained. No doubt the reduced length can be related to the proximity of the wire to ground (added capacitance). Two amateurs who erected half slopers for 80 meters (on 100-foot or 30-m towers) said the lengths were precut to 1/4 wavelength, and an SWR of 1 resulted. This suggests that each installation is unique, requiring some empirical work on behalf of the amateur. I hope to do some antenna scaling to 28 to 144 MHz soon. No doubt a model half sloper can be checked then for characteristic impedance, radiation pattern and radiation angle. For the present, anything I might claim would be pure conjecture.

As for performance, the 40-meter half sloper seems to greatly exceed the full sloper thus far. Even though it slopes off the *west* side of my tower, and supposedly has radiation reinforcement in that direction, I am receiving good reports from Europe to the northeast and South America to the south. This also was true of the full sloper, which tilted to the *south*. For the most part, my signal reports are 10 to 20 dB better than previously. This has been noted by three W8 stations in Michigan with whom I've maintained weekly schedules for the past two years. At 0100 UTC my 1-kW signal reports consistently run from 20 to 40 dB over S9 in Michigan, whereas they used to be on the order of S9 to 20 dB over S9. I have observed the same improvement with stations I contact frequently in Texas and California.

Perhaps the major improvement in performance comes from the current portion of the antenna being raised to twice the original height, which is significant with any type of antenna. What role the tower plays in the overall system requires careful analysis. Perhaps such an investigation would dispel any black magic that seems to exist. But the half sloper *does* work, and mighty well.

One weak characteristic I noted is that when the upper insulator and feed-connection point become covered with ice, the antenna is rendered useless. The SWR reads full scale in the forward and reflected directions, and the transmitter won't load into the system. A protective covering is suggested for that part of the system if you live where sleet storms are likely to occur.

W7RM suggested a unique way to employ half slopers. Two or four of them are placed on the tower. Opposite wires can be joined to the feeder by means of a remote relay to convert any two half slopers to an inverted-V antenna. This gives the operator a choice between low-angle radiation with the half sloper and higher angles of radiation with the inverted V. Four half slopers can be installed 90 degrees apart on the tower, then switched for any one of four chosen points of directivity. A remote switch would be used for this also. — *Doug DeMaw, W1FB*

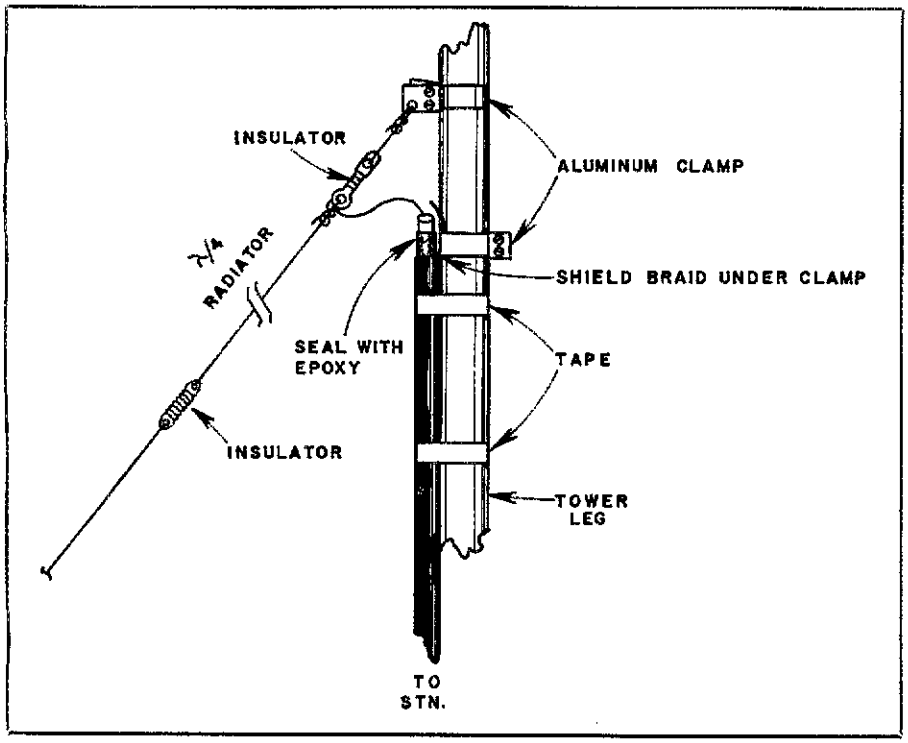


Fig. 1 — A method of installing and feeding a half-sloper antenna.

Vest-Pocket TTL Logic Probe

Have you ever had trouble with your favorite keyer or the digital readout on a piece of station equipment? This simple logic probe could help you solve the problem fast.

By E. H. Rogers,* KØGKB and Garry Bartels,** WB1CPM

It's hard to imagine what we did before the introduction of digital logic. Just take a look around and you will discover many places where digital logic plays an important part. But where does all this tie in with the average amateur and his station equipment? It seems like every new piece of gear on the market uses some kind of digital device. It may be the frequency display on your new receiver, or perhaps the digital frequency counter that's going to help you in the next FMT. Digital test equipment is also becoming commonplace in the ham shack, as well as digital devices such as keyers and control circuits.

A significant factor in the increased interest in digital logic was the introduction of TTL (transistor-transistor logic) devices. These devices marked a great improvement over their forerunners, resistor-transistor logic (RTL), with faster switching speeds and better noise reduction. Now TTL ICs can be purchased through most any electronic distributor at a price that greatly encourages experimentation.

*1480 Marys Lake Rd., P. O. Box 2873, Estes Park, CO 80517
**Editorial Coordinator, *QST*

The Logic Probe

Most amateurs are familiar with the use of the standard multimeter for troubleshooting, but just how do you go about testing digital logic? There are only two states to worry about in digital circuits;

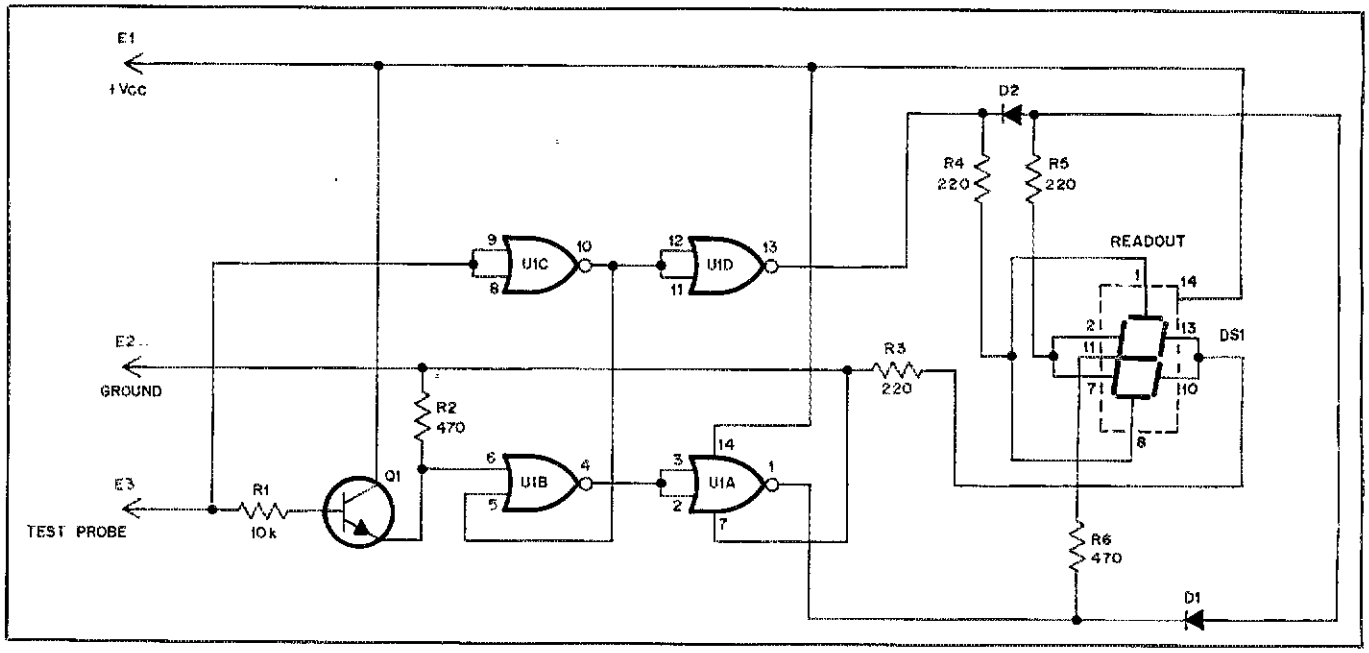


Fig. 1 — Schematic diagram of the TTL Logic Probe. Resistances are in ohms, k = 1000. Resistors are 1/8-watt carbon; 1/4-watt film-type resistors may be used as an alternative.
D1, D2 — Small-signal silicon diode, 1N4153 or equiv.
DS1 — 7-segment LED digital-display readout, type SLA-1, Radio Shack 270-372, or equiv.
E1, E2 — E-Z Clip test hook, Radio Shack 270-372, or equiv.
E3 — Probe tip made from a standard phone tip.
Q1 — Silicon switching transistor, 2N3904 or equiv.
U1 — TTL quad dual-input NOR gate, type 7402.

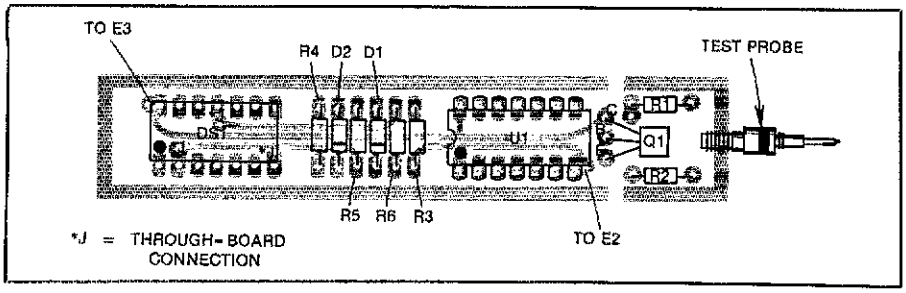
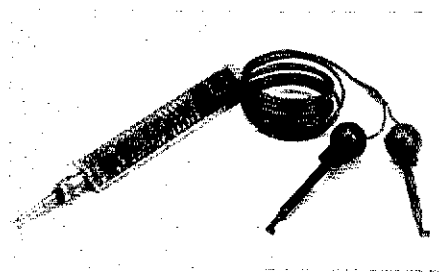


Fig. 2 — Parts placement diagram for the TTL Logic Probe, shown from the component side. All part values are indicated in Fig. 1. The board is double sided, and many points require soldering on both sides of the board. Shaded areas represent copper foil as viewed from the component side. (The etching patterns are shown in the "Hints and Kinks" section of this issue.)



Assembled logic probe shown without protective heat-shrink tubing. Note the construction of the circuit test probe. Connections to the E-Z Clips are made to the underside of the board.

these are the logical one and zero states. You could use a voltmeter or oscilloscope to monitor these logic states, but most of the time it is only necessary to know if you have either a one or zero at the input or ouput of a gate. Besides, a scope is a little hard to carry around in your back pocket. The logic probe is just the answer. This small piece of test equipment will tell you at a glance if you have a one or zero state, or high-impedance point (one that isn't directly connected with the actual logic circuit). The circuit is shown in Fig. 1. This particular logic probe is designed strictly for TTL and is an offshoot of the original Vest-Pocket Logic Probe.[1] The circuit is fashioned after a design furnished by Bryan Nakagawa. We wish to thank Bryan for his valuable assistance throughout this project.

[1]Rogers, "The Vest-Pocket Logic Probe," *QST*, August 1972, p. 46.

To operate the probe simply clip the red lead to the positive terminal (+Vcc) of the IC or power supply. The black lead is then connected to ground. The probe tip is touched to the part of the circuit you want to check for a logic state. The readout will then indicate 1 for a logical one, 0 for logical zero, and H for a high-impedance point. Care should be taken to make sure the potential between +Vcc and ground does not exceed 5 volts. This possibility exists mainly when TTL devices are interfaced with other components that operate at a higher supply voltage.

Construction

The logic probe is constructed on a single etched circuit board (double sided) that contains all components except for the two E-Z Clips. See Fig. 2. The test-probe tip is soldered directly to the board just ahead of Q1. The feedthrough pins can be soldered in place first, a small piece of tinned wire clipped from the end of a resistor will work fine for these. You may find these pins are not needed, depending on the type of LED display you have, so check first before you solder. The layout is not critical, in case you decide to breadboard the probe. But it is nice to make the probe as small as possible, so it is easy to hold when actually testing a circuit. The finished probe can be covered with a piece of heat-shrink tubing to protect the circuitry. Also it is a good idea to fasten the leads of the E-Z Clips securely to the board to prevent them from pulling loose or breaking when the probe is used.

So there you have it, a simple TTL logic probe that's small enough to slip into your pocket. The project can be assembled in a few hours and will prove invaluable in tracking down problems in TTL circuits.

Feedback

☐ A dc-blocking capacitor was left off the schematic for "A Medium-Power Solid-State Transmitter" (June 1979 *QST*, page 11). A 0.1-μf disk capacitor should be installed between the junction of L9 and C2, and the collector of Q5 to prevent possible damage to the power supply when the transmitter is operated into some types of loads.

☐ "Novice Questions and Their Answers," in May 1979 *QST*, page 34, contained an error in the answer to the question pertaining to ground radials. Aluminum should *not* have been mentioned as a suitable material for use as ground radial wire. Aluminum will corrode quite rapidly when placed underground or in contact with topsoil.

☐ In "Simulated Emergency Test Results" (June 1979 *QST*), Southern New Jersey should have been listed among those sections attaining 2000 or more points. Also, St. Clair County should have been listed in Michigan, not Ohio. Thus, the point totals for Michigan increase to 7449, while Ohio's decreases to 12,657.

Strays

TECHNICAL SYMPOSIUM WELL-RECEIVED

☐ High attendance and excellent acceptance marked the seventh League-organized IEEE technical session, held at ELECTRO/79 in New York City on April 25, 1979. A capacity crowd attended session 23, which lasted nearly an hour beyond the prescribed time limit to accommodate the long Q&A period.

Hudson Division Vice Director George Diehl, W2IHA, opened and closed the technical session. His request for a show of hands from amateurs in the audience drew a 90 percent response, most of whom also were engineers. That says something for the quality of Amateur Radio, even though some argue that *QST* and the other League publications are "too technical."

Dr. Richard Harris delivered a detailed paper on his NBVM (narrow-band voice modulation) system. He was followed by the popular Jerry Sevick, W2FMI, who revealed his latest developments and discoveries with high-efficiency, magnetic-core, broadband transformers. The third speaker was well-known amateur Dana Atchley, W1CF, who discussed amateur-band, 24- and 48-GHz Gunnplexer transmitters and receivers. A live demonstration was presented in combination with video in "living color." The final paper was delivered by Nat Sokol, WA1HQC. His topic was "High Efficiency Class E Amplifiers." The four lectures were highly interesting and timely.

Session 23 was organized by Doug DeMaw, W1FB, and chaired by Marian Anderson, WB1FSB. Marian is the ARRL technical secretary and an editorial assistant for the League's technical books. We wish to express our deep gratitude to the IEEE technical committee for accepting our session proposal this year. Special thanks go to the four outstanding authors who volunteered to participate in the convention's technical program and traveled to New York at their own expense.

Copies of the preprint of session 23 (bound edition of the four presentations) are available for $3 from the IEEE Publications Office in New York City. Cassettes of the session also are available from the IEEE. — *Doug DeMaw, W1FB*

The Imperfect Antenna System and How It Works

Let's take a look at the meaning of SWR, impedance mismatch and reflected power, and the reason for "SWR losses."

By Stan Gibilisco,* W1GV

This article is about "imperfect" antenna systems. More specifically, it is about the imperfection resulting from an impedance mismatch. Everybody likes to have an antenna that displays a perfect SWR of 1; such an antenna gives the builder a sense of accomplishment. In January 1979 *QST*, we showed a method of quickly and accurately determining the extent of the power loss caused by an impedance mismatch.[1] Here, we will discuss impedance mismatch from a more theoretical, but elementary, standpoint.

Reflected Power

As you might guess, the amount of power loss caused by a "high SWR" is often surprisingly small. For example, at 7 MHz with a 100-foot (30.5-m) length of RG-8/U coaxial cable, an SWR of 3 will cause a power loss of only about 0.27 dB over that of a perfectly matched system. This represents 6.4 percent of the power. And yet, you may have heard that when the SWR is 3, 25 percent of the power gets reflected back to the transmitter from the antenna! What's going on?

First, let's take a close look at the meaning of "power." Suppose we have a transmission line that is completely loss-free: no ohmic resistance and an absolutely perfect dielectric between the conductors. Let this transmission line be terminated with a resistor of R ohms, with R equal to the characteristic impedance or Z_0 of the line. This situation is shown schematically in Fig. 1.

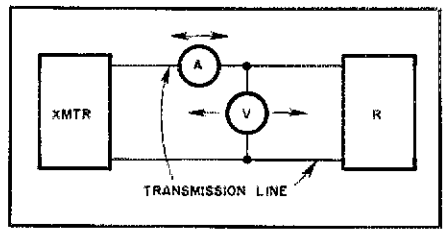


Fig. 1 — Transmitter connected to a load via a two-wire transmission line. V is a voltmeter and A is an ammeter, both of which are movable along the line. For coaxial line, the ammeter would be connected in the center conductor; for two-wire line as shown, it may be connected in either conductor. R is a pure resistance.

If the transmitter is tuned up so that the output is 100 watts, we will find that 100 watts is dissipated in the resistor as heat. How does this 100 watts get to the resistor from the transmitter? Of course, current flows in the conductors of the transmission line. If we place an rf voltmeter across the conductors at any point along the line, we will get a reading of, say, E volts. If we insert an rf ammeter in either conductor, we will get a reading of I amperes. If we divide E by I, we will obtain both R and Z_0: $R = Z_0 = E/I$. And finally, $EI = I^2Z_0 = E^2/Z_0 = 100$, the number of watts put out by the transmitter, and also the power dissipated by the resistor. This should come as no surprise.

In reality, power does not travel down the line. Power is defined as the rate of energy expenditure. In a lossless line, no energy is expended by a signal traveling from the transmitter to the load. Power is power only when it is dissipated in some way — in the form of heat, light, emitted radio waves, sound waves and so on. A transmission line transfers *current*, not power. The expressions "forward power" and "reflected power" are sort of mathematical figments of the imagination, and have served to create misconceptions among amateurs. The apparent discrepancy in the power-loss figures in our 7-MHz SWR example is a result of one such misconception. The 6.4-percent number represents real power, dissipated as heat in the transmission line. (We'll have more to say about this later.) The 25-percent "reflected power" figure has no practical connection with what is going on, for it does not represent power in a true sense.

What "Reflected Power" Really Is

We have implied that the terms "reflected power" and "forward power" are meaningless. This is true in a practical sense. However, an impedance mismatch can create certain effects that can make it *seem* as though power actually is reflected. Let's examine this matter.

Suppose we have a transmitter that is tuned to deliver 100 watts output into a perfectly matched 50-ohm antenna system, such as a dummy load fed by RG-8/U coaxial cable. If we disconnect this antenna system from the back of the transmitter (with the key up, of course!) and hook up a system having an SWR of 3 on RG-8/U cable, what will happen if we press the key without retuning the transmitter? The answer is that the load will dissipate, not 100 watts, but 75 watts.

*9725 S.W. 182nd St., Miami, FL 33157
[1]Notes appear on page 27.

What has happened to the other 25 watts? The transmitter output has decreased. The radio now is not properly tuned to compensate for the impedance mismatch. With most transmitters, it will probably be possible to obtain 100 watts output again by retuning the final amplifier; the efficiency of the system will be essentially the same as it was with the perfectly matched system. The tuning range of some commercially manufactured rigs will only compensate for an SWR of 2 or less. Others, especially older models, will tolerate a mismatch of up to 5 or even higher.

When you calculate "reflected power" from the appropriate formula[2] you will get a figure of 25 percent for an SWR of 3. What this actually means is that if you perform the exercise described above, the power dissipated in the load will fall 25 percent — for example from 100 to 75 watts — unless you retune the transmitter. You can see that this is of little practical significance, since most of us make sure our rigs are properly tuned before we pound away!

The Definition of SWR

It has been said that it's pretty darn hard to talk about something if you don't know what it is. This axiom applies just as well to SWR as it does to anything else. Exactly what is SWR?

Return, if you will, to Fig. 1. Suppose the transmission line is several wavelengths long at the frequency of the transmitter output signal. If we connect an rf voltmeter across the line, we'll get a reading of E volts. Now, as we move the meter back and forth along the line, one of two things must happen: Either the reading will stay put at E volts or it will change, depending on the value of R. Suppose it changes. There will be several places where the reading reaches a local maximum, meaning that it rises to a peak and then falls as we pass the point. Let this maximum reading be called E_{max}. There also will be several places where the meter reaches a local minimum. Call this voltage E_{min}. We define the *voltage standing-wave ratio* (VSWR) as the ratio E_{max}/E_{min}. When we speak of the SWR, we really are talking about the VSWR. If the voltmeter reading remains constant as the meter is moved, then $E_{max} = E_{min}$, and consequently the VSWR is 1.

Now imagine that we connect an rf ammeter at various points along one of the conductors. We will find that there are current maxima and minima, and that they are in a ratio identical to the VSWR. If I_{max} is the maximum current and I_{min} is the minimum current, then $I_{max}/I_{min} = E_{max}/E_{min}$. The current maximum occurs at the same point on the line as the voltage minimum; the current minimum occurs at the same point as the voltage maximum. These minimum points are sometimes called voltage nodes and current nodes, respectively. Nodes are separated by an electrical distance of 1/4 wavelength on a mismatched line, and alternate from one kind to the other.

If R is a pure resistance, then the VSWR will be equal to whichever of the ratios R/Z_o or Z_o/R is at least 1. Defining the SWR on a transmission line as the ratio E_{max}/E_{min} is slightly faulty in practice. If the line has any loss (and all real-life transmission lines do), the ratio E_{max}/E_{min} will converge toward 1 as the voltmeter is moved farther and farther away from R. According to the definition, the SWR therefore varies along the length of the line. This is perhaps not all that objectionable. But suppose the line is very short compared to a wavelength, so that we can't move the voltmeter far enough back and forth to determine minimum and maximum readings! Then we simply cannot define the SWR this way. But, we can calculate what it would be if the line *were* long enough. We also can find out what it would be by means of a rather odd-looking diagram called a *Smith Chart*. We will not get into either of these methods here, as they are thoroughly covered in *The ARRL Antenna Book*.

Losses Caused by Standing Waves

The details of voltage and current distribution along mismatched lines are rather complicated mathematically. What follows is a simplified, nonmathematical, and (I hope!) clear look at the reason for "SWR loss."

Whenever current flows in a conductor, some heat is generated because of resistance in the conductor. This heating is proportional to the resistance of the conductor and to the square of the current. In the case of rf current, the heat generation also increases as the frequency goes up, because of "skin effect" — the tendency of rf current to flow only on the outside of a conductor. This heat represents an energy loss. Any energy dissipated as heat will never be radiated as a signal.

There is a voltage between the conductors of a transmission line, and hence

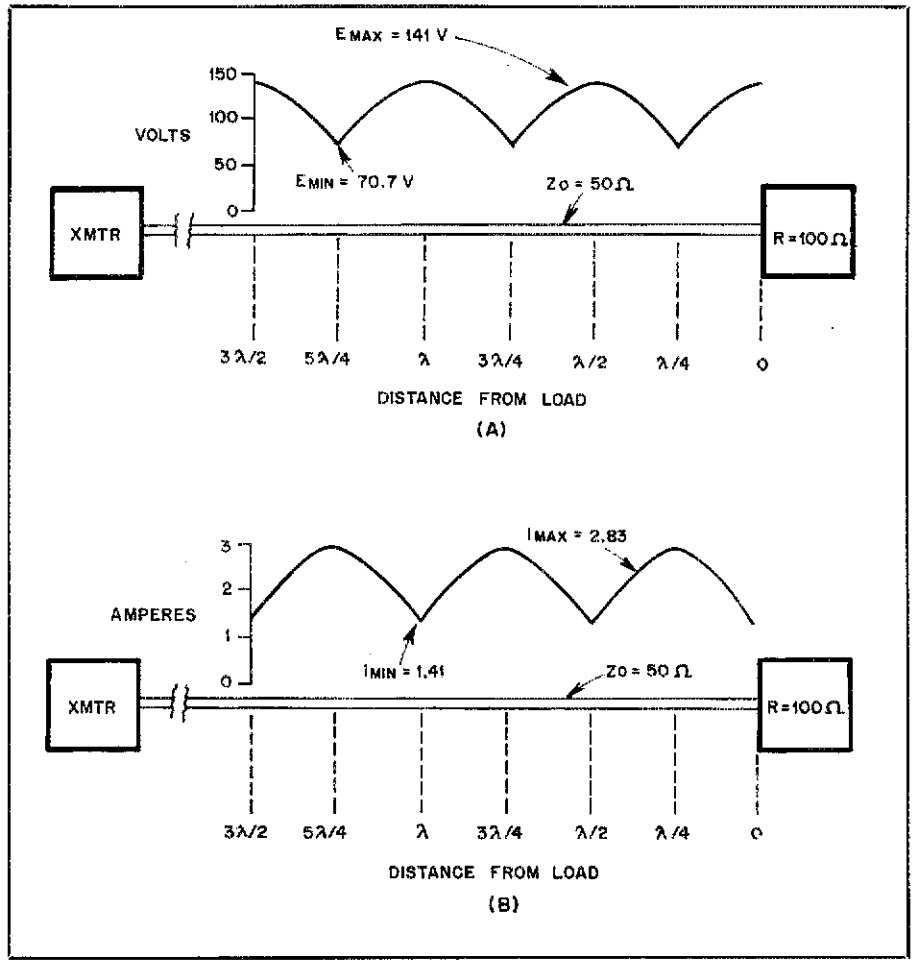


Fig. 2 — Distribution of voltage (A) and current (B) along a 50-ohm transmission line terminated in a pure resistance of 100 ohms and fed with 200 watts. In this example, current nodes exist at even multiples of λ/4 from the load and voltage nodes occur at odd multiples of λ/4 from the load. The mismatch causes the *average* current and voltage values along the line to be greater than the values under perfectly matched conditions (R = 50 ohms), even though the transmitter output power is the same.

across the dielectric. Some heating of the dielectric material takes place as a result of leakage current. The amount of heat increases with increasing voltage and frequency. It depends on the kind of dielectric material as well. This heat also is energy that will never reach the airwaves.

There is a third form of loss that deserves mention, although it does not actually reduce the amount of rf radiation. Any transmission line radiates to some extent; although in theory it isn't supposed to, it always will. If the antenna system is properly balanced, the amount of this "radiation loss" is small enough to be ignored.

Consider again a perfectly terminated, lossless length of 50-ohm line. Suppose we connect it to a transmitter and tune the transmitter for 200 watts output. Then the product of the current and the voltage (EI) is 200 everywhere along the line; also, since Z_o = 50 ohms, the ratio of the voltage to the current (E/I) is 50 everywhere along the line. We can solve these two equations and find that E = 100 volts and I = 2 amperes at every point along the transmission line.

Suppose we connect a 100-ohm resistive load at the far end of the line in place of the 50-ohm resistive load. The voltage and current no longer will be uniformly distributed along the line. There will be places where the voltage is less than 100 V and places where it is greater than 100 V. There also will be places where the current is less than 2 A and places where it is more. The actual distribution is shown in Fig. 2.

Without getting into a mathematical analysis (which would be a little thick in this case, I must admit), we can average the voltage and current values along the line with this 2:1 mismatch. The average voltage is approximately 116 V and the average current is about 2.32 A. With the matched load, the average voltage is 100 V and the average current is 2 A (since they are the same all along the line). The mismatch, therefore, causes an increase in both the average current and the average voltage. This will occur with *any* mismatch, and the larger the SWR, the greater the increase in the average current and voltage.

In a real-life transmission line, the increased average current will make the net conductor loss greater, and the increased average voltage will make the net dielectric loss greater. Therefore, the transmission line will be lossier than when it is perfectly matched. This extra loss is what we call "feed-line mismatch loss."

Measuring SWR

The standing-wave ratio on a coaxial transmission line is often measured by means of a simple indicator, called an "SWR meter" or "reflectometer." Such instruments are designed for lines having a particular Z_o value. Most commercially manufactured units are made to be used in 50-ohm coaxial cable. Such units will not give accurate readings if they are installed in a line with any other Z_o. To illustrate what can happen if an SWR indicator is used in a line not having its design Z_o, consider the following situations, illustrated in Fig. 3.

At A of Fig. 3, a 50-ohm reflectometer is installed in a length of 75-ohm cable. The 75-ohm cable is terminated by a 75-ohm resistor, and hence the actual SWR on the line is 1. But the SWR indicator acts on the magnitudes and the phase difference of the voltage and current at the point where it is inserted in the line, relative to its design impedance (50 ohms in this case). It indicates as if it sees a 75-ohm pure resistance, and will register 75/50, or 1.5. It will indicate this mismatch wherever it is placed along the line.

At B, the 75-ohm line is terminated with a 100-ohm resistor, and the reflectometer is located 1/2 wavelength away from the load. The exact characteristics of the load will thus be represented by the voltage and current at the point where the reflectometer is placed: a pure resistance of 100 ohms. (The load characteristics are always repeated at multiples of 1/2 wavelength from the load, along any transmission line.) The indicator will read 100/50, or 2. But the actual SWR is 100/75, or 1.33.

At C, the 75-ohm line still is terminated with the 100-ohm resistor, but now the reflectometer is 1/4 wavelength away from the load. At odd multiples of 1/4 wavelength from the load, the impedance is a pure resistance of 56.3 ohms.[3] Hence, at this point the indicator will show a reading of 56.3/50, or 1.13. But the actual SWR is still 1.33, of course, just as it is at B. We now have a situation in which the indicator is not only giving the wrong reading, but its reading varies, depending on where it is located along the line. If you're skeptical about all of this, you can verify the information with actual measurements, as we did.

We have assumed that the indicator is accurate when it is installed in a 50-ohm line; then the circuit details of the indicator have nothing to do with the above results. The foregoing situation was chosen deliberately for simplicity, and to provide an irrefutable set of circumstances. The point is this: Always make sure an SWR indicator is used with the right kind of transmission line. Otherwise, the readings will be inaccurate; furthermore, there is no "correction factor" that can be used to convert the readings to meaningful values.

Even when the indicator is inserted in the proper type of line, you still have no real assurance that the readings are accurate! The SWR readings of three different instruments were compared on the same antenna in the 80-meter band. The readings not only differed, but the frequency of minimum SWR (the resonant frequency) was different by tens of kHz, according to each of the three instruments! We won't get into an involved discussion of the reasons for these discrepancies, except to mention that some units apparently have a bit of built-in reactance, and are more or less susceptible to rf currents that sometimes exist on the outer conductor of coaxial cable.[4]

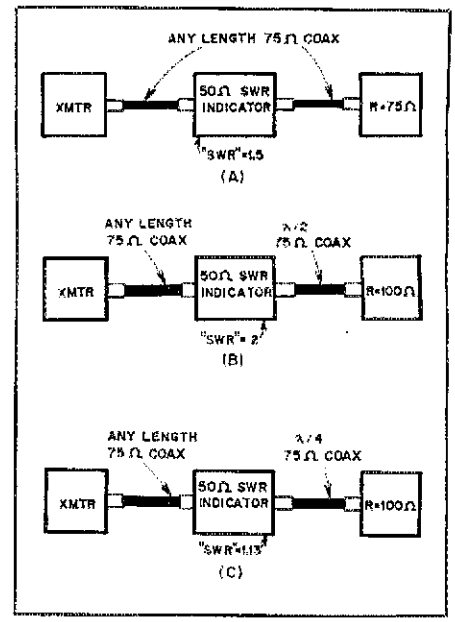


Fig. 3 — Results of placing a 50-ohm reflectometer into a 75-ohm coaxial line. At A, the 75-ohm line is perfectly matched to the load. At B and C, the load is a pure resistance of 100 ohms, giving an SWR of 1.33. The reading of the reflectometer varies depending on its distance from the load. These results were verified by measurements.

If your transmitter "likes" what it sees, it's probably just as well not to measure the SWR at all. Even a rather inaccurate instrument can be useful for such tasks as Transmatch adjustment and approximate location of the resonant frequency of an antenna, but the readings should not be regarded as absolute truth.

Reactive Loads

In our examples, we have considered only loads that are pure resistances. In an actual antenna system, the load will usually have reactance as well as resistance. However, any reactive load is equivalent to some mismatched resistive load plus a little extra transmission line. *It is therefore possible to evaluate any antenna system as though the line were terminated in a pure (but perhaps mismatched) resistance.* This is illustrated in Fig. 4.

At A, we have a transmission line terminated in a reactive load. There will always be points on the line where the input impedance is only resistance (if the line is cut and fed at such points) whatever the load. These points are labeled R_1, R_2,

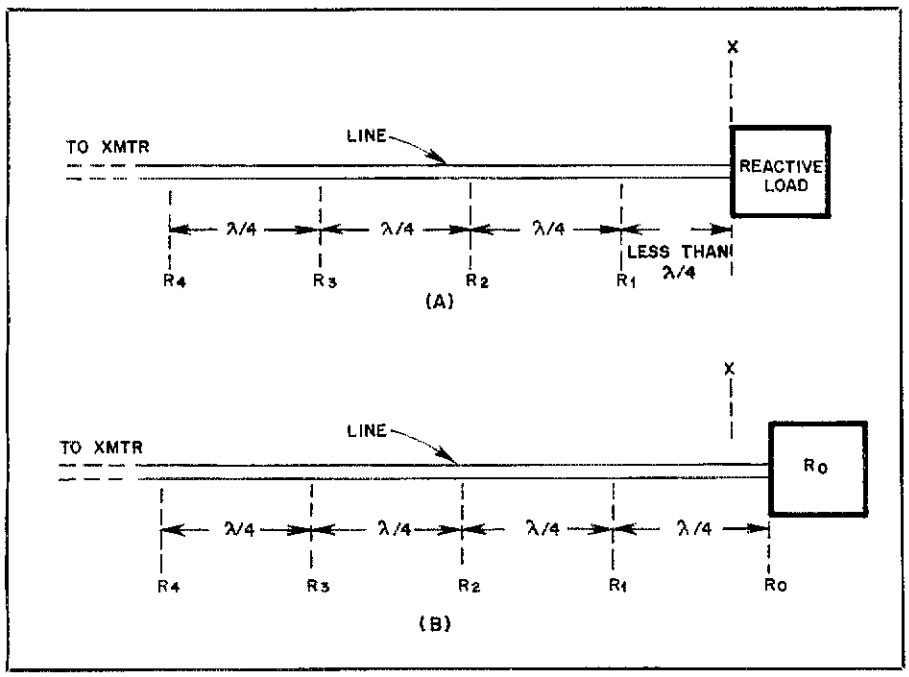


Fig. 4 — At A, a line is terminated in a load that contains reactance as well as resistance. By adding a certain amount of line terminated by a pure, but mismatched resistance, R_0, conditions to the left of point X can be duplicated, as shown at B. R_1, R_2, R_3 and so on represent points along the line where the input impedance would be purely resistive. R values at points with even-numbered subscripts are equal to each other; R values at points with odd-numbered subscripts are equal to each other. See text.

R_5 and so on. They are separated by 1/4 wavelength. The distance between the load and R_1 is always less than 1/4 wavelength if the load contains reactance.

At B, we have removed the reactive load and added sufficient transmission line to extend 1/4 wavelength past R_1. If we now terminate the line in a pure resistance of just the right value, R_0, then the conditions along the line (to the left of where the reactive load was) will be identical to the conditions at A.

Returning to A, it will always be true that $R_1 = R_3 = R_5$ and so on, and also that $R_2 = R_4 = R_6$ and so on. We can see that R_0 should be the same as the even R values to obtain the desired conditions on the line. One set of R values will be greater than the Z_o of the line and the other set of R values will be smaller than Z_o; which set is larger and which is smaller will depend on whether the reactance of the load is capacitive or inductive.

We will not evaluate any reactive situations quantitatively, since the calculations are really unimportant here. The point is that *every* antenna system can be treated as though the load is purely resistive, given just the right length of feed line. The preceding examples of resistive terminations are therefore quite adequately detailed. Especially important, the feed-line mismatch loss depends only on the SWR, and not particularly on whether the load has any reactance.

We should mention one more thing concerning reactance. If the SWR on a transmission line is 1, then the load cannot have reactance. If the load does have reactance, there is some point along the line that displays a pure resistance, and hence where conditions are different than at the load. But in a perfectly matched system, conditions are the same all along the line. It is therefore possible that a 50-ohm line may be terminated with a load having a net impedance of 50 ohms, but the SWR is not 1 because part of the 50 ohms is made up of reactance.

Summary

The intent of this article is to describe, in a qualitative yet "fudge-free" manner, various aspects of impedance mismatches. Some of the effects are very complicated if considered in thorough mathematical detail, but the mathematical models need not be demonstrated to gain a practical understanding of what happens. For a more thorough discussion of SWR and feed-line matching, refer to the series, "Another Look at Reflections," by M. Walter Maxwell.[5] And of course, don't forget *The ARRL Antenna Book*. For the really ambitious student of antenna theory, engineering textbooks are recommended.

When a transmission line is terminated by a load that has a resistance different from the Z_o of the line, or by a reactive load, the currents and voltages along the line are nonuniform. This makes the line lossier than it is when the SWR is 1, but this extra loss is often negligible and has been grossly overemphasized.

A transmitter can be made to "see" the correct load by eliminating the reactance and changing the remaining resistance to the proper value, usually 50 ohms. This can be done anywhere along the line — at the antenna end, at the transmitter, or in between. When the feed-line mismatch losses are small, it does not make any difference where this tuning is done, so it should be done wherever it is most convenient.

The "reflected power" numbers shown on some SWR meters in watts do not necessarily represent "lost" power. The difference between the "forward" and "reflected" power readings does represent the power being delivered by the transmitter, however, if line losses are taken into account.

The SWR is defined as the maximum voltage divided by the minimum voltage along a transmission line. SWR can be determined mathematically if the line Z_o, the load resistance and the load reactance are known.[6]

Finally, if there is one most important thing to remember, it is this: Power is just the rate at which energy is used up. Energy always ends up somewhere; this is just about the most fundamental law in the universe. In the case of your antenna system, be it "perfect" or "imperfect," a little of the transmitter output energy gets changed into heat in the feed line and antenna wires. The rest — *all* the rest — is radiated into space by the antenna. QST

Notes

[1]Gibilisco, "What Does Your SWR Cost You?" *QST*, January 1979.

[2]As a mathematical quantity, "reflected power" is the square of the *reflection coefficient*, designated by the Greek letter ρ. See *The ARRL Antenna Book*, 13th Ed., p. 85, for discussion. The formula is

$$\rho = \frac{SWR - 1}{SWR + 1}$$

Hence if the SWR is 3, $\rho = (3 - 1)/(3 + 1) = 2/4 = 0.5$. The "reflected power" is $\rho^2 = 0.25$, or 25 percent.

[3]This value is obtained as follows: If Z_o is the characteristic impedance of the line and R is the (pure) load resistance, then at odd multiples of 1/4 wavelength from the load, a transmitter would "see" a pure resistance of the value Z_o^2/R ohms.

[4]These are called "parallel line currents" or "antenna currents." See Bartlett, "Novice Questions and Their Answers," *QST*, May 1979. See also *The ARRL Antenna Book*, 13th Ed., p. 110.

[5]*QST*, April, June, August and October 1973, April and December 1974, and August 1976.

[6][Editor's Note: The SWR in a line terminated with a reactive load may be determined by:

$$SWR = \frac{A + B}{A - B}$$

where

$$A = \sqrt{(R + Z_o)^2 + X^2}$$

$$B = \sqrt{(R - Z_o)^2 + X^2}$$

R and X are the load resistance and reactance in ohms, and Z_o is the characteristic impedance of the line.]

The Cornwall Collinear

No doubt you've heard the old saying about antennas: "If it didn't come down last winter, then it isn't big enough." Fortunately for the vhf enthusiast, this may not always apply.

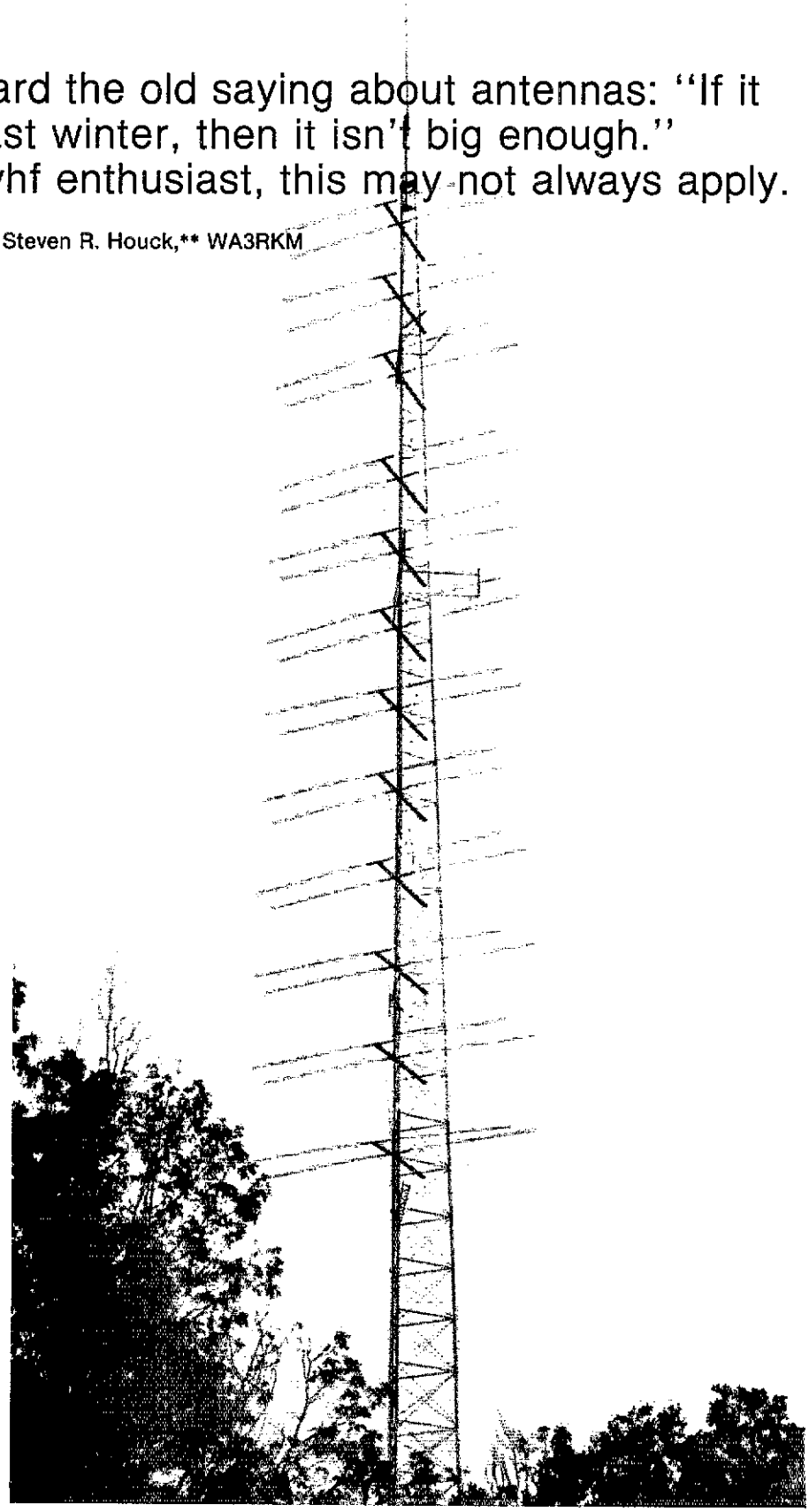
By Vincent A. Quaresima,* K2NE and Steven R. Houck,** WA3RKM

The story of the Cornwall Collinear begins in Johnstown, PA, during the flood of July 1977. It was during the Johnstown disaster that we first met each other. During a lull in the operation, we first discovered a strong mutual interest in vhf DXing and, in particular, the 6-meter band. The second author has operated in many vhf contests, not only from his home, but from the excellent contest site of the Lancaster Radio Transmitting Society atop Cornwall Mountain. The first author visited Cornwall Mountain for the first time in August 1977; we began to plan a 6-meter antenna that would give us that "something extra" which separates the truly superior contest station from all the rest.

Planning It

Having been aware of the excellent results obtained by W2JKI through the use of a nonrotating collinear curtain on 6 meters, we decided to try this type of antenna. At first, we considered constructing it out of wire and stringing it between two of the club's towers. However, there was a 150-foot, free-standing tower used by a commercial repeater on the premises. We easily obtained the owner's permission to erect our "experimental" antenna on it.

As can be seen in the photograph, this gave us the opportunity to put the array entirely above the trees. With Cornwall Mountain being the highest in the area, this gave us a clear shot to the horizon in all directions. We decided to aim the array at 260 degrees, feeling that this would work to the best advantage in section totals during the contest. Our long-boom,



We don't expect that everyone who sees this picture will rush right out and build an antenna like this, but if you decide to make one, the dimensions are given in the text. If you think this antenna has high gain, you are correct. The author claims it's around 18 dB over a dipole.

*c/o John K. Ossi Vo-Tech High School, Dept. of Mathematics, Hawkins Rd., Medford, NJ 08055
**255 Locust St., New Holland, PA 17557

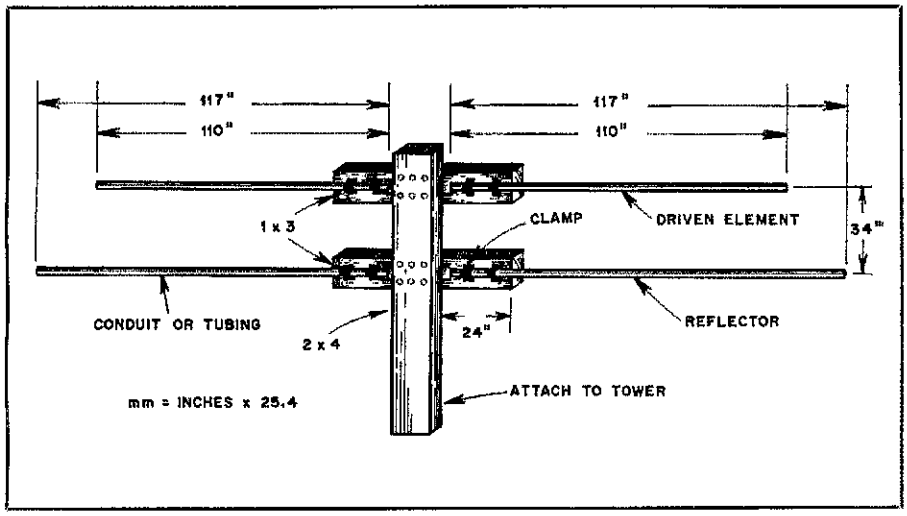


Fig. 1 — Top view of a single bay, showing the method of construction used by the authors. Construction details may vary, but the element lengths and spacings should be duplicated. The driven elements are fed at the inner ends.

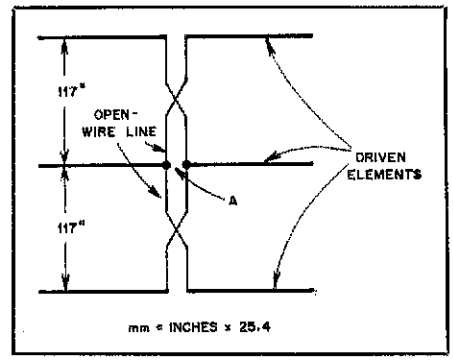


Fig. 2 — The entire 48-element array consists of four sets of three bays. A single set of three bays is phased as shown here. The 117-inch (2.72-m) spacings may be varied by about ± 5 percent to fit the available mounting structure. The sections of open-wire line are 118 inches (2.74 m) long, corresponding to 1/2 wavelength at 50 MHz. The phasing system is sufficiently broadbanded to cover the lower 250 kHz of the band.

6-element Yagi was used for the East Coast sections.

Building It

The actual construction of the antenna was not very difficult; the hardest part (as we are sure you can imagine) was placing the antenna on the tower once it was complete. We constructed the antenna using wooden booms, with electrical conduit for the elements. On each boom, we placed two driven half-waves in phase and two identical parasitic reflectors. Twelve assemblies were constructed in this way. The ideal spacing between assemblies (1/2 wave in free space) was not practical on the tower we used. So, we positioned the bays as close to this stacking distance as the cross-braces on the tower would permit. The performance did not seem to be degraded as a result.

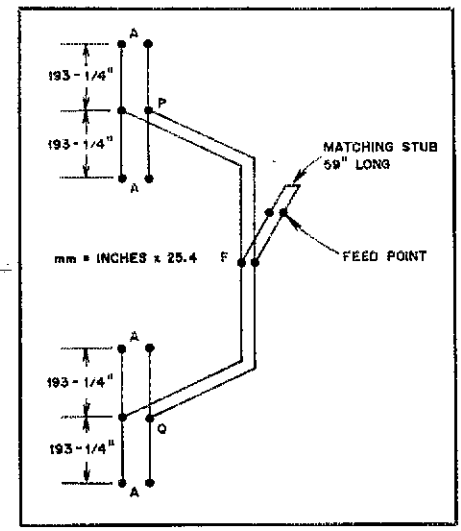
The driven elements were each cut to a length of 110 inches[1] and the reflectors were cut to 117 inches. The spacing between the driven elements and reflectors was 34 inches center-to-center (Fig. 1). Fig. 2 illustrates the method we used to co-phase a group of three bays. The entire array was phased as shown in Fig. 3.

Using It

The constructing and installation of the antenna took six days, spread out over a four-week period. Naturally, the question in our minds after all this work was "How will the thing get out?" The first station contacted with the array was WB3AIT in northwestern Pennsylvania. We exchanged S9-plus reports. By switching between the 6-element Yagi at 85 feet (approximately the height of the center of the collinear) and the collinear, we found that the collinear gave about 6 dB gain over the Yagi. Estimating the gain of the Yagi to be 12 dBd, this would indicate that the collinear had a gain of about 18 dBd. This test was repeated with many stations in western Pennsylvania, Ohio and West Virginia with the same results. Reference to the equations in the vhf manual published by RSGB would seem to indicate that the E-plane half-power beamwidth of the collinear is about 100 degrees, and the H-plane beamwidth is on the order of two or three degrees. This also corresponds closely to the gain of 18 dBd. The size and immobility of the antenna made it impossible to test this figure on an antenna range. Perhaps someone would like to scale the antenna for 432 MHz and see how accurate our figure is.

Using the Cornwall Collinear in the September 1977 VHF QSO Party was a sublime joy. While nearby scatter was quite difficult to work using the collinear (no doubt because of the low radiation angle), the more distant sections were worked with ease. K5SW in Oklahoma provided our best DX. This was the first time a station that far away had been worked via scatter from Cornwall Mountain. The large horizontal beamwidth of the antenna made it possible to work Georgia and Tennessee as well.

Fig. 3 — Interconnection of the four sets of bays. Points marked A are the feed points for each set of three bays as shown in Fig. 2. All feed lines are 300-ohm, parallel-wire type. The lengths FP and FQ may be any integral multiple of 1/2 wavelength, taking the velocity factor of the line into account. The matching stub should be made of 1/4-inch (6-mm) OD rods spaced 1 inch (25 mm) center-to-center. The exact position of the feed point on the stub will depend on the impedance of the transmission line to the station; — this position must be found experimentally. A 1:1 balun should be used between the feed point and coaxial transmission line.



Conclusion

Of course, no project such as this would be possible without the assistance and cooperation of many people, and it is to these people that we owe a debt of gratitude. In particular, our hats are off to Herb, K3VMY, who spent many hours on the tower erecting the array; to John, WA3ZBI, who helped with the ground construction of the bays; to Earl, N3EG, for claiming that it could never be done (and thereby providing additional motivation for doing it); and the board of directors of LRTS and the club members who tolerated the strange goings-on. We especially thank Dennis, K3SLG, one of the owners of the Pine Grove (PA) 04/64 repeater, for his donation of over 700 feet of hardline. This project was a lot of fun, a tremendous learning experience and, in the words of one of the ARRL contest people, "the biggest darn 6-meter antenna I ever saw!"

Notes

[1]Inches are converted to millimeters by multiplying by 25.4. Inches are converted to meters by multiplying by 0.0254.

Slippers for a QRP Transceiver

Have a Fibber McGee's closet filled with leftovers from vacuum-tube days? You may already have most of the components needed to build this 20-watt amplifier for your low-power rig!

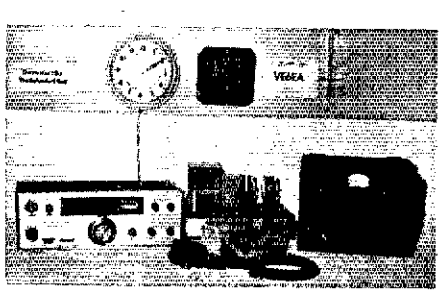
By Roy Usher,* VE6EA

Soon after the Argonaut came onto the market a few years ago, the writer purchased one, leading to many fun-filled hours at VE6EA. Admittedly, the 2-watt power of the transceiver provides little clout when competing with the "full gallon plus" stations with which we often have to cope. Frequently, in the struggle to survive in such an environment, the thought of building a linear amplifier to boost the power came to mind. Only recently, however, did I decide to do something about the project.

As I mulled over the various aspects of constructing a linear amplifier, several questions arose requiring answers. How much should the power be increased? What circuit should be used? Would the amplifier be a tube type or have solid-state design? Could the cost be kept at a minimum?

Fortunately, I had a well-stocked junk box in addition to a good supply of parts collected over the years. The demands on the family treasury, therefore, were minimal. Actually, the only new components needed were the silicon rectifiers and filter capacitors.

*19 Leon Pl., St. Albert, AB, Canada T8N 1X6



VE6EA's Argonaut, power supply and linear amplifier. The semisolid-state power supply and the amplifier consist mainly of treasures from the junk box.

Planning

When the plans for the amplifier began to take shape, a power increase of 10 dB seemed practical, considering the components that were on hand. Before proceeding to select a circuit, the matter of choosing between tube and solid-state design had to be resolved. My decision to use the vacuum-tube approach stemmed mainly from the fact that I had worked with tubes for more than 50 years. I knew relatively little about solid-state techniques.

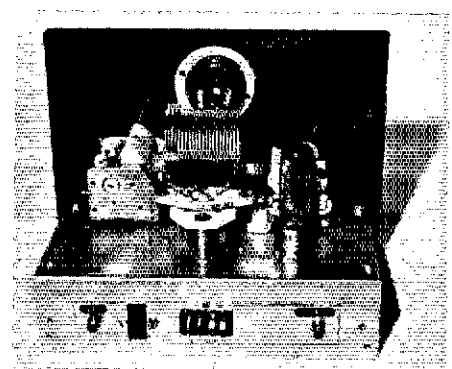
The ARRL *Handbook* and other Amateur Radio publications offer circuit designs that would have been applicable to my amplifier. However, I had an idea, which to my knowledge had never been applied to any small linear amplifiers. I wanted to try it. The plan called for terminating the transceiver output with a 50-ohm resistor and driving the amplifier with 10 volts developed across the resistor. This arrangement called for a tube with high mutual conductance because of the low driving voltage. Likely choices for this assignment were the 6AG7 and the 6CL6.

The Breadboard Stage

In order to pinpoint any problems in the early stages of construction, I rigged the circuit in breadboard fashion. This permitted easy changes where necessary. One of these changes pertained to the 6AG7. While this tube worked to a degree, it was not possible to drive the plate current high enough. A broadband toroid was made to furnish a 1:4 impedance transformation. But after several rewindings of the toroid, the 6AG7 still failed to perform satisfactorily. The high plate resistance of the tube limited the plate current too much.

The toroid coil, used to raise the drive voltage, has a core taken from a piece of Motorola equipment designed to operate in the vicinity of 11 MHz. It performs as I expected over the range from 10 to 80 meters. The dimensions are 11/16-in. (18-mm) OD, 3/8-in. (10-mm) ID and 1/4-in. (6-mm) thick. There are 32 turns of no. 24 enameled wire bifilar, tightly and smoothly wound on the core. I would suggest, however, that a slightly larger core be employed to allow sufficient space for the coil to be wound in one layer. Toroid cores may be obtained from Amidon, G. R. Whitehouse and other firms which advertise in the ham ads of *QST*.

After reviewing the data sheets of several more suitable tubes, I turned to the EL84/6BQ5, which has a slope of 11.3 mA per grid-volt change. (See Fig. 1.) This gave me the characteristics for which I had searched. Only the mechanical



A rear view of the VE6EA linear amplifier. Components are installed in a professional manner.

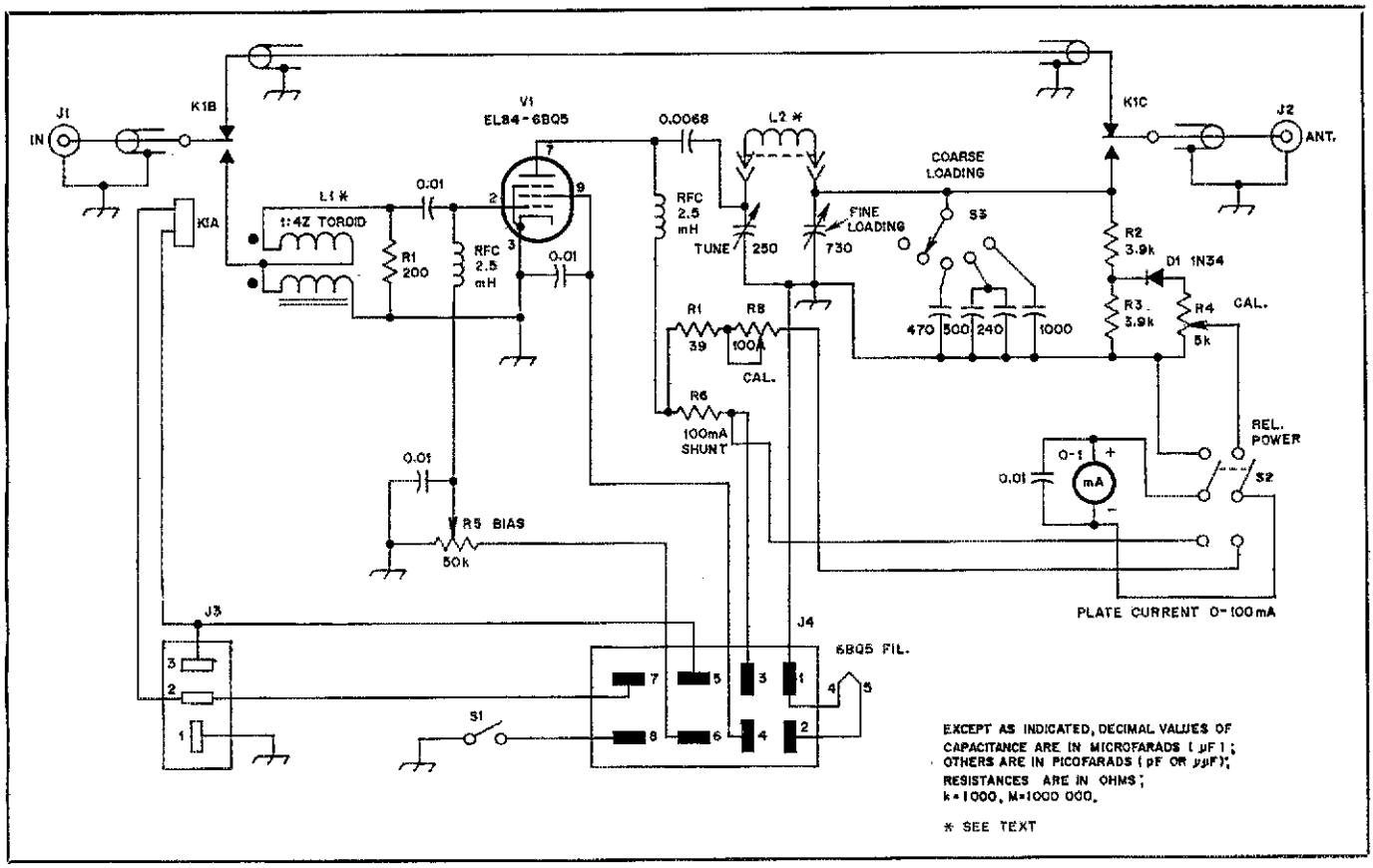


Fig. 1 — Circuit for a 20-watt linear amplifier for the Argonaut. A wide-band toroid is incorporated in the grid circuit of V1. The output circuit consists of a pi network with plug-in coils. J1 and J2 are coaxial connectors. J3 and J4 are Jones connectors. See Table 1 for connections to J4. The value of R6 can be determined by application of Ohm's Law (for shunts) after the resistance of the meter has been determined. [A 10-μH balun may be substituted for L1. It should consist of 12 bifilar turns on an Amidon FT-50-61 core. Before placing the two wires on the core, they should be twisted together over the entire length with eight to 10 twists per inch — Ed.]

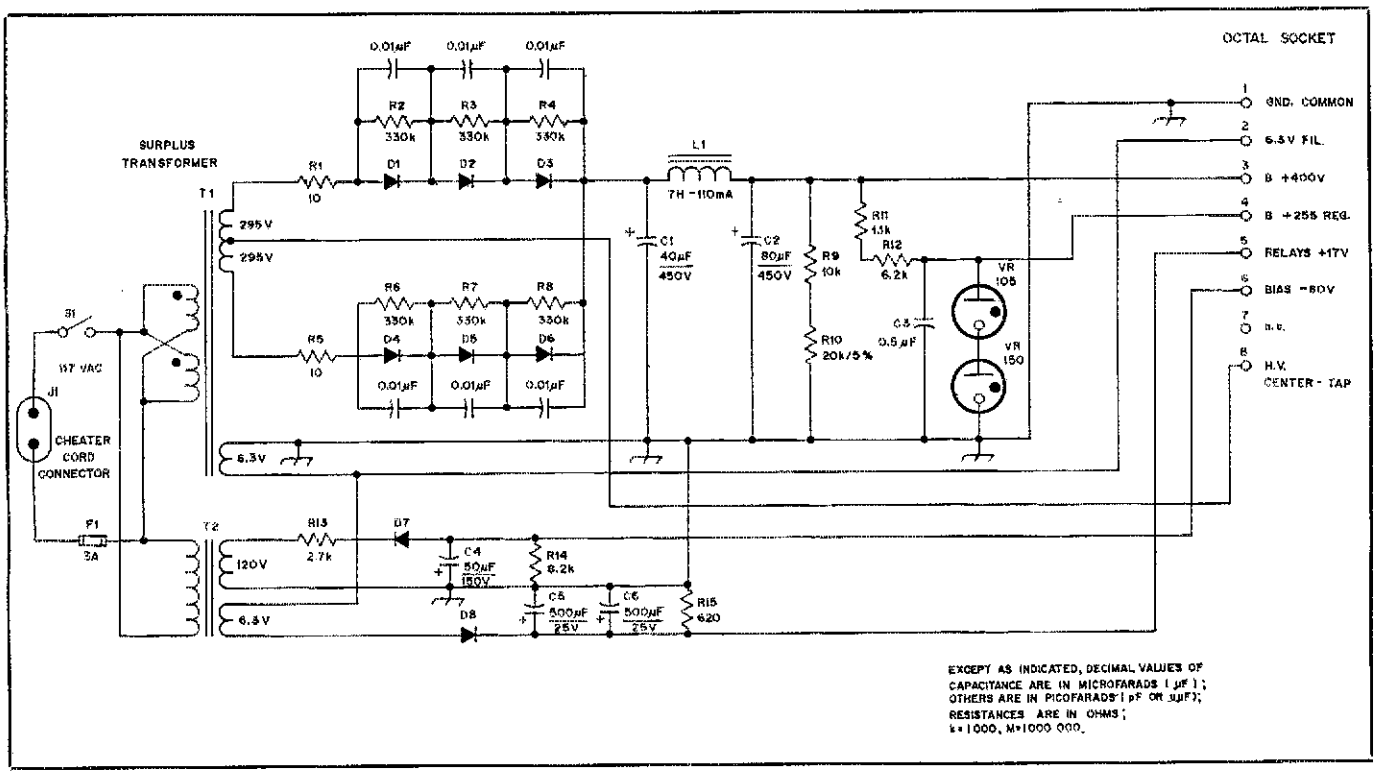


Fig. 2 — Power supply for the VE6EA linear amplifier. D1-D6, incl., are 1.5 A, 1000 PIV silicon rectifiers. D7 is rated at 1.5 A, 1000 PIV, while D8 is rated at 1 A, 100 PIV. L1 should have an inductance of 7 henrys and be capable of carrying 110 mA. T1 is a surplus power transformer. T2 is a Hammond no. 262D60 transformer. Other transformers that have approximately the same ratings may be used.

Table 1

Jones Connector, J4

Pin	*Connection*
1	Ground/common
2	Filament, 6.3 V
3	Plate B+, 400 V
4	Screen B+, 255 V
5	Relay supply, +17 V
6	Bias, −60 V
7	Push to talk
8	HV center tap

problems of construction remained to be ironed out.

Once the breadboard version of the amplifier was completed and tested, the working version was assembled and placed inside a commercially made surplus case. A good measure of care went into the construction of the power supply so that its outward appearance would reflect a well-built unit. Both units can be seen in the photographs.

About the Power Supply

The rather ordinary power supply for the linear amplifier (Fig. 2) provides plate voltage (380 V), regulated screen voltage (255 V), and allows the amplifier to deliver 20 watts PEP into a 50-ohm load. This output is developed with a 20-V drive across the 200-ohm load on the toroid transformer. The plate current peaks near 50 mA during normal speech levels. The peak input would be about twice that, or approximately 100 mA. The input under this condition would be about 38 watts. If a normal 60-percent efficiency is obtained, the output would be a little more than 20 watts. By adjusting the bias voltage, a resting current of 15 mA can be set. Operating the output tube in this manner doesn't seem to bother it at all.

The Keying Circuit

The keying circuit of the Argonaut should be mentioned because of a particular characteristic. When the transceiver is placed in the receive mode, 9.5 V will appear on the keying lead. Grounding this lead will switch the operation from receive to transmit. Therefore, a relay with two separate sets of contacts is required. One set keys the Argonaut, while the other keys the linear amplifier. Refer to the circuit diagram of the control system, Fig. 3, for an illustration of this.

Because I employed a Yaxley two-section, three-position switch for mode changing, I inadvertently encountered the minor difficulty of having an insufficient number of switch contacts. I should have used a three-section rotary switch instead. To provide for the necessary contacts, I modified the key jack by adding a normally closed contact which I insulated from the main contacts. This part of the jack opens when the key is plugged in for cw use.

A Compromise and a Problem

In my stock of parts, the only dual-section variable capacitor I found for use in the output of the pi network had a maximum capacitance of 365 pF per section (730 pF total), an inadequate amount for the 40- and 80-meter bands. Provision had to be made for switching in extra capacitance for operation on those bands. These additional capacitors (470, 740 and 1000 pF) are small in size, but capable of handling the circulating tank current of the 20-watt amplifier.

The switching relay for inserting or removing the linear amplifier introduced an unexpected problem. The relay caused an increase in the SWR between the transceiver and the antenna when the linear amplifier was not in the circuit. Investigation revealed that the problem occurred when a 20-meter doublet antenna having a 50-foot RG-58/U transmission line was put into service. Rewiring the relay so that the break in the coaxial line could be as short as possible reduced the SWR to about 2:1. For operating with a long-wire antenna, an L network consisting of a roller inductor and a 150-pF variable capacitor furnished adequate matching, free of any undesirable effects.

Old-Timers' Coils

Reminiscent of those "good old days" are the plug-in coils for my amplifier. Many an old-timer will recall those fine Barker and Williamson JEL and MEL types. A JEL-40 covers the 80-meter band while a JEL-20 is used on 40. For the 20-meter band, I have a homemade coil. A reduction in the number of turns on an MEL-10 provided coverage on the 10-meter band. Indeed, the whole unit looks as though it was built 20 years ago, but only some of the parts are that old — the design and construction are strictly modern.

Summary

This article was written to suggest an idea rather than tell specifically how to build it. For the benefit of those who may wish to construct a similar amplifier, the circuit diagrams are provided. Variations of component values may be necessary for many builders who depend on items from the junk box. Certainly not everyone will have exactly the same parts that were in my collection.

The little amplifier works very well from 15 to 80 meters. At the time of writing this article, it had not been used on 10 meters except for a trial tune-up. Output power was somewhat lower than on the other bands. Otherwise, the amplifier seems stable. There is no need for neutralizing. After all, making a tube oscillate with a 200-ohm swamping resistor from grid to ground would be rather difficult.

Reports from stations I've worked are quite pleasing whether I use the doublet or the long wire. The comments are interesting, especially when the operators learn that the power output is only 20 watts! QST

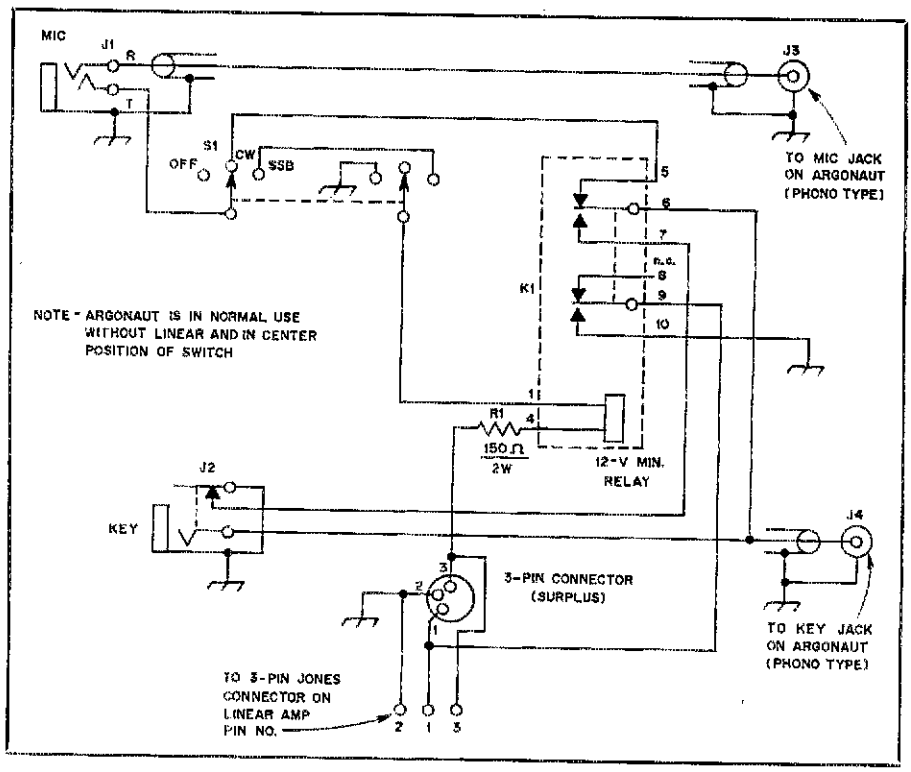


Fig. 3 — Control circuit for the VE6EA linear amplifier. J1 and J2 are phone jacks. J3 and J4 are phono-type jacks. K1 is a miniature 12-V relay. S1 is a three-position rotary switch. Note: The key should be unplugged for ssb operation.

A Digital Morse Code Clock

Here's a handy 24-hour clock that will generate Morse code signals for hours and minutes. Even if you haven't had much experience with IC projects, you should be able to get this one ticking.

By Roger M. Blood,* WA4HBZ

Until now, the task of building a Morse-code clock has been a major project involving complicated circuits and hard-to-find parts. This project is a straightforward approach to the problem of constructing such a clock to be used on a repeater.

At the outset, the goals of this project were to keep the circuit simple and reliable, to use only easy-to-find parts, to minimize the parts count and cost, and to provide for interfacing with a repeater.

Circuit Overview

Fig. 1 shows the circuit of the 24-hour Morse-code clock for use with a repeater; Fig. 2 shows a power supply for the clock. The two main parts of the circuit are the digital clock and the BCD-to-Morse converter. The digital clock (shown on the left side of Fig. 1) is made up primarily of 7490 decade counters, U1 through U8, which are wired up as divide-by-10 and divide-by-six counters to form the needed countdown chain. The output is in binary-coded decimal (BCD) form. Since most digital clock chips on the market have seven-segment output, finding a chip with BCD output can be difficult (and the price averages around $10!). It's more practical to build the clock from scratch. By so doing, the clock has static output which does not require demultiplexing circuitry. Also, it is easier to control the clock's internal operation. A latch in the middle of the countdown chain keeps the clock from changing while code is being generated. Provisions for setting the clock are included.

The remainder of the circuit is the BCD-to-Morse converter, which scans the four digits of the clock and generates the Morse code for each digit. The heart of this circuit is a 2048-bit programmable read-only memory (PROM), which stores the Morse code for the numbers zero through nine, and all control signals. During operation, addresses of the PROM are counted through. Signals are produced that generate the code, determine whether or not the final digit is being sent and move to the next digit if not, and set the spacing between the digits. Fig. 3 is the flow chart for this sequence. Control circuitry is kept to a minimum by having the PROM perform this work.

The Digital Clock

U1 through U8 form a 24-hour digital clock using the ability of the 7490 to reset at different counts. This is accomplished by feeding various outputs of the counters into reset pins 2 and 3. If outputs B and C are connected to the reset pins, the IC will reset when it reaches the count of six, providing for the tens-of-minutes digit. (Note that since output D never changes in this mode, the carry signal to the next counter must come from output C.) The hours digits are reset in a similar way, but are wired to reset when they reach a combined count of 24. U5 represents minutes, U6 represents tens of minutes, U7 represents hours, and U8 represents tens of hours.

To prevent the clock from counting while the code is being sent, a simple latch consisting of U9B, U9C and U9D blocks the carry signal from U4. During this time, pin 4 of U9B will be low and the latch cannot change state. When the code is finished, the latch will again be enabled as pin 4 goes high, and any change of state on the carry line can then pass to U5. There will be no loss of time; the clock catches up as soon as the BCD-to-Morse converter is finished generating the code.

The clock is set by providing extra carry pulses to the counters through exclusive-OR gates U22A and U22B. When the SET switch is momentarily closed on either the minute or hour advance lines, a positive-going pulse leaves the 555 and causes the exclusive-OR gate to change state. This in turn increments the following 7490 by one count. U20 and U21 are wired as one-shots which are triggered on the first pulse from the switch, ignoring extra pulses caused by switch bounce. (Without this feature the clock would be almost impossible to set.) Resistor and capacitor values are critical here. Any substitutions must result in a pulse duration of close to 1/2 second; otherwise the clock is likely to set on both the closing and opening of the switch.

An LED display can be added to the clock if desired (see Fig. 4). This is, of course, not necessary since setting can be done by ear. But it does make the job easier!

BCD-to-Morse Converter

BCD output from the 7490 clock chain is fed into two dual four-line to one-line data selectors, U12 and U13. Depending on the count applied to pins 2 and 14, they will select one of the four clock digits and send the BCD data for that digit to the PROM. On command, the four digits will be sequentially selected, beginning with U8 (N_0) and ending with U5 (N_3). U11 determines the digit to be selected. It is used as a 2-bit binary counter, counting from zero to three. As soon as a digit has been sent, a signal from the PROM increments U11 one count and causes the 74153s to select the next digit.

In the resting state, the last digit that was sent is N_3. The output of U9A is low, holding the Morse generator until a start signal is applied.

When the START switch is pressed, U18 begins to oscillate, clocking counters U15 and U17; the hold signal goes low. The 555 will now continue to run regardless of the state of the start switch. At the third address, a signal from the PROM increments the counter U11 from three to zero, advancing it to select the data from U8, and the first digit is sent. Morse code is generated at output 1 (pin 12) of the PROM. Seven counts after the code ends, a reset pulse programmed into output 3 of the PROM sets the counters to zero, and the sequence for the second digit (N_1) begins. Since we haven't yet reached the last digit (N_3), pin 4 of U10 is low; the

*630 Barcelona Ct., Satellite Beach, FL 32937

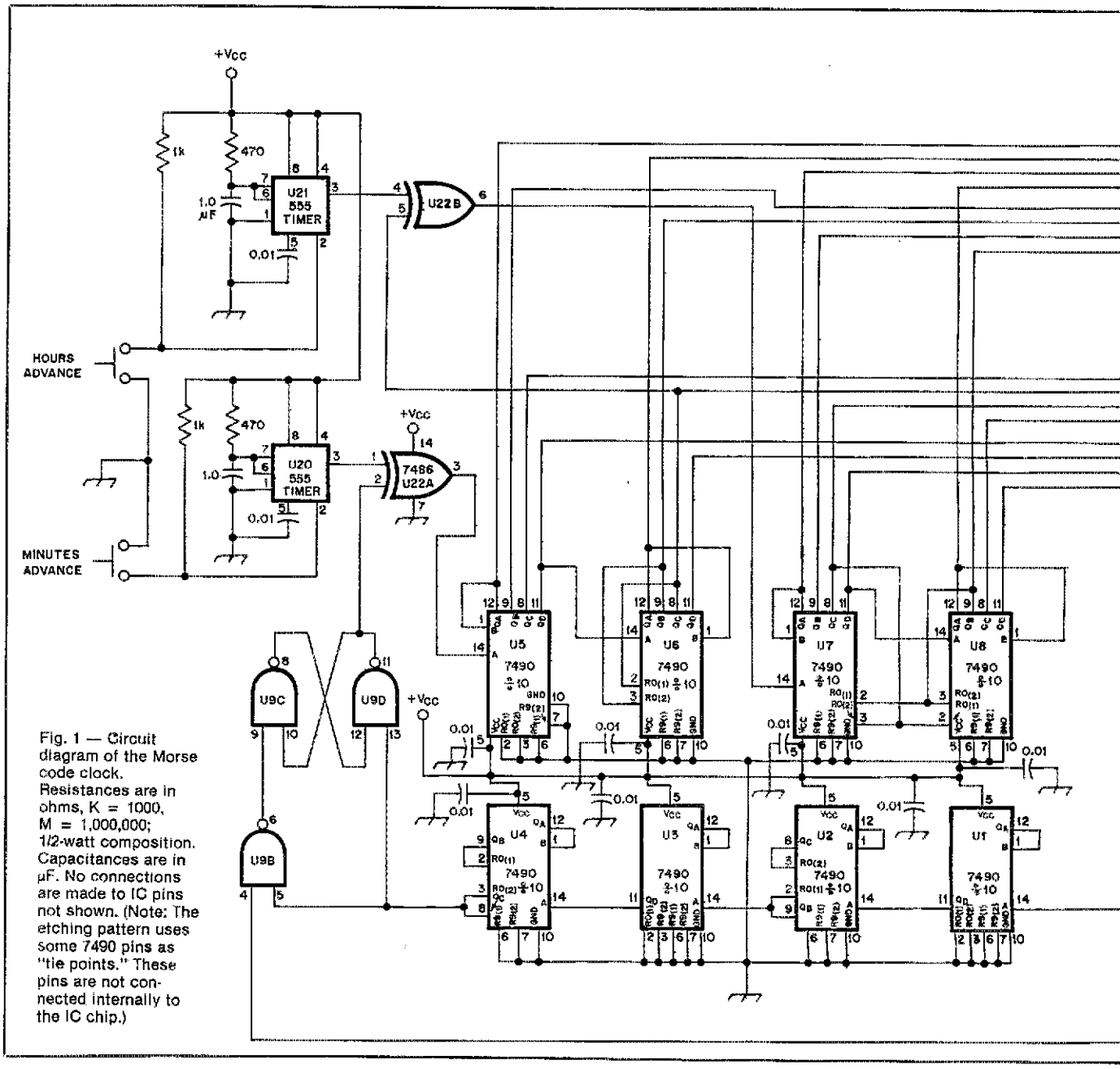


Fig. 1 — Circuit diagram of the Morse code clock. Resistances are in ohms, K = 1000, M = 1,000,000; 1/2-watt composition. Capacitances are in µF. No connections are made to IC pins not shown. (Note: The etching pattern uses some 7490 pins as "tie points." These pins are not connected internally to the IC chip.)

counter continues and the decoder begins to generate N_1. Finally, upon completion of N_3, U10 will be high, and when the hold signal arrives, the 555 will stop.

Since the outputs of a PROM can be "dirty" during address changes, the outputs are fed into a temporary latch, U17. The "latch" is actually a type D flip-flop, which updates its contents on the positive edge of the clock. Since the counters change on the negative edge, spikes generated in the outputs during address changes will not affect the rest of the circuit. Both normal and complemented outputs are available from the latch, eliminating the need for inverters on outputs 1, 2 and 3. Morse code from output 1 is fed to the reset pin of U19, a 555 audio oscillator. A high on pin 4 of the 555 allows it to run. A high on pin 4 of U18 indicates that the circuit is running, and can be used to keep the repeater on the air while the code is being sent.

Memory Description

Morse code is programmed into the PROM in the usual way. (A dit is represented by one bit and a dah by three bits, with one bit between dits and dahs). Using the method described herein, a zero will require 30 addresses of the PROM. Areas of the PROM are easily divided up into binary-sized pieces, that is, 2, 4, 8, 16, 32, 64 and so on. The zero will fit into an area 32 addresses long, so we divide the PROM into areas of this size. We will use a five-bit binary counter. By feeding this into the first five addresses of the PROM, we can count through areas of the PROM 32 addresses at a time.

Since our PROM has nine address lines in all, four remain unused. We will enter the BCD code for the number we wish to call from memory into these inputs, dividing the PROM into 16 areas of 32 addresses each. Since we need to store only 10 numbers, six of these areas will remain unused.

The PROM used in this circuit is a Harris HM-7620 2-K bipolar device. It has nine address lines and four outputs. This gives us a 512 × 4 configuration, which means that there are 512 different addresses that can be applied to the PROM, each with four corresponding outputs. As supplied by the manufacturer, all the outputs would be in the high state if the IC were put into a circuit. By programming, specific outputs can be changed to the low state. Once a PROM is programmed, the

output is changed permanently! Much care must be exercised if you wish to program a PROM yourself; it's easier to obtain the services of someone who has a commercial programmer.[1]

Programming Pattern

The programming pattern for the number 3 is shown in Fig. 5. The binary representation for this number is 0011, which we apply to addresses A5 through A8. If all the other address inputs are low, this puts the PROM at address 96, the beginning of the fourth area of memory. (Remember, the first area contains the zero.) As the count progresses on A0-A4, the address to the PROM is incremented and Morse code is generated at output 1.

[1]Notes appear on page 37.

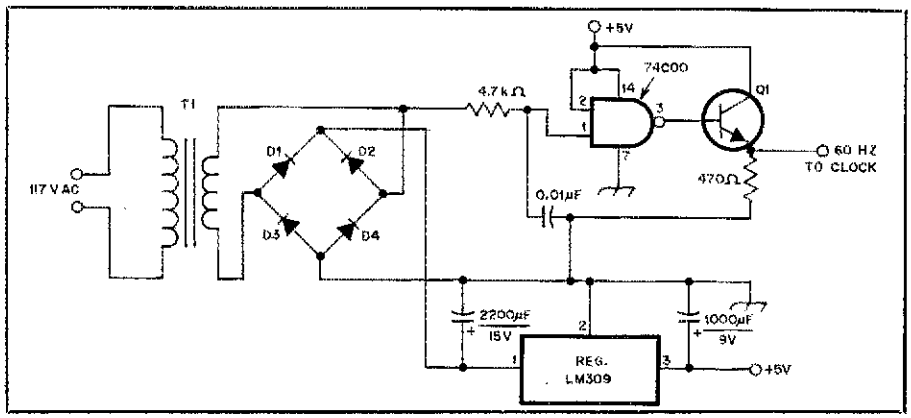


Fig. 2 — A power supply circuit for the Morse-code clock. (Any 5-volt supply capable of delivering 1 ampere will be satisfactory.)

D1-D4, incl. — General purpose silicon rectifier, minimum rating 20 PRV, 2 A.

Q1 — General-purpose npn silicon transistor.

T1 — Filament transformer, secondary winding 6.3 V, 1 A.

A signal is always programmed into output 2 at the first address of each area, in this case address 96. Another signal is placed on output 4 at the third address of each area. The sequence continues until the number is finished. In order to set the spacing between digits, a reset pulse appears on output 3 at the seventh address after the code ends. This indicates to the rest of the circuit that the end of the number has been reached. All the numbers zero through nine are programmed in the same manner.

Construction

If you haven't already invested in some wire-wrapping equipment, this project is a perfect excuse to do so. Wire wrapping is easy. A hand tool and some wire are a small investment compared to the time they can save. (An electric wire-wrapping gun isn't necessary unless you plan on making a living wrapping circuits!) New wire-wrap sockets can be very expensive. I found some good deals on used sockets at a local hamfest; often you can find some boards with lots of sockets on them and the ICs removed. They're cheap, but there's a catch: You have to take the wire off. After unwiring one board, you'll know why the guy who sold them to you didn't unwire them for you. But you'll end up with a lot of good sockets — and a lot of experience at unwrapping! [A hand unwrapping tool is also available. — Ed.] Or if you prefer, use the circuit-board layout of Fig. 6.

The layout is not critical, but it makes sense to keep parts that are close together on the diagram close to each other on the board. I mounted the ICs on perf board in four rows and six columns. Hook up all power supply lines first, making sure that each IC gets connected. Use a 0.01-μF bypass capacitor on the supply line at each IC. These can be mounted on the board and wire wrapped like the sockets; use a little solder on the component leads to keep the wire from slipping off. You may also want to add the four seven-segment decoders and the LEDs to display the time.

I was able to fit the entire unit, including power supply, into a 9 × 5 × 2-inch (229 × 127 × 51-mm) aluminum box. The power supply was mounted in the rear. This circuit draws almost 1 ampere, so be sure to mount the LM-309 on a large heat sink; simply mounting it on the chassis is not satisfactory. Also, drill some holes in the box for ventilation.

On the side of the box, I brought out the various connections for interfacing with the repeater: ground, start, audio output, and pin 4 of U18. Two momentary-contact switches are used for the setting function. You may also want to include a switch to turn the LED display on and off (if one is used).

With the exception of the PROM, all parts for this project should be available at local electronics stores. Circuit Board Specialists will also supply the parts (except the PROM) and printed-circuit boards for this project.[2] Fig. 6 shows the layout for the pc board. Jumper information appears in Table 1.

Other parts sources to consider are the many mail-order houses in the back of this magazine. I have had very good luck with them. Also, don't forget the parts-supplier list in the 1979 *Handbook*. The PROM will be available preprogrammed from the author for a limited time.

Wiring to the Repeater

There should be no problem in hooking this clock to a repeater that has an

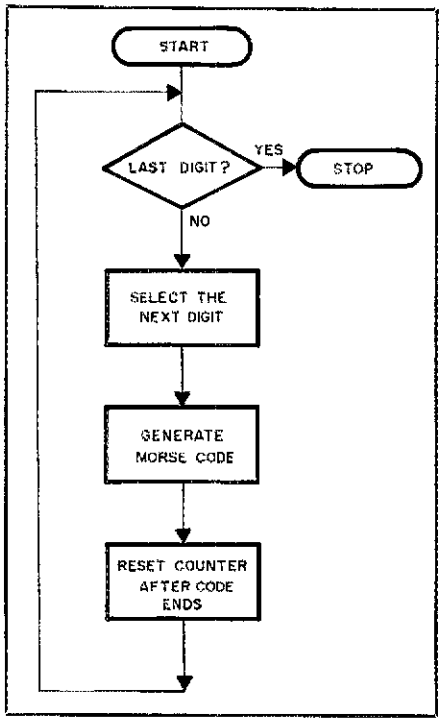


Fig. 3 — Flow chart for the code-generating procedure (see text). This work is done by the PROM, which keeps the control circuitry to a minimum.

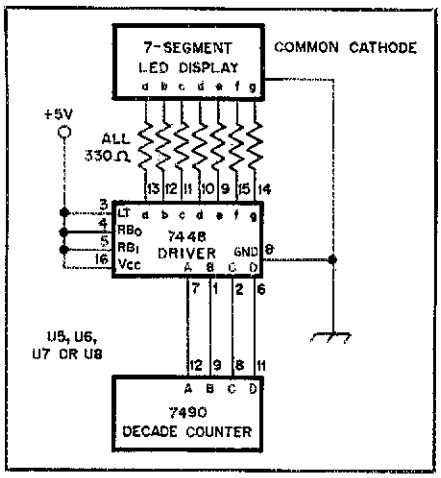


Fig. 4 — Adding an LED display to the clock. This circuit may be added to U5 through U8. An LED display facilitates setting the clock and checking its accuracy, but is not essential for proper operation of the circuit.

Memory Location	D A8	C A7	B A6	A A5	E A4	D A3	C A2	B A1	A A0	01	02	03	04
96	0	0	1	1	0	0	0	0	0		■		
97	0	0	1	1	0	0	0	0	1				
98	0	0	1	1	0	0	0	1	0				■
99	0	0	1	1	0	0	0	1	1				
100	0	0	1	1	0	0	1	0	0	■			
101	0	0	1	1	0	0	1	0	1				
102	0	0	1	1	0	0	1	1	0	■			
103	0	0	1	1	0	0	1	1	1				
104	0	0	1	1	0	1	0	0	0	■			
105	0	0	1	1	0	1	0	0	1				
106	0	0	1	1	0	1	0	1	0	■			
107	0	0	1	1	0	1	0	1	1	■			
108	0	0	1	1	0	1	1	0	0	■			
109	0	0	1	1	0	1	1	0	1	■			
110	0	0	1	1	0	1	1	1	0	■			
111	0	0	1	1	0	1	1	1	1	■			
112	0	0	1	1	1	0	0	0	0	■			
113	0	0	1	1	1	0	0	0	1				
114	0	0	1	1	1	0	0	1	0				
115	0	0	1	1	1	0	0	1	1				
116	0	0	1	1	1	0	1	0	0				
117	0	0	1	1	1	0	1	0	1				
118	0	0	1	1	1	0	1	1	0				
119	0	0	1	1	1	0	1	1	1			■	
120	0	0	1	1	1	1	0	0	0				
121	0	0	1	1	1	1	0	0	1				
122	0	0	1	1	1	1	0	1	0				
123	0	0	1	1	1	1	0	1	1				
124	0	0	1	1	1	1	1	0	0				
125	0	0	1	1	1	1	1	0	1				
126	0	0	1	1	1	1	1	1	0				
127	0	0	1	1	1	1	1	1	1				

Fig. 5 — Programming pattern for the number 3. This is the 32 × 4-bit area of the PROM used to store the number 3. Morse code is stored in output 1. The signal from output 2 stops the BCD-to-Morse converter at the end of the four-digit cycle. The signal in output 3 initiates the start of the next cycle, while the signal in output 4 is used to select the next digit for the decoder.

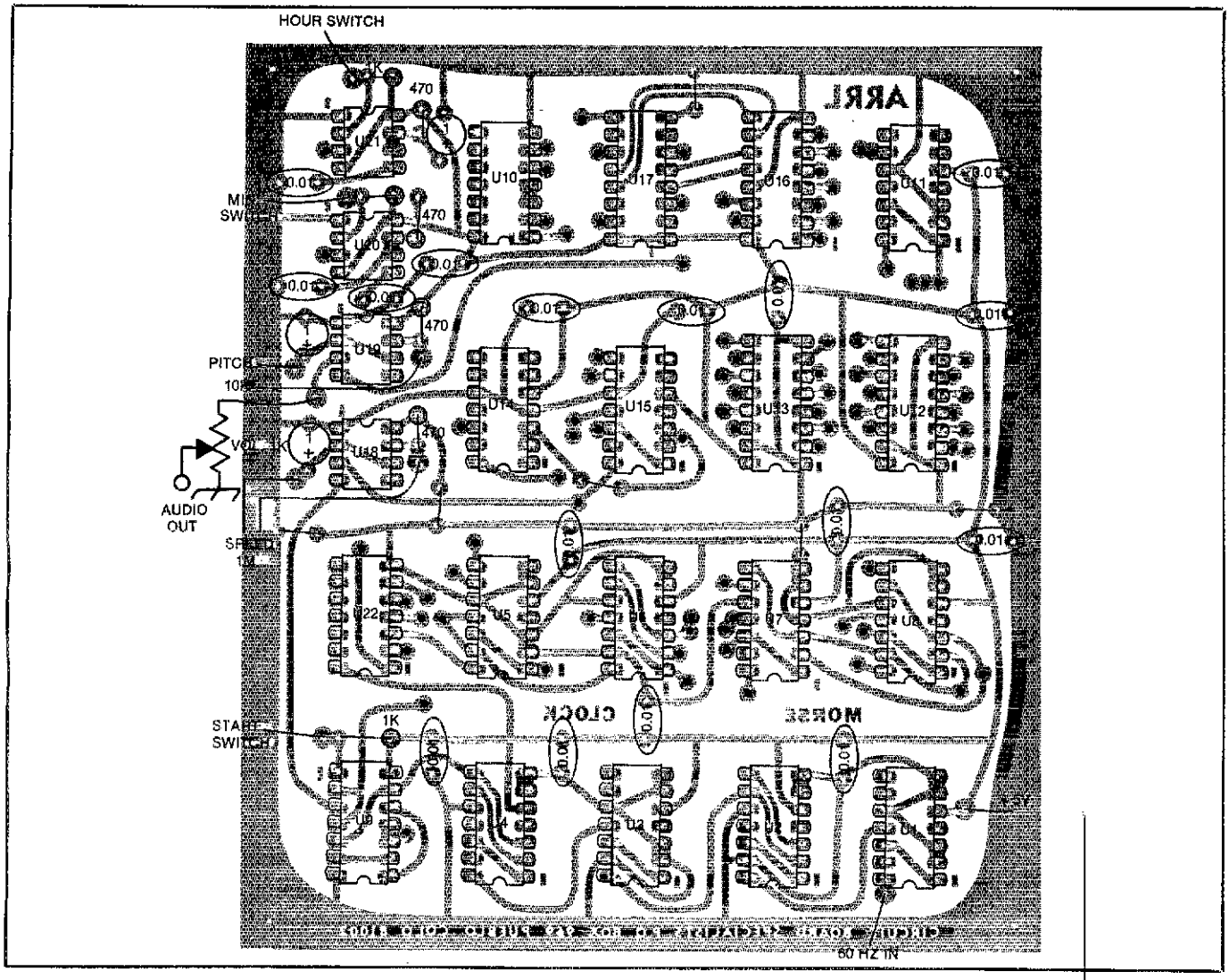


Fig. 6 — Parts-placement guide for the digital Morse-code clock. Parts are placed on the nonfoil side of the board. Shaded areas represent copper on the opposite side of the board. (The etching pattern appears in the "Hints and Kinks" section of this issue.) Decimal-value numbers alone represent capacitance in μF, and whole numbers represent resistance in ohms; k = 1000, M = 1,000,000. There are many jumpers on this board, but most of them are not shown here because of space limitations; see Table 1 for these interconnections. Points of connection for these jumpers are shown as black dots. (Circuit-board design courtesy of Circuit Board Specialists.)

automatic identifier. The active-going low-start control can be triggered upon Touch-Tone control, or automatically when logging autopatches. If the repeater is battery operated, you may want to use a crystal time base for the 60-Hz signal; otherwise the power line will be a satisfactory source. The code begins immediately when the start switch is activated, so a delay circuit might be desired in order for the operator to hear all of the first digit. If the repeater already has a 5-volt power supply, be sure it can provide the extra ampere of current.

Conclusion

When completed, this circuit will provide you with a reliable Morse-code digital clock at minimum cost. It should take about two weekends to build once you have all the parts. The basic idea behind this circuit can be extended to other devices; for example, the BCD data from a digital voltmeter could be translated into code and sent over the air for keeping tabs on the power supply at a remote repeater site. By expanding the multiplexing circuit to scan more digits, even a frequency counter could be modified to have a Morse-code readout. Using this circuit with digital test equipment could be useful for blind operators.

In any event, this clock is bound to stir up a lot of conversation on the air. By the way, do you know what time it is? QEX

Notes

[1]Preprogrammed memory ICs that are ready for use in this project are available from the author for $6.
[2]Circuit Board Specialists, P. O. Box 969, Pueblo, CO 81002.

Table 1
Jumper Interconnections Not Shown in the Parts-Placement Guide (Fig. 6).

IC No.	Pin	to IC No.	Pin
5	1	13	3
5	8	12	3
5	9	13	13
5	11	12	13
6	1	13	4
6	2	13	12
6	3	22	5
6	3	12	4
6	11	12	12
7	9	13	11
7	11	12	11
7	11	8	14
7	12	13	5
7	14	22	6
8	2	12	5
8	3	13	10
8	8	12	6
8	11	12	10
8	12	13	6
9	2	10	6
9	10	22	2
10	1	11	1
10	2	11	9
10	5	17	6
11	1	12	14
11	1	13	14
11	9	12	2
11	14	17	15
12	2	13	2
12	7	16	15
12	9	16	14
13	7	16	2
13	9	16	1
14	12	16	3
14	14	15	11
15	3	17	11
15	8	16	7
15	9	16	6
15	11	16	4
15	12	16	5
15	14	17	9
17	3	19	4
20	3	22	1
21	3	22	4

● *Basic Amateur Radio*

The Weekender — A Simple Crystal Calibrator

Interested in building, but haven't tried it yet? Here's a perfect first project — modern, inexpensive and practical.

By Ken Powell,* WB6AFT

The Weekender is a modern version of the 100-kHz crystal calibrator. Aside from use as a means to check the accuracy of receiver dials, this unit is quite handy as a signal source for calibrating other instruments in the shop. It will provide an accurate signal for checking the time base on scopes, and can be used to check the dial accuracy of signal generators and other rf devices.

The vacuum-tube oscillator of the traditional calibrator has been replaced with an integrated circuit (IC) oscillator with a frequency of 1 MHz. The 1-MHz signal is divided down to 100 kHz and to 10 kHz by additional ICs. All of this is accomplished with far less power than was required to heat the filament of a vacuum tube in the older crystal-calibrator circuit. In fact, this unit is powered by four size AA penlight cells! Battery life should approach that of the rated shelf life for the cells used.

This project is easy to build, and should help introduce the beginner to digital devices and modern construction techniques. Construction is simplified by the use of an etched circuit board. The techniques used here can certainly be applied to larger, more complicated designs, and should help reduce the time span between sketch-pad idea and final circuit operation.

The Circuit

A schematic diagram of the crystal-calibrator circuit is shown in Fig. 1. The use of ICs greatly simplifies the calibrator and keeps the parts count low. The ICs used in this project were designed for use in digital computer logic. These devices have very fast switching times, which provide an oscillator output that is rich in

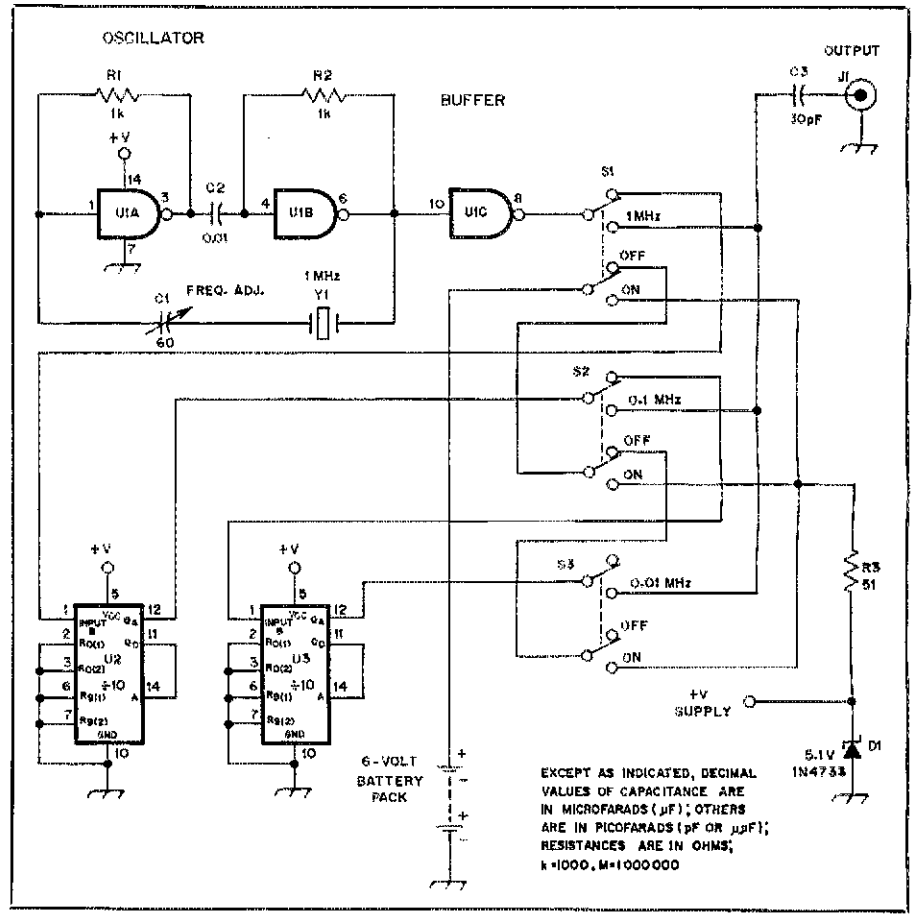


Fig. 1 — Schematic diagram of the crystal calibrator circuit. No connections are made to IC pin numbers not shown. All part numbers in parentheses are Radio Shack, except where indicated otherwise. All resistors are 1/4 watt.
C1 — 15 to 60-pF trimmer (Jameco 15-60pF).
C2 — 0.01-μF disk (272-131).
C3 — 30-pF ceramic disk.
D1 — 5.1-V Zener diode (Jameco 1N4734).
J1 — SO-239 or other rf-type (278-195 or 278-201).
R1, R2 — 1 kΩ.
R3 — 51 Ω.
S1, S2, S3 — Dpdt push-button switch (Lafayette 34-02823V).
U1 — Quad NAND gate IC, 74LS00 (276-1900).
U2, U3 — Decade counter IC, 74LS90 (276-1923).
Y1 — 1-MHz crystal (Jameco CY1A).
Misc. — Circuit board,' metal case (270-252), batteries, IC sockets (optional), and battery holder (Lafayette 34-50095 or 270-391).
Parts sources: Jameco, 1021 Howard Ave., San Carlos, CA 94070. Lafayette, 111 Jericho Tpke., Syosset, NY 11791, or local stores.

*6949 Lenwood Way, San Jose, CA 95120

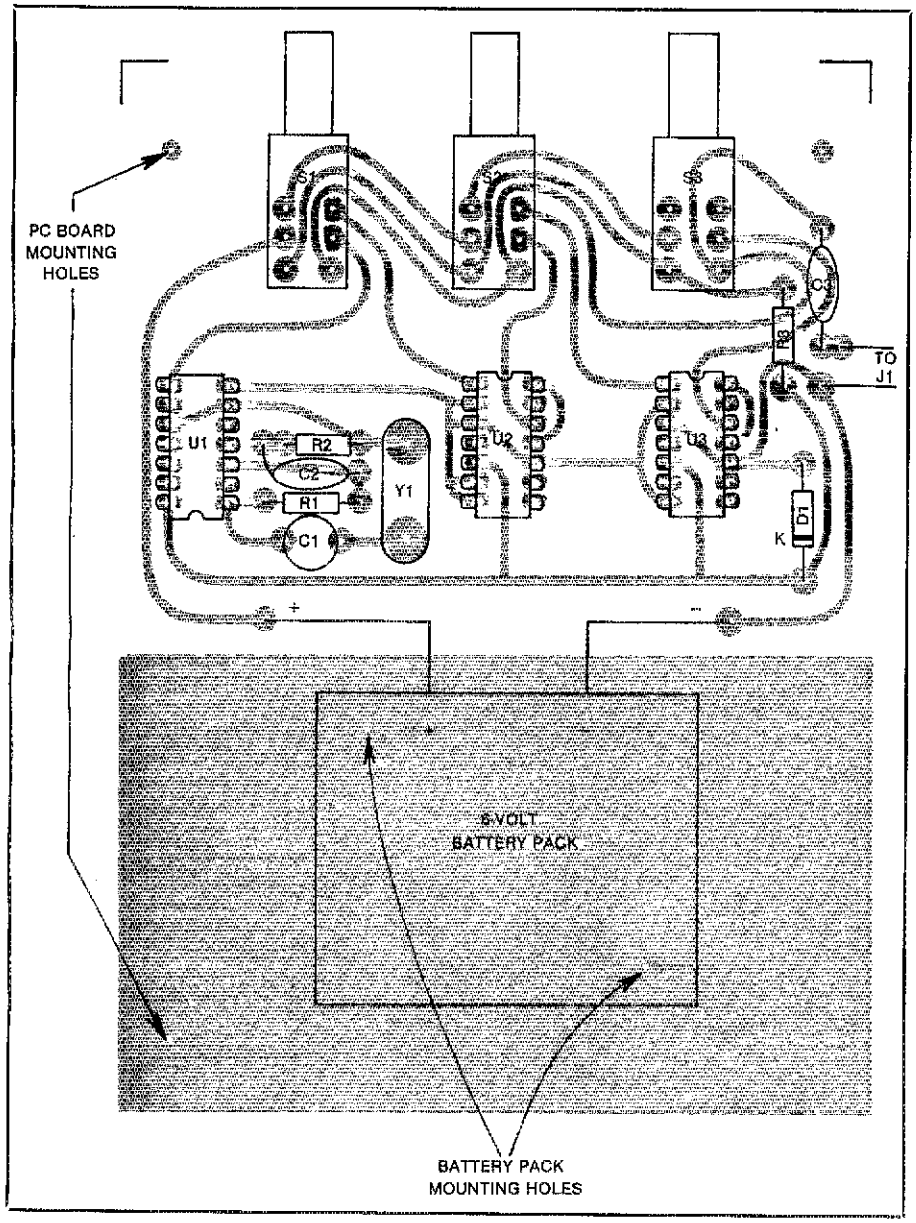
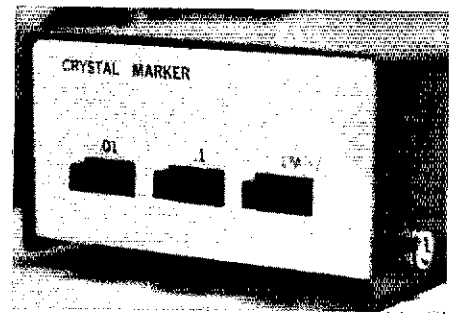


Fig. 2 — Parts-placement diagram for the crystal calibrator. This is an X-ray view of the board as viewed from the component side. The shaded areas represent copper foil (unetched areas) on the reverse side. A full-scale etching pattern for this pc board is contained in the "Hints and Kinks" section of this issue. The layout is tailored for the components listed in Fig. 1. Be sure to check dimensions if you use substitutes.

harmonic content. U1, a quad NAND gate, is used as a 1-MHz, crystal-controlled oscillator with the crystal serving as the feedback element. C1, a small trimmer capacitor, is used to adjust the frequency. The oscillator is composed of two sections of the quad NAND IC; a third section serves as a buffer between the oscillator and the output-selection switches. The fourth NAND section of U1 is not used. The 1-MHz signal from the oscillator and buffer is routed to the output at J1 when S1 is depressed. Power also is applied to the circuit upon activation of S1. This condition will provide a 1-MHz signal at the output connector, with harmonics usable throughout the hf and lower vhf spectrum. This allows the calibrator to be used on most amateur bands, or even as a test-bench signal source.

When S1 is not in the "on" position, the 1-MHz signal is routed to the input of U2. This IC is a 4-bit decade counter connected to perform a "divide-by-10" function on the input signal. Thus, with a 1-MHz input, the 4-bit decade counter output is 100 kHz. This signal is applied to the output connector when S2 is depressed. As with S1, a second set of contacts in S2 applies power to the entire circuit when the switch is activated. This condition provides 100-kHz markers up through the 6-meter band.

When S1 and S2 are not activated, the 100-kHz signal is applied to the input of U3, a second decade counter connected to perform a divide-by-10 function, as with



The prototype crystal calibrator installed in a commercially available cabinet. Note the professional-looking lettering job.

U2. Therefore, for a 100-kHz input, U3 provides a 10-kHz output. This signal is routed to the output connector; power is supplied to the circuit when S3 is activated, as with S1 and S2. Using this switching scheme, the need for a separate on/off switch is eliminated, yet power is applied only when an output signal has been selected.

D1 is a Zener diode, used to provide voltage regulation for the circuit, aiding circuit stability. The shunt regulator is formed by D1 and R3, a dropping resistor included to limit current through D1. The calibrator-circuit power consumption is low (current drain is on the order of 27 mA); therefore, the batteries should last quite a while.

Construction

Any number of construction techniques can be used to build the calibrator circuit. However, the assurance of ultimate success provided by the simple circuit-board method makes it the front-runner. The first step in the construction process is to etch and drill a board similar to that shown in the parts-placement diagram of Fig. 2. (Alternatively, commercially etched and drilled boards are available.[1]) Next, mount the components as shown in Fig. 2. Pay particular attention to the orientation of the integrated circuits. After mounting and soldering all of the on-board components, connect the output and power supply leads to the board.

The next step is drilling and labeling the case. I used Datak Instant Lettering (a dry-transfer process) to label the prototype calibrator shown in the photos. This type of lettering gives the finished unit a professional look. After the lettering was finished, I applied a light coat of clear acrylic spray to protect it.

Fig. 3 shows a sketch of the final assembly. Mount the circuit board in the case. Connect the output and power leads to J1 and the battery pack, respectively.

[1]Etched and drilled pc boards are available from J. Oswald, 1436 Gerhardt Ave., San Jose, CA 95125. Order number MG1006. Price at time of writing is $4.50 each, plus 75 cents shipping and handling in the U.S.

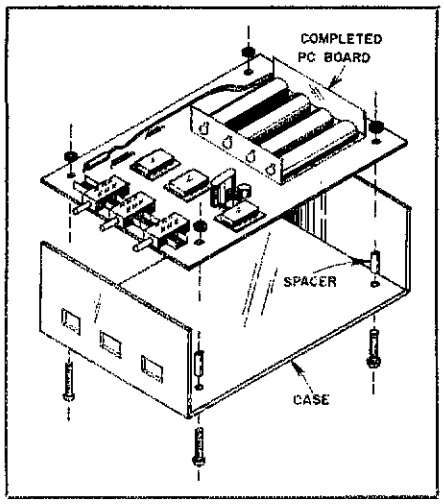
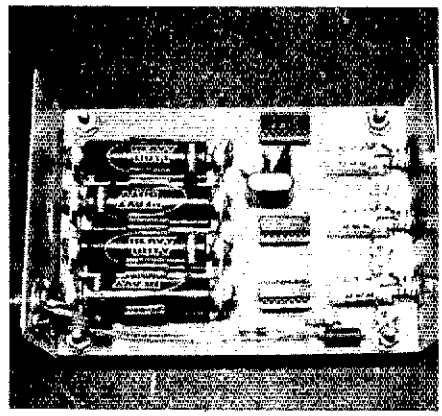


Fig. 3 — Assembly details for the pc board mounting in its case. The top cover should not be installed until after the finished unit has been calibrated (see text).



The inside of the completed calibrator. Two screws are used to fasten the battery holder to the circuit board. Short pieces of hookup wire are used to connnect the battery pack to the circuit board, and a length of light-gauge speaker wire is connected between the rf-output connector and the circuit-board output point.

Leave the case open to allow access to trimmer C1.

Testing and Calibration

The completed unit can be tested and calibrated with any receiver that has a BFO and is capable of receiving WWV. Tune in WWV on 5, 10 or 15 MHz and zero beat the WWV carrier on the receiver.

Now, with the calibrator connected to the receiver antenna jack, turn the calibrator on by selecting the 1-MHz position (S1 actuated). Adjust C1 for a zero beat on the receiver. This should set the oscillator frequency at close to 1 MHz. Release S1 and press the 100-kHz button (S2). The zero-beat condition should be maintained. Repeat the check with the 10-kHz position, and again, the zero-beat condition should remain. Precision adjustment of C1 can be made by tuning the receiver slightly off zero beat with WWV and adjusting C1 so the pulsations in the audio tone occur at a minimum rate.

Using the Calibrator

The calibrator is now ready for band-edge checking or dial-setting down to the nearest 10 kHz. Even an older, general-coverage receiver can be set to the proper frequency with a little practice. The nearest 1-MHz spot can be found with the 1-MHz position. Then, with the 100- and 10-kHz markers, the beats can be counted until the nearest 10-kHz point is reached. I tried this procedure with an old National receiver that had an uncalibrated dial. Using the calibrator, I adjusted the receiver for 3,590 kHz to listen for the West Coast code session. Sure enough, at 0300 UTC the code came rolling in.

I thought about dividing by 10 one more time to get 1-kHz markers, but since even the 10-kHz markers are tricky to count on an old receiver, I decided to leave well enough alone. There are many applications for a small-signal source, and just about any of them make this unit worth owning. QST

Strays

On a recent trip to Europe, Japan Amateur Radio League President Shozo Hara, JA1AN (right), met with Hon. Mohamed Mili (center), secretary general of the International Telecommunication Union and Mr. Fujiki of the International Frequency Registration Board at ITU Headquarters in Geneva, Switzerland.

SATELLITE COMMUNICATIONS PACKAGE OVERLAYS

☐ Thanks to Jim, WB2TPS, for pointing out a source of possible confusion with the acetate overlays in the new *Satellite Communications* package. Included are three overlays for three separate OSCARLOCATORs: OSCAR 8's overlay has the smallest rangefinder oval, OSCAR 7's (the only one not labeled) has the medium-size oval, and the Soviet RS series' has the largest oval. As a convenient rule of thumb, the higher the altitude of an orbiting satellite, the greater the area illuminated on the earth. The above satellites orbit at 550, 910 and 1070 miles, respectively. For instructions on assembling the OSCARLOCATORs, see pages 26 and 27 of the blue-covered *Getting to Know OSCAR.* — *Steve Place, WB1EYI*

HAVE A FAVORITE INSTRUCTOR?

☐ Now is the time to nominate your favorite instructor for the 1979 Herb S. Brier, W9AD, Memorial Award. This annual award goes to the most outstanding instructor of the year, in the eyes of the judges (see February 1979 *QST*, page 52 for details). If you know a particularly deserving instructor, write to the Club and Training Department and tell us why you think this person deserves the award. It's a great way to say "thanks" to someone special who isn't often recognized "officially." — *Jeanie M. S. Zaimes, AB1P*

CANAD-X AWARDS

☐ Canad-X offers three awards to qualified amateurs, the Trans Canada Award, the Seaway Award and the Provincial Capitals Award. For a list of requirements, send an s.a.s.e. to Ron N. Nickle, VE3SF, Awards Manager, 286 Burnett Ave., Willowdale, ON M2N 1W1, Canada.

MOVING? UPGRADING?

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

Morse Code Transmissions of Computer Programs

Have you ever wished you could "talk computer" on the amateur bands? A few additions to the basic Morse code characters will enable you to exchange computer programs over the air!

By Phillip L. Emerson,* WD8IZA

An increasing number of amateurs are becoming interested in computers, both professionally and at home. It is not surprising to see more and more computerization in the ham shack as a result of all this. But how do you begin to "talk computer" on the air?

It may be a bit of a surprise to learn that the standard international Morse code is *almost* adequate for discussing your favorite algorithm (a kind of mathematical attack on a problem) over the air! If another amateur can be found using the same model of computer, you could use a numerical machine language as a last resort. This, of course, would require that both of you are familiar with the "internal language" used in your computer system. A simpler approach would be to use a standard user-oriented programming language such as FORTRAN (*for*mula *tran*slation).

Among all of the higher level computer programming languages, FORTRAN has the smallest number of characters. This is because it was developed during the days when a six-bit alphabet was standard, and because of continued efforts toward standardization. Some newer languages such as BASIC (*b*eginners *a*ll-purpose *s*ymbolic *i*nstruction *c*ode) and FOCAL (*for*mula *cal*culator) have become more popular with home-computer systems. One reason for this is that they are not required to translate information, but interpret it in much the same manner as a common calculator. These newer programming languages require a larger number of characters and tend to vary slightly between computer manufacturers.

Additions to the Morse Code

Standard FORTRAN programs only require three symbols that do not have representation in the international Morse code, the equal sign, asterisk and plus sign. The author proposes the dit-dah combinations listed in the table for these missing elements. Also listed in the table are proposed uses of common Morse code symbols such as the fraction bar and period. The equal sign, which appears in a large proportion of the statements of almost any program, is crucial for the correct interpretation of a statement. Therefore, it deserves a dit-dah combination that is brief, easy to produce, and uniquely recognizable. The $\overline{\text{IM}}$ seems to be the best pattern available for this purpose. The proposed patterns for the plus sign and asterisk have the advantage that their component letters are mnemonic for the implied arithmetic operations. The proposed use of the remaining patterns seems natural and intuitive in view of current on-the-air practices. A possible exception is the use of $\overline{\text{AAA}}$ for the decimal point, rather than the more commonly used letter R. Perhaps this could be avoided, but FORTRAN allows variable names to contain both alphabetic characters (including R) and numerals.

Proposed Morse Code Patterns for Special FORTRAN Symbols.

Program Symbol	*Morse Code*
Equal sign	$\overline{\text{IM}}$
Plus sign	$\overline{\text{AD}}$
Asterisk	$\overline{\text{MU}}$
Minus sign	$\overline{\text{BA}}$
Division sign	$\overline{\text{DN}}$
End of statement	$\overline{\text{BT}}$
Decimal point	$\overline{\text{AAA}}$

Spaces are indicated in Morse code by pauses, which also can occur for other reasons. Sometimes unintentionally! Fortunately, FORTRAN is insensitive to the presence or absence of spaces, except in a few minor situations. The first involves certain redundancies required by the FORTRAN language such as the separation of a statement number from the actual statement. The statement proper never begins with a numeral; the statement number never contains an alphabetic character. Hence, blank spaces are not really needed to indicate the junction between statement number and statement proper. Spaces are used in connection with the special function of the sixth character position to indicate whether or not a statement from the preceding line continues. In communicating the essence of an algorithm, however, there is never any need to divide a statement into successive lines. This segmentation, and the associated use of the special sixth character position, is necessary mainly for compiling a program from an input device having the capability to read only limited line length. The operator at the receiving station is in the best position to determine any needed segmentation in view of the nature of his own equipment.

Another minor situation where spaces can be significant is in what is called the Hollerith field. This is a special type of format code used to write a record. It requires the proper placement of spaces to operate correctly. Spaces can be avoided in the Hollerith format code by the use of a special *nX* field, meaning "skip the next *n* spaces," where *n* is a whole number. Although most compilers require spaces to be included in some of these situations, such spacing generally can be supplied by the receiving operator. The occurrence of pauses in the transmitted message is therefore irrelevant, except to facilitate copying by the receiving operator.

Some Special Considerations

In Morse code, there is no distinction between left and right parentheses.

*3707 Blanche, Cleveland Heights, OH 44118

FORTRAN compilers ordinarily require this distinction, although it can be redundant in some FORTRAN statements. These distinctions *are* useful for us humans, who tend to become confused when confronted with long expressions containing many parentheses. They also are useful for shortcuts in the ways computer compilers determine the structure of statements. In simple statements, there is little difficulty in identifying the left and right parentheses intuitively, since they must come in balanced pairs. In more complex arithmetic expressions, there is a simple rule that can help to evaluate parentheses. Replace "pep" with (e), where p represents an unspecified parenthesis and e represents an expression. In the case of functions, subscripted variables and FORTRAN statements, slight variations of this rule can be applied. The only difficulty with this rule is in the occurrence of a parenthesis in a Hollerith field, where the parenthesis need not obey any rules at all! These esoteric formats are rare and probably of little interest. One can better envision the exchange of simple routines where there is no particular requirement for elaborate input and output formats, such as programs performing calculations for winding inductors, determining reactance as a function of frequency, or for values of components in a filter. In these situations, one is interested in the numerical results and not so much in the production of an esthetic output display.

In view of these features of Morse code and FORTRAN, it ought to be rather easy to communicate simple programs over the air. Assuming that the receiving operator is familiar with FORTRAN, he only would need to be informed of the special code characters for the equal sign, plus sign and asterisk. The other special code characters are close enough to standard practice that an experienced operator would probably determine their meaning just from the usage. As for restricted versions of other popular programming languages, BASIC would seem to require additional special code characters for at least the up-arrow and the two inequality signs, < and >. FOCAL would need an up-arrow, an exclamation mark and probably a special character for the space. Simple programs written in one language can often be easily translated into another language. In view of this, FORTRAN might be suitable as a common computer language for Morse-code transmissions.

It is hoped that the information presented here will encourage more on-the-air exchange of computer information. There are almost endless possibilities for computer professionals and amateurs alike. With just a few characters added to the Morse code we are all familiar with, the exchange of computer programming information can be made easy and enjoyable right now.

Strays

THE KENTUCKY DISASTER

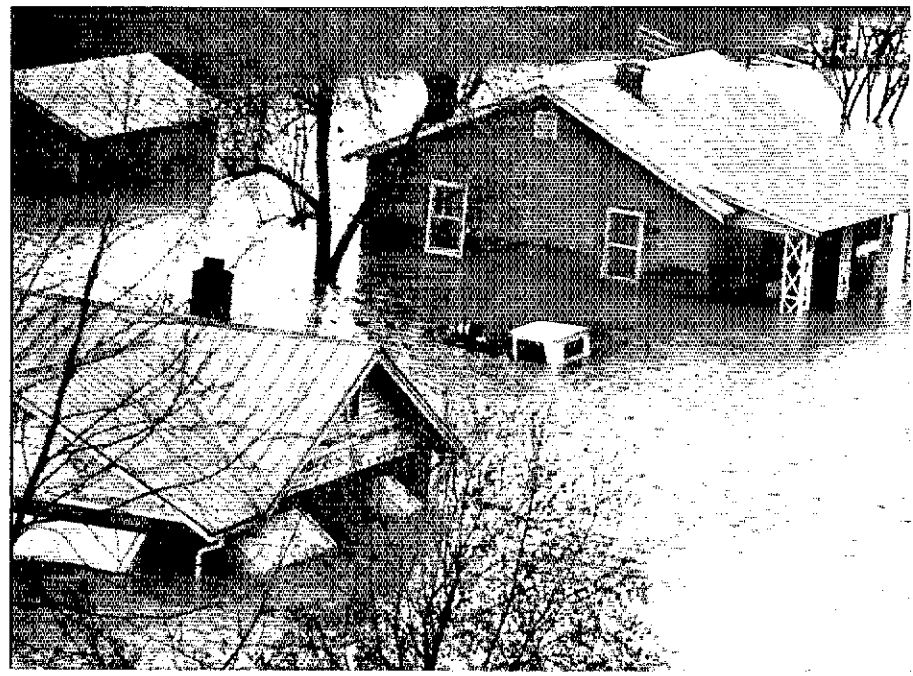
The Frankfort, KY, weather report for Wednesday, December 9, 1978, read "increasing cloudiness with rain developing tonight and continuing through Thursday." This prediction gave little forewarning of the impending disaster. By Friday, the Kentucky River's water level was 17.7 feet, having risen more than five feet in 24 hours. Flash-flood warnings were issued as the deluge continued. The river overflowed on Saturday, flooding most of Frankfort. It crested at 47.5 feet on Monday. Telephone and power services were sporadic during the flood; fresh water was in short supply. Damages were estimated at $65 million in Frankfort alone, where 1300 homes and businesses were destroyed.

Throughout the disaster, Amateur Radio operators from the Capitol ARS manned an emergency net, providing communications from Frankfort to other cities in the rain-drenched state. The net was activated Saturday on 147.84/.24 by K4HOE, emergency coordinator for Franklin County (KY). Despite personal problems caused by the flood, almost all club members participated in the net.

K4ZBC, a blind ham, opened the net station at Red Cross headquarters on 84/24 and 3960 kHz, the Kentucky Traffic Net frequency. The club also operated the Kentucky Disaster and Emergency Services (DES) station, WC4ACW. Transmissions at the DES office were limited because the National Guard was using the station's 3960 antenna. All communications at WC4ACW were via 2-meter fm with relays from outboard stations monitoring 3960 kHz. Club members tried to overcome this problem by installing an indoor antenna, but this proved ineffective because the DES communications room was completely shielded. Construction of a second antenna at the DES station should resolve this conflict in the event of future emergencies.

The Frankfort CB REACT group handled most local communications during the flood. This allowed the Capitol ARS to concentrate on providing communications with the rest of the state. Nighttime interference caused by the storm blocked propagation between Frankfort and Louisville, where the Kentucky SEC, WB4ZML, was located. This problem was solved by W7LJP, in Spokane WA, who relayed messages between the two cities. WBØVKG, of Fargo, ND, also passed traffic between Frankfort and Louisville.

Through the efforts of the Capitol ARS and hams on the Kentucky Traffic Net, emergency communication lines were available during the crisis. The club provided an invaluable public service to Frankfort and the state in their hour of need. — *Willard J. Zuhalka, K4HOE*



Amateur Radio operators are ready to meet the challenge when rampaging floodwaters swamp telephone lines and strand homeowners. (*W8JM photo*)

Product Review

Trio-Kenwood R-820 Receiver

One of the newest pieces of hf equipment from Kenwood is a triple-conversion receiver designed primarily to mate with the TS-820 or TS-820S transceiver. While most receiver buffs will turn up their noses at a triple conversion receiver, they need not — Kenwood engineers have certainly done their homework. At first glance the receiver appears to be endowed with more than its share of bells and whistles. A closer examination reveals that virtually all controls perform a useful function, with perhaps the exception of the tone control. Since the same front panel is used for both the TS-820 and the R-820 (different lettering, of course), they must have needed a control to fill that one remaining hole.

The R-820 has been designed for "full transceive" or "VFO transceive" operation with the TS-820 or '820S transceivers. Also, the R-820 can be used with TS-520 and '520S transceivers for "VFO transceive" only. The difference between full transceive and VFO transceive can be summed up simply: Full transceive allows the R-820 receiver to function in much the same way as an external VFO, only better. With the TS-820/R-820 combination one can transmit on the transceiver VFO, receive on the receiver VFO; or transmit on the receiver VFO, receive on the transceiver VFO; or transceive on the transceiver VFO; or transceive on the receiver VFO; or operate the two units independently. When the two units are operated separately, the receiver can be tuned to a different frequency on the same band or any other band without affecting the operation of the transceiver. The R-820 will remain connected to the same antenna that is attached to the transceiver unless the user provides external antenna switching.

VFO transceive operation is basically the same as full transceive except that the high-frequency oscillators (HFOs) in the transceiver and receiver are not synchronized. This means that you can't operate transceive without first adjusting the RIT controls on both the receiver and transceiver to make up for the difference in frequency between the HFO in the receiver and the HFO in the transceiver. As the manual specifies, this must be done every time you change bands or move more than 200 kHz within any given band. Full transceive with the TS-820 is certainly the way to go; however, there is one small catch. You'll have to make several small wiring modifications to your TS-820. These changes are outlined in detail in the instruction manual and shouldn't present much of a problem to anyone who has ever handled a soldering iron.

In addition to providing reception of all hf amateur frequencies and the 15-MHz WWV band (15.0-15.5 MHz) the R-820 also covers several popular shortwave bands. These bands are 49 meters (5.9-6.4 MHz), 31 meters (9.4-9.9 MHz), 25 meters (11.5-12.0 MHz) and 16 meters (17.7-18.2 MHz).

Technical Info

As mentioned earlier, the R-820 receiver is of the triple-conversion variety employing i-fs at 8.83 MHz, 455 kHz and 50 kHz. One advantage to the triple-conversion technique is that it allows all manner of signal-path gymnastics as will be outlined later. A block diagram of the receiver, Fig. 1, better explains the operation of the '820.

As signals arrive at the antenna terminal, they are first routed through a step attenuator (0-40 dB in 10-dB steps) and then to either the rf-amplifier stage or to the shortwave converter system which precedes the rf amplifier. Input to the rf-amplifier stage first passes through a link-coupled, single-tuned circuit to the 3SK35 dual-gate MOSFET amplifier. The drain of this device is coupled to the gate of the 3SK41 buffer through a double-tuned circuit. This extensive rf amplifier filtering accounts for the excellent out-of-band suppression characteristics of the receiver. Output from the buffer is fed to a balanced mixer, consisting of two 3SK41s, that receives local-oscillator energy from the phased-locked loop.

The 8.83-MHz first i-f energy passes through a half-lattice crystal filter and on to the noise blanker gate. The signal path then encounters the first set of diode-switched filters (8-pole crystal type). Only one filter comes as standard equipment with the receiver and it is suitable for ssb reception (2.4 kHz). Optional a-m (6-kHz) and cw (500-Hz) filters are available and can be installed on the filter board. From there, the signal is converted to the second i-f through another balanced mixer using two 3SK41s. Next, the signal is applied to a second set of diode-switched filters, at 455 kHz, with ssb (2.4-kHz) and a-m (6-kHz) filters supplied as standard equipment. Two optional cw filters (500 Hz and 250 Hz) are available for this i-f. Output from these filters is then amplified and applied to the third mixer, a single 3SK41, where the 455-kHz i-f is converted down to 50 kHz. This third i-f provides for the notch circuitry and the majority of the receiver gain.

A second block diagram, Fig. 2, shows the frequency conversion scheme a bit more clearly. This Kenwood scheme is a bit unusual in that it allows for *both continuously variable bandwidth and i-f shift at the same time without affecting the receive frequency*. With the optional filters installed, the a-m bandwidth can be varied continuously from 4.3 to 6 kHz, the ssb bandwidth from 600 Hz to 2.4 kHz and the cw bandwidth from 150 to 500 Hz. This function is particularly handy when operating on a crowded band since the optimum receiver bandwidth can be easily selected. After you've chosen your bandwidth, the i-f shift control can move the received passband to further eliminate interference on either side of your QSO. And if that's not enough, you can call for some help from the notch filter (which has a depth of approximately 50 dB!). If you can't eliminate QRM with this system, chances are it just plain can't be done!

Using the Receiver

It takes the better part of an evening to get a good feel for the receiver and what it can do. Perhaps the most surprising aspect of the receiver is the noticeable lack of birdies. One would expect a triple-conversion receiver to have numerous spurious signals across the

The R-820 looks practically identical to the TS-820S at first glance. A closer look reveals the new front panel lettering and a few other slight differences distinguishable from the outside. The insides are a whole different story!

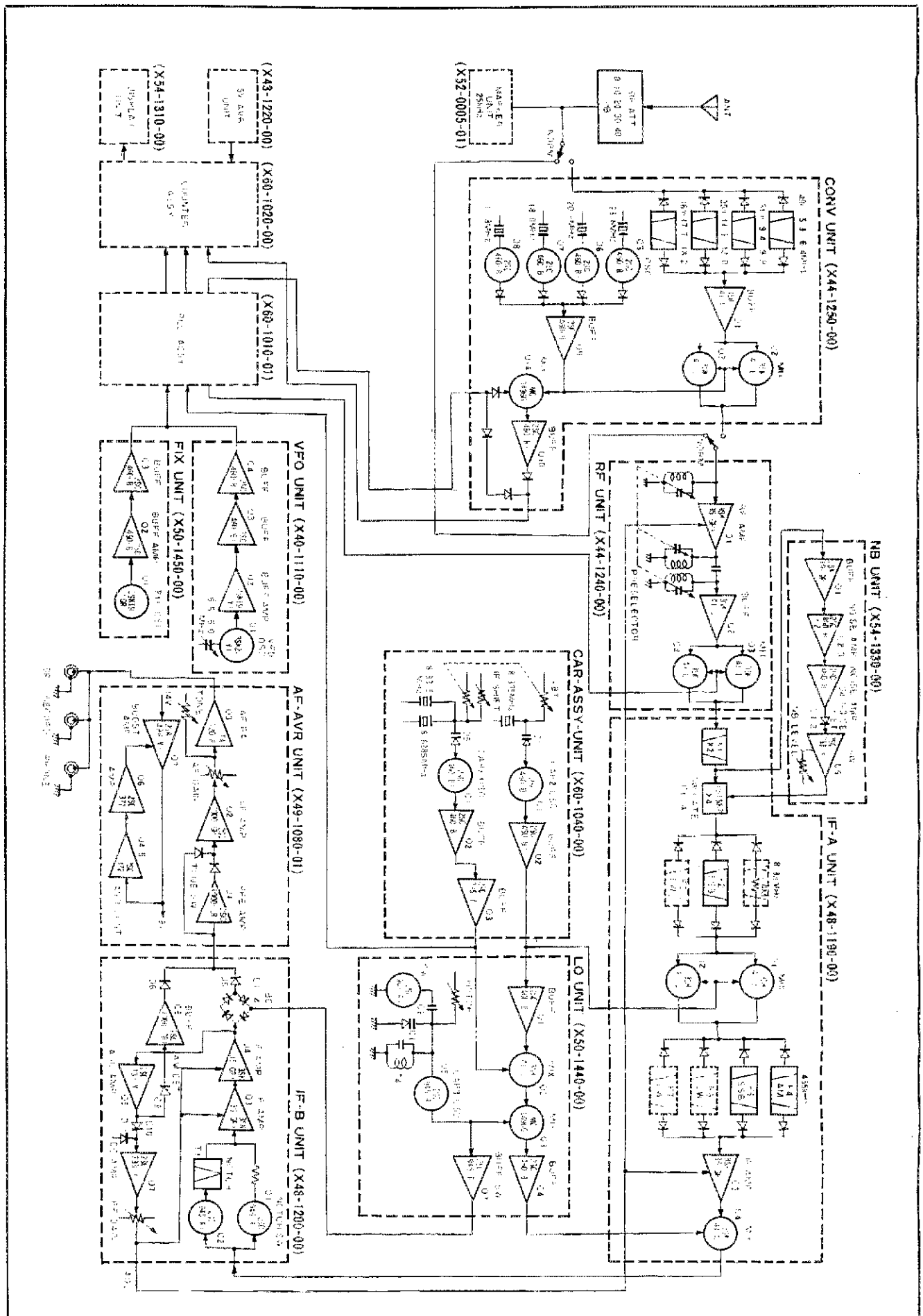


Fig. 1 — Block diagram of the R-820 as shown in the owner's manual.

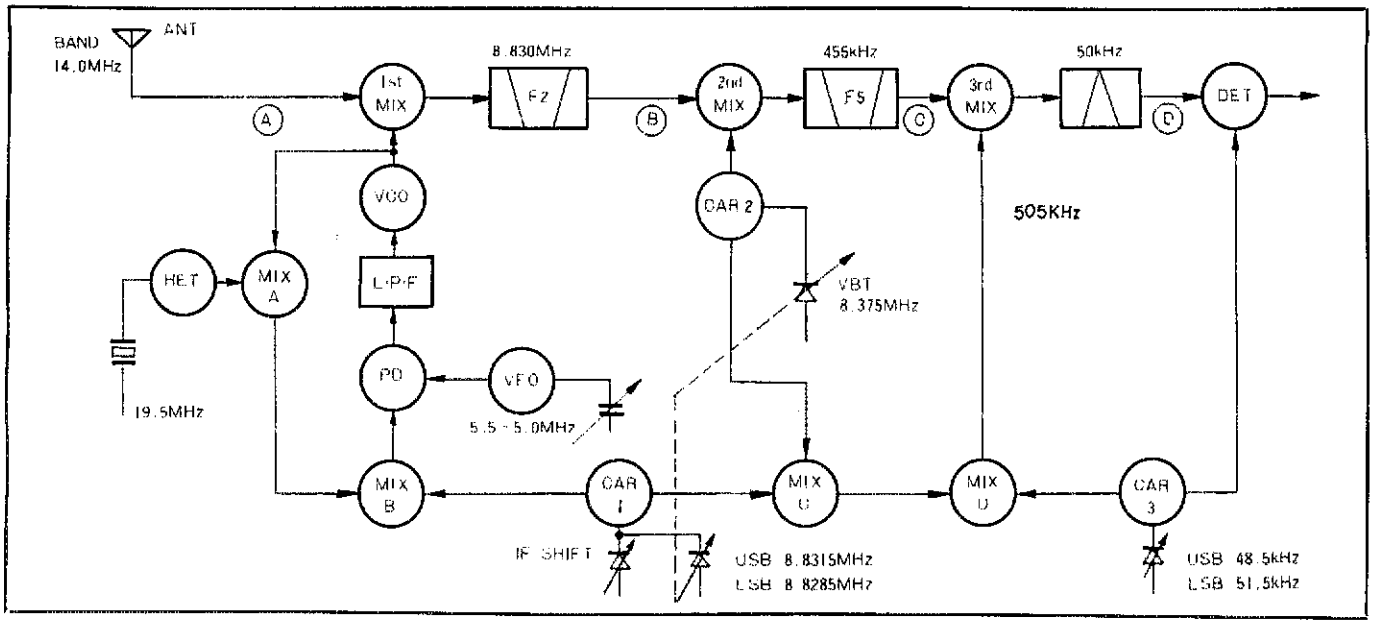


Fig. 2 — Simplified diagram of the conversion system used in the R-820, as shown in the owner's manual.

Trio-Kenwood R-820 Receiver Claimed Specifications

Frequency coverage:
1.8-23 MHz, 3.5-4.0 MHz, 7.0-7.5 MHz, 14.0-14.5 MHz, 21.0-21.5 MHz, 28.0-30.0 MHz.
Shortwave bands:
5.9-6.4 MHz, 9.4-9.9 MHz, 11.5-12.0 MHz, 15.0-15.5 MHz, 17.7-18.2 MHz.
Modes: Ssb, cw, a-m, RTTY.
Image rejection: More than 80 dB (SW bands more than 50 dB).
I-f rejection: More than 90 dB (SW bands more than 40 dB).
Selectivity: Cw (250 Hz) less than 250 Hz (−6 dB). less than 500 Hz (−60 dB) (Note 1);
cw (500 Hz) less than 500 Hz (−6 dB), less than 850 Hz (−60 dB) (Note 2);
ssb (2.4 kHz) less than 2.4 kHz (−6 dB), less than 3.9 kHz (−60 dB);
a-m (6 kHz) less than 6 kHz (−6 dB), less than 12 kHz (−60 dB).
Variable bandwidth: Cw (500 Hz) 150-500 Hz (−6 dB) (Note 3);
ssb (2.4 kHz) 600 Hz-2.4 kHz (−6 dB);
a-m (6 kHz) 4.3-6 kHz (−6 dB) (Note 4);
Note 1: optional filter YG-455CN installed;
Note 2: optional filter YG-455C installed;
Note 3: optional filters YG-88C and YG-455C installed;
Note 4: optional filter YG-88A installed.
Notch filter attenuation: Greater than 50 dB.
Frequency stability: Within 100 Hz during any 30-minute period after warm-up. Within 1 kHz during the first hour after 1-minute warm-up and within 100 Hz every 30 minutes thereafter.
Antenna impedance: 50-75 ohm unbalanced.
Af output: More than 1.5 W (8-ohm load, 10 percent distortion).
Af load impedance: 4-16 ohms for both speaker and headphone.
Power consumption: 120 V, 30 W ac; 13.8 V, 1.6 A dc.
Semiconductors: ICs: 40, FETs: 34, transistors: 89, diodes: 170.
Dimensions (HWD): 6 × 13-1/8 × 13-3/16 inches (152 × 333 × 335 mm) projections not included.
Weight: 26.4 lbs (12 kg).
Price class: $1100.

bands. On the contrary, we could count only four and that was with no antenna connected to the receiver! With the antenna connected, the spurious signals didn't move the S meter and were virtually undetectable. By the way, the S meter is calibrated in both S units and dB in terms of μV. This is particularly handy for giving out comparison reports since the dB scale of the meter is very linear and accurate.

Other features not mentioned thus far include the following: blue LED digital readout with accurate analog backup, transmit signal monitor, front-panel transceive/separate function switch, 25-kHz marker, standby switch, RIT control and RIT indicator, and connecting terminals for a tape recorder, phone patch, headphones and speaker. Also included are outputs for two i-fs (8.83 MHz for a panoramic display and 50 kHz).

Receiver performance tests, as outlined by Hayward,[1] were performed on the R-820 and yielded the following numbers: noise floor, −138 dBm; blocking dynamic range, 115 dB; and IMD dynamic range 84 dB. These tests were performed at 14 MHz. An additional set of tests completed at 3.5 MHz did not produce any significant differences. In actual use, the receiver performed every bit as good as the numbers suggest. In fact, the receiver appeared to be considerably "tighter" than the receiver in the TS-820 transceiver. This is no doubt attributable to the extra filters used in two different i-fs. Using the TS-820/R-820 combination hooked up for full-transceive operation results in a most flexible system. Operating the two units side-by-side left no doubt in this reviewer's mind which receiver he would reach for when the going gets rough. The difference is practically like night and day, as one would probably expect . . . the receiver alone sells for more than the transceiver!

For additional information on the R-820 contact Trio-Kenwood Communications Inc., 1111 West Walnut, Compton, CA 90220. — *Jay Rusgrove, W1VD*

[1]Hayward, "Defining and Measuring Receiver Dynamic Range," *QST*, July 1975.

TEN-TEC 544 HF TRANSCEIVER

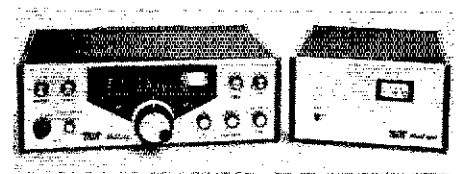
Here's a lightweight, reasonably compact, solid-state transceiver with digital display that is a model of simplicity in design and operation. Covering 80 through 10 meters (160-meter converter optional), the 544 has an output of 85 to 100 watts and features full cw break-in.

Transmitter adjustment is quick and easy because the conventional "dipping and peaking" technique is eliminated through the use of broadband networks. The one-step operation consists of increasing transmitter drive until an LED indicator begins to glow. This feature should be an important asset to the handicapped amateur. The panel meter serves a dual-purpose: It measures SWR on transmit and functions as an S-meter on receive.

Receiver incremental tuning (RIT) adds versatility to the 544. Actuation is indicated by an LED. This switch-activated circuit provides up to plus or minus 5 kHz in receiver tuning relative to the transmit frequency. This feature is beneficial when you are working several stations not exactly on the same frequency, or when a station responds to your CQ slightly off frequency.

The six easy-to-read 0.4-inch (10.16-mm) LED frequency readout digits are complemented by 1-kHz markers on the dial skirt. One revolution of the main tuning dial provides 25 kHz of frequency change.

The Ten-Tec 544 has an aluminum chassis and sub-panels. A lightweight aluminum case with cyolac (plastic) side panels encloses the rig.



The Ten-Tec model 544 shown here with power supply model 252M.

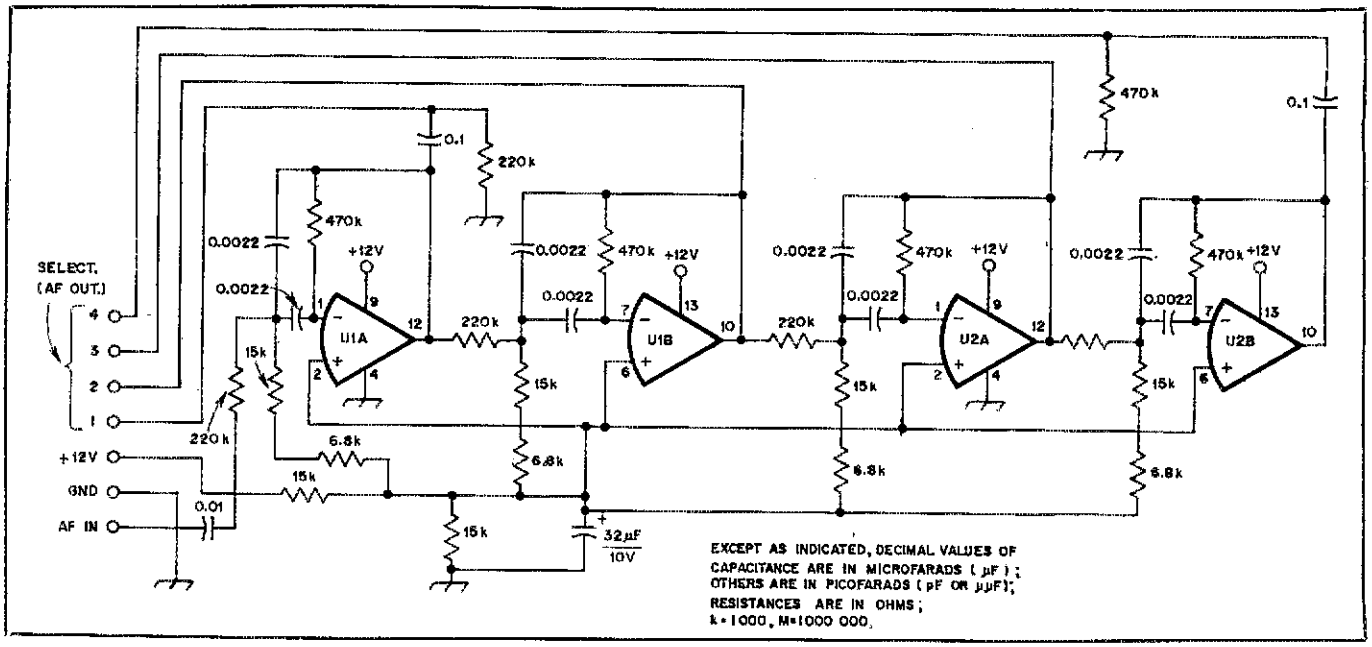
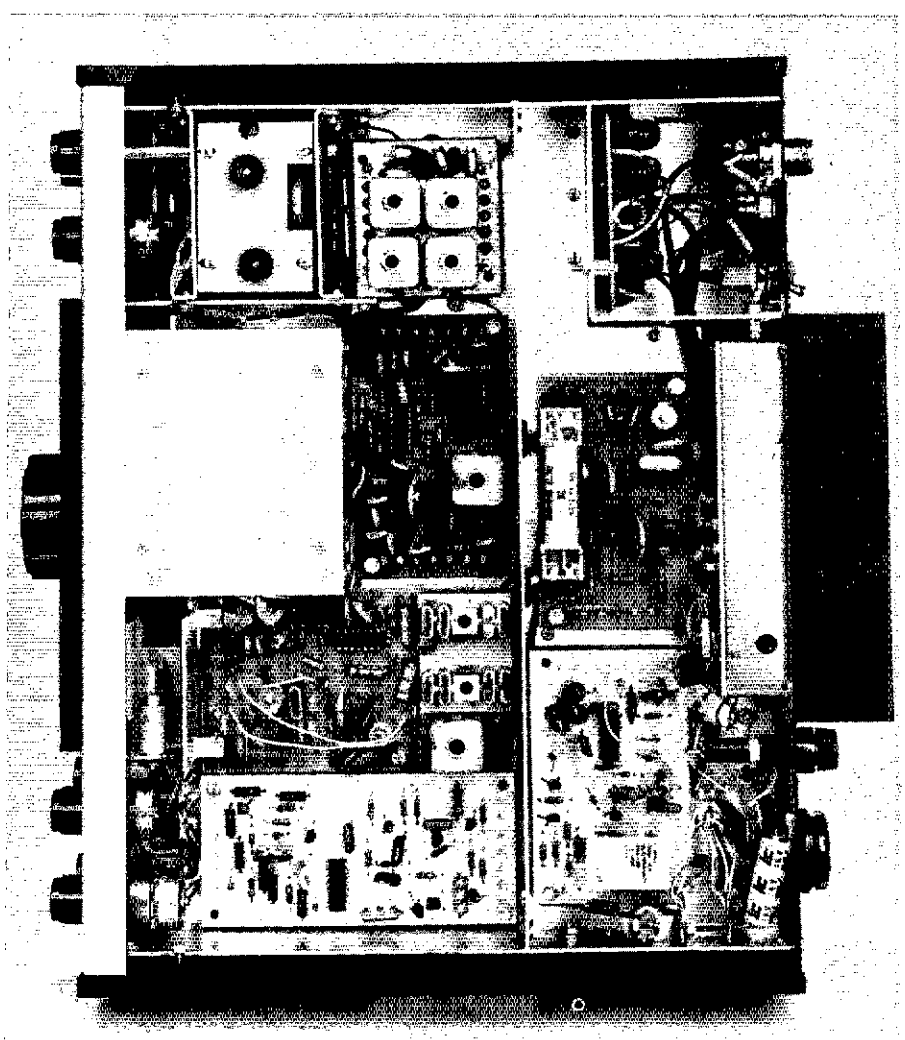


Fig. 3 — Schematic diagram of the Ten-Tec 245 RC active audio filter. All resistors are 1/4-and 1/2-watt close-tolerance composition types. All capacitors and resistors in the frequency-determining parts of the circuit are 5-percent tolerance. The 5-percent capacitors are polystyrene. The others are disk ceramic. The polarized capacitor is electrolytic. U1, U2 — 747 dual op amp.



When the top cover is removed, you can see much of the modular construction used inside the Ten-Tec 544.

Of the 18 pc boards, 10 are the plug-in variety. This should greatly facilitate any maintenance that might be necessary.

In order to prevent damage to the output transistors, the external power supply will shut down in excessive current situations, or when the SWR is higher than the recommended maximum of 3:1. This safety factor was inadvertently tested when the reviewers were tuning a home-built antenna for minimum SWR. Happily, no damage to the equipment resulted.

Transmitter spectral purity was tested in the ARRL laboratory with a spectrum analyzer. The results of the tests are displayed in the spectral photo.

Many positive comments concerning the quality of the signal were received while we were running the rig through its paces. It did not exhibit the audio "fuzziness" sometimes associated with commercial receivers. The transmitted ssb signal has "presence" and excellent quality, according to numerous reports received by W1FB while using the transceiver. A clean, well-shaped, chirp-free signal was reported during cw QSOs.

The rig was used for several days without the optional RC active audio cw filter, but QRM was often difficult to work through. The audio filter is a compact plug-in module which required only 10 minutes to install. It features a 150-Hz bandwidth centered at 750 Hz. It especially proved its worth during operation on the noisy Novice portion of 40 meters. It also reduces wide-band noise during receive. The circuit for the Ten-Tec RC active filter is presented in Fig. 3. One of the interesting features of this filter is the availability of four selectivity levels, even though the 544 provides only a "full in" or "out" choice.

The filter has four active poles, U1A, U1B, U2A and U2B, as shown. The pc board is set up with four end terminals to which a suitable switch can be connected for obtaining the various degrees of audio selectivity desired. Each of the solder terminals is connected to the

Ten-Tec 544 Specifications

Dimensions (HWD): 4.5 × 13.6 × 13 inches (114 × 346 × 330 mm).
Weight: 12 lbs (5.44 kg).
Power requirements: 12 to 14 V dc at 1 A on receive, 2 A on standby-transmit, 18.5 A maximum transmit.
Receiver audio power: 1 watt at less than 2 percent distortion.
Semiconductors: 65 transistors, 38 diodes, 14 ICs.
Price class: $875 (transceiver), $150 (power supply).
Manufacturer: Ten-Tec, Inc., Sevierville, TN 37862.

output of a different filter pole. Those who aren't fearful of degrading the resale value of the 544 may wish to add a switch to permit the use of all four selectivity levels.

Two 747 dual op amps are used as the active devices in the filter. Good stability is assured by virtue of the polystyrene capacitors used in the frequency-determining portions of the circuit. These capacitors also provide the high Q needed for proper filter performance. There is no reason why this Ten-Tec accessory cannot be used with other types of receivers, provided it is installed at some low-level point in the audio channel, and that 12 volts at a few milliamperes is available.

RC active audio filters are a worthwhile addition to any receiver, even if a narrowband i-f type of cw filter is employed. The audio filter helps to eliminate the wide-band noise which originates after the i-f filter, thereby enhancing the receiver signal-to-noise ratio.

Available as accessories are the following: ac power supplies (model 262M with VOX and 252M without VOX), dc circuit breaker for mobile operation (model 1140), noise blanker (model 249), remote VFO (model 242), crystal oscillator for six fixed frequencies (model 241), 160-meter converter (model 240), 10-meter crystals for 29.0-29.5 MHz (model 212) and 29.5-30.0 MHz (model 213), RC active audio cw filter (model 245), and ceramic microphone (model 215P).

An overall impression of the Ten-Tec 544 transceiver is good. It is functional, easy to operate, lightweight and performs well. Because of its size and weight it should make an excellent portable rig. A carrying handle is not provided, but would be a welcome addition. — *Dave DeMaw, KA1BUQ and Doug DeMaw, W1FB*

CUSHCRAFT ATV VERTICAL HF ANTENNAS

With the increasing urbanization throughout the world, limited-space antennas are receiving a great deal of attention. For ease of assembly, erection and operation, it's hard to beat a trap vertical. After a couple of months on the air with the ATV-5, this reviewer concluded that trap verticals can be very effective performers, too.

Cushcraft manufactures three hf verticals: the ATV-3 covering 20, 15 and 10 meters, the ATV-4 covering 40, 20, 15 and 10, and the ATV-5, which features at least partial coverage of 80 through 10 meters. Designed for roof, mast or ground mounting, these antennas are constructed of telescoping aluminum tubing and weather-resistant traps. The traps are prewound of heavy-gauge copper wire on fiberglass forms for maximum efficiency. The antennas operate as electrical quarter-wavelength monopoles on all bands. The traps isolate the radiating sections, and also provide distributed loading on the lower bands, resulting in a maximum antenna height of only 28 feet (8.6 m) on 80 meters. The trade-off, of course, is reduced frequency coverage on that band. About 75 kHz may be covered within the 2:1 VSWR specification. This should not be construed to mean the antenna isn't *useable* over the entire band, for it certainly is. If one has a Transmatch or a transmitter with a flexible output network, good results can be had over all of 75 and 80 meters. If this type of operation is contemplated, we recommend assembling the antenna to resonate at the low end of the band. In the phone segment, the small extra loss from standing waves on the transmission line will be at least partially offset by the reduced ground system loss with the higher radiation resistance associated with the greater length. (See Gibilisco, "What Does Your SWR Cost You?" *QST*, January 1979.) A capacitance hat provides top loading for increased bandwidth on 40 meters.

Assembly is very simple, thanks to the clear, well-illustrated instructions. One would have to be extremely slow to take more than 30 minutes putting one of these together. The instruction booklet has a table of dimensions for the various segments of each band. By interpolating, one can scale the antenna for the cw section of one band and the phone section of another. The "center" dimension is adequate for full coverage of all bands except 40 and 80 meters on the ATV-5. Cushcraft claims 240-kHz bandwidth on 40 meters with the ATV-4. Unlike some other verticals, the ATV series features slotted tubing sections with circumferential clamping. This method of joining provides the low-resistance connections necessary for high radiation efficiency, as well as allowing repeated length adjustments. Although it appears several times in the instruction booklet, the following warning bears repetition: *Never erect an antenna where there is a possibility of it contacting the utility wires.*

The performance of the ATV-5 is surprisingly good. The antenna was ground mounted on an image plane of 11 radials. One of these was 60 feet long and the others were 25 to 30 feet long. No doubt a proper ground system would have enhanced the efficiency and low-angle radiation, but parting the New England soil in the dead of winter is no small feat. Parachute-cord guys provided additional stability in high winds. Using 100 watts of output power, we received good signal reports on 20 meters from Australia, Japan and Siberia. St. Helena was worked on 40. Much to our amazement, considering the marginal ground system, even 80 meters produced DX. Several contacts were made with eastern Europe on this band. We didn't spend too much time on 15, but the antenna was reliable for contacts with Europe and the U.S. West Coast. The results on 10 meters were less impressive, with Texas representing the hottest DX worked. We attribute this to the generally poor antenna location. There are numerous automobiles and concrete and steel buildings within a few wavelengths of the radiator. On the lower bands, at least some of the radiation emanated from the higher sections. Also, the comparison is a little unfair, because ssb was used exclusively on 10 meters. Our activity on the other bands was mostly cw, which has a significant DXing advantage at the 100-watt power level. We are confident that the high-band performance would have been superior if the antenna had been roof mounted. The proximity of the utility wires precluded erecting the full 28 feet on the roof. Later on, we intend to mount the 20-, 15- and 10-meter section on the roof where it can do the most good.

Cushcraft ATV-5 Vertical Antenna Manufacturer's Claimed Specifications

Overall height — cw: 28' 4" (8.64 m), phone: 24' 9" (7.54 m).
Wind surface area: 1.49 sq ft (0.139 sq m).
Assembled weight: 8.5 lbs (3.9 kg).
Maximum mast diameter: 1-3/4" (44 mm).
Frequency coverage (MHz): 28.0-29.2, 21.0-21.5 14.0-14.4, 7.0-7.3, 3.5-4.0.
SWR bandwidth (2:1): 80 m — 75 kHz*, 40 m — 160 kHz,* 20 m — 500 kHz,* 15 m — 500 kHz,* 10 m — 1.0 MHz.*
Input impedance (nominal): 50 ohms (takes PL-259 connector).
SWR (at resonance): 1.5:1 or less.*
Power handling capacity: 2000 watts PEP.
Element material: Hard-drawn aluminum tubing.
Trap materials: 1/8-inch (32-mm) wall fiberglass tubing with enameled copper wire coils.
Price class: $110.
Manufacturer: Cushcraft Corporation, P. O. Box 4680, Manchester, NH 03108.
*Confirmed by ARRL measurements.

Vertical antennas tend to pick up more man-made noise than horizontal ones. It is unfortunate that the urban environment which dictates the use of limited-space antennas such as verticals also generates more noise. In extremely noisy areas it may be advantageous to use a miniature low-noise antenna for receiving (see DeMaw, "Beat the Noise with a Scoop Loop," *QST*, July 1977, and "Low-Noise Receiving Antennas," *QST*, December 1977) and restrict the vertical to transmitting duty.

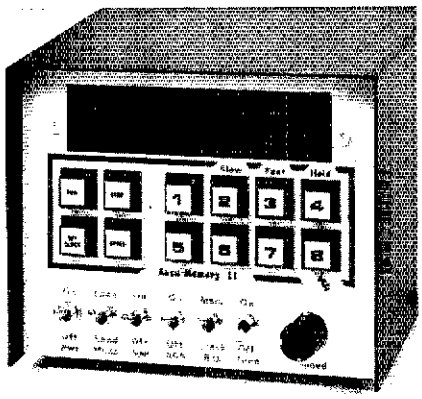
The radiating elements of the ATV series have no rf chokes in the bases, so the user may want to install one for lightning protection. Such a choke could be wound on a large ferrite toroid core, and should have about 500 ohms of reactance at the lowest working frequency. Use the heaviest possible wire for the winding. Hose clamps can be used to attach the choke across the base insulator. No choke was used in the reviewer's installation because there are several grounded structures nearby which are taller than the antenna. In any case, the feed line should be disconnected from the station equipment when the antenna is not in use.

One final word of caution: Like all multiband antennas, trap verticals have little inherent rejection of harmonics. With modern transmitters of good design, the harmonic suppression should be sufficient, but it is wise to make tests with other competent amateurs to ensure compliance with FCC regulations.

The ATV-5 is an important part of the modest antenna farm at W1RN, where a horizontal directive array at an effective height is out of the question. Where economics are concerned, it may be a most cost-effective system at any location. — *George Woodward, W1RN*

ACCU-CIRCUITS ACCU-MEMORY II KEYER

A few years ago, the Accu-Keyer was introduced to Amateur Radio and it soon became one of the most popular keyers on the air. Later, memory capability was added and we



The Accu-Memory II keyer shown from the front. The digital display is located behind the dark window. All controls are on the front panel; the rear apron contains the jacks, line cord, fuse holder and an enclosure to hold the optional batteries.

had the Accu-Memory. Now we have the Accu-Memory II. This new keyer is an Accu-Keyer with a six-digit, 24-hour clock, digital speed readout and *twice* the memory capacity of the original Accu-Memory. The Accu-Memory II comes only in fully assembled form, and is in the $230 price class. Since many people reading this review will be familiar, at least to some extent, with the first Accu-Memory, only the additions will be discussed here.[1]

The Accu-Memory II contains eight 512-bit memory locations. In other words, the first four sentences of this review will roughly fill the memory. Any time the unit is plugged in, the memories receive power — regardless of the position of the on/off switch. Also, user-supplied batteries (three 1.5-V size AA) may be installed in the unit to retain the memories in the event of loss of ac power.

As mentioned earlier, the six-digit readout will indicate time, memory address, or speed. A three-position switch located on the front panel determines whether the readout indicates the time, memory address, or both. In the latter case, memory address is shown when a message is being loaded or sent, and the rest of the time the clock output is displayed. Pushing a front-panel button will cause the speed to be read out momentarily. This is true whether or not code is being sent.

The red LED readouts are 3/10-inch high, and are located behind a red Plexiglas panel. The LEDs are somewhat difficult to read when exposed to bright light, and some "background" is evident. While this should not be noticed in most stations, it did present problems when we tried to photograph the unit. For this reason, the LED display was blacked out.

Having a clock built into the keyer saves space that an operating-position clock would normally take. Another user-supplied battery (standard 9-V transistor) may be installed as a backup power source for the clock. If and when ac power is interrupted, the Accu-Memory II clock automatically switches to an internal crystal oscillator for its time base.

The Accu-Memory II is attractively housed in a metal enclosure approximately 4-1/4 × 5-1/4 × 12 inches HWD (108 × 133 × 305 mm) and weighs 4.25 lbs (1.93 kg). It comes with a well-written instruction manual that also contains information on how to make any desired modifications, a complete parts layout, and schematic diagram.

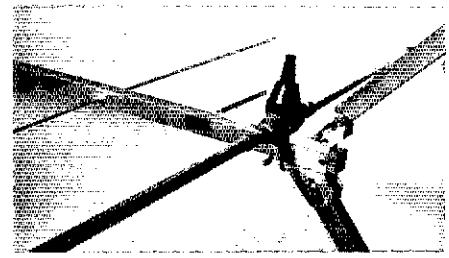
Speed range of the Accu-Memory is approximately 6 to 50 wpm. Power requirements are 117 V ac, 10 watts. The unit has proved to be insensitive to rf at this writer's station where rf input power levels up to 1 kW and tuned feeders are used. In fact, operation of the Accu-Memory II has been flawless since the unit was first plugged in. I'll hate to send this one back. For more information, write to Accu-Circuits, P. O. Box 13287, Orlando, FL 32859. — *Jim Westbrook, K1FD*

TONNA F9FT 144/16 2-METER YAGI ANTENNA

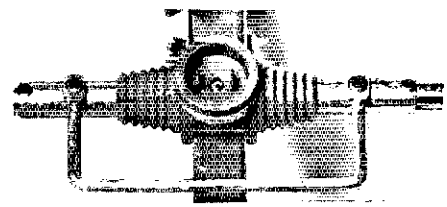
With the market for Amateur Radio equipment rapidly becoming a world market, the reputation of a new imported product sometimes precedes it. Such is the case with the F9FT 144/16 16-element, 144-MHz antenna. It was widely used in Europe before its introduction into the U.S. and first attracted attention on this side of the Atlantic when four-bay systems began to be used successfully by European moonbouncers. It was only last year that U.S. distribution of the French-made antenna began in earnest.

The 144/16 is designed for the 144-146 MHz band (146-148 MHz is not available to amateurs in Europe) and is intended for horizontal polarization. Its construction and appearance are quite different from American-made antennas. On the 50-ohm version being distributed here (the 75-ohm version is more popular in Europe), the driven element is a beta-matched split dipole. No balun is used. The feed-line connection is made with two clips such as are commonly used for electrical connections in automobiles. The connection is made inside a weatherproof boot. When the feed line is installed according to instructions, no feed-line radiation is evident, judging by the very deep nulls off the side of the antenna and the lack of rf in the shack. The configuration of the 13 directors is reasonably conventional; however, the reflector arrangement is a departure from the norm. Instead of one in-line reflector the 144/16 uses *two* reflectors, one above and one below the plane of the other elements. Presumably the designers have found the resulting performance to be worth the mechanical problem of mounting elements in this fashion.

Materials used in the antenna appear to be of very good quality. The elements are made from solid aluminum-alloy rod and are mounted *through* the square boom using aluminum hardware. Many purchasers will appreciate the fact that the boom-to-mast bracket accepts masts up to two inches in diameter; there is nothing more frustrating than to assemble your shiny new vhf antenna only to discover that it is designed to mount on a piece of thin TV mast! There is a boom support, made of the same material as the boom, which provides for a sturdy 21-foot-long (6.4 m) assembly weighing less than 10 pounds (4.5 kg). The construction of the antenna should be more than a match for a New England winter, and the test antenna has already ridden out one moderate ice storm without so much as a slightly bent element. Mind you, the antenna won't *work* while carrying a load of ice; no long-boom vhf Yagi will. The 1979 VHF Sweepstakes proved that to many of us in the Northeast! But at least it will survive so you can enjoy it between ice storms.



The rear section of the F9FT 16-element Yagi boom. At right, the two boom sections that branch out from the main boom are used to support the two reflector elements. Note the feed-point hardware and element-to-boom mounting method.



A close-up view of the F9FT feed point. The plastic piece in the center of the photo insulates the driven element from the boom. Hairpin matching is used, and the connector is a pair of "automotive type" male spade lugs located inside the recessed area of the center insulator. A rubber boot slips over the feed line and snaps over the lip on the insulator, making a tight, weatherproof seal.

Rating the performance of an antenna is a risky business, especially when it is not possible to run a long series of instantaneous comparisons between similarly sited antennas. However, because the 144/16 is mounted in the same position as a 56-element array reviewed last October, some comparison is inevitable. First of all, the larger array undoubtedly had more gain and its main lobe was much sharper. Those looking for the last fraction of a decibel on 2 meters will do well to use some form of stacked, multiple-antenna system in preference to a single Yagi. On the other hand, the 144/16 can share tower space with a rather large hf antenna, something which was out of the question with the larger array. Also, there are times when the broader pattern of the single Yagi is a blessing, such as in contests and when calling CQ; too sharp a pattern can result in missed contacts. The first test of the 144/16 came during the Perseids meteor shower on August 12, when five contacts were made with Midwestern stations without prior scheduling. A larger array might not have been as productive.

The Tonna F9FT 144/16 is distributed by Texas RF Distributors, Inc., 4800 W. 34th St., Suite D-12A, Houston, TX 77092. The 144/16 is in the $80 price class. — *David Sumner, K1ZZ*

[1]The original Accu-Memory appeared in *QST* as a feature article. Below is a list of a few of the articles pertaining to this popular design.

Garrett, "The WB4VVF Accu-Keyer," *QST*, Aug. 1973

Garrett and Contini, "The Accu-Memory," *QST*, Aug. 1975.

Garrett, "Enhance the Performance of Your Accu-Memory," *QST*, July 1976.

A complete bibliography of articles pertaining to the Accu-Keyer is available from ARRL Technical Information Service for an s.a.s.e.

Hints and Kinks

IC-245 MEMORY SAVER

Unless the ICOM-245 is permanently connected to a 12-V source, it requires reprogramming of the offset and resetting the frequency each time power is removed and reconnected. That's a bit of a nuisance in a mobile installation.

A solution is to use a NiCad battery pack which will recharge when power is connected to the radio. The simple circuit shown in the accompanying drawing will hold the memory if power is connected to the radio for three or four hours every two to three days.

The 8.75-V battery is made up of seven AA NiCad cells in series. Proper care and feeding of NiCads must be used to ensure that both the charging current and voltage are regulated. In this circuit, current is regulated by the no. 47 pilot lamp. The 9.1-V Zener diode holds the charging voltage at a safe four percent over the battery terminal voltage. D1 and D2 are small silicon blocking diodes. D1 is required to prevent battery leakage back into the 12-V circuits in the IC-245 if the power switch is left on with the external 12-V power removed. D2 is necessary to prevent 12 V from the radio bypassing the current regulator when external power is applied to the rig.

By using this circuit, fully discharged cells will draw an initial maximum 120-mA charge, dropping rapidly to 40-50 mA which will gradually taper to 3-5 mA when the battery is fully charged. If your operating habits will permit a longer charge cycle (six to eight hours) or if you don't remove the external power for very long periods, a no. 53 pilot lamp substituted for the no. 47 will cut the charge rate approximately in half.

The battery pack and charging circuit are housed in a battery holder for eight size AA cells, Radio Shack part no. 270-387, with the three diodes and pilot lamp mounted in the unused space for the eighth cell. This pack fits neatly inside the IC-245/SSB at the rear of the ssb adapter. Fm-only versions of the IC-245 will require external mounting or perhaps the use of one of the new 7.5-V NiCads (packaged in a 9-V case) with appropriate changes in the charging circuitry. — *John F. Smith, W3JF, Warminster, PA*

ETCHLESS PRINTED-CIRCUIT BOARDS

Most home-constructed electronic projects now have ICs, transistors and R, L, and C components mounted on printed-circuit boards. The parts generally are inexpensive enough. Results are just short of being sensational. However, the task of making and etching the boards is a messy one that many of us could do without. An alternative is to grind away the unwanted copper with a high-speed hand tool.

A Dremel Moto-Flex model 232 tool, a no. 189 cutter, a no. 60 drill and 1/8- and 1/32-inch collets will do the job. The accompanying photograph shows a TTL crystal marker made the etchless way where the board was prepared while I was relaxing on the patio in the afternoon summer sun — no hot plate, no sink and no spilled ferric chloride. The penciled template is also shown.

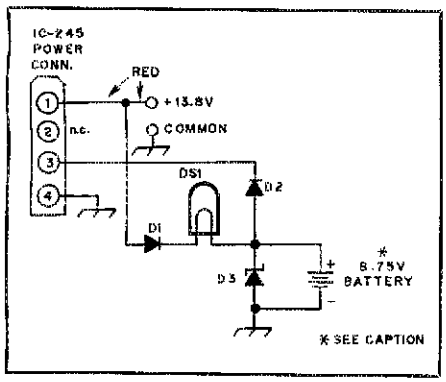
To prepare a board in this manner, obtain the required circuit diagram and the parts. Make a full-scale penciled layout on 10 × 10 squares-to-inch graph paper. Place the DIP pins on the intersections of the grid lines. The area of the to-be-removed copper is located on horizontal and vertical straight lines. Next, using a Vector 10 × 10 perfboard as a template, drill no. 60 holes for the DIP ICs on a blank board of appropriate size. Tape the penciled layout on board. View the sunlight through the board for correct alignment of IC pins. Place carbon paper under the penciled layout and transfer the layout to the foil. All that remains, then is to grind away the unwanted copper, drill remaining holes, insert the components, solder them in place and test.

I do suggest that before grinding the unwanted copper you take time to practice on scrap printed-circuit board material. I hold the tool as if it were a felt pen, making the cutting strokes from right to left. Then I reverse the board 180 degrees and restroke the cut, a procedure that gives more uniform results. For cuts between the IC pins, simple "eyeballing" works well, much to my surprise. Solder bridges between IC pins are virtually nonexistent, apparently the result of the slight undercutting into the board material.

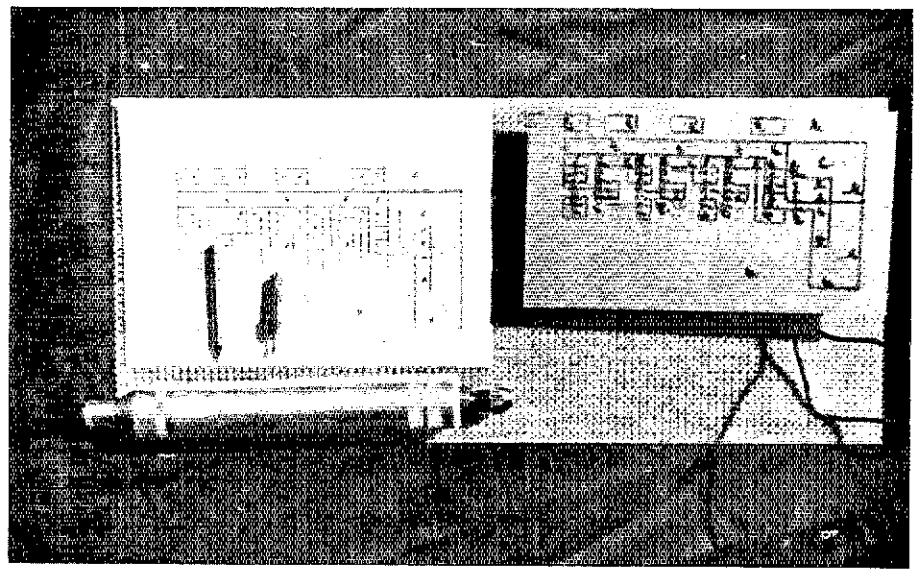
So far, I have not experimented with a motor-speed controller or other types of cutters, nor have I tried a drill-press attachment. Nevertheless, with the procedure outline here, I'm now completing more home-constructed projects, with less effort and a maximum of fun. Why fool around with a hobby if it isn't fun? Now, please pass the sunburn lotion. — *J. S. Reddie, W7KJ, Seattle, WA*

CW SIDETONE FOR THE SB-301, SB-303 AND SB-401

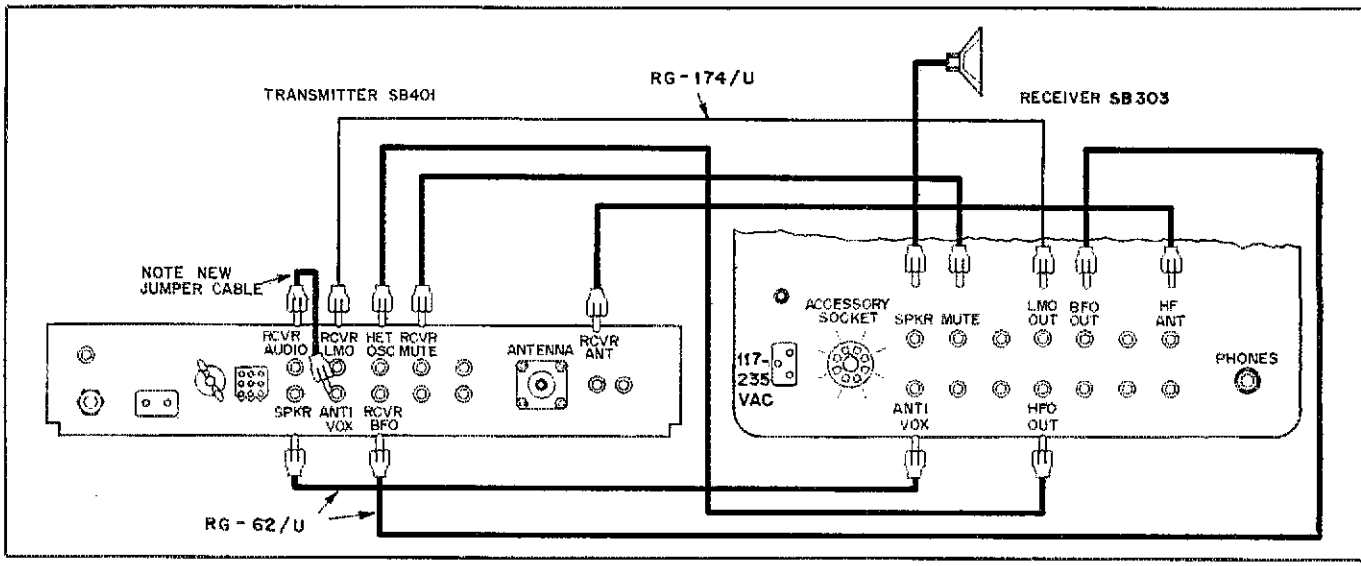
How many times have you wished you could feed the cw sidetone signal from your SB-401 to your headphones and at the same time have your speaker disabled? By making the simple cable changes shown in the accompanying



Use of a NiCad power supply like this one will avoid reprogramming of the offset and resetting the frequency of the IC-245 transceiver each time the main power source is removed and reconnected.
BT1 — Seven AA NiCad batteries in series, Radio Shack no. 23-125 or equiv.
D1, D2 — 1N4005 silicon diodes, Radio Shack no. 276-1101 or equiv.
D3 — Zener diode, 9.1 V, 1 watt, Radio Shack no. 276-562 or equiv.
DS1 — No. 47 pilot lamp, 6.3 V, 150 mA.



A completed crystal marker is shown on the left along with the full-scale penciled layout, perfboard, Moto-Flex hand piece, cutter and no. 60 drill. No etching is required to make this board. See "Etchless Printed-Circuit Boards."



Alternative connections to obtain cw sidetone from headphones when using the SB-301, SB-303 and SB-401.

schematic diagram, the cw sidetone can be heard in the headphones or speaker depending upon which you desire. To have the sidetone on the headphones only in the case of the SB-303, just pull out the speaker disabling switch. To have the sidetone on the headphones only in the case of the SB-301, just plug the headset into the headphone jack. — *Dave Poplewski, WB8DZR, Dowagiac, MI*

SEMI-AUTOMATIC CW WITH AN ELECTRONIC KEYER

There are several reasons why some operators still prefer a semi-automatic mechanical key, such as the Vibroplex Bug, over a fully automatic keyer. Some call letters and contest exchanges seem easier to copy when certain dahs are given increased emphasis. Many operators like to use shorthand cw characters like a long dah followed by a dit for the number nine or an extended dah to represent zero.

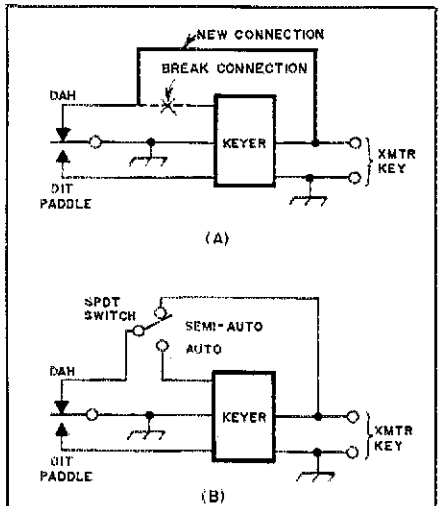
Changing the speed of the mechanical semi-automatic key from fast to slow and back between exchanges, however, is cumbersome. It is much easier to twist a speed-control knob on an electronic keyer than to adjust weights on the mechanical key. Furthermore, an electronic keyer eliminates the critical adjustments necessary for sending a string of well-formed dits on the mechanical unit. An alternative is to modify an electronic keyer for semi-automatic operation. By making this change the operator may obtain the advantages of the electronic keyer while avoiding the disadvantages of the mechanical unit.

Diagram A shows how virtually any electronic keyer and paddle can be wired for semi-automatic operation. The only limitation is that both the keyer paddle common and the transmitter keying input common must be connected to ground.

Diagram B shows how a switch can be added to the circuit for selection of either automatic or semi-automatic operation. The spdt switch can be mounted on a piece of plastic which can be drilled for support by the paddle terminals.

Neither of these circuit configurations require any internal modifications to the keyer. The keyer monitor circuit will not be functional for dahs with these configurations. However, this is not a problem generally because Bug users usually have other means of monitoring their sending. In order to preserve full monitoring capability within the keyer, the operator must examine the keyer circuit to find an internal point for dah paddle connection when semi-automatic operation is desired.

If the keyer has a tune feature, this can provide a clew to the location of a connection that will preserve full monitoring capability. The tune function is sometimes actuated by grounding an internal point. In this case, try the hot side of the tune function switch. Some keyers have an input for an external straight key. This input can also be tried for the dah paddle connection. The internal circuit point that I use on the Autek MK-1 keyer is at Q13, pin 3. When tapping into an existing circuit with an external connection, some degree of protective buffering in the form of a series diode or small r choke is recommended. I might add that a con ventional single-lever paddle will feel more lik a bug than the newer dual-lever iambic pad dles. — *Tony Arnold, K6MC, Encinitas, CA*



Electronic keyer connections for semi-automatic operation. The spdt switch in circuit B offers a choice of automatic or semi-automatic operation. See monitoring information in text.

W1FB ADVICE SOLVES TVI PROBLEM

We are particularly gratetul to Doug DeMaw, W1FB, for his product review on the Kenwood TS-520S (May 1978 *QST*). The advice he provided solved a burdensome TVI problem that plagued TV reception in the homes of three of our neighbors. One neighbor was especially uncooperative and downright disrespectful.

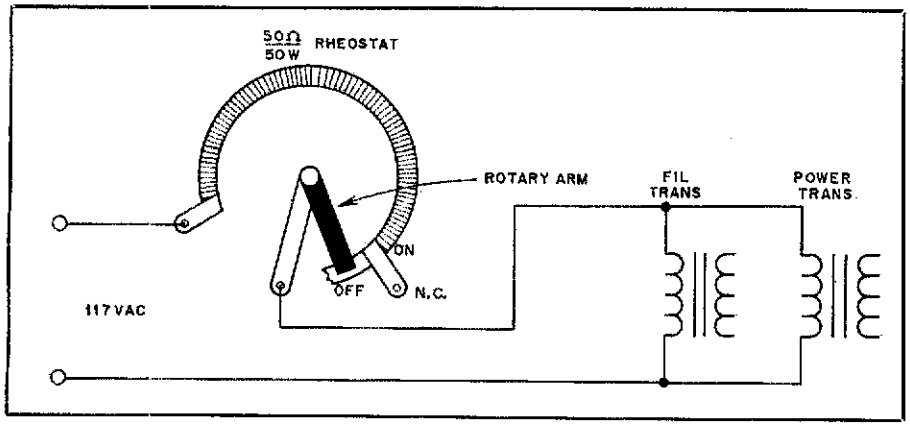
I had read thousands of words on TVI including the FCC's new TVI brochure before coming across the W1FB review. We followed Doug's recommendations to the letter except for the lead to the blower. That we shielded with aluminum foil, which in turn was grounded to the screen. Next, high-pass antenna filters were added to the TV sets. In one case replacing an alligator antenna clip with a direct connection between the twin-lead and the antenna terminals noticeably reduced the interference.

We now enjoy operating our TS-520 with no worries about TVI. Therefore, we'd like to suggest that all transceiver and transmitter operators experiencing such interference problems read Doug's review. — *Phil Hartz, WDØFFX and Bonnie Hartz, WDØHHB, Aberdeen, SD*

FOR THE SB-220

☐ I think all SB-220 owners will benefit from and enjoy W1KAY's article (February 197 *QST*) on the SB-220. My observations concerning failure of 3-500Z tubes, used in this amplifier, may be of additional help to some of the owners.

The base-pin seal of the 3-500Z is fragile. No lateral pressure should be exerted on the pins nor should this type tube be rocked to get it into or out of the socket; otherwise the seal may be damaged. A break in the seal is likely to result in a plate-to-grid arc which in turn may cause a burned-out rf choke. If a 3-500Z does



W3MJ controls the inrush of filament current to his SB-220 by the use of an Ohmite type J rheostat as shown in this drawing.

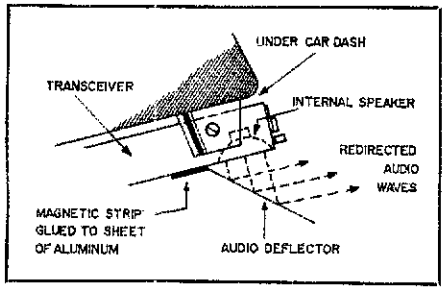
not enter the socket easily, then adjust the contacts in the socket. In the event a 3-500Z fails to operate properly, check for chipped glass or a crack.

Furthermore, I suspect that inadequate base cooling may contribute to shortened tube life. For that reason, I do *not* advise reducing the fan speed. — *Charles Solie, WB5LHV, Houston, TX*

☐ Several years ago I installed a stand-by/operate switch on my SB-220. To avoid a depreciation of resale value, this switch can be installed within the area covered by the name plate. The plate can be removed and the switch mounted. At resale time, one just has to remove the switch and replace the name plate in order to restore the appearance. — *Ed Rolek, K9SQG/8, Dayton, OH*

☐ WIKAY's article "Upgrading Your SB-220 Linear Amplifier" brought to mind my simple method of controlling the "inrush" of filament current to my amplifier tubes. It also serves to protect the high-voltage diode rectifier string.

I use an Ohmite type J, 50-W, 50-Ω power rheostat as the *off-on* switch. There *is* an off position. The time taken to turn the knob to *on* gives all the protection needed. The end contacts and the rotor arm seem to handle full legal power. Ganged dual rheostats would probably be best for use with a 240-V transformer. — *Pete Marsh, W3MJ, Monroeville, PA 15146*



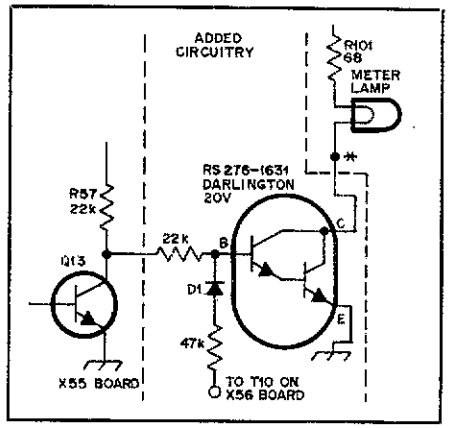
K3FOD uses an aluminum deflector plate below the loudspeaker of his 2-meter transceiver for improved audibility when operating mobile. The plate is glued to a magnetic strip that permits the deflector to be removed at will. Use of the plate prevents sound waves from being absorbed by the carpeting in his vehicle. High-frequency sounds can thus be heard more clearly.

STATUS LIGHT FOR THE 7400A

Having become accustomed to a status light on previous equipment, I decided to add one to my Kenwood 7400A. Several local amateurs have expressed interest in this modification, suggesting that perhaps other *QST* readers may wish to try it.

This simple circuit uses an inexpensive Radio Shack Darlington pair, RS 276-1631. A package of 10 sells for about $2. D1 is a 1N4004 silicon diode.

With this modification, the meter lamp will be illuminated only when a carrier is being received and when the transmitter is on. It is not illuminated while monitoring. — *Norman Herman, W7UJF, Scottsdale, AZ*

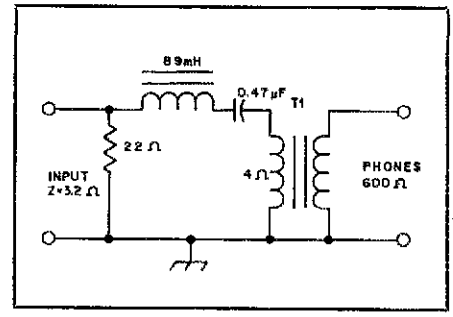


A simple modification for the Kenwood 7400. It provides a status light that is illuminated only when a carrier is being received or when the transmitter is on. D1 is a 1N4004 silicon diode. Resistances are in ohms.

ANOTHER VERSION OF FRANK NOBLE'S FILTER

I absolutely agree! The cw filter designed by Frank Noble (November 1977 *QST*), modified by W4AMN (August 1978 "Hints and Kinks"), is truly a gem. In my case, inasmuch as I wanted to feed my 600-ohm Telex no. 1210-04 phones, I incorporated a matching audio transformer at the output of the filter as indicated in the accompanying diagram.

Because of the difficulty of obtaining an



This modification of Frank Noble's cw filter (November 1977 *QST*), developed by EA3PI, permits the use of 600-ohm Telex phones with the filter. Circuit changes include the use of an output transformer, T1, and a 22-ohm resistor that reduces background noise without noticeably attenuating the signal.

88-mH toroid, I wound a coil on the best ferrite miniature transformer core I could find. The wire size was the largest that could be both adjusted and yet fill the core sufficiently to obtain 89 mH. The proper amount of inductance was determined with the aid of a Marconi bridge. The series configuration, consisting of the inductance L1 and the capacitor C2, furnishes the desired resonant frequency.

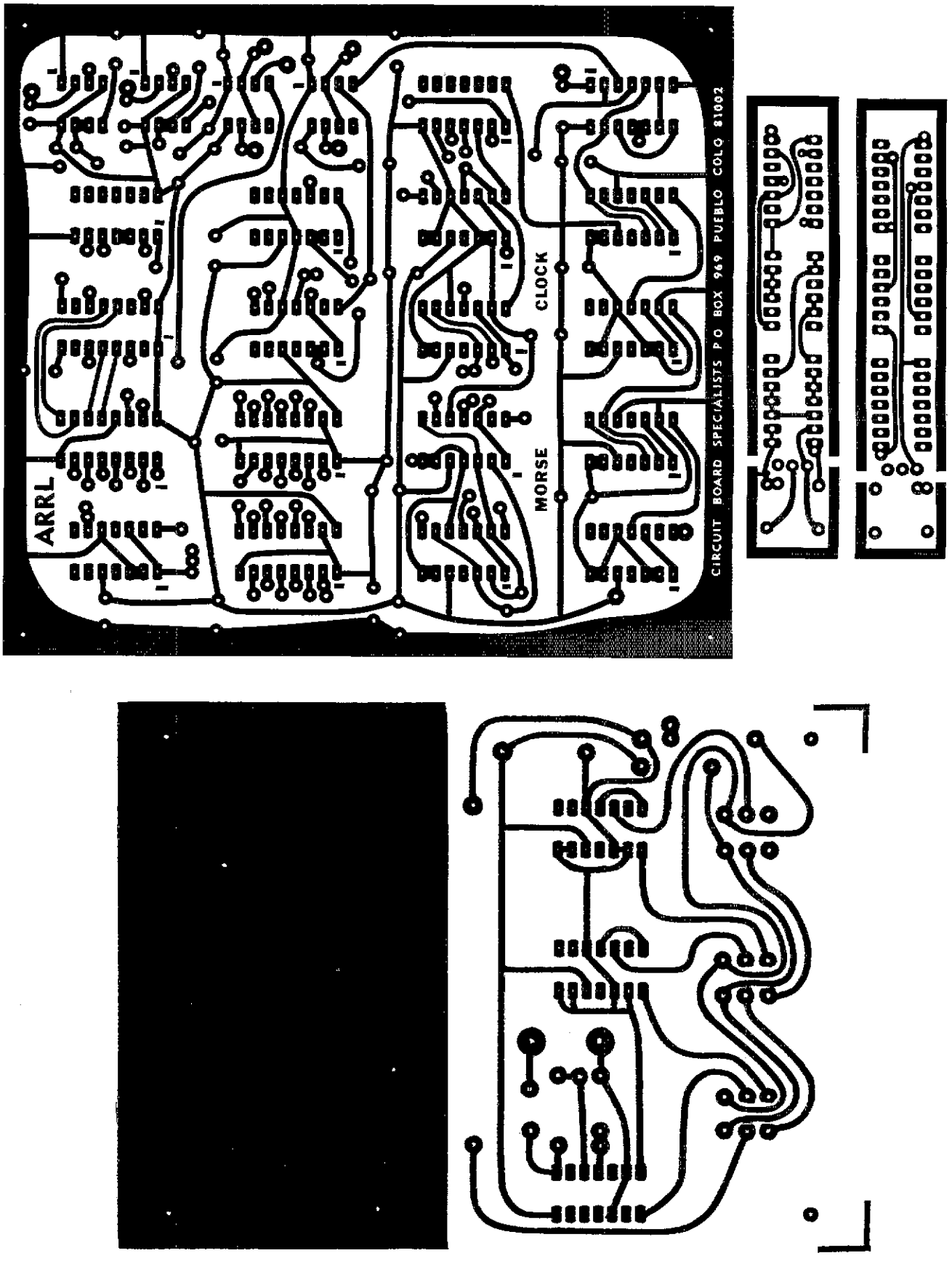
During tests, I found that a 22-ohm resistor between the filter input and ground notably reduced background noise without appreciably attenuating the signal. My version of Frank's filter easily fits in the control box of my rig. Performance is remarkably good. There is a sounding release upon receiving a cw signal at the 400-Hz frequency of the i-f filter in my Drake R-4C. Careful tuning of the receiver is required. — *Juan Aliaga Arqué, EA3PI, Barcelona, Spain*

REMOVING PILOT LAMPS

Bayonet pilot lamps recessed deep in fixtures frequently resist removal and break or twist out of the bases. The following procedure avoids this problem. Use a piece of firm rubber tubing of about the same diameter as the lamp to wobble the lamp loose. Press inward on the lamp (if corroded and tight, a drop of lubricant will help loosen it) and then apply counterclockwise torque while wobbling it in a clockwise orbit. This will walk the lamp out of the bayonet lock and enable it to be lifted out. — *Charles C. Littell, Jr., ex-W8KTL, Engineering Associates, Arcanum, OH*

MORE ON THE WB1AJD/WB1AJE ANTENNA

The construction plans for the V antenna shown in "Hints and Kinks" (January 1978 *QST*) immediately caught my eye. To make the 15-meter version, I used scrap 2 × 4s cut to 1-1/4-inch (32-mm) widths and I also enlarged the center plate. The crossarms were secured to the plate with 1/4-inch (6-mm) furniture-assembly tee nuts. These nuts are not readily found in hardware stores, but may be obtained at upholstery supply companies. For the sake of durability, some reinforcing of the center of both crossarms and the boom has been applied to my antenna. With this V I've worked both coasts from my QTH and have received good RST reports from stations in both directions. — *John Hacker, WDØDQS, Kansas City, KS*



Etching patterns for projects in this issue of *QST*. Black represents copper; the patterns are shown at actual size. The two large boards are single sided (copper on one side only); the upper pattern is for the digital Morse-code clock (see the parts layout in Fig. 6, page 37), and the lower pattern is for the Simple Crystal Calibrator (see Fig. 2, page 39). These patterns are shown from the foil side of the board. The two small patterns represent foil on the front and back of the double-sided board for the TTL Logic Probe (Fig. 2, page 23). The pattern on the right represents the side on which the components are mounted.

International News

Conducted By Bruce Alan Johnson* WA6IDN

Another Meeting with the Chinese . . .

The government of the People's Republic of China has long known of the benefits of the Amateur Radio Service. Since the nation's turn outward late last year, the Chinese have taken several opportunities to talk with the International Amateur Radio Union (IARU) about the Service. (See, for example, March 1979 *QST*, page 57.)

Observers of Sino affairs, however, are quick to point out that the Chinese will bring their country onto the air on their own schedule, and on their own terms. Most probably, they will start along the lines followed in the beginning by the Eastern European nations: licensing clubs and school stations, rather than a large number of individual applicants.

There has for years been great emphasis by the Chinese on the participation of the general population of China in simple but needed scientific enterprises. For example, China has a widespread program of simple seismological observation posts scattered in villages throughout the country. The information collected by the villagers contributes significantly to the country's earthquake warning system.

The technological training potential of the Amateur Radio Service is by no means lost on the Chinese. During the ITU Region III Seminar held recently in Sydney, Australia, the Chinese delegates were notably enthusiastic upon being presented with one of the Project Goodwill receiver kits. With the average Chinese per capita income standing at roughly $274 a year, Project Goodwill offers not only an effective means of providing equipment for small club and school stations, but simple technical training as well.

Once again the atmosphere of the ITU Seminar (as it was in the Special Preparatory Meeting in Geneva in 1978 and the Special Seminar for Africa and the Middle East in 1979) was observed to be especially friendly to the Amateur Service. Officers and members of the Wireless Institute of Australia (the IARU member-society) hosted a reception for the 156 delegates — most of whom represented developing countries in Region III (the region comprising non-Soviet Asia, Australia and the Pacific nations). Promotional literature was made available to delegates; a continuous 5-1/2-minute video tape on Amateur Radio was played. The tape, prepared by VK5KG, stressed involvement of young people in the Service. It reportedly drew considerable attention from the representatives of the developing countries.

Will the People's Republic of China be on the air soon? We think so. But it will be their own people who will be allowed to transmit at first. This is the way it should be. One promising sign: The Association of Radio Sport of the People's Republic of China was formed recently in Peking. They have notified ARRL/IARU headquarters of their election of a slate of officers.

Keep a patient ear open: Perhaps we'll soon hear a 20-meter cw signal from Qinghua University in Peking — or from wherever the Chinese authorities decide to try the receiver and companion transmitters. QST

*International Services Officer, ARRL

Delegates from the People's Republic of China discuss the Project Goodwill receiver kit presented to them during the ITU Region III Seminar held in Sydney, Australia. (l-r) Mr. Sui Hongliang; Michael Owen, VK3KI (director, IARU Region III Association); an interested onlooker; Mr. Liang Shi; Mr. Nie Banggno. *(photo by Australian Photographic Agency)*

Delegates from the developing countries of Region III were delighted with the Project Goodwill receivers on display at the ITU Seminar. *(photo by Australian Photographic Agency)*

WARC Countdown

Conducted By David Sumner,* K1ZZ

HF WARC Proposals Leave Room for Optimism

While the World Administrative Radio Conference does not open until September, the translation and distribution of conference proposals is such a big job that the ITU requested all administrations to submit their proposals by the end of January. Not all administrations were able to comply. As noted in "League Lines" last month, the U.S. did not get its proposals for allocations below 27.5 MHz to the ITU until April. Even now, quite a number of administrations have not completed their work.

Since February, however, the ITU has been distributing documents in a steady stream, making it possible to reach some tentative conclusions about the issues which are likely to be addressed during WARC-79. At this writing, the allocations proposals of 43 administrations have been circulated (including one joint proposal representing the views of six Arab nations). A single set of documents is already almost six inches thick; before the conclusion of the conference in December, a complete set of documents in one language is expected to have nearly 20,000 pages! Simply identifying all the issues of interest to the Amateur and Amateur-Satellite services is a formidable task.

As an international organization accredited by the ITU, the International Amateur Radio Union receives several copies of the conference documents. These are distributed throughout the world to members of the IARU WARC team who will be present in Geneva as observers during WARC-79. The team members already are hard at work analyzing the proposals.

The 43 allocations proposals which have been distributed are summarized in the accompanying bar graphs. As you can see, to date 13 countries have proposed a new Amateur Service allocation in the vicinity of 10 MHz, nine in the vicinity of 18 MHz, and 10 in the vicinity of 24 or 25 MHz. There is not a single proposal which would adversely affect the 21-MHz band; five would expand the band by 50 kHz. There are only two proposals, those of Saudi Arabia and the U.S.S.R., which would adversely affect the 14-MHz band. The Saudi proposal is for domestic sharing of the top 100 kHz of the band (and the 1.8- and 7.0-MHz bands) with the Fixed and Mobile services. In other words, Saudi Arabia is asking that it be permitted to assign fixed and mobile stations within its borders to frequencies within the band, without having to protect amateur stations from interference. The U.S.S.R. proposes that the Fixed Service share 14.25-14.35 MHz worldwide, as it already does within the U.S.S.R. (Some other countries propose deleting the footnote which permits the U.S.S.R. Fixed Service operations.)

The 10-meter band (28-29.7 MHz) is not shown on these bar graphs because the ITU uses 27.5 MHz as a dividing line between those frequencies which are generally useful for long-range ionospheric propagation and those which are not. Another reason is that only one country, the People's Republic of China, has made a proposal which would affect the band in any way. China proposes that the Mobile Service be added, *secondary* to the Amateur and Amateur-Satellite services. This status would mean that stations in the Mobile Service would have to operate in a manner so as not to cause harmful interference to amateurs.

The proposals of Saudi Arabia, the U.S.S.R. and China would be harmful to the interests of radio amateurs worldwide, and the IARU team will work to line up opposition to them. However, it is fair to say that if these are the most serious threats posed to 20 and 10 meters, these two important bands are in very good shape, indeed!

Below 10 MHz the picture is somewhat more complex, as may be seen from the graphs. There is a further complication because the meaning of the graphs is somewhat different below 4 MHz than above. Between 4 and 27.5 MHz, the chart shows proposals for *worldwide* allocations. This is in line with the realities of propagation at these frequencies. As a general rule, sharing on a regional basis is avoided in this range in order to minimize interference problems. However, below 4 MHz inter-regional interference is less of a problem; it is quite common for allocations to be different in the three Regions. To show how the proposals of each administration affected other Regions below 4 MHz would have greatly complicated the graphs without providing much useful information. Therefore, below 4 MHz, the graphs show the proposals of an administration *for its own Region*.

Top-band buffs can take heart from some of the proposals emanating from Region 1. At the present time, there is no Region-wide, 160-meter amateur allocation there. However, the following footnote applies (country names are from 1959):

> In Austria, Denmark, Finland, Ireland, Netherlands, the F.R. of Germany, Rhodesia and Nyasaland, United Kingdom, Switzerland, Czechoslovakia, and the Union of South Africa and Territory of South-West Africa, administrations may allocate up to 200 kHz to their amateur service within the band 1715-2000 kHz. However, when allocating bands within this range to their amateur service, administrations shall, after prior consultation with administrations of neighbouring countries, take such steps as may be necessary to prevent harmful interference from their amateur service to the fixed and mobile services of other countries. The mean power of any amateur station shall not exceed 10 watts.

Some other administrations in Region 1 permit limited amateur operation in parts of the band if interference is not caused to stations operating in accordance with the Table of Frequency Allocations. There already appear to be at least 14 votes in favor of some form of Region-wide allocation, and more support is known to exist. The U.S.S.R. and Poland do not propose a Region-wide allocation, but propose to add themselves to the list of countries in the existing footnote.

At both 160 and 80 meters, some countries advocate narrower, exclusive amateur bands in preference to the shared bands we now have. U.S. and Canadian amateurs seldom think of the bands as being shared, because in both countries it is national policy to assign no nonamateur stations to the bands (with the exception of 160-meter Loran-A, which is soon to come to an end). However, in much of the rest of the world, the bands are heavily occupied by nonamateur stations, and many amateurs overseas would much prefer a narrower band if protection from interference was part of the deal. Of course, from the amateur viewpoint, the best way to solve the dilemma is to provide exclusive allocations *within* the present shared bands, as proposed at 80 meters by the U.S. and several European countries.

A proposal such as Argentina's, to make the 80-meter amateur band exclusive but half its present width, deserves some explanation. When a band is shared by two or more coequal services, such as the 3.5- to 4.0-MHz band in Region 2, each administration has the option of making some, all or none of the band available to each of the services. Typically, agreements are reached with neighboring countries on how the band will be used. In making its proposals, Argentina cited such an agreement, dating back to 1951, between the countries of southern South America. This agreement provides 3.5-3.75 MHz for amateurs and 3.75-4.0 MHz for fixed and mobile stations, thus separating the services and reducing the possibility of interference between them. Argentina made a similar proposal at the last general WARC in 1959 to bring the rest of Region 2 into line with its domestic allocations. Thus, the proposal does not mean that Argentina necessarily opposes continued amateur operation in North America in the 3.75- to 4.0-MHz band; after all, these operations are unlikely to cause interference to fixed and mobile stations thousands of miles away. If Argentina has been experiencing such interference, then its WARC-79 delegation probably will be instructed to press for separate, exclusive allocations for the different services. If not, then the delegation is unlikely to object to continuation of the *status quo* at the high end of the band. This is a good reason why we should avoid interfering unnecessarily with other services in our shared bands.

Not surprisingly, the situation at 7 MHz is one of the most difficult to straighten out. Outside Region 2, where the band is now 7.0-7.3 MHz, amateurs generally have only the bottom 100 kHz; above 7.1 MHz the allocation is to broadcasting. Outside Region 2, only one country — Papua New Guinea — supports an

*Assistant General Manager, ARRL

Amateur Service allocation above 7.1 MHz, and quite a few propose that the Region 2 allocation be cut to create a worldwide broadcasting band! There is some support for an extension of the amateur band *below* 7 MHz. While interference from broadcasting places serious limits on the usefulness of the band in Region 2, it is still better to have the shared allocation above 7.1 MHz than to have no allocation at all. This point will have to be made on behalf of Region 2 amateurs.

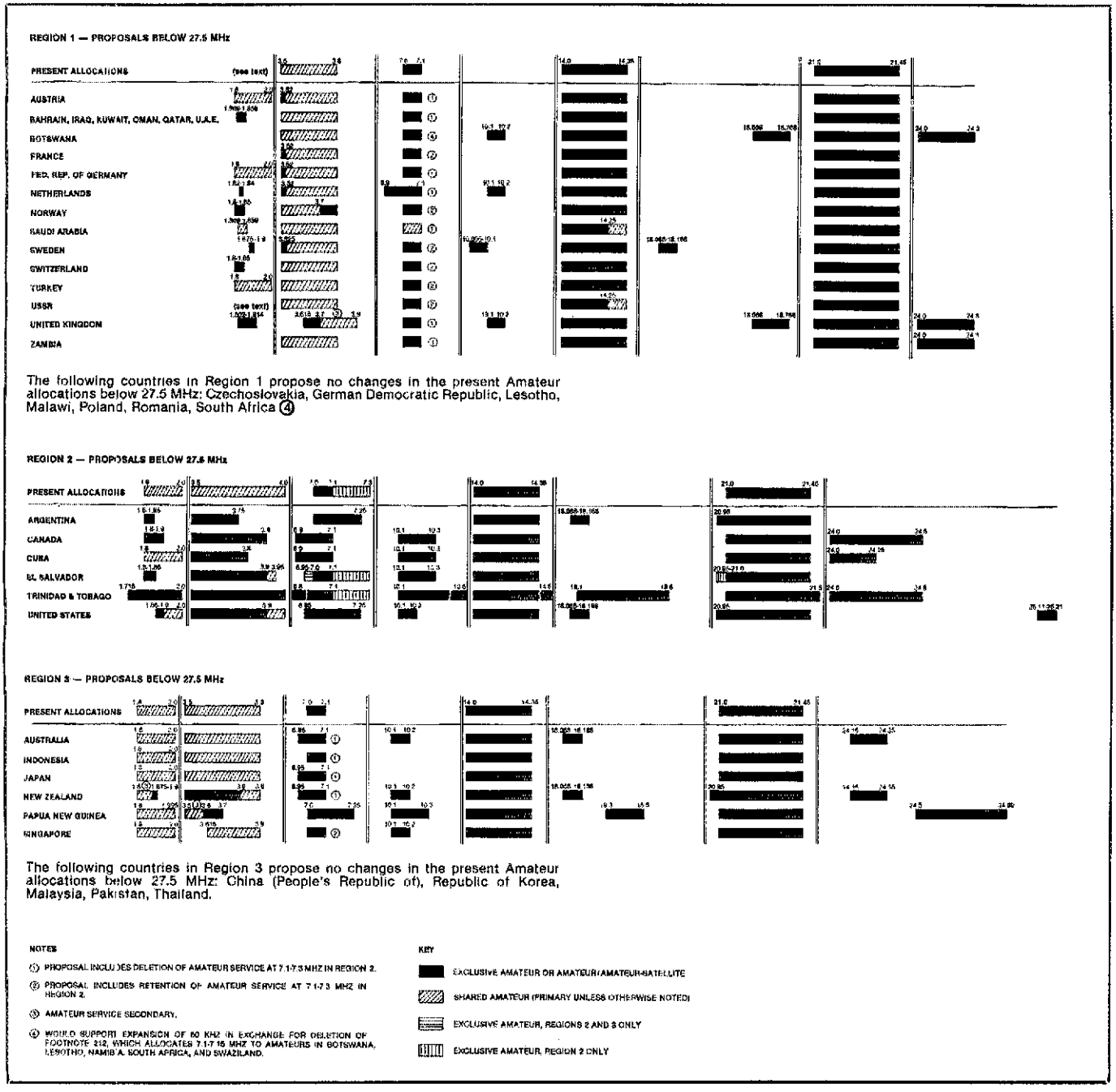
Finally, in the interest of completeness, it should be noted that two administrations are proposing a low-frequency allocation in the vicinity of 190 kHz for amateurs: Trinidad & Tobago and Papua New Guinea. In fact, these two countries are the most supportive of the Amateur Service in their respective Regions. The Trinidad & Tobago proposals, in particular, leave very little to be desired. The next time you work a 9Y4 or a P29 station, congratulate them for having such strong support from their governments!

220 MHz: Safe from Maritime?

Amateurs were dismayed when the final FCC proposals for WARC-79 included a new sharing partner in the 220- to 225-MHz band (February *QST*, pages 9 and 55). As submitted to the ITU in January, the U.S. proposals call for a new Maritime Mobile Service at 216-225 MHz, with the Amateur Service sharing 220-225 MHz on a secondary basis.

In all the other proposals we have seen, there is not a single one which agrees with the U.S. on this issue. In all of the discussion which has taken place with other administrations since the proposal was made, no overseas support for it has surfaced. It is reasonably safe to say that the proposal is going nowhere, and that the U.S. delegation realizes this.

There is always a slim possibility that the issue, which now appears to be dead, might be resurrected during the course of the conference. For now, however, those of us who are concerned about the future of the 220-MHz band can direct our energies toward increasing the level of activity in the band. In some parts of the country, this effort already has been reasonably successful. Overall, however, we have a long way to go if we are to retain the allocation in the long run in the face of pressure from competing services.



The following countries in Region 1 propose no changes in the present Amateur allocations below 27.5 MHz: Czechoslovakia, German Democratic Republic, Lesotho, Malawi, Poland, Romania, South Africa ④

The following countries in Region 3 propose no changes in the present Amateur allocations below 27.5 MHz: China (People's Republic of), Republic of Korea, Malaysia, Pakistan, Thailand.

NOTES

① PROPOSAL INCLUDES DELETION OF AMATEUR SERVICE AT 7.1-7.3 MHZ IN REGION 2.

② PROPOSAL INCLUDES RETENTION OF AMATEUR SERVICE AT 7.1-7.3 MHZ IN REGION 2.

③ AMATEUR SERVICE SECONDARY.

④ WOULD SUPPORT EXPANSION OF 50 KHZ IN EXCHANGE FOR DELETION OF FOOTNOTE 212, WHICH ALLOCATES 7.1-7.15 MHZ TO AMATEURS IN BOTSWANA, LESOTHO, NAMIBIA, SOUTH AFRICA, AND SWAZILAND.

KEY

EXCLUSIVE AMATEUR OR AMATEUR/AMATEUR-SATELLITE

SHARED AMATEUR (PRIMARY UNLESS OTHERWISE NOTED)

EXCLUSIVE AMATEUR, REGIONS 2 AND 3 ONLY

EXCLUSIVE AMATEUR, REGION 2 ONLY

WARC Proposals as they would affect the amateur bands below 27.5 MHz.

Moved and Seconded...

MINUTES OF EXECUTIVE COMMITTEE
MEETING No. 374
April 21, 1979

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 0901 EST on April 21, 1979, at the Headquarters offices of the League in Newington, Connecticut. Present: President Harry J. Dannals, W2HD, in the Chair; Vice President Victor C. Clark, W4KFC; Directors Gar Anderson, KØGA, Max Arnold, W4WHN, Richard A. Egbert, W8ETU, and Larry E. Price, W4RA; and General Manager Richard L. Baldwin, W1RU. Also present as observers were Vice Presidents Noel B. Eaton, VE3CJ, and Carl Smith, WØBWJ; Directors Don Miller, W9NTP, William Stevens, W6ZM, John Sullivan, W1HHR, and Stan Zak, K2SJO; General Counsel Robert M. Booth, Jr., W3PS, Assistant General Manager David Sumner, K1ZZ, Communications Manager John Lindholm, W1XX, and Washington Coordinator Harold Steinman, K1FHN.

The General Manager presented to the Committee a report on actions taken on Board directives since the January 1979 meeting.

After discussion, on motion of Mr. Egbert, the staff was directed to file comments in response to Minute 44 of the January Board meeting (re KZ5 call signs) no later than May 15.

After discussion, on motion of Mr. Arnold, voted that no formal action be taken at this time with reference to the Mary Lewis suit.

On motion of Mr. Price, voted that no formal action be taken at this time with respect to membership in the Personal Communications Foundation.

On motion of Mr. Price, voted that Price Waterhouse be named auditors for the American Radio Relay League for the year 1979.

The Committee affirmed its mail vote instructing the staff to file on Docket 78-365 (FCC Quiet Zone).

On motion of Mr. Clark, voted that the Orange Section SCM election be affirmed and made the subject of an explanatory letter by the President to all members of the Orange section.

On motion of Mr. Arnold, the staff was directed to file comments in response to RM 3317 (requesting a hobbyist license on frequencies adjacent to 28 MHz) and 3299 (requesting exclusive ssb assignments for CB operations in the vicinity of 27 MHz), based on the initial staff draft as modified by comment of the Executive Committee.

On motion of Mr. Price, voted that the budget submitted to the directors by the General Manager on March 19th be adopted.

On motion of Mr. Egbert, the Committee recognized the names of 918 individuals who had recently been elected to Life Membership in the League, and directed the General Manager to list their names in *QST*.

On motion of Mr. Clark, the Committee approved the affiliation with the League of the following Amateur Radio societies: Acton-Boxboro ARC, Boxboro, MA; Amateur Radio Club of Loudon, Loudon, TN; Anoka County Radio Club, Fridley, MN; Association of Wilmington ARE, Wilmington, DE; Baltimore ARC, Inc., Baltimore, MD; Bethel Amateur Radio Klub, Bethel, OH; Black River ARC, Bangor, MI; Champaign-Urbana Repeater Group, St. Joseph, IL; Datapoint Amateur & Tech Assn., San Antonio, TX; Dauberville DX Association, Reading, PA; Delaware County ARA, Southeastern PA; East Alabama ARC, Auburn, AL; Eastern Ohio Amateur's Assn., St. Clairsville, OH; Exxon ARS Tiger Chapter, Baton Rouge, LA; Free State ARC, Fruitvale, TX; Frosty Network, Denver, CO; Gleason Employees ARS, Rochester, NY; Hannibal ARC, Hannibal, MO; Hope Valley Repeater Assn., No. Kingston, RI; Hopkins County ARC, Nortonville, KY; Illiana Repeater System, Inc., Catlin, IL; Issaquah ARC, Issaquah, WA; Japan America ARS, La Mirada, CA; Keuka Lake ARA, RFD Urbana, NY; Lakes Region ARC, Moultonboro, NH; Lakeway ARC, Morristown, TN; Lanphier High School ARC, Springfield, IL; Manhattan-Ave of the Americas RC, New City, NY; Milacron ARC, Cincinnati, OH; Mississippi State Univ. ARC, Mississippi State, MS; Monsignor Farrell High School ARC, Staten Island, NY; Muscle Shoals ARC, Muscle Shoals, AL; Ohio College of Applied Science ARA, Cincinnati, OH; Onalaska Wireless Assn., Onalaska, WI; Oswegatchie Valley ARC, Oswegatchie, NY; Oxford County ARC, Delhi, ON, Canada; Radio Amateurs of the Gorge, Hood River, OR; Radio Amateur Teletypist Soc., Minneapolis, MN; Racal-Milgo ARC, Miami, FL; Shrewsbury High Amateur Radio Club, Shrewsbury, MA; Star & News ARC, Indianapolis, IN; State Line ARC, Hobbs, NM; Tamaqua Penna Transmitting Soc., Tamaqua, PA; University of Rochester ARC, Rochester, NY; Vermilion ARC, Ely, MN; Vermont Technical College ARC, Randolph Center, VT; W6YL ARC, San Jose, CA. (With this action the League now has 1777 Category I affiliated clubs, five in Category II, and 329 in Category III.)

On motion of Mr. Arnold, the Committee approved the following convention dates: Alabama State, May 19-20, 1979, Birmingham, AL; Oklahoma State, July 27-29, 1979, Oklahoma City, OK; Saskatchewan Province, July 27-29, 1979, Moose Jaw, SK; North Florida Section, August 4-5, 1979, Jacksonville, FL; Kentucky State, September 29-30, 1979, Louisville, KY; Delta Division, June 7-8, 1980, Senatobia, MS; New England Division, October 3-5, 1980, Boxborough, MA; Pacific Division, August 30-September 1, 1980, San Jose, CA; Pacific Division, May 15-17, 1981, Fresno, CA.

During the course of the meeting the Committee discussed, without formal action, the matter of tax-exempt status in the Town of Newington, the distribution of *QST* on tape by the Library of Congress, the 1979 National Convention program, the RFI Task Group, the Greenbank/Sugar Grove Quiet Zone, the possible date of the next meeting of the Executive Committee, new publication titles to be released during 1979, a mailing to non-members, fund-raising, the presently encouraging financial picture of the League, the hiring of additional personnel in the Club and Training and the Technical Departments, the Communications Act rewrite hearings, the League's court brief in the linear amplifier ban, the problems relating to call signs, and an article on zoning for *QST*.

During the course of the above the Committee was in recess from 1056 to 1107, from 1156 to 1218 and from 1230 to 1244.

There being no further business, the Committee was adjourned at 1517.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

LIFE MEMBER APPLICANTS
April 21, 1979
List 1

Louis C. Abbott, Jr., WA5SRQ; Ronald J. Abeare, K8UFX; James I. Adams, W4MER; Ronald E. Adams, WB2YZS; Anthony G. Alateras, W5USO; James T. Alexander, K6PKG; Ronald H. Allen, WA1NGR; John Amaniera, WA2JWJ; Roland A. Anders, K3RA; Christopher Anderson, WB5EEF; David M. Anderson, WA6KHH; F. A. Anderson, VE7ADA; James A. Anderson, K1JA; Larry Dwaine Anderson, WB7BZB; V. C. Angell, WA3WVT; Steven R. Antiel, WDØHDY; Paul T. Antos, WB2ABD; Gonzalo A. Aponte, WD5BJJ; William H. Arnott, WD8BBW; Otto M. Arnquist, W5NT; Robert A. Ashurst, WB6AZK; Fred W. Atkinson III, WB4AEJ; John E. Bagwell, W4DQK/W5ZYR; C. Dwight Baker, W4IJY; David R. Baker, WB4AJL; Teade J. Bakker, VE3IFI; Columbus Baldo, A16S; Edith E. Baldo, KB6P; Brian Neil Baldwin, WB3BIT; James B. Bamberg, K4UBF; Iamissky Lee Banks, WB4BQK; Walter R. Barfield; David Barker; Charles L. Barkely, WB4CBZ; Lewis M. Barnard, Jr., W2KIM; William H. Barnes, Jr., WBØNSQ; Lynn C. Barnica, KB5BY; William T. Barr, N4NX; Garey K. Barrell, K4OAH; Ottis L. Barron, K5BSE; Wayne D. Bartholomew, WA3WLD; Gordon A. Bass, K2UIR; Gary L. Bastin, WB4YAF; John Joseph Baumann, WB9UUG; Orville E. Bean, W1MXX; Roger D. Bean, K2SLZ; Hulette S. Benefield, WA4UGE; L. Emory Bennett IV, N3EB; Anthony C. Berg, W1OT; Clarence H. Bergquist, WB6EDU; Dan Berkes, WBØYYA; Roger D. Bernard, W8WMQ; Gordon E. Berry, W5LTM; Vincent J. Biancomano, WB2EZG; Charles G. Bird, K6HTM; Stephen R. Bird, WA7LHZ; James J. Bishop, K4RPN; Jeffrey P. Bishop, W7ID; R. James Bishop, WA4MAV; Richard A. Blaine, K6ODK; D. N. Blackburn; Robert R. Bodenhamer, WA4TIJ; Arthur B. Boggs, WAØPAF; Christopher W. Boone, WB5ITT/WR5AOK; Hugh P. Boswell, Jr., K5TJG/ W5OAK; Gerard F. Bouvier, K1IU; Eugene C. Bowman, Jr., K5VCS; Donald A. Bozanic, K3LIV; James L. Bracey, W5JEG; James D. Bradley, WA7RBP; William J. Bradley, N4YZ; Lester M. Bradway, WA4CAR; Charles R. Breeding, K6UWR; Barbara G. Brocklehurst, WB3DYA; Ronald E. Brodowski, WB2OJX; Gladys K. Brokhausen, N5AKJ; Douglas W. Brown, VE6CIV; Lawrence E. Brown, WA3CSP; Phillip C. Brown, WD8ROG; Taylor P. Brown, WB5FBC; Thomas L. Bruce, WA5LIQ; Stan Brunk, WØICG; James E. Bryant, WB4LYR/DA1BR; Stephen A. Buchanan, W1WLU/HB9BST; Malcolm J. Burdis, WA6ELX; Timothy E. Burke, WA4BLZ; William F. Butterworth, WD8ISS; Les Cammer, WB6OLL; Ken W. Campbell, VE6BLA; William T. Capo, Jr., WB2UXS; Robert D. Card, WB7ANH; Alan R. Carpenter, WB8BMX; Donald F. Carringer, W8KGH; Henry F. Carter, Jr., K3VW; W. Wallace Cashwell, WA4TNH; Jose A. Castillo, N4BAA; Frank A. Ceney, Jr., K9HYZ; Eric K. P. Chang, KH6DKQ; Sheldon A. Shelsy, WB6KED; Ernest G. Christensen, WA6KOC; Michael E. Claymiller, WB9QEZ; Joseph E. Claytor, Jr., W4BSO; Gerald L. Clough, WB5JEO; David M. Coelho, WA1JGA; William H. Clow, Jr., WB7CVK; Teddy A. Coggins, WD4CWV; Phillip E. Coley, K4MPE; Judith R. Comstock, WB5QCI; Lorraine Conary, KL7IAF; Robert L. Connelly, K3ZOD; Jerry Cook, WA8VWK; Kenneth D. Cool, WB9GVW; John W. Cooley, WB8WBN; William D. Cooley, WB2YIK; R. Fraser Cooper, VE3IZB; Ronda F. Cooper, N5YX; David Cottrell, WD8JUM; Robert A. Couch, WB5VBQ; Thomas Couch, WA6WWB; Robert L. Coulbourne, W4FTD; Leland L. Cox, AA4F; Robert B. Craig, W2EAL; Nelson B. Crandall, WA4VDN; D. Frank Cronin, Jr., W1CCI; Robert L. Croop, KØLPI; Jerome J. Curtis, Jr., WA6JKQ; Dale R. Dallon, WA1QEK; Marie Dambrosky, WBØHUC; Gerald M. Dancer, KØBUP; James E. Daugherty, WAØKDJ; Carl Davis, WB9VWI; Day B. Davis, Jr., WBØTTL; E. C. Davis, W6JCN; Enrico Davoli, WB4GKN; Steven M. Day, WBØTCM; Joseph O. DeMott, WB9FUY; Frank S. DePetrillo, W1EYH; George W. Deas, WD9GIT; Matthew J. DeGumbia, AF1A; Richard L. Dehn, WAØSQN; Margaret M. Demeules, W3HSS; John H. Derry, K9CUN; Michael J. DiGirolamo, WA6MMR; James J. DiSpirito, AB9Q; Gordon C. Dial, K5SUZ; Leslie R. Dirickson, WB5OYE; E. Reed Doke, KØDP; Ron Dollerschell, WBØYNQ; Edward Domangue, K5CZ; William R. Doud, W6MA; Douglas L. Dowds, WB6ROH; Louis Drennan, WBØRRY; David W. Drew, K3DX; E. Garrison Drummond, WA4NYZ; Leonard E. Dryer, W1DCC; Curtis L. Dubay, WA3SWR; Warren Dubuke, K2SM; Neil E. Dunham; Bruce E. Dunn, WB5LSZ; David L. Durand, W1WR; Ted G. Dusablon, WB7AHF; Donna Dusablon, WB7NQB; Alexander S. Dydula, WB1CLC; C. Les Eargle, Jr., WB6TMC; Charles B. Eder, W6LOE; James C. Edgerton, W1XG; James T. Edmondson, WA7KQG; Douglas N. Edwards, WB2BQD; G. Kip Edwards, W6SZN; Robert E. Elbert, WB7QQD; William L. Elkin, W4KUS; Henry H. Enman, Jr., WA1EDS; John J. Enot, WA8OYG; Gerald G. Erickson, WØUAK; Randy M. Erickson, WB7EUU; Donald E. Etters, WB4DJO; John A. Evans, WD8JND; Philip R. Evans, WA7JCE; Clinton B. Ewell IV, WD8LGB; Harry L. Ewell, K8WMI/W4DZG; Robert A. Fairfield VIII, WA6EOB; Don Falle, VE2DFO; W. J. Stuart Farmer, K7WF; Milo M. Farnham, WBØUVI; Julius J. Fazekas III, WB2EOO; Dennis Lee Feick, WA6OZX; Alan G. Feldman, WA2BAB; James H. Ferguson, Jr., AD5F; Willis Fetzer, WD8LPI; Montie L. Fisher, WA5TSL; Brett M. Flathers, WDØAPT; Mayford Warren Flynn, WB4ZOJ; Gerald D. Ford, WA7KYZ; Gaston L. Foskey, K4RIM; Allen B. Foster, KA6DZV; Marcel G. Fournier, AJ4Z; Gerald A. Fox, WB9SWY; Samuel R. Frazier, WB7AHP/KZ5SF; Jimmy L. Freeman, WB6ZZY; Mark S. Friedman, WB8BCU; Joseph D. Fritz, WAØOFZ; Richard Frombach, AB2X; William M. Fruit, WA9ACP; Mallam R. Frye, WN9MUJ; Gordon Fuller, WB6OVH; D. Paul Gagnon, N6MA; Terry Gaiser, N6UR; William D. Galebach, W3IGJ; Robert Galka, WDØEUD; C. Earl Gamble, VE3HKS; William R. Gary, K8CSG; Patrick D. Gasper, N5PG; Everett A. Geiger, K2GPL; Gerald L. Geisel, WA8ZPP; Jerry A. Gentry, WBØIWA; Phillibert Geoffrion, WD9BDW; Wilmah M. Getchell, W1HRE/W4LRD; Michael E. Gilbert, WA8NXV; Dennis J. Gillig, WB9URA; Irving Glassman, K1SEO; Gerald J. Goeke, W8VYG; Randy Goldthwaite, WB4LDV; Dennis M. Gollehon, WB7CTF; Ronald E. Goltz, WB8TIW; Irwin J. Goodman, AF2K; Jack K. Goodman, WA1FNT; Patrick Gormley, WB3JRC; Gerald D. Gray, WAØIKA; Earl E. Gray, N4ACI; Robert H. Greene, WA5LBK; Douglas Greenway, Jr., K5CR; Michael S. Griffin, WB7NIT; Thomas J. Griffin, WB4YXA;

George C. Grimes, WB3BWD; Clifford W. Grinnell, W7QJN; Ralph Grosse, AC4R; Warren D. Groskiaus, KA8AWQ; Mervin H. Grossman, K5CY; Huston H. Green, K7ITA; Gerald A. Gutman, K2VWZ; Allen R. Guy, WA5RVT; Boyd E. Guymon II, AA6BG; William S. Haddock, Jr., WA5EJQ; Robert A. Hagensen, W1RCT; Ronald A. Haines, VE3DNH; Robert J. Hajek, K9LTN; W. Vern Hajek, K6UGS; Leonard J. Hall, WA7KOE; Richard L. Hanberry III; Ernest W. Hansen, K3VVV; Russell S. Hanson, WBØIJU; J. Don Harris, W9GUM; James E. Harriss, WB5HNV; Michael L. Harshman, K3HPG; Raymond J. Hassler, WB9VVX; Walter E. Hastings, K5ELN; R. David Hawes, N3RD; Charles W. Hayden, W1YTL; Frank B. Hayne III, W5AHS; Stanley S. Hazen, K2SSB; John D. Heacock, WD5JGA; C. Gordon Heckel, N1AET; Paul A. Hecker, W3PZC; David E. Heil, K8MN; Ralph W. Held, K6QS; Frank T. Heller, Jr., W1HVY; John W. Henbest; John Taylor Henderson, WB3EYT; Ronald L. Herold, WD4IAD; Clarence Hill, Jr., K4PEQ; Barry L. Hilton, AF7K; Robert E. Hilton, WB7ULF; Donald R. Hinte; Alvin J. Hintz, WBØRXJ; Donald L. Hirst, W6AGP; Steward G. Hoar, N7ZZ; Steven R. L. Hodges, VE3IMI; James T. Hoff, WB6PWA; Carl W. Hoffmeyer, WB2YHE; James Hofmann, N5CY; Lawrence R. Hogue, WB5OMF; Amy Hohensee, WBØUQI; Harold V. Holmes, KA3AUN; David Carl Hoos, WD6CQD; C. D. Hopkins, Jr., AB4L; Steve Hopper, WD4HCS; James W. Horton, WB8YWA; Martin R. Hubbard; Donald F. Hudson, WØKNW; Douglas G. Hudson, K7CUU; William W. Hudzik, WA2UDT; James N. Humphrey, WA4POA; George A. Hussey III, W1YOU; Nanako Ihara, JI1VLV; Howard Iko, WB2BQW; William W. Inkrote, Jr., K2NJ; John C. Iseman, WA2WOL; Paul A. Jacobson, N8AKD; Twila L. Jacobson, WBØBXD; Alfred E. Jacques; John Joseph Jamack; Terry P. James, WB5BAB; Jimmie Jang, WD6ESB; W. R. Januszewski, VE6AIH; Sandy Jenkins, K8NQW; Clarence G. Jewell, WA2GFF; Alvin W. Johnson, K8AJ; Douglas E. Johnson, WØBKS; John J. Johnson, WA3STT; Kenneth C. Johnson, K9DZG; Mark D. Johnson, WAØDPR; R. Verle Johnson, Sr., K4FHO; Ronald P. Johnson, K4EMW; Perry K. Jones, W5MGZ; David J. Jorde, N6AGX; Michael R. Joyce, N6ML; Russell Kaelberer, WBØIWL; Warren G. Kahle, WA5WPF; Stanley F. Kaisel, K6UD; Gerald Karst, WB6UVT; Robert L. Kellogg, WBØHDV; Gary Keltz, WB1FOK; Dwight C. Kempf, WA3ULR; Frank M. Kennedy, K2TTI; John E. Kent, K1VMI; Charles W. Kenworthey, Jr., WB5FWI; Dean E. Kidd, W7TYR; Stephen C. Kellebrew, WB5YQI; Harry M. King, WB6JPL; Frederick Kirch; David T. Kjellquist, WB5NHL; William J. Klamm, Jr., W7DMN; Dennis G. Knight, WA7FXF; Lee J. Knirko, W9MOL; Mark Korchinski, VE5ZU; Howard Krakower, VE3JDZ; Kevin R. Kramer, WBØVVP; Adolph Krassler; Daniel J. Krusensky, AL7S; Jeffrey A. Kruth, WA3ZKR; Alphonse A. Kubilius; Mike Lachniet, W1CSV; Phillip B. Ladd, WBØQML; Richard Ladisky, WA1NSJ; Fred C. Lamb, WD8KVW; Donald Lampkin, WA2HMB; George H. Landauer, WA2PAV; James F. Lane, WA4NUR; Robert C. Landis, N3RL; Leland J. Lannoye, Jr., WA9AOE; Donald Larkin, WB8RVT; Arthur W. Larson, W2MB; Earl A. Larson, WB9UIB; Mickey LeBoeuf, K5ML; Stanton LeSieur, WB7AHB; William E. Leasure, K3EI; James G. Lee, W6VAT; Robert E. Lee, K2TWK; Ronald P. Lee, WB5LBQ; John F. Leech, WB8ZRO; Larry C. Lennon, WØPSH; Larry S. Levine, WA1SYI; Charles R. Levy, WA3LPG; Herbert A. Lewis, WB7CNQ; Fred T. Little; Ralph I. Lockhart, WB4CTW; Joseph Loewy, KB4FO; Barbara Lombardi, K1EIR; Elizabeth Lombardi, K1EIC; Henry A. London II, WB4ZIQ; James N. Long, W4ZRZ; William O. Long, N3GR; James E. Lovett, WD5HBD; Ann F. Lucas, N5ASX; Robert J. Luhn, WD8PMU; James M. Lumsden, WA6MYJ; James S. Lynch, AA8G; H. J. MacLean, VE3GRO; James R. Maccani, WØHUP; Roy E. Mannikko, WB9PKN; David R. Marlowe, AF7G; Rabe F. Marsh, III, W3TNU; Dale Marteeny, WB6ZES; Chester R. Martin III, WA3NEN; William A. Mason, AB3P; Geral Dean Mather, WB7AWO; Henry J. Matthews, WB5ZBX; Kenneth C. McAninch, KA5DKS; James McCann, WA4IGD; Paul F. McCarron, W1HZY; Robert Walter McClearn, WA6CPV; Richard D. McCoach, N3DM; Robert W. McIntyre, VE3HJK; John F. McKay, W7JAL; Duayne T. McNeil, KA4GLD; Ernest F. Meadows, WA8YNF; Joseph Merdler, N6AHU; Steve Merkey, WBØNRQ; Ronald K. Mettler, WB4GHU; Dan Merrick III, K8TX; Irwin Miller, K3KNH; William Q. Miller, WA4SHN; Daniel L. Mitten, WA3NFV; Leonard K. Moncaleri, AC3T; George R. Monroe; P. L. Moore; Ralph E. Moorhouse, W4YR; Thomas E. Morgan, WA4BUO; Robert S. Morris, W4MYA; R. A. Mountford, VE2MF; Joseph A. Munger, Jr., WBØRLI; D. E. Munter, WB9ULT; Samuel T. Murphy, KA4DAM; Steven W. Myers, WB5MFI; Ben Narmore, WA6FZH; Leonard M. Nathanson, W8RC; Donald A. Nay, WB9TVD; Michael S. C. Nelsen, WBØEWV; Charles F. Newell, WB4QKU; Alvan M. Newton, WA7YHH; Nicholas J. Nitka, WB9SZF; Robert S. Norin, W7YAQ; Gene E. Northington, K4NWU; Lynn C. Noyes, W7KGV; Dalton P. O'Donnell, VE3AZB; James O'Sullivan, K2LAY; Guy R. Olbrechts, WB7VOR; George F. Oliver, WA1WYM; Jack J. Orr, WA6LOH; Richard Palmer, VE2FKK; Eugene H. Parker, WA8WUT; Robert S. Parnass, WB2TQK; Ted Parsons, WBØTYB; Hubert A. Patterson, WA4ZLJ; Robert E. Pearcy, WB7ERP; Robert H. Peck, W1AQT; Kenneth M. Pepin, WØUKL; Jack R. Perciful, N4TR; Carl D. Perkins, Jr., WB6PYS; Kenneth P. Perry, WB4SBY; Daniel N. Petersen, WA6OIL; Rollin F. Pettingill, WB6AJU; Robert L. Phillips, W3AUL; Neal T. Pinckney, KB6EI; Lou Ann Mercer Pinckney, KB6HP; David M. Pittle, W6SQA; Fred J. Porter, WB4JSU; Ivan Porter, WA1PLW; Maurice Poulin, VE2AEP; Stewart R. Powell, WB6NAY; James L. Park, Jr., WB8RXB; James C. Preston, WA6UFY; I. J. Putzer, WA2LWG; Daniel I. Rafkind, W2GVG; William E. Rankin II, WAØYPL; Thomas M. Renegar, K3UE; Doug A. Renwick, VE5RA; Willard A. Revaz, Jr., W1TS; Robert L. Reynolds, WB9RZA; Charles D. Rhine, AAØM; Betty C. Rhodes, KL7AP; Pat J. Richmond, WA4ZBC; Bobby J. Riley, KA4CBH; David J. Ring, Jr., N1EA; Garry H. Ritchie, W8OIW; Andrew J. Roberts, VE7CGY; Vernon J. Roberts; Stanley M. Robinson, W9NJR; Richard Rohrer, WD4GXO; William A. Roussel III, K5TAS; Jack W. Rucker, W4SON; Evan W. Runner, WD8AVW; James B. Russell, K8QAL; Irvin L. Ryker, WD4GWX; Peter J. Salerno, N3HI; Roger W. Sampson, WA1RRL; Ken Sanders, WAØARO; Stirling R. Sanford, WA6NQO; Janet M. Santoski, K9UTQ; Paul R. Schaffenberger, W8LXQ; J. Phil Scherck, WA7AGY/WB6MKF; Gerald Scherkenbach, N9AW; Frederick G. Schieffer; Craig R. Schmidt, WBØGFZ; Gerald N. Schmidt, N5GS; Mark W. Schontz, K8FU; Peter C. Schreiber, K9IE; Martin R. Schroedel, K9LTL; Robert W. Selbrede, W9NQ; C. F. Sharkey, Jr.; Pattie M. Sharrow, WB4PRT; James N. Sheetz, K9OQO; Louis K. Sherwood, WB5TAT; Guy E. Shipley, WB5MXO; Arnold D. Sias, WA7FAB; Joe S. Simpkins, WA4OXD; John M. Sims, N6AB; Mike Singer, WB5YDE; Park T. Small, Jr., Channing H. Smith, WA5FAO; Chris Quentin Smith, WB8FBN; Donald K. Smith, WB4SQV; Douglas R. Smith, WA7PYO; Harold C. Smith, WA2KND; M. H. Smith III, WA4CYS; Ronnie G. Smith; Steven Avery Smith, WA4PHT; Charles W. Smurphat, WB3BRD; Alan J. Soenke, WA6VNN; Robert Sondack, VE2ASL; Richard J. Sons, N5CU; Larry Sossoman, K4CEB; William A. Spence, W7LWH; Dennis A. Spencer, AGØA; Norman E. Spidell, K7RT; Charles T. Spradlin, WA4RNF; Russell Wade Stallings, WB4LRO; Steven A. Stepka, WB7NAR; John Vernon Stockslager, K3YNO; Stan H. Stockton, K5GO; Dorothy F. Stoddart, WA1KSX; Romuald Stone, N3AF; Michael W. Stover, WB9ZLV; Carl F. Strahm, K6KGB; John A. Stuart, WD4EGC; Michael J. Stuart, WB4EGC; Michael J. Stuart, WB4ETD; Jerry D. Stuckle, AIØK; Neal B. Sulmeyer, AE6E; Stanley K. Summers, WA6OFV; Raymond L. Swartwout, WA9ZDC; Dennis Sweeney, WA4LPR; Paul M. Sykes, WBØKWI; John M. Szczepaniak, WB5KIC; Michael J. Taitt, WA7VQE; Lee Tary, W3XW; J. D. Taylor, VE7BML; John P. Taylor, W6KEE; Willis E. Teague, Jr., W8DWO; Phillip E. Temples, K9HI; Dwight Tewksbury, WA2ZUG; Pete Theer, WB5RPU; Keith M. Thomas, WB6QNE; Alvin Thompson, WB5IQL; C. W. Thompson; Ian W. Thomson, N7CC; Ralph T. Tilghman, N4TI; Stephen Tivy, WD6AND; John P. Topel, W6GNJ/W9OO; James E. Trulove, WA7ABV; William R. Tubbs, Jr., KB6JM; Gerald H. Tucker, WA6LNV; R. Marvin Turner, WA8NNO; David Turnmire; Richard P. Tyson, N2IG; James A. Van Gorder, WA7WBE; Gene Van Sickle, W9KJF; Anthony J. Vella, WB2ZSY; Arthur A. Vidmar, N9AOP; Harold L. Vincent, WB9DBM; George E. Vose; Ronald Wagner, WD8SBB; Gary Waldsmith, K4SUK; Dale C. Wallace, WA8SKC; Robert C. Wallison, K8RW; Robert A. Warner, WAØKVW; Paul Bertram Washington, WB3CMY; Sidney Weinstein, W2TCR; H. Walter Welch, WB2MNC; H. Max West, K4VCB; George C. Whitney, W5VIJ; Charles E. Wieand, K3FME; David L. Wilkins, KA5CUP; David R. Wilks, AA5H; Richard L. Williams, WB3JIW; Robert W. Williams, W9EA; Scott T. Williams, AE6U; Larry D. Wilson, WBØUFQ; R. G. Wise, K7RG; Kirby H. Woehst, W5VWF; Michael L. Wolcutt, WB4OEX; Warren A. Wolff, W5KKW; Mark A. Woodworth, WD8KHU; Charles B. Wright, K8UN; John A. Wyatt, KN1FPQ; William C. Yardley, WD8DDO; Gary Yarus, WBØMSZ; Robert M. Yoksh, WBØEZR; John A. Young, K8BA; John Gibson Young, VP9HL; John J. Young, Jr., WD5FXP; Lawrence R. Young, K4LXV; Lynn R. Young, WBØIBZ; Stephen C. Zahos, WB2UNH; Dieter Zinsmeister, WA1VUH; Lawrence H. Zuckerman, K3LZ.

Strays

George "Bud" Woida, W9KQB, has had great success with this little antenna (note size compared to stamp in foreground). Woida has completed Three-Band WAS, Five-Hour WAC and DXCC 150 using this antenna and a 150-watt transmitter. *(K9ZZ photo)*

Cover Plaque Award for the December 1978 *QST* article "The Club Filter" is presented to author Spencer Schubbe, N8AP, by Great Lakes Division Director Richard A. Egbert, W8ETU, at the 1979 Great Lakes Division Convention. Left to right are ARRL President Harry J. Dannals, W2HD, N8AP, W8ETU and Michigan SCM Stanley J. Briggs, W8MPD.

I would like to get in touch with . . .

☐ other clubs that would like to exchange newsletters. Contact the Twin Base ARC, c/o Walt Livingston, WA4YCM, Editor, 133 Warwick Dr., Prattville, AL 36067.

☐ anyone having aircraft ham antenna experience. Contact Willis Van Norman, KØJCF, Rte. 3, Box 25, St. Charles, MN 55972.

☐ high-school clubs forming a 40-meter net. Contact James Teeple, Syosset High School, Southwood Rd., Syosset, NY 11791.

☐ anyone having information on the Wireless Association of Central California, which was founded May 27, 1910, in Fresno. Contact Gary Payne, WD6BJK, 1347 E. Dakota, Fresno, CA 93704.

☐ any hams who were in Navy *Platoon R29 in 1943*. Contact John Mensing, W4MFL, 321 Monroe Pl. South, Port Orange, FL 32019.

The New Frontier

The World Above 1 Gig

Conducted By Bob Cooper Jr.,* W5KHT

Sharing Microwave Technology

Two of the finest traditions in Amateur Radio come into focus in the world above 1 gig; the tackling of impossible challenges and the amateur-conversion of seemingly worthless surplus equipment into an operating station. No place is this more evident than in the current spurt of interest in building low-cost, backyard "private television satellite receive terminals"; or TVROs as they are known in the commercial trade.

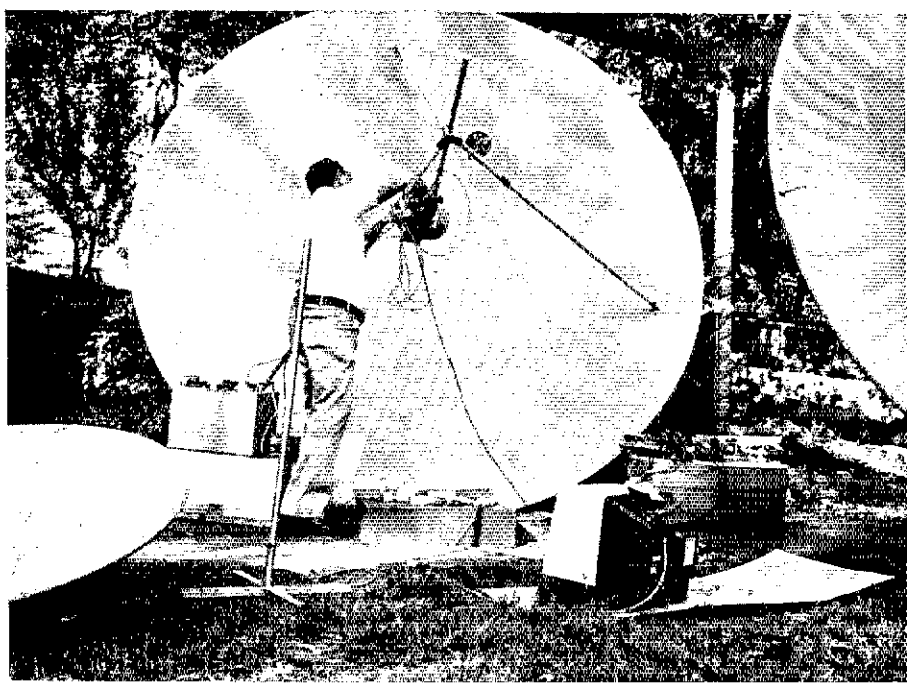
At the present time all of our amateur-designed and -constructed communication satellites operate in a relatively low orbit plane; which of course requires that if we are to access the satellite (OSCAR, for example) we must first locate its path and then follow the path with our uplink antenna/downlink antenna systems. Commercial communication satellites employ a different system, known as geostationary orbiting, which simply implies that from any fixed position on earth the satellite, in orbit around the earth some 22,300 miles above the equator, "appears" to stand still. This is a handy operating mode since it means you can locate the geostationary satellite with your antenna system once and having found "the bird" leave the antenna alone and devote additional experimental time to improving the receiving or transmitting system utilized in conjunction with the satellite. A wide variety of such satellites circles the earth above the equator; more than 30 of these are devoted to radio, Teletype and television transmission relay. The most commonly employed downlink (or satellite to earth) frequency band for these super-repeaters is 3.7 to 4.2 GHz; approximately halfway between our amateur 9-cm and 6-cm wavelength bands. Because no amateur geostationary satellites are yet in operation, these radio/teletype/television-carrying birds provide amateur microwave experimenters with perhaps the best opportunity to become familiar with a whole new set of challenges and parameters not readily duplicated with terrestrial circuits.

Steve Birkill, G8AKQ, in Sheffield, England, is one of many pioneers in this field. Using a surplus 8-foot dish antenna and two completely homebrew (and designed) downconverter/receivers operating at both the 4-GHz downlink band and the recently opened 11/12-GHz downlink band, Birkill has pioneered amateur-constructed ultra low noise GaAs FET (gallium arsenide field effect transistor) technology at both of these bands outside of a laboratory environment.

On our side of the pond, Robert Coleman, K4AWB, in Travelers Rest, SC, began with a 10-foot surplus parabolic, a discarded Western Electric TD-2 microwave mixer head, a surplus military version 2- to 4-GHz signal generator as a local oscillator source and proved that for under $200 a creative amateur experimenter can bring down virtually noise-free television pictures from domestic U.S. geostationary satellites. Coleman, like many others, is a careful hamfest shopper and says he has found virtually everything he needed for the project by paying close attention to anything that looks like it once might have inhabited a commercial microwave system. Nobody bothered to tell Coleman, for example, that unless you employ a very special ferrite circulator between the feed antenna output port and the input to a GaAs FET amplifier stage that the GaAs FET would be impossible to tame (as in stabilize). Lacking this inside information, Coleman built up a two-stage 1.8-dB noise figure 4-GHz amplifier, using Hewlett-Packard HFET-1101 and -1102 devices, that works as well as units costing several thousand dollars commercially. And he did this with nothing more elaborate than a VOM for test equipment!

The message through all of this is quite clear. Not only is amateur kitchen-table ingenuity alive and well in the world above 1 gig, it is thriving and producing user results that send the commercial boys away muttering and shaking their heads.

Finding this type of "above-1-gig-technology" in a form that the nonmicrowave engineer can understand has always been a problem. Low-cost, do-it-yourself microwave technology is surprisingly simple once somebody shows you how it is done. This summer, August 14th through 16th to be exact, a three-day international seminar on "practical microwave technology" is being held in Oklahoma. Approximately 500 microwave region enthusiasts are expected to attend and the concentration will be on 2.15-GHz, 3.7/4.2-GHz and 10.0/10.5-GHz microwave technology. While not an Amateur Radio event, ham microwave enthusiasts are welcome and more than half of the seminar instructors are in fact licensed hams. If this sort of practical approach to the world above 1 gig excites you, additional details are available from your column conductor.



Robert Coleman, K4AWB, and his 10-foot "surplus" dish fed with a G8AKQ-designed hybrid-mode feed experiment with 3.7- to 4.2-GHz geostationary satellite TV reception near Travelers Rest, SC.

*Rte. 5, Box 364, Guthrie, OK 73044

Canadian NewsFronts

Conducted By Ron Hesler,* VE1SH

DOC Proposes Regulation Changes

Through the *Canada Gazette*, Part I, the Department has given notice that it proposes making changes to Part II of the General Radio Regulations governing the Amateur Experimental Service. Although the notice alleges that these changes were developed as "a result of discussions . . . at the Second National Amateur Radio Symposium as well as from representations received from individual amateurs," League members will be interested in knowing that some of these proposals *were initiated by the CRRL as long ago as three years!*

The official notice should appear in Part II of the *Canada Gazette* sometime after the comment expiry date the latter part of June. The CRRL, of course, will be making official comment on all seven proposed changes just as soon as its Board of Directors determines the position of the League on these proposals. This position shall be detailed on this page next month.

The proposed changes and amendments would delete the necessity of mobile logging and change Sections 61 and 62 to take into account the current availability of transmitting equipment with built-in measuring devices. A proposal also has been made to delete the conditions attached to the operation of portable or mobile installations, with the exception of the frequency requirement for operation on board pleasure vessels (1800-2000 kHz).

It is further proposed to permit Amateurs and Advanced Amateurs to use F1 emission (fsk Teletype) on 160 meters. Also, that Amateur class license holders would be permitted the same F1 privileges (3.5 MHz-29.700 MHz) as that of Advanced Amateurs.

A major proposal which is bound to cause much concern is that of extending the 40-meter phone band from the present allocation to 7050 kHz-7100 kHz. As the CRRL previously has advised the Department, we are categorically opposed to this expansion at this point in time. I believe it would be safe to assume that our Board of Directors shall again decide to file comment against this proposal, for the same reason as previously: It is not considered justifiable to expand phone privileges at the expense of cw and the cw nets operating in this portion of the spectrum. Additionally, we also have valid reason to believe that if Canada so expands the 40-meter phone band, the United States will be petitioned to follow; therefore, any temporary advantage Canadian phone operators might have in the pursuit of DX will be relatively short-lived.

The final proposal would permit Amateur class holders to operate phone from 1800 kHz-2000 kHz.

ECLIPSE TESTS

During the recent solar eclipse, many amateurs in Canada and the U.S. did some experiments to ascertain if there were propagation changes. Amateurs in Manitoba were coordinated by VE4MR, while the Ontario coordinator was VE3JAB. Communication was with W3LH, a staff member of NASA who was stationed at Red Lake, the scene of many rocket shots to explore the atmosphere.

Kenora amateurs assisted in these tests by putting an a-m signal on 3750 kHz which W3LH was to monitor both before and after the test. However, the signal was very weak and therefore probably was of little use during the tests.

Unfortunately, all amateur operations were hampered by poor normal propagation, although a reverse of what was expected occurred during the actual eclipse . . . signals improved as the eclipse was in progress. Tnx Lakehead ARC.

TARIFF BOARD HEARINGS

In a routine follow-up on this matter, our legal counsel, Bob Benson, VE2VW, advises the following: "The Board has essentially reached its decision and has already drafted part of its report and although there is a remote possibility that there could be a release of information in May, the more likely prognosis is for release in July." Canadian amateurs . . . keep your fingers crossed!

CRRL MEMBERSHIP

We feel that one of the most significant guidelines which we have to indicate membership support is the annual tabulation of our membership renewal rate. We therefore are pleased to report that, for the first time, the Canadian Division of the ARRL has edged out our American counterpart. In the U.S., 76.7 percent renewed, compared to 78.2 percent in Canada and 57.7 percent foreign. Additionally, it is interesting to note that for those in Canada whose membership expired for the first time, 69.2 percent renewed, compared to 67.7 percent in the U.S.

It has often been alleged that Canadian "memberships" should be more rightfully classed as "subscribers to *QST*." We suggest that if this were the case, the Canadian renewal rate would more closely parallel the figure for that of foreign, in which case members do not have a vote in the affairs of the League. Contrary to what also has often been alleged, we are grateful for the ever-increasing support of the League by Canadian amateurs.

Septuagenarian Jim Goodman, VE3FZG (left), long-time president of the Oakville Amateur Radio Club, is shown here being presented with his Division Certificate of Merit on behalf of Director Ron Hesler, VE1SH, by Vice Director Bill Loucks, VE3AR.

POTPOURRI

☐ An Amateur Radio Communications Seminar, entitled "Nature of EMO/Amateur Relationships," was recently held by the Nova Scotia EMO organization, at EMO headquarters in Debert. The seminar was attended by SCM Solomon and other League officials, as well as more than 50 amateurs engaged in Amateur Radio Emergency Communications in that province.

☐ VE5RG has won the CRRL Director's Gold Medallion and Ribbon for the highest Canadian score in the Canadian Amateur Radio Teletype Group's 18th Annual W/W RTTY DX Sweepstake.

☐ The Sorel-Tracy (PQ) Amateur Radio Club will hold a DXpedition in Zone 2 in late July. Operating dates will be July 21-28. All amateur frequencies and both A1 and A3 modes will be used. The call will be VE2CBS.

☐ We wish to acknowledge with grateful appreciation donations for the League's developing country transmitter-receiver kits program from the Oakville Amateur Radio Club and the Calgary Amateur Radio Association.

☐ During 1979, the members of the Lakehead Amateur Radio Club will be using the prefix VX3 to commemorate the 300th anniversary of the founding of the first fur trading post at the mouth of the Kaministiquia River in 1679 . . . near where Thunder Bay now stands. To help celebrate the event, a special scroll will be available to any amateur in the U.S. or Canada who works five stations in Thunder Bay using this special prefix. Send log information to Lakehead ARC, P. O. Box 2571, Thunder Bay, ON P7B 5G1.

☐ From August 17-19, the Radio Amateur Quebec Inc. (RAQI), will hold their annual convention at Le Chateau Montebello, in Montebello, PQ. All amateurs coast-to-coast are invited to attend this gala affair. Full information is available from *Charles Savard*, VE2FKC, Apt. 901, 680 Blvd. St. Joseph, Hull, PQ J8Y 4A9. QST

*Director, Canadian Division

Washington Mailbox

Conducted By Michele Bartlett,* N1AGD

Repeaters Repeaters Repeaters Repeaters

As part of its efforts to deregulate the Amateur Service, the FCC in Docket 21033 ruled that any amateur may put his station in repeater operation. Previous to September 1977, an amateur who wanted to put a repeater on the air had to file a blizzard of papers, which he traded for a "WR" call sign. Now an amateur may identify his station in repeater operation using his own call sign followed by certain designators, and need not notify the FCC that he is doing so. He must abide by certain sections of Part 97 and should consult with his local frequency coordinator, who will help him decide on a clear frequency. The rules have been greatly relaxed, as is apparent when comparing the listings in the ARRL *Repeater Directory* over the past several years — an average growth rate of 28 percent.

Q. On what frequencies are repeaters permitted?

A. All vhf/uhf bands have frequencies available for repeater operation as follows (in MHz): 52.0-54.0, 144.5-145.5, 146.0-148.0, 220.5-225.0, 420.0-431.0, 433.0-435.0 and any other amateur frequency above 438.0. In addition, repeater operation is permitted on 29.5-29.7 MHz, restricted to amateurs holding at least a General class license.

Band plans have been adopted to make the best possible use of these frequencies, while meeting all the technical and regulatory requirements. These band plans include protection for satellite and weak-signal work, linear translators and simplex operation. You can find a complete outline of the band plans on pages 15-17 of the 1979 ARRL *Repeater Directory*, available for $1 from your local Amateur Radio dealer or from Hq. (The directory also lists the names and addresses of all frequency coordinators and all members of the ARRL VHF Repeater Advisory Committee.)

Q. How is a repeater controlled?

A. There are three kinds of control: local, remote and automatic. *Local* (manual) *control* means that the control operator is right at the transmitter, with the associated operating equipment directly accessible. Direct mechanical or wire control of the transmitter from a control point located on the same premises as the transmitter also is considered local control (97.3m-j). *Remote control* is also manual control, with the control operator on duty at a control point other than the transmitter site. Operating adjustments take place via a control link, such as a telephone line or radio link (97.3m2). *Automatic control*, which is a popular method among repeater licensees, is the use of devices and procedures which enable the machine to function without the supervision of a control operator (97.3m3). One drawback is that the use of autopatch is not permitted on a repeater that is under automatic control. However, the minute a control operator comes on duty, the station is no longer considered to be automatically controlled. (A control operator must have the capability of shutting down the entire machine — not just the autopatch.) For a more complete discussion of autopatch and automatic control, see "Washington Mailbox," January 1979 *QST*.

Q. What are some examples of control links?

A. Two of the most common control links are the telephone line and radio remote control. A phone line can be used in the normal way, with the control operator dialing an unlisted number which rings at the repeater site. He then sends a signal which activates or deactivates the repeater functions. The other kind of telephone control involves a dedicated line, or "hotline." It cannot be used to place outside calls. The control operator merely picks up the receiver, and is instantly connected with the transmitter site. He then signals the repeater in the same manner as through a regular telephone line.

Radio remote control *must* be accomplished on a frequency above 220.5 MHz, excluding those frequencies between 431-433 and 435-438 MHz, where repeaters are not permitted (97.61d). In addition, the input frequency of the repeater must not be used for the control link (97.88e).

Q. Does this mean that I cannot control my 2-meter repeater on a frequency below 220.5 MHz?

A. That is correct.

Q. What are the identification requirements for a station in repeater operation?

A. The i-d must be at a level of modulation sufficient to be intelligible over the conversation in progress. The repeater must identify itself at least every 10 minutes (97.84a) either by telephony or telegraphy (97.84c). If by code, the speed shall not exceed 20 words per minute (97.84g).

An amateur who puts his station in repeater operation will instruct the machine to identify using his call sign followed by a slant bar (dahdididahdit) and the Morse code letters "R" or "RPT." If the i-d function is accomplished on telephony, the call sign shall be followed by the word "repeater" (97.84d-1). Amateurs who hold "WR" call signs may continue to use these calls until they expire, at which time they will not be renewed. Of course, a "WR" call need not be followed by "RPT" or "repeater."

Q. Are there special station log requirements for repeaters?

A. Much of the information that an amateur used to send to the FCC when requesting a repeater license is now entered in the log of his station in repeater operation. Of course, there is a minimum logging requirement for *all* amateur stations: (1) the call sign of the station, the signature of the station licensee or a photocopy of the station license; (2) the locations and dates upon which fixed or portable operation was initiated and terminated; (3) the date and time periods the duty control operator was someone other than the station licensee, plus the signature and call sign of that control operator; and (4) a notation of third-party traffic sent or received, including names of all third parties and a brief description of the traffic contents. This entry may be in a form other than written (i.e., a tape recording), but one which may be readily transcribed into written form by the licensee upon request by the Commission (97.103a-b).

In addition, the log of a remotely controlled station must have the names, addresses and call signs of all control operators, a functional block diagram and technical explanation of the measures taken to prevent access to the repeater (either physically or through unauthorized control operations), and a description of the means used for monitoring the repeater and shutting it down in the case of a control link malfunction.

If more than one station is involved in a system, the network diagram must be entered in the log. Additionally, if the repeater has an effective radiated power greater than the erp listed in 97.67c (which depends upon the frequency in use and the antenna Height Above Average Terrain), then various technical information relating to the erp and HAAT must be entered in the log (97.103c-e).

Normally, logs must be kept for a period of at least a year following the last date of entry. However, the repeater licensee must retain the log of a station in repeater operation for as long as the information required by 97.103c-e is accurate.

Q. I would like to put my station in repeater operation, especially now that I know a little more about how repeaters work. Where can I get more information?

A. The ARRL publication, *FM and Repeaters for the Radio Amateur*, is a complete manual of fm and repeater operation and equipment design. It costs $5 from your local dealer or from Hq., $5.50 outside the U.S. The League also has a package of information available which contains emergency reference information, repeater dos and don'ts, a copy of the FCC Memorandum Opinion and Order on Docket 21033, and samples of block diagrams and other information to help the amateur comply with logging requirements. If you are serious about putting a repeater on the air and would like a Repeater Kit, please send a large (9" × 12" or larger) self-addressed envelope with at least 80 cents postage to Hq. (These kits are rather expensive to produce, so please don't ask for one unless you intend to use it.) Once your repeater is operational, drop us a line on the registration card which is included in the kit; we will list your station in the next copy of the *Repeater Directory*. QST

[Note: Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared by ARRL, have been reviewed by FCC staff members. Numbers in parentheses refer to specific sections of the FCC rules.]

*Membership Services Assistant, ARRL

Happenings

Conducted By W. Dale Clift,* WA3NLO

Members Will Choose ARRL Policymakers

Who makes the decisions for the League? Who decides such things as the ARRL proposing Novice phone privileges on 220 MHz, suing the FCC over its ban of the commercial manufacture and sale of 10-meter linear amplifiers, and opposing CB expansion at the expense of amateurs? If you guessed, "those guys at League headquarters," *you're wrong*!

The policies of the League are controlled by *you*, the members, through a Board of Directors which you elect on a geographical basis. Every full member of ARRL is eligible to sign a nominating petition and vote for a representative on the ARRL Board of Directors. The Board sets the League's priorities and decides which services will be made available to the membership. The League is, in effect, a miniature republic, and the Board is its parliament or congress or legislature.

The 16 directors serve for two-year terms, with half standing for election in the even-numbered years, half in the odd. Just as in national, provincial or state politics, the voters/members have the privilege and the responsibility either to decide they like the actions of their incumbent representatives and thus support them actively for reelection, or to decide that other representatives could do a better job, and work for the election of those persons. At the same time that directors are elected, vice directors are also chosen, who can fill in when the director is unable to serve.

The quality of future League decisions will depend on the care with which ARRL members choose their leaders — apathy can be deadly! So read on.

Nominations Are Open

It is time for ARRL full members in the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions to begin picking a director and a vice director in each division for the two-year term which will begin January 1, 1980. From now until September 10, at noon, League headquarters will accept nominations bearing the signatures of 10 (or more) full members of a division naming a full member of the division as a candidate for director or vice director. The nominee must hold at least a General class amateur license or a Canadian Advanced Amateur Certificate, must be at least 21 years of age, and must have been licensed and a full member of the League for a continuous term of at least four years at the time of the election. No person is eligible who is commercially engaged in the manufacture, sale or rental of radio apparatus capable of being used in radio communication. Neither is a person eligible who is commercially or governmentally engaged in frequency-allocation planning or implementation. Finally, no one can run who is commercially engaged in the publication of radio literature intended in whole or in part for radio amateurs. The idea behind these rules is to ensure that candidates (1) possess a lasting interest in Amateur Radio and the League, (2) have the legal capacity to make decisions for ARRL, and (3) are free of conflicts of interest.

Balloting Follows

Whenever there is more than one candidate for either office, ballots will be sent to all full members of the League in that division who were in good standing on September 10. The ballots will be mailed not later than October 1 and, to be valid, must be returned to Headquarters by noon, November 20. A group of nominators can name a candidate for director, for vice director, or both, but there are no "slates" as such — each candidate appears on the ballot in alphabetical order. If a person is nominated for both director and vice director, the nomination for director will stand and that for vice director will be void. A person nominated for both offices does have the option, however, of declining the higher nomination and running for vice director if he or she wishes. Since all the powers of the director are transferred to the vice director in the event of the director's death, resignation, removal outside the division, or inability to serve, careful selection of candidates for vice director is just as important as for director.

Nominating Form

The following form for nomination is suggested; it may be copied onto any paper, or a blank following this form may be obtained from Headquarters on request:

Executive Committee,
The American Radio Relay League,
Newington, CT 06111

We, the undersigned Full Members of the ARRL residing in the . . . Division, hereby nominate . . . of . . . as a candidate for director; and we also nominate . . . of . . . as a candidate for vice director from this division for the 1980-1981 term.

(Signature . . . Call . . . City . . . ZIP . . . Date)

Nominees or, indeed, any member may obtain a copy of the Articles of Association and Bylaws, along with a pamphlet outlining the duties and responsibilities of elected League officials.

"Absentee Ballots"

All ARRL members who are licensed by FCC or DOC but are temporarily residing outside the U.S. or Canada are now eligible for full membership. These members overseas who arrange to be listed as full members in an appropriate division prior to September 10 will be able to vote this year where elections are being held.

Even within the U.S., full members temporarily residing outside the ARRL division they consider home may now notify the secretary prior to September 10, giving the current *QST* address and the reason that another division is considered home (as for instance, holding an amateur call appropriate to the division). So if your home division is the Atlantic, Canadian, Dakota, Delta, Great Lakes, Midwest, Pacific or Southeastern Division, but your *QST* goes elsewhere, please let the ARRL secretary know, as soon as possible but no later than September 10, so you'll receive a ballot for your home division.

The Incumbents

These persons presently hold the office of director and vice director in the divisions conducting the elections this year: *Atlantic* — Harry A. McConaghy, W3SW and Jesse Bieberman, W3KT; *Canadian* — Ronald J. Hesler, VE1SH and William W. Loucks, VE3AR; *Dakota* — Garfield A. Anderson, KØGA and Tod A. Olson, KØTO; *Delta* — Max Arnold, W4WHN and John H. Sanders, WB4ANX; *Great Lakes* — Richard A. Egbert, W8ETU and George H. Goldstone, W8AP; *Midwest* — Paul Grauer, WØFIR and Claire Richard Dyas, WØJCP; *Pacific* — William J. Stevens, W6ZM and Robert C. Smithwick, W6JZU; and *Southeastern* — Larry E. Price, W4RA and Frank M. Butler, Jr., W4RH.

In summary: Petitions need 10 or more signatures of full members and are due at Headquarters by noon, September 10. If there is only one candidate for an office, he or she will be declared elected by the Executive Committee; otherwise, ballots will be mailed not later than October 1 to full members of record September 10. To be valid, ballots must reach Headquarters before noon, November 20. The new term will begin at noon, January 1, 1980.

For the Board of Directors:
June 1, 1979
R. L. Baldwin, W1RU
Secretary

VETO STINGS NJ HAMS

New Jersey radio amateurs lost the final round of a long battle when Governor Brendan T. Byrne vetoed a bill which would have exempted licensed amateurs from the State's "scanner law." Under the present law, it is a misdemeanor to have a receiver capable of tuning in police, fire, municipal or other government frequencies in a motor vehicle, unless the operator has a permit issued by the local police.[1]

New Jersey hams have been working for over two years to be exempted from this law. These radio amateurs have argued that because the majority of Amateur Radio repeaters operate on frequencies capable of being received by so-called "police scanners," an exemption would facilitate licensed amateurs to monitor their local repeaters on the 144-MHz and 450-MHz bands while mobile. But the more serious problem of having no exemption is amateur vhf transceivers being confused with "banned

*Deputy Manager, Membership Services, ARRL

[1]New Jersey Statutes Annotated 2A: 127-4.

receivers" by the police. There have been several instances where licensed radio amateurs have been detained and questioned for having 2-meter equipment which was mistakenly identified as illegal receivers.

Leaders of the NJ Amateur Radio community succeeded in getting an exemption passed in both houses of the legislature. Senate bill S-729, sponsored by Senator Charles Yates, passed by a vote of 35-0, while the NJ Assembly passed the bill by a vote of 63-3. Despite repeated urgings by New Jersey hams and a letter sent by ARRL President Harry Dannals, W2HD, Governor Byrne vetoed S-729.

The following message was sent to the New Jersey Legislature by Governor Byrne:
State of New Jersey Executive Department,
May 3, 1979.
Senate Bill No. 729.
To the Senate:

Pursuant to Article IV, Section 1, paragraph 14(a) of the Constitution, I herewith return Senate Bill No. 729 without my approval. This bill would exempt New Jersey residents who hold certain radio amateur licenses from the requirement of the current statute that they obtain a permit from the Chief of Police where they reside before they may install or possess in an automobile a short-wave radio receiver operative on fire, police or other governmental frequencies. The current statute makes the failure to obtain such a permit a misdemeanor. The stated purpose of this legislation was to encourage licensed individuals possessing short-wave radios in their automobiles to help during civil emergencies. In reality, the presence of well meaning or curious individuals at accident or emergency scenes more often than not hinders the operation of the authorized emergency personnel. I believe it would not be in the best interest of our citizens to encourage and facilitate the presence of such individuals at those critical situations. The mere presence of any vehicles or pedestrians or both on route to or at emergency scenes may slow down an operation in which even a few minutes may be important to life. If a licensed amateur radio operator has a need to have these receivers installed he can, under current law, obtain a permit from the police. In addition, the possibility exists that the criminal element in our society will take advantage of this bill to monitor police activity from automobiles and thereby gain advantage in their illegal enterprises. The result may needlessly endanger the lives of police officers and other people. I believe the current law strikes a desirable balance between the needs of our licensed amateur radio operators and of our fire, police and other emergency personnel. Accordingly, I return herewith Senate Bill No. 729 without my approval.
Respectfully signed,
Brendan T. Byrne, Governor

[Editor's Note: Thanks go to Lee Deeny, WA2ESZ, for providing us with the Governor's message.]

ARRL General Counsel Robert Booth, Jr., W3PS (on the right), received a certificate of appreciation in recognition of his contributions to the allied fields of Amateur Radio and broadcasting from the National Association of Broadcasters at its annual convention held in Dallas. It was presented by George Bartlett, W1MMM, NAB vice president for engineering. Bob is a registered professional engineer and a practicing attorney with offices in Washington, DC. A broadcast station owner and operator, he is an active member of NAB. He is also a former president of the Federal Communications Bar Association. Bob has been ARRL general counsel since 1961.

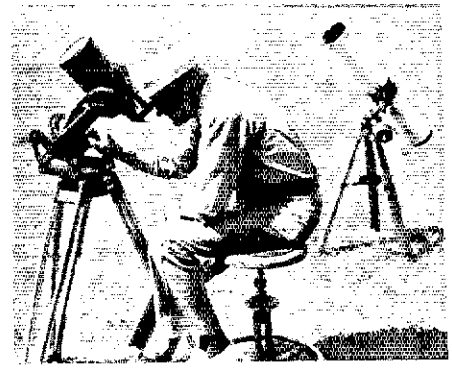
FCC AFFIRMS DECISION: NO MORE SECONDARY, SPECIAL EVENT, AND SEPARATE REPEATER LICENSES

Last year the FCC issued a First and Second Report and Order in Docket 21135, the call-sign docket. The First Report and Order abolished the separate licensing of secondary and special event stations; the Second Report and Order abolished the separate licensing of repeater stations. These operating modes became part of the privileges of the amateur's primary license, with certain identification requirements for stations in repeater operation. Seven parties petitioned the Commission for reconsideration of its action involving secondary and special event station licenses: the ARRL; Philip E. Galasso, Iselin, NJ; Herbert L. Schoenbohm, Christiansted, U.S. Virgin Islands; Matthew J. Frey, Lancaster, PA; John J. Bartko, Bethesda, MD; the Southern California Repeater and Remote Base Association, Pasadena, CA; and Vern A. Weiss II, Kankakee, IL. In addition, the ARRL petitioned for reconsideration of the Commission's action concerning repeater licenses. The Commission has now upheld its decisions of last year.

In a Memorandum Opinion and Order released April 27, 1979, concerning secondary and special event station call signs, the Commission said that while an overwhelming number of comments opposed the proposed rule changes, action contrary to such comments, where such action has a rational basis and is justified, cannot be characterized as arbitrary or capricious. The Commission said further that while the rule changes substantially alter the licensing process, they benefit the Commission, the taxpayer, and ultimately the amateur licensee by providing a more efficient and uniform system of licensing.

In a separate Memorandum Opinion and Order released May 16, 1979, concerning repeater stations, the Commission said that contrary to claims of the ARRL, it had given sufficient notice of its intention not to allow the renewal of present "WR" licenses and that its action in eliminating "WR" call signs does not prejudge the outcome of other issues not yet decided in Docket 21135 — the future of club, RACES and military recreation station call signs. It added further that when separate repeater licenses were issued, many were issued for repeaters that were never built, and that repeater licensing and "WR" call-sign assignments were a waste of Commission resources which could be used more beneficially in other areas. — *Hal Steinman, K1FHN*

George G. Batterson, W2GB (left), was presented the Dayton Hamvention Amateur of the Year Award during the Hamvention Banquet on April 28, 1979. The award honors George for outstanding service to the amateur fraternity. He's been continuously active in ham radio for 67 years and is a co-founder of the Antique Wireless Association. Shown with George at the banquet is ARRL President Harry Dannals, W2HD.



Edward P. Tilton, W1HDQ, won the 1979 Hamvention Specific Achievement Award for his service to amateurs through his editorship of the *QST* vhf columns from the late 1930s to 1960. Ed, now retired, will be remembered for his popular "On the Ultrahighs," "The World Above 50 Mc." and the ARRL *VHF Manual*.

LEAGUE COULD LOSE W1AW — CLUB CALLS STILL IN LIMBO

The future licensing of the club station at ARRL headquarters as W1AW is still uncertain. In fact, all club stations may be forced to take either a new "2 × 3" format call sign with the prefix "WK," or else expire. Unbelievable?

That was proposed by the FCC on February 23, 1978, in its Further Notice of Proposed Rulemaking in Docket 21135. (See April 1978

QST, page 55.) A decision has yet to be made.

Amateurs had until June 2, 1978, to submit comments and until June 30, 1978, for reply comments. In addition to requiring all club stations to be in the new "2 × 3" format with the prefix "WK," the Commission proposed that applicants for a club station license "demonstrate a compelling need for such licenses." The FCC also proposed continuation of RACES and military recreation stations under revised procedures.

Renewal/Modification Information

Because the FCC is still unsettled about how it will issue new club station licenses in the future, there has been confusion over the current status of presently licensed club stations. Presently licensed club stations may be renewed and/or modified. The "freeze" imposed by the FCC on club, RACES and military recreation station licenses applies to applications for *new licenses only*.

To renew or modify a club station license, the station trustee must send a completed Form 610-B to the FCC, Gettysburg, PA 17325. The trustee must also apply for renewal of his operator license *simultaneously* by sending a properly completed Form 610.

Because the FCC has not yet decided how it will issue club stations in the future, the Form 610-B has not been updated. A few items on the 610-B no longer apply.

Item 13 states the following: "A new Club Station License must be obtained if there is a change of Trustee." This no longer applies, because the Commission *will* process a change of trustee and allow the club to keep the same call sign.

Item 13B states that a certified copy of the constitution or organization papers and bylaws must be attached to the application. This is no longer required. However, all other items must be answered.

Club station renewals/modifications take the FCC a great deal longer to process than other applications. The Commission is presently processing renewals/modifications for military recreation and RACES stations as it is club stations.

LICENSE PLATES FOR MAINE HAMS

State Representative Robert Howe, K1MZB, has introduced into the Maine Legislature "An Act to Provide Amateur Radio Operators with Initial Plates at Reduced Costs." The bill simply adds the following words to the existing authorization for amateur call-letter plates: ". . . and shall be issued to the applicant at an initial cost of $5 and at no cost thereafter."

When the bill was heard before the Legislative Committee on Transportation on Wednesday, March 28, about 20 amateurs were on hand. K1MZB, K1CXW and K1YFY made able presentations stressing the public service aspects of Amateur Radio and the desirability of the general public, and those in need of assistance, in particular, of being able to identify quickly those who could render communications assistance. The hams also pointed out the past assistance of amateurs in the location of feasible State Police repeater sites.

In addition, *Ham's Wide World* was shown at the State Office Building during lunchtime on that day and a short 2-meter demonstration was made before the committee during the hearing. K1CXW set up a rig in the hearing room, and in a three-minute period received "signal reports" from some 31 hams, both fixed and mobile, from locations ranging from Bangor to Portland. Reports are that the Committee was favorably impressed. Final results await action by the full Legislature. Meanwhile, a strong letter-writing campaign is underway. — *Edward Bristow, Jr., WA1MUX*

BEHIND THE DIAMOND

Well, you've finally received that important DX QSL from your bureau! Now those 100 elusive countries are confirmed, and you can just *see* that DXCC Certificate on the shack wall! It's likely the most prestigious operating award in the ham fraternity — it means that "you've finally made it!" Ever wonder who is the driving force behind the DXCC program? This month, "Behind the Diamond" introduces Donald B. Search, W3AZD, ARRL assistant communications manager in charge of DXCC.

Don's a native of Washington, DC; he was raised there until age nine, when his family moved to nearby Silver Spring, MD. Involved with the electronics industry since high school, Don entered the U.S. Air Force in 1959 and soon specialized in automatic weapons control systems for such complex aircraft as the F-101-B (sounds like a transceiver, doesn't it!). He completed his tour of duty in 1963 as Airman First Class. After that, Don held technician posts with four prominent electronics manufacturers in the Washington metropolitan area before joining the ARRL headquarters family in 1977.

DX has been Don's niche in Amateur Radio since he was first licensed as a Novice, WN3AZD, in January 1955. His first rig was a Heathkit AT-1 and Hallicrafters S38-B, modest in comparison to the multi-multi contest setups he was to operate later on. General class privileges came soon after, in 1956. Once he had decided that DX held first priority, Don didn't waste much time; he earned his DXCC in 1958, making the grade with his low-power gear in just under a year. He's been at it ever since and now has 339 countries confirmed; most of his cards (and exotic ones they are) line the walls of his office at Headquarters. Contest operation has become a large part of Don's ham career, too. He was a member of a big contest team in the Bahamas in 1969 and he operated in the record-breaking DXpeditions to Curacao in 1969, 1974 and 1978. From 1968 to 1977, Don was a regular operator for W3AU's multi-multi contest station, and he's now one of the W2PV contest gang. Don holds various ARRL Section Awards and also some from *CQ Magazine*'s WPX and WW forays. An Honor Roll member of both ARRL and *CQ* since 1974, he has both 5BDXCC and 5BWAS to his credit. Don is a Life Member of ARRL and an Advanced class licensee.

One might wonder what Don's up to when he isn't Search-ing for DX? Well, he's an authority on the aviculture of budgerigars . . . raising and breeding parakeets! At present, he has 28 of these small tropical birds. Successful training of them, he says, comes by the same route as rare DX — with patience! Contrary to popular belief, both male and female budgies can be trained to talk (this reporter learns something new every day!) . . . never a dull moment at the W3AZD QTH! Don's YL, Hope, holds Novice class ticket WB3ANE and, we understand, is going after her Technician class ticket soon. Hey! Who said that hams are for the birds? Couldn't have been Don . . . — *Sandy Gerli, AC1Y*

Donald B. Search, W3AZD

CB ANTENNA HEIGHT V. POWER LINES

The FCC has denied a request to roll back its 60-foot CB antenna height limitation. The U.S. Consumer Product Safety Commission (CPSC) asked that the FCC restore the old 20-foot limit for directional CB antennas because at least 120 people are killed each year while erecting or dismantling antennas that come in contact with power lines.

Higher antennas increased the risk of power line accidents, the FCC agreed, but rather than reduce antenna heights it decided to include a power line hazard warning in CB Rule 18. Keeping 60 feet as the permissible height for directional antennas, the FCC said, provides recognizable benefits such as reduced channel congestion, improved CB communications and more efficient use of the CB spectrum.

WB2VMS REVOKED, KB2BD CANCELLED

The FCC recently revoked the amateur station license WB2VMS of Edward R. Bones for fraudulently obtaining an amateur license for Stephen H. Shulman. Bones had represented himself as Shulman at the Commission's District Office in New York City on May 24, 1978, in return for payment of $1000. Bones passed the Advanced class examinations for Shulman, who was issued KB2BD. On November 24, 1978, FCC informed Shulman it had information that he had not personally taken the exams. Shulman admitted to the scheme and submitted his licenses for cancellation. Bones denied the accusations, but FCC concluded that the evidence established Bones' guilt. Bones' station license, WB2VMS, was revoked and his operator license suspended effective May 11, 1979.

FM/RPT

Conducted By Stan Horzepa,* WA1LOU

Morse MAYDAY

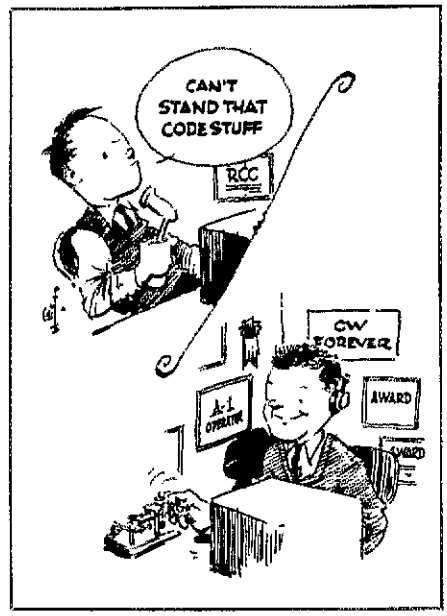
Consider the following: Are we, as radio amateurs, losing our ability to respond to emergencies? Let me elaborate by citing an example.

A chartered light plane took off from Detroit bound for Bar Harbor, ME, with a pilot and two passengers, one a ham radio operator. They ran into heavy fog in New York State, but as the plane was well-instrumented and the pilot qualified, they did not anticipate trouble. They also did not anticipate instrument failure and subsequently crashed in a thickly wooded area in northwestern Connecticut.

The pilot was killed instantly and the passengers were severely injured; one was unconscious. The other surveyed the scene and surmised that unless he could get help soon, they were doomed. The instrument panel with its radio gear was demolished. The ham's legs were pinned under collapsed fuselage, so he could not get out to seek assistance. He always carried his 2-meter portable transceiver, so he reached for it, only to discover it also had been damaged; the microphone was in splinters. Turning the radio on, a conversation between two mobiles came through loud and clear. He sorted out the PTT wires in the shattered mic and tried to key the transmitter. The output meter deflected!

Holding his breath, praying that someone would understand, he attempted to send MAYDAY in cw. "I missed part of that. Some joker is playing with his microphone," one mobile remarked.

Again, he transmitted with the same result. Next, he tried the Touch-Tone pad to generate some cw tones. "If the batteries only hold out," he thought.



"The band must be open. I hear some cw coming in."

He transmitted his call sign; nothing. Next, he sent the call of one of the mobiles DE his own call.

"The band *is* open! I hear the i-d of another repeater."

Maybe he would have better luck on another repeater, but the crystals he had did not match the frequencies of any other accessible repeater. He switched back to the one repeater he could access and made one long transmission.

"Boy, that's the worst fist I ever heard. Sounds like he's using his feet. Hi hi."

The receiver audio was disintegrating, indicating that his battery power was getting low. After a few more transmissions, the receiver was dead.

Don Nutter, WB1DGR, offered the preceding scenario. These events did not actually occur, but Don believes that such an incident is possible. Don believes from first-hand experience.

WB1DGR has net control duty on a local weather net. One day, he had a bad cold, lost his voice, and was unable to take the net. He decided to use Morse code on the repeater to give notice concerning his situation. Using a code oscillator, he tried to make his intentions known, but the results were similar to those he cites in the example above.

"We all have to pass a code test in order to get our tickets, but do we realize just how important the code is after we get on voice? After all, we are hams and code is part of our heritage," WB1DGR reflects.

It's true that once you get a ticket, you can forget about the code and yak all day. Is this what ham radio is all about? All hams do have a responsibility. Public service is its name. To fulfill this responsibility, shouldn't we keep our cw skills sharp so when an emergency occurs and cw is the preferable mode of communications, we won't stand by waiting for the storm to abate?

May *QST*, page 89, lists the W1AW code schedule. Why don't you check it out and see when the next convenient cw practice is being transmitted?

OPERATING GUIDE EXCERPTS

The Lake County Amateur Radio Club of northwestern Indiana has published an operating guide for users of the group's repeater, WR9AMU. Some excerpts from the booklet, written by WD9FMX, WB9JKO and WA9DJP, are repeated here for your consideration.

☐ The principal design of the repeater is for mobile-to-mobile use. It is not intended for base-to-mobile or base-to-base operation. However, common sense should prevail. If you are in a snowstorm or late for dinner or some other priority should occur, by all means use the repeater mobile-to-base.

☐ English is our common language and when we use phone, we should use English. Do not use cw abbreviations like QTH, QSO, QRX, etc. Say, "I am at home" or "please stand by." Say it in English. [Look up the verb "destinated" in the dictionary and you'll think twice before using it on the air again. — Ed.]

☐ During prime operating time (weekdays from 6 to 9 A.M. and 4 to 6 P.M.), more stations use the repeaters than at any other time. To allow everyone the opportunity to use the system, extended conversations should not be held on the repeater. Transmissions should be kept short and simplex channels used whenever possible.

☐ When operating on a repeater system, always listen for a few minutes before transmitting to ascertain whether or not the system is being used. Possibly, a net, emergency traffic or some other activity or QSO is in progress and no one is transmitting at the time you turn to the frequency.

☐ If engaged in a multiple station roundtable, always remember to turn it over to a specific station. Nothing is more frustrating than having to wait and guess whose turn it is to transmit, then have two stations double for the next transmission. When turning it over, you do not have to list all calls; merely mentioning the next station should suffice.

☐ Emergency traffic has absolute priority over all other types of traffic. It is for this reason that breaking stations should be allowed to enter a QSO immediately. All stations should keep the frequency clear until the emergency traffic has been completed.

REPEATER CENSUS

Attention stat fans! The statistics for the latest ARRL *Repeater Directory* have been compiled and compared with last year's statistics; the results are revealed here for the first time.

A few comments.

The overall 28-percent increase corresponds with the annual growth rate, which has hovered around 25 percent for each previous edition of the directory. These figures represent what has been reported to ARRL headquarters. Some private and closed repeaters do not submit information; therefore, they cannot be counted in this census. If this information was available, the 450-MHz total would be most affected because there are more private and closed repeaters on that band than on any other.

Projecting into the future, at the present rate of growth the number of repeaters in the U.S. and Canada will break 10,000 late in 1982. QST

Repeater Census

Band	*10*	*6*	*2*	*220*	*450*	*1215+*	*ATV*	*Total*
1978	27	165	2699	325	344	5	11	3820
1979	36	193	3438	446	728	7	24	4872
% Change	+33	+15	+28	+37	+117	+40	+109	+28
Leader*	CA/IL	NY	CA	CA	NY	CA/PA	NJ	CA

*Slash bar indicates a dead heat

*Hq. liaison, VRAC

Correspondence

The publishers of QST assume no responsibility for statements made herein by correspondents.

"RUSSIAN WOODPECKER"

☐ How much longer are we going to tolerate the interference on the 14-MHz band being caused by the wide band PØ emissions originating in the U.S.S.R.? I plead with every Amateur Radio operator throughout the world to file complaints with your respective government. — *Louis Bremer, W3LE, Baltimore, MD*

[Editor's Note: What follows are excerpted portions of official responses to Mr. Bremer's letter. The latest word from the FCC and the Department of State as of April 1979 is that there are no outward signs of the situation changing from within the Soviet Union. The International Frequency Registration Board has been involved with no apparent success.]

☐ The Commission has sent four complaints of harmful interference, concerning the high frequency bands between 5 and 17 MHz, to the Soviet administration. The Commission has received no replies. On October 6, 1976, the Commission sent a telegram to the International Frequency Registration Board (IFRB) requesting its assistance in resolving this case of harmful interference. — *William Torak, International and Operations Division, FCC*

☐ Since that time (October 1976) many administrations have expressed their concern to the U.S.S.R. Indeed, a statement of concern was added to the Final Acts of the Aeronautical Mobile (R) Conference held in Geneva during February of 1978. The Department of State is completely cognizant of the situation and is acting in the best interests of the United States. — *Robert L. Cutts, International and Operations Division, FCC*

NOVICES APPRECIATE THOUGHTFULNESS

☐ We are writing to express our appreciation for a very special type of ham operator. His name is John Thompson, W1BIH. On March 10 this gentleman came on the air in the middle of the 10-meter Novice band and offered all Novices a chance to QSO with an operator from the island of Curacao. It is this type of person who will foster the correct concept of comradeship that can be had on the ham bands. It takes the sting away from those few discourteous operators who give the Novice the feeling that he or she is not wanted among the select few. We are struggling new Novices and appreciate this kind of thoughtfulness. — *Glenn, WB7VLA and Marian, WB7VLB, Eddy, Naches, WA*

THANKS, HQ.

☐ Thank you, ladies and gentlemen from Newington, for the excellent service you provide us who are members of ARRL. First, there is the daily code practice sent by W1AW. What a convenient way to increase cw proficiency!

Second, I would like to thank Bruce Johnson and the International Department for their help in providing me with the information I needed to obtain reciprocal amateur licenses from various foreign countries. I received a complete packet of materials that included all the forms I would require for the places where we intend to sail.

Finally, there is Jim Bartlett from the Technical Department. Last month, after a frustrating defeat by the written element of the Amateur Extra exam, I wrote to Jim for help. After a short wait, I received not one, but two letters neatly typed with diagrams and formulas, complete with derivations that enabled me to follow the solution step by step.

Such personal attention is far more than I expected when I joined ARRL a year ago. Many amateurs, myself included, are unhappy about the steadily rising price of our ARRL membership. But this rate increment is as inevitable as the inflation which has increased the price of gasoline needed to travel to hamfests and has caused our amateur equipment to cost more and more each year. When I consider the services that your fine organization provides, I must conclude that the $18 fee is well worth it. Keep up the good work — you are certainly appreciated by the crew of the *Moon Shadow*. — *Linda M. Turner, WD4OCI, Jacksonville, FL*

NO SHORTCUTS

☐ In the "Happenings" column of the April 1979 edition of *QST*, I read that two petitions have been filed with the FCC requesting abolition of transmitting the call sign of the station with whom one is making contact, even for contacts less than one-minute duration. All you have to do is listen to the increasingly popular list operations to hear a great number of amateurs doing this today. In some cases you even hear Amateur Extra Class ops (who should know better) just give a signal report without their *own* call. They must assume they were properly identified when net control gave their calls. When a DX station desires, it is great to get him as many contacts as possible but until the FCC officially makes a change, no shortcuts should be taken from the existing regulations. — *Bill Rohrbach, WA2DXJ, Chatham, NJ*

WARC WORK

☐ It is a mystery to me that so many hams do not seem to have grasped how much work has been put into preparation for WARC by IARU and the various national societies. It paid off in the unified effort made possible at the Special Preparatory Meeting (SPM) (March *QST*, page 56). I would not like anyone to have the impression that the Canadian document at the SPM was the work of one person. The original draft was written by VE3UD, and the groups which worked on revisions and additions included VE3AR (representing CRRL), VE7BBQ and several other amateurs and nonamateurs. The propagation data were put together by Don Ross of our Communications Research Centre. With such an orchestra it was a pleasure to be the conductor! — *Bob Eldridge, VE7BS, Burnaby, BC*

[Editor's Note: Don't miss "WARC Countdown," a new (if temporary) feature that had its debut in June *QST*.]

THE FOUR BONES LAW

☐ I've been an amateur for only one year and probably am the last to know the dos and don'ts or the who's who concerning Amateur Radio organizations, but anyone who is ready to put down an organization trying to do a job should read the "Four Bones Law." Someone said the membership of an organization is made up of four bones. There are the wishbones, who spend all their time wishing somebody else would do the work. There are the jaw bones, who do all the talking but very little of anything else. Next come the knuckle bones, who knock everything that everybody else tries to do. Finally, there are the back bones who get the load and *do* the work. ARRL, thanks for doing the work and a job well done! — *Wes Myers, Jr., WD4MUS, Roanoke, VA*

THE RUNNING WORD

☐ As an Amateur Radio operator and a runner, I was really pleased to find in my January 1979 issue of *Runner's World* an article about hams providing communications assistance for running activities like the 1977 New York Marathon. The article was written by Bill Pellerin, WA5EBB, a runner and ham from Houston, TX. It was titled "Riding the Air Waves Can Make a Race a Breeze." Bill's article provided an excellent outline of what Amateur Radio is, what hams do and how they have given, and can continue to provide, assistance in running activities. With the explosion of interest in athletics and running, ham radio can add another public service to the list by helping with races and fun-runs. A poorly organized and conducted race can make a pleasant afternoon run seem like an all-day hassle. I urge Amateur Radio clubs to offer their services to local running clubs. Congratulations to Bill Pellerin for his contribution to both running and the continuing publicity needs of ham radio. — *William Shelton, KA7BTA, Vancouver, WA*

TIEING UP SIMPLEX

☐ Recently I switched my 2-meter rig to 146.52 simplex. The frequency was quiet so I sent my call followed by "listening on 52 direct." A KA2 came on and asked that I please stay off 52 today because of some marathon. I apologized and made it a point to stay clear. As the day wore on I thought more about the incident and grew more and more angry. It doesn't seem right that a group should tie up the national simplex frequency. I realize that this was a charitable event, but when such an event occurs, why not use a repeater frequency or a noncalling simplex frequency? I am sure that there are enough repeaters around to furnish more than adequate communications. 146.52 is used by base stations. Many mobiles use it for traffic reports and local information. It is not right to ask people to stay off such a frequency. If it was an emergency then by all means, tie it up. However, as important as a marathon may be, it is not important enough to warrant exclusive use of the national simplex frequency by a select few. I wonder what my fellow hams think? — *Mario Filippi, WB2JII, Pelham, NY*

THE RADIO TWO-STEP

☐ Until recently the amateur publications have ignored what has transpired in the amateur market in the last two years. While we have all discussed it, no one would put it into print. Before the advent of CB, ham radio had slipped into a state of dullness. We saw many amateur manufacturers fold up their tents and fade away. The business just wasn't there. Then came CB. Soon amateur equipment became popular because of the higher power and availability. Many dealers catered to this market by supplying ham equipment to nonhams. Some even went to the extent of modifying it for illegal use. Then the CB two-steppers got into the act and started offering their wares to the backyard dealer. Some of the larger ham dealers got in on the action and started their own two-stepping and offered their equipment to dealers. An oversupply of dealers resulted when the CB market began to fade. The 800 numbers and slick ads prompted mail-order competition in a market already deluged with equipment. Now the market is in a shambles and there is no stopping it. The result will be direct factory sales.

Why has all this happened? Hams are notoriously cheap. They will go any route to save a buck. When price alone is the judging factor, services go out the window. The mystique is gone. Amateur Radio is now a consumer item. The public now sees radio as useful to their needs and they feel they have the right to it. The League is caught between the old standards and the future. Maybe it's time we all accepted the inevitable instead of trying to ignore it. — *James Beckett, WA2KTJ, Horseheads, NY*

Hamfest Calendar

***Arizona:** The Amateur Radio Council of Arizona will hold the 29th annual Fort Tuthill hamfest from August 3-5 at the Main Exhibit Hall, Coconino County Fairgrounds, Flagstaff. Variety of prizes, tech sessions, exhibits. Campsites available. For details, write Fort Tuthill Hamfest, c/o 8520 E. Edward Ave., Scottsdale, AZ 85253.

British Columbia: The Okanagan International Hamfest Association's hamfest will be July 28-29 at the Gallagher Lake KOA Kampsite, eight miles north of Oliver. Good food, prizes, flea market, entertainment. Talk-in on 3.800, 34/94 OKN repeater, 76/76. Contact John Juul-Andersen, VE7DTX, 8802 Lakeview Dr., Vernon, BC V1B 1W3 or Lota Harvey, VE7DKL, 584 Heather Rd., Penticton, BC V2A 1W8.

Colorado: The Rocky Mountain Radio League, Inc. will sponsor its swapfest July 22 at the home of WAØHJZ, Highway 93, Golden Gate Canyon Rd., outside of Denver. Slow-scan TV and computer demonstrations. Potluck lunch, prizes, camping facilities. For more info, write Charles Kaufman, WAØGUN, 3734 S. Poplar, Denver, CO 80237, or phone 303-757-3081.

Idaho: The 47th annual WIMU hamfest will be held July 27-29 at Macks Inn, Idaho. Two-meter hunt, OSCAR demonstration, ladies activities, prizes. For further information, contact Dave Hunting, WB7FGV, Box 662, Kemmerer, WY 83101, or call 307-877-9440.

Illinois: The Big Thunder ARC is holding its annual hamfest July 22 at the Boone County Fairgrounds, one mile north of Belvidere on IL-76. Talk-in on 52. Cost $1.50 in advance, $2 at the door. For details or tickets, contact Michael Santucci, WD9JGH, 862 Ivy Oaks Rd., Caledonia, IL 61011.

Illinois: The 22nd annual Quad-County Radio Club, Inc. hamfest and breakfast picnic is July 14-15 at Terry Park, Palmyra. Flea market, movies, music, prizes. Camping for self-contained units. Talk-in on 73 and 52. Advance tickets $1.50, at the gate $2. Contact the Quad-County Radio Club, P. O. Box 81, 602D E. Walnut St., Chatham, IL 62629.

Illinois: The Shawnee Amateur Radio Association's hamfest will be held August 5 at Rend Lake in southern Illinois. Complete camping and recreational facilities available. Hourly prizes, family activities. No charge to vendors. Details from Nicholas Koenigstein, WB9ELP, 2009 Gray Dr., Carbondale, IL 62901 or Gary Wheeler, WB9SWG, RFD 2 Box 229, Carterville, IL 62918.

Indiana: The Steuben County Radio Amateurs presents its annual fm picnic and hamfest August 5 at Crooked Lake, Angola. Prizes, picnic-style barbecue chicken, inside tables available, overnight camping facilities. Talk-in on 81/21 and 52. Admission is $2. Contact Donn Laird, WB9YIT, 202 W. Pleasant, Angola, IN 46703.

***Indiana:** The 33rd annual Wabash Valley ARA hamfest is July 15 at Vigo County Fairgrounds, Terre Haute, one mile south of I-70 on U.S. 41. Free outdoor flea market, covered flea market $2. Prizes, good food, XYL bingo. Talk-in on 25/85 and 52. Advanced tickets $1.50 (four for $5), at gate $2 (three for $5), under 12 free. For details, send s.a.s.e. to WVARA Hamfest, P. O. Box 81, Terre Haute, IN 47808.

***Kansas:** The Pittsburg Repeater Organization, Inc. hamfest is July 8 at Lincolin Park, Pittsburg. Admission is $1. For details, write to Jack Dock, RR 2, Pittsburg, KA 66762.

Maine: The Somerset ARA will sponsor a hamfest July 22 at Cornville, just north of Skowhegan. Talk-in on 13/73 and 52. Prizes, no charge for admittance. Contact Ed Bristow, WA1MUX. RFD 4 — Box 187, Skowhegan, ME 04976.

Maryland: The annual hamfest of the Baltimore Radio Amateur Television Society starts at 8 A.M., July 29, at the Howard County Fairgrounds, 15 miles west of Baltimore on Rtes. 32 and I-70. Flea market, prizes, plenty of good food, indoor and outdoor exhibit areas. Talk-in on 16/76, 63/03, 52 and 52.525. Tickets $2, tailgating $2, tables $4 in advance or $5 at the door. Contact BRATS, P. O. Box 5915, Baltimore, MD 21208.

***Massachusetts:** The Northern Berkshire Amateur Radio Club will host its hamfest July 21-22 at the Cummington Fairgrounds. Advance registration $3 single, $5 couple. At the door, $4 single, $6 couple. Flea market $1. For details, write Tom Hamilton, WA1VPX, 206 California Ave., Pittsfield, MA 01201, or call 413-499-3578.

Michigan: The Black River ARC's 26th annual VHF picnic and swap and shop is August 5 at the Allegan County Park. Take I-196 north of South Haven to Glenn exit. Talk-in on 90/30 and 52. Swimming, playground, prizes. For more info, contact Ed Alderman, WB8BNN, RR 2 Box 98 AA, Bangor, MI 49013, or call 616-427-8830.

***Michigan:** The Sawyer Amateur Radio Association will hold the 31 U.P. hamfest July 28-29 at the National Guard Armory, Marquette. Many activities, prizes, ARRL meeting. Talk-in on 16/76 and 52. Advance tickets $3, at the door $3.50. Banquet registration $9 in advance only. Contact SARA, P. O. Box Y, Gwinn, MI 49841.

Michigan: The Shiawassee ARA's hamfest is from 8 to 5, July 15, at McCurdy Park, Corunna, east of Owosso on M-71. ARRL booth, swap and shop, net meetings. Talk-in on 63/03. For details, contact Harold Strauss, K8DTG, 1013 S. Shiawassee St., Owosso, MI 48867, telephone 517-723-4749.

Missouri: The CQ Amateur Radio picnic begins at 8 A.M., August 4, at the Macon County Fairgrounds Park, Macon. Take Highway 63 south. Tennis courts, playground, camping on grounds. The picnic is sponsored by the NEMO ARC, Macon County ARC and the Tri-County ARC. Write to Charles Roberts, WBØHLW, P. O. Box 13, Macon, MO 63552.

Missouri: The Hannibal Radio Club will sponsor a hamfest and picnic July 8 at Hannibal High School. FCC exams start at 9 A.M. at the school. Talk-in on 28/88. For detail, contact Richard Gerling, WBØRKR, 2 Fairway, Hannibal, MO 63401.

Missouri: The fourth annual Indian Foothills ARC hamfest is July 22, 8 A.M., at the Saline County Fairgrounds, Marshall. Prizes, equipment displays, flea markets, XYL activities. Tickets are $2 or three for $5 in advance, $2.50 at the gate. Talk-in on 28/88, 84/24 and 52. For information or tickets, contact Norman Gibbings, WBØSZI, 692 North Ted, Marshall, MO 65340.

***Missouri:** The Zero Beaters ARA will hold its hamfest July 15 at the fairgrounds pavilion in Washington. Prizes, no admission charge. For details, write the Zero Beaters ARA, Box 24, Dutzow, MO 63342.

Montana: The International Glacier-Waterton hamfest is July 21-22 at the Three Forks Campground, 10 miles east of Essex on U.S. Highway 2. Registration at 9 A.M. Talk-in on 34/94 and 52. More information from Glacier-Waterton Hamfest, P. O. Box 2225, Missoula, MT 59806.

Nebraska: The annual hamfest of the Central Nebraska ARC is July 28-29 at Victoria Springs State Park. Talk-in on 146.40-147.00. For details or to register, write Harry Roblyer, WØDLM, Burwell, NF 68823 or C. J. Christensen, WAØYGZ, Taylor, NE 68879.

***New York:** The Radio Central ARC hamfest is August 5 at Mt. Sinai Elementary School, Mt. Sinai, Long Island. Rain date is August 12. CW contest, ARRL table, variety of activities, great food; $3 per tailgate space, admission $1.50, XYLs and children free. For details, write Radio Central ARC, Ham-Central, P. O. Box 680, Miller Place, NY 11764, or call Joan Longtin at 516-924-8438 or Robin Goodman, 516-744-6260.

North Carolina: The Cary Amateur Radio Club will hold its seventh annual swapfest July 21 at the Lion's Club Shelter in Cary. Purpose is to buy, sell and trade as much electronic equipment as possible. Talk-in on 28/88, 75/25 and 52. Dealers welcome. Registration for prizes. For more info, contact Cary ARC, P. O. Box 53, Cary, NC 27511.

North Dakota: The International Peace Garden hamfest is July 14-15 at the Peace Garden, on American side between Manitoba, Canada, and North Dakota. Equipment displays, "Ham of the Year" awards, QCWA meeting, free Sunday breakfast. Prizes, camping facilities. Registration $6 for hams, $4 for nonhams. For details, write to Bob Arndt, AEØY, 112-3 Del Mar Ct., Minot AFB, ND 58704.

***Ohio:** The Tusco Radio Club and the Canton ARC will cosponsor the fifth annual Hall of Fame hamfest on July 15 at the Stark County Fairgrounds in Canton. Advance tickets $2.50, $3 at the gate. FCC exams planned. For more info, contact Max Lebold, WA8SHP, 10877 Hazelview Ave., Alliance, OH 44601.

Ohio: The 15th annual Wood County ARC Ham-a-Rama is July 29 at the Bowling Green Fairgrounds. Gates open at 10 A.M., with free admission and parking. Dealer tables and space available. Trunk-sale space and food also are available. Prizes. Talk-in o 52. Tickets $1.50 in advance, $2 at the door. Write t Wood County ARC, c/o Eric Willman, 14118 Bisho Rd., Bowling Green, OH 43402.

Oregon: The Lane County Ham Fair is July 21-22 a the Oregon National Guard Armory, 2515 Centennia Blvd., Eugene. Displays, lectures, swap and shop transmitter hunt, snack bar. Free parking for trailers Registration is $3. Phone or write to Wanda Hemen way, WA7SZR, or Earl Hemenway, K7KVV, 236 Madison, Eugene, OR 97405, or call 503-485-5575.

Pennsylvania: The second annual Beaver Valle ARA hamfest is July 15 from 9 to 5 at Brady's Ru Park, Beaver. Free space for vendors. Talk-in o 25/85 and 52. Tickets cost $3. Contact Gar Mohrbacher, WB3FKE, 3414 47th St., New Brighton PA 15066.

Pennsylvania: The Broadcaster's ARC will hold it second annual hamfest from 9 to 4 on July 15 a Pocono Downs Race Track, Rte. 315, four miles sout of Wilkes-Barre. Admission $2.50, no extra charge fo sellers, XYLs and children free. Talk-in on 66/06 an 52. All indoors. For more info, write John Soha W3KLU, 62 S. Franklin St., Wilkes-Barre, PA 18703 or call 717-823-3101.

Pennsylvania: The Tri-Club hamfest of GYE Lehigh Valley ARC and Delaware-Lehigh ARC is Jul 15 at the Allentown Police Academy, Lehigh Parkway South. Talk-in 34/94 and 52. Admission $2, $4 fo sellers. Contact LVARC, c/o San Yoder, K3SY, Rte 1 Box 410, Allentown, PA 18104.

Pennsylvania: The 42nd annual Pittsburgh hamfes of the South Hills Brass Pounders and Modulator will be August 5, from noon to dark, at Allegheny County Community College, south campus on Rte 885. Large indoor air-conditioned area for vendor and flea market. Prizes and food. Talk-in on 13/7 and 52. Preregistration $1.50, $2 at the door. Vendor must register. Contact Bruce Banister, 595 Leprechaun Dr., Bethel Park, PA 15102.

***Tennessee:** The Oak Ridge ARC will sponsor a hamfest July 14-15, from 9 to 5 both days, at the Oak Ridge Civic Center. Many prizes, food concession variety of local attractions. Swimming, golf, etc. FCC exams on July 14 at 8 A.M. Talk-in on 28/88, and 52 Contact Charles Byrge, WB4OBE, 171 California Ave., Oak Ridge, TN 37830.

***Tennessee:** The Radio Amateur Transmitting Society will hold its Nashville hamfest July 29 at the National Guard Armory, Sidco Dr., Nashville. Prizes tables, bargains, refreshments available. Admission $3. Talk-in on 90/30. For more info, contact Richard Wagner, K4MZE, 1015 Haber Dr., Brentwood, TN 37027, or call 615-794-5356.

Texas: The 14th annual Northwest Texas Emergency Net Picnic and Swapfest will be August 5, beginning at 8 A.M., at the City Park in Levelland Cosponsored by the Hockley County ARC and the Northwest Texas Emergency Net. Talk-in on 28/88 Donation of $2 requested. Contact John Bell W5NGX, 208 Pat St., Levelland, TX 79336.

Texas: Encounter '79, the Texas VHF-FM Society's summer convention will be held August 3-5 at the Villa Inn, Irving. Transmitter hunt, exhibits, programs, flea market planned. Talk-in on 52. Preregistration is $5, $6 at the door. Write to Encounter '79, P. O. Box 3608, Arlington, TX 76010.

Virginia: The 1979 Shenandoah Valley Amateur Radio Club hamfest will be held August 5 at the Ruitan Fairgrounds, Berryville. Gates open at 8 A.M. Talk-in on 22/82 and 52. Contact SVARC, P. O. Box 139, Winchester, VA 22601.

Wisconsin: The Sheboygan County ARC swapfest is July 22 from 9 to 5 at the Wilson Town Hall, Sheboygan. Many prizes, good food. Equipment displays, public auction at 3 P.M. Adults $1, children free. Talk-in on 66/06 and 52. Contact SCARC, Farnsworth Junior High School, Sheboygan, WI 53081, or call 414-457-3203.

Wisconsin: The South Milwaukee Amateur Radio Club will hold its Swapfest '79 on July 14, from 7 to 5, at the American Legion Post 434, 9327 S. Shepard Ave., Oak Creek. Picnic area, refreshments, prizes available. Overnight camping space. Admission of $2 includes a happy hour with free beverages. Talk-in on 94. For details, including a map, write the SMARC, Robert Kastelic, WB9TIK, P. O. Box 102, South Milwaukee, WI 53172.

Wyoming: The Wyoming hamfest, sponsored by the Sheridan ARC, will be July 21-22 at the Meadow Lark Ski Lodge, 42 miles east of Buffalo on Big Hown Mountain. Good fishing, games, swap table. Talk-in on 23 and 52. Advanced registration is $5, at the door $7. Dinner July 21 costs $5, under 12, $2.50; deadline to register is July 10. Contact Larry Markley, WB7WQQ, Birney Star Rte., Box 35-G, Sheridan, WY 82801.

*ARRL Hamfest

Coming Conventions

June 30-July 1
West Virginia State, Jackson's Mill
July 27-29
Oklahoma State, Oklahoma City, OK
July 27-29
Saskatchewan Prov., Moose Jaw, SK,
August 4-5
Arkansas State, Little Rock, AR
August 4-5
North Florida Section, Jacksonville, FL
August 11-12
Pacific Division, Reno, NV
September 9
Illinois State, Rockford, IL
September 28-30
New England Division, Hartford, CT
September 29-30
Kentucky State, Louisville, KY
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

ARRL NATIONAL CONVENTIONS

July 20-22, 1979
Baton Rouge, LA
July 25-27, 1980
Seattle, WA
March 13-15, 1981
Orlando, FL

OKLAHOMA STATE CONVENTION

July 27-29, 1979, Oklahoma City, OK

The Oklahoma State ARRL Convention and famed "Ham Holiday" will be held July 27 through 29, at Lincoln Plaza, 4445 Lincoln Blvd., Oklahoma City, OK. Sponsored by Central Oklahoma Radio Amateurs (CORA), its program will include an ARRL forum and technical talks on 1-GHz techniques, fast-scan TV for radio amateurs, NBVM, and other subjects of current interest. In addition, a full program is scheduled for the ladies.

Preregistration will be $4 if received before July 20; after that date, $5. A special award is being made to encourage preregistration. There will also be many other prizes. Mail your registration to CORA, P. O. Box 14424, Oklahoma City, OK 73113.

Adequate rooms are available for commercial exhibitors. Over 10,000 square feet of floor space — all under cover, convenient to loading and unloading and with unlimited table space — is available at no cost to flea-market swappers. (No commercial exhibits in the flea-market area.)

The Lincoln Plaza is near the Oklahoma Cowboy Hall of Fame, the Oklahoma State Capitol, Oklahoma City Zoo, and many other attractions. The hotel has a disco, a private club and full recreational facilities for all of the family. So bring your family for a real Ham Holiday! There is unlimited parking space — no crowding — no long walk from the car — no worry of losing your space if you move your car!

SASKATCHEWAN PROVINCE CONVENTION

July 27-29, 1979, Moose Jaw, SK, Canada

The Moose Jaw Amateur Radio Club is sponsoring the 1979 Saskatchewan Province CRRL-ARRL Convention (Particifest '79), July 27th through 29th at the Saskatchewan Technical Institute, 600 Saskatchewan St. W., Moose Jaw, SK.

A complete program of forums will be presented: DOC, CRRL-ARRL, CARF, SARL, CLARA, ARES, NTS, technical, XYL, commercial exhibits, contests, swap and shop, and interesting guest speakers. There will be a Saturday night banquet and dance at the Western Development Museum starting at 6 P.M.

Registration on Friday night 6:30 P.M. to 10 P.M., Saturday from 8 A.M. to 9:40 A.M. Talk-in on 3785 kHz, 146.34/94, 146.46/06.

For information and preregistration contact VE5AE through NTS or Sask Phone Net, 3785 kHz at 0100Z or Particifest '79, Box 150, Bushell Park, SK S0H 0N0.

ARKANSAS STATE CONVENTION

August 4-5, 1979, Little Rock, AR

The second Annual Little Rock Ham-A-Rama will again be held at the Arkansas State Fairground. This location offers ample space for dealers and a large flea-market area. The dealers' exhibits will be in an air-conditioned building, with ample power available. In addition to the displays and flea market, a full schedule of programming will be provided, focusing on Amateur Radio in Arkansas. At press time arrangements were being made for speakers who will bring participants up-to-date on recent developments of general interest for amateurs. Highlighting the festivities will be a Saturday evening party where everyone can meet and discuss their favorite interests in a convivial atmosphere. We are looking forward to seeing you in August and enjoying another pleasant hamfest together.

NORTH FLORIDA SECTION CONVENTION

August 4-5, 1979, Jacksonville, FL

The Jacksonville Hamfest Association is pleased to announce the 1979 ARRL North Florida Section Convention and Jacksonville Hamfest to be held August 4-5 at the Jacksonville Beach Municipal Auditorium. The location is just one block from the beach where U.S. 90 meets the sea, so there will be plenty for the whole family to do.

Advanced registrations are available at $3 per person from R. J. Cutting, W2KGI/4, 303 10th St., Atlantic Beach, FL 32233. Price at the door will be $3.50.

A large indoor swap area will be featured with advance table reservations available for $5 per table per day from Robbie Roberts, KH6FMD/W4, 10557 Atlantic Blvd. No. 31, Jacksonville, FL 32211. Information on exhibitors booths and space is available from the same address.

Other features and programs include statewide organization meetings such as traffic nets and MARS, a microprocessor seminar, solar power demonstration, DX "pileup" contest, hidden transmitter hunt, OSCAR forum, ARRL forum, emergency preparedness programs, DX and contest presentation, antenna and technical seminars, and much more.

The hamfest is sponsored by the six Amateur Radio clubs of the greater Jacksonville area and all proceeds go into the promotion of Amateur Radio. More general information may be obtained from JHA, 911 Rio St. Johns Dr., Jacksonville, FL 32211. QST

50 Years Ago

July 1929

☐ The Washington conference did not end international meetings affecting amateur radio; the new CCIR (technical consultative committee) will hold its first meeting later this year in The Hague.

☐ President Maxim, speculating on ultra-DX possibilities, wonders if an amateur will be the first to communicate with and thus confirm the existence of life elsewhere in the cosmos.

☐ Coupling between stages has many facets, and J. M. Grigg presents the design aspects complete with formulae.

☐ The A.R.R.L. Board met in May; besides a request to authorities for more space for phone, directors affirmed a strong position that the only test of a message to be handled by amateurs is whether compensation is involved; the text content is immaterial.

☐ Comdr. William Justice Lee, W4XE, is experimenting with r.f. effects on small animals, and warns that power at 5 meters has potentials of damage to humans.

☐ A station description of an elaborate W8CEO setup shows a remote control system not only for the transmitter tuning but also for antenna matching.

☐ W3BAY has designed a compact portable receiver which can also serve as a monitor. And W6AM has a mobile receiving unit which he uses in railroad travel with his W6ZZA portable operation.

☐ Technical Editor Westman calls our attention to possible amateur applications of two new tubes — UX-841 and 842.

☐ "The DX Meter" is a gadget to measure distances between points on the earth's surface for DX record purposes.

25 Years Ago

July 1954

☐ After several tries, W0NWX and crew finally reached remote and forbidding Clipperton Island for some exciting DX activity as FO8AJ.

☐ A high-power linear of novel physical design is the contribution of W5SCE.

☐ W1JEQ relates simple fundamentals of single-control multiband tank circuits, while W6MUR delves into design considerations.

☐ A general portrayal of amateur (RACES) participation in civil defense communication is provided by W3IFS of the Washington federal staff.

☐ W1ICP shows another version of W2JN's system of getting 50-kc. markers from a 100-kc. crystal unit.

☐ The Superior Court has again upheld the League's action in declaring several candidates ineligible to run for director because of lapses in their memberships.

☐ W4CIZ's report on activities of the Washington TVI Committee provides much helpful guidance for the rest of the country plagued with this problem.

☐ W0WHZ has no complete design, but a number of his ideas on receiver circuits and construction should inspire us to build our own.

☐ The Editor urges local clubs to make certain that anyone looking for help in obtaining an amateur license can locate a suitable proctor under the new mail examination system.

☐ The use of resins to construct potted circuits is quite practical in the home workshop, says W2ALJ.

☐ W2IDZ and W1DX complete their series on 50-Mc. TVI and radiotelephony, respectively.

☐ W1BVR has newly been elected a vice-president of the League. — *W1RW* QST

YL News and Views

Conducted By Jean Peacor,* K1IJV

Reflections

Tempus fugit! Time and *tide* wait for no man! Or, where has the time gone? In today's rapidly paced world, it is a luxury to have an occasion that encourages you to pause and reflect.

Ever wish you had kept a diary? Intentions can be the best each January 1st, only to find that by March you have skipped so many days why not wait until the following January and do it right. For those who stay with it, your memoirs are practically written. For those who don't?

Some rainy day wend your way atticward and find your old logs. They're better than a diary. Since I was a Novice in the beginning, my first logs show page after page of nicely unanswered CQs. No one had warned me that you must go through the ear-training period. Since my OM and I were new in this hobby together, the first few dared on-the-air attempts were strictly togetherness. Then came the day I had to try a CQ all on my own. The deep breathing! Who's nervous? The expectancy of far away places, only to be answered by a ham right down the street.

What excitement to learn that our section was to start a Novice Training Traffic Net — a Red Letter Day. At last, stations that would answer whenever being called. What patience the Old Timers showed.

Upgrade day. That more than proved Amateur Radio is indeed a privilege — all those frequencies. Until then, Ohio seemed to be as far as our radio signal would reach from Massachusetts. Now here was the world — truly an oyster. All the hours of hard study were quickly forgotten.

Scanning the logs, you will find that you actually remember conversations from several years back. You'll see the days that bands had to have been open to the world since there is that logged pileup for proof.

Your first contest. No way could a winner evolve from that turmoil.

The rare night that, while listening for local stations on 80 meters, all that could be heard were far away places. What's more, they heard and answered you.

A pleasant memory can almost be guaranteed on each log page. Time and tide may not wait for us, but that rainy day in the attic can prove to be most memorable. The time spent is right there in the log and the tide may indicate the direction you can travel. Perhaps it will convince you to try cw again. Or, is it ssb you've neglected lately? Or, in remembering the kindnesses shown you as a Novice, you'll be stirred enough to return the same kindness to newcomers. Whatever, it can be a day well spent.

In the process of reminiscing, rereading many old *QST*s followed the log review. Starting with Eleanor Wilson's "YL Column" that appeared for 10 years and continuing through Louise Moreau's columns of the past 13 years, I found them to be virtually historical. These pages have been adorned with "YL Columns" for more than a quarter century. We are here to stay.

These reflections stem from the excitement of writing the column again. It is a great pleasure for me to be back. This is your column; your views on what you'd like to see in it are most welcome. So please, keep those cards and letters coming.

THIRTY YEARS — STILL GOING STRONG: YL/OM CONTEST RESULTS

Win or lose — it's all in having played the game. The weekends in March of the 30th Annual YL/OM Contest produced great results. If you played the game, you are familiar with its excitement. If not, make it a must for next year because whether your love is cw or phone, or both, you will find that this contest makes for fun-filled weekends.

SSB First Place YL Award goes to Suzanne Malesic, HI8XDJ, for her score of 88,282. In second place is YU3AJK with 71,311; third place honors (first in U.S.) go to Donna Mollan, WB7FDE, with 63,495 points.

First place OM honors, ssb portion, go to OZ5EV for his high score of 4113; AA4FF takes second place (first in the U.S.) with 2974 and W3IEZ is third with 1595.

K1NEI, Beryl (Billie) Medler, was Number One in the cw YL portion with her outstanding score of 13,706. WA2WHE, Gretna Longware, of Elizabethtown, NY placed second with 11,286 and third place honors go to K8ONV, Mary Ryden, of Milan, OH with 9225.

The cw OM portion was won by Fred Fraley, AA4FF, with his score of 938. No newcomer to the contest, Fred is the only station to win both portions in past years, which he did in 1975 and 1977. He came close to doing that again this year. Many of you better know him under the alias of W4CHK. Second place with 776, goes to KØBM, Ben Moschenross, of St. Charles, MO. Third place honors were won by W5UN, David Blaschke, from Texas with a score of 743. You'll remember Dave as W5WZQ.

YLRL will award cups to HI8XDJ, OZ5EV, K1NEI and AA4FF, with certificates going to second and third place finishers.

The runner-up roster follows: *SSB Portion* — High for each district — U.S. YLs: WB1CZC, 5350; WA2NFY, 1620; WA3HEN, 7166; K4LMB, 13,390; K6KCI, 13,332; WB7FDE, 63,495; K8ONV, 24,700; WA9TVM, 27,234; WBØJFF, 4300. DX YLs: I3MWP, 61,820; LZ1KDP, 42,552; YU1NHV, 37,674; G3EZI, 25,800; VE2FIM, 17,500; VK3KS, 16,469; VP9IX, 12,180; 15AZX, 10,920; GD4GWQ, 10,238; VE5FK, 6440. High for each district — U.S. OMs: W1BNS, 1000; K2LFG, 1203; AA4FF, 2974; W7EOI, 1353; KB8GH, 383; W9CA, 834; KØETA, 1031. DX OMs: G4DZI, 1235; OK1DKS, 990; UB5UAT, 775; VE3BR, 520; DL1RA, 496; EA2LY, 342; I1YPT, 270; LA2MT, 248; JA7GLB, 225; I8IHG, 220. *Cw Portion* — High for each district — U.S. YLs: K1NEI, 13,706; WA2WHE, 11,286; W3CDQ, 714; WA4SRD, 3183; AD6Z, 4815; N7YL, 3182; K8ONV, 9225; N9YL, 6120; WBØNIE, 5600. DX YLs: GD4HIT, 7475; I1MQ, 4464; DK8LE, 3280; SP5YL, 1710; JA1AEQ, 315; OZ7YL, 270; VK3NCS, 140. High for each district — U.S. OMs: W1GKJ, 525; W2AAU, 572; AA4FF, 938; W5UN, 743; W6ZT, 504; W7RD, 180; W8EAO, 405; W9CA, 473; KØBM, 776. DX OMs: VE2CO, 594; IT9AGA, 135; F6ERZ, 70; VK3XB, 62; SP8MJ, 25; SM5RH, 9.

Billie, K1NEI, takes first prize for cw. No stranger to 20-meter cw, she really put Vermont on the map during the contest. Licensed since 1960, a YLRL and WRONE member and recently retired, she now enjoys cw even more, along with her hobbies of gardening, painting and ceramics.

Foxy Fox (that's the mascot) and Fred Fraley, AA4FF, vice president of Lynchburg (VA) Amateur Radio Club. Fred took first place in cw and second place in ssb YL/OM.

"The busier you are the more you can do." Donna, WB7FDE, proves that adage not only because of her YL/OM score, but as the State of Washington's only YL emergency coordinator, an elementary school teacher, and recipient of many awards (DXCC 5-Band WAS included). Look for her on all bands, but especially on 20 and 10 meters chasing a little DX in her spare time.

SPECIAL REQUEST

I am interested in establishing contact with all Extra Class husband and wife teams and determining the dates licensed. If you qualify, or know of someone who does, please write Edith E. Baldo, KB6P, 3 Eton Ct., Berkeley, CA 94705.

*Country Club Drive, Monson, MA 01057

Silent Keys

It is with deep regret that we record the passing of these amateurs:

K1AM, Frederic A. Lane, Wakefield, RI
ex-1AWI, Lewis J. Smith, Norwich, CT
ex-K1BBU Andrew F. Underhill, Jr., Mount Dora, FL
W1BGY, Jules T. Steiger, Willimansett, MA
W1CX, James W. Moore, Ellsworth, ME
W1FPT, Ernest G. Johnson, Trumbull, CT
WA1HSM, Robert S. Quimby, Lexington, MA
W1JDP, John H. Blake, Penacook, NH
W1JXT, Howard C. Tucker, Putnam, CT
WA1NZJ, Clifton E. Pentz, Merrimack, NH
W1SAN, Lloyd H. Wiswell, Pittsfield, MA
WD2AIB, George A. Biddle, Rochester, NY
K2BEF, Harry P. Steckle, Sayville, NY
W2CCX, Harry Adelman, Newark, NJ
W2CE, George S. Beck, Elmhurst, NY
WA2CIK, Ralph E. Parsons, Ocean City, NJ
W2DFB, Carl F. Lefferson, Oakhurst, NJ
K2HW, Edward T. Farish, Massapequa, NY
WB2OXN, William J. Llewellyn, Conklin, NY
WA2TNA, James G. Mooney, Elizabeth, NJ
N3AMI, Richard K. Thomas, King of Prussia, PA
W3APL, Roderick W. Maben, Ellicott City, MD
W3ATX, Joseph W. Marsden, Philadelphia, PA
W3BBC, Richard H. McElwee, Glenolden, PA
WA3DPG, Trusten M. Baldwin, King of Prussia, PA
W3DQ, Willard S. Wilson, Sr., Wilmington, DE
W3DV, J. Edwin Ahrend, Monaca, PA
W3GNN, William Mauer, Fayetteville, PA
W3PQK, Lee V. Mincemoyer, S. Williamsport, PA
K3SGA, William H. Hadley, Collegeville, PA
WA3TCE, Leonard D. Fowler, Bryn Mawr, PA
K4BS, Donald R. Greenawalt, Vero Beach, FL
K4CFN, Virgil D. Baker, Jr., East Point, GA
WB4CYG, Phillip R. Ankrom, Macon, GA

*Life Member

*K4GD/W3GD, Ivan H. Loucks, Lady Lake, FL
WB4GPS, Glen C. Clute, Charleston, SC
W4IN, Ronald J. Bashford, Lynnhaven, VA
WB4KYN, W. Fred Dillon, Church Hill, TN
WA4KYT, Eugene E. Stitt, Bristol, TN
WB4LPA, Ralph C. Webster, Zephyrhills, FL
WA4LVF, Leon A. Akins, Yorktown, VA
WB4LXJ, Paul Szabo, Tampa, FL
W4MJC, Charles A. Gilreath, Chattanooga, TN
W4MZK, Dr. Edwin B. Brickhouse, Oak Hill, FL
WA4OAZ, Laura J. Trent, Cowpens, SC
*WA4PFE, Dr. Neil D. Ganter, Merritt Island, FL
K4RG, Gordon V. Peck, Pompano Beach, FL
W4SO, Col. Carroll S. Miller, Orlando, FL
W4SOF, James E. Murff, Jr., Gainsville, GA
*W4TKK, Michael A. Kalange, Huntsville, AL
K4UQJ, James F. McCraw, Gaffney, SC
W4ZBW, Michael Thiess, Dayton, KY
W5AFM, Grace H. LaGrone, Comanche, TX
W5CEZ, Carter L. Simpson, Sulphur, LA
K5DPT, J. Theo Gresham, Wichita Falls, TX
W5MAA, Edward Tong, Metairie, LA
W5MBH, Kermit B. Cumpston, Blooming Grove, TX
W5PXL, Keith W. Doughty, Garland, TX
W5RG, Thomas R. Gentry, Dallas, TX
WA5RVX, Donald W. Sweezey, El Paso, TX
W5TWZ, Chester W. Ofelt, Albuquerque, NM
WB5WKJ, Billy Lewellen, Harrah, OK
N6APL, Lauren F. Elliott, Santa Ana, CA
WD6ERL, Perry A. Munro, Anaheim, CA
K6GT, E. Finley Carter, Portola Valley, CA
K6GTA, Edmon V. Kaiser, Stockton, CA
WA6GUW, Huey E. Scott, Jr., Los Angeles, CA
WA6HQG, Wilfred W. Cobleigh, Los Angeles, CA
W6HTR, Carl E. Shaw, San Mateo, CA
N6KX/WA6HIQ, Alan R. Salisbury, Buena Park, CA
K6LOR, William Swenson, LaPalma, CA
W6MQP, E. R. "Jack" Lee, Oceanside, CA
W6NXN, C. Edward Gulbran, San Diego, CA

K6OEJ, Philip E. Coombs, San Carlos, CA
WA6OPM, Norman Martin, Thousand Oaks, CA
WB6SZC, Harold T. Rossman, Alhambra, CA
W6WDM, Antone T. Avila, Petaluma, CA
W7LLH, Victor Drabble, N. Ogden, UT
WB7PUO, John W. Caubre, Port Orchard, WA
ex-8BCR, Earl Cassell, Grafton, WV
ex-W8CCF, Forrest R. Frishette, Charleston, WV
W8IXU, William G. Bartels, Cincinnati, OH
WB8NLH, George M. Garrison, Columbus, OH
WD8OSN, Milton A. Monahan, Southfield, MI
WA8PEW, Arthur D. Berry, Dearborn Heights, MI
W8RFD, Frank E. Aley, Charleston, WV
WB8TCA, Herman J. Hartman, Bronson, MI
K8WNQ, Albert M. Barnes, Cincinnati, OH
*WA8YHN, Herbert C. Mickle, Blacklick, OH
WA9AVK, Evald L. Gingras, Chicago, IL
*WD9AVY, Bernard V. Murdock, Elkhart, IN
W9BAV, James M. Clark, Rockford, IL
W9BEJ, Dan E. Murray, Pana, IL
W9DFJ, Irvin N. Berens, Big Bend, WI
WD9FJE, Donald R. Underhill, Boonville, IN
W9KWA, Lt. Col. Wilson Thomas, Brookfield, IL
W9LIW, George McAleer, Elmwood Park, IL
W9MTW, Walls C. Shreffler, Joliet, IL
W9NSX, Sylvester "Doc" Senso, Kaukauna, WI
KØBLN, William L. Douglas, Littleton, CO
WØPKF, Vernon H. Warner, Oberlin, KS
WØSTH, Carlton H. "Bud" Vernon, Corning, IA
WØVPY, Dr. Wayne O. Wallace, Sr., Atchison, KS
VE2AI, Gaston Hebert, Montreal, PQ
VE6CQ, F. Edin H. MacDonald, Calgary, AB
VE7KZ, Edward Skelton, Vancouver, BC
VE7MB, J. D. Hart, Westbank, BC
VO1BZ, M. C. "Murray" Campbell, Corner Brook, NF
F9AA, Fernand Raoult, Paris, France
FP8JP, Joseph Paturel, St. Pierre, Miquelon Island
PAØAAE, Jacques Meys, Panningen, Netherlands
PAØPRF, Albert Drenth, Amsterdam, Netherlands
9Y4TU, Karl E. McLeon, Port of Spain, Trinidad

Club Notes

Ever wonder if the effort the club spent on an exhibit was worth the time consumed? K4GRM of Collier Co. (FL) ARC recently received a radiogram from a Novice in Maine who had visited the club mall display the previous year. At that time, the person wasn't licensed. Now he's trying for his General!

WB9VIV of Libertyville and Mundelein (IL) ARS suggests that club members give talks at club meetings on Amateur Radio subjects about which they feel unsure. He has found that it is an excellent means of learning the material and may be a boon to passing the next-highest license class exam.

Forx ARC (ND) held an Amateur Radio magazine exchange at a recent meeting. Members exchanged or gave away unwanted magazines. They also are considering a "boat anchor exchange," and would invite beginners, students, experimenters and anyone else who likes good "junque."

A local broadcast radio station in the San Fernando Valley (CA) RC area sponsors a "1070" contest, giving away $1070 each month. The SFVRC secretary buys 10-cent post cards and sells them at club meetings. Members enter the contest in the name of the club and hope the club will win some money. The winning member might get a bonus!

The Sun Parlor Retirees ARC (ON) received a grant from Health and Welfare Canada through a senior citizens' "New Horizons" program. The club purchased equipment for a station at the local fire department. Club objectives are to assist senior citizens and interest them in a great hobby.

A message contest was held by the Northern Florida ARS. The club member handling the most traffic in a month's time won a prize.

An interest group within a club may prove rewarding. Kaw Valley (KS) ARC is investigating the possibility of forming an astronomy interest group. Members have made their own telescopes, are planning a local net and publish a monthly bulletin. Another club similarly involved is the Hughes El Segundo (CA) Employees Assn. ARC. — *Rosalie White, WA1STO*

When visiting hams from other states or countries are in the area, invite them to talk on "Amateur Radio in their town." Here, Heart of America RC (MO) Treasurer WBØJXZ (l) and President WBØBMB (r) welcome JR3s MKX and MKW with honorary club membership cards.

Communications for a leukemia-thon were handled by Heart of America RC (MO) members. The photograph shows (left to right) WBØYBA, WBØNKR and WBØLFY at work. Camille, WBØYBA, a member of the Leukemia Committee, also coordinated activities.

Strays

QST congratulates . . .

☐ John F. Kienzle, WA2UON, who received the Notable American Award from the Editorial Board of the American Biographical Institute.

☐ Bo Bovart, WBØZNW, who received a special plaque of appreciation from the Heart of America RC (MO), for recruiting 11 new members during 1978. The 85-year-old ham got his Novice license two years ago.

☐ George L. Voltz, WB9OKR, who has been promoted to vice president of Support Operations for Radio Shack.

The World Above 50 MHz

Conducted By
William A. Tynan,* W3XO

VHF Conferences

Vhf conferences have become an important, integral part of the world above 50 MHz. For anyone seriously interested in techniques, equipment or wave propagation associated with vhf and higher frequencies, attending one or more of the vhf conferences held around the country each year can be a very interesting and rewarding experience, not to mention an educational one. On top of the wealth of technical information that one can absorb, there is the tremendous enjoyment of getting together with those who share an intense interest in the same facet of Amateur Radio as you do. I hasten to point out, however, that there have been those who have gone to vhf conferences, not knowing what they primarily consist of, who were somewhat turned off by the one or two days of technical papers. Yes, these people could while away the hours at the pool or in the lounge but it was obvious that they did not quite know what they had gotten into and were a little out of their element. Vhf conferences are not like large conventions or hamfests; they are quite small by comparison and there is usually only one activity scheduled at a particular time. During the daytime hours, this is usually dissertations on subjects from sporadic E propagation to how to build ultra-low-noise preamps for 432 or higher. The evenings are usually devoted to measuring the noise figures of pet preamps or converters but there's also plenty of time for swapping lies, as well as good ideas, over a cool one or two.

There are four main vhf conferences presently held in the U.S. each year. The Northeast Conference and the West Coast Conference are both in May. The Mid-Atlantic Conference, sponsored by the Pack Rats, is held in late September or early October. The oldest and best known of these get-togethers is put on each August by the Central States VHF Society. Their conference is always held someplace in the central U.S. on the weekend following the Perseids meteor shower. This year's affair is August 17-19 at the Dallas-Fort Worth Airport Holiday Inn North in Irving, TX. Planned technical talks include a discussion of high-dynamic-range receivers and impulse noise reduction to be presented by Al Burson, K5WXZ, of Collins Radio; information on calculating receiver noise figures by anothe gentleman from Collins, Courtney Hall WA5SNZ; and information on the fine point of mixer, amplifier and oscillator design usin JFETs and dual-gate MOSFETs, presented b Sam Weaver of Texas Instruments' Applica tions Department. Also, Mike Vestal, WØYZS will put on a slide show of his 70-cm EME DX pedition to the Western states. Noise-figur measurement equipment will be available fo 50 through 2300 MHz and Gerald Williamson K5GW, has agreed to set up the range for th antenna gain tests expected to include 144- an 432-MHz capability.

All in all, it looks as if CSVHS president A Ward, WB5LUA, and Bill Duval, K5UGM conference chairman; and the rest of the gan around Big D are putting together a bang-u conference. I urge anyone seriously interested in the world above 50 MHz to consider attend ing.

For more information, send a large s.a.s.e with 28-cents postage to Ted Mathewson W4FJ, 1525 Sunset La., Richmond, VA 23221 CU there!

VHF SPACE NET CONTEST

The annual VHF Space Net Contest has been quite a popular operating activity for a number of years. This year's event, celebrating the 10th anniversary of the landing on the moon of Apollo 11, will be held July 21 and 22. This is the contest in which ZIP codes are the multipliers, so it makes for some interesting doings. For full rules send an s.a.s.e. to K4AWS, Box 15, Sumterville, FL 33585.

ON THE BANDS

6 Meters — As expected, F2 propagation trailed off during late April and early May. But old Sol's swan song offered some nice DX opportunities, nevertheless. On April 29, ZS6XJ duplicated ZS6LN's feat of working HI, reported last month, by hooking up with KH6NS. This 12,000-mile path appears to be more consistent than anyone had imagined. W4MMZ reports that he and several other south FL stations worked ZK1AA around 2200 UTC on May 3. Signals ran about 5 × 5. The evening of May 4-5, W6XJ hooked up with LU3EX, H44DX, VK8s GB, DI and VV as well as ZK1AA. The next afternoon, Gary added LU8AHW, H44PT and H44DX again. This was interspersed during late afternoon local time of the 4th with an Es opening to the Pacific Northwest. A number of stations were worked on this opening including VE7BLF. During the contact, they QSYed to 2 meters and worked on that band too.

This is only one of many reports of Es, which seems to be off to a very nice start this year. NØLL commented, during 50-MHz Es contact with this conductor the evening of May 11, that some Es had been noted at his Smith Center, KS, QTH every day for the past week. Conditions seem to have been almost that good here in the Washington area. Most of the openings from this part of the country were of the single-hop variety, principally to FL and the Gulf Coast, but one double-hop session to CA was reported by K3HFV to have occurred the afternoon of May 10. Es for the summer 1979 season appear to be shaping up quite well. We should know by the time this appears in print just how good the season is to be.

Back in the exciting world of F2, K7JA/JR1ZJC passes along some pages from the May 1979 issue of Japanese *CQ Magazine* containing long lists of DX stations worked on 6 meters by various JAs during late February and the first part of March. Of course, there is a string of VKs and other Pacific calls but it's interesting to see the likes of K6HPT, WA6JRA, WB6BYA, K6HCP, WB6YPT, K6PXT, W6XJ, K6PHE, K6JZK, W6SJR, K6HHJ, K6RMJ and N6CW. There is also a bunch of LUs, PYs, a few other South Americans such as CE4CP and CE3OK and, a very nice catch on any band, HS1SD. Makes an East Coaster want to move to CA, or South America, or Japan — or somewhere!

While in the Pacific, YBØAT passes along information on the YBØX DXpedition by a JA group. They were on 6 meters and OSCAR from Jakarta between April 29 through May 7 and are scheduled to repeat the operation in August and October of this year.

An outstanding bit of DX was worked at 0043 UTC April 12 by W4NVV on the west coast of FL. Carrol's big catch was VK5KK. As reported last month, a week earlier several FL stations worked VK4RO, but VK4 is Queensland on the northeast coast of Australia while VK5 is South Australia on the south coast. What will be next? Better get that 52-MHz capability ready.

K5SW, QSL manager for K4ERO/HC1, passes along an impressive listing of the DX worked by him and XYL N5KW including such tidbits as LU8EEM, CE4CP, LU3FX, LU8AHW, LU1DAU and LU2BG. Sam says that K4ERO/HC1 now has 40 states and needs VT, most of the 7s, as well as HI and AK.

The always interesting and informative propagation summary turned in each month by WA5IYX contains an especially noteworthy item for April. Pat notes that on the 17th he observed Channel 2 TV signals which he established as being from South America and propagated via F2. He could not hear the sound, so the F2 muf that day was in the vicinity of 58 MHz. Pat would like to know if anyone else has experienced similar F2 TV reception. On the same day K4ERO/HC1 and JE1PCX/MM2 (7°S, 87°W) put u good signals to the East Coast for several hours.

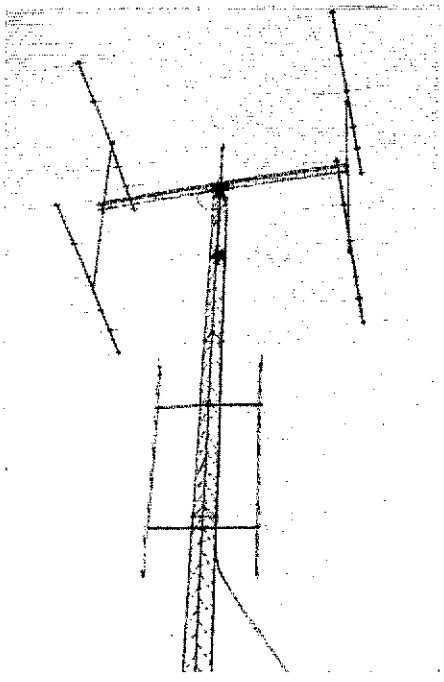
Earlier, at 0200 UTC the same day, when th Japanese maritime mobile was located at about 10° and 89°W he was worked by K8NXI. That's 2100 EST which would seem to indicate TE but JE1PCX was, a the time, about on the geomagnetic equator. Mayb someone can figure that one out!

A letter from K1ZZ, as well as other communica tions I have received, notes that CO2KK is gettin back on 6 meters. Apparently Arnie has an ol a-m/cw rig with a crystal on 50.109. The thought ha occurred to this conductor that someone may have a ssb exciter such as a 10A or 20A or possibly one of th Heath single-band rigs, which they might care t donate to the cause of getting a rare, but easil workable, country on 6-meter ssb. I am sure tha CO2KK can make good use of it and can come up wit the necessary additional gear to put the rig on 5 MHz.

2 Meters — The appearance of summerlike weathe early in May brought a bang-up tropo session to th central part of the country. WBØVYV, IA, reports, vi the telephone recorder, that he worked 10 TX station including W5UWB, Kingsville, and W5LUU, San An tonio, during the evening of May 6. The next morning he added K5BMG, LA; N5AOX, MS; and KA4EXL TN. From the southern end W5UWB lists 10 state contacted including 24 9s in IN and IL, 6 0s in MO an IA, one 8 in MI, one 4 in KY and 19 5s in TX, LA, AR and OK. W5LUU characterized the opening as "th most widespread tropo he has seen in 30 years on meters." Derwin happily notes that he netted two ne states, bringing his total to 25. EME is next with 1 5-element Yagis going up soon. Apparently the easter extremity of the tropo bending was around Bloom ington, IN. There, W3EP/9 does his 2-meter DXin from a hilltop with a portable setup. When informe of what was going on about midnight May 6 by W9[P Emil packed up his gear and headed for the hill There, in about 2 hours, he hooked up with W5EB Austin, TX; W5JLY, San Antonio (about 1000 miles) K5SW, OK; WB5QVM, Denison, TX; and WB5NBC AR. Those of you who have "impossible" locations take note.

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730 or call 301-384-6736 and record your message.

Well-known 6-meter operator WA8OGS, Cincinnati, OH.



The arrays at WA8OGS are the key to Joe's big signal. The 6-meter antenna at the top of the tower consists of four 6-element Yagis, while lashed to the tower is an 80-element north-facing collinear for 2 meters.

In the long-haul skeds department, K5UGM, Irving, TX, reports that he has been running over a 549-mile path with W5FF near Albuquerque, every Sunday morning at 0900 Central Time on 144.105 cw. Signals are quite consistently between 229 and 449. Bill would like to find someone to the east who would be interested in schedules. He can be reached at 2316 Spanish Tr., Irving, TX 75060, or call 214-253-1266. K5UGM is also on EME and has worked K1WHS and W6PO so far. Also among the converts to 2-meter EME is KH6IHP. Steve says that his four F9FTs and 8877 seem to be performing well. To date he has worked 11 stations, six the first weekend of the EME Contest. One of these was N7NW who is also running four F9FTs. Steve expects to be on 2 meters for another few months and then reinstall the 70-cm system.

Several have happily informed me that they are back on vhf or back in their home territory. K1FJM, who put NC into many a 2-meter and 70-cm log, is /4 again, this time from the Miami, FL area. Pete plans a high-power 2-meter and 70-cm setup and is determined to work New England on tropo. His address is 19570 S.W. 264 St., Redland, FL 33031. Back in AR, near where he ran up a total of 46 states, is K5MWH. Mike's new address is 2902 Kay La., Springdale, AR 72764. From RI, W1XJ reports that he is back on after a long absence due to antenna damage. Anyone needing 2-meter, 1-1/4-meter or 70-cm contacts with RI is invited to call 401-821-1710.

23-Cm Standings

Figures are states, U.S. call areas (plus VE and XE call areas plus other DXCC countries) and best DX in miles.

K1PXE	13	5	448	K5LLL	2	2	847
W1JR	8	3	257	W5LDV	2	2	838
W1XP	7	3	300	K5PUF	1	1	290
W1QXX	6	3	260	W5HPT	1	1	257
K1FO	6	3	172	W5HN	1	1	235
WA2LTM	17	6	770	K6ZMW	2	2	250
K2UYH	15	4	520	N6NB/6	2	2	250
W2VC	13	5	537	W6OCU	2	2	200
K2JNG	10	4	305	N6CA	1	1	120
W2DWJ	10	4	200	N6TX	1	1	112
K2YCO	8	5	570				
WA2VTR	6	4	320	N6CA/7	1	1	220
K2EVJ	5	3	247	K8WW	6	4	448
WA2EUS	4	5	320	W8YIO	5	4	551
K2OVS	3	2	135	W9HUV	5	3	525
W3HMU	11	5	300	W9JIY	5	3	300
K3IUV	9	4	290	W9WCD	3	3	770
WA3JUF	7	4	300	W9JTP	3	2	165
K4QIF	12	5	551	WØZJY	3	1	170
K4NTD	3	2	847	VE3HW	1	1	260
W4VHH	2	1	350				
W4LDV	1	1	290				

W5JTA, in the latest *SWOT Newsletter*, questions why 2-meter ssb is not used during emergencies. Len contends that it could be far more effective than fm on hauls of 100 to 150 miles and would not suffer the QRM and outage problems inherent with hf. He cites the April tornadoes which hit parts of TX and OK as an example of the kind of emergency in which 2-meter ssb could have served well if people were properly organized. Good idea, Len. Sounds like something the SWOT nets could be doing.

Speaking of nets, the 550 Amateur Radio Club of NNJ is sponsoring a 2-meter ssb net each Tuesday evening at 2100 local time on 144.225. NCS is the club station WA2SNA. All are welcome.

1-1/4 Meters — One of this band's most inveterate stalwarts is K5FF near Albuquerque. Way out there in the dry desert air, you can imagine that 220-MHz contacts are rather hard to come by. But Lee and OM Fred, W5FF, are in there trying, nevertheless. Their patience was rewarded recently when K5PHF and K5WXN appeared from El Paso. Both Lee and Fred worked K5WXN (who runs 50 watts out) quite easily for their first TX contact, but K5PHF's 1 watt was only barely detectable over the 200-plus-mile path. It is understood that he will have more power on soon.

From OH, K8AXU reports that he is ready and waiting on 1-1/4 meters, as well as 2 meters and 70 cm. Al is hoping for another super tropo session like the one last August. Aren't we all? Next time, this conductor vows to be home instead of at the other end of the country.

One of the Washington, DC, area's early 1-1/4-meter operators, W4API, recently joined the ranks of the silent keys. Charlie was also active on 70 cm and 23 cm. His most recent interest was ATV, having been the 1976 recipient of *A5 Magazine*'s "Good Image Award." His quiet way of contributing to our hobby was appreciated by all of those who came in contact with him. W4API will be missed.

70 Cm — EME activity got a real shot in the arm as a result of the running of the first annual EME Contest one year ago. As this is being written in mid-May, with only the first weekend of the 1979 competition completed, it appears that even more new stations are taking the earth-moon-earth plunge. From the May issue of the *432 Newsletter* published by K2UYH comes word of 70-EME operation by ZL2BCG, YU2RGC, VK5MC (of 2-meter EME fame), LA6VM, G8VR/W1 CT, GW3XYW, WA1VUM CT and KØPAY KS. K2UYH worked this last station a few days after the contest for state number 46. Ron's four-Yagi system seems to be performing well but he still must see the moon in order to aim the array.

An event long awaited in the ranks of moonbounceers finally occurred the evening of May 11 when K2UYH completed a contact with UK2BAS, the first successful EME operation by a Soviet amateur. Victor uses a high-power amplifier feeding 72 bays of four-element Yagis and NE645 preamp. I am sure he will be much sought after.

Terrestrial 70-cm activity continues to grow in many areas of the country. In the Northeast, one of the newest converts to the band is VE1RC. Despite the fact that he runs just 13 watts, Howard has been successful in working W1JR over a 325-mile path. From the Gulf Coast, K5JRH reports that he is active on 70 and 23 cm. Those wishing skeds on either band may call Holley at 713-694-9296. QST

Strays

The sunny weather in Imperial Beach, CA, helps Henry McTighe, K6GOE, run this solar-powered, 2-meter fm transceiver. *(K6GOE photo)*

BRUSSELS AWARD

☐ The Brussels Millennium Award, to celebrate the city's 1000th anniversary, will be issued to all qualified hams. To be eligible, hams must contact stations from Brussels with the special prefix OS (1, 4, 5, 6, 7, 8) during 1979. Requirements: hf (3.5 to 29.7 MHz) on at least two bands — for DX and Europe, 10 stations from Brussels; for Belgium, 15 stations from Brussels; for SWLs, same conditions with reports of QSOs between stations from Brussels and outside Brussels. Contacts and listening reports via repeaters or during contests are not valid. Cost for DX and Europe is three IRCs. Log information must be sent before February 15, 1980 to Brussels Millennium Award, P. B. 1000, B 1040 Brussels 4, Belgium.

TEXAS EXPEDITIONS

☐ Members of the North Texas High Frequency Association in Denton are planning two mini-expeditions this summer. The first expedition, *cw only*, will be to Telegraph, TX, in July. In August, the NTHFA will be operating in Telephone, TX, *on phone only*. Both will be active on 40 and 15 meters. Hours of operation will be from 8 A.M. to 6 P.M. CDST. Calls to be used are WD5ICY and WD5IKY. For more information, contact Duncan Engler, WD5IKY, 812 Crescent St., Denton, TX 76201.

HAMS "BRANCH" OUT

☐ Amateur Radio operators from the WR6ABW 2-meter repeater group supplied communications for the recent Urban Forest Run in California. An estimated 3500 people participated in the 6.2-mile run, which was sponsored by the Tree People, a conservation group working to expand urban forests in Southern California. The hams manned stations at three mobile aid clinics spaced throughout the course. After the event, the Tree People donated 10,000 baby Canary Island pine trees to be planted to promote urban forestry.

Besides providing his radio services, one ham, George Romanisky, WA6WXD, also ran in the event. George maintained communications via a hand-held as he ran the course in less than one hour. Congratulations to all the hams who helped make the Urban Forest Run a success!

How's DX?

Conducted By Clarke Greene,* K1JX

The Davids of DX

Recently a letter describing QRP activities in the United Kingdom arrived from Chris Page, G4BUE. Chris is a member of the G-QRP-Club, a group formed in 1972 to promote interest and growth in low-power Amateur Radio communication.[1] He was very enthusiastic about their activities, and felt that amateurs in the U.S.A. and Canada may be interested in participating.

For those in the audience who are not familiar with QRP operation, just look at a list of international Q signals. QRP enthusiasts take the instruction "reduce power" quite literally. Although the definition of operating QRP varies, most groups have established the recommended power ceilings of either five or 10 watts as the basis for their activities. Many use much less power.

After reading through the material sent by G4BUE, I became very curious about low-power operation. Although perhaps a bit masochistic, it seemed like an ideal challenge and a perfect panacea for a stubborn case of TVI. Some of my contest-oriented friends suggested that I contact Gene Walsh, N2AA. They mentioned that Gene had started "fooling around with that low power stuff" a couple of years ago. Via a telephone call, Gene answered a lot of my questions.

"Having been completely bored with DXing for some years, the challenge of the flea power really bit me hard. Since high power and abominable techniques seem to be the rule today, QRP offers the ultimate proof that successful DXing comes from 'between the headphones,' not in the size of the electric bill. In addition, QRP sharpens the skill needed for contesting, that is taking advantage of opportunities for getting the call in at the right time.

The most important thing is to judge the other guy's ability to pick you out. Big pileups, for example, are a waste of time unless the guy in charge has a good technique and those calling are spread out a bit. Medium and small pileups with a good op at the other end are duck soup; you are in and out before the kilowatters get their steam up. I remember working KC4 (Antarctica) on the first call, despite a great pile up, by calling a bit below the throng; it was Tom Frenaye (now K1KI) and as much his skill as it was mine. If the other guy is good, you've got it made. The important thing is to judge who to spend your time on.

The next thing is to listen a lot before jumping into the fight. The opportunities are endless, but you have to be there listening to take advantage of them. One of many examples: a few weeks ago, AP2KS was coming in with a respectable signal on 10 meters; a sizable pileup was brewing to match. There was a fair bit of QRM and Khalid was having trouble hearing, so he said that he was going down a few kilohertz. Why I was the only one to hear that I'll never know, but I got a solid QSO and I had never even intended to call when I heard the pileup. These opportunities happen often; all it takes is a keen ear and a propensity to keep one's mouth shut until the right time. These things should be important to any DXer, but they are bread and butter to a QRP freak. The little tricks of the trade made the QRPer equally, if not more, effective to the mass of dunderhead kW DXers who inhabit the bands these days. The beauty of it is that you *must* use the tricks; brute force is simply not available. It works! It's super sport!

Persistence is another cardinal rule; persistence without stupidity. If you judge that you have a chance, hang in there and you will get the contact. Once you feel it is a lost cause, or that it is strictly up to the gods, get out of it and go look for something else.

Marginal conditions and weaker signals yield quite a number of good ones, if only because the majority of the folks go after the loud ones. When everyone is chasing a few choice loud ones, the band is inhabited with plenty of others who are very workable. You will get your chance at the choice ones also, but when they are attracting the mob, the rest of the DX (some as choice) is much easier to work. It goes back to listening carefully and taking advantage of the right opportunities.

Learning the habits of the ones you are after is another rule, the same one you learn if you are running high power. If you know where and when the guy is around, then you will get him. You take a few losses, of course, since you are not the only one in the world who knows these things. But you will get him if you hang in there for your shot. If you don't nail someone who is regularly active and workable one day, you'll do it the next. Some have gotten away from me, but not many.

You asked how my operating tactics changed when I decided to go to QRP. Well, the rules stated above (and some others overlooked in this piece) became all-important. Blasting through is no longer an option; all else remains the same.

So, the rules are as follows, in order of importance:

(1) Judge how well the other guy can hear you, taking into account how well he operates, conditions, etc.; (2) Listen a lot and take advantage of the opportunities; (3) Be persistent, but not obnoxious; (4) Take advantage of marginal conditions and weak signals, as the casual DXers miss them completely; (5) Learn something about the ones you are after; it almost always results in a QSO if you hang in for your shot; (6) Use your brain and you can work any of the things that are available to the "high-power gang."

Gene also named some other QRPers for me to talk to. Unfortunately, none were available (probably, they were all at the Dayton Hamvention) in time for inclusion in this month's column. If there is sufficient interest, some future columns will include interviews and tips from these fellows. Thanks to you, Gene.

What can be expected from QRP DXing? N2AA has worked over 200 countries in the last few years running less than 10 watts. On 20 meters, Gene has used a four-element Yagi at 50 feet. A three-element Yagi on his chimney has provided Gene with more than a DXCC's worth of countries on 10 meters since last fall. Four stations have received *CQ*'s Worked All Zones award while running QRP; WA2JOC, W6PQZ (solar-powered), W8IIC (1-watt output) and N2AA. Quite a few hams have achieved DXCC and WAS while not running up large electric bills. So, if you're looking to put sport back into your DX hunt, consider the challenge of QRP.

[1]The G-QRP-Club has a wide-ranging awards program, publishes a quarterly journal and sponsors many activities. Those interested in joining the club (it's open to anyone, anywhere who has an interest in low-power communication) should contact G3RJV. His address: The Reverend George Dobbs, G3RJV, "Willowdene," Central Avenue, Stapleford, Nottingham, NG9 8PU England.

DX PORTFOLIO

One of the ways the aforementioned G-QRP-Club promotes two-way international QRP contacts is by sponsoring activity weekends. Part of the weekends is devoted to two-way contacts between Europe and the U.S.A. A list of the remaining activity periods for 1979 appears in Table 1. Additionally, the international QRP calling-frequencies appear in Table 2.

The subject of antennas always comes up when talking about DXing and contesting. Usually the comments center on the subject of how "I can't get through or compete because I don't have the big antennas the other guys do." Sure, big antennas help and most of the big signals come from big antennas, but they aren't necessary. A table provided by K1KI elucidates on the antennas used by the top scorers in last year's 10-Meter Contest. As can be seen, giant antennas aren't needed by giant killers.

The other topic addressed by contesters and DXers is propagation. Band opening maps for the United States to Europe and Japan show what time contesters throughout the country began working Europeans and JAs during the 1978 10-Meter Contest. These maps were developed by actually analyzing the logs sent into the ARRL hq. Study of these maps suggests a rather definite pattern correlating to local sunrise as well as to social customs (like getting up at 6 A.M. and going to bed at 11 P.M.). These two maps come from the hard work of K1WJ and K1KI.

All is not well on the QSLing front. W0CAW reports that in a recent QSO with FR7BP, Jan told him that IRCs are robbed from the mail before arriving at Reunion Island! Similarly, AP2MQ told WB3DWH that the practice of sending "green stamps" for return QSL postage is illegal in Pakistan, and can cause considerable difficulties for the recipient. Monsoor says IRCs are okay, though. Moral of these two stories: *Follow the instructions of the DX station when it comes to QSLing.*

*c/o ARRL, 225 Main St., Newington, CT 06111

Table 1

CW QRP Activity Weekends

June 23-24, 1979	0900-1100 UTC on 14,060 kHz
August 4-5, 1979	1100-1300 UTC on 21,060 and 28,060 kHz
October 6-7, 1979	1130-1230 UTC on 7030 kHz
	1400-1500 UTC on 3560 kHz
	1600-1900 UTC on 21,060 and 28,060 kHz (for Europe to U.S.A. QSOs)
	1900-2200 UTC on 14,060 kHz (for Europe to U.S.A. QSOs)
	2030-2130 UTC on 3560 kHz
QRP Winter Sports 1979	
Daily December 26-31	1000-1100 UTC on 21,060 kHz (for G to Scandinavia QSOs)
	1100-1200 UTC on 14,060 kHz (for G to Scandinavia QSOs)
	1130-1230 UTC on 7030 kHz
	1200-1500 UTC on 21,060 and 28,060 kHz (for Europe to U.S.A. QSOs)
	1330-1530 UTC on 3560 kHz

Table 2

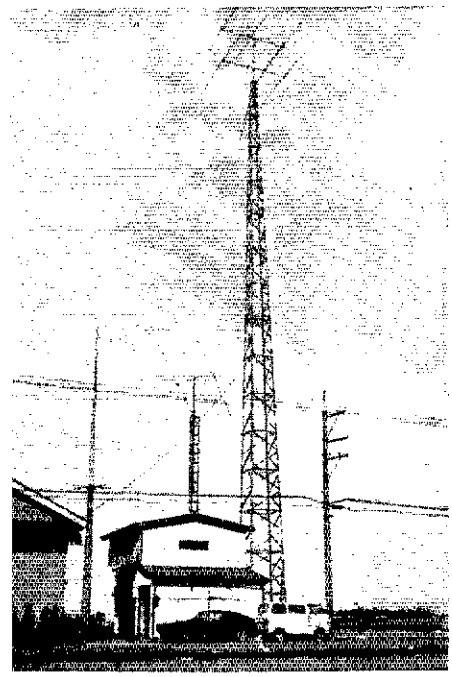
International Calling Frequencies (in kHz)

CW	3560	7030	14,060	21,060	28,060
SSB	3690 (EU)	7090 (EU)	14,285	21,285	28,885

Table 3

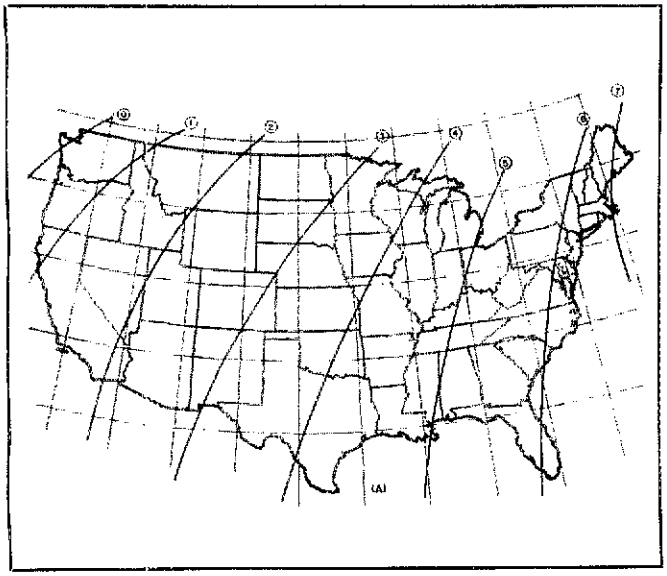
Top 22 Stations, 1978 10-Meter Contest

Station (in order)	*Antenna(s)*	*Height (feet)*	*Station (in order)*	*Antennas*	*Height (feet)*
W3RJ	TH-6	90	WA1TFF	4-el quad	
	5-el	80	K6LL/7	4-el quagi	50
K1VTM	6-el	85	K9EGA	8-el	65
N7DD	TH6DXX		K1LL	6-el (42-ft boom)	60
K9HMB	6-el/6-el			4-el (20-ft boom)	60
W2YV	4-el	100	AI6V	6-el (28-ft boom)	26
	5-el	60	N6RO	TH-6	
	3-el	80	K7NHV	4-el	60
W9RE	5/5 quad/Yagi	90/55	W6RR/7	7-el	
VE6WQ	4-el		K5RC	7-el	90
K1UO	5-el	80		5-el	80
	3-el	115	K7RI	5-el	
W7EJ	6-el (32-ft boom)	102	W8FF	3-el	110
	3-el	35	WA3FET	TH-3	100
N7ZZ	TH-6	50			

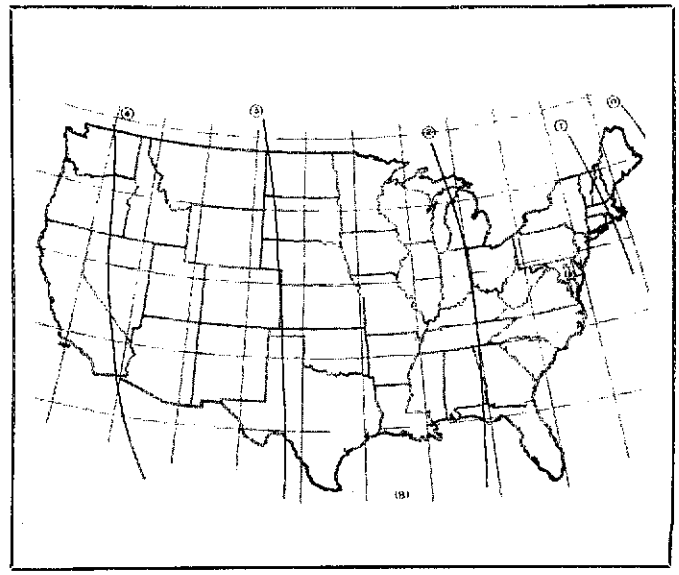


JA9BE enclosed these photos with his 5BWAS application. The large, 40-meter-high tower supports a vertical W8JK antenna as well as a two-element Yagi for 40. 5BWAS plaque number 553 ought to go well with Mori's 5BDXCC plaque. *(photos via W1CKK)*

Ten meters opened to Europe as early as 1030Z December 9 in eastern Canada, and about 1630Z in northern California. It closed by about 1730Z everywhere, leaving the east with logs full of European QSOs and the west coast happy with the leftovers.

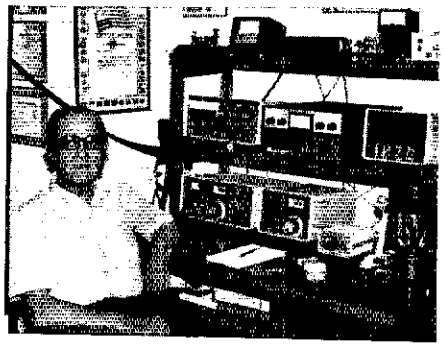


The west had the best part of the Saturday afternoon (December 9) opening to Japan and the rest of the Far East, with an opening of better than four hours, starting at 2200Z. New England was lucky to get in an hour's worth of QSOs before the band closed.



PROPAGATION CHARTS EXTENDED

In anticipation of the fall DX season, and in recognition of the higher solar activity we are experiencing, beginning this month we are extending the propagation charts above 30 MHz. This change should help identify possible 50-MHz openings and will also make the 28-MHz predictions more useful. If we are fortunate enough to have continued improvements in solar activity, we may have to extend the charts even higher, above 43 MHz. Let's hope we do!



IØZQ is often found on 10-, 15- and 20-meter cw from this station in Rome. Elvio is one of the radio licensing officials for Italy. *(thanks to W6TLY)*

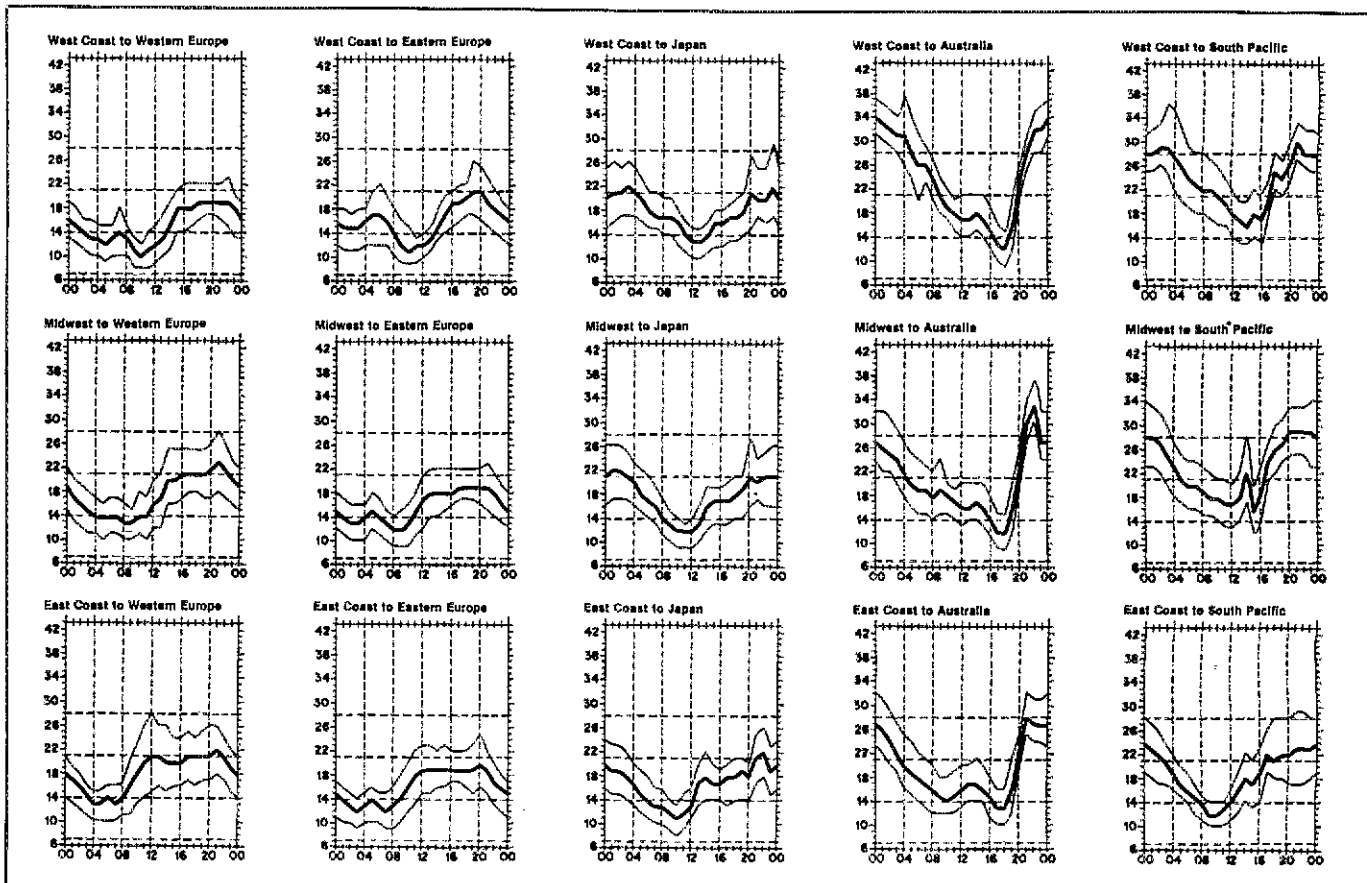
Kurt von Escher, HB9AOO, is one of two Swiss radio amateurs to achieve 5BDXCC. Operating Drake Twins from his Bern apartment, Kurt earned his multiband plaque no. 527 all on ssb. A ham for the past nine years, Kurt is an electronics engineer at the University of Bern. He shares a second operating QTH with HB9SM, located about 12 miles north of Bern on a farm, which gives them room to use 80-meter antennas. This is the 50th anniversary year for the Swiss Amateur Radio Union, USKA; Swiss hams are using the prefix HB7 in lieu of HB9 to commemorate the occasion. Since Switzerland is adding new cantons, there is no longer an H-22 award. This year there is a special award for working all 23 cantons with HB7 prefixes. Next year there will be an H-26 award. *(photo by WA4NTP)*

QSL Corner

QSL MANAGERS

The following hams have graciously offered their services as QSL managers: K1HZ, N2IT, WD5EAE, and WB7TXY. K5MK asks us to remind all that he no longer manages QSLs for 8P6ID.

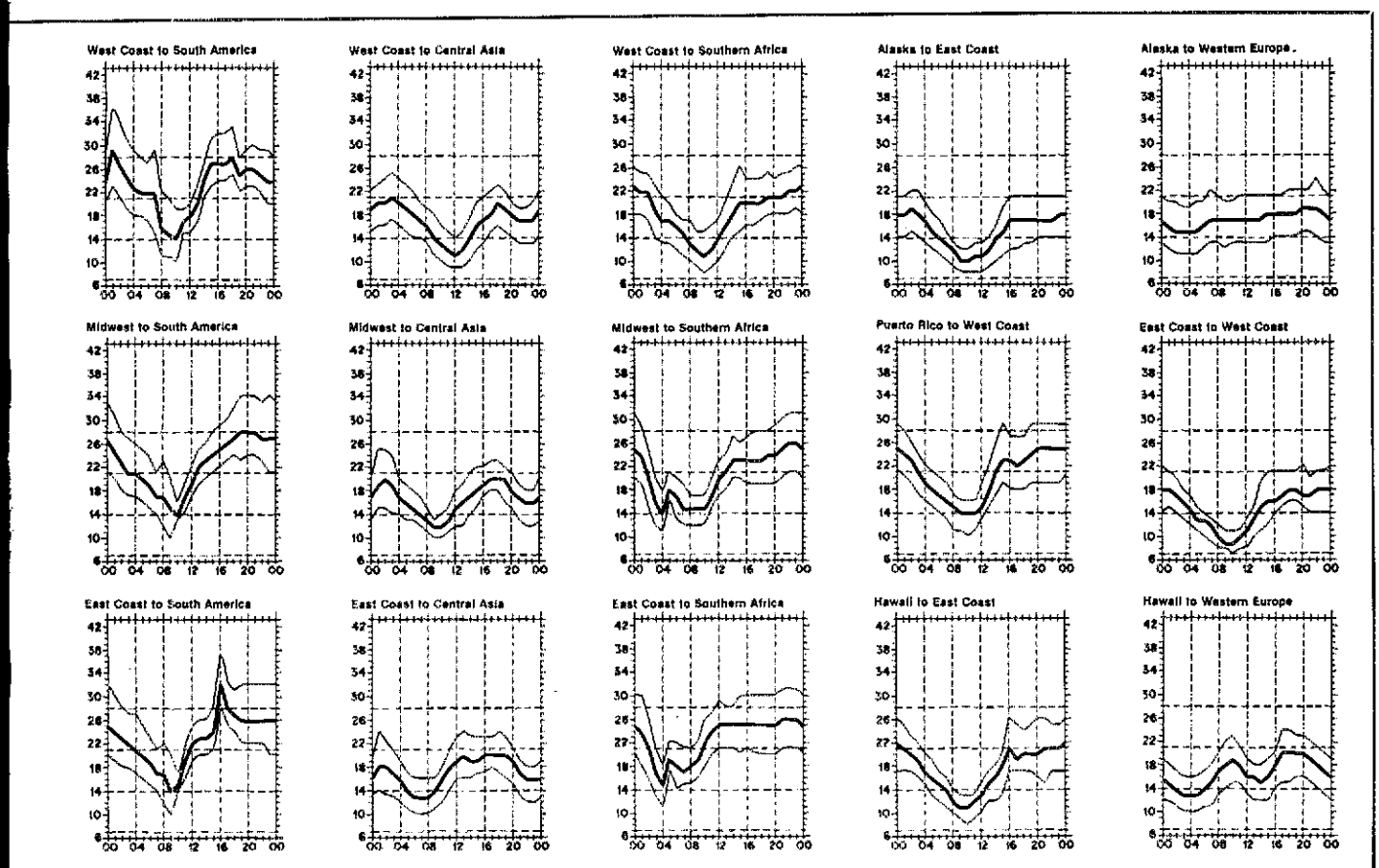
A2CBW (DK3KD), A6XB (K1DRN), A7XAH (DJ9ZB), C31NF (K2FV), C5ABK (G3LQP), C5ABX (K6MEP), C5ABZ (K6GP), C6AEY (WB9HAK), C6ANQ (K4IPO), CE1BLL (WB4LFM), CN8RU (YV5CKR), CO8RA (KA8BAC), CT1RM (W3HNK), CT2BB (W1EP), CT2CF (WA4MAV), CT2CP (WB1CRG), CZ6MP (VE6MP), EA6EI (LA5NM), EA8JJ (W3HNK), EL2EV (W3HNK), FØCGP (K2FV), FG7AR/FS7 (K8OCL), FGØAYO (W2KN), FGØDYM/FS7 (W3HNK), FGØEVT (F6BFH), FH8OM (DJ1TC), FH8YL (I8JN), FK8CW (K2IJL), FR7AI/J (F6EWE), FPØCU (W6KBD), FR7ZL/T (N4NX), FW8AC (F6HWX), FW8AD (W7OK), FY7BC (F9LM), G5CET (K2FV), G5CQP (K6SMH), GJ3DVC (GJ2LU), GJ4HSW (GJ2LU), G15CET (K2FV), H5ACD (VE3DPB), H7H (YN1H), HD1A (WA4QMQ), HG6V (HA6KVB), HI7XWL (W2GHK), HK1CWB (N3SM), HL9KE (K4WSB), HL9KF (AB5G), HL9TD (WB5SAG), HL9TT (WA7HQD), HLØDHX/1 (WA4DPF), HV2VO (IØGPY), HV3SJ (W6KNH), HW2ITU (F6BFH cw May 1977), HW2ITU (F6BFH ssb May 1977), HW3ITU (F5II cw May 1977), HW3ITU (F5II ssb



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

May 1977), HW5ITU (F6AQO cw May 1977), HW5ITU (F9MD ssb May 1977), HW5ITU (F5IN cw May 1978), HW5ITU (F9RM ssb May 1978), HW6ITU (F6BBJ cw May 1977), HW6ITU (F6BIA ssb May 1977), HW6ITU (F6ARC cw May 1978), HW6ITU (F6BFH ssb May 1978), HW8ITU (F8RU ssb May 1977), HW9ITU (F9RM cw May 1977), HW9ITU (F9RM ssb May 1977), HZ1KE (W3RJB), I2PJA (WD9AXF), IN3JIS (I3QBR), IP5CJA (I5HCH), IV3HL (I3HL), IY4FGM (I4BFY), J20BS (DJ9ZB), J3ABG (WA4WTG), J3AJ (W7LLC), J3AAG (K1EM), J3ABN (WB4SGV), J6LFZ (WB1CRG), J6LGK (WB4SXX), J6LGL (WB4SXX), JA7JT/JD1 (JH7BRG), JK1TOJ (WB0DUL), JY5CB (WA2JUN), JY6TC (HB9AGA), JY8AQ (WA8AQ), K0BJ/C6A (W0PAH), KH6EDY (KH6BZF), KH6GB/KH1 (KH6IUO), KH6JHJ/KH4 (KM6BI), KH6JNO (K7BBB), KH6XX (W3HNK), KL7JEF (WD8KKF from Jan. 12, 1979), KL7NA (W3HNK), KM6BI (W5RU July 1978 on), KP4AM/D (W6WX), KP4D (W3HNK), KP4Q (W3HNK), KX6PT (K7BBO), KZ5OJ (WB3KGY), KZ5RO (WB6IJZ), LA7JO (WB5HCS), LU8DBI (K6EVQ), LU8EBI (K6EVQ), LU9VI (WA6GRT), M1C (K2FV March 4, 10, 11, 12, 13, 1979), N6PO/TG7 (W6SZN), N6VR/6W8 (K6MEP), OA4JR (WB9FMX), OA4SS (WA6DVE), OH1AS/OH0 (OH1PA), OK3TAB/D2A (OK3ALE), OX3OB (LA3JM), PJ9CG (AB1U), PT7WA (WD4DXK), PZ3UK (WA7TWG), SM4BNZ (WB2JVP), SV5JH (DJ9ZB), SV0WTT (W6GBG), T2T (W5RBO), TA1MB (DK3GL), TA2BAL (N4ANV), TK7G (FG7AS), TR8LE (W3HNK), TU2AA (W6OML), TU2DJ (K1BJ), TU2HJ (W3HNK), TU2HS (DJ9HD), VE3KLT (VE3GGQ), VK2DCA/VK9N (HB9AAA), VK2NYK (VK2FT), VK8TD (W6MSG), VK0AB (VK2BRN), VK0JC (OZ8AE), VK0JM (VK3BAF), VO6ONT (VO1HP), VP1KG (YASME), VP1MT (XE1BV), VP2DD (W2OB), VP2DR (WD8KKF from Feb. 13, 1979), VP2DXA (WB8LDH), VP2DXB (WB8LDH), VP2DXC (WB8LDH), VP2DXD (WB8LDH), VP2DXE (WB8ZJW), VP2DXF (N2OO), VP2LFS (WB2FSW), VP2LFZ (WB1CRG), VP2LR (W2GHK), VP2MAH (WA3ZBI), VP2MAR (PY2DFR), VP2MBJ (K1IJV), VP2MBK (K1IJV), VP2MBU (WA4ZSX), VP2MCU (K1IJV), VP2MCV (K1IJV), VP2MEC (K4TVE), VP2MFO (W0FNO), VP2MH (W8HM), VP2MHK (HB9HK), VP2MOC (W2KF), VP2SAH (WB2AMO), VP2VDP (WA2EPK), VP5GBX (K2ON), VP8SO (G3KTJ), VP8SU (G3RCA) VQ9IJ (N5RU), VQ9KK (WA3HUP), VQ9MR (N5GU), VR1AW (W5RBO, VR1BD (W5RBO), VR3AO (WB6MFE), VR3AR (W7OK), VR6HI (ZL1ADI), VS5M (N4GG), VS5OO (N2OO), VS5SW (K4SMX), VS6AB (DK2SX), VS9MB (G3KDB), VU2OF (DL8DF), WA5FBH/6Y5 (WD5ABG), WB3JLF/HK1 (N3SM), WD4CEM/KH4 (W5RU), WH2ABB (AB5G), WH4AAA (W5RU), W5TIY/TI2 (N5IQ), WB5OYM/KH4 (N5ASF), WA6VNR/6W8 (K6MEP), WA7UWE/C6A (WB4LIB), XE2NQ (N1AR), XT2AE (W2TK), YJ8KC (ZL1BAB), YJ8PD (VK3OT), YK1AA (DJ9ZB), YN1Z (K4CLA), YS1O (W2KF), YS9RVP (WA0JYJ), YT2D (YU2CDS), YT9MI (YU2CBM), ZD7PL (G3KTJ), ZD8TW (K8NOQ), ZD9GH (ZS1ZI), ZF2AX (W4IQW), ZL2BJU/K (W6ORD), ZL3FM (K8SMC), ZP5GLS (W3HNK), ZS2CW (W6RIA, s.a.s.e.), ZS4BP (W7VRO), 3A0KK (K3FV), 3D2WR (G5RP), 3D6BL (WB0MSZ Sept. 1977 to August 1978), 3D6BP (W1OX), 3V8BZ (DL1HH), 3V8KK (K2FV), 3V8R (WB9OQU), 4U1UN (W2MZV), 5B4DI (K4BSI), 5H3FW (DF4JA), 5H3GK (SM5AWO), 5T5CJ (W4BAA), 5V7AR (F6ACB), 6B1B (XE1LLS), 6W8HB (ON8HB), 6Y5GL (VE2RD), 6Y5MB (VE2AUF), 6Y5MD (VE2AUF), 6Y5YM (VE2YM), 7P8BG (VE3EUP), 7P8BI (WB0MSZ), 7X2BK (WA3HUP), 7X4AN (DJ2BW), 7Z2AP (I8YCP), 8P6FU (W3HNK), 8P6FX (WA4RRB), 8P6GN (WB4RRK), 8P6IB (WA4WTG), 8Q7AE (I2ZAQ), 8Q7AH (WB4ZNH), 9G1JG (OZ4ZP), 9G1MP (DJ6KP), 9G1RU (HB9BFY), 9H1FN (WA1YYK), 9H4L (W3HNK), 9H31MAR (9H1R), 9H79GL (W3HNK), 9J2BO (W6ORD), 9J2FC (WB1BWS), 9J2TJ (N8JW), 9K2EC (SM7CSJ), 9K2FX (W4KA), 9N1BMK (JA8BMK), 9N1DRL (YU3DRL), 9N1MM (N7EB, ex-W3KVQ), 9V1TX (N5FN), 9X5AB (ON8RA), 9X5MS (SM7HKJ), 9X5OM (DK3MO), 9X5PT (VE3BOZ), 9Y5NP (W3HNK).

CF2YM/zone 2, P. O. Box 35, Dorion, PQ J7V 5V8 Canada
CN8AQ, P. O. Box 40, Tangiers, Morocco
DA1JU, W7AMM, P. O. Box H, Raytheon Middle East, Saudi Arabia Project, APO, NY 09697
D4CBS, Box 101, Praia, Rep. of Cape Verde
EP2EJ, W7AMM (see DA1JU)
J28AG, Box SP85038/CT, Djibouti, Rep. of Djibouti
JH1WIX, Taroh Yagi, 3-29-1 Kugahara, Ohtaku, Tokyo, Japan 146
P29GT, Gary Teske, P. O. Box 345, Mt. Hagen, Papau New Guinea
PA9AUT, W7AMM (see DA1JU)
SU1DP, Box 138, Ismalia, Egypt
SV1JG, P. O. Box 564, Athens, Greece
VK9NI, P. O. Box 290, Norfolk Island, 28009 Australia
VS6EZ, General Post Office, Hong Kong
YJ8KB, P. O. Box 730, Port Vila, New Hebrides
5H3BP, P. O. Box 1022, Dar-es-Salaam
6Y5SS, P. O. Box 35, Dorion, PQ, J7V 5V8 Canada
6Y5YM, P. O. Box 35, Dorion, PQ, J7V 5V8 Canada



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 July 15 to August 15, 1979, assume a sunspot number of 152, which corresponds to a 2800-MHz solar flux of 195.

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 February 1 through February 28, 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

CO2FA/265	JJ1BBQ/110	YU5FAM/103	AF2C/115	K3JC/112	K4JAF/100	AG5X/103	W6MPG/106	WB8QPD/110
DJ9AS/119	JA5OP/105	5B4HF/187	K2OXS/100	W3GOH/180	K4YCK/132	K5ENA/104	WA6YTQ/105	WD8KCO/117
DJ9WB/103	JA5SIX/100	K1FB/141	N2WR/105	W3HXO/254	KD4N/100	KB5DO/130	AA7C/108	K9ACQ/104
DJØNU/112	JH6XJW/125	K1TEJ/105	WA2MNM/145	W3OH/161	N4VA/239	N5HB/106	K7AII/108	W9DDX/116
DK1KX/101	JH7MJB/104	W1VD/136	WA2OHD/115	W3WGS/122	WA4HQA/103	WB5KTD/100	N7EG/116	WA9WWT/106
F6ARI/113	KH6JI/100	W1WEF/103	WA2QAU/162	WA3VQK/103	WA4MFS/101	WD5EWD/101	N7JB/101	WB9KBV/144
FY7YE/104	KP4CKY/106	WA1YEV/100	WB2HWK/101	WA3WMF/100	WA4VDN/105	K6JEN/110	WA7NEQ/102	WB9PVH/105
G3TBK/104	VE1ST/110	WA1YTW/114	WB2IHN/104	WB3JTU/101	WB4NFO/168	KB6HT/108	K8NW/251	WBØRRX/175
GM3ITN/336	VE3HGD/114	WB1EMN/140	WB2MIY/207	AA4BS/100	WB4YTK/101	N6MQ/233	KA8BAC/100	WDØFNU/103
HS1ALP/106	YU2RJG/121	WB1FSW/106	K3IE/154	K4HAV/153	WD4KRK/100	W6IAE/109	WB8DSU/106	

Radiotelephone

CX7BV/130	I2JQL/218	KL7JAR/105	WA1YTW/112	K4HAV/143	WB4YTK/103	KB6HT/107	WA7OOB/107	WD8NQE/106
DJ8RN/112	I2UEN/210	PAØPAS/160	AF2O/103	K4YCK/132	AD5C/103	N6MQ/193	WB7NCD/101	K9QVB/127
DJØNU/112	I8AKN/110	PY2BGO/129	N2HK/106	N4VA/194	KB5DO/114	W6IAE/108	WB7RKE/100	W9DDX/114
DK5NH/109	IØSGF/104	VE3ENF/100	W2VHJ/109	W4SPK/100	W5LKP/109	WB6NFA/109	K8NW/244	WB9FUM/101
DL3EW/137	JA1TII/115	XE1OW/108	WB2MIY/207	WA4PUF/105	W6NLB/105	WB6VIN/107	N8ACA/115	WB9UKK/113
EA1QF/120	JH2LLE/100	YS9RVE/211	W3HXO/242	WB4NCJ/106	K5HZH/266	WB6VSK/105	WB8DSU/105	WB9VCI/101
EA1TA/110	JA5CAX/112	3D2UP/132	W3WGS/120	WB4NFO/168	WB5KYF/106	K7CU/4/111	WD8ILW/105	KBØBU/120
EA8OZ/236	JA5OP/104	9V1TP/114	AA4NA/116	WB4YKI/100	K6EID/238	K7JXR/119	WD8KCO/102	WØQFY/112
HS1ALP/106	KC6GF/100	K1FB/120						

CW

DJ4EY/102	JA4GXS/104	K1WB/129	K3SWZ/103	AB4H/103	WA4VMZ/102	WB5PLD/101	WD8MAS/102	WB9KBV/127
HB9BIF/100	9H1ED/110	WA1CGR/103	W3JF/104	N4RR/182	WB4OSN/180	N6JM/105	W9NO/101	WBØRRX/105
JJ1BBQ/110	9H1FN/108	K3IE/110	W3KA/100	N4VA/147	W5JW/141	N6MQ/161		

Satellite

W2LV	W1NU

5BDXCC

PAØWRS	DK5AD/W3

Endorsements

Mixed

DJ8WD/200	JA5EN/242	6Y5MP/212	WB2GOK/200	AA4VK/244	W4JVU/328	K5LM/316	W7BCT/263	K9POG/305
DK2WU/132	JA6RIL/260	W1BIH/362	K3AO/254	AB4Z/220	W4NNH/344	K5OA/311	W7DV/290	K9SM/314
DK3SF/290	LA9CE/311	W1BL/240	K3HBP/200	AE4H/300	W4OY1/122	N5AB/252	W7FOF/163	K9VOK/300
EA2IA/271	OE3EVA/249	W1EOA/290	K3OTY/294	AF4M/216	W4PZV/306	W5GAI/160	W7NI/168	N9KV/239
F6DHB/201	OK1AUP/144	W1ETV/180	N3ED/311	AG4L/190	W4QO/169	AA6RF/175	W7QK/348	N9OK/212
HB9HT/240	PAØLOU/345	W1MIJ/338	W3AMF/119	K4CIA/331	W4TFB/277	AE6U/265	WB7TLE/163	W9JUV/357
I1SBU/271	PT2VE/152	W1UU/337	W3AX/271	K4EWG/321	W4ZR/290	K6RK/272	K8CH/315	WA9VIZ/290
I2SM/329	SM6AYM/140	WA1EOT/262	W3FMC/230	K4EZ/344	WA4DPU/180	N6JM/225	K8SI/301	ABØX/240
I5IZ/214	SMØBZH/251	WB1ARX/122	W3JF/125	K4JEX/199	WA4LOF/249	N6OZ/200	N8EL/207	ACØA/141
IØUCM/160	VE2AFU/246	K2IJ/242	W3KA/326	K4LE/239	WA4LZR/192	N6SV/241	W8DA/341	KØLUZ/241
IT9AZS/245	VE3HLC/221	K2KGB/312	W3UJ/250	K4SE/240	WA4MIT/131	W6PKA/139	WA8EUK/140	KØSVW/241
JA1CRR/312	VE6HT/241	K2TV/204	W3US/242	K4XP/291	WB4EBX/128	W6PQZ/274	WA8KEM/120	KØYST/204
JE1BQE/141	VE7BAF/142	W2FG/325	W3XX/278	N4ATK/252	WB4NDX/239	WA6GFE/327	WB8DUC/118	NØOA/323
JH1QQJ/280	VE7CHK/160	W2JQ/140	WA3INW/185	N4OH/204	WB4OSN/266	WD6ATC/120	K9AWK/328	WØCYY/180
JA2INS/275	VE7KL/240	W2NJ/221	WA3SXH/270	N4XZ/258	WB4RFZ/220	K7CU/4/153	K9CT/300	WØGKE/295
JH3LJU/187	YU1NYP/304	W2PK/219	WB3BMX/176	N4ZS/190	WD4IKM/127	K7HRW/122	K9FD/219	WAØOVU/120
JA4GXS/165	YU3SO/232	W2VJN/310	AA4M/248	W4CEB/179	AB5PI/144	K7KD/261	K9GX/143	WAØYEF/120
JA4ZA/336	ZS6IW/331	W2YC/140	AA4NA/200	W4EJN/302	K5CSK/240	N7NG/306	K9IL/259	WBØNAA/159
JA5CAX/178	ZS6RM/343	WA2YUH/180	AA4S/300	W4JD/317	K5JW/324	N7SW/199	K9MIE/169	

Radiotelephone

CN8CG/239	JE1BQE/112	PY6CN/273	W1EW/230	WA3YGO/120	W4TFB/253	W5ILR/164	W6USG/315	W8TXM/140
CN8CX/162	JA4GXS/131	VO1CU/303	W1WXZ/250	AA4M/166	W4ZR/290	W5LZW/346	W6ZKM/327	W8VHY/327
CO2FA/265	JA4ZA/332	VE3BX/305	WB1DQC/160	AA4VK/244	WA4GQA/128	W5SDR/318	WA8OTV/140	WB8RMD/202
DK3SF/280	JA6RIL/248	VP9CP/179	WB1EWP/121	AC4B/229	WA4LOF/226	W5UAW/322	WB6LMN/124	WD8BSX/130
DK5XN/271	JA8GZV/175	XE1J/281	K2KGB/308	AG4L/189	WB4NDX/239	WA5SMM/274	K7KD/261	K9EHA/180
F6BDS/281	KH6HHN/163	YU3SO/222	K2POA/270	K4ONF/199	WB4NKO/139	AA6RF/166	N7OK/184	K9GX/142
F6DZU/179	KZ5AS/174	ZS6RM/335	K2TV/186	K4SE/203	WD4IKM/127	K6HD/180	W7BCT/262	K9POG/298
G4BSY/124	OA4BS/305	6Y5LA/188	W2FG/313	K4TO/261	K5GZ/269	K5RK/256	W7QK/320	K9SM/297
G5AFA/321	OZ5EV/271	6Y5MC/183	K3AO/200	KB4BL/128	K5HT/120	K6SMF/251	W7YEM/250	W9TEI/200
I2SM/329	OZ7OP/272	6Y5MP/212	K3OTY/294	N4XZ/200	K5JW/315	N6SV/240	WA7UFS/209	W9YRM/270
I2ZLG/191	P29JS/269	6Y5MR/120	N3ED/283	W4JVU/328	K5LM/311	W6AXH/300	WB7ETJ/200	ACØA/138
I6PQO/120	PAØLOU/270	K1QMV/303	W3KA/240	W4LCL/228	K5OA/306	W6CN/162	WB7TLE/163	KØLUZ/175
I8XIW/147	PT2VE/144	K1WB/159	W3US/229	W4PZV/301	K5UKW/293	W6ORD/240	W8GKM/327	WØYNZ/120
IT9VQC/171	PY4KL/339	W1BIH/321	W3XM/308	W4SKO/348				

CW

DL1QT/140	JA1GLT/120	JA8CFR/203	K2IJ/190	WA3GJZ/121	K4SE/182	AE6U/207	W8DA/121	WB9SLV/181
I5IZ/127	JA2EIV/203	SM6AYM/140	N3ED/194	AA4M/180	N4OW/211	W7EEJ/140	K9QVB/145	WØAP/140
IØWLS/151	JA2INS/180	VE3BX/181						

Corrections: Honor Roll listing, mixed W7PHO should be 319/357, W9DC 316/333

Strays

I would like to get in touch with . . .

☐ anyone who was in the 82nd Airborne Division during World War II. Write to Ernest R. Blanchard, K1ZEO, Gardner Rd., Winchendon, MA 01475.

☐ amateurs interested in joining a Veterans of Foreign Wars net. Contact Robert Cregar, WD8NKT, 1103 S. Jefferson, Bay City, MI 48706.

☐ hams interested in joining the newly formed Amateur Scientists Radio Organization. ASRO has been formed to encourage and assist radio experimentation. For more information, write ASRO, P. O. Box 4, McMechen, WV 26040.

☐ hams who have modified successfully their Heath HW-16. Contact Erland Frej, OZ1DDJ, NY Munkegade 74, DK-8000 Aarhus C, Denmark.

☐ currently active or retired police officers, sheriffs, judges, law enforcement personnel or gangster buffs to form a net on 75 meters. Contact H. Michael Crestohl, VE2BDM/N1ALB, Box 642, Victoria Station, Montreal, PQ, H3Z 2Y7, Canada.

Public Service

Conducted By Robert J. Halprin,* K1XA

Junk Food for the Ears

What does this title mean? It is another way of describing *comments* or *informals* often heard on traffic nets, which a number of readers have written in about. Some nets indulge in "going around for a round of comments" as a regular ritual, though it is usually restricted to sessions that lack traffic. It's sort of like when the floor director gives your favorite talk show host on TV the sign language to "stretch it out." The fundamental question here is, why not just close the net instead, if there's no traffic, thereby relinquishing the frequency to the tagchew aficionados? Makes more sense.

While it's evident that some hams check in only to serve up their nightly monologue, this emphasis on informals is clearly out of place on *traffic* nets. If the good old boys only want to talk about the weather and their petunias, then delete the word "traffic" from the net name. Otherwise, some poor joker is going to show up one evening with a message and is he going to be in for a surprise. It's also important to maintain good relations with amateurs on the band who aren't involved with the net's activities. If all they hear night after night is a barrage of verbal diatribes there will be problems. Certain amateurs have an unusual way of demonstrating their disapproval of a particular on-the-air activity. One correspondent indicates he'd rather watch the local A&P truck unload than listen to 20 hams mouth plastic niceties. While the latter may be good for team spirit, it's obvious that camaraderie — but not plasticity — abounds among traffickers who are actually handling traffic.

Then there is the "informal concerning traffic." It goes something like this: "Joe, uh uh, I just delivered your number six routine." First of all, this particular message always has a station of origin 2000 miles away, so it's not "your" message. Secondly, when a ham accepts a message for delivery, he should deliver it as common courtesy and not expect a round of applause. And thirdly, the message was number six, not number six routine.

The net control, with backing from the net manager, should strive to diplomatically limit the amount of air time devoted to such words of wisdom. It's obvious the net is runnin' on empty when the NCS directs WB---- to make a transmission, then turn it over to KA----, who passes it to N----, and then back to control. Chances are, dead silence accompanies this circuitous procedure half the time. Why not? Everyone has gone off to find their Rand McNally.

In keeping with the subject of this editorial, we'll keep it brief. A rule of thumb: If the net is clear of traffic after a reasonable time, and there isn't any net information or ARRL bulletins to flog, close it down. Nets have no special claim on amateur frequencies.

MARS ADDRESSES — A CORRECTION

In this section for May *QST*, the addresses of the three branches of the Military Affiliate Radio System appeared. Unfortunately, we missed the boat on the current Navy MARS address, so here is the up-to-date information.

Navy MARS
Chief, Navy-Marine Corps MARS
Building 13
U.S. Naval Communications Unit
Washington, DC 20390

Army MARS
Commander
U.S. Army Communications Command
ATTN: CC OPS OM
Fort Huachuca, AZ 85613

Air Force MARS
Chief, U.S. Air Force MARS
HQ AFCS/DOYR
Scott AFB, IL 62225

The Army and Air Force addresses were correct in the May issue and are repeated here for convenience.

TRAFFIC GENERATION

Having handled traffic for some time and enjoying every moment of it, I have noticed that there are some net sessions when we have all kinds of traffic and everyone is busy, while at other times, there is very little and the net is dull. If the latter happens too often, the members drift away for want of better ways to spend their time. I can't blame them. It does give us something to think about; how can we get more traffic into the traffic nets?

Here in Eastern Mass., we put our heads together to discuss the subject. How could we originate more traffic without having to make traffic handling a full-time job? The answers were very simple:

1) When delivering a message, leave your first name and telephone number with the addressee so they know how to contact you if they have a message of their own to get out.

2) Gather a roster of names/telephone numbers in your local net. Send these lists to nursing homes, churches, offices and other places, so people will know who to contact to send radiograms.

3) Have your radio club set up communications booths at the local shopping mall, hamfests and other public gatherings. Not only will you be picking up traffic, you also will be exposing Amateur Radio to many people who have only a vague idea of what it's all about.

Not only are these ideas good for creating more traffic, they also prove to be a lot of fun, while performing a public service. If all participants in the National Traffic System would try out some of these ideas, or cite some ideas of their own, it would enhance Amateur Radio that much more. — *WA1TBY, Section Traffic Manager, EMass*

COMMUNITARIANISM SOLVES EMERGENCY NEEDS

Santa Barbara, California, may be one of the most fortunate counties in the nation. It is certainly becoming one of the best prepared counties for coping with serious emergencies following three mini-disasters in recent years. And such progress is at little or no expense to the taxpayer!

An organization called AVERT (Affiliated Volunteer Emergency Response Teams) has developed the art of applied "communitarianism" by gathering viable volunteer public-service-oriented action organizations from communities within Santa Barbara to provide the kind of organized help government and the people are going to need if or when serious emergencies strike.

As recently as March 17-18, participating teams of the AVERT Council successfully completed their second downed-aircraft search and rescue operation in four months following an all-day/all-night exercise covering a 500-square-mile area near the San Rafael Wilderness in northern Santa Barbara County. Council teams representing communications, transportation and search and rescue were alerted and activated for what ultimately turned out to be three separate aircraft beacons, called ELTs (Emergency Locator Transmitters), transmitting on 121.6 MHz, the FAA-authorized practice frequency for air/ground operations.

Coordinated with the knowledge of federal, state and county agencies and sanctioned by the county sheriff with state registration through the Office of Emergency Services, the multiteam effort saw sheriff's area squadron planes flying DF missions; Santa Ynez Search and Rescue Explorer Scouts hiking in to act as "victims" with simulated injuries; Santa Barbara and Los Padres four-wheel drive units providing back-country transportation and CB communications over rugged terrain; ARES operators supplying portable, mobile and fixed station communications on hf/vhf/uhf circuits; search team management and leadership by the Los Padres Search and Rescue Team; and additional support by other AVERT teams including the U.S. Coast Guard Auxiliary, MARS and the Santa Maria Search and Rescue Team.

Civil Air Patrol mission coordinators prepared and executed the air and ground search scenario and other CAP members participated on direction-finding teams and in communications. No romp in the woods, the event contained rigorous hurdles for the best prepared teams to test their skills, equipment and capacity to work cooperatively with others toward a common goal, that of locating, treating and evacuating safely "victims" of a simulated airplane crash.

Ten Aero Squadron planes were deployed during morning training exercises in the electronic search. Convoys of vehicles descended on the Santa Maria Airport which had been designated the search base by operations leaders based on initial alerting information. The first briefing session brought together all team members except the "victims" and others helping implement the scenario. Eight ground mobile teams, consisting of vehicles, drivers, search and rescue personnel and radiomen, were formed.

Pilots located the ELT in a remote area near Figueroa Mountain. Ground mobile and walking direction-finding teams approached the area more slowly to the extent roadways and trails were available. They, too, radioed back a stream of compass bearings to plotters at base camp, who redirected them, based on strength of signals, bearings and accessibility as determined from detailed topographical maps.

By dusk, the simulated crash had been sighted and the "victims" located. Evacuation was nearing completion when word was flashed that one of the search planes had "crashed" on a nearby range with three people aboard. Another ELT beacon had been activated, but it was not immediately discernible. The sun had gone down, making flying conditions unsafe in the mountainous terrain. The unexpected turn of events was characteristic of the imaginative and very realistic scenarios produced by Civil Air Patrol mission coordinators.

Searchers were tired and cold from their long ordeal, yet four mobile teams were reformed and proceeded on into the night to find remaining "crash victims," who were located in the early morning hours 10 miles from the earlier "crash."

AVERT was formed two years ago when the Chamber of Commerce became concerned that emergencies and disasters invariably left regular government agencies without adequate forces to respond to peak demands; that the first 72 hours were the most critical in the life of a given community before state and Federal support could be mustered; that efficient government agencies operated best as separate entities and were not designed to com-

*Asst. Communications Manager, ARRL

The AVERT gang coordinates a successful search and rescue. *(photo courtesy W6POU)*

municate horizontally as is essential during a severe breakdown; that fire, flood and earthquake "mini-disasters" in Santa Barbara had confirmed these problems; and that skills, equipment and manpower existed in the ranks of serious-minded, responsible, public-service-oriented volunteer organizations — some in existence for years — to cope with various types of emergencies. Since its founding, AVERT has captured the interest of many well-known organizations now serving as member teams, as well as various leaders in government and private-user agencies. — *W6POU, AVERT Coordinator*

SOME THOUGHTS ABOUT BPL

I have been working on some data of my own dealing with the Brass Pounders League. Using the figures for an average month (not December), I came up with the following very conservative figures: Total traffic points were 27,939, handled by 34 stations. This comes to an average of 822 points per station. However, I will not include the ones who were over 1000. This makes 29 stations handling 24,168. Also, since there are many two-point messages, to find the number of single messages handled, 75 percent of that figure was taken to add up to 18,126 single messages that month. Now, it is hard to say how much of this is handled solely to *up* the count, but again, to be very conservative, let's say 25 percent. This would mean that there are about 5000 junk messages tumbling into our fine traffic nets every month. That's 60,000 per year. True, it is getting traffic handling more exposed to more hams, but is it good exposure?

. . . One thing I know for sure is that the most common complaint from someone bitching about traffic handling is that they don't want anything to do with frivolous messages. Maybe doing away with BPL is a harsh alternative, especially since it is so much a part of tradition. But is BPL the same as it was years ago? Not according to some of the old-timers in my area. Maybe it is time for a change to a different type of traffic-handling award that recognizes good-quality procedures and worthwhile public service . . . Let's see how others feel. — *WB1BZR, OTS Vermont*

NATIONAL WEATHER ASSOCIATION AWARDS

The NWA has announced its Awards Program for 1979 and, as was the case last year, organizations and members of the Amateur Radio community may well qualify for recognition under two categories. They are:

1) The greatest contribution to meteorological operations by an organization that is not directly a part of the professional meteorological community. This category could include such things as clubs, ARES or RACES groups, or nets that are providing services to the National Weather Service.

2) The greatest contribution to meteorological operations by an individual who is not a member of the professional meteorological community. This could be one key individual who was instrumental in establishing a net or ARES group, or it could be an amateur who has, in one instance or over a long period of time, provided key observations or communications support to a weather agency.

Narrative nominations, with comments or endorsements by a recognized appropriate authority, should be sent to Mr. Charles Pierce, Chairman, Awards Committee, 42 Brunswick Rd., Arlington, MA 02174; to be received by September 30, 1979. — *WA9NEW/1*

PUBLIC SERVICE DIARY

☐ Watkins Glen, NY — March 3. WB2BMC was visiting a state park when a 17 year old slipped from one of the hiking paths and fell more than 100 feet. WB2BMC raced to his car and put out a call for help over WR2ABD; WD2AHJ responded and made a long-distance call to the county sheriff and shortly afterward, an ambulance was on the scene. (AF2A)

☐ Brownsville, TX — March 26. All land-line communications into and out of Brownsville International Airport were disrupted when construction equipment severed a cable. Within minutes of the outage, Amateur Radio operators began relaying hourly aviation weather reports from the airport to other parts of the Lower Rio Grande Valley. (National Weather Service Office, San Antonio)

☐ Savannah, GA — April 9. A tornado struck southern Savannah and Chatham Counties, and members of the ARC of Savannah assisted c.d. in the collection of damage reports and rendering of service to the storm victims. Communications was carried on via 2 meters through W4HBB/R to c.d. headquarters from the field units. (WA4LHT)

☐ Tennessee River, MS — April 15. Six-foot-high waves literally sunk a 17-foot boat with two smashing blows that left four drowned and one in critical condition. Rescue squads from three states battled the raging river for three days and nights; ham radio operators with the Yellow Creek Emergency Corps stepped in and radio links via 2 meters and hf were set up to the law enforcement agencies and to each of the rescue squads' home area. (WB5BSG)

☐ Caribbean Sea, northwest of Jamaica — April 25. Thanks to quick-thinking Mike Davis, WD6FFV, three fishermen recently were rescued from a ship sinking in the Caribbean Sea. The 13-year-old ham from Torrance, CA, picked up a MAYDAY from the *Carman*, which was disabled 75 miles northwest of Jamaica. "They said they had a hole in their ship, were taking on water, and could only last about eight more hours," Mike said. The young ham relayed the ship's coordinates to the 11th Coast Guard District Rescue Coordination Center in Long Beach, CA. A Coast Guard ship was dispatched from Miami, FL, to the sinking vessel and rescued the three crewmen. (*Los Angeles Times*)

AMATEUR RADIO EMERGENCY SERVICE REPORTS

☐ State of Kentucky — December 9. When record-breaking floods swept through central and eastern Kentucky, members of local ARES groups and the Bluegrass ARC provided communications for numerous relief efforts throughout the emergency, which often wiped out normal means of communications. (WB4ILF EC Dist. 20 KY and WD4SIH)

☐ Greenup County, KY — April 14. A downed aircraft was reported and communications assistance requested by the state police and airport authorities to aid the search operation. Amateur Radio linked search teams in boats, aircraft and four-wheel-drive equipment, as well as teams on foot, to the emergency center. (K4DZM SCM KY)

☐ Los Padres National Forest, CA — April 14. Six teenagers were hiking on the western edge of the San Rafael Wilderness. The group dispersed to hunt for a dog reportedly bitten by a rattlesnake. When the hikers regrouped, one was missing. Search and rescue teams were called in, and through the Council of Affiliated Volunteer Emergency Response Teams, local ARES groups in Santa Barbara County were contacted to provide communications for the effort. (W6POU)

COMMUNICATIONS SERVICE OF THE MONTH

On April 14, five teenage girls from Massachusetts, traveling south to Florida, were involved in a collision with a tractor trailer a few miles south of Petersburg, VA, on I-95. Their sedan was demolished and three of the girls were injured. Fortunately, several members of the Chesterfield ARES were close by.

WA4FMS radioed the message concerning the accident to WB4MLM, while the rest of the fellows did what they could to calm the injured girls. WB4MLM called the state police and within minutes, the emergency crew and police were on the scene.

Most of us would have patted ourselves on the back and gone home saying we had done our good deed for the day. But not WB4ZEB. He went to the hospital after the girls were released, picked them up and took them to his home. There they spent the night with his family.

The next day, WB4ZEB took three of the girls to the bus station so they could continue their trip to Florida. He then took the other two girls to the airport where they boarded a plane home to Massachusetts. — *W4NWM*

☐ ARRL Section Emergency Coordinator Reports. For April, 30 SEC reports were received denoting a total ARES membership of 15,365. This represents a 12 percent decrease in reports received one year ago (34) and a three percent increase in membership (14,941). Sections reporting were Alta, Ariz, Ark, Conn, EBay, ENY, EMass, EPa, Ind, Kans, Mar/NFld, Mich, Mo, NFla, NTex, Ohio, Okla, Ont, Oreg, SDgo, SF, SJV, SBar, SFla, SNJ, Utah, Va, Wash, WVa, WPa.

NATIONAL TRAFFIC SYSTEM

VE1WF appointed as ECN manager; congratulations Don. NTS got its share during the recent emergencies and the KL7AA Mother's Day activity. 9RN certificates to WA4UIH, WB9IHH, WB9UYU and WD9DMV.

April Reports

Area Nets

	2	3	4	5	6	7
SAN	90	3782	42.0	1.256	90.0	
CAN	90	2360	26.2	.730	99.6	
PAN	59	2305	39.1	.911	98.3	
Region Nets						
1RN*	60	686	11.4	.547	95.0	93.3
2RN	126	1559	12.4	.797	91.9	95.6
3RN	91	811	8.9	.555	99.5	96.7
4RN	120	1824	15.2	.557	72.4	98.9
5RN						
6RN	90	1415	15.7	.413	96.0	98.9

RN7	120	1495	12.5	.860	100.0	98.9
8RN	87	665	7.6	.435	93.0	98.9
9RN	119	889	7.5	.401	89.0	100.0
TEN	90	869	9.7	.354	72.3	99.2
ECN	61	424	6.9	.521	75.0	56.7
TWN	90	718	7.9	.377	84.2	98.9
TCC						
TCC Eastern	187[1]	1198				
TCC Central	197[1]	1074				
TCC Pacific	108[1]	1071				
Sections[2]	6127	28330	4.6			
Summary	7420	51475	6.9			
Record	6256	36620	19.1			

*incomplete report

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (148): ASN (AK), AENB AEND AENJ AENM AENS AENV (AL), OZK (AR), ACN HARC SWN (AZ), SCN SDNN (CA), CN (CO/WY), CN CPN WESCON (CT), DEPN (DE), FAST FMTN FPON FPTN NFPN PBTN PEN QFN SPARC (FL), CGVHFN GASSBN GSN GTN NGARES WGN (GA), I75mN ICN TLCN (IA), IMN MTN (ID/MT), ILN (IL), ICN ITN QIN (IN), KPN KSBN QKS QKS-SS (KS), KNTN KTN (KY), LAN LTN (LA), EM2MN EMRI EMRIPN RIEM2MN WMPN (MA/RI), MEPN MTN (MB), AEN CMEN PSET PTN SGN SPSN (ME), MACS MiTN MNN QMN UPN (MI), MSN MSPN MSSN PAW (MN), MEOW NEMOE (MO), APN (MR/NF), CAEN IMN MSBN MTN (MS), NCSSBN THEN (NC), WNN (NE), GSN (NH), MCN NJN NJPN NJSN OBTTN UCEN (NJ), RRN (NM), HVN NAS/SUF (NY), BNR 06mN ONN OSN OSSBN (OH), NWOKSN OFON OLZ ONON OPEN OTWN (OK), CMN GBN LN ODN OLN OPN OSN (ON), AREST (OR), EPA EPAEPTN LVN PFN PTTN WPA WPA2MTN WPAPTN (PA), WQVIUHF (PQ), SCSSBN (SC), SDMN SDN SDSSBN SDWXN (SD), SATN (SK), MCRN TN TNN WTVHFN (TN), TTN (TX), BUN UCN (UT), VFN VN VNTN VSBN VSN (VA), NWSSBN WSN (WA), BEN BWN WIN WNN WSBN (WI), WVN WVNN WVPN (WV).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

W4SQQ named assistant Eastern TCC director (evening).

1	2	3	4	5
TCC Eastern	196	95.4	3371	1198
TCC Central	210	93.8	2152	1074
TCC Pacific	120	90.0	2105	1071
Summary	526	93.1	7628	3343

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (April): Eastern Area (N2YL/K3KW, Directors) — W1s KX NJM OD, WA1s VEI ZAZ, K1s BA EIR GN SSH XA, W2s CS FR GKZ MTA RQ, WA2s ICB SPL, WB2KDC, N2YL, W3s FAF PQ YQ, WA3WQP, K3s KW NGN, N3HR, W4s JK MEE SQQ UQ, WA4CCK, WB4PNY, WD4OVR, K4s BKX KNP, N4KB, W8PMJ, WB8WTS, K8KMQ, VE3s GOL SB. Central Area (W5GHP/W9JUJ, Directors) — WD4HIF, WN4KKN N4MD, W5s KLV RB, WA5s BHF INJ IOU RKU, WB5s FDP MVR NKC OXE SDD, K5s GM MC, N5s TC TS YL, W9s CXY DND JIJ JUJ NXG, N9TN, WØs AM HI, WAØs TNM YVT, KØs EVH EZ. AFØO. Pacific Area (W5KH, Director) — N5s MR NG, W5s JOV KH PDO, K5MAT, N6s GW PZ WP, W6s EOT INH OA VZT, WA6UAZ, W7s AK DZX EP GHT LYA VSE. K7HLR, ADØA, WØKON, KØs BN DJ TER, WBØTAQ, VE7ZK.

Independent Nets (April 1979)

1	2	3	4
Amateur Radio Telegraph Society	30	1665	273
Central Gulf Coast Hurricane	30	304	2380
Clearing House	30	264	445
Empire Slow Speed	28	140	430
Hit and Bounce	30	326	487
Hit and Bounce Slow	18	99	170
IMRA	25	372	811
North American SSB	25	292	206
North American Traffic and Awards	30	67	900
Washington Region PON	17	30	387
West Coast Slow Speed	30	171	355
75 Meter ISSB	30	1150	1172
20 Meter ISSB	25	600	505
7290 Traffic	47	630	3005

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

REPEATER LOG

According to reports received between April 20 and May 20, the following repeaters and simplex frequencies were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Medical Emergency	Vehicular Emergency	Fire	Search and Rescue	Miscellaneous	Total
WR1ADK					1			1
WR2ADL				1				1
K3PSP				1			1	2
VE3RPT							1	1
VE3YRC							1	1
WR4ACY				21				21
WR4ADR				1				1
WR4AIC		1						1
WR4AIQ				1				1
WR4AKH				1				1
WR4BAZ			1					1
WR5ABA				16				16
WR5ABE			1	1				2
WR5ABY			4	34			3	41
WR5ADI							2	2
WR5AJG				4				4
WR5APK				3				3
WR5APN				1				1
N5DD			1	4				5
WR7AEF						1		1
WR7AHK				1				1
WR7AMW		1						1
WR8ABC				1				1
WB8BUI				1				1
W8WUX				1				1
K8ZIS						1		1
WR9ABY				9				9
WRØACM						1		1
Simplex				1				1
Total	2	7	0	103	1	3	8	124

Public Service Honor Roll April 1979

This listing is available to amateurs whose public service performance during the month indicated qualifies for 40 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. 10; (2) Checking into phone/RTTY nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned liaison, 3 points each, max. 12; (6) Phone patches, 1 point each, max. 20; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points. This listing is available to Novices and Technicians who achieve a total of 20 or more points.

158
W5REC
148
W5UYH
132
WB5VFS
112
WB5USS
106
KL7JEB
91
WA4CNY
80
WB5OXE
72
WD4COL
71
WB5LAT
69
WA2JKG
67
K1BSO
WB2RMI
WB5SDD
W8VPW
65
AF2L
64
W2MTA
WB4PNY
VE5HG
W7GHT
W9JUJ
62
W6OA
WØKON
AFØO
61
K1PAD
W1RWG
W1TN
W1UD
WB2EAG
AA2H
W2RQ
WA3PXA
WD4ISN
WA4YIU
WB4ZOJ
WA6UAZ
WD8NKA
WBØZQG
60
WB5MMI
W9HOT
WDØBMR
59
WA2SPL
W2ZOJ
WA4JDH
W5KLV
58
WA2MFV
K4DZM
WB5NKC
WBØHOX
57
WB2KDC
VE3GT
W4OGG
N5RB
WA5RKU
N5TC
56
W1GUX
K2GCE
W2SQ
WA2UWA
K4BKX
WD4EGT
N4NK
N4WA
K4ZN
W5GHP
AA5J
K5TL
W6RNL
WA8HGH
WD8LRT
NØAHA
KØEZ
55
WØOYH
WAØTNM
54
VE5AE
WØMDT
53
WA1TBY
W6JXK
KB8GC
AEØM
52
K2VX
WA3NAZ
WØOTF
51
W5VMP
50
VE3GOL
WD4HIF
K5OUK
WB6BWZ
K7GXZ
WB8MTD
49
W1TM
VE1WF
W2UEZ
VE3DPO
VE3GJG
AA3S
W3YQ
WA4CCK
W4FMN
W4NWM
WB4WYG
W4YVG
K5ARH
K5DPG
WA5RVT
W7EP
AF8A
N8CW
WØFT
48
WB5MVR
K5PC
47
WB1CPF
WB2JAY
WB2PJU
WA3WQP
N4PQ
AE5I
W7JMH
W7LUP
WD8CSA
46
K3JL
WD6EEN
WB8WTS
WBØNIE
45
WA1MJE
W5VXU
NØACW
44
W1BJ
AF1L
VE1RI
VE1RO
N2APB
N3AKC
VE3FHZ
VE3JRT
WB3JZA
WD4CNQ
K4EV
K4JGW
KK4M
WA4PFK
W4PIM
WB4QBB
W4WXA
K4XE
N5ES
WB5NKD
N5WB
WB7PSP
N8ABA
K9BVE
W9NXG
W9XD
KØDJ
WØKJZ
43
WB2IDP
WA2QWR
N3AIU
W3DP
WA3JGP
WD5AHH
W5SBE
WB8YDZ
W8YIQ
42
WB2HIQ
VE3JIR
KD4D
W4HON
W4JK
N4MD
VE5KS
WA5VBM
AC5Y
WB8KWD
KAØAIT
41
WB1EMU
KB2JG
K3ORW
WD4AWN
K4VHT
WD9CIS
40
WA2MVQ
WB5CIT
WB8YRY
27
WA2HEB/T
WA4MJT/T
25
KA2CHK/T
24
WB2RMJ/T
WB3GZR/T
22
KA2CNN/T
KA7AWH/N
N8AKS/T

Brass Pounders League April 1979

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: WA1ZXB, AA4FG, WB4RIS, K8AAZ, WØBMA, WØMZI.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

1	2	3	4	5	6
W3CUL	553	1942	2163	96	4754
WØWYX	39	1071	400	671	2181
WA4JDH	1	880	852	2	1735
WA2SPL	6	781	759	27	1573
W4MEE	3	726	726	15	1470
WB8KWD	1	726	723	15	1465
WBØIBS	30	622	619	3	1274
WA3WQP	22	510	543	27	1102
W3VR	201	399	421	15	1026
W7DZX	26	469	480	7	982
W5KLV	53	449	453	6	961
K1BCS	117	347	456	21	941
W9ZGQ		624	1	313	938
WØKON	46	408	347	2	803
N4PQ	1	371	415	4	791
W7AK	32	361	367	26	786
WØBMA	83	296	317	72	778
WB3GZU	113	257	312	69	751
W5DAD	74	318	318	37	747
K4TH	13	352	221	154	740
WB5MVR	67	234	340	97	738
WB4PNY	1	379	319	12	711
AA4FG	266	82	336	8	692
WA4AVN	87	303	287	6	683
WD4HIF	1	347	296	35	679
W9JUJ	30	379	241	5	655
WB2RMI	4	319	310	12	645
W2MTA		337	277	1	615
W2ZOJ	23	264	277	1	615
WB6EIG	34	286	286		606
WAØHJZ	8	354	26	216	604
WB5SDD	27	260	238	76	601
N4MD	4	302	271	15	592
WA4CRI	170	103	178	116	567
WB3JZA	19	198	305	24	546
WA2ELD		257	272	3	532
KL7JEB	22	232	257	17	529
W8VPW	24	221	268	16	529
WA4CNY	39	133	298	68	528
W9JIJ	106	205	201	4	516
W5UH	67	305	141	2	515
WBØMTA	61	178	257	15	511
K8DTG	10	255	236		501

Multioperator stations:

W4DUG	2540	20	2587	3	5150
K5REL	19	312	24	307	662
K5REJ	24	261	26	259	570

BPL for 100 or more originations plus deliveries:

W5UXP	220	KA2CHK	106
W7LUP	165	K9UTQ	106
K1DFS	153	WDØFZJ	105
K5OUK	148	WBØHZL	105
WØMZI	144	W5SBE	103
AD2X	125	WD8KZX	102
N3AIU	109	WØZWL	101

Multioperator station:

WA4PUP	135

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Operating News

Conducted By John F. Lindholm,* W1XX

TRASH

Another tough night at the tennis court. Hammered again. And to think just a few short weeks ago, my doubles partner and I were claiming to be "invincible."

It's been a long-standing sked. Every Wednesday night for about four years now, the same four guys vent our frustrations on a fuzzy yellow ball from 2130 to midnight. The losers buy the Pepsis.

Down and dejected, I drag in through the back door, past the hamshack, heading for the rack to lay my weary body down. But just as I saunter past the hamshack, the radios emit vibes that tickle an undefined sense. A new country is awaiting on 20 meters. I just know it.

Flick on all the switches, turn the beam on Europe, spin the tuning dial and . . . abracadabra, there it is: ". . . 73 Raul and I will QSL. Best wishes to you and your family. N5RQ from Foxtrot Nine Uniform Whiskey Stroke 3 Alpha." A quick check of my DXCC list reveals I do not have Monaco confirmed. Geronimo, it's into the pileup. "F9UW/3A from Whiskey One Xray Xray . . . W One Xray Xray . . ."

"K1MEM from F9UW/3A . . ." Hmmm, I don't like getting beat out, especially not by another "one." More salt in the wound. Let's catch him on the next contact; but wait, I'm golden. "73, Jim, and hope to see you again. K1MEM from F9UW/3A and standing by for the W1 Xray station."

And that's precisely when it all happened. TRASH. Four thousand W1 Xray stations from the New York Island to the Redwood Forest, W4s, KA5s, WB8s. "Keelo Bravo Zeero . . ." Grumbling to the wall (not my microphone): Hey, wait a minute, gang; the man said the Whiskey One Xray! That's me! Hey, WA7 . . . you're not the W1 Xray station. Not to be trashed about: "F9UW Stroke 3 Alpha from W1XX. Chris please repeat my report. You're 5 9 (*sic*) in Connecticut." Well, the TRASH didn't get me, but a thousand lashes with a wet Wouff Hong to all the TRASHers who were on frequency.

The above is a true story, a story that is repeated on the DX bands many times per day. TRASH comes in various forms. This brand of TRASH is referred to as "calling-out-of-turn TRASH." Other varieties include: trying to bust list operations, backbiting the list taker, calling when the DX station is working by districts (and it ain't your district). It's all TRASH, *T*ransmitting *R*adio *A*mateur *S*ignals *H*eedlessly. It's downright discourteous.

There are other kinds of TRASH. Tuning up on the air, invariably on top of FB8ZM. Didja ever notice how stations try to "talk" to the station tuning up? Save your breath. He ain't listening. He's too busy TRASHing. Calling a DX station on his frequency, when he has indicated he's listening off frequency. That's TRASH. The gestapo types who make a five minute transmission on the DX station's frequency to tell the world that you are a lid for calling on frequency. Pure TRASH.

Then we have the blatantly deliberate, malicious TRASH usually generated by the sickos in the fraternity. Net jamming. Tape playing. Music. The he-man types who take great pride in transmitting on W1AW code practice frequencies. Unidentified carriers on repeaters, causing time-out. The kerchunkers. All TRASH.

Did we have all this TRASH 10, 15 or 20 years ago? No doubt Amateur Radio has suffered the pains of growing. The gates have been opened to swell the ranks. And this is good. But, no doubt some have learned their trade of TRASH on frequencies of other less-disciplined services. The newcomers have been a boon to Amateur Radio, and if bad habits came with them, then shame on us for not better showing the proper way by example. Veteran amateurs who years ago would not have considered a "hell" or a "damn" on the air now find more risque expressions tolerated. Perhaps it's a sign of our more permissive society. But is it what we all want for Amateur Radio? Unfortunately, TRASH breeds TRASH. TRASH belongs at the dump, not on the air.

Old-timers can remember the days when it was relatively commonplace to receive an FCC "pink slip." Knowing that big brother was watching was perhaps a deterrent, but can't we promote an antilitter campaign on the merits of its own relative goodness without resorting to the fear of getting caught? More and more amateurs today get honked off by receipt of a friendly cooperative Official Observer report. They're trying to help. Let's not generate so much TRASH on the air that we force our hard-working OOs into the role of sanitary engineers.

What to do? Be courteous. Follow the directions of the DX station. Invest in a dummy load. If you don't like list operations, stay away from them. Keep your comments of frustration off the air. Ignore the degenerates who jam the nets. Don't even acknowledge that you hear them. Feeding their warped egos by acknowledgement does not make the problem go away. When a repeater is being TRASHed, the control operator should dump it. Are these all the answers? Of course not. Some TRASH problems we know are indeed very serious, and require serious solutions.

But a simple "Is this frequency in use?" or "QRL?" can go a long way toward eliminating "unheardly" TRASH. Not that healthy competition should be eliminated, but an immaculate spectrum would make operating a greater joy for all. On the DX bands, what a far greater impression we could present to our friends in foreign countries. Will you assist in eliminating these poor practices?

SCM ELECTION NOTICE

To all ARRL members in the New Mexico, Alabama, Western Massachusetts, Alaska, Santa Barbara, Kansas, Tennessee, Michigan, East Bay and Delaware 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.*

Petition forms (CD-129) are available on request from ARRL headquarters, but are not required. The following form is suggested:

(Place and date)

Communications Manager, ARRL
225 Main Street, Newington, CT 06111

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

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, September 7, 1979.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on October 1, 1979, and returns counted November 20, 1979. SCMs elected as a result of the above procedures will take office January 1, 1980.

If no petitions are received for a section by the specified closing date, such section will be resolicited in January *QST*, and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager. You are urged to take the initiative and file a nominating petition immediately.

John F. Lindholm, W1XX
Communications Manager

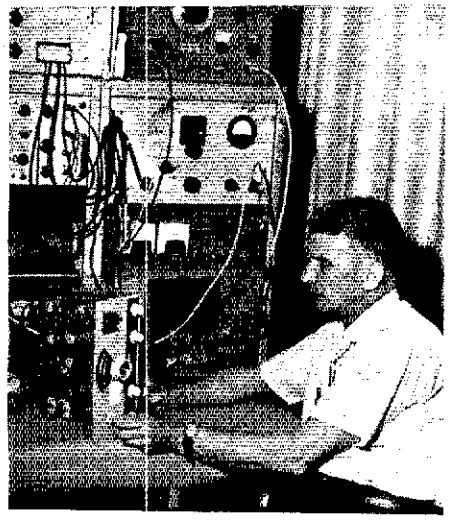
*Communications Manager, ARRL

W1AW NOTE

The complete W1AW summer operating schedule appears in May *QST*, page 89. A W1AW schedule also is available on request from ARRL headquarters. Please enclose an s.a.s.e. See the "Contest Corral" section of *QST* for times and dates of W1AW Code Proficiency Qualifying Runs.

MEET YOUR SCM

Richard McAbee, W4MTK, Section Communications Manager of South Carolina since January 1979, moved into his new position with an extensive Amateur Radio and electronic background. A graduate of Cecil's Business College, Spartanburg, SC, and several U.S. Air Force technical schools for radio operators, radio mechanics and instrument landing, Richard is employed as an electrical and instrument mechanic for E. I. duPont de Nemours & Co., of Aiken. First licensed in 1960, W4MTK holds OTS and OBS appointments and is a former EC and NM. He holds public service awards for Hurricane Camille and the Jackson Tornado, as well as the Single Side



Richard McAbee, W4MTK, SC SCM

Bander of the Year award for 1970 and 1977 and the W4IW Award in 1971. Richard has been an officer in the North Augusta-Belevedere ARC. Besides ham radio, his hobbies include an interest in automobiles and baseball. With W4MTK at the helm, the South Carolina Section's operating activities are in good hands. — *Arline Bender, WA1VMC*

Strays

GEORGE, WA, HAS A BIRTHDAY

George Washington — the president and the town — were honored by Amateur Radio on the first president's birthday. The annual event is sponsored by the Olympia (WA) Amateur Radio Society. Operations in the town of George were handled by the Radio Club of Ephrata, WA. A special message from Washington Governor Dixie Lee Ray was transmitted during the event. Northwestern Division ARRL PRA John H. Brown, W7CKZ, launched the first special event to honor the city in 1978.

Gene Bye, W7WMO (foreground), and David Knannlein, WB7UBZ, man the special event station at George, WA. Gene and a crew of operators worked 240 stations in six hours. *(W7CKZ photo)*

DATE (UTC)	OSCAR 7 Ref. Orbit	OSCAR 7 Time (UTC)	OSCAR 7 Long. W.	OSCAR 8 Ref. Orbit	OSCAR 8 Time (UTC)	OSCAR 8 Long. W.	SOVIET RS Ref. Orbit	SOVIET RS Time (UTC)	SOVIET RS Long. W.
1 July	21151	0021:39	69.3	6728J	0032:30	52.7	2965	0151:41	280.4
2 July	21164	0115:56	82.9	6742A	0037:40	53.3	2977	0156:21	282.7
3 July	21176	0015:16	67.8	6756AJ	0042:50	54.6	2988	0000:38	255.2
4 July	21189	0109:33	81.3	6770X	0048:00	55.9	3000	0005:19	257.9
5 July	21201	0008:53	66.2	6784A	0053:10	57.2	3012	0009:59	260.6
6 July	21214	0103:10	79.8	6798AJ	0058:20	58.5	3024	0014:39	263.3
7 July	21226	0002:31	64.6	6812J	0103:31	59.8	3036	0019:20	266.1
8 July	21239	0056:48	78.2	6826J	0108:41	61.1	3048	0024:00	268.8
9 July	21252	0151:04	91.8	6840A	0113:51	62.4	3060	0028:41	271.5
10 July	21264	0050:25	76.7	6854AJ	0119:01	63.7	3072	0033:21	274.2
11 July	21277	0144:42	90.3	6868X	0128:11	65.8	3084	0038:01	277.1
12 July	21289	0044:02	75.1	6882A	0129:21	66.3	3096	0042:42	279.7
13 July	21302	0138:19	88.7	6896AJ	0134:31	67.7	3108	0047:22	282.4
14 July	21314	0037:39	73.6	6910J	0138:41	69.8	3120	0052:02	285.1
15 July	21327	0131:56	87.1	6923J	0001:38	44.5	3132	0056:43	287.9
16 July	21339	0031:16	72.0	6937A	0006:48	45.8	3144	0101:23	290.6
17 July	21352	0125:33	85.6	6951AJ	0011:58	47.1	3156	0106:04	293.3
18 July	21364	0024:54	70.4	6965X	0017:08	48.3	3168	0110:44	296.8
19 July	21377	0119:11	84.0	6979A	0022:18	49.7	3180	0115:24	298.8
20 July	21389	0018:31	68.9	6993AJ	0027:28	51.5	3192	0120:05	301.5
21 July	21402	0112:48	82.5	7007J	0032:38	52.3	3204	0124:45	304.2
22 July	21414	0012:08	67.3	7021J	0037:48	53.6	3216	0129:25	306.9
23 July	21427	0106:25	80.9	7035A	0042:58	54.9	3228	0134:06	309.7
24 July	21439	0005:45	65.8	7049AJ	0048:08	56.2	3240	0138:46	312.4
25 July	21452	0100:02	79.4	7063X	0053:18	57.5	3252	0143:26	315.1
26 July	21465	0154:19	92.9	7077A	0058:29	58.9	3264	0148:07	317.8
27 July	21477	0153:40	77.8	7091AJ	0103:39	60.2	3276	0152:47	320.5
28 July	21490	0147:56	91.4	7105J	0108:49	61.5	3288	0157:28	323.3
29 July	21502	0047:17	76.2	7119J	0113:59	62.8	3299	0001:45	295.8
30 July	21515	0141:34	89.8	7133A	0119:09	64.1	3311	0006:25	298.5
31 July	21527	0040:54	74.7	7147AJ	0124:19	65.4	3323	0011:05	301.2
1 Aug.	21540	0135:11	88.3	7161X	0129:29	66.7	3335	0015:46	303.9
2 Aug.	21552	0034:31	73.1	7175A	0134:39	68.5	3347	0020:26	306.7
3 Aug.	21565	0128:48	86.7	7189AJ	0139:49	69.3	3359	0025:06	309.4
4 Aug.	21577	0028:08	71.6	7202J	0001:46	44.8	3371	0029:47	312.1
5 Aug.	21590	0122:25	85.2	7216J	0006:56	46.1	3383	0034:27	314.8
6 Aug.	21602	0021:46	70.0	7230A	0012:06	47.4	3395	0039:08	317.6
7 Aug.	21615	0116:03	83.6	7244AJ	0017:16	48.7	3407	0043:48	320.3

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 28.737668° W. per orbit in a period of 114.944814 minutes. O 8 progresses an average of 25.807744° W. in a period of 103.226293 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.

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.

Rules, 1979 ARRL UHF Contest

Now is the time for all good uhf enthusiasts to come to the aid of *their* contest, the Second Annual ARRL UHF Contest. Will you hear the uhf bands come alive on the weekend of August 4-5? Maybe, but if and only if enough interest is shown in this activity. In the first running of this contest (1978), reports were received from a mere 118 stations. To keep this contest going, we have to at least double the activity this time out. Get hold of your uhf buddies; talk it up on the air. Encourage the inactive to dust off their 220- and 450-MHz boxes and put them to use to keep the UHF Contest alive. Let's show how we feel about our uhf privileges.

Official entry forms can be had by sending a self-addressed, stamped envelope to ARRL hq.

Rules

1) The 1979 ARRL UHF Contest begins at 1900 UTC on Saturday, August 4, and ends at 1900 UTC on Sunday, August 5. Entrants may use as much of this period as they wish.

2) Contacts may be made on all authorized amateur bands above 220 MHz, using all authorized modes of emission. (However, use of the 430-MHz band is limited to 430-433 MHz, inclusive.)

3) No station may contact any other station more than once per band for QSO credit, regardless of mode.

4) For a valid contact to occur, each station must send *and* receive an exchange consisting of a signal report plus either a four- or five-digit number, indicating the position of the station in longitude and latitude, rounded *down* to the next whole number.

Example: K8WW in Seven Hills, OH, would send 59 and 8141 as his exchange, since his longitude and latitude are 81° west, 41° north. WB6NMT in San Diego, CA might send 599 and 11732 (117° west and 32° north). Even a station at 117°, 59 minutes west would send 117, not 118!

Stations not competing in the contest may be counted for contact and multiplier credit if they send their location with enough specificity that the competing station may determine the appropriate longitude-latitude designation.

5) Partial QSOs do not count. Both calls, the full exchange, and acknowledgement must be sent and received.

6) Fixed, portable or mobile operation under one call is permitted. Only land-based stations (not aeronautical or maritime mobiles) may be counted for multipliers. A portable or mobile station may not be counted for more than one QSO per band, even if the station is moving. However, a station that changes locations may be contacted for additional multipliers but only once for QSO points.

7) A transmitter, receiver or antenna used to contact one or more stations under one call sign may not subsequently be used during the contest period under any other call sign, even if more than one call is assigned to a given location by the licensing authority. One complete station must exist for each contact an entrant claims.

8) All equipment and antennas used by entrants must be owned and operated by amateurs. Use of nonamateur-owned gear is not prohibited, but use of such equipment places the entrant in a separate category, ineligible for awards.

9) All equipment and antenna adjustments, logging and operating must be performed by one person for a station to qualify for single-operator status. All stations in which more than one person participates in any of these functions during the contest period are classified as multioperator stations.

10) While no minimum distance is specified for contacts, equipment in use must be capable of real communication (i.e., able to communicate over a distance of at least a kilometer).

11) Scoring: a) Each completed contact on the 220- and 430-MHz bands is worth three contact points. QSOs on 1296 MHz are worth six points each, while those on 2304 and higher frequencies are worth 12 points each.

b) The total multiplier is derived by counting the number of different exchanges (i.e., longitude and latitude numbers) received on each band and summing these band totals. Thus, each geographic area one degree in longitude by one degree in latitude is a unit worth one multiplier and may be counted as such on each band on which they are worked.

c) The final score is determined by adding up the contact-points amassed on all bands used and multiplying that total by the sum of longitude-latitude multipliers on each of the bands.

Example: W3HMU works 25 stations in 12 one-degree multipliers on 220 MHz, 34 stations in 17 multipliers on 432, 10 stations on 1215 MHz in six multiplier blocks, and one station in one multiplier on 2304 MHz. He has 249 contact-points (75 + 102 + 60 + 12) and a multiplier total of 36 (12 + 17 + 6 + 1), for a final score of 8964 points (249 × 36).

12) Contacts made by retransmitting either or both stations, whether by satellite or terrestrial means, are prohibited. Frequencies regularly occupied by a repeater in a locality may not be used for contest work in that area, even if the repeater is turned off.

13) A station located precisely on the dividing line between two one-degree longitude or latitude units may select either one as his location but may not hand out both multipliers without moving his complete station (including antennas) at least 100 meters.

14) Entries must be postmarked no later than August 20, 1979 and must set forth the call sign, exchange (both sent and received), time/date, frequency/band and mode used for each claimed QSO. An accompanying summary sheet must list the total number of QSOs and multipliers (both broken down on a by-band basis *also*), the final claimed score, a description of the equipment used, calls of *all* operators if multiop, mailing address and station location, and a signed statement that all rules and regulations have been followed.

15) The high-scoring single-operator and multioperator station in each ARRL *Division* will receive a certificate. Additional certificates will be awarded at the discretion of the ARRL Awards Committee.

16) Disqualifications: see January 1979 *QST*, page 85.

Strays

NAVAL AWARD

☐ The Royal Naval Amateur Radio Society has announced sponsorship of the Endeavour Award. To be eligible, amateurs must work RNARS members living in Australia. For details, contact RNARS, P. O. Box 537, Albury, NSW 2640, Australia.

CW AWARD

☐ The Sao Paulo Group of CW sponsors the CWSP Award for all hams who have worked five members of the group since October 15, 1976, cw only. For a list of club members, write CWSP, P. O. Box 15.098, Sao Paulo, SP, Brazil 01000.

CENTENNIAL AWARD

☐ The Bancroft ARC (ON) will celebrate its hometown's centennial by operating special-event station XJ3TBC continuously during Homecoming Week, August 11-18. Special QSLs will be issued for working XJ3TBC. Cw and phone; all hf bands except 160 meters. VHF on 52, repeater VE3TBF on 24/84. Certificates available for working XJ3TBC on three different bands; two bands for DX. Contact the Bancroft ARC, P. O. Box 631, Bancroft, ON, KØL 1CØ Canada.

GEM OF AN AWARD

☐ To mark the 100th anniversary of the discovery of sapphires in Central Queensland, Australia, the Gemfields Radio Group has announced sponsorship of the Centenary Award. The period of the award is from 2000Z Aug. 15, 1979 to 1800Z Aug. 24, 1979. For details, contact the GRG, c/o Post Office, Rubyvale 4702, Queensland, Australia.

JOIN THE STAMPEDE TO CALGARY!

☐ The Calgary ARA will be operating solar-powered station VE6SUN at the Calgary Stampede from July 6 to 15. The station will work each day from 1600 to 0400 UTC on the high-frequency bands. A special QSL card is available; contact with VE6SUN will count towards the Calgary Stampede Award (10 contacts with Calgary stations). More than a million people are expected to visit the 1979 Calgary Stampede, where the theme is "Alternate Energy Sources." Amateurs visiting "the largest rodeo in the world" are invited to stop by the CARA booth.

Results, 1979 Novice Roundup

A *Novice,* in learning the *tech*niques of contesting in the NR, will *generally advance* up the ladder of Amateur Radio licensing, with that little *extra* effort.

By Bill Jennings,* K1WJ and Tom Frenaye,** K1KI

Hey, all you Novice and Technician types out there. Ever switched on the rig and called "CQ" without getting an answer? Ever sat there in frustration, trying to break the pileup on that "rare" state that you need for WAS or that DX station who's reeling off the QSOs at a pretty good clip? Then, my friend, you've probably got a case of the "well, you can't win 'em all" blues or the "I can't even win one" syndrome. Have we got the solution to your problems — the Novice Roundup.

Ask any of the 561 ops from whom we received logs for the 28th annual running of the Novice Roundup (NR) what they, personally, got out of their participation, and the variety of answers probably will equal the number of individuals participating. Comments ranged from "worked my first DX" to "worked more stations during the NR than in any or all previous time spent on the air" to "increased my code speed several times over" to "had several fine ragchews with folks that I met while I was in the contest." Although the comments differ somewhat, two basic underlying themes, improved operating skills and enjoyed the competition of the Novice Roundup, seem most prevalent. What more need be said?

If you didn't participate in the 1979 NR, you missed a real FB time. Don't make the same mistake again. If you can put out a decent signal, not necessarily a "killer" signal (ops in the last NR ran from 1-watt input to the full legal limit, using antennas ranging from random longwires to multielement beam arrays), we're sure you'll enjoy the NR. After all, next February isn't all that far off.

Since the Novice license was made a five-year renewable or permanent-type affair, we figured that this year would be a good time to draw the line between those newly licensed (less than two years) and the "old-timers" in grade. It seemed logical to assume that if compared side-by-side, the more experienced operators would dominate any top scoring list compiled. It just ain't so. Newcomers WDØBQG and KAØBJI turned in the top all-around Novice scores. In fact, "new" Novices would hold places 1, 2, 5, 6, 7 and 10 in an overall Top Ten rating. Pretty much the same for "new" Technician licensees. The "new" Techs, led by N6BCY and WB6VVH/9, would hold places 3, 4, 6, 7 and 10 on an overall Top Ten Technician list.

*Communications Assistant, ARRL
**Assistant Communications Manager, ARRL

Top Ten Novices

Licensed more than two years		*Licensed less than two years*	
WA4UYJ/N	62,228	WDØBQG/N	66,468
WB1AOG/N	61,408	KAØBJI/N	62,694
KA2BNF/N	57,440	WD5COV/N	61,335
WB5LVL/N	54,225	WB1FPF/N	60,515
WA4OUT/N	49,932	WB1DEU/N	58,310
KL7ISO/N	47,227	WD9DBC/N	50,641
WB2IUI/N	44,500	KA3ARI/N	50,000
WB3GWB/N	40,936	WA2MRW/N	49,929
WBØYWP/N	38,048	WH6AFE/N	47,005
WD4AHZ/N	36,849	KA4BUI/N	44,405

Top Five Technicians

WB3FWD/T	28,824	N6BCY/T	21,255
WD5HZN/T	22,104	WB6VVH/9T	19,180
WBØVKE/N	17,334	WD5GRV/T	18,444
WB2JCU/1T	15,376	WD5FPJ/T	17,052
K8DHK/T	14,440	WD9DTF/T	16,860

You can find WA2VQE (NLI Section) at home pounding brass in the Novice Roundup or on the job pounding a beat in the South Bronx. Charles is a police officer in the Big Apple (New York City). Don't try to steal *his* frequency.

Peggy, KA4FVU, with less than 2 months of previous on-the-air experience, proceeded to jump head first into the NR and came away with 279 QSOs, 63 multipliers and second place in the Georgia Section.

We didn't mean to neglect the "over-two-year" crowd. For Novices, WA4UYJ, who was fifth last year, and WB1AOG, both turned in fine performances to lead the pack, while Techs WB3FWD and WD5HZN were number one and two, respectively.

Did you find your claimed score reduced somewhat? The ole log checker has sharp eyes. Each log was given a thorough examination. Where necessary, QSOs and points were deleted, not as a punitive measure, but to point out mistakes to prevent recurrence. After all, the Novice/Tech contestants of today are the "Big Gun" contesters of tomorrow.

QSOs and points can be and were deleted from logs for the following reasons;

1) Incomplete contacts in the log. The call sign, time/date, frequency band of QSO, and *complete exchange,* both sent and received, must be indicated for *each and every* QSO claimed for credit. Many QSOs were deleted because they lacked the *complete* exchange.

Idaho's top scorer Jack, WB7VBC, who shares the rig with XYL KA7ALU, calls his burro mascot (on the tuner) appropriately enough, "DX."

Russ, WD8PMA, at 16k points, placed sixth overall in the Michigan Section.

William, KA4BFU, from Virginia, stuck mostly to 80 meters to keep his QSO rates up and went to 15 meters to snag most of his 58 multipliers.

which in this case was the call sign, a signal report and the ARRL Section. No matter what contest you enter, *always* be sure to indicate on your entry the *complete* exchange required for *each* and *every* QSO that is claimed in the log for credit.

2) Incorrectly copied information. The log checker has a great many entries at his disposal and can cross-check a good portion of the QSOs in most logs. Example. If you copy the call sign of KX6XXX as KX6XXD, the log checker can then cross-check your log with that of KX6XXX and delete the QSO as an incorrectly copied contact. Be sure to copy, correctly, all the information that is sent to you for each contact during the contest. If you are not sure of what was sent because of QRM or the other op sending a little too quickly, ask for a repeat or a QRS. Better to spend a few extra seconds during the QSO than to lose the points later.

3) Duplicate contacts. If the contest rules state that you can work a station only *once* during the contest for credit, *do not* enter the same station again for credit in your log. When the log checker finds duplicate contacts (dupes) in your entry, he removes that QSO plus a penalty of three additional QSOs. Best way to avoid dupes is to keep a dupe sheet (CD-77A or equivalent) during the contest (enter stations as you work them) and double-check your log by duping it again after the contest. It's time well spent.

4) General rule violations. Be sure to *carefully* read the rules for each contest *before* the contest begins. Lots of things that you may never consider important, such as time limits, on/off times, etc. might be an important part of that particular contest.

A very important part of the NR are the General and above licensees and our DX friends who pay a visit to the Novice bands, not just 'cause it's kinda fun for them too, but to help hand out points and multipliers to the NR participants. Thanks, fellows and gals, really appreciate it.

To all those who played in 1979, but will have upgraded in license class (as many do), good luck and be sure to come back next year and give us a hand. To those who didn't participate this year, try it next year; you'll like it. To those newly licensed and those who will be licensed by next February and are reading this report, we extend a hearty congratulations and an invitation to enter the Novice Roundup in 1980.

SOAPBOX

I would like to say to new Novices, "Get in *your* Novice Roundup because if you don't participate, you will always be wondering." I wondered what it was like to be in the Novice Roundup. Now I know how it feels and I know for a fact that if I had missed *my* Novice Roundup, I would have hated myself for the rest of my years (KA7CKE). I never was a Novice, so by participating in this NR, I'm filling in that time in my ham radio life now (WA3UNX). How many points is a contact with a guy named Mr. Spock located on Vulcac Island worth?-(WB3INW). Now that I've got the hang of the NR and have a new rig, I almost wish I wouldn't get that General ticket (Hi!) (KA9BDQ).

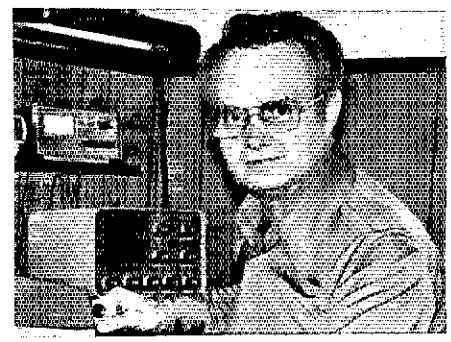
The toughest thing about the NR comes afterward in trying to get used to just calling CQ not CQ NR and signing your call without the /N (KA8CBZ). The XYL says that I was an "extra" for nine days — EXTRA hard to live with . . . (WD9IOS). DX wasn't exactly rolling in, but I did alright with my dipole at five feet (WDØBLU). You should have heard all the QRM suddenly disappear at 2359Z on February 11 (WDØEAB). The NR caught me with my "ANTs down" so to speak. I only had 80- and 15-meter dipoles up, so I missed out on 10 and 40 meters (WD4SKH). Interesting observation. Quite a few SM (Sweden) stations giving out QSOs and points to the Novices . . . nice gesture (W9FSD). Seems a lot of folks that I talked to on the air knew nothing about the NR. I spent a lot of time explaining, made a lot of new friends, and enjoyed the contest (WB2ONA). Hello, Maine? (WD8RUP). Great fun. Non-ham XYL thinks I'm a nut (WD6DBA/7). Last year, someone said that NR stood for numb rist; revise that to Nervous Reck (WA4UYJ). I started with no serious intention of trying to make a score, but found myself so absorbed in the contest that I just couldn't seem to leave it alone. Wonder if the FCC will make you (ARRL) file a statement to the fact that contests may be habit-forming. Hi! (KA1AUK). Surprised a bit with my results. Using 90-watts output and 65-foot longwire up only 10 feet above ground. Moral: don't hesitate to try simple antennas, you may be pleasantly surprised with the results (WD6BJK). Okay, you guys want comments? I'm writing this from my padded cell. Seriously, NR is for the insane. After six hours of operating on the first night, I racked up the astounding total of 10 QSOs. But, I did get four new states after the week was up. I'll be back next year for revenge (WD8OTW). I had a couple of new Novices over to my shack during the contest, and their feeling about the contest was that if the cw was being sent a little slower, they might have given it a try. I think if a standard speed were sent (like 10 wpm) just for the contest, more new Novices might have gotten on the air. Getting the Novices on the air and having them learn a little about contesting, I'm sure, is the whole idea behind the NR (KA8BQX). In my third NR, I finally worked North Dakota,

Overall Division Leaders

KA3ARI/N*	Atlantic	WB3FWD/T
WD9DBC/N*	Central	WB6VVH/9T*
WDØBWH/N*	Dakota	WDØCHC/T*
WA4UYJ/N	Delta	WD5HZN/T
WD4FXX/N*	Great Lakes	K8DHK/T
KA2BNF/N	Hudson	KA2BZS/T*
WDØBQG/N*	Midwest	WDØAOP/T*
WB1AOG/N	New England	WB2JCU/1T
KL7ISO/N	Northwestern	WB7SEN/T
WH6AFE/N*	Pacific	WD6BJK/T*
WD4GOO/N*	Roanoke	KA4CVL/T*
KAØBJI/N*	Rocky Mountain	WD5FMB/T*
KA4BUI/N*	Southeastern	KA4EER/T*
WD6EIM/N*	Southwestern	N6BCY/T*
WB5LVL/N	West Gulf	WD5FPJ/T*

*Denotes operator licensed less than 2 years

The Orange Section's number one operator in the NR, Jeff, KA6AEI.



Ed, WB3FWD, used a beam antenna, inverted Vs, and 180 watts of input power to work 356 stations and become the number one Technician operator in this year's NR.

completing Novice Band WAS . . . With my 2 × 3 call sign, I get calls from other non-Novices (I'm an Extra). Some don't even seem to understand the problem . . . By the way, could a Novice/Tech, who had passed the General test and had interim privileges, enter the NR as a Novice/Tech? (WB1ANT). [Good question, Matt. Once the Novice/Tech has passed the test and received the Interim Permit, he/she is officially considered the higher class (General from the question) licensee. You might remember Matt, WB1ANT, as having the third highest non-Novice point total in the 1978 NR — Ed.]. Really like the fact that in the NR, you can get an award for making 200 or more contacts. In other contests, you don't get an award unless you win (WDØFGY). Would like to suggest changing the abbreviation of LA to LAX so to avoid confusion with La. LAX would catch on very quickly as it is already the abbreviation for Los Angeles International Airport (WB2IUI). I think I could have done better if my shack were a little warmer. It's only partially insulated and never got above 43° F (KA8BPY). I like to operate on 10 meters best, but there weren't many NR operators on 10 (KA8BQH). Murphy is back. Newly erected dipole caught SWR fever (WD4FJP). Great contest! Mamma mia, so much activity! (N6HE) 1979 NR was a real success for me. Ten new states worked and to my surprise, an SM station answered my CQ. Thirty hours is the perfect amount of operating time. Be back next year (KA2BPV).

FEEDBACK

Please note the following corrections to the 1978 Novice Roundup, the results of which are to be found in August 1978 *QST*, page 67.

WB7RCN, listed in third place in the Arizona Section, should be the one and only station (Section Winner) listed under a Nevada heading.

WB5BUT/7T listed under Idaho should really be WD5BUT/7T.

Station Equipment — Antennas — Multipliers for the Top Ten Overall Scorers

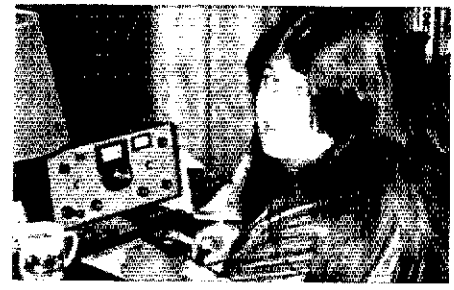
Call	Equipment Receiver/Transmitter/Power Input	Antenna(s) Used	ARRL Sections	DXCC Countries
WDØBQG	Drake TR4-CW/xcvr/250 watts	vertical/Vs	74	13
KAØBJI	Collins 75S-3/Collins 32S-1/160 watts	quad/Vs	66	20
WA4UYJ	Drake TR4-C/xcvr/180 watts	vertical/Vs	73	21
WB1AOG	Yaesu FT-101EE/xcvr/180 watts	beam/vertical	73	28
WD5COV	Heath SB-303/Heath SB-401/180 watts	dipoles	73	14
WB1FPF	Drake TR7/xcvr/250 watts	beam/Vs	70	21
WB1DEU	Heath HW-101/xcvr/180 watts	dipoles	71	14
WB5LVL	Yaesu FT-101E/Drake R4-C/200 watts	beam/vertical/Vs	69	6
WD9DBC	Yaesu FT-101/Drake R4-C/250 watts	beam/vertical	68	21
KA3ARI	Collins 75S-3B/Collins 32S-1/180 watts	beam/Vs	67	13

In Iowa, Wayne, WBØYWP, found himself in the middle of his first contest, the Novice Roundup, and thinks he may be hooked on contesting. Its hard to get that "dupe sheet" off your back. (Hi!)

The number two score from North Carolina came from this lady, KA4APY. Sandra managed to finish up her WAS (Worked All States) during the NR and had a great time doing it.

Eileen, WD9HZG (IL), upped her all-time QSO total by about 2000 percent, while doubling her code speed during the Novice Roundup.

Tom, WD6DXH, went into the NR QRP-style from the SCV Section.



Teresa, WD5HPK (N. TX), was pleasantly surprised at the FB results her 70 watts and end-fed longwire antenna produced.

Novice Roundup Scores

Scores read, left to right: call, score, number of contacts, number of multipliers, and number of hours of operation. An asterisk indicates an operator who has been licensed less than 2 years.

U.S.A.

1

Connecticut

WB1ENU/N* 32,112-431- 72-28
KA1BUC/N* 24,282-212- 71-18
WB1HKV/N* 15,740-264- 60-29
KA1BUJ/N* 14,495-223- 65-22
WA1ZXT/N 12,320-209- 59-25
WB1ERG/N* 12,272-208- 59-30
KA1BIJ/N* 10,700-214- 50-18
WB1FKU/N* 10,845-200- 49-12
WB1DVE/N* 9289-219- 41-18
WB1CTM/N* 6336-129- 44-17
WB1ESJ/N* 4070- 95- 37-19

Eastern Massachusetts

WB1FPF/N* 60,515-645- 91-30
WB1CTH/N* 15,121-197- 73-25
WA1JUY/N*(WB1GHC,opr) 11,872-224- 53-17
KA1BJY/N* 11,514-202- 57-18
WB1FVY/N* 3876- 58- 57- 6
N1AJJT/T* 1015- 45- 23-21
WB1GNV/N*(+KA1AUY/N) 9706-196- 46-23

Maine

KA1AJH/N* 3813- 83- 41-20

New Hampshire

WB2JCU/1T 15,376-248- 62-27
KIFUB/N 14,770-191- 70-30
KA1AUK/N* 14,100-300- 47-28
WB1EIH/T* 855- 35- 19-17

Rhode Island

WB1DEU/N* 68,310-671- 85-30
WB1FLL/N* 18,810-275- 66-22
KA1BTU/N* 18,693-264- 67-30
WB1GLT/N* 12,432-212- 56-30

Vermont

WB1CUQ/N* 10,689-218- 49-27
KA1BEE/N* 4784- 94- 46-23
KA1BSZ/N* 546- 26- 21-30

Western Massachusetts

WB1AOG/N 61,408-598-101-30
KA1BBD/N* 15,624-252- 62-29
KA1BLV/N* 13,908-244- 57-30
WB1GLX/N* 13,260-221- 60-30
KA1RDD/N* 4248-118- 36-19
WB1FPN/N* 1624- 58- 28-10

2

Eastern New York

WA2MRW/N* 49,929-561- 89-28
WB2LQI/N* 24,563-304- 77-30
WB2SXL/N 17,043-299- 57-
WA2VAX/N 15,680-245- 64-24
KA2DLX/N* 13,328-213- 56-27
KA2BFQ/N* 12,749-199- 61-30
WB2YNW/N* 12,488-208- 56-28
WA2JDI/N 4180- 95- 44-13
WD2ABB/T 946- 33- 23-13
KA2BX5/N* 60- 5- 4- 2

New York City - L.I.

KA2CKM/N* 27,216-358- 72-28
KA2CVM/N* 16,683-239- 67-30
KA2CRF/N* 16,520-280- 56-27
KA2AEV/N* 16,287-257- 61-27
WA2VQE/N* 13,230-179- 70-30
WA2WBI/N* 11,350-212- 50-26
KA2BZK/N 11,284-217- 52-26
KA2CWI/N* 11,025-210- 49-25
KA2BUU/N* 10,339-201- 49-30
WA2HQB/N 9248-128- 41-30
KA2DXH/N 350- 15- 10-
KA2DIV/N* 231- 11- 11-24

Northern New Jersey

KA2BNF/N 57,440-718- 80-30
WB2IUI/N 44,590-475- 89-30
KA2BTD/N* 16,730-224- 70-23
WA2LXU/N* 16,368-244- 62-29
KA2COY/N 16,065-240- 63-30
KA2BZS/T* 12,120-202- 60-30
WB3JON/2N* 11,970-210- 57-30
KA2BAQ/N* 11,074-211- 49-22
WB2UHM/N* 8288-224- 37-25
WA2TNN/N 6580-140- 47-27
WB2VTE/T* 5120-113- 40-26
WV2ZQW/T 5000-100- 50-19
KA2CEU/N* 4704- 96- 49-16
WA2KKG/N 900- 40- 18- 9
WB2ONA/N* 36- 6- 5- 6

Southern New Jersey

KA2BEW/N* 32,486-439- 74-30
WD2AGZ/N* 32,214-413- 78-27
WA2SOQ/N* 14,220-227- 60-28
WA2JXO/N 12,040-200- 56-27
WD2AGU/N* 11,312-202- 56-28
WB2REN/N* 10,363-241- 43-29
WB2STV/N* 9300-135- 60-28
KA2BPV/N* 9016-181- 46-25
KA2AGE/N* 8632-166- 52-16
KA2CNB/N* 1768- 68- 26-14
KA2BLG/N* 1248- 48- 26- 9
WA2NBE/N* 783- 29- 27- 8
KA2CQX/N* 416- 26- 16-10
WB2YGE/N* 144- 18- 8- 4
WD2AHA/T* 96- 12- 8-10
WA2MGV/T 16- 4- 4- 2

Western New York

KA2CMC/N 21,440-335- 69-19
KA2CJD/N* 21,420-315- 68-21
KA2CRV/N* 19,902-306- 62-27
KA2BNS/N* 13,062-239- 58-18
WB2MVC/T* 11,400-200- 57-30
KA2CFH/N* 10,712-206- 52-15
KA2BGX/N* 10,250-195- 50-23
KA2BNL/N* 7000-160- 40-28
KA2CGV/N* 4773-101- 43-
KA2CFS/N 3672- 87- 36-20
WA2PSG/N 3604-106- 34-16
KA2AKG/N* 2345- 67- 35-11
KA2CSY/N* 1484- 45- 27-12
N2ALB/T* 1196- 46- 26-13

3

Delaware

KA3BSM/N* 11,180-219- 52-29
WA3BZT/T 7579-143- 53-30
WA3GAY/N*(WB3KYQ/N,opr) 3456-108- 27- 5
WB3KYQ/N* 324- 16- 9- 3
WB3LGC/T* 1- 1- 1- 1

Eastern Pennsylvania

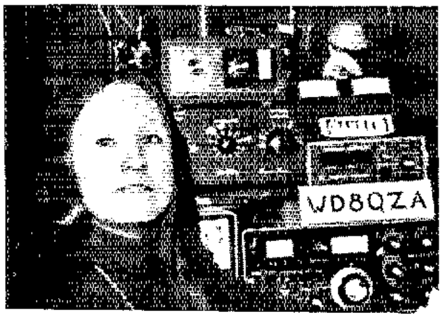
KA3ARI/N* 50,000-605- 80-30
WB3HVS/N* 34,848-381- 88-30
WB3DCT/N 23,363-358- 61-15
WB3GTT/N 21,770-296- 70-22
KA3ALL/N* 21,204-327- 62-30
KA3ASN/N* 19,293-317- 59-27
WB3KRH/N* 15,600-260- 60-29
WB3ISQ/N* 14,526-249- 54-30
KA3BOD/N* 14,070-320- 42-20
WB3FUD/N 13,090-238- 55-30
WB3KMF/N* 12,726-202- 63-22
KA3AKZ/N* 10,560-220- 48-28
WB3KIT/N* 9800-200- 49-30
KA3CAN/N 8900-150- 46-20
KA3AFY/N* 4620-105- 44-24
KA3AJC/N* 3772- 82- 46-19
K3EBZ/T 2214- 82- 27-27
WB3IMO/N* 1674- 44- 31-14
KA3BTG/N 442- 26- 17- 3

Maryland - D.C.

WB3FWD/T 27,824-356- 74-30
KA3BHK/N* 21,827-299- 73-29
WB3EMD/N 19,032-312- 61-29
KA3BXP/N* 18,070-278- 65-29
WB3JRU/N* 13,132-196- 67-
KA3AKC/N* 11,607-209- 53-26
WB3HMX/N* 11,232-208- 54-20

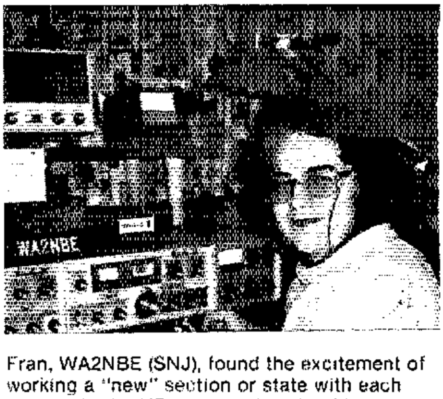
Western Pennsylvania

WB3GWB/N 40,936-476- 86-30
WB3HHI/N* 20,164-264- 71-30
WB3INW/N* 13,720-230- 56-22
KA3APH/T* 12,870-224- 55-30
KA3AVA/N* 2516- 74- 34-24
KA3ATT/N* 198- 12- 9- 3



Despite a little needling from her parakeet, who has learned to whistle "CQ," Retha, WD8QZA, managed to take the number three (overall) slot in West Virginia.

All Novice Roundup ops aren't rotten to the core (oops corps!). Paul, KA4EDF, took a short leave from his job with Uncle Sam's Marines to get in on a little NR activity from North Carolina.



Fran, WA2NBE (SNJ), found the excitement of working a "new" section or state with each contact in the NR very much to her liking.

4

Alabama

KA4BUI/N*	44,405-520- 83-30
WD4SBM/N*	32,810-366- 85-24
WA4ZCS/N	25,704-378- 68-30
KA4CDS/N*	21,896-372- 68-30
KA4DSF/N*	16,992-221- 72-20
WD4JON/N*	14,238-226- 63-12

Georgia

KA4EPX/N*	18,966-327- 58-29
KA4FVU/N*	18,207-279- 63-27
WD4RCP/N*	13,224-228- 58-20

Kentucky

WD4FXX/N*	38,500-490- 77-22
WD4NWW/N*	34,944-448- 78-29
KA4CQR/N*	33,150-410- 78-30
WD4PWV/N*	23,746-368- 62-30
KA4FBZ/N*	22,208-332- 64-30
KA4FLZ/N*	21,700-290- 70-30
KA4AZT/N*	16,434-249- 66-23
WD4IEH/N*	16,250-235- 65-15
WD4IAG/N*	14,198-214- 62-21
KA4DWQ/N*	12,879-233- 53-29
KA4CVK/N*	12,800-200- 64-30
WD4NYC/N*	7194-109- 66- 7
WD4IWU/N*	1160- 48- 20-14

North Carolina

WD4GOO/N*	28,800-400- 72-23
KA4APY/N*	26,307-318- 79-30
WD4MIA/N*	17,766-267- 63-30
KA4BNF/N*	12,900-215- 60-21
KA4EDF/N*	12,449-211- 59-28
WD4SKH/T	9185-167- 55-19
KA4CHG/N*	9180-170- 54-26
WD4NLX/N*	7791-139- 49-30
WD4JIR/N	4361- 89- 49-26

Northern Florida

KA4ESB/N*	17,528-298- 56-28
KA4ANG/N*	16,245-275- 57-30
WD4KHI/N*	14,224-254- 56-30
WD4MDK/N*	1891- 46- 31- 5

South Carolina

KA4ETC/N*	25,920-417- 60-30
KA4AUR/N	19,272-272- 66-22
KA4DRB/N*	12,803-217- 59-29
WD4JOT/N*	9568-208- 46-25
WD4PLF/T*	8410-135- 58-27
WD4BHM/N	4578-109- 42- 8
WD4FJP/T*	608- 38- 16- 8
WD4PRJ/N*	560- 28- 20-10
WA4WYE/T	336- 21- 16- 7

Southern Florida

WD4AHZ/N	36,849-519- 71-26
WD8BQV/4N	12,906-224- 54-27
KA4DHC/N*	12,192-234- 48-17
WD4NRF/N*	9200-230- 40-29
KA4EER/T*	7008-146- 48-30
WD4ONZ/N*	2929-101- 29-22
WD4ERA/T*	494- 26- 19- 8
KA4FGE/T*	315- 21- 15-11

Tennessee

WA4UYJ/N	62,228-647- 94-23
WA4OUT/N	49,932-647- 76-30
WD4SIG/N*	14,280-255- 56-14
KA4CHT/N*	14,101-224- 59-20
WD4PEQ/N*	13,359-219- 61-25
WD4NMD/N*	13,115-190- 61-15
WD9HJD/N*	4746-103- 42-21
WD4NLJ/N*	3330- 80- 37-12
KA1AIX/N*	2747- 67- 41-13
KA4AHU/T*	638- 29- 22- 8

Virginia

WD4JHY/N*	26,216-432- 58-30
KA4BFU/N*	23,954-393- 58-30
WD4LGQ/N*	19,057-323- 59-27
KA4BQK/N*	16,932-239- 68-27
KA4CVL/T*	13,038-236- 53-24
WD4MVP/N*	10,759-203- 53-30
KA4EOW/N*	6240-146- 40-23
WD4ACG/N	5060-110- 46-29
KA4BPU/N*	4690-119- 35-30

5

Arkansas

WD5HZN/T	22,104-307- 72-17
WD5GRV/T*	18,444-318- 58-24
WD5BTM/N	12,432-212- 56-23
WD5CND/T*	6477-102- 51-19
KA5AMR/N*	4248-108- 36-10
KA5ADQ/N*	3060- 65- 36-21
KA5APD/N*	220- 20- 11- 8

Louisiana

WD5EAE/N*	11,170-207- 54-27
KA5BCT/N*	9984-208- 47-16
KA5BPY/N*	8064-168- 48-30
KA5ARC/N*	273- 21- 13- 5

Mississippi

KA5BHD/N*	9856-214- 44-15
WD5CTI/N*	8840-221- 40-13
KA5CPP/N*	8624-144- 56-30
WD5KEM/N*	5670-111- 45-21
WD5BSJ/N*	532- 28- 19-

New Mexico

WD5COV/N*	61,335-705- 87-30
KA5CWE/N*	39,044-419- 86-29
KA5CNE/N*	12,432-222- 56-
WD5FMB/T*	3870- 90- 43-16

Northern Texas

KA5BXU/N*	18,792-324- 58-21
WD5JCF/N*	11,236-212- 53-30
WD5HPK/N*	10,089-171- 59-30

Oklahoma

KA5ALN/N*	25,608-388- 66-26
WD5FTZ/N*	15,732-276- 57-30
KA5DHO/N*	15,372-237- 61-28
WD5IRR/N*	8575-160- 49-27
N5AFV/T*	2475- 75- 33-14
WD5JTB/N*	2170- 52- 35-20
WD5JLU/T*	135- 15- 9- 2

Southern Texas

WB5LVL/N	54,225-723- 75-30
WD5CHB/N	29,370-445- 66-30
WD5FPJ/T*	17,052-294- 58-30
KA5DGR/N*	12,876-222- 58-29
WD5IES/N*	7872-154- 48-29
WD5JWP/N*	6014- 82- 62-30
KA5COJ/T*	4794- 94- 51-19
WD5KDD/N*	2795- 50- 43-30

6

East Bay

KA6BTU/N*	130- 14- 10- 6

Los Angeles

WD6EIM/N*	26,650-410- 65-30
WD6DIR/N	22,043-319- 67-26
N6BCY/T*	21,255-317- 65-30
KA6DOX/N*	16,352-292- 56-15
KA6DQX/T*	6783-133- 51-21
WD6FYP/N*	5712-112- 51-16
KA6CAD/N	510- 30- 17-11

Orange

KA6AEI/N*	11,577-227- 51-23
KA6ANJ/N*	6120-120- 51- 6
WD6HBR/N*	5418-106- 43-21
KA6DUE/N	5209-124- 42-12
WD6EWG/N*	2870- 70- 41- 8

Santa Barbara

KA6DKS/N*	5980-130- 46-29
KA6BSD/N*	5130- 99- 45-14

Santa Clara Valley

KA6DZS/N*	23,324-343- 68-30
WD6CIO/N*	23,270-343- 65-19
KA6DLS/N*	17,546-273- 62-30
WD6ERA/N*	14,112-224- 63-16
WD6GYJ/N*	7191-138- 47-18
WD6DXH/N*	49- 7- 7- 1

San Diego

WA6EEH/T*	5151-101- 51-20

San Francisco

WD6GUS/N*	22,080-320- 69-28
KA6AXV/N*	18,361-286- 61-20

San Joaquin Valley

WD6FGT/N*	25,949-317- 77-30
WD6BJK/T*	11,536-206- 56-30
KA6CZR/N*	4800-100- 48-15
WD6AHV/N*	3026- 74- 34-19

Sacramento Valley

KA6AVS/N*	13,140-209- 60-28
KA6CDO/N*	10,260-171- 60-19

Hawaii

WH6AFE/N*	47,005-595- 79-30

7

Arizona

KA7CME/N*	10,712-206- 52-24
WB7PLX/N	9558-162- 59-
WB7RSE/N*	1176- 34- 24-11

Idaho

WB7VBC/N*	32,100-408- 75-30
WD6DBA/7N*	29,670-410- 69-30
WB7RXY/N	24,832-388- 64-27
KA7CXE/N*	11,544-212- 52-24
KA7AEB/N*	1248- 52- 24-15

Nevada

KA7CPK/N*	8800-176- 50-22

Oregon

WB7WSX/N*	27,334-346- 79-19
WB7SEN/T*	12,960-216- 60-30
KA7CDD/N*	10,317-181- 57-15
WB7VNN/N*	3916- 89- 44-22

Utah

KA7BCD/N*	17,545-309- 55-30
WD8PNY/N*	11,850-222- 50-16
KA7AWO/N*	11,336-208- 52-21
WA7KPL/T	1484- 53- 28-12

Washington

KA7AWH/N*	31,176-398- 72-30
KA7CXK/N*	19,406-313- 62-27
KA7BOD/N*	16,632-252- 66-30
KA7BWF/N*	16,343-267- 59-30
WB7UVR/N*	15,871-269- 59-25
WB7QMR/N*	13,272-237- 56-27
WB7VOW/N*	6223-127- 49- 6

Wyoming

WB7UVB/N*	20,515-373- 55-15

Alaska

KL7ISO/N	47,227-544- 83-30
WL7ACP/N*	22,050-280- 70-30
WL7ACN/N*	392- 28- 14-24

8

Michigan

WD8BHE/N	34,204-483- 68-22
WD8NKC/N*	33,831-522- 63-30
KA8CWR/N*	27,975-353- 75-30
WD8KXV/N*	17,514-278- 63-21
WD8JJM/N*	17,150-245- 70-17
WD8PMA/N	16,335-287- 55-27
WD8JZQ/N	14,340-239- 60-19
WD8RNQ/N*	14,091-216- 61-25
WD8QMS/N*	13,572-224- 58-22
WD8JRU/T*	12,586-203- 62-30
WD8KXT/T	11,988-222- 54-27
KA8CBZ/N*	11,700-300- 39-30
WB8WTZ/N	11,450-229- 50-19
KA8BPY/N*	11,286-209- 54-23
WD8PLZ/N*	10,710-210- 51-23
WD8ODA/N*	8085-147- 55-30
WD8KLP/N*	7729-131- 59-15
KA8DEZ/N	6020-172- 35-27
WD8LCE/N*	5304-104- 51-30
KA8CCW/N*	4085- 95- 43-16
KA8CUT/N	306- 18- 17- 7

Ohio

WB8YNF/N	35,768-526- 68-30
WD8MHD/N*	35,651-443- 77-29
WD8QYH/N*	21,075-266- 75-22
KA8AZN/N*	19,656-273- 72-26
WD8JUO/N	17,157-301- 57-26
WD8RNT/N	14,941-223- 67-23
WD8PUH/N*	14,850-255- 55-29
WD8SAF/N*	14,848-222- 64-26
KA8BQH/N*	14,545-235- 57-30
K8DHK/T	14,440-175- 76-18
KA8CZW/N*	12,939-217- 57-27
KA8AMI/N*	12,644-203- 58-28
WD8NJM/N*	12,508-202- 59-28
KA8CGF/N*	11,956-234- 49-30
WD8RIF/N*	11,800-236- 50-26
WD8CWS/N	10,660-205- 52-21
KA8ANQ/T*	9881-231- 41-28
KA8BQX/N*	8862-207- 42-28
WA8WFX/T	7770-200- 37-30
KA8CZR/N*	5198-113- 46-30
WD8PTU/N*	2992- 88- 34-21
WD8POG/N*	2601- 51- 51-30
KA8CRX/N*	2124- 59- 36-18
KA8BKN/T*	672- 22- 21-10
WD8AQH/T	630- 30- 21-16
WD8OTW/N*	528- 33- 16-15
WD8RWW/N	56- 8- 7- 4
WD8LKW/N*	6- 3- 2-15
WB8YNC/N	4- 2- 2- 3
KA8CLB/N*(+WD8NSD/N)	53,944-613- 88-30

West Virginia

WD8RMY/N*	37,620-495- 76-28
WB8WRY/N	34,224-481- 69-30
WD8QZA/N*	26,100-420- 60-29
KA8AEO/N*	26,025-332- 75-28
WD8KAC/N*	19,435-284- 65-16
KA8BIZ/N*	14,700-210- 70-29
WD8KSL/N*	14,094-223- 58-30
KA8ALP/N*	6273-113- 51-
WB8WEZ/N	2201- 61- 31-15

9

Illinois

WD9DBC/N*	50,641-569- 89-29
KA9BVK/N*	35,235-420- 81-30
WD9IFW/N*	29,625-395- 75-25
WD9IOS/N*	23,976-314- 74-30
WD9EJE/N*	20,945-295- 71-26
KA9ACS/N*	20,169-228- 83-30
WB9RKY/N	19,234-326- 59-29
WB6VVH/9T*	19,180-264- 70-30
WD9JCC/N*	19,020-317- 60-26
KA9AEK/N*	18,476-283- 62-27
KA9CWR/N*	12,760-217- 55-25
WD9HZG/T*	10,920-210- 52-29
WD9JLO/N*	10,224-213- 48-30
KA9ALR/N*	5544-111- 44-13
KA9AWS/N*	4480-102- 40-15
KA9CWD/N*	4160-130- 32-16
KA9BRC/N*	2508- 76- 33-20
WD9IDS/N*	2401- 49- 49-20
WD9GPY/N*	1998- 74- 27- 6
WD9FDW/T*	1400- 40- 28- 9
KA9AZY/N*	1056- 48- 22-23
KA9BDQ/T*	608- 32- 19-16
WD9HNM/N*	120- 9- 5- 3
KA9BNG/N*(+WD9GKG)	12,772-206- 62-25

Indiana

KA9CDE/N*	42,849-519- 81-30
WD9EDP/N*	35,224-461- 74-30
KA9BSD/N*	34,918-427- 79-27
WB9ZPK/N	30,710-415- 74-25
KA9AUF/N	27,122-362- 71-26
WB9YQT/N	16,479-218- 63-23
WD9AKM/N	14,335-225- 61-30
KA9AIO/N*	11,840-170- 64-28
KA9BSF/N	9065-185- 49-
WD9HZV/N*	8400-200- 42-30
WB9WHU/T	6432-124- 48-21
WD9HZN/N*	6235-135- 43-29

Wisconsin

WB7VOT/9N	23,800-340- 70-30
WD9HTG/N*	21,312-333- 64-26
KA9CPJ/N*	19,703-323- 61-28
KA9CFJ/N*	18,526-314- 59-30
WD9CYW/N*	17,388-261- 63-30
WD9DTF/T*	16,860-281- 60-30
KA9CDP/N*	15,972-232- 66-30
WD9DXG/N*	13,481-221- 61-24
WD9EKV/N*	13,296-257- 48-16
KA9CHP/N*	12,980-220- 59-18
KA9CBR/N*	6930-221- 30-18
WB9UAJ/T*	5985-133- 45-15
WB9WBV/N	4800-120- 40-10
N1ABY/9T*	4400-100- 40-19
WD9GTQ/N	3450- 75- 46-16

Ø

Colorado

KAØBJI/N*	62,694-729- 86-27
WBØVNN/N	27,584-431- 64-29
WDØGXR/N*	17,940-299- 60-17
WDØEPV/N*	16,714-259- 61-18
WØDK/N(WBØWQS/N,opr)	14,357-293- 49-18
KAØCHL/N*	12,750-250- 51-15
KAØCVA/N*	11,977-203- 59-19
WDØDYH/N	10,440-174- 60-14
WDØFLX/N*	10,504-202- 52-21
KA2AXF/ØN*	10,200-200- 51-21
KAØCSL/N*	2926- 77- 38- 5
WD5DOB/ØN*	2176- 64- 34-10

Iowa

WDØHMR/N*	43,092-567- 76-30
WBØYWP/N	38,048-464- 82-30
WDØFGY/N*	32,010-470- 66-30
WDØBLU/N*	29,696-464- 64-29
WDØEVR/N*	27,404-403- 68-29
KAØCGM/N*	23,520-316- 70-27
KAØBLT/N*	16,968-293- 56-16
WBØSPX/N	16,775-260- 61-30
KAØBEO/N*	15,544-258- 58-12
WDØHWU/N*	15,435-245- 63-30
KAØCCF/N*	14,042-223- 59-17
KAØBIN/N*	11,284-207- 52-30
WDØBNP/N*	7208-126- 53-23
WDØEWD/N*	6700-100- 67-10
WDØELK/T*	5535-125- 41-28
KAØCIT/N*	1200- 50- 24-19

Kansas

WBØYJT/N	21,889-361- 59-30
KAØBUT/N*	20,522-321- 62-30
KAØCPD/N*	19,592-316- 62-28
WDØFTT/N*	14,340-239- 60-30
WDØHQL/N*	13,747-218- 59-30
KAØANR/N*	12,789-246- 49-30
WDØDMN/N*	2204- 58- 38-10
KAØANT/N	684- 36- 19- 2

Minnesota

KAØABQ/N*	25,600-390- 64-26
WHØBQG/N*(KAØCRF/N,opr)	19,800-264- 75-30
WBØVKE/T	17,334-321- 54-30
KAØASU/N*	17,000-235- 68-30
WDØGGQ/N*	16,422-213- 69-28
WDØGZE/N*	13,398-216- 58-13
KAØCAO/N	12,780-213- 60-30
KAØCRO/N*	357- 21- 17- 6
KAØCYF/N	110- 11- 10- 1

Missouri

WDØFPJ/N*	20,301-303- 67-29
WDØFPK/N*	18,544-304- 61-29
WDØATR/N*	17,995-205- 61-17
KAØAYG/N*	17,792-278- 64-14
WD4FFL/ØN*	11,809-241- 49-25
KAØCEY/N*	8800-200- 44- 9
WDØGFG/N*	1683- 51- 33- 5
KAØAGK/N*	1204- 43- 28- 5
WBØZHB/N	154- 14- 11- 6

Nebraska

WDØBQG/N*	66,468-744- 87-30
WDØEAB/N*	19,894-323- 58-19
WDØAOP/T*	12,916-205- 63-20
WDØFEV/N*	12,760-232- 55-25
KAØBTN/N*	486- 27- 18- 5

North Dakota

WØHSC/N*(KAØCVI/N,opr)	19,880-284- 70-
KAØAEU/N*	19,600-350- 56-30
WDØCHC/T*	19,115-281- 75-30
WDØAJS/T*	15,345-279- 55-24

South Dakota

WDØBWH/N*	31,050-435- 69-30
KAØAXD/N*	14,300-286- 50-30

Non-Novices

K1KI 37,989,K1XA 24,128, K9BG 22,815,WB0PYD 21,063, W3ARK 20,130,WN4KKN 19,272,WB1ANT 18,644, WB8ZFB 17,703,W1RN 17,100, W1FM 15,996,W1WLW 14,579, K8AQM 14,101,N6HE 13,340, KØGUY 13,014,K4IQJ 12,768, WB8LFO 12,031,WA3UNX 10,302,WA4OGV 10,014,W4YOK 9955,KØFPC 9955,K2SX 9616, K9GDF 9310,WA2LJM 9180, WØUBT 8208,N6QH 8003, WA4TNI 7548,K5HM 6968,K1TO 6912,KA1BKM 6800,N1ADX 6625,K1FD 6566,WA2EYA 6517,K7WF 6500,WD8IJZ 6396, WB8MSV 6300,WD8LFK 6251, GM6HZE 5984,WA7NXL 5980, WA4BTK 5520,K2ZR 5355,K1ZZ 5203,AF8O 5198,N2CC 4940, W4GHV/5 4905,WB4YOQ 4662,WD8OUP 4644,W2EZ 4646,K8TU 4371,AG5B 3854, N6HC 3875,KH6CP 3720, VE4AAU 3649,W9WR 3645, AB6R 3608,N6GL 3325,W8XT 3293,WD9ISG 3192,NØZA 3078,W1XX 3060,K9OSC 2821,K8DDG(WA1TWD,opr) 2736,WB1DFV 2409,WA2LLO 2016,WAØDTV 1683,WB2HSG 1674,VE3FEA 1508,AB1P 1220,WA2YSA 1134,WA5IPS 1102,WB8ZME 1034,W9HPG 972, WAØQWY 792, W1SE 765, N9ALG 756, AA9F 714,KH6JJ 494,KB3DS 420,K3OX 190,KA6EFC/N(+WA6VNO,WD6CYW) 22,685, WDØGPF(+AE9OM) 16,800, WA6BXI/T(+K6YK) 8109, WD8QMP(Multiop) 7950,W8TQE (K8s AGM KIC,KA8s ALF ALG ALH ALI,N8ASB,WB8s BTJ DSU ZFB,WD8AUX,oprs) 792,N8ASB (+KA8s ALF ALG ALH ALI,K8s AGM KIC,WB8s BTJ DSU, WD8AUX) 200

Check Logs

K1VUT,KA1AZT/N,KA1ARB/N, W1DA,W1JEC,WB1EAB/T, KA2AOZ/N,W3QEI,WA3EEE, WB3DNL,WA3USW/4,K4EJQ, WB4FOT,WB4WDP/N,WD4JHW/N, KA5CTG/N,KB6IE,KH6IJA, WD6FLV,KA7AHC,W7YS, WA7YUL,K8QJO,K8QJO,N8AFE, W8VUV,WA8BHF/T,WD8LFQ, WD8PPQ/T,WD8RUP/N,K9BK, N9AIB,W9FSD,KAØAWN/N, KAØBAI/N,KAØCDM/N,SM2COR

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Tom Frenaye,* K1KI

JULY

4

Straight-Key Night, June *QST*, page 88.

5

West Coast Qualifying Run, (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0400Z. The run takes place at 9 P.M. PDT on July 4. 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.

12

W1AW Qualifying Run, 10-35 wpm at 0200Z (10 P.M. EDT, July 11). Transmitted simultaneously on 1,835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. May *QST*, page 89, carries the complete W1AW schedule of code practice and bulletins, or send an s.a.s.e. to ARRL for a copy. Other details per the July 5 listings.

14-15

IARU Radiosport Championship, May *QST*, page 84.

Colombian Independence Day Contest, June *QST*, page 88.

21-22

VHF Space Net Contest, from 6 P.M. July 21 until 9 P.M. July 22, local time. Commemorates the 10th anniversary of Apollo II, man's first landing and walk on the moon. Use all vhf and uhf bands. Exchange signal report and zip code (or P. O. location if outside USA). Each QSO counts two points. Stations may be worked again on different bands and modes. Final score equals QSO points times the number of different zip codes plus P. O. locations worked. Six entry categories: I — 100 to 500 watts; II — 25 to 100 watts; III — 5 to 25 watts; IV — 1 to 5 watts; V — XYL only; VI — club participation. Trophy to highest score in each category. Awards. Mail by August 17, 1979 to A. W. Slapkowski, K4AWS, Box 15, Sumterville, FL 33585.

QRP Summer Contest, sponsored by Activity Group CW - DL. 24-hour period beginning 1500Z on July 21. Use 160-10 meters, cw only. Entry classes: A — below 3.5 watts input, single operator; B — below 10 watts input, single operator; C — below 10 watts input, multioperator; D — above 10 watts (contact QRP stations only). Class C stations may operate full 24 hours, others must have a nine-hour break. Exchange signal report, QSO number and input power. Example: 599001/5. Operation on any one band must be in one class. Use VFO or crystal on one band, not both. If crystal controlled, use only three crystals per band. Count one point for QSO with own country; two for own continent; three for other continent. Multipliers are DXCC countries (plus IA PY VE VK W ZS call areas) plus one for each DX QSO. Band results; QSO points times multiplier. Total score: sum of band results. Crystal controlled stations multiply by two. Logs must be received by September 3, 1979. Enclose one IRC for results. Send to Siegfried Hari, DK9FN, Spessartstrasse 80, D-6453 Seligenstadt, Fed. Rep. of Germany.

Seanet World Wide DX Contest, organized by the Singapore Amateur Radio Transmitting Society (SARTS), open to all; cw July 21-22 and phone Aug. 18-19; full 48-hour period UTC for each mode (160-10 meters). Classifications are single-band single operator, multiband single operator, multiband multioperator. Call CQ SEA or CQ Seatest on phone. Exchange RS(T) plus consecutive serial starting with 001. Scoring: for stations outside of the Seanet area score as follows. Contacts with HS YB DU 9V1 9M2 9M6 and 9M8 count 20 points on 160, 10 points on 80/40, 4 points on 20/15/10 — for other contacts in the Seanet area not listed above count half of the above points. Contacts with non-Seanet area stations do not count. Multipliers will be 3 points for each Seanet country. Final score will be the sum of points multiplied by the sum of country multipliers. Seanet prefixes: A4 A51 A6 A7 A9 AP BV BY C21 CR9 DU EP HL/HM HS JA/JE/JF/JG/JH/JI/JJ/JK/JL JD1 JY KA KC6 KG6/KH2 KH6 KX6 P29 S21 S79 VK VQ9 VS5 VS6 VS9K VS9M/8Q6 VU2 VU (Andaman, Nicobar, Laccadives) XU XV5 XW8 YB YI8 ZL 3B6 3B8 3D2 4S7 4W1 5Z4 9K2 9M2 9M6 9M8 9N1 9V1. No crossband, no cross mode, no combined cw/phone logs. Transmission of two or more signals at the same time is not permitted. Only one contact per band with the same station. Contest numbers should begin with 001 on each different band. Log in UTC. Send entries to Eshee Ismial Razak, 9M2FK, P. O. Box 725, Glugor, Penang, Malaysia to reach there before October 31. Results will be announced at the 9th Seanet Convention in Singapore on November 30. Results for one IRC included with your entry.

28-29

Danubian Bent Contest, sponsored by the Radio Amateur Society of the County Pest in Hungary; as an aid to achieving the Danubian Bent Diploma. Cw event the full 24-hour UTC period July 28, phone the similar period July 29. Call CQ DD; all bands. Categories Class A single band, Class B multiband, Class C are group stations (multiband). QSOs in your own country count 1 point, outside your country but within your continent 2 points, other continents 5 points, HA7 QSOs count 10 points. Exchange RS(T) plus consecutive serial number starting with 100. Multipliers are countries on the ARRL DXCC List. Log separately each band and mode. Final score is the sum of points on all bands multiplied by the sum of multipliers on all bands. Awards. Postmark your entry by September 1 and sent to PRA Sz. H-1387, Budapest, Box 36, Budapest, Hungary.

County Hunter's Contest, sponsored by the CW County Hunter's Net. From 0000Z July 28 until 0200Z July 30. Call CQ CH. Exchange QSO number, category (portable-P or mobile-M), signal report, state (or province or country) and county (U.S. only). Work stations once per band per county. County line stations give and receive one QSO number, but each county counts as a multiplier. Count one point for each fixed station worked, three for portable or mobile stations. Multiply QSO points by U.S. counties worked. Mobiles and portables calculate score based on QSOs within a state. Awards. Logs must show category, date/time in GMT, station worked, exchanges, band, QSO points, location and claimed score. Suggested frequencies: 3575 7055 14,070 21,070 28,070 kHz. Entries with more than 100 counties must include a list of counties worked. Enclose large s.a.s.e. for results. Send logs by September 1, 1979 to CW County Hunter's Net, Jeffrey Bechner, W9MSE, 673 Bruce St., Fond du Lac, WI 54935.

New Jersey QSO Party, sponsored by the Englewood ARA. From 2000Z July 28 until 0700Z July 29 and 1300Z July 29 until 0200Z July 30. Phone and cw. No cw QSOs in phone bands. NJ stations may work each other. Suggested frequencies: 1810 3535 3900 7035 7135 7235 14,035 14,280 21,100 21,355 28,100 28,600. Exchange QSO number, signal report and ARRL section or country (NJ stations send county). Final score equals NJ QSOs times NJ counties for out-of-state stations. NJ stations count one point per QSO, except three points for DX QSOs. Multiply points times ARRL sections. Logs must be received by August 25, 1979. Large s.a.s.e. for results. Send to Englewood Amateur Radio Association, Box 528, Englewood, NJ 07631.

Rhode Island QSO Party, sponsored by the East Bay Amateur Wireless Association. From 1700Z July 28 until 0500Z July 29 and 1300Z July 29 until 0100Z July 30. Phone and cw. RI stations may work each other. Exchange signal report and state, province or country (county for RI stations). Suggested frequencies: cw — 1810 3550 3710 7050 7110 14,050 21,050 21,110 28,050 28,110; phone — 3920 7260 14,300 21,360 28,600 50.3 145.1 RI stations score two points per QSO, RI Novice/Techs count five points per QSO. Others count two points per RI QSO (five for N/T in RI). Count ten points for N1RI QSOs. Multiply QSO points by RI counties (max 5). RI stations multiply QSO points times sum of RI counties, states, provinces and DX countries. Certificates and club awards (min. three entries); s.a.s.e. for results. Send by August 31, 1979 to East Bay Amateur Wireless Assn., Box 392, Warren, RI 02885.

31

W1AW Qualifying Run, 10-35 wpm at 2300Z (7 P.M. EDT). See July 12 for more details.

AUGUST

2

West Coast Qualifying Run, 10-35 wpm at 0400Z (9 P.M. PDT, August 1). See July 5 for more details.

4-5

ARRL UHF Contest, this issue, page (82).

Illinois QSO Party, sponsored by Radio Amateur Megacycle Society from 1800Z August 4 until 2300Z August 5 (rest period from 0500Z to 1200Z August 5). Phone and cw. Exchange serial number, signal report and state, province or country (IL stations give county). Suggested frequencies: cw — 60 kHz from low end, 25 kHz from low end of Novice bands; Phone — 3975 7275 14,275 21,375 28,675. Score one point per QSO (two for Novice and Tech QSOs). Illinois stations multiply QSO points times states (50), provinces (10) and a maximum of one DX multiplier. IL mobiles or portables add 200 points for each county where more than ten QSOs were made. Others multiply QSO points by Illinois counties. Count one extra multiplier for every eight QSOs in one county. Club participation, awards, s.a.s.e. for results. Send logs by September 15, 1979 to RAMS-K9CIU, 3620 N. Oleander Ave., Chicago, IL 60634.

YO-DX Contest, sponsored by the Romanian Amateur Radio Federation, 24 hours starting 1800Z August 4; 80-10 (no crossband); cw, phone (no crossmode). Entries single op single band, single op multiband, multiop single band, multiop multiband. The object is to contact as many YO stations in as many YO "counties" as possible. EU stations may also be worked by W/VE contingent. One may contact the same stations on other bands/modes but only after at least a one-hour lapse. Exchange RS(T) and QSO no. starting with 001, regardless of band or mode. Non-EU stations earn 2 points for each EU QSO, 10 points for each YO station. Each YO county and each country is a multiplier. Abbreviations of counties in each YO call area as follows: YO2 AR CS HD TM, YO3 BU YO4 BR CT GL TL VN, YO5 AB BH BN CJ MM SJ SM, YO6 BV CV HR SB MS, YO7 AG DJ GJ MH OT VL, YO8 BC BT IS NT SV VS, YO9 BZ DB IF IL TR PH. Score equals QSO points times multiplier. Logs must include band/mode, time(Z), stations, serials, multiplier column (filled in if new multiplier), QSO points. Include a summary with computations, name, address, equipment description plus usual declaration. Awards. Logs must be postmarked no later than September 1 and addressed to Romanian Amateur Radio Federation, Box 1395, R-76100 Bucharest 5, Romania. Decisions of the contest commission are final.

*Assistant Communications Manager, ARRL

10

W1AW Qualifying Run, 10-35 wpm at 0200Z (10 P.M. EDT, August 9). See July 12 for more details.

11-12

European DX Contest, (WAEDC), sponsored by the Deutscher Amateur Radio Club, full 48-hour UTC period, 80-10 meters. No 1979 rules received; assumed to be the same as 1978. (Note: Phone Sept. 8-9 RTTY Nov. 10-11.) Single op all band; multiop single transmitter. Only 36 hours of operation out of the 48 are permitted for single ops. The 12 hours of nonoperation may be taken in one, but not more than three periods any time during the contest. Non-EUs work EU stations only. Exchange RS(T) plus serial number starting with 001. Each QSO worth 1 point. Stations may be worked only once per band. Each confirmed QTC (given or received) counts 1 point. The mult. for non-EUs is determined by the no. of EU countries worked on each band. The multiplier on 80 may be multiplied by 4, the mult. on 40 by 3, the mult. on 20-15-10 by 2. Score is the total QSO points plus QTC points multiplied by the sum total of multipliers from all bands. A QTC is a report of a confirmed QSO that has taken place earlier in the contest and later sent back to an EU station. It can only be sent by a non-EU to an EU. A QTC contains the time, call and QSO no. of the station being reported. A QSO can be reported only once and not back to the originating station. A maximum of 10 QTCs to the same station on all bands is permitted. You may work the same station several times to complete this quota. Only the original contact, however, has QSO point value. Keep a uniform list of QTCs sent. QTC 3/7 indicates that this is the 3rd series of QTCs sent and that 7 QSOs are reported. Certificates. Usual disqualification criteria. Contest Committee decisions final. Log 40 QTCs or QSOs per sheet (sheets are available from the DARC). Separate logs per band. Deadline for cw logs September 15; for phone entries October 15, RTTY December 1. WAEDC committee address is Box 262, D-895 Kaufbeuren, Fed. Rep. of Germany.

18-19

Seanet, phone
SARTG RTTY

23

W1AW Qualifying Run

25-26

All Asia, cw
Ohio Interstate QSO Party

SEPTEMBER

1-2: Skokie Aviation Enthusiasts Contest
A.R.I. 10-Meter Portable Contest
RTTY Art Contest
I.Z DX Contest
8-9: WAE, phone
AC-DC Contest
ARRL VHF QSO Party
North American Sprint
15-16: CAN-AM Contest, cw
Washington QSO Party
SAC, cw
Kentucky QSO Party
16: ARRL Frequency Measuring Test
22-23: KZ5 QSO Party
SAC, phone
29-30: CAN-AM, phone
Delta QSO Party
KZ5 QSO Party

October

6-7: ARRL Simulated Emergency Test

Note: July 18 is the deadline for the receipt of announcements to go into September *QST*.

Strays

HAMS WORK NET AT RAFT RACE

The *Guinness Book of World Records* labels Atlanta's Ramblin' Raft Race as the "world's largest participation event." The aquatic spectacular, held annually in May on the Chattahoochee River, attracts half a million participants and spectators each year. The 1979 edition drew the largest crowd ever. The 11th annual event also attracted some well-organized support from Atlanta's ham community.

Organized by the Metro Atlanta Technical Society (MATS) 2-meter repeater group, 34 amateurs formed a safety radio network covering the 9.2-mile course. Hams were stationed at critical points selected by the producer of the waterborne mob scene to report injuries, accidents and potential hazards to the huge crowds on the river, bridges and along the shores of the Chattahoochee. Messages included reports of several injuries (one serious), requests for assistance by stranded rafters, warnings of dangerous flotsam moving downstream, two brush fires and several incidents of missing persons. The net also relayed messages to control the river's water level and reported on shifting crowd patterns afloat and ashore. Traffic requiring action by public safety agencies was directed to amateur stations located with the agencies' own communicators. The interface worked well, with no delay in traffic handling reported after the nine-hour operation ended.

To assure reliable communications, each ham station simultaneously worked the MATS repeater and a simplex frequency. Messages to and from low-powered units unable to hear or hit the repeater were relayed by a simplex monitoring station at a high location midway through the course. All traffic was heard by each participating station.

Extending his congratulations to the Atlanta hams via recording, U.S. Senator Sam Nunn, D-GA, cited the safety net as an "excellent example of how hams can provide a vitally needed public service." Angelo R. Ditty, Jr., the FCC engineer-in-charge in Atlanta, said, "This is the sort of project that will make new friends for ham radio and strengthen its efforts to use the spectrum for public services."

Copies of the MATS operation booklet for the raft race are available to amateur groups planning similar event nets. Send $1 to cover copying and postage costs to MATS, P. O. Box 76601, Atlanta, GA 30328. — *Robert C. Diefenbach, WD4NEK*

Fourteen stations operated along the Chattahoochee River during the race, relaying emergency and crowd control traffic. This station worked with the local civil defense unit. *(WD4DAA photo)*

The primary control station for the 34 hams who took part in the safety network at Atlanta's Ramblin' Raft Race, the world's largest participation event. *(WA4PBW photo)*

Barry Woodward, WA4ZOT, checks a map while transmitting route information to the Amateur Radio control station at the raft race. *(WA4PBW photo)*

Station Activities

SCM ✕ ARES ✕ OVS ✕ SEC ✕ OBS ✕ TCC ✕ OO ✕ NTS ✕ WAC ✕ CP ✕
A-1 OPR ✕ EC ✕ DXCC ✕ RCC ✕ WAS ✕ STM ✕ OES ✕ OTS ✕ NM

CANADIAN DIVISION

ALBERTA: SCM Sydney T. Jones, VE6MJ — SEC: VE6XC. NMS: (APSN) VE6AFO, (ACWN) VE6BBL. Another of our old timers has passed away, VE6GK. He was well known not only in Alberta but around the world, having made several trips to the Pacific Islands and Australia and New Zealand. Affectionately known to his many friends as the "Golden Kiwi" his friendly chatter on twenty meters will be sadly missed. My sincere appreciation to the Calgary Club for their warm welcome at April 23 meeting. The Northern Alberta UHF Society is now active and anyone interested in joining this group should contact VE6AK, II449 - 65 St. Edmonton. VE6ON and VE6RP have returned from a trip to KH6 land. The Northern Alberta Radio Club was pleased to welcome the Canadian Vice Director, VE3AR, William Loucks at the April meeting. He brought us up to date on the WARC proposals and other items of interest. Traffic: (Apr.) VE6AMM 51, VE6ON 50, VE6ABC 14, VE6EO 6, VE6CF 6, VE5QV/6 4, VE6MJ 4, VE6YW 5, VE6CJT 3, VE6XD 2, VE6WV 2, VE6CB 2, VE6CFQ 2. (Mar.) VE6CEY 105.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — The phone and cw nets seemed very busy for the month, but no reports of their activity. Bill Loucks, Vice Director CRRL paid us a visit. 75 of us enjoyed the evening. VE7AZ was awarded a plaque from VE8RCS for 25 years phone patching them. VE7HQ reports Coast Loran "A" will QRT in December, and we will be moving from Spring Island. He is Co-ordinator Canada for Intruder Watch. Senior Citizen A.R.C. GAM. VE7ZA, pres.; VE7SS, recording secy.; VE7AMW, corresp-secy. QCWA GAM vernon June 30 all welcome, VE7DKY or VE7FB for info. Traffic: VE7ZK 114, VE7FB 101, VE7HQ 42, VE7COA 34, VE7CDF 20, VE7BLO 12.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst/SCM: VE4JP. STM: VE4RO. SEC: VE4TR. NMs VE4TE VE4NM VE4IZ VE4DJ. MEPN QNI 1319, QTC 100. 30 Sessions MMN QNI 556, QTC 88, 30 Sessions MTN QNI 228, QTC 101, 30 Sessions Many operators now active during the flood. Weather still cold and wet. This will be a unforgettable year for Amateur Radio participation. The emergency measures organization, the provincial, federal and local governments are deeply grateful. We are in the middle of one of the worse floods in Manitoba history. My home had to be evacuated in a hurry and fortunately most of the gear was in the mobile, and other more important items were stored elsewhere. When this is all over you will receive an up to date report on ARES activity during the flood. For the present, all I can say is that Amateur Radio has been placed in almost complete charge of communications for the Emergency Measures Organization. For the first time as far as we know, we have received the blessing on the federal level, and have aircraft such as helicopters at our disposal to drop and pick up operators in isolated areas. In other words, Amateur Radio is now top dog in both Provencial and Federal levels. How we managed to do this in another story and will be told after its all over. Realizing full well that this happens on a regular basis in the USA where disasters strike, but in Canada, it is rare indeed when Amateur Radio is rated as priority one. Please keep in mind that many operators will not be listing their traffic count during this flood until end of May. Traffic: VE4RO 174, VE4PG 138, VE4JA 108, VE4LS 104, VE4IN 95, VE4IZ 57, VE4ZU 38, VE4TE 29, VE4QJ 28, VE4LU 24, VE4HR 23, VE4ADS 22, VE4AEJ 14, VE4LB 10, VE4NE 9, VE4CR 7, VE4AAD 6, VE4GB 6, VE4LA 5, VE4AAV 4, VE4CF 4, VE4DE 4, VE4EG 4, VE4FK 4, VE4EF 3, VE4MG 3.

MARITIME-NFLD: SCM, Aaron D. Solomon, VE1OC — ASCM: VO1FG. STM: VE1WF SEC: VE1ASW NMs: VO1JN VE1WF. Silent Key: VE1GX. Sydney ARC will host 1981 Maritime A.R. Convention. Aurora made LF cond'x poor-FB for VHF operators. LOLA Winners: OMs VE1ZA VE1ACB. YLs VE1YV VE1AMB. VE1 Cont. Winers: PH. VE1s ACB,BMW,SJ.cw-VE1s AWN,AXG,MF. Wh. Cane Contest: VE1s YE, AMB. Congrat's to all winners. Bull. Editors VE1s FQ RI RY UT WB rec'd Cert of Merit for keeping their members informed of A.R. activity. VE1AKL writes abt. RTTY Comp. op. in CB Amateur. VE1CL gives Hist. NB Rep'trs. in IRG Bulletin. VE1ACA tells microproc & AM.Rad. in Moncton Bull. At Campbell-down Rad.(VCS) VE1s AIG ASR BFV & ex. VE1YW. IRG Ex. VE1AL, pres; K1TXJ VE1s BGO OR, vice pres.; VE1DQ, treas.; VE1LW, secy. K2SQM & XYL back Peggy's Cove for Summer. St.John's DOC RI guest SONRA Meeting. VO1DI made hon. mem.SONRA & plaqaue for VHF work. VO1QB to set up SONRA radio museum. VO1GW lost Ant. APN Sess. 31 QNI 242 QTC 196/183. NPN Sess. QNI 107 (No rpt. rec'd) Traffic: VE1WF 269 VE1RI 165 VE1BSE 86 VE1RO/LCH 86 VE1OC 39 VO1PR 16 VE1BXF 10 VE1KR 8 VE1BXA 5.

ONTARIO: SCM, Larry Thivierge, VE3GT — SEC: VE3APK, STM: VE3GOL. To update the Atmospheric Environment Service's weather watch program outlined in last month's column, all details and information for amateurs who wish to participate can be obtained by writing to the following address: Environment Canada, Ont. Weather Office, PO Box 159, Toronto AMF, Ont., L5P 1B1, Attn: Mr. M.J. Newark. I am sorry to report the following Silent Keys: VE3s GFP GKG IW DH and WW VE3DH had been active OTS appointee dating back to 1925. Suggestions have been received from amateurs in Kenora area that due to the time zone change there (CST) and their difficulty in accessing Southern Ontario's traffic nets, consideration be given to their becoming a part of the Manitoba Section. Amateurs in North West Ontario are invited to submit their comments. Oxford Co. ARC, under VE3FVZ has become a League affiliated club. New ECs are: VE3AC, Sudbury and VE3DUK, Timmins. WB3KCV attempting to form a youth amateur committee. If you have any ideas, please contact him. Kitchener Waterloo ARC pleased with the attendance at club meetings. New OTC members are: VE3s COF ADH and BEG. The autopatch on repeater VE3YAK is now fully functional and ready for use by members. VE3RL's 20,000th contact was VE3HJ and he received a Call Book to mark the occasion. Quinte ARC has a membership of 104. VE3TWR is a new repeater located on the CN Tower, Toronto, operating on 449.4 MHz in and out on 444.4 MHz. Another new repeater is VE3IXK, operating on 146.82/146.22 MHz, located in Georgetown and sponsored by the Halton ARC. Westside club members who managed to snag VR6HI included VE3s BHZ and BQL. Windsor's Sun Parlor ARC meets every Su on 3800 kHz from 1300 to 1400 local time. At the Welland Co. ARC's annual dinner dance, VE3HLE received the club's Amateur of the Year award and VE3KYX received the Fern Barrick trophy for the best cw log of the year. XJ3TBC, Bancroft, Ont., offers award for working the station on three different bands, Aug. 11-18, 1979. Prizes given for working station closest to a preselected time. Traffic: VE3GOL 461, VE3KK 367, VE3JRT 288, VE3HGJ 260, VE3CYR 238, VE3ISW 204, VE3FZG 189,VE3GFN 179, VE3GT 154,VE3DPO 146, VE3JPP 122, VE3SB 108, VE3GYD 93, VE3GNW 77, VE3JJK 70, VE3JIR 50, VE3IMR 47, VE3GJG 45, VE3HCS 44, VE3FHZ 43, VE3DUK 40, VE3APK 37, VE3IFP 36, VE3BVG 34, VE3JRO 26, VE3EHL 20, VE3GCE 19, VE3ANJ 18, VE3JHE 13, VE3WM 12, VE3HSF 10. (Mar.) VE3BZR 60, VE3AC 4, VE3HOI 4.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA New ECs: VE2APC for Gagnon area, VE2DLE for Bas St-Laurent area, RAQI will hold its annual convention from 17 to 19 Aug. at "Chateau Montebello," Montebello P.Q. Contact VE2FKC at (819) 770-1315 for info. Operators (cw) are needed for the OSN. Please contact your SCM. VE2DKH est toujours attentif au traffic pour LaTuque sur VE2RAP. VE2VI est le president du club VE2CIP. Traffic: (Apr.) WB1EZI/VE2 40, VE2EC 23, VE2APT 11. (Mar.) VE2UN 106, VE2EC 42, VE2APT 15.

SASKATCHEWAN: SCM, N. Waltho, VE5AE — NM: VE5DC VE5HG. Sask should be looking at another 4 repeaters in the future to fill in the gaps we have now. The RARA 2-MTR net at 0330Z is going full swing for the summer. Ham's around the province were doing some flood monitoring this spring. Sask Hamfest is just around the corner. See you there. Next year it will be in North Battleford. By the time you read this, there should be an improvement in the WX. Snow on 6 May is not exectly spring type WX. Nets: SATN, 31 sessions, 426 QNI 35 QTC. Sask fone net, SPN 30 sessions, 862 QNI, 91 QTC. Traffic: VE5AE 52, VE5HG 39, VE5WM 17, VE5NJ 11, VE5OL 11, VE5DC 8.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ. STM: W3WD W3QQ. PSHR: K3JL 46, N3AKC 44. New Appt. N3AKC as OTS. W3WD received his WAC certificate and WB3DUG made No. 563 5-Band WAS. Congratulations! WB3GXD and AC3U were active in a MD RACES and ARES Drill while WB3FOE represented Delaware in a NJ Simulated Emergency. DVARS is meeting Tue at 8 PM on 146.355-955 for a Swap Fest. This Club has a new repeater on 223.36-4.96 and has moved the old machine near Middletown on 223.60-4.20. DEPN: QNI 53, tfc 2. DTN: QNI 319, tfc 81. Traffic: (Apr.) W3QQ 151, N3AKC 133, WA3GAY 60, WB3DUG 40, W3DKXX 30, K3JL 21, W3WD 20, WA3WIY 17, AC3T 10, W3FEG 4, WB3GOI 4, W3HGA 4. (Mar.) W3HGA 8.

EASTERN PENNSYLVANIA: SCM, G. S. Van Dyke, Jr., W3HK — SEC: WA3PZO. STM: K3NGN. NMs: K3KW W3VW WB3BKV K3AIZ. Net reptr: PFN, QNI 387, QTC 1275; PTTN, QNI 386, QTC 210; LVN, QNI 17, QYC 12; EPA, QNI 728, QTC 547. EPAEP&TN, QNI 396, QTC 173; AREC (2), QNI 12. Repts W3CL W3KEK; OBS: WA3JYZ WA3JZA W3CL W3ID; OVS: W3CL WA3BJO WB3CTU WB3GOA N3CP. PSHR: WA3WQP WB3JZA N3AIU W3DP W3GOA WB3JUK WB3CAI AA3C. BPL: W3CUL WA3WQP W3VR WB3JZA N3AIU WA3ATQ. Fellas note your calendar of dead line to report. I can't retype report for each late comer! W3CUL & W3VR reports events this month equaled Christmas rush! WB3BKV now AG3R. When your appointment nears expiration I will send you a renewal. If you need a new certificate let me know then. W3VA rediscovered there is a two meter band! W3ID trying hard to keep AREC alive in Montgomery Co. Many hams and clubs reported being alerted on the TMI incident, nice going. OBSs haven't reported much. I'm still wondering if we are that good. Many report making WAS and DXCC Must be lots of night work going on. W3WRE got antenna fixed-now rig won't work, maybe it's the key! W3GMK has everything fixed. Is afraid to turn rig on. K1PZU ex WA1AJK settling in Wilkes-Barre. W3EU reports blood shot eyes from hamfest OSOs. W3KEK doing fine using iron fence for 160! There will be no spring in the Poconos says WA3ATQ. New Officers Dauberville DX ASSN WB3FYL, pres; WB3FPA, vice pres ; WA3VUE, secy.; WB3HYX, treas. Get those antennas up! Traffic: (Apr.) W3CUL 4754, WA3WQP 1102, W3VR 1026, WB3JZA 546, K3KW 459, N3AIU 317, WA3ATQ 305, W3IPX 207, AD3X 203, AG3R 190, W3DP 182, W3FAF 178, WB3JGP 132, AA3B 110, K3NGN 86, WB3JYZ 82, W3VA 81, N3CD 53, KA3BOD 48, WB3CAI 46, W3ID 34, AA3C 31, WA3AIB 28, WA3YDC 26,WA3YOE 24, W3ADE 20, WB3JUK 18, W3CL 15, K3EBZ 10, WA3VIL 10, WA3CKA 4, W3HK 4, K3AI 1, WA3BJQ 1, W3EU 1, W3GMK 1, W3KEK 1, W1PZU 1, WA3VUE 1, W3WRE 1. (Mar.) WB3GZV 33, N3CP 15, WB3UJK 8, W3WRE 1 W3GMK 1.

MARYLAND — District of Columbia: SCM, Karl R. Medrow, W3FA — KA3AZS became a Silent Key on 22 April as a result of injuries received in an automobile accident. She was the SYL of K3ON, and an active member of the Anne Arundel Radio Club. She will be missed. W3XE forwards plans for the MDC QSO party 15-16 September. Be Ready. N3IT is on the summer hamfest tour! WB3EPN corrects my goof — He works at Galluadet, but goes to the Antioch School of Law evenings. W3ZNW was on the receiving end for a change. WB3FAF likes the 10-X contests. W3WBY reports some 2 meter openings. K3RXK and WB3AIO made it to Dayton. KB3AP is listed in Who's Who in the East. W3CDQ found propagation and contest time a mismatch. W3EON's new plaything is a memory keyer. WB3JRW has a busy month. W3MR has an endless supply of pink envelopes. WA3HEM is temporarily QRT for Rcvr repairs. W3HJH is moving to Florida. He reluctantly gives up the SEC job. Thanks for getting the ARES back in shape. K3ORW and WB3FAF were real competition in the CD party. AA3S and WA3FUJ also made it to Dayton. WB3CEs is attending music concerts. N3SJ is piling up points on 3rnd. W3FZV covered the cw CD Party. WB3GZU made BPL the hard way again. Congrats. WB3KDQ is becoming a MDD regular. WB3KYL finds traffic handling interesting. N3APS says his call has him at the top of the list and his name at the bottom. N3AQV will be on weekends for a while. N3QA finds time to help MDD. W@VJD/3 handles the hard to deliver ones on the late MDD sessions. K3IU found his old reports on the bottom of the pile. N2GAJ/3 has been doing well in Easton. With the Nets, Net-Manager Sessions/Traffic/-QNI Avg. MEPN/AA3S 30/166/27.3, 100%W3ADQ WB3BFK and WA3HW. Others N3AGM N3APS and K3OMN. WR PON/W3DFW 17/30/22.8. MCD Pon/W3OYY 4/19/25.5. Hagerstown/WB3GEJ 4/17/19 all on 34/94, and it gets Cumberland with new coverage! Traffic: (Apr.) WB3GZU 751, K3ORW 180, W0VJD/3 169, W3FA 141, WB3JRW 87, K3IU 63, N3QA 50, N3SJ 49, AA3S 48, N3AQV 40, KB3AP 32, W3FZV 26, WB3KYL 20, N2GAJ/3 19, WB3FAF 14, N3IT 13, N3APS 10, WA3FUJ 10, WB3KDQ 9, WB3CES 8, W3WBY 8, W3ZNW 6, K3RXK 4, W3ECN 4. (Mar.) K3IU 73, WB3FAF 16, WA3FUJ 4, (Feb.) K3IU 82.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, WB2LCC — SEC: W2HOB.

Net	Mgr	Time(PM)	Freq	Sess.	QNI	QTC
NJN/E	AF2L	7	3695	30	591	375/318
NJN/L	AF2L	10	3695	30	385	2
NJPN	K2VX	6	3950	35	601	417/357
JSARS	WA2HEB	8:30	.91	30	374	61/56
MCN	AA2H	10:30	.075	30	261	112/100
SJVN	WB2LCC	10:30	.27	30	144	83-72
SPARTN	KB2EV	10:30	.94	30	237	83/79

April 28 marked a significant point in the continuing saga of public service communications in SNJ. WA2KNZ, our newly appointed RTTY coordinating station, and WB2PUW chaired a very interesting meeting at Stockton State College in Pomona. Discussed were plans to implement a statewide RTTY repeater for the handling of traffic and other emergency communications. This idea has great potential due to the wide coveage of the proposed repeater and the practicability of handling large volumes of traffic via this mode. We wish them the best of luck in this enormous undertaking. Traffic: AA2H 358, KB2EV 158, WB2LCC 125, W2SWE 78, N2AFN 67, N2AJG 58, W2IU 55, W2HOB 54, WA4RDI 53, WA2GXU 46, WA3YGZ 46, N2ALS 45, WA2HEB 35, K2UL 23, WB2AIQ 22, N2ABT 21, WA2GTJ 20, W4NLC 20, WA2CUW 16, WB2SQD 10, WD2AHO 9, WB2PUW 8.

WESTERN NEW YORK: SCM, Lonnie J. Keller, WA2AOG — STM: W2MTA, SEC: WB2FTX. Congratulations to W2ZOJ on his third consecutive BPL. Other BPL to W2MTA and WA2ELD. PSHR to W2MTA W2ZOJ WB2PJU and N2APB. Note the new PSHR format with your reports! Welcome to new section Affiliated Clubs Gleason Employee's ARC, Keuka Lake ARA, Oswegatchie Valley ARC and the Univ. of Rochester ARC, and to new OTS appointees WB2OMZ WB2VSJ; OES: WV2HJK and WB2JAB. OO I WV2HJK. WA2MFV reports that OCTEN on 146.79 (Oneida County) at 6:30 local time is growing by leaps and bounds, and even reports the average per session traffic count higher than the per session QNI total — keep up the good work! The Auburn 87/27 machine now has autopatch available. Congratulations to the Lockport ARA during their 50th Anniversary! KA2EGC N2APA upgraded to General and Advanced. Congrats to WA2VTI and WB2LKO who now have new harmonics gracing their shacks. WB2ANI now AK2F. New Novices KA2EVJ and KA2ENM. RaRa handled communications for the SCCA Pro rally in Wellsboro, PA. W2ZOJ sporting a new TenTec Omni-D to help with his increased traffic load. Please be patient if it takes a little time to answer your notes and questions. About the time you are reading this, I will just be settling into the new QTH. Trying to find which box something is in, can be frustrating sometimes! Traffic: W2ZOJ 631, W2MTA 615, WA2MFV 593, WA2ELD 532, W2RUF 186, WB2OMZ 170, WB2PJU 168, N2APB 153, W2FR 138, WA2JCU 132, WB2OTC 106, W2PZL 80, K2GWN 63, WA2AOG 45, WA2AIV 39, KA2BGX 22, AF2K 22, WB2ANI 15, K2VR 11, KA2CFK 4, WB2NAO 4.

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	Freq.	Time Day
WPACWN	30	434	162	3585	7:00 P Dy
WPAPTN	30	477	206	3983	6:30 P Dy
WPA2MTN	30	443	162	146.28/88	8:00 P Dy
PATTN				3610	6:30 P Dy
WPARACES				3990.5	9:00 A Su

Congratulations to the Indiana County ARC on receiving one of the 14 awards in the country given by the National ARRL Affiliated Club Awards Committee. They received one of the two awards received in the Atlantic Division. New EC for Blair County is WB3EFO a YL. My XYL and I traveled to Dayton with the Butler ARC and everbody had a fine time. I forgot to thank the Foothills ARC for a fine evening at their Xmas Dinner. I enjoyed it immensely. We also had a fine evening with the members of the Butler ARC at their April 1st. meeting. New officers for the Crawford ARS are K3YAK, pres.; WA3PRJ, vice pres.; WA3ZBY, secy/treas.; K3TLP K3GGS, directors. New Novice: KA3GVE. New Generals: N3ASB WB3KVO. New Extra KB3BE. ARL 40 for N3AEP & XYL, and WA3LUM and WYK, congratulations. ARL 48 to WA3AOG & XYL. I would appreciate schedules of local nets in operation in the section. Traffic: (Apr.) W3GJ 459, WA3PXA 311, N3EE 211, W3YQ 93, AC3N 83, N3FM 78, WB3PAV/3 65, W3SMV 64, W3MML 57, K3HCT 55, K3SMB 54, W3KUN 47, WB3JDI 45, W3UHL 44, WA3UNX 37, W3SN 33, WB3GWJ 19, W3RUL 19, K3MS 18, N3KB 17, WA3ATQ 14, W3EXC 14, WB3BOB 12, WA3VRE 12, N4DR 9, W3AS 8, W3IJT 6, K3UA 4, K3VQV 4, AF3B 3, N3ASB 2, W3LOD 1. (Mar.) WB3GZR 5. (Dec.) WA3UNX 70.

CENTRAL DIVISION

ILLINOIS: SCM, Edmond A. Metzger, W9PTN — Asst. SCM: W9RYU. SEC: W9AES. NMs: WA9KFK and W9JSR. Cook County EC: W9HPG.

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 BENEFICIAL

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.

BIG VALUE "PACKAGE"

ANTENNA, TOWER, ROTOR, ACCESSORIES

① TRI-EX W-51, 51' SELF SUPPORTING TOWER W/5 ft. MAST.

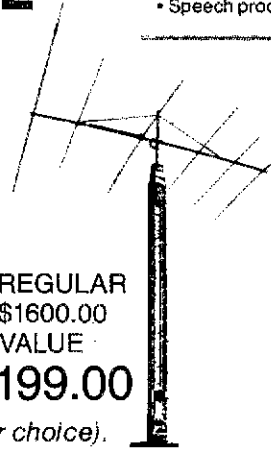
② TH6DXX, HY-GAIN'S BEST TRI-BANDER.

③ HY-GAIN BN-86 BALUN.

④ CDE HAM IV ROTOR.

⑤ 100' RG-8 SUPERFLEX COAX.

⑥ 100' ROTOR CABLE.



REGULAR $1600.00 VALUE

$1199.00

PLUS FREE FREIGHT, CONTINENTAL U.S.A. (our choice).

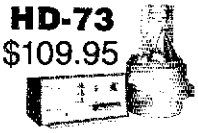
TR-7625

CALL FOR PRICES

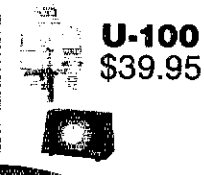
TS-120S

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

Net	Freq.	Times/Day	Tfc.	Sess.
ILN	3890	0030/0400 Dy	294	60
ILL Phone	3915	2245 Dy		
NCPN	3915	1300/1800 Dy	195	30
IEN	3940	1400 Su		
W9VEY	--	--	39	5
Nem. Stn				

W9HOT reports that the 9RN passed 316 messages in 730 minutes and 59 sessions. Illinois was represented 100% with W9JIJ W9NXG W9YCE W9HOT W9KRH and WB9OKF participating. K9YMZ is recovering after a serious hospitalization. WD9DSG is erecting a new Wilson Antenna system. W9CEU W9FKZ and WA9KFU became Silent Keys during April. Our deepest sympathy to their families and friends. From reports coming to this column, Field Day this year will in all probability have the largest number of participants in ARRL history. The many new clubs will try with their first attempt in scoring. N9ARF is a new call in Saline County. The IL Section ARRL convention and Hamfest will be held in Rockford, IL. Su Sept 9th. The Chicago FM Club will hold their EXPO '79 on Sat and Sun Sept. 15 and 16. The Peoria Amateur Radio Club's Hamfest will be on Sun Sept 16th. The 17th annual IL QSO party will be held on Aug 4 and 5th. Consult a future issue of QST for the complete details or write RAMS, K9CJU, 3620 N. Oleander Ave. Chicago, IL 60634. WA9AQN is a new OTS appointee. The Champaign-Urbana Repeater Group, St. Joseph, Illinois; The Illiana Repeater System, Inc., Catlin, Ill.; and the Lanphier High School ARC, Springfield, Ill. were elected affiliated by the League's committee. WICUT, the managing editor of QST will present a program on the making up of an issue of QST at the Western Illinois ARC of Quincy on Mon June 4th. WD9FGK, now General. The CAN reports a traffic of 827 messages during 60 sessions and Illinois was represented 100% with K9UZG W9YCE W9HOT and W9NXG checking in. W9JIJ is the only BPL recipient for the month. Traffic: W9JIJ 516, W9HOT 363, W9NXG 322, WB9JSR 186, K9BVE 185, WD9DMV 165, WA9KFK 161, K9DAC 151, N9TN 141, W9OK 122, K9PNG 110, WD9DSG 106, WB9PUK 89, W9YCE 70, W9KR 62, K9SW 59, W9LNQ 48, N9MX 48, W9OYL 45, KA9ALR 42, WA9JJE 35, WD9BEX 32, W9PRN 30, W9OBS 28, KBEEA 27, WA9AQN 25, WB9ZED 16, W9HBI 10, WA9VLK 10, W9MCH 8, W9SGK 8, WB9YJF 8, K9BK 4, WD9EBQ 2.

INDIANA: SCM, J. M. Kell, W9LTU — SEC: W9UMH. STM: W9JUJ. MNs: K9GGS(ITN), WB9UYU(QIN) WB9YXN(ICN), W9PMT(VHF PAM). April net reports, time in UTC and freq in kHz.

Net	Freq.	Time	QNI	QTC	Sess.
ITN	3910	1330/2130/2300 Dy	3074	423	90
QIN	3656	1430/0000/0300 Dy	925	386	90
ICN	3708	2315 Dy	129	37	27

IPON report for April QNI 116, QTC 0. VHF Nets from W9PMT QNI 214, QTC 0. W9JUJ appointed as new Section Traffic Manager. WB9UYU appointed new manager for QIN replacing W9JUJ. Sunday, July the 8th, is the Indy hamfest. Our SEC will have a forum there and has requested the presence of all EC's. WA8IDN spoke in Indy in April. It was a very interesting talk on WARC and amateur radio in Africa. There will be another league official in to talk on the subject of WARC at the Indy hamfest on July 8. Please send a report of your Field Day activity; number ops, rigs, contacts, etc. to me. I would like to refer the traffic handlers to page 73 of May QST. Circle as many items as you've heard on Indiana Traffic Nets. How many of those items apply to you personally? For those wanting to know about the new PSHR I will refer you to April QST page 76. ICN report for March QNI 217, QTC 47, Sess 30. Hope to see you all at INDY. Traffic: (Apr.) W9JUJ 655, W9FC 238, W9QLW 195, W9XD 164, W9TG 147, WB9UYU 144, W9DKP 122, WD9CIS 72, WB9VJE 60, WA9OCF 54, W9DLF 49, N9PS 45, N9AEI 43, WA9OKK 42, W9EI 29, W9IOH 26, WB9PIR 20, W9BUQ 18, W9UEM 17, K9CGS 16, K9TKE 16, W9CMT 15, WA9OHX 15, W9KT 14, K9RPZ 14, WA9GJZ 13, W9HUF 12, KA9BSF 11, W9WEI 8, W9BDP 6, W9PMT 6. (Mar.) W9FC 215, WØTG 171, WD9CIS 63, WB9VJE 40, WA9GJZ 8.

WISCONSIN: SCM, Roy A. Pedersen, KØFHI — SEC: W9OAK. NMs: W9AYK WB9ICH W9IEM WB9ZRE K9KSA W9DM K9LGU K9EN. Nets, Freq., Time. QNI, QTC, Mgr. BWN, 3985 1145Z M-Su, 736,705, BEN,3985 1700Z Dy, 618,192 WSBN, 3985 2230Z Dy 1063,415 WB9IGH WNN, 3725, 2215Z Dy, 32.7 (Mar 67.5) WB9ZRE. WIN-E, 3662,0000Z Dy, 310,128, W9IDM. WIN-L, 0300Z Dy, 246,141, K9LGU. Wi ExPO, 3925, 1701Z M-F, 489,45, WA9NIX. WD9JID has General. WB9MPF is now AG9G. KA9AAD WD9BFV WD9HLI WA9GGH KA9CXE WD9FFD Generals. KA9CUN WD9ESL Techs. WB9YOK W9SDH W9GHY WB9UIO Advanced. KA9EEE new Novice La Crosse area. KA9EAC new Novice in Oshkosh area. WB9HQI now KB9GI. BPL to W9ZGW K9UTO. Nets in Wisconsin time effective May 1 will be BWN 1145Z, BEN 1700Z, WNN 2215Z, WSBN 2230Z, WIN-E 0000Z, WIN-L 0300Z. Wisconsin Valley ARC assisted in a hospitals move to new location. Everything went very smoothly. Again amateurs play an important role in public service. Congratulations gang. W9DM W9OT have OMNI-D. Northern Wisconsin traffic net on 2 meters had 527 QNI and handled 37 messages. KA9DWQ KA9EEW have Novice. Traffic: (Apr.) W9ZGO 938, W9IEM 341, W9CXY 311, K9UTO 240, W9DND 222, W9YCV 215, K9UU 143, K9FHI 112, AF9T 100, WB9YPY 92, WD9EAQ 73, AD9X 73, WB9ICH 65, W9UCL 57, N9CP 55, W9FDY 54, WD9ESZ 53, W9DM 51, W9AYK 51, KA9CYG 50, WB9ZRE 49 K9AQ 45, WD9DHF 44, W9UW 44, WD9AJA 42, KA9CPA 41, K9LGU 41, K9AKG 40, AG9G 40, WB9RRU 40, W9ESM 36, K9HDF 36, K9VSY 29, K9CPM 26, WB9JSW 26, K9JPS 25, KB9FM 19, WB9YPZ 11, WA9ZTY 4, W9ZBD 3. (Mar.) W9CXY 347, K9ASC 2.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX -- SEC: KØHJC. STM: AFØO.

				QNI	QTC
MSPN N	3945	12:05p	WØOPX	570	97
MSPN E	3929	5:45p	WØDUW	654	228
MSN 1	3685	6:30p	AFØO	207	136
MSN 2	3689	10:15p	KØPIZ	148	81
MSSN	3710	5:30p	WDØBFR	116	35
MWX	3925	6=:15p	WBØUKI	366	271
PAW	3925	9-12/1-5	WAØEPX	2904	319

This month has been good for the new and upgrade amateur operators. Novices are KAØPLO KAØCBD KAØDFO KAØDGM KAØCDC KAØDWV KAØDWU. Tech to Gen are: WDØBYI WDØCDS WDØCDT upgrade to Gen are KAØCBC KAØBOA KAØAJD KAØCYB KAØDFV KAØAJF. Gen to Adv. WDØBFR WDØHMF. Congratulations to Bemidji Radio Club. All of the KA's listed above are from

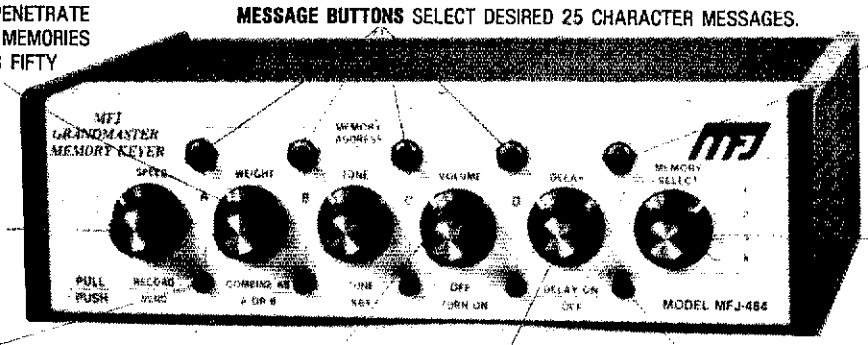
NEW! MFJ INTRODUCES THE GRANDMASTER MEMORY KEYERS

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 ORM. **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 master charge

MFJ ENTERPRISES, INC. P. O. BOX 494 MISSISSIPPI STATE, MISSISSIPPI 39762

SPECIALIZING IN CENTRAL AND SOUTH AMERICAN TRADE

N&G

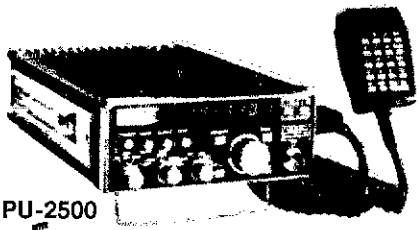
HEY...O.M.
COME VISIT OUR
FACILITY...THE MOST
MODERN IN THE SOUTH...
73'S

DIRECT FACTORY DISTRIBUTORS

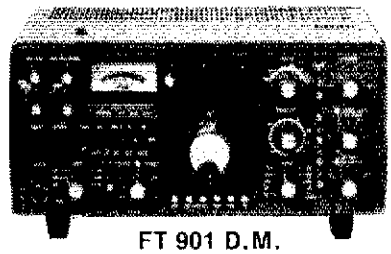
Wilson • Info-Tech • NuViking
Shure • Yaesu • Larsen • Midland
CDE • Callbooks • Dentron • B&W
VHF Engineering • Hustler • Swan
Bird - Cushcraft • HY-Gain • TenTec
Icom • KLM

Ride our YAESUMOBILE FREE to and from Miami Int'l. Airport. "We offer lots more than price."

YAESU STANDARD OF THE WORLD



CPU-2500
WITH KEYBOARD MIKE



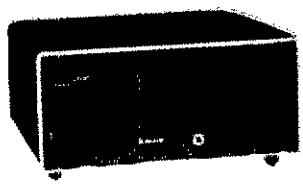
FT 901 D.M.

FRG 7000

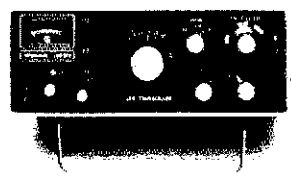
202R

5 BAND
MOBILE
45

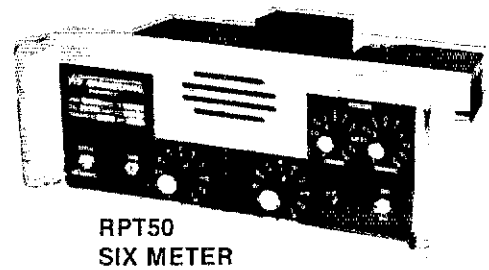
SWAN ELECTRONICS
A member of the Cubic Corporation family of companies



HF-700S



100 MX MOBILE TRANSCEIVER



RPT50
SIX METER
VHF. ENG. FM REPEATER

OUR NEW MAIN HEADQUARTERS ADJACENT TO MIAMI INT'L AIRPORT
7285 N.W. 12th STREET
MIAMI, FLA. 33126
SE HABLA ESPANOL

SUPPORT YOUR LOCAL AMATEUR RADIO DEALER

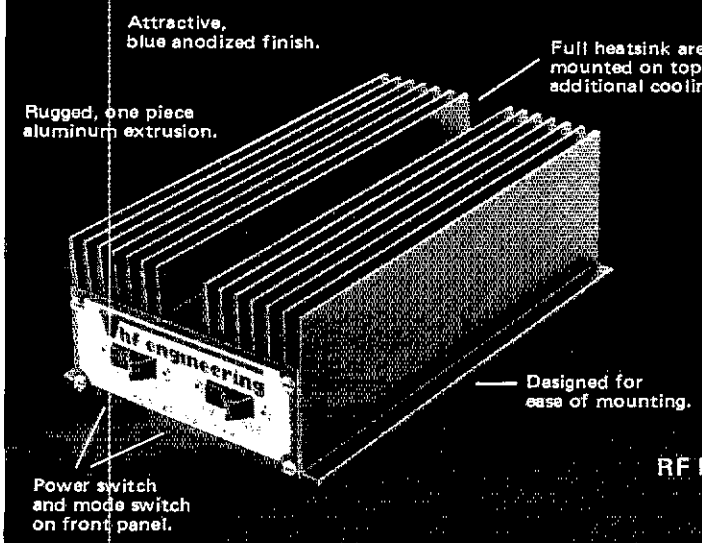
When buying Yaesu equipment, remember that equipment is responsible for the warranty service.

SPECIAL EXPORT PRICES
UPS (BROWN)

master charge
VISA

DADE: (305) 592-9685 BROWARD: (305) 763-8170

Don't depend on your antenna to do all the work...



EXTEND YOUR RANGE
and improve weak signal area performance
with

Vhf engineering

BLUE LINE AMPLIFIERS

RF Power Amp, Wired & Tested, Emission — CW-FM-SSB/AM

Model	BAND	Power Input	Power Output	Price
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

FEATURES

- High efficiency means low current drain.
- Broad band design (no tuning).
- Direct 12 volt DC operation.
- Indicator lamps for On/Off and FM/SSB.
- Relay switching (allows you to put amplifier in or out of circuit at the flip of a switch).
- Insertion loss of less than 1 dB.
- 90 day limited warranty on parts and labor.

AVAILABLE ONLY AT THESE AUTHORIZED DEALERS

CALIFORNIA
C & A Electronic Enterprises, Carson, CA 90745, Ph. 213-834-5868
Tele-Com Electronics, San Jose, CA 95121, Ph. 408-274-4479
Zackit Corporation, Vallejo, CA 94590, 707-644-6676

COLORADO
A.E.S. Communications, Wes-Com, Colorado Springs, CO 80909, Ph. 303-475-7050

FLORIDA
Amateur Electronic Supply, Orlando, FL 32803, Ph. 305-894-3238
N & G Distributing, Miami, FL 33126, Ph. 305-592-9685
VHF/JAX, Orange Park, FL 32073, Ph. 904-264-7176

GEORGIA
Creative Electronics, Marietta, GA 30065, Ph. 404-971-2122

ILLINOIS
Klaus Radio, Peoria, IL 61614, Ph. 309-691-4840
Spectronics, Oak Park, IL 60304, Ph. 312-848-6777

IOWA
Bob Smith Electronics, Fort Dodge, IA 50501, Ph. 515-576-3886

MASSACHUSETTS
Tufts Radio Electronics, Medford, MA 02155, Ph. 617-395-8280

MICHIGAN
Adams Distributing, Detroit, MI 48228, Ph. 313-584-4640
The Ham Shack, Kentwood, MI 49508, Ph. 616-531-1976

MINNESOTA
P.A.L. Electronics, Minneapolis, MN 55412, Ph. 612-521-4662

MISSOURI
Aloha Electronic Labs, Columbia, MO 65201, Ph. 314-449-1362

NEBRASKA
Communications Center, Lincoln, NE 68504, Ph. 402-466-3733

NEVADA
Communications Center West, Las Vegas, NV 89106, Ph. 702-647-3114

NEW YORK
Barry Electronics, New York, NY 10012, Ph. 212-925-7000
Delmar Electronics, W. Babylon, LI, NY 11704, Ph. 516-420-1234
VHF Communications, Jamestown, NY 14701, Ph. 716-664-6345

OHIO
Universal Amateur Radio, Reynoldsburg, (Columbus) Ohio 43068 Ph. 614-866-4267

OKLAHOMA
Derrick Electronics, Broken Arrow, OK 74012, Ph. 918-251-9923

PENNSYLVANIA
LaRue Electronics, Scranton, PA 18509, Ph. 717-343-2124

SOUTH DAKOTA
Burghardt Amateur Center, Watertown, SD 57201, Ph. 605-886-7314

TEXAS
AGL Electronics, Dallas, TX 75234, Ph. 214-241-6414
Madison Electronics Supply, Houston, TX 77002, Ph. 713-658-0268

VIRGINIA
Radio Communications, Roanoke, VA 24016, Ph. 703-342-8513

WASHINGTON
A-B-C Communications, Seattle, WA 98155, Ph. 206-364-8300

WISCONSIN
Amateur Electronic Supply, Milwaukee, WI 53216, Ph. 414-442-4200

CANADA
Bytown Marine Ltd., Ottawa, Ontario, Can. K2H 7V1, Ph. 613-820-6910
Traeger Distributors, Richmond, BC, Can. V6X 2A7, Ph. 604-278-1541

Vhf engineering

DIVISION OF BROWNIAN ELECTRONICS CORP.

Prices and specifications subject to change without notice.

that club. A welcome to MN goes out to AIØY of Dodge Center, MN, formerly WB9HLM of WI. WBØLRK and WBØQUE were involved in helping during the ND floods. Thanks to all of the MN operators for the help they were able to give to Wichita Falls, TX during their recent disaster. Thanks to WØMD, the Duluth papers have had some excellent publication regarding Amateur Radio. The first article was about the work of AF9T WBØQUE and AFØQ were doing after the TX tornado disaster, and the second article was about traffic and Amateur Radio in general. Traffic: WBØHOX 427, AFØO 388, WAØYVT 291, WAØTFC 180, WBØOEU 147, NØAHA 128, WBØUKI 101, WDØCGM 100, WDØBFR 91, WØHZU 90, WØRIO 72, AEØM 68, KAØAIT 54, KØCSE 52, WBØNZB 47, WØOPX 43, KØZBI 37, WBØZBJ 30, WBØLRK 27, WAØLVG 26, WBØJYT 15, WBØJUL 9, AIØY 7, KØRMX 5, KØFLT 4, WBØCDS 2.

NORTH DAKOTA: SCM, Lois A. Jorgensen, WAØRWM — SEC: WBØTEE. OBS-ORS: WØDM. Many hams from the eastern part of ND worked late hours on the flood. Grafton Radio Club held their annual Banquet with a good attendence despite the flood. Congrats to WBØWVG on his science project. Good Luck to the National Science Fair. Congrats to the Novices in Williston: KAØCBW KAØAFE; Tech WDØGRC; upgraded to General, WDØGMD and WDØAPE. Congrats to WØHNV of Drayton on getting his all USA Countries. Best Wishes to WBØJMK on his marriage. WBØAUM moved to Omaha, NE to stay with Ma Bell. Hettinger Club now has Bowman and Lemom SD with them. Officers are WBØSHD WØVWJ KAØIYP who is a Novice. Congrats KAØIYP.

NET	kHz	CDT/Days	Sess.	QNI	QTC	Mgr.
Goose River	1990 kHz	0900 Su	5	45	5	WØCDO
DATA	3996.5	1830 Dy	24	231	45	WAØCRH

The ND YL WX Net has stopped 'til Nov. 1, 1979. Traffic: WAØRWM 132, NØAFP 25, WAØCRH 21.

SOUTH DAKOTA: SCM, Lydia S. Johnson, WØKJZ — Ass't SCM: WØDVB. SEC: WAØTNM. Net Mgrs: WØs WE MZI HOJ NEO ZWL TNM VRE. Conrats to BPL earners WØs MZI ZWL; and PSHR: WAØTNM 55 points, WØKJZ 44 points. New Directors for SFARC: WØNRW WØGES WØLX and WØSMV. Newly licensed in SF are KAØs DBZ DCD DCW DLU. In Lead KAØDJL and KAØDJK. Upgraded to Technician KAØs AQY DBZ and WDØETF; to General WDØCTM; to Advanced WBØZPZ. Congrats to all of you! ADØV demonstrated slow scan TV to the Signal Hill Club members. Nets: SND QNS 79, QTC 67; WX QNS 316, QTC 207; SSB(eve) QNS 963, WTC 38; Mng QNS 266, WTC 45, Dak. Div. Convention dates Oct. 5-6-7 in S.F. Traffic: WAØTNM 353, WØZWL 236, WØMZI 264, WDØBMR 203, WAØVRE 142, WØKJZ 126, WØDVB 98, WØHOJ 84, WBJOMF 50, WØWE 38, KØFRE 23, WØIG 16.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC: WD5IRB. NM: AD5D W5MYZ W5POH WA5ZWZ Nets, Freq, Time/Day, QNI, QTC, Mgr. OZK, 3760, 0000/Dy, 200, 12, W5MYZ. ASN, 3740, 0030/Tu-S, WB5WPV. NEAWN, 146.28/88, 0030/Tu-S, WA5YWJ. SCARC, 28.765, 0130 Su/0030 M, 87, 9, WD5HJC. APN, 3937, 1100 M/S, 960, 40, W5POH, M-Bird, 3928, 2130/M-F, 751, 5, WA5ZWZ. ARN, 3995, 2330/Dy, 1302, 102, AD5D. ARN net certificates issued to N5BK WB5BRD KB5FG WD5GTM K5HQY K5HTF WB5PHL WB5RMY W5UNX. CAREN Hamfest Aug 4/5, Little Rock. More info from CAHEN, P. O. Box 2884, Little Rock 72203. WA5VNV has resigned as Ark SEC. Thanks for job well done. WD5IRB has agreed to try as SEC. Welcome aboard. Jonesboro ARC hamfest Aug 19 at Jonesboro. OBs WB5WWA 1, W5UAU 1. Traffic: AD5D 36, WB5GWU 36, W5UAU 27, W5BLP 23, W5POH 23, W5KL 16, WB5WWA 7, K5DW 3.

LOUISIANA: SCM, S. T. "Tom" Losey, Jr., K5TL. ASST SCM: K5DPG. SEC: WB5IYH. STM: N5YL. NMs: N5RB K5ARH N5IB WD5CMA WB5IYH. N5YL active on CAND. N5EK WD4CMA K5DPG WD5CWK K5BLV K5TL all active on DRN5. Attended Shreveport Hamfest May 5 & 6 and it was super. Glad to see all the interest and enthusiam shown by the SARA CLUB MEMBERS — great bunch of men and women. SARA HAM OF THE YEAR AWARDS won by WB5ORJ and K5TL. Division Director Max Arnold, was in attendance and presented a very informative message during ARRL FORUM. K5ARH new LTN Net Mgr. Thanks to N5ES for the super job he did during the past year as LTN Mgr. GNOARC planning for a big Field Day this year. Jefferson Parish Civil Defense needs Amateur Radio communications backup, contact WB5RNM. WB5IKT has the bug bad for RTTY. K5EEB active in Ponchatoula Civil Defense program. K5TTC back on NETS again — missed you. Traffic Handlers Picinic to be in Lafayette this year, that is, if the water goes down. Don't miss the National in Baton Rouge this year, its going to really be a good one.

Net	Freq.	Time/Day	QNI	QTC	Mgr.
LAN	3615	7 & 10 PM Dy	311	154	N5RB
LTN	3910	6:30 PM Dy	556	158	K5ARH
LSN	3703	7:30 PM M-F	87	8	N5IB&WD4CMA
LRN	3597.5	6:30 PM SU	10	6	N5RB
RACES	3993.5	8:00 AM SU			WB5IYH
LEN	3910	9:00 AM SU			WB5IYH

Traffic: (Apr.) W5CHP 260, N5YL 194, N5ES 192, N5RB 191, WB5USS 186, K5TL 108, N5TS 59, K5ARH 48, WD5CMA 56, WB5OOM 53, K5DPG 46, N4EK 42, WB5LBR 28, WA5TQA 24, WB5FMD 14, WA5PRI 12, K5BLV 9, WB5ILX 9, WD4GJB 4, WB5NXM 4. (Mar.) WA5IQU 243, N5YL.

MISSISSIPPI: SCM, E. Ed Robinson, W5XT — SEC: WB5FXA. Biggest news this month is the Jackson, MS area and Columbia flood. With all pros and cons weighed, no question the Amateur Radio Service made a fine showing. The Capital Area EC, WD5IKD, had over 130 hams to coordinate and it's impossible to name any without slighting many. Tnx to all! Am receiving Newsletters from increasing clubs/areas including the Gulf Coast, Jackson, Hattiesburg, and Vicksburg. Keep up this good spread of info. Field Day and summer are upon us. Please continue to support your nets. CGCHN (WB4PGB)Sessions 30, QNI 2516, QTC 221. MSBN (K5WSC) Sessions 30, QNI 2280, QTC 100. MTN (K5OAF)Sessions 30, QNI 158, QTC 72. MN (WA5JWD)Sessions 30, QNI 739, QTC 12. MsRACES (N5AMK)Sessions 5, QNI 247, QTC 11. Capital AEN(WD5IDK)Sessions One, for 6 days duration QNI 140 +. Traffic: W5EDT 241, K5OAF 221, WB5VFS 109, WB5SNB 60, WB5YGQ 43, N5AMK 22, WA5OKI 22, W5XT 19, K5MK 13, WD5CSU 3, WD5DCK 3, AF5V 1.

TENNESSEE: SCM, O. D. Keaton, WA4GLS — SEC: WB4DYJ. Asst. SCM: WB4PRF. STM: W4ZJY. Certificate of Merit has been awarded to WB4JGL for his outstanding performance at the US Weather Service Radar installation during a severe thunderstorm. Be sure to at-

TS-120S

ALL SOLID-STATE HF TRANSCEIVER

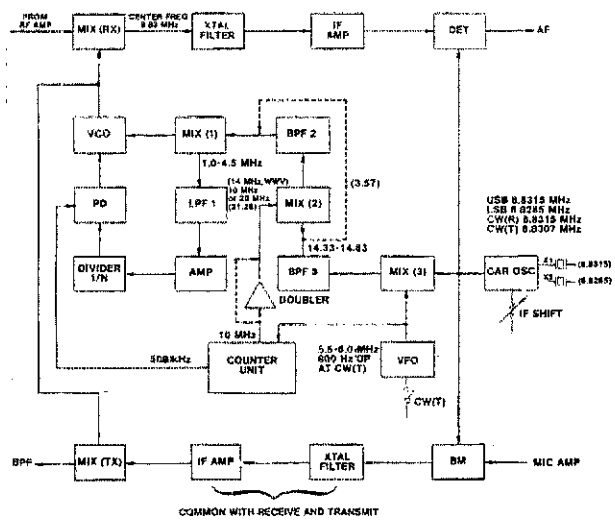
TS-120S

What's unique about the PLL circuit in the TS-120S?

A single-conversion PLL (phase-locked loop) system is employed in the TS-120S. Only one crystal is required, instead of a heterodyne crystal element for each band, resulting in simplification of circuitry, and a marked improvement in overall stability. The single-conversion PLL system also improves the spurious characteristics during transmission and reception, and makes IF shift operation and mono-dial indication available on any model.

The VCO frequency is obtained from the PLL circuit by synthesizing the VFO and CAR frequencies and reference oscillating frequencies of 10 MHz and 500 kHz supplied by the counter. Bandswitching is accomplished by changing the preset value of the programmable divider in the PLL. Therefore, when switching bands, the frequency (except, of course, the 1-MHz and 10-MHz order digits) remains the same. The frequencies for each band and PLL stage are shown in the table.

FREQUENCY COMPOSITION OF THE TS-120S PLL SYSTEM



First, MIX (3) mixes the CAR and VFO frequencies, using a double balanced mixer to reduce spurious signals. The output of MIX (3), after passing through a bandpass filter (BPF 3) is applied to the input of MIX (1) on the 3.5 and 7.0-MHz bands. On the 14-MHz and WWV bands, MIX (2) mixes the output of MIX (3) with a 10-MHz signal from the counter-unit oscillator. On the 21 and 28-MHz bands, MIX (2) mixes the output of MIX (3) with a 20-MHz signal from a doubler connected to the counter-unit oscillator.

The output of MIX (2) – or MIX (1) on the 3.5 and 7.0-MHz bands – is mixed with the VCO output at MIX (1), providing output frequencies shown in the table. The output passes through a lowpass filter (LPF 1) and is amplified, and the resulting digital signal is divided by a programmable divider, producing a 500-kHz output.

"Information" from the band switches is converted into BCD signals in the counter and the division ratio as shown in the table is preset. The loop-filter consists of transistors mounted on the outside to minimize signals. A Motorola MC4044P functions as the phase comparator. Five VCO circuits with high-output transistors cover all of the bands.

If the output of the phase comparator unlocks, VCO output is switched off to prevent emission at unwanted frequencies and, at the same time, the digital display blanks to warn the operator.

What is the concept of the TS-120S digital counter for displaying frequencies?

The TS-120S digital counter employs a VFO frequency counting system. First, the VFO frequency is mixed with a 5-MHz signal obtained from the reference oscillator chain and is converted to 0.5 to 1 MHz. This signal passes through a lowpass filter, is amplified, buffered, and shaped into a digital (square) wave, passes through a 0.1-second gate circuit, and is applied to a four-digit counter. The signal is counted from 10 Hz to 100 kHz and is fed to a preset counter to derive the carrier output.

The 100-kHz order digit presets at 5 to display the operating frequency on the 3.5, 28.5, 29.5, and WWV bands, and at 0 for display on 7.0, 14.0, 21.0, 28.0, and 29.0 MHz. The 1-MHz and 10-MHz order digits are determined by a matrix operating with bandswitch information.

The counter outputs are switched by the multiplexer and converted from BCD to seven-segment information by the decoder to light the fluorescent display tubes. The large digits have good luminous intensity and a dark filter, providing fatigue-free viewing over long operating periods. The display can be read easily, even in the car and other sunlit locations.

The reference oscillator produces a 10-MHz signal and performs time-base division, and generates gate pulses, latch pulses, and reset pulses, which are applied to the counter. The PLL circuit produces 10-MHz and 500-kHz outputs. The marker circuit produces a 100-kHz signal which synchronizes the 25-kHz multivibrator to obtain a marker signal as accurate as the reference frequency.

The 1/10 division at the first stage of the count-down chain utilizes low-power Schottky TTL, and other divisions use CMOS ICs for low power consumption and minimum spurious emission. With the IF shift circuit, the CAR frequency is independent of both transmitting and receiving frequencies.

When the VFO frequency is counted, the operating frequency is indicated as accurately as the reference oscillator frequency, provided that the 10-MHz reference is calibrated to WWV.

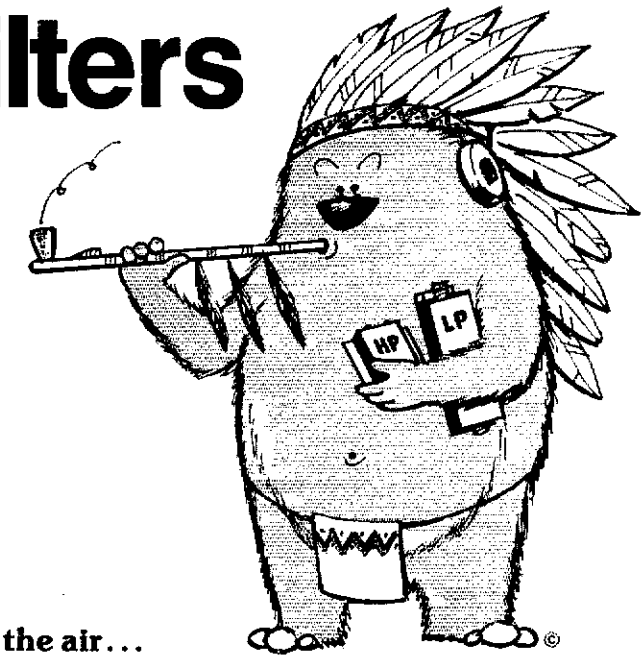
True operating frequencies are displayed accurate to three digits (100-Hz order), regardless of CW transmitting and receiving frequencies or the position of the band switch or mode switch. When the VFO is tuned to the extent that the 1-MHz and 10-MHz orders are switched (beyond the band edge), these digits are blanked out.

FREQUENCIES FOR EACH BAND AND PLL STAGE

BAND	RANGE (MHz)	VCO (MHz)	MIX (1) INPUT (MHz)	MIX (1) OUTPUT (MHz)	DIVIDER RATIO	DCBA
WWV	14.5–15.0	23.33–23.83	24.33–24.83	1.0	1/2	1 1 1 0
3.5	3.5– 4.0	12.33–12.83	14.33–14.83	2.0	1/4	1 1 0 0
7	7.0– 7.5	15.83–16.33	14.33–14.83	1.5	1/3	1 1 0 1
14	14.0–14.5	22.83–23.33	24.33–24.83	1.5	1/3	1 1 0 1
21	21.0–21.5	29.83–30.33	34.33–34.83	4.5	1/9	0 1 1 1
28	28.0–28.5	36.83–37.33	34.33–34.83	2.5	1/5	1 0 1 1
28.5	28.5–29.0	37.33–37.83	34.33–34.83	3.0	1/6	1 0 1 0
29	29.0–29.5	37.83–38.33	34.33–34.83	3.5	1/7	1 0 0 1
29.5	29.5–30.0	38.33–38.83	34.33–34.83	4.0	1/8	1 0 0 0

Drake TVI Filters

help you keep peace with your neighbors



Don't let your several-thousand dollar investment in a ham station sit idle because of your concern that you might ruin your neighbors' TV reception...

Drake TVI Filters can keep you on the air...

Although TVI/RFI is a complex subject, basically it has two forms: (1) Harmonics generated by the transmitter which fall on TV/FM channels. (2) Direct radiation from a strong fundamental signal directly into a nearby TV receiver. This is possible because strong signals at ham band frequencies can sneak around the tuned circuits in a TV and cause interference within the set. Even though the signal may be clean, direct radiation interference can occur as far away as several blocks, depending upon your power, antenna system, and the design of the TV.

TWO KINDS OF DRAKE TVI FILTERS:

"Low Pass" Filters will reduce or eliminate TVI caused by harmonics from amateur transmitters. All transmitters generate some harmonics which might be just strong enough to cause TVI. We believe every station should be equipped with a Low Pass Filter, designed to cut off at 41 MHz, the TV i-f frequency. Drake filters are down 80 dB at 41 MHz to provide maximum protection.

"High Pass" Filters are used to reduce or eliminate direct radiation interference at the TV set. There are less expensive High Pass Filters on the market for the TV set, but do they really work? Drake HP Filters provide 40 dB attenuation below 52 MHz; some others have measured at only 3 to 6 dB down.

The Drake "Peacemakers":

Drake TV-3300-LP

1000 watts max. below 30 MHz. Attenuation better than 80 dB above 41 MHz. Helps TV i-f interference, as well as TV front-end problems.

Drake TV-5200-LP

200 watts to 52 MHz. Ideal for six meters. For operation below six meters, use TV-3300-LP or TV-42-LP.

Drake TV-42-LP

For transmitters operating at 30 MHz and lower. Rated 100 watts input.

Drake TV-300-HP

For 300 ohm twin lead. New connectors for "no-strip" installation.

Drake TV-75-HP

For 75 ohm TV coaxial cable; TV type "F" connectors installed. Ideal for master antenna systems for apartments and condominiums.

Certain situations require both a Low Pass and a High Pass Filter to solve the problem, and Drake can provide both types.

Specifications and prices subject to change without notice or obligation.

For a FREE Drake Full Line Catalog contact your favorite Drake Dealer.

R. L. DRAKE COMPANY DRAKE®

540 Richard St., Miamisburg, Ohio 45342
Phone: (513) 866-2421 • Telex: 288-017

Known 'round the world for world-wide radio communications.

tend the ARRL National Convention in Baton Rouge, LA on July 20 thru 22. K4XE has been appointed OTS. Net certificates have been awarded to: W4SGI WA4SBY WA4WZJ WB4DZF K4KFW W4MUH WA4USY WA4TJW KB4NZ WB4DDJ WA4VPQ WA4THR WA4IPT WA4ZTK WA4BDS WD4DKY. CW Nets report: 74 sessions, 473 QNI, 183 QTC. Phone Nets report: 193 sessions, 6764 QNI, 894 QTC. Weather nets are to be commended for their work during these spring months are: WTWN, TCDWN, KWN, ETWN. All nets should report important net activity monthly to the SCM. W4OGG, Chairman of the TN QSO party reports a new record of 94 out of 95 counties reporting. Be sure to attend the Crossville Hamfest on June 30 & July 1 and the Oak Ridge Hamfest on July 14 & 15. Traffic: (Apr.) WA4CNY 528, WB4BKF 143, AF4T 139, W4OGG 136, K4JGW 133, WB4PRF 92, W4ZJY 71, N4UC 63, K4XE 52, WB4ZS7 52, K4WOP 39, W4PFP 37, WA4GLS 34, WA4FMR 31, K4VM 17, W4VJW 14, WA4WVW 14, W4PSN 12, K4WWQ 12, W4EWR 8, W4TYV 7, N4BBB 4, (Feb.) WA4FMR 34, WA4GLS 34, WB4ZSZ 34, W4TYV 29, K4AMC 27, WB4PRF 25, W4ZJY 24, K4VM 23, K4WWQ 22, W4PFP 21, WA4WVW 17, WB4GWA 14, WB4YPO 14, W4FLW 13, W4RUW 10, WA4CGK 8, WA4DKC 8, W4EWR 7, K4DEC 6, W4PSN 6, WB4DYJ 5, W4VJW 5, K4IVM 4, K4UMW 4, KA4CLJ 3, WB4YBL 2.

GREAT LAKES DIVISION

KENTUCKY: SCM, Joseph E. Miller, K4DZM —

Net	QNI	QTC	Net	QNI	QTC
KTN	1114	175	CARN	203	23
KNTN	336	118	PON	55	4
MKPN	914	101	5th ARES	51	4
KSN	170	4	4th ARES	19	3
KRN	442	41	KYN		

Congratulations to all Kentucky operators for their support and participation in all the nets. Traffic was up in April, largest increase by the Novice net, KB4OZ NM. Thanks to all clubs for the Field Day operations. Wilderness Trail ARC rcvd. ARRL Charter. WA4EBN has 5BWAS. Remember to make plans for the Lexington Hamfest. Summer time is Antenna time so be safe. Traffic: WA4AVV 136, K4DZM 124, WA4EBN 73, KB4OZ 64, WA4WSM 63, WB4NPD 61, WA4UIH 61, WD4COF 57, WA4JAV 51, WD4RNI 40, WB4AUN 35, K4TXJ 34, WD4KDG 33, WA4GAL 32, W4CDA 28, WA4JTE 25, K4YZU 24, WA4FAF 23, K4HOE 20, WB4RIT 20, WA4SWF 8, WA4YPO 6, WA4AGH 5, KA4AZT 1.

MICHIGAN: SCM, Stanley J. Briggs, W8MPD/K8SB — Asst. SCMs: WA8DHB, W8SOP. STM: WB8MTD SEC: WA8EFK NMs: K8LNE K8KMQ KB8AI K8RV WB8YDZ WA8DHB WB8ZNS.

Net	Freq.	UTC/DAY	QNI	QTC	Sess.
GLETN	3932	0130 Dy	951	300	30
QMN*	3683	2200/0200 Dy	1160	347	89
MiTN*	3953	2300 Dy	655	286	30
MACS*	3953	1500 Dy	840	221	30
UPN*	3922	2100 Dy	790	123	35
MNN*	3722	2130 Dy	353	98	30
WSSBN	3935	2300 Dy	750	58	30
SVARA	21130	2330 Tu	18	0	4

VHF LOCAL NETS: 20 reports 1366 30 82.

=NTS Section nets. The first Novice to receive the Michigan Traffic Award is KA8CPS. The Mich. Traffic Award is presented to Mich. Amateurs who originate at least 20 formal messages on behalf of non-amateur members of the public. Congratulations The latest Mich. ARC to become affiliated with the ARRL is the Black River ARC of the South Haven - Bangor area. New Emergency Cordinator appointment: WB8PLO for Saginaw County. OBS reports received from K8NKB N8AG AC8Y, OO from K8JH. No OVS reports. why not? This is the time of year for VHF action! I am very sorry to report the following Silent Keys: W8BXU W8OCN W8LTH. Oak Park ARC elected new officers WB8UGI, pres.; WA8RNB, vice pres.; K8NKB. secy.; WD8IDJ. treas.; W8CBX, member at large. Are you an ARES member? Do you know who the Emergency Coordinator for your area is? If not, drop a note to the Section Emergency Coordinator: WA8EFK. July brings two opportunities for Mich. Hams to get together; July 15 the MiTN and the Great Lakes nets will hold meetings at the Shiawassee ARA Hamfest and swap-shop in Corunna. The U P Hamfest will be July 28 and 29 at Marquette. I hope to see you at one or both. More up-grades: Extra-WD8CEG to AJ8C. General-WD8QMS. Traffic: W8VPW 529, K8DTG 501, WB8MTD 306, WD8KZX 258, K8KMQ 257, K8RV 208, WD8NON 197, W8MPD 176, WD8NKA 171, AF8V 171, W8BYR 151, KB8AI 123, WD8LRT 122, WD8CSA 120, WA8DHB 113, K8LNE 97, WD8EGQ 87, WD8OSE 81, WB8AIR 80, K8GXV 72, WA8WZF 63, K8BGC 62, KA8CPS 58, WB8TTA 56, WB8ITT 51, W8CUP 48, WB8YDZ 45, W8YIQ 45, WB8ZIY 43, NR4KY 42, W8DIE 42, W8NOH 39, K8ZJU 39, K8DD 38, WD8LSV 37, N8ABA 36, WB8QYU 36, WB8POL 33, WA8QAF 33, W8SOP 33, WB8SYA 30, KB8BZ 29, W8IHX 27, WB8PLO 26, W8JXJ 21, W8VIZ 21, WB8YIG 21, AC8F 20, K8UPE 18, WD8PAF 18, WD8IBY 15, AC8Y 15, KB8BS 15, WD8IVY 15, WB8DJS 14, K8DYI 14, KA8DMT 13, WA8AXF 12, WA8VBF 12, N8AOA 10, WD8IXZ 10, WB8MJB 10, KB8FK 9, W3GOJ/8 9, W8LDS 9, W8HKL 8, W8TBP 8, WD8NJO 7, W8SDB 7, WA8GTG 6, WA8MDK 6, K8MJK 6, W8QFO 6, WA8WVV 6, WD8IEW 5, N8AG 4, WB8IEK 4, K8JED 4, WB8HSN 4, WB8VVF 4, W8FZL 4, WA8FXR 4, W8WVL 4, WR8ALB 3, WB8ILV 3, W8HNQ 3, KB8GT 2, AC8U 2, WB8UUJ 1, K8QBZ 1, W8WOJ 1.

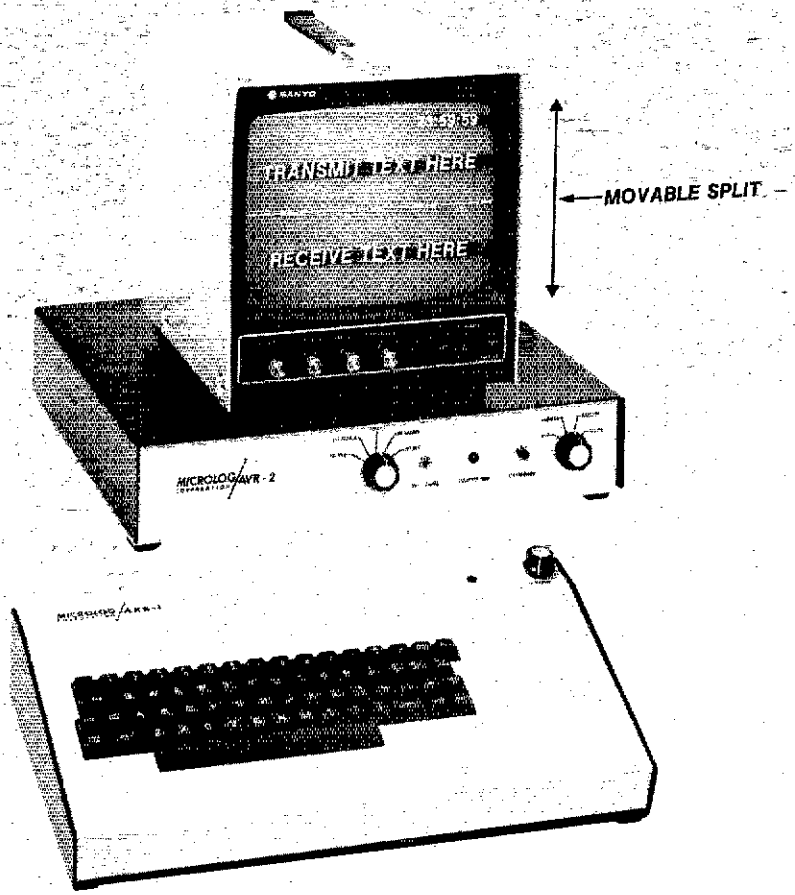
OHIO: SCM, Harold C. Chapman, WB8JGW — Asst. SCMs: WA8MCR W8TP N4VY. SEC: K8AN. NMs: AF8A K8AF N8CW W8DIL WB8KWD WB8YGW.

Net	QNI	QTC	Sess.	Time (Local)	Freq.
BN	518	219	60	6:45/10 PM	3.577
BNR	111	881	28	6 PM	3.605
ONN	124	57	25	6:30 PM	3.708
OSN	212	87	30	6:10 PM	3.577
OSSBN	2686	901	90	10:30 AM/4:15 & 6:45 PM	3.9725
O6MN	387	25	30	9 PM	50.160

Spring is a time of change and it has been evidenced in the Section. Last month the managership of BN and OSN changed. This month WB8OMQ was elected to managership of OSSBN effective May 1 to replace W8DIL who has found it necessary to drop the position because of his work load. Many thanks to him for his yeoman duties the past 3 years. WB8OMQ has already provided evidence that he intends to provide strong effective leadership. Please assist him with your cooperation and assistance. Spring brings the revival of all of the public service events: as the leaves pop out on the trees, almost every bulletin received indicated numerous activities with walkathons, bikeathons, road rallies, and health drives of one form or another - all too

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

The Sangre de Cristo Mountains - ETO'S backyard

WHY WISH YOU'D BOUGHT ALPHA?

IS SOMETHING ELSE "JUST AS GOOD?"

New ***ALPHA*** owners often tell us, *"I wish I'd saved my time and money and bought an* ***ALPHA*** *in the first place."* Why not benefit from their experiences? Compare first!

TRY TO GET ANY OTHER MANUFACTURER TO TELL YOU - IN WRITING - THAT IT'S SAFE TO OPERATE HIS DESK TOP LINEAR AT A FULL D-C KILOWATT . . . SAY FOR 24 HOURS KEY-DOWN. OR, ASK HIM FOR A FULL YEAR WRITTEN WARRANTY. LOTS OF LUCK!

YOUR NEW *ALPHA* WILL HAPPILY AND COOLY RUN THAT KILOWATT KEY-DOWN . . . FOR 24 DAYS IF YOU WISH. AND YOU'LL BE PROTECTED BY ETO'S UNMATCHED WARRANTY FOR TWO YEARS. WE PUT IT IN WRITING ALL THE TIME. IT'S THE WAY WE BUILD AND WARRANT EVERY *ALPHA*!

The new ***ALPHA's*** are the best we've ever built. Nothing else even approaches an ***ALPHA's*** combination of power, convenience, quality, and owner protection. The ETO/***ALPHA*** two year limited warranty offers you eight times as much protection as the industry-standard 90 day warranty.

The new ***ALPHA 374A*** adds NO-TUNE-UP operation to all the other traditional ALPHA qualities and capabilities. You can hop instantly from one HF band to another, with full maximum legal power and with little or no amplifier tune-up at all! (If new amateur bands are added, you can manually adjust your ***ALPHA*** to work them, too.)

In 1974 the original ***ALPHA 374*** set a standard of high power convenience that has remained unmatched since. Despite its small size, not even one '374 owner ever burned out a power transformer. Impressive? The new '374A has an even huskier power supply. And it has ETO's ducted-air system with acoustically-isolated centrifugal blower to insure cool, whisper-quiet operation.

Before you get serious about any other brand of linear, compare its convenience and quality, its transformer heft, its cooling system efficiency and noise level, and its warranty - with the ***ALPHA's***. Be sure to ask around about its reputation.

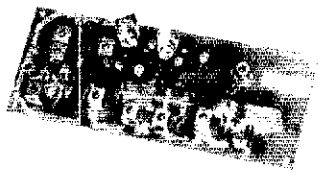
Call or write for detailed literature and thoroughly check out all the great new ***ALPHA's*** . . . so you don't make a mistake.

ETO

EHRHORN TECHNOLOGICAL OPERATIONS, INC.
BOX 708, CAÑON CITY, CO 81212 (303) 275-1613

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
XV2-8	144-146	220-222

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

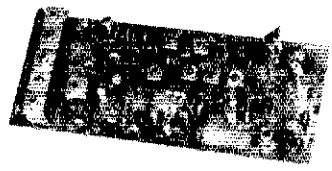
MODEL	RF RANGE	OUTPUT RANGE
C28	28-32 MHz	144-148
C50	50-52	28-30
C50-2	50-52	144-146
C144	144-146	28-30
C145	145-147	28-30
C146	146-148	28-30
C146	144-146	26-28
C220	220-222	28-30
C220-2	220-222	144-146
C110	Any 2 MHz of Aircraft Band	26-28 or 28-30
C110-ELT	121.5 (121.6)	CB Chan 9 (17)

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

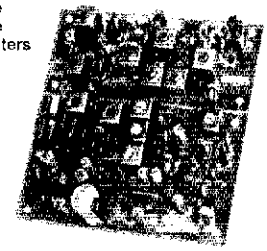
LPA 2-45 VHF PA, 2W in/40-45W out. Can also be used with 8-10W drive Kit price $109.95

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

numerous to mention in this column. PLEASE do your utmost to get local publicity - even to the point of campaigning on the front door of the newspaper assignment editor, TV and Radio station news editors and above all don't forget the weekly newspapers in your area who may give you more support and be read more widely and thoroughly than the biggest of the dailies. Let's face it our PR pants are down! Only an exerted effort in each local area coupled with utilization of the ARRL Ham Newsline hot line which in turn is coupled to UPI via hotline will bring the desired results. Overheard reports indicate many rig and antenna changes - which reminds me that necessary antenna repairs are overdue here. For those of you who hold appointments, the umpteenth reminder that in order to retain any appointment you must forward monthly reports to your SCM even though the report might be negative. A lapse of three months is reason for cancellation of your appointment. Many have been cancelled and the procedure will continue to be exercised. Appointees without activity are similar to trees without leaves. Appointments: EC: WB8GVU Defiance/Paulding Co. NM WB8OMQ. OBS, K8JA. OES, WB8YUS. Local Net Reports: BRTN - QNI 297, QTC 88, Sess. 30; COARES - QNI 84, QTC 39, Sess. 3; EOTN - QNI 196, QTC 51, Sess. 30; TSRAC - QNI 673 QTC 59 Sess. 20. Upgrades: WB8GUU/AIBW. Traffic: WB8KWD 1465, W8PMJ 325, K8AAZ 318, WA8HGH 219, K8BYR 169, WB8WTS 156, WA8GMT 153, W8ENI 150, W8TH 145, WB8UBR 138, WB8OMQ 119, K8AE 104, WD8DTG 102, N8CW 91, WB8MEK 90, W8QZK 90, W8MOK 77, WB8-JGW 75, AF8A 72, WD8LLD 64, WD8JTT 59, N8TM 56, WD8LPP 54, WB8SRC 54, W8GGX 52, WD8JIK 45, W8DIL 43, K8OZ 43, WB8SIQ 42, WB8TRK 42, WD8QZM 41, W8TP 41, K8AN 40, WA8MAZ 40, WD8QMP 38, WD8MKC 36, WA8SED 36, WA8SSI 36, WB8PIY 33, W8WEG 33, WB8CJU 32, W8RG 32, K3RC 29, WB8FWF 28, W8LZE 28, WD8RNM 27, WB8WNH 26, WB8YGW 24, WD8KFN 23, W8SQHV 23, K8CKY 20, WD8KBW 20, AB8P 19, N8AKS 18, N8AUC 17, K8HLJ 15, N8AUH 14, WD8INK 14, WD8PEI 14, WB8YTI 14, KB8FU 13, K8PE 12, WB8MRL 11, N8JR 10, WB8VLR 10, WB8VZX 10, K8CYX 9, WB8LWY 9, WD8PYV 9, W8OCU 8, W8ZM 8, WB8KKI 7, WB8QHU 7, WA8TSX 7, WB8WHF 7, WB8YTQ 7, WD8LOL 6, WA8MIH 6, AF8O 6, WD8PPQ 6, WD8DIP 5, KA8DNI 5, WD8JIL 5, K8DHJ 4, W8EK 4, KB8GG 4, WB8YTD 4, W8IM 3, W8KN 3, WD8OTO 3, N8FU 2, WB8INY 2, WB8NHV 2, WB8UDA 2, W8XT 2, WD8EKI 1, WB8YVI 1. (Mar.) K8ONA 4, WA8ROQ 4.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Guy L. Olinger, K2AV — SEC: WB2VUK. STM: WA2SPL. ASCMs: WB2VUK WB2COY W2IT WB2KDC. NMs: W2GS W2WSS KB2JG WB2QOH. Nets NYPON 5 PM 3913 ESS (slow) 6 PM 3925 NYSPTEN 6 PM 3925 NYS 7 & 10 PM 3677, HVN 6:45 & 730 PM M/F 3797 SDN 9:30 PM M/F 66/06. WA2SPL off on a rash of new OTS appts. Welcome to WB2SPK WB2FOM W2IQK KB2JG (ex WA2MKQ) and WB2SON. Note that HVN (and perhaps SDN by this printing) has an outbound session at 6:45 PM. This is to give liaison to the rest of NTS on a same night basis. Oh No Not Again Dept: Somehow N2EF's card for Feb. didn't make it. Sez he made PSHR but can't refigure the count. Congrats on Feb. PSHR. Along this line, best to mail and originate a msg. Sometimes have kids bring mail from six houses up the street. Overlook Harmonic has the conversion of Sears #61382C to 10M. See AJ2I. Hope all you A-S-T folks got to W2AWF old-time ham gear show. SARA & WECA gave FD shows before (!!) FD. AARA paper has expounded on corollaries to Murphy's Law. You guys trying to bait Murphy into a trap or something? W2YJF working the world 5W & homebrew vert. (whew). PSHR: WA2SPL KB2JG WB2KDC WB2EAG. BPL: WA2SPL AD2X. Traffic: WA2SPL 1573, WB2EAG 317, AD2X 254, W2CS 185, WB2KDC 143, W2YJR 98, W2BIW 90 WA2E-QW 89, K2AV 79, N2JK 63, W3EFU 62, WB2KTV 49, WA2CJY 43, N2FF 37, WA2ZSG 30, KB2JG 28, K2MI 26, WA2MZJ 25, AA2Y 18, WB2QOH 9, K2HNW 7.

NEW YORK CITY — LONG ISLAND: SCM, Paul A. Lindgren, WA2UWA — Asst. Scm: Steve Bloom, WB2IDP. STMs: WB2BNY WA2JKG. NM: WB2LIG. NM/ASCM: WB2EUF. The following are major ARES nets. Please join one.

Net	Freq.
Bronx	28.64 50.35 146.88 fm
Kings	28.64 50.35 146.88 fm
Richmond	146.88 fm
Manhattan	29.50 146.88 fm
Queens	29.50 50.52 145.62 am/fm
Nassau	28.72 145.68 am
Oyster Bay	147.315 fm
Huntington	145.59 am 147.21 fm
Smithtown	28.65 147.21 fm
Babylon	146.685 fm
Islip	146.715 fm
Brookhaven	146.715 fm
East Suffolk	146.82 fm

Note: net times mostly between 2000 and 2100 local on Monday evening. PSHR for April WA2UWA K2GCE and KA2CNN WB2IDF & WA2SKG. KA2CNN is the first Technician from NLI to make it Congratulations! WA2YUS glad to say that he graduated 30 new Novices in his Hall of Science radio class. WA2JKG holding Novice classes in his home Sunday morning with several students. W2DBQ back on 160 after ten years absence. K2IZ has a new Kenwood 7600A. WA2USJ reports handling a radiogram to Andrew Young from the ambassador's mother. I regret to report K2GG and W2LEE as Silent Keys. Congratulations to the Grumman Radio Club on their fine performance during the Iranian crisis. Suffolk County Radio club had a very interesting talk on antennas by W2LR at their last meeting. Congratulations to KA2BRY on upgrade to General. Remember new PSHR rules now in effect. ECs, if you have any corrections to the ARES net listing in this column please let either the SCM or the Asst. SCM know. WA2JKG held an open demonstration at Queens shopping mall 1st week of June. Club bulletin editors: please remember to send the SCM and the Asst. SCM a copy of your bulletin. Suffolk County Radio Club will hold their flearnarket on September 9th with the 16th as raindate. OO W2DX reports many crummy signals on the air. Hope everyone has a good Field Day. Members reporting events for this column remember there is a two month lag between the time I write it and the time it is published so please report the event as early as you can. LIMARC WR2ADX now WB2NHQ/R. LIMARC did an excellent job of covering Nassau County marathon. They also now have a swap and shop on the air on WA2SXW/r 146.25/85. Net control is N2FP. Hope everybody in NLI has a fun and prosperous summer. Traffic: (Apr.) WA2UWA 184

The Foundation of a Dynamic Hobby.

☐ **NEW** ARRL NOVICE Q&A BOOK **$2.00 U.S. $2.50 Elsewhere.** **See page 159.**

☐ **THE RADIO AMATEUR'S HANDBOOK** Internationally recognized, universally consulted. The all-purpose volume of radio. Packed with information useful to the amateur and professional alike. Contains hundreds of photos, diagrams, charts and tables. 56th Ed. **$9.75 U.S. $10.75 Canada. $12.00 Elsewhere.**

☐ **THE RADIO AMATEUR'S LICENSE MANUAL** Study guide and reference book. Complete with typical questions and answers to the FCC amateur exams for Technician, General, Advanced and Extra Class. 77th Ed. **$4.00 U.S. $4.50 Elsewhere.**

☐ **THE ARRL ANTENNA BOOK** Theoretical explanation and complete instructions for building different types of antennas. Simple doublets, multielement arrays, mobile types, rotaries and others. 13th Ed. **$5.00 U.S. $5.50 Elsewhere.**

☐ **ARRL HAM RADIO OPERATING GUIDE** A ready reference source and guide to good operating practices, ideal for the amateur who wishes to brush up on operating procedures and who wishes information on all facets of amateur operating. 1st Ed. **$4.00 U.S. $4.50 Elsewhere.**

☐ **A COURSE IN RADIO FUNDAMENTALS** Twenty-six chapters present the electrical and electronic principles that are basic to understanding radio circuit operation. 5th Ed. **$4.00 U.S. $4.50 Elsewhere.**

☐ **SATELLITE COMMUNICATIONS** Popular series of reprints from *QST*. Includes *Getting to Know OSCAR from the Ground Up*. 1st Ed. **$4.75 U.S. $5.50 Elsewhere.**

☐ **SOLID STATE DESIGN FOR THE RADIO AMATEUR** Thorough treatment of the use of solid state devices. Provides a wealth of tried and proven circuitry plus practical application data. 1st Ed. **$7.00 U.S. $8.00 Elsewhere.**

☐ **OPERATING KIT** The active ham's favorites — *The Ham Radio Operating Guide*, Log Book, Message Pad and U.S.A. Call Area Map. Just **$6.50.**

☐ **HINTS AND KINKS** If you build and operate an amateur radio station, you'll find this a mighty valuable book in your shack and workshop. Vol. 10. **$4.00 U.S. $4.50 Elsewhere.**

☐ **SINGLE SIDEBAND FOR THE RADIO AMATEUR** A digest of the best articles from *QST*. Includes discussions of theory and practical how-to-build-it descriptions of equipment. 5th Ed. **$4.00 U.S. $4.50 Elsewhere.**

☐ **SOLID STATE BASICS** Perfect as a study guide for the beginner or as a refresher for the more experienced builder. Complete with a ten watt transmitter as a workshop exercise. 1st Ed. **$5.00 U.S. $5.50 Elsewhere.**

☐ **UNDERSTANDING AMATEUR RADIO** Explains in simple language the elementary principles of electronic and radio circuits. Includes how-to-build-it information on low cost receivers, transmitters and antennas. A "must" guide for the newcomer. 3rd Ed. **$5.00 U.S. $5.50 Elsewhere.**

☐ **TUNE IN THE WORLD WITH HAM RADIO** The complete beginner's package. Everything needed to obtain a Novice license: Theory, rules, how to assemble a station, and operating practices. With one-hour code cassette. 2nd Ed. **$7.00.**

☐ **FM AND REPEATERS FOR THE RADIO AMATEUR** A complete treatment of fm and repeaters. Includes chapters on receivers, transmitters, antennas as well as repeater operation. 2nd Ed. **$5.00 U.S. $5.50 Elsewhere.**

☐ **REPEATER DIRECTORY** **$1.00 U.S. $1.50 Elsewhere.**

☐ **ARRL ELECTRONICS DATA BOOK** Includes data on radio frequency circuits, filter design, L, C, and R networks, antennas and feed systems. This 128-page reference is a useful addition to the amateur's technical library. 1st Ed. **$4.00 U.S. $4.50 Elsewhere.**

☐ **RADIO FREQUENCY INTERFERENCE** A must publication for all hams! Full treatment is given to the causes and solutions for those pesky interference problems. Complete with illustrations and photos of the more common kinds of interference. 1st Ed. **$3.00 U.S. $3.50 Elsewhere.**

☐ **THE RADIO AMATEUR'S VHF MANUAL** A thorough treatment of vhf. Covers receiving and transmitting principles, techniques and construction, antenna and feed system design, uhf and microwaves, test equipment, interference causes and cures. 3rd Ed. **$4.00 U.S. $4.50 Elsewhere.**

☐ **ARRL CODE KIT** Two cassettes provide practice at 5, 7½, 10 and 13 wpm. Step-by-step progression and use of random code characters plus proven suggestions and hints in the accompanying instruction book make increasing your code proficiency easy! **$8.00.**

☐ **THE ARRL ANTENNA ANTHOLOGY** Four chapters packed with information on vertical, Yagi, quad and miscellaneous antenna types along with a section on antenna theory and test methods. Taken from the pages of *QST*. 1st Ed. **$4.00 U.S. $4.50 Elsewhere.**

Prices subject to change without notice

I would like these publications shipped to me postpaid:

_____ **$** _____

_____ _____

_____ _____

_____ _____

Total enclosed or charge to MC or VISA Account $ _____

VISA Account No. _____ **Expires** _____

Master Charge No. _____ **Expires** _____

Master Charge Bank No. _____

Ship to:

_____ _____

Name **Call**

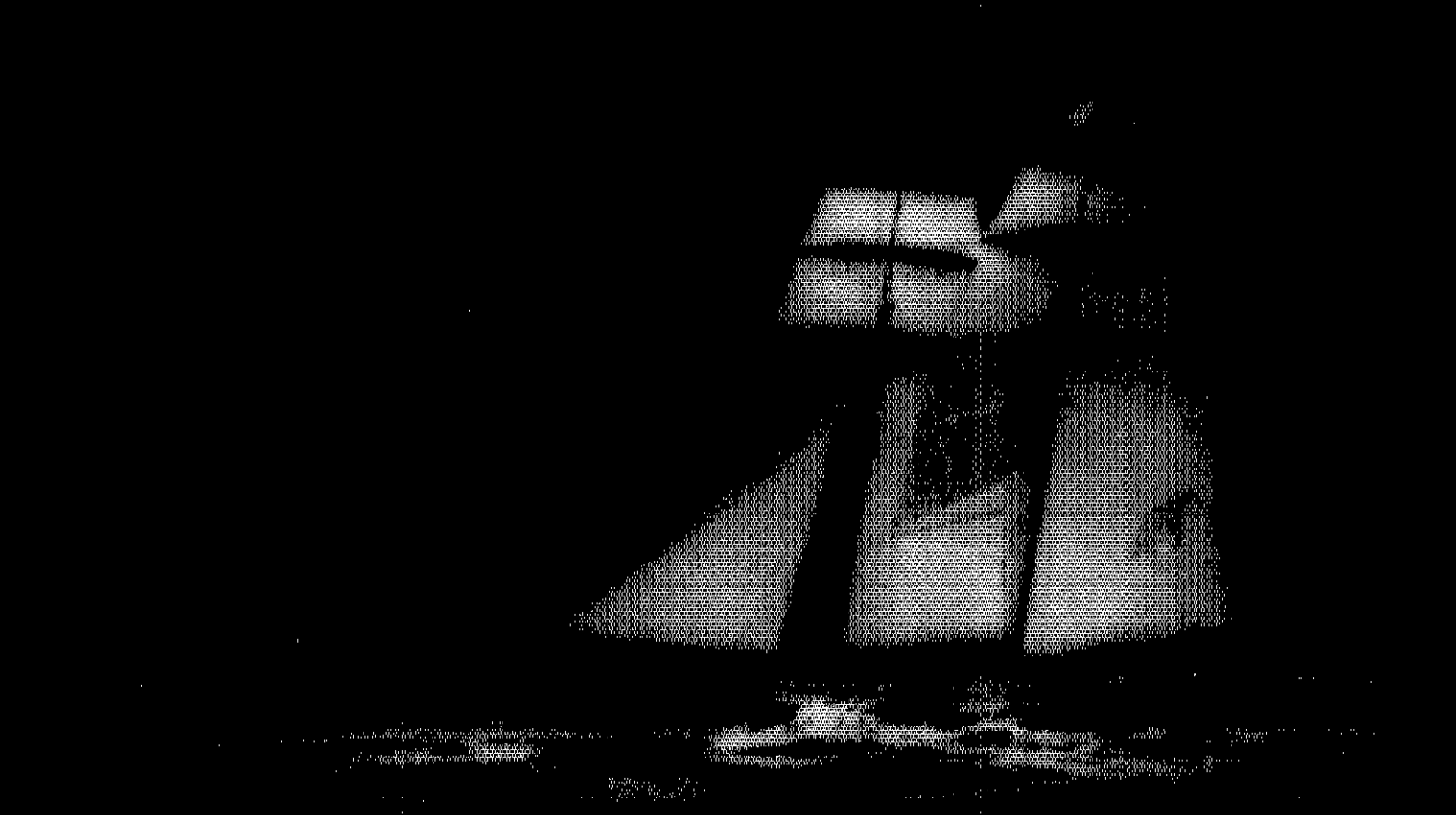
_____

Address

_____

City, State or Prov., Zip or Postal Code

The American Radio Relay League, Inc.



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-2600'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 $599.50.
FCC type accepted

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

Dedicated
to making amateur radio
more fun.

All New! REAL·STATE·OF·THE·ART

DIGITAL INSTRUMENTATION FROM OPTOELECTRONICS

TWO NEW AC-DC- BATTERY PORTABLE COUNTERS

OPTO-8000.1A **10Hz to 600MHz Frequency Counter**

- Precision TCXO time base 0.1PPM Stability 17-40°C
- Super Sensitivity with preamps in both Hi-Z & 50 Ohm inputs <10 mV to 150 MHz <50 mV @ 600 MHz
- Auto Decimal Point
- Aluminum Case
- Socketed IC's
- Three position attenuator. X1, X10, X100 (avoids false counting)

***OPTO-8000.1A**	Factory Assembled - **2 Year Guarantee**	$329.95
***OPTO-8000.1AK**	Kit Form - **1 Year Parts Guarantee**	$279.95
***NI-CAD-80**	NI-CAD Battery Pack (installs in case)	$ 19.95

OPTO-7000 **10 Hz to 600 MHz Miniature Counter**

- XTAL (TCXO) Time Base ±.08PPM/°C Standard
- Aluminum Case
- Hi-Z & 50 Ohm inputs
- 1 Sec. & 1/10 Sec. Gate times
- Auto Dec. Pt.
- Built-in Prescaler and Preamps Standard

***OPTO-7000**	Factory Assembled - **1 Year Guarantee**		$139.95
***OPTO-7000K**	Kit Form $99.95	***AC-70** AC Power Pak	$ 4.95
***NI-CAD-70**	NI-CAD Battery Pack and Charger Circuitry		$ 19.95
***TCXO-70**	Optional Precision TCXO Time Base 0.1PPM, 17-40°C		$ 79.95

CM-1000 **Digital Capacitance Meter**

- Featured Sept. 1976 Radio Electronics Magazine
- Measures from 1 pF to 200 mF
- 3 1/2 Digit 6" Digits
- Aluminum Case
- Accuracy of 1% less and up

***CM-1000** Factory Assembled $179.95 ***P-1000** Probe
***CM-1000K** Kit Form $129.95 ***P-1000K** Probe Kit

T-100 **Precision Thermometer**

For Use with Digital Voltmeter
- Deposit 10 my per degree
- Switchable Fahrenheit/Centigrade
- Resolution to .01° with 4½ Digit Meter
- Requires two 9V Batteries (not included)

***T-100** Factory Assembled & Calibrated $59.95 ***T-100K** Kit Form

#D-450 Antenna, Rubber Duck, BNC Fitting, 450 MHz

#D-146 Antenna, Rubber Duck, 146 MHz

#RA-BNC Right-Angle BNC Adapter for Above Antennas

PROBES:

#P-100 50 Ohm, 1X Direct Connection RF Probe

#P-101 Lo-Pass, Attenuates RF at audio frequencies

#P-102 Hi-Z, 2X High Impedance, general purpose

TERMS: Orders to U.S. and Canada add 5% to maximum of $10.00 per order for shipping, handling and insurance. To all other countries, add 10% of total order. Florida residents add 4% state tax. C.O.D. Fee: $1.00. Personal checks must clear before merchandise is shipped.

master charge

BANKAMERICARD

Factory Direct - Phone Orders

(305) 771-2050 • 771-2051

OPTOELECTRONICS, INC.

5821 N.E. 14th Avenue, Fort Lauderdale, Florida 33334

WB2HIQ 141, WA2JKG 137, K2GCF 114, WB2LIG 80, K2CRT 41, KA2CNN 39, WB2IDP 37, N2LI 28, W2DBQ 16, K2IZ 14, WA2YUS 14. (Mar.) WB2EUF 156, K2HD 131, WA2JKG 104. (Feb.) WA2JKG 108.

NORTHERN NEW JERSEY: SCM, Robert Neukomm, WA2MVO — SEC: WB2VUF. STM: W2XD. NM: AF2L K2VX WA2LVH WB2RMI WA2OPY & W2UEZ.

Net	Mgr.	Freq.	Time/Days	Sess.	QNI	QSP
NJN	AF2L	3695	7 PM Dy	30	591	318
NJN	AF2L	3695	10 PM Dy	30	385	214
NJPN	K2VX	3950	6 PM Dy 9 AM Su	35	601	357
UCEN	WB2RMI	146.085/685		30	262	178
OBTTN	WA2OPY	147.72/12	8 PM Dy	30	314	93
NJSN	W2UEZ	3735	6:30 PM Dy	21	104	24
NJVHF	WA2LHV	49/49	10 P			

It is with deep regret that I advise W2SWE is now a Silent Key. He was a "super" CW man and loved traffic and he will be sorely missed! WB2PIR to Tech; and KA2ERI also. WB2WEX and WA2YOS. KA2AVA and K2LPG now sporting new ICOM 211s. Mark your calendar for the 550 Club Fleamarket on August 18th at the American Legion Hall in Oakland. BARA nets: 145.80 FM Wed 9 PM and 21.150 8 PM Fri and 8:30 PM Su. At this writing the following clubs plan Field Day operations that I'm aware of: 550, BARA, Englewood ARC, TCRA and others. I hope all had an excellent time at "field day". A new club has started in Belmar: "BARS" is the name and its primary purpose is running classes for licenses. Contact WB2TOM for particulars. May 12th BARA and the Bergen County FM Association covered the "Christian Health Care Center" at Wyckoff's Marathon with K2IZI K2ZO N2LA WA2PIK WB2PIL WB2KIM and K2TM participating. The same group ran the Ridgewood Memorial Day Marathon on the 28th with 4,000 entrants in both the 5 and 10 kilometer runs. It's Ridgewood's 4th year! Just got news that a new gang called the "Rock Creek Critters" are going upstate New York to work portable for FD and they hope to use a 30-year old generator — look for them under K2TN/P. 550 Club is having a picnic in the Ramapo Mountains the weekend of July 28-29 and get particulars from WB2VZW or WB2LBP. All you traffickers — the Annual NNJ/SNJ picnic will be held at the usual place — Shark River State Park and the date to be announced is in July. Mark your calendars. Two new members of TCRA are: W2ENY and WA2RME - welcome! K2VX NM for the NJPN gave an excellent talk on handling traffic at the 550 club. He is available or talks at other club groups, so send him a radiogram. Rutgers University ARC new officers: WA2MLY, pres.; WA2SAU, vp.; WB2TDI, treas.; WB2WIO, secy. W5DTR/2 started Hunterdon County Traffic and Emergency Net on Thurs 8 PM on 147.375. He was also active in 2 recent walk-a-thons. W2ODV undergoing extensive renovation for CD preparedness. NJS net sessions 30, QNI 204, QSP 105. Traffic: (Apr.) WB2RMI 845, W2RQ 333, W2COB 314, K2VX 289, KA2CHK/T 227, AF2L 190, WB2RMJ/T 163, WA2MVO 144, W2UEZ 114, W2SQ 111, N2IC 101, W2ZEP 55, WB2AIU/T 54, AG2R 54, W2UH 43, WA2QVE 37, WB2HSG 36, K2PH 32, W2TCA 31, WA7DPK/2 26, WA2QWR 18, W5DTR/2 14, K2ZFI 12, WA2EPK 6, W2ODV 2, W2KB 1. (Mar.) WB2RMJ/T 56, WB2QWR 35, WB2KLF 22, WA2EPK 3.

MIDWEST DIVISION

IOWA: SCM, Max R. Otto, WØLFF — SEC: WØIYW. WAØAUX at the helm of WBØKAM, kept track of the Pony Express riders with the help of: WBØADZ WØASM WBØENL WBØETW WØFQ WØGL! KØHCN NØHR WØIYW WØIZK KØKGJ WAØKVB WAØKXR WØLMP WAØMIZ WØTHC WAØUVH WBØWOE WAØYFQ WAØYGV and WBØZQC. Mt. Pleasant repeater will be on soon on 7.99/39. Congrats for upgrades to General go to WDØDCG KAØAMR KØIWA and WBØHVR. Election results for The Iowa 75M Net show WØSRR KØKOJ ACØZ WBØMOY WAØYGV directors with KØJVO chairman of the Board. WBØJFF, secy/treas. NCS for Noon session: WBØAVW WBØTWW KØJGI WØWC WBØJFF and WØWDC who is also manager. NCS for eve. session: KØRN KØLK WBØJYF WØLFF WBØAVW and WØYLS who is also mgr. Congrats to WBØZXU for logging a KL7 and KH6 to complete all 50 on 2M. KØSVX moving to Florida. WAØAUX and WØUPX keeping Iowa alive on DTRN. KAØCLO and KØCKX have new 227RA. WØGET has IC-701. WDØAQC has new stack fives and Jena Quad. WAØEDF has new System III and WDØHND has new 101-ZD and has WAS on Novice Bands. WAØZZG had 30 Novice students, WDØEJQ had 18 pass code. NØII will start General Classes July 11. WØGGO WØGON and WØTGO handled H & W for Wichita Falls. WAØYYL back in New London. WØSWY has patch on 2. WBØTXL team tound Cedar Valley fox in 40 minutes. Have a safe 4th, so you can call me on the 5th.

Net Mgr.	Freq.	Time(Z)Days	QNI	QTC	Sess.
Iowa 75M WØWDC	3970	1730 M-S	1204	94	25
Iowa 75M WØYLS	3970	2300 M-S	878	101	25
Tall Corn WØYLS	3560	2330 Dy 0300	367	143	60
Iowa Code WBØNSS	3713	2359 M-W-F	64	27	12

Traffic: WAØAUX 496, WØSS 232, WØYLS 206, WØUPX 172, AEØR 80, WDØGDL 76, KØGP 76, KØOFI 24, KAØBYI 14, WØBW 5, WDØHND 5, (Mar.) KØHCO 4.

KANSAS: SCM, Robert M. Summers, KØBXF — WØKL reports ARES membership standing at 868. Only 14 local emergency nets active the past month in 56 sessions — another slow month. WØFT confirms this with the comment-Highlights will have to be at the hamfests this year and not on the ham bands due to QRN. The Hiawatha ARC and others have seen to it that the Sabetha and Hiawatha libraries now have the ARRL books. A real fine project. From WBØFAQ — Oscar is dead — number 7 that is! Oscar 8 is going great guns but needing more Kansas stations to show. For more informaton try 146.49 MHz. Our state net reports are as follows:

Net	QNI	QTC	Mgr.	Freq.
KSBN	1113	218	WØOYH	3920
KPN	200	40	WØOYH	3920
CSTN	941	101	WAØOMB	7255
KWN	813	444	WAØLBB	3920
QKS	445	201	WØFT	3610
QKS-SS	122	28	WDØESF	3735

For more details of the nets consult your ARRL net directory. Traffic: (Apr.) WBØOBH 319, WDØACG 182,

OMNI HAS IT *ALL*. All the advantages and capabilities, all the new conveniences and new levels of performance you need, whatever your HF operating specialty. All built-in, ready to use.

***ALL* SOLID-STATE.** All the advantages of total solid-state from the pioneer of HF solid-state technology. Reliable, cool, stable — from receiver front-end to transmitter final.

***ALL* HF BANDS.** From 160 through 10 meters (and all the crystals) plus convertible 10 MHz and "AUX" band positions for possible future needs.

***ALL* BROADBAND.** Band changing without tuneup — without danger to the final amp.

***ALL* READOUTS.** Choose OMNI-A for analog dial (1 kHz markings) or OMNI-D for six 0.43" LED digits (100 Hz readability.)

***ALL* VOX AND PTT FACILITIES** built-in; 3 VOX controls plus PTT control at front and rear jacks for external PTT switch.

***ALL* SQUELCH NEEDS** for tuning and monitoring are built-in.

***ALL* FILTERS INCLUDED:** 4-position CW/SSB filter (150 Hz bandwidth with 3 selectable skirt contours) plus 8-pole Crystal filter (2.4 kHz bandwidth, 1.8 shape factor.)

***ALL* MODE SWITCH** puts all filters to work in any mode.

***ALL* BREAK-IN:** Instant or delayed receiver muting to fit any band condition or mobile operation.

***ALL*-VERSATILE OFFSET TUNING;** dual ranges, ±5 kHz range for off-frequency DX or ±0.5 kHz range for fine tuning.

***ALL*-SENSITIVE RECEIVER;** from 2 μV on 160 m to 0.3 μV on 10 m (10 dB S+N/N) for ideal balance between dynamic range and sensitivity.

***ALL* OVERLOADS HANDLED;** dynamic range typically exceeds 90 dB and PIN diode switched 18 dB attenuator also included for extra overload protection.

***ALL* LINEAR/ANTENNA BANDSWITCHING FROM FRONT PANEL;** auxiliary bandswitch terminals on back panel for external relays or circuits are controlled simultaneously by the OMNI bandswitch.

***ALL* INTERFACE JACKS FOR PHONE PATCH;** access to speaker and microphone signals.

***ALL*-LEVEL ADJUSTABLE ALC;** set output from low power to full, retain low distortion at desired drive to power amp.

***ALL* SIDETONE ADJUSTMENTS:** pitch and volume.

***ALL*-POWERFUL, *ALL*-WARRANTED FINAL AMPLIFIER.** 200 watts input to final. Proven design with full warranty for first year and pro-rata warranty for additional 5 years.

***ALL* 100% DUTY CYCLE.** For RTTY, SSTV or sustained hard usage.

***ALL*-MODE POWER:** basic 12 VDC for easy mobile use, external supplies for 117/220 VAC operation.

***ALL* FRONT PANEL MICROPHONE AND PHONE JACKS.** Convenient.

PLUS *ALL* THE OTHER HANDY BUILT-INS: "Timed" 25 kHz crystal calibrator in OMNI-A with automatic 5-10 sec."on" time for easy 2-hand dial skirt adjustment . . . Zero-Beat switch for placing your signal exactly on CW listening frequencies . . . SWR bridge switches "S" meter to read SWR each time you transmit for continuous antenna monitoring . . . Separate receive antenna capability . . . Dual speakers for greater sound at lower distortion . . . Plug-in circuit boards for fast, easy field service.

***ALL*-FUNCTIONAL STYLING.** "Clamshell" aluminum case clad in textured black vinyl with complementary nonreflective warm dark metal front panel and extruded aluminum bezel and bail. Convenient controls. Complete shielding. And easier-to-use size: 5¾"h x 14¼"w x 14"d.

AND *ALL* THE OPTIONS: Model 645 Keyer, Model 243 Remote VFO, Model 248 Noise Blanker, Model 252MO AC Power Supply.

Model 545 OMNI-A $899 Model 546 OMNI-D $1069

Experience the *all*-encompassing HF world of OMNI. See your TEN-TEC dealer or write for *all* the details.

arma

TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862
EXPORT: 515 LINCOLN AVE., CHICAGO, ILL. 60646

TEN-TEC's "OMNI" FILLS *ALL* YOUR HF NEEDS

Swan's Success Story:

100MX Power House

The Field-Proven Rig the Whole World's Talking About.

235 Watt PEP and CW on **ALL** Bands

Price? You won't believe it! Just ask your dealer.

All solid state quality American construction, with epoxy glass boards to withstand the rugged mobile environment.

Look to Swan for Quality Accessories and Service

SWAN ELECTRONICS

A member of the Cubic Corporation family of companies.

305 Airport Road
Oceanside, CA 92054
714-757-7525

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.

PSU-5 Power Supply with Speaker

ASTRO 150 Transceiver

ST-3 Antenna Tuner

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

W0HI 180, W0AM 164, W0OYH 161, K0EZ 116, W0FIR 88, WD0FBP 82, W0FT 48, K0FPC 45, W0CHJ 42, W0HYC 38, W0KL 31, WA0WJX 30, K0BXF 25, WD0WZF 25, W0RBO 23, W0PB 17, K0YTA 16, N0AOL 14, W0FDJ 14, WB0SZS 12, WB0CJB 12, WA0SEV 11, N0IN 3. (Mar.) W0HI 119, W0PB 20, W0KL 12.

MISSOURI: SCM, L. G. Wilson, K0RWL — Assistant SCM: Joe Flowers, W0OTF. SEC: WB0FKY.

Net	QNI	QTC	Net	QNI	QTC
HBN	304	13	MEOW	356	52
TNT	92	25	NEMOE	197	1
ACE	27	1	METN	186	86
MON (March)	269	214	MON	252	306
MON2)March)	166	55	MON2	145	84

All stations are urged to take part in all Missouri nets. We are especially looking for stations in small towns and less populated areas to check into cw nets for clearing traffic. If information is needed, contact W0BMA or myself. Congratulations to the PHD ARC for another excellent hamfest. Still did not win any big prizes, must be talking to the wrong persons. My XYL and I had an enjoyable trip to the Dayton Hamfest and it was very nice to meet several Missouri hams there. It is understood that AB0I will shortly have a couple of quads up at 150 feet plus a backup system at 80 feet. The backup system was good enough for over a million points during the tone WPX. N0XA is sporting a new 4 element quad at 90 feet. WB0MPH now has an Icom 701. Does not sound like I am going to have too much luck DXing with all these big guns and new antennas. At a recent hamfest, a certain cw contest freak took the Extra code test and failed to everyone's surprise. That same afternoon he was able to copy a DX pileup contest at 25 wpm fairly well. I am now waiting for the FCC to make their tapes a DX pileup before retaking. HI! Traffic: W0BMA 778, W0HH 460, WD0FZJ 251, W0OTF 199, K0ONK 183, K0SI 159, WB0NIE 147, W0OUD 103, W0BV 78, K0SSN 66, WB0SND 44, AI0I 35, W0BVL 26, W0VTF 22, K0RWL 17, WA0KUH 2.

NEBRASKA: SCM, Ed O'Donnell, WB0GWR — K0MAF, of Lincoln, is a Silent Key. The Three Rivers ARC, in Beatrice is active and involved in storm-watches. The Blue Valley Club in Seward has installed a new repeater on 87/27 near Seward and York. The Pine Ridge ARC held their 25th Silver Anniversary Hamfest June 2nd & 3rd. The Sandhills ARC and other clubs, have plans for the Victoria Springs Hamfest which will be held July 28 & 29. Beginning July 1st, Rex Greenwell, K0KP, of Lincoln will be the new SCM for Nebraska. NET REPORTS: Nebr. Cornhusker Net, QNI 864, QTC 94; Mid-Nebr ARES 2Mtr Net, QNI 158, QTC 2; Nebr. Morning Phone Net, QNI 1160, QTC 46; Nebr. ARES 75 Mtr. Net, QNI 204, QTC 1; Nebr. Storm Net, QNI 1147, QTC 68; Pawnee ARC 2Mtr FM Net, QNI 126, QTC 0; Platte Valley 2Mtr Net, QNI 55, QTC 0; P M Net, QNI 233, QTC 54; OCWA Net, QNI 65, QTC 0; Sandhills WX Net, QNI 125, QTC 0; Western Nebr. Net, QNI 556, QTC 52. Traffic: W0FQB 320, W0VEA 104, K0BRS 103, K0AIE 80, WA0BOK 58, W0GEO 50, W0VYX 31, W0EUT 26, W0HOP 21, W0HTA 21, W0ZNI 18, WB0GWR 17, WA0PCC 16, WA0DXY 11, W0WKP 11, WB0GMQ 9, WA0QEX 7, WB0IGN 3, W0YFR 3, W0DJU 2, W0NIK 2, W0OOX 2, K0SFA 2, WA0LOY 1.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, W. I. Pace, W1ID — SEC: W1SY. STM: WB1AIU. NMs: WA1LOU K1EIR K1EIC. WA1ELA. EC: K1DFS.

Net	Freq.	Time/Days	Sess.	QNI	QTC
CN	3640	1900/2200 Dy	60	396	329
CPN	3965	1900 M-S /000 Su		465	175
WESCON 78/18		2030 Dy	30	603	128

CN HI QNI: W1EFW W1WP WA1UUA WB1CPF.
CPN HI QNI: K1CD W1HMJ K1EIC.

Please allow me to take a bit of our valuable space here to thank WB1AIU for his help in putting the last column together. With an operation in December followed by a bad case of hepatitis (probably hospital occassioned) I was in no shape at all to do the job. He came thru and did the job promptly and well. My apologies to those organizations to whom I had committed time and a club visit which of course could not be kept. Noteworthy of these was the annual CPN dinner!!!! I sincerely promise each of these commitments will be met as soon as the old "pins" steady up again and the good Lord willing that should be very shortly now! The PVRA announces it's annual election meeting on June 15 1979 Fri at 8:30 PM at the Holiday Inn, East Main St., Meriden. Tid-bits from N1ABL's PVRA Times. WA2LGG has been know to operate from the shower! Dont feel bad, K1LOM. It is now a proven fact that chicken soup will do it every time! All of the periodicals received here are indicating this year should be a banner one for Field Day. All are making for this year to be the "big-one." The Shoreline club has donated $50. as there effort to help some ham in an undeveloped country with a rig. Most commendable!!! W1EZE has graciously offered the use of his private swim-club facilities to all hams. This comes early in June on the 3rd and should be a great family day with all of the facilities of the club at the disposal of all. He has even conceded to permit a tail-gate flea-market which should certainly turn into a very popular of the festivities. Traffic: W1OD 434, WB1CPF 270, WA1UUA 245, W1DFT 218, K1GF 217, W1EFW 215, K1DFS 158, K1XA 89, W1HMJ 76, WB1AIE 74, W1BDN 65, WA1RLV 52, K1ADE 31, W1GVT 22, W1KV 21, WA1LOU 18, WA1ZNK 15, WB1DJG 12, W1BDI 11, K1EUW 10, K1OQG 10, W1OV 10, W1CUH 6, W1JA 5, K8AXL 2, W1VS 2.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — SEC: WA1BLG. STM: WA1TBY. EC: K1FMN W1XA N1RR W1ZMO W1ALP. OO: WA1NAE W1NF W1AUQ OVS: W1JR W1GXT OBS: WA1QAA.

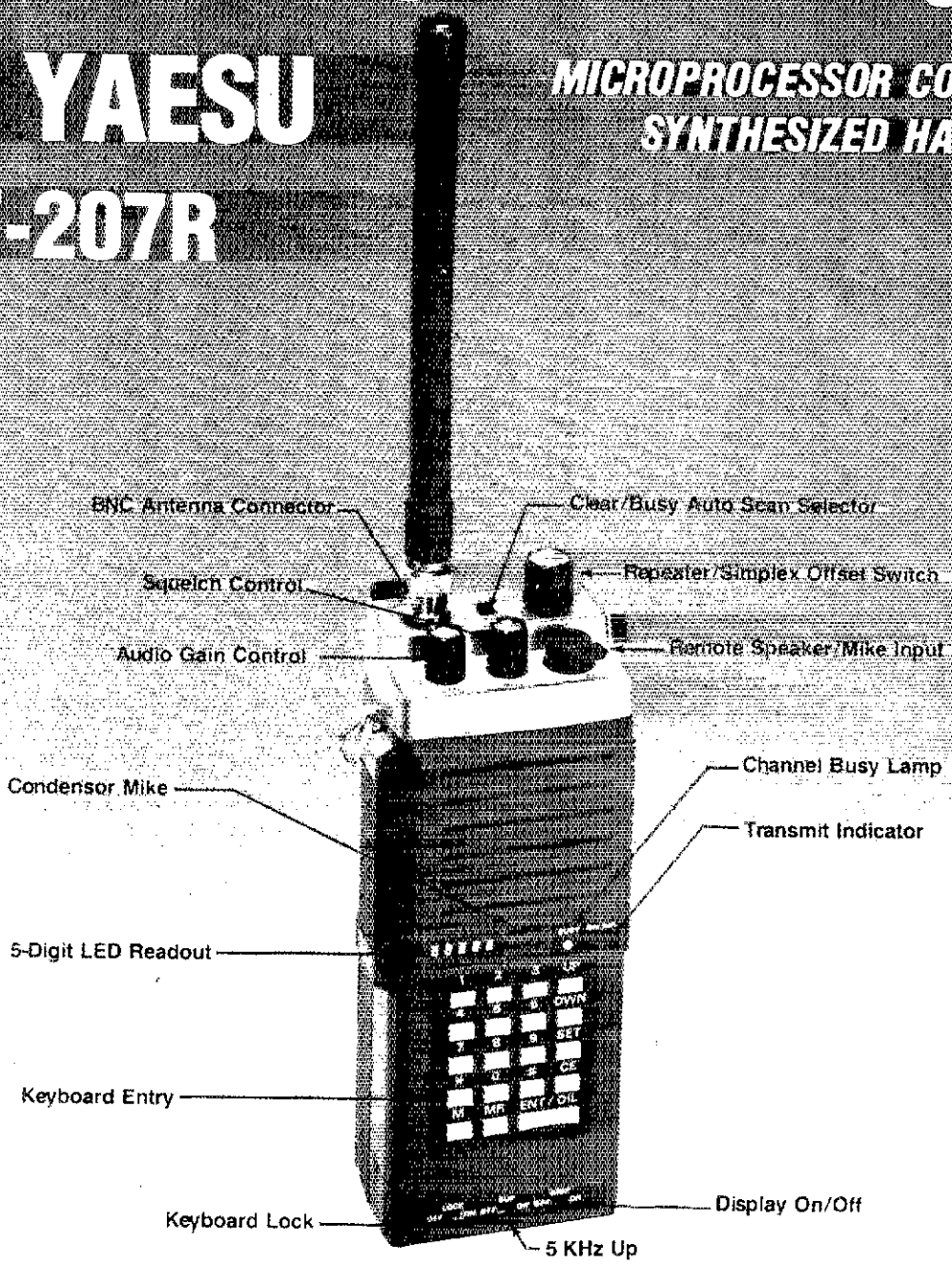
Net	Freq.	Time/Dy	QNI	QTC
EMRI	3.58	19/2300 Dy	597	387
EMRIPN	3.898	1730 Dy	412	224
NEEPN	3.945	0830 Su	70	24
EM2MN	90/30	2000 MWF	30	26
EM2MN	145.8	2000 TTh		

Barnstable Club had NE Director, W1HHR, and your SCM attend meeting and W1HHR presented K1VV with an award for Public Relations for his efforts on the Marconi anniversary station. K1VV was quick to say that many people worked on the project and they deserved credit also. I bet a lot of you got a kick out of working the simulated spark gap signals. K1YHM of the Framingham Club is starting a scrapbook for the club. Quanapowitt Radio Assn. News reports that W1VRK, a pioneer in SSTV, now active on K1VTE's ATV repeater in Malden. Whitman ARC ran a mall display in Brockton. Greater Lawrence Amateur Radio Fellowship, a new club, already affiliated. Massasoit Club reports that the

A Breakthrough In Technology!

THE YAESU FT-207R

MICROPROCESSOR CONTROLLED SYNTHESIZED HANDIE



The Yaesu FT-207R Synthesized Handie has all the features you could want in a very compact package

- 144-148 MHz Range
- 10 KHz Steps
- 3 Watts Output
- 4 Memories plus Programmable Offset
- Priority Channel
- Memory and Band Auto Scan
- Optional Equipment:

Tone Squelch, Speaker/Mike, Nicads, Battery Charger

- Keyboard Encoded Frequency Entry
- 2 Tone (Touchtone®) Input from Keyboard
- Keyboard Lock guards against accidental frequency change
- Odd Splits Can Be Programmed from Keyboard
- Automatic Battery Saver Feature for LED Display
- Rubber Flex Antenna

arma

Price And Specifications Subject To Change Without Notice Or Obligation

YAESU **The radio.**

YAESU

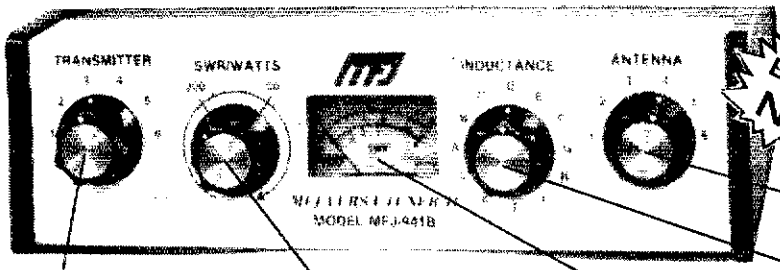
YAESU ELECTRONICS CORP., 15954 Downey Ave., Paramount, CA 90723 ● (213) 633-4007
YAESU ELECTRONICS Eastern Service Ctr., 9812 Princeton-Glendale Rd. Cincinnati, OH 45246

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



BRAND NEW

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 BRAND NEW

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 BRAND NEW

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 BRAND NEW

Same as MFJ-941B, less SWR/Wattmeter, antenna switch, mounting bracket. 7x2x6 in.

ULTRA COMPACT 200 WATT VERSA TUNERS FOR ALL YOUR NEEDS.

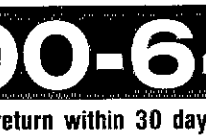
MFJ-901 VERSA TUNER MATCHES ANYTHING, 1.8 THRU 30 MHz. NEW LOWER PRICE

$49.95 BRAND NEW

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 BRAND NEW



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

MFJ ENTERPRISES, INC. P. O. BOX 494 MISSISSIPPI STATE, MISSISSIPPI 39762

Pastor of St. Thomas Church has offered room for classes and clubhouse at no charge. He knew about Amateur Radio as a missionary in South America when phone patches were run for him. WA1YAU won the Wellesley ARS WAS competition. K1BSO handled emergency traffic with KA1EQ aboard a ship in the vicinity of Mt. Soufriere when it erupted. Eastern Mass. traffic handlers gathered in Dedham for what hopefully will be an annual event. Kudos to WA9NEW for organizing the affair. Its Bikeathon and Walkathon season with groups from the following participating: Minuteman Repeater Association, Chelmsford, Billerica, Bedford, Bellingham, Sturdy Memorial Hospital ARC, Dartmouth and New Bedford. WA1ZQT worked KH6 to complete WAS. W1AUO drove to Newington with his 101 cards and in 20 minutes was checked out for DXCC. W1NF resuming sked with W1MZ/MM. Boston University considering a 2 meter repeater. WA1VAB announces a change in the EMRI net frequency from 3.66 to 3.58 to get off the commercial RTTY station. Your SCM requests nominations for an annual Public Service Award to be presented at the NE Division Convention in the fall. Lets hear from you. Traffic: (Apr.) WB1DXR 360, W1PEX 328, WA1EYY 296, WA1TBY 268, WA1ZAZ 256, WA1YWK 149, K1GN 126, K1BSO 94, W1ATX 87, WA1LAD 69, W1CE 68, WB1EMU 63, W1TR 63, WA9NEW 61, W1FJI 51, W1DMH 49, KA1AHD 39, K1BZD 39, W1MX/AD1F 31, WA1ZGK 23, WA1IFE 16, WB1FSD 15, N1EE 13, WA1FNM 12, W1XA 10, W1PI 8, WB1ACA 3, AC1O 3, W1ALP 1. (Mar.) W1PEX 304, WA1YWK 189, W1ATX 173.

MAINE: SCM, Ed Bristow, WA1MUX — Sandy River ARC new officers are: W1HTG, pres.; WB1EYS, v.p.; WA1LZR, secy.; KA1CNV, treas.; WB1FNG, activities. Androscoggin ARC worked foot race for Lewiston Rec. Dept. WA1s SCO JZP WB1AOD & K1YXO on hand. Club also to cover May 6 Walkathon. Pine State ARC worked Safety & Admin. Comm. for both the Squadabscook (4/15) & Kenduskeag (4/21) Canoe races. 15 members turned out. NCSs N1SW & N1AHH. Sess/QTC/QNI:SGN 25/182/1013; SPSN 7/6/26; PTN 31/140/245; BYN 25/27/841; CMEN 12/13128; AEN 5/2/57. PSHR: W1RWG W1BJ AF1L. Our D1RN coverage was 88.8% in April-Sure you'd like to try it-contact K1GUP for details. Traffic: N5YX 141, W1RWG 111, W1BJ 86, W1ISO 78, W1KX 76, N1RP 68, W1HDC 64, AF1L 59, WA1JZP 41, WB1BYR 38, WA1MUX 36, K1GUP 34, W1JTH 28, WA1JCN 28, WA1YNZ 15, W1CTR 10, W1BMX 7.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1SWX/W1NH — SEC: K1RSC. NMs: N1NH W1TN. Congratulations Port City ARC new officers: WB1ALS, pres; WB1DSW, vp; W1YFZ, secy; WA1PSR, treas. Concord Brasspounders planning Amateur Radio Week June 17 thru Jun 23. N1CB says don't forget King Ridge on Sept 23. Come and win the Tempo 2M Syn HT. W1DPv now at Iron Mt., NC on 40 cw with TRY looking for NH friends. W1GUX will have his rig fixed soon. The NH CW Net meets on 3622 at 630 local. Dont forget the ARRL convention in Hartford on Sept 29 and 30. For those who really plan ahead, it will be back in Boxborough on Oct 3-5 1980. WA1FSZ now AF1T, W1VTP has a bigger & better 75 meter antenna. He is also looking for 2 meter SSB contacts. N1AIX WØEB WB1EWE W1HZN & W1TN provided communications for the Merrimack Walk-A-Thon. W1HZN's XYL Marianna assited in finding the Fox in the Nashua Clubs Fox hunt. The moonbounce antenna has been moved from W1NH to K1MFQ's. WA1YDC is recovering from an auto accident. Everyone have a Happy 4th. Traffic: K1BCS 941, W1TN 239, W1GUX 191, N1NH 132, WB1HFI 30, W1MHX 28, K1UQX 24, WA1HOB 19, W1SWX 9, W1CUE 8, WB1HGQ 7, WA1SRU 6, WA1PEL 4.

RHODE ISLAND: SCM, J. Titterington, W1EOF — SEC: K1DT STM: N1RI. All hands are requested to participate in the annual RI QSO Party on July 28-29. EBAWA once again is the sponsor. Get on, gang, and make a lot of noise for Little Rhody. More details from N1RI or N1DM. Congratulations to Hope Valley Rptr Assn. — they have ARRL affiliation. Apple Valley ARC dinner was successful. Many section people were in the Red Cross Disaster Drill of Apr. 26th & first reports were very encouraging — particularly in the Newport area. Anyone interested in low freq. tests on 160 kHz get in touch with K1DT. PRA will open their fall season will full schedule of technical talks. As usual, all groups had a hang-up time on Field Day. RIEM 2-mtr traffic net QNI 242, ttc 80, WA1CSO, Net Mgr. We need traffic people, please contact this office. Traffic: K1BA 428, WA1YUH 88, W1EOF 37, WA1CSO 33, K1DT 26, N1RI 19, AE1S 10.

VERMONT: SCM, Bob Scott, WIRNA — SEC: WIVSA. Understand some were not too happy with this column in May QST. I agree in part with the author. Those who know me, know I moved a lot of ttc in years gone by. See Page 73 of May QST — congrats to the responsible party. New ARC — VT Tech. College; Advisor/Trustee WA1KLB. Randolph Ctr., VT. K1BQB watch out for WB1BZR! GMN 457/50; Carrier 445/37; VtRFD 89/15; VTP 77/13. WB1BZR reports working 8 call areas, 15 states on 144 MHz. Emergency Pub. Srvc 2 mtr. ttc. Both WR1AEA & WR1AFL, 2. One of 'em was a VE2, via autopatch, helping one of local hams who found the road to narrow! N1AIG organized and conducted communications for Bike-A-Thon, Burlington area, May 5. Traffic: K1BQB 127, WB1BZR 141.

WESTERN MASSACHUSETTS: SCM, Bill Lowe, W1TM — SEC: WAØDNB. STM: W1KK. NMs: W1UD WA1MJE. Section Nets: WMN 7 PM Dy on 3562, WMEN 4:30 PM Weekdays on 3935, WMEN 8:30 AM Sun on 3935. This net has liaison with entire section through two meter repeaters at 9:00 AM. All stations welcome. Recent NCS, WMN: N1YY, K1JJV K1JHC W1KK WB1AUV W1UD W1BVR, WMEN: W1UKR W1OWJ WB1EHS WB1CWH WA1MJE. WMEN: WA1DNB W1TM K1IQA N1AAX. Congrats to W1ZT on fine performance during 1978 88 contest. W1KUE out of hospital and doing well. WB1CSL, now Advanced, has installed 40M adaptor on his triband beam. W1WF reports antenna problems. Tower and beam in need of repairs. Top ttc station this month is K1SSH, who is regularly listed on the TCC roster. He is a good example of excellent cw performance. Incidentally, stations desiring to improve their cw ability should monitor NTS nets. Most section nets are in sessions 7 PM Dy on 80M. Traffic: (Apr.) K1SSH 236, WA1MJE 214, W1UD 115, W1TM 86, W1KK 76, K1JJV 40, WB1AUV 36, W1BVR 24, K1JHC 24, WA1PON 24, WB1EHS 23, W1UKR 23, W1EFC 21, K1BE 14, N1YY 11, WA1YWW 9, W1DVW 8, W1DOY 5. (Mar.) K1SSH 109, W1NLE 70, WB1AUV 41, W1DOY 18, N1CQ 11.

NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davie, KL7CUK — Spring has

TUFTS RADIO

STOCKS **Vhf engineering** PRODUCTS

SAME DAY SHIPMENT ON MOST ORDERS

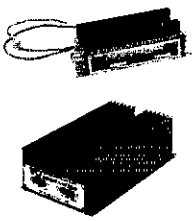
RECEIVERS

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 10.7F 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

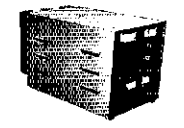


PA2501H Kit	2 mtr power amp—kit 1w in—25w out with solid state switching, case, connectors	69.95
PA4010H Kit	2 mtr power amp—10w in—40w out—relay switching	69.95
PA50/25 Kit	6 mtr power amp, 1w in, 25w out, less case, connectors & switching	59.95
PA144/15 Kit	2 mtr power amp—1w in—15w out—less case, 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

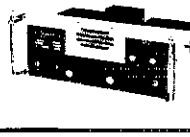
Model	Band	Power Input	Power Output	
BLC 10/70	144 MHz	10W	70W	159.95
BLC 2/70	144 MHz	2W	70W	184.95
BLC 10/150	144 MHz	10W	150W	269.95
BLC 30/150	144 MHz	30W	150W	249.95
BLD 2/60	220 MHz	2W	60W	189.95
BLD 10/60	220 MHz	10W	60W	169.95
BLD 10/120	220 MHz	10W	120W	269.95
BLE 10/40	420 MHz	10W	40W	169.95
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
RPT50	repeater—6 meter, wired & tested	899.95
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
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
DPLA50	6 mtr close spaced duplexer	680.00
DPLA144	2 mtr, 600 KHz spaced duplexer, wired and tuned to frequency	409.95
DPLA220	220 MHz duplexer, wired and tuned to frequency	409.95
DPLA432	rack mount duplexer	379.95
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	2,355.00
RB144 W/T	144 MHz repeater base station w/autopatch	2,085.00
RB220 W/T	220 MHz repeater base station w/autopatch	2,085.00
RB432 W/T	432 MHz repeater base station w/autopatch	2,105.00

AUTO PATCHES

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

209 Mystic Avenue
Medford MA 02155
1-800-225-4428
Mass. residents only
(617) 395-8280

OPEN DAILY 9-9 SATURDAY 9-6

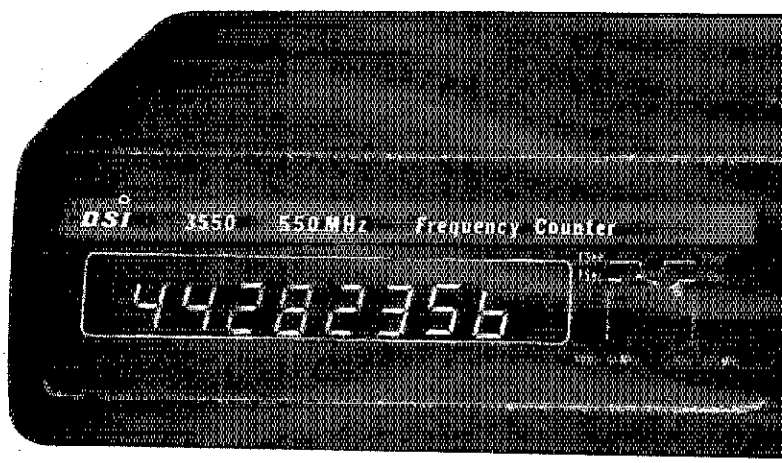
YOU ASKED FOR IT
YOU GOT IT
DSI QUIK-KIT®
50 HZ — 550 MHZ COUNTER KIT
95% ASSEMBLED 100% TESTED
Performance You Can Count On

FREQUENCY COUNTER APPLICATION:

- **Ham Radio — Two Way Radio — CB**
- **Audio Amplifier & Receiver Repair**
- **Computer Maintenance & Construction**
- **A Must for TV — PLL & VTR Repair**

$99.95
MODEL 3550K

includes built-in
Pre-Amp & Prescaler



DSI OFFERS THE BEST OF TWO WORLDS . . .

An unprecedented DSI VALUE . . . in a high quality, LSI Design, 50 HZ to 550 MHZ frequency counter kit. And, because it's a DSI innovation, you know it obsoletes all competitive makes, both in price & performance.

With 95% of the assembly completed by DSI, you are only one hour away from solving all of those difficult bench problems, from adjusting 60 HZ clock-time bases to setting the frequency of a 468 MHZ Mobile Radio.

(800—854-2049) (800—542-6253)

Every 3550 QUIK-KIT® PC board factory assembled and tested before shipme The problems of bad LED's, IC's, a Capacitors are a thing of the past. manufacturer except DSI offers a 550 M frequency counter with . . . 8 digits, .5 in. LED TCXO, 1 HZ resolution and a one year warra on parts for under $100.00. We do n know how long we can hold this low, low pri

Model	Price	Frequency Range	Accuracy Over Temperature	@ 146MHz	@ 220MHz	@ 450MHz	Number of Readouts	Size of Readouts	Power Requirements	Size
3700	$269.95	50Hz - 700MHz	Proportional Oven .2 PPM 0° - 40°C	10MV	10MV	50MV	8	.5 Inch	115 VAC or 8.2 - 14.5VDC	3"H x 8"W x 8"
3600A	$199.95	50Hz - 600MHz	Oven .5 PPM 17° - 37°C	10MV	10MV	50MV	8	.5 Inch	115 VAC or 8.2 - 14.5VDC	2¼"H x 8"W x 5"
3550W	$149.95	50Hz - 550MHz	TCXO 1 PPM 65° - 85°F	25MV	25MV	75MV	8	.5 Inch	115 VAC or 8.2 - 14.5VDC	2¼"H x 8"W x 5"
3550K	$ 99.95									

1 HZ Resolution to 55 MHZ • 10 HZ Resolution to 550 MHZ • .1 and 1 Sec. Gate Time • Auto Zero Blankin

3550K Kit	$99.95
T-101 Ant.	3.95
AC-9 AC Adp.	7.95
Shipping, Handling, Ins.	10.00

AMERICAN EXPRESS MasterCard VISA

DSI INSTRUMENTS, INC.
7924 Ronson Road, Dept. G
San Diego, California 92111

3550W Wired	$149.
T-101 (incl.)	
AC-9 (incl.)	
Shipping (incl.)	

TERMS: MC — VISA — AE — Check — M.O. — COD in U.S. Funds. Orders outside of USA and Canada, please add $20.00 additional to cover air shipment. California residents add 6% Sales

NEW FROM DSI

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

MODEL 100 HH
50 Hz — 100 MHz

$99.95
Without Battery Capability

SAVE $5.00
With Battery Capability
MODEL 500 HH . . $169.95
MODEL 100 HH . . $119.95

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. [illegible] (800—854-2049) [illegible] (800—542-6253) [illegible]

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	6	.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.

AMERICAN EXPRESS · master charge · VISA

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.

sprung in this section after a long cold winter. There is a considerable amount of new calls now with many stations being upgraded. We now have KL, AL and WL prefixes, but the most confusing is the same letters after the numeral with either KL or AL. KL7Q and KL7P (ex KL7JDI and KL7JDH) handled QTC for the Red Cross on the lower 48 flood problem. KL7FBR and KL7HAY have returned from the lower 48 for the summer. The Alaska Pacific Net and the Alaska Snipers Net continue to handle the QTC both to and within Alaska. Don't forget the Alaska 49er Net on ten meters, this is a *10X10* net that meets every Sa and Su. at 1900 Z. Join the gang and get in on the award certificate. I understand it is an outstanding award. Several classes of new operators have recently been licensed and soon will be on the air. Again I ask for activity reports from everyone. Traffic: KL7P 106, KL7Q 44.

IDAHO: SCM, Lem Allen, W7JMH — The Pocatello Club brings to our attention that in case of highway emergency, call the police or sheriff so you won't be sent the bill for the ambulance. K7LD was voted honorary life member. He will be missed. N7APC has new 20 wpm cw certificate! WA7GSM is off on a well deserved trip. Over the past 13 years as official weather station for Nampa he has sent 2080 weather reports to Denver. Thats quite a record. W7GHT is back from a trip where he logged over 1000 contacts with county hunters from exotic counties — good show.

Net	Freq.	Time/Days	Sess.	QNI	QTC
FARM	3935	8 PM Dy	26	1150	13
CD	3990	8-10 AM M-F	21	512	16
IMN	3635	9 PM M-F	21	183	98
EL-CEN	146.52		4	36	4
TV-EMG	145.44	9PM S	5	206	22

Be sure to send in your FD activity to SCM, for inclusion in this and other reports. Traffic: W7GHT 149, AC7P 127, WA7GSM 68, W7JMH 61, W7ASA 15, KA7COI 10.

MONTANA: SCM, Robert Leo, W7LR — Send me names or calls of Montana hams for Emergency Coordinators in Montana cities with no present EC. WIMU July 27, 28, 29 at Macs Inn. Glacier-Waterton hamfest July 21, 22 Essex MT. New ARRL License Manuals, Handbook, Repeater Directory now available. Join in MT section net, 1st & 3rd Su 3947 9:15 AM local time. Ideas from Apr. 15th session on emergency plans: form state 2-meter link system; develop state portable repeater for emergency work; have EOCs always available; develop more 2-meter RTTY stns; develop more local emergency plans before the emergency. Will report next month on RACOM (rptr advisory comm) May Helena mtg. Any inputs to the RACOM tech comm? WB7s UOB UOI tested Little Rockies for rpt site. W7NEG operated 3 county CD drill stn in Co. Courthouse. K7WNE reports on 2-mtr Missoula net, QNI 42, QTC 10. Meets Th 9 PM 28/88. They helped CE & CAP in search & rescue test IMN Apr. QNI 183, QTC 98. W7DB sent OBS. W7LBK back on with renewal too. KB7BI handled Texas Hurricane tfc, & much net activity. Some W7LR old timer QSLs (then W6PBV): W7CT 1946, W7DPK 1937, W7GHT 1939. RCVRS: 5X24, SW3, Silver 5B; TX: PP 10s, 53-140; 6L6s! Send in your old timer QSL info, or news from new QSLs or QSOs. Be thinking of a MT QSO contest & give me your ideas on this at the summer hamfests. Also I still need more inputs for this column. Traffic: W7IXD 36, KB7BI 16, W7NEG 9, W7LR 8, W7DB 4, W7HAH 4, W7LBK 3.

WASHINGTON: SCM, Bob Klepper, W7IEU — SEC: WA7RWK. STM: W7DZK. NTN 11:30 AM 3970 Dy, QNI 1448, QTC 80. ESN 5 PM 3920 Dy, QNI 432, QTC 33. WARTS 6 PM 3970 Dy, QNI 3124, QTC 214. NWSSBN 6:30 PM Dy, QNI 622, QTC 31. WSN 6:45 PM, QNI 459, QTC 191. CBN 7PM 3960 Dy. WARNS 7PM 3940 M. WEST 7:30 PM 3987 M. ARES/EC 7:30 PM M. WB7PSP new liaison from RN7 to PAN. Still has time to make WAS and prepare for FD. W7BCS worked both cw and SSB CD parties, in spare time chasing DXCC. K7EFB has made his DXCC. OARS had good turnout for first annual banquet thanks to WB7TIV and many hours with callbook. New officers Clark Cty ARC are: AE7P pres.; WB7SJH v.p.; WA7YEC, secy.; WB7RDE, treas., KA7CFT and WA7WOU have upgraded. Don't forget Wenatchee Hamfest June 2 and 3. WB7BND is chairman for North Seattle ARC FD activity. K7ANP is a SK. Regarding SK's, if you hear, or know of any, pse let me know so it can be reported to HQ. WARNS and AREC/EC nets have moved to Mon nights at 7 and 7:30 PM respectively. New officers for HAMS Club are: WB7EBP pres.; WA7VQO vice pres.; WA7OJI secy.; W7ZEV, treas. HAMS have also changed meeting nights to 2nd and 4th Wed. WB7EBP and W7ERH were NCS's for March of Dimes Walkathon. 9 members of Radio Amateurs of Skagit Cty (RASC) toured Jim Creek Naval Radio Station. New Members of RASC are W7AKY, WB7VQT and WB7SXK. SEC, WA7RWR, reports 1006 signed up in ARES. K7NZV assisted WA7EBH with Red Cross drill. KL7JEB KB6AL WB7SWW called by Skagit Cty Sheriff to help in search for 77 year old man. WB7GWC very active as NCS for local Diabetes Bikathon, also reports his XYL is now KA7DMA. I would also like to report that after many years of pushing, passed his Novice test and awaits his call. Good luck to all in Field Day but please watch for stations working public service communications on 2 meters. Amateurs in Marysville will be using 146.58 both Sat and Sun. How about some news from the rest of you? Traffic: (Apr.) W7DZX 982, W7AK 786, KL7JEB 529, W7LUP 368, W7KZ 177, WB7PSP 140, W7ZIW 131, K7GXZ 115, WA3WPY 109, WA7BDD 105, W7IEU 92, N7AJ 91, KA7AWH 47, W7EBU 32, WA7PHD 31, W7APS 30, W7BUN 25, N7AFZ 21, W7ZEV 21, K7AJT 18, K7NZV 14, WA7OJI 12, W7LG 8, N7AFY 7, N7RV 6, W7BCS 4, W7ERH 4, W7RXH 4, K7VNI 3. (Mar.) WB7PSP 61.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — Asst SCMs: K6UWR W6ZF VE2AQV/W6. SEC: K6UWR. PSHR: W6OA W6JXK. WD6BMX took a "short" vacation. W6OA using a new Ten Tec Omni-D and reports LARC "slowly" tooling up for FD. K6CSL heading up ACRC FD planning. W6ZF home from recent surgery at Travis Air Force Base and says "feel like I could lick my weight in tigers." KA4DZW, Central Solano County EC, reported a successful disaster drill in Benicia. Those participating with him wer KB6LL WA6TJK WD6BUS and WB6FIS in Vacaville who stood-by for traffic during the entire exercise. Also participating were members of SCARS and NBARA. N6XN, Napa County EC, directs the NVEN on WR6AFU each Wed at 7:00 PM. SBARA welcomed new members W6UAV W6JDT KA6EWH N6BFO. EBARC welcomed new members W6OR WD6DLR W6CGD. MDARC's "Carrier" for April gave their 275 paid-up members outstanding prose as well as excellent photo coverage of their auction and several photo-illustrated

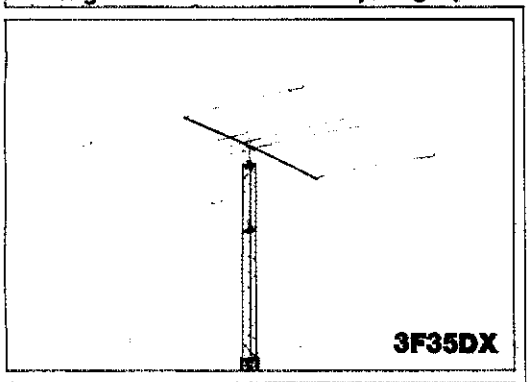
TET®

ANTENNA SYSTEMS

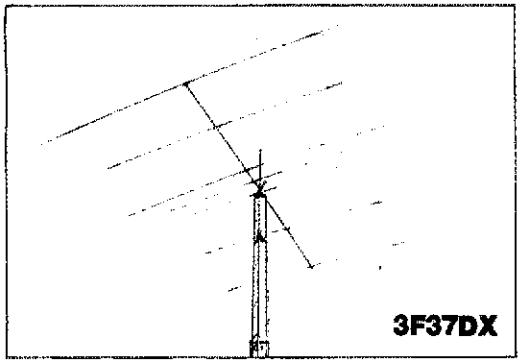
Multi Band Beam Super DX Series

NEW HIGH PERFORMANCE TRI-BAND BEAMS AS GOOD AS FULL-SIZE MONO BAND ANTENNAS.

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.

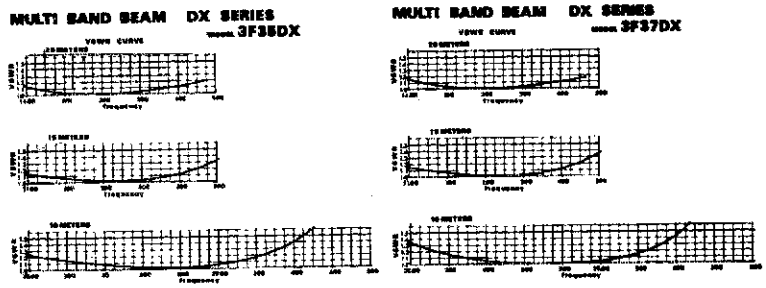


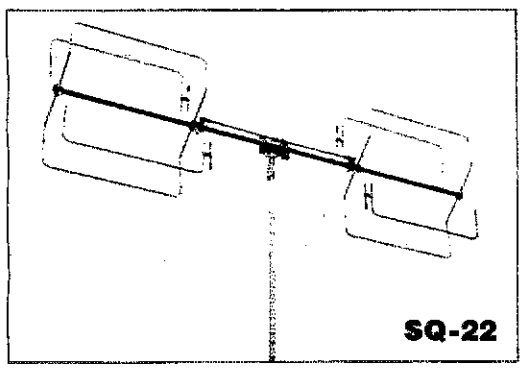
3F35DX



3F37DX

MODEL		3F37DX	3F35DX
BAND		14 21 28	14 21 28
ELEMENTS		7	5
ELEMENTS PER BAND	20m	3	3
	15m	5	3
	10m	5	3
ANTENNA GAIN	20m	EXCELLENT	
	15m		
	10m		
FRONT BACK RATIO		EXCELLENT	
MAX. POWER INPUT		3kw	3kw
VSWR		1.5 or better	1.5 or better
IMPEDANCE		50Ω	50Ω
MAX. ELEMENT L.		10.5m	10.5m
BOOM LENGTH		7.9m	5.0m
BOOM DIAMETER		50mm	50mm
TURNING RADIUS		6.3m	5.25m
WIND RATING		40m/sec.	40m/sec.
SUITABLE MAST		50mm	50mm
WEIGHT		23kg	17kg





SQ-22

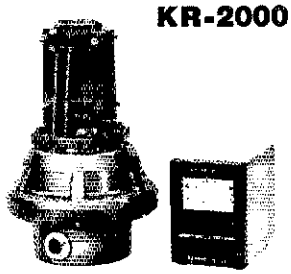
"SWISS QUAD VHF SERIES"

SQ-22 TWO METER DUAL QUAD

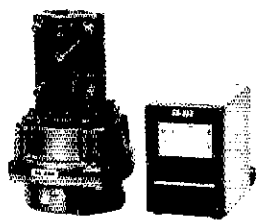
Antenna gain and front-to-back ratio are well improved when two elements are driven in phase difference compared to a single driven element such as a conventional quad or yagi. The SQ-22 provides the owner with features such as simple assembly and light weight.

KEN PRO ROTATORS

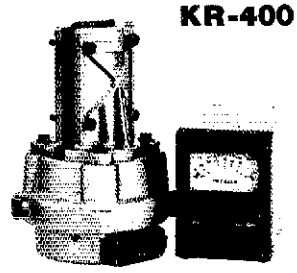
KR-2000



KR-600



KR-400

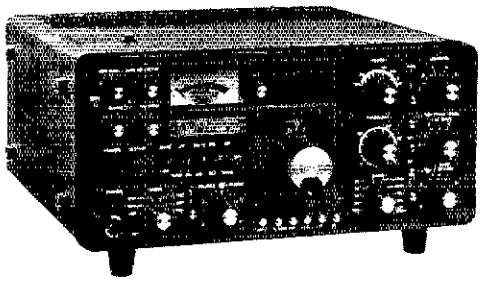


KR-500

425 Highland Parkway, Norman, Oklahoma 73069

Tel (405) 360-6410

TET U.S.A.



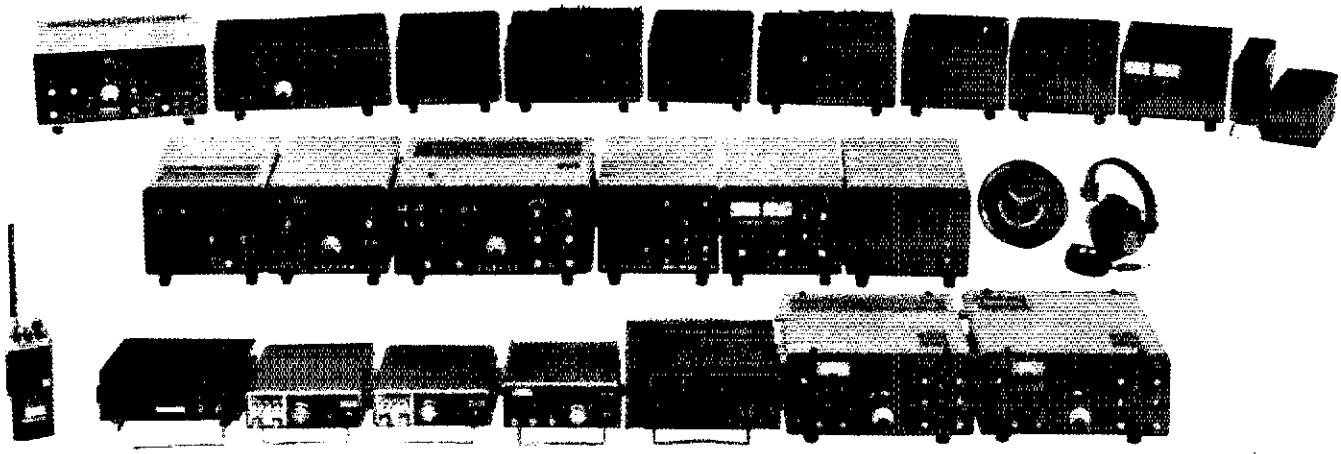
YAESU
The radio.

Is Our Number **1** Line At

Cohoon Amateur Supply

SOUTH
307 McLeans Hopkinsville, KY 42240
502-886-4534

WEST COAST
1298 Via Alta, Santa Maria, CA 93454
805-937-8685



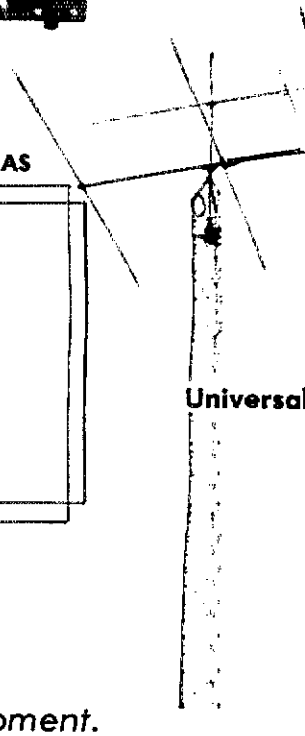
ALSO STOCKING:

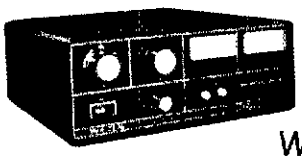
TRANSCEIVERS

ICOM
TEN-TEC
ATLAS
DENTRON
SWAN
PACE

TOWERS AND ANTENNAS

CUSHCRAFT
HY-GAIN
UNIVERSAL
ALLIANCE
HUSTLER

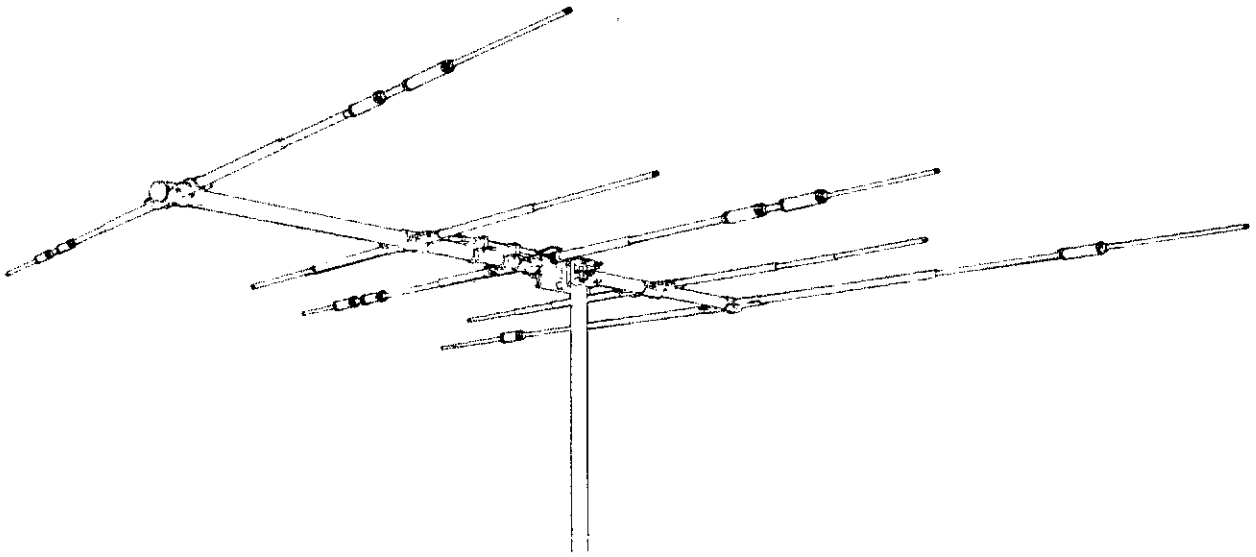




Write For Used Equipment
Sheets and Catalog

We also take trade-ins on all the lines we carry.
Call us at 502-886-4534 for a super deal on your old equipment.

TH5DX
10-15-20 METERS

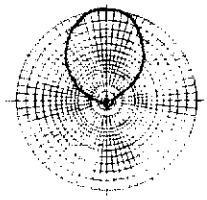


We are proud to introduce the newest member of our famous Thunderbird line of Tri-Band antennas. The TH5DX offers outstanding performance on 20, 15, and 10 meters. It features 5 elements on an 18 foot boom, with 3 active elements on 15 and 20 meters and 4 active elements on 10 meters. The TH5DX also features separate air-dielectric Hy-Q traps for each band. This allows the TH5DX to be set for the maximum F/B ratio and the minimum beam width possible for a Tri-Band antenna of this size. Also standard on this antenna are Hy-Gain's unique Beta-match, rugged Boom-to-mast bracket, taper-swaged elements and improved element compression clamps.

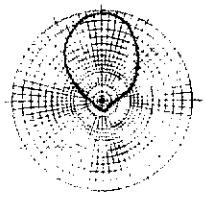
Boom length	**18 feet**
Longest Element	**31 feet**
Turning Radius	**18 feet**
Surface Area	**6.4 sq. feet**
Wind load	**164 lbs.**
Weight	**50 lbs.**

VSWR at resonance	**less than 1.5:1**
Power Input	**Maximum Legal**
Input Impedance	**50 ohms**
-3dB Beamwidth	**66° average**
Lightning Protection	**DC ground**

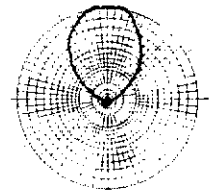
20 Meter



15 Meter



10 Meter



NOTE: These are original Polar Charts on file at Hy-Gain Electronics

hy-gain electronics
DIVISION OF TELEX COMMUNICATIONS, INC.
8601 Northeast Highway 6 • Lincoln, Nebraska 68505 U.S.A.
Telephone (402) 467-5321 telex: Hygain Lcln 48-4324
EUROPE: 22, rue de la Legion-d Honneur
93200 Saint Denis - France
Telephone: (820) 98.46 telex: Telrodi 630013

articles and features. Section clubs are on the move — attend a meeting and see what you've been missing. There's still time to sign-up for FD! Traffic: W6OA 295, W6JXK 290, N5MR/6 100, WB6UZK 52.

NEVADA: SCM, Leonard M. Norman, W7PBV — SEC: K7ZAU. The Pacific ARRL Division Convention (also known as Sierra Hamfest) site is MGM Hotel, Reno, August 11-12. Send QSL to WB7EIX for details. The annual SAROC Convention site is Hotel Tropican, Las Vegas January 10-13. Send QSL to POB 945, Boulder City 89005 for details. W7MWF and K6HIT/7 are on a diamond hunting expedition. W7OK and WA7ESM both out of hospital and doing FB.K7ZAU and K7YFN visiting their son in AZ. K7ZOK and YL have moved into their new QTH and have expanded their antenna farm and orchid greenhouse. W7PBV active with a Atlas 210, TH6DXX antenna and W-51 Tri-EX tower. Your June activity report due before July 5th should be sent to W7PBV, your July report should be sent to W7SK. W7ILX is a Silent Key.

PACIFIC: SCM, George Morton, N7HR/KH6 — This is my final column. I shall be relocated at NAVSECGRUDET POB 579, FPO Seattle 98788 by the time you read this. I'm looking forward to duty in the shadow of Mt Fuji, but will miss the aloha spirit of hams in Hawaii and the American possessions. KH6DD now has the helm of the section and I wish him fair winds, following seas and fullest support in his voyage as section skipper. He is an outstanding amateur, dedicated to league goals and a community leader who will serve well as SCM. I encourage section amateurs to reflect on the benefits derived by amateur radio from public service: Our unique skill in emergencies is needed in our island community to a greater extent than most other areas. Please give him the kokua needed to ready our section for any contingency. Aloha and best wishes to you all.

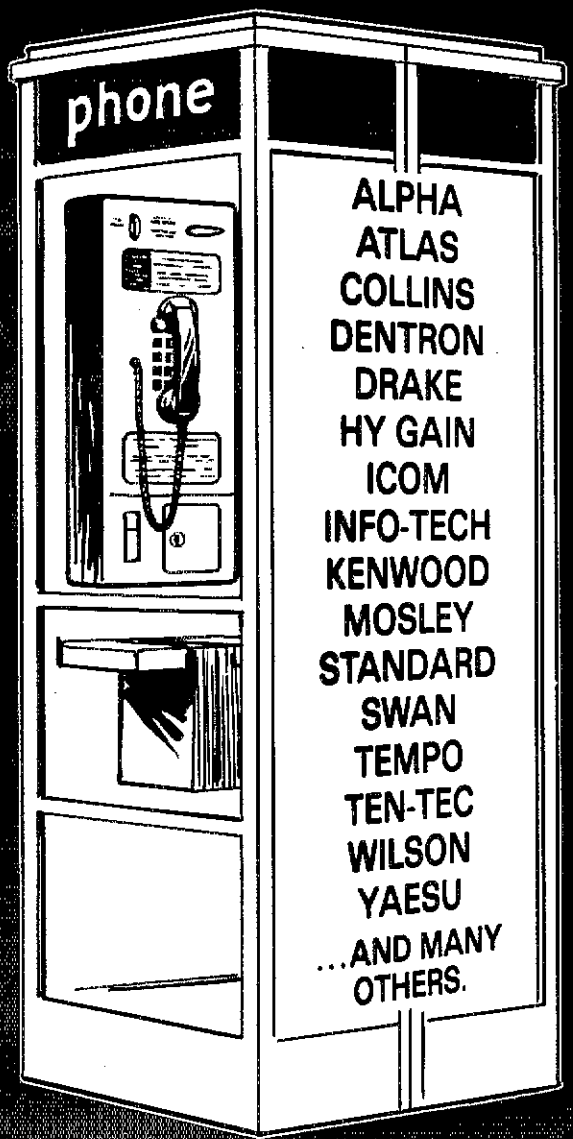
SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — ASST. SCM W6NJU. W6VTY has completed 18 audio powered Easter Eggs for blind children's fun. FB OM! WA6FGZ's Novice class had 15 graduates. W6TWS of the Nevada Co ARC became a Silent Key. WB6GFJ has been appointed as a Public Relations Assistant. Congratulations to K6ZYU WB6FBN WB6PWT and KB6LG who passed Advanced exams and K6SAM who made General. W6HNL a new Jem quad, WB6KYN a Tempo Syncon S1 and W86s TVX and VLN share a Midland 13510. N6AUQ and WB6GFJ have converted their CB rigs to 10 meters. N6JV crawled over the 300 country mark. The North Hills annual Ham Swap was the biggest yet. An overflow crowd and lots of gear. After 30 years of hamming, W6GO has confirmed over 100 countries. It wouldn't have taken so long if he hadn't kept listening for the squelch tail. Traffic: W6DEF 45, W6SX 21, W6RSP 3.

SAN FRANCISCO: SCM, Mark Nelson, AA6DX — SEC: N6KM. Your SCM is in the process of moving to Redding, in the SV, sooo! Field Day is to be biggest ever, according to club reports. Santa Rosa group is progressing on 432 EME. W6GYM has 76 countries wked with dipole at 20 feet! The Bay Area 220 Group is actively participating in WARC '79 preparations..are you? W6IPL, NCN Manager, is moving to Martinez. Tnx to WA6VEF for co-ordinating NCCC DX Test effort..70 megapoints! W6BON Silent Key. SFRC provided Bay Area Walkathons with communications, as Santa Rosa AREC for "Superwalk." Nice Job! N6GT reports heavy SSB and cw activity on VHF and errors and inequities in QST's "World Above" column. WA6SKC has FB AREC Net for Sonoma Valley. WB6TJU and KA6AAZ made Advanced Class. Traffic: (Apr!) W6NL 493, K6PB 153, K6TP 143. (Mar.) W6NL 214, WB6AMP 204, W6RNL 198, K6TP 104, W6IPL 92, K6PB 56 WA6QXV 40.

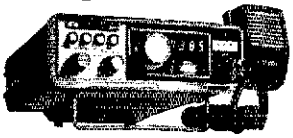
SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. W6IRJ is the new EC for Calaveras County. ECs are still needed in Amador and Tulare Counties. N6AWH is Net Manager and OTS. Appointments renewed: OTS, WA6RXI and WA6IQZ. EC, WA6KZV. OVS, W6DPD. W6OGL is the new pres. of the Central Valley RC. Officers of the Tulare County ARC are WB6THY, pres.; W6PIX, vp.; W6MUV, secy/treas. The club meets the 4th Thurs. in Visalia. SARA now has 70 members. New officers of the San Joaquin Net are W6DPD Manager, W6CUA secy, and WA6VIS asst secy. NCN/VHF for April QNI 1285, QTC 261. KA6FLO is a new Bakersfield Novice. WD6GGC made General. WA6ONI has a Tempo SY-1. KA6CTG is N6BJU. K6CPQ is N6DGS. WB6WVN has a new tower and beams. WA6VIS has a quad. KB6DI is on 2-m. I hope to see many San Joaquin Valley Amateurs at the Pacific Division Convention Aug. 11-12 in Reno, NV. Traffic: (Apr.) N6AWH 196, W6DPD 54, WB6TTP 46, WA6YAB 32, K6PMG 25, WA6WDL 6, WA6JDB 3. (Mar.) WB6TTP 14.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. NM: W6RFF. WB6VWK checking into NCN as well as OO duties. Regular reporter W6AUC busy with lone traffic and nets and also active with QCWA. W6KZJ busy as usual with NCN and traffic handling. K6PU reports that with help of K6SMH, his base for new tower is complete — and should have the tower up by now. K6PU also made DXCC honor roll after 21 years of DX chasing. W6YBV continues to collect surplus food from several supermarkets and distibutes them daily to several charity groups — *He does this early each morning, but still finds time to handle the most traffic in the section — a real Public Service ham!!* W6RFF finally completed the antenna installation after a year at the QTH. New members of SCCARC are; AA6T, KA6DZS and W6SGP. The NCN Honor Roll included SCV members; WD6AFR WD6GUA WD6GXY WB6HDO WA6JWK WA6KRA W6KZJ W6LLV WA6MIV WA6NMQ W6RFF W6YBV N6YE K6YKG and WA6ZFL. RFF acting as NCN mgr. while W6IPL moves to the Bay Area. In March NCN had 2293 check-ins in 91 sessions, and handled 691 msgs — a very active group. New members of LERA ARC is WB6WHQ. LERA is starting a Novice class and preparing for Field Day. Remember the Pacific Division Convention in Reno Aug 10-12, see you there. New members of PAARA; KA6EKG, KB6LT, WIARR, and WA6KVT. Their flea mkt is sked for Oct 6. N6YV works Europe with 5 watts! New affiliated club is W6YL Amateur Radio Club, San Jose State Univ. New SPARK member is N6BLR. New FARS members; WA6IAK and WB6KZI. Their flea mkt is Sept 9. I would appreciate news letters or bulletins from any club in SCV that does not send me one at present — thanks. Any info, from anyone, is welcome, and is needed by the sixth of the month. Traffic: W6YBV 374, W6RFF 57, W6AUC 49, W6KZJ 33.

Ham Radio Center has a Branch Store on the corner.



Special!



YEASU FT-227R—2-Meter

RETAIL $385.00

NOW $279.00

Add $3.00 shipping and handling/unit (USA)

CALL TOLL FREE

BEST PRICE

FAST DELIVERY

1-800-325-3636

HAM RADIO CENTER

8340-42 Olive Blvd. • P.O. Box 28271 • St. Louis, MO 63132

arma

master charge

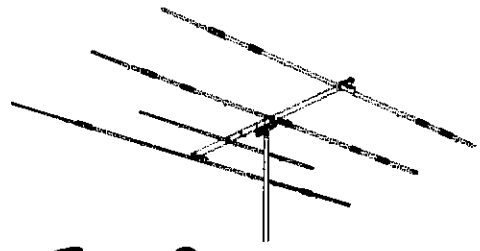
VISA

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	$299.95	$239.95	18HT	Hy-Tower 80-10M vertical	299.95	239.95
TH3MK3	3 el. 10-15-20M beam	229.95	179.95	18AVT/WB	80-10M Trap vertical	99.95	79.95
TH3JR	3 el. 10-15-20M beam	149.95	129.95	14AVQ/WB	40-10M Trap vertical	69.95	57.00
Hy-Quad	2 el. 10-15-20M Quad	229.95	179.95	12AVQ	20-10M Trap Vertical	39.95	32.95
205BA	5 el. "Long John" 20M beam	289.95	229.95	14RMQ	Roof Mounting kit (verticals)	33.95	29.95
155BA	5 el. "Long John" 15M beam	169.95	139.95	5BDQ	80-10M Trap doublet	89.95	69.95
105BA	5 el;"Long John" 10M beam	119.95	99.95	2BDQ	80-40M Trap doublet	49.95	39.95
204BA	4 el. 20M beam	219.95	179.95	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	79.95	69.95	205	5 el. 2M beam	17.95	
103BA	3 el. 10M beam	54.95	44.95	208	8 el. 2M beam	25.95	
402BA	2 el. 40M beam	209.95	169.95	214	14 el. 2M beam	31.95	
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				

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	269.95
TA-33	3 el. 10, 15, 20 Mtr. beam	264.00	189.95
TA-36	6 el. 10, 15, 20 Mtr. beam	392.75	269.95
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

WILSON

System One	5 ele. 10, 15, 20, Mtr. Beam	$299.95	$239.95
System Two	4 ele. 10, 15, 20 Mtr. Beam	249.95	199.95
System Three	3 ele. 10, 15, 20 Mtr. Beam	199.95	159.95
WV-1	10-40 Mtr. Vertical	79.95	69.95

TAYLOR

HQ1040AV	10-40 Mtr. Trap vertical	59.95	49.95

ROTORS

HamIII $125.00 | 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

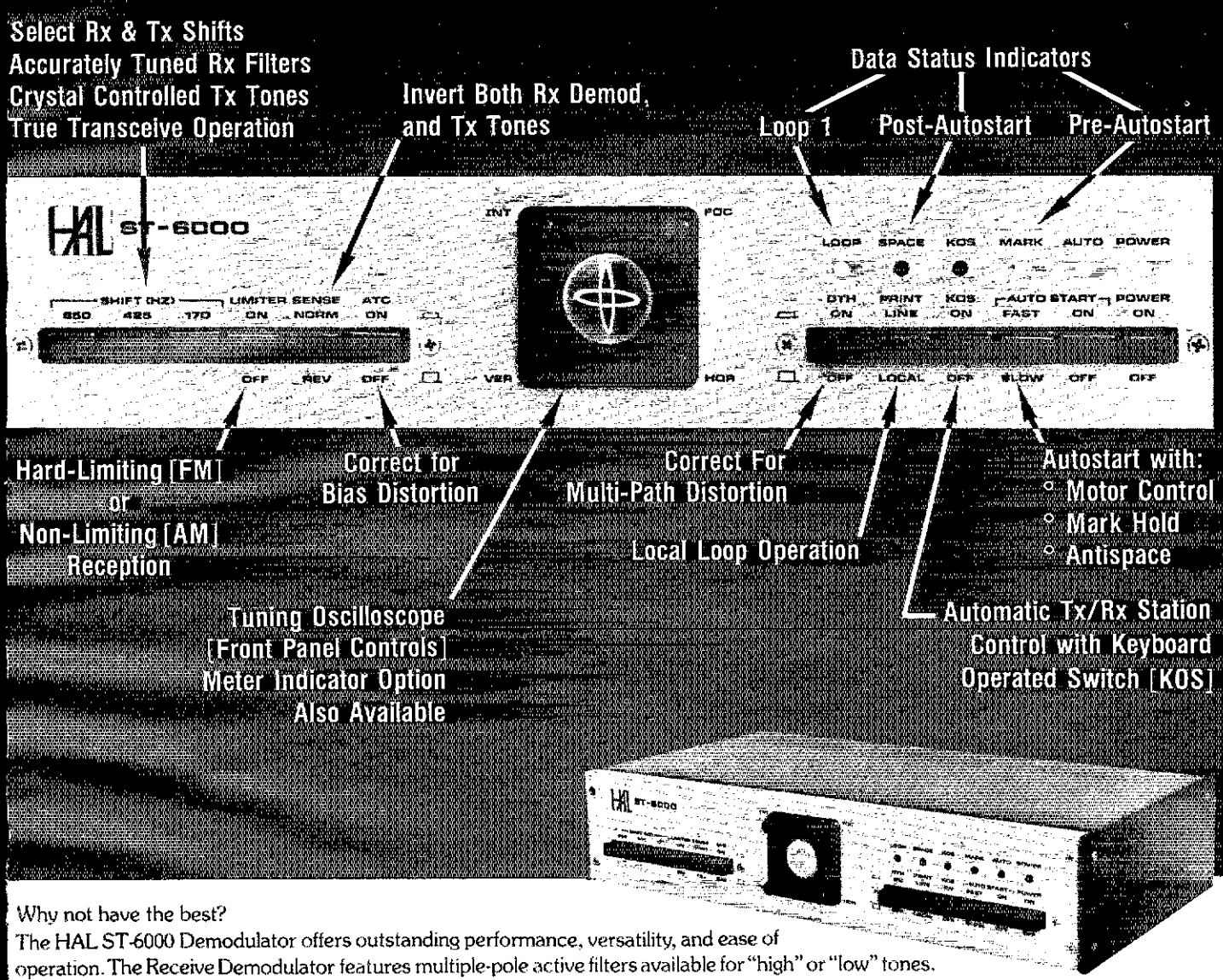
We carry all major brands of ham radios AT DISCOUNT PRICES

BANKAMERICARD

Yaesu — Kenwood — Drake — ICOM — Dentron —
Ten-Tec — Swan — Tempo — Midland — E.T.O. — Wilson

master charge

Full Features and Superior Performance ST-6000 RTTY DEMODULATOR



Why not have the best?
The HAL ST-6000 Demodulator offers outstanding performance, versatility, and ease of operation. The Receive Demodulator features multiple-pole active filters available for "high" or "low" tones. These filters are frequency-matched to the transmit tone crystals for true transceive operation. Input bandpass filters, discriminator filters, and post-detection filters are carefully designed and tested for optimum weak-signal recovery. The ST-6000 has an internal loop power supply, 2 loop keyers, RS-232, MIL-188C, and CMOS data I/O, and rear panel connections to data and control circuits for connection to UART and computer devices. Use it with the HAL DS-3000 KSR for the best in RTTY performance.

$595.00

Write today for HAL's latest RTTY catalog.

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

For our Overseas customers:
see HAL equipment at:
Richter & Co.; Hannover
I.E.C. Interrelco; Bissone
Vicom Imports; Auburn, Vic., Australia

ROANOKE DIVISION

NORTH CAROLINA: SCM, Bill Parris, AA4R — STM: N4UE. SEC: K4CJZ. Good attendance at the Raleigh Hamfest — sponsoring club, the Raleigh ARS did excellent job as usual. Congrats to RARS members & Newsletter Editor WD4HSI for the large edition available at the Hamfest. Gastonia ARS Third Annual Hamfest well attended also, good job by K4NYO & WD4PJX and all the club help which turned out. Catawba Co RACES group active in 4 county simulated aircraft incident with Hams supplying communications from the site to the Hospital. Stanly Co. ARC having Novice classes now with good attendance. W4OCZ reports conducting seminars on Radio & Electronics at local schools recently. Morehead High School ARC conducted demonstration for the school on Amateur Radio...W4NAP is the advisor of the 17 member group. Mecklenburg ARS now involved with local weather bureau in establishing backup communications to be used in emergencies. W4FMN actively involved working with clubs who would like to establish working relationship with their local weather bureaus...call him for his ideas. Many new upgrades this month including to Advanced: WD4AEI WB4PRE WD4JIH WA4BKN WD4LMM WA4OJU WA4OZM; to General: WD4ODM KA4BZE KA4BZG; to Technician: KA4FHT WD4MAC N4AXT KA4CAC KA4FCQ. WB4OXT is now KK4M. WB4NDB will now be known as KK4L. New appointees this month include WD4GXD(EC Rockingham Co), WA4OJU(OBS), WB4WII(OTS), WD4LVM(EC Columbus Co), WD4FTR(EC New Hanover Co), WD4IYA(EC Brunswick). Traffic: WD4CNO 154, W4FMN 149, KB4IZ 145, WB4MXG 124, WD4CFZ 112, K4MC 92, AB4S 91, K4VHT 88, K4DHX 76, N4UE 65, WA4SRD 63, K4FTB 48, AA4R 46, WA4UYS 44, WA4CUD 41, WD4AIE 36, WB4CES 30, WB4VQZ 28, WB4TOP 25, AB4V 24, K4TPK 23, WD4FJM 18, WD4RDT 16, W4EHF 14, W4IZI 13, KK4M 12, WD4ABZ 11, WA4IHG 10, AI4O 8, N4BEX 7, WA4AKB 5, K4AI 4, N6DR 3, WB4VHE 2, W4EAT 1.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTX — Asst. SCM: WB4UDK. STM: WB4ANK NMs: WA4SJS KD4D check-ins/traffic April SCSSBN 1546/217, CN(E) (Mar) 313/132, 270/165, Blue Ridge 2M net 607/12, Anderson 2M net 516/23, York County AREC, (Mar) 236/17, 136/0, Lancaster 2M net 109/7, Laurens County AREC 52/0, Dillon County 23/2. Congrats to 14 Hams in Greenwood, Laurens, & Newberry Counties for taking course on Official Hurricane observers. Thanks to EC's for sending Public Service Activity Reports. New appointees this month, W4OCX, NM (Carolinas Morning Net, on 3.919 MHz, newly organized June 1) WD4BUM OTS, OVS WD4HBX OVS, OTS, WA4VYS, EC, Newberry County, KB4MX OO Class II. Traffic: (Apr.) N4PQ, 791, WD4AWN 367, K4ZN 281, W4NTQ 156, W5NQL 83, WD4HVL 53, W4ANK 43, WB4UDK 43, K4FRX 40, KD4D 33, W4FVV 31, W4MTK 31, WA4SJS 24, WB8TCT/4 22, WA4VYS 18, WB5DRT 16, W5OCX 15, W4FMZ 15, WD4HBX 12, W4DRF 10, N4WR 10, WB4AFP 10 WD4BUM 10, K4PFC 8, AF4E 8, WB4REU 8, WA4EOD 6, WD4EDM 7, KB4IU 6, WD4FJP 4, N4EE 4, WD4DOL 4, WB4EMK 2, K4WUR 2, W4W1Y 1. (Mar.) KD4D 35, WB4JNE 12, WD4EOD 7, K4RF 2.

VIRGINIA: SCM, Rick Genter, K4BKX — ASCM: Buddy Smith, W4YE. STM: W4SQO SEC: N4NK. Chief OO: W4HU. Chief OVS: WA4PGI.

Net	kHz.	Time(PM)	Sess.	QTC	QNI	Mgr.
VNTN	3907	Noon	29	126	213	WA4FDV
VSBN	3947	6/10:15	60	617	1391	W4JK
VSN	3680	6:30	29	123	354	WA4YIU
VN	3680	7/10	58	449	799	WB4FLT

W4TMN bought his first commercially built rig in 33 yrs. W4NTG and WB4LAB are busy with school. WB4DBK has decided to attend UVA commerce school and will major in finance. W4HU was active in both CW and SSB CD parties. W4WWQ was in last CD party and is also DXing. WB4ODZ and N4UY were active in Vopex drill. WA4RXY was active with communications for Heart Fund road race. K4DHB spent 3 days operating Morse International wire circuit provided by Western Union. W4NWM has four element quad up 50' N4IF has homebrew 75'tower W4JK retired Heath twins after 16 years, for Omni D. AD4J made WAC on 75 meters. WD4GVU finished WAS and conducted fox-hunt for Portsmouth ARC. N5BA made CP-25; now working on 30. WA4OEH, new pres. of Richmond ARC. K4LKQ, pres. of Lynchburg ARC won the LARC transmitter hunt in just 27 mins. WA4FKX in charge of Field Day for the Williamsburg ARC. N4RF is the new publisher of the Hampton Roads Repeater Assn. which features an ATV column. The Pentagon ARC recently hosted W6EZV, General Curtis E. LeMay. WB4UPA was program speaker for the So. Peninsula ARC. WA4NTP is active on Sterling Park ARC net with converted CB rig. The Ole VA. Hams ARC is busy planning for the June Manassas hamfest. WA4YJF, local EC, gave program on ARES to the Roanoke Valley ARC. The Alexandria RC and WA4VBE will handle communications for the Potomac river crew races. The No. VA. RC is planning for FD. K4EJ had fun on recent Fla. trip with 2 meters. Traffic: (Apr.) WB4PNY 711, WA4AVN 683, WA4CCK 467, W4SOQ 444, W4JK 409, K4BKX 322, N4NK 307, W4UO 301, K4KNP 267, WB4DBK 246, WB4FLT 169, KF4R 155, N0ZO 150, K0JH 127, N5BA 113, W3BBQ 109, W3BBN 98, N4IF 94, K4GR 78, W4OKN 76, K4JM 71, W4YVG 70, WA4ONR 69, WA4RTS 67, AA4CK 64, WA4YIU 64, W4NWM 57, WA4LJI 51, WA4FDV 47, WAJAZ 46,, WB4RWY 46, KB4OF 42, N4YQ 42, WD4RDF 38, WA4ISA 35, WA4PBG 30, K4DHB 29, WB4KIT 28, W4OOL 28, N4LE 27, WB4ANB 20, WA4YJF 19, K4EJ 18, AG4D 17, KB4OG 16, WA4RXY 15, WB4DOZ 14, W4KXE 14, N4SD 14, KB4OB 11, WD4ODZ 12, K4ITV 9, N4UY 9, WB4TPT 8, W4KFC 7, N3RC 7, WB4SHK 7, K4VWK 7, WB2JAY 6, WB4MAE 6, WA4OWC 6, W4WWQ 6, WB4LAB 5, WB4ZKN 5, N4AZI 4, WB4UHC 4, N4DW 3, WB4FNW 3, WD4EUV 2, N4AOP 1, W4DM 1, AF4O 1. (Mar.) N4RF 84, WA4ONR 68, N4YQ 41, WD4RDR 37, W4TZC 21, WB4DOZ 18, WB4UHC 12, KJ4J 11, WB4ZWT 9, WB4FDT 8, N4BBX 7, KI4W 7, N4UY 6, N4DW 4, WD4GVU 4, WB4SHK 4, WB2JAY 2, AD4J 1, WB4UPA 1.

WEST VIRGINIA: SCM, Karl Thompson, K8KT — SEC: K8QEW. STM: WA8WPW. NM: W8YP WA8WPW WD8JYM. Huntington Hamfest was fine event again this year. Congrats to those responsible. QCWA meeting and dinner was held in Bridgeport with 27 in attendance. WB8UDY: pres., W8ZPT, vice pres.; W8NR, secy-treas. Next meeting will be in October in Charleston. Very successful meeting held between Weirton area hams and Nat'l Weather Service. Charleston area hams were active in March of Dimes Walk-a-Thon and Coal River Canoe Race. AE8Q has been appointed Ass't. Director for Parkersburg area; Congratulations. WV QSO Party

CALL TOLL FREE
1-800-228-4097

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

YAESU
KENWOOD
DRAKE
ICOM
STANDARD
EDGECOM
KDK
PANASONIC

DENTRON
HY-GAIN
MOSLEY
CUSHCRAFT
WILSON
HUSTLER
LARSEN
BENCHER
ROBOT

TAYLOR
SWAN
TEMPO
TEN-TEC
MIDLAND
CDE
AUTEK
MIRAGE
AEA

E.T.O. ALPHA
VHF ENGINEERING
BERK-TEK CABLE
CONSOLIDATED TOWER
SAY
SHURE
TELEX
ROBOT-SSTV
BENCHER

Our Mail Order Hours (CST)

M F 8 am to 12 Midnight
Saturday 8 am to 6 pm
Sunday 12 Noon to 8 am

Call and Talk to

Don	WBØYEZ	Ken	WDØEMR
Denny	WØQR	Eli	KAØCEJ
Bill	WBØYHJ	John	WBØMTS
Joe	WAØWRI	Blaine	WBØQLH
Jim	KAØCRK	Bob	WBØRQZ

BANKAMERICARD

Communications Center

443 N. 48th, Lincoln, Nebraska 68504 In Nebraska Call (402)466-8402

master charge

Stalking the Ultimate DX.

Now you can really enjoy the challenge of working that tough to work 2-meter DX. The all new Boomer 3.2-λ yagi gives exceptional forward gain. A high efficiency balanced feed system, with integral balun, gives a clear, precise pattern. The trigon reflector reinforces Boomers' very high front to back ratio. Boomer has that 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 activities.

The Boomer is designed to last with a large diameter round boom for more strength with less wind load. It has a reversible truss support, high strength aluminum mounting plates and all stainless steel hardware.

When you install Boomer, you'll appreciate our typical attention to detail. You can throw away the hack saw and hand drill. Boomer has a detailed instruction manual, precisely cut elements, plus machined and finished components which need only pliers and screwdriver to assemble.

When you are ready to move up to even higher gain, we have complete stacking kits with everything necessary to assemble two, four and larger yagi arrays.

Stalk down to your local dealer (anywhere in the world) for full details on Boomer.

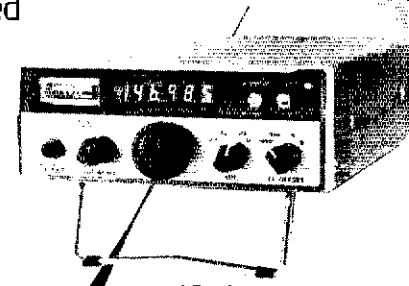
A-3219 BOOMER
UPS SHIPPABLE

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

IT'S ABOUT TIME...

...Someone offered a 2 Meter FM Transceiver with all of the features you want at a price you can afford.

- 25 Watts
- Fully Synthesized
- 144-148 MHz
- 5 KHz Steps
- Provisions for non-standard splits
- Full 1 year warranty
- 2-5/8(H) x 6-5/8(W) x 10-3/4(D)



1979 FM-28
only $295.00

NOW AVAILABLE WITH SSSSSSCAN

FM-28 WITH SCANNER OPTION
$395.00

- Scan capability 144-147.995 MHz
- Scan entire band or memory
- Up to 800 channel memory
- Internal battery holds memory when power is turned off.
- Scanner option can be added to any FM-28

With or without Scanner option—The Clegg FM-28 is the 2 Meter value of the year.

ORDER DIRECTLY FROM:

Clegg

Communications Corp.
1911 Olde Homestead Lane
Greenfield Industrial Park East
Lancaster, PA 17601
(717) 299-7221

Send check or money order...
$395.00 for FM-28 with scanner option
$295.00 for FM-28 without scanner option
or
Charge to VISA or Master Charge
—Detailed brochure available on request—

had increased activity this year. Winner to be announced soon.

Net	Freq.	Time(Z)	Ck-In	Ttc	Sess.
Hillbilly	14290	1700 Su	200	78	5
Novice	3730	2115 Dy	146	14	30
Phone	3990	1600 Dy	246	19	30
Phone	3990	2200 Dy	775	127	30
CW	3567	2300 Dy	131	45	30

Traffic: WA8WPW 250, WD8JYM 46, WD8LDY 42, W8HZA 42, W8YP 34, K8ZDY 32, N8AJC 26, WD8JYN 21, K8KT 19, WD8DHC 14, WD8JGN 10, K8QEW 7, K8YL 6, WB8UDY 6.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Robert E. Porter, K0DJ — SEC: W0GOW. STM: WB0MCL. NM: K0CNV WB0ZOG, W0GW spent three days handling health and welfare traffic during tornadoes in Texas. A hearty congratulations to WB0QPI who has just upgraded to General. Plans being formulated by N0ACW and others in the Vail area for a new repeater. W0WYX gearing up for the severe thunderstorm season with the weather service Frosty Network newly affiliated with ARRL. The club operates in the Broomfield area. AD0A now acting as assistant manager for TWN. WD0AIT using his newly aquired general ticket to help administer the local nets. W0YB enjoying new TS-520. Wedding bells soon to ring for WB0HZC and WB0TAQ. Summertime means several public service events. Let's all try to do our share by participating and showing the public what amateur radio really is all about! Net tfc: Columbine 30 sessions, QNI 1061, QTC 248, informals 161, QNF 1125; CWN 30 sessions, QNI 211, QTC 279, QNF 1223; Hi-Noon 30 sessions, QNI 1146, QTC 88, informals 108, QNF 1204; SSN 30 sessions, QNI 97, QTC 20, QNF 445. Traffic: (Apr.) W0WYX 2181, WB0IBS 1274, WA0HJZ 604, WB0MTA 511, AD0A 230, WB0HZL 222, WB0ZQG 190, WD0AIT 181, N0ACW 143, W0RE 111, W0HXB 107, K0DJ 97, W0EJD 96, W0GO 87, W0GW 58, W0NFW 58, W0MDT 54, WB0UWE 54, WB0UWE 31, W0LAE 24, WB0YKH 24. (Mar.): W0MDT 109.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR, NMs: WD5AHH & K5KPS. Southwest Net (SWN) meets daily on 3585 kHz at 1915 local time and handled 184 msgs with 204 stations reporting in. New Mexico Roadrunner Net (NMRRN) meets daily on 3939 kHz at 1800 local and handled 161 msgs with 1142 stations reporting in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 106 msgs with 795 check-ins. Yucca Two Mtr Net handled 15 msgs with 399 check-ins. Mesilla Valley Bean Feed huge sucess with 686, a new record. Good to see Maurice Carpenter K0HRZ our Div. Dir. Good to have Sandia Crest/Cabillo Pk 450 link up after lightning strike. Philmont Ranch S&R conference big success. Traffic: W5DAD 747, W5UH 515, KL7HSF 299, W5JOV 175, WD5AHH 137, K5KPS 110, K5MAT 49, W5BWV 37, WA5MIY 18, WB5QAL 14.

UTAH: SCM, Carl R. Ruthstrom, W7GPN — SEC: WA7ZBO, led a communications exercise in support of a March of Dimes Walkathon in SLC 21 April. ARES and UARC club members involved were: WB7DHJ WA7MTF WB7DPA WB7BXS KB7EL N7ARE W7LUA W7CWK W7DBO WB7VJK N7AOM, K7RJ WA7TMP WB7SGF and WB7SUB. Ex Utahn W7RQT, now in WA, keeps sked with W7GPN Sundays at 1530Z on 7190 kHz. W7JVU and WB7QVZ have new TS-120 transceivers. WA7ENF has new AMCOM 2-mtr transceiver. W7WQC back on air after 10 year absence. He is active on 2-mtrs and HF with TS-820. W0BWJ, ARRL VP, brought Utah gang up to date on latest happenings at the UARC meeting 5 April. W7OCX was appointed STM, filling a need for a qualified traffic specialist. For those of you who might have missed it, K7QEQ will be the new SCM come 1 July. Please give him your support. Traffic: K7HLR 347, WA7JRC 92, WA7MEL 86, N7IE 31, W7OCX 19, W7UTM 10, WB7UFW 5.

WYOMING: SCM, Chester C. Stanwaity, W7SDA, — On Vacation. Asst. SCM: K7IKO Reporting: Wyoming Hamfest will be held July 21-22 at Meadow Lark Ski Lodge, East of Tensleep on US 16. Talk in frequencies will be 3923 and 146.52. We all extend our condolences to K7ITH, whose XYL passed away in May. WB7NVS has been operating bicycle mobile. Spring must surely be here, for winter killed repeaters are coming up in profusion. Jackalope Net Report for March; 26 Sess., 468 QNI. April Net Reports: WX Net 25 QNI, 352 QTC. Sheridan ARES; 38 QNI, I QST. Cowboy; 21 Sess. 661 QNI, 16 QTC. Traffic: WA7GYQ 87, WA7SGG 22.

SOUTHEASTERN DIVISION

ALABAMA: SCM, William E. Scates, WA4JYU — SEC: W4WYT. STM: WA4JDH. OTS: KA4BUI. Thanks to W4TOX, for setting up BARC publicity on Channel 13 in Birmingham. They did a story on the club and Ham Radio. WB4VSH N4KC WD4OKY were in pictures. Channel 6 is working on a story — Ladies in Ham Radio. Many clubs got publicity during April's bad weather. The Muscle Shoals Times-Daily did a nice piece on ham activity during April's severe weather in that part of the state. Many thanks to WB4WRO and WD4HCM, who worked CD Headquarters. W4IBU and the AENM also put in many hours. W4KCQ, the Tuscaloosa club station was on the air for over 48 hours in a row. WD4DAT, the new Tuscaloosa EC, is doing a good job down there. WA4YCM and N4AWW, members of Twin Base ARC, Montgomery, also put in some hrs in emergency work at the Red Cross office. Some 25 inquiries were handled by them. TBARC also active in providing communications for Walk-A-Thon. TNX to KA4AOK WA4YFC WB4UAY WA4YCM. Tuscaloosa ARC active in Timber Acres Horse Show. Traffic: WA4JDH 1735, N4MD 592, K4AOZ 106, WA4YCM 102, W4IBU 77, WA4ZPZ 73, KA4BUI 63, WB4EKJ 31, WB4RCF 24, W4UP 20, WA4JYU 14, WB4GZV 7, WB4TVY 7.

CANAL ZONE: SCM, Alvin Sholk, KZ5AS — TNX to the Radio Club of Panama, especially HPIMN, for attending the last CZARA meeting and offering assistance to the KZ5s in obtaining Panamanian Amateur Radio Licenses when we lose the KZ5 license on October 1, 1979. Plans are progressing for Field Day reports KZ5FT. KZ5 portable will be on the air Field Day. KZ5ED and KZ5NW active on 6 meters and very, very popular.

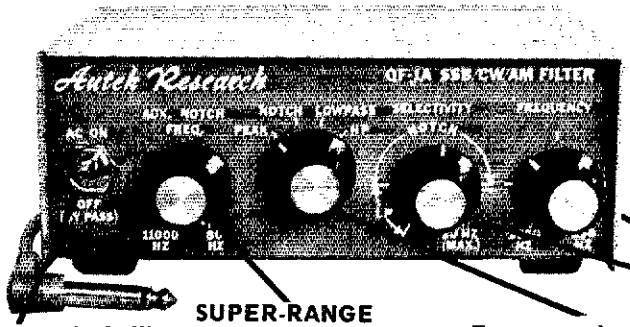
GEORGIA: SCM, Eddy Kosobucki, K4JNL — Asst SCM: K4VHC. SEC: K4SWJ. STM: WA3NAZ. NMs: W4HON W4WXA.

Net	Freq.	Time
GCN	3995	0700 M-S/0800 EDT Su
GTN	3718	1815 EDT Dy
GSSBN	3975	1930 EDT Dy
GSN	3595	1900/2200 EDT Dy

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.)

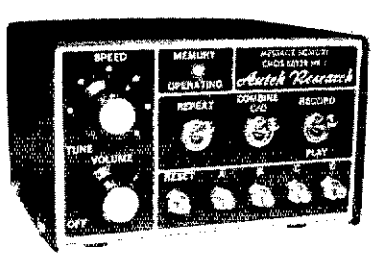
AUTEK pioneered the **ACTIVE AUDIO FILTER** way back in 1972. Today, we're still maintaining that engineering leadership. Our **QF-1A** evolved from suggestions from thousands of owners, and years of dedication to making the "ultimate" filter. No gimmicks — just something that really "works" like the 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 bandcountries 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 _____

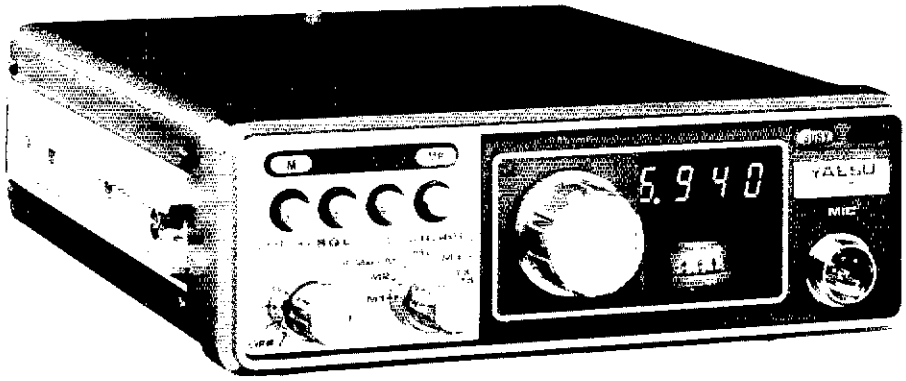
NAME _____

ADDRESS _____

CITY STATE ZIP

Send to Autek Research, Box 5127E, Sherman Oaks, Ca. 91403.

The Scanning Memorizers



FT-127RA
(220 MHz)
FT-227RB
(144 MHz)
FT-627RA
(50 MHz)

The FT-127RA, FT-227RB and FT-627RA, FM transceivers, allow scanning and expanded memory coverage for the demanding VHF FM operator. All feature up/down scanning capability with control from the microphone; the scanner will also search for a busy or clear channel. Four memory channels are available — two for simplex, three for repeater channels,one for a split of up to 4 MHz. Other performance features are similar to those of the renowned FT-227R.

OPTIONAL EQUIPMENT

Keyboard Microphone: YM-22 for FT-127RA and FT-627RA; YM-23 for FT-227RB (YM-22 standard feature with FT-227RB) • Squelch Unit • FP-4 AC Power Supply

CPU-2500R/K 2M FM Transceiver
with Central Processing Unit

The age of computers has entered the amateur scene with the announcement of the CPU-2500R/K 2-meter FM transceiver. Controlled by a 4-bit central processing unit (CPU), the CPU-2500R/K contains a scanner, 4 memory channels, manual or automatic tone burst, an optional sub-audible tone squelch, and 25 watts output.

The keyboard microphone allows two-tone input for autopatch or control purposes, as well as remote programming of dial or memory frequencies.

Automatic ±600 kHz repeater split, or program a split up to 4 MHz using the memory. Keyboard microphone allows remote programming of odd splits.

CPU scanner will search for a busy or clear channel, upon your command.

Four memory channels for simplex or repeater use, plus another memory channel for a split of up to 4 MHz.

C&A Electronic Enterprises
Distributors of Commercial and Amateur Radio Equipment
22010 S. Wilmington Ave., Suite 105
Carson, CA 90745

Available from C & A Electronics
Call for best price.
800-421-2258
(TOLL FREE — OUT OF CALIFORNIA)
213-834-5868
(CALIFORNIA)

Choose the Best Available!

Before you make the choice of a new hand-held, ask about these important features:

1. Is the case fiberglass reinforced Lexan®?
2. Are the batteries convenient for carrying extras?
3. Is the capacity sufficient for a day's operation?
4. Is there a method for conserving battery life when high power is not required?
5. Does it fit your hand comfortably?
6. Do you have a choice of charging methods?
7. Do you have an ample choice of accessories to back up your radio?

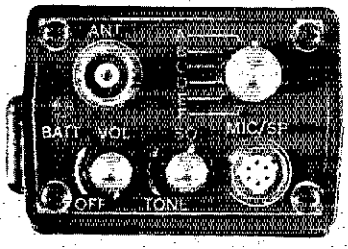
If you can answer 'yes' to all of the above, then you've made the obvious choice.

YOU WANT A WILSON MARK IV HAND-HELD . . . AND ACCEPT NO SUBSTITUTE FOR IT!

Wilson hand-helds have been known world-wide for exceptional quality and durable performance. That's why they have been the best selling units for years.

The Mark Series of miniature sized 2-meter hand-helds continues the tradition of dependability and operation, but in an easier to use, more comfortable to carry size.

The small compact size battery pack makes it possible to carry one or more extra packs in your pocket for super extended operation time. No more worry about loose cells shorting out in your pocket, and the economical price makes the extra packs a must.



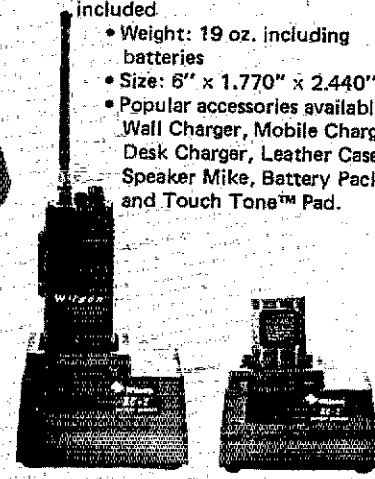
Conveniently located on top of the radio are the controls for volume, squelch, accessory speaker mike connector, 6 channel switch, BNC antenna connector and LED battery condition indicator.

Optional Touch Tone™ Pad available.

MARK II: ≃ 1 & 2.5 watts
MARK IV: ≃ 1 & 4.0 watts

SPECIFICATIONS:

- Range: 144-148 MHz
- 6 Channel Operation
- LED Battery Condition Indicator
- Individual Trimmers on TX and RX Xtals
- Rugged Lexan® outer case
- Switchable Hi-Lo Power
- Current Drain: RX 15 mA
  TX - Mark II: 500 mA Hi, 400 mA Low
  TX - Mark IV: 900 mA Hi, 400 mA Low
- 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 carrier
- BNC Antenna Connector
- .3 Microvolt Sensitivity for 20 dB Quieting
- Uses special rechargeable Ni-Cad Battery Pack
- Rubber Duck and one pair Xtals 52/52 included
- Weight: 19 oz. including batteries
- Size: 6" x 1.770" x 2.440"
- Popular accessories available: Wall Charger, Mobile Charger, Desk Charger, Leather Case, Speaker Mike, Battery Packs, and Touch Tone™ Pad.



Illustrated is Wilson's BC-2 Desk Top Battery Charger shown charging the Mark Series unit or the BP-4 Battery Pack only.

To obtain complete specifications on the Mark Series, along with Wilson's other fine products, see your local dealer or write for our Free Amateur Buyer's Guide.

Consumer Products Division

Wilson Electronics Incorporated

A SUBSIDIARY OF REGENCY ELECTRONICS, INC.

4288 So. Polaris • P. O. Box 19000 • Las Vegas, Nevada 89119
Phone (702) 739-1931 • Telex 684-522

Prices and specifications subject to change without notice.

ARES 3975 1700 EDT Su
Have appointed W4GH and W4VZY to coordinate statewide use of repeaters during emergencies. Atlanta offering two $250. Scholarships to high school students. Fine gesture for the Atlanta Radio Club. Details will come via W4GTS. Congradulations to K4WC on attaining WAS #304 on 75 with two letter calls. WA3NAZ still gleaming over his new Omni-D. Fairs are forthcoming, get with sponsors to exhibit Amateur Radio. GSSBA Picnic moves to Madison this year on July 28th. Severe WX condx on Good Friday brought out many inactive amateurs throughout the state. N4UZ now on 2 with HR-312. GSN real active in April, QNI - 629, QTC - 362 with 46 different stations. No Georgia QSO Party this year, Columbus ARC giving it up after 18 years. First annual Warner Robins Hamfest on September 30th. Annual GSSB Association meeting will be held there on the same day. Savannah Radio Club will hold a Hamfest on October 30th and 31st. SCM would appreciate receiving your Club Bulletins. Traffic: WA3NAZ 316, WD4ADV 275, WA4PUP 271, W4WXA 238, W4PIM 215, WB4ZOJ 178, AA4GA 81, W4GH 71, K4EV 68, K4NM 67, W4HON 63, W4BIA 38, N4BHX 36, N4UZ 31, K4JNL 30, WA4CBT 13, K4PIK 13, WB4FAS 9, K4BAI 8, W4CMX 8, AK4T 6, W4DGN 5, WB4LBM 5, WB4ZVX 4, K4WC 2. (Mar.) N4UZ 14.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RH.

Net	Freq.	Time(Z)/Days	QNI	QTC	Mgr.
NFPN	3960 kHz	2230Z	1548	303	WD4PDK
QFN	3651 kHz	2300/0200ZDy	—	—	WA4JPV
CFN	7272 kHz	1630Z Dy	378	235	W4WNY

Two new EC's this month — W2DXZ/4 for Flager County and W4UEA for Marion County. Net Certificates earned by WB4TZR on FPTN and WB4ADL on FAST Net. New officers of the Pensacola FMRA: WA4FNY, pres.; WA2GIN/4, vice pres.; WB4PKR, secy/treas. Pensacola 16/76 repeater now provides direct access to 911 emergency number. The FFARA sponsored a picnic at Blackwater State Park; a few members got lost on the way! WA4FNY lost his antenna farm to a tornado. Okaloosa County hams provided much comm. support during a major train derailment near Crestview. Newly oranized Crestview radio club was especially helpful. Plans are being made for expanded use of 220 MHz FM in that area. WD4JEJ is putting on a 220 repeater at Eglin AFB — 222.34/223.94. Chipola ARC sponsored a DXpedition to rare Liberty County. A large crowd attended the "open house" at the new W. FL. CD ECC in Defuniak Springs. W4WNY had the Lt. Gov. make a contact on 146.52! W4JGD upgraded to Extra; KA4AJD KA4FFB WD4JDU & WD4OHX upgraded to Advanced. WD4HWE is new Trustee of Tallahassee 31/91 repeater. TARC requires everyone to wear name tag or be fined 10c! KA4DCD completed his WAS. WD4BII provided comm. after gas explosion in Hilliard. W4LSR, FMTN secy, celebrated his 74th birthday. KF4U new NCS on GATOR Net. WB4FJY active again. Traffic: (Apr.) AA4FG 692, WD4HIF 679, WA4CRI 567, W4MGO 393, N4WA 210, WD4IIO 170, WB4RIS 142, WD4BTO 125, WB4TZR 120, WD4HXS 113, K4RNS 86, WD4DNC 81, W4JL 81, WB4FJY 79, W4KIX 77, W4FZX 70, WD4PDK 70, WD4NYY 62, WB4GHU 51, WB4ADL 44, KB4T 42, WB4VAP 42, WB4QBB 41, WA4EYU 39, W4RH 38, W4MVG 36, WB4DTS 34, KF4U 30, WA4CLY 24, WA4ONZ 18, WA4GIN/4 15, WB4WOO 14. (Mar.) WB4QBB 55, WA4STZ 40, KB4B 15. (Feb.) WD4DNC 260.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst SCM: W4KGJ SEC: AA4WJ. New appointments: OTS,OBS, OO-3: WA4FKE. Net certificates issued: FMTN: W4AZJ WB3DON/4 W4DSH W4PPC; PFN: N4AXN WB4CSL KA4GYA WA4ESX WA4FYR WD4MDX WD4NHH K4TH W4TZW; SWFTN: WA4BYT WB4CHO WB2CMR/4 K4DDY WA4EIC K4ENA WD8GAK/4 WA4GIE WB4GSV WA4HXU K4IRT WA4JWM KB4KB WB4KYE W4RLB WA4MOQ W4MPV W4NNW W4PKP WB4PSI WA4CSW WB8SNT/4 K4SSO W4YCL; QFNS: WD4CVY WD4OMR WA4PFK; FPTN: W4DDW WA4EIC WA4FKE WB4AID K4KIC W4KMN WA4NBE WB4PIB K4SJA W4WYR; TPTN: K4EUK WA4GYR W4MEE W8PXM/4; NFPN: WD4KDS W4YPL. Festival of States activities in St. Petersburg culminated with fireworks and Night Parade April 3rd and a Day Parade April 7th. Radio Amateurs of Pinellas County, coordinated by St. Petersburg ARC, furnished safety communications. Stations active were: W2AED/4 WB4AIZ W4APV N4AUO N4AXN KA4BBB N4BLS KA4BPO W4BUB W4CF KA8COZ/4 WB4CSL WA4CZW WB4DWU W4EGM WA4FEN WB4FVN WA4FYR WA4GCH W4GPL K5IHH/4 WA4IIT W4IRA K4ISS K4KE WD4KEZ WD4KGY WA4KNI WB4KSJ K4KXC K4NAN WD4NHH N4NL WB4QAT W4OJH WB4PEL WB4PNV WD4PUV K8PXM/4 WA4QGV K4RHD WA4ROX WA4RDQ K4RXO WD4SCD K4SCL WA4TJG WA4UBT W1UEF/4 WB4UFO WA4VIP WA4WGO WA4WKO WA4WOU K4WYN WB4ZDZ WB4ZPU. W4DPH reported 15 Radio Amateurs coordinated a walkathon in Clearwater area April 28th. Congrats to Tampa ARC, WB4BQZ pres, for a fine display at Florida State Fair and origination of 2540 messages for Fair visitors. TARC used a 6 meter RTTY link from Fairgrounds to their club-house on Davis Island thence HF traffic outlets. WA4MEE did his share and earned a BPL with 1470 total. K4TH also was active, earning a BPL with 740 total. June 1st begins "Hurricane Season". Let's all recheck our equipment, especially emergency power supplies, and do what can be done to be ready in the event of need. If you are not a member of the Amateur Radio Emergency Service, get in touch with your Emergency Coordinator and sign up. Traffic: (Apr.) W4DUG 5150, WA4MEE 1470, K4TH 740, WB4WYG 382, K4SCL 379, WA4PFK 557, K4EUK 327, WB4FVV 231, WD4COL 216, W4NTE 144, WA4GYR 143, W4NFK 141, WA4JPV 125, W4IRA 121, WA4SCK 116, KE4O 113, WB4PIB 109, WD4ISN 106, WA4NBE 93, WA4EIC 90, WB4AID 76, WB4CDQ 76, WD4EGT 74, W4GPL 72, K4YX 62, W4WYR 61, W4KMN 60, N4ET 54, WB4SNX 41, WA4HXU 40, WA4RLV 38, N4AUO 31, N4TW 30, WB4FVN 15, WB4CHO 13, W4AZJ 12, K4GRM 12, W4SMK 11, WA4UOQ 10, W4MNZ 6, WK4GJ 6, W4TJM 4, WB4GSV 3, WD4HMC 2, W4JM 2. (Mar.) WB4WYG 282, N4TW 34, K4GRM 22, W4KGJ 21, W4AZJ 11.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Willard Haskell, AG7D — ARCA is sponsoring annual Hamfest at Fort Tuthill, Flagstaff, AZ, Aug 3, 4 and 5. Our Southwestern Division 1979 Convention is coming up in Oct. 19, 20 and 21 and will be held at the Anaheim Sheraton Hotel, Anaheim CA. Data relative to the foregoing will be found in QST. So plan not to attend and support our division. K7OMR, suffered a broken ankle a short time ago, but in the "spirit of Ham Radio", WB7DRD K7LIW WA7BXQ WA7RKF W7TLR

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-4	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	29
Also Sixer	29
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	429
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-5MKII 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-1 P Linear	179

Standard
SRC-146 HT	$149
826 M Trnscvr	195
SRC-144	395
SRC-851T	250

Swan
700-CX Xcvr	$459
260 Cygnet	289
279 Cygnet	329
500 Xcvr	299
500 CX Xcvr	389
117-XC AC Supply	95
14X DC Module	39
MK II Linear	475
KK VI 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

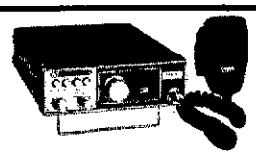
Tempo
Tempo one Xcvr	$299
AC One Supply	79
FMH 2M H.T.	149
CL-220 Trncur 220 MC	179
FMH 2M w/Talkie	149

Ten Tec
PM-3 Trnsur	$ 49
Argonaut Xcvr	199
KR-40 Keyer	79
RX-10 Receiver	49
S-30 Signalizer	29
Triton II	479

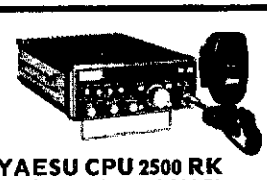
Yaesu
FT-401 Xcvr	$499
FRDX 400SD Rec	325
FT 2 Auto 2M FM	249
FT-101B Xcvr	549
FL-2100B Linear	295
FV-101 VFO	79
101E Xcvr Demo	695

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.

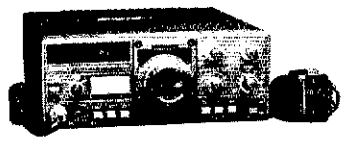


YAESU FT227RA
Regular $399.00
Cash (no trades) $339.15



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

CUSTOMERS THE WORLD OVER ARE CLAMORING FOR OUR GIANT "ONE CENTERS"

SALE

A PENNY MORE GETS YOU TWO

Spectrol

"SKINNY-TRIMS" POTENTIOMETERS

SINGLE TURN FLAT Type-63 Cat. No. 92CU3866

3/8" square! Single turn style. Screw driver adjust. 20% tolerance. 0.5 Watt ratings, cermet construction. PC leads.

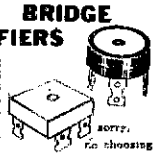
10	1K	25K
20	2K	50K
50	2.5K	100K
100	5K	200K
200	10K	500K
500	20K	1 Meg

2 FOR $1.29

4 FOR $1.30

ORDER BY CAT. NO. AND VALUE

25 AMP BRIDGE RECTIFIERS



	PIV	SALE	2 FOR
☐	25	1.25	1.26
☐	50	1.85	1.86
☐	100	2.25	2.26
☐	200	2.95	2.96
☐	400	3.50	3.51
☐	600	4.25	4.26
☐	800	4.95	4.96

sorry, no choosing

Order No. 2271 & voltage

"CRIMP-ON" PL-259 COAX PLUG 2 for $1.29

Quick, Easy plier crimping. No Soldering! Strip insulation-squeeze. Mates to SO-239. For RG58/U - 59/U. Cat. No. 92CU5696

4 for $1.30

"THE FAT" MALLORY AA MERCURY BATTERY $1.49

2 for $1.50

Cat. No. 92CU5679

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

LEDS!

YOUR CHOICE 6 for $1.29 1¢ SALE 12 for $1.30

Order by Cat. No.

☐	1788	MICRO TOPHAT RED
☐	1942	MED YELLOW STUBBY
☐	1802	MICRO SINGLE PIN RED
☐	2135	JUMBO RED
☐	2139	JUMBO GREEN
☐	2137	MICRO RED
☐	2790	JUMBO RED CLEAN

3 ELEMENT 120 VAC HOTPLATE

$6.88 2 for $6.89

This Top Quality, Multi-Purpose Hotplate features, Built-In Thermostat, Neon "Red" AC Indicator Lamp, and 1/8" Textured Glass Surface for even heat distribution. Generates up to 150° C. 120 watts! Use for photographic applications, laboratory work, aquarium heater, plants, etc. Size: 10-3/8" x 6-5/8" x 1/8"; Wt. 1 lb 2 oz.

Cat. No. 92CU5723

1 AMP 1000 VOLT MINI RECTIFIERS 20 for $2.49

40 for $2.50

Famous IN4007 epoxy rectifiers, marked (color coded), 100% Prime, with axial leads. 1000's of hobby uses.

Cat. No. 92CU2383

■ 6-OPTO-COUPLER, 1500V isolation, hobby material, u test(#2629A)	1.29	12 for 1.30
■ 6-2N915 UHF TO-18 TRANSISTORS(#1423)	1.29	12 for 1.30
■ 75-MOLEX SOCKETS, Type M1938-4, makes 14 to 40 pin sockets(#1609)	1.29	150 for 1.30
■ 6-CALCULATOR AC ADAPTOR JACK, standard threads 3 terminals(#2316)	1.29	12 for 1.30
■ 50-TUBE SOCKETS, 4,5,6,7 pin tubes, asst(#3839)	1.29	100 for 1.30
■ 40 CTS RESISTOR NETWORK, asst styles and values, singles and dips,(#5699)	1.29	80 for 1.30
■ 10-BULLETT RECTIFIERS, 1.5 amp, 200V, axial(#84)	1.29	20 for 1.30
■ 6-READOUTS, MAN-3, common cath, LED, the claw, RED(#3338)	1.29	12 for 1.30
■ 8-LEDS, asst sizes and shapes, red, green, yellow, amber(#3869)	1.29	16 for 1.30
■ PHOTO FLASH ELECTRO. CAP, 600 MF @ 360V(#3897)	1.29	2 for 1.30
■ 4 MICRO SWITCH, plunger style, N.O. contacts, SPDT, solder tabs,(#5785)	1.29	8 for 1.30
■ 10 TRANSISTOR/LED SOCKETS, 1/4" high, 3-pc leads, plastic base,(#5745)	1.29	20 for 1.30
■ 5-SLIDE VOLUME CONTROLS, asst of popular values, for HIFI(#2318)	1.29	10 for 1.30
■ 10-D33021 TRANSISTORS, low power, silicon, hfe-60, TO-92(#5627)	1.29	20 for 1.30
■ 50 1/4 WATTERS, asst value carbon resistors, some 5%ers,(#5797)	1.29	100 for 1.30
■ 60-CERAMIC CAPS, incl. NPO's, neg. coef. N750's asst values(#590)	1.29	120 for 1.30
■ 10-TV/FM SPLICERS, for 300 ohm shielded twin lead. Bakelite.(#5547)	1.29	20 for 1.30
■ 30"#30 WIRE-WRAP WIRE, fits all tools and machines, continuous length,(#3803)	1.29	60 for 1.30
■ 10-G.E. POWER TAB TRANSISTORS, D40NT,N2, some NS, TO-220(#5629)	1.29	20 for 1.30
■ 2-¼" BLOCK TRIM POTS, 200K, 15-TURN - PC-leads,(#2535)	1.29	4 for 1.30
■ 1-12VDC SMIL REED RELAY, spst, N.O. 2200 ohms, 7/8" x 5/16" x 5/16"(#5515)	1.29	2 for 1.30
■ 50-TEMP. COEFFICIENT VOLTAGE REF. DIODES, asst volt, +50%(#5647)	1.29	100 for 1.30
■ 6 -SKINNY TRIM POTS, PRECISION, 50% yield(#3389)	1.29	12 for 1.30
■ 60-pc-PRECUT, PRETINNED WIRE, various lengths and colors(#1971)	1.29	120 for 1.30
■ 5 DUAL DIGIT READOUTS, H.P. 5082 Type, Bubble Magnifier,(#5748)	1.29	10 for 1.30
■ 4 CALCULATOR KEYBOARDS, 17 keys and up, multi-function,(#5777)	1.29	8 for 1.30
■ 10-5K POTS, audio taper, plastic snap-in mounting(#5124)	1.29	20 for 1.30
■ 10-1&2 MEG DUAL POTS, audio taper, snap-in mounting(#5125)	1.29	20 for 1.30
■ 50-1 AMP ZENERS, wide asst of values, untested(#1964)	1.29	100 for 1.30
■ 12-SCR'S & TRIACS, 10 AMP, asst values, untested(#2087)	1.29	24 for 1.30
■ 3-QUADRACS, 10 AMP, 100% prime, 50-100-200V, TO-220(#5048)	1.29	6 for 1.30
■ 20-MINI RECTIFIERS, 1½ AMPS, 25V, epoxy, axial(#5374)	1.29	40 for 1.30
■ 10-2N3704 TRANSISTORS, silicon, TO-92 case, hfe-300 100%(#5625)	1.29	20 for 1.30
■ 50-IF TRANSFORMERS, asst sizes(#35A9)	1.29	100 for 1.30
■ 10-TV CHEATER CORD JACKS(#5519)	1.29	20 for 1.30
■ 10-2N3705 TRANSISTORS, silicon, TO-92 case, hfe-150 100%(#5626)	1.29	20 for 1.30
■ 4-1.5V SILVER OXIDE WATCH BATTERIES, specify: RW-15,18(#5063)	1.29	8 for 1.30
■ 3-LCD WATCH READOUTS, 3½" digits, 7 seg. dim 1½ x 1"(#5066)	1.29	6 for 1.30
■ 100 RED BLOCK DISC CAPS, asst values, 50% material(#1698)	1.29	200 for 1.30
■ 10-INSTRUMENT KNOBS, asst styles and colors, ¼" shaft(#5121)	1.29	20 for 1.30
■ 4-MIKE HOLDERS, for CB's and other mobile rigs(#5634)	1.29	8 for 1.30
■ 50-1N4000 RECTIFIERS, asst to 800V, u test(#2594)	1.29	100 for 1.30
■ 20-UPRIGHT ELECTROS, asst'd values & capacitance.(#3226A)	1.29	40 for 1.30
■ 1-UHF TUNER, solid state, standard type(#2927)	1.29	2 for 1.30
■ 6-ITS A SNAP, 9 VDC BAT-clip, red n black lead(#2852)	1.29	12 for 1.30
■ 8-1400 VOLT "RED BALL" RECTIFIERS, axial 1 AMP(#2590)	1.29	16 for 1.30
■ 20-1N4148 SWITCHING DIODES, 4 nsec. axial(#3000)	1.29	40 for 1.30
■ 6-10 AMP QUADRACS, w/trigger diode up 600V(#3620)	1.29	12 for 1.30
■ 1-8" LINE CORD, 2-cond., 18 guage, moulded plastic plug, black, new.(#5803)	1.29	2 for 1.30
■ 40-SQUARE DISC STYLE CHOKES, color coded(#3203)	1.29	80 for 1.30
■ 30-TRANSISTORS TO92 2N4400 series, u test(#3291)	1.29	60 for 1.30
■ 6-TRANSISTORS TRANSFORMERS, audio, inter, etc mini(#3295)	1.29	12 for 1.30
■ 15-PRINTED CKT TRIMMER POTS, asst values, etc(#3346)	1.29	30 for 1.30
■ 7-2N3055 HOBBY NPN TRANSISTORS, TO-3(#3771)	1.29	14 for 1.30

***Buy any item on this page and get 2nd item of the same cat. no. for only one penny!**

■ 25-DTL FAIRCHILD IC's, gates and flip flops, Dip, 100%(#3709)	1.29	50 for 1.30
■ 1-24 VOLT 50 MIL. TRANSFORMER, 115V input, open frame, 1x1x3/4"(#5631)	1.29	2 for 1.30
■ 5-SPST PUSHBUTTON MOMENTARIES, rt. angle, pc mt, on-on"(#5635)	1.29	10 for 1.30
■ 1 3" x 4" DOUBLE SIDED PC BOARD, hi-quality, copper plated,(#5694)	1.29	2 for 1.30
■ 30-RADIO AND TV KNOBS, asst styles, sizes(#217)	1.29	60 for 1.30
■ 60-TUBULAR CAPACITORS, asst. volts and sizes(#219)	1.29	120 for 1.30
■ 4-ROCKER SWITCHES, DPDT, solder tab leads,(#3302)	1.29	8 for 1.30
■ 50-POWER RESISTORS, 3.5,7 w. axial, pop sizes(#228)	1.29	100 for 1.30
■ $25 SURPRISE, all kinds of parts in a pak(#294)	1.29	2 for 1.30
■ 12-PANEL SWITCHES, rotary, slide, toggle etc(#295)	1.29	24 for 1.30
■ 60 COILS AND CHOKES, rf, parasitic, if, etc(#297)	1.29	120 for 1.30
■ 60-TERMINAL STRIPS, up to 4 solder lugs(#334)	1.29	120 for 1.30
■ 25-PLASTIC TRANSISTORS, untested and hobby, TO-92, TO-18,(#2604A)	1.29	50 for 1.30
■ 50-MICA CAPACITORS, asst values(#373)	1.29	100 for 1.30
■ 10-SETS RCA PLUGS AND JACKS, phono(#402)	1.29	20 for 1.30
■ 60 DISC CAPACITORS, asst values long leads(#437)	1.29	120 for 1.30
■ 20-TRANSISTOR ELECTRO'S, asst up and ax(#453)	1.29	40 for 1.30
■ 75-HALF WATTERS, resistors, color coded, asst(#454)	1.29	150 for 1.30
■ 35-SILVER MICAS, red backs, axial, asst(#455)	1.29	70 for 1.30
■ 4-PUSH BUTTON, SPST, PANEL, N.C. 125V, @ 1A(#5289)	1.29	8 for 1.30
■ 100-GERMANIUM DIODES, axial leads, u test(#642)	1.29	200 for 1.30
■ 100-STABISTORS, Regulator, sensing and computer. Axial, ex. yield(#3140)	1.29	200 for 1.30
■ 100-PRINTED CIRCUIT ½ WATT RESISTORS, asst(#1060)	1.29	200 for 1.30
■ 12-TRANSISTOR SOCKETS, asst npn and pnp types(#651)	1.29	24 for 1.30
■ 50-3 AMP SILICON RECTIFIERS, axial, asst V(#865)	1.29	100 for 1.30
■ 50-POLYSTYRENE CAPS, plastic coated, prec.(#1052)	1.29	100 for 1.30
■ 30-4" CABLE TIES, non-slip white plastic(#3217)	1.29	60 for 1.30
■ 30-pc-HEAT SHRINK, asst sizes, 50% shrinkage(#5248)	1.29	60 for 1.30
■ 2-5.1V, 5%, 10W, STUD ZENER, DO-4 case(#5287)	1.29	4 for 1.30
■ 10-RCA PHONO JACKS, chasis mount, teflon base(#5119)	1.29	20 for 1.30
■ 15-THERMISTORS, asst types, styles & values(#2048)	1.29	30 for 1.30
■ 4-5-DIG[T 7-SEGMENT READOUTS, in flat pak case(#3616)	1.29	8 for 1.30
■ 25-METAL CAN TRANS., asst, prime, hobby, TO-1, TO-5, TO-18,(#2603A)	1.29	50 for 1.30
■ 1-"FOTO-FET" N CHANNEL, Crystalonics, J-Sealed Effect Transistors(#1169)	1.29	2 for 1.30
■ 1-VOLTAGE REGULATOR, TO202 case, 12V 600MA(#1900)	1.29	2 for 1.30
■ 2-3 DIGITS ON A DIP, LED, red, DL-33(#1887)	1.29	4 for 1.30
■ 3-MM5262 2K DYNAMIC RAM, specify type(#3459)	1.29	6 for 1.30
■ 10-2N711 HIGH SPEED SWITCHING TRANSISTORS, TO18, npn(#3374)	1.29	20 for 1.30
■ 2-15W HI POWER TRANSISTORS, 220V, npn, TO66(#2797)	1.29	4 for 1.30
■ 1-HEAVY DUTY LINE CORD, 8 ft., 2 cond. #18 guage, black,(#5803)	1.29	2 for 1.30
■ 1-MM5312 DIGITAL CLOCK CHIP, 100%(#1525)	1.29	2 for 1.30
■ 2-MM5725 4 FUNCTION CALCULATOR CHIP, 100%(#2036)	1.29	4 for 1.30
■ 25 PLASTIC TRANSISTORS, untested, TO-92,(#3731)	1.29	50 for 1.30
■ 3-10 AMP 25V BRIDGE RECT, comb style(#2447)	1.29	6 for 1.30
■ 1-ALLEN BRADLEY POT, 10K, 2-14 watts, type-J, 2x¼" shaft(#1748)	1.29	2 for 1.30
■ 6-LINEAR SWITCHING TRANSISTORS, 2N2905, pnp, TOS(#3375)	1.29	12 for 1.30
■ 50-2 AMP CYLINDRICAL RECT. up to 1K, u test(#4006)	1.29	100 for 1.30
■ 1-HEAVY DUTY LINE CORD, 2 cond. 6 ft. #18 guage, white,(#5804)	1.29	2 for 1.30
■ 10-2N2222 (or equiv.), TO-18 metal case(#1992)	1.29	20 for 1.30
■ 10-DATA ENTRY SWITCHES, SPST, 1 amp, norm open 125V(#5321)	1.29	20 for 1.30
■ 8-TRANSISTOR RADIO EARPHONES, 8 ohms imped(#2946)	1.29	16 for 1.30
■ 15-FLUORESCENT OVERFLOW READOUT TUBES, w/leads(#3288)	1.29	30 for 1.30
■ 2-ALUMINUM HEAT SINKS, for TO-220(#5338)	1.29	4 for 1.30
■ 1-2N5001 80V TRANSISTORS STUD(#2800)	1.29	2 for 1.30

"ONE PENNY MORE GETS YOU TWO"

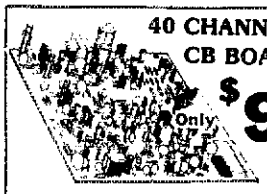
MINI LECTROS

Plastic

MFD.	VOLTS	SALE	LEADS	2 FOR
25	15	.14	Axial	.15
25	25	.17	Axial	.18
25	50	.24	P.C.	.25
50	15	.17	Axial	.18
50	25	.19	Axial	.20
50	100	.21	Axial	.22
100	15	.23	Axial	.24
100	25	.25	P.C.	.26
100	50	.35	Axial	.36
100	100	.39	Axial	.40
150	15	.23	Axial	.24
200	15	.24	P.C.	.25
220	25	.32	P.C.	.33
250	15	.29	Axial	.30
250	25	.32	Axial	.33
250	50	.45	Axial	.46
300	15	.31	Axial	.32
300	25	.33	P.C.	.34
500	15	.33	P.C.	.34
500	25	.36	P.C.	.37
500	50	.39	Axial	.40
1000	15	.55	P.C.	.56

Order by Cat. No. 92CU5718 and Value

40 CHANNEL CB BOARD



$9.99

2 for $10

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 National Semi MM series PLL. May be used for 10 meter conversion (see 6 month series "CB to 10" in 73 Mag.) The parts alone make it an offer you can't refuse.

Cat. No. 92CU5880

MOTOROLA STYLE "SANDY DISC" 10 AMP RECTIFIERS

• Heavy Sand Type Hermet Construction

	PIV	SALE	2 FOR
☐	25	.34	.35
☐	50	.38	.39
☐	100	.43	.44
☐	200	.54	.55
☐	400	.61	.62
☐	600	.78	.79
☐	800	.98	.99
☐	1000	1.19	1.20

Cat. No. 92CU5677 (Specify voltage)

"BEEM -O- LIGHT" LASER DIODES

Rated @ 4.9 Watts. Wavelength .904 nm

$5.99

2 for $6

Cat. No. 92CU5508

LED WATCH GUTS

$1.49

2 for $1.50

(Ladies') Cat. No. 92CU5115C

(Men's) Cat. No. 92CU5115B

HOW TO ORDER

When ordering, always use catalog number, type no., the name of the magazine you are ordering from and the month.

POLY PAKS®

COD's MAY BE PHONED!

P.O. BOX 942-M7
SO. LYNNFIELD, MA 01940

Terms: Add Postage **Rated:** Net 30
Phone: (617) 245-3828.
Retail: 16-18 Del Carmine St.
MINIMUM ORDER: $8 Wakefield, MA

Introducing Kantronics' Field Day™
Morse Code/teletype reader and code speed display:

Kantronics' Field Day Morse Code/teletype ader and code-speed display reads code signals ght off the air. Its powerful microcomputer stem picks out signals, computes their speed, id reads even sloppy copy up to 80 words er minute!

Flys through the air ith the greatest of ease.

Field Day is simple to use. You plug it into ur station receiver just as you would a set of eadphones.

Code and teletype conversations are nverted from dots and dashes to standard hanumeric text. The text advances across 10 g half-inch displays, and lab tests show that en the fastest CW is easily readable.

Field Day displays incoming or outgoing code eeds for you at the touch of a button. An curate code speed-sampling program shows e speed right on the front panel. Everything is closed in a single, lightweight package that's all enough to fit in with the rest of ur station.

Pay a little, get a lot.

In addition to a highly superior code-reading ogram and unique "on-board" speed display, **Field Day** has the specifications that make it a truly great code reader.

Modes: CW, RTTY and speed display. **Speed Range:** 3-80 WPM. **RTTY Speeds:** 60, 67, 75 and 100 baudot. **Code Display:** 10 alphanumeric displays. **Special Characters:** AS, AR, SK, BT, /, ?, (,), ", ', comma, period, colon, semicolon, "understood," "attention," and "error." **Filtering:** Active, 750 Hz center, 200 Hz bandwidth. **Input Impedance:** 1,000 ohms. **Power Requirements:** 117 Vac, 20 watts. **Dimensions:** HWD 3.44" by 8.50" by 9.25". **Warranty:** Limited, one year parts and labor. **Price:** $449.95 Shipments after 3/1/79.

3. C'mon, take a test drive.

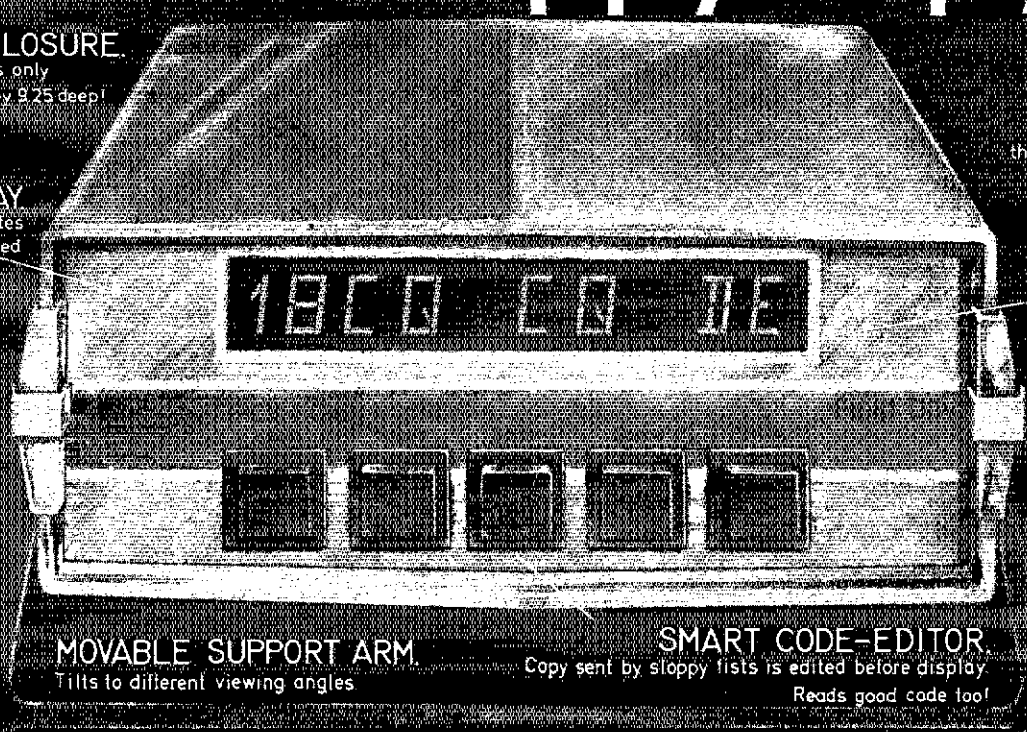
Check with these Authorzed **Kantronics** dealers for more information on the **Field Day** Morse Code/teletype reader and code-speed display:

Associated Radio/Kansas City, **Barry**/New York, **Bill's**/Carbondale, IL, **Brodie**/Moore, OK, **Burghardt**/Watertown, SD, **Burstein-Applebee**/Kansas City, **Cohoon**/Trenton, KY and Austintown, OH, **Fontana Electronics**/Fontana, CA, **H-E-P**/Aurora, CO, **Hirsch**/Williamsville, NY, **Long's**/Birmingham, **Madison**/Houston, **MidCom**/St. Louis, **Omar**/Durand, MI, **Omaha Radio Center**/Omaha, **Queen City**/Cincinnati, **Radio World**/Oriskany, NY, **Spectronics**/Oak Park, IL, **Tracy**/Fort Worth.

KANTRONICS
The Lightweight Champs.

(913) 842-7745
1202 East 23rd Street
Lawrence, Kansas 66044

Our Smart Machine™ reads sloppy copy.



MPACT ENCLOSURE.
nches. FIELD DAY is only
high by 8.50 wide by 9.25 deep!

EED DISPLAY.
cial program computes
ived and transmitted
e speeds.

RTTY COPY.
Control functions in back
for copying all
the standard baudot speeds.

ON-BOARD
CODE DISPLAY.
No need to tote around
a TV set to copy code.

MOVABLE SUPPORT ARM.
Tilts to different viewing angles

SMART CODE-EDITOR.
Copy sent by sloppy fists is edited before display.
Reads good code too!

NEW! NEW! NEW!

KDK

FM2016A

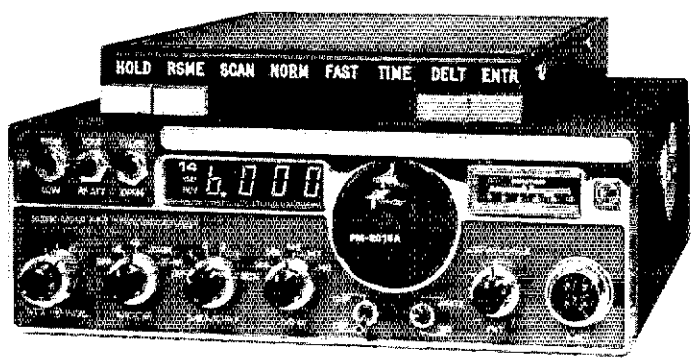
All Solid State-CMOS PL digital synthesized - No Crystals to Buy! 5KHz steps - 144-149 MHz-HUGE ⅜" LED digital readout PLUS MARS-CAP and MULTIPLE OFFSET BUILT IN. ● 5 MHz Band Coverage - 1000 Channels (instead of the usual 2 MHz to 4 MHz-400 to 800 Channels) ● 4 CHANNEL RAM IC MEMORY WITH SCANNING AND AUTO TRANSMIT ● MULTIPLE FREQUENCY OFFSETS ● ELECTRONIC AUTO TUNING - TRANSMIT AND RECEIVE ● INTERNAL MULTIPURPOSE TONE OSCILLATOR ● RIT ● RF ATT ● DISCRIMINATOR METER - 16 Watts Output-Superior Receiver Sensitivity and Selectivity - 15 POLE FILTER, MONOLITHIC CRYSTAL FILTER AND AUTOMATIC TUNED RECEIVER FRONT END, COMPARE! ● Superb Engineering and Superior Commercial Avionics Grade Quality and Construction Second to None at ANY PRICE.

INTRODUCTORY PRICE

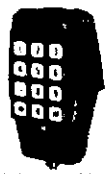
$369.00

ALSO - **NEW** FM 6016A FOR 6 METERS

Regulated AC/PS
Model FMPS-4R . . . $39.95



SHOWN WITH OPTIONAL μP-800 MICRO-PROGRAMMER* $99.00



FMMC-1* Microphone with Built-in Touch Tone Pad.
WHY BUY LESS?
THE FMMC-1 HAS IT *ALL!*

- New! Auto key up
- Snap-Action Keyboard
- Adj. level and tone balance
- Use with any transceive
- Only 3¾" x 2" $39.95

- **FREQUENCY RANGE**: Receive and Transmit: 144.00 to 148.995 MHz, 5 Khz steps (1000 channels) + MARS-CAP and MULTIPLE OFFSET BUILT IN.
- **HUGE ⅜" LED DIGITAL READOUT.**
- **4 CHANNEL RAM SCANNER WITH IC MEMORY AND AUTO TRANSMIT:** Program any 4 frequencies and reprogram at any time using the front panel controls—search for occupied (closed) channel or vacant (open) channels. Internal Ni-Cad included to retain memory (no diode matrix to wire or change).
- **MULTIPLE FREQUENCY OFFSETS: NO CRYSTALS TO BUY - EVER** - Any offset any split! "Odd Ball" splits accomplished by digital programming. Never any need for crystals!
- **INTERNAL MULTIPURPOSE TONE OSCILLATOR BUILT IN**: Sine Wave 1750 Hz tone burst for "whistle on operation" and sub-audible tone operation. Internal 2 position switch for automatic and manual operation, tone burst or sub audible tone. PL - adjustable 60-203 Hz (100 Hz Pre-Set).
- **AIRCRAFT TYPE FREQUENCY SELECTOR**: Large and small coaxially mounted knobs select 100KHz and 10KHz steps respectively. Switches click-stopped with a home position facilitate frequency changing without need to view LED's while driving and provides the sightless amateur with full Frequency Selection as standard equipment.
- **FULL AUTOMATIC TUNING OF RECEIVER FRONT END AND TRANSMITTER CIRCUITS:** DC output of PLL fed to varactor diodes in all front end RF tuned circuits provides full sensitivity and optimum intermodulation rejection over the entire band. APC (AUTO POWER CONTROL) - Keeps RF output constant from band edge to band edge. NO OTHER AMATEUR UNIT AT ANY PRICE has these features which are found in only the most sophisticated the expensive aircraft and commercial transceivers.
- **TRUE FM**: Not phase modulation - for superb emphasized hi-fi audio quality second to none.
- **RIT CONTROL**: Used to improve clarity when contacting stations with off frequency carrier.
- **MONITOR LAMPS**: 2 LED's on front panel indicate (1) incoming signal-channel busy, and (2) Transmit.
- **FULLY REGULATED INTEGRAL POWER SUPPLY**: Operating voltage for all 9v circuits independently regulated. Massive Commercial Hash Filter.
- **MODULAR COMMERCIAL GRADE CONSTRUCTION:** 3 Unitized modules eliminate stray coupling and facilitate ease of maintenance.
- **ACCESSORY SOCKET**: Fully wired for touch tone, phone patch, and other accessories. Internal switch connects receiver output to internal speaker when connector is not in use.
- **MULTI-PURPOSE METER**: Triple Function Meter Provides Discriminator Meter, "S" Reading on receive and Power Out on Transmit.
- **RECEIVE**: Better than .25uv sensitivity, 15 POLE FILTER as well as monolithic crystal filter and AUTOMATIC TUNED LC circuits provide superior skirt selectivity - COMPARE!
- **HIGH/LOW POWER OUTPUT**. 16 watts and 1 watt, switch selected. Low power may be adjusted anywhere between 1 and 16 watts. Fully protected - short or open SWR.
- **RF ATT**. Live right next to King Kong Repeater and can't operate? With the 2016A You Can - Just flick the RF ATT switch. Only the 2016A has this feature.
- **OTHER FEATURES:** Dynamic Microphone, built in speaker, mobile mounting bracket, external 5 pin accessory jack, speaker jack, and much, much more. Size 2½ x 7 x 7⅛. All cords, plugs, fuses, microphone hanger, etc. included. Weight 5 lbs.

Manufactured by one of the world's most distinguished Avionics manufacturers, Kyokuto Denshi Kaisha, Ltd. First in the world with an all solid state 2 meter FM transceiver.

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

ORDER NOW TOLL-FREE
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

Regional Sales & Service Center
East: Sanford Communications, Colonia, N.J. (201) 574-3003
Northeast: Buzzards Bay Electro Buzzards Bay, Mass. (617) 759-3376
West: The Radio Place Sacramento, Cal (916) 441-7388
Northwest: Action Supply, Inc. Boise, Idaho (208) 344-5084
Midwest: Universal Service Columbus, Ohio (614) 866 4267
South: Electronic Communicatio Highland Springs, Virginia (804) 737-5100

WB7BGP WB7NUY WB7NUZ WA7HEH WA7LZC and W7CEN raised the new tower and beam. WA7JPG has been hospitalized after a severe heart attack. We wish him a speedy recovery. For the younger set, N3AIU is attempting to establish a ARRL youth amateur committee. Members must be under 21 years old. The objective is to provide direct youth amateur representation to the ARRL, specifically to take suggestions presented to the committee, organize them and present to ARRL Officials; plan and coordinate youth activities and to provide assistance to young ARRL amateurs that hold leadership appointments. Contact N3AIU, Bethlehem, PA. N7EH newly assigned OBS for TRA Net, Races Net, and Cactus Net. A-10, QNI-910, QTC-150; SWN,QNI-204, QTC 184; Cactus, QNI 1237, QTC 99. New Advanced licences have been earned by: WB7UJL W7LSZ and WB7UJN. New General: KA7DDT KA7BSH KA7CVE KA7BOH N7AUX KA7EDF K7MBJ and WB7MFX. New Technicians: WB7WQJ WB7SCO KA7AUP and KA7DYQ. Members of the Tucson Repeater Association provided public service communications for the Arizona Association for public transportation school bus rodeo. The event took place at the Marana High School, Marana AZ, April 7, 1979. Traffic: W7LVB 203, K7MC 153, W7EP 146, K7UXB 66, WA7KQE 63, AC7D 22, K7NMQ 21, K7NTG 20, K7JKM 15, N7EH 7, KB7DV 3, WA7WEB 3.

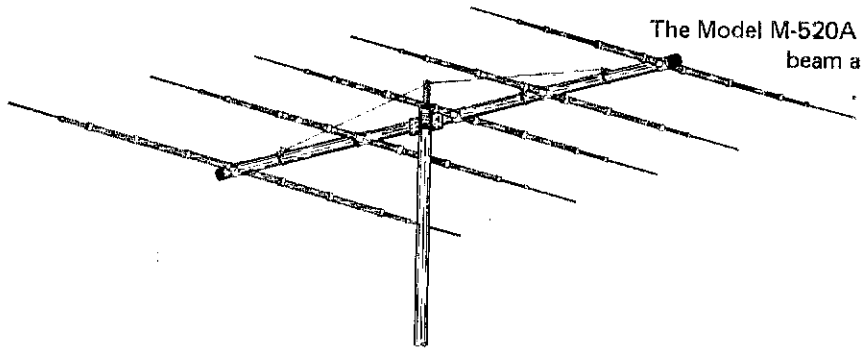
LOS ANGELES: SCM, Perry Masterson, KD6C — With the long lines for gas these days, I guess that our members were to busy to file any reports. W6CK hosted the annual Morse Club banquet for the 7th year on April 26th. A professional humorist entertained the 135 persons in attendance (including W6AM), as did W6CK with demonstrations of hypnotism and ESP. A Nationwide telegraph circuit connected all 42 chapters of the organization throughout the nation that day. We want to welcome a New affiliate club to our section, The Japan America Amateur Radio Society. N6MS is pres. W6RO from the Queen Mary is now in operation. It is reported to be receiving a lot of visitors. W6INH is still chasing DX. He has 260 confirmed. He is planning to build a new Linear in the near future. N6VI is working well with all his new antennas on as many bands as most people can count. K6EA is leaving this month for a couple of months in MN. We wish him a pleasant summer. W6BWG has now worked 271 and has 260 confirmed. Nice DX score. I have received a few questions regarding endorsements for appointments. The field appointments need to be endorsed every two years. Please send me your cert. and ask for an endorsement. For those many appointees who have not sent in reports for many months, don't be surprised to have your appointment cancelled, for inactivity. The OOs as usual have been doing a nice job. Keep the reports coming in. The SCM has bowed to peer pressure and changed his call from W6RHS to KD6C. Traffic: (Apr.) W6INH 323, W6OEO 296, K5DY/6 262, N6PZ 113, WA6LVO 105, K6EA 51, W6BRO 49, W6BWG 22, WA6OCM 9, K6CL 2. (Mar.) W6INH 230, W6OEO 227, K5DY 165, N6PZ 88, WB6YID 80, WA6LVO 50, K6EA 43, W6BRO 25, W6BWG 21, WA6FSF 17, K6CL 11, WA6OOM 5.

ORANGE: SCM, Roy C. Zukerman, AC6H — ASCM K6KNC. SEC: AE6N. ECs WB6ARK W6DOR K6GGS W6LKN WA6TLE WA6PLZ W6SQE W6WPP. WA6JFP with the help of too many to mention put on an outstanding amateur radio display with RTTY, SSTV, etc. for County Fair Days at Knotts Berry Farm for over a week. Plans for the 1979 Southwestern Division Convention in Anaheim are progressing well under the leadership of W6RE and his committee. Newly formed S. Cal. Contest Group (W6LEN, pres.) changed its name to Southern Sixlanders Contest Group to avoid confusion with the SC-Contest Club in the San Diego area. Congratulations to W6DIY WD6AUS WA6RNA and the rest of the group leading the VIP (Visually Impaired Pupils) radio club, in bringing ham radio to handicapped students integrated with the unimpaired. WA6IOL got a very nice note from a "civilian" for his assistance at the scene of a freeway accident. He also reported a busy month as OO. Orange County Council made some minor clarifications of its rules for the local contest within Field Day, as many clubs report preparations for the annual exercise. Traffic: WB6EIG 606, WB6QBZ 134, WA6QCA 52, AC6H 3.

SAN DIEGO: SCM, Arthur R. Smith, W6IN! — Asst SEC: N6RD. STM: N6GW. Palomar ARCs North County Traffic Net handled 51 messages during Apr. This net is good opportunity to learn traffic handling. It meets daily at 2000 local time on the Palomar repeater, 146.13/73. New officers for S. D. Amateur Radio Council are W6PDA, chmn; WA6BDW, vice chmn; W6OGC, treas; W6PKA, secy. For info about RACES in San Diego County, contact C.A. Mattingly, 448-4611. He is the new Deputy Director for Communications. Volunteers are needed in Alpine, Borrego Springs, Campo, Encinitas, Crest, Fallbrook, Jacumba, Julian, Lakeside, Pine Valley, Poway, Ramona, Rancho Sante Fe, Santee, Spring Valley and Valley Center. New PSHR rules are now in effect. See Apr QST, page 76. Palomar ARC UHF repeater now on 444.425 in, 449.425 out. W6PKA writes DX column for Poway ARS "Call Letter." An ARES RTTY net operates each Su 1900 PT on 223.22 in, 224.82 out with SD Teleprinter Soc. sponsorship. W6MNO is net manager. SD Repeater Assn meets monthly at new location, 3927 Utah, San Diego, on third Thurs. Official Observers needed to strengthen Amateur Radio's self-policing program. Contact W6INI. Traffic: (Apr.) WA6UAZ 417, N6GW 221, WA6AMK 218, WB6PVH 193, W6HUJ 187, K6HAP 116, WB6MLB 107, WB6HMY 78, N6AT 70, WA6ZZL 68, WA6UFY 67, WA6SKU 8, WB7SUA 2. (Mar.) WB6PVH 132, WA6ZZL 68.

SANTA BARBARA: SCM, D. Paul Gagnon, N6MA — Our Clubs were active this month with CP5NP presenting a trip to Goldstone and W6SUN/WB6OCX talking on Field Day at Simi Settlers ARC; WB6ACU flying in from Florida to present music synthesizers at Santa Barbara ARC; N6VR presenting his DX-peditlon to Ghana and Somaliland at Ventura County ARC. SBARC sponsoring an intra-club contest competition for major contests. Contact WA6KTZ for details. The VCARC annual Swapmeet was a success. June 17 is the date for the Sattelite ARC annual Santa Maria Swapfest and BBQ. Presently N6MA is acting as temporary Section Emergency Coordinator. Would you like to volunteer for this important position? Santa Barbara South County ARES provided comms for the Hang Glider Association outing led by N6AJA. They also combined with the North County group let by WB6BWZ to provide comms and phone patches for Los Padres Search and Rescue from NIRA campground during search for lost child. Sixth Region Net Daytime session needs help. They meet on 7275 at 2030Z DY. WB6JKM and W6ZRR sent over 100

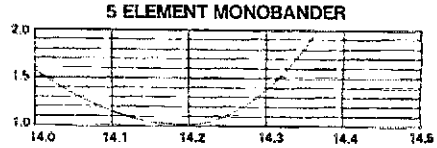
NEW, IMPROVED Wilson's MONO-BANDERS

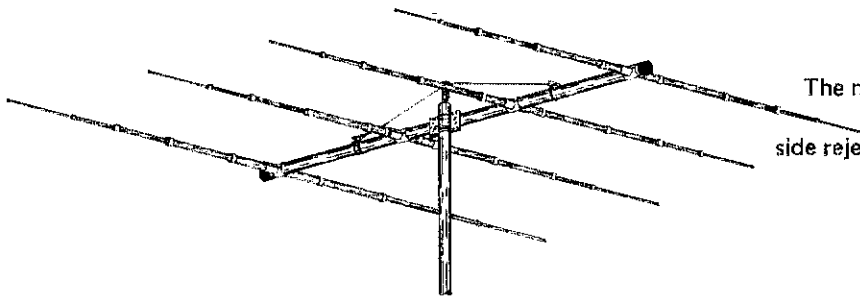


The Model M-520A offers the discriminating DXer an unexcelled beam antenna that really punches through the QRM . . . ask anyone who owns one! Features 5 full sized elements on a 2" O.D. x 34 ft. boom. Low SWR across the entire 20 meter band. The M-520A is shipped UPS in two cartons.

M-520A

5 ELEMENT MONOBANDER

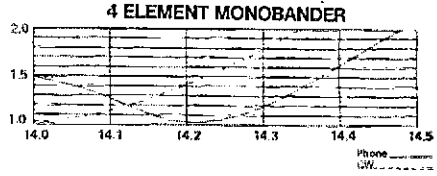




The magic 20 meter beam: M-420A . . . 4 elements on a 26 ft. boom. Super front-to-back and side rejection. The M-420A ships UPS in two cartons.

M-420A

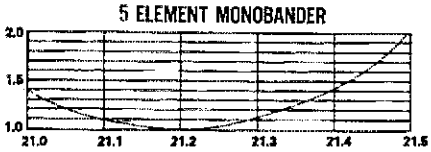
4 ELEMENT MONOBANDER

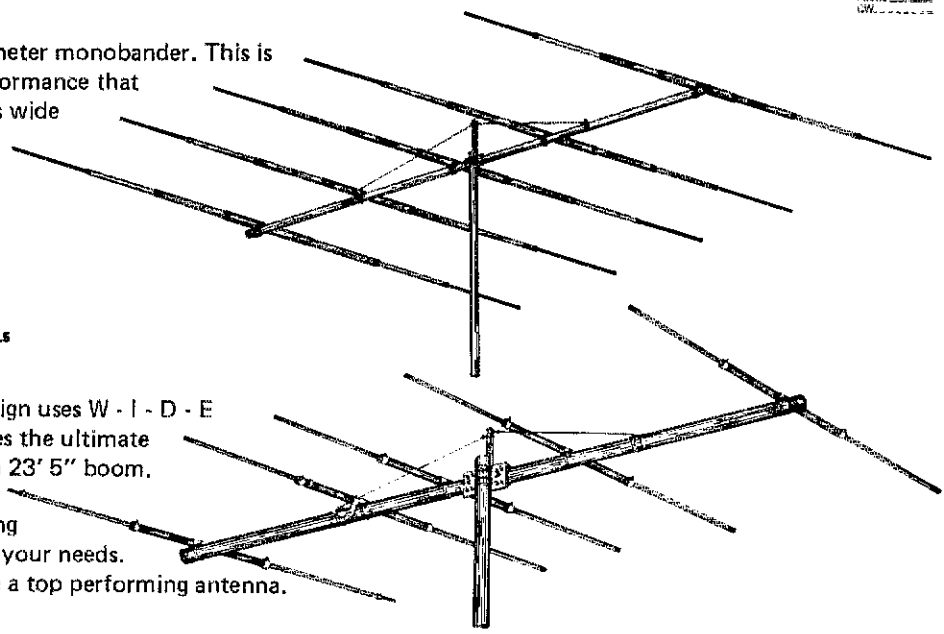


The M-155A is the top of the line 15 meter monobander. This is the one for the serious DXer. Top performance that will make you heard on 15! 5 elements wide spaced on a 25' 7" boom.

M-155A

5 ELEMENT MONOBANDER



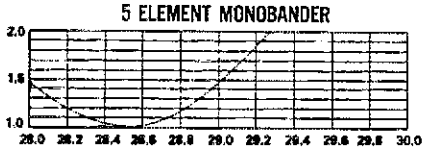


The M-105A — our latest 10 meter design uses W - I - D - E spacing. Well researched design provides the ultimate in a 10 meter antenna. 5 elements on a 23' 5" boom.

With the 10 meter band making a strong comeback, choose our model to fulfill your needs. Five wide spaced elements will provide a top performing antenna.

M-105A

5 ELEMENT MONOBANDER



SPECIFICATIONS	MODEL M-520A	MODEL M-420A	MODEL M 155A	MODEL M 105A
Band MHz	14	14	21	28
Maximum Power Input	Legal Limit	Legal Limit	Legal Limit	Legal Limit
VSWR (at Resonance)	1.1:1	1.1:1	1.1:1	1.1:1
Impedance	52 ohms	50 ohms	50 ohms	52 ohms
Boom (O.D. x Length)	2" x 34'6"	2" x 26'	2" x 25'7"	2" x 22'5"
No. Elements	5	4	5	5
Longest Element	33'6"	26'6"	25'3"	18'3"
Turning Radius	25'	22'6"	17'6"	12'6"
Mast Diameter	2" O.D.	2" O.D.	2" O.D.	2" O.D.
Boom Diameter	2" O.D.	2" O.D.	2" O.D.	2" O.D.
Surface Area (Sq. Ft.)	8.9	7.6	4.25	2.9
Wind Load	227 lbs.	186 lbs.	108 lbs.	75 lbs.
Assembled Weight (Approx.)	70 lbs.	50 lbs.	40 lbs.	35 lbs.
Shipping Weight (Approx.)	79 lbs.	56 lbs.	46 lbs.	40 lbs.
Matching Method	Beta	Beta	Beta	Beta

Prices and specifications subject to change without notice.

Consumer Products Division

Wilson Electronics Incorporated

A Subsidiary of REGENCY ELECTRONICS, INC.

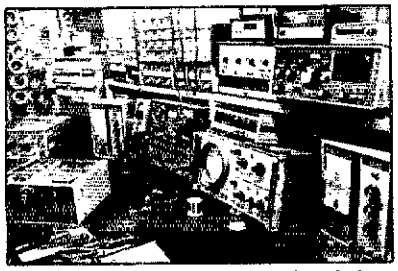
4288 So. Polaris • P. O. Box 19000 • Las Vegas, Nevada 89119
Phone (702) 739-1931 • Telex 684-522

Call Toll Free 1-800-243-7765

FREE
- Monthly Computerized Used Equipment List
- Courteous, Personalized Service

New Equipment — All new equipment on display is operating for actual "on the air" QSO's. We really know our gear!

Used Equipment — We recondition and guarantee all our used equipment. We make sure it satisfies you!

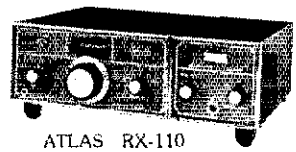


Service Shop — You've probably heard of our fine service reputation — using Cushman CE4B signal generators, Hewlett Packard oscilloscopes, Bird wattmeters — we fix it right!

Inventory Warehouse — Our large volume assures you the best prices!

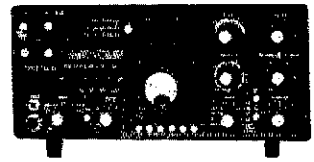
ICOM IC-701

YAESU FT-301D



ATLAS RX-110

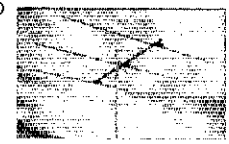
YAESU FT-7B



YAESU FT-101ZD

TEN TEC OMNI-D

KDK 2016A



CUSHCRAFT ANTENNAS

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!"*

SAME DAY U.P.S. SHIPPING *"Just a phone call away"*

COMPLETE RADIO SERVICE SHOP *"Mail Order Repair Service"*

- Fast Efficient Service
- Most Repairs Done and Shipped Within 7 Days
- We Repair All Brands
- Amateur Extra / First Class Licenses
- All Work Guaranteed
- Free Shipping Both Ways If Work Is Done
- Send Us Your Defective Equipment U.P.S. Collect

OUR FINE REPUTATION SPEAKS FOR ITSELF . . .
"YOU SHIP IT — WE FIX IT"

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)

"We can match most any other quote!"

"We want your used gear! We will buy or trade."

Call or Write for your super quote today!

master charge

VISA

THOMAS COMMUNICATIONS

95 Kitts Lane, Newington, Conn. 06111
"Near ARRL Headquarters"

Connecticut Residents Call: **203-667-0811**

OSTS each. N6AXP sailed his sloop BOA VAIGEMM II from San Francisco to Miami via the Panama Canal. AA6BB, and WB6GNS graduated 15 Novices from the SMRA class. N6ADI N6VR WA6IJZ and W6WBY are VCARC members receiving a contest award for efforts in ARRL contests. WA6MQU and XYL have a new harmonic. New Licenses: KA6DKS and KA6CDF and WD6GJS General; WA6CDT and KB6KZ Advanced; KA6s BPH BPG and CWJ Tech; KA6s ETO ENP E7M and EPF Novice. N6AFI s-1 and TS820; WA6DJS System 3; K6VMN a System 3; WB6GNS a System 3, WA6TKK a System 2 and TS820; WA6FPX 1296 gear. PSHR: N6YH 22, WD6EEN 46, WB6BWZ 50, W0KON 62, N6MA 20. W0KON has made Brass Pounders League Again! Traffic: W0KON 803, N6YH 110, WB6BWZ 89, WD6EEN 42, N6MA 18.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC . Asst. SCM: AE5C. SEC: N5WB. STM: W5VMP. NMs AE5I AA5J. This Section has been hit by everything but the kitchen sink this month. Amateur Radio, thru the ARES, RACES, and NTS has risen to the occasion with "flying colors," getting the job done with who and what was available. Fantastic work done by all! The new official frequencies for emerg. and priority tfc for this Section are: 7290 and 3961 kHz (SSB) and 3770 kHz (CW). If you hear of or are involved in a disaster, please monitor these freq. and establish communications ASAP. New ECs: N5GK, Denton Co; WD5JDA, Floyd Co; WB5KIJ, Freestone Co; WB5GGJ, Parker Co; WB5SBO, Grayson & Fannin Co's; K5KXG, Anderson Co; K5ERJ, Lynn & Garza Co's; WD5IMA, Panola Co; KB5AI, Ellis Co. Please sign up for ARES at once with your local EC. The time to organize is before the disaster! EC's needed in the Waco and San Angelo areas. Contact N5WB. DARC emer. trailer being outfitted with new 4 freq. portable rptr, crank-up tower, KWM-2, and 2mtr RTTY stn, plus new generator to run it all. SWDCARC building up similar unit. WB5JCT upgraded to Adv. W5TU's 11 yr old son now KA5EFE. D/FW Metro Tfc. Net meets Dy on 28.88 @ 1830CDT; had 26 sess. 402 QNI, 122 QTC, 106Q SP in April. NM is AA5J. Big County 2mtr Net in Abilene area on WR5AFC; a tfc and tng net with NTS liaison. Meets @0100Z summer and 0200Z winter. NM is WA5INJ. BPL for April: WB5SDD K5REL K5REJ K5OUK W5UXP. The tfc reports are not really the true picture of actual tfc passed this month. N5WB K5JHP N5AWD WB0TTO K5MWC K5OJI and W5FC all had tfc counts in excess of 4000 points each, but were working under emergency conditions, and an accurate count was impossible due to the circumstances during the Wichita Falls disaster. Also, WA5UTA and his fine ARES organization in W.F. all made PSHR on their emer. tfc count alone, but have not had time to document their work. Congrats to all participants for a super job! Traffic: K5REL 662, WB5SDD 601, K5REJ 570, W5UXP 440, K5OUK 409, AA5J 335, WB5BKM 317, K5PC 197, WB5OXE 186, AE5I 182, WA5INJ 111, WB5LAT 107, W5VMP 104, W5CTZ 79, WB5UHO 73, WD5JDA 47, KA5Q 34, WA5QFD 32, WA5EZT 28, WB5YYK 28, AC5Y 26, WB5JCT 18, N5BT 12, K5ERJ 12, K5SOR 12, WD5GFP 8, W5YK 8, WB5KTC 5, KB5GU 3, KB5AI 2, WA5UBK 2.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Spring Storms began first week in April, with Lawton and neighboring areas hit hard. Also Wichita Falls and Vernon TX. Then last week Garfield Co. hit hard. To say I am proud of our amateurs is putting it mildly, they did a wonderful job and really operated in the public interest. Three of our fine Operators became Silent Keys this month; WA5AOB W5BKN & W5WI. They will be missed. Have some good reports from our OVS this month. Hugo Club put on demonstration at a CB Jamboree. Lots of interest shown. K5JB, new OBS for MORI repeaters. WB5ELG a new tower and Triband beam. Oklahoma City talking a YL net on 16-76 repeater. How about it gals? Amateurs have received some excellent publicity in the Media this month.. Wish they would give call letter. When you see this, we should be under way with new PSHR reporting. Hope it increases number of reports (7 for April). Talk of a booth at State Fair sounds good to me. Next bit Oklahoma City event is Ham Holiday, July 27-29, C.U. There. Woodward to Help with Road Runner Marathon, May 26. Enid handled Tri-State and Parade again this year. W5RB has 50 yr certificate from UCWA, congrats. Let's get those Local Nets going with traffic, technical and rag chewing. Try it for size. Traffic: WB5MVR 738, K5JGZ 444, W5REC 364, WB5NKC 290, W5RB 284 WB5NKD 281, W5UYH 128, W5VXU 71, W5BYC 63, WB5EAY 59, WB5OAH 51, K5CAY 48, WA5OUV 43, WA5FSN 39, W5FKL 34, W5SUG 27, WD5ETB 22, W5VOR 22, K5MGD 21, W5HGH 18, KA5DRD 15, WB5ELG 10, WD5IFB 9, WB5OVT 4, W5JJ 2.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W5KR — Asst SCM: N5TC. SEC: WD5CZI. Net-Mgrs-at-large: N5TC (phone), WA5RKU (cw). OO reporting this month: WB5CIT OVS reporting this month: N5AJO WB5CIT OVS N5AJO now operating 10-mtr mobile with converted CB rig. OTS (and past SCM) K5HZR reports on the 7290 Traffic Net picnic. There was a great program, highlighted by a talk on ARRL by W5EDZ. WA5CTJ and WB5UVI are new horseshoe champs. WD5IKV and K5GM are new domino champs. WB5YDD has new Aldo 103 for mobile use and new 3kW generator for portable/emergency use. OTS, K5RG reports Wichita Falls tornado generated plenty of priority traffic. EC/OTS WA5RVT gave talk on traffic handling at last club meeting. WB5AHN enjoying new IC-701 and N5FN chasing DX while acting as QSL manager for 9VITX. WA5RSI has new TS-700SP. W5EDZ and W5KR attended the charter party of the Williamson County ARC to celebrate affiliation with ARRL. Traffic: W5KLV 961, W5SBE 409, N5TC 383, K5HZR 236, WA5VBM 202, WA5RKU 186, WB5MMI 98, WB5CIT 60, WB5YDD 41, AK5M 35, W5SPD 31, K5RG 29, WA5RVT 27, W5KR 25, K5RVF 14, K5DG 1.

Harrison "Ham Headquarters U.S.A. ®"

"When you deal with me I personally see to it that your needs receive individual attention.
You will enjoy quickest delivery from our large inventory of factory fresh, latest improved production models. If you wish, we will fire up and check it out for you. And because we do not let things out on trial basis, everything you get will be truly brand new, untampered with!
Should you ever run into any trouble, we are here to take care of you.
We service what we sell, our Lab is among the finest in the country.
With it all, I'm very competitive, I will try to beat any equivalent deal you got. (and even if my price seems a few dollars higher I assure you it is still the greatest bargain anywhere.)
So, drop me a line or phone me. Tell me what to get, what you have to trade in, what offers you have-I'll do the rest.

"TNX 73
BEN SNYDER W2SOH

KENWOOD

TS-180S All solid state 160-10 mtr. 1,149.95
TS-820S XCVR 10-160 mtr 1299.00
R-820 RCVR 10-160 mtr. 1099.00
DG-1 Digital frequency display(TS-820) 199.00
VFO-820 VFO remote(TS-820S) 175.00
TS-520S 10-160 mtr. XCVR 849.00
VFO-520S VFO (TS-520S) 155.00
R-300 170 khz 30mhz RCVR 279.00
AT-200 200 w. antenna tuner 159.00
TL-922A 15-160 mtr. amp 1199.00
SM-220 Station monitor 349.00
TS-600 6 mtr. 10 w.ssb/cw/fm/am/dig. .. 799.00
TS-700SP 2 mtr.ssb/cw/fm/am/dig 799.00
TR-8300 70cm/fm 10 w.23 ch. XCVR 369.00
MC-50 Microphone 45.00
TS-120S Solid state HF SSB XCVR 699.00
VFO-120 Remote VFO(TS-120S) 159.95
AT-120 Antenna tuner 99.95
AT-180 antenna tuner/SWR meter/RF power meter/antenna switch 179.95
PS-30 base station power supply 139.00
YK-88CW 500-Hz CW filter 59.95
VFO-180 Remote VFO for TS-180S ... 179.95

DRAKE

TR7/DR7 10-160 XCVR, Dig. readout .. 1,395.00
R4C 10-160 HF RCVR 699.00
T4XC 10-160 HF XMTR 699.00
PS-7 power supply for TR7 ..... 249.00
AC-4 power supply for T4XC-TR4's 150.00
MN-2700 Antenna matching network ... 279.00
L-7 15-160M, linear amplifier 1,099.00
UV3 144 ..... 595.00
UV3 2-band 795.00
UV3 3-band 995.00

WILSON

Mark II 2 m. 2.5 w. Hand held 229.00
Mark II w/tt pad 2 m. 2.5w hand held 291.00
Mark IV 2m. 4w. hand held 259.00
Mark IV w/tt pad 2m. 4w. hand held 321.00
System I 5 element tri-band beam 279.95
System II 4 element triband beam 219.95
System III 3 element tri-band beam 179.95

YAESU

FT-901 DM 10-160 m. XCVR 1459.00
FT-101 ZD 10-160 m. XCVR 895.00
FV101B 137.00
SP101PB Spkr/Patch 87.00
CPU 2500 RK VHF XCVR FM mob. Key. 585.00
FT-225RD 2m. digital All mode 895.00
FT-227 RA Auto Scan 4 mem. 399.00
FT-625 RD All mode 6 M. 895.00
FT-202 RHand Held 2 M 199.00
FT-127 RA 220 MHZ AutoScan 479.00
FRG-7 RCVR Gen. Coverage 370.00
FRG-7000 RCVR All band HF 655.00
YC-500 J 500 MHZ 10PPM Freq. counter 239.00
YP-150 Dummy load 86.00
YO-901 Monitor 445.00
FV-901 DM Synthesized VFO 415.00
FC-901 Antenna Tuner 199.00
YM-2500 Keyboard Microphone 69.00
FTV-250 2 M. XVTR 275.00
FTV-650 B 6 M. XVTR 239.00

BIRD

43 Wattmeter 125.00
Table 1 Elements 2-30 mmz 45.00
Table 2 Elements 25 1000 mmz 38.00
CC' Carrying Case 27.50

ICOM

IC-211 2m. all mode base station 895.00
IC-701 HF XCVR 1.8-29.9999 mhz 1659.00
RM-2 Remote programmer(245-211-701) 190.00
IC-280 Remotable 800 ch. 2m. mobile ... 489.00
IC-245S 2m. FM/CW/SSB LSI-mobile ... 714.00

TRAC

Message memory keyer 69.95
CMOS Electronic keyer 36.50
Twin paddle Squeeze key 25.95

PACE

Communicator MX FM portable 2 mtr. ... 265.00
Communicator I Handheld FM portable . 239.00
Communicator II 25/1 w. mob. 800 ch. .. 399.00

TEMPO

S-1 Syncom 800 channel syn. XCVR 349.00
S-1T Syncom Same with touch tone 399.00
S-30 Solid state 30w. amp(with S-1) 89.00

CUSHCRAFT

A147-11 11 el. 146-148 FM antenna 36.95
A147-20T 144-147 mhz 20 el FM antenna . 62.95
AR-2 135-170 mhz Ringo 24.95
ARX-2 135-170 mhz Ringo Ranger 39.95
AMS-147 146-148 mhz stainless mag. mt. 34.95
ATB-34 4 element 3 band beam 289.95
ATV-3 3 band trapped vertical 49.95
ATV-4 4 band trapped vertical 89.95
ATV-5 5 band trapped vertical 109.95
A28-3 3 element 28 mhz 69.95

VIBROPLEX

Original Deluxe 65.00
Original Standard 49.95
Vibro-keyer deluxe 65.00
Vibro-keyer standard 49.95
Champion 46.50

HyGain

221-TH3 Jr. 3 element tri-band 750w pep 149.95
226-203 BA 3 element 20 Mtr. 2kw pep ... 129.00
228-18TD 10-80 portable tape doublet ... 94.95
236-153BA 3 element 15 mtr. beam 79.95
239-103BA 3 element 10 mtr. beam 54.95
244-HyQuad 2 element Quad tri-band ... 229.95
330-DB10/15A 3 element DuoBand beam 149.95
380-2BDQ 40-80 trap-doublet 49.95
383-5BDQ 5 band trap doublet 89.95
386-18AVT/WB 5 band trap vertical 99.95
388-TH3 MK3 3 el, trap tri band beam 229.95
389-TH6 DXX 6 el. super thunderbird 299.95
394-204BA 4 element 20 mtr. beam 219.95

Prices subject to change

Harrison radio

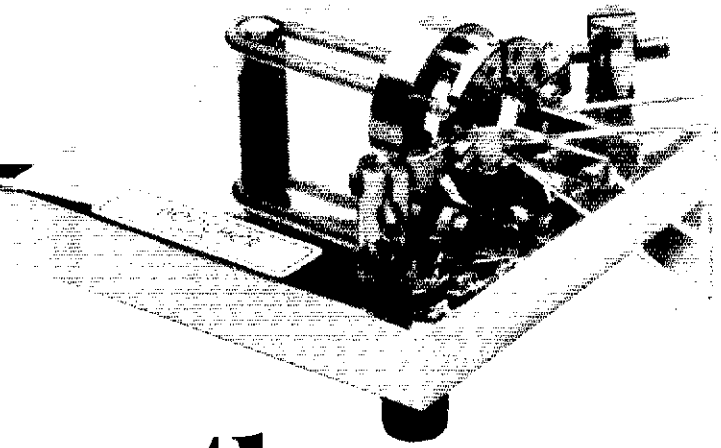
FARMINGDALE
2265 Route 110, 11735 (516) 293-7990
NEW YORK CITY (212)895-4777
301 Madison Avenue, 10017 (212) 697-8910
Valley Stream
10 Sunrise Highway 11580, (516) 872-9565

CHARGE IT! MASTER OR VISA

N.Y.C. HOURS: 10 AM to 6 PM 9 AM to 2 PM Sat.

OPEN NITES 'TIL 9 Saturdays 'til 6

PROMPT ORDER DEPT
We carefully pack and ship ham gear, accessories and parts to most any part of the world. **Address orders to:**
20 Smith Street
Farmingdale, N.Y. 11735
Or - Phone your orders to
(516) 293-7990
N.Y. residents only, add N.Y. Sales Tax



the Ultimate IAMBIC PADDLE

- Full range of adjustment in tension and contact spacing.
- Self-adjusting nylon and steel needle bearings.
- Solid silver contact points.
- Polished lucite paddles.
- Precision-machined, chrome plated brass frames.
- Standard model has black, textured finish base; deluxe model is chrome plated.
- Heavy steel base; non-skid feet.

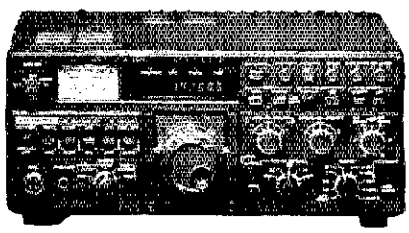
WRITE FOR LITERATURE

BENCHER, INC.

333 W. Lake Street, Dept. C
Chicago, Illinois 60606 • (312) 263-1808

Available at selected dealers or send $39.95 ($49.95 for chrome model) plus $2.00 shipping and handling. Overseas amateurs invited to request quotation for air parcel post shipment.

Red Cross.
The Good Neighbor.



TS-180S

Your paid phone call or letter could save you up to $120.00 on the Kenwood TS-180S.

RDC

ROSS DISTRIBUTING COMPANY
78 SOUTH STATE STREET
PRESTON, IDAHO 83263
208-852-0830

AT LAST!

The Antenna Book you've been waiting for. Taken from the pages of *QST*. The new *ARRL Antenna Anthology* is chock-full of antenna projects for every interest. There are dipoles, verticals, Yagis, quagis, phased arrays, Novice antennas and more! You also get a chapter on Antenna Theory and Test Methods. Your library is incomplete if you don't add this brand new book. Make sure you stop by your local ARRL dealer, *soon.*
$4.00 U.S., $4.50 Elsewhere.

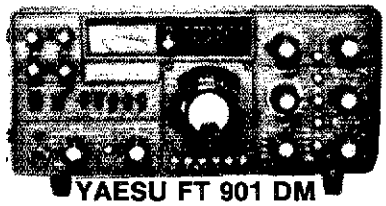
AMERICAN RADIO RELAY LEAGUE
225 MAIN ST., NEWINGTON, CT 06111

CALL A.R.S.O.N. NOW!
615 868-4956
for the Best DEALS

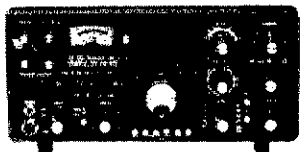
Amateur Radio Supply of Nashville, Inc.

615 South Gallatin Road, Madison, Tennessee 37115

best prices · best service · best trades



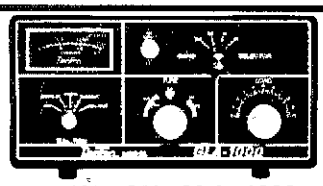
YAESU FT 901 DM
Call for yours today!



THE NEW FT101ZD
!! IN STOCK !!
Digital 160M-10M • Deluxe Features
Check the others . . . then get our price!

NEW!
YAESU FT207R
Synthesized Handi-Talkie. 3 Watts. In Stock! Write or Call for Price.

NEW!



DENTRON GLA 1000
1 KW DC Input! • 1200 W. PEP!
Clipperton L • MLA 2500 B • DTR 2000L
We have the New Dentron AF-1A Audio Processor. Dentron Antenna Tuners, Antennas and SWR Meters.
CHECK OUR PRICES

J. W. Miller - Daiwa **NEW!**
Call or write for Super Low Prices.

Fast UPS delivery. Place your order then standback!!! We ship your order the same day we get it. Best prices and quick handling of your order.

Used Equipment? Our stock turns fast - write or call your specific needs.

CLOSEOUT SPECIALS!
Send S.A.S.E. for our pink sheet specials

STORE HOURS
Mon. - Fri. 9 AM - 5 PM

NEW!
KENWOOD TS180S
All Solid State with Digital Frequency Control. 200W P.E.P. Best Prices!

NEW!
KENWOOD'S NEW TS 120S
ALL SOLID STATE HF TRANSCEIVER
PLUS A FULL LINE OF ACCESSORIES
Before You Buy, Get Our Prices!

NEW!
KENWOOD TR7600
KENWOOD TR7625
10 or 25 Watt FM 2 meter xcvr synthesized with memory. **Get our best price!**
IN STOCK!! Also 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!

SSTV — ROBOT
PUT YOURSELF IN THE PICTURE!!
Get in on the latest in Ham Radio.

IN STOCK
Call or write for prices.

ICOM 701, 211, 215, 280, 30A -
ALL IN STOCK!!
Compare Our Prices!!!

CDE ROTOR SPECIALS
The NEW HAM IV Rotor

NEW!

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 RG8X $185.00
Send cashiers check or M.O. please.

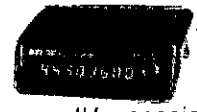
2M HANDI TALKIES??
WILSON, YAESU, TEMPO

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!!

MIRAGE
B108 2M AMP • MP1 HF SWR MTR
MP2 VHF SWR MTR
We've got 'em in stock! Call or write for prices.

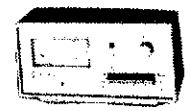
DATONG
We have in stock the amazing Datong FL-1 active audio filter. Also now have the ASP, Automatic speech processor . . . plus the Code tutor . . . Fantastic additions to your station. Call or write for information and prices.

Get On Frequency!
DSI Counter Semi-kit



Write or call for special price.

Rotor Special
ALLIANCE HD-73



SPECIAL OFFER!!
$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 RG8X $150.00
Cashiers check or M.O. please.

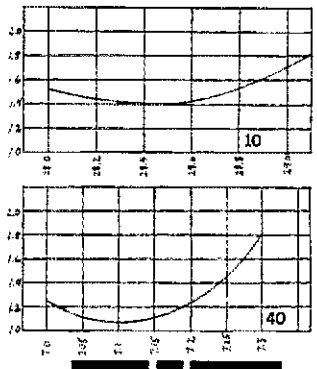
Sure, we take trades on new equipment! Call or write. We're Burning to Make "Hot" Deals!!

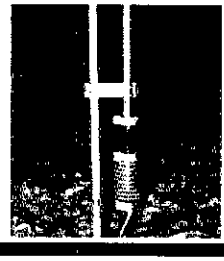
160-10 Automatically!

Beware of Inferior Imitations

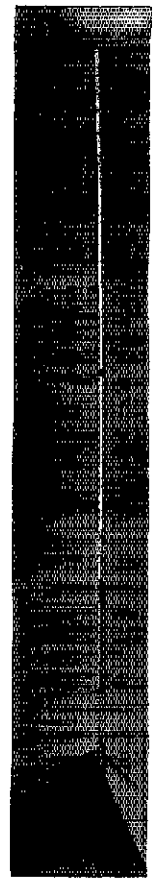
The HF5V-II+TBR-160 System.

ONLY THE HF5V-II VERTICAL GIVES YOU THE CHOICE: 80-10 meter operation with the antenna alone, or 160-10 meter operation with the antenna and optional TBR-160 unit. COMPARE: Easy to install and adjust . . . 26 ft. tall . . . 80+ mph wind survival . . . no guys needed . . . stainless steel compression clamps . . . aircraft alloy tubing . . . low angle of radiation for superior DX performance . . . only one feedline required . . . mounting post included . . . 90 day factory warranty (Write for details) . . . At your dealer or factory direct . . . post card for catalog. PATENT PENDING.





A PRACTICAL ANTENNA SYSTEM THAT REALLY WORKS — FOR A FRACTION OF THE COST OF A TRI-BAND BEAM AND TOWER! Other models from $68.00.



HF5V-II $98.00
TBR-160 $34.50
UPS PPD. CONT. U.S.

BUTTERNUT ELECTRONICS COMPANY
Route 1 Lake Crystal, Mn. 56055 Phone: (507) 947-3126

Dealer inquiries invited.

QUALITY WHERE IT COUNTS...

7208 10 Hz to 600 MHz MINI COUNTER

- All Metal Cabinet
- 115V or 12V Operation
- Automatic DP
- 8 Digit .4" LED Readout
- .1 & 1 Sec. Gate Times
- Stable Crystal Timebase ± .1 ppm/°C

7208 Kit 149.95 **7208A Assembled $199.95**

Options:	
Prop. Crystal Oven (OCXO)* ± 1 ppm 10° to 50°C	$39.95
Ni-Cad Battery, Built-in with charger	$39.95
Handle	$5.00
VHF-UHF Preamp	$10.00
240V	$10.00
Receive Frequency Adapter	$49.95

CTR-2A 500 & 1 GHz FREQUENCY COUNTERS

- Precision 10 MHz TCXO ± .01 ppm/°C
- Built-in Preamp, 10 mv@150 MHz
- All Metal Cabinet
- 8 Digit .3" LED Display
- .1 & 1 Sec. Gate Times
- Period Option Available

CTR-2A-500K Kit $249.95 **CTR-2A-500A Assembled $349.95**
CTR-2A-1000K Kit $399.95 **CTR-2A-1000A Assembled $549.95**

Options:			
Proportional Crystal Oven (OCXO)* ± .1 ppm 10° to 50°C			$49.95
.43" LED Readout	$10.00	10 Sec. Gate	$5.00
12V DC	$15.00	Handle	$10.00
240V	$10.00	Period	$15.00

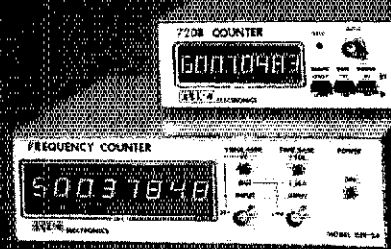
*OCXO - achieve superior frequency stability through the use of proportional control oven which maintains the crystal at a stable temperature.

in the DAVIS 7208 & CTR-2A Frequency Counters

NOW . . . *for the FIRST TIME*
RECEIVE FREQUENCY ADAPTER
ONLY 49.95 No. 7208 only

CALL FACTORY DIRECT
1-716-874-5848

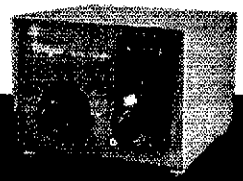
15 DAY MONEY BACK GUARANTEE
We Guarantee Our Quality



DAVIS
DAVIS ELECTRONICS
636 Sheridan Drive
Tonawanda, New York 14150
(716) 874-5848

TERMS:
Add $3.00 shipping to U.S. & Canada. Other countries add 10% to total price. N.Y. State residents add 7% sales tax. C.O.D. Fee $1.00. P.O. accepted from rated companies.

master charge VISA



Unique WIRE TUNERS

IMPROVED
Random Wire Antenna Tuners

Continuous frequency coverage with long or short wires. Excellent for MARS operation. Choice of configuration for wide range impedance matching capability, plus harmonic suppression. Turns counting dial on rotary inductor for **perfect** match and exact resetability. Runs cold at 1500 watts **output power.** Eight years of proven success.

- **CONTINUOUS COVERAGE**
- **PERFECT MATCH (1:1 SWR)**
- **IDEAL FOR MARINE OR PORTABLE**
- **COMPACT, 5" x 6½" x 10"**
- **FULL YEAR GUARANTEE**

SOLD FACTORY DIRECT ONLY TO GIVE YOU FULL VALUE.

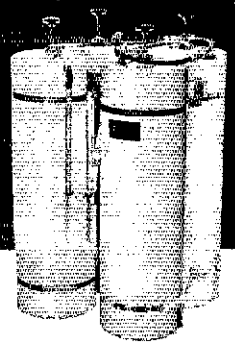
Prices F.O.B. factory.

Standard: 3.0-30.0 MHz	$119.00
Wide Range: 1.7-30.0 MHz	$139.00
Transmatch: 1.7-30.0 MHz	$154.00

W6's add state sales tax. Send check or money order ($15.00 deposit on C.O.D.'s) to:

Unique PRODUCTS COMPANY
1003 SOUTH FIRCROFT STREET
WEST COVINA, CALIFORNIA 91791
Tel: (213) 919-1430

DUPLEXERS



U.S. Patent No. 4,080,601

OUR NEW BANDPASS-REJECT DUPLEXERS WITH OUR EXCLUSIVE

BpBr CIRCUIT*

. . . provides superior performance, especially at close frequency spacing.

Models available for all Ham bands. Special price for Amateur Repeater Clubs

CALL OR WRITE FOR DETAILS:

WACOM PRODUCTS, INC.
Box 7307
Waco, Texas 76710
817/776-4444

JULY SPECIALS

Bonus: Extra 3% discount on merchandise when order is accompanied by Cashier's Check or Money Order.

Order #	List	Spl.
HY-GAIN		
389-TH6DXX - 6 el. Tribander, 24 ft. Boom	$299.95	205.00
388-TH3MK3 - 3 el. Tribander, 14 ft. Boom	229.95	169.00
221-TH3JR - 3 el. Low Power Tribander, 12 ft. Boom	149.95	109.50
385-14AVQ/WB - 10-40 M. Vertical	69.95	51.25
386-18AVT/WB - 10-80 M. Vertical	99.95	73.00
244 - 2 el. Triband Quad	229.95	169.00
214 - 14 el. 2 Meter Beam, 186" Boom	31.95	23.75
375 - 5 el. 10 Meter Long John, 24 ft. Boom	119.95	87.75
376 - 5 el. 15 Meter Long John, 26 ft. Boom	169.95	124.50
377 - 5 el. 20 Meter Long John, 34 ft. Boom	289.95	212.00
MOSLEY		
TA-33 - 3 el. Tribander, 14 ft. Boom	264.00	169.00
Others — Write.		
WILSON		
System One - 5 el. Tribander, 26 ft. Boom	299.95	218.00
System Two - 4 el. Tribander, 18 ft. Boom	249.95	181.50
System Three - 3 el. Tribander, 14 ft. Boom	199.95	145.50
CUSHCRAFT		
ATB-34 - 4 el. Tribander, 18 ft. Boom	289.95	215.00
A147-11 - 11 el. 2 Meter Beam, 144" Boom	36.95	27.50
ARX-2 - 2 Meter Ringo Ranger Base Antenna	39.95	29.75
TOWERS		
Hy-Gain - 37SS: 37 ft. crank up self-supporting tower. Antenna area 9.0 sq. ft.	661.00	513.00
Hy-Gain - 52SS: 52 ft. crank up self-supporting tower. Antenna area 9.0 sq. ft.	889.00	690.00
Wilson - TT-45 Freestanding crank up mast with house bracket and hinged base plate. Antenna area 6 sq. ft. when 40 ft. high.	344.95	280.00
Wilson - MT-61 Freestanding crank up mast with house bracket and hinged base plate. Antenna area 7½ sq. ft. when 54 ft. high.	749.95	599.95

Towers are drop shipped freight collect by truck from the factory.

WIRE & CABLE — Sold in multiples of 50 ft. only!
Maximum of 1000 ft. available in one piece uncut.
All cables have maximum (95%) braid coverage.

	Price in cents per foot 0-150 ft	200-950 ft	1000 ft
RG-8/U Foam, 13 ga. Center Conductor PVC Jacket	16.8	16.0	15.7
RG-8/U Foam, 11 ga. Center Conductor PVC Jacket, Loss 1½ db/100' @100 MHz	20.3	19.6	18.9
RG-8/U Foam, 11 ga. Center Conductor NCV jacket NCV = Non-Contaminating Vinyl jacket.	21.3	20.4	19.7
RG-213/U, 13 ga. Center Conductor, PE Dielectric, NCV Jacket (Non-Contaminating)	21.4	20.5	19.9
RG-58A/U Foam, 20 ga. Center Conductor PVC Jacket	7.5	7.2	6.9
RG-174/U Miniature RG-58, NCV jacket	5.0	4.8	4.6
RG-11/U Foam, PVC Jacket, 75 Ohms	16.8	16.0	15.7
18ga. Copperweld Antenna Wire	2.0	1.6	1.2
14ga. Copperweld Antenna Wire	4.0	3.3	3.1
12ga. Copperweld Antenna Wire	5.0	4.5	4.2
8 Conductor Rotor Cable - 6#22's, 2#18's	12.0	11.0	10.6

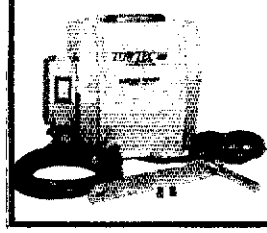
Hy-Gain #155 Center Insulator	List $5.95	Spl. $4.45
Hy-Gain #156 End Insulator (Pair)	List $3.95	Spl. $2.95
Hy-Gain #157 Center Insulator w/SO-239	List $7.95	Spl. $5.95
PL-259 Connectors	50c ea. or 10 for $4.00	
UG-175 Adaptors	20c ea. or 10 for $1.50	

Literature & Cable Samples Available: Send one stamp for price sheet and an additional stamp for each two cable samples desired (USA only). Prices do not include shipping. Prices subject to change without notice.

MC & VISA Welcome!

COMMUNICATIONS SERVICES

326A West Main Street — Philadelphia, Miss. 39350
Phone: 601-656-5345 Hours: 8-5 Mon.-Fri. Closed Sat. & Sun.



TIRED OF CRANKING?

Motorize Your Tower With Our Electric Hoist/Winch

- STURDY — RELIABLE — EASILY INSTALLED
- IN USE ON E-Z WAY, HEIGHTS, TRI-EX, TRISTAO, ROHN, ALUMA, VERSATOWER, WILSON, TEL-TOW'R, PIPES, ETC.

TOWTEC CORP. $225
118 ROSEDALE RD., YONKERS, N.Y. 10710 Tel. (914) 779-4142

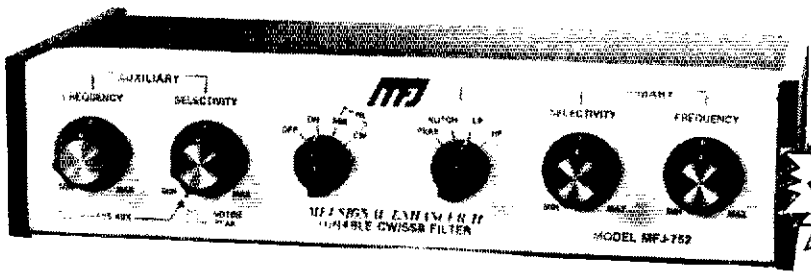
Sunday, August 19, 1979 Famous Flea Market

WARREN, OHIO HAMFEST

Trumbull KSU Campus **See Our Ham-Ad**

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).

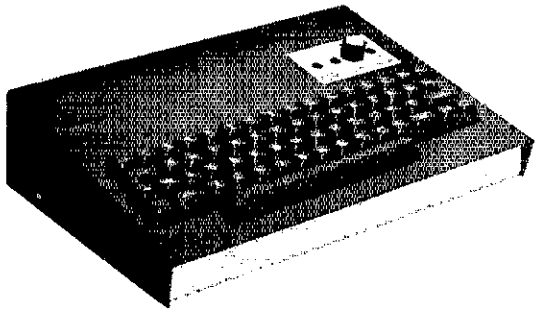
To order, simply call us toll free 800-647-1800 and charge it on your VISA or Master Charge or mail us a check or money order for $79.95 plus $3.00 for shipping/handling.

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.

MKB-2000 KEYBOARD

NEW!



ONLY $300.00 ppd.
(Wis. Res. add 4%)

MORE FEATURES FOR YOUR MONEY

* Complete set of alphanumeric, punctuation, and special function keys
* 512 character text buffer
* 10 reprogrammable 50 character message memories
* 5-99 WPM, keyboard selectable
* Built-in sidetone with adjustable tone and volume
* Buffer/Memory fullness indicators
* RTTY with "Brag Tape" cassette interface, AFSK modulator, ASCII, and memory expansion options available
* 1 year warranty on parts and labor
* Attractive anodized brushed aluminum and gray wrinkle finish case, only 13.3 x 9.4 x 3.5 in.

Send For Free Information

Order Yours Today

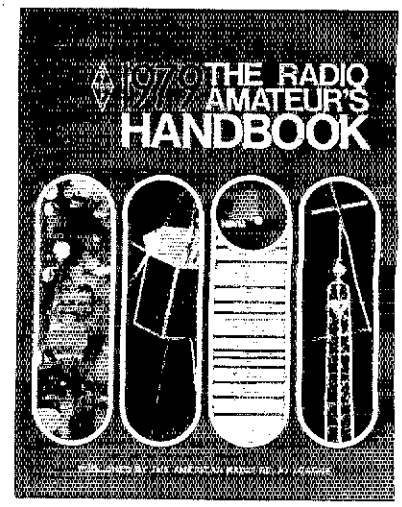
Ask About Our MVD-1000 Video Display

DGM ELECTRONICS

master charge

VISA

787 Briar Lane, Beloit, Wis. 53511 (608) 362-0410



See your local dealer or purchase directly from

American Radio Relay League
225 Main St.
Newington Ct 06111

$9.75 U.S. — $10.75 Canada — $12.00 elsewhere. Cloth edition $15.75 U.S. and $18.00 elsewhere postpaid.

CALL TOLL-FREE

1-800-325-3609

MID COM ELECTRONICS, INC.

2506 S. BRENTWOOD BOULEVARD
ST. LOUIS, MISSOURI 63144

9 to 9 Monday thru Friday
9 to 4 Saturday

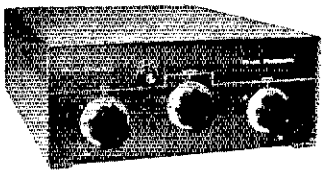
INTRODUCING TOLL-FREE SERVICE ! ! !

Call now for special introductory prices on the new all solid-state Swan Astro 150 and accessories.

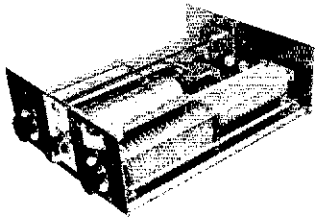
VISA master charge

NEW — FROM MURCH ELECTRONICS — THE ULTIMATE TRANSMATCH

NEW — The UT-160 & UT-160B

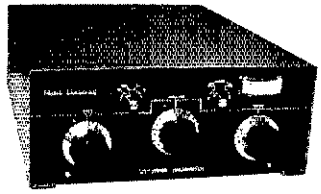


UT-160, less balun & meter $194.50 + shipping
UT-160B, with balun, no meter $212.75 + shipping



Internal construction
Of UT-160 models

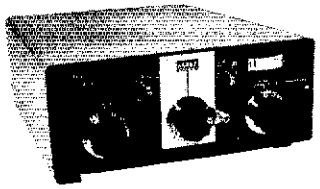
NEW — The UT-160M & UT-160MB



UT-160 M with meter, no balun $212.75 + shipping
UT-160MB with meter, balun $230.50 + shipping

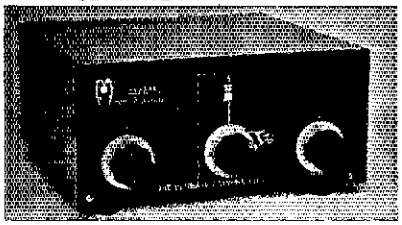
- UT-160, UT-160B, UT-160M & UT-160MB models:
- Ceramic inductor tapped every turn each band
- All B models for use with balanced lines, heavy duty 3 core balun
- All M models have relative output meter
  12"Wx15½"Dx5"H, 13 lbs. shipping wt.

NEW — The UT-2000B



- Continuous coverage 160-10 meters
- Rotary inductor with turns counter
- Relative power output meter
- Three core balun
  12"Wx15½"Dx5"H, 13 lbs. shipping wt.
  $242.50 + shipping

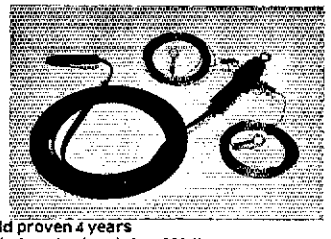
MODEL UT-2000A
ULTIMATE TRANSMATCH



Similar to the one in Low McCoy's article
July 1970 QST also 1976 Handbook

- 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
  12"Wx12"Dx5½" H, 12 lbs. shipping wt.
  $139.95 + shipping

MODEL 68A
MULTIBAND ANTENNA 10-80 M



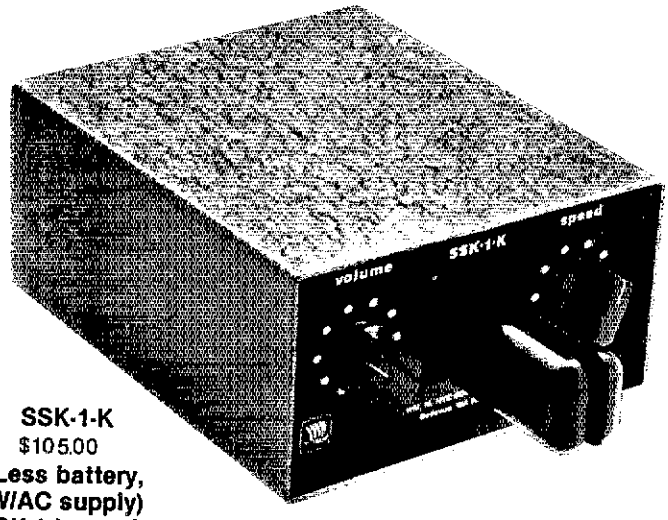
- Field proven 4 years
- Sealed center insulator, 102 ft. wire, 30 feet heavy duty twin lead
- Coax fitting to connect twin lead to 52 ohm transmission line (68 feet or more, not included)
- Ready to use. Great on all bands when used with the Ultimate Transmatch
- 2000 w P.E.P.
  $44.50 p.p.

SEE YOUR DEALER OR ORDER DIRECT

- Use these Transmatches with any antenna — dipoles, random wires, verticals, whips, beams
- Function switch — in, out, dummy load (not supplied), ground (switch not on UT-2000A)
- Provides SWR of 1 to 1 to the transmitter
- Full legal power on all bands 160 to 10 meters (UT-2000A 80 to 10)
- Outputs for coax, random wire, balanced line
- 4000 volt capacitors, heavy duty construction throughout
- Use with any watt meter, SWR bridge
- Changing frequency by a few kilocycles normally requires only a slight adjustment

Send for our literature

MURCH ELECTRONICS, INC. BOX 35 FRANKLIN, MAINE 04634 PHONE 207-565-3312



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

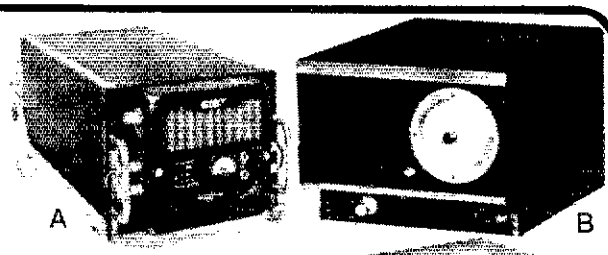
For faster, surer sending, here's a whole new kit of tools in one compact, handsome cabinet! The NYE VIKING Iambic Keyer gives you all the action features of the Super Squeeze Key . . . Plus! Keys either negative-, or postive-keyed transmitter up to 200 Ma at 250 volts . . . operates on internal 9V battery, 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.

Available at leading dealers throughout the U.S.A.
Order NYE VIKING products by toll-free telephone! Call 1-800-426-2742.

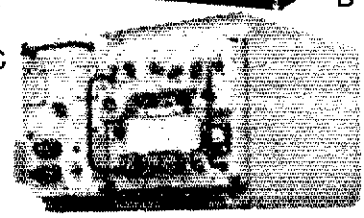
Nye Viking

WM. M. NYE COMPANY, INC.
1614 - 130th Ave. N.E., Bellevue, WA 98005 * (206) 454-4524

RECOGNIZE THESE?

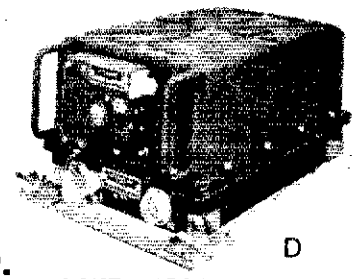


TOP CASH PAID FOR THESE ITEMS



ALSO WANT ANY OTHER COLLINS AVOINIC EQUIPMENT, MODULES, OR PARTS. ALSO NAVY AND GROUND EQUIPMENT.
IF IT'S MILITARY, WE ARE INTERESTED.
FIND OUT WHAT YOUR EQUIPMENT IS WORTH.
Absolutely no obligation, call collect NOW for information and prices.
WHO KNOWS? YOU MIGHT BE SITTING ON A "GOLD MINE".
CALL COLLECT TODAY AND FIND OUT.

URGENTLY NEEDED
AN/SRC-21 or AN/SRC-20
or parts from same.



A-618T or ARC-94 or ARC-102.
B-490T or CU-1658 or CU-1669.
C-URC-9A or RT-581 and PP-2702.
D-ARC-51

SPACE ELECTRONIC CO.

DIV. OF MILITARY ELECTRONIC CORP.
35 Ruta Court, S. Hackensack
N.J. 07606, (201) 440-8787

INSTRUCTOGRAPH MORSE CODE

Since 1924 Instructograph has serviced the world with the most complete equipment ever devised for learning Continental code. You have complete control of sending & receiving AT ANY SPEED YOU DESIRE while machine is running, without changing tapes (not cassettes). A complete course for beginners incl. machine, 10 double sided tapes, key, manual, built-in speaker. Nothing else to buy. $98.50 plus UPS 12 lb. del. chg. Add 6% S.T. for Calif. del. For catalog on 45 advanced tapes write: Instructograph Co. Box 5032 Dept. A Glendale, CA 91201. (213) 246-3902 or 245-2250.

INSTRUCTOGRAPH CO. CLOSED FOR VACATION SEPT. 10 TO SEPT. 30, 1979

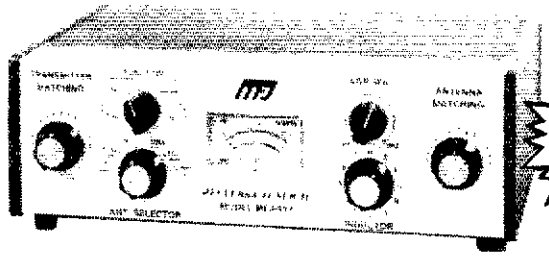
METUCHEN RADIO

-BUY- -SELL-
"TEE" BRUNO - WA2AET

"ALL OF YOUR HAM NEEDS"
201-494-8350
216 MAIN ST., METUCHEN, N.J. 08840

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.



BRAND NEW

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.

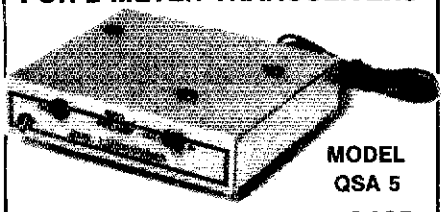
Don't wait any longer to tune out that SWR and enjoy solid QSO's. Order your *Deluxe* Versa Tuner II at no obligation, today.

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.

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

VISA · master charge

JANEL LABORATORIES

33890 EASTGATE CIRCLE•CORVALLIS, OR 97330•(503) 757-1134

SATELLITE TRACKING SOFTWARE

STI
SAT TRAK INTERNATIONAL

- **TRACK SATELLITES ANYWHERE**
- **ACQUIRE VISUALLY AT NIGHT**
- **PREDICT FUTURE SIGHTINGS**

SATELLITE TRACKING SOFTWARE

An international group of professionals offers ready-to-use software for beginners, professionals or schools to allow you to operate your own SPACE CENTRE and SATELLITE TRACKING SITE. The package includes cassette tape, information on how to obtain and use orbital parameters available from NASA, and complete operating instructions. Programs listed below are in BASIC FORTRAN is available on request.

Order #	Description	Cassette	
STI-11-E	Generates satellite RA/DEC or Lat/Long/Ht for any time.	$12.95	Apple Sorcerer TRS-80 North ★
STI-21-L	Generates azimuth/elevation/time for visual sighting.	$15.95	**SPECIAL INTRODUCTORY PRICE TILL 1 SEPT.**
STI-30-A	Updates current satellite parameters from observation time for future calculation.	$12.95	
STI-900	All three on one medium	$29.95	

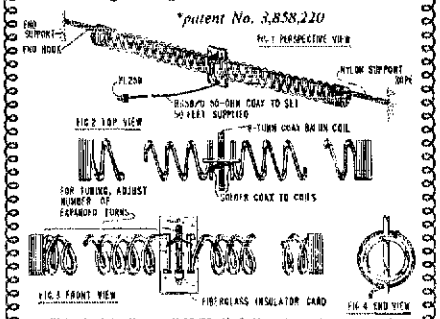
Shipping free except $2.50 US outside North America

Send cheque/money order to:
SAT TRAK International
c/o Computerland of Colorado Springs
4543 Templeton Gap Road
Colorado Springs CO USA 80909
Colorado residents add 5% sales tax.

SLINKY!®

a **lot** of antenna
in a **little** space

new Slinky® dipole* with helical loading radiates a good signal at 1/10 wavelength long!



- This electrically small 80/75, 40, & 20 meter antenna operates at any length from 24 to 70 feet • no extra balun or transmatch needed • portable — erects & stores in minutes • small enough to fit in attic or apartment • full legal power • low SWR over complete 80/75, 40, & 20 meter bands • much lower atmospheric noise pickup than a vertical and needs no radials • kit includes a pair of specially-made 4-inch dia. by 4-inch long coils, containing 335 feet of radiating conductor, balun form, 50 ft. RG58/U coax, PL259 connector, UG-175/U adaptor, 100 ft. nylon rope and instructions • now in use by US Dept. of State, US Army, radio schools, plus thousands of hams the world over.

Money Back Guarantee
when returned within 2 weeks

AVAILABLE AT ALL LEADING DEALERS IF NOT, ORDER DIRECT

TELETRON CORP.
Suite 100
Box 84
Kings Park, N.Y. 11754

Complete Kit #80-40-20 **$39.95 postpaid**
(N. Y. residents add sales tax)

name.....
street.....
town.....zip.....
enclose check with order • we ship UPS upon receipt of order • COD's $1 extra

'79 ARRL NATIONAL CONVENTION

Baton Rouge, Louisiana

Louisiana Council of Amateur Radio Clubs

INVITES YOU

July 20, 21, 22, 1979

TO

Grandeur on the Mississippi

REGISTRATION DATA FORM

NAME _____ CALL _____

STREET _____

CITY _____ STATE _____ ZIP _____

MAIL TO:
LCARC
Post Office Box 891
Baton Rouge, La. 70821

	Each Person	Number
Pre-registration with Banquet	$23.00	
Pre-registration Only (After July 1 $7.00)	$ 6.00	
XYL/YL Registration ($4.00 After July 1)	$ 3.00	
Fine Tuning	$ 2.50	
Acadiana Tour Before July 1	$15.00	
Plantation Tour Before July 1	$12.50	
RV Space Before July 1 per day	$ 5.00	
Wouff Hong	$ 1.00	
Non Amateur Registration	$ 2.00	
QCWA Breakfast . . . 7:30 Saturday	$ 5.00	

REGISTRATION REQUIRED FOR ALL EVENTS

ANTENNA SYSTEMS/TOWER HARDWARE

HY-GAIN ANTENNAS

TH5DX	New 5-Element Triband Beam	$195
TH6DXX	6-Element Triband beam	$210
TH3MK3	3-Element Triband beam	$170
TH2MK3	2-Element Triband Beam	$109
TH3JR	3-Element Triband Beam	$115
205BA	5-Element 20-mtr "Long John"	$210
155BA	5-Element 15-mtr "Long John"	$125
105BA	5-Element 10-mtr "Long John"	$89
203BA	3-Element 20-mtr beam	$99
204BA	4-Element 20-mtr beam	$160
153BA	3-Element 15-mtr beam	$59
103BA	3-Element 10-mtr beam	$49
402BA	2-Element 40-mtr beam	$170
DB1015A	3-Element 10-/15-mtr beam	$115
Hy-Quad	2-Element 10-/15-/20-mtr quad	$170
64B	4-Element 6-mtr beam	$32
66B	6-Element 6-mtr beam	$89
18HT	Hy-Tower 80-10 mtr vertical	$220
18V	80-10 mtr vertical	$26
18AVT/WB	80-10 mtr trap vertical	$72
14AVQ/WB	40-10 mtr trap vertical	$55
12AVQ	20-/15-/10-mtr trap vertical	$36
RMQ	Roof mount kit for verticals	$30
203	3-Element 2-mtr beam	$14
205	5-Element 2-mtr beam	$17
208	8-Element 2-mtr beam	$20
214	14-Element 2-mtr beam	$24
2BDQ	80/40 mtr trap dipole	$39
5BDQ	80-10 mtr trap dipole	$69
GPG2	5/8 Wave 2-mtr ground plane	$18
J-Pole	4-Bay 2-mtr stacked J-Pole	$49
LA1	Heavy duty Lightning Arrestor	$45
LA2	Coax in-line arrestor	$7
BN86	kW balun	$12
CI	Heavy duty center insulator	$7

TIMES WIRE COAX

RG-213/u MIL SPEC RG-8/u replacement	$0.25/ft
1/2" Aluminum jacketed hardline	$0.55/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'	$69
ATB34	4-Element triband beam	$215
A21-4	4-Element 15-mtr beam	$79
A28-4	4-Element 10-mtr beam	$69
A50-5	5-Element 6-mtr beam	$49
A50-10	10-Element 6-mtr beam	$95
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
DXK140	Stacking kit for pair DX120	55
LAC1	Coax lightning arrestor M/F	$5
LAC2	Coax lightning arrestor F/F	$5

CDE ROTORS

HAM 4 — (New model - 15 ft² rating)	$139
Tailtwister — (Now rated at 30 ft²)	$189
8-Conductor Rotor Cable	$0.15/ft

HY-GAIN CRANK-UP TOWERS

HG-35MT2	35-ft guyed (9.5 ft² ant)	$325
HG-50MT2	50-ft guyed (8.6 ft² ant)	$530
HG-37SS	37-ft free-standing (9 ft² ant)	$600
HG-52SS	52-ft free-standing (9 ft² ant)	$800

ROHN TOWERS

25G — $36.50 20G — $29.50 45G — $62.50

HDBX48	Free-standing 48-ft tower (18 ft² ant)	$290
HBX56	Free-standing 56-ft tower (10 ft² ant)	$315
FK2548	48-ft 25G foldover tower	$545
FK2558	58-ft 25G foldover tower	$600
FK2568	68-ft 25G foldover tower	$655
FK4548	48-ft 45G foldover tower	$765
FK4558	58-ft 45G foldover tower	$840
FK4568	68-ft 45G foldover tower	$915

(freight paid on all foldover towers)

100-ft 25G tower (complete)	$588
100-ft 45G tower (complete)	$888

Write or call for quote on direct factory $1200 freight paid order for BX, 20G, 25G, or 45G towers and accessories.

GALVANIZED STEEL TOWER HARDWARE

3/16" EHS (3990 lb rating)	$9.50/100 ft	$90/1000 ft
1/4" EHS (6000 lb rating)	$11/100 ft	$99/1000 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
5000 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

For a quote on your antenna system or tower needs write or call:

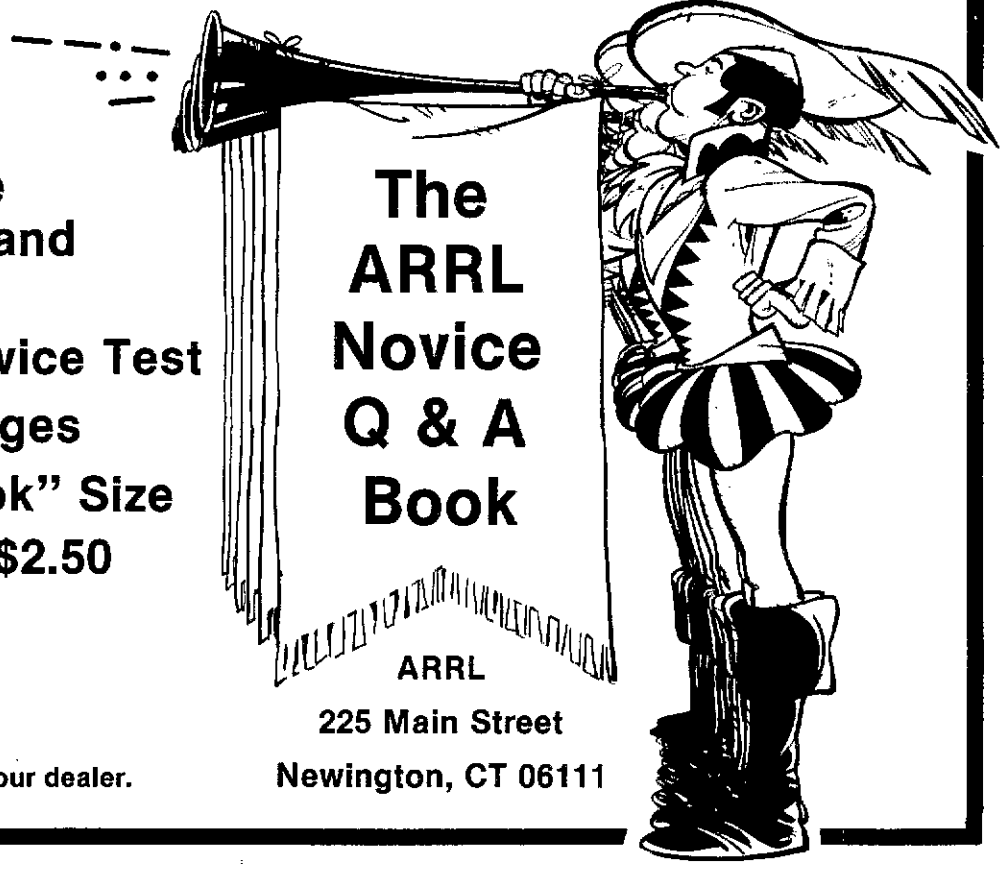
TEXAS TOWERS

113 Starlite Drive ● Plano, Texas 75074

Open 1-7 PM Monday thru Saturday

Telephone: (214) 423-2376

ANNOUNCING...



- **223 Sample Questions and Answers**
- **Sample Novice Test**
- **96 Total Pages**
- **"Pocketbook" Size**
- **$2.00 U.S. ($2.50 elsewhere)**

The ARRL Novice Q & A Book

ARRL

225 Main Street

Newington, CT 06111

Order direct or from your dealer.

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. Fear 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 June 21 through July 20 will appear in September *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.

RADIO Expo '79 September 15th and 16th, 1979, Lake County Fair Grounds, Routes 120 and 45, Grays Lake, Illinois. Manufacturers displays, flea market, seminars, ladies programs. Advance tickets, $2. Write EXPO, P. O. Box 305, Maywood, IL 60153. Exhibitors inquiries: Expo Hotline 312-345-2525.

SUPERFEST 1979 Peoria Illinois. Now two fantastic days — September 15th and 16th. Manufacturers (R.L. Drake, etc.), forums and excellent programs for the ladies. Great smorgasbord Saturday night. Advance tickets $2. Exhibitors and advance tickets write: Peoria Hamfest, 5808 N. Andover Ct., Peoria, IL 61614.

WARREN, Ohio Hamfest — Sunday August 19, 1979, Trumbull KSU Campus; Ohio 45 at Warren Outerbelt. Our 22nd year with the big & famous flea market. $2 registration. Prizes: Ten-Tec 546, complete; Wilson Antenna system; Mark 2 HT; Atlas 110 special and more. Mobile check-in. Arrowsigns lead from interstates, main highways. For map, details, QSL: Hamfest, Box 809, Warren, Ohio 44482.

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.

MASSACHUSETTS NoBARC Hamfest July 21, 22 at Cummington Fairgrounds. Tech talks, demonstrations and dealers. Flea market, $1; advance registration $3 single, with spouse $5, to Tom Hamilton, WA1VPX, 206 California Avenue, Pittsfield, Massachusetts 01201 or $4/$6 at gate. Mobile talk-in on 146.31/91. Gates open at 5:00 P.M. on Friday for free camping.

ELMIRA, New York International Hamfest — September 22, 1979. Tech talks, free flea market, great food, contests — even more prizes than last year! For more info, contact WA2FJM, John Breese, 340 West Avenue, Horseheads, New York, 14845.

31st Annual U.P. hamfest will be held on July 28 & 29, 1979. Add your name to our mailing list. Send QSL to Sawyer Radio Ass'n., P. O. Box 73, Gwinn, MI 49843.

BLOSSOMLAND Fall Swap Shop, October 7th, Berrien County Youth Fair Grounds, Berrien Springs, Michigan. Large convenient facilities and refreshments. Tables restricted to radio and electronic items. Advance ticket donation $1.50. Tables $2. Write Charles White, 1940 Union Ave., Benton Harbor, MI 49022. Make checks payable to Blossomland ARA.

HAMFESTERS 46th annual picnic and hamfest, Sunday, Aug. 12, 1979 at Santa Fe Park, 91st and Wolf Rd., Willow Springs, IL, southwest suburb of Chicago. Famous Swappers Row. Tickets at gate $2, advance $1.50. For Hamfest info or advance tickets send check or money order (s.a.s.e. appreciated) to Box 42792, Chicago, IL 60642.

OHIO: Second annual Salem area hamfest, 9 A.M.-3 P.M. Sunday, August 5th, Kent State Salem campus, Salem. Advance tickets, $1.50, $2 at door. Inside tables, $5, space for yours, $2. Fleamarket space, $1. Air conditioning, wheelchair ramp, free parking, refreshments, prizes; grand prize: Atlas RX-110, TX-110, PS-110. Check in 146.52 simplex. Details: Harry Milhoan, WA8FBS, 1128 West State, Salem, OH 44460.

CERTIFICATE for proven two-way radio contacts with Amateurs in all ten USA areas. Award suitable to frame and proven achievements added on request. S.a.s.e. brings TAD data sheet from W6LS, 2814 Empire, Burbank, CA 91504.

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.

2ND Annual electronic flea market and swapfest sponsored by Suffolk County Radio Club Inc., to be held Sept. 9, 1979 (rain date Sept. 16) on the grounds of Oddfellows Hall, Jayne Blvd., Port Jefferson Sta., L.I., NY. Buyers $1.50, sellers $2. There will be prizes and refreshments will be available. Talk-in on .52 and .94 and on 223.5 MHz. Directions: L.I.E. to Route 112 then north to Route 347, follow signs two blocks to Jayne Blvd. Tickets and information: WA2SDI, 516-234-9376, Floyd E. Davis, 25 Hemlock St., Central Islip, L.I. NY 11722.

KENTUCKY — The Bluegrass Amateur Radio Club will host its annual Central Kentucky ARRL Bluegrass Hamfest August 12, 1979 starting 8:00 A.M. at Fasig Tipton Sales Paddock, Newtown Pike, Lexington, Kentucky. Talk in 146.16/76 MHz, Forums, indoor exhibits, prizes, paved flea market area. Admision $2.50 advance; $3 at door. Flea market space $2 extra. For information contact Edward Bono WA4ONE, 2077 Dogwood Drive, Lexington KY 40504.

FOX River Radio League Hamfest — Kane Co. Fairgrounds Exhibition Hall St. Charles, IL. Sunday, August 26th Tickets: $1.50 advance — $2 at gate. Contact: Martin Schwamberger, WB9TNQ, 1051 Northfield Drive, Aurora, IL 60505.

TRI-CLUB Hamfest July 15 in scenic Lehigh parkway, Allentown. Info: S.a.s.e. K3SY, R1, Box 410, Allentown, PA 18104.

THE 14th Annual Melbourne, Florida Hamfest will be held Friday, September 7 from 6 to 11 P.M. and Saturday and Sunday September 8 and 9 from 9 A.M. to 5 P.M. in the air-conditioned Melbourne Civic Auditorium located on Hibiscus Boulevard. Donation is $3.50 per person. Full program includes forums, meetings, swap tables, commercial exhibits, prizes, etc. Talk-in on 25/85 and 52. Sponsored by the Platinum Coast Amateur Radio Society. For more information write P. O. Box 1004, Melbourne, FL 32901.

THE Annual Bluefield Hamfest, Bluefield, WV will be held Sunday, August 26. Indoor and outdoor flea market space will be available for individuals and dealers. Prizes. For more information contact Bill Fisher, 420 Union Street, Bluefield, WV 24701. Talk-in on 16/76 and 52 simplex. See you there.

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 19BT, 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.

WANT QSLs Fast? Send $9.95, name, address, call, 100 multi-color sent return mail! ($4.00 each additional hundred) Satisfaction Guaranteed! (Samples only: 25c.) W5YI; Box 1171-C; Garland, TX 75040.

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 787-1, Atascadero, CA 93422.

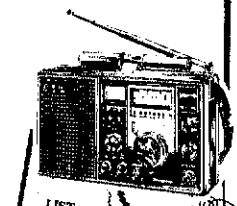
QSLs samples and catalog 50c. Ritz Print Shop, 5810 Detroit Ave., Cleveland, OH 44102.

QSLs. Reasonable cost. Samples 25c. N3QA Printing, Box 68, Stevensville, MD 21666.

SHORT-WAVE SALE!

PANASONIC "COMMAND" SERIES

RF-2200

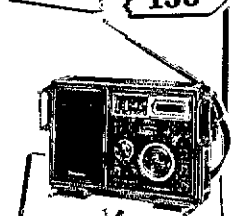


RF-2200 8 BAND AM/FM, SW freqs from 3.9 to 28 MHz . . . Double super heterodyne . . . Precise calibrated tuning to 10 kHz . . . Double-check xtal marker at 500 kHz and 125 kHz . . . RF gain control for AM/SW BFO switch for SSB & SW Plus many more features such as ext jacks for AC ant., & spkr. . . . Big radio features at low price.

LIST $179.95 NOW ONLY $139.95

Plus $2.50 Shipping

RF 2900

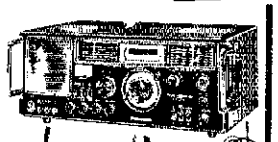


RF 2900 DIGITAL AM/FM SW from 3.2 to 30 MHz . . . 5 digit LED display reads all bands . . . Double superheterodyne . . . PLL circuitry . . . FM AFC & wide/narrow bandwidth control . . . Fast/Slow tuning . . . Built in AM ant. . . . Telescoping whip for TM/SW . . . BFO pitch control for SSB/CW . . . and much, much more for the price . . .

LIST $279.95 NOW ONLY $219.95

Plus $2.50 Shipping

RF-4900



FULL SW COVERAGE FROM 1.6 to 31 MHz. ALL DIGITAL

LIST $499.95 NOW ONLY $389.95

Plus $5.00 Shipping

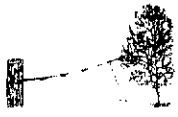
RF-4900 DIGITAL AM/FM, SW coverage from 1.6 to 31 MHz • Full digital readout on all bands • 5 digit fluorescent readout • Premix double superheterodyne • Fast/slow tuning • AFC on FM. Narrow-wide selectivity switch for AM/SW • BFO Pitch control • Calibration control • ANL switch for AM • FET RF circuit • 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 $49.95.**

SWL ANTENNAS

MOSLEY SWL-7 DIPOLE



For 11,13,16,19,25, 31, & 49 meters. An inexpensive horizontal dipole with 8 pretuned weatherproof trap assemblies that are the key to the SWL-7's amazing broadband coverage. Complete kit w/instr.

$39.95 ppd

MOSLEY SWV-7 VERTICAL

For 11,13,16,19,25, 31, & 49 meters. 6 specially designed traps all housed in single weatherproof phenolic housing for top DX reception. Designed for roof or ground mount & swaged for maximum resistance to wind vibration. Few verticals can match it for SWL fun only

$69.95 ppd

SPECTRONICS, INC. — 1009 GARFIELD ST., OAK PARK, ILL.-60304

PHONE: (312) 848-6777

Loop Antenna

Here is an exciting new device to improve your reception on 160, 80, the broadcast band, and on VLF.

It is well known that loops pick up far less noise than most other antennas. And they can null out interference. Now Palomar Engineers brings you these features and more in a compact, carefully engineered, attractive desktop package.

Unlike ordinary direction-finder loops, it tilts to match the incoming wave front. The result: Deep nulls up to 70 db. You have to listen to believe it!

Does the Loran on 160 give you a headache? The loop practically eliminates it. Broadcast station 2nd harmonic ruining your DX? Turn and tilt the loop and it's gone. Does your friend in the next block with his kilowatt block those weak ones? Use the loop and hear him fade out.

Loop nulls are very sharp on local and ground wave signals but usually are broad or nonexistent on distant skywave signals. This allows local interference to be eliminated while DX stations can still be heard from all directions.

The loops are Litz-wire wound on RF ferrite rods. They plug into the Loop Amplifier which boosts the loop signal 20 db and isolates and preserves the high Q of the loop. The tuning control peaks the loop and gives extra preselection to your receiver.

Plug-in loops are available for these bands:
- 150-550 KHz (VLF)
- 540-1600 KHz (Broadcast)
- 1600-5000 KHz (160 & 80 meters)

master charge VISA

Send for free descriptive brochure.

Order direct. Loop Amplifier $67.50; Plug-in Loop Antennas $47.50 each [specify frequency band]. Add $2 packing/shipping. Calif. residents add sales tax.

Palomar Engineers

Box 455, Escondido, CA. 92025 • Phone: [714] 747-3343

70/80, $8 each. K4KHT, 4330 N.E. 13th Street, Ocala, FL 32670.

HEATHKIT SB-220 linear 80-10M mint $500. Swan 500C with p/s,. 16 Pole i-f filter, new finals/driver $450. Other items. Send s.a.s.e. for list. W1GWA, Dennis Bird, 144 Golden Hill St., Bridgeport, CT 06604. 203-334-4837.

RETIRED? Want extra income? A very popular ham item; one man, business for sale W1CPI — 1-603-472-3033.

2-METER FM transceivers, Genave 202 $100, GTX-10 $75, GTX-200 $100, GTX-200T $125, GTX-2 $75, includes choice of any 8 frequencies we have. We want synthesized 317-856-5558 WA9CQS, 5546 Kentucky Avenue, Indianapolis, IN 46241.

WANTED — Motorola two-way portable equipment, All Models — HT-200, HT-220, MH-70, MX series, 150-170 MHz, 450-512 MHz, private line, non-private line, single, multiple frequencies, all types of accessories — batteries, chargers — single or multiple units. Contact our sales office in New York City; Write or call person to person: H. Martin Gillmon, Vice-President Marketing, Specialized Mobile Radio Services, Inc., 322 West 48 Street, New York, NY 10036. 212-935-9696.

MICROWAVE low-noise preamplifiers; 2-4 GHz; 30 dB; amateur, satellite, MDS bands; $25/up; Trade; s.a.s.e., George Steber, WB9LVI, 9957 River Road, Mequon, WI 53092.

WANTED: Early experimental/commercial television receivers — color and b&w, and items related. Gary Hough, 1725 N. Valencia, Santa Ana, CA 92706.

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.

TOROIDS — 88 or 44 mHy. $5 for five toroids, U.S. and Canada only. M. L. Buchanan, Box 74, Soquel, CA 95073.

HW-101 (Owners). Send for your copy of thirteen modifications that can improve your transceiver's overall performance, on both transmit and receive. Send $2 to HW-101-Mods. 6817 Gettysburg Dr., Hudsonville, MI 49426.

KLM amplifiers and antennas big discounts! KDK 2016A $330. Bearcat 250 scanner 264.88. Write for other hot specials! Ben Franklin Electronics 109 N. Main Hillsboro KS 67063. 316-947-5751.

COLLINS 75A3 with calibrator, speaker, manual. KWS1 with cables, extra final tubes, manual. Sell as pair or separately. Best offer. Will ship. W7PSO, 6666 So. Poplar, Casper, WY 82601.

REPAIRS and installations Philadelphia area, personal service by Bruce, K2HR. Free phone consultation 609-768-2491.

NEW Atlas 350XL-Dig-VFO-Bwr cost over $1800 sell for $995. plus shipping. N8ES 216-831-9198.

TRANSFORMERS rebuilt. Enegren Electronics, 300 N. Winchester, Olathe, KS 66061. PH: 913-782-4720.

CALL toll free for an EZ deal. 800-247-2476/1793, Iowa call 800-362-2371. See ad elsewhere. WØEZ, Bob Smith Electronics, RFD 3, Fort Dodge, IA 50501.

TEN-TEC 540 $680 262M $120 Century 21 $248. Hy-Gain 14AVQ/WB $56. TH6DXX $225. All new! Supina, 525 Ridge, State College, PA 16801.

WANTED: General Radio 874-UB (L) Balun — and any accessories. W6KMK. 213-377-5006.

EPOXY circuit board $3 sq. ft. Fifty cents for price list refunded first order. Hinchey Enterprises, P. O. Box 2486, Stockton, CA 95201.

FAST professional ham repair service New York City area. Amateur Extra; FCC Commercial license. Fully equipped shop. Reasonable. Hich Tashner N2EO 212-352-1214.

WANTED: Cards for Western 16 digit card dialer. W3MO, Box 688, Devon, PA 19333.

DRAKE R-4/T-4X solid tubes replace vacuum tubes to give better performance! Pre-Mixer and Mixer 6EJ7/6HS6/6AU6 plus T-4X 12BA6 $17.50 each. Field change kits for additional improvements $22 each. Sartori Associates, W5DA, Box 2085, Richardson, TX 75080. 214-494-3093.

WANTED: Drake L4-B linear. Greg Hodsdon K7KJM 503-760-5739.

RTTY, HAL DS-3000KSRV3, like new, purchased Sept. 1978. Selling to acquire newer model W7PSO, 6666 So. Poplar, Casper, WY 82601.

FREE catalog of new merchandise with low prices. ICs, semiconductors, resistors, capacitors and more. Key Electronics, Box 3506Q, Schenectady, NY 12303.

FOR SALE: Atlas 210X with noise blanker perfect cond. Will Demo gladly $595. Heath HW-8 & p.s. Novice rig — $125. Ten-Tec 20 & 40 M QRP with p/s., phones & hand key $79.95. Wanted: FT-101, must be perfect. Call "T" Bruno, WA2AET, 201-494-8350 — 48 Sheridan Ave., Metuchen, N.J. 08840.

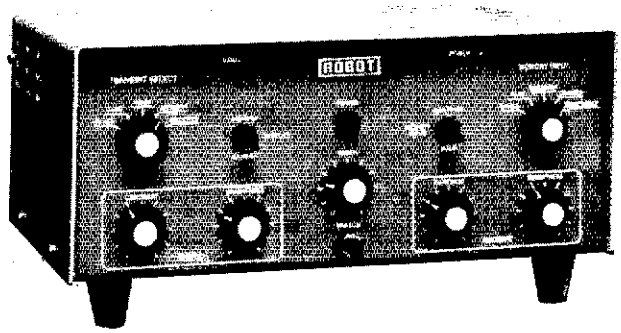
STOP Looking for a good deal on amateur radio equipment — you've found it here — at your amateur radio headquarters in the heart of the Midwest. Now more than ever where you buy is as important as what you buy! We are factory-authorized dealers for Kenwood, Drake, Yaesu, Collins, Wilson, Ten-Tec, Atlas, 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.

ROBOT'S MODEL 400 CONVERTER MAKES SSTV OPERATING EASY!

Contacts are established by voice communications.

SSTV is voice alternated with video operation.

Your SSTV system applies the SSTV audio signal to the transmitter microphone jack in place of the voice signal from your microphone.



Operation requires no more than the ability to focus a camera and adjust a TV set.

Any home TV set can be used for a display monitor without modification. The Model 400 connects to your TV set's antenna terminals by means of the RF adaptor kit.

In fact, SSTV is so easy, it's the first ham radio activity that permits the whole family to be involved.

TUFTS ELECTRONICS
209 Mystic Avenue
Medford, Mass. 02155
1-617-395-8280 (Mass. residents)
1-800-225-4428

ROBOT

SSTV EQUIPMENT

Model 400 Scan Converter $795
Slow-to-fast and fast-to-slow converter; all solid state. Shipping weight: 15 lbs.

RCA TC1000 CCTV Camera $280
500 line resolution; 10,000: 1 ALC; ext. adj: Beam, Target Focus, vidicon position; Weight: 3 lbs., 10 oz. Comes with 16mm lens. 2¾" H x 4½" W x 9½" D. Shipping weight: 7 lbs.

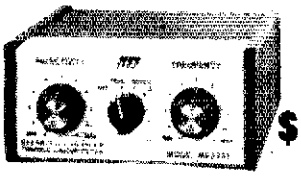
RF Modulator Kit . . . . . $ 25
P.C. board, assembled and tested, for converting video to RF for input to TV receiver antenna terminals (Channel 2 or 3), with tuning tool. Requires +5V d.c. power supply.

20 ft. coax video cable with BNC connectors . . . . . $ 15

UHF Plus to BNC jack adaptor. $2.08

MFJ Tunable SSB/CW Filter

Instantly zero in SSB/CW signals with tunable peak, notch, lowpass filter.



$59.95

Peak, notch or lowpass signals, zero in with freq. control, adjust bandwidth for minimum QRM. Double tuned for extra steep skirts.

Linear freq. control tunes 300 to 3000 Hz. Output is constant as bandwidth is varied flat to 40 Hz. Tight notch to 70 db. 5x2x6 in.

Hear off frequency calls with simulated stereo.

Plugs in phone jack. 2 watts out. 110VAC or 9-18 VDC. One year unconditional quarantee.

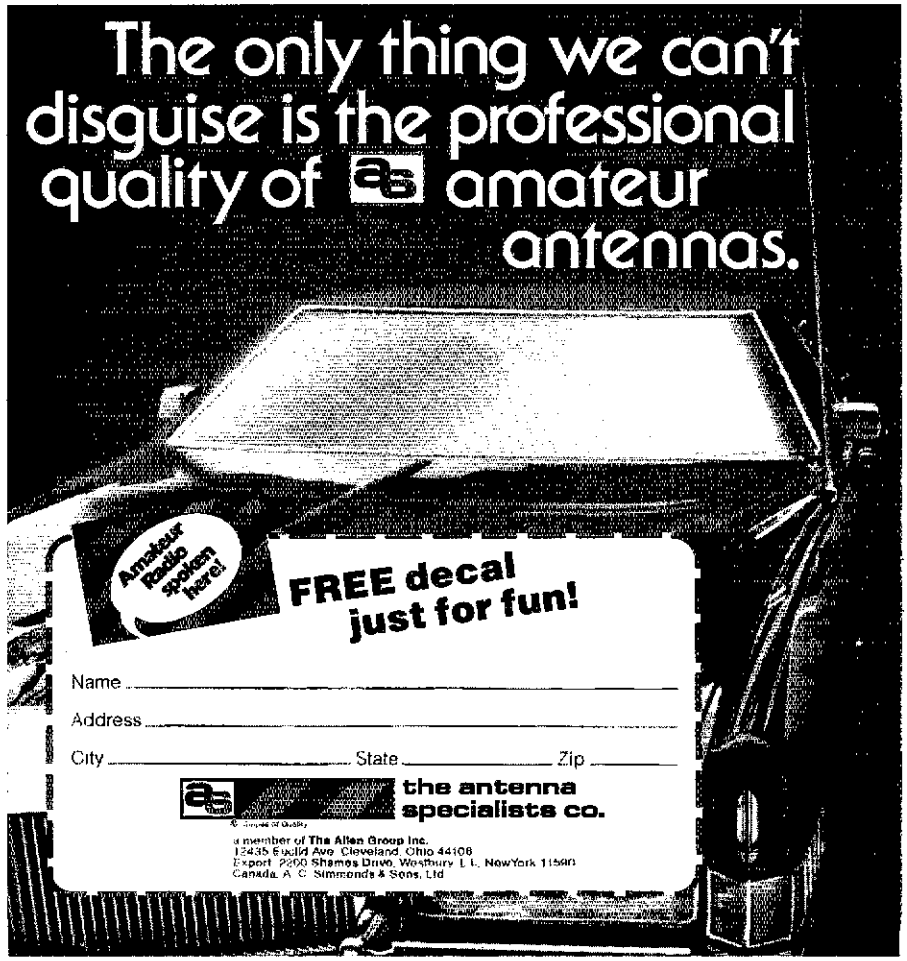
Try it. If not delighted, return within 30 days for refund (less shipping).

Order your MFJ-751 today. Call toll free 800-647-1800. Charge VISA, MC. Or mail check, money order for $59.95 plus $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

The only thing we can't disguise is the professional quality of amateur antennas.



FREE decal just for fun!

Name _____

Address _____

City _____ State _____ Zip _____

the antenna specialists co.

a member of The Allen Group Inc.
12435 Euclid Ave. Cleveland, Ohio 44106
Export: 2200 Shames Drive, Westbury, L.I., NewYork 11590
Canada: A. C. Simmonds & Sons, Ltd

CODE practice cassettes — Computer generated, perfect code. High quality, full 90-minute cassettes. QSO tapes very much like FCC code exam. Printed text included. 25 QSOs at 15 wpm order no. C7 — 25 QSOs at 22.5 wpm order no. C8. Other types and speeds available. All cassettes $5.95 each ppd. S.a.s.e. for catalog. MC and Visa welcome. Fast Service! K5SMG, John C. Tarvin, 14480 Shadowlane Ct., Morgan Hill, CA 95037.

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.

ROSS Specials: Your paid phone call or letter to me can save you $2 to $40. We have large stocks of Kenwood, Yaesu, ICOM, Drake, Ten-Tec, Hustler, High-Gain, ETO, Mosely, Larsen, Taylor, MFJ, etc. Some of this month's specials: Save up to $100.95 on the Kenwood TS-120S. ICOM 701S for $1279. Ross Distributing Co. 78 S. State, Preston, ID 83263. 208-852-0830.

SAMPLING oscilloscope, HP-185B; 4 GHz, 90 p.s. dual trace 188A plug-in; 1 GHz dual trace 187C plug-in. All manuals, $250. FOB. Silman, R1, Hinesburg, VT 05461.

FT-101EE — $500; Charlie Tepper, 212-268-2654.

WHOLESALE Prices — Antenna Specialists, Hy-Gain, CDE. Also Mosley but delivery is 6 to 18 months. S.a.s.e. brings quotation. Equipment repairs by FCC and FAA licensed personnel. TALED Electronics, Lyrical Lane, Sandy Hook, CT 06482. 203-426-0724.

HALLICRAFTERS SX-115 $300, HT-32A $195, HT33A $350, matching speaker, cables, manuals. Excellent condition and clean. $795 takes all. T. Brooks, P. O. Box 652, Essex Junction, VT 05452. WB1HCT. 802-899-2048.

OLDER QSTs, CQs, and 73s available. Send s.a.s.e. for list to K9HOI, 5200 Cumnor Road, Downers Grove, IL 60515.

WILSON Handhelds and antennas — Big discounts! Bearcat 210 scanners $199.88. Pace synthesized 25 watt mobile $324. New Alda all band mobile at discount price! Pace new Communicator MX handheld — Big discount! Write for Red Hot Special sheet. Ben Franklin Electronics, 109 N. Main, Hillsboro, KS 67063. 316-947-5751.

6BDXCC record book $5. N5FG, 4706 Washington Ave., Gulfport, MS 39501.

ROSS' Specials: The Swan 350D for $595; the 100MX for $579. The Atlas 350ps for $179 and the R110 for $200. The Ten-Tec Century 21 for $255. The Yaesu FP4 for $40. the YC221, $89 and the 101ZD for $758. The Wilson Mark II with TTP, LC1, and BR4WC-14 for $280. The Drake PS-3 $75. The 1525EM mic for $34., the MN4C for $125. and the TR/DR7 for $1219. The Tempo VHF1 — $309. The KDK scanner FMS5 for $80., and the Alda 103 for $410. Ross Distributing Company, 78 S. State, Preston, ID 83263 208-852-0830.

WANTED: — Old Microphones — Pre 1940, for my microphone museum. Also mic related items. Write Bob Paquette, 443 N. 31 St., Milwaukee WI 53208.

ROSS-Trader Ed says, "We refuse to be undersold; Big sale, the Ross needs folding money. Shop around for the best price then telephone the Ross last." New Atlas 210X transceiver, $529. New Drake C-Line, T-4XC, R-4C, & AC-4, regular $1548 cash price $1289. New Rohn 50' foldover tower prepaid $595. Used Mosley TA-33 beam $159. New Ham-III rotor. $119. New Kenwood transceiver; 820-S, $849. New 520-S, $639. Alpha linear $1189. Specials: New Dentron 2000 watt linears, $519. Drake R-4C $579. New Drake TR-7 transceiver, $1155. New Dentron GLA-1000 linears, $289. Dentron HF-200A transceiver, $559. Used 120-S, $579. Moory Electronics Company P. O. Box 506, DeWitt, AR 72042. Tel.: 501-946-2820.

FOR SALE: Motorola 41V ac/dc power 07/67 13/73 22/82 28/88 34/94 94/94 52/52 $55. Heath HP-23B supply $40. Paco S-50 scope $35. All excellent. You ship. Ron, W9UW, 414-464-6596 evenings.

SALE: Hal Communications ST-6 RTTY terminal unit with AK-1 afsk oscillator. Factory wired, tested. Manuals, Mint condition, never used. $250 cash. John H. Hogan, W7IYM, P. O. Box 743, White Salmon, WA 98672. Phone 509-493-1897.

TEN-TEC Century 21 transceiver $225. Heath HG-10 VFO $60, DX-60 transmitter $60, both for $110. Heath SB-620 scanalyser $100. K2VX, Wiesen, 18 Wilbur Ave., Newark, NJ 07112. 201-923-5322, office 201-575-1570.

WANTED: Digital remote VFO. Must be in good condition. David Burlington, 1430 Edgewood Drive, Lodi, CA 95240. 209-368-3439.

FOR SALE: Hal DS-3000 Version III RTTY and cw, 8 months old. $1595 new, take $1,100. Sandy Mestel, WD8MWW, 216-494-9845 evenings.

MN-2000, Drake 1 Kw antenna tuner; Excellent condition, $190. W. Trumbull, M.D., WA6DTP, 2021 Santa Monica Blvd., Santa Monica, CA 90404. 213-829-4469.

COLLINS KWM-2A, late round emblem with PTO dial brake, no. 38K, $1400. 312B-5 console/PTO, $350. 4CX1000A, $60 guaranteed. WA6VBL, 213-249-5086.

ICOM 211 mint condx. $500 firm. W4DGA 703-273-8278.

WANTED: one kW high level modulated am transmiter (80-10M) Collins KW-1, Johnson Desktop with Ranger etc. Send complete information to: W5VYY, John Gammon, 916 Rivercrest, Allen, TX 75002. 214-727-4845.

HEATH HW-16 and HG-10B. Good condition. Call Tom 714-626-9882. WB6TQE.

HW-8, HWA-17 p.s. 2 mos. old, $130. Knight TR-106 & VFO $30. Neal Rao, 301-321-9545.

ATLAS 215X mint condition in original box with manual $550. WB6FBM 714-831-9288.

HEATH TX-1 $75. Hallicrafters SX-101A $125. Both in very good condition. WB6SIO 714-645-4250.

HAMMARLUND Service — will align and refurbish your Hammarlund receiver to original factory specification. 22 years experience (14 years at factory). *Original* Hammarlund manuals for following: HQ-100, HQ-145A, HX-50, NX 500, HXL-1, others, $9 ea. ppd. s.a.s.e. for reply. Buying "junk" Hammarlund receivers for parts. Wayne Cordell, K4HCS, Blue Ridge Communications, Rte. 4, Weaverville, NC 28787 704-645-7070.

QST and CQ collection, almost complete except for few very early isues (includes No. 2 QST) Call or write for details. $1000. W7NSU 509-529-0916.

KENWOOD TS-700S $575. Heathkit SB-634 station console $125. Heathkit HR-1680 receiver $175. Wilson 1405 HT, TTP, charger, case, speaker mike $275. (All mint, original cartons, will ship) Robert Luyben, 1731 Crestview Drive, New Ulm MN 56073. 507-354-8924. 28 ASR, good, pick up only.

MARCONI Wireless Telegraph Co. engraved stock certificate, issued in the 1910s. Has large vignette of telegraph station and towers. Ornate and great for framing. A real collector's item. $75 each. Larry Loughran — K6SGD, 541 Jefferson, Redwood City, CA 94063.

COLLINS KWM2A, PM2, $600. New Yaesu FT-101 digital receiver, am, cw filters, shortwave xtals, spkr, $600. WB2TCR, 1-607-797-2768.

MAKE the Antenna go the long haul with DX Life stainless hardware. Small quantities and U-Bolts available. Send s.a.s.e. for info. Hy-Gain antenna stainless hardware for: 14 AVQ $14.95, 18 AVT $15.95, TH3 MK III $26.95, 204 BA $26.95, (TH6-DXX $37.95 — send parts list), 205 BA $39.95, 155 BA $26.95, 105 BA $26.95. DX Life Stainless Co., 7 Alta Place, Yonkers, NY 10710.

WANTED: TR-4CW with P.S. W2SK, 201-334-7155.

KENWOOD TV-502 $175. R-599A $250. Henry Digital Display for R-599A/TS-520 $100. W2HI, 161 Evans, New Hyde Park, NY 11040. 516-354-3122.

SALE: Two meter fm transceiver, 25 watt, with built in pre-amp. Mint, manual. $125 plus shipping. Plane, 42 Pennsylvania Ave., Niantic, CT 06357.

OLD radio tubes such as 26, 45, 71A etc., Disposing of these types and many more. Send want list and s.a.s.e. to N4XE, 2739 Colonial Ave., Roanoke, VA 24015.

WANTED: Ten-Tec 405 linear amp. Steve, WØOGJ, 38 Lawrence Pl., Freehold, N.J. 07728. 201-431-3715.

SELL: Drake L4B linear with power supply and Johnson KW matchbox with SWR. Excellent condition. $740. Will ship. U-Pay UPS. WØFB, Buffalo, MN 55313. 612-682-4829.

HEATH DX-60B, HG-10B VFO, mint, $150. 5" Oscill, $120. WB4YIQ, 3111 Morningside Dr., Raleigh, NC 27607.

I want to buy A-R-105A/ARR-15 surplus receiver. R. M. Utterberg, 7104 Harriet Ave. So., Minneapolis, MN 55423.

FOR SALE: ICOM IC-211, mint condition, $625. Lack of ssb activity in Arizona. W7JT, Tucson, AZ Telephone: 602-326-0159.

DATA Signal dial pulse converter for sale. Three years old. Cost $250. Will sell for $125. A-1 shape. AARA (K4VBH), Box 268, Americus, GA 31709. 912-924-2389.

SELL: SB-102, $340; HP-23A $40; SB220, $350. All, $600 Like new w/manuals. F.O.B. Sparks, C.A. Brant, WA7HLF, Box 1657, Sparks, NV 89431. 702-358-0829.

SELL: Drake TR-6 and RV-6 VFO, $680 — money order — U.P.S. delivery. Write: N2AWM (ex-WB2FZE), P. O. Box 571,, Miller Place, New York, NY 11764.

SWAN 500CX-SS16: mint, 117-XC, DD-76, VX-2. $600. M. Seife, 914-354-1377.

NEED schematic or manual for RBA-7 vlf receiver. Will buy. E. B. Charlton, 1533 Outrigger Dr., Baton Rouge, LA 70816.

YOU'LL save dollars with our used equipment and closeout list. Call or write Adirondack Radio Supply, P. O. Box 88, Amsterdam, NY 12010 518-842-6350.

ICOM-502 with BC-20 mint condition — 1 month old $230 Rege Dvorsky, 2903 Stayton, Pittsburgh, PA 15212. 412-761-7310.

ERC SL-55 filter $50. G. Zielinski, 312-361-0969.

TRI-EX MW50 crank up tower. Very good condition. Local pick up only. $250. John O'Rourke, WA5WRC, 4142 East 36 Place, Tulsa OK 74135.

MODEL-15 teletype with table, built in p.s. dolley and extra's — $75. DT-600 demodulator in Ten-Tec, excellent — $45. RCA Carfone 25-54 MHz 100 W transceiver — $35. 50 W transceiver $30. Hefty p/s $25. You pick up. WA2URT, 516-921-6188.

HALLICRAFTERS SX-100; best offer. EICO 723 cw transmitter w/crystals $45. WA2SKZ, 1470 Bluespruce Ln., Wantagh NY 11793. 516-826-1125.

SELL Heath HW-2021 2 meter handheld complete with Nicads, charger, crystals, TouchTone encoder $140. or trade for Yaesu FV-101B VFO. WBØNPM, 7741 Chanhasen Rd., Chanhassen, MN 55317.

SELL: New Swan beam TB-2A $130. KA4CUF 919-258-6654.

WILSON, Mark IV, TTP, desk and wall charger, leather case, 6 pair crystals, $300. Bearcat 250 scanner, $250. ICOM 215, nicads, 15 pr. crystals $250. HR2-B, 4 pair

crystals, $100. All mint. Robert Aucoin, WA2LHP, 1316 Ives St., Watertown, NY 13601. 315-788-4672.

SELL Hallicrafters FPM300, excellent. WA3UQR.

"LIVING On Air" — autobiography of WA8CLM, Don F. DeGroot, who became chief executive of WWJ-AM-FM-TV, Detroit; KTVY, Oklahoma City; WALA-TV, Mobile; KOLD-TV, Tucson — father of two other hams. 484 pages, hardcover. $12.95 plus $1 postage. Send check to Oakmore Publishing Co., 30225 Ardmore, Farmington Hills, MI 48018.

DENTRON GLA-1000 linear amp with 10 meters plus complete set of extra finals, $330. Drake MN-2000 antenna tuner $175. Dentron Antenna Tuner Jr., $39. WB2FLX, Bob Nicolella, 1-518-399-3639, Scotia, NY 12302.

SELL: 1kW (CCS) amp, RF103; Robot 400; Sony CVC2100A Camera; Robot 80A, 70A; Model 28KSR teletype — WA4MMO, 275 Ivy Circle, Elkin, NC 28621. 703-783-6645 nites.

SIC Meter KLM 661 transceiver $600, 8 element beam, $100; Yak Shack 75 watt amplifier $100; Drake WV-4 $70, D. Stanley, WD4RHJ, 1616 Patriot Ave., Paris, TN 38242.

NOVICE Station — Century 21, calibrator, Swan SWR1A, MFJ long wire ant tuner, $300. Will ship. N8AGR, Phone 313-378-5286.

KENWOOD 520S with cw filter — new — you register. 22S mint with VIP-60. Mint IC-2F with IC-3P. Cash sale only. W4XS, 615-794-5380.

MY file of old QST. Send s.a.s.e. for list or call R. Ferguson, Rte. 2, Box 132, New Windsor, MD 21776. 301-775-7150.

SELL: Heathkit HW-2036 2 meter, excellent condition, $240. WB5TJT, 505-623-3820.

HW-16 $110, HG-10B $30, Vibroplex bug $25, postpaid, N9PS 1-219-282-2190.

WANTED — SBE-2 transmitting mode selector exciter unit and power supply made by Technical Material Corporation. N8DL, Dennis Lampe, 2827 Rosebud Dr., Cincinnati, OH 45238. Tel: 513-451-2864.

FT-101, 160M, fan (needs work) $295. (W6RQZ) 1330 Curtis, Berkeley, CA 94702.

ROHN Tower — come take down 90ft. 25G with all Rohn guy hardware and accessories, up since 10/78. Kansas City area. Make offer. Geoffry S. Howard, WØCG, 14 Arms Blvd., Apt 5, Niles, OH 44446. 216-544-3181.

DRAKE TR-4, AC-4; mint, high serial, never mobile: $450. 34-PNB n.b., new: $70. Mosley TA-40-KR, 40M dipole traps only, $40. Shure 440 SL PTT; $15. Shure 515SA, new; $20. Telrex Cycolac element support, mint, $30. FOB K5YYI. 1-405-262-3363.

FOR SALE: TS-820 with dc supply, cw filters and service manual $875. Homebrew 3-500Z amplifier 80-10 meters 1 kW $375. Heath SB-120 scanalyzer $125. N4ALG, Kentucky, 606-269-5909.

WANTED: Novice xmtr 10-80 m, VFO must. Ted LeSarge, 6027 W. Decker Rd., Ludington, MI 49431. 616-845-6905.

MIDLAND 13-500 2 meter transceiver with crystals for five channels, includes mike. Vince Stegenga, 923 Jewell, Milan MI 48160 (313-429-4231).

TWO 30 watt Electro Voice P.A. paging speakers, Model 844. Like new best offer. WØURI.

LIKE new Heath station — SB-104 with noise blanker and cw filter, SB-644 remote VFO, SB-634 station console, SB-604 speaker, HP-1144 ac power supply. Cost $1150 new. Sell for $700. Station must be picked up at Hammondsport, New York. W4NXE (703-979-4532).

WANTED: Lunar 6M10-120P 50 MHz amplifier. R. Arrowsmith, 3505 Woodburn Rd., Annandale, VA 22003. 703-560-7161.

CENTURY 21 xcvr, perfect condition, $215 postpaid. WB7VOO (602-298-4820).

DRAKE B-Line w/160M $750. Mint IC-211 $750, Johnson kW Matchbox w/SWR $165. K4TO 205-536-6546.

SPR-4 Mint — Crystals for ham, CB, MARS, shortwave. With speaker. Must sell. $300. Phil Walters, 201st ASA Co., Box 1816, APO New York 09178.

SWAN 250C, supply and TV2B transverter. Clean signals, $600 firm. WA3IWW, Monocacy Station, PA 19542. Phone: 1-215-385-3343.

SELL: DX Engineering RF speech processor for Drake T-4X, B, C transmitters. $90. Robert Peterson, 1025 Vineyeard Drive, Conyers, GA 30208.

QSTs 1963 thru 1978 complete. $50 or best offer (plus U.P.S.). Will deliver locally. W1QXT, 467 Pine Rock, Hamden, CT 06514. (203-387-5623).

YAESU FR-101D, $500. FL-101 $450, both $900. Absolutely mint condition with manuals, guarantees and original boxes. Murch UT-2000A transmatch $90. KB2BS, 39 Woodberry Rd., New Hartford, NY 13413. 315-724-3009.

COLLINS Filters: F455J05 (75A4) — $90, F455FA05 — $110, F455FA08 — $75, F455FA21 — $50. W9ZR, 1-414-532-6643.

HW-32 Transceiver. HP-23 power supply. Excellent condition. $95 for set! Postage prepaid. Milton Lederman, WB2HHR, 27 West 72nd, N.Y., NY 10023.

COLLINS: 75A4, 3 filters, serial 2703, $375. Receiver R390/URR with manuals, $350. Receiver Yaesu FRG-7 new, $275. Drake T4XC, one year old, new final tubes, 475. AC4 Power supply $70. Variety of vacuum and variable capacitors. Send for list of parts. W2AIW, P. O. Box 338, Manasquan, NJ 08736. (201-223-1841).

KENWOOD TS-700A, $450. Excellent condition. Contact WAØLLQ, 402-339-3448.

ESTERLINE-ANGUS Model-AW recording chart ammeter 0-5A, ac, also, 2000W ac/dc wattmeter, both portable, cheap. S.a.s.e. for full descriptions. W2HWQ.

ATLAS 210X with noise blanker $450. Kenwood TR-2200A with touchtone $180. Yaesu FTV-250 transverter $140. Regency "touch" scanner $140. All in mint condition. WBØTIE 1-303-576-5119.

SELL: 1 Heath HM-102 hf wattmeter/SWR bridge, $35. 1 Heath HM-102 vhf wattmeter/SWR bridge, $35. 1 Heath HW-12A & HB-p.s., $140. Good clean equip. W3KBR — 717-564-0405.

TEN-TEC Century 21 xcvr three months old $195. K2POF a.c. 518-664-7597.

R4C, crystals, filter, N/B, T4XC, MS4, AC4, 404 Mic, $1199. WB5OCL (713-498-0194).

NOVICES: Quick reference to 19 Q-signals, abbreviated meanings, 1/4-inch high letters, 8-1/2 x 11 chart. Plus 10 unique station log sheets. Mail $1 to KB9EA, 1800 Lake Breeze Rd., Oshkosh, WI 54901.

COMPLETE Yaesu station $850. FR-101D, FL-101, cables, speaker, both converters, general coverage crystals, microphone, processor, spare tubes, dustcovers. All new condition. W7LJI, 291 Coachman, Eugene, OR 97405. 503-686-8879.

DELUXE amateur station: Heath SB-303 rcvr with cw filter, Heath SB-401 xmtr with xtal pack, Heath SB-634 matching console (clock, SWR, phone patch etc.), Heath matching speaker, excellent quality microphone, all cables and manuals — Excellent condition — First $675 gets it — You pay shipping — Wayne, W6RIA, 707-528-1681.

DRAKE R4A rcvr (with 7 extra xtals); T4X xmtr; AC-3 pwr; MS-4 spkr; all excellent condition, factory overhauled, complete for $495 cash. Drake MN-2000 ant. tuner $178 never used. 2 kW linear amp. SB-220 (with ten mtrs.) $440, clean like new. W4JSQ. Day: 202-692-6332/6240; evening: 703-780-3970.

SELL new cabinet for Hallicrafters SX-115 rx. Can't ship. W2EZM, 431 Oakland, Maple Shade, NJ 08052.

HEATHKIT SB-200 10-80M — like new, $350. WDØBGY, 612-435-8753 after 5.

COLLINS: 75S3B, round, $750; 30L1, round, $695; 32S1, $350; 312B4, $225; KWM2 — $495. All mint. W9ZR, Box 301, DePere, WI 54115. 1-414-532-6643.

WANTED: Old and/or unusual hand keys or bugs. Especially need a sidewinder and vertical bug. Carl Elkins, Al4P, 1701 Woodland St., Nashville, TN 37206. 615-226-0651.

MUST Sell: Radio Shack TRS-80 16K level 2 computer. Microtronics M-80 cw — RTTY interface. 4 months old perfect operating condition. New $1030, asking $900. Paul K1YOU, (413-538-7978 — Evenings).

COAX — 1/2" Hardline, 50Ω, with jacket. Solid copper center conductor. 500' or 1000' rolls — 45c/ft (freight collect). Connectors available. RG-213/U 50Ω MIL type (MIL-C-17) coax. 100' multiples, 23c/ft. 400' roll, 21c/ft. Add UPS shipping. Info — s.a.s.e. JRS Electronics, (WA8OGS), P. O. Box 1893-B, Cincinnati, OH 45201.

TEMPO-ONE/AC-ONE $299. Chuck, K8AXL, 203-666-0657 Tue.-Fri eves. only.

WANTED: Drake 2-B receiver near mint condition not chopped up. Call Robert Scheffer, 1-215-489-1636.

TELREX 20M, 4 element mono bander on 36 foot boom, mint; $200. FOB K5YYI. 1-405-262-3363.

KENWOOD TS-820S, VFO-820, SP-520, Turner 454H, Dentron 160-10AT Heath HM-102 and SB-200, Tymeter 124 from estate of WB4OTK. $1,600, you pay shipping. Call Jim WB4KPZ 703-369-7918 after 1830 EDST.

FOR SALE: Temps S1 HT with Data Signal TTP and extras. Mint $330. WD5KAD 918-299-9645.

HEATHKIT DX60B, HG-10 B, HM-102, Drake 2C, headphones, misc. crystals, homebrew speaker, complete rig $300. N1AMD 392 Boston Post Road, East Lyme, CT 06333. 203-739-8454.

SELL: Heath HR-10B $80, HW-202 $170, Kenwood TR-7400A $350 like new, manuals, WB9URK, 303 W. Forest, Atwood, IL 61913.

WANTED: Eico 751 ac power supply WD4HFO, 510 Wells Ave., Fulton, KY 42041.

SELL Heath HW-101 mint ac and dc power supplies included $375. Will consider trade for SB-104A. KB5EH 318-984-7509.

30 AMP power supply, 13.8 VDC (115 VAC input). Five year limited warranty. Hammertone metal case. $124.95, all ratings continuous duty. Other models from $44.95. Add shipping; COD accepted. S.a.s.e. for info. JRS Electronics, WA8OGS, P. O. Box 1893-B, Cincinnati, OH 45201.

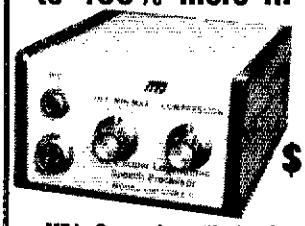
75A-4 5748, Mint, $425; Yaesu FT-301D, digital, cw filter, $675. Trade? W8RH 513-277-0409.

HALLICRAFTERS — HT-32A, $150.; SX-101A, $150. SX-25, $85. W8RH, 3451 Ridge Ave., Dayton, OH 45414. Phone: 513-277-0409.

CRYSTALS: FT-243 made to your frequency. 40M fundamental, Novice & General to 20M, 15M, 10M, $1.50 each, minimum five $1.25. 80M $2.95, minimum five $2.50. Eight megacycle fundamentals — 6M-2M $1.50, minimum five $1.25. 160M $3.45, five $2.95. Sockets 30c. Stock discounted specials, metal HC-6/u, 3716.666-3742.666-8107.143 — CR7 7022.22 $1.95 each. Air-Fcl 20c per crystal. Stamp for 1700-30,000 FT-243 and 160M-2M listings/circuits. Crystals Since 1933. Bob Woods, WØLPS. C-W Crystals, Marshfield, MO 65706.

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.

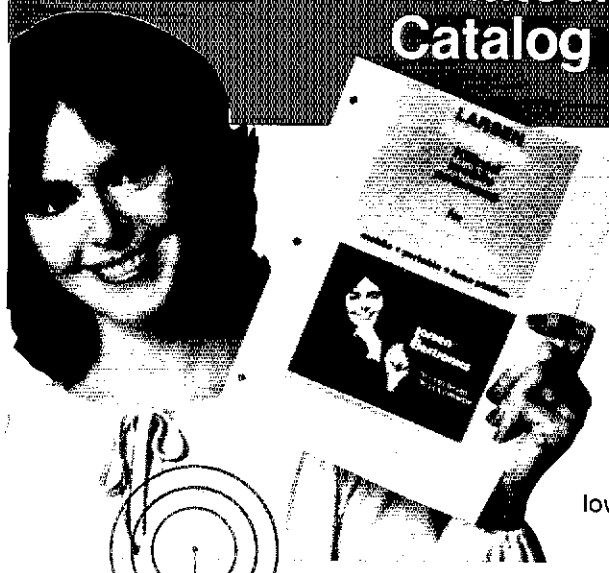
CALL TOLL FREE ... 800-647-1800

For technical information, order/repair status, in Miss., outside continental USA, call 601-323-5869.

MFJ ENTERPRISES, INC.

BOX 494, MISSISSIPPI STATE, MS 39762

NEW! Larsen Kūlrod® Amateur Antenna Catalog



Twelve pages packed with performance-proven Larsen Kūlrod antennas and a variety of mounts for mobile, portable and base station two-way communications. Models for the complete range of amateur frequencies in low, high and UHF bands.

Write for your free copy today.

Larsen Antennas

11611 N.E. 50th Ave.
P.O. Box 1686
Vancouver, WA 98663
Phone: 206/573-2722

In Canada, write:
Unit 101
283 E. 11th Ave.
Vancouver, B.C. V5T 2C4
Phone: 604/872-8517

*Kūlrod is a Registered trademark of Larsen Electronics, Inc.

---

ege, inc.

JULY SALE

Wilson—	
System One	$201.95
System Two	165.95
System Three	134.95
Cushcraft—	
ATB-34	202.95
ARX-2 Ringo Rngr	27.95
Hy-Gain TH6-DXX	200.00
MFJ Enterprises—	
NEW 1.5 KW & 3 KW Tuners —15% OFF	
Mini quad HQ-1	118.95
Alliance HD-73 Rotor	95.00

Telex-Hustler, CES, Bencher Greatly Reduced. Write or Call for a Flyer.

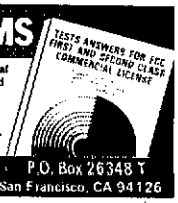
2410 Drexel St.
Woodbridge, Va. 22192
(703) 494-7949

I Pay Cash

for your military surplus electronics. If you have or know of availability TT-98 TT-76 Teletypewriter, phone me collect. Dave Buchanan (213) 760-1000.

PASS FCC EXAMS

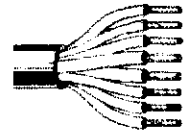
The Original FCC Tests-Answers exam manual that prepares you at home for FCC First and Second class Radiotelephone licenses. Newly revised multiple-choice exams cover all areas tested on the actual FCC exam. Plus "Self-Study Ability Test." Proven! $8.95 postpaid. Moneyback Guarantee.



COMMAND PRODUCTIONS Radio Engineering Division — P.O. Box 26348 T, San Francisco, CA 94126

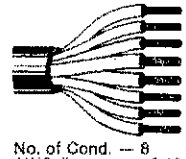
BELDEN

Part Number	MHz	db/ 100 ft.	db/ 100 m	
9888 42¢/ft	50	1.2	3.9	
	100	1.8	5.9	
	200	2.6	8.5	
	300	3.3	10.8	
	400	3.8	12.5	
8214 26¢/ft	50	1.2	3.9	
	100	1.8	5.9	
	200	2.6	8.5	
	300	3.3	10.8	
	400	3.8	12.5	
8237 23¢/ft	100	2.0	6.6	
	200	3.0	9.8	
	400	4.7	15.4	
	900	7.8	25.6	
8267 27¢/ft	100	2.0	6.6	
	200	3.0	9.8	
	400	4.7	15.4	
	900	7.8	25.6	



8448 17¢/ft

No. of Cond. — 8
AWG (in mm) — 6-22, (7x30), [.76]; 2-18, (16x30), [1.19]



9405 28¢/ft

No. of Cond. — 8
AWG (in mm) — 2-16, (26x30), [1.52]; 6-18, (16x30), [1.17]

W5GJ, W5MBB, K5AAD, N5JJ, AG5K, W5VVM, W5EGP, WA5TGU, WB5AYF, K5BGB.

MASTERCHARGE • VISA

MADISON ELECTRONICS SUPPLY, INC.

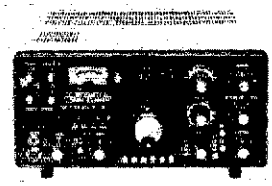
DLA! **1508 McKINNEY • HOUSTON, TEXAS 77002 • 713/658-0268**

BEST Buys at Barry Electronics — HAM Headquarters ! ! ! WRITE or CALL. Best Cash Deal or Trade-Ins. Yaesu, Collins, Drake, KDK, Wilson, Atlas, Swan, Bird Wattmeters stocked, Tubes & Chimneys (3-500Z, etc.), Icom, Robot, Tempo, Midland, Towers, Rotors, Antennas, etc.

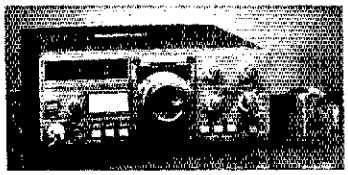
BARRY ELECTRONICS

512 Broadway NY, NY 10012
DEPT. Q,
212-WA 5-7000
TELEX 12-7670

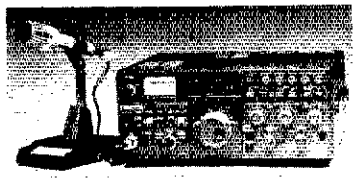
KRYDER ELECTRONICS, Inc



YAESU FT-101ZD



KENWOOD TS-120S



KENWOOD TS-180S

2810 Maplecrest Rd.
Ft. Wayne, Ind. 46815
AC219-484-4946

&

5520 N. 7th Ave.
Phoenix, Ariz. 85013
AC602-249-3739

VISA

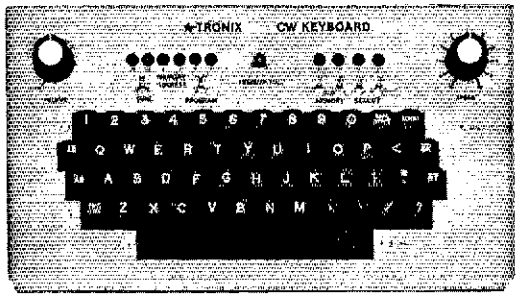
New 5826 Northwest 50th
Okla. City, Okla.
AC 405-789-1951

master charge

NEW — 64 CHARACTER BUFFER

CW KEYBOARD

32 CHARACTER PROM $15.00



256 CHARACTER ERASABLE MEMORY $95.00

- Perfectly timed code automatically
- Speed adjustable — 5 to 50 WPM
- Reed-relay output — plug it in like a key
- Sidetone loudspeaker
- Easy as typing a letter

Call or write to order or request specifications. $249.00 plus handling. Mastercharge or Visa accepted. 23151 Alcalde, Unit C-6, Laguna Hills, CA 92653.
(714) 830-6428

A-TRONIX

WIEP DX-QSL SERVICE
CENTER ST., RAYNHAM, MASS. 02767

Designed to efficiently process all your QSL cards to foreign QSL bureaus, QSL MGRS, or direct to DX stations, BY FIRST CLASS MAIL.

Cost 5c each or 22 per dollar.

PROMPT SHIPMENT GUARANTEED.

Need Help For Your Ticket?
Recorded Audio-Visual
THEORY INSTRUCTION
NOVICE GENERAL
No Electronics Background Necessary
For Additional Free Information:
AMATEUR LICENSE INSTRUCTION
P.O. Box 6015 Norfolk, Va. 23508

IC-211 for sale. Very good condition. $650. Call Stan Horzepa, WA1LOU, weekdays at 203-666-1541, weekends and evenings at 203-755-1516.

Atlas 180, AC console, DMK, resonators for 40 and 80 meters. Best offer over $425. Write John WBØWYI.

WILSON System III Tribander beam. Brand new. $120. W2GVK, 516-499-3538 evenings.

WANT to trade: Cobra 200 220-Mhz fm rig, new no carton. Will trade for general coverage receiver capable of ham code bands — in good condition. Tim Braddock 607-432-5455.

DON & MIKE super goodies: ICOM IC280 $359; Tonna 144/16el $69.95; Cushcraft ATV-5 $89.95; New "Longboomer" 19el-2M beam $79.95; TH6DXX $238; TH3MK3 $179; new Telrex TV5ES $315; 2M814 $65; Bird 43, slugs, stock, prepaid; Cetron 572B $29.50; Belden 8214 RG8 foam 26c/ft; 8448 8 wire rotor cable 17c/ft; 9405 HD rotor 28c/ft; 9888 doubleshield foam 42c/ft. Amphenol PL259 silverplate 59c ea; Times 1/2" foam hardline 65c/ft; Berktek RG8X minifoam RG8 16c/ft; Consolidated HD18GA galvanized tower $29.95/10' section; Alliance HD73 $109.95; VHF blue line amps, kits, stock; Bearcat 220 $279; Call for fast quotes; prices FOB Houston. Madison Electronics, 1508 McKinney, Houston, TX 77002. 713-658-0288.

WILSON Sales and Service. Mark II and Mark IV in stock. 1402 service and modification. Crystals for area repeaters. Will service most amateur vhf fm equipment. Hutchinson Electronics, 521 East 11th, P. O. Box 370, Hutchinson, KS 67501. 316-662-7462. Tom WØUY.

ESTATE Sale: Drake TR-4C transceiver, AC4 pwr, RV-4C VFO, MS-4 spkr & mike, all in excellent working condition, package only, $525. Drake TR-3 transceiver, RV3VFO, AC3pwr, spkr & mike, package only, $375, with manuals. You ship. Send s.a.s.e. for balance of list. Joe Harms, W4BLQ, 905 Fernald, Edgewater, FL 32032.

KENWOOD Headquarters — Ham Radio Outlet — Call us Toll-Free at 800-854-6046. We are open all day Saturday. We also supply Drake — ICOM — Yaesu — and lots, lots more. Free UPS on most orders. Call before you buy. 800-854-6046, Ham Radio Outlet.

SELL mint meatball Collins KWM2A with DX Engr. processor PM-2 and 516F2 power supplies, 312B5 VFO, crystal pack, suitcase and spare tubes. Asking $2200. Serious offers only. WA2RUD, Bill Levy, 914-241-0251.

HEATH HW-2036A 2M FM xcvr $225, excellent condx. ICOM IC-245 2M ssb cw-fm xcvr, new, a steal at $500. KLM 2M solid-state amp, 160W out, $190, hardly used. Call Jeff, W1OH, 401-246-0150 evenings.

TOWER — 60 ft. aluminum tower by Universal. New base freestanding — will deliver NY NJ metro area. $600. K2BOG, 201-875-7300.

COLLINS S/Line 75S-3B(C) 32-S3(A) 516-F2 200 Hz filter. Round, mint. $1700. Will ship. K4NYK 404-457-6842.

TRADE Heath GR-110 vhf scanning monitor, mint condition, for ham band cw receiver, s.a.s.e., pse. Richards, WB4RRE, 137 Aspen Circle, Leesburg, FL 32748.

NATIONAL receivers built before 1940 wanted. AD1E, Box 73, Kennebunk, ME 04043.

KENWOOD TS-820, digital, xtras $850. Dr. Michael Hayes, N2OD, 425 Neptune Avenue, Brooklyn, NY 11224.

COLLINS S/Line, 75S3B with cw filter, 32S3 with rf processor, speaker and ac supply. Immaculate, $1400/offer. WA6IYC, 1352 Calle De Oro, Thousand Oaks, CA 91360.

UNIQUE wiretuner, standard, mint, $95. W1ABJ 617-232-7080.

WILSON HT 1402, 8 sets common xtals, desk charger, speaker-mike, TT pad, case, extra nicad pack, 10W amp, $225. WD4CKA 615-453-1892.

MOBILE home, one year old, two bedroom, fourteen wide, fifty foot tower, Mosley CL33 beam and rotator. Excellent for winter home for retiree. Completely furnished. Owner leaving country. KA4EIN, 1013 Tralee, New Port Richey, FL 33552. (813-842-2267).

WANTED: Air Dux pi-net coil 195-2, 5 volt C.T., 30 amp xfr. W7RBF, P. O. Box 11184, Phoenix, AZ 85061.

GROTH-Type
COUNTS & DISPLAYS YOUR TURNS
- *99.99 Turns*
- *One Hole Panel Mount*
- *Handy Logging Area*
- *Spinner Handle Available*

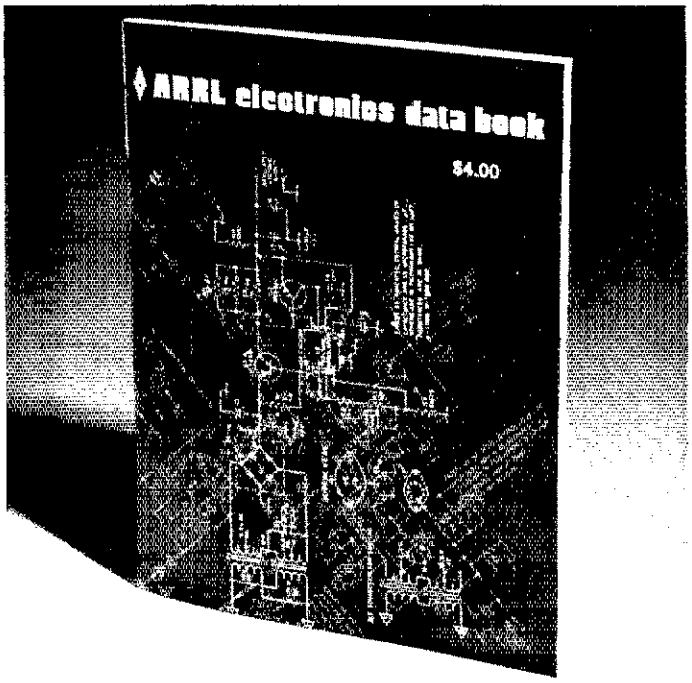
Case: 2x4"; shaft ¼"x3"

PRICES	POST PAID
TC2	$8.00
TC3	$6.75
Spinner (S)	$1.00

Add $0.75 for Air or UPS

Model TC2: Skirt 2-1/8"; Knob 1-5/8"
Model TC3: Skirt 3"; Knob 2-3/8"

R. H. BAUMAN SALES
P.O. Box 122, Itasca, Ill. 60143



Now you can find all of those elusive charts, tables, and data in one place! This 128-page book covers everything from standard resistance values to design values of toroidal cores. Maximum emphasis is placed on tables and diagrams. The 10 chapters are:

1. Math Aids and Tables
2. Time and Frequency
3. Radio Frequency Circuit Data
4. L, C, and R Networks
5. Transformers
6. Filter Design
7. Antennas and Feed Systems
8. Catalog of Solid State Circuits
9. Construction and Testing Data
10. Data Potpourri

This new ARRL publication will be invaluable to amateurs, engineers, students and experimenters — a useful adjunct to **The Radio Amateur's Handbook** and other League technical publications. Pick up a copy at your favorite radio-electronics dealer or order direct from the League headquarters. $4.00 U.S.A. and Possessions, $4.50 Elsewhere.

THE AMERICAN RADIO RELAY LEAGUE, INC.

NEWINGTON, CONN. 06111

FOR SALE: Viking II with VFO, mint, $150, 275 watt Matchbox, mint, $60, Ranger, $85, Hallicrafters SR40 rcvr, $40. Wanted: Spherical audion, Paragon RA 10. W3HWT, 329 Evergreen, North Wales, PA 19454.

SWAN 250C, 117XC, excellent, $375. 6-meter receiver pre-amp, $12. FT-227R, never mobile, $267. Benningfield, 502-465-8763.

APPLE II log program for QSOs, DX, contests. Revision documentation. Cassette $12. Alex Massimo, AF6W, 4041 41st. Street, San Diego, CA 92105.

I Will assemble and test your Heathkit. Please write for details. Paul Preidecker, WA5WBF. 4123 Durness, Houston, TX 77025.

SELL: Kenwood TS-900, cw filter, power supply $700. DC-900 mobile supply (new) $100. VFO-900 remote VFO (new) $150. SB-220 with 10 meters $550. Heath GR-78 receiver $50. Gonset G-66B mobile receiver/power supply BC-10 Meters $60. Viking Valiant $150. All in excellent condition. You ship or pick up. 215-286-9203. Mike, W3SV.

FOR SALE: Collins KWM2, Waters notch filter and chanelator, 136B2 noise blanker, 312B5 external VFO, 516F2 supply (no cabinet). Will not separate, $950. 312B4 winged excellent condition $250. 51S1 round, electrically very good condition, cabinet medium, must be seen, $850. Paul, W1CKA, 203-582-4885.

SELL QST: 1/32 thru 12/78. H.R.: 3/68 thru 12/78. 73: 10/60 thru 12/69. CQ: 1/47 thru 12/70. F.O.B. K6JZ, 721 Shady Glen, Martinez, CA 94553. 415-229-0808.

SELL: Swan 350-C transceiver, 117XC power supply, speaker. Used very little & like new. Brand new outboard VOX control. Complete set brand new tubes plus set spares. Great reports on air. Original cartons and manuals. $450. + ship. Plane, 42 Pennsylvania Ave., Niantic, CT 06357.

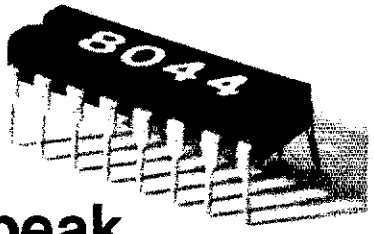
SELL: Ameco PT-2 pre-amplifier, brand new, $60. MFJ compressor-processor, never used, $40. Plane, 42 Pennsylvania Ave., Niantic, CT 06357.

KENWOOD TS-520, excellent, PTT microphone, good Vibroplex style key, tot $475. You pay shipping. John Bittens, W8WTK, 6463 Buckingham, Parma, OH 44129.

DUO-Bander 250W transceiver 80-40M, ssb, cw, p.s., mint $150 Prepaid. 502-465-8763, Benningfield.

FOR SALE: Kenwood TS-520 (w/cw filter) — $500. Kenwood TV-506 (6m xvrtr) — $150. Johnson KW matchbox (w/SWR) — $160. Kever (w/paddle) $30. 4CX1000 (new) best offer? Tom Frenaye, K1KI, Box 62, Unionville, CT 06085.

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 '78 QST) (write)

VISA
Curtis Electro Devices, Inc.
Dept. Q (415) 964-3136
Box 4090, Mountain View, CA 94040
master charge

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

CUSTOMIZED GREAT CIRCLE BEARINGS

- Centered on *your* QTH
- Short *and* long path bearings
- For *every* DXCC country
- Shows *distances* too
- *Laminated* in plastic
- Great *gift* idea

$12.75 Calif.; $12.00 US/Canada; $13.00 all others. Includes shipping; send check, money order, Master Charge/VISA

VISA **Interproducts**
2377 Pollard Ct., Los Gatos, CA. 95030 U.S.A.

SUMMER SPECIALS!

KDK 2016A..... $335.00
Pace Communicator II..... 324.00
Big Discounts on Wilson Handhelds . Write
Big Discounts on KLM Amps..... Write
Bearcat 250 Programmable Scanner $259.00
Write For Our Red Hot Specials List!
Ben Franklin Electronics
109N. Main, Hillsboro, Kansas 67063
316-947-2269

FOR BEST PRICE AND FAST DELIVERY
CALL
1-800-325-3636
TOLL FREE
HAM RADIO CENTER

NOW! NOW! NOW! NOW! NOW!
The ultimate answer for eliminating the damaging effects of antenna weight on your rotor . . . it's the

"UDM THRUSTOR"

- Fits any taper tower or can be used with flat top.
- Accepts 1¼" mast pipe.
- All steel construction.
- Utilizing precision ground & hardened ball-type thrust bearing.
- Comes ready to install.
- Eliminates the damaging effect on your rotor.
- Shipped prepaid UPS (U.S.A.)
- Check, cash money order, Visa, MasterCharge. $49.95 complete.
- Also available for 2" mast pipe for $59.95.

UDM ENTERPRISES
P.O. Box 2037, Sandusky, Ohio 44870

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:
E-Z WAY top-notch engineered sturdy steel towers that crank down and tilt over. Aluminum dipped or galvanized optional. Self-supporting to 115 feet. Prices from $100.00. Also ALUMA towers that crank down, so light you can walk them over. Prices from $192.00. Both towers discounted.

Send 30¢ cash or stamps, for literature and prices, or call 1-813/988-4213, day or night.

Skylane Products
W4YM 406 Bon Aire Ave. Temple Terrace, FL 33617

TRIPOLE MULTI-BAND

The TRIPOLE™ antenna covers the 160, 80, 40, 20, 15, 10 and 6 meter bands without retuning or a tap change. 80 to 120 ft length. 2 KW PEP. Twinverted V and horizontal without an antenna tuner. Neat appearance, built-in balun, rugged, aids mast or tower guying. A best choice for an all-around amateur station antenna.

Guaranteed. Kit T80-K $54.95; Assembled T80-A $69.95 Prices postpaid cash. TX residents add 5% sales tax.

Call or send card for information on TRIPOLE antennas and feedline kits. Order direct or ask your dealer.

"best"

Universal Radio Co. Dept. Q1
P. O. Box 26041
El Paso, Texas 79926 (915) 592-1910
master charge

BOMAR
TWO METER CRYSTALS
Standard / Icom / Heathkit / Ken / Clegg / Regency / Wilson / VHFEng. / Drake / Motorola HT-220 and others!
LIFETIME GUARANTEE! Now only $9 a pair!

Make/Model _____

Xmit. freq.	Rec. freq.

Name _____
Address _____
City _____ State _____ Zip _____

Bill: ☐ MC ☐ Visa ☐ Amex
Credit Card # _____
Exp. date _____
Signature _____

the indispensable **Bird 43** THRULINE WATTMETER

Power Range	Frequency Bands (MHz) 2-30	25-60	50-125	100-250	200-500	400-1000
5 watts	—	5A	5B	5C	5D	5E
10 watts	—	10A	10B	10C	10D	10E
25 watts	—	25A	25B	25C	25D	25E
50 watts	50H	50A	50B	50C	50D	50E
100 watts	100H	100A	100B	100C	100D	100E
250 watts	250H	250A	250B	250C	250D	250E
500 watts	500H	500A	500B	500C	500D	500E
1000 watts	1000H	1000A	1000B	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
READ RF WATTS DIRECTLY! (Specify Type N or SO239 connectors)

TUFTS Radio Electronics
Send for our new catalog! $3.00 shipping charge order • NO C.O.D.s!
209 Q Mystic Ave
Medford MA 02155
1(800) 225-4428
(817) 395-9280

TELREX tribander — top of the line model TB6EM, plus parts from extra antenna. $200 — you take down, $300 on ground. Teletype model 32ASR bought new from teletype used only six months and stored. $500 — Heathkit SB-610 scope — $150. Drake MN-2000 $100 Arnold Chase WA1RYZ (203-521-5252).

FT-207R Yaesu handi-talkie in stock — Special price. Tonna F9FT beam $79 prepaid. Drake TR7/DR7 in stock -special deal, save cash. We need trade-ins — Whatcha got? Radio Wholesale, 2016 Auburn Ave., Columbus, GA 31906. John, WB4JUN, 404-561-7000. Nites & Holidays, 404-561-5300.

TR-6 Drake 6 meter ssb — mint condition! With noise blanker, AC-4 supply. $600. 707-584-7844, 542-8842. Mike, WB6VZY.

Jobs for Hams

VOICE of America has opportunities for U.S. citizens qualified as Civil, Electronic, Mechanical and Electrical Engineers. Supervisory openings available in Liberia and Philippines for broadcast station construction projects. BS in Engineering or equivalent experience in construction and contract supervision required. Must be available on a world wide basis. Starting salary commensurate with skills and experience plus housing and overseas allowances. Civil Service Application (Form SF-171) available at Office of Personnel Management (formerly the Civil Service Commission) Job Information Centers and most federal buildings should be sent to International Communication Agency, Code 15-79, Washington, D.C. 20547. An Equal Opportunity Employer.

TECHNICIAN: To service HiFi/Stereo equipment. A great opportunity for someone experienced in audio, to work on over 25 different brands of stereo gear. This center city Philadelphia shop has a top notch reputation and handles only the finest equipment available. Contact Neal Warren, W3PF, at: Electronic Servicenter, 13 S. 21st St., Philadelphia, PA 19103. 215-564-0800.

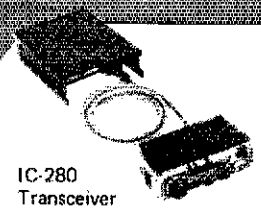
Index of Advertisers

AED Electronics: 144
AGL Electronics: 128
ARRL '79 National Convention: 158
Accu-Circuits: 116
Advanced Receiver Research: 175
Aluma Tower: 179
Amateur Electronic Supply: 112, 132, 149
Amateur License Instruction: 178
Amateur Radio Supply of Nashville: A.R.S.O.N.: 147
Amateur Wholesale Electronics: 140, 141
American Radio Relay League: 105, 146, 153, 154, 159, 161, 164, 167, 180
Amidon Associates: 120
Amphenol RF Division: 162
Antenna Specialists: 169
Antenna Supermarket: 166
Ashcraft, Phil N5DD: 124
Associated Radio Communications: 171
Atlantic Surplus Sales: 150
A-Tronix: 120, 178
Autek Research: 133
Autocode: 175
Barker & Williamson: 171
Barry Electronics: 177
Bauman Sales: 178
Bencher, Inc.: 146
Ben Franklin Electronics: 181
Bob's Amateur Radio Center: 98
Buchanan, David: 177
Butternut Electronics: 148
C Comm: 163
C&A Electronics Enterprises: 134
Caddell Coil: 180
Certified Communications: 136
Clegg Communications: 131
Cohoon Amateur Supply: 122
Command Productions: 177
Communications Center: 126, 129
Communications Services: 150, 151
Communications Technology Group: 158
Cover Craft: 136
Cubex Co.: 179
Curtis Electro Devices: 141
Cushcraft: 5, 130
DGM Electronics: 150, 154
DSI Instruments: 118, 119
D&V Radio Parts: 171
Daltec Systems: 150
DaringOn Industries: 124
Davis Electronics: 148
Dentron Radio: 4, 106
Drake, R.L.: 99, 167
Dynamic Electronics: 144
EGE, Inc.: 177
Ehrhorn Technological Operations: 102
Electronic Research Corp. of Virginia: 176
Fuji-Svea: 149
GL Enterprises: 173
GLB Electronics: 181
Germantown Amateur Supply: 160
Gotham: 152
HAL Communications: 127
Ham Radio Center: 125, 164, 168, 172, 176, 179, 181
Ham Radio Outlet: 90, 91
Hamtronics (Hilton, NY): 103
Hamtronics (Trevose, PA): 137
Harrison Radio: 145
Henry Radio Stores: Cov. II, 1
Hy-Gain Electronics: 123
ICOM: 2
IRL: 179
Inline Instruments: 172
Instructograph Co.: 156
International Crystal Mfg. Co.: 7
Interproducts: 181
Jacksonville Hamfest: 124
Janel Laboratories: 112, 157, 160
Kampp Electronics: 168
Kantronics: 139
Kaufman Industries: 144
Kengore Corp.: 162
Kirk Electronics: 132
Kryder Electronics: 178
Larsen Electronics: 177
LaRue Electronics: 173
Lattin Radio Laboratories: 168
Little Rock Ham-a-Rama: 180
MFJ Enterprises: 93, 108, 115, 136, 154, 157, 166, 169, 170, 177, 184
Macrotronics: 170
Madison Electronic Supply: 120, 172, 177, 179
Metuchen Radio: 156
Microcraft: 174
Microlog Corp.: 101
Mid Com Electronics: 155
Mini-Products: 174
Murch Electronics: 155
N&G Distributors: 94
Nye Co., William: 156
Optoelectronics: 107
Pagel Electronics: 171
Palomar Engineers: 165, 182
Pathcom, Inc.: 152
Payne Radio: 104
Pipo Communications: 160
Poly Paks: 138
Radio Amateur Callbook: 108
Radio World: 96, 174
Robot Research: 96, 169
Ross Distributing: 146, 150
Rusprint: 150
SST Electronics: 162
SAT TRAK International: 157
Siemans Medical Laboratories, Inc.: 175
Skylane Products: 181
Skytec: 128
Southeastern Crystal Corp.: 116
Space Electronics: 156
Spectronics: 165
Swan Electronics: 110, 111
TET Antenna Systems: 121
Teletron Corp.: 157
Telrex Labs: 92
Ten-Tec: 109, 173
Texas Towers: 159
Thomas Communications: 143
Towermaster: 100
TOWTEC CORP.: 151
Tri-ex Towers: 113
Trio-Kenwood: Cov. IV, 6, 97
Tufts Radio Electronics: 117, 169, 181
UDM Enterprises: 181
UPI Communications: 168, 180
Unadilla-Reyco: 96
Unique Products: 151
Universal Radio: 181
VHF Engineering: 95
Van Gorden Engineering: 150
Vibroplex: 173
WIEP DX QSL Service: 178
Wacom Products: 151
Wanzer Co.: 176
Warren Hamfest: 151
Webster Radio: 183
Western Radio Electronics: 144
Wilson Electronics: 135, 142
Wrigh Tapes: 176
XITEX Corp.: 153
Yaesu Electronics Corp.: Cov. III, 114

Dial your discount...

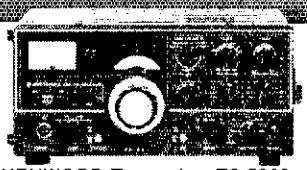
Call Webster FREE

(800) 344-2198



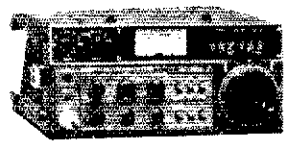
IC-280
Transceiver

PRICE TOO LOW TO PRINT



KENWOOD Transceiver TS-520S
160 thru 10M
List $849.

PRICE TOO LOW TO PRINT



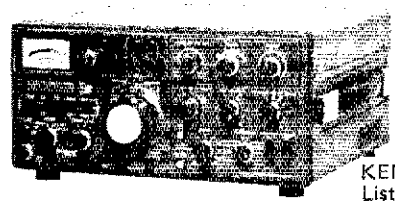
ICOM IC 701S, 160 thru 10M

PRICE TOO LOW TO PRINT

Call or write for your monthly SUPER DISCOUNT BULLETIN!

YAESU

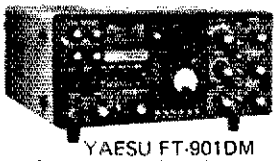
YAESU FT-227R
2 Meter FM $399.
Dial for your discount!



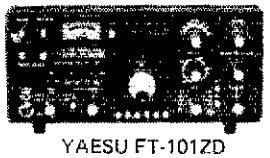
KENWOOD Transceiver
TS-820S 160 thru 10M
List $1299.

PRICE TOO LOW TO PRINT

KENWOOD R-820
List $1099.



YAESU FT-901DM
160 thru 10M $1459.
Dial for your discount!

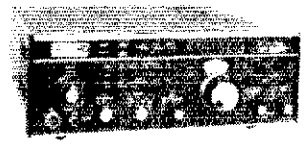


YAESU FT-101ZD
FT-101E, 160 thru 10M $895.
Dial for your discount!

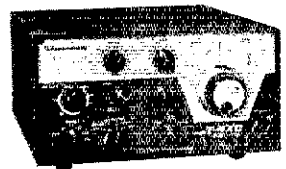
Super Signal Savings!

ROTORS
CD44 $154.95 - SALE $94.95
Ham X $349.95 - SALE $199.95

DRAKE



DRAKE TR-7/DR-7 $1295.
PS-7 $195.
Dial for your discount!



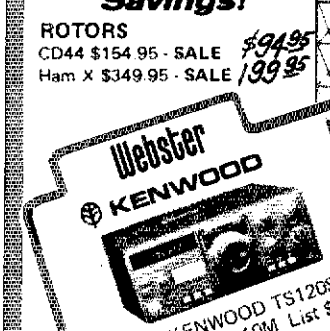
DRAKE TX T-4XC $699.
RX R4C $699 160 thru 10M
Dial for your discount!

YAESU Receiver
FRG-7 Broadcast to 30 Mhz $370.
Dial for your discount!

ICOM

ICOM Transceiver 2M FM SSB
IC 211 List $991
Dial for your discount!

Total Tower lines available.
Call for info.



Webster
KENWOOD
KENWOOD TS120S
80 thru 10M List $699.
Dial for your discount!

Send us your name and address — get ADVANCE INFO FREE

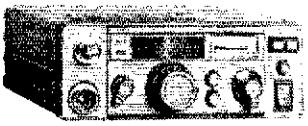
FT-202
Hand-held
Transceiver
$199

Dial for your discount!

Books Available:
ARRL Handbook
US & Foreign Call Books

Prices subject to change without notice!

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 $759. *Dial for your discount!*

KENWOOD RM-76
List $125. *Dial for your discount!*

ICOM

ICOM 245-SSB
2 Meter FM SSB *PRICE TOO LOW TO PRINT*

SWAN

SWAN 100MX, 80 thru 10M
1 KC readout, built-in noise blanker and VOX *Call for price and info*

Webster radio, inc.

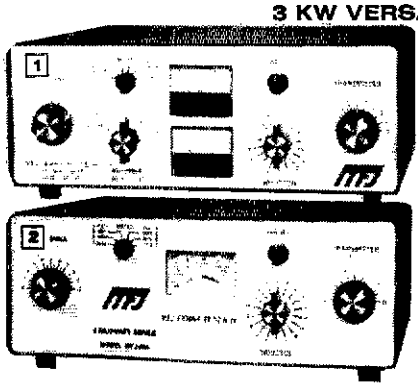
2602 E. Ashlan, Fresno, CA 93726 / Ph. (209)224-5111

HOURS: 9 a.m. to 6 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.

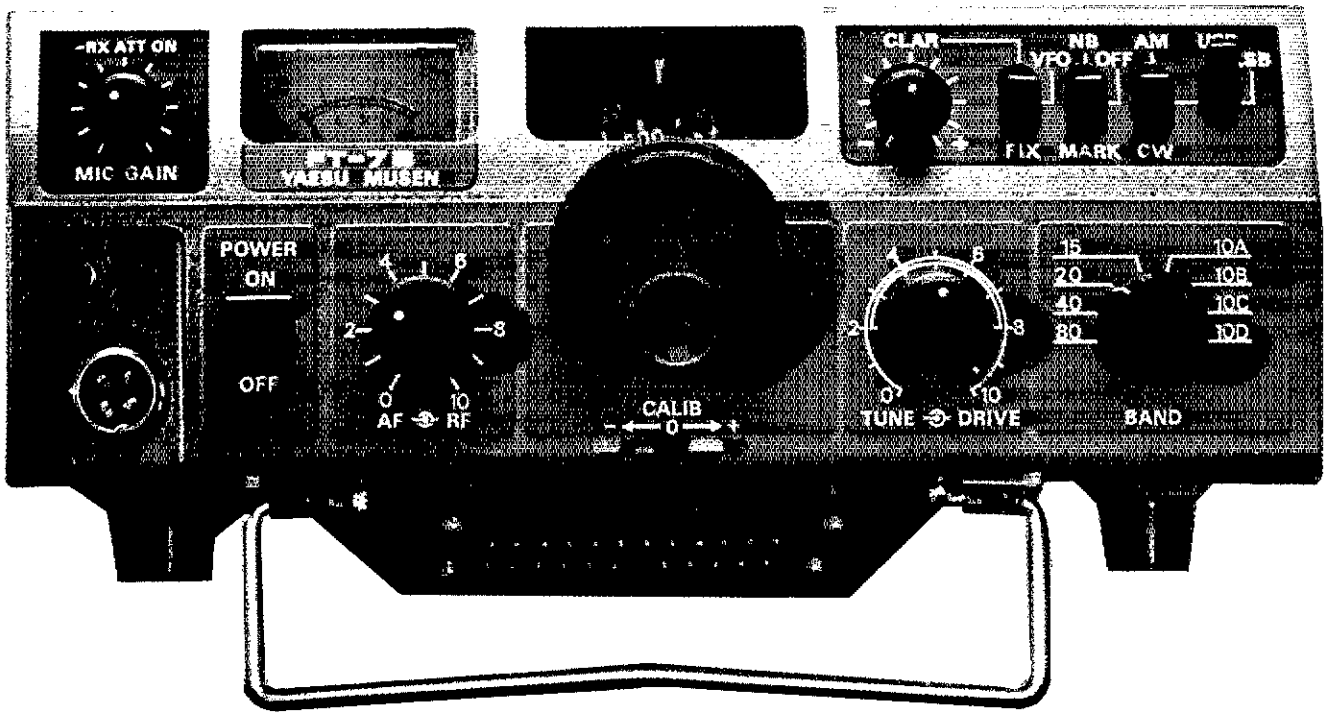
Order By Mail or Call TOLL FREE 800-647-1800 and Charge It On VISA master charge

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

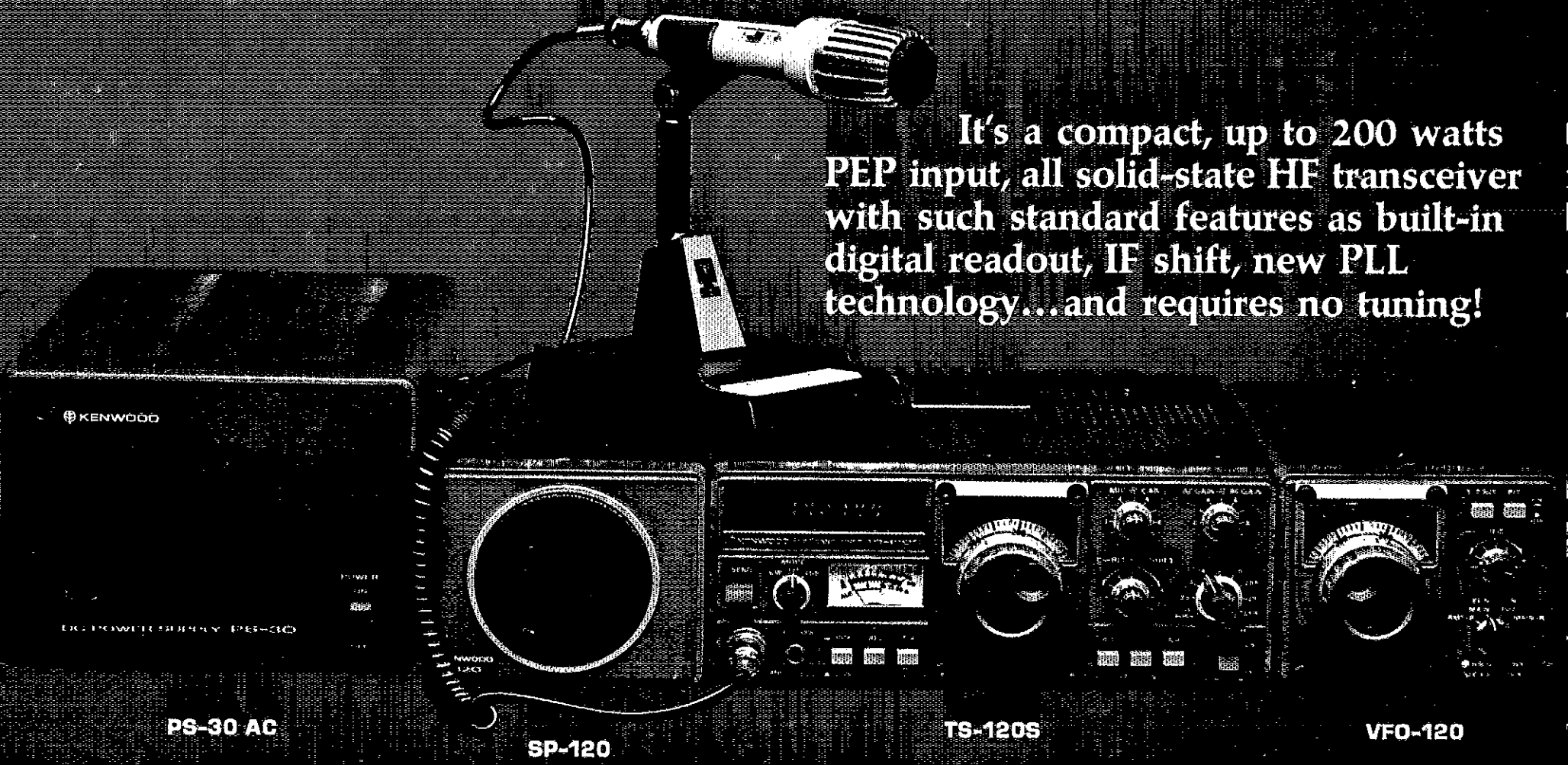
YAESU

The radio.

579X

YAESU ELECTRONICS CORP., 15954 Downey Ave., Paramount, CA 90723 ● (213) 633-4007

TS-120S...A big little rig.



It's a compact, up to 200 watts PEP input, all solid-state HF transceiver with such standard features as built-in digital readout, IF shift, new PLL technology...and requires no tuning!

Exciting and perfect for car or ham shack use! But, there's more to say about the TS-120S! This unique all solid-state HF, SSB/CW transceiver produces a hefty signal and also offers a lot of other features in a very attractive, compact package. See this new model at your Authorized Kenwood Dealer!

KENWOOD
...pacesetter in amateur radio

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