

# QST

devoted entirely to Amateur Radio

December 1977 \$1.50



**Breakthrough in voice transmission! One-half spectrum space required.**

SOLD AT LAST

THE CALLBOOK—UNITED STATES LISTINGS—



## WE DON'T KNOW OF ANOTHER TRANSCEIVER OFFERING ALL THESE FEATURES AS STANDARD EQUIPMENT

- Hybrid digital frequency presentation . . . built-in
- AC and DC VDC power supplies . . . built-in
- CW filter . . . built-in
- High performance noise-blanker . . . built-in
- VOX and semi-break in CW keying . . . built-in
- Speaker . . . built-in
- Cooling fan . . . built-in
- Microphone . . . included

*When you buy the Tempo 2020 you don't have to spend a bundle on accessories . . . just hook up to a power source and an antenna and you're on the air. A truly fine transceiver at a modest price.*

The Tempo 2020 features a phase lock-loop (PLL) oscillator circuit that minimizes unwanted spurious responses. It is an advanced solid-state unit with only 3 tubes, including 2 rugged 6146-B final amplifier tubes. It covers all bands 80 through 10 meters, USB, LSB, CW and AM. Additional features worth noting is the 2020's crystal calibrator and WWV receiving capability, dual RIT control, fixed channel crystal control on two available positions, RF attenuator, adjustable ALC action, phone patch in and out jacks, separate PTT jack for foot switch, extraordinary receiver sensitivity (.3u S/N 10 db) and oscillator stability (100 Hz 30 min. after warm-up).

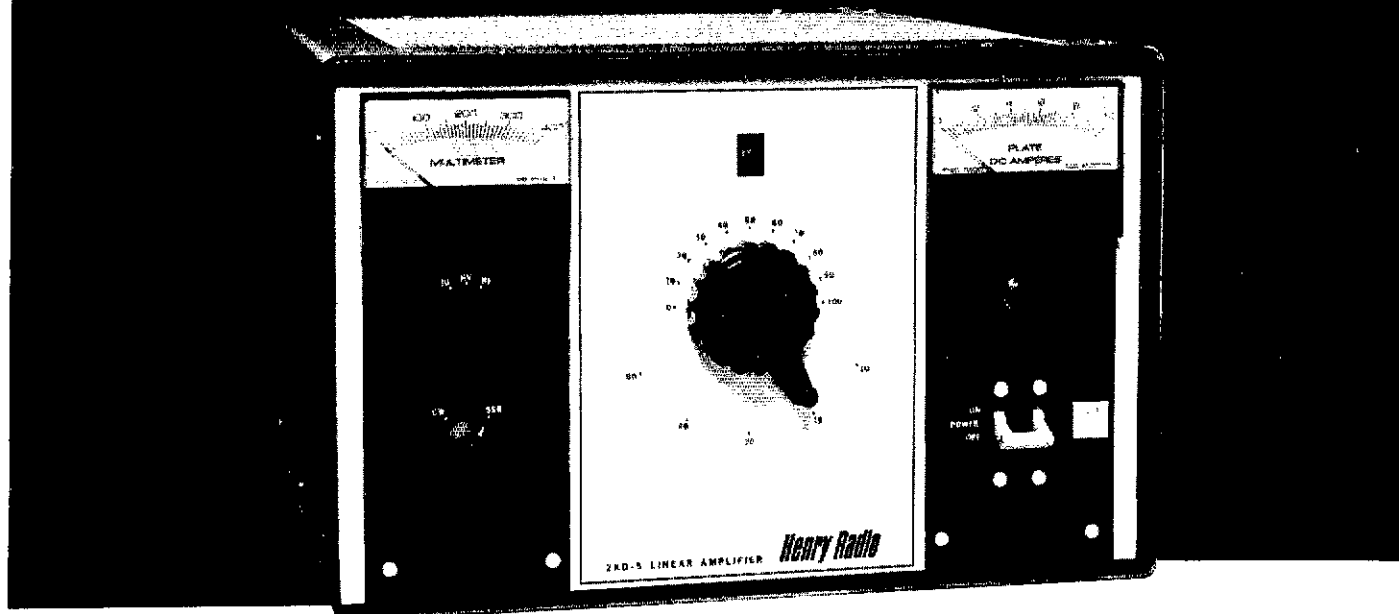
The **TEMPO 2020** ..... \$759.00  
 Model 8120 external speaker..... \$29.95  
 Model 8010 remote VFO..... \$139.00

*Send for descriptive information on the fine transceiver, or on the time proven Tempo ONE transceiver which continues to offer reliable, low cost performance. Both are available at select dealers throughout the U.S.*

# Henry Radio

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

# This is the amplifier you have been waiting for



## The new 2KD-5 linear amplifier... a one piece desk model with the power and reliability of a console

At Henry Radio, we know how to build only one kind of amplifier... the best. We want you to compare the 2KD-5 with any other desk model at any price. Remember, the 2KD-5 is only one model in the world's broadest line of amplifiers... both vacuum tube and solid state... for HF, VHF and UHF... fixed station and mobile... low power and high power. Never before has any one company offered such a cornucopia of high power RF amplifiers. Remember also that Henry Radio offers a broad line of commercial and FCC type accepted amplifiers covering the range of 3 MHz to 500 MHz. Henry amplifiers are

in use all around the world. Commercial and export inquiries are invited.

- The 2KD-5 is a 2000 watt PEP input (1200 watt PEP nominal output) RF linear amplifier, covering the 80, 40, 20, 15 and 10 meter amateur bands.
- Two Eimac 3-500Z glass envelope triodes operating in a grounded grid circuit.
- Pi-L plate circuit with a rotary silver plated tank coil for greatest efficiency and maximum attenuation of unwanted harmonics.
- Full legal input in all modes. 2000 watts PEP input for SSB. 1000 watts DC input for CW, RTTY and AM.
- Jumper for 115 or 230 VAC, 3 wire single phase.
- 10.5" high x 15" wide x 17.5" deep
- Price...\$895.00

**2K-4...LINEAR AMPLIFIER.** Offers engineering, construction and features second to none. Provides a long life of reliable service, while its heavy duty components allow it to loaf along even at full legal power. Operates on all amateur bands, 80 thru 10 meters. If you want to put that strong clear signal on the air that you've probably heard from other 2K users, now is the time. Move up to the 2K-4. Floor console...\$995.00

**TEMPO 6N2** brings the same high standards to the 6 and 2 meter bands. A pair of advanced design Eimac 8874 tubes provide 2,000 watts PEP input on SSB or 1,000 watts on FM or CW. Complete with self-contained solid state power supply, blower and RF relative power indicator. ...\$895.00

**TEMPO 2002.** The same fine specs and features as the 6N2, but for 2 meter operation only. ...\$745.00

**TEMPO 2006.** Like the 2002, but for 6 meter operation. ...\$795.00

**TEMPO VHF/UHF AMPLIFIERS.** Solid state power amplifiers for use in most land mobile applications. Increases the range, clarity, reliability and speed of two-way communications. FCC type accepted also.

Model	Drive Power	Output Power	Price
-------	-------------	--------------	-------

**LOW BAND VHF AMPLIFIERS (35 to 75 MHz)**

Tempo 100C30	30W	100W	\$159.
Tempo 100C02	2W	100W	\$179.
Tempo 100C10	10W	100W	\$149.

**HIGH BAND VHF AMPLIFIERS (135 to 175 MHz)**

Tempo 130A30	30W	130W	\$189.
Tempo 130A10	10W	130W	\$179.
Tempo 130A02	2W	130W	\$199.
Tempo 80A30	30W	80W	\$149.
Tempo 80A10	10W	80W	\$139.
Tempo 80A02	2W	80W	\$159.
Tempo 50A10	10W	50W	\$ 99.
Tempo 50A02	2W	50W	\$119.
Tempo 30A10	10W	30W	\$ 69.
Tempo 30A02	2W	30W	\$ 89.

**UHF AMPLIFIERS (400 to 512 MHz)**

Tempo 70D30	30W	70W	\$210.
Tempo 70D10	10W	70W	\$240.
Tempo 70D02	2W	70W	\$270.

Tempo 40D10	10W	40W	\$145.
Tempo 40D02	2W	40W	\$165.
Tempo 40D01	1W	40W	\$185.
Tempo 25D02	2W	25W	\$125.
Tempo 10D02	2W	10W	\$ 85.
Tempo 10D01	1W	10W	\$125.

**TEMPO 100AL10 VHF LINEAR AMPLIFIER.** Completely solid state, 144-148 MHz. Power output of 100 watts (nom.) with only 10 watts (nom.) in. Reliable and compact...\$199.00  
**TEMPO 100AL10/B BASE AMPLIFIER** ...\$349.00

Tempo solid state amplifiers are available at Tempo dealers throughout the U.S.

please call or write for complete information.

# Henry Radio

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

Prices subject to change without notice.





# QST

December 1977  
Volume LXI Number 12

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.

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Subscription rate \$12.00 per year postpaid, U.S. funds, U.S. & Possessions, \$13.50 in Canada, \$14.50 elsewhere. Single copies \$1.50. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U.S. and for an equivalent amount in U.S. funds.

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

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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

As Santa and the gang show, amateur radio is firmly entrenched in the space age. Happy holidays to all!



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# Sooner or later . . .

every Ham will probably own at least one

## Small size . . . giant performance

**TWO MODELS AVAILABLE:  
2.5 Watt MARK II and  
4 Watt MARK IV**

**SPECIFICATIONS:**

- Range: 144-148 MHz
- 6 Channel Operation
- Individual Trimmers on all TX and RX Xtals.
- Current Drain: RX 15 mA, TX - Mark II, 500 mA, Mark IV 900 mA
- 12 KHz Ceramic Filter
- 10.7 MHz and 455 kHz IF
- Spurious and Harmonics: 50 dB below carrier
- BNC (Twist type) Antenna Connector
- .3 Microvolt Sensitivity for 20 dB Queiting
- Uses special rechargeable Ni-Cad Battery Pack
- New improved Rubber Duck included
- One pair Xtals 52/52 included
- Weight: 16 oz. (.45 Kg) inc. batteries
- Size: 6" x 1.770" x 2.440"

**ACCESSORIES AVAILABLE**

Include LC-4 Leather Case, WC12 AC Wall Battery Charger, BC4 Desk Type Battery Charger, SM4 Speaker Mic, Touch Tone Pad, Tone Options.

# Wilson Hand-Held

# NEW!

The new arrivals to the Wilson family of quality high performing hand-held radios are the small American-made small sized MARK II and MARK IV. The ultimate hand-held for the amateur who demands quality, performance and value.

**FEATURES:**

- Lightweight and compact size - fits comfortably in the palm of your hand.
- Rugged Lexan® case.
- Same dependable performance as all Wilson Hand-Helds.
- Microswitch Speaker-Mic built in.
- Priced at

**\$199<sup>95</sup>** MARK II (2.5 watt)

**\$239<sup>95</sup>** MARK IV (4 watt)



Other Wilson units available are the VHF Models 1402SM, 2.5 watt, Model 1405SM Switchable 1 and 5 watt and 4502SM, 450 MHz, 2202SM, 220 MHz UHF units

Available After  
January 1978

**DON'T  
MISS OUT  
ON THE  
EXPLODING HAM  
MARKET!**

**ATTENTION AMATEUR DEALERS:**

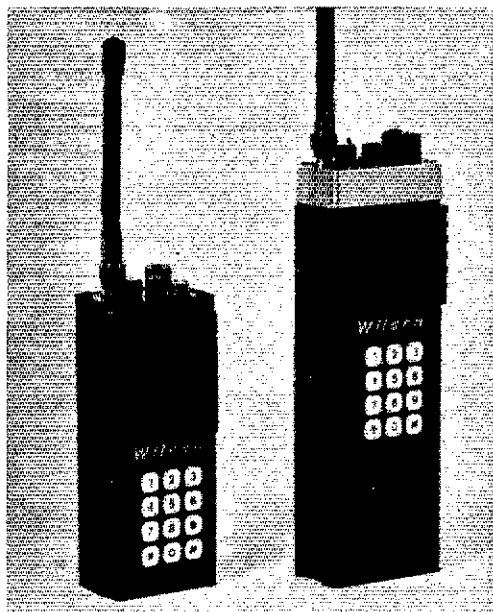
Wilson is accepting  
new dealers in many areas . . .  
contact us if you are interested.

FCC CERTIFICATION  
PENDING

For an illustrated Amateur Products Buyers Guide, write:

# Wilson Electronics Corp.

P.O. Box 19000 • Las Vegas, Nevada 89119 • (702) 739-1931 • TELEX 684-522



FOR SIZE COMPARISON, THE NEW MARK IV IS ILLUSTRATED NEXT TO WILSON'S 1405SM SWITCHABLE 1 & 5 WATT RADIO.



KENWOOD AND ALL OF OUR AUTHORIZED DEALERS WHO SELL KENWOOD PRODUCTS WOULD LIKE TO TAKE THIS OPPORTUNITY TO WISH OUR FELLOW HAMS THE MERRIEST CHRISTMAS AND A NEW YEAR OF FANTASTIC QSO'S. AND FOR THOSE CONTEMPLATING THE PURCHASE OF AMATEUR RADIO GEAR OR ACCESSORIES, WE CORDIALLY INVITE YOU TO VISIT OR CONTACT ANY OF THE FINE DEALERS LISTED BELOW.

REMEMBER, WHEN YOU BUY YOUR KENWOOD PRODUCT FROM AN AUTHORIZED KENWOOD DEALER YOU'RE BUYING CONFIDENCE ALONG WITH YOUR HAM GEAR.

**FOLLOWING IS A LIST OF AUTHORIZED DEALERS.**

As of Dec. 1, 1977

**ALABAMA**

**Long's Electronics**  
3521 10th Ave. North  
Birmingham, AL 35234

**ARIZONA**

**Power Communications\***  
6012 North 27th Ave  
Phoenix, AZ 85017

**CALIFORNIA**

**Gary Radio**  
8199 Claremont Mesa Blvd  
San Diego, CA 92112

**Ham Radio Outlet**  
999 Howard Ave  
Burlingame, CA 94010

**Ham Radio Outlet**  
13754 Victory Blvd  
Van Nuys, CA 91401

**Henry Radio, Inc.**  
11240 West Olympic Blvd.  
Los Angeles, CA 90064

**Henry Radio, Inc.**  
931 North Euclid  
Anaheim, CA 92801

**Webster Radio**  
2602 East Ashlan  
Fresno, CA 93726

**COLORADO**

**CW Electronics**  
1401 Blake St.  
Denver, CO 80202

**CONNECTICUT**

**Audiotronics\***  
18 Isaac Street  
Norwalk, CT 06850

**FLORIDA**

**Amateur Electronic Supply**  
621 Commonwealth  
Orlando, FL 32803

**Amateur Radio Center**

2805 N.E. Second Ave.  
Miami, FL 33137  
**Grice Electronics**  
320 East Gregory St.  
Pensacola, FL 32501

**HAWAII**

**Lafayette Radio Company**  
1111 Mc Cully St.  
Honolulu, HI 96814

**ILLINOIS**

**Erickson Communications**  
5935 North Milwaukee Ave  
Chicago, IL 60646

**Klaus Radio, Inc.**  
8400 North Pioneer Parkway  
Peoria, IL 61614

**INDIANA**

**Graham Electronics**  
133 South Pennsylvania  
Indianapolis, IN 46240

**Hoosier Electronics**  
43 B Meadows Shopping Center  
Terre Haute, IN 47802

**IOWA**

**HI, Inc.**  
1601 Avenue 'D'  
Council Bluffs, IA 51501

**KANSAS**

**Associated Radio Comm.**  
8012 Conser  
Overland Park, KS 66204

**LOUISIANA**

**Digital Electronics, Inc.\***  
1201 Annunciation Street  
New Orleans, LA 70190

**MAINE**

**Craig Radio Company**  
Route 1 By-Pass South  
Kittery, ME 03904

**MARYLAND**

**Electronic International Service**  
11305 Elkin St.  
Wheaton, MD 20902  
**Professional Electronics**  
1710 Joan St.  
Baltimore, MD 21204

**MASSACHUSETTS**

**Tufts Electronics\***  
209 Mystic Avenue  
Medford, MA 02155

**MICHIGAN**

**Electronic Distributors**  
1960 Peck St  
Muskegon, MI 49441  
**Radio Supply & Engineering**  
1207 W. 14 Mile Rd.  
Clawson, MI 48017

**MINNESOTA**

**Electronic Center**  
127 Third Ave. North  
Minneapolis, MN 55401

**MISSOURI**

**Ham Radio Center**  
8342 Olive Blvd.  
St. Louis, MO 63132  
**Henry Radio Company**  
211 North Main St.  
Butler, MO 64730

**Midcom Electronics, Inc.**  
2506 South Brentwood Blvd.  
St. Louis, MO 63144

**MONTANA**

**Conley Radio Supply**  
318 North 16th St.  
Billings, MT 59101

**NEBRASKA**

**Communications Center\***  
2226 North 48th Street  
Lincoln, NE 68504

**NEW MEXICO**

**Electronic Module**  
601 North Turner  
Hobbs, NM 88240

**NEW YORK**

**Adirondack Radio Supply**  
185 West Main St.  
Amsterdam, NY 12012  
**Harrison Radio Corporation**  
20 Smith St.  
Farmingdale, L.I., NY 11735

**NORTH CAROLINA**

**Freck Radio Supply**  
252 Patton Ave.  
Asheville, NC 28801  
**Vickers Electronics**  
500 East Main St.  
Durham, NC 27702

**OHIO**

**Amateur Electronic Supply**  
17929 Euclid Ave  
Cleveland, OH 44112  
**Sreppo Electronics**  
314 Leo St.  
Dayton, OH 45404

**OKLAHOMA**

**Derrick Electronics**  
714 West Kenosha  
Broken Arrow, OK 74012  
**Radio Inc.**  
1000 South Main  
Tulsa, OK 74119

**OREGON**

**Portland Radio Supply**  
1234 S.W. Stark St.  
Portland, OR 97205

**PENNSYLVANIA**

**Electronic Exchange**  
136 Main St.  
Souderton, PA 18964  
**Hamtronics**  
4033 Brownsville Rd  
Trevose, PA 19047  
**JRS Distributors**  
646 West Market St.  
York, PA 17404

**SOUTH CAROLINA**

**Accutek, Inc.**  
420 Laurens Rd  
Greenville, SC 29607

**SOUTH DAKOTA**

**Burghardt Amateur Center**  
124 First Ave. N.W.  
Watertown, SD 57201

**TENNESSEE**

**Sere-Rose & Spencer Elec.**  
1465 Wells Station Rd  
Memphis, TN 38108

**TEXAS**

**AGL Electronics**  
3068 Forest Lane #309  
Dallas, TX 75234  
**Douglas Electronics**  
1118 South Staples  
Corpus Christi, TX 78404

**Electronics Center**

2929 North Haskell  
Dallas, TX 75204  
**Madison Electronics**  
1508 McKinney Ave  
Houston, TX 77002

**UTAH**

**Manwill Supply Company**  
2780 South Main St.  
Salt Lake City, UT 84115

**WASHINGTON**

**ABC Communications**  
17541 15th Ave. N.E.  
Seattle, WA 98155  
**Amateur Radio Supply Company**  
6213 - 13th Ave. South  
Seattle, WA 98108

**WISCONSIN**

**Amateur Electronic Supply**  
4828 West Fond Du Lac Ave.  
Milwaukee, WI 53216

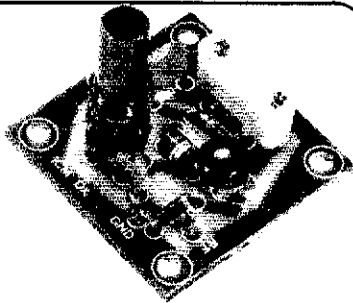
\*Pending



# for the experimenter!

INTERNATIONAL CRYSTALS & KITS

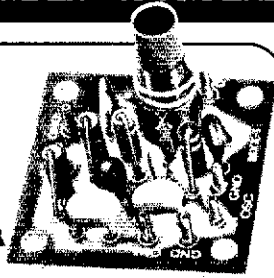
OSCILLATORS • RF MIXER • RF AMPLIFIER • POWER AMPLIFIER



### OX OSCILLATOR

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

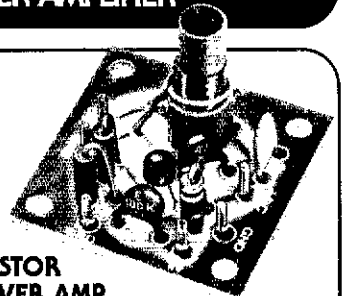
\$3.95 ea.



### MXX-1 TRANSISTOR RF MIXER

A single tuned circuit intended for signal conversion in the 30 to 170 MHz range. Harmonics of the OX or OF-1 oscillator are used for injection in the 60 to 179 MHz range. 3 to 20 MHz, Lo Kit, Cat. No. 035105. 20 to 170 MHz, Hi Kit, Cat. No. 035106  
*Specify when ordering.*

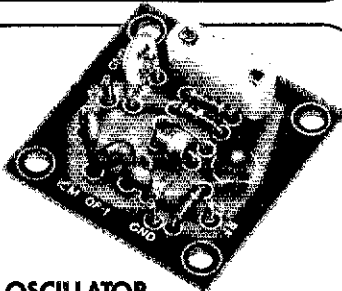
\$4.50 ea.



### PAX-1 TRANSISTOR RF POWER AMP

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

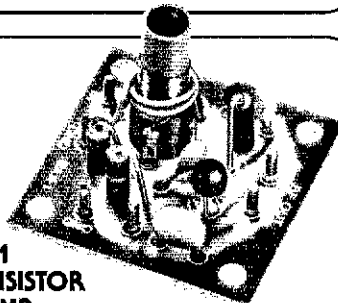
\$4.75 ea.



### OF-1 OSCILLATOR

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

\$3.25 ea.



### SAX-1 TRANSISTOR RF AMP

A small signal amplifier to drive the MXX-1 Mixer. Single tuned input and link output. 3 to 20 MHz, Lo Kit, Cat. No. 035102. 20 to 170 MHz, Hi Kit, Cat. No. 035103.  
*Specify when ordering.*

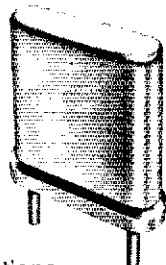
\$4.50 ea.



### BAX-1 BROADBAND AMP

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

\$4.75 ea.



.02% Calibration Tolerance  
**EXPERIMENTER CRYSTALS**  
(HC 6/U Holder)

Cat. No.	Specifications	
031080	3 to 20 MHz — for use in OX OSC Lo	\$4.95 ea.
	<i>Specify when ordering</i>	
031081	20 to 60 MHz — For use in OX OSC Hi	\$4.95 ea.
	<i>Specify when ordering</i>	
031300	3 to 20 MHz — For use in OF-1L OSC	\$4.25 ea.
	<i>Specify when ordering</i>	
031310	20 to 60 MHz — For use in OF-1H OSC	\$4.25 ea.
	<i>Specify when ordering.</i>	

Shipping and postage (inside U.S., Canada and Mexico only) will be prepaid by International. Prices quoted for U.S., Canada and Mexico orders only. Orders for shipment to other countries will be quoted on request. Address orders to:

M/S Dept., P.O. Box 32497,  
Oklahoma City, Oklahoma 73132.



**International Crystal Mfg. Co., Inc.**

10 North Lee  
Oklahoma City, Oklahoma 73102



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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

**Atlantic Division**

HARRY McCONAGHY, W3SW, 8708 Fenway Dr., Bethesda, MD 20034 (301-365-4421)  
*Vice Director:* Jesse Bleberman, W3KT  
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*Vice Director:* Edmond A. Metzger, W9PRN  
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 292 Heather Lane, Long Lake, MN 55356

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MAX ARNOLD, \* W4WHN, 612 Hogan Rd., Nashville, TN 37220 (615-832-9732)

*Vice Director:* Malcolm P. Keown, W5RUB  
 213 Moonmist, Vicksburg, MS 39180

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 20 Wilson Ave., Chatham, NJ 07928

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 2933 Dudley St., Lincoln, NE 68503

**New England Division**

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*Vice Director:* Fred E. Evans, W1JFF  
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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 prerequisites, although full voting membership is granted only to licensed amateurs.

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## Is the Component Market Drying Up?

There is frustration among amateurs who build their own equipment. If we could affix a title to the matter we might label it, "Where, Oh Where, Have the Components Gone?" Also, we might add something about the ridiculous cost of many of the parts we amateurs use.

A substantial number of letters from QST readers cross our desks each week, laced with complaints such as, "Why do you people specify such obscure and expensive parts in your projects?" Or, the correspondent might say, "How come you don't use Radio Shack parts so that I can get everything I need in one store?"

We assure you that the Hq. staff would zealously embrace a concept that simple if it were practical. Evidence of our efforts to satisfy that idealistic goal was seen in "The Tuna-Tin 2" and the "Herring-Aid 5" transmitter and receiver projects carried in QST for May and July of 1976: All of the parts, except for the chassis, were purchased from Radio Shack. To our dismay, some of the basic components used in such projects have been dropped by Radio Shack and Lafayette. Those imported 455-kHz i-f transformers are one of the items, as are some of their ferrite-loaded inductors. The name of the game these days seems to be "volume sales." Slow-moving items are not worth stocking, so the experimenter suffers when he or she wants to assemble a project.

The ARRL has been left holding the bag on a number of occasions: Items stocked by various suppliers were specified in QST and our technical books. Shortly after publication we were told that the items in the parts list had been discontinued by the manufacturer or supplier. Our crystal ball was not effective! Unfortunately, the reader is unaware that we were not derelict in our publication efforts. The lead time for articles and books can be many months: If a supplier drops an item from his line, we have no way of knowing about it until too late.

The J. W. Miller Co. is a friend to amateur radio with its myriad small components. Recently, however, Miller has dropped some of the items that amateurs need — 455-kHz i-f transformer/filter modules, variable capacitors and dial mechanisms. There was no diabolical intent connected with that move: It's a simple matter of economics

when a supply house acquiesces to the pressures of competition.

This does not solve our problem as amateurs. We can be thankful that WA0UZO with his QST kits, and G. R. Whitehouse with his varied line of basic components by mail, have risen to the surface recently.

It is unlikely that the reader will find consolation in the knowledge that the ARRL is struggling with the same parts-procurement problems that the amateur does: Even our projects are delayed weeks or months as we attempt to collect components for a circuit. Some correspondents insist that, "The ARRL do something to force supply houses to stock the items I need." The League tries frequently to encourage mail-order houses to sell ordinary items in single lots. The usual response is, "The paperwork for that kind of service costs us more than the profit margin." The League can't force anyone to do a particular thing. Frankly, we don't know how to solve the parts problem. We're seeking solutions. But if we were to use only those components found at the local hobby store — well, the state of the amateur art would go swishing down the tube quickly!

It has been suggested that League Hq. set up a special stock of components for QST and book projects, thereby enabling League members to purchase the necessary components in kit form. Under an arrangement of this type the parts would be sold at "cost." Certainly there is merit to the general concept, but in the long term the establishment of a Headquarters "parts store" would be costly to the ARRL members. Considerable expense would result from the need to stock a substantial amount of material, maintain an inventory and hire at least two people to administer the operation. Additional clerical persons would be needed just to handle the volume of mail that would result from a service of this type. Finally, because of the speculative nature of so specialized a membership service, the entire operation would operate at a loss: It would be impossible to predict the popularity, and therefore the subsequent demand for parts, connected with a given project.

Why not start your own small-parts business and aid the cause of amateur radio? — W1FB

# League Lines...

FLASH! At press time we learned that the FCC has delayed implementation of the new repeater regulations scheduled to go into effect on November 4, 1977. Many parties, including the ARRL, filed petitions for reconsideration in Docket 21033, and pending FCC action on those petitions the old rules will remain in force. In particular, the proposed new repeater subbands, and Technician segment 144.5 to 145 MHz, are not yet available for use. Also, mobile and portable auxiliary-link operation is not authorized. There is still a freeze on the filing of applications for new repeater, auxiliary-link, and control stations, but applications for modifications and renewals of these stations will be processed.

Docket 19759 (proposing Class E CB at 220 MHz) is dead!!! The FCC declared the proposal as "obsolete" and dismissed any further proceedings in the matter on October 13, 1977. More info is in "Happenings."

The ARRL Code of Ethics, which goes into effect with the January issue of QST, is intended to limit the sale of transmitters, transceivers and amplifiers to licensed amateurs. It is not intended to limit the progress of prospective amateurs. If a would-be Novice wants to buy a transceiver because he needs the receiver portion to cover, for example, the WIAW code practice transmissions, he could get a note from his Novice instructor, or from some other licensed amateur, indicating that he is a sincere candidate for an amateur license. Or, as one West-Coast dealer is already doing, the would-be amateur could purchase a used receiver from the dealer, who would give him full trade-in credit toward a transceiver within some specified time limit.

Wanted: Layout artist to join Hq. staff to provide art direction for QST articles. Art degree needed. Amateur license helpful. Contact Julie MacGregor.

Because of the expected avalanche of 75,000 Novice applications this season, FCC advises that the 30-day limit for the administration and return of all Novice tests will be strictly adhered to. If you are giving Novice tests, get them in on time; earlier, if possible. Rejection of the entire application is probable for late returns.

Because many new manufacturers now offer assistance to the public in solving RFI problems, an updated RFI assistance list is slated for a future issue of QST as space permits. In the meantime, an update is available now for a self-addressed, stamped envelope (s.a.s.e.) sent to RFI-Update, ARRL, Newington, CT 06111.

The ARRL Stolen Equipment Registry is now in operation for a one-year trial period. To report stolen equipment, write ARRL (with s.a.s.e., please) and ask for a stolen equipment registration card. Only one item per card, please. The Registry is updated monthly and is available for a 13-cent s.a.s.e. If your equipment is recovered, please drop the Registry a note indicating the item number and the issue where it appeared to discontinue the listing. Help shut the door on dealing in ripped-off gear!

Amateur radio TV PSAs are now available in 16-mm color, optical-sound format; 20- and 30-second lengths. Documentation of ARRL non-profit status is available for TV stations requiring such information. If you can get air time for these PSAs, contact ARRL, Public Information Office.

Repeater rule confusion? More details and explanations of Docket 21033 are in "Washington Mailbox" and "Happenings" this issue.

AMSAT News: AMSAT-OSCAR 7 changes its Mode A/Mode B schedule on January 1. See "Operating News." WALEHF has relinquished the AMSAT QSL Bureau managership and all cards now go to Ross Forbes, WB6GFJ, P. O. Box 1, Los Altos, CA 94022. Also, the OSCAR ASCII STA mentioned in October is good to March 15, 1979, instead of 1978.

# A Bonanza Awaits You in the Ham-Ads

Amateur radio equipment from the '50s and '60s is the great bargain of the '70s. Here's what to look for.

By Stu Goodman,\* K2RPZ

**E**ven though television was booming in 1954, I was more involved with radio — shortwave listening, to be exact. I remember staying up all night listening to all those foreign stations on my \$20 Hallicrafters S-20-R, a gift from my father that year. Like many hams, I was lead into amateur radio by shortwave listening.

My SWL friends and I have come a long way since then — and so has the equipment. If you've recently received your license, or are on your way toward getting it, you'll want to know where to look for used amateur gear that won't throw your budget for a loop.

The tube-laden gear from the '50s, '60s and before (my S-20-R predated World War II) will serve just about any newcomer to the amateur bands — and not just Novices. There are clubs, in fact, that specialize in finding, restoring and using vintage equipment (see related story).

## A Wide Range

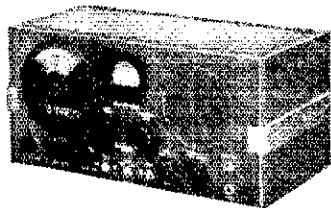
As even a quick perusal of the Ham-Ads in any *QST* will reveal, you have a wide range of brand names and models to choose from. If you ask around, you may find that the ham up the block has a rig just like one described here. By all means check out flea markets and the "Ham Trader" (information is elsewhere in this issue). But you'll find a good variety of used, good-quality equipment right in the Ham-Ads of each month's *QST*. Act fast, though — the most-wanted equipment tends to disappear pretty quickly.

In many cases, you'll be able to get on the air for less than \$150 or \$200. It could be all you'll need to spend for



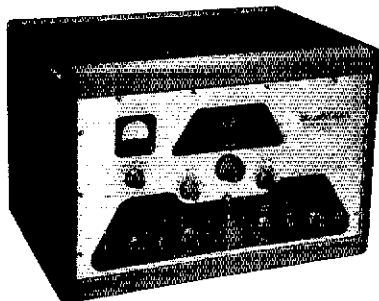
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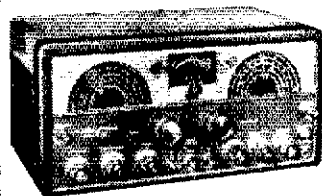
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Selectable Side Band Receiver

years to come to get a good clean signal out.

### Transmitters

If you can find one, the Heathkit AT-1 may sell for as little as \$25. First sold in the mid-'50s, it was a popular rig in its day, featuring a built-in power supply and 6L6 doubler-final. The 35-watt transmitter operates on 80-10 meters.

Heath's DX-20 runs 50 watts on 80-10 and originally sold in kit form for about \$35. Next came the DX-35, which runs 60 watts on cw and 50 on a-m phone.

A giant in the field, the Heath DX-100 weighs in at 107 pounds. It runs 120 watts on cw and 100 watts on a-m phone. When new, the kit sold for about \$200. You can pick one up today for about \$80.

The E. F. Johnson Co. produced a line of transmitters in the 1950s that were both popular and reliable. The renowned Viking I was introduced in 1950. Running 115 watts cw and 100 watts a-m phone, it sold in kit form for \$210. Today you can find one for under \$30!

Sporting increased power and price tag, the Viking II followed in 1953. You still hear "Rig here Viking II" on the cw bands today. Typical price today is under \$40.

A Viking Ranger will cost you about \$70 today. This mid-'50s transmitter featured a built-in VFO, one of the first to do so. Later models included 6-meter coverage. It sold in wired form for \$250 when new.

The Viking adventurer, cw-only rig, runs about 50 watts input from an 807 final. It was available, in kit form only, for about \$55. Today's price — \$25! Just recently, this writer worked WA1VSW (ex-1SI) while he was using this rig. He sounded fine on 80 meters from New Hampshire.

Johnson kept building higher powered rigs right into the late '50s and '60s. In 1959 the Challenger was introduced, running 120 watts on cw and 70 watts on a-m phone. Two 6DQ6As were used in the final of this rig, which operated on 6 meters as well as 80-10. It sold in kit form for about \$115 and wired for \$150 or so.

Many other companies sold transmitters in those days — among them Drake, National, Globe (produced by WRL Radio), Knight (Allied Radio), Eico and Ameco. You'll find listings for them in *QST* Ham-Ads, most at low prices. They offer the Novice or Technician licensee a good buy for their first cw rig.

### Receivers

Many used receivers can be found in the *QST* Ham-Ads. Most of them can be

put to good use in today's Novice or Technician station. Look for a receiver with better than 1 microvolt ( $\mu$ V) sensitivity. For cw use, try to find a receiver with selectivity as close as possible to 500 Hz. Actually, a selectivity of from 1.2 kHz to 400 Hz is fine for cw. An external filter that will drop selectivity down to 80 Hz is available very reasonably on today's market. Most issues of *QST* carry an ad featuring this filter.

While many receivers were built in the late '30s (like my Hallicrafters S-20-R, vintage 1939), in most cases they will not be easily found on today's market. What you will find, however, and at low prices, are ham-only receivers made in the late '50s or early '60s. These tube-type receivers perform well. All that is needed is a T-R switch and an antenna, along with one of the rigs described in the transmitter section above, and you'll be ready to send CQ!

The Hallicrafters S-38-D, introduced in 1954, was popular in its day. It featured a built-in speaker, slide-rule dial and bandspread. It sold for close to \$50. The S-85, built by Hallicrafters in 1954, is the better buy today. It had most of the features a Novice wants, including separate bandspread, noise limiter and an automatic volume control (avc). When new, it was available for about \$120. The SX-99, which included an S meter, was just a bit more expensive, selling for about \$150.

The best of the lot built by Hallicrafters in the late '50s was the SX-100, built in or around 1955. This receiver had an adjustable selectivity from 0.5 to 5 kHz. Also employed were 100-kHz calibrators, avc, automatic noise limiter (anl) and an antenna trimmer that worked.

In 1958, Hallicrafters introduced the SX-101. This receiver had a built-in S meter, large-scale slide-rule dial, seven ham bands, a 40:1 tuning ratio and a selectivity of 0.5 to 5 kHz. It sold for \$395 when first introduced, and the speaker (no. R-47) was an additional \$12.95. You can get one today for about \$125.

The Hammarlund Co. produced a series of popular receivers. In 1957, the HQ-100 was introduced, featuring a built-in clock. The bandspread on the HQ-100 was every 10 kHz on 80, 40 and 20 meters, and every 20 kHz on 15 meters. The 10-tube receiver sold new for \$179.

The HQ-110, also built in 1957, covered 6 to 160 meters, and was even more popular, probably because of its 6-meter coverage. Using 12 tubes, this receiver had a sensitivity of 1.5 microvolts and featured a built-in Q multiplier and clock. It sold, when new, for \$239.

Other ham-only models included the HQ-170, HQ-145 and HQ-180. Built in



1963, the HQ-180 was a 16-tube receiver, selling, when new, for close to \$450. Today's price is about \$275.

Other companies marketing ham-only receivers in the '50s and '60s included the National Company, still selling amateur products in Japan, and the Drake Company.

The Drake 2-A cw and ssb receiver was first introduced in 1960, while the 2-B followed in 1961. The 2-B was a triple-conversion receiver covering the 80- through 10-meter bands. The dial was marked every 1 kHz. When new, it sold for \$280. Even today, it commands about \$175.

The Drake R-4 series, introduced in 1965 and still marketed today, offers the new ham a great buy when available. They cover the ham bands in 500-kHz sections, with some of the series having selectivity as low as 400 Hz (fine on cw without the use of an external cw filter). You can find an R-4 today for \$200 or so.

A best-bet Drake receiver is the 2-C, first built in 1967. This triple-conversion receiver is usually sold quickly when offered for sale in *QST* Ham-Ads.

The 2-C sold for \$229 with the Q-multiplier/speaker an additional \$40.

#### Transceivers, QRP Rigs

An early Heath transceiver, the HW-16, is in use at this writer's station. It runs about 90 watts, cw only, and covers the first 250 kHz of the 80-, 40- and 15-meter bands. Its sharp selectivity offers the new ham a fine receiver as well as a FB transmitter. When used with the Heath HG-10B VFO, it enables the Novice to move around the bands with ease.

You can usually find HW-16s today for under \$100, although the HG-10B VFO has increased in price recently. It will probably cost you another \$40 or \$50.

For those who wish to run low power (not recommended for Novices), try the Heath HW-7. A modern solid-state transceiver popular with low-power enthusiasts, is the Ten-Tec Argonaut.

#### A Good Deal for the Seventies

In general, the new ham can find a bonanza in used equipment right here

on the pages of each issue of *QST*. Careful thought should be given as to how much power one wants, how good a receiver one wants and how much money one has to spend for used equipment. It can usually turn into a good deal for the ham of the '70s, whether today's Novice or yesterday's Technician amateur who wants to pound brass on the low bands for the first time.

As stated above, I am using an HW-16 rig that was built in 1967. With a dipole antenna, I have worked into the Midwest on 80 meters. Just up the block from me, Scott Cronin, WB2IMX, runs a DX-60A. A Novice, he has worked into Europe many times with a vertical on 15 meters. He has just added a Drake 2-NT transmitter to his line up of equipment bought from the Ham-Ads in *QST*.

#### Join In!

Lots of fun awaits the ham who desires to go the cw route. I've been on the air for 19 years, but have enjoyed the last few months the most. Why? Cw, of course!

**QST**

# Ham Radio for \$50!

Scared off by complex-sounding gear with a price tag to match? Head for the nearest flea market or Ham-Ad!

By Stu Stephens,\* K8SJ/W8KAJ

One of the really sad things I hear from would-be hams is "ham radio costs too much." Sad — and *not true!* What is sad is prospective hams thinking they have to begin with expensive, new equipment. What is sad are the folks who think nothing of plunking down \$200 for a five-watt, one-band, one-mode rig, shying away from the imagined expense of ham radio!

Having thoroughly enjoyed the hobby on the meager allotment assigned to parsons, let me propose three "facts" about ham radio.

#### On the Air for Less than \$50

Two simple factors are involved: the growing availability of good used gear and the phenomena known as "ham-fests."

\*2386 Queenston Road, Cleveland Heights, OH 44118



### Looking for Used Equipment?

Flea markets and auctions are ideal places to find amateur radio bargains — If you're careful!

Remember, everyone will tell you that the rig he's reluctantly parting with is working. *How well* it's working is a subjective judgment which you will have difficulty making on the spot.

First off, don't be afraid to dicker a bit. Odds are that you can bring the price down somewhat from the original asking price after

a bit of good-natured haggling.

Most hams are honest, but try to get some type of written guarantee that the rig will do what the seller says it will. In other words don't expect flea-market equipment to be air-ready. It probably won't be. But try to get a clear idea of its problems before you lay your money down. It's pretty much the same as buying a used car.

It's a good idea to take along a ham buddy who knows the lingo and the type of gear you're looking for.



Whether flea market, swap tables or auction, the hamfest is still one of the best ways to pick up used gear or parts. Odds are you'll have a great time doing it. (W9QKE photo)

Following World War II, amateur radio enjoyed an unprecedented boom in American equipment manufacturing. Quality companies such as National Radio, Hammarlund, Hallicrafters, Harvey Wells, RME, World Radio Labs/Globe and others produced excellent radios when Icom, Kenwood or Yaesu were still newcomers to the equipment market. As technology developed and

companies gradually faded from the market, the demand was for the latest, solid-state, transceive-ability gear. "The grass is always greener!" Quality radios of the '40s, '50s and '60s often go begging in the demand for the shiny gear of the '70s.

With this history in mind, check the calendars in any ham magazine for hamfests in your area. If you live

anywhere other than Botswana, there should be two or three near you every year. The fun and fantastic feature of a hamfest is the flea market, swap shop or auction — the most immediate and economical source of older gear. Try to go with another ham who is familiar with the gear available. Prepare to dicker a bit; that's part of the fun! Expect to do a little work on whatever you find; they *all* say "it works." But it will be worth it!

At a recent hamfest, I bought a Heath DX-40 — a 75-watt, 10- through 80-meter cw and a-m transmitter from the late '50s — for \$18. The asking price was \$25, and I first offered \$15. At the same hamfest, I passed up a National NC-125 — originally a \$200-class radio with built-in audio filter — for \$35, in favor of an NC-88 for \$20. For \$38 I virtually duplicated my Novice station of 1959 for which I had paid \$140! And \$38 still leaves \$12 to pick up antenna wire, key, headphones, log book, etc. to reach \$50!

### Old Gear Is Good Gear

There have been dramatic technological changes over the years, but don't sniff at the earlier engineering. Collins gear of the '40s and '50s even today commands premium prices because they are still excellent radios. As good as the new equipment is, the best receiver I've ever used to sort out a Novice cw pileup is a HQ-145X, 15 years older and \$450 cheaper than that Kammernfrantz 1000 of today!

### Fun Is Not Determined by Price

They might even be *inversely* related! This is the best thing of all to know. During a recent Classic Radio Exchange — an operating event sponsored for older gear — I had long-distance phone calls from all over the country from excited hams. Here were seasoned veterans, with fabulous stations, having a ball working with their older, cheaper gear. "I worked Ontario with my Harvey Wells Bandmaster!" an excited W5 reported. He had worked Ontario dozens of times, but never with his Harvey Wells!

When you don't have the dollars to invest, you have to develop good operating skills. And the payoff in satisfaction and thrills can be far greater!

So what's holding you back? If you're a fresh kid, go mow a few lawns. If you're a big kid, quit smoking and put that dollar-a-day habit in the piggy bank. In a couple of weeks, the time it'll take you to pass your Novice or General, you'll have more than enough for that first station. Who knows? We might run into each other, when you'll hear: "The rig here is a Lysco 600" . . . built in 1951 and "Fine Business!"

### General Coverage or Ham-Bands Only?

It's up to you. If shortwave listening is your thing, you'll probably want a general-coverage receiver that tunes a continuous spread of frequencies, usually 1.6 to 30 MHz. The bands will be alive with foreign broadcast stations and you'll hear WWV (precise time and frequency transmissions) in addition to the ham bands. There are all sorts of opportunities for code practice reception, too.

Many good ones are still available, even those up to 40 years old. Hammarlund and National were the best-known manufacturers, while new ones can be purchased from chain electronic outlets.

Why stick to a ham-bands receiver? They're easier to tune and their dials are easier to read — important factors for all operators but vital if you want to compete in contests. And pound for pound, the general-coverage receiver will be a bit more expensive than an equivalent ham-bands only rig.

Which one should you buy? You'll get different opinions from different people, but the final decision is yours. If you can survive pretty well without international broadcasts, stick to the ham-only rig. If ease of operating is less important than having a variety of bands to choose from, get yourself a general-coverage receiver.

# How to Adjust a Straight Key and Send Good Code

Participating in a contest taught David a lesson: A keyer doesn't make a good operator — but determination and practice do! Here's what happened in fiction, and how!

By Jim Bartlett,\* WB9VAV

“S

pecial Novice Code Contest,” the sign said. “Prize awarded to the winner by the Hamfest Awards Committee!”

Now as he sat at the table with the other finalists, David patted his forehead with his handkerchief and poked it back into the rear pocket of his jeans. In the preliminary part of the contest, over two dozen Novices had been eliminated and only four of them remained. David had turned in the best paper of anyone, having copied a whole paragraph at 18 words per minute without one mistake! But the other finalists weren't far behind, and now the winner was to be selected by his sending ability. Overhearing the other contenders whispering about their sending speeds, he was relieved to hear the best was only 20 words per minute. “I ought to be able to send at least 25,” thought David confidently as he remembered the many WIAW code practices he had paced in his shack. He had followed along in *QST* and sent in time with the signal (with his transmitter off, of course) until he could keep up with the Headquarters station at 25 words per minute.

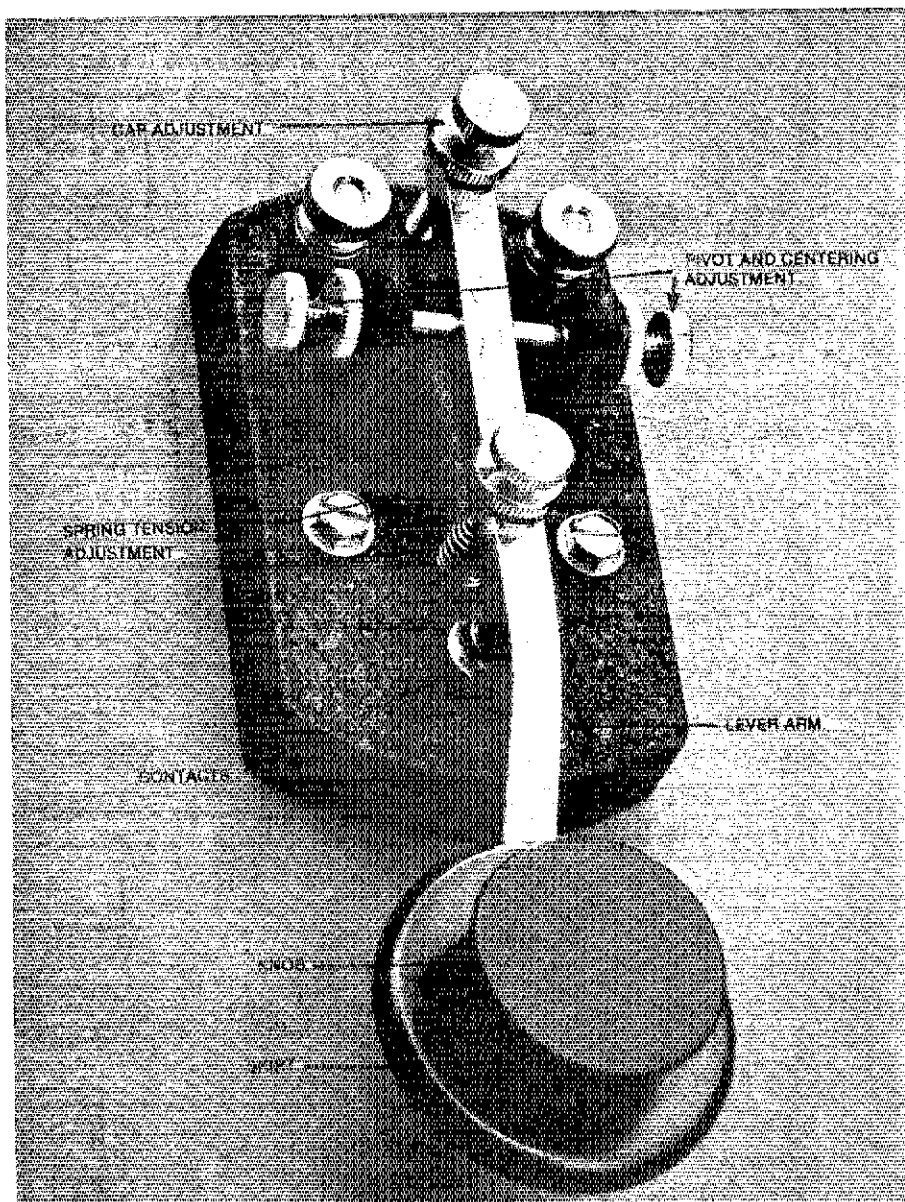
“Okay son,” barked the contest official as he walked toward David. “It's your turn to send — are you ready?”

The man had startled him back to reality and David was a little shaken, but he quietly slipped from his chair and followed the official to the sending station.

“Come around here and sit down at the key,” said the man. “Adjust it if you want to . . . I'll test your fist in a minute.”

“Hey! What's this thing?” cried David, pointing to the straight key on the desk.

“That,” said the man, with a surprised look, “is a straight key! Haven't



Most straight keys are built similar to this, although some include a shorting switch for use during tune-up. Note the lock nuts at each adjustment point. These should always be loosened before and retightened after an adjustment is made. Wires from the transmitter are attached to the two terminals at the rear of the key.

\*Basic Radio Editor, *QST*

you ever seen one of those before?"

Sure David had seen a straight key, but he hadn't sent on one, except once in a while when he was at his grandfather's house. That's what Grandpa used. But David had saved his money and bought an electronic keyer when his Novice license came last year. He wasn't used to the straight key anymore!

David reluctantly took his seat, and scooted the chair closer to the desk so he could reach the key. "Might as well adjust it a little," he thought to himself . . . "I'll just move this screw in a little . . . or maybe out - nah, just leave it alone. Move the back one out some," he thought, "yeah . . . that oughta be okay . . ."

"Well, are you ready to send?" asked the man.

"Yes . . . I guess," said David hesitantly, but his voice sounded pretty shaky, and he could feel his hand trembling a little.

"When I turn this paper over, you may begin sending. Okay?" asked the official. The man flipped the paper over and David swept his eyes down to the first word in the paragraph.

"Ddahdadiiddadiddadadaddadidi -," sent David.

"Hold it a minute," said the man as he spun around and leaned over toward David. "Now, son, you're going to have to send a little cleaner than that, and you really need to go a bit faster, too, if you want to beat the high score. Let's try it again, okay?"

But the second try was just as bad, in fact worse now that David knew he wasn't sending fast enough. He couldn't help it if he sounded rotten; it was that confounded brass clunker's fault that the code sounded crummy. It just didn't send like his keyer did, even with a lot more effort on his part.

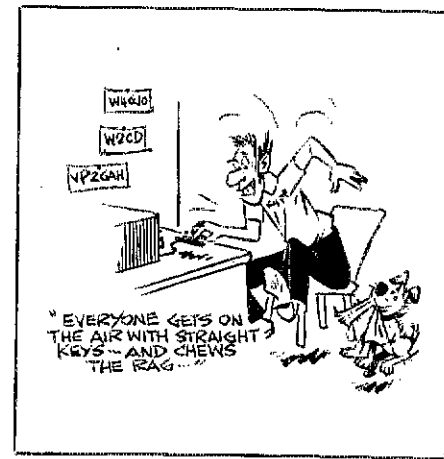
David sulked for three hours. He didn't speak a word the whole way home. He just sat with his elbows on his knees and frowned at the certificate he had received at the Novice contest. "Participant," it said in bold letters.

"Whoopie," muttered David sarcastically. He knew that he had done his best, but he had set his heart on winning that prize, and now he'd come away without it. Boy, would he get a ribbing from the guys in the club when they found out he muffed the finals because he was a straight-key lid!

But David wasn't a quitter. He decided right then that he would call his grandfather when he got home. If anyone could teach him to send good code on a straight key, it was Gramps!

### Adjusting the Key

That evening, his mother took him over to his grandfather's house. David's grandfather met him at the door. "Let's go on out to the shack," he said. "I have



everything all set up." As they walked out to the radio room located in the old garage behind the house, David's grandfather tried to cheer him up. "Don't feel bad about the contest," he said. "Many people would be glad if they could learn theory like you do. Being able to send readable code isn't difficult, but it does take know-how and a lot of practice. You know, David, the secret of sending good code is learning good code. Most young people think the primary objective is to increase their speed, when actually all you have to do is learn the correct code in the first place."

"But Gramps, I send good code," said David. "I can if I use my keyer."

"That's different," emphasized his grandfather. "But at least using the keyer should have helped you learn how correct code sounds." As they sat at the familiar radio bench, David admired the worn brass key. "All right," said his grandfather, "let's pretend you don't know anything about keys. We'll go over it from the beginning, and that way we won't miss anything."

"I should have learned this to start with," David admitted. "By now, I probably have lots of bad habits to correct." He was getting excited already. His grandfather was a good teacher, and he had a way with words that made David enjoy listening to him.

"All right," began his grandfather, "a telegraph key like this one, is simply a lever-type switch, and it's used to turn the transmitter on and off. When the lever is depressed, the contacts close, and that turns the transmitter on."

"Right," chirped David, "and when the lever is released, the contacts open, and that turns the rig off!"

"Very good," said his grandfather. "Now the first step in setting up the key is to align the contact points sideways, so that one is directly above the other. The knobs on the side are used to make this adjustment. First we loosen the locking nuts on the screws, and then bring the contact points into alignment by turning the screws. There, see how

they are lined up? Now I tighten the lock nuts to keep the points from shifting on me.

"Next, we adjust the key lever for the amount of travel we want. As a general rule, a 16th of an inch is a good place to start. We measure the amount of travel at the knob of the key. When we move the screw in the back here, we can bring the contacts apart enough so that we have to push the knob down about a 16th of an inch before they make contact again. After we finish the adjustment, we tighten the lock nut, just like we did before . . . there, all set! Now we have to set the spring tension on the lever. We can adjust that on the screw up here, in the front. We just loosen the locking nut and move the screw in or out until the tension feels about right."

"But how do you know where to set that one?" asked David. "You can't measure that in fractions of an inch," he laughed.

"You're right," chuckled his grandfather, "but you can tell where to put it by the way it feels when you send . . . if you set the spring tension too heavy, your sending will probably be choppy. And if you set it too light, you're likely to run the characters together. It's best to do a little experimenting so you can find the right tension for you. There, we've adjusted the key . . . now let's adjust you!"

### How to Send

"The key should be mounted about 18 inches in from the edge of the operating surface, like we have it here," said David's grandfather. "And when I say mounted, I mean either screwed down to the table, or mounted on a thin board about six inches wide and two feet long. Either way, the key won't start moving around on you when you're trying to send. Now, the correct posture for sending code is to sit up straight in your chair and square with the operating table."

"Like this, Gramps?" asked David.

"That's just fine. Now which hand are you going to send with?" he asked.

"Oh, I always send with my right hand," said David, raising it as he spoke.

"Very well. Then your right arm should be in line with the key and your elbow should be resting on the table in front of you. Now this table is just the right height for sending code, because I built it that way. But if you use a table that isn't the right height, you can get a sore arm or a sore back! If you use a low table, sit in a low chair so that you can send without bending over, or else you'll get a sore back for sure. And if you have to use a table that's more than a few inches higher than your waist when you're sitting down, then sit on a cushion, or your arm and shoulder could be mighty sore the next morning."

"I don't have to worry about any of that," said David. "I have a table that's just the right size. Dad made it for me to put my transceiver on."

"Good for you!" his grandfather exclaimed. "Now let's see how to hold the key. First, put the index finger and your second finger on the top of the knob, and then put your thumb on the left side of the knob and rest it on the skirt. The skirt is that flat part under the knob."

"Hey, the skirt looks like a poker chip!" said David.

"As a matter of fact, that's what lots of people use, if their key doesn't come with a skirt already on it," explained his grandfather. "Having a key like this one can be handy because the skirt supports your thumb and ring finger as you grip the knob from the sides. Now put your ring finger on the other side of the knob and rest it on the skirt on the right side. There you go, now just let your baby finger relax. Some people just use three fingers, and let the ring finger and baby

finger both relax, but I like to use four fingers on my key. Now keep your wrist off the table, David, only your forearm close to your elbow should be resting on the table. Don't grip the knob so hard either, just relax and hold it firmly but not tight. That's better, now you're ready to send," he said as he reached over and turned on the code-practice oscillator. "First try sending strings of dits, about 10 or more at a time. Keep them evenly spaced, and they should flow smoothly from the key."

"How's this?" asked David as he sent a string of dits on the key.

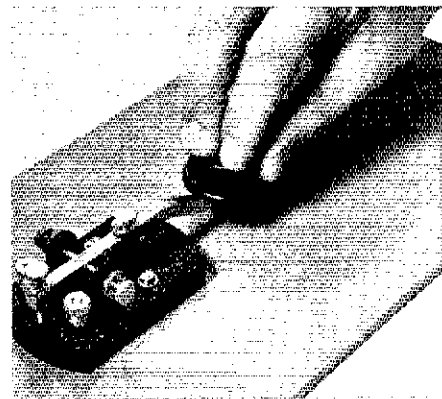
"That's very good," said his grandfather. "Now that you've developed a smooth rhythm, try adding dahs to your strings. Remember that a dah is three times as long as a dit, and the interval between each dit or dah and the next, should be the same length as a dit."

"Dah-di-dah-di-dah-di-dah-dit," sent David. "Am I keeping the spacing right?" he asked.

"Yes, indeed you are, David, but remember that your sending should be a wrist action. Don't use your fingers or arm to operate the key, just the wrist . . . and keep relaxed while you're sending," said his grandfather.

After David had a few more minutes of practice, his grandfather reached above the radio bench and selected a copy of *QST* magazine from his ham library. "Okay, David, I think you're ready to tackle some characters. One of the best ways to learn to send characters on a straight key is to say the sounds out loud as you send them. For example, here is the letter Q, so as I send it I will say 'dah-dah-di-dah' and send in time with my voice," said David's grandfather.

"Dah-di-dah-dit dah-dah-dah dah-di-dit dit," sent David as he said the sounds. "Hey, that's easy as pie!" he



The finger grip used on the key will vary slightly with the finger length and type of key knob, but should look similar to this. The specific grip used is also subject to personal preference, and therefore many variations of this grip exist.

gleamed. "I send a lot smoother that way!"

"Now let's concentrate on the intervals between characters and between words," said his grandfather. "You should leave a 'dah' space between characters, and a double 'dah' space between words. It's very important that you leave enough space between characters and words, because in ham radio the purpose is to communicate. If you run everything together, the fellow on the other end won't know what you're trying to say."

### Straight-Key Night

David practiced his spacing for a while, until finally he could send whole sentences from the magazine without a mistake. "That's a good straight-key fist you've got there, David," remarked his grandfather. "Just keep practicing and you'll be ready to go before the next Straight-Key Night comes this New Year."

"What's a Straight-Key Night?" asked David.

"That's a day when everyone sends with a straight key! It's an operating event sponsored by the ARRL twice a year, once on New Year's and once on the Fourth of July. Actually the event is 24 hours long, not just an evening, but participants vote for the 'Best Fist' and 'Most interesting QSO' awards, and the winners are listed in *QST* magazine," said his grandfather. "It's not a contest, just a time for everyone to get on the air with their straight key and chew the rag."

As he watched the car's taillights disappear that evening, David's grandfather knew his grandson would enjoy developing his newfound skill. He smiled as he sat on the porch step and anticipated the satisfaction of working a certain young man on New Year's Day Straight-Key Night.

**QST**



The generally accepted way to hold a key for minimum fatigue is with the wrist well off the table so that only the forearm near the elbow rests on the table. A common error is to rest the entire forearm on the table. This results in rapid muscle fatigue, and a loss of proper coordination.



# Telegraph Keys: "As American as Pumpkin Pie"

From the early days of railroading to manned space flights, telegraph keys have been chattering away for nearly a century and a half. Louise Moreau's collection is one of the finest in the world.

By Joel P. Kleinman, \* WA1ZUY

**D**espite the electronic marvels we all now take for granted, the humble telegraph key lives on as a basic part of nearly every amateur's station. Conceived decades before the Civil War, it still gets a signal out better than just about any other means of communication:

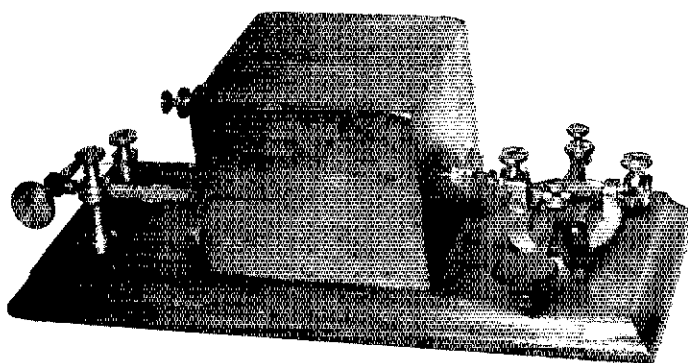
Louise Moreau, W3WRE, doesn't have to explain what she likes most about amateur radio to people who visit her shack. After gazing at the 249 keys that adorn it, they usually get the idea. Mrs. Moreau is surrounded by telegraph keys, and she wouldn't have it any other way.

As one of only five or six people in the world who specialize in collecting the brass machines that helped change the course of history, Louise is justifiably proud of her collection, and is in demand as a speaker at amateur radio clubs around the country. "They're as American as pumpkin pie. Do you realize that the same mode of communication that was used to relay news of Lee's surrender at Appomattox and Custer's Last Stand is used as a back-up on manned space flights?" she tells them.

\* Features Editor, QST



The first Vibroplex, made by Horace G. Martin in 1904. Its price? Five dollars!



A vintage 1883 box relay and key on base. J. H. Bunnell manufactured this arrangement, patented in 1881. Notice that the key is in the style of modern straight keys.

In a recent interview, Louise conveyed her enthusiasm for the entire history of communications as well as the code. But she is clearly most intrigued by telegraph keys, those fascinating little machines that are still in widespread use after nearly 150 years.

*QST: Where do you find the keys you collect?*

Moreau: For the most part, I'm given "grandpa's old one." Very few of them were purchased. If you let people know you're after one and walk around a hamfest with a key in your hand, people will often remember you and bring them next year. I get as many as six at a time at hamfests! Old barns are another good source.

*QST: Describe some of the ones you're most proud of.*

Moreau: I started out with a J-38 telegraph and bug. I now have 249 different keys, dating back to 1848. Let's see — there's a Vibroplex no. 1, the prototype of every Vibroplex ever made, from 1904. I have a key found in the ruins of the Johnstown, PA, Western Union office after the 1889 flood. Then there's the key that was on the desk in the flag office of the USS *California*, sunk at Pearl Harbor, and one used on the USS *Nautilus*. And there's one from the press desk at the Dempsey-Turney fight.

*QST: What do they look like?*

Moreau: There's one only an inch long and a big old spark key. Each one is somehow distinctive.

*QST: What do you use?*

Moreau: An electronic keyer! Why? It's the lazy man's way to send cw. You can send and send for hours at a time and never get tired. I can do 40-words-per-minute solid copy in the Continental code, and 25 wpm in the old Morse.

*QST: What appeals to you so much about cw?*

Moreau: I find cw contacts more interesting. And the people themselves are more interesting! Yes, I work phone, but about 99.99 percent of the time

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you'll find me on cw. At one time I was even on 2 meters on the West Coast.

On cw, fists are as individual as voices are on phone. I don't think we should ever lose that. It's just another language, that's all it is. Look what you can do with it in disasters. And look what it's doing for some of the handicapped who have speech problems. There's a blind and deaf woman in California who works cw magnificently. One of the most outstanding people I've ever heard on a traffic net has muscular dystrophy. He sends with his feet!

*QST: How did you get started in amateur radio?*

Moreau: I learned code when I was a Girl Scout at age 12. My original job was as a telegrapher, but they put printers in soon afterwards. I didn't get my ham license until 1953. It started

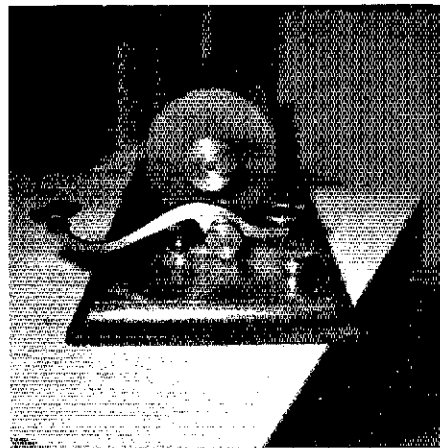
out as my husband's hobby. I was helping him try to get his code up.

We both took the test and became Novices. I never really meant to be one, but oh, do I love it!

*QST: Do they really use cw in space?*

Moreau: They sure do! I remember hearing John Glenn say, while he was orbiting the earth, "Want me to go to the key?" I asked NASA if they really use telegraph keys in space, and astronaut Owen Garriott, W5LFL, called me on the phone. "Yes, they do have facilities for code transmissions from space," he said. It's done through the umbilical used for voice control. If voice communications should ever fail, it's used as a back-up.

After all these years, code is still kind of necessary. QST



Sporting brass contacts, the first curved lever and no coil spring or tension adjustment, this "Camelback" key was made by Thomas Hall of Boston in 1848.

# A Key to Success

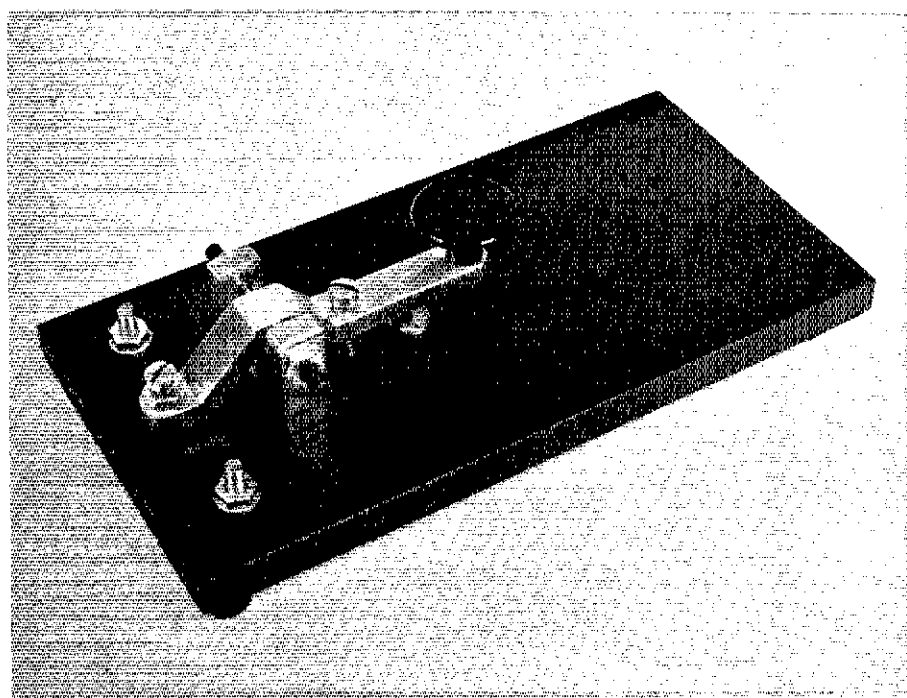
At one time, just about all keys were hand-machined pieces of art. Here's a way to make your own.

By Daniel Wissell, \* WB2MFH

*It is rumored that the art of building is becoming extinct among the ham ranks. Some say this is due to the recent availability of top-notch equipment from commercial sources at reasonable prices. However, it is important to remember two of the main motives behind building: the ham's desire to learn from the experience, and his pride in the finished product.*

*These principles can be applied to keys as well as electronic equipment. Here's one man who enjoyed taking the long way around just for the personal satisfaction!*

**M**y search for a good key started after I completed my first QSO with my \$1.98 beginner's-special key. When I saw the yoke flexing in the heat of a seven-word-per-minute contact, I knew some changes were in order. But the thought of trying to modify a pressed-



\*65 Western Ave., Morristown, NJ 07960

This handmade brass key puts a strong cw voice on the air for WB2MFH.

steel key on a plastic base was not very appealing.

I began searching the local supply houses only to come up with more expensive versions of my two-buck key. The mail-order houses were to be my next step, but the search ended when I found a piece of scrap brass about 1/2 inch thick, two inches wide and six inches long. Immediately the words of my Elmer returned. "Build it!" The thought of making my own key suddenly seemed to embody the very essence of being a ham.

### Construction Details

At first glance, the construction of this key would seem to require an extensive collection of tools, but this is not the case. Practically the entire project was built using only a hand drill, hacksaw and file. I used a tap and die set to cut threads in the metal where necessary, but these tools can usually be borrowed or rented if you don't have them. The yoke was tackled first. After first tracing the pattern onto the brass, I made two vertical cuts with the hacksaw to form the "legs" of the yoke. Then a horizontal cut was made by drilling a series of small holes and inserting the saw blade to finish the cut. The rough edges were then filed flat. The lever was cut and shaped in a similar manner.

The spring was salvaged from a lawnmower carburetor. It has an outside diameter of 13/64 inch, an inside diameter of 1/8 inch, and is about 1/2 inch long. The spring-tension adjustment bolt was filed to fit the inside diameter of the spring. The knob was filched from my beginner's key. All of the hardware on my model is no. 10-32, however, the builder may use any convenient size. The contacts were salvaged from an old relay. These had no. 10-32 studs already attached, but contacts removed from any source (relay, automobile ignition points, etc.) can be soldered to bolts to form screw-in contacts.

The entire project required about six hours to complete and was fabricated in one weekend. The results after using the key for several weeks have been good. Since I use a transmitter with only 3 watts input on 80 meters, a good, clean cw voice is a must. I believe that my newly found "voice" has been largely responsible for my contacts with hams in eight states and Canada (so far).

Finally, after explaining on the air about your typical homemade transmatch or SWR bridge, there is a certain feeling of pride when the other fellow comes back with . . . "Did u sa homemade key?" I would like to thank Bob Simons for assistance with the drawings and Art Sutton, WA2VVX, to whose encouragement and help I owe my Novice ticket and also this article.

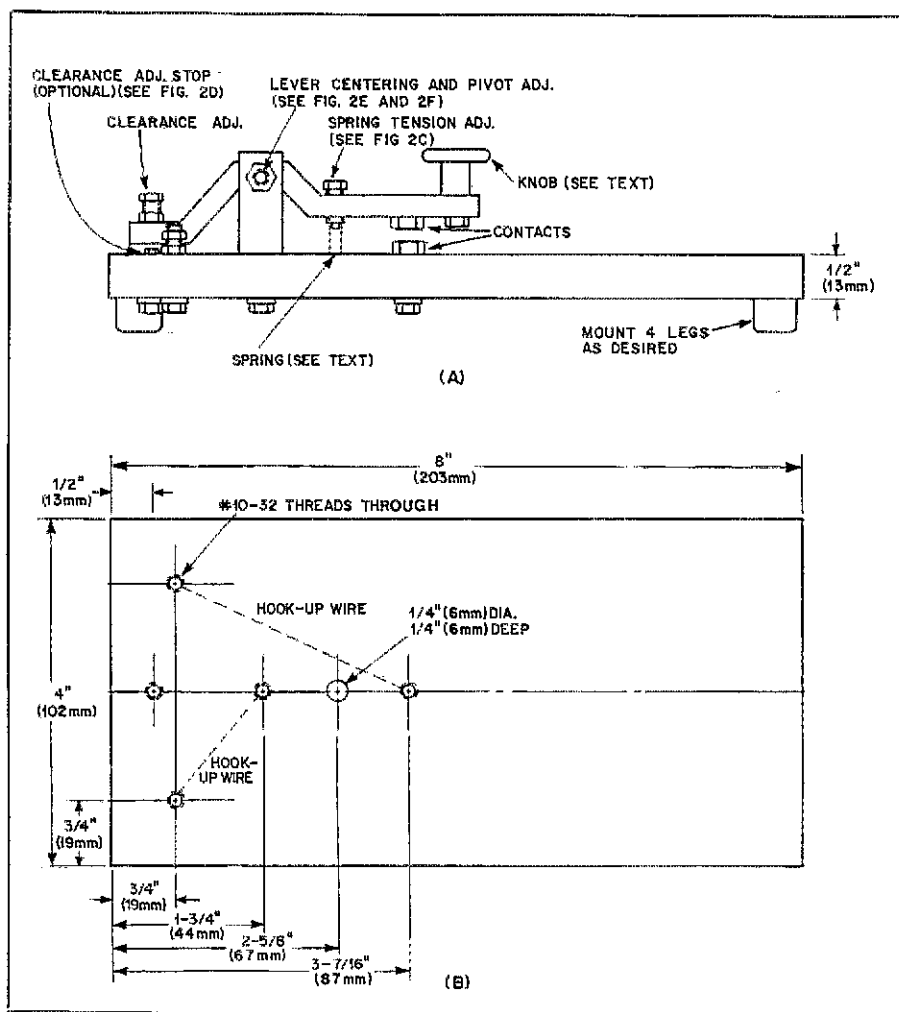


Fig. 1 — The key assembly is shown at A, and baseplate dimensions are given at B. The baseplate may be made of wood or plastic.

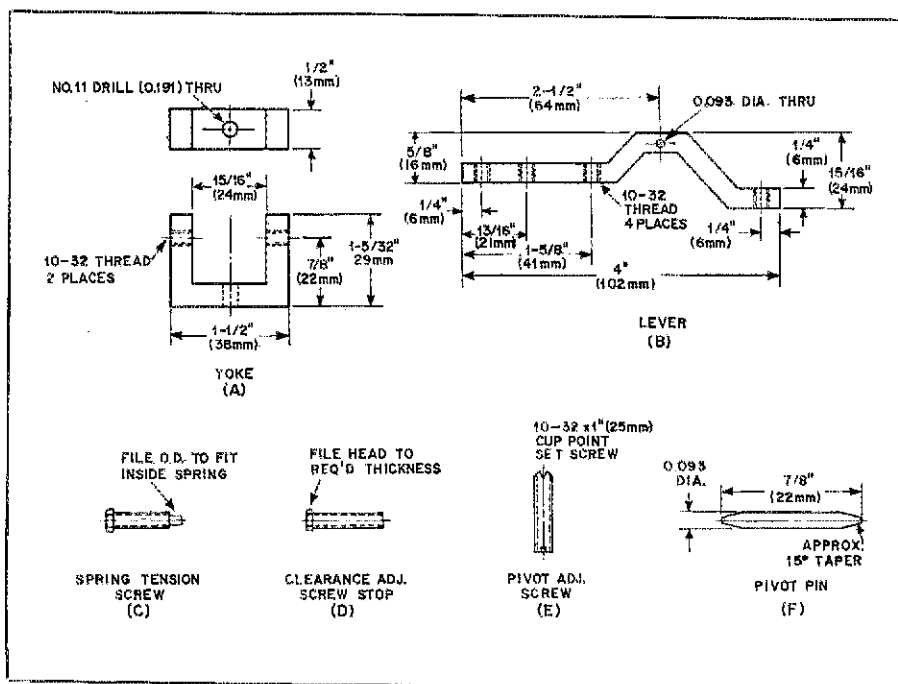
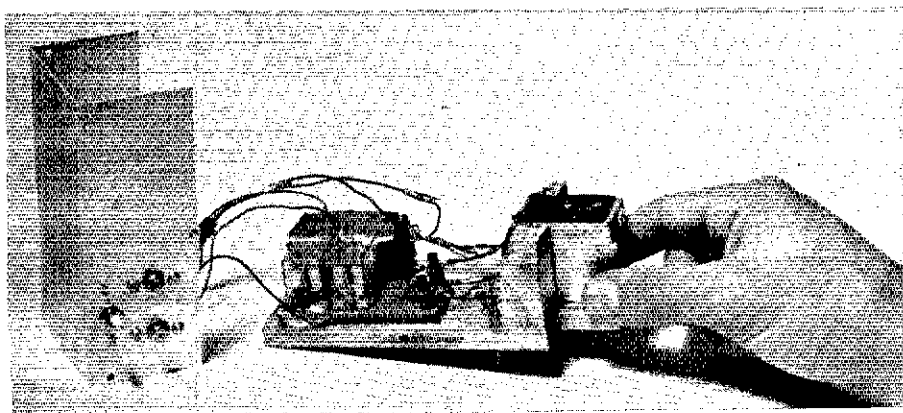


Fig. 2 — Dimensions are shown at A for the yoke of the key, and at B for the lever. The author cut these from 1/2-inch-thick brass. C, D, E and F show the details of the spring-tension screw, clearance-adjustment screw stop, pivot-adjustment screw, and pivot pin, respectively.

# Daniel's Key

This unique paddle design contains no moving parts, and yet will trigger your electronic keyer. Still in the dark? That's because it works on infrared light!

By Daniel L. Nevels,\* WD5ETR



The author's model of Daniel's Key uses the conventional paddle front-end design.

In the early days of ham radio, the straight key was the only link between a cw man and his transmitter. Then came the "bug" or semi-automatic key. This device enabled operators to send faster by automatically sending strings of dits. With all the weights and adjustments it was a mechanic's nightmare for some people, but it got the job done. More recently the bug has been replaced with all types of electronic gadgets, the most common of which is the electronic keyer. Now the only piece of purely mechanical equipment remaining in the cw family is the paddle. The paddle is used to trip the keyer so that it will send its dots and dashes.

But there are some folks who will never leave state-of-the-art alone, and I happen to be one of those people. Reflecting about that last piece of machinery linking the ham to his cw rig got me thinking. Why not have an electronic paddle?

Daniel's Key is an electronic paddle that utilizes infrared emitters and sensors. A sensor is placed at the top of the paddle body and an emitter is placed at the bottom. When the operator's finger breaks the beam of light, a relay breaks contact and a dot or dash is sent. Infrared devices were chosen over standard LEDs and phototransistors because an infrared detector does not react to visible light. This makes the paddle ideal for use in locations where ambient light could affect the operation of standard phototransistors. Infrared LEDs and detectors are widely used in such applications as tape and card readers, character recognition devices, velocity indicators, encoders and intruder alarms.

## The Innards

The objective in designing this circuit was to keep the cost to a minimum, and make the project easy to duplicate. Basically, the circuit is a dc amplifier. (See Fig. 1A.) D1 and D2 are forward-biased diodes, and therefore emit light.

Transistors Q3 and Q4 offer little internal resistance when exposed to the emissions from the infrared emitting diodes. This low resistance in Q3 and Q4 allows current to flow to the bases of Q1 and Q2, forward biasing them. Under this condition, Q1 and Q2 conduct and the resulting current flow activates relays K1 and K2. Relays were used instead of solid-state switching so that the paddle would be compatible with all electronic keyers.

Whenever the infrared light beams are not interrupted, the relays are energized. But if something comes between an LED and its IR detector, the above process is changed. As the intensity of infrared light reaching transistors Q3 and Q4 decreases, their internal resistances increase until at some point there is not enough bias at the bases of Q1 and Q2 to make these transistors conduct. When this happens, the relays release. So by placing an object between an IR LED and its corresponding IR detector, we can make a relay contact open. And when the object is removed the contacts close. Result? A simple on/off switch that is untouched by human hands!

If you assemble this circuit and don't see the LEDs light when you turn it on, believe me they are probably working; you just can't see the light! The easiest way to find out if your LEDs and detectors are functioning properly is to attach the detectors to your ohmmeter and slowly bring the LED closer to the detector. As you do this, watch the meter to see that the detector resistance decreases as it receives more infrared light.

## Selecting the Diode

The TIL-31 LED was used because it is one of the few available that provides a strong enough light for this applica-

\*General Delivery, Rougon, LA 70773

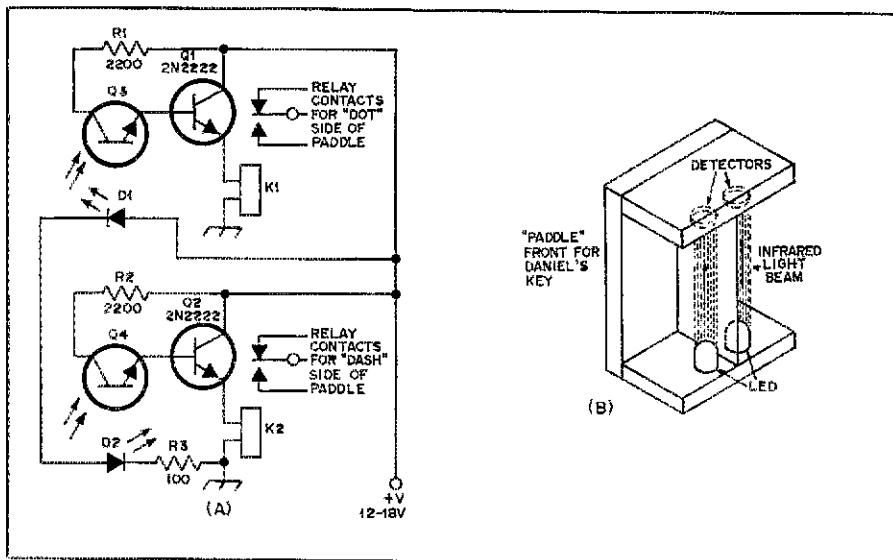


Fig. 1 — The schematic diagram for Daniel's Key is shown at A. A typical paddle front is shown at B. The diodes and detectors are mounted close to the divider, and about 1/2-inch in from the front edge. The IR devices should be mounted carefully so that proper alignment is achieved.

tion. Most infrared LEDs are designed for use in places where the distance between LED and detector does not exceed 1/4 inch. For the paddle, we need to separate the two devices by about 2-1/2 inches. This distance gives the operator room to put his fingers between the LED and detector. (See Fig. 1B.) Care must be used when mounting the infrared devices, because at the 2-1/2-inch spacing, alignment becomes critical.

Daniel's Key is designed to serve as the paddle or keying device for an electronic keyer, but can also be used as a straight key by using one side of the circuit. The variations are almost unlimited! My hope is that the concept of using infrared devices will one day be used to help disabled persons communicate more effectively with the world. If this article has helped anyone, please write me. Your letter will be the only reward I desire from this project. **QST**

## A Poor Boy's Paddle

Two keys back-to-back make an inexpensive paddle for your keyer. It's great for a first paddle, a spare or to fill in for your regular paddle in a pinch!

By Howard Goldstein, \*WB2IWX

What looks like two straight keys tied together with the knobs removed? A Poor Boy's Paddle, that's what. After I finished building my Accu-Keyer,<sup>1</sup> the money that was left over wasn't enough to buy a paddle for the keyer! Since most magazine construction articles seemed too complicated, I decided to try building something that would be easy to do with a minimum of financial investment. Anyway, how can someone who can't send properly with a hand key build a paddle which requires hours of work and a lot of tools and skill to make? Thus we have the birth of the Poor Boy's Paddle.

If you want to duplicate my simple design, here are the necessities: two hand keys, preferably identical to each other, such as Radio Shack 20-1085; some strong cement that will hold the

\*5409 Ave. K, Brooklyn, NY 11234

<sup>1</sup> Garrett, "The WB4VVF Accu-Keyer," *QST*, August, 1973.

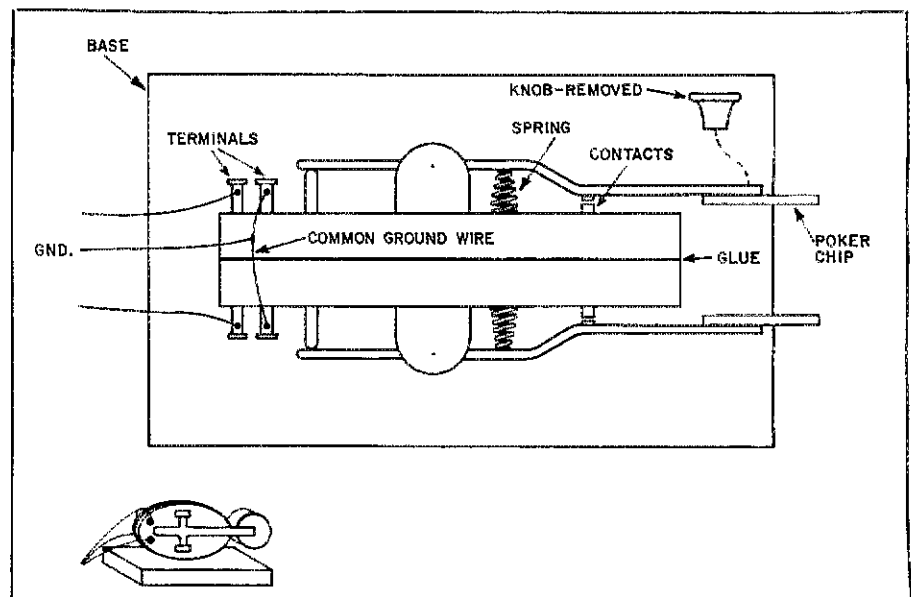


Fig. 1 — The Poor Boy's Paddle. Keys are glued back to back, and knobs are removed. Note the connections to the terminal posts.




keys together, Krazy Glue or an equivalent containing alpha cyanoacrylate; a base to mount the keys on (metal, wood, Plexiglas, Lucite or whatever) and a few minutes to assemble the darn thing!

First remove the plastic knobs from the keys. These can be discarded, or added to the junk box. If the bases of your hand keys are rough, sand them down lightly so that the glue will have more surface area to adhere to. Take a small amount of glue and spread it on the base of one of the keys. Then take the other key, and press the two bases of the keys together so that the levers

are both facing the same direction. After the glue has set, apply a small amount of glue to the material you are using for a base. (I used an old metal ashtray turned upside down.) Then press the keyer assembly to the base of the material and hold until the glue has set. See Fig. 1.

Now all you need is a common ground line. Attach a wire from a terminal on one key to a terminal on the other. The last step is attaching the paddle to the keyer. Just hook the ground wire from the keyer to the common wire that goes between the keys. Then attach the remaining wires

(one for each dot and dash contact) to the remaining terminals. The way in which these are connected will determine which side of the paddle will produce dots, and which dashes. If the bare paddles are too small for your fingers, glue two poker chips on the paddle tips.

The Poor Boy's Paddle cost me \$2 to make and about 10 minutes to complete. The keys each cost me a dollar, and the glue, ashtray and poker chips were just lying around the house. For Field Day? Great. Contests? Good luck. The paddle is almost infinitely adjustable for any hand. QLF? Nope. 

## Strays

### NEW OSCAR TEST FLIGHT DECEMBER 3

□ Amateur satellite enthusiasts will get a sneak preview of AMSAT-OSCAR D, the new satellite scheduled for launch in February, when a test flight of its new 146- to 435-MHz transponder takes place in California on December 3. The aircraft containing the transponder will leave Van Nuys Airport near Los Angeles, fly to San Diego, Santa Barbara, San Francisco, Stockton, Fresno, Bakersfield and back to Van Nuys.

This fourth flight test of an amateur satellite transponder is sponsored by several California clubs, including those of the Jet Propulsion Laboratory, Hughes, TRW and Project OSCAR. The test is designed to provide California amateurs the chance to learn the ropes of the new "Mode J" transponder that will fly aboard the new spacecraft, to be called OSCAR 8 after launch. Activity through the transponder (145.9- to 146-MHz uplink, 435.1- to 435.2-MHz downlink) is encouraged; a commemorative QSL will be sent to all amateurs who send in a report of stations worked or heard. The aircraft call in flight will be WA3NDS. Send reports to Skip Reymann, W6PAJ, P. O. Box 374, San Dimas, CA 91773.

### FT-221 MANUAL AVAILABLE

□ Yaesu Electronics Corporation has announced the availability of its new 140-page *Service and Maintenance Manual* for the FT-221 series of 2-meter transceivers. The amply illustrated manual is written in simple language and allows owners of these transceivers to troubleshoot and take all necessary volt-

age, resistance and current measurements.

To enable the owner to better understand his equipment, the function of each plug-in circuit board is explained, as is operation in all modes — cw, usb, lsb, a-m, fm, SSTV and RTTY. It may be purchased from any authorized Yaesu dealer or ordered direct from Yaesu Electronics Corporation, 15954 Downey Ave., Paramount, CA 90723. The cost is \$15, plus \$1.50 for first-class postage and handling. California customers add six-percent sales tax. Foreign customers should add postage for one-half kilogram weight; payment in U.S. dollars.

### QUEEN APPRECIATES THE THOUGHT

□ Her Majesty Queen Elizabeth II has expressed "warm thanks" for the Silver Jubilee greeting sent around the world via AMSAT-OSCAR 7 on June 7. In a letter to AMSAT/UK director Pat Gowen, G3IOR, a representative of Buckingham Palace said the Queen was "most interested to learn of different Jubilee greetings exchanged through the medium of your satellite."

### OPERATION SANTA CLAUS

□ If you know anyone who'd like to speak to St. Nick over the air, let him or her in on the Calgary Amateur Radio Association's Operation Santa Claus. From December 6 through 17, CARA will be operating on 3790 kHz between 0200 and 0300Z and on 3910 kHz between 0300 and 0400Z, plus or minus QRM. There will be two stations on

frequency waiting for anyone who wants to chew some rag with Santa — a net control station and a Santa Claus station. All calls from amateur stations with children will be accepted.

### QST Congratulates . . .

□ W. W. "Mac" McLeod, W4FKG, for developing Tel-PLUS (Telephone Pioneer Learning Utilization System), which allows aphasia patients to receive therapy from a pathologist over telephone lines. A former president of the Birmingham (AL) ARC, Mac and Tel-PLUS were featured in South Central's *Bell Notes*, enclosed with its customers' monthly bills.

□ Jerry Markle, W7KDQ, on promotion to national sales manager for Communications Power, Inc., of Mountain View, CA.

□ Russ Bernard, WB8YMB, on promotion to chairman of the Sociology and Anthropology Department at West Virginia University in Morgantown, WV.

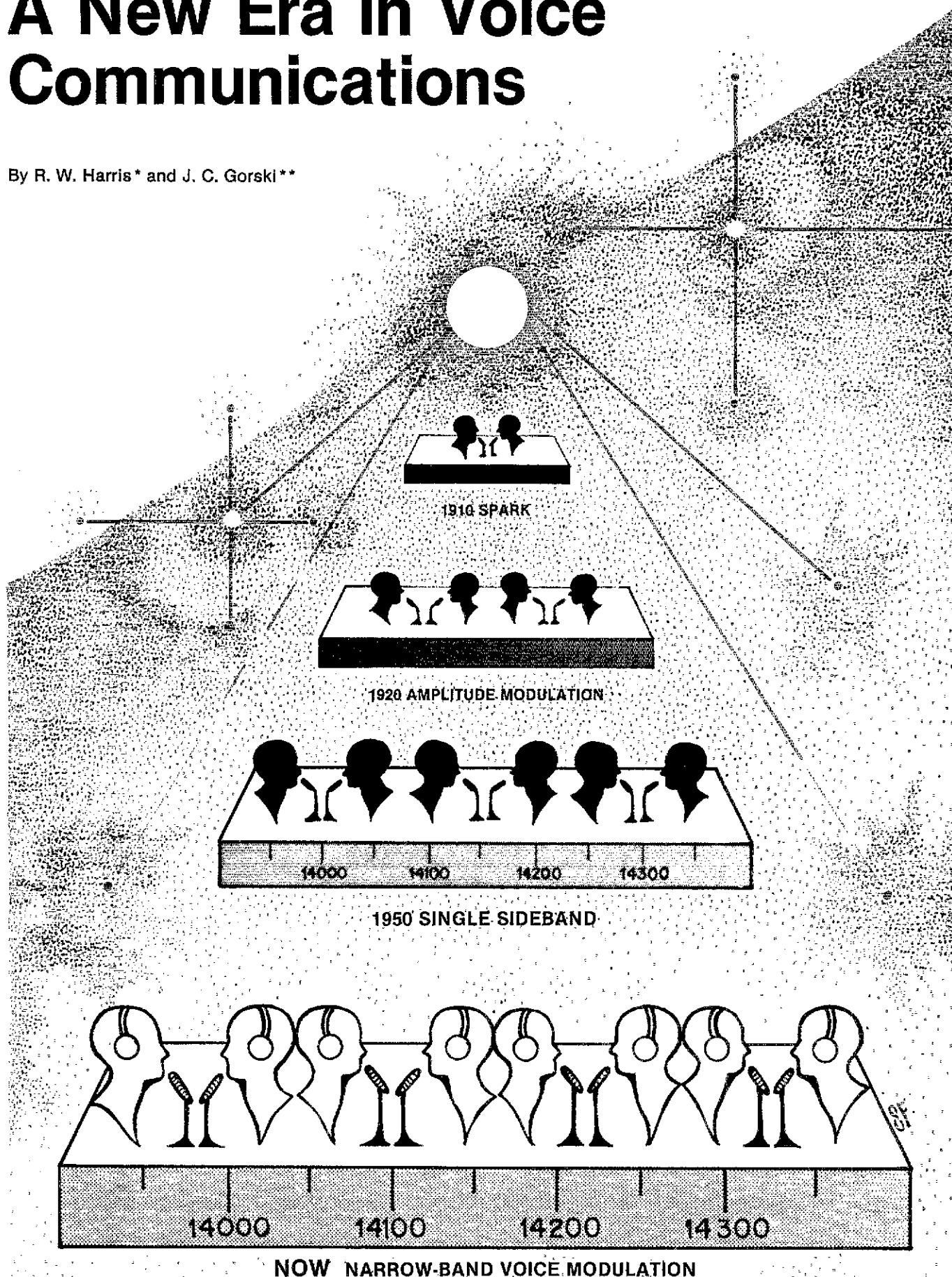
□ Harley Gabrielson, K6DS, who has been honored by the United Way volunteer bureau for his work with orthopedically handicapped children in an El Cajon, CA, school. Twice a week for four years, he has been teaching them how to wire printed circuits and has even inspired some to get Novice licenses.

### NET CORRECTION

□ The correct net manager for Alabama Emergency Net D (AEND) listed on page 4 of the 1977-78 *Net Directory* is WA4RND, 802 Nolan Blvd., N., Madison, AL 35758.

# A New Era in Voice Communications

By R. W. Harris\* and J. C. Gorski\*\*



*There have been some exciting technical breakthroughs in the history of amateur radio such as the "discovery" of hf propagation and the use of ssb telephony, which had lasting and salutary effects not only on amateur radio but all of telecommunications. We are now on the verge of another such development — that of an economical and practical system of narrow-band voice modulation which may more than double the number of available voice channels.*

**A**mateur radio is about to undergo a fundamental change.

After many months of investigation, three researchers have perfected a means of narrow-band voice transmission that promises to do for the Amateur Radio Service what single sideband did 30 years ago. With spectrum space at a premium for amateur radio and other services alike, investigators have long sought such a simple, economical means of compressing transmission bandwidth for voice communication.

Recently, Dr. R. W. Harris, ARRL member from the University of the Pacific in Stockton, CA, J. F. Cleveland, WB6CZX and T. Lott, VE2AGF/W6, have uncovered the key to this long-held goal — a practical means of reducing bandwidth by a factor of two for normal voice communications. Called narrow-band voice modulation (NBVM), it will radically alter radio and telephone communications the world over.

#### An Advantage at WARC

Coming on the threshold of the World Administrative Radio Conference (WARC), this technological advance promises more than a long-overdue solution to the problem of crowded radio bands. Its contribution to the Amateur Radio Service is doubly beneficial, for it gives a fresh boost toward a strong amateur position at WARC.

Significantly, amateur radio is at the forefront of this technological achievement, as NBVM was first tested on 14.225-MHz ssb. On a Thursday afternoon in early May of this year, Tom Lott, VE2AGF/W6, in San Mateo, CA, contacted Clarence (Smithy) Smith, KH6BFF, in Honolulu, HI, who reported clear communications in the first radio transmission of any type to use the system.

#### Amateurs to Participate in Experimentation

Since no FCC authorization is needed to take advantage of the break-

through, amateur radio operators will be first to extensively put into practice a very efficient, effective means of conserving spectrum space. For starters, the inventors are planning ways to make experimental hardware available that will allow amateurs to "add on" devices to their existing ham gear. Results will help determine the most practical lower bandwidth limit suitable to the large majority of radio service users.

Harris, Cleveland and Lott view this amateur participation as vital in showing how it may be used successfully in other telecommunication services. Furthermore, such amateur involvement will provide a powerful means of demonstrating that hams should retain their present frequency allocations and that other radio bands can be used more efficiently.

#### How It Works

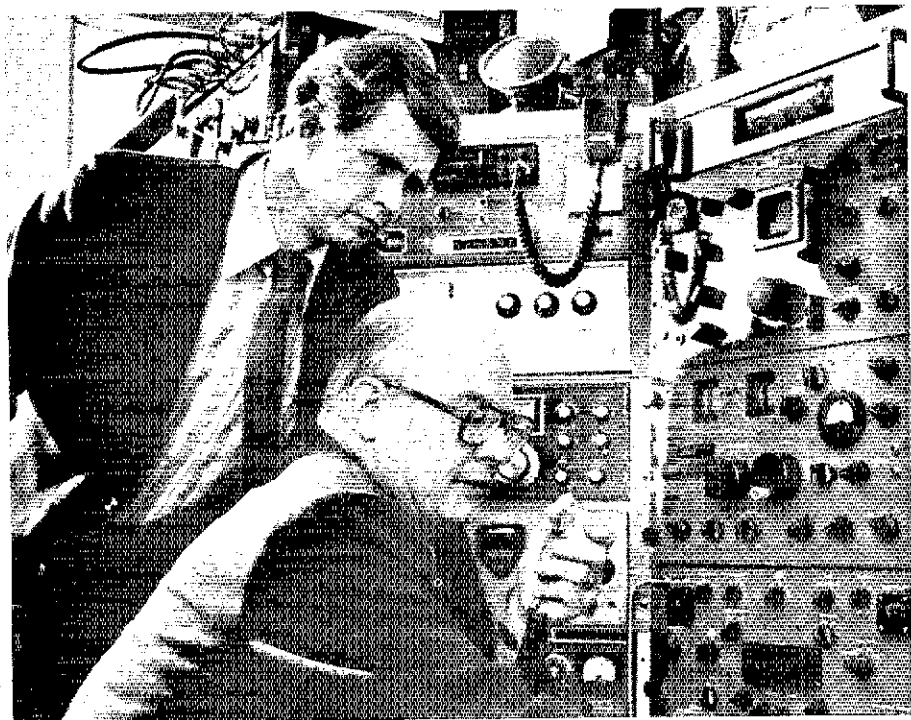
The reason NBVM is potentially very economical and also very powerful from a communications standpoint is that it emphasizes the most important information-bearing parts of speech but still retains its original timbre and identifiable characteristics.

Through research, the inventors have found that consonants carry the bulk of speech identity. Furthermore, vowels and consonants are produced one after another in time by all speakers. These facts can be readily seen by referring to a written text. For example, consider the sentence: "Each year, communications systems get more complex,

and the preparation needed to successfully use and design systems increases." If just the vowels are available, we would see "Ea ea ouiaio ye e oe oe, a e eaiao eee o ueu ue a ei ye ieaie," while if only the consonants are available we would see "ch yr cmmnctns sstms gt mr cmplx, nd th prprtn ndd t scssffly s nd dsgn sstms ncrss," which contains much more information. Significantly, NBVM emphasizes consonants in the transmission but it does provide vowel energy as well to allow a natural-sounding voice.

On transmission the consonants are emphasized and folded, electronically, into blank spaces not occupied by vowels as speech occurs. This folding action accomplishes the all-important spectrum savings by a factor of two. Significantly, vowels and consonants do not interfere on transmission because a vowel and consonant cannot occur at the same time. It is significant also that on transmission the consonants are increased in energy so that there is a relatively constant speech energy output, as opposed to the case in normal speech when the vowels dominate the consonants by 20 to 25 dB. On receiving the folded speech, the vowels and consonants are unfolded in a continuous manner and the vowels are amplified to restore the natural energy balance between vowels and consonants.

The result is a transmitted speech waveform that efficiently uses the transmitter energy available while providing a bandwidth savings of a factor of two.



A technological first: Inventor Richard Harris watches as Tom Lott, VE2AGF, uses narrow band voice modulation (see story) to make the first ham radio contact with Clarence (Smithy) K. Smith, KH6BFF

\*Assistant Professor, Electrical Engineering, University of Pacific, Stockton, CA  
\*\*Editorial Supervisor, QST

Preliminary experiments indicate that a rather high-quality speech signal can be achieved with a transmission bandwidth of 1500 Hz. If intelligibility only is desired, however, a transmission bandwidth of 1200 Hz or even 1000 Hz is possible. Further experiments are now being made in order to assess the practical lower limit.


#### Not Costly

The invention is rather simple in concept and does not appear to be costly when produced for a volume market. It is fortunate that amateurs who do not have the proper receiving

equipment to attain the full quality available can still receive and demodulate the transmitted signal. The signal can be received and decoded by placing the ssb receiver in the lower-sideband mode, tuning the receiver 3 kHz higher in frequency, and adjusting the BFO to give maximum intelligibility.

Because of its fundamental nature, NBVM can be used by virtually all types of analog modulation, some of which are amplitude modulation (a-m), double sideband (dsb), single sideband (ssb), vestigial sideband (vsb) and frequency modulation (fm). The researchers note that in fm use there are several tradeoffs

to consider, one of which is to fill up the available fm bandwidth by deviating the carrier further and thereby increase the received signal-to-noise ratio because of greater fm improvement. The greater carrier deviation is possible because the audio bandwidth at the fm input is only one half the normal audio bandwidth. Alternatively, one may consider the same carrier deviation as in current fm systems and realize a bandwidth savings.

During the next several months, as the system is made available for ham use, its inventors invite all amateur radio operators to participate to test thoroughly NBVM in actual use. 

## How They Did It

Amateur radio was involved in the discovery of NBVM from the beginning. Although skeptical at first that his idea could be made practical, Harris's doubts soon evaporated as his ham co-inventors helped make it work.

By Judith Gorski\*

**H**ave you ever watched a baby playing with his toes or a child poking his fingers into the underside of a truck to see what makes it go? Some individuals seem never to lose this natural curiosity to find out why things work as they do. Dr. Richard Harris is one of these people.

"I don't think I'll be satisfied until I really understand a lot of the natural processes," he commented in a recent interview with *QST*. In his latest work on reducing the transmission bandwidth for normal voice communications he has helped unravel a few more mysteries in his quest to understand his environment.

But not without problems. "It was quite a struggle and we were very discouraged at times. In fact, we worked about a month I guess and had investigated quite a number of these systems. We were almost ready to give up and do something else when we found a way to



get a fairly intelligible product. Once we got that breakthrough we just gradually improved it."

One of the driving impetuses for the 37-year-old researcher has been his humanitarian desire "to do some good for other people." Narrow-band voice

modulation is an innovation in communications technology that potentially will touch the lives of millions. "It gives me a good deal of satisfaction to think that perhaps I've used my background in some way to benefit others." In a *QST* interview, Harris explained some of the details behind the revolutionary invention.

*Were you skeptical at first that you could practically implement your idea?*

"Somewhat, although one of the basic ideas I had of folding the consonants into spaces between vowels sure seemed like a good idea to me. It seemed like it should work. I just didn't know how I could do it in a simple manner. I thought it could be done in a complex manner, but I was quite skeptical about how simply it could be done."

*What was the greatest difficulty you had to overcome in implementing the idea?*

"I think the greatest difficulty was really seeing how we could present a

\*Editorial Supervisor, *QST*

complete voice to the listener and still maintain a very narrow bandwidth. Complete voice means one that is natural, one that has both timbre, natural tone information, and has vowel and consonant energy. To start we could do consonant energy quite well but not any vowel energy, there wasn't any naturalness to the voice. But we were able to get the complete voice by boosting the bass."

*Did thinking about product cost limit your research or your design objective in any way?*

"Yes, very much. I've worked in industry on some very large, costly systems that will get very large bandwidth compression but very poor quality. And I was determined that there had to be a way to produce a fairly good quality speech signal cheaply that could be of wide and broad use to a large group of people. I went at it with 'what can you do for very little cost that would do someone some good.'"

*What influence did amateur radio have on this project?*

"A great degree of influence. Jim Maxwell, W6CUF, a good friend of mine, was always very excited about the possibility of developing a cheaper system. And then, Fred Cleveland, and Tom Lott, my co-inventors, are also hams and were very excited about it when I first talked with them about engaging in this research with me."

*By that time did you have the idea or just the desire?*

"I think I had some of the preliminary ideas, although certainly not the end. It took quite a while to evolve the



Dr. Harris along with WB6CZX and VE2AGF invented the first practical narrow-band voice modulation system.

solution. But I think I was very greatly influenced toward a cheap solution by the amateur radio people."

*What will the impact be on amateur radio? It should make more frequency space available.*

"It should. Also, it does have some application in not only a-m transmission types, but fm. I'm quite anxious to try it on fm transmission where it should allow a greater signal-to-noise ratio at the receiver. In analyzing the bandwidth that is available in amateur radio now in the fm transmission, the deviation is very small. If we cut the bandwidth by a factor of two going into the fm modulator, then we can deviate the carrier much farther and thereby get back an fm improvement."

*Did your research on this project require special test equipment or was the equipment you used something that any radio amateur might have?*

"I think a lot of radio amateurs would have equipment we have. We have a good 'scope, a few power supplies and good signal generators. We used off-the-shelf parts. The one thing I like about working on speech is that it can all be done with low frequencies with off-the-shelf parts and there's no real exotic equipment, no real special layout problems (especially if you work at base band), so I would think that amateurs could really work a lot more in this area. I'm sure they are very much now, but I think they could even do more."

*In your university research you worked on speech processing for blind and stroke victims. Was this related to the project in any way?*

"Not directly, although some of the ideas we were working with such as speeded speech, applied. You've heard of speed reading? Well, we were investigating the use of speeded speech or speed hearing for the blind. It turns out that some of those techniques in which you use speeded speech are technically usable for speech bandwidth compression. So I would say as a background yes, but not directly.

*Do you have any other big ideas in the hopper?*

"There are some ideas I've been talking with one or two other colleagues about — applying the basic technique that we have in voice to the reduction of television bandwidth transmission. In television, for example, there are sharp contrasts, it's either black or white and it takes very little bandwidth to transmit just a black signal or just a white signal. But the only thing you need bandwidths for is the transitions between black and white. This idea I've been discussing with a colleague on the East Coast and it's pretty interesting."

## Strays

### AMATEURS HELP CONTAIN FIRES

□ Its members didn't know it, but as the recently formed Santa Barbara Council of Affiliated Volunteer Emergency Teams (AVERT) began its evening meeting July 26, fire had broken out nearby. A kite had brought together two sparking electrical lines, igniting dry brush. Forty-five mile-per-hour Santana winds quickly forced the flames down a canyon, engulfing the Eucalyptus Hill and Riviera foothills. Before it could be brought under control by 2000 fire fighters, the fire destroyed more than 200 homes.

Amateur radio and CB teams worked throughout that night and the following day to supply local, regional and long-haul service. Health-and-welfare inquiries were handled by the AVERT Council, which brought together ARES, the Santa Barbara ARC and REACT units. It was not uncommon to find amateur transceivers, CB radios and scanners being used side-by-side throughout the emergency.

Approximately 40 mobile and fixed-station operators participated in and around Santa Barbara. Emergency Coordinator WA6TUO credits numerous distant stations with significant assists in acting as relay stations and clearing 14,300, 7235 and 3935 kHz of interference during the emergency.

After the fire was brought under control, whole roads of stark fireplaces surrounded by charred, smoldering ruins were all that remained of more than \$30 million worth of residential real estate. There's no doubt that it would have been much worse if it hadn't been for the amateur and CB volunteers who provided assistance. — W6POU

□ About 45 amateurs helped maintain direct communications between fire fighters battling last summer's Carr Fire and their base camps and fire bosses. Whether mobile at the fire camps, patrolling the canyons of rural Arizona with Forestry Service personnel or manning base stations at various locations, the volunteer amateurs participated actively.

The five-day fire caused \$1.5 million damage, burning 9000 acres. The Cochise Amateur Radio FM Association repeater, WR7ACK, was closed to all but emergency traffic for four days, from June 19 to June 22. In addition, the Arizona Cactus Net and a second area repeater, WR7ABR, also maintained around-the-clock liaison with the fire area for the duration of the emergency. — K7RDG and W7HER

# The Data Set 101A — A New Solution to an Old Problem

Getting into RTTY? Then you'll minimize difficulties with this narrow-range afsk terminal unit. It is versatile and has solid-state construction. Whether you're an old-timer or a beginner, you'll like this device designed by Bell Laboratories.

By John L. Ohm, Jr.,\* W8IS

Check through issues of *QST* for the last several years. You will notice a number of interesting and informative articles concerning radioteletype. Additional information may be found in two other ARRL publications, *The Radio Amateur's Handbook* and *Specialized Communications Techniques*. The systems described have been enthusiastically used by many amateurs. However, not much has been said about the Bell System Data Set, model 101A. For narrow-shift RTTY, so extensively used today, the Data Set is a natural. Furthermore, it's 100-percent solid state!

When Bell Laboratories designed the model 101A in 1960, it was indeed ahead of the times. This communication device, one of a set of TTY demodulators, was used in conjunction with the TWX system. A noteworthy feature is the capability of the set to receive narrow-shift (200-Hz) teleprinter signals. The Data Set is also designed to receive either of two pairs of audio frequencies. These pairs of frequencies are

F1 (mark) = 1270 Hz  
F1 (space) = 1070 Hz  
F2 (mark) = 2225 Hz  
F2 (space) = 2025 Hz

As may be observed, the F2 frequencies differ but slightly from those currently in amateur use, namely 2295 Hz (mark) and 2125 Hz (space).<sup>1</sup> The amount of frequency shift is the important factor at this point of the dis-

<sup>1</sup> Editor's Note: The mark and space frequencies referenced here are reversed from the usual amateur standard (2125 Hz for mark and 2295 Hz for space). However, compatibility with the Data Set may be obtained if the radio-frequency signals are treated as though they were on upper sideband. See later text.]

\*11373 Appleton, Redford, MI 48239



The Data Set is a good tool for RTTY beginners and old-timers alike. Jeanette Ohm, four-year-old daughter of the author, grins as she tries the keyboard of the teleprinter at W8IS, her father's station. Can anyone "resist" a picture like this!

cussion. The actual frequency is not of immediate concern.

The Data Set 101A consists of a modulator and a demodulator. Operation of the instrument is such that when signals are being received on one pair of frequencies, the modulator will be transmitting on the other. Thus, if the set is demodulating on F2, transmission occurs on F1 and vice versa. This split frequency design was arranged to enable

terminal units on the Bell System TWX line to transmit and receive simultaneously.

The demodulator consists of five basic sections. To isolate the Data Set from other equipment, the first section incorporates a hybrid coil. The second section contains a limiter. A discriminator is found in the third section, while there is a dc amplifier in the fourth. In the fifth section a keyer provides the



drive for the selector magnet on the teletypewriter.

Among the other characteristics of the model 101A is a local-copy circuit that allows testing of the unit. Provision is also made for space-hold and auto-start. A power supply is built in the Data Set.

The desk telephone which appears in the photograph is an integral part of the model 101A. The primary purpose of the set is to control the functions within the Data Set and for listening to the audio signals. It is not for normal voice communication.

In a normal telephone installation the buttons on the desk set select one of several telephone lines. For the Data Set, however, these buttons serve to determine the mode of operation. Selection of the mode also establishes the frequency of operation. Of the six buttons, only five are used. These are labeled ANS, CLEAR, ORIG, TEST and LOCAL. The ANS (answer) button selects the F1 frequency for reception and demodulation. The CLEAR button disables the entire unit including shut-down of the teletypewriter motor. The ORIG (originate) button selects the higher F2 frequency for demodulation. The TEST button permits the retransmission of an incoming signal to the originating station for the purpose of checking receiving circuits. The LOCAL button provides a local-loop operation which the operator may use for practice with the teletypewriter.

#### A 600-Ohm Source

A basic requirement for receiving audio teleprinter signals through the Data Set is a signal source with a 600-ohm output. Typical sources might be a phone patch or a receiver with 600-ohm output capability. A transformer such as the Stancor A-3880-15W may be used for matching purposes.

Prospective buyers of a Data Set are strongly urged to obtain the manual for this device at the time of purchase. Its information, understandably, is valuable for installation, operation and maintenance. From the maze of wiring beneath the teletypewriter, one must locate the cable connections normally used to interface the Data Set with the telephone line. The cable to be located is one that is typical of a telephone hookup line.

#### Back to the Drawing Board

When the writer made initial attempts to activate the Data Set by a signal fed from a Heath HW-101 into the 600-ohm line input of the model 101A, the transceiver gain had to be set for maximum level. Although the Data Set began to function, the noise level was deafening! A VTVM measurement of the transceiver output indicated

about 100 volts at the activation level. Although impedance matching had been accommodated, clearly there was a problem of providing sufficient signal voltage to the Data Set.

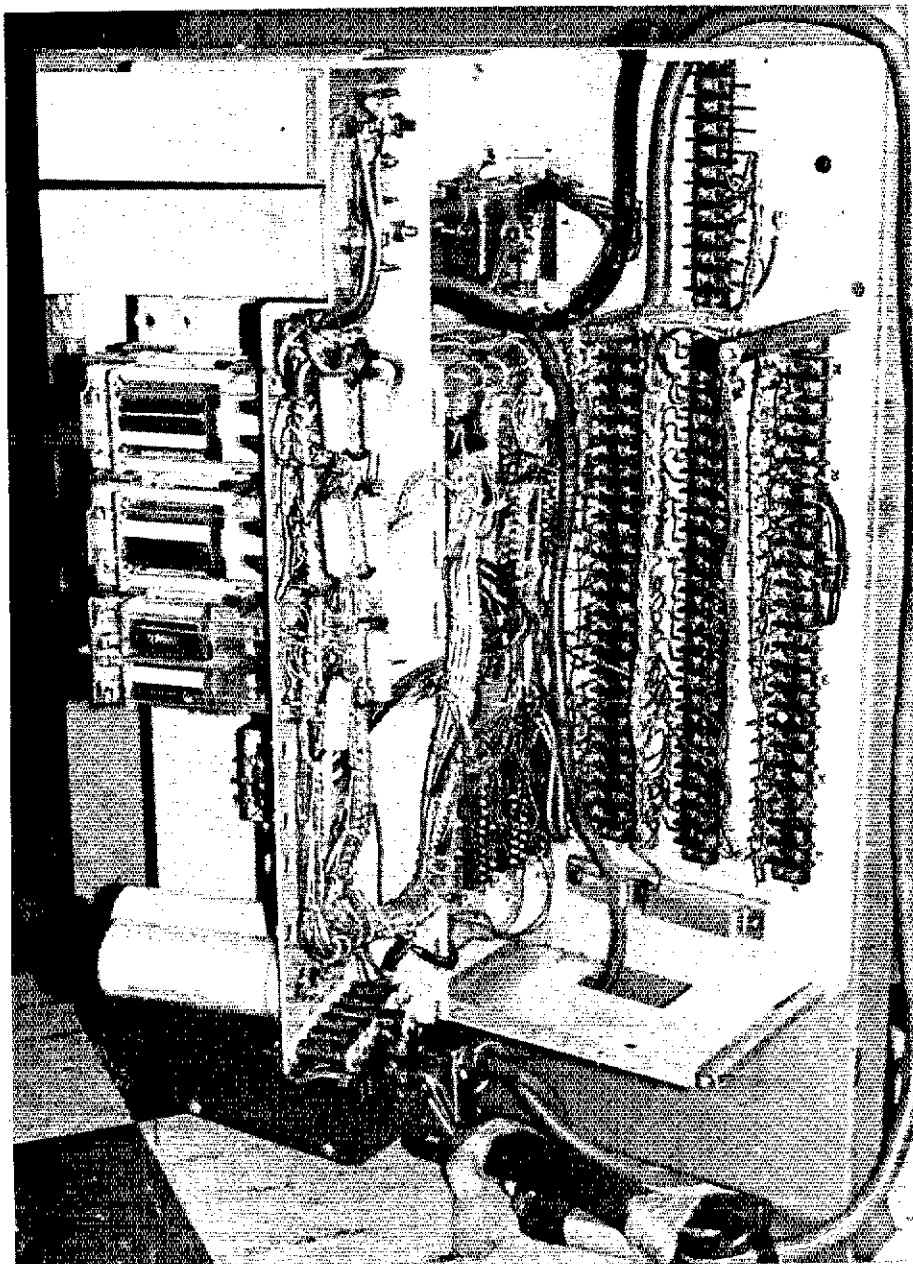
The basic problem was a loss in the telephone itself. Could the phone set be bypassed? Happily, back at the drawing board, a way was found to inject the signal directly into the hybrid coil, which isolates the telephone from the main circuits of the Data Set.

There are six plug-in circuit boards in the Data Set. One of these, labeled HYBRID, contains the hybrid coil. On the face of this particular board are

three test points, respectively labeled TP1, TP2 and TP3. TP1 and TP2 are connected directly to the input of the hybrid coil. By connecting the 600-ohm signal source to these two terminals, the signal loss incurred by the telephone desk set is avoided.

#### Preparing for RTTY Reception

Prior to tuning in the first station for RTTY signals there are a few checks to be made. For monitoring the signals, the loudspeaker must be connected to the receiver. The two-position MAN-DIAL switch is to be placed in the DIAL position. This switch is located in a rather



Close-up of the side of the Data Set. The vertical hinge at the center permits the rear section to be opened for servicing. At the upper left are low-pass filters for F1 and F2 frequencies. Function-control relays are at the left center. Terminal strips for interconnection of various sections are at the right of the hinge. At the bottom center is the rear of the MAN-DIAL switchbox and cable.



inconspicuous little black box under the Data Set.

Pressing the LOCAL button on the telephone set activates the teletypewriter motor, indexing the carriage to the left margin. The SEND-REC-BREAK switch on the face of the teletypewriter is set in the SEND position. If the motor has started properly, one may then type out a few "QUICK BROWN FOXES" to test the operation. A push on the CLEAR button should bring all functions to a halt.

Let's presume now that the Data Set has performed correctly up to this point. The next procedure is to tune the receiver to the signal from the VFO on crystal calibrator. This is followed by adjusting the receiver for a tone of approximately 1000 Hz and pressing the ANS button on the telephone. A relay then closes followed by another relay a second later, producing a tone through the loudspeaker. This tone is generated through the modulator in the Data Set. There is no interference with reception. The operator should not forget that the transmit and receive frequencies are different, a Data Set characteristic that permits duplex operation on the TWX system.

To observe whether or not the teletypewriter motor can be activated, the receiver is next adjusted to produce a tone of approximately 1270 Hz. If the motor does start when this frequency is reached, the receiver can be considered as functioning properly.

The bandwidth of the discriminator coil can be roughly defined by tuning the receiver around the VFO or crystal-calibrator frequency. As the receiver tuning becomes too high or too low in frequency, the printer will run open, causing the ribbon mechanism to jump rapidly. As the receiver is adjusted to the midrange between these two extremes, the machine runs silently, waiting for an RTTY character. The RTTY audio signal level is kept low

when fed directly to the hybrid coil. As little as -20 dBm will operate the auto-start function.

### The Disabling Circuit

At this stage of preparations, the new owner of a Data Set should become familiar with the disabling system. If the audio level is low enough, the teleprinter will run open for a period of about one second. Then two conditions arise. The motor shuts off and the machine becomes completely disabled. In addition, the ANS button on the telephone pops out and the CLEAR button will glow for one second. With the Data Set made inactive, signals cannot be received until the ANS button is pressed to ready the auto-start function.

The two conditions that will disable the unit are the lack of a mark tone for a period of one second and the receiving of a space tone of more than 800 milliseconds duration. To repeat the entire process, the ORIG button must be pressed after tuning in an audio tone of approximately 2225 Hz. After resetting the 101A, the Data Set is prepared to handle radioteletype. The receiver should be in the usb or cw mode.

### Find a Strong Signal

For the initial RTTY test the operator should locate a fairly strong signal with the receiver. Select either the ANS or ORIG key on the telephone unit. With the mark frequency being the higher of two tones, tuning must be done for a 170-Hz shift while working with a 200-Hz discriminator. A useful guide while adjusting for this tone is to tune to a point just above the frequency that causes the teletype machine to run open. By so doing, the 170-Hz lower space signal is placed within the passband of the other discriminator coil. As soon as the machine is activated, printing should begin.

If garbled copy is produced, the receiver may not have been placed in the usb mode. After being set for usb, the receiver is then tuned around the RTTY signal. Near the lowest usable frequency for the mark filter, the Data Set should turn out good copy. That's all there is to it!

### Concluding Comments

The Data Set 101A was designed for use with telephone circuits, and not for crowded, noisy amateur radio frequencies. Nor was this device prepared to cope with selective or general fading, commonly experienced by radio amateurs. Under these troublesome conditions a loss of one of the tones will result in garbled copy on the printer. On the other hand, where there is negligible noise level, an S3 signal is capable of causing the machine to print good copy. This fact has been established at the writer's station.

Among the modifications that might be considered for the Data Set are the installation of one of the many good fsk or afsk circuits described in *QST* and other publications. The station owner who is proficient in solid-state technology may wish to construct and install a decision threshold computer (DTC) to compensate for selective-fading conditions. Such a project should embody good design techniques. The modulator card, incidentally, can be removed from the Data Set without affecting receiving performance.

Regardless of the limitations mentioned, the Data Set 101A has the makings of a very versatile terminal unit. Components are easily accessible. Solid-state construction makes circuit modification relatively easy, if desired. Although the 101A is not intended for use in radio installations with inherent reception problems, the Data Set is a good tool for RTTY beginners and old-timers alike.

**QST**

## Strays



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wrap securely. Address to ARRL Membership Overseas QSL Service, 225 Main Street, Newington, CT 06111.

### QST Congratulates . . .

□ Dr. Ernest Bechtol, W4HBZ, on his installation as president of the Clinton, TN, Lions Club.

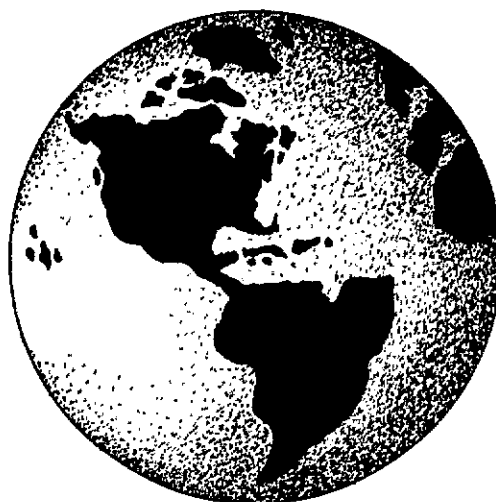
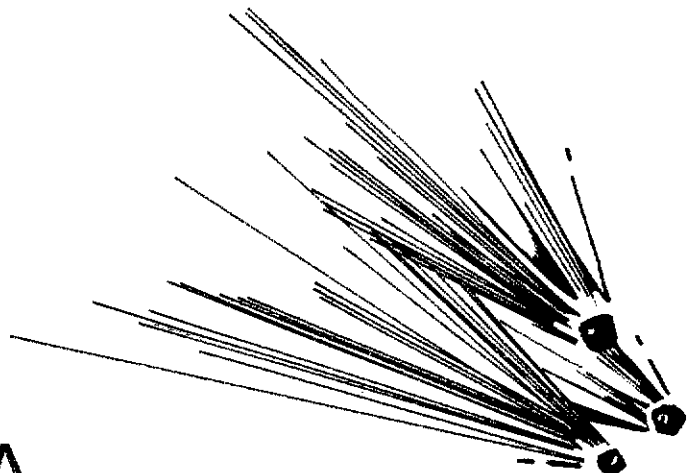
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# VHF DX via Meteor Scatter

Meteor-scatter propagation offers a challenge for the experimenter and an opportunity for amateurs to contribute to the advancement of vhf communications.

By Jim Stewart,\* WA4MVI



**A**mateur radio is rapidly changing. Space-age ideas and techniques are finding their way into our hobby as OSCAR satellite QSOs become almost routine to thousands of us around the globe. Moonbounce enthusiasts are constantly advancing the state of the art. And yet another form of space communication and a very interesting form of vhf DX may already be within the capabilities of many amateurs. This mode of DX is known as meteor scatter.

A meteor is some object, usually either metal or stone, which enters the earth's atmosphere from space and then vaporizes due to its velocity and air friction. Meteors appear in all sizes,

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As a meteor falls across the sky, it leaves a trail of ionized gases . . . which provides a propagation medium for a short time.

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from large boulders to dust particles. As a meteor enters the atmosphere, its energy is released in proportion to its size and velocity in the form of heat, light and ionization. Ionization (no matter what the source) is what interests the vhf experimenter most. The high-frequency operator is usually blessed with it, depending more or less on the sunspot cycle. Ionization of the upper atmosphere results in DX or skip, by reflecting radio signals from distant stations back to earth.

As a meteor falls across the sky, it leaves a trail of ionized gases which quickly dissipates, but which provides a propagation medium for a short time. This time decreases with increasing frequency. A burst of higher signal level can be heard on the hf bands when listening to a distant signal. The upper limit of signal usage appears to be around 432 MHz. Six and 2 meters are the most popular bands for meteor-scatter work.

Six-meter operators will possibly notice a burst of signal resulting from meteor ionization lasting perhaps a half-minute while the 2-meter burst would be only a few seconds. On 432, the signal, if heard, would be only a "ping." A ping is generally too short to convey any intelligence, while a "burst" may last long enough to receive several minutes of signal.

## The Communications Mode

It becomes readily apparent that very high-speed cw or ssb is almost a necessity. The most information per unit of time that can be achieved and

copied by the other station is preferred. A quiet frequency on a less popular band segment is necessary if contact is by schedule. One may want to listen for bursts on some of the more popular active frequencies such as 50.110, 144.110, 145.010, 145.025, 145.100 MHz, etc.

The antenna need not be exotic and high power is not required. Meteor DXing can be accomplished by a station running perhaps a hundred watts and a single Yagi or collinear array. Horizontal antenna polarization is standard among most vhf DX operators although its effect is not definitely known on meteor reflection. The antenna should be pointed about the same direction as would be used for a direct contact, even though the area from which the signals originate is well outside normal range. Antenna direction for a schedule should be carefully calibrated and determined within five or 10 degrees.

Contacts via meteor scatter are possible from 400 to 600 miles out to about 1400 miles. The ability to elevate the antenna 10 to 20 degrees above the

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horizon sometimes enhances signals from the closer ranges.

Some meteors enter the atmosphere almost every hour. These random particles can support a QSO if both operators schedule long and often enough. The preferred times for operation are during a major meteor shower, when many fall each hour. Different showers exhibit different characteristics. The preferred showers are the Perseids in August, the Leonids in November, and the Geminids in December. During mid-December the rate often reaches 60 per hour on a good year and "ping jockeys" are usually up through the night.

A schedule is perhaps the best way to begin, preferably with a station operator who is accomplished and experienced in the technique. The list of stations appearing in the "Two-Meter Standing" box of *QST's* vhf column is a fine place to shop for a candidate. Most of these operators have moved up in the standings using this technique. Before contacting one, however, it is suggested that you first acquire skill in weak-signal work on either 6 or 2 cw or ssb and thoroughly check out your station.

A frequency must be agreed on for the schedule and both stations must be able to determine frequency within about one kHz if bursts are to be heard. Time must also be accurately known and should be checked with WWV or CHU just prior to the schedule. A clock with a large sweep-second hand is helpful.

The usual procedure is for each station to transmit for 15 seconds, then listen for 15 seconds throughout the sked. The sequence is agreed on in advance, as are the starting and ending times. For example, K5XXX transmits beginning on the minute and continues until 15 seconds after. Then W4ZZZ transmits from 15 seconds until 30 seconds, while K5XXX listens. This procedure continues throughout the schedule unless a long burst is heard, at which time an attempt is made to rapidly complete the QSO. Bursts as long as several minutes are sometimes

heard, probably the result of several large meteors falling together.

### The Information Exchange

The information that must be exchanged for a valid contact is generally well established. Both stations must receive their call as well as the station calling, a signal report and a "roger" or "R," indicating that the signal report was received. A "73" is usually sent to signify that the "R" was received, with perhaps "SK." When all is received, a QSO has been completed. Most operators agree that this must all take place in one period of operation, such as an hour or two. Information received today must be disregarded when a schedule is resumed tomorrow.

### Meteor DXing can be accomplished by a station running perhaps 100 watts and a single Yagi or col-linear array.

Signal reports usually consist of a length-of-burst report as follows: S1 - short burst or ping . . . no calls or information received; S2 - portion of calls or information received; S3 - five to 15 seconds of transmission received; S4 - 15 seconds to two minutes of transmission received; and S5 - "rag-chew" quality; normal RST sent if desired.

Actual signal strength is of little importance. A so-called "blue whizzer," a large meteor yielding a long strong burst, may produce a 40-dB-over-S9 signal strength for several seconds. A typical exchange between two stations might go something like this:

"W4ZZZ W4ZZZ de W5XXX W5XXX K"

"W5XXX W5XXX de W4ZZZ W4ZZZ K"

This is repeated until one station hears enough to begin sending a report.

"W4ZZZ W4ZZZ de W5XXX S2 S2 S2 K"

W5XXX would continue, fitting his message into his 15-second interval, until he received an "R."

"W5XXX de W4ZZZ R R R S2 S2 S2 K" and so on.

The "R" would continue to be sent until a "73" was received.

"W5XXX de W4ZZZ 73 73 73 SK SK"

"W4ZZZ de W5XXX 73 73 73 SK SK"

This might appear to be complicated but if the procedure is followed, it is easy to interpret what you hear and then respond. Quite often a telephone call or contact on hf ends the QSO by the caller saying, "Congratulations, I have your 73. SK." Sometimes a QSO takes days of schedules or hours but occasionally only a few minutes. Now is a good time to comment that sometimes one tends to be overzealous and to overcoordinate. It is best not to discuss what you have heard until later, not while the QSO is in progress. Nothing is more satisfying than a *valid* QSO.

A more technical discussion of the physics involved and details of showers for meteor scatter are contained in a very fine article by Walter F. Bain, W4LTU, "VHF Propagation by Meteor-Trail Ionization," May, 1974, *QST*. This work has almost become a standard for the serious-minded operator who desires more detail.

This fascinating experimental technique is excellent training for EME operation and is highly recommended for the amateur who may later want to attempt a more demanding and expensive moonbounce project. It offers an experiment for those times when there are no sunspots, OSCARs are out of range, sporadic E has faded and the local fm repeater is covered up.

So, when you're tuning across the band with that new super-duper, all-mode, all-channel vhf rig hot off the shelf, and think that you probably just imagined that rare DX call sign, you might have actually heard some patient lucky operator complete a rare one, perhaps state number 50 on 'TWO!

## Strays



I would like to get in touch with . . .

□ hams who have improved the sensitivity of the HW-7 receiver section. Jim Rekus, WD0BVF, RR 1, Box 62NN, Columbus, NE 68601.

□ As this winter sets in, the old-timers in North Dakota talk about going out for a cold 807 when they take a beverage break. Others, preferring dif-

ferent thirst quenchers, might QRX in some of these ways: 6V6 = soft drink, CK722 = Pepsi Generation, 1625 = MARS operator, 304tl = after the last Field Day QSO, 5894 = fmer, 3A4 = QRP operator. - WB0NST

### QST Congratulates . . .

□ Allie C. Peed, Jr., K2DHz, recently elected president of the Society of

Photographic Scientists and Engineers. He joined the Eastman Kodak Co. in 1953 as a technical editor, and is now manager of advertising promotion and publications.

□ Joe Demer, WA7NAG, who has been awarded a six-year scholarship in the bio-engineering program at Johns Hopkins University. A Novice at 13, he upgraded to Extra in just two years.

# Predicting the Coverage of a Repeater

Here's a method for designing a repeater installation to provide a desired coverage — a big improvement over having to modify a repeater after it has been installed!

By Louis L. Taylor,\* W5MKG

A brief glance at the *ARRL Repeater Directory* will show the extent to which repeater activity has proliferated. In some areas, numerous repeaters in close geographical proximity to each other operate on nearly adjacent channels, and the possibility exists for a mobile station to key up two repeaters simultaneously. The need for planning and coordination is obvious and has been stressed many times. This article is concerned with some of the technical aspects of repeater siting for proper coverage.

Predicting the range which can be worked through a repeater would not be difficult if the earth were a smooth globe with no hills, trees or other perturbations. Unfortunately, this is not the case, and repeater-range prediction is usually performed by guess and hope, with little knowledge of the effects of antenna height or configuration, or power output. Here's a way to use your pocket calculator to predict range and the effects of changes in effective radiated power (erp) and antenna height. Also, a few field tests using some one else's repeater are described to increase the accuracy of your prediction.

A wealth of theoretical and empirical information exists on the subject of propagation in the 144- to 450-MHz region of the spectrum. The most notable examples are based on the work of Bullington<sup>1</sup> and are summarized in

the text by Jakes.<sup>2</sup> However, if one desires to determine the tower height, antenna gain, receiver sensitivity and transmitter power output necessary to obtain a particular mobile talk-out or talk-back range with a high degree of accuracy, this material can become confusing. Furthermore, it does not provide a clear-cut method to incorporate the effects of foliage and terrain in a range prediction. The techniques and calculations described below enable one to predict the propagation absorption of trees and terrain and the range that can be obtained with a particular repeater configuration.\*

## Technique

Temporarily install a test transmitter in a position similar to the intended repeater site, or select an existing repeater or transmitter that is situated similarly to the intended repeater. The only restrictions are (1) the test rig must be in the same band as the intended repeater, (2) the propagation paths along which range is to be determined must be similar in foliage and topography for the test transmitter and intended repeater, and (3) the erp of the test transmitter must be known in the direction of the test measurements.

The mobile setup should include a receiver calibrated to enable converting

\*[Editor's Note: In amateur literature, *The Radio Amateur's VHF Manual*<sup>3</sup> has a section entitled "Reliable VHF Coverage" based on the work of Bray,<sup>4</sup> in which path loss and station gain are conveniently nomographed for accurate determination of communications range.]



Fig. 1 — A 5/8-wavelength whip mounted in the center of the roof of a sedan minimizes the directional effects of vehicle orientation.

S-meter readings to microvolts of input and an antenna of known gain (the author prefers a 5/8-wavelength antenna installed in the center of the roof of a sedan — see Fig. 1). Measure the signal strength at a distance from the test transmitter that is equal to the maximum range desired from the repeater. A strip-chart recorder connected to your receiver will simplify the job of data collection. Fig. 2 shows a test installation on the front seat of a sedan. Whether you employ a strip-chart recorder or an assistant with pad and pencil to record data, the measurements should be made with the vehicle moving slowly enough to record the standing-wave pattern from the test transmitter.

The locations where measurements are made must be typical of locations where mobile radio operation is anticipated. Anomalies caused by large metal objects such as water towers or

\*P. O. Box 446, Magnolia, TX 77355

<sup>1</sup>Footnotes appear on page 35.

passing trucks should be marked on the recording.

### Calculations

After a good collection of data points representative of the location selected for the repeater has been obtained, the computations can be started. The work can be done with pencil and paper, but a programmable calculator will make the job easier.

The data reduction should be accomplished as soon as possible after the measurements are taken. Not all factors influencing the measurements will be annotated on the data, and memory may be needed a times to assist in evaluating the test results.

It is important to realize that unless the test transmitter and antenna are at the exact site of the intended repeater, the data is a surrogate model. The average signal level and variations in signal level are indicative of the intended repeater only to the extent that the propagation path from the test transmitter to the measurement site is representative of the propagation path being simulated. The person making the measurements, if observant of foliage and terrain along the propagation path,

will soon realize which features make large differences in received signal strength and which features have little effect.

Mark the areas on the recording that are good samples of the propagation-path data desired. Ignoring sharp spikes and sudden deep nulls, take the mean recorded level at the selected locations. Next, convert the recorded level to dB referenced to one microvolt and plot the signal strength on semi-log paper as illustrated by the asterisks in Fig. 4. Make a separate plot for each radial from the test transmitter that is being investigated. To convert from microvolts to dB, remember that  $\text{dB} = 20 \log_{10} (E_1/E_2)$ , or referenced to one microvolt,  $\text{dB} = 20 \log_{10} E_2$ .

The data plotted in Fig. 4 was taken using WR5AFK while traveling along routes 149 and 1774 northwest from Houston, TX. The periodic fluctuations for the first 10 miles of range are due mainly to alternating phase additions and cancellations of the signal from the antenna and the signal reflected from the surface of the earth (image signal). The data points plotted at 15-, 20- and 28-mile ranges are averages of over 100 measurements at each range.

The next step is to superimpose the calculated signal strength for the test transmitter without regard to tree and terrain absorption upon the plots of the measured signal strength. This entails converting the test-transmitter power output to erp, then subtracting the smooth spherical-earth propagation loss, adding receiver gain and converting to receiver input voltage level.

To convert power differences to dB, remember  $\text{dB} = 10 \log_{10} (P_1/P_2)$ , or referenced to one watt,  $\text{dB} = 10 \log_{10} P_2$ . Now subtract line losses and add the gain of the test antenna *in the direction that the measurements are being considered*. The result is erp in the direction of interest.

### Propagation Losses

Reference 1 contains a nomograph which may be used to calculate the smooth spherical earth propagation loss from a radiator. The process entails determining free-space loss, then adding the loss from the horizon to the mobile unit ( $L_1$ ), the loss from the test transmitter to the horizon ( $L_2$ ) and the loss over the segment of the earth between these horizon points ( $L_3$ ), which may be positive or negative. For those not having the referenced work, empirical formulas are provided in Table I. The theoretical propagation loss is the algebraic sum of  $L_1$ ,  $L_2$ ,  $L_3$  and the free-space loss.

The level of the received power is obtained by subtracting the total propagation loss from the erp, then adding the receiver antenna gain over a 1/4-wavelength whip. A 5/8-wavelength antenna on the sedan roof has 3-dB gain. The resultant value will be in dBw. To convert to dB relative to one microvolt use the relationship  $P = E^2/R$ , and  $E = \sqrt{PR}$ . To convert the power from dB to watts for use in the above formulas, use the relationship  $P = 10^{\text{dB}/10}$ . To get volts, multiply by 50 (input impedance of the receiver) and take the square root. To get microvolts, multiply this result by  $10^6$ . Now to go back to dB relative to one microvolt remember the first calculation,  $\text{dB} = 20 \log_{10} E$ .

Calculate sufficient points to draw the "Bullington smooth earth" curve, as shown in Fig. 4, over the distances for which the measured data were plotted. If the measured data and the calculated curve do not plot as similar curves from eight or nine miles out, you may be plagued with unusual propagation conditions created by atmospheric anomalies. The test data must be taken on days with no temperature inversions to ensure that the propagation is typical of normal or average conditions.

### Analysis

The difference in dB between the

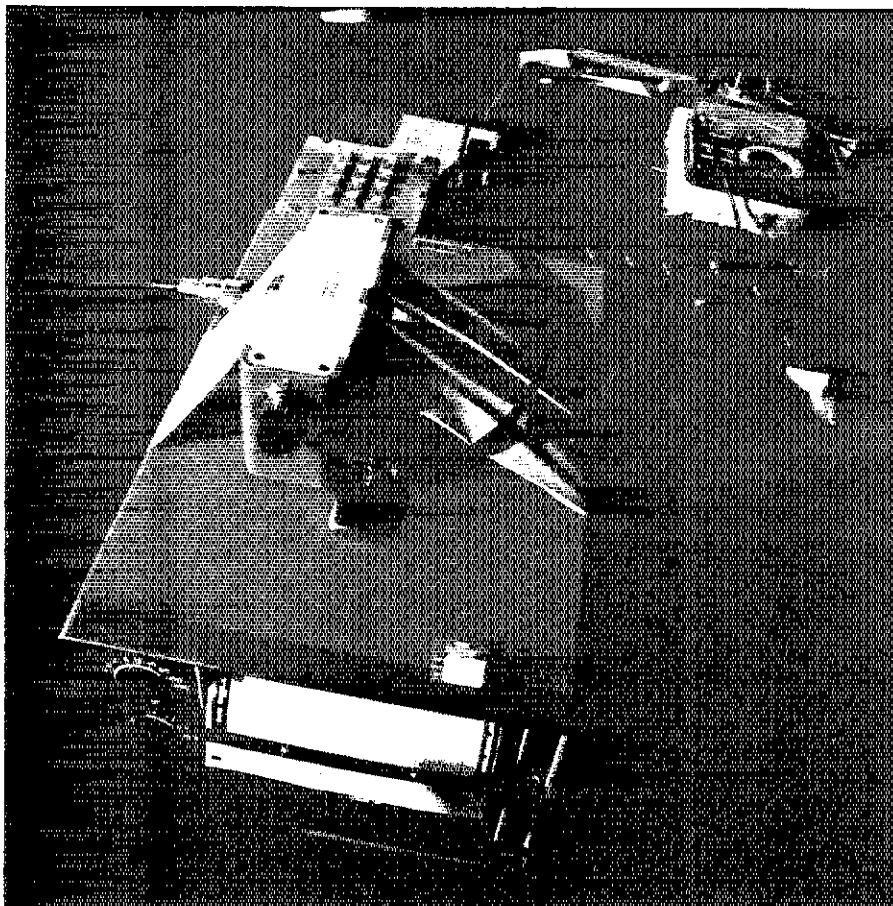


Fig. 2 — Mobile test setup for signal-strength measurements. The chart recorder is connected across a sense resistor in series with the receiver S meter. The input attenuator is useful for calibrating the system as well as protecting the receiver from overload.

**Table 1**  
**Propagation Path Loss Formulas**

Segment Loss (dB)	Distance Unit	144 MHz	220 MHz	420 MHz
Free space loss	miles	$(80 + 20 \log_{10} D_{0(mi)})$ dB	$(83.6 + 20 \log_{10} D_{0(mi)})$ dB	$(89.6 + 20 \log_{10} D_{0(mi)})$ dB
$D_0$ = distance from test transmitter to mobile unit	kilometers	$(75.9 + 20 \log_{10} D_{0(km)})$ dB	$(79.5 + 20 \log_{10} D_{0(km)})$ dB	$(85.5 + 20 \log_{10} D_{0(km)})$ dB
$L_1$ = horizon to mobile unit loss (antenna on sedan roof) $D_1$ = 3.4 mi (5.4 km)	—	32 dB	30 dB	27 dB
$L_2^*$ = test transmitter to horizon loss				
$D_{2(mi)} = 1.414 \sqrt{\text{ant. ht. (ft.)}}$	miles	$\left( \frac{109.7}{D_{2(mi)}} - 0.13 \right)$ dB	$\left( \frac{95}{D_{2(mi)}} - 0.28 \right)$ dB	$\left( \frac{77.5}{D_{2(mi)}} - 0.42 \right)$ dB
$D_{2(km)} = 3.993 \sqrt{\text{ant. ht. (m)}}$	kilometers	$\left( \frac{175.5}{D_{2(km)}} - 0.13 \right)$ dB	$\left( \frac{152}{D_{2(km)}} - 0.28 \right)$ dB	$\left( \frac{124}{D_{2(km)}} - 0.42 \right)$ dB
$L_3$ = horizon to horizon loss	miles	$(0.62 D_{3(mi)} - 0.5)$ dB	$(0.72 D_{3(mi)} - 0.4)$ dB	$(0.86 D_{3(mi)} - 0.3)$ dB**
$D_3 = D_0 - D_2 - D_1$	kilometers	$(0.99 D_{3(km)} - 0.5)$ dB	$(1.15 D_{3(km)} - 0.4)$ dB	$(1.33 D_{3(km)} - 0.3)$ dB**

The total smooth-earth loss is the algebraic sum of  $L_1$ ,  $L_2$ ,  $L_3$  and the free space loss.  
 \*Valid only for test transmitter antenna heights over 50 feet (15 meters).  
 \*\*Valid only for values of  $D_3$  less than 15 miles (24 kilometers).

measured data and the calculated curve is the propagation loss due to foliage and terrain. If the terrain is flat and the trees are distributed uniformly, the measurement points will be at a constant distance below the calculated curve in the vicinity of maximum range. These values will vary from one or two dB at 144 MHz in areas with sparse trees to around 25 dB at 220 MHz in areas with thick pine trees. The effect of occluding hills is difficult to predict, but is discussed in the references.

The next step is to calculate the propagation loss from the repeater to the maximum range points desired. To this calculated propagation loss must be added the propagation loss contribution of trees and terrain determined by the plots. Finally, the total propagation loss value determined by the method described above can be used to predict signal level, the effects of changing antenna height, or changing erp.

Keep in mind that this propagation loss is bilateral, and that the repeater's transmitter power and receiver sensitivity must be tailored to be compatible with the "typical" mobile radio system — a 5/8-wave whip, a transceiver with 10 watts output and a receiver sensitivity of 0.3 microvolt for 10 dB of quieting. Occasional "rabbit" and "alligator" situations may exist with hand-held transceivers and kilowatt mobile rigs, but if the repeater is well planned, communications will be reliable and the regular users will be well pleased. **QST**

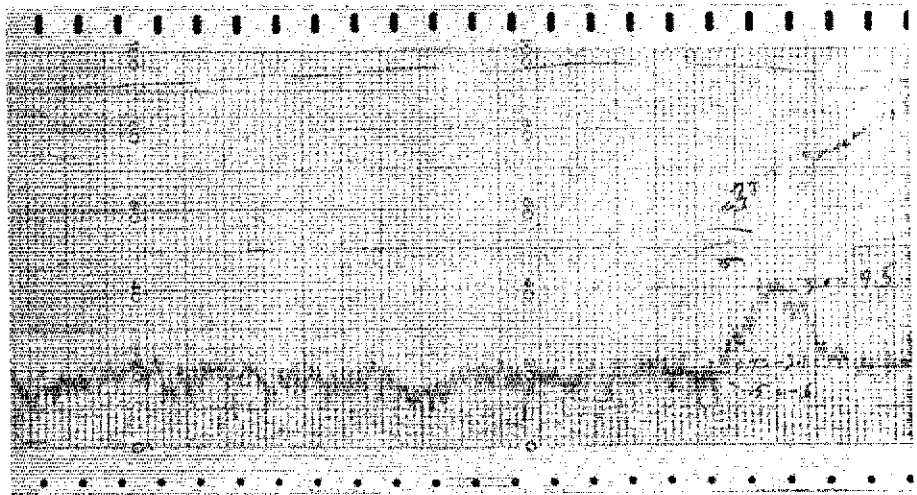


Fig. 3 — A recorded section of signal strength versus distance. The fine-grain ripples are 1/4 wavelength apart. The marked signal increase on the right of the graph was recorded on an overpass.

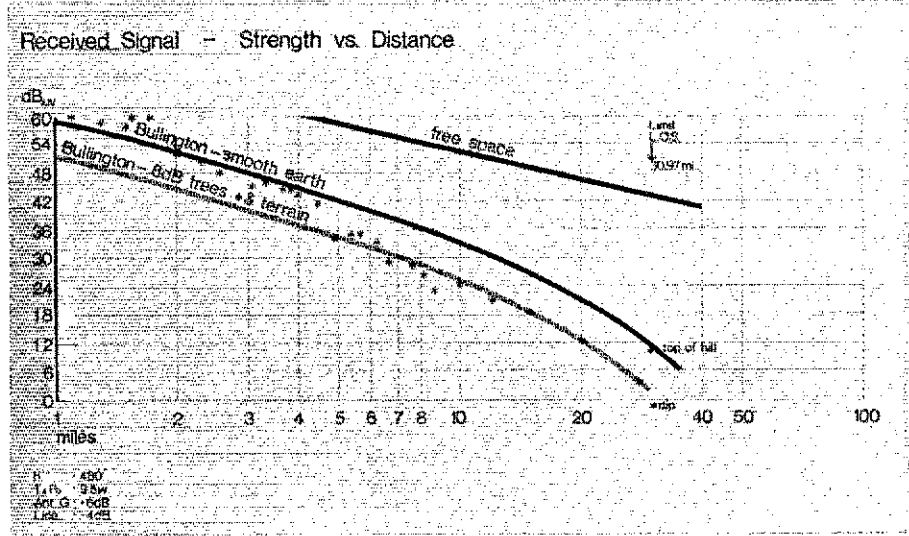


Fig. 4 — Actual measurement over a 30-mile (48-km) range plotted against the free space and smooth earth predictions. The variations at 30 miles illustrate the advantage of added height for fringe-area communication.

**References**  
 1 Bullington, "Radio Propagation Fundamentals," *The Bell System Technical Journal*, May, 1957, pp. 593-625.  
 2 Jakes, *Microwave Mobile Communications*, John Wiley & Sons, 1974, Chapter 2.  
 3 *The Radio Amateur's VHF Manual*, 3rd edition, ARRL, 1972, pp. 24-27.  
 4 Bray, "A Method for Determining VHF Station Capabilities," *QST*, Nov., 1961.



# Low-Noise Receiving Antennas

Digging the weak ones out of the noise on 80 and 160 meters can make you gnash your teeth in frustration — especially if others in your area copy signals you can't hear! Low-noise receiving antennas will help.

By Doug DeMaw,\* W1FB

I've scoured the IRE, IEEE and amateur archives in search of a definitive paper on the subject of practical low-noise receiving antennas for the medium and high frequencies. The only material which seemed applicable in amateur work came from the pen of H. H. Beverage and was published in *The Proceedings* back in the 1920s. Much has been written about the use of small receiving loops, and *QST* has contained articles on that subject.<sup>1,2,3</sup> A Beverage antenna is excellent for low-noise work on the lower frequencies, but few amateurs have the property available to erect one; a Beverage must be a wavelength or greater in size to function as it should (520 feet or more on 160 meters). Small receiving loops work well in noise reduction, but aren't efficient. A fairly robust preamplifier must be used to hear the weaker signals, even though the signal-to-noise ratio is likely to be improved while using a loop of small area. It seemed that some other types of simple antennas could be utilized to aid the receiving situation on an average-size city lot. This paper describes some of the antennas tried during my experiments.

## Simple Wire Antennas

Unless you are a dedicated DXer on 80 and 160 meters, you're probably unaware of the annoyance of atmospheric and man-made noises that can blanket a very weak DX signal. The better DX signals seem to rise above the noise, but some of the more modest DX stations don't have high power and elaborate antennas, so they have weak signals. For example, the UK operators are restricted to only 10 watts of transmitter power on 160 meters!

\*ARRL Senior Technical Editor  
<sup>1</sup> See references on page 39.



Representation of a half-wavelength open-loop antenna for low-noise reception on 160 meters. This is a tabletop mockup of the system in use at W1FB.

It has been rather well established that even a short 160-meter vertical antenna will outperform a horizontal or inverted-V antenna which is less than 100 feet above ground, at least for DX work. The typical horizontal half-wavelength antenna (end or center fed) can't exhibit a low radiation angle unless it is a half-wavelength above ground or greater. Now that's a mighty high antenna on 160 or 80 meters — 250 and 130 feet, respectively! So the short or full-size quarter-wavelength vertical and

its ground system predominate among those stations which are successful in working the faraway stations consistently. Out to 500 or 1000 miles, however, the low-to-the-ground horizontal or inverted-V antennas usually do a better job because they are high-angle radiators.

An unfortunate paradox exists for the fellow or gal who uses a vertical antenna on the lower bands — the system is dreadfully noisy for reception. Man-made and atmospheric noises tend

to be polarized vertically, so the antenna responds especially well to noise energy. You can step out-of-doors and see a clear sky, complete with stars and a bright moon, yet when you return to the shack and activate the receiver you may find QRN from some distant storm front so intense that weak-signal reception is impossible. The unwanted condition is enhanced by the low-angle characteristics of the vertical antenna, plus the vertical polarization of the noise. Added noise may come from appliances and power-line hash in the immediate vicinity of the antenna.

I have had more than occasional periods of despair because of the noise picked up by my 75-foot vertical antenna on 160 meters. It became apparent that something had to be done about developing a quieter antenna for receiving on 160, and with a small piece of urban property (two city lots, end to end) a Beverage antenna was out of the question.

In desperation one afternoon, just before the ARRL 160-Meter Contest, I collected 200 feet of hook-up wire from the workshop and strung it from the shack window out into the woods behind my house. I simply draped it over the branches of the small trees and secured it at the far end. Fig. 1A shows the fash-up, complete with a simple tuner which I used to match the wire to my receiver. I placed a switchbox in the line to the receiver so I could make quick comparisons between the vertical antenna and the wire one. Although the low wire antenna was broadside east and west, it made no difference with respect to directivity. An antenna only 7 feet above ground (a Beverage excepted) isn't going to show a response in some favored direction. But because the radiation angle had to be high, it seemed that noise should fall off, as it would from the polarization being horizontal. I was pleasantly surprised with the results I obtained. Some USA signals (out to 1000 miles) were considerably louder than they were with the vertical! The ambient noise reading on my S meter was zero with the horizontal wire, and with the vertical it bounced as high as S7 at times. The residual noise level on the vertical was S3. While switching between the antennas I noted that some very weak U.S. signals were Q5 on the wire antenna, and were unreadable while using the vertical.

The band opened to Europe late that evening and I began making comparisons between the antennas. G3UBR was pushing my S meter up to an S8 reading with the vertical, but the noise level was peaking at S9, and the copy was difficult. His signal dropped to S1 on the low wire, but he was perfectly Q5! It could be seen from those experiments that the signal-to-noise ratio had been

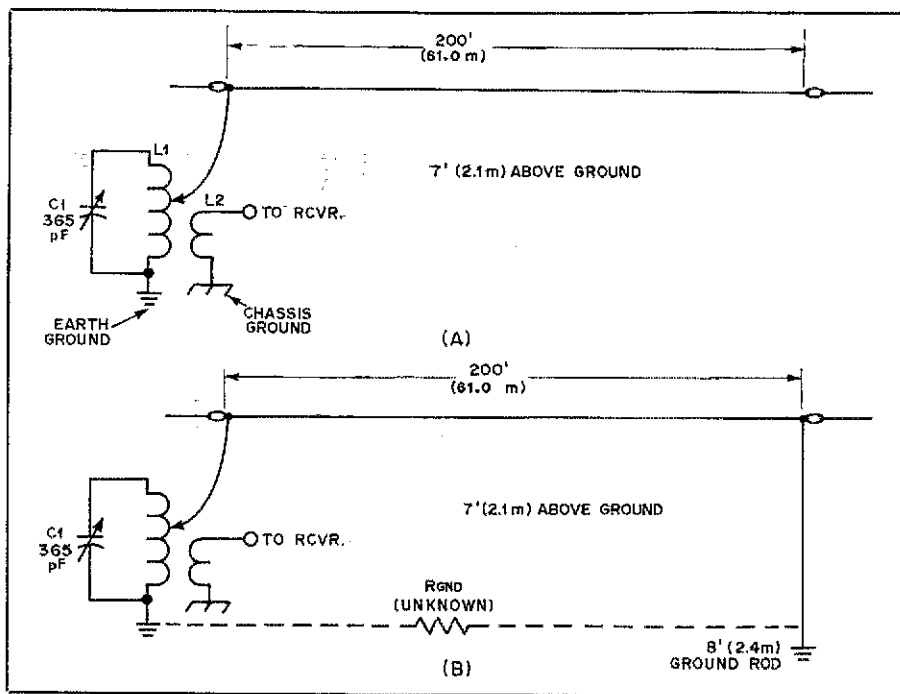


Fig. 1 — Illustrations of low-height wire antennas. An ungrounded low-noise receiving antenna is shown at A. The version at B has been grounded at the far end to form a closed loop of approximately 0.5 wavelength.

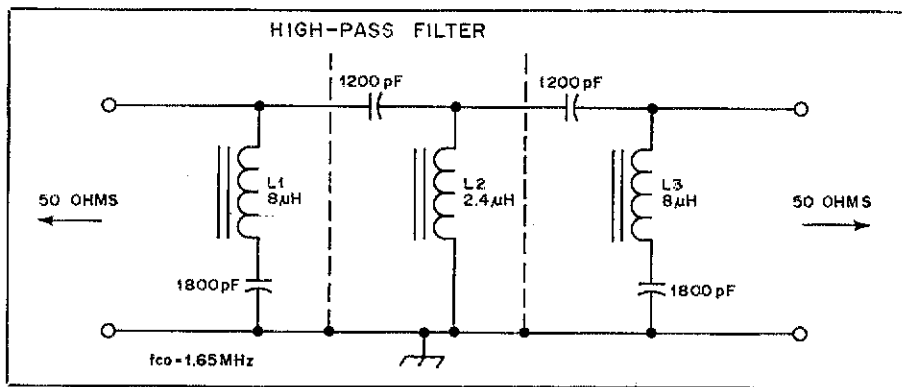


Fig. 2 — Schematic diagram of a seven-element high-pass filter for rejecting bc-band energy. The characteristic impedance of the filter is 50 ohms, and it is an m-derived image-parameter design which was suggested by Ed Wetherhold, W3NQN, as determined by a computer. Theoretical attenuation is better than 30 dB across all of the bc band. The midsection m-derived branch of the circuit was eliminated to simplify construction. According to W3NQN, a midsection m-derived filter can be added and tuned to a particular bc station that presents a difficult interference problem. L1 and L3 are formed by winding 40 turns of No. 30 enamel wire on a T50-2 powdered-iron toroid core. L2 has 22 turns of No. 30 wire on a T50-2 core. The filter capacitors are silver-mica types, and the completed filter should be in a shield box.

enhanced considerably. However, some of the less robust European and Caribbean signals that evening were not quite readable on the wire antenna; the gain of the receiver system just wasn't sufficient to hear them well enough for good copy.

The next day, a 20-dB preamplifier was built and added to the line. That resolved the weak-signal problem, but brought on a new problem — unwanted responses from local bc-band stations. A high-pass filter (Fig. 2) was whipped

together and added in the 50-ohm line. That cured the problem to some extent. However, it was learned that breaking up the ground-return circuits provided a total cure. This was tried after KIFM (ex-WIYNC) explained how he had cured a similar malady on 160 meters by placing a 1:1 ratio broadband toroidal transformer in the line to his receiver so that he could use separate grounds for the receiver and antenna. Not only did the technique break up some unwanted ground loops, it pre-

vented unwanted rectification caused by poor bonding of water pipes in the house. Fig. 1 shows that the ground return for the antenna is an earth ground, while the one for L2 of the matching network is the chassis of the receiver.

It seemed worthwhile to try some additional configurations for the wire antenna, so the far end of the first experimental antenna was grounded by connecting it to an eight-foot pipe which I drove into the soil. This is shown in Fig. 1 at B. The intent was to create a large rectangular loop type of antenna -- the earth serving as the missing conductor of the loop. I reasoned that the response would change from omnidirectional to broadside (east and west), since a loop would have been formed. The results were interesting but not as predicted. Maximum response came off the ends of the wire (north and south), and east-west directivity was practically zero. This was fine for working Nova Scotia and Florida from Connecticut, but the W6 and European stations were "out to lunch," if I may use the vernacular of the day. K1FM and I mulled this over and deduced that because of the resistivity of the ground between the ends of the antenna I had a "baby Beverage" with a large resistance in the ground circuit, and neither end of the wire "knew" which end had the termination! Therefore, it responded in both directions (off the ends) in a half-wavelength loop fashion. The signals weren't very spectacular in any direction as compared to the ungrounded 200-foot wire, so the system was discarded as a "flop."

### Large Horizontal Loops

It was a simple matter to utilize the 200 feet of wire for the formation of a

large closed-loop antenna (roughly 0.5 wavelength). Even though maximum response for a large loop is at right angles to the plane of the loop, my curiosity had to be satisfied. There just *might* be enough energy received from a DX signal to provide good copy. The wire was rerouted through the yard and woods to form a loop which was roughly 50 feet on a side.

A balanced matching network was connected to the fed end and tests were resumed. There was a decided improvement in signal-to-noise ratio, but it was useful only while receiving stations out to approximately 600 miles. During the daylight hours some *very local* 160-meter signals rose majestically to become perfectly devoid of noise (50 to 100 miles away), whereas with the vertical they were not readable unless they were extremely loud to begin with. Nighttime tests proved the closed loop to be a dismal DX antenna.

My next experiment called for opening the far end of the loop and adding sufficient wire to each leg to form a true half-wavelength open loop. Fig. 3 shows that arrangement. The loop was parallel to the earth and 7 feet above it. (The 7 feet is not some magic number I chose. Rather it was a height that would prevent people from coming in contact with the wire.) The theoretical feed-point impedance of this type of loop is 50 ohms, as specified in *The ARRL Antenna Book*. However, I left the balanced matching network in the line for two reasons: to maintain a balanced condition and to discriminate against unwanted bc-band energy (I live near three bc transmitters).

This antenna proved to be the best of the varieties tested at W1FB. Omnidirectional response was obtained, and the signal-to-noise ratio was very good.

A preamplifier<sup>4</sup> was needed to bring the gain up to the same level as that obtained with the vertical, although good copy was had on DX signals without the preamplifier. However, the receiver af gain had to be carried at a high setting for comfortable copy. On one occasion I was unable to copy OK1ATP and OE5KE with the vertical. Upon switching to the half-wavelength open loop both stations were completely readable. At dawn one morning I discovered that KJ6DL could be copied RST 459 with the loop, but dropped to RST 259 on the vertical. I should mention that I did not work KJ6DL, as the Midwest stations had him "sewed up" while some of the East Coast gang tried unsuccessfully to make contact.

### A Word of Caution

Any receiving antenna that is used near to the transmitting antenna (especially if the former is tuned to resonance) will pick up a considerable amount of rf during the transmit period. Therefore, some means must be used to prevent damage to the front end of the receiver (or the preamp). I burned out two MPF102 transistors in my preamp, and destroyed a protective diode in the front end of my FT-301D transceiver (which was being used as a separate receiver) until I realized what was happening. Therefore, a relay should be used to short the coax of the receiver input while transmitting.

### Other Antennas

Lumped-inductance ferrite-rod antennas can be used as low-noise aids to reception. I have experimented with them on and off for a number of years, and some good results were obtained. They seemed to perform as well as small wire loops and had the advantage that they could be used indoors. They may also be aimed at the area of interest. Like any small receiving antenna, they require a preamplifier to make up for the inefficiency that is inherent. Fig. 4 shows the best of the ferrite loops I have developed. L1 is wound on an Amidon Associates ferrite rod which is 0.5 inch in diameter and 7 inches in length. It functions as the loop, and maximum response is off the broadside of L1. It is tuned to resonance by means of C1. A 16-inch wire is used as a sense antenna to provide a unidirectional (cardioid) response in the direction of interest. R1 is adjusted for the greatest null off the backside of the system, and as it is adjusted one must repeak C1. W1VD (ex-WA1LNQ) and I measured front-to-back ratios as great as 40 dB with this kind of receiving antenna. We used a remote signal source some 150 feet away to make the tests (a 10-mW crystal oscillator and a 12-inch radiator vertically polarized). We observed that

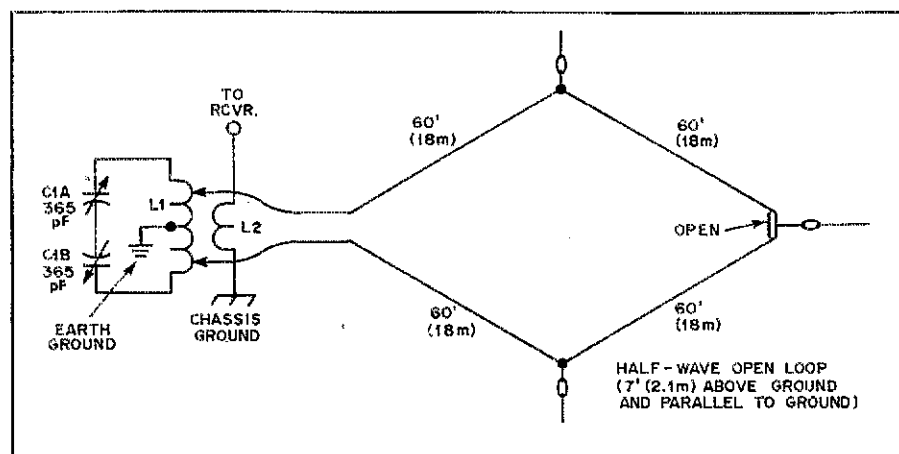


Fig. 3 — A half-wavelength open-loop receiving antenna for 160 meters. The antenna is parallel to the earth and spaced seven feet above it. C1 is a two-section broadcast-radio variable capacitor. L1 should have an inductance of 50  $\mu$ H. The feeders are tapped on L1 to obtain an SWR of 1. An earth ground is connected to the center of L1, but L2 is returned to chassis ground (see text).

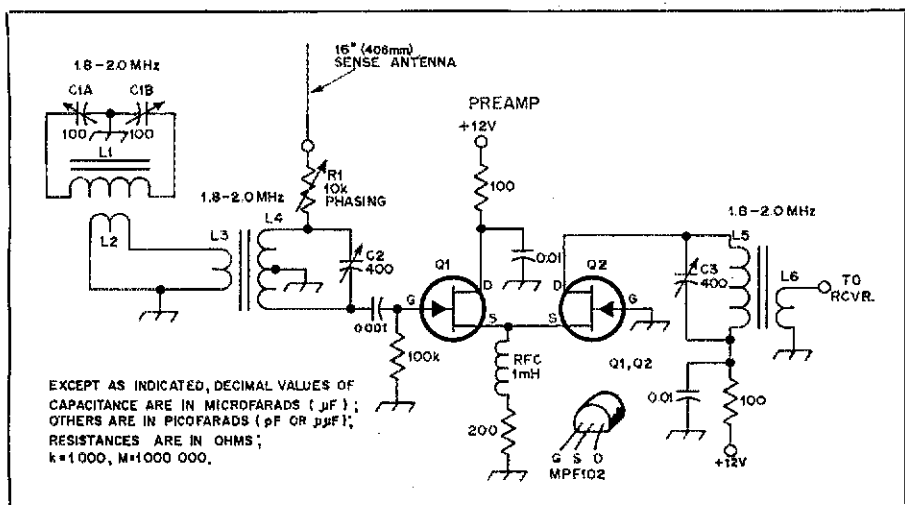


Fig. 4 — Circuit for a ferrite-loop receiving antenna, with sense antenna to obtain a cardioid pattern. L1 consists of 48 turns of No. 14 enameled wire spaced to occupy 4-1/2 inches on an Amidon ferrite rod (see text). L2 is a six-turn link wound over the center part of L1. L4 and L5 are wound on T80-2 powdered-iron toroid cores. Each contains 50 turns of No. 26 enam. wire, and L4 is center tapped. L3 and L6 are six-turn links. C1 is a dual-section air variable which is mounted close to L1 (short leads). C2 and C3 are mica trimmers. Preamplifier gain is approximately 25 dB.

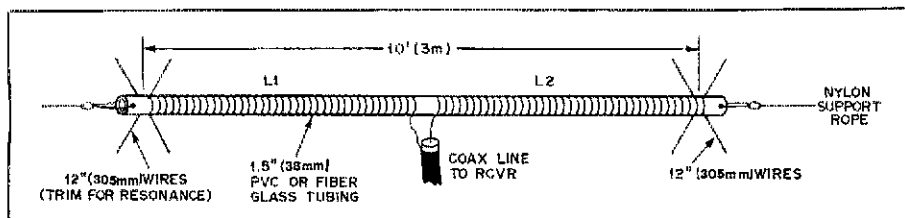


Fig. 5 — Details for a 10-foot helically wound half-wavelength dipole. PVC tubing serves as the foundation for the antenna. Capacitance hats at the ends of the element permit frequency adjustment and help to lower the Q of the antenna.

the greater the front-to-back ratio the lower the signal level from the desired direction. In a practical system one might prefer a preamp with a gain of 40 or 50 dB. The circuit shown in Fig. 4 has a gain of 25 dB, and was adequate for use with the particular receiver employed during our tests. The sense antenna is mounted vertically in front of the ferrite loop, some six inches away from the loop (not critical). The circuit of Fig. 4 provided good reception of DX signals, and the noise pickup was low. W1VD built a similar loop circuit for use on 80 meters. He reported excellent results during the reception of weak signals, but concluded that a more vigorous preamplifier was required for his work.

Still another possibility for a low-noise receiving antenna is shown at Fig. 5. Here we have a helically wound half-wavelength dipole which can be used vertically or horizontally. It will help toward reducing noise, and can be used just a few feet above ground. I

experimented extensively with this type of antenna (and quarter-wavelength versions) in the early 1950s. They were tested on 80 and 160 meters as transmitting and receiving antennas. An eight-foot-high helically wound vertical for 80 meters was worked against a mediocre ground system (water pipes, chain fence, and ground rods) and turned out to be an effective radiator while working DX with a 100-watt a-m transmitter on 75 meters. It compared favorably during transmit periods with my 80-meter inverted-V antenna, the center of which was 60 feet above ground. Of greatest significance was the reduction in response to 15.75-kHz TV horizontal-oscillator energy in the neighborhood. I haven't taken time to attempt an analysis of that phenomenon, but the problem vanished when I used the helix. I noticed also that random noise seemed greatly reduced when the helically wound antennas were used vertically or horizontally.

The helical dipole of Fig. 5 can be wound on a length of PVC or fiberglass tubing. PVC material is very lossy, so no attempt should be made to transmit with the antenna, as the PVC may melt. To realize a quarter-wavelength element in a helically wound radiator, one must wind approximately one half wavelength of wire on the form. I have found that a 250-foot length of insulated wire (wound with equal spacing between the turns) provides an element that is slightly longer electrically than one quarter wavelength on 160 meters. During tune-up it is a simple matter to remove turns until resonance is established.

The antenna of Fig. 5 can be adjusted by means of a dip meter. One half of the dipole is resonated while the other half is shorted out by means of a five-foot clip lead. The antenna must be mounted where it will be used when the adjustments are made. A six-turn loop of wire, one inch in diameter, is connected between the feed point of one dipole half and ground. A ground rod just below the antenna will suffice. The dip-meter coil is inserted in the pickup loop for the test. The process is repeated for the remaining dipole half. The capacitance-hat spokes at the dipole ends can be trimmed for final adjustment.

This type of antenna has very narrow frequency response. Therefore, it should be peaked for the part of the band where the DX listening will take place (DX window on 160 meters, or 3500 to 3510 kHz on 80 meters). If it is tuned for the highest desired operating frequency, reception lower in the band can be effected by adding a short clip-on wire to each end of the dipole. The length of the wire additions can be determined by means of a dip meter, as outlined earlier.

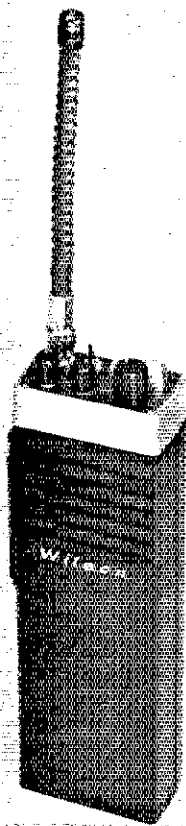
### In Summary

I have only agitated the surface slightly in this discussion of low-noise receiving antennas. Beyond a doubt there have been many amateurs who have tried antennas of this general type, and the results obtained may have been more interesting and spectacular than mine. I would be interested in receiving reports concerning simple low-noise receiving antennas. The data could serve as the foundation of an informative *QST* article.

### References

- 1 DeMaw, "A Receiving Loop for 160," *QST*, March, 1974.
- 2 Nose, "A 160-Meter Receiving Loop," *QST*, April, 1975.
- 3 Boothe, "Weak-Signal Reception on 160 — Some Antenna Notes," *QST*, June, 1977.
- 4 DeMaw, "Build This 'Quickie' Preamp," *QST*, April, 1977.

# Product Review



The Wilson 2202 SM 220-MHz hand-held transceiver comes in a box measuring 8-7/8 x 1-3/4 x 2-7/8 inches, and weighs in at just about two pounds with battery. The case is black with brushed aluminum.

## WILSON MODEL 2202 SM TRANSCEIVER

It is becoming more and more evident that 220 is an excellent repeater band. The recent edition of the *ARRL Repeater Directory* shows over 200 repeaters on this band, with more coming on every day. Wilson Electronics is more than aware of this growth as evidenced by their Model 2202 SM hand-held, 220-MHz transceiver. The 2202 uses crystal control, and can cover any six channels in the 220- to 225-MHz band. Crystals are of the plug-in variety and can be netted with individual trimmers in both the transmit and receive modes. The unit comes supplied with crystals for 223.50 simplex.

The dual-conversion receiver uses a tried and tested design, a 10.7-MHz and 455-kHz i-f. A 12-kHz ceramic filter is incorporated to provide excellent selectivity. This, coupled with a 0.3  $\mu$ V sensitivity for 20 dB quieting, makes the 2202 SM receiver an excellent unit. The speaker, which also serves as the mic, produces more than adequate audio, even in a noisy automobile. An excellent squelch circuit is used, which provides noncritical settings.

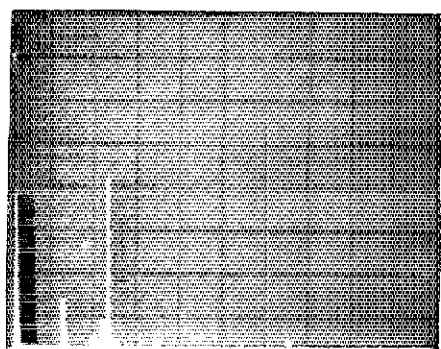
The transmitter provides two power levels, 1 watt or 2.5 watts output. The author found that in nearly all cases the 1-watt level was sufficient for local repeater work. However, in emergencies, it is nice to have a few dB gain to play with. On-the-air reports from listeners about the audio quality from the transceiver were all favorable.

Current requirements in the 2202 SM are 15 mA in the receive mode and 400 mA when transmitting — using a 12-volt supply. The supply is a 12-volt battery pack (not sup-

plied). A NiCad pack is available, price class \$18 and a charger, \$40. Price class of the 2202 SM is \$260. The manufacturer is Wilson Electronics Corp., 4288 S. Polaris, Las Vegas, NV 89103. — *WBLAND*

### Wilson 2202 SM Specifications

Weight: 1 lb 4 oz, less battery.  
Operating voltage: 12 V dc.  
Rt output power: 1 or 2.5 W.  
Receiver sensitivity: 0.3  $\mu$ V for 20 dB quieting.  
\*Manufacturer's ratings, not verified in the ARRL lab.



Spectral analysis of the 2202 SM output. The pip at the far left is the base-frequency marker. Horizontal scale is 100 MHz per division. The carrier is attenuated from full-scale to prevent overloading of the analyzer. The spurious signals are all down more than 65 dB, exceeding FCC spurious-emission specifications.

## TOLTEC WIRE-WRAPPING SUPPLIES

Let's say you're wanting to build a project which uses a couple-of-dozen integrated circuits and a handful of other parts. There is no circuit-board etching pattern available, and anyway you may want to experiment with the circuit a bit to improve its operation. How do you go about wiring it up? Soldering point-to-point lengths of wire is one way, sure. Would you consider wire wrapping? As the saying goes, try it, you'll like it! Wire-wrap techniques permit placing several conductors at one pin of an IC with no pain, no strain, no solder. And if you decide to move or remove a conductor later, unwrapping the wires is not difficult. A tool for wrapping by hand and a separate unwrapping tool are not expensive. Or for "the person who has everything," electric wrapping tools are available.

The problem for the amateur, though, is where to buy the wire. Of course you can purchase a spool of No. 28 or smaller solid-copper, tinned, plastic-covered hookup wire, and you can cut and strip each length as you need it. That gets a bit tedious, though.

Besides, hookup wire is rather brittle and usually doesn't take kindly to more than one or two wrap and unwrap jobs. A different alloy of wire is commonly used for production wire-wrap runs, and precut, prestripped lengths are available — *in quantity*. Still not much help for the amateur wanting to purchase small amounts!

Here's where Toltec Corp. comes in. Now, to aid those amateurs wanting to do modest amounts of wire wrapping, Toltec offers a wire kit. At a price class of \$44 you get 2300 lengths of wire ranging from 1.5 in. (38 mm) to 11.25 in. (286 mm). Each length is packaged separately with 100 wires per package (200 for commonly used lengths), 14 packages in all. Both ends of each wire are stripped of 1 inch of its green Kynar insulation, the correct amount for a proper wire wrap. The wire itself is No. 30, solid, silver-plated. If you prefer, this wire may be purchased from Toltec in 100- or 1000-ft spools. Toltec also offers hand- and electric-operated wrap tools and an unwrap tool. That's Toltec Corp., 2432 Washington, N.E., Albuquerque, NM 87110. Try it; you *will* like it! — *KITD*

## IC TIMER COOKBOOK

The *IC Timer Cookbook*, a new Sams publication by Walter Jung, is an excellent source of information on the versatile timer integrated circuits. Obviously, the author has done extensive research in the preparation of his book and has used information compiled from over 100 previously published articles dealing with the 555 and other timer ICs.

The cookbook is divided into two parts: The first explains the theory of operation of timer circuits, gives general operating procedures for the use of the chips, and describes more than half a dozen specific timer ICs. This section covers the 555 and 556 general-purpose chips, the 322 and 3905 wide-range precision units, and the 2240, 2250 and 8260 programmable timer/counter ICs. The second part gives the basement experimenter dozens of "recipes" for cooking his own unique circuits, and shows 50 applications for the timer ICs in circuits by themselves and in larger systems.

A very thorough appendix contains specifications for all the ICs used, and a list of the original and second-source manufacturers for the ICs with each source's part numbers. Also

listed are sources for the other components used in the various timing circuits.

The *IC Timer Cookbook* is written in a practical, easy-to-read style that makes it suitable for use by readers with a wide range of backgrounds. Every circuit example contains not only all component values, but also the design equations they were derived from.

An excellent introduction to IC timers and their applications for anyone with limited experience in this field, this book would make a valuable addition to any ham's reference library. It measures 5-1/2 by 8-1/2 inches and contains 287 pages. In our opinion, the \$9.95 price is a little steep for a paperback. — *WB9VAV*

### MICROWAVE MODULES MMv1296 VARACTOR TRIPLER AND MMc1296 RECEIVING CONVERTER

Activity on the 23-cm band is beginning to increase, according to reports from around the country. Part of this upsurge in interest is no doubt due to the availability of commercially produced equipment for this band. While building one's own equipment for this band is not all that difficult, the ham in a hurry may wish to consider using the store-bought approach.

#### Varactor Tripler

Using a "passive" frequency multiplier is the utmost in simplicity. In the case of the MMv1296, power applied at 432 MHz is retrieved at the output in the form of 1296-MHz power. Device efficiency is high, on the order of 60 percent. Maximum input is 20 watts, so power output on 23 cm will be 10-12 watts. Some form of output filtering is desirable, such as an interdigital filter or cavity. Undesired outputs will be suppressed at least 30 dB, but the potential for TVI exists. Because the varactor diode is a passive device, no power supply is required.

#### Receiving Converter

To reduce the effects of spurious responses, the local oscillator in a uhf converter should operate on the highest frequency possible. In the MMc1296, the LO operates on 105.67 MHz. Oscillator output is multiplied by 12 and mixed with the received

signal. This provides an output on 28 MHz. An optional i-f output of 144 MHz is available. The converter uses a hot-carrier-diode single-balanced mixer. There is no i-f preamplification. Image attenuation in such a system is not good. While the chance of image reception is slight, "double-sideband" reception can result in misleading noise-figure measurements. The converter cannot differentiate between noise at the signal frequency and noise at the image frequency, which would cause an indicated noise figure 3 dB better than actual to be obtained. Inserting a band-pass filter between the noise source and the converter may also yield inaccurate data. Unless the filter introduces absolutely no mismatch into the line, its reactance may affect the noise figure of the converter front end. A single-resonator filter, properly matched, is the most reasonable method. Mismatches caused by coupling between sections of a multiresonator filter will almost certainly defeat the purpose of using one, at least during measurement. Noise figure of the MMc1296 converter we tested was measured at 7.5 dB, with no filter used. This converter has a 28-MHz i-f output. When no front-end amplification is used, it becomes necessary to develop converter gain in an i-f amplifier. The MMc1296 uses a single MOS-FET. Nominal gain is claimed to be 23 dB for this converter, although this parameter could not be ascertained.

Construction of both units is very professional. Double-sided, glass-epoxy board is used in the receiving converter. Tuned lines are used in the multiplier. Both units are enclosed in cast-aluminum boxes, 4.5 x 2.5 x 1.25 inches in size.

If the reader wishing to try 1296 does not have a source of power on 432 MHz, a varactor tripler such as that described in the *ARRL VHF Manual* may be used for tripling up from 144 MHz. Older commercial fm rigs may be purchased at low cost, and a surplus 450-MHz transmitter converted to operate at 432 MHz is another possible solution.

Microwave Modules equipment is distributed in the U.S. by Texas RF Communications, 4800 West 34th St., Suite D12A, Houston, TX 77092. Price class for the MMc1296 is \$70, and for the MMv1296 \$90. — *W1XZ*

receiver section is capable of receiving cw or ssb signals, but the transmitter is strictly cw, with 70 watts input on 80 through 10 meters. Full coverage is included for all bands except 10 meters. The rig comes with crystals installed for 80, 40 and 20 meters. One crystal for 15 meters and two for the 28- to 29-MHz segment of 10 meters are available as plug-in options.

Instant band changes are possible with the Century because it has a pretuned front end. To change bands, just turn the bandswitch and adjust the drive level. Very simple! Full break-in is also included in the Century 21. This means that an incoming signal can be heard whenever the key is not down — even between dots in an H — if you're not sending too fast! These features, along with a built-in power supply, speaker and adjustable sidetone, make the transceiver a breeze to operate.

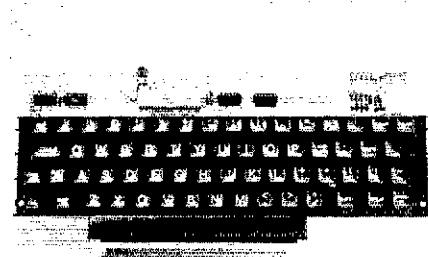
### POLY PAKS KEYBOARD AND ENCODER

Poly Paks recently announced a new keyboard and encoder kit (or wired unit). The keyboard utilizes 63 keys and, with the encoding circuitry, provides output of all 128 ASCII (American Standard Code for Information Interchange) characters. One feature of the unit is a display of seven LEDs that show each character of the ASCII code as the appropriate key is depressed. We really like this feature because with many keyboards, you cannot always be sure that what you expect is what you get when you press a key.

The kit consists of the keyboard, a two-sided plated-through circuit board, and the components that are mounted on the board. While the directions could be a little clearer, they do the job. It took us about two hours to wire the kit, and it worked the first time around. We gave the keyboard a thorough testing, trying it on two different computer systems.

The keyboard is encoded for both upper and lower case, shift lock if desired, and control-key operations that are necessary for so many types of computer and RTTY operations. Voltage requirements are plus 5 V dc and minus 12 V dc; total power drain is 200 mW. Either positive or negative strobe is available via a jumper connection. Size is 13 x 5 x 2 inches and the weight is 3 pounds. Price class: kit \$60, wired \$70. Manufacturer: Poly Paks, Box 942, South Lynnfield, MA 01940.

— *W1ICP*



The Poly Paks keyboard and encoder.

### TEN-TEC CENTURY 21

The first thing that impressed me about the new Ten-Tec Century 21 was its basic good looks. Pictures just don't do this new cw transceiver justice at all! Not that I get hung up on looks, but the Century is, in my personal opinion, the best-looking rig that Ten-Tec has put out! The cabinet is all metal — top, bottom, back, front and sides. The dial operates smoothly, having the spinner type of finger hole which makes fast frequency changes a snap. This is almost a necessity, because it takes about 30 revolutions of the tuning knob to sweep a 500-kHz band segment (lots of bandspread!).

The Century is a cw man's rig. Actually it's ideal for either the beginner or the QRP cw fan, because it offers a host of state-of-the-art features at a relatively low cost. The

A common VFO is used to control the receiver and transmitter in the Century 21. In the receiver, an incoming signal is first mixed with the appropriate high-frequency oscillator. The product is between 5.0 and 5.5 MHz at this point. This signal is amplified and applied to the product detector where it is beat against the VFO output. The product of this last mixing is at audio frequency. This signal is fed through one of three selective bandwidth filters before going to the speaker. The 2.5-kHz filter is used for general listening and most ssb work. The 1-kHz filter is used for normal cw, and the 500-Hz filter is used to help eliminate interference while receiving cw signals.

In the transmitter, the hf oscillator being used (there is one for each band) is mixed with the VFO output, and the product is fed to band-pass filters. From there, the signal is

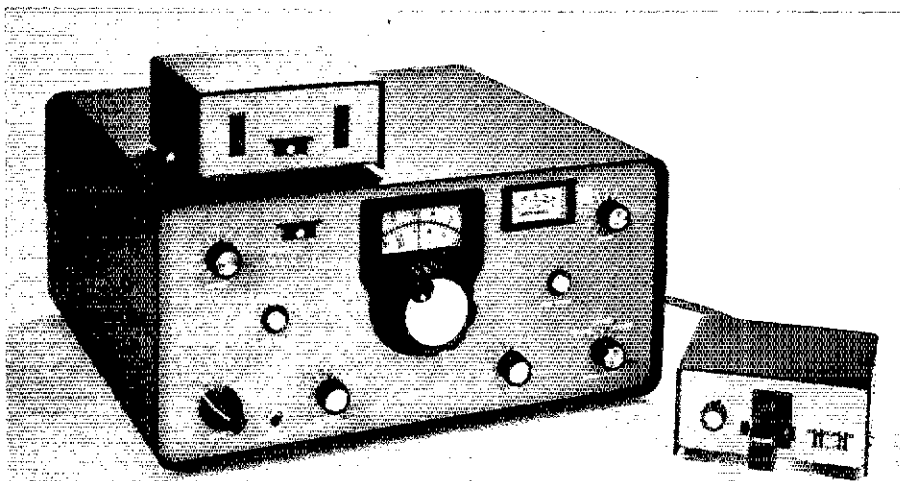


amplified at a low level before going to the driver and power amp. Finally, the power amplifier output is run through low-pass filtering before being fed to the antenna. Individual low-pass filters are used for each band, and these are switched into the antenna line by the band switch. The cw signal from the Century is clean, chirpless, and without drift. The keying is click-free. The final amplifier in our Century 21 came to us biased for Class AB operation, but all new production models are factory-biased for Class C. After talking with the people at Ten-Tec, the final bias on our review sample was changed to Class C. The spectral analysis shown was taken after the modification was made.

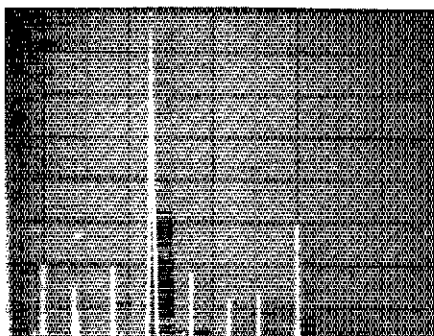
Another very handy feature is the spotting switch, which allows you to zero beat a cw station before calling him (or her). Pressing the zerobeat button disables the offset section of the VFO. Once the transmitter has been set to the same frequency as the incoming signal, the receiver can be adjusted using the offset or incremental-tuning control to receive the cw signal on either side of zerobeat. Front-panel layout is symmetrical, with the large tuning knob located in the exact center. Across the top are the receiver tuning offset, dial readout, input power meter, and drive control. The meter is monitored while setting the drive level. This allows the operator to select the input power, up to 70 watts. Another neat thing about the Century is its automatic-shutoff circuitry. If the input power is run up beyond about 70 watts, or if the antenna shorts or opens leaving the transmitter working into a high SWR, the rig senses the current rise and instantly shuts down the power supply. To reset the circuit breaker after the problem has been corrected, simply turn the main power switch off and then on again, and normal operation is restored.

I basically think of myself as a cw operator. But after having used only tube-type gear that required tune-up in the past, the Ten-Tec really took adjusting to. It's just plain hard to adapt yourself to a rig that only needs to be turned on! That's one of the benefits of solid-state finals . . . no warm-up, no pre-selector, no plate or load controls, just a drive-level adjustment when you switch bands (takes about one second) and you're on!

Along with the transceiver itself, we also received the optional crystal calibrator, model 276, and the matching keyer, model 670 for review. The calibrator has a neat feature in that it pulses the calibration signal to the receiver instead of sending out a continuous note. This helps the operator find the *real* calibration mark on the dial without disconnecting his antenna. With the standard type of "always on" calibrator, it can be difficult at



The Ten-Tec Century 21 transceiver is an enjoyable rig that makes cw operation on hf as easy and uncomplicated as possible. An antenna and key are all that are necessary to put this solid-state jewel on the air! The Century 21 is shown here with its accessory keyer and crystal calibrator.



The spectrum analysis of the Century's output on 7 MHz. The pip at the left edge of the photo represents zero frequency. The horizontal scale is 2 MHz per division, and the vertical scale, 10 dB. The fundamental is the large pip in the center of the photo, and the second harmonic is the pip farthest to the right. The second harmonic is about 50 dB down from the full scale fundamental. All other pips are mixing products at least 60 dB down. This complies with FCC regulations.

times to distinguish the calibration pip from the numerous carriers on close-by frequencies.

The electronic keyer was designed specifically as a companion to the Century 21 transceiver. It contains no battery itself, but is plugged into the back of the transceiver from which it derives its operating power. The keyer speed can be adjusted from six to 50 words per minute. The keyer has self-complet-

ing dots and dashes and an automatic weighting circuit that increases the dot length about 10 percent at 20 wpm. The weighting circuit is designed to help increase the readability of the code being sent, especially at higher speeds.

The plastic paddle on the keyer performed pretty well once the springs were properly adjusted. The keyer itself is fairly light, containing only one IC and a handful of other parts. This made the case a little unstable on the operating surface when confronted with my "heavier than normal" keying fist. A small amount of rubber cement on the keyer feet was sufficient to stop the unit from walking away from me as I sent with it. One last note on the model 670 keyer: It should not be used to key transmitters with cathode or grid-block keying. It should only be used with the Century 21 transceiver. Ten-Tec equipment is manufactured by Ten-Tec, Inc., Sevierville, TN 27862. — WB9VAV

#### Ten-Tec Century 21 CW Transceiver

Dimensions (HWD) and weight: 5-3/4 x 12-3/8 x 11-1/2 inches; 15-1/2 lbs.\*  
 Power requirements: 105-125 V ac, 50/60 Hz.  
 Frequency range: 80-10 meters (28-29 MHz on 10 meters).  
 Receiver sensitivity: 1  $\mu$ V or less, 10 dB S+N/N.  
 Transmitter output: 40 watts.\*  
 Price class: \$290, model 670 keyer \$30, model 276 calibrator \$30.  
 \*Measured in ARRL lab.

#### ICOM IC-22S

A brisk market often sets the stage for technological advancements, which sometimes seem to be outright revolution. About six or seven years ago there was a marked shift from converted surplus equipment to equipment specifically manufactured for the 2-meter fm band. It would appear that we are in the midst of another "revolution" — this time from crystal control to frequency synthesis. And, one rig seems to have caught the fancy of the amateur community, the IC-22S.

The simple straightforward design of the IC-22S lends itself to modification, as witness the number of modification articles in the amateur magazines. Therefore, the editors decided to review the IC-22S with one of the more versatile modification packages available, the Spectronics Speuscan-S scanner. During the period of review the products were used together, although it is perfectly easy to detach the scanner and use the IC-22S by itself.

The IC-22S uses a diode matrix to form a binary code. This code determines the fre-

quency-dividing ratio needed to enable the transceiver to operate on a given, standard 2-meter fm, channel. In other words, instead of buying crystals at around \$10 per pair, one merely plugs in from one to seven diodes which cost about 10 cents each at Radio Shack. If you move or if the local repeater switches to another operating frequency, it is a simple matter to pull the diodes out and plug them in the appropriate holes.

Before I acquired this unit for review, I overheard a conversation one day between the owner of an IC-22S and another ham. The

IC-22S owner was bemoaning the fact that he had spent several hours tediously laboring to program in the channels that he desired. One of the first things that I did after getting this unit was to pick up some diodes and try programming it myself (the IC-22S comes from the factory with five of the more popular frequencies already programmed in). The owner's manual carries a table that gives the diode placement positions for all standard channels and splits between 146 and 148 MHz. Including the time involved in taking the case off and putting it back on, it took about 20 minutes to program in six channels. Therefore, I concluded that the above-mentioned ham was simply putting on a show for his friend or perhaps lacked a manual, lacked good eyesight, lacked the full use of his hands and arms or lacked the ability to solder.

Operation is straightforward and simple. The operator turns the unit on to his choice of either the high- or low-power output position. He turns the channel selector dial to the particular position that he wishes to use. He is then faced with deciding the exact format that is required. Simplex operation is, of course, straightforward. When programming in duplex (repeater) frequencies, the owners manual instructs the operator to program the lower frequency of the pair. On standard 146-MHz repeaters one chooses Duplex A which offsets the receiver 600 kHz above the programmed frequency. On standard 147-MHz repeaters one chooses Duplex B which offsets the transmitter 600 kHz up. No provisions are provided for oddball splits. A small red light comes on when one keys the transmitter and a similar green one lights when the squelch is broken. A lock indication circuit has been built into the phase-locked loop which disables the transmitter if the PLL fails to lock. As a visual indication of failure to lock, the meter lamp goes out for both transmit and receive. The unit is reverse-polarity protected by a large diode across the dc input jack.

The first time that I actually got my fingers on an IC-22S, WA8UUY came to visit and brought his new rig with him. We hooked it up to a newly erected Ringo and tuned around seeing if we could key some repeaters. When we got a response, I would ask him what frequency it was. After a couple of embarrassing shrugs of the shoulder, he confessed to having left his crib sheet in his car. The weak link in the IC-22S, then, is its human's recall ability. One could tape the crib sheet to the case (yuk, ugly), one could take one of those exotic "memory courses" or among other possibilities one could purchase the Spectronics SpecsScan-S to go with one's IC-22S.

### Spectronics SpecsScan

As implied above, one of the things that I found most striking about the SpecsScan-S is that the *programmed* (not the offset) frequency is read out digitally with a large LED display. This is true whether one is tuned to the dedicated scanner channel or to any of the 21 other channels. The display indicates whether one is on 146 or 147 MHz by means of two LEDs. The three remaining significant digits are then read out digitally.

The SpecsScan-S is designed to be hooked into the 22nd position of the IC-22S. This position must be dedicated to the SpecsScan for as long as one intends to use it. Everything is supplied for proper wiring of the unit to the

IC-22S. A detailed owners manual gives complete, simple-to-understand instructions. It would appear that a typical wiring job would take about one hour (the unit tested came prewired). Two wires are attached to the power cable. Nine wires are connected to the matrix board — eight to the 22nd position and one common. Since the common is not ground, but 9-V regulated, care must be taken not to short this wire out as it could cause damage to the regulator. Finally, one wire is attached to the switched side of the green light (squelch voltage).

One control is used to determine the direction and the rate of scan. The operator can scan from a rate of zero to a very high speed in either direction with the twist of this one dial, which gives a great deal of control to the operator. A separate potentiometer is used to provide variable scan delay. The power switch is connected to scan delay control shaft.

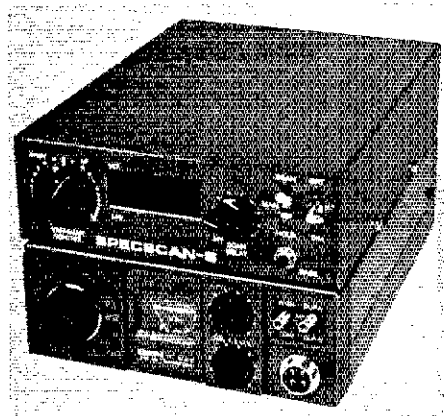
When I first got the unit, I did not have the owners manual and found the three-position SCAN/MANUAL/HOLD switch a bit tricky. I doubt that I would have had any trouble if I had read the manual carefully. In the SCAN position, the unit will scan according to the rate and direction set by the VARI-SCAN control. It will lock on any channel having enough of a signal to keep the squelch open. If the operator wishes to pass a particular channel, but continue scanning, he merely pushes the PASS button when the unit locks on to that channel and normal scan is resumed.

In the MANUAL position, the scanner will not lock on to a channel. I found this feature of tremendous benefit at home in Connecticut. We seem to be blessed with a large number of very active repeaters here. Without this control, it is conceivable that the scanner would lock on to one of these busy channels and stay there most of the evening or until the operator pressed the PASS button, which could get tiring very quickly. By setting the VARI-SCAN control to a very slow rate and using the manual position, one can get a good idea of local activity without being constantly locked onto a busy channel.

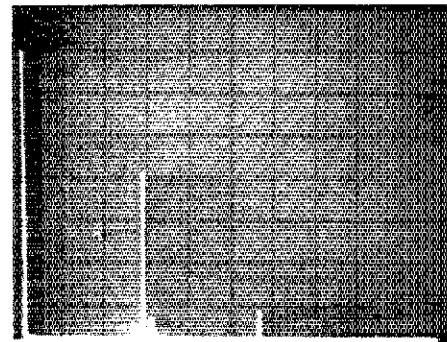
In the HOLD position, the scanner is locked onto whatever frequency is displayed on the readout. If the operator is in the SCAN position and desires to transmit, he must switch to the HOLD or else, when the transmitter is keyed, squelch voltage drops out and the scanner resumes scanning. I can assure you that hams on those repeaters that one scans past while transmitting can become quite annoyed. The owners manual warns the operator of this potential problem, but then I found out the hard way, before I got a copy of the manual.

Other features include a switch that permits the operator to choose between dim and bright for the LED display. Anyone having used a LED display device in direct sunlight can readily appreciate the "bright" option. The power cord supplied with each IC-22S has an in-line fuse; however, the replacement cords as a rule do not. Therefore, Spectronics decided to provide an extra measure of protection by internally fusing the SpecsScan-S.

The units can be used together as either a base station or mobile, or the IC-22S can be used by itself. Since the SpecsScan-S uses less than 500 mA (CMOS circuitry) most of the garden-variety power supplies that would



This shows the packaging for the IC-22S and the SpecsScan. The top unit, the SpecsScan, is firmly mounted to the transceiver with a factory-provided bracket.



This shows the IC-22S output. The horizontal divisions are 50 MHz and the vertical, 10 dB. The tall pip at the left is the base indicator with the 2-meter fundamental appearing at the center. The fundamental is attenuated to prevent overloading of the analyzer. All spurious signals are more than 70 dB down. The IC-22S exceeds FCC requirements for spurious radiation.

supply the two amperes needed for the IC-22S will also supply the current needs of the scanner. Each SpecsScan-S comes with a special mobile mounting bracket which allows the scanner to be mounted directly above the transceiver for a mobile installation.

The SpecsScan-S is the same size as the IC-22S and same color. Together the units make an attractive addition to most shacks.

The IC-22S is available from a large number of dealers, price class \$300. The SpecsScan-S is available from Spectronics, price class \$150, which includes everything needed for a complete hookup. Spectronics makes a package deal of both units at a price class of \$400. As an introductory offer for those ordering the package, Spectronics will wire the units. — *WB8NAS*

### ICOM IC-22S and Spectrum SpecsScan

Dimensions (HWD), IC-22S: 2.28 × 6.14 × 8.58 inches; SpecsScan: 2 × 6.14 × 8.58 inches.

Voltage (both units): 13.8 V dc negative ground.

Current, IC-22S: 2-A transmit, at 10 W, 0.9 A at 1 W. Receive, 700 mA, maximum audio, 400 mA squelch. SpecsScan, 500 mA.

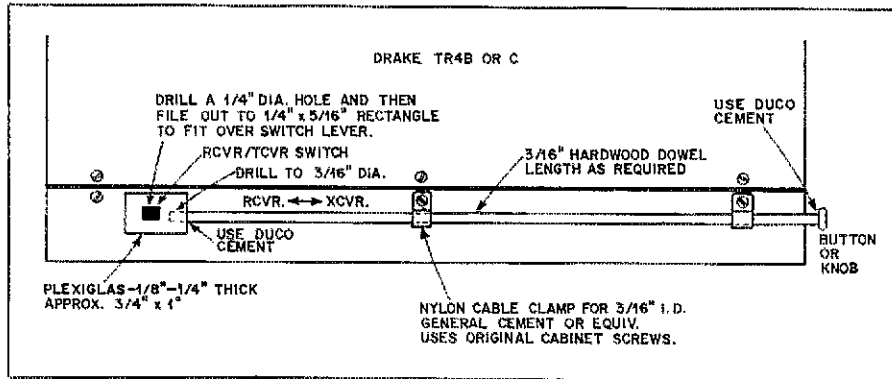
# Hints and Kinks

## LEVER ELIMINATES NEED FOR LONG ARMS

Here is a kink which I have incorporated in my TR-4C and R-4C lineup at W1EWD. The drawing illustrates how the T-R slide switch on the TR-4C is operated by a rear-mounted lever that avoids the inconvenience or reaching behind the set to change from send to

receive and vice versa. A toggle switch at my operating position allows me to switch headphones to the receiver.

I'm interested in cw work and like good selectivity. For this reason I find the R-4C is very effective when used in conjunction with a narrow-bandwidth filter. — Ken Bishop, W1EWD



Lever for operating rear-mounted switch on Drake TR-4C and R-4C equipment.

## VOX FOR VERY SMALL BOX MODIFICATION

I recently built the "VOX for a Very Small Box," described by Blakeslee in *QST* for March, 1976. Although the unit performed well, one problem became apparent. The cure might be worth passing on to others who may have encountered the same trouble.

At the end of each timing cycle of the NE555, relay K1 would drop out for a fraction of a second, even though audio was still being fed to the input of U1A. I suspect this resulted from the NE555 needing a

certain period of time to recover before being retriggered.

The solution to the problem was found in *The TTL Cookbook* by Don Lancaster. The addition of a single pnp silicon transistor allows the NE555 to perform as a negative-recovery monostable multivibrator. The timer may be retriggered continuously and relay K1 stays engaged between timing cycles.

My newly constructed VOX has been a valuable addition to my Galaxy GT550 transceiver. I wish to thank Mr. Blakeslee and the staff of *QST* for sharing the design with me. — William B. Jones, W7KGZ

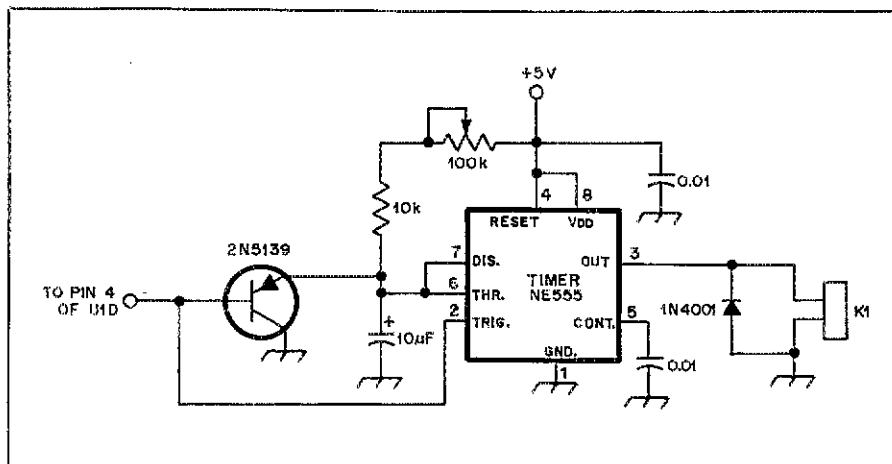


Fig. 1 — Modification of the "VOX for a Very Small Box." The addition of the pnp silicon transistor allows the NE555 timer to be retriggered continuously and relay K1 stays engaged between timing cycles.

## VARIABLE LOW RESISTANCE

After years of searching for a means of obtaining a variable low resistance which will handle some power, I found this answer. A Slinky coil, obtainable in toy stores, consists of about 80 turns and an approximate resistance of three ohms. By suspending the coil from one end and using contact clips, any resistance up to that value is available. Addition of one or more coils extends the resistance range.

For experimental purposes, such as testing low-voltage power sources under load and numerous other applications, one of these toys is a handy gadget to have around the shack. When purchasing one of these units, one should be sure the material is steel, not plastic. Some are being made of nonconductive stock. — Gordon Wiley, W1AUN

## FENCE INSULATORS FOR TRANSMISSION LINES

Polyethylene electric-fence insulators, used widely on farms, are just the right size to accommodate 300-ohm, open-wire transmission line. Farm supply stores sell them for under 10 cents apiece. I have used them both outside and inside the house. — Karl A. Hansen, WN9UUD

## THOUGHTS ON COPPER-CLAD WIRE FOR ANTENNAS

While coated copper wire is desirable for use as antenna wire, it is still hard to beat the low cost of copper-clad steel wire. When one can buy a half-mile reel for about \$23 (under one cent per foot), the copper-clad material seems like a real bargain. This type of wire, used for electric fences by farmers, is available at farm supply stores, or may be purchased from Montgomery Ward and Company. Their buyer told me it is 32-percent copper, not much under the 40 percent shown in the ARRL "reminder book." While this fence wire is 18 gauge, the strength is way over that of hard-drawn copper. The National Electrical Code specifies nothing smaller than 14 gauge should be used for antennas. I doubt, however, that one ham in 50,000 knows this rule is based on copper. In deciding to use copper-clad for my antenna system, I thought that if it held up for the farmer it would hold up for me.

Wards also sells 15-gauge aluminum wire in 1/4-mile coils for slightly over one cent per foot. I've considered this for use as radial wire. — Temple Nietzer, W9YLD

[Editor's Note: After several years of exposure to weather, copper-clad wire becomes pitted in various spots. It should be examined every two or three years.]

## SOLDERING STAINLESS-STEEL WIRE

Some amateurs are using stainless-steel wire for antennas and ground radials because of the durability of the material. The conductivity is less than that of copper but the trade-off is worth considering where climate and weather are enemies of antenna systems. My antenna, constructed with No. 13 solid stainless-steel wire, remained in perfect shape through four years of rigorous weather. I found it easy to solder the connections by cleaning the ends to be spliced with no. 120 grit emery paper. Then I wrapped the wires together for about one inch. A stainless-steel soldering kit, such as sold by Sears, is used to complete the connection. Place a drop of acid-flux solder on the joint while applying heat from a 150-W soldering iron. Allow the solder to flow evenly over the splice and the work is finished. — *P. L. Demmer, KH6CTQ*

## SMALL-SPACE 160-METER ANTENNA

I have had my lumps with 160-meter antennas but this one works well and may interest top band operators with little room to spare. I call it a reverse-fed Marconi but it may appear also as a modified form of a loop antenna. The hot end is fed in the shack through an L network and the far end is grounded. The last 45 feet or so consist of a telescopic steel mast with the base grounded by means of several driven pipes all connected together. The rest of the antenna is a slanted wire extending from the top of the grounded mast to my TV mast, some 50 feet away. The 20-foot down-lead terminates at the L network. This wire antenna has enabled me to work VR3, HKØ, YV and several other DX areas. — *Arthur B. Hale, W4AWS*

## QUIETING THE YAESU FT101E/EE VOX RELAY

The FT101E/EE transceiver is an enjoyable rig to operate. Mine does have a rather noisy VOX relay which is a distraction, especially during cw break-in operation. Recently, I removed the audio circuit board and cleaned both sides of the contacts, using a pencil eraser. To remove all eraser residue, I thoroughly wiped the surfaces with a cloth well moistened with denatured alcohol. The cleaning not only removed a hum that was noticeable when the speaker was cut off but also eliminated most of the noise from the relay. — *David R. Malley, K1NYK*

## PLASTIC TUBING FOR INSULATION

To protect coaxial-cable braid from weather corrosion, I use clear plastic aquarium air tubing. This material is available at pet shops and many hardware stores. When purchasing the tubing, fit a sample of the braid to be sure the tubing has a large enough inner diameter. The clear plastic material permits easy periodic inspection of the braid. — *Carl Nebelsky, WB1BPZ*

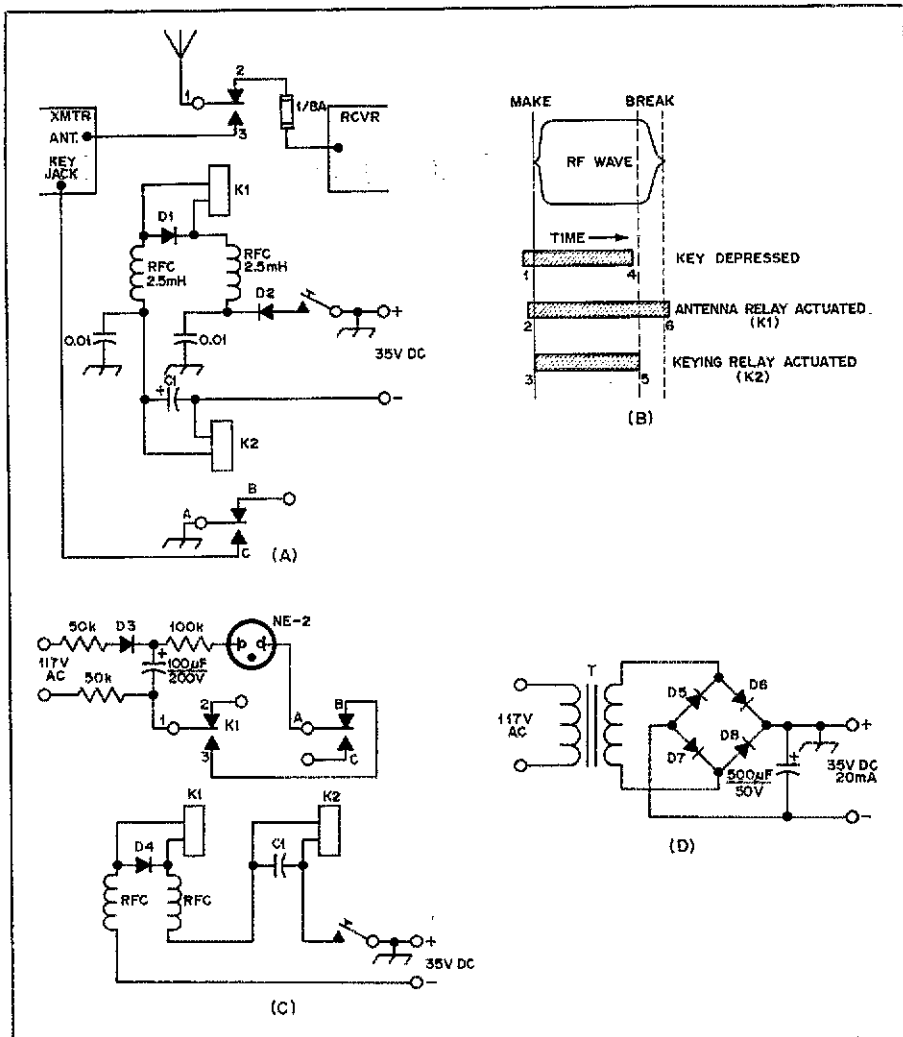


Fig. 2 — A simple cw QSK circuit is shown at A. The effect of closing and opening the key on the rf wave is illustrated at B, while C represents a simple test circuit for the system. The power supply at D may be used. D1-D8 are 600-PIV, 1-A diodes. K1 and K2 are Sigma 65FP1A-12DC relays.

## SIMPLE CW QSK

Efficient use of the cw portion of amateur bands must include break-in keying. Toward that end, this system has been used successfully at a dozen or so very active stations, some using full kW transmitters. Construction cost, covering all new parts, power supply and simple test circuit, is under \$35.

The series relay system shown in Fig. 2A switches the antenna from receive to transmit and keys the transmitter in a sequence that assures cold switching of the transmitter rf output. The relays are fast enough to follow code elements at speeds in excess of 45 wpm.

Proper keying sequence is accomplished by causing K2 to be delayed in closing normally open contacts by connecting a capacitor across the relay coil. Antenna relay K1 is delayed in opening normally open contacts by a diode shunted across its coil. The number sequence in Fig. 2B indicates the progression of events as the key is closed, then opened.

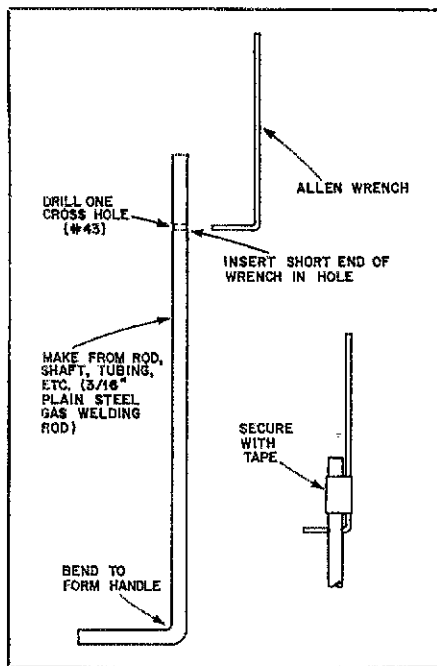
A simple test circuit, shown in Fig. 2C, provides a means of observing and verifying the proper keying sequence. A solid flash of the neon bulb should occur upon closing the key and again when the key is opened. A variable resistor in series with D4 and/or C1

allows adjustment of the sequencing. The effectiveness of D4 and C1 may be observed by disconnecting them one at a time. Usually no series resistor is required.

Because K1 and K2 do not have insulated moving contacts, K1 must be operated above rf ground potential. That is the reason for the rf chokes and a base made of insulating material. These relays are operated from a 35-V dc, 20-mA power source. A suitable supply is shown in Fig. 2D.

Relays may be mounted in the same housing or in separate cases. Shielding between relays is not necessary, but rf leads should be kept well apart from other leads. A 5 × 4 × 3-inch Minibox encloses my relays. Coaxial cable fittings are used for the antenna and transmitter rf output connections. Shielded phono jacks are used for all other external connections. The relays may be located anywhere between the transmitter and antenna or Transmatch. Insertion of K1 in the coaxial line does not introduce "suck-out" and does not inhibit hash or backwave.

Among the sources for relays are C and H Sales Co., 2176 East Colorado Blvd., Pasadena, CA 91107 and Olive Industrial Electronics, 6622 Olive Blvd., St. Louis, MO 63130. — *Herbert H. Stevens, W6RSP*

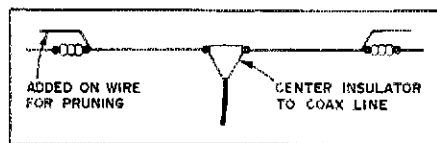


### EXTENSION FOR SETSCREW WRENCH

This idea for making an extension for set-screw wrenches to reach deep-seated screws was suggested by the late William L. Smith, W3GKP, a former designer of electronic equipment. The extension may be made from welding rod, a shaft or tubing, and can accommodate wrenches for setscrews no. 8 and smaller. — *WIJEC*

### UNWANTED RF PATH

The four-conductor cable from an antenna rotor system makes an excellent path for unwanted rf reaching the shack. Connecting 0.01- $\mu$ F capacitors from each lead to ground eliminates the problem. — *Michael Scheidt, WA7GUD*



### CUT TO ORDER

When erecting dipoles, a bit of pruning is usually necessary to bring the system into resonance at the selected portion of the band. It can be quite a task to correct a mistake if the antenna is cut too short.

A method that I use is to cut the antenna slightly short of the calculated length and then solder on an additional length of rigid No. 12 copper wire at each end, making the total length a little longer than the calculated figure. It then becomes a simple matter to prune a little at a time until the antenna is precisely where you want it. Usually the added rigid wire is found to be between one and five inches long and it is self-supporting. — *Bill Tucker, W4FXE*

### SHORTIES FOR THE SHOP

If you use a typical self-supported tower without the top section, the structural pipes are open-ended at the top. Corks placed in the top of each pipe will prevent moisture build-up and wind whistle. — *Richard Mollentine, WAØKKC*

An old trick for soldering to aluminum is to place a drop of oil on the aluminum and then scratch the metal with a knife or other sharp instrument until the area to be soldered is shiny. Apply a soldering gun or iron and rosin-core solder. After the solder has taken, wipe the oil from the surface. A very neat solder base should then appear. — *Tom Bracket, KØJFN*

When soldering wire to an SO-239 female chassis connector, insert the head of a pair of chain or round-nose pliers into the contact sleeve on the front of the SO-239. The pliers act as a heat sink and will prevent the plastic insulation between the inner and outer conductor from melting. — *Dean Smith, WN9RIJ*

### GAMMA MATCH RELIABILITY

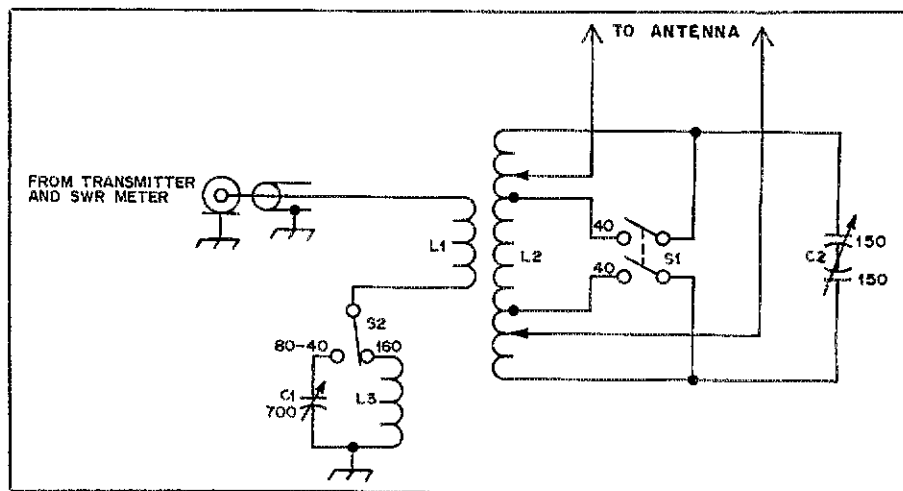
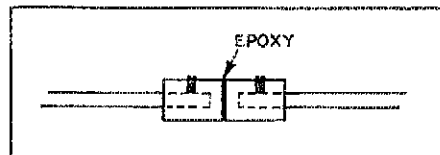
Though the rf voltage across a gamma-match tuning capacitor is typically low, satisfactory reliability can be attained only with the use of a transmitting capacitor. The Millen 12000 series or equivalent with spacing for 3000 V is

a good example. In working with my three-band quad, which employs a separate gamma match for each band. WB2BXL and I found that receiving-type capacitors simply would not stand up, even at lower power levels.

Cobwebs and trapped insects can become moisture collectors in weatherproof boxes with drain holes. The inevitable result with close-spaced capacitor plates is arcing and serious detuning of the matching network. This was our lot. The troubles disappeared after substitution of transmitting capacitors. They were installed in plastic refrigerator boxes with a drain hole punched in each bottom. The covers are sealed with black vinyl electrical tape. Also, a mothball or piece of camphor is placed in the box and helps to repel insects, besides inhibiting corrosion from condensation. — *R. G. Rowe, K2BK*

### SHAFT COUPLERS MADE FROM KNOBS

Ever need a simple insulated shaft coupler on a weekend when the stores were closed? Should that happen again, just epoxy two small radio knobs together, face to face, and away you go! — *Craig Iansiti, WD8BDQ*



A multiband antenna coupler that includes 160 meters.

### AN ANTENNA NETWORK THAT COVERS 160

Owners of equipment having 160-meter capability may be interested in the matching network I use for an inverted-V antenna with my DX-100. The antenna extends 46 feet (14 m) per leg and is 40 feet (12.2 m) high. The feeder is a 40-foot (12.2-m) 450-ohm tuned line. I have also used this network to match my transmitter with a 36-foot groundplane antenna mounted 25 feet above ground. The network can be adjusted for a 1:1 SWR on each band, 40 through 160 meters.

L1 consists of 12 turns, 2-inch diameter

(51 mm) and 10 turns per inch (approximately 7  $\mu$ H). L2 is 37 turns, 2-1/2 inch diameter (64 mm), 3 turns per inch (approximately 37  $\mu$ H). L3 should have 20 turns close wound, 2-3/8 inch (60 mm) diameter (approximately 30  $\mu$ H). L1 and L3 have No. 18 wire. L2 is wound with No. 12 wire.

I have a set of taps that permit switching from 80 to 40 meters by just retuning C1, the link capacitor. I use these taps when I go from RN6 on 80 meters to PAN on 40 meters. No tap change is needed to move from 80 to 160. By switching L3 in, the antenna network may be tuned to 160. When changing bands C2 must be readjusted. — *Richard Barnes, W6IPL*

## ARRL Destroys Windmill!

June 6, 1973, was a very dark day for amateur radio. Universally, hams were shocked and outraged when they learned that FCC had proposed taking the top 1 MHz of the 220 band for Class-E CB. Doom and gloom reigned supreme. Proponents of the measure included the Electronic Industry Association (EIA) and the Office of Telecommunications Policy (OTP). One message came through loud and clear from our membership — the League must do everything in its power to stop this. The atmosphere of that day indicated that the doom-mongers had a big share of the audience in the amateur community. We were compared to Don Quixote fighting the windmills. When our original petition for an extension of the deadline for comments was denied, we appealed. Finally, we were granted the extension, but in the meantime we had been encouraging, begging and pleading with individual amateurs and numerous groups to write the Commission countering with logical arguments. We had also been preparing our own filing which in its final form weighed over three-quarters of a pound. No assertion in the original proposal went unchallenged. We raised issues that questioned the credibility of the very idea. Our presentations were so thorough and so well-documented, that even the powerful forces that supported Class E were unable to "ram" it through. Time was on our side.

On October 13, 1977, the FCC made public its decision to drop its proposal for Class E CB (Docket 19759) as obsolete. The following is taken from that release:

1) The number of CBers increased dramatically to 10,406,828 as of May, ac-

companied by a change in how the service was used;

2) In February, 1976, the FCC formed the Personal Radio Planning Group (PRPG) to conduct an in-house study of personal radio services, and two months later set up the Personal Use Radio Advisory Committee to obtain assistance from industry and users; [ARRL has been represented on PURAC since its founding. — Ed.]

3) In July, 1976, the Commission increased the number of CB channels from 23 to 40;

4) The following April, after completing the initial phase of its frequency evaluation study, the PRPG concluded that other frequencies as well as the 220- to 225-MHz band should be considered for personal radio service. 220- to 225-MHz band should be considered

These and other developments made the comments and reply comments of the Docket obsolete, the Commission said. Furthermore, it believed the issues listed in the 1973 Notice no longer provide an adequate basis for a personal radio service, and new rulemaking would have to be framed based on newer information.

Therefore, its termination is in the public interest," the Commission said, adding that it would consider the issue in some future rulemaking.

### Repeater Deregulation

In other matters before the FCC, the League has filed for reconsideration in Docket 20133 protesting the elimination of special calls for repeaters, protesting the elimination of separate licensing for repeaters and stating

that there ought to be better protection for those on vhf/uhf engaged in weak-signal work. President Dannals and General Counsel Booth were particularly encouraged by the strong dissenting statement from Commissioner Margita White.

### Amplifiers and Type Approval

The FCC has granted the League's petition for oral argument on the use of linear amplifiers (Dockets 21116 and 21117) and has scheduled three hours on December 1 for those presentations. The League has asked for one hour of this time period and it is expected that other groups (including the Amateur Radio Manufacturers Association) and individuals will provide additional input.

### Ex Parte Contacts

The United States Supreme Court refused to consider the request of FCC that the Home Box Office decision by the Court of Appeals be reviewed. The result is that the obstacles imposed last spring on ex parte contacts (informal, unrecorded discussions) in rule-making matters will continue. This will continue to make the League's task of dealing with the FCC much more difficult in the months ahead.

### Saudi-Arabian Third Party

The agreement between the governments of Saudi Arabia and the United States to allow amateur radio station 7Z1AB to exchange third-party traffic has been discontinued. This is due to the departure of the licensee, U.S. Ambassador William Porter, from Saudi Arabia. —

## VANIK BILL GAINS COSPONSOR

Congressman Joseph Lyman Fisher, of Virginia, tells William T. Barron, W4WCF, that he will cosponsor HR-8496, the bill introduced by Representative Charles A. Vanik of Ohio to give FCC authority over the radio frequency interception potential of home-entertainment devices (TVs, stereos, cassette recorders, etc.). The full story — and some nice quotes! — on the Vanik bill appear on page 57, October *QST*. Bills with similar objectives had earlier been filed by Senator Barry Goldwater, K7UGA, of Arizona (see page 64, May *QST*) and Representative Adam Benjamin, Jr., of Indiana (see page 64, September, *QST*) — S-864 and HR-8079, respectively.

Good message here: Contacting your rep-

resentatives in Congress can pay off for ham radio. How about it — have you written? — *WIUED*

## KM1CC — THE LAST SPECIAL-EVENT STATION?

On January 18, 1903, from the Marconi Rotary Spark Gap Station located in South Wellfleet (Cape Cod), MA, Guglielmo Marconi successfully completed the first two-way radio transmission between the United States and Europe. During the week of January 14-22, 1978, special-event station KM1CC, will be celebrating the 75th anniversary of this event. The station will be operating from the original Marconi station location in South Wellfleet and is being sponsored by the Town of Barnstable Radio Club. K1VV had the foresight to apply for the special call sign

some time ago, before the FCC put the freeze on issuing any new special call signs.

Operation of KM1CC will be on 160 through 10 meters (cw, ssb, RTTY and SSTV where permitted) with some attention given to 2-meter fm and 6-meter\*ssb. The FCC has granted special approval for the use of A2 on all amateur bands and the famous sound of the 240-Hz Marconi Rotary Spark Gap will be reproduced for cw QSOs. It is said by the old-timers who lived near the original "CC," that it could be heard for several miles without the benefit of a receiver.

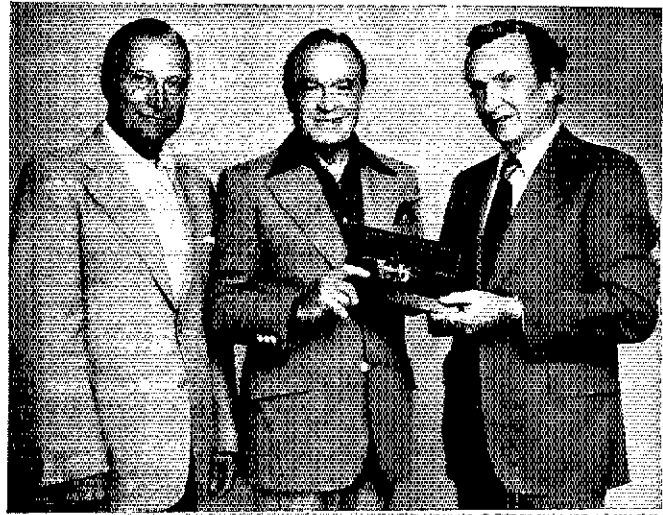
Additionally, the Cornish Radio Club will be operating special-event station GB3MSA (Great Britain Three Marconi's Seventy-fifth Anniversary), at Poldhu, England, at the original Marconi station location. The Irish Radio Transmitters Society will also be on with an as-yet-undetermined EIØ special-event call sign from a site in Clifden, Ireland, where Marconi had another station. —

\*Public Information Officer, ARRL





Douglas Edwards of CBS News accepts a plaque for his assistance in The Wide World of Amateur Radio from Peter O'Dell, ARRL Public Information Officer as Steve Mendelsohn, WA2DHF and producer of the radio series, looks on. (WB1ADL/W1RM photo)



Bob Hope accepts ARRL plaque from TV newsman, Roy Neal, K6DUE, right. At left is John Pawlek, long-time radio engineer for Mr. Hope, who made the recordings. (NBC photo by Herb Ball)

Dick Van Dyke accepts ARRL plaque from PRA Lenore Jensen, W6NAZ and his partner-director, Byron Paul, WA6RNG, on set during filming of a Kodak commercial Byron did the recording of the public service announcements which were written by Lenore. (W6VGQ photo)



Edgar Bergen is presented with ARRL plaque before the Pacific Pioneer Broadcasters In Hollywood by Alvino Rey, W6UK, left, who explained to the group that amateur experimenters had made the first radio broadcasts. Charlie and Mortimer were unable to attend the ceremony, but were noted as also having assisted. (W6VGQ photo)



## PUBLIC RELATIONS -- ON THE UPSWING

Several exciting developments in our PR efforts have occurred in the last few months. To recap, over a year ago, through the hard work of Lenore Jensen, W6NAZ, we were able to persuade Dick Van Dyke to record some public service announcements (PSAs) for amateur radio. We were able to distribute about 300 copies of these spots to various radio stations around the country. About nine months ago, W6NAZ succeeded in getting Bob Hope to record some more radio PSAs for us, which we began distributing to the stations that had received the Van Dyke spots. We were able to add additional stations to the point that over 700 stations have carried these spots.

Earlier this year we reached agreement with Steve Mendelsohn, WA2DHF, to syndicate a 15-minute, six-part radio series that he produced, entitled "The Wide World of Amateur Radio." This has now been aired over at least 200 stations across the country. Recently W6NAZ was able to persuade Edgar Bergen to record additional radio spots for us. These, we anticipate, will be ready for distribution sometime around the middle of January. WA2DHF, employed by CBS, was able to "walk" our paperwork through the CBS legal department so that the spots could then be played on the CBS Radio network. As a result of these efforts, in one week during early October Headquarters received more general-inquiry letters than were received during the entire year of 1975. We have received word from hams all across the country that

they have heard the amateur radio spots on local CBS affiliates.

In the very near future we will begin to distribute two audio/visual PSAs which Dave Bell, W6BVN, has produced for us for use on TV. These spots were developed around footage shot during the California fires earlier this year. Both emphasize the value of volunteers in times of emergency -- of course the volunteers just happen to be hams! These should be available for distribution around the first of December. Additionally, it is planned to expand "The Wide World of Amateur Radio" to 13 weeks for this spring, although details have not been finalized at this point. The League feels that these efforts, to let the public know of the valuable service that hams provide, will be useful to every amateur. --

## BEHIND THE DIAMOND

Whether it means troubleshooting problems for ARRL members in the Pacific Division or acting as backup for W6OWP during the ARRL West Coast Qualifying Run, Jean A. "Doc" Gmelin, W6ZRJ, is one ham who puts at least 100 percent into any activity. Although retiring this month as Pacific Division Director after 10 years on the job, "Doc" has no intention of becoming inactive. "I'm going to miss the give-and-take of the Board meetings but I will stay busy with ham radio — you can be sure of that," he said.

Jean Arthur Gmelin was born in Bay City, MI, but shortly afterward his family moved to San Jose, CA, where they had resided before his birth. He attended local schools, including San Jose State College where he graduated in 1955 with a BA in Photojournalism. The only interruption Doc's college career suffered was during the Korean War in which he served as an Aviation Photographer's Mate. Although his Naval Reserve unit's esprit de corps ran high (the unit volunteered to go serve in Korea), the Defense Department declined their offer and kept them stateside.

Following his release from active duty, Gmelin worked for several San Jose area newspapers as a photojournalist. After several years, however, Doc switched to education where he has been ever since, first as a science teacher, now as the audio-visual coordinator for Fremont High School. His responsibilities include operation and maintenance of the school's closed-circuit TV links and duplicating services. His educational pursuits continue (he received an MA from San Jose in 1960) with active participation in the Fremont High School Faculty Club and the California Teachers Association.

Doc's amateur career began in 1947; he achieved Amateur Extra Class status in 1969. From the beginning he was involved with clubs and traffic handling. His ARRL appointments include ORS, OPS, OBS and OO. He is active in ARES, a member of the A-1 Operator Club, and a Life Member of the League. He belongs to the following radio clubs to name but a few: QCWA, the West Valley ARA, the Santa Clara County ARA, the Society of Amateur Radio Operators, Northern California Contest Club, and Baycom. All this and trustee of two club stations: W6UW/W6UU, the Santa Clara County ARA station at Red Cross hq, and WA6DVV, the

Fremont High School Bandjammers Radio Club.

Writing for *Worldradio News* and *QST* also move Gmelin. In his *Worldradio* column, W6ZRJ keeps readers of that publication updated on the ARRL plans for handling a number of problems facing amateur radio enthusiasts. His position as Director and many years in amateur radio mean a first-class piece of writing every month. In addition, Gmelin has written feature articles for *QST*.

Does he have any other interests? Sure! His duck hunting exploits have earned him the title of "California's Number One Duck Hunter" courtesy of Robert York Chapman, WIQV. "I'd like to get back into competitive pistol shooting after I retire as Director," Doc said, "I've missed it over the last several years." He is also involved with Masonic Lodge work. A member of Sunnyvale no. 511 F. & A.M., San Jose Scottish Rite (32nd degree), the Islam Temple Shrine, ZRJ manages to squeeze in a few hours for the International Order of Job's Daughters with his wife.

This year Doc and Caroline, K6BGM (also a Life Member of ARRL), celebrated their 25th wedding anniversary. They have three children: Ann, 19; Bob, 15 and Katherine, 6. The Gmelin family lives in Cupertino, CA.

The only question remaining for Gmelin to answer is one that has perplexed him since he first became interested in amateur radio. Namely, how does an avid ham fit the Pacific Division Convention in with the start of duck hunting season (on the same weekend)? Obviously a foul fate, but we believe that Doc will be able to wing it! — *WAITZK*

## ANOTHER TILTON RETIRES

When Leitha Phillips Tilton came to work at the League, amateur radio was only two years removed from the World War II blackout. As she retires, the amateur radio of those days seems radically different from what we know today. Leitha's charm and wit, however, are two qualities that have not been affected by time.

Although she is anxious to enjoy retired life with her twice-retired husband, Ed, WIHQ, Leitha nonetheless has mixed emotions about the decision. "I'll miss the many friends I've made over the years," she says. "But both Ed and I enjoy traveling very much. We hope to do a lot more in the coming months." When not on the road, they'll live at their Canton, CT, home.

Nearly all of her ARRL employment was spent in the Circulation Department where orders for publications, supplies and membership are handled. She was also a stalwart member of the ARRL Girls Club, serving in every leadership position except secretary. Her retirement will create a void that even the most dedicated personnel department would have trouble filling.

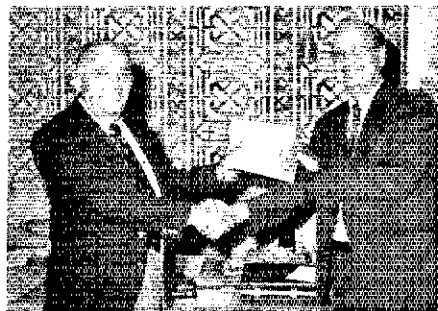
Leitha remains active, however. Aside from traveling (the couple explored England on their honeymoon last spring), she enjoys collecting stamps and coins and is an enthusiastic rockhound. Although she no longer sings regularly in the Grace Church (Episcopal) choir in Newington, Leitha is maintaining her interest in music. "I hope to devote more time to the choir in Canton now," she said.

Has the ham radio "bug" ever bitten Leitha? You bet! Unfortunately, her duties in the Circulation Department have kept her from going beyond learning the code. "I must have learned it and relearned it four or five times," Leitha explained. "Now that I have more time, I hope to get my license soon."

Following her retirement party thrown by the ARRL 10-year club, her friends at Hq. hope she'll also find time to come back and visit often. — *WAITZK*

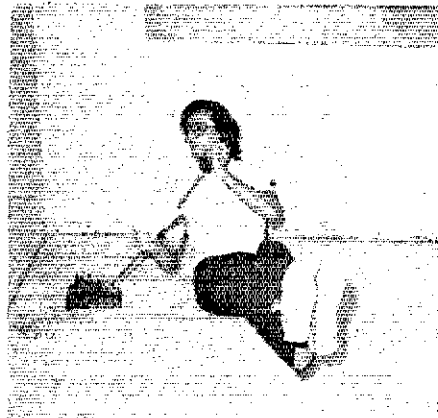


Leitha Phillips Tilton



Great Lakes Division PRA, K8JA, presents \$1000 contribution check to Director Egbert, W8ETU for ARRL Foundation (and AMSAT) on behalf of the Toledo Mobile Radio Association. (WABJUU photo)

PLUSH OFFICES????? When the expansion of the headquarters building was first announced, certain perennial critics bemoaned that membership funds were being squandered on plush offices. Shown above is Deputy Department Manager, (Membership Services), Hal Steinman, K1ET, hard at work in his new office. Now we ask you, does this look like a plush office?



"Doc" Gmelin, W6ZRJ



# Coming Conventions

January 21-22, 1978  
Southeastern Division, Miami, FL  
February 17-19  
Florida State, Orlando, FL  
March 18-19  
South Carolina State, Greenville, SC  
March 25  
Great Lakes Division, Muskegon, MI  
May 5-7  
Delta Division, Baton Rouge, LA  
May 13-14  
Alabama State, Birmingham, AL  
May 19-21  
New York State, Rochester, NY  
May 20  
Wisconsin State, Lake Delton, WI  
May 27-28  
Tennessee State, Knoxville, TN  
July 1-2  
West Virginia State, Jackson's Mill, WV  
September 1-3  
West Gulf Division, El Paso, TX  
September 22-24  
ARRL National, San Diego, CA

October 13-15  
Midwest Division, Kansas City, MO  
October 14-15  
New England Division, Boxboro, MA  
November 11-12  
Hudson Division, McAfee, NJ  
November 18-19  
South Florida Section, Clearwater, FL

NOTE: Sponsors of large ham gatherings should check with League headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL hq. for up to two years in advance.

# Hamfest Calendar

Indiana: South Bend Swap n' Shop is January 8, at New Century Center downtown by river on U.S. 31 Oneway North across from St. Joseph Bank Building. Half acre in one large room at ground level of entrances and loading dock. Tables \$2 each. Four-lane highways to door from all directions. Talk-in: 146.52 and area repeaters. Info from Wayne Werts, K91XU, 1889 Riverside Drive, South Bend, IN 46616.

# Club Notes

In mid-September all actively affiliated clubs received a package of materials for a membership solicitation drive. Included were new pamphlets covering why amateurs will want to join clubs, order sheets for getting lists of ARRL members by ZIP code to solicit, special ARRL membership forms for persons joining through their club (their treasury gets \$1.50 for each one), and other promotional aids.

Want quizzes to use during your meetings? Let us know what topics you'd like to see them on, what format (multiple guess, true-false), whether you'd like ideas or an outline for planning a program to go with the quiz, and any other suggestions you have. Staffer WA6RBE would like to know.

Like what you read here but your club isn't affiliated? You never know, the club may have been at one time and is just in our "inactive" files. Write us and we will check the archives — let us know if the club ever had another name, too. If the club is inactive, all that's needed is for 51 percent of the members to be ARRL members and to fill out and return a one-page annual report which we will send. If the club never was affiliated, we'll send a "club kit," containing affiliation papers and all sorts of aids for the club. Once these forms are completed and returned, the affiliation process (Hq., Director and Board of Directors' Executive Committee approval) starts. Write! — WA1STO

# 50 Years Ago

December, 1927

QST devotes a major portion of this issue to a hearty welcome for the new UX-222 shield-grid tube, along with several construction articles. It's really a screened-plate, of course, and the shielding prevents the grid-plate capacitance from causing self-oscillation. Thus it is an ideal tube for r.f. amplifiers without requiring neutralization.

Harold Westman's version graces the cover — the r.f., detector and audio sections each in its own metal compartment. IANA's design highlights even more shielded sections, housing "decoupling" circuits to insure against stage interaction.

The Editor writes from Washington with heavy heart — only four of the 52 nations at the frequency conference are known supporters of amateur radio (Canada, Australia, New Zealand and the U.S.A.). President Maxim is concerned, but points out how much worse it would be were there no League or I.A.R.U.

At A.R.R.L.'s request, the Federal Radio Commission has opened 14,000-14,500 kc. (of a 14-16 Mc. band) to voice, as well as 5 meters. The 75-meter phone segment is deleted; interference to c.w. has been too great.

The League is sponsoring another DX test in February, and (horrors) announces \$4000 worth of prizes for the winners!

Kruse, though crediting others for part of the idea, speculates whether using a microphone diaphragm as one plate of a crystal holder would produce a frequency modulation system.

The "current-fed Hertz" is a popular antenna, and Robert Whitmer shows us some energy distribution diagrams and how it can best be adjusted for correct operating conditions.

9XL, one of the standard frequency stations, has had so many complaints about its pure d.c. note (hard to tell from broadcast harmonics) that they've added a chopper wheel in the power supply to produce a distinctive tone.

# 25 Years Ago

December, 1952

The Editor reminisces about the first U.S. radio law (1912), in particular that the initial concept of licensing receivers as well as transmitters (as in most other countries) was dropped only because the Wireless Association of Pennsylvania lobbied hard on behalf of amateurs. (Its spokesman, Charles Stewart, 3ZS, became ARRL vice president when the

League was formed in 1914.)

WN7RMP still finds bargains in war surplus, this time a radio compass (\$4.95) which he converted to a receiver, with room left in the cabinet for a small transmitter.

Malfunctioning relays have been a major source of trouble in electronic keys, so W21MU presents a circuit using only tubes.

The versatility of the Viking 1 is once again proved as W1LF1 describes how to revamp it to produce a 5-meter signal.

Another fine article on sideband by W9OHM, this one showing some receiving techniques, in particular recommending oscillator injection at the signal frequency rather than i.f.

A flashlight bulb connected to a small circle of wire is simplicity itself, but this "tuning loop" has many practical applications in the ham shack, WIICP says.

W1HDQ's high-power rig covers 21 and 28 Mc., but the pi-net circuit has also been designed to cover 50 Mc.

W1DF has a nifty 5-band rig with a 6146, bandswitching, v.f.o., TVI-proofed and provisions for modulating the screen.

Secondary standard, frequency meter, signal generator and modulation monitor are capabilities in a single unit built by VE3PN.

Motorola announces F.C.C. has type-approved its Citizen's Band equipment — for 460-470 Mc., that is. — W1RW

# Silent Keys

It is with deep regret that we record the passing of these amateurs:

\*W1FYZ, Dr. Joseph S. Rosko, Wethersfield, CT  
 W1IA, Gordon B. Stanys, Stamford, CT  
 W1IG, Dr. Carl F. Muckenhoupt, Newton Highlands, MA  
 W1NCX, Earl C. Fish, Greenwich, RI  
 K1RYP, Albert R. Barrett, Walpole, MA  
 W1WTK, Samuel H. Townsend, Haverhill, MA  
 K2BBX, Stanley F. Dobrowski, Jr., Kearny, NJ  
 K2BJ, William E. Hart, Williamsville, NY  
 W2FYE, Franklin H. MacIndoe, Wildwood Crest, NJ  
 WB2HHS, Vernon F. Stoberl, Tonawanda, NY  
 WA2JBM, Albert H. Champagne, Rochester, NY  
 WB2JQA, David Lichter, Rome, NY  
 W2KZY, Edward Broland, Speculator, NY  
 WB2MAP, Myles G. Standish, Little Silver, NJ  
 W2NCA, Rudolph H. Gottschalk, Wyckoff, NJ  
 WB2NJE, Leech H. "Fie" Fifield, Honeoye Falls, NY  
 WA2NNR, Richard A. Cox, Keansburg, NJ  
 W2NWL, John W. Case, Bricktown, NJ  
 K2POX, Robert L. Robinson, Cortland, NY  
 W2RQ, Karl B. Hoffman, Kenmore, NY  
 K2YNM, David W. Johnson, Burnt Hills, NY  
 WA3CIV, Charles C. Dwight, New Cumberland, PA  
 K3DRK, Edward A. Fazenbaker, Hagerstown, MD  
 K3DS, George C. Kimball, Waymart, PA  
 W3GS, John E. Wagoner, Media, PA  
 W3KPM, Thomas T. Schwab, Fairview, PA  
 W3KZQ, Walter H. Johnson, Oxon Hill, MD  
 K3LWT, Rev. D. Earl Trimbath, Butler, PA  
 W3NSX, Joseph H. Mozuch, Pittsburgh, PA  
 W3WWZ, Benjamin J. Crapo, Brentwood, MD  
 WA4ATE, Charles N. McLarty, Memphis, TN  
 W4BHX, William L. Love, Jr., Gulfport, FL  
 WB4BLT, Forrest A. Carter, Jr., Virginia Beach, VA

W4CCA, Hubert M. Hickman, Wewahatchka, FL  
 W4CX, William T. Gerson, Pompano Beach, FL  
 W4EFB, James H. Lazenby, Jacksonville, FL  
 K4EN, William C. Kohl, Coral Gables, FL  
 W4HMH, James H. Emery, Nashville, TN  
 K4HTE, F. Bruce Parsons, Nokomis, FL  
 K4HYW, John Penaz, Miami, FL  
 W4JKU, Edward W. Hooper, Muscle Shoals, AL  
 W4SOX, Joseph B. Sample, Jacksonville, FL  
 WA4SWZ, W. Dan Browning, Richmond, VA  
 W4WBY, Franklin A. Sherrill, Crab Orchard, TN  
 W4WWE, Rev. John W. Snyder, Milton, FL  
 \*W4YEB, Charles B. Raybuck, Alex, VA  
 W5BXO, Hal L. Benson, Midwest City, OK  
 WB5EOY, Richard L. Shumate, Farmington, AR  
 K5EJ, Otto V. Holliman, Henderson, TX  
 W5FLO, Paul A. McCollum, Stillwater, OK  
 W5GI, Lon G. Wainman, El Paso, TX  
 W5GVZ, Talmadge N. Lawrence, Fort Worth, TX  
 K5IHC, Raymond M. Barrington, Garland, TX  
 WB5OBZ, Everett J. Gilmore, Enid, OK  
 WB5RCZ, Gary L. Albert, San Antonio, TX  
 W5UNL, Major Lorin E. Robinson, Albuquerque, NM  
 W5UYR, Rudolph E. Salamon, Rogers, AR  
 W6ANA, Travis "Larry" Emry, Santa Rosa, CA  
 W6BSS, Raymond G. Mattinson, San Clemente, CA  
 WA6EDX, Earl F. Arvin, Smith River, CA  
 WA6ERQ, Richard H. Peterson, Rubidoux, CA  
 WB6FJV, Vincent W. Speer, Vista, CA  
 W6GCF, Charles Busby, Fresno, CA  
 WA6GOR, Vernon E. Cordier, Los Osos, CA  
 WA6UDY, James H. Shoemaker, Ventura, CA  
 \*W6UMI, J. Elliott Judd, Los Angeles, CA  
 W6ZL, Don L. Lusk, Costa Mesa, CA

W6ZTJ, Carrie "Kay" Brown, Concord, NH  
 W6ZWK, Sam E. Parker, San Diego, CA  
 WA7AUM, Lee S. Johnson, Long Beach, WA  
 Ex-7DL, Dwight A. Mason, Gig Harbor, WA  
 KL7HEK, Arthur V. Clark, Anchorage, AL  
 W7QFR, David W. Noonan, Tacoma, WA  
 W7VHZ, Earnest A. Wirts, Freeland, WA  
 Ex-W8AT, John C. Hess, Alliance, OH  
 WA8AWE, John S. Chalupka, Newport, MI  
 WA8DDT, Frank L. Turk, Euclid, OH  
 K8DPD, Everett A. Walters, Willowick, OH  
 K8LGB, Spencer Warren, Cadiz, OH  
 W8RU, Thomas J. Donohoe, Columbus, OH  
 W8SST, Ted F. Dudek, Independence, OH  
 W8UBU, Jessie L. Swift, Morley, MI  
 WA9AAL, Claire L. VanDevender, Indianapolis, IN  
 K9AEI, Walter S. Cooper, Chicago, IL  
 W9AEO, Theodore G. Emmons, Michigan City, IN  
 K9ELF, Paul W. Steinert, Hortonville, WI  
 W9FXZ, Lawrence E. Tyler, Bartonville, IL  
 K9GZG, Ernest C. Delp, Jerseyville, IL  
 WA9GZP, James T. Brown, Chicago, IL  
 K9JFO, Bracy W. Hayes, Blue Island, IL  
 K9MYA, Gilbert L. Porter, Aiton, IL  
 WA9NGL, Joseph J. Mikel, Westville, IL  
 WA9TZZ, William R. Washburn, Culver, IN  
 WB9UMF, Charles E. "Bud" Miller, Bourbonnais, IL  
 W9VMQ, Dwight F. Borton, Zanesville, IN  
 W9BAN, Frederick J. Wells, Goodman, MO  
 W0ILK, Max H. Dunlap, White Bear Lake, MN  
 W0PRI, Karl G. Smith, Lenora, KS  
 VE1EW, R. A. S. Weir, St. John, NB  
 VE1GB, Rev. Harry S. Bird, Windsor, NS  
 VO1EN, The Rev. Dr. Lester Burry, St. John's, NF  
 KP4EPE, Miguel Ruiz Giusti, San Juan, PR  
 KP4OA, Pio A. Torres, Caguas, PR  
 XE1GGV, Luis de la Garza Venegas, Mexico

\*Life Member, ARRL

# Strays



Japan Amateur Radio League President Shozo Hara, JA1AN, addresses members on the World Administrative Conference. Japan's national amateur radio society, the JARL is one of the staunchest defenders of amateur frequency allocations.

## EDWARD E. KLEINSCHMIDT

Keys clattering against paper to reproduce characters sent from a distance have been the hallmark of the teletypewriter, invented in 1914 by Edward E. Kleinschmidt. He died this summer in Canaan, CT, just short of his 102nd birthday. Born in Bremen, Germany, he earned more than 100 patents on other electronic devices even though he had no formal education. Today, impact and thermal printers process words at rates of 1200 per minute or more, but for many Kleinschmidt's name still conjures a vision of exotic machines which allowed people to liberate time and space.

## QRP JOURNAL DIES

Adrian Weiss, K8EEG/Q, has reported the termination of his QRP journal, *The Milliwatt*. The end actually came in June, 1975, after 33 issues, because of its editor's pressing personal matters.

He reports that complete sets of back issues for 1971, 1973, 1974 and 1975 are still available at \$4 each. 1970 and 1972 issues are incomplete, being available at \$3 and \$3.50, respectively. K8EEG says that he's available as an information source for QRP matters, but does not have the time to respond to letter inquiries about the *Milliwatt*. He can be reached at 83 Suburban Estates, Vermillion, SD 57069. — W1FB

# YL News and Views

Conducted By Louise Moreau,\* W3WRE



## YL Groups in India and Brazil

YL interest in amateur radio in Brazil, and in India is growing. In India nearly 40 women hold amateur radio licenses and have become quite active on the air. While there is no formal organization, these women meet each other on the air and are particularly interested in knowing more YLs worldwide. The gals meet at the All India amateur radio conventions, not as a separate YL group but rather these women gather as YL/OM couples that is significant of the husband and wife licensing interest in India. Mrs. Leela Chowdappan, VU2CP, has been working hard to increase the interest of Indian women in amateur radio.

In Brazil the main purpose of BRYLA is to get more interest of the gals of Brazil who speak little English by giving them help through the YL nets. An unofficial YL organization has been formed in the QAP nets on 20 and 40 meters. These nets were formed by the YLs with the purpose of helping the women all over the country to meet on the air and to make it possible for YLs of other countries to check in when conditions permit. The 20-meter net meets on 14.160 MHz at 0000 UTC. The women of the 40-meter net meet not only on the air, but hold an annual dinner meeting in Rio de Janeiro. A third on-the-air group has formed on 21.365 MHz with their main purpose to find and grow to know the YLs in North America. While they are very active among themselves, these



Leela Chowdappan, VU2CP, India's second YL, licensed in 1964, is active on both 20 and 40 meters. A member of YLRL and ARRL, Leela operates each day looking for contacts with this country.

Women are very anxious to find contacts among the YLs of the United States and Canada.

In order to encourage us to work them,

the BRYLA certificate was created with PY2FI as the certificate custodian. This popular award is available to all amateur radio operators.

## 1977-78 LARK OFFICERS

LARK members have elected the following women to head the club in 1977-78. President Donna Henfeld, WB9VMN; Vice President Carol Clarke, WB9VIP; Secretary Nancy Huntington, WB9HGN; Treasurer Stella Snyder, WB9YUV. LARK members have two nets: Wednesdays at 0230 UTC on 7.130 MHz and Sundays at 0300 UTC on 7.240 MHz. The club sponsors a certificate for contact with members.

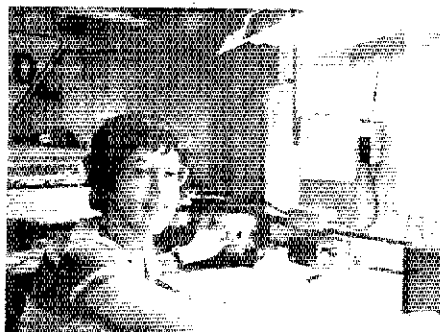
## GREENLAND'S FIRST YL

Greenland has added another country to the YL map making a total of 127 countries with licensed amateur radio operators. Anny Rasmussen, OX3ZM, is the first and only YL amateur in Greenland. Anny is a member of the Julianehaab Greenland Radio Club. "YL News and Views" thanks ARRL First Vice President Victor Clark, W4KFC, for this information.

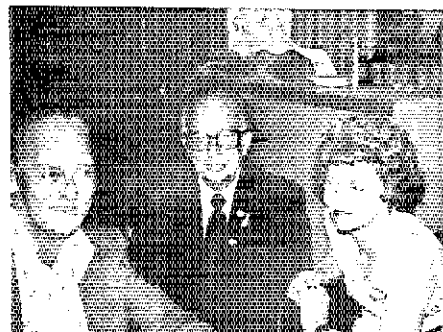
## YL-OM PLAN AHEAD

The YL-OM Contest has been scheduled to be held February 18-19, 1978, for the phone contest. The cw contest will be March 4-5, 1978. The rules will be found in detail in "Operating Events." Again YLRL requests that all the contest logs be mailed to contest custodian Phyllis Shanks, W2GLB. Forwarding may create a delay that might well cause them to arrive after the specified date, thus resulting in disqualification.

\*YL Editor, QST. Please send all news notes to W3WRE's home address: 305 N. Llanwellyn Ave., Glenolden, PA 19036.



The second YL in the third call district to earn the distinctive YL call. Susan, K3YL, is active as assistant EC in the Philadelphia area. She is a member of ARRL, AREG and NTS on the EPA net. Her motto is "cw is fun." (K3PA photo)



OZ4KS, OZ2NU, OX3ZM (l-r). Licensed last year, Anny is Greenland's first and only YL operator. (W4KFC photo)

## YL SUFFIX COMPLETE

That distinctive YL suffix can now be found in most call areas of this country: W1YL, Ellen White; W3YL, Sandy Rutiser; W4YL, Elsie McGraw; K5YL, Margretta Chance; N6YL, Carol Bourne (Carol is also WA9NEJ, YLRL vice president); K7YL, Marilyn Lillie; W8YL, Rosetta Reed; K9YL, Mary Keener and KH6YL, Eleanor Kimitsuka. With the N prefix now appearing there will no doubt be women with that special suffix in the missing areas as the gals advance to Extra Class.

## W7LLD NEW YL CODE CHAMPION

Many YLs prefer cw as their favorite form of operating but Evelyn Headings, W7LLD, is one of our top cw operators. Evelyn won the Code Copying Contest at the 1977 Northwest Division Convention, copying 51.2 wpm with a pencil!

Evelyn, a brand new amateur whose call appears for the first time in the spring supplement of the *callbook*, is a real whiz on cw and may well be considered among the top 10 YL cw operators of this country.



# Correspondence

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

## A "GENTLEMANLY" ART?

□ In issues of QST I've read about sloppy and illegal use of the amateur bands and the need to keep up with the state of the technical art. Very little space has been used to correct the opposite problem. We have been the traditional educators for the newcomer to radio. I recently heard a W9, roundly abusing a WB9 who had not QRX'd quickly enough during a ragchew. I have never, in 10 years as a ham, heard such an acrimonious distortion of the "friendly counsel" we usually offer the less experienced. There is never a Wouff Hong around when you need one. — *Carl Rayman, WAORLY, Austin, MN*

□ I can't understand why there has to be so much argument in ham radio. Contesters argue with nets, and DXers confound ragchewers. Listen guys and gals; this is a hobby. It's made for fun. Let's keep it this way and keep arguments and politics down. Ham radio is so diversified. There's something for everyone, so enjoy it, and let the other guy enjoy his hobby. — *Will Roberts, WA4PSL, age 17, Roseboro, NC*

□ As a relative newcomer to amateur radio, I relish being called an "OM" but my wife generates much QRM when I refer to her as my XYL! I would like to get her activated in ham radio but she insists that as long as we OMs are not distinguished as OMs and XOMs, why should our opposite-sex hams be branded as YLs and XYLs? I have her solemn promise that if I get a movement started to end this, she will enter a Novice course and work her way up. Can I get support from the ham world? — *Ralph Conn, WA2DTQ, Millburn, NJ*

□ One of my Novice trainees is that rarity of recent amateur inductees — an SWL. He reminds me, and hopefully the rest of us, of an important piece of radio amateur PR: the SWL QSL. Quite a few hams evidently don't reply to cards from SWLs, thinking it beneath their dignity, I guess. They should not. An unanswered SWL is a mark against our hobby, since it may kill the desires of someone else to join us. — *Art Reis, WB9YOB, Wonder Lake, IL*

□ I would like to comment: Upon listening to 2 meters, it seems we have a lot of new hams. I don't know who to blame for the word "destinated." Must we have it? We have pleasant words that say that we are at home or wherever. "Destinated" sounds like some disaster! — *Col. Edson Snow, W2UN, Canandaigua, NY*

## REPEATING THE WORD

□ I live in Somerset, PA, 30 miles away from the recent flood, I don't know what the price, in money and work, would be for an average 2-meter repeater, but I know what the value of one can be in times of emergency.

The Johnstown 34/94 repeater carried an almost unbelievable burden of critical traffic. I don't think anyone could have listened to that net and not have been impressed by the great job they were doing. — *William Casteel, K3JQO, Somerset, PA*

□ My experience in amateur radio,

particularly recently during the Johnstown Flood relief operation, has impressed upon me the value of ARRL as a unifying force and an aid, at the national level, in time of need. We don't always agree with each other or with established policy, but if you can show me an organization that does, I'll show you an organization that is stagnant, irrelevant, and that should vote itself out of existence. — *Vince Quaresima, WA3HGX/2, Camden, NJ*

## HATS OFF

□ As an ex-CB operator I was surprised by the help and generosity offered by amateur radio operators. Everyone I have talked with has gone out of his way to offer help. This is the kind of spirit supposedly found in CB radio, but in many cases is practically non-existent. — *Jim Caldwell, WDSFWA, Fort Worth, TX*

□ The Novice and General classes being conducted by the many clubs are to be complimented. They represent many, many hours of preparation, study and planning by many dedicated individuals. — *Wright Gifford, WB1CCO, Vernon, CT*

□ I wish to thank you for the help you gave me in receiving my Novice license. I am blind and know next to nothing about electronics, but have learned much through your books and publications.

What I appreciate most is that you know more about what is available for the blind on this subject than all the lending libraries. Good work, ARRL. — *Vinny Samarco, WB1EKJ, Ware, MA*

□ Before I became an associate member of the ARRL, a product review of the Kenwood TS700A was made. Having just purchased one of these, I am most anxious to read the review by the technical staff. I would like to say what a fine job you're doing. I read every article and all the advertisements, in fact, I bought my Swan 700CX from reading it first in QST back in 1976. Please keep up the high standard of journalism because you're a leader in the electronics field. — *Fred Jenkins, VK2BFJ/G3WS, Australia*

## BLOCKED BY BLOCK 2

□ I recently had a ham license application returned to me as my signature was not the format as the name in block 2. The instructions call for a signature. It says nothing about it corresponding to block 2. I suggest ARRL approach the FCC about (a) accepting a person's normal signature, even though the first name is not written out, or (b) have FCC change instructions for form 610 so their desires are clear. — *Joseph Wright, Edenton, NC*

## WN BACK IN

□ WN calls are now being issued to amateurs with Technician, General and Advanced licenses. In mid-June the form 610 for the Tech was returned to me with a letter stating that counterpart calls could no longer be issued, but I could have WN1RSQ. As you can imagine, it leads to lots of questions on the

air. I operate strictly cw around 3535 and 14035 and most contacts want to know what a Novice is doing on those subbands! — *Joe Curchidi, WN1RSQ, Needham, MA*

## OUT O' SPACE

□ For years I've been saving QST magazine. I consider it a source of reliable information, and protect each issue from page-benders. Now I'm being forced to compromise my collection to reduce space. To do this, I'm editing each past issue, carefully taking the pages of value to my operation out of the magazine. With the aid of a three-hole punch, they nicely fit into a three-ring notebook. Just think, a whole year of QSTs in the space three issues used to take, and you're the editor! — *Robert Deck, WB9DYY, River Grove, IL*

## ROBOT IDENTIFICATION

□ Just saw *Star Wars*. Found an incredible sense of identification and affection for the marvelous little robot named ARTOO DEETOO. Wish I knew why . . . ? — *ENTHREE EFBE (David Wecht), Baltimore, MD*

## A FAR CRY

□ Last year I wrote to you pleading for more explicit diagrams and elementary projects for the beginner. I really didn't hold out much hope that you would, but I've been proved wrong . . . you are sensitive! I do hope that the mass of electronics experts do not begrudge the space given to "education." I'm sure this will greatly assist the "appliance operator" become an experimenter. That seems to be the name of the game. Thank you for the change. — *Eric Stabler, VE3ISD, Dunnville, ON*

## WD WHO?

□ After receiving my ticket the early part of May, my ambition to go on the air was running high. During June I acquired my station and for the next 2-1/2 months I attempted to build my code skills. On Tuesday, September 13, at 0129:30 UTC, I took that first big step and called CQ. Shortly my call was coming back. Had I made a mistake in copying? WD9DPZ, Jim Sullivan, My QTH and that of DPZ were both Indianapolis, even Pike Township. After our QSO Jim and I talked over the telephone and neither one of us could picture the odds of my calling my first CQ and receiving a return call from the next sequential call sign. A further footnote, both Jim and I were in the same Adult Education Amateur Radio Class at Pike High. This welcome QSO was NOT prearranged. — *Robert Largent, WD9DPY, Indianapolis, IN*

## RETIRED NOT TIRED

□ I recently retired to an apartment and a simplified life-style. My ultimate radio shack contains a 5-watt, ssb transceiver, a small matchbox and a piece of wire. I'm having as much fun as I did when I first started, over 46 years ago. All of which brings me to this request. Why not a "gentleman's agreement" to set aside a portion of the 20-meter band for the low-power operators. Say 14100 to 14110 for the cw portion and 14300 to 14310 for phone? To further identify the low-power station, why not substitute QRP for CQ and use a two by one format repeated three times followed by a listening period. — *Clifford Parody, K3EER, Williamsport, MD*



## Unlicensed Operation

Judging from reports we hear from around the country, the use of vhf amateur equipment by nonhams is an increasing problem. Some of these errant operators "bootleg" by using a self-assigned call sign while trying to fit into the local fm and repeater crowd. Others engage in harassment of legitimate amateur operations, especially of repeaters in the major metropolitan areas. Still others stick to the less-used simplex frequencies or move just outside the ham band and use the equipment as a private communications system. But they have one thing in common: They are all threats to amateur radio. Unfortunately, some of the nation's major consumer retailers have become accomplices, either knowingly or unknowingly, by adding 144- and 220-MHz ham gear to their product lines without

emphasizing the study needed to obtain a license. For example, the 1977 Christmas catalog of Montgomery Ward includes a full-page spread for three different ham rigs, two amplifiers, and a line of antennas, with only this brief "license note" at the bottom: "These ham radios are to be used by licensed amateurs only. Any FCC office in any major city can advise persons of details for obtaining license applications." This sort of footnote is totally inadequate, misleading, and contrary to the spirit of the League's new Code of Ethics (*QST* for November, 1977, page 11). Unfortunately, Wards is not alone.

In response to the increasing potential for unlicensed operation in the ham bands, many repeater groups have developed rather sophis-

ticated methods of direction-finding, and conduct training exercises for their members on a regular basis. We would like to be a medium for information exchange between repeater groups around the country. If your group has experience in direction-finding that would be helpful to others, please share it with us. Several groups are in the process of doing so, and we are also gathering information from European sources.

Eventually we would hope for some proof-of-license regulations which would stem the flow of ham gear into the wrong hands. In the meantime, the League's Code of Ethics is a necessary step in the right direction, though it is not the whole answer. It must be supplemented by marketplace pressure from concerned amateurs.

## ONLY ONE REPEATER?!

Can you picture New York City, Los Angeles, Chicago or Philadelphia, each having just *one* 2-meter repeater? That is essentially the situation faced by British amateurs, who are limited by Home Office policy to one vhf repeater per metropolitan area. The area covered by one repeater generally is not permitted to overlap with another, resulting in spotty coverage outside the major cities. There are several other key differences between the British and the American approaches to repeater operation. The Radio Society of Great Britain is the licensee for all repeaters; tone access is required; and auto-patches and the handling of third-party traffic are not permitted. There are 10 pairs of frequencies available for repeater operation in the European 2-meter band and seven of these are used in Great Britain. Inputs are in the 145.0- to 145.225-MHz range and outputs are 600 kHz higher. The 146- to 148-MHz band is

not available to amateurs in Europe.

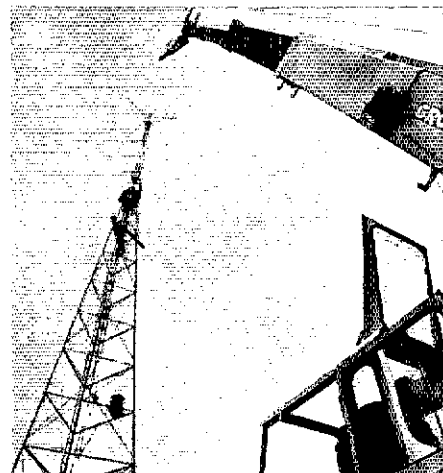
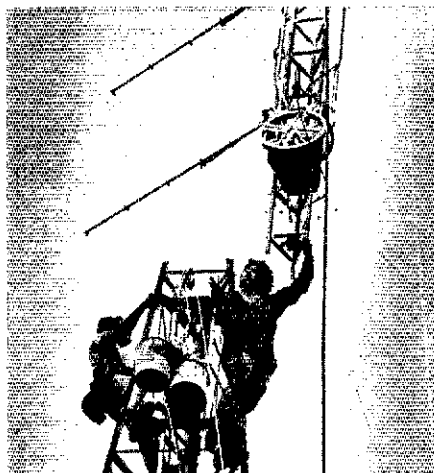
What happens when there is only one repeater to serve an area with thousands of amateurs? One result, obviously, is that the repeater is in almost constant use; GB3LO in London is seldom silent except in the wee hours of the morning. Unfortunately, the existence of only one repeater creates a "captive audience" situation; GB3LO frequently is jammed, largely by nonamateurs and former hams with no apparent motive. The miscreants know the London repeater has a very large listening audience with no other repeater to use, and this encourages their antisocial behavior.

There is one major benefit of having only one repeater; it encourages simplex activity and the use of modes other than fm on 2. You can find sb activity in the London area almost any time of day or night; even mobile sb is popular. RTTY autostart, which prints out a message in your shack even when you are not home, is not uncommon.

Activity on 450 MHz, where repeaters are not restricted as on 2 meters, tends to be very high in Great Britain, in part because there are no ham bands at 50 and 220 MHz (though some limited operation is permitted on 70 MHz).

Another benefit of the British system is very low incidence of interference between co-channel repeaters. No repeater can operate unless it is a part of the overall RSGB plan; therefore, there are few problems with frequency coordination.

As in the U.S., the first fm mobile and repeater activity in Great Britain was conducted using equipment converted from the commercial service, frequently by amateurs employed in the mobile radio field. However, unlike the U.S., the British government has strictly limited the proliferation of repeaters through regulation. Comparing the two approaches can provide some interesting lessons for amateurs in both countries.



WR2AJY, 147.675/075 MHz, in Robbinsville, NJ, eight miles east of Trenton, went on the air in the summer of 1977. Owned by Herb Spair, K2SAF (at the left), it has microprocessor-controlled beams that can be called upon at will. The four beams are stacked vertically, and are rotatable around the tower mounted atop an existing windmill tower. The photos at the center and right show a closeup of the beams under the omni-directional antenna, the crane lifting the entire assembly into place, and the two volunteers guiding the top section into place. The repeater has 22 watts coming out of the duplexer, and it covers central New Jersey and eastern Pennsylvania 24 hours a day, seven days a week. The total height of the tower is 150 feet. (Photos courtesy of Warren Kruse, Trenton (NJ) Times)

## Bermuda: Hams to the Rescue

Taking a lesson from the tragedy endured by Guatemala in its 1976 earthquake, the members of the Radio Society of Bermuda vowed to be prepared for any emergency which might strike their island nation. On 4 September 1977, an emergency communications exercise was conducted in Hamilton by Bermudan amateurs, and its success was great enough to attract the attention of the capital city's newspaper - its front page, in fact.

For more than three hours, 30 amateurs passed simulated emergency traffic containing complex medical terminology and unfamiliar names. The result was gratifying: better relations with the government agencies which would be served in emergencies, and a membership with sharpened skills in fulfilling the public service obligations of the Amateur Radio Service.

\*International Services Officer, ARRL



Amateurs in Bermuda put their skills to the test as they demonstrate their ability to provide vital communications during any emergency which might strike their country.

These three gentlemen were among those at a June meeting in England to plan (as the International Working Group) important strategy for the upcoming World Administrative Radio Conference. From left to right: Noel B. Eaton, VE3CJ, IARU President; Richard L. Baldwin, W1RU, ARRL General Manager/IARU Secretary; Lord Wallace of Coslany, President, Radio Society of Great Britain.



## WEST GERMANY

Well over 3000 amateurs traveled from nine European countries to attend the famous "Europa Treffen" (European Meeting) sponsored by the Deutscher Amateur Radio Club in the city made famous by the Volkswagen: Wolfsburg. Manufacturers of ham equipment were extensively represented with displays of gear, and German newspapers and magazines spread word of the meeting throughout West Germany. The city of Wolfsburg hosted an official reception for the visiting amateurs, and even a sightseeing tour of the lovely city was conducted via amateur radio - with 378 cars participating. The DARC has long been known for hosting exceptional hamfests and meetings.



European amateurs peruse some of the exhibits at Wolfsburg, West Germany, during the famed "Europa-Treffen." (See text.)

## A FINAL WORD ON PHONE PATCHES

As discussed in this column in the August, 1977, issue (page 71), we amateurs must become more attentive to complying with the regulations concerning third-party traffic. We offer below a remark of the Federal Communications Commission, made recently: "We again warn the amateur service of unlawful use of telephone interconnection facilities and stress that unless voluntary compliance with our third-party traffic regulations increases significantly, we may have to take action to curb the transmission of *all* third-party traffic in the Amateur Radio Service." (Docket 21033)

## ZAMBIA: SPREADING THE GOOD WORD

One of the rapidly developing nations in Africa today is the Republic of Zambia. The Zambian government has quickly recognized the vital role played by the Amateur Radio Service in providing a unique corps of self-

training technical experts, and the Radio Society of Zambia has been working vigorously to promote public knowledge of amateur radio.

At the Zambia National Science Fair in Lusaka this past August, amateurs displayed literature, posters, and an active station. The resultant interest was almost more than they could handle! Science instructors and students were enthusiastic in their response to the Society's offers of assistance in training, with many of the students being from remote areas of the country where electricity has yet to be seen.

Government officials in attendance were reportedly quite pleased with RSZ's activities, and hosted the amateurs to an official luncheon in appreciation of their efforts to foster amateur radio among native Zambians.

## LIBERIA AND USA: RECIPROCAL PARTNERS

Reciprocity was formally established between the U.S. and the Republic of Liberia on 22 September 1977. Amateurs holding the General class license or higher may now apply for a guest operating permit when visiting Liberia, and Liberian amateurs are accorded the same privileges when visiting the United States.

## DENMARK: 50 YEARS OF AMATEUR RADIO

Experimenterende Danske Radioamatører is the name of Denmark's amateur radio society, and ARRL Vice President Victor Clark, W4KFC, was on hand in August to observe the festivities. Plenty of time was generously made available by the Danes for the discussion of WARC-79, and ideas were exchanged by the officers of several European societies. EDR has more than 5000 members.

Musical entertainment is provided by radio amateurs at Hvidovre (Copenhagen) Club's "Chicken Party." Left to right: OZ1CEK, XYL of OZ3FD and OZ3FD.



## Repeater Deregulation

On September 21, 1977, the FCC acted in Docket 21033 — repeater deregulation. Details appeared in last month's "Happenings of the Month" column. This action abolished separate and distinct licenses for repeater, auxiliary-link and control stations, and made these modes of operation privileges of all other station licenses. It also opened up to repeater operation 144.5-145.5 MHz and all frequencies from 220 MHz on up, with the exception of 435-438 MHz. Here, we'll discuss some of the questions amateurs have been asking about this controversial docket.

*Q. Why did the FCC eliminate separate repeater, auxiliary-link and control station licenses?*

A. The reason is simple. Although repeater, auxiliary-link and control stations are relatively few in comparison with the population of the Amateur Radio Service as a whole, their impact on the processing of other amateur licenses is far out of proportion to their number. Processing these special types of licenses is more complex than processing and issuing simple primary station licenses. A more complicated data base must be maintained, and large amounts of the FCC staff's time is devoted to just these licenses. By eliminating these licenses, more time can be devoted to the processing of Novice class and other operator license applications, and applications for primary station licenses.

*Q. Is the FCC eliminating all rules governing repeaters? That is, is a station operating in the repeater mode now to be treated just like any other type of amateur station?*

A. No, far from it. The FCC is lifting the requirement that a licensee file an application when he operates his station in the repeater, auxiliary-link or control mode. Formerly, the applicant had to submit applications (FCC form 610) for each such station he intended to place on the air. He need no longer do so.

However, the FCC has *not* modified its rules concerning effective radiated power versus height above average terrain (erp vs. HAAT). This information must still be contained in the log of a repeater station. (97.111f)

*Q. But aren't you saying that any amateur station can, practically on a moment's notice, be put into repeater operation if the station licensee so desires?*

A. Well, you're oversimplifying quite a bit. Even if you happen to have a repeater sitting around the shack, there are other requirements for operating a station in the repeater mode. But it is true that insofar as putting a repeater station on the air is concerned, the FCC is out of the picture.

However, even before Docket 21033 went into effect, it was possible for a licensee to put a repeater station on the air without special permission from the FCC. All he had

to do was find the licensee of an existing repeater station who was willing to share with him the responsibility of the repeater in portable operation. The first licensee could then operate a portable repeater station under the authority of the existing repeater station license.

Because this provision was previously in the rules, and was not abused by amateurs, the FCC does not believe that the abolishment of separate repeater station licenses will encourage "fly-by-night" repeater operation.

*Q. Has anything been done to relieve repeater stations of the requirements concerning the logging of third-party traffic?*

A. No. Notations of third-party traffic (which includes communications via autopatch) must continue to appear in repeater station logs. The FCC *did* remove the requirement that transmissions from open-access, automatically controlled repeaters either be monitored in real time or recorded, but some means must still be employed to insure that notations of third-party traffic carried over those repeaters appear in the repeater station logs. (97.103b2)

*Q. Why didn't the FCC go all the way and remove the requirement of logging third-party traffic in repeater station logs? Practically speaking, it means that transmissions of third-party traffic via autopatch over repeater stations will still have to be recorded.*

A. In Docket 21033, the FCC makes a strong comment concerning third-party traffic and the Amateur Radio Service. The words speak for themselves:

"In our 1972 Report and Order in Docket 18803 . . . amateur licensees were warned about use of autopatch equipment in violation of section 97.114 of the rules, to facilitate the regular business affairs of any party. Since 1972, autopatch abuse has become, if anything, more widespread. The Amateur Radio Service is not now, and never has been, a common carrier, and third-party traffic of all types must, under normal circumstances, constitute a very small part of amateur activity. We again warn the amateur service of unlawful use of telephone interconnection facilities and stress that unless voluntary compliance with our third-party traffic regulations increases significantly, we may have to take action to curb the transmission of *all* third-party traffic in the Amateur Radio Service."

The FCC feels that the present requirement that third-party traffic passed through a repeater be noted in the repeater's log is an effective deterrent against abuses of third-party traffic privileges. It does not intend to drop that requirement at this time.

*Q. What happens to present repeater (WR), auxiliary-link and control station licenses?*

A. They will be allowed to die a natural death. They remain in effect till expiration, at which time they will *not* be renewable.

*Q. What happens to applications for these types of licenses that are already in the hands of the FCC but are as yet unacted on?*

A. They will be dismissed without action.

*Q. You say that repeater, auxiliary-link and control station modes are now privileges of all other types of licenses. Does this mean that club stations can be operated in these modes? Can secondary stations be operated in these modes?*

A. The answer to both questions is yes.

*Q. When a station is operating as a repeater, how does it identify?*

A. Stations in repeater operation identify by transmitting the letters "RPT" after the station call sign if identifying by telegraphy, or the word "repeater" if identifying by telephony. (97.84d1) Only the station acting as the repeater need identify in this manner. The stations being retransmitted may identify in the usual manner.

*Q. How do stations operating as auxiliary-link or control stations identify?*

A. These are both considered "auxiliary" operation, and the identification requirements for both are the same. Stations in auxiliary-link or control operation identify by transmitting the letters "AUX" after the station call sign if identifying by telegraphy, or the word "auxiliary" if identifying by telephony. (97.84d2)

*Q. What happened to the FCC's proposal that a station occupying a given frequency be given priority in that frequency's use over other stations?*

A. The FCC is taking no action on this proposal at this time, but reserves the right to act on it at a later date if amateurs do not solve among themselves certain frequency management problems that now exist. In particular, the FCC is concerned about malicious interference to, and from, certain amateur service "monitoring nets." If amateurs cannot solve these conflicts on their own, the Commission will consider additional regulations in the future to resolve these matters.

[Editor's Note: The League is filing with the FCC a petition for reconsideration in Docket 21033. This petition requests that the distinctive "WR" prefix be retained for repeater stations, that the separate licensing of repeater stations be continued, and that more protection be provided for vhf/uhf weak-signal operation. See "Happenings," this issue.]

[Note: Questions appearing in this column are typical of those frequently asked of the FCC and other agencies. Answers, prepared at ARRL, have been approved by FCC staff. Interpretations contained herein concur with those of the Personal Radio Division of the FCC. Numbers in parentheses refer to specific sections of the FCC rules.]

\*Asst. Manager, Membership Services, ARRL

# The World Above 50 MHz



Conducted By  
William A. Tynan,\* W3XO

## Our Challenge

As a result of a recent ruling out of Washington, our world above 50 MHz faces one of its most severe tests to date. We amateurs have long prided ourselves on our ability to "regulate ourselves." In effect, FCC, with its September 21 Report and Order on Docket 21033, has now said "let's see you do it." Whether the Commission's order giving repeaters essentially free rein on all frequencies above 144.5 MHz will be used as a model for further "deregulation," such as removing all phone/cw subbands on our lower frequencies, is a matter only for conjecture. In any case, the gauntlet has been thrown down to the vhf community first. How we, as a group, manage our bands and how we, as individuals, conduct ourselves may have great impact on the future of all of amateur radio.

Our most popular vhf band, 2 meters, is where the FCC order will have its most immediate effect, but 1-1/4 meters, now apparently saved from CB encroachment, and 70 cm will certainly be impacted also, if not right away, then surely in the years to come. The challenge on 2 meters is made particularly difficult by the fact that FCC, for reasons known to itself, saw fit to extend Technician class privileges only to the lower limit of the newly created repeater band, 144.5 MHz. As reported in November *QST*, the VHF Repeater Advisory Committee (VRAC) has recommended that repeaters in the new segment use 20-kHz channels with a low-in/high-out, 600-kHz spacing. This means that repeater inputs will begin at 144.51 and extend to 144.89 while the corresponding outputs will be from 145.11 to 145.49. This leaves 144.90 to 145.10 MHz presumably free of repeaters. Additionally, VRAC has proposed that this space *not* be used for fm simplex as are similar gaps between repeater inputs and outputs in the 146 and 147 portions of the band. Instead, the Committee recommends that this space be left open for ssb, cw and a-m operation, at least as long as Technicians are denied access to the 144.0 to 144.5 part of the band. This arrangement has been coordinated with the VHF/UHF Advisory Committee (VUAC) and has met with general approval. So, now it's up to us, the users of the 2-meter band to adapt to the new situation in which we find ourselves. True, those using ssb a-m and cw will have less space in which to operate but, nevertheless, the approximately 200 kHz between 144.9 and 145.1 should provide room to maneuver. It would be best to not go below 144.91 or above 145.09 in order to stay out of the passbands of fm receivers, including those used as inputs. An alternate plan calling for ssb, cw and a-m terrestrial work to be accomplished above 145.5 MHz, which has been voiced in some quarters, does not appear to represent a good idea for several reasons.

First it is higher in the band and thus farther from the activity around 144.1 with the usual problems of antenna bandwidth to worry about. It is also in the part of the band used by amateur satellites. With the advent of AMSAT's A-O-D and the Russian RS spacecraft, this range may become quite crowded with satellite activity quite soon.

What is to stop fm operators from using the 144.9 to 145.1 area for simplex as is done in the two higher repeater bands? The answer is nothing: except their respect for the interests of others and our own diplomacy in informing them of the band plan when they do stray into the ssb/cw/a-m section. It will also help a great deal if we respect the new repeaters which are about to become our very close neighbors by not trying to assert our "rights" by continuing to operate on our pet frequencies. Things are changing, and we must learn to adapt to the changes if 2-meter ssb, a-m and cw operation for Technicians is to survive.

Just how should we use the space between 144.91 and 145.09? This conductor suggests the following scheme which has been discussed with Joe Reiser, W1JR, VUAC chairman and Lloyd Pratt, KSASZ, chairman of SWOT (Sidewinders on Two). Both found the idea generally acceptable. In lieu of 145.1 as the calling frequency, use 145.0 MHz. This has the advantage of having the calling frequency on an even spot where crystal calibrators can be readily used. For local QSOs, nets, etc. use the space above 145.0 while for DX work drop down below the calling frequency. As a further suggestion to prevent confusion, move nets that have been operating on frequencies such as 145.15 and 145.175 down 100 kHz but leave 145.025 operation where it is at present.

For those operating ssb, the transition should be quite painless since essentially all have VFOs. For some using cw or a-m, it may be a little more difficult as many are crystal-controlled. New rocks may have to be obtained or old ones moved. Don't overlook the possibility of pulling crystals with a variable capacitor or inductor, thus making them into VXOs.

The ease with which we make the transition to our new situation and the fewer the cases in which FCC enforcement is called for, the better off will be our hobby of amateur radio. We have said that we can regulate ourselves. The more that we can demonstrate this, the more we can maintain and improve our position with Washington, especially in these days of tight budgets. Whether one's bag is ssb, cw, a-m or fm, he must get along with his fellow hams and must see to it that what he does has a minimum impact on what the amateur in the next block or across town wants to do. With understanding and patience, along with good operating procedures and properly adjusted equipment, we can meet the challenge.

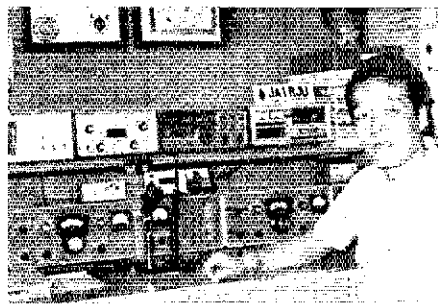
## ON THE BANDS

**6 Meters** - The September 4-15 operation of KC6PO, Ponape Island, by the Japanese SMIRK group forms the backbone of our 6-meter news this month. Although no one could call this the prime time of the year, the group nevertheless contacted 142 stations including KG6RO on Saipan and Guam stations KG6JH, KG6DX, KG6APP and KG6JDX. The other 136 were JAs including nine of the 10 call areas. HL9WI was heard but unfortunately no contact resulted. JE1HYR says that the DXpedition may have resulted in a resident convert as KC6CW got in on an opening to the Japanese mainland on September 23, at which time he worked 18 JAs.

From this neck of the woods, there are few reports of openings during September. In his OVS report, WA0MRH does note Es on the 15th, 16th, 28th and 29th as well as aurora on the 20th and 21st. For October W3TFA reports a fairly good opening to FL on the 6-7 evening. On that occasion Stan held an extended cw QSO with WB4OSN. No other signals were heard, however.

The off-season is the time to concentrate on scatter. One who is going in for this mode in a big way is K2NE. Vince operates portable from a club station site near York, PA, on weekends. The setup consists of 750 watts to a 48-element collinear fixed in a westerly direction, as well as a rotatable Yagi. Those wishing skeds may contact him at 105 N. 26th St., Camden, NJ 08105.

Some who worked W2BN/C6A last June have asked for a QSL address. It's 932 Oakland, Burlington, NJ 08016. Speaking of DXpeditions, K5ZMS, SMIRK no. 1, passes along the information that WB2RLK/6YS racked up 800 QSOs in 40 states, five VE provinces and three countries during his short Jamaican stay last June. Ray also notes that SN2NAS is listening on 50.1 and trying to find out if he will be allowed to get on. It is also understood that KV4IF, who worked a number of stations on 6-meter fm last summer, is hoping to get some ssb equipment and put it to good use next season. Couple that with a possible trip to VP2M by K8NXXI and others, maybe a sojourn by WB2RLK to VP9 and it should be another interesting year. On top of all of this, YV5ZZ says that YV5LW and YV6ASU will be joining him on 6 by next season. Another potential 6-meter DX station is YN4TK. He has the beam left behind following last summer's DXpedition but he is in need of a transverter. SMIRK is collecting money or suitable equipment for this and other DX stations anxious to become active on 6. Those wishing to contribute can write Ray Clark, 7158 Stone Fence Dr., San Antonio, TX 78227.



One of Japan's most prominent and active 6-meter operators, Kazu, JA1RJU.

\*Send reports to Bill Tynan, W3XO, P. O., Box 117, Burtonsville, MD 20730, or call 301-384-6736 and record your message.

It is with sadness that we report the passing of well-known 6-meter operators K3MWQ and K7QFW.

Inadvertently omitted from the list of 50-MHz WAS holders published last month were the following: Nos. 163 through 168 belong to K7VNU, K6ITZ, WB7DBP, WA7JEL, K7ZCB and K7GSE. Congratulations.

**2 Meters** - Of course, the big news affecting 2 meters this month is the FCC action on Docket 21033. The implications of that are treated above.

The fine tropo of early September continued pretty much through the end of the month, except for the contest weekend of course! One brand new 2-meter ssb operator who was able to take advantage of the conditions was WA4YRK near Oak Ridge, TN. Dave's new FT221R arrived September 22. After connecting it to his 11-element beam and looking in the book to see how to put the rig on ssb, he immediately hooked up with WD4EXH, VA, with S9 signals both ways. Having never done so well on fm, Dave was understandably impressed and excited. But that wasn't all. He went on to work WB4NMA, W4LNG and K4APD, all GA and with good signal reports. To top off the evening, K5CM, OK, went into the log. The next night it was WA4IRJ, SC, WA4OVC, VA, along with K8TQK, OH. WA4YRK got a great introduction to 2-meter ssb. Welcome aboard, Dave! That same opening extended at least as far south and west as Kingsville, TX, 40 miles south of Corpus Christi. From that spot, W5UWB reports contacts with TN stations WB4TCQ, W4CRU, WB4LHD and WA4VWR/4; OK stalwarts K5CM and K5SW; along with WB0GLT, N0JA and WA9NPT, MO and K8TQK, OH. Jack got state number 26 out of it in the form of W4HJQ, KY.

Somewhat belatedly, we report another tropo opening between HI and Southern CA. This one took place July 29 with K6DYD, San Diego, working a number of KH6s through the 8000-foot-high Mauna Loa repeater. It is understood that no direct contacts took place on this occasion. Thanks to KH6BZF for this piece of news.

Those looking for RI will be glad to know that K1ABR is active again under his new call W1XJ. LA is due to be on 2-meter EME soon in the form of a combined effort by WB5LBT and W5DC. WB5LBT is looking for all types of skeds on 2 as well as 70 cm.

An interesting DXpedition mainly for the purpose of OSCAR Mode A operation, but nevertheless resulting in several Galapagos-to-mainland 2-meter QSOs, was staged in late September by HC8CD. In addition to making many satellite contacts in North and South America, the group completed cw and fm two-ways over a path of approximately 320 miles with HK6CHY/6, HK6CYH/6 and HK6VH who had journeyed to the top of Cerro de Ruiz to work the Galapagos group.

One possible fallout of the new FCC rules may be the advent of linear repeaters which can accommodate ssb, a-m, cw as well as fm. Such "machines" have been proposed before but nothing came of it. Now WA3NFV, Philadelphia area, says he is going to put one on and has already received a coordinated pair - 144.51 in/145.11 out.

W3AIR was a well-known call on 2 meters from the Washington area over the years and on 5 meters from Trenton, NJ, before WWII. We are sorry to report that Frank is another one of the fine vhf men who have joined the ranks of the silent keys.

**70 Cm** - More and more mail is being received each month reporting 70-cm tropo activities. This is directly traceable to the tremendously increased activity on the band. As on 2 meters, the later part of September produced fine openings on this band, WA4CQG, Auburn, AL, alerted by a phone call from WB5LUA, got in on the fun the evening of the 20th and the morning of the 21st working W0YZS, KS, with 599 signals at times, WB5LUA, W5UND and W5HN, all TX. That evening Dale hooked up with K9ZGT, near Chicago, for a distance of 750 miles. Two nights later WB5LBT, IA, and WD4EXA, VA, were added to the log. This made the 10th state in four days for WA4CQG, running only 10 watts. Output has now been increased to 300 watts. On September 26-27 Dale had a

fine QSO with N0IS, MO, with S-meter-pinning signals at times. Landline calls to K4GL and W4ISS alerted them and both worked Bob also. The opening on the 21st was also reported by K5LLL, Houston. Ron worked W0YZS with very strong signals.

An unusual contact resulted in a new state for W0YZS. Mike worked K5UGM while Bill was operating from his car in Ida, LA, using a TS-520 feeding a Microwave Modules transverter, KLM 70-watt amplifier and KLM 7-element beam. Since the car is capable of moving while the setup is operating, Bill wants to know whether this constitutes mobile or portable. The late September openings resulted in a long string of QSOs for WB5LUA, Big D. Al's best DX was K4EJQ, TN, 866 miles. Probably his most unusual contact was with WA4PGJ/4, Jackson, TN, 490 miles, while that station was running 10 watts to a small Yagi inside an apartment.

Having completed an EME contact with YV5ZZ, WB5LUA is now a proud holder of WAC. From the other end of that circuit YV5ZZ says that his new antenna consisting of 16 21-element F9FT arrays, is performing well. So far Ed has worked F9FT, W1JR, K2UYH, K3PGP, W4WD, I5MSH, VE7BBG, ZESJJ, PA0SSB, G3LTF, JA1VDV, ON4DY and K3NSS in addition to WB5LUA.

An interesting piece of news is passed along by W1XZ at Hq. During the September contest, K1TZD/4 in FL heard 4- to 6-second bursts of the 432-MHz signals of W2SZ/1, Mt. Greylock, MA. W2SZ/1 was running 600 watts output to a 96-element array. WA2SPL, a principal W2SZ operator, is setting up at home to run skeds with K1TZD/4. Others wanting schedules may call 518-279-9401. Another 70-cm operator looking for schedules is WAITZV. Call Jerry at 603-635-3890.

**Microwaves** - What certainly looks like a new record for our 5-cm band has been chalked up by K5PJR near Grove, OK and K5FUD, Allen, TX. The two home stations operating on 5732.5 and 5815.8 MHz are 267.23 miles apart which is well in excess of the 214 miles between mountaintops spanned by W6IFE/6 and K6HJ/6 in June, 1970. Rigs at both ends of the TX to OK circuit used fm with about 100 kHz deviation. Exciters consisted of Collins MW118s which provided the 2-GHz output to drive triplers, producing about 1 watt. The antenna at K5PJR was a 6-foot dish at 80 feet while at K5FUD a 4-foot dish at 30 feet did the job. Both stations used EW-159 waveguide as transmission line. The two fellows had been running schedules for some time but the fine tropo conditions prevailing at the end of September did the trick, at times producing full quieting signals. Those interested in more details or wishing to set up schedules may contact Tony Bickel, K5PJR, P. O. Box 1057, Grove, OK 74344.

The September VHF QSO Party brought out 23-cm activity on both coasts. From NC, K1FJM/4, with equipment brought by K2UYH and operating from a 160-foot light-

house, managed the first 23-cm QSOs between NC and PA and NJ. WA2LTM got his 17th state out of it and then went over to K2UYH's home QTH so that Al could work his own station for state number 14. WA3JUF and W3HMU made up the PA contacts. On the opposite coast, K6ZMW, from his new hilltop QTH near Stockton, chalked up a record 15 23-cm QSOs in five sections during the test. The best distance was N6NB atop Mt. Pinos, 250 miles to the south. Other Northern CA stations working N6NB included K6UQH and W6KOC. K6ZMW believes that the full potential of the band is not being realized by many people because of very low power (less than 5 watts), inability to properly aim antennas and poor receiver performance. Joe pleads for improvements in these areas as well as for more activity from Southern CA.

## WHO'S WHO?

It has been suggested that a list of the new and old calls in the vhf fraternity be published so one can tell who he's talking to or reading about. I have been compiling such a list but need help to complete it. So, please send along any such calls you may be aware of. I'll publish the list as soon as possible.

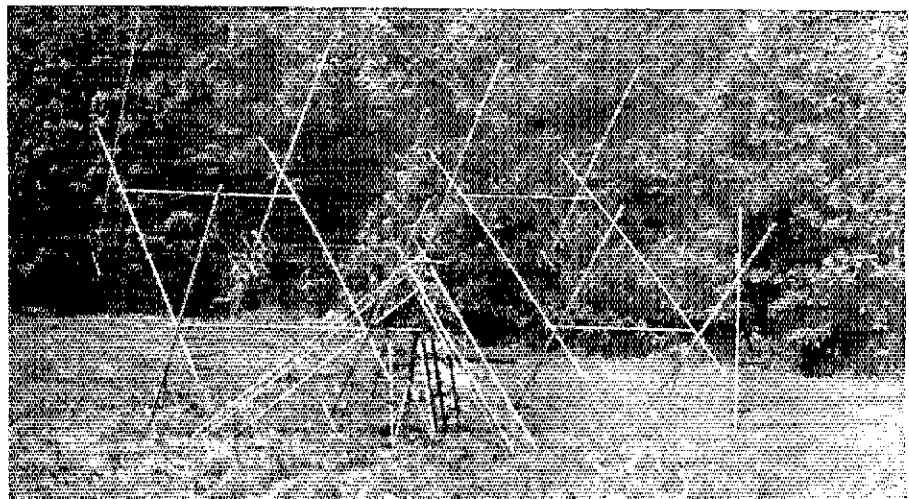
## HAMARAMA 1977 - A NEW VHF CONFERENCE IS BORN

What was started six years ago by the Mt. Airy VHF Society, otherwise known as the "Pack Rats," as simply a flea market shows signs of becoming one of our major vhf conferences. To complement the Northeast VHF Conference and the West Coast VHF Conference held each spring, along with the Central States VHF Conference in August, the Pack Rats decided that fall and the Philadelphia area would make a fine time and place for another gathering devoted to swapping ideas on the latest in vhf/uhf techniques. So to their already popular Hamarama they added, this year, a second day for technical meetings and good fellowship. Having attended the affair, this conductor can attest to the success of the endeavor and make a prediction that in the years to come this will become one of the major events on the vhf calendar.

The papers presented this year included a talk on amplifier technology by Paul Wade, WA2ZZF; an EME symposium conducted by Tony Sousa, W3HMU; a presentation on ATV by Ron Whitsel, WA3AXV and Dick Pierce, K3MWV; and a discussion on microwaves by Dick Knadle, K2RIW. Another popular and lively event was the vhf contest forum presided over by Bill Olson, W3HQT. In the evening, a fine buffet dinner and hospitality suite provided a pleasant close to an interesting and challenging day.

See you there next year.

QST



The eight 8-element 220-MHz quags at WB2BYP. John is looking for 1-1/4 meter EME skeds. Call 518-279-3640 weekends.



# Public Service

Conducted By Robert J. Halprin,\* K1XA

## Johnstown — One Man's Opinion

We received many individual reports of Johnstown emergency communications and they were all greatly appreciated. Public Service Awards will be issued to all participants shortly after the write-up is printed.

One letter we received was different. It was written by an individual with 25-years experience in ham radio, especially in the emergency and traffic field. The following is an adapted version of his letter, which describes one part of the Johnstown operation. The call signs have been deleted to protect the innocent.

"I went to Johnstown, PA, to help with their flood cleanup communications the week after the flood. From the ham communications point of view, it was a very frustrating experience. I'll outline some of the problems I saw.

"When I first reported to c.d. hq. at the county seat, I was being set up to take over as operator of the 34/94 net control station on the Johnstown repeater. This station previously was using only the suffixes of the call signs; no call-sign prefixes were being used, not even every 10 minutes as required by FCC regulations. Knowing that this was illegal, I took the microphone and started a call-up to find out what stations were currently in the net (using complete calls). The operator I was relieving grabbed the mic out of my hand and told me that I couldn't operate if I insisted on using complete call signs. This, incidentally, was the same operator who was so badly confused as NCS that he didn't know what stations were in his net, where they were, or how adequately they were manned; things I was trying to find out.

"I heard this happen many times: A station would call in and say 'I have emergency traffic' (most of this emergency precedence traffic didn't in any way justify its E classification). The NCS would say 'Send your traffic' without even finding out whom it should be sent to. The station with the traffic would then start reading his message, without indicating who should copy it. You guessed it! After he was through, he and the NCS would find out that NO ONE had copied it.

"There was a bad mixture of formal and informal traffic and seldom any indication of whether what was being sent was formal or not. Several times I would hear a 'formal' message being transmitted, then the receiving station would ask for a fill and find out the sending station had been making it up as he went and *couldn't* repeat it. Most formal traffic was read at about two to five times normal writing speed, so many fills were required.

"When I asked to be reassigned in the field (after leaving c.d. hq.), I was sent to the mayor's command post. Toward the end of the day, I met the mayor and told him why I was there. He invited me to come to his 9 P.M. staff meeting and give his staff a brief description of what kind of ham communication we could furnish them.

\*Asst. Communications Mgr., ARRL

"Before this meeting, I talked with W3--- at c.d. hq. and asked him what communications capability I should offer as being available. He told me simply to get the mayor to make a formal request and they would supply whatever he asked for. Keep that statement in mind.

"At the mayor's staff meeting, they decided they could well use a small, local-coverage net on 2-meter fm simplex, with the NCS as the mayor's command post and six handheld or mobile units for the six area supervisors who were doing field work. I asked him for a request of this in writing, got it, then transmitted a message to c.d. hq. for the equipment and personnel to establish the net.

"Then some strange things happened. The next morning, I checked into the 34/94 net. A couple of stations who had heard my message the previous night called in. One volunteered the base station antenna and coax needed; he was told by the NCS to stay where he was. Another said that there were plenty of operators where he was and he would be able to come to the command post with his handheld to help. He was also told to stay where he was. I got the definite feeling that W3--- had set me up to volunteer to help, with no intention of supplying the help the mayor requested. To the best of my knowledge, the ham support that the mayor asked for was *never* provided.

"Later that morning, the assistant fire chief asked me to find out where the stations in our net were located, so that he could use them for his communications. I asked the NCS and he refused this information at the direction of W3---, saying it was confidential info that should not be aired. Pardon me, gentlemen, but that was just so much bull. I think the truth was that the NCS still didn't know where they were, but didn't want to admit it.

"Another ridiculous thing was that commercial telephone service had been restored at the time I was there (five to six days after the flood) to most of the places being served by the 34/94 net. My training from ARRL says that as soon as normal channels of communication are restored, the hams should fold up and go somewhere where they are *needed*.

"Later this second morning, another crew of hams was sent down to operate a station on the 34/94 net and replace me. I was reassigned to another location that had commercial telephone service and National Guard radiocommunications, and didn't need me. I called in from there and again was reassigned, this time to a place that already had more operators than it could use. I called in from there and was further reassigned to still another station that had commercial telephone service restored and enough operators for continuous operation. At that point, I got the message and left for home.

"Before I left Johnstown, I ran across a ham from the Washington area, three from Ohio and one from Baltimore. They all had

received practically the same runaround that I did. All of us had responded to the specific request that more operators were needed. The Johnstown c.d.'s problem was one of disorganization — they didn't really know what they had or what they needed. Confusion reigned supreme a week after the flood.

"The three hams from Ohio finally gave up chasing geese and found out that a suburb of Johnstown was still in bad shape and honestly needed ham communications. They went there and set up operation on 34/94. One of the last things I heard about them was that they were passing some obviously useful traffic. But the NCS told them to close down and report back to Ebensburg (a 25-mile trip) to be reassigned to a location in Johnstown (a 20-mile return trip to within five miles of where they were at the time).

"What I have described in this letter shows the need for emergency communications training. You just cannot gather up a bunch of untrained operators and have effective communications to support an emergency. It is quite difficult to get hams interested in training when there's no emergency in progress (the 'don't fix the roof while the sun's shining' syndrome) and then when you need trained operators, they don't exist.

"I could tell you many more stories about that frustrating two days, but this letter is already too long. There were plenty of *good* ham communications provided at Johnstown, but it was awful if you got tied into the c.d. net on 34/94, where many were too busy *playing* ham communications to *provide* ham communications.

"That's the summary of my two days in the Johnstown 'wildfowl preserve,' where turkey operators and wild goose chases were regularly scheduled. I always like to see hams get the recognition they deserve for a job well done, but sometimes I feel there is a great reluctance to face up to the fact that sometimes we do a poor job. In Johnstown, there was a lot of poor operating and if we face up to it, then we can profit from it and learn how to do it better the next time."

Want to learn how to do it better? Participate in the Simulated Emergency Test; details this issue.

## PUBLIC SERVICE DIARY

□ Point Colborne, ON — June 10-12. K6GMU/VE3 and VE3TC were instrumental in notifying police through VE3WCR in the apprehension of three juvenile offenders and the recovery of much stolen property. (VE3GT, SCM ON)

□ Warren Co., OH — June 30. Hams responded to help the Co. Disaster Services director with communications when a windstorm blew off the roof of the Carlisle City Building and police hq. (WB8EMH)

□ Perth, ON — July 23. VE3SB contacted VE3GT on the local emergency net to report a fire near his summer cottage. Authorities were notified and a major disaster was averted. (VE3GT, SCM ON)

□ Thunder Bay, ON — July 31. The Lakehead Search and Rescue Unit conducted a success-



ful search for a lost fisherman in the Circle Lake area. Communications were conducted on 3750 kHz by Lakehead ARC members. (VE3AYZ)

o Reno, NV — July 31. EC K7VYT activated the local ARES net when a plane crashed in the Hunter Lake area. The plane was located in 35 minutes. (K7ZAU, SEC NV)

o Riverside, AL — August 19. Members of the St. Clair ARC and the Calhoun Co. AKA assisted the Sheriff's Dept. in the search for a suspect in the homicide of a local police officer. (WA4UKB)

o South Korea — August 19. HM1KA, of the South Korea Amateur Radio League, put out an emergency call for a drug needed to save the life of a four-year-old Korean boy. He was answered by OCWA president W6ATC, who flew to Seoul himself and personally delivered the lifesaving medicine. (W6ATC)

o Granite Peak, MT — August 21. When a lone mountain climber fell and then slid 80 feet down, nearby ham-bikers called for help with portable equipment. The injured man was later rescued by helicopter. (W7BMI)

o Guayaquil, Ecuador — September 7. Within three hours of receiving an emergency call from HC2WF on 20 meters, a group of Miami hams coordinated their efforts and successfully located a supply of a scarce antibiotic and put it on a plane to Ecuador. (K4SCL, SCM SFla; W4UG, VDir Roanoke Div.)

o Mendoza, Argentina — September 9. LUDIQ/W6 picked up an emergency appeal from an Argentinian ham requesting equipment vitally needed for a brain operation. LUDIQ's wife, a former employee of a local hospital, arranged for the equipment to be flown in. The operation was a success. (K6K6P)

o For September, 35 section emergency coordinators reported a total ARES membership of 13,234. At this time in 1976, 33 reports were received, with a membership of 12,051. Sections reporting were Alta, Ariz, Ark, Colo, Conn, Del, ENY, EMass, Ga, Ind, Me, Mar/Nfld, Mich, Mo, NLI, NC, NEta, NNI, NTex, Ohio, Okla, Ont, Org, Oreg, SDgo, SJV, Sask, SFla, SNI, Va, Wash, WVa, WMass, WNY, Wisc.

o Repeater Log. According to reports received to date, repeaters were used to report 86 auto accidents and related occurrences, four disturbances, two fires, two medical emergencies and two drownings. Repeaters involved were WR4ALL, WR5s ABA ABY ADP AIB AIG, WR6s ACF ACU AMB AOX, WR8AHC, WR9ABQ ABY AJE.

## NATIONAL TRAFFIC SYSTEM

The Central Area Staff met in St. Louis, MO, on October 15-16. Summary minutes will appear later. W0HXB has been appointed manager of TWN-D and will continue as manager of TWN-E! Combined reports received from 1RN, 2RN, 4RN and TWN — the new procedure officially starts next month. PAN is now back on 3675 kHz. 4RN-D has shifted to 3935 kHz for its second session. RN5-D certificates went to W4AFO, K4WWQ and WB5RXZ. Preparations for SEF should be underway.

## September Reports

(daytime sessions)		(evening sessions)						
	1	2	3	4	5	6	7	
1 EAN	30	1636	54.5	1,353	98.8			
2 EAN	59	605	10.2	526	81.4			
3 CAN	30	1178	39.3	913	100.0			
4 CAN	60	338	5.6	217	93.9			
5 PAN	30	855	31.8	847	98.8			
6 1RN	29	335	8.1	250	91.1			
7 2RN	88	863	9.8	550	93.4	80.8		
8 3RN	119	717	6.0	456	90.1	95.0		
9 3RN	60	276	4.6	336	97.8	100.0		
10 3HN	30	81	2.7	377	100.0	98.3		
11 4HN	120	881	7.3	553	69.6	98.3		
12 RN5						100.0		
13 RN5	30	262	8.7	318	82.5	100.0		
14 RN6	60	497	8.2	430	100.0	100.0		
15 RN6	30	120	4.0	216	75.0	96.6		
16 RN7	60	399	6.6	544	91.1	96.6		
17 RN7	60	125	2.0	150	56.4	96.6		
18 8RN	54	293	5.4	328	74.4	96.6		

8RN	29	92	3.2	464	85.6	98.3
9RN	60	506	8.4	389	94.6	100.0
9RN	30	71	2.3	330	73.3	81.6
TEN	60	476	7.9	361	85.0	100.0
TEN						100.0
ECN	58	221	3.8	319	85.0	100.0
TWN	72	490	6.8	330	69.8	90.0
TCC Eastern	106	547				
TCC Central	84	523				
TCC Pacific	110	615				
Sections	3003	19401	3.9			
Summary	6261	32403	5.1			
Record	5442	29730	15.4			

TCC functions not counted as net sessions.  
 Section and local nets reporting (137): BCEN (BC), MTN (MB), GMN GBN GBSN ODN OPN OSN (ON), GSN WOVUHF (PO), SATN (SK), AENB AEND AENJ AENM SENS IAL), ASN (AK), ATEEN (AZ), AMBN APN ARN OZK (AR), NCN NEN SCN (CA), GWN (CO, WY), CN GPN NMVFN (CT), DEPN DIN (DE), EAST FMFN PFTN GN NFPN PBARESTN QFN QFN SPARC IPTN (FL), CVEN GARES GSN GSBBN (GA), IMN MTN (ID), (IL), ILN (IL), INTN IIN QIN (IN), I75MN TLON (IA), KPN KSN KWN QKS QKS-SS (KS), KSN KYN (KY), LAN LBN LSN LTN (LA), MSN PIN SN (ME), MDCTN MDD MEPN (MD-DE), HHTN EMR EMR/ISS, EM2MN NENN WMN WMPN (MA,RI), HEN KCAN MACS (WN QMN (MI), MSN MSPN MSSN PAW WXX (MN), MTN (MS), MON MOSSBN MSN (MO), NHVIN (NH, VT), PVTEN NJN NJPN NUSN (NJ), SWN (NM), NLI NLI/PTN NLS NLI/V NYS WDN (NY), CNN NOSSBN SCSSBN (OH), OAN OFON OIZ OPEN OTWN STN (OK), PTN (Pa), EPA EPA/PTN PITN WPA WPAP&TN WPA2MP&TN (PA), SDN (SD), TN TNN TPN (TN), TEX TTN (TX), UCN (UT), VFN VN VSN VSN (VA), WSN (WA), WVN WVN/W WVPN (WV), BEN BWN WIN WNN WSN WSSN (WI).

1 — NET	5 — RATE
2 — SPSSIONS	6 — %REP.
3 — TRAFFIC	7 — %REP TO ARFA NET
4 — AVG.	

## Public Service Honor Roll September 1977

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/RITTY nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RITTY 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.

69 WA5RKU	WB8VLR	K9LGU	N8CW
65 W5KLV	WA9QCF	K0EVH	WB8YVI
64 N3HR	WB0HOX	W0FT	W9MR
62 K4BKX	WB8YDZ	WB0FO	W9MXG
61 W2MTA	WB8VLR	W0OYH	W0OTF
N2MW	N2YL	WA0TNM	W0RFF
WB4DBK	WB5NCK	WB0VZ	WB0ZAL
WB5NCK	W4MEE	VE7ACU	VE7AMH
W45YEA	WB0LFY	VE7AAF	VE7HJ
W8JGW	51	48	VE7RO
59 WA4JDH	K1PAD	WA1UNC	VE7GOL
58 W42BMI	K5DG	47	43
N5YL	K6JT	W2CS	W4FMN
W6UAZ	W7GHT	WA2ZJP	WB4OXT
57 VE3GT	WA4PSL	N6GW	WB5OSN
56 W1BA	W1KX	WB8DIL	W48WTS
W1KX	W1RWG	52	WB0LSI
WA1VEI	WA2ERT1	W4MEE	46
WA2ERT1	K3ORW	WB0LFY	K5OWK
N2GM	W43PRW	59	WB6FTY
W43PRW	K3YHR	58	W0AM
W2MLC	WA4GNY	N5YL	K0DJ
WB0BB	WA4JUX	K6JT	K2SE
WA4JUX	K5MAT	W6UAZ	K3YL
N4VA	WB5ODM	W7GHT	WB5PVI
N5ES	WB6PVH	57	WD9AUD
W5GHP	N5FC	56	W9JW
N5RB	W48ZNG	55	WB0PGZ
N5FC		54	W9JW
		53	WB0PYD
		52	WA1OUZ
		51	K2AV
		50	WA3NDO
		49	K4VHC
		48	WB5RLH
		47	W48VBS
		46	N4DY
		45	WB4EKJ
		44	W44HNDIN
		43	W08JYMN
		42	W44TD
		41	W44QGV/T
		40	WD8JYNT
		39	K5MK
		38	K5TTC
		37	W5UYH

## Independent Nets (September)

1 Amateur Radio telegraph society	2	3	4
Central Gulf Coast Hurricane	30	454	483
Clearing House	31	213	2826
Hir & Bounce	60	820	390
IMRA	26	342	883
North American SSB		56	210
Washington Region PON	17	48	246
20 Meter ISSB	26	540	454
75 Meter ISSB	30	642	1101
7290 Traffic	42	476	2114

1 — NET  
 2 — SESSIONS  
 3 — TRAFFIC  
 4 — CHECK-INS

## Transcontinental Corps

K3KW has been appointed assistant director, TCC — Eastern. KH6IU has joined the ranks of ICC — Pacific. W2GKZ received a TCC-E certificate, 10th annual!

1 Eastern	2	3	4	5
123	86.2	1786	547	223
Central	90	93.3	1005	123
Pacific	120	91.7	1247	675
Summary	333	90.4	4038	1685

1 — AREA  
 2 — FUNCTIONS  
 3 — SUCCESSFUL  
 4 — TRAFFIC  
 5 — OUT-OF-NET TFC

## TCC Roster

The TCC Roster (September): Eastern Area (VE55B, Dir.) — W1s KX NJM QYY K1s. BA ER GN NIA PAD SSB XA, WA1AZ, W2s CS FR GKZ MTA RO, N2GM, WA2IGB, W3YQ, K3s KW PA, N3HR, WAUQ, K4KNP, N4KB, W8s LIA PMJ, K8KMQ, VE1AAU, VE3s GQL SB, Central Area (W5GHP, Dir.) — N4s DY MD, W5s, GHP RB, K5s GM MC, N5s TS YL, WA5s HNN, IOU, W5s OXY DND FC NXG, N9TN W0s AM HI, K0CW EVH WA0TNM, Pacific Area (K5MAT, Dir.) — W5KH, K5MAT, N6GW, W6s E01 MLE OA VZT YBV, K6HW, KH6IU, W7s DXZ FP GHI KZ, K7WD, W0s F11 FV IW I.Q, K0s BN DJ TER, WB0TAQ, VE77K

## Brass Pounders League September 1977

BPL Medallions (see December 1973 QST, p. 58) have been awarded to the following amateur since last month's listings: K3KW.

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 W3CUL	2	3	4	5	6
793	1360	1662	41	3856	
K3NSN	386	800	800	301	2887
W0WYX	50	935	247	588	1920
W3VR	317	219	394	12	842
K9CPM	1	519	37	341	968
K0YFK		433	1	432	866
N3HR	20	395	326	53	794
N4MD	4	371	351	12	738
WA4JDH	10	357	352	1	700
W0NMW		642	31	55	728
K1BCS	42	41	194	357	648
WB0HOX	17	305	312	8	642
WB6EIG	11	301	300	1	613
W5DAIJ		303	303	606	
K0ONK	2	425	119	15	561
WA1UNC	10	283	232	23	548
K0DJ	33	227	247	7	514
WA1AZ	9	259	238	3	509
WB8DKO	5	265	239	3	507
W5KI V	2	294	191	19	506
W5REG	5	226	269	3	503
N5YL (July)	73	186	220	22	501

Multiprotor Stations  
 W1MX 280 24 259 10 603  
 BPL for 100 or more originations-plus-deliveries

W7TZK	200
K7YWA	190
W1TR	175
W7SOT	117
W9IOH	104

Multiprotor Stations  
 WBWPOB 118  
 WRFY 115  
 W4ATD 110

1 — CALL	5 — DEL.
2 — ORIG	6 — TOTAL
3 — RECD.	
4 — SENT	



## Retort, Rebuttal and Rejoinder

"As I see it, OSCAR will go the way of all repeaters," opines K5GVT, responding to our recent AMSAT commentary. "It will become overloaded to the point of unusability. And your 'great equalizer' provides little or no incentive for amateurs to build bigger and better communications equipment. Knocking the big-signal hi ham has become stylish lately and is usually done by weak-signal types apparently too lazy to put forth the big-signal effort. Those 'grandiose 20-meter weapons' reflect the American way: within the rules you strive to be No. 1. The guy who does his best to dig up a good radio location and erect a really effective antenna installation deserves better results than those with 30-minute rooftop verticals or dipoles. Don't knock the honest Big Gun and don't confuse him with 10-KW cheaters."

WA1SPM expresses concern about the operational security of orbiting satellite repeaters. "They can, very possibly, be paralyzed, manipulated or commandeered. Not so easily the ionospheric shortwave spectrum."

N4ZR has similar OSCAR reservations: "With a whole hemisphere in view, and all signals within a few dB of each other, DX competition will become sheer chaos. I predict that the use of satellites eventually will be banned for competitive activities. The total power available from such a repeater must divide among all users. The bigger the pileups, the weaker all signals. No, I don't think we'll all be deserting the standard hf bands for satellite spectra. DX sport will still abound on 160 meters and down."

Pete also feels that call-sign-changing need not be deprecated, particularly considering that, like himself, a good many amateurs never have been at ease with potluck labels dished out by FCC. "Maybe multiples aren't very sensible but call-changing, especially as an incentive toward earning Extra Class, strikes me as eminently reasonable." Judging by the variant IDs heard on the bands these days, a lot of active DX hounds share N4ZR's sentiments. Not W9NN, though. Bob supports our "case for identity" with a chuckle at the two-letter-suffix scramble. W9NN has a 1920s original and he's trying to come up with an adequate answer to that wearying QSO comment of the day: "Maybe we've contacted before, OM. What was your other call?"

### FROM QST'S DX MAILBAG

**EUROPE:** Holland's '77 PACC test has State-side entrants finishing in this order: N2CW, W9OHH, K4LEX, Ws 3ARK, 9QWM, 0BMM, N4MM and W8VSK. VEs 1MX and 3JK won and placed for Canada. Country leaders elsewhere included DF3BN, DM3BF, EA5QR, F2VO, FC9VN, G3BSE, GM3KLA, HA5KFB,

HB9QA, JR1FVW, LB1G, LZ2JF, OD5LX, OH1ZAA/2, OK1DKW, ON6NL, OZ1LO, SM0DSF, SP8ECV, UAs 3QAQ, 9YAR, UB5JFJ, UC2WAZ, UD6CN, UKs 2WAO 5JAA, 9AAA, 0L7QH, UO5ODX, UP2BB, UQ2GON, YO6HO, YU3TIA and ZS6AJS. (PA0DIN) . . . U7EX, manipulated by 17s DLV VCA and myself in the Cheradi Islands this summer, logged some 3500 U.S. QSOs among 8000 contacts with 131 countries. The trio also made a thousand QSOs with commemorative call IJ7ONU. Shortly before QRT time a violent storm erased our beam and tower. (I7DPO) . . . TF4F worked about a thousand stations from Flatey Island in early August. Had the pleasure of visiting some of the TF gang in Reykjavik shortly afterward. (W4KFC) . . . I'd like suggestions toward building a fairly simple general-coverage converter for such ham-band transceivers as my FT-101. One attempt at an L-C tuner didn't fare so well. (SM6FXA) . . . Watch for my signals from 3A0GY on the 8th-10th of this month. Monaco's mountains hamper USA QSOs but a few more sunspots may help. (WB2EZG) . . . YU1PCF intends to sign 4079WARC on 160 cw this season. (VO1KK) . . . Shortage of DX-oriented personnel stalls the Franz Josef output of UK1PAA. (WA6AUD) . . . YL DX? G4EZI adds GD4FWQ, FH0YL, HS1YL, KL7JDI, OE6YAG, OY1S, PY2PE, VE7s DKC and DFO, all mostly on 20 voice. (DXNS) . . . Prominent European DX hound UR2AR was a rare surprise guest at a summer Northern California DX Club gathering. (NCDXC)

**AFRICA:** My DXcursions as A2CAZ, VE3EXT/S83D6, 7P8BE, 7Q7PV, 9G1HE, 9J2PV and other calls resulted in about 35,000 QSOs. Cambridge DX Canada is sponsoring a 1977-78 African DXpedition beginning this month and will appreciate the gang's interest and support. (VE3EXT) . . . When part of South Africa becomes Bophuthatswana on the sixth of this month VE3EXT may be there to air its first ham transmissions. (VERON) . . . J28AY represents Djibouti on 40 cw where CT3BQ is also popular. ZD8RR likes ssb on 75. (K3UA) . . . ZS6WW also has good DX ears on 7-MHz cw. Oliver neatly pulls my barefoot FT-101 and dipole through heavy QRM. (WB9OUH) . . . That's FM7WO vacationing on Reunion as FR0DGP. (K5VI/3) . . . 5X5NK closed down for return to Germany, and 5Z4NH says that 5Z4LW departed Kenya for home and LA2UA. (VE1UNB) . . . Formerly bustling with a thousand hams, Angola now is officially QRT. At the moment I'm an SWL in Portugal. (D2ASW, ex-CR6s LW SW) . . . African addenda courtesy DX literature of clubs, groups and individuals: C5AAP should be found around 14,215 kHz after 2200 until the first of the year. . . . ARRL's K1XA and WB2CHO tried the DX end as 6W8MM last month . . . CT3AF's 20-year WAS quest is hung up on Wyoming. . . . TR8UCV is a 28-MHz delicacy on weekends at 1000-1500 UTC. . . . W6YO stopped off at FH0YO and S79K for a few hundred QSOs before further travels aboard *Yankee Trader*. . . . With improved 15-meter conditions the Africana net is heard on its regular 21,355-kHz spot at 1700 UTC once more. . . . C9MDB, 14,185 kHz at 1800 UTC, claims to be okay for Mabuto, old Mozambique. S9RLB, a few kHz lower, is heard from Sao Thome. . . . ZE5JJ recently tried an ambitious balloon-supported wire on 40 and 80 but the dangle angle suffered from bag sag.

**ASIA:** I'm heading for Korea with a Triton and material for a 14-MHz quad. I'll be an HL9 for at least a year with the Signal Corps. Been on from K4WAR at Fort Gordon where

10-meter DX is fantastic. (K5UI) . . . Our new HZ1AB CL-33 does very well at a height of 70 feet. WB9FUV and I relocated the station to a more accessible site not far from its old spot in Dhahran. Europeans had a rare treat in early July when HZ1s AB and FA, Saudi Arabia's only known actives, were both available on 14 MHz. (K8CSG) . . . I first wrote to "How's" in 1954 from HZ1AB. Since then I've signed KA2RB, EG6ICD (Marcus) and other Pacific calls. Now I'm back in Saudi Arabia with, at the moment, no operating authorization. Former KS6s DH and DW also work with me in ARAMCO's communications department some 150 miles south of HZ1AB. We're cautiously optimistic that we can soon obtain hamming privileges. (W7KJJ, ex-K56DY) . . . Ex-KW8HJ (K3BHL) now radiates from H8XDF on a two-year D.R. tour. (K3SWZ) . . . AP2TN's favorite cw hangout is 14,040 kHz at 1300 UTC on Saturdays. I manage Tariq's Stateside QSLing. (W8QFR) . . . Despite poor conditions on Chichi Jima our Morioka DX Club DXpeditioners worked 58 countries and hundreds of W/K/Ns as JA7ZSQ/JD1 in late summer. (JH7WKQ) . . . On a recent trip to The Orient I was fortunate to attend a meeting of British Fleet Club VS6s in Hong Kong. One topic of conversation sounded quite familiar: problems for hams arising from illegal CB operation in their region. (K7GD) . . . Via the clubs press: A new quad should improve the attack of JT0JD1's 50-watter on 14,215 kHz around 0330 UTC. . . . North Dakota will ring the WAS bell for EP2SV who is due for Statesward QSY this month. . . . SQ7AD nears the end of a three-month Maldives stay with a KW and Yagi on 15 and 20 voice. He's JG1CF back home. . . . A9XC couldn't cut through for an A7 license and expects to terminate his Bahrain business in February. . . . KA6KJ threatens a Marcus encore by spring when propagation should be much more favorable than that encountered by recent KA1S efforts.

**OCFANIA:** After reading about the stuff in "How's" for years I'm now enjoying life at the DX end on Yap. Mostly weekend cw activity near the low band edges, 15 through 80, with a 6V6-6BG6s 50-watter derived from a retired TV set. An old HQ-140 does the receiving, and my antenna is an open-wire-fed Y beam with 200-foot legs. I'd like to work more Stateside stations but the bands here are filled with Japan and Siberia much of the time. Any W/K/Ns needing the Western Carolines on cw are invited to assist my WAS. (KC6JJ-KH6GPC) . . . While signing VR8N in late April I received happy and surprising news that my second child had been born a month ahead of schedule. (Z44TT) . . . I've received a two-year Navy assignment to the Philippines and hope to operate reciprocally with my Triton II, 4BT4 and dipoles. (WA1APX) . . . Long time since I kept in touch with "How's" from KH6111. On business trips coming up I expect to be signing portable KG6, KG6S and C6A. Incidentally, I don't know if my two Five-Band DX Century Club memberships are a first but I hold no. 95 as W5FL in '71, no. 376 as W9DD in '74, (N5RM) . . . After five years and 272 countries as WSSZV I'm down east again with my old call. Logs and QSLs are still on hand for 1970-71 Yop operation by the XYL and myself as KC6s YL and WS. (W3FDP) . . . VK0AC's 180-foot long-wire over saltwater lays in an S7 signal at my QTH. He leaves Macquarie for return to VK3ZOK around Christmas and likes 40 cw. (K3CL) . . . VK9XR/mm, sailing solo about North and South America, is heard on 14,215 kHz at 0330 UTC. VS6GG shuts down for VK

\*c/o ARRL, 225 Main St., Newington, CT 06111



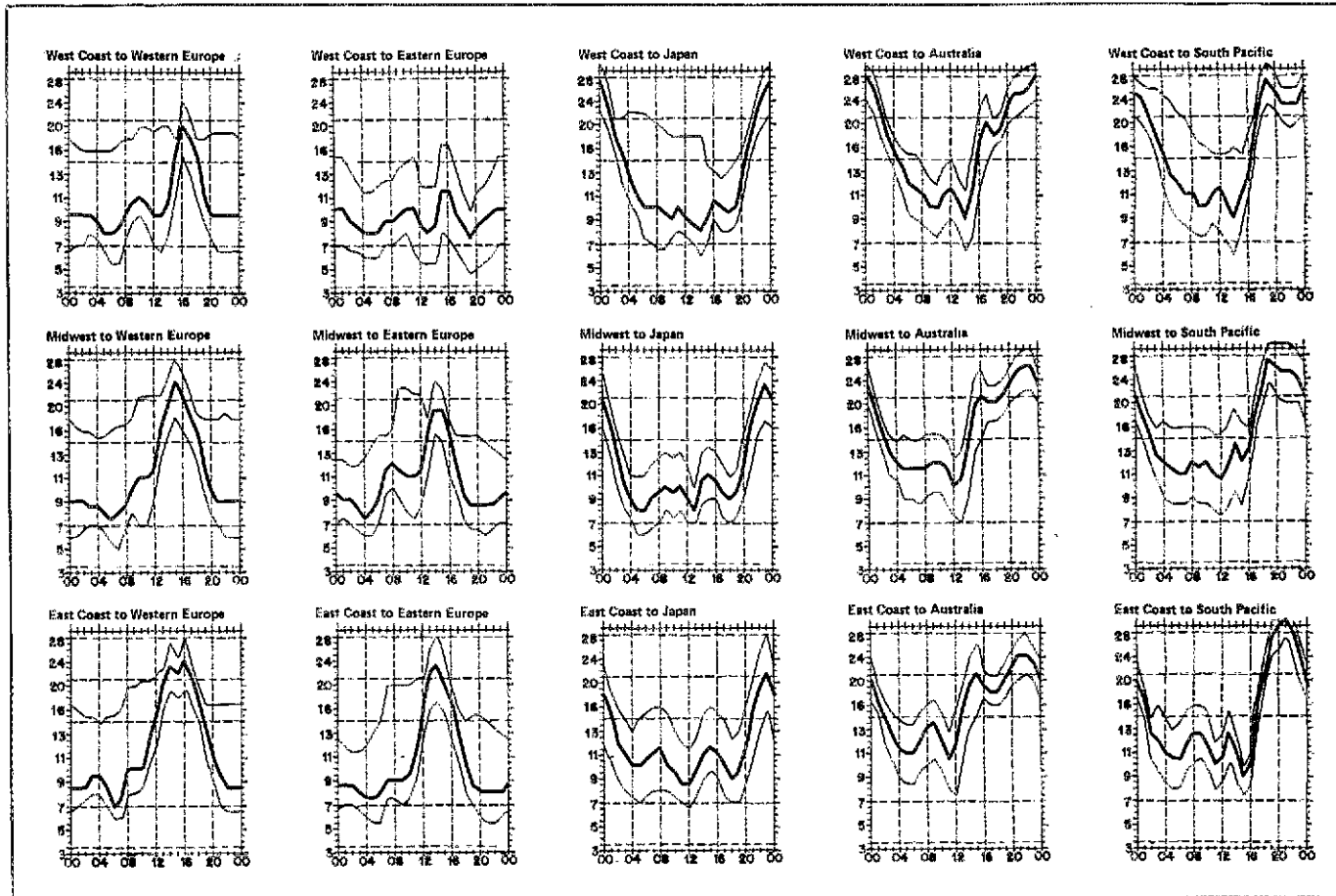
CT4IK and D2ASW, left and right, relax in the former's Lisbon hamshack. Will, ex-D2AIK, is relocating to Argentina. Art remains in Portugal and eventually should have his own CT4 call.

reassignment, and VS6DO goes back to England via Washington. VS6DA visited Australia for some hot-air ballooning and was well-heard signing VK6XB at 12,000 feet. (WA6AUD) . . . VR4DX does his 160-meter cw thing near 1800 kHz from 0300 UTC. (VERON)

**NORTH AMERICA:** Results of this year's Bermuda Contest show K2UR, WA2DIG, W1s FJ DO, K3DH, WA3UHJ, W3GG, WB9OBX, W2FFO, WA4QMQ, N1XX, W9OHH, WA2CPP and W7OK scoring in that order for

our side. The Canadian sequence goes VE6 3KZ 1A1H 1RU 1AMB 3GFN 3RO 3BTQ and 4SW. Across the water it went G4 4CNY 3VPW 3ZBA 4DSE 6CJ 3ESF, GM3CFS and G6NK. VP9s IG IF, VE7DRL/VP9 and VP9HL were 1-2-3-4 on the home front. (RSB) . . . Great to be back in the game after a nine-year layoff. Forty and 20 cw are still going strong but what happened to leaves? Glad to find that 50 watts, an SP-600JX and dipole can still work plenty of DX. (W0RNB, ex-W9CAQ) . . . Operated briefly in mid-August as a portable-OX from Thule with an FT-101E on 20. Some contacts doubted my legality but full permission was received from the base communications chief and Danish authorities. (K1SC) . . . Santa Barbara ARC was feted at the gala October open house of W6s AM and MA. (WA6AUD) . . . I'll be QRT from Newfoundland shortly but my VO address will still be good for incoming QSLs. (VO1KE) . . . Nicaragua's rainy season was a real test of one's wireless fortitude. (YN1QPX-W5QPX) . . . Wow, nice to hear all those 10- and 15-meter DX signals boiling through again. (K2TV) . . . Now settled in Billings after a VE1 P.E.I. tour that brought 160-meter WAC and 61 top-band countries. Any overseas ops still needing Montana can find me on the lower frequencies. (W6BYB/7) . . . Recent wide-open conditions on 28 MHz are quite a shock to ham newcomers. At University of New Brunswick ARC we scored almost a thousand 10-meter contacts during the summer including QSOs with 32 states. Being such a wide band, 10's lower edge is sometimes open when its higher frequencies appear dead. We use a TS-820 and 75-foot-high TA-33. (VE1UNB) . . . My bare-foot FT-101E and 20-foot-high groundplane also find 10 mighty interesting. A short CQ

on an apparently dormant band can stir surprising DX results. (WB5K5U) . . . I find a simple groundplane radiator increasingly effective on 21 MHz. Those propagation charts surely come in handy for those of us with limited DXing time. (WA9BEV) . . . My modest dipole seems to be a USSR pipeline on 20 cw. (W1BFK) . . . We're volunteering a little poetry for next May's DX Hoggery & Poetry Depreciation Society hamfest. (K3NPC, WD0s BPG DLV) . . . Finally cracked the DXCC barrier from WB9NME before QSY to the University of Wisconsin. An FT-101E and 18AVT did the job. (W9WI) . . . Most visitors to Montserrat concentrate on ssb so I received a big cw welcome as VP2MBC last August, especially on 40 and 80. (W1CDC) . . . My XF4JJ ticket remains valid until my departure from Mexico next June. (XE1UFA-WB4KPX) . . . If all goes well K1MM and I will be buttoning up a Juan Fernandez venture early this month. While in Chile we intend to iron out details for a near-future San Felix DXpedition. (N4WW) . . . Some of that recent 10-meter DX was freaky stuff, particularly on east-west paths. Auroral disturbances coincided with nighttime openings to Norway, Alaska and Japan. (WA9IXF) . . . Visitor W5NC logged my 20,000th QSO for the year, SP2BLC on September 14th. (KV4AA) . . . I'm starting to DX in terms of 5BDXCC, with a long way to go. A new 7-MHz vertical seems to be doing well but city QRN levels make things difficult. (W9UNQ) . . . N2AC's double-letter-suffix DXCC recalls my own efforts at the same trick. I did it as K4HNA in the mid-60s, again as W8KGR a few years ago. Doubt if I'll try for a third! (W4MGN) . . . About a dozen North Florida DX Association members descended on Haiti for well-



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

organized autumnal contest action. (NFDXA) . . . W6T1 maintains its DX bulletin schedule on 14,002 kHz each Sunday at 1800 UTC, Monday at 0200, (NCDXC) . . . Acknowledgement for much monthly "How's" data is gratefully accorded Canadian DX Association *Long Skip* (VE1AL/VE3), Columbus Amateur Radio Association *CARAScope* (W8ZCQ), *DX News-Sheet* (G. Watts, Norwich, England), Long Island DX Association *Bulletin* (W2IYX), Newark News Radio Club *Bulletin* (M. Witkowski, Rte. 6, Box 255, Stevens Point, WI 54481), Northern California DX Club *DXer* (K6SSJ), North Florida DX Association *News* (WA4UFW), VERON's *DXpress* (PA0TO) and Western Washington DX Club *Totem Tabloid* (K7s RA VPF). TU!

## THE ARRL DX QSL BUREAU SYSTEM

The ARRL DX QSL bureau system distributes cards free of charge from DX stations to amateurs within the League membership area (see page 8). Every active DXer should keep several 5 x 7-inch envelopes on file with the bureau of his home district. Place your call sign in large block letters in the upper left corner, and attach a single first-class stamp, unless you normally receive more cards. Unclaimed cards are discarded after one year. For more details on the bureau system, write ARRL hq.

□ First Call Area: all calls\* — Hampden County Radio Association, Box 216, Forest

Park Station, Springfield, MA 01108.

□ Second Call Area: all calls\* — North Jersey DX Assn., P. O. Box 8160, Haledon, NJ 07508.

□ Third Call Area: all calls\* — Jesse Bieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355.

□ Fourth Call Area: K4, N4, W4 — National Capitol DX Assn., Box DX, Boyce, VA 22620.

□ Fourth Call Area: WA4, WB4, WD4, WN4 — Sterling Park Amateur Radio Club, P. O. Box 599, Sterling Park, VA 22170.

□ Fifth Call Area: all calls\* — ARRL W5 QSL Bureau, Box 1690, Sherman, TX 75090.

□ Sixth Call Area: all calls\* — ARRL Sixth (6th) District DX QSL Bureau, 2814 Empire Avenue, Burbank, CA 91504.

□ Seventh Call Area: all calls — Willamette Valley DX Club, Inc., P. O. Box 555, Portland, OR 97207.

□ Eighth Call Area: all calls — Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.

□ Ninth Call Area: all calls — Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.

□ Zero Call Area: all calls — W0 QSL Bureau, Ak-Sar-Ben Radio Club, P. O. Box 291, Omaha, NE 68101.

□ Puerto Rico: all calls\* — Radio Club de Puerto Rico, P. O. Box 1061, San Juan, PR 00902.

□ U.S. Virgin Islands: all calls — Graciano Berlarido, KV4CF, P. O. Box 572, Christiansted, St. Croix, VI 00820.

□ Panama Canal Zone: all calls\* — KZ5 QSL

Bureau, KZ5OD, Box 407, Balboa, CZ.

□ Hawaiian Islands: all calls\* — John H. Oka, KH6DQ, P. O. Box 101, Aiea, Oahu, HI 96701.

□ Alaska: all calls — Alaska QSL Bureau, 4304 Garfield St., Anchorage, AK 99503.

□ SWL — Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

□ QSL Cards for Canada (VE and VO) may be sent to: ARRL Central QSL Bureau, P. O. Box 663, Halifax, NS, Canada, B3J 2T3. Or, QSL cards may be sent to the individual bureaus.

□ VE1\* — L. J. Fader, VE1FQ, P. O. Box 663, Halifax, NS B3J 2T3.

□ VE2 — A. G. Daemen, VE2IJ, 2960 Douglas Avenue, Montreal, Quebec H3R 2E3.

□ VE3 — The Ontario Trilliums, P. O. Box 157, Downsview, Ont., Canada, M3M 3A3.

□ VE4 — W. A. Stunden, VE4BJ, 578 Oxford St., Winnipeg, Man., Canada, R3M 3J9.

□ VE5\* — A. Lloyd Jones, VE5JI, 2328 Grant Road, Regina, Sask., S4S 5E3.

□ VE6\* — G. D. Holeton, VE6AGV, 4003 1st St., N.W. Calgary, Alta T2K 0X2.

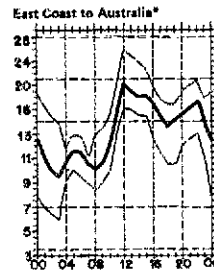
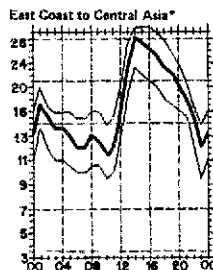
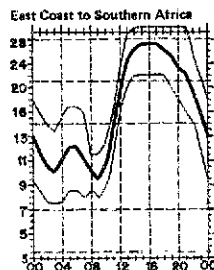
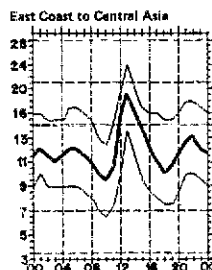
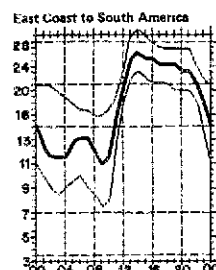
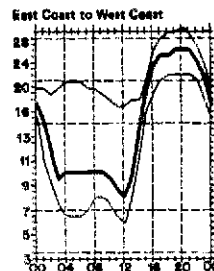
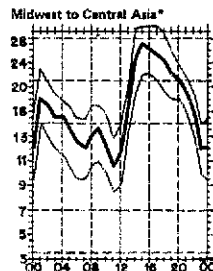
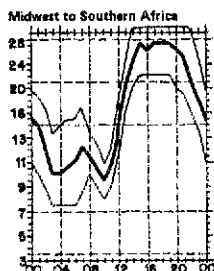
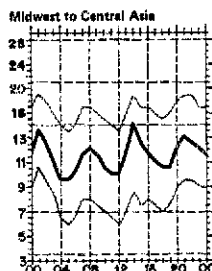
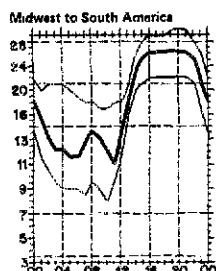
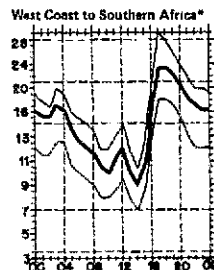
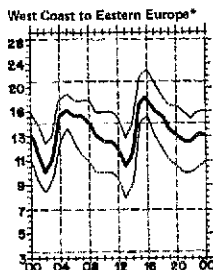
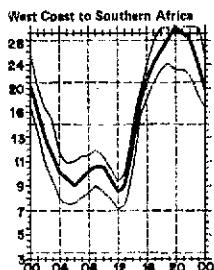
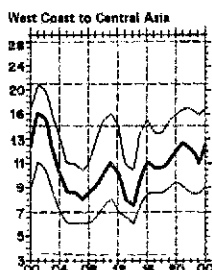
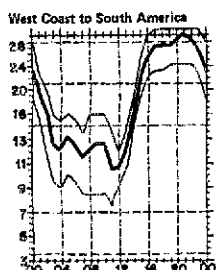
□ VE7\* — Howard Martin, VE7AFY, No. 45-9960 Wilson Road, Ruskin, BC V0M 1R0.

□ VE8\* — Al Sturko, VE8NS, P. O. Box 72, Fort Smith, NWT X0E 0P0.

□ VO1, VO2 — William Coffen, VO1KM, P. O. Box 6, St. John's, Nfld., A1C 5H5.

\*These bureaus sell envelopes or postage credits. Send an s.a.s.e. to the bureau for further information.

QSL bureaus for other areas can be found in the December, 1975, issue of *QST*, page 64.



lowest curve (optimum traffic frequency, or *fof2*). See January 1977 *QST*, page 58, and September 1977 *QST*, page 35, for a complete explanation. The horizontal axis shows Universal Coordinated Time (UTC); the vertical axis, frequency in MHz. Asterisk indicates long-path circuits. Data are provided by the Institute for Telecommunication Sciences, Boulder, CO. These predictions for December, 1977, assume a sunspot number of 52, which corresponds to a 2800-MHz solar flux of 104.

# DX Century Club Awards

The DX Century Club certificate is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL Countries List. There are now 319 countries on the list, and the DXCC Honor Roll (published in the March and September issues) highlights those ops who are within 10 countries of that figure. Each DXCC certificate may be endorsed for additional countries over 100 — in increments of 20 up through 240, increments of 10 through 300, and increments of 5 over 300. This listing contains the call signs and exact country totals of amateurs who've joined the DXCC or increased their country totals during the period from October 1, 1975, through September 30, 1977. Think you may be ready for DXCC? Write Headquarters for details.

Call Sign	Country Total	Call Sign	Country Total	Call Sign	Country Total	Call Sign	Country Total
MIXED	348	W5HJA	105	W5ANB	105	W7WJL	105
349	W5AAE	W5HGX	106	W5BNA	106	W7WJN	106
350	W5AKA	W5WVW	107	W5WBA	107	W7WJQ	107
351	W5ALB	W5WVW	108	W5WBA	108	W7WJQ	108
352	W5ALC	W5WVW	109	W5WBA	109	W7WJQ	109
353	W5ALD	W5WVW	110	W5WBA	110	W7WJQ	110
354	W5ALE	W5WVW	111	W5WBA	111	W7WJQ	111
355	W5ALF	W5WVW	112	W5WBA	112	W7WJQ	112
356	W5ALG	W5WVW	113	W5WBA	113	W7WJQ	113
357	W5ALH	W5WVW	114	W5WBA	114	W7WJQ	114
358	W5ALI	W5WVW	115	W5WBA	115	W7WJQ	115
359	W5ALJ	W5WVW	116	W5WBA	116	W7WJQ	116
360	W5ALK	W5WVW	117	W5WBA	117	W7WJQ	117
361	W5ALL	W5WVW	118	W5WBA	118	W7WJQ	118
362	W5ALM	W5WVW	119	W5WBA	119	W7WJQ	119
363	W5ALN	W5WVW	120	W5WBA	120	W7WJQ	120
364	W5ALO	W5WVW	121	W5WBA	121	W7WJQ	121
365	W5ALP	W5WVW	122	W5WBA	122	W7WJQ	122
366	W5ALQ	W5WVW	123	W5WBA	123	W7WJQ	123
367	W5ALR	W5WVW	124	W5WBA	124	W7WJQ	124
368	W5ALS	W5WVW	125	W5WBA	125	W7WJQ	125
369	W5ALT	W5WVW	126	W5WBA	126	W7WJQ	126
370	W5ALU	W5WVW	127	W5WBA	127	W7WJQ	127
371	W5ALV	W5WVW	128	W5WBA	128	W7WJQ	128
372	W5ALW	W5WVW	129	W5WBA	129	W7WJQ	129
373	W5ALX	W5WVW	130	W5WBA	130	W7WJQ	130
374	W5ALY	W5WVW	131	W5WBA	131	W7WJQ	131
375	W5ALZ	W5WVW	132	W5WBA	132	W7WJQ	132
376	W5AMA	W5WVW	133	W5WBA	133	W7WJQ	133
377	W5AMB	W5WVW	134	W5WBA	134	W7WJQ	134
378	W5AMC	W5WVW	135	W5WBA	135	W7WJQ	135
379	W5AMD	W5WVW	136	W5WBA	136	W7WJQ	136
380	W5AME	W5WVW	137	W5WBA	137	W7WJQ	137
381	W5AMF	W5WVW	138	W5WBA	138	W7WJQ	138
382	W5AMG	W5WVW	139	W5WBA	139	W7WJQ	139
383	W5AMH	W5WVW	140	W5WBA	140	W7WJQ	140
384	W5AMI	W5WVW	141	W5WBA	141	W7WJQ	141
385	W5AMJ	W5WVW	142	W5WBA	142	W7WJQ	142
386	W5AMK	W5WVW	143	W5WBA	143	W7WJQ	143
387	W5AML	W5WVW	144	W5WBA	144	W7WJQ	144
388	W5AMM	W5WVW	145	W5WBA	145	W7WJQ	145
389	W5AMN	W5WVW	146	W5WBA	146	W7WJQ	146
390	W5AMO	W5WVW	147	W5WBA	147	W7WJQ	147
391	W5AMP	W5WVW	148	W5WBA	148	W7WJQ	148
392	W5AMQ	W5WVW	149	W5WBA	149	W7WJQ	149
393	W5AMR	W5WVW	150	W5WBA	150	W7WJQ	150
394	W5AMS	W5WVW	151	W5WBA	151	W7WJQ	151
395	W5AMT	W5WVW	152	W5WBA	152	W7WJQ	152
396	W5AMU	W5WVW	153	W5WBA	153	W7WJQ	153
397	W5AMV	W5WVW	154	W5WBA	154	W7WJQ	154
398	W5AMW	W5WVW	155	W5WBA	155	W7WJQ	155
399	W5AMX	W5WVW	156	W5WBA	156	W7WJQ	156
400	W5AMY	W5WVW	157	W5WBA	157	W7WJQ	157
401	W5AMZ	W5WVW	158	W5WBA	158	W7WJQ	158
402	W5ANA	W5WVW	159	W5WBA	159	W7WJQ	159
403	W5ANB	W5WVW	160	W5WBA	160	W7WJQ	160
404	W5ANC	W5WVW	161	W5WBA	161	W7WJQ	161
405	W5AND	W5WVW	162	W5WBA	162	W7WJQ	162
406	W5ANE	W5WVW	163	W5WBA	163	W7WJQ	163
407	W5ANF	W5WVW	164	W5WBA	164	W7WJQ	164
408	W5ANG	W5WVW	165	W5WBA	165	W7WJQ	165
409	W5ANH	W5WVW	166	W5WBA	166	W7WJQ	166
410	W5ANI	W5WVW	167	W5WBA	167	W7WJQ	167
411	W5ANJ	W5WVW	168	W5WBA	168	W7WJQ	168
412	W5ANK	W5WVW	169	W5WBA	169	W7WJQ	169
413	W5ANL	W5WVW	170	W5WBA	170	W7WJQ	170
414	W5ANM	W5WVW	171	W5WBA	171	W7WJQ	171
415	W5ANO	W5WVW	172	W5WBA	172	W7WJQ	172
416	W5ANP	W5WVW	173	W5WBA	173	W7WJQ	173
417	W5ANQ	W5WVW	174	W5WBA	174	W7WJQ	174
418	W5ANR	W5WVW	175	W5WBA	175	W7WJQ	175
419	W5ANS	W5WVW	176	W5WBA	176	W7WJQ	176
420	W5ANT	W5WVW	177	W5WBA	177	W7WJQ	177
421	W5ANU	W5WVW	178	W5WBA	178	W7WJQ	178
422	W5ANV	W5WVW	179	W5WBA	179	W7WJQ	179
423	W5ANW	W5WVW	180	W5WBA	180	W7WJQ	180
424	W5ANX	W5WVW	181	W5WBA	181	W7WJQ	181
425	W5ANY	W5WVW	182	W5WBA	182	W7WJQ	182
426	W5ANZ	W5WVW	183	W5WBA	183	W7WJQ	183
427	W5AOA	W5WVW	184	W5WBA	184	W7WJQ	184
428	W5AOB	W5WVW	185	W5WBA	185	W7WJQ	185
429	W5AOC	W5WVW	186	W5WBA	186	W7WJQ	186
430	W5AOD	W5WVW	187	W5WBA	187	W7WJQ	187
431	W5AOE	W5WVW	188	W5WBA	188	W7WJQ	188
432	W5AOF	W5WVW	189	W5WBA	189	W7WJQ	189
433	W5AOG	W5WVW	190	W5WBA	190	W7WJQ	190
434	W5AOH	W5WVW	191	W5WBA	191	W7WJQ	191
435	W5AOI	W5WVW	192	W5WBA	192	W7WJQ	192
436	W5AOJ	W5WVW	193	W5WBA	193	W7WJQ	193
437	W5AOK	W5WVW	194	W5WBA	194	W7WJQ	194
438	W5AOL	W5WVW	195	W5WBA	195	W7WJQ	195
439	W5AOM	W5WVW	196	W5WBA	196	W7WJQ	196
440	W5AON	W5WVW	197	W5WBA	197	W7WJQ	197
441	W5AOP	W5WVW	198	W5WBA	198	W7WJQ	198
442	W5AOS	W5WVW	199	W5WBA	199	W7WJQ	199
443	W5AOT	W5WVW	200	W5WBA	200	W7WJQ	200
444	W5AOU	W5WVW	201	W5WBA	201	W7WJQ	201
445	W5AOV	W5WVW	202	W5WBA	202	W7WJQ	202
446	W5AOW	W5WVW	203	W5WBA	203	W7WJQ	203
447	W5AOX	W5WVW	204	W5WBA	204	W7WJQ	204
448	W5AOY	W5WVW	205	W5WBA	205	W7WJQ	205
449	W5AOZ	W5WVW	206	W5WBA	206	W7WJQ	206
450	W5APB	W5WVW	207	W5WBA	207	W7WJQ	207
451	W5APC	W5WVW	208	W5WBA	208	W7WJQ	208
452	W5APD	W5WVW	209	W5WBA	209	W7WJQ	209
453	W5APE	W5WVW	210	W5WBA	210	W7WJQ	210
454	W5APF	W5WVW	211	W5WBA	211	W7WJQ	211
455	W5APG	W5WVW	212	W5WBA	212	W7WJQ	212
456	W5APH	W5WVW	213	W5WBA	213	W7WJQ	213
457	W5API	W5WVW	214	W5WBA	214	W7WJQ	214
458	W5APJ	W5WVW	215	W5WBA	215	W7WJQ	215
459	W5APK	W5WVW	216	W5WBA	216	W7WJQ	216
460	W5APL	W5WVW	217	W5WBA	217	W7WJQ	217
461	W5APM	W5WVW	218	W5WBA	218	W7WJQ	218
462	W5APON	W5WVW	219	W5WBA	219	W7WJQ	219
463	W5APO	W5WVW	220	W5WBA	220	W7WJQ	220
464	W5APO	W5WVW	221	W5WBA	221	W7WJQ	221
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466	W5APO	W5WVW	223	W5WBA	223	W7WJQ	223
467	W5APO	W5WVW	224	W5WBA	224	W7WJQ	224
468	W5APO	W5WVW	225	W5WBA	225	W7WJQ	225
469	W5APO	W5WVW	226	W5WBA	226	W7WJQ	226
470	W5APO	W5WVW	227	W5WBA	227	W7WJQ	227
471	W5APO	W5WVW	228	W5WBA	228	W7WJQ	228
472	W5APO	W5WVW	229	W5WBA	229	W7WJQ	229
473	W5APO	W5WVW	230	W5WBA	230	W7WJQ	230
474	W5APO	W5WVW	231	W5WBA	231	W7WJQ	231
475	W5APO	W5WVW	232	W5WBA	232	W7WJQ	232
476	W5APO	W5WVW	233	W5WBA	233	W7WJQ	233
477	W5APO	W5WVW	234	W5WBA	234	W7WJQ	234
478	W5APO	W5WVW	235	W5WBA	235	W7WJQ	235
479	W5APO	W5WVW	236	W5WBA	236	W7WJQ	236
480	W5APO	W5WVW	237	W5WBA	237	W7WJQ	237
481	W5APO	W5WVW	238	W5WBA	238	W7WJQ	238
482	W5APO	W5WVW	239	W5WBA	239	W7WJQ	239
483	W5APO	W5WVW	240	W5WBA	240	W7WJQ	240
484	W5APO	W5WVW	241	W5WBA	241	W7WJQ	241
485	W5APO	W5WVW	242	W5WBA	242	W7WJQ	242
486	W5APO	W5WVW	243	W5WBA	243	W7WJQ	243
487	W5APO	W5WVW	244	W5WBA	244	W7WJQ	244
488	W5APO	W5WVW	245	W5WBA	245	W7WJQ	245
489	W5APO	W5WVW	246	W5WBA	246	W7WJQ	246







CW

274	229	W4WSF	165	153	K6RLY	138	N3ED	122	WAAMCH	111	106	K8SW	103	K9CT	K8K*	GM4DKO
W9KNI	K4PI	K9RL	178	K5ETA	JACFR	J1BN	W7WN	K8DQ	WASMOE	ACBPT	F2LI	PABATY	DJ2AA	VE3GPO	K8K*	GM4DKO
W9KNI	W9CA	194	130BO	164	JH1EIG	K2FL	W7WN	K8DQ	WASMOE	JAZNS	HF1AC	W3IAB	H8SAHA	W3CGS	K8K*	GM4DKO
255	216	W1AB	187	178	K5LM	K2J	W7RR	128	118	W8AP	K2AC	ZPAL	JA1FOA	W3KFO	N3K	ITSRAN
K4YFQ	DL6EN	197	178	183	PY2FFA	W1RR	137	137	W8RT	YCSAC	W2OB	ZP5AO	K1SA	W8MCO	OH2BN	JA1BLM
258	216	W1UR	175	182	152	G4UE	141	136	W8HR	W3DH	W3DH	W3DH	K4KZP	W8UTT	G2KX	JH5AU
K9MM	K9N	W1UR	175	182	152	G4UE	141	136	118	DJ5DA	W3DH	W3DH	K4KZP	W8UTT	G2KX	JH5AU
259	267	W4AFDR	174	182	152	G4UE	141	136	118	DJ5DA	W3DH	W3DH	K4KZP	W8UTT	G2KX	JH5AU
K8GA	ON4QX	W4AFDR	174	182	152	G4UE	141	136	118	DJ5DA	W3DH	W3DH	K4KZP	W8UTT	G2KX	JH5AU
250	206	K2SHZ	174	182	152	G4UE	141	136	118	DJ5DA	W3DH	W3DH	K4KZP	W8UTT	G2KX	JH5AU
K4RI	SM5BHW	K4FK	173	182	152	G4UE	141	136	118	DJ5DA	W3DH	W3DH	K4KZP	W8UTT	G2KX	JH5AU
W1DA	SM5BHW	K4FK	173	182	152	G4UE	141	136	118	DJ5DA	W3DH	W3DH	K4KZP	W8UTT	G2KX	JH5AU
240	205	JAT1MX	172	182	152	G4UE	141	136	118	DJ5DA	W3DH	W3DH	K4KZP	W8UTT	G2KX	JH5AU
K2TQC	W6PT	181	172	182	152	G4UE	141	136	118	DJ5DA	W3DH	W3DH	K4KZP	W8UTT	G2KX	JH5AU
232	203	180	172	182	152	G4UE	141	136	118	DJ5DA	W3DH	W3DH	K4KZP	W8UTT	G2KX	JH5AU
K3FN	J4JL	F8CRT	170	182	152	G4UE	141	136	118	DJ5DA	W3DH	W3DH	K4KZP	W8UTT	G2KX	JH5AU
QZ1VY	201	K5KEZ3	170	182	152	G4UE	141	136	118	DJ5DA	W3DH	W3DH	K4KZP	W8UTT	G2KX	JH5AU
231	201	DL8AN	169	182	152	G4UE	141	136	118	DJ5DA	W3DH	W3DH	K4KZP	W8UTT	G2KX	JH5AU
W9KT	W9CQ	QZ1GA	169	182	152	G4UE	141	136	118	DJ5DA	W3DH	W3DH	K4KZP	W8UTT	G2KX	JH5AU
224	200	W2G	168	182	152	G4UE	141	136	118	DJ5DA	W3DH	W3DH	K4KZP	W8UTT	G2KX	JH5AU
W9ZM	FSAT	W4BV	168	182	152	G4UE	141	136	118	DJ5DA	W3DH	W3DH	K4KZP	W8UTT	G2KX	JH5AU

# Strays



## DXCC NOTES

**New call, new certificate?** Many U.S. amateurs have recently changed their call signs. This has led to requests that they be issued a new DXCC certificate made out to the new call. Perhaps a general announcement may clear up any confusion about this.

It has been the policy of the DXCC branch not to issue a new DXCC certificate when a call-sign change occurs. The original award is dated, numbered and issued to the station which has qualified for the award by working 100 or more DXCC countries. It would be inaccurate at a later date to issue a second DXCC certificate to a call sign which could not possibly have worked the necessary 100 DX stations by the original certificate date.

For later record-keeping purposes, the DXCC record will be changed to indicate the new call. As new countries are worked using the new call, these credits will be added to this DXCC record. The new call is the one then used in QST to identify future DXCC endorsements. But this updating does not change the status of a DXCC certificate as it was originally issued on a particular date and assigned the appropriate chronological award number.

**New call signs for a new award.** If you have a new call sign and are applying for a brand-new DXCC award, be sure to include at least one QSL card which confirms a contact you made using your new call. Even though you may have your new call, your DXCC certificate must be issued to your old call if all of your cards indicate the former call. The certificate can be issued to your new call only if there is at least one card to justify this.

**DXCC record photocopies.** Quite a few requests for photocopies of records are being made because of the new Rule 9 situation (see "DXCC Notes," September QST). We are happy to provide these copies. Certain information included with your request will expedite its return to you.

Please be sure to indicate the mode of your award (mixed, phone or cw), the DXCC certificate number and the date of your last submission of cards. Don't forget to mention the call to which the award was issued, if you have a new call and have not already informed us of the change.

**Honor Roll reminder.** Applications for adding endorsement credits to your DXCC Honor Roll record must be received at ARRL hq. by Friday, December 30. Applications received after this date cannot be processed in time for inclusion on the Honor Roll list to be published in QST for March, 1978.

## DXAC NOTES

The ARRL DX Advisory Committee welcomes comments from DXers on the following agenda item, a proposed change in

the ARRL DXCC rules: "Should a country be temporarily deleted for Honor Roll purposes if there has been no amateur radio activity there in the last 10 or 15 years?"

Please direct your comments to ARRL hq. for distribution to the DXAC.

Strange things happen during my travels. On my last trip to San Francisco I checked into the hotel and asked if they had my reservation. The gal looked at me very strangely. . . I looked at her reservation and there it was, AMERICAN RADICAL RELAY LEAGUE! - W1YL

## I would like to get in touch with . . .

users of amateur radio for telemetry purposes in model rocketry systems. Ed Nixon, K9LWX, P. O. Box 279, Cottonwood Falls, KS 66845.

anyone who has had open-heart surgery with bypasses or uses a pacemaker or both. William Dunn, WD5GCV, 3106 Elm Dr., Grand Prairie, TX 75051.

hams 16 or under for a net in the Northern New Jersey area. Chris Janson, WB2OVW, 4 Third St., Emerson, NJ 07630.

## Seasons Greetings from the Hams of the ARRL/IARU Staff

Kathy Kearman	WB1AAE	Jim Cain	K1TN
Bobbie Chamalian	WB1ADL	Mark Starin	WA1TZK
Dave Klemp	WB1AND	Perry Williams	W1UED
Jean DeMaw	W1CKK	Jay Rusgrove	W1VD
Laird Campbell	W1CUT	Rita Tilley	WA1WEV
Bob White	W1CW	Bill Jennings	K1WJ
Sandy Gerli	WA1EEA	Chuck Bender	W1WPR
Chris Schenck	W1EH	Bob Halprin	K1XA
Joanne Buteau	WB1EKR	Bob Myers	W1XT
Michelle Fuini	WB1ENT	John Lindholm	W1XX
Steve Place	WB1EYI	Jim Kearman	W1XZ
Michelle Bartlett	WB1FAU	Ellen White	W1YL
Doug DeMaw	W1FB	Joel Kleinman	WA1ZUY
Hal Steinman	K1FHN	Dave Sumner	K1ZZ
Tony Dorbuck	K1FM	Gary Bartels	WB2CFL
John Nelson	W1GNC	Chod Harris	WB2CHO
Stan Gibilisco	W1GV	Bill Dunkerley	WA2INB
Ed Tilton	W1HDO	Don Search	W3AZD
Lew McCoy	W1ICP	Dale Clift	WA3NLO
Stuart Leland	W1JEC	Louise Moreau	W3WRE
Joe Moskey	W1JMY	Bill Tynan	W3XO
Clark Greene	K1JX	Jim Westbrook	WA4ZUI
George Hart	W1NJM	Bruce Johnson	WA6IDN
Dan Wall	WA1PAT	John Troster	N8IQ
Craig Clark	WA1QWW	Tom Frenay	WB6KIL
Ed Kalin	K1RT	Bryan Leipper	WA6RBE
Dick Baldwin	W1RU	Pete O'Dell	WB8NAS
John Huntoon	W1RW	George Barker	WB8PBC
Lee Aurick	W1SE	Rod Newkirk	W9BRD
Rosalie Cain	WA1STO	Jim Bartlett	WB9VAV
Jerry Hall	K1TD	Jim Morris	KH6HQ
Dave Karpel	K1THP	Maxim Memorial Station	W1AW

# 44th ARRL International DX Competition

The sunspots are appearing in greater numbers this year and a lot of new DXers are arriving on the bands — another 10-percent increase this past year. Competition should be close in the various categories.

The CAC has recommended only one rule change for this year's DX Contest. Multi-single stations that make a contact on one band must remain on that band for ten minutes before switching to make a contact on another band.

Remember to send an s.a.s.e. for log sheets, check sheets and a summary sheet in time for the contest.

The mailing deadline for all entries is April 17, 1978, and don't forget to send a picture if you have the time to take one! — WB6KIL

## Rules

1) *Eligibility:* Amateurs worldwide, operating fixed stations, are invited to participate.

2) *Object:* Amateurs in the 48 contiguous United States and Canada will try to work as many amateur stations in other parts of the world as possible. Other amateurs work W/VE.

3) *Conditions of entry:* Each entrant agrees to be bound by the provisions of this announcement, by regulations of his licensing authority, and the decisions of the ARRL Awards Committee. The ARRL Awards Committee will void or adjust entries as its interpretation of these rules may require. Its decisions will be final.

4) *Entry classifications:* Entries may be made in either or both the phone or cw sections. Cw scores are independent of phone scores. Entries will be further classified as single- or multioperator stations. Single-operator stations are those at which one person performs all the operating, logging and spotting functions. Multiple-operator stations are those obtaining any assistance, such as from spotting or relief operators, or in keeping the station log and records. Single-transmitter, multioperator entries will be recognized as a distinct category from multi-multi. Multi-single stations that make a contact on one band must

remain on that band for ten minutes. The use of electronic or mechanical devices or any other methods of simultaneous operation on two or more bands is prohibited. The use of two transmitters simultaneously on one band is prohibited. *The use of spotting nets (operator arrangements involving assistance through DX alerting nets, etc.) places an entry in the multi-operator category.*

Single-operator stations may enter in the all-band, high-band or low-band categories. The all-band class may use any combination of legal amateur bands; the high-band class is for those using only 20, 15 and 10; the low-band class is for those using only 160, 80 and 40. Single-operator stations may enter in only one class and that class must be clearly indicated on your summary sheet. Operation on a band not allowed in your class (i.e., operating on 20 while competing in the low-band class) is permitted although those points cannot count toward your score. For those competing in either the high-band or low-band class, it is recommended that a separate list of any QSOs made on a band(s) not within your class be submitted for checking purposes. Multi-operator stations may compete only in the all-band class.

A person(s) able to operate for only one of the two weekends (be it one cw or one phone or one of each) from a country different from that in which the operator(s) normally lives may submit a log in the "one-weekend DXpedition" class. Such logs will be listed separately in the results. Operation from the 48 contiguous United States or Canada is not valid for this class.

5) *Contest periods:* There are four weekends, each 48 hours long; two for phone work and two for cw.

6) *Valid contacts:* In the phone section, all claimed credits must be made voice-to-voice. In the telegraphy section, only cw contacts count. Cross-band contacts may not be counted. Three points are earned for each completed two-way exchange. Incomplete QSOs will not count for contest points or multipliers. The same station may be worked again for additional points if the contact is made on a different frequency band.

7) *Exchange:* (a) Amateurs in the 48 contiguous United States and Canada transmit a two- or three-figure number, representing the RS(T) report, plus state or province. (The latter may consist of an appropriate abbreviation.) Example: WA8VRB might transmit "579 MI" on cw, "57 Michigan" on phone. (b) Other amateurs will transmit five- or six-figure numbers, each consisting of the RS(T) report plus three "power" numbers. The power indicator will represent the approximate transmitter power input. Example: OZ1LO, with 150-watts input, might transmit "579150" on cw, "57150" on phone.

8) *Scoring:* W/K and VE/VO stations multiply total points earned under Rule 6 by the number of countries worked on one band plus the number of countries worked on each other band. All other stations multiply total points earned under Rule 6 by the sum of the number of continental states and VE/VO licensing areas worked on each band.

There are 48 continental states plus VO and VE1-VE8, a possible total of 57 multipliers per band.

9) *Reporting:* A summary sheet, log sheets and a DX checkoff sheet for each band used (CD-175 or CD-175A or facsimile) are required from all W/VE/VO entrants (except KH6 and

## 1978 Contest Periods

Phone Starts	Ends	Cw Starts	Ends
Feb. 4 0001 UTC	Feb. 5 2359 UTC	Feb. 18 0001 UTC	Feb. 19 2359 UTC
Mar. 4 0001 UTC	Mar. 5 2359 UTC	Mar. 18 0001 UTC	Mar. 19 2359 UTC

ARRL INTERNATIONAL DX COMPETITION

ARRL OFFICE: WABONK TX TX FARRL HQ: 2230 N. 17TH ST., S.D.A.K.

Operator logs and summaries must be submitted for each mode of operation.

Mode	Total QSOs	Points
140	5	4
160	59	33
40	128	78
20	473	82
15	224	67
10	36	19
Total	1428	255

1428 4284 263

1043852

ARRL OFFICE: WABONK TX TX FARRL HQ: 2230 N. 17TH ST., S.D.A.K.

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KL7). DX entrants (including KH6 and KL7) must submit log sheets and a summary sheet. Separate logs, summaries and check sheets (when required) are required for each mode used from all entrants. Single-operator and multi-single entries must submit logs arranged chronologically *not* on a by-band basis.

Contest reports must be postmarked no later than April 17, 1978, to be eligible for *QST* listings and awards. All DX competition logs become the property of the American Radio Relay League and none can be returned.

10) *Awards*: To document the performance of participants in the ARRL International DX Competition, a full report will be carried in *QST*. In addition, special recognition will be made as follows: (a) A personalized plaque will be awarded to the highest single-

operator DX phone and cw station (non-W/VE) in each continent. (b) On both phone and cw, a certificate will be awarded to the highest-scoring single-operator station in the all-band, high-band and low-band categories in each country, in Alaska, Hawaii and in each of the contiguous U.S. and Canadian ARRL sections (see page 8 in any *QST*) from which a valid entry is received. In addition, a certificate will be awarded to the highest-scoring multi-single and the highest-scoring multi-multi station in each W/VE call area and DXCC country from which a valid entry is received. (c) A certificate will be awarded to each noncountry winner DX entrant making 1000 or more QSOs on *either* mode.

11) Information on affiliated club competition and disqualification criteria is on page 85 of *QST* for January, 1977.

## Strays

### A CHRISTMAS STORY

One evening, a few weeks before Christmas, the relative seclusion of the shack was interrupted by my daughter Tricia. "Guess what, Daddy?" she asked, eyes wide with enthusiasm. Without waiting for a reply she continued, "Guess what I got you for Christmas?"

"What?" I asked.

"Can't tell; it's a secret. But you'll really like it." It's something really special, something you've always wanted."

"A new car?" I suggested.

She giggled and said, "No, better than that." But she wouldn't say what it was, only that it had something to do with "all your radio stuff."



Even the XYL, usually a reliable confidant, informed me that she had been sworn to secrecy. She did admit to being confused, however. "I can't imagine what in the world you would want it for," she confessed. "But Tricia is sure you want one. I couldn't talk her out of it."

This only heightened my curiosity. I came close to snooping as the days dwindled, but the thought that I might not be able to feign surprise on Christmas morning held me back.

As the first rays of morning sunshine penetrated our bedroom on the long-awaited day, whispering restlessness from the other rooms made it clear that further sleep would be impossible. We headed for the tree with little reluctance.

It didn't take long for Tricia to extract a long box that had been pushed far back behind the tree. With beaming pride, she placed it on my lap. "Here's your present, Daddy."

I wasted no time in ripping it open, and was surprised not to find the book or magazine or soldering gun I had expected. Inside was a large plastic rifle.

At first I didn't know what to say. After exchanging puzzled looks with my XYL, I decided the only thing to do was ad lib. "Honey," I said, gathering Tricia in my arms, "that's a very nice present. How did you know what Daddy wanted?"

She smiled with a wisdom not befitting her tender years. "Oh," she replied, "it was easy. One day I heard you tell someone on the radio that you always wanted a big gun. So I got one

for you for Christmas. Is it big enough? If not, the man at the store said I could exchange it."

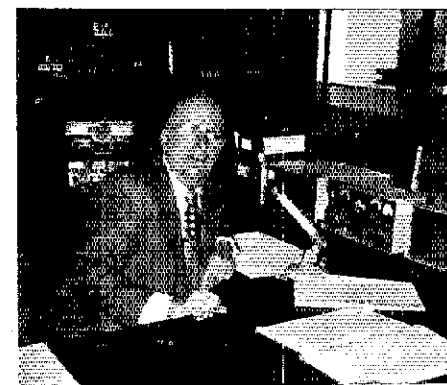
"It's perfect," I said, "just what I've always wanted." The pieces then began to fall into place. Later, I tried to explain it to the XYL.

"Well," I said, desperately searching for the right words, "hams with big elaborate stations and impressive signals are referred to as 'big guns.' Tricia must have heard me tell someone that I wished I was a big gun. She thought I wanted one."

My explanation did little to relieve her confusion. She just catalogued it amongst the many other eccentricities of ham radio.

I suppose no one really understood, except Tricia and I. To this day that big red gun hangs on the wall over the rig, an eternal silent reminder of the secret of giving. — L. Foord, VE3FLE

NN3SI, the top-notch amateur station at the Smithsonian Institution's Nation of Nations exhibit, is fast becoming one of the most popular sights among hams visiting the Washington, DC, area. Equipped for multiband operation, SSTV and OSCAR, the station offers the public a very impressive look at amateur radio. John Swafford, W4HU, is at the mic. — (WA4MVI)



# Rules, 31st VHF Sweepstakes

In the last two years, the ARRL Contest Advisory Committee has studied a number of possible revisions of the rules for VHF Sweepstakes, with the goal of making it an even more interesting event for vhf enthusiasts.

Last year, a simpler exchange was introduced and that popular rule change will be continued. This year, there's a brand-new incentive for QSOs on the higher amateur bands — those above 6 and 2 meters!

As always, complete contacts on 6 and 2 are worth two points each. But from there up, there's a *geometric* increase in points per QSO. On 220 and 432 MHz, each contact is now worth four points. Contacts on the 1215-MHz band bring eight points apiece, and QSOs on 2300 MHz or any higher amateur band are worth 16 (yes, 16) points each!

Meanwhile, the rule that permitted each station to use the national simplex fm frequency (146.52 MHz) for up to four hours during the September VHF QSO Party proved to be a workable compromise and will apply again in this year's VHF SS.

With the new incentive for uhf work, plus the always-popular club competition, this 31st annual VHF SS should be an exciting event.

In addition, notice that the contest dates have been moved to accommodate all of the Super Bowl fans. No need to have your TV next to your transmitter, and the TVI complaints should be down this year.

Don't forget to send an s.a.s.e. for the new log forms and a summary sheet. Logs should be postmarked by February 20, 1978.

## Rules

1) *Eligibility:* Amateur operators in any ARRL section (see page 8) operating at home, or mobile or portable *under one call*, on or above 50 MHz, are invited to take part. Yukon-N.W.T. (VE8) counts as a separate multiplier.

2) *Object:* Participants will attempt to contact as many other stations in as many ARRL sections as possible.

3) *Contest periods:* The contest starts at 2:00 P.M. your local time, Saturday, January 21, 1978, and ends at midnight, Sunday, January 22, 1978. Contacts between stations in different time zones can be counted only when the contest period is in progress in both

of the zones concerned.

4) *Exchanges:* Amateurs in the U.S. and Canada transmit the signal report, ARRL section and a consecutive serial number (starting with 001). Foreign stations will give their country name rather than ARRL section. One-way or partial contacts for partial point credit are NOT permitted.

5) *Scoring:* (a) Complete contacts on the 50- and 144-MHz bands count two points each, complete contacts on the 220- and 432-MHz bands count four points each, contacts on the 1215-MHz band are worth eight points each and contacts on 2300 MHz or any higher amateur band count 16 points each. A section only counts once for multiplier credit regardless of band. (b) Foreign entries: All contacts with foreign countries (such as Mexico and the Bahamas) count for score. All foreign countries are grouped together as one, and a section multiplier of *no more than one* may be claimed for contacts with all foreign stations contacted. Foreign stations may only work stations in ARRL sections for contest credit. (c) Final score is obtained by multiplying total contact points by the sum of the different ARRL sections worked plus 10. (See the example.)

6) *Conditions for valid contact:* (a) Repeat contacts on different bands may be counted for each different station worked. (Example: N6NB works K6KLY on 50, 144 and 1215 MHz;  $2 + 2 + 8 = 12$  contact points, but only one section multiplier.) (b) Crossband work may not be counted. (c) Portable or mobile station operation under one call, from one location only, is permitted. (d) A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest (with the exception of family stations, where more than one call is assigned to one location by FCC/DOC). (e) Contacts with aircraft mobiles cannot be counted for section multipliers.

While no minimum distance is specified for contacts, equipment in use should be capable of real communications (i.e., able to communicate over at least a mile).

Contacts made by retransmitting either or both stations do not count for contest purposes. In addition, use of the 146- to 148-MHz segment of 2 meters is restricted as follows: Contest contacts

may be made only on these recognized simplex frequencies: 146.49, .52, .55, .58 and 147.42, .45, .48, .51, .54, .57 MHz. Contest contacts may *not* be made on any other frequency between 146 and 148 MHz; this restriction includes all repeater frequencies (including 146.76 and 146.94 MHz). Also, use of the national calling frequency (146.52 MHz) is restricted to four hours total operating time for each participating station during the contest period (including both listening and transmitting time). These four hours may be taken in operating periods of not more than one hour each and must be clearly indicated in the log. After each operating period on 146.52, the participating station may not transmit on 146.52 MHz for at least 15 minutes.

7) *Awards:* Entries will be classified as single- or multioperator, a single-operator being defined as one manned by an amateur who neither receives nor gives assistance to any person during the contest period. Certificates will be awarded in each ARRL section to the top-scoring amateur in the single-operator classification. Multioperator work will be grouped separately in the official report of results in *QST*; outstanding multiop efforts will receive certificates.

8) *Conditions of entry:* Each entrant agrees to be bound by the provisions of this announcement, the regulations of his licensing authority, and the decisions of the ARRL Awards Committee.

9) *Reporting:* Reports must be postmarked no later than February 20, 1978, to be considered for awards.

10) *Information on affiliated club competition and disqualification criteria is on page 85 of QST for January, 1977.*

## Scoring Example

Band	Contacts	Points
50 MHz	5 × 2 =	10
144 MHz	17 × 2 =	34
220 MHz	3 × 4 =	12
432 MHz	3 × 4 =	12
1215 MHz	2 × 8 =	16
2300+ MHz	2 × 16 =	32
Totals	32 QSOs	116

Final score = (number of QSO points) × (the number of ARRL sections + 10).

# Simulated Emergency Test Announcement

January 28-29, 1978

Attention ragchewers, repeater enthusiasts, DXers, contesters, vhfers, experimenters and, oh yes, traffic handlers and emergency-preparedness types. If a disaster like the Johnstown flood, for example, struck your community, would you be able to provide a service to your town, city or state by supplying amateur radio communications? Would you know how to go about it? Here's word about an ARRL-sponsored event which can help you become better prepared to render a valuable service to the public, should the need arise.

On January 28-29, hundreds of towns and cities throughout the U.S. and Canada will be beset with tornadoes, hurricanes, blizzards and other simulated disasters. The purpose? To simulate realistic conditions under which amateurs can provide valuable communications services. Emergency coordinators (ECs) plan scenarios for the local Amateur Radio Emergency Service (ARES) and other interested amateurs: The National Traffic System (NTS) will hold extra and extended sessions as needed to facilitate the handling of formal message traffic from coast to coast.

Although January 28-29 is the official weekend, groups are free to hold their SETs on any two-day period between January 1 and February 28 to coincide with the time when amateur activity, public-service value and mass media exposure can be the greatest. All SETs held during this SET "period" will be included in the SET results article in a future issue of *QST*.

How do you participate? Here's how. Most local activity will center on 2 meters. If you have a 2-meter fm radio, you're in business. If the identity of your local EC is unknown to you, ask your section emergency coordinator (see opposite page) who your EC is. Advise your EC of your availability and he will tell you how you can help. He may ask you if you are interested in joining the local ARES group. This only

Here's an example of a routine SET message to an SEC.

requires you to complete a simple form (CD-98) denoting your band capabilities and your willingness to participate in ARES activities. Many ARES groups work closely with civil defense, Red Cross, Salvation Army and other public-service agencies. If there is no EC assigned for your area, perhaps you or another amateur could volunteer to organize some emergency-preparedness activities. Contact your SEC or SCM (page 8, *QST*) for details.

Another way to get in on the SET action is to participate in your local or section (or higher level) National Traffic System net. Most every ARRL section has at least one net operating on the section level, meeting on 80 or 75 meters. Local nets are usually on 2 meters.

Familiarize yourself with traffic-handling procedures (get a copy of the 1977-78 *Net Directory*, which contains complete beginner's information). In an emergency, it is imperative that all stations go about handling communications and messages according to a standard form and using maximum efficiency. If possible, report into net sessions before the SET to get to know the procedures. Many Novice nets play a big role in SET — Novices and Technicians take note!

Check with the net managers of the

Register with the Amateur Radio Emergency Service, using CD-98. This form should be submitted to your EC if known, or your SEC.

nets you are active in to determine when the net will meet for the SET. Both daytime and evening segments of NTS will be employed.

All amateurs are encouraged to initiate at least two messages during the SET period. One can be to your SEC (see SEC list) and another to a friend or relative in a distant part of the country.

For the SET, all nonroutine test messages should carry the word "TEST" before the precedence, e.g., test priority on phone or TEST P on cw, and as a further step to insure test messages will not be construed as the real thing, use the words "TEST MESSAGE" in the first two words of the text. Do not use "TEST" in the precedence or in the text of a routine message. A routine message is a routine message regardless of whether or not it was drafted for the SET. For improved efficiency, try to avoid using long words such as participating, communications, simulated emergency, etc., in texts whenever possible.

To prevent SET messages from dragging out beyond your SET period the handling instruction HXB is used (after the precedence and before the station of origin in the preamble) on SET messages. Liberally interpreted HXB means "cancel message if not delivered within the SET period; service

(send a service message to) originating station."

For SET messages sent during exercises held on a date *other than* the primary SET weekend, use HXB followed by a number, e.g., HXB48 which means "cancel message if not delivered within 48 hours of filing time; service originating station." If the message is not a test message, and you would like to have it delivered even after the SET is over, don't use HXB at all.

Repeater public-service coordinators, net managers, radio officers, etc., who

don't hold ARRL leadership appointments should write to Hq. for a copy of the 1978 SET Bulletin and reporting forms. The SET is open to all amateurs and groups. Since 1977 was a record-breaking year for SET activities, the sky's the limit this time! Don't forget to report your activities promptly to Hq. — deadline is March 15.

Would you be able to communicate if you suddenly discovered your home was without commercial power? This happens in many emergencies. Some exercises and net sessions will operate

on the assumption that commercial power has been disrupted. Equip yourself with some sort of emergency-power source or battery-operated rig, such as a 2-meter transceiver.

Experience has shown that when real emergencies develop, most amateurs are willing to assist. Yet history has also demonstrated that amateurs without adequate training can be more of a detriment than a help. Don't let other interests prevent you from becoming familiar with emergency procedures. Join in the 1978 SET — you'll enjoy it.

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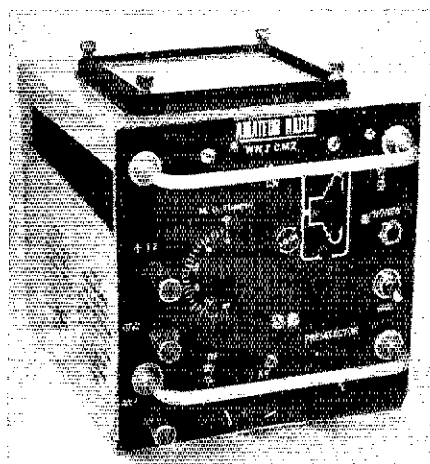
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\*No appointed section emergency coordinator, SCM listed.

# Strays



It's small, inexpensive, and works great! WB7CMZ's \$84 40-meter receiver from QST for January, 1973.

□ This nifty little 40-meter cw receiver was built by Glen Jacobs, WB7CMZ, using WICER's plans from QST for January, 1973. The dial mechanism, panel, chassis, calibration chart, handles and cabinet were all cut from a TU-8B tuning unit and the spring-loaded terminals are from a TA-219/U modem. Glen says that the whole thing cost him only \$84 by using those parts cannibalized from old military surplus gear. He is currently working on a matching QRP transmitter to be built inside the shell of another TU-8B.

Glen says he is so impressed with his receiver's performance that he has put all of his other gear up for sale! The receiver also contains an MFJ audio filter, and runs on a 9-volt transistor battery. — WB9VAV



Totaling 209 years of involvement in amateur radio are (l to r) Jeff Woodhouse, W7FL; Harold Buroker, W7QC; Damon Nuckols, W7LKH and "Doc" Daugherty, K7JR, licensed for 54, 54, 38 and 63 years, respectively. Buroker is being presented with the QCWA Golden Anniversary Award and the 50 Years Continuously Licensed Award.

# Frequency Measuring Test

Welcome to "What's my frequency?" Enter and sine in please.

By Jean DeMaw, \* W1CKK

**D**espite QRM, QRN, Murphy and all other conditions that prevailed, one-third of the September 18 FMT participants achieved Honor Roll standing. The umpire readings for the early run were 14003.478, 7062.350 and 3523.131 kHz. The umpire found the late 20-meter reading nonexistent.

The 142 participants who submitted their results took a total of 2036 measurements. Of these, 137 were able to make the cutoff point of 179 parts per million, and of those, 48 measured their way into Honor Roll listing.

The next Frequency Measuring Test is scheduled for February 12, 1978. Full rules will be listed in January.

## Honor Roll

This top listing is the standing of the frequency-measuring leaders. In consideration of the minimum possible error due to Doppler (and other unavoidable factors), we accredit as of equal merit all those reports computing 4/10ths parts per million (or better) accuracy. Please note that a participant must submit a minimum of two measurements to qualify for this listing. Again, the following are of equal merit, and are most conveniently shown in an alphabetical listing by call area. K1BC W1BGW W1MK W1PLJ K1VHO W2AXT WA2ELD K2HT N2LI W3BFF WA3WBK K4BE N4NE W4NTO K4VA WB4VEH WA4YVQ WB5OAH W5FMO W5IJW W5QIV K5JW WB6AAL W6CDF W6CLM K6IJ K6MZN N6MW W6QQI W6RQ W7BUN W7CRU ex-7HM W7KR WB7ONX K7ST W8CUJ W8JLJ W8OK W9HPG W9KO W9TJ K9WGN W0CZ W0RUR KL7IYA VE2HN VE3AC.

## Better than 35 Parts per Million (Class I OO Qualification)

(.5) W4NHY W0CP, (.6) W4IBU W4RZH Ireland, (.7) N7SC, (.8) W5OS

WA2CLG, (7.6) WB2FWS, (8.0) WA7DUY, (8.5) WA2NVO WA3PLI, WB8STQ, (.9) W1CQ W1NN, (1.1) WA6GHH, (1.2) W4QN W7WM, (1.3) WB5NGF W0OII, (1.6) W1NIN, (2.1) N5RR, (2.3) W1AYG K4OAO WA7PHD, (2.7) K8LIX, (3.0) K6EC, (3.2) K9BGL W0BJ W0KL, (3.4) W3YO, (3.7) W0GW, (3.8) W9TG, (4.2) W4BUZ, (5.4) K6CL, (5.9) OEN, (6.4) WA3JSZ, (6.5) K4EK, (6.7) WB8ESK, (7.1) K4AO K5GB, (7.2) W4XP, (7.3) WA3CLG, (7.6) WB2FWS, (8.0) WA7DUY, (8.5) WA2NVO WA3PLI, (9.7) WB3ERE, (9.8) N2BE, (10.0) W1HJP W2ND, (10.2) K2IAM, (10.3) WA7HGB, (10.5) WA2MID, (10.8) K6HI, (11.2) WA8CEU, (11.4) K6GG, (12.7) WA5NOM, (13.3) W7SK, (13.6) KH6CZ, (13.8) W3KEK, (14.0) VE6QM, (15.1) K2LYV W3ADE, (15.3) K6EPX, (17.1) W6AEE, (18.9) K2FS, (20.0) WA7IJN, (20.8) W2AIQ, (21.3) WB2TFH, (23.0) K4JQY, (25.0) K6QPG, (27.1) K5DL, (28.0) W3KCM, (28.2) WA2ERP, (29.0) N3EE, (29.3) K2MD, (29.4) K9VSY, (29.9) W5OF, (30.3) K6VRS, (30.4) K4TXJ, (31.8) K4ZN.

## Better than 179 Parts per Million (Class II OO Qualification)

(37.1) KH6BC, (40.6) W9MKL, (42.1) WD8BEU, (42.2) W2DX, (43.0) W1EWD, (49.5) W1DDO, (50.0) W1TN, (53.3) K1LWI, (55.5) VE3BAJ, (58.3) WA6KXO, (66.2) W9TGN, (76.1) W7JIE, (85.9) W9PBI, (109.6) W0EUQ.

## Honor Roll Measuring Methods

This is my first try for the FMT and enjoyed it very much. A lot better than the football game in progress (a losing cause). I used carrier calibrate on a Control Electronics 100V to produce zero-beat in the receiver and to drive counter. Zero-beat was observed on S meter. Also in speaker with VFO on at

times. BFO switched off and on to insure that I was not trying to zero with the BFO on BFO image. Difficulty encountered with backlash in VFO dials, needs adjusting. Counter zeroed to WWV earlier in day and checked before and after each run. All equipment allowed to warm up *all* day. (WB5AOH) Equipment here was a 75A-4 and a home-built counter and a digital mixer. With a combination like this, you just sit and watch the frequency and read directly on the counter. (W7KR) Zero beated W1AW with my transmitter and measured my transmit frequency. (WB7ONX) Gear was a Drake R-4C, using a Triton IV into a dummy load for comparison, output measured with a Davis frequency counter. The Triton is useful because its output is easily varied. (KL7IYA) I zeroed the clock on the counter to WWV just before each contest. I used the Drake 2B-2BQ to listen to W1AW. I used the FT-101, Antenna and counter to generate a local signal to beat and measure the W1AW frequency. The scope helped me to determine zero-beat. I hope to be within 10 Hz on each measurement. This is my first time. (W0CZ)

## QRGee

I think it would be a good idea to have some kind of a certificate award for the FMT. (W6CLM) [What say people? Send in your comments. — Ed.] This is my first try and already I'm making plans to modify equipment. Enjoyed it very much. (K6IJ) First attempt in the FMT. (K7ST) Everything set up the previous day. Wouldn't you know it, the battery went dead in my BC221 which I had converted to solid state. I defeated Murphy by setting up an emergency 9-volt source from a transistor tester. (W4RHZ)

## Feedback

Additions to the May 4 Honor Roll: K6MZN WA6VPJ. Credit for 8.1 ppm goes to W7FIS.

\*Communications Assistant, ARRL

# Field Day, 1977 Results

Reflections on a weekend in June. A record turnout and activity highlight the biggest Field Day ever.

By Bill Jennings,\* K1WJ and Tom Frenaye,\*\* WB6KIL

**A** balmy Saturday in June and a weather report indicating more of the same for at least 48 hours. Antennas and towers erected in record time. Stations assembled, without mishap, and functioning flawlessly. No trace of poison ivy, sunburn, food poisoning or annoying insects. All this, topped off by an unexpectedly high QSO rate, helped to make the most successful Field Day ever.

Is this wishful thinking, or perhaps a dream you say?

For all but a very few participants of Field Day 1977, yes. For the rest of us poor mortals, that Saturday in June signaled the start of another battle against the forces of nature which we call Field Day.

Struggle, competition and eventual success — therein lies the very essence of the Field Day experience. A feeling of accomplishment invokes a camaraderie between fellow Field Day participants. Such involvement stimulates a confidence in your ability and the abilities of your fellow operators to turn the worst conditions that nature has to offer into an enjoyable (if not immediately, then in retrospect) and memorable experience.

Field Day 1977, held June 25-26, was a record-breaker, as its predecessor of a year before, in terms of almost any numerical parameter one cares to name. A total of 21,590 operators manned (or is it "peopled" nowadays) 1592 individual FD stations, causing increases of 34 percent and 20 percent respectively over the same totals in 1976. A record 4194 transmitters were pressed into service, averaging a shade over five operators for each transmitter in use.

The 365 reported stations in 3A made that category the most popular, followed in order by: 2A with 307 entries, 1A at 205, 4A boasting 160 entries, 1B with 126, and 101 total entries for the 1D category, making it the sixth-most-popular category to enter.

\*Communications Assistant, ARRL

\*\*Assistant Communications Manager, ARRL

The publicity bonus, since its inception this year, for those who make their FD location easily accessible to the public, was money (or is that bonus points) in the bank to all but a very few of the eligible entries. The forms that the publicity took for each of the

individual FD operators ranged from a few lines in the local "shopper's news paper," to announcements in local electronics and radio stores, signs along the road giving directions to various FD sites, and full-bore news media coverage including network television time and

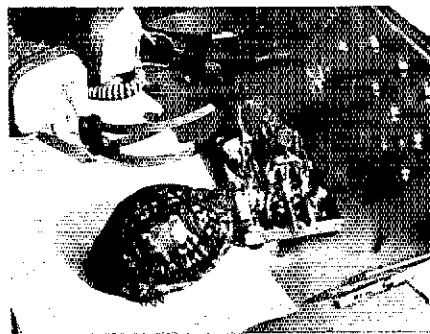


The members of the W/K Amateur Radio Club (W1, W9OC/9, 2A, rest before that final push that will set the tower and tribander securely in place.

From left to right are WB3EUB, WB3CEG and WB3INS, operating Novice station WB3INS at K3LR/3, the Shenango Valley (PA) AR FD Group, 3A.



The gang from the University of Pittsburgh (PA) ARA, W3YI/3, 1A Battery, seems to think that this operator was the one who kept their QSO rate down.



nationally aired commercial radio programs.

Remember those Novice training classes that the club held about this time last year? Those classes paid off, in spades, around Field Day time with a number of eager, savvy operators. In more than one instance, the QSOs produced by the Novice station meant a higher position in the overall standings for a club in the 3A and up categories. These newcomers, many of whom will have upgraded by Field Day 1978, once they've caught the Field Day fever, will form a nucleus of able, experienced operators for the club's Field Days for years to come.

Far fewer (78) entries this year than in 1976 had to be processed as incomplete entries. A properly filled-out ARRL Field Day summary sheet, a list (not log) or check sheet by band/mode of all QSOs made, and attaching proof of all bonus points claimed, are all the

components necessary for a complete and valid FD entry. An entry lacking any of the necessary components has to be individually processed and may or may not be able to be completed in time to make the FD listings. Be extra careful in submitting your entry, take the time to check and make sure that all the necessary information is included. Now is not too soon to start planning for your group's next Field Day operation.

By and large, the majority of the entrants favor the Field Day scoring system as it stands, including the QSO scoring, power multipliers, and the bonus points structure. Any comments or suggestions concerning any aspect of FD administration or operation are actively solicited and given careful consideration.

What will Field Day 1978 bring? Who knows? The variety of possibilities is endless. The only certainty is that

that special weekend in June will roll around again.

Who can resist the challenges and enjoyment of Field Day?

### Soapbox

The bad news: A storm blew over our four-element beam. . . . The good news: It missed our tent and trailer. (W3IW/3, 4A) Well, another Field Day has come and gone, and for the first time in eight years, the Northern Alberta Radio Club's Field Day efforts (also known as the Northern Canada Mud Slidin', Beer Drinkin', Gas Burnin', Naked Chicken Chasin', Yahoo and Whoopup Nudist Camp) were smiled upon by the "weather elves" (scratch the Mud Slidin') and we spent the weekend basking in glorious sunshine. (VE6NC/6, 3A) Our club has participated in Field Day for over 30 years and we always work *almost* every state. This year we worked *all* 50 states.



Is this the filming of a flying-fish hunt for a segment of "The American Sportsman" television show? No way. W2YV (with the bow) and W2AZD (with the fishing tackle) found the right combination that makes stringing dipoles through the trees a snap. The Poughkeepsie (NY) ARC, K2KN/2, finished in fifth place in the 3A category.

WA5YCG goes to his trusty 9 iron to try to loft the ball (with a line attached) over the antenna support poles. Although the wind made things a little rough, the Louisiana State University ARC, W5YW/5, 1A, thought it was par for Field Day, which suits them to a tee.



The gent on the right is James Catina, a photographer with the *Courier News* (Elgin, IL). Jim went to cover the FD story on the Elgin ARS, W9IKN/9, 3A, for his newspaper and ended up taking the code test for the Novice license. WB9EEA, left, president of the Elgin ARS, administers the test. Jim passed and is awaiting the theory portion of the exam. Good luck, Jim.

The operators of the Boston (MA) Contest Club, K1YHM, 3A, indicate that the smiles on their faces in this photo quickly faded as they faced a two-hour climb to the summit of Burch Mt. in VT. Just as quickly, they added that the magnificent view from the top was worth it.



### Class-A Call-Area Leaders

1A	W5NNL/5	8A
W1TM/1	K6AA/6	W1BIM/1
K1RW/2	K7AUO/7	K2AA/2*
K3MK/3	WB8JBM/8	W3PIQ/3
N4BP/4	W9TE/9	W5SC/5
W5ZR/5	W0MXW/0	W6LFJ/6
N6NB/6	VE3RC/3	W7VW/7
N7DX/7		W8QLY/8
W8NP/8*	5A	W0YL/0
K9BGL/9	K1MUJ	9A
W0ZZ/0	W2PE/2	W2LI/2
VE5UA/5	K3SSC/3	W3AI/3*
	W4POX/4	W6HE/6
2A	W5TI/5	W7DK/7
W1TX/1*	W6ZE/6	K8DAC/8
W2RR/2	W7YN/7	W9VCF/9
W3FT/3	W8ICS/8	WB0MWE/0
N4ND/4	W9NB/9	VE3ZM/3
W5RU/5	W0RHX/0	
W6PIY/6	VE3OW/3	10A
W7AC/7		W2RS/2*
W8JI/8	6A	K3YTL/3
W9MO/9	K1VV/1	W9GEG/9
K0UR/0	W2DI/2	
VE1FO/1	W3CU/3	
	K4BFT/4	11A
3A	W5EJK/5	W1NEM/1*
K1JNQ/1	W6TRW/6	W5MS/5
K2KN/2	WB7QIW/7	
K3LR/3	W8LC/8	12A
N4SA/4	W9KQ/9*	W9JZ/9
K5DX/5*	W0WCL/0	
N6VV/6	VE2BLW/2	
WB7DDQ/7		7A
W8GI/8	W1JP/1	15A
W9SU/9	W2OYH/2	VE3NAR/3*
W0KQU/0	W3AWA/3	
VE7SAR/7	W4IY/4	16A
	WB6LRU/6	W3AU/3*
4A	K7LED/7*	VE3WE/3
W1OP/1	W8VPV/8	
W2DMM/2	W9UVI/9	
N3AW/3*	W0LF/0	23A
K4KS/4	VE3DRT/3	W2RJ/2*

\*Denotes overall class leaders

(KØLIR/0s, 3A) We were plagued by uncooperative rigs, bad antennas, rain, wet firewood and wet Cub Scouts who needed our shelter at the scout camp to get dry. . . . I'm surprised that we made it through alive!! (W2CWW/2, 1A)

### Feedback

Please note the following changes in the 1976 Field Day Listings (November, 1976, *QST*, pages 84-87): The Texas DX Society, K5GEG/5, shown with a total score of 2928 in the 3A category, warrants a change in score to 6028 and a move in the 3A listings up to ninth place. The Lakefield ARC, listed in the 3A category with 4450 points is in reality the *Larkfield* ARC. A change in the final score is also in order for the Oakland County ARS, W8TNO, shown in the 3A listings in 142nd position, should really have 4200 points and be listed in 40th place. K9SEM/9 shown in the 3A category with 1310 points as the final score, should be listed

in the 3C category with the same score. The 1D listings show a WN4NKU with 748 as the score. The call should be WN4NKL. The W8VND shown in the 1E listings with 2172 points, should have been listed as the leader in the 3E category. Finally, a change noted in the Class A Call Area Leaders box, The Miami Valley AR Contest Society, W8OK/8, should be listed as the eighth-call-area leader.

### Scores

Class A stations are clubs or groups operating portable, with more than two operators. Score listings are grouped according to the number of transmitters in simultaneous operation at each station. The scores list club or group name, total number of contacts, letter indicating power classification (determined by the dc input power where A is 10 watts or less, B is greater than 10 watts but less than or equal to 200 watts, and C is greater than 200-watts input), number of participants (if

known), and total score. Listed in descending order from highest to lowest score.

Class B stations are those portable stations manned by one or two operators. Where two persons participated, the call of the other operator (if known) is shown following that of the amateur whose call was used. Figures following the calls indicate number of contacts, power (same as class A), and final score.

Class C are mobile stations. These are listed by call (no. of operators), number of contacts, power (same as class A) and final score.

Class D are home stations using commercial power sources. These are listed by call, number of contacts, power and final score.

Class E stations are home stations utilizing emergency power sources. The listings include call, number of contacts, power and final score.

Asterisks (\*) denote stations, which did not begin set-up operations prior to 1800 UTC on Saturday.

**QST**



N4ZR and K3KWJ (in the background) at the 2A FD station, W3DOS, of the Department of State Amateur Radio Club (DC).



The San Diego State University FD operation at WA6GRF/6, 4A, included a slow-scan station, pictured here in the background.



A little coordination and teamwork and the tower raising at VE2CV/2 (3A), the Champlain Lookout (PQ) FD Group, is duck soup.

"Safety First" for the Glen Gates Gang (IN), W9MO/9, 2A. WB9JHW readies the fire extinguisher during the refueling of the generators.



W6JTH/6 (1B Battery), atop Half Dome in Yosemite National Park. W6JTH is shown at the left, operating; WA6VBA is on the right, logging.

K8YHJ is mildly surprised at the pileup, as the result of his CQ for W8OWN/8, 6A, the Big Rapids Area ARC (MI).



1A - Battery

Table listing various radio clubs and organizations under the '1A - Battery' section, including details like club names, call signs, and membership information.

Table listing various radio clubs and organizations under the '1A - Battery' section, continuing from the previous table.

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Table listing radio clubs and repeaters in the Midwest region, including Riveau ARC, Central Michigan Boondock Invaders, Barker's Bandits, and many others.

Table listing radio clubs and repeaters in the Eastern region, including Fort George ARC, Non Club Group, and many others.

Table listing radio clubs and repeaters in the Southern and Western regions, including Totem ARC, Rome RC, and many others.

Table listing radio clubs and repeaters in the Northern and Far West regions, including Kingsport ARC, Sharon ARC, and many others.







# Operating News

Conducted By George Hart,\* W1NJM

## QRM

In almost every mail we receive complaints of QRM to WIAW's bulletins and code practice — and occasionally a complaint about WIAW causing QRM to an ongoing QSO. (We also get complaints about using abbreviations without explaining what they mean — so, QRM means interference, QSO means a contact between two stations.)

"What can be done about this?" the first type of complainant asks. "Why doesn't WIAW listen first, before transmitting?" asks the second type. Well, we have tried to deal with both these matters previously, but perhaps too long ago to be remembered, so let's go over the ground again.

WIAW is an amateur station and, just like any other amateur station, must take its chances with QRM. Unlike most other amateur stations, however, we are committed to a certain schedule (see details in WIAW schedule, elsewhere on these pages). Thousands of listeners monitor one or the other of the several WIAW frequencies every time we make a scheduled transmission. Yes, thousands! Many of them are unlicensed persons trying to get code practice, or licensed amateurs trying to upgrade. Others are trying to get the latest dope on what is going on in the amateur world, or at Headquarters. Some probably use the WIAW signal to estimate propagation conditions on the band on which

they are listening. Perhaps a few members just want to check on their Headquarters station and swell with pride when its signal stands out, both in quality and signal strength — this is *my* station, from *my* Headquarters! Or, if the signal doesn't sound just right, to drop Headquarters a line criticizing it. Yes indeed — thousands of listeners, each transmission.

No doubt there are times when a QSO taking place on the frequency is disrupted by WIAW's transmission. Do we mean we don't listen before transmitting, as we have always admonished others to do? Fraid so. How can we? The transmissions are sent simultaneously on numerous frequencies, some of them cool kilowatts. Imagine the procedural problems in listening first on each frequency. It would take eight receivers and an operator with eight pairs of hands (two octopi?), plus provision for a VFO on each band and sufficient isolation of transmitters to make possible listening on one band while kilowatts are blasting away on several others. Transmitters would have to be activated on each band in turn, after it had been ascertained that the frequency was clear, or a clear spot near the designated frequency (if any) was found and the necessary QSY (move to another frequency) made. By the time this is accomplished, 10 or 15 minutes will have gone by, while WIAW is blasting away on callup on frequencies found to be clear. It just isn't practical.

How about making a brief announcement a minute beforehand to the effect that WIAW will start a transmission on "this frequency" in one minute? Might help in some cases, give those using the frequency a chance to vacate but it would undoubtedly make some users even madder. Here comes WIAW, commencing the frequency again. Who do they think they are? Chances are many stations would slug it out with us, being damned if they'll move for us. Maybe this is the reason why so much QRM occurs during WIAW transmissions — the few infuriated by our "deliberate" QRM trying to get even with us.

There is only one conclusion that can be drawn. When you balance the ill will of the very few disaffected by the WIAW transmissions against the thousands who benefit from them, the conclusion has to be that the transmissions should be continued and we take our chances on QRM. There is usually some bad with every bit of good. We just accept it and plead for understanding.

But all this hardly answers the other question — the first one, above — which is "What can be done about the QRM on WIAW?" Actually, not very much. Most of it is unintentional, although such QRM has a tendency to sound deliberate if it bothers you. As a matter of fact, if the station causing the QRM were on there before WIAW came on the air, there can be considerable legal question (if it should come to that) as to

\*Communications Mgr., ARRL

WIAW Operating Schedule (October 30, 1977-April 30, 1978)

PST	CST	EST	UTC	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
6 A.M.	8 A.M.	9 A.M.	1400	Slow <sup>1</sup>	Fast <sup>2</sup>	Slow <sup>1</sup>	Fast <sup>2</sup>	Slow <sup>1</sup>		
7	9	10	1500			Cw Bulletins <sup>3</sup>				
8	10	11	1600			RTTY Bulletins <sup>4</sup>				
1 P.M.	3 P.M.	4 P.M.	2100	Fast <sup>2</sup>	Slow <sup>1</sup>	Fast <sup>2</sup>	Slow <sup>1</sup>	Fast <sup>2</sup>	Slow <sup>1</sup>	Slow <sup>1</sup>
2	4	5	2200			Cw Bulletins <sup>3</sup>				
3	5	6	2300			RTTY Bulletins <sup>4</sup>				
4	6	7	2400	Slow <sup>1</sup>	Fast <sup>2</sup>	Slow <sup>1</sup>	Fast <sup>2</sup>	Slow <sup>1</sup>	Fast <sup>2</sup>	Fast <sup>2</sup>
5	7	8	0100			Cw Bulletins <sup>3</sup>				
6	8	9	0200			RTTY Bulletins <sup>4</sup>				
6:30	8:30	9:30	0230			Phone Bulletins <sup>5</sup>				
7	9	10	0300	Fast <sup>2</sup>	Slow <sup>1</sup>	Fast <sup>2</sup>	Slow <sup>1</sup>	Fast <sup>2</sup>	Slow <sup>1</sup>	Slow <sup>1</sup>
8	10	11	0400			Cw Bulletins <sup>3</sup>				
9	11	12	0500			RTTY Bulletins <sup>4</sup>				
9:30 P.M.	11:30 P.M.	12:30 A.M.	0530			Phone Bulletins <sup>5</sup>				

<sup>1</sup> Slow code practice on cw bulletin frequencies, 8 minutes each session; 5, 5, 7-1/2, 7-1/2, 10, 13, 15 wpm.

<sup>2</sup> Fast code practice on cw bulletin frequencies, 8 minutes each session; 35, 30, 25, 20, 15, 13, 10 wpm.

<sup>3</sup> Cw bulletins, 18 wpm, on: 1.835, 3.58, 7.08, 14.08, 21.08, 28.08, 50.08, 147.555 MHz

<sup>4</sup> RTTY bulletins 60 wpm/170-Hz shift on 3.625, 7.095, 14.095, 21.095, 28.095, 147.555 MHz.

<sup>5</sup> Phone bulletins on 1.835, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

Normal ARRL office-visiting hours are Monday through Friday 8 A.M. to 5 P.M. and Saturday and Sunday 3:30 P.M. to 1 A.M. (all local Eastern Time). The station address is 225 Main St., Newington, CT 06111 (about 7 miles south of Hartford). Maps with local street detail are available upon request. Please note that all footnoted frequencies are approximate. If you wish to operate when visiting, you must have your original operator's license with you. (Schedules can also be arranged to work WIAW.) The station will be closed Dec. 25-26, 1977; Jan. 1-2, Feb. 20, Mar. 24, 1978. Staff: Chief operator/Asst. Communications Mgr. C. R. Bender, W1WPR; Chris Schenck, W1EH; Stan Gibilisco, W1GV.

In a communications emergency monitor WIAW for special bulletins as follows (times in UTC): *phone* on the hour, *RTTY* at 15 minutes past the hour, *cw* on the half hour.

To improve your first by sending in step with WIAW (but not over the air!) and to allow checking the accuracy on certain tapes, note the UTC dates and QST text to be sent in the Q300 practice from the issue of QST two calendar months past: Dec. 2, It Seems to Us; Dec. 6, World Above; Dec. 12, League Lines; Dec. 15, Public Service; Dec. 21, Happenings; Dec. 23, Operating News.

who is QRMing whom. WIAW has no prior claim to the frequency just because we publish a schedule showing we will be making a transmission there at that time. It is probably a fact that 99 percent of the stations heard on the same frequency as WIAW during code practice or a bulletin had forgotten that we come on at that time, or never realized it in the first place. Most of these move off when they realize that WIAW is on there. A few do not and they are fully within their rights. This doesn't make things less annoying to you, of course, but there it is.

How about that other one percent? These are the jokers who, for whatever reason, are on there for the purpose of causing QRM to WIAW. You can tell it by listening to them. They call CQ over and over (and never get an answer because nobody can copy them through WIAW — or WIAW through them), or call another station, probably a fictitious one, or hold their key down, send Vs, NST, swish their VFO back and forth, or any of a number of different tactics. Most of them are probably "sickies" — some of them perhaps not even amateur licensees.

It has been variously suggested that ARRL get our official observers after those who cause QRM to WIAW, or perhaps get up a form card to be sent out to stations heard on the same frequency as WIAW during bulletins or code practice. This doesn't strike us as being such a good idea, for one basic reason; it smacks too much of using an ARRL-organized program to fulfill a selfish ARRL project. It is, in effect, saying: "You get off my frequency, because what I am doing is more important than what you are doing." The latter is probably true, but the recipient of the communication may not (probably won't) think so. If he has any anti-ARRL tendencies, they will immediately come to the fore. Again, the question will be asked: "Who do you think you are; God?" (This is an exact quote from one letter received.)

No, having the QOs or Headquarters send notices may backfire. But spontaneous requests from listeners affected may be a different matter. Oh, it won't make any difference to the one percent who are "sickies." In fact, they'll love it, but they're hopeless anyway. If we can make an inroad into the other 99 percent, we'll have reduced the amount of QRM considerably. You the WIAW listener must make the request for consideration, making the point that you are the one being hurt, not WIAW or ARRL. The appeal of the beginner for assistance has universal acceptance, a tradition in our ham fraternity.

But make sure it is an appeal, not a demand. Those other stations have as much right on 3580, 7080, 14,080, etc., as does WIAW. If we can, by spontaneous action, effect a "clear channel" for WIAW services, how good this will look on the record of the amateur service!

## SCM ELECTION RESULTS

The following were elected for two-year term of office beginning October 1, 1977:

### Uncontested

Wash. R. L. Klepper, W7IEU

**Balloting results:** In the Los Angeles Section, Stanley S. Brokl, K6YYQ, defeated Perry Masterson, W6RHS, 689-598.

## AMSAT-OSCAR 7

Ref. Orbit	Date	Time (UTC)	Long. W
13923A	1 Dec.	0120	75.2
13935B	2 Dec.	0019	60.1
13948A	3 Dec.	0113	73.7
13960B	4 Dec.	0013	58.5
13973A	5 Dec.	0107	72.1
13985B	6 Dec.	0006	56.9
13998X	7 Dec.	0101	70.5
14010B	8 Dec.	0000	55.4
14023A	9 Dec.	0054	69.0
14036B	10 Dec.	0149	82.5
14048A	11 Dec.	0048	67.4
14061B	12 Dec.	0142	81.0
14073A	13 Dec.	0041	65.8
14086X	14 Dec.	0136	79.4
14098A	15 Dec.	0035	64.3
14111B	16 Dec.	0129	77.8
14123A	17 Dec.	0029	62.7
14136B	18 Dec.	0123	76.3
14148A	19 Dec.	0022	61.1
14161B	20 Dec.	0117	74.7
14173X	21 Dec.	0016	59.6
14186B	22 Dec.	0110	73.1
14198A	23 Dec.	0010	58.0
14211B	24 Dec.	0104	71.6
14223A	25 Dec.	0003	56.4
14236B	26 Dec.	0058	70.0
14249A	27 Dec.	0152	83.6
14261X	28 Dec.	0051	68.4
14274A	29 Dec.	0145	82.0
14286B	30 Dec.	0045	66.9
14299A	31 Dec.	0139	80.4

## NOTES

- 1) All time and date references are in UTC.
- 2) The times and longitudes are for OSCAR's first equator crossing each day, which is called the reference orbit.
- 3) For December, A-O 7 will operate Mode A on odd days and Mode B on even days. Starting January 1, 1978, it will be on Mode A only on days of the year fully divisible by three (February 2, day no. 33, for example) and the other two days in between will be Mode B.
- 4) All Monday orbits are reserved for QRP use only. Use a maximum of 10 watts ERP. Wednesdays are reserved for special experiments; authorized users only. This includes *Tuesday evenings* for the Western Hemisphere.
- 5) The Mode B transponder inverts signals. Upper sideband on 432 MHz becomes lower sideband on 145 MHz.
- 6) A-O 7 progresses 28.73707 degrees west per orbit in a period of 114.94513 minutes.
- 7) A-O 6 has been permanently removed from service.

To keep abreast of latest developments, tune into the regular phone and cw bulletins over WIAW, AMSAT bulletins transmitted over the beacon frequencies on A-O 7 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays on 3850 kHz 1sb; Mid-States at 0200 UTC; West Coast 0300 UTC).

Haven't listened to OSCAR yet? Try this: If you live in the eastern half of Canada or the U.S., listen to the reference orbit given in the chart (don't forget times are UTC). If you live in western North America, listen about an hour and 55 minutes later. Give OSCAR plenty of time to cross your QTH's horizon — a pass lasts a maximum of 25 minutes. There are many other passes that you will be able to hear or talk through, both in the morning and evening.

## Spacecraft Frequencies

Spacecraft	Uplink	Downlink	Beacon
A-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

This schedule of orbits for AMSAT-OSCAR 7 will be a regular feature of QST. Further information on the amateur satellite program can be obtained free of charge from ARRL HQ. Also, the popular and informative series of QST articles for the beginner has been reprinted in book form. *Getting to Know OSCAR from the Ground Up* covers OSCAR 6, OSCAR 7, the newest satellite, A-O 8, to be launched early next year, and the exciting Phase III program scheduled for late 1979. It includes an OSCARLOCATOR, a tracking device that lets you know which passes you can access and where the satellite is in the Northern Hemisphere at any given moment. The book is available for \$3 ppd. from the ARRL.



# Operating Events

## DECEMBER

- 3-4: 160-Meter Contest, North Carolina QSO Party, EA Contest phone, Connecticut QSO Party, IOPS cw\*
- 8: West Coast Qualifying Run\*\*
- 10-11: 10-Meter Contest, HA-DX Contest, EA Contest cw\*
- 16: WIAW Qualifying Run\*\*
- 17-18: SOWP Christmas ASO Party\*
- 28: WIAW Qualifying Run\*\*

## JANUARY

- 1: Straight-Key Night\*\*
- 4: West Coast Qualifying Run\*\*\*
- 7-8: CD Party phone\*\*
- 14: Hunting Lions on the Air\*\*
- 14-15: YU 80-Meter DX Contest\*\*
- 17: WIAW Qualifying Run\*\*\*
- 21-22: VHF SS,\*\* CD Party cw\*\*
- 28-29: Simulated Emergency Test\*\*

## FEBRUARY

- 4-5: DX Competition phone\*\*
- 4-12: Novice Roundup\*\*\*
- 12: Frequency Measuring Test\*\*\*
- 18-19: DX Competition cw\*\*

\*Detailed last month  
\*\*Details this issue  
\*\*\*Details next issue

## DECEMBER

- 8: West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z (Universal Coordinated Time, abbreviated UTC, with Z shown as a time designator). The run will take place at 9 P.M. PST the night of December 7. 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 include your name, call (if any) and complete mailing address. A large, stamped, addressed envelope will help to expedite your award/endorsements.
- 16: WIAW Qualifying Run at 0300Z, 10-40 wpm, transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 and 147.555 MHz. This is 2200 EST (10 P.M. local Eastern time) the night of December 15. Underline one minute of the highest speed copied. Certify that the copy was made without aid and send it to ARRL per the instructions just above.
- 28: WIAW Qualifying Run at 1400Z. This represents 9 A.M. EST Dec. 28. Other details just above.

## JANUARY

- 1: Straight-Key Night, the full 24-hour period. This is a friendly meeting on the air, using straight keys; from 0000-2400Z. Suggested areas of operation on 80, 40 and 20 are 60-80 kHz up from the bottom edge of the cw band; 10 kHz up from the bottom of each Novice segment. When participating, please use SKN in lieu of RST, preceding the 3-digit report, to clue in "passersby." Following SKN, send a list of the calls of the stations you worked plus your vote for the best fist heard that period (not necessarily one you've worked). This is not a contest and we aim to

keep it that way! Vote too for the most interesting QSO of the period. With your report include any interesting, appropriate photos for consideration. Check page 74 of the October issue for a bit of flavor of the July running of SKN. The period is long enough to permit DX participation. Be sure to look for the Scandinavians who have expressed an interest in joining the fun.

7-9: CD Party phone, appointees only, starts 2300Z and ends 0500Z. All CD (Communications Department) eligibles are notified separately of this event in the quarterly CD Bulletin.

14: Hunting Lions on the Air, 8th annual, coordinated by the Arpoador Lions Club of Rio de Janeiro, Brazil. Non-Lions are welcome to participate. Contest starts 1200Z, continuing for a 24-hour period. Phone and cw are separate events, scored separately. Bands 80-10. Log each band/mode separately. Note time, calls, when contacts are made between Lions or Leos, the name of the Lions Club should be noted in the log. Mail entries within 30 days to the Lions Club of Rio de Janeiro (Arpoador), Brazil.

14-15: YU 80-Meter DX Contest, 2100Z Sat. to 2100Z Sunday, 80 cw only. Call CQ YU. Exchange RST plus consecutive serial starting with 001. Contacts between stations in the same country count 1 point, between stations on the same continent 2 points, between stations on different continents 5 points, with YU stations 10 points. Only one contact with the same station is permitted. Earn a multiplier of 1 for each DXCC country worked (including your own) and each YU prefix. Score will be the sum of points times total multiplier. Single and multiop, categories (clubs are multi). Awards. Log date/time(Z), calls, exchanges, note country/YU prefix if "new" and points. Postmark logs before March 15 and send to the YU-1X Club SRJ, Box 48, 11001, Belgrade, Yugoslavia.

## Strays

### YOU CAN HELP A KID SMILE AT CHRISTMAS

□ "The latest official bulletin shows that weather conditions are good for a Christmas Eve landing in Milwaukee." Children in 13 Milwaukee, WI, hospitals listened intently as Sheriff Michael Wolke issued periodic updates on Santa's journey from the North Pole.

Once Santa arrived, he spoke to them via amateur radio, just as the sheriff had done.

The brainchild of the local ARES group, the project brought a measure of cheer to Milwaukee youngsters who were confined to hospital beds, as well as a great deal of satisfaction to those who participated.

Last year's exercise was so successful that ARES emergency coordinator Robert Fairman, WB9NNI, began planning this year's activity soon thereafter. The sheriff's office, the general manager of two local radio stations and a large number of area hams participated enthusiastically.

Media coverage helped publicize their efforts and inform local agencies of the potential for ARES to assist in a genuine emergency.

Santa actually visited Washington, DC, area hospitals the past two Christmases, thanks to the efforts of PRA Ginny Pinker-

ton, K4SHE; Steve, W3ETX and John, K3FRO. Although media coverage did not materialize last year due to competition from the new President-elect, officials and staff at the Hospital for Sick Children were favorably impressed.

K4SHE suggests that persons considering a similar venture secure permission of hospital officials ahead of time, schedule the event for a week or so before Christmas, contact newspapers, television and radio stations and use simplex 2-meter frequencies to avoid interference.

Out at the St. Jude Hospital and Rehabilitation Center in Fullerton, CA, Joe Moell, WA6JFP, arranged an amateur TV "first." Using the hospital's color television camera with a 432-MHz video transmitter and receivers provided by members of the Southern California ATV Club, the volunteers brought Santa to a group of appreciative patients.

Needless to say, the TV newscast crew was duly impressed at their ability to set up a complete TV station in the space of a few minutes.

Another worthwhile Christmas project occurs each year in Cincinnati, under the auspices of the OH-KY-IN VHF Amateur Radio Society. Carting their communication van to a local shopping mall, the group collects Christmas messages and sends them on their way via the traffic nets.

These are some of the things that local clubs and individuals do for their community — and amateur radio — at Christmastime. Why not pitch in and do your share this year?



Three-year-old Joshua Rapkin heard Santa loud and clear during the Milwaukee County ARES's Christmas effort last year. Children in 13 area hospitals conversed with the jolly visitor from the North Pole. George Halper, W9SUF, holds the mic. (Milwaukee Sentinel photo)

# Station Activities

SCM X AREC X ORS X OVS X SEC X OBS X TCC X OO X NTS X WAC X

CP X A-1 OPR X EC X DXCC X CLUBS X RM X OPS X FCC X PAM X WAS

## CANADIAN DIVISION

**ALBERTA:** SCM, Sydney T. Jones, VE6MJ — SEC: VE6X-C. PAM: VE6AFO. VE8TD was able to relay weather info to a sailboat in the Arctic when all other means failed. 6AK is making plans to return to the air waves after attending NAJT. The Northern Alberta Radio Club have resumed code and theory classes. VE6KY is showing interest in the Oscar program. VE6OH and VE6MJ recently made contact via Oscar 7. The fly-in in central Alberta recently was a success despite poor weather. VE6AGT has resumed his interest in flying and reports increased activity in the Lakeland Amateur Radio Club. VE6KL and VE6ABC have started up the Swap and Shop net again. Congratulations to VE6ABC and his XYL VE6BBC on their Advanced tickets. Traffic: VE6HO 29, VE6AFO 16, VE6WV 8, VE6JH 3, VE6BBL 1.

**BRITISH COLUMBIA:** SCM, H. E. Savage, VE7FB — British Columbia Public Service Corp Net, 3755, Net Mgr. VE7DKY. Asst. Mgr., VE7QC. Should be pleased with the smooth way the NCSs are conducting the Net. VE7GY BCEN Net Mgr. has moved to Victoria and has again taken over the reins. A big thanks from us all to VE7DCA who looked after the shop for two months whilst 7GY was moving. VE7LL our Asst. Vice Director Peggy and motorhome are heading south till next spring. VE7CB has a new TS-820-S and purchased 26-foot trailer to move same to the south till next spring. Vancouver ARC 1977/78 officers, VE7FB, pres.; VE7ARR, secy. Who would drive 230 kilometres for Xmttr. Hunt? and back same day. VE7HI. Traffic: (Sept.) VE7ZK 132, VE7DKY 108, VE7FB 51, VE7COA 35, VE7BLO 19, VE7OM 17, VE7MW 14, VE7DOI 14, VE7CB 10. (Aug.) VE7DKY 199, VE7COA 22.

**MANITOBA:** SCM, Steve Fink, VE4FQ — Asst. SCM: Peter Guenther, VE4PG. RM: VE4UL. PAM: VE4JP. VE4PG writing my first report as Acting SCM. News bits are appreciated. VE4HU VE4IX VE4AAU and VE4TY now operating with new towers. ARLM had another good auction sale in Oct. and your support is appreciated. Welcome to VE4ADX, at Dauphin who is active on MTN. MTN is now on a daily sked and your support is needed. MEPN: 30 sess., 981 QNI, 47 QTC. MTN: 24 sess., 118 QNI, 44 Trf. Traffic: VE4PG 105, VE4QU 52, VE4UL 30, VE4IX 22, VE4YE 17, VE4JP 16, VE4HR 9, VE4AB 6, VE4AD 6, VE4LN 5, VE4LU 5, VE4NM 5, VE4OD 4, VE4OW 4, VE4AAU 2, VE3BLV 2, VE4CR 2, VE4JA 2, VE4LB 2, VE4MG 2, VE4NE 2, VE4UO 2, VE4XN 2, VE4AAF 1, VE4GB 1.

**MARITIME & NEWFOUNDLAND:** SCM, Aaron D. Solomon, VE1OC — Asst. SCM: VO1FG. SEC: VE1DI. PAM: VO1JN. RM & APN Mgr.: VE1ACU. RM & NTN Mgr.: VO1WG. Silent Keys: VE1AEI VE1ATY, ex-VE1ASP VO1EN (ex-VO6B). Recent Hosp: VE1AFA VE1MK VE1EK VE1PA. Hamfest '77 enjoyed by over 325 people. Congrats to co-chmn. VE1ACJ & VE1SY and committees. Prize winners: W1AZQ VE1GL. Other awards to VE1YO VE1RO VE1BIE. Hidden Tr. Hunt won by VE1FH VE1AMC VE1DQ. Code copying winner VE1MX. 50 Yr. Awards: VE1BZ VE1AN VE1BT VE1BY VE1CP. Char. ARC took part in Simulated Air Crash Exercise. MSN Fall Sked. now 2000Z both Sat. and Sun. JAPN: sess. 30, QNI 114, QTC 85/59. Traffic: (Sept.) VE1ACU 111, VE1HJ 55, VE1RO 29, VE1AMR 28, VE1ABG 24, VE1EJ 24, VE1KL 18, VE1ASW 12. (Aug.) VE1ASW 53, VE1AMR 50.

**ONTARIO:** SCM, Larry Thivierge, VE3GT — Asst. SCM: Noreen Nimmons, VE3GOL. The following NTS Ont. nets were omitted from the 1977/78 Net Directory: Ont. Daytime Net (ODN) 3645 kHz, 2100Z. Ont. Southern Net (OSN) 3667 kHz, 0000Z. Ont. Phone Net (OPN) 3770 kHz, 0000Z. Laurentian Net, 3755 kHz, 2345Z. VE3s HC CGO FZZ AMT COH FHE and CKX on the mend after being on the sick list. New calls are VE3ZC from Neustadt and VE3s IRR IRK JND JRY AND IRB from around the Section. VE3FQK is now IRS. VE3HFV is off to UOT. VE3DZK moved to Kingston and is active from Queens. VE3VX. VE3IFP from Copper Cliff is an OPS. VE3JLN renewed old acquaintances in Boston, and has a new ringo ranger for two meters. VE3HDO joined the TS-820S gang. OVMRC VP VE3FMW transferred to Toronto. Repeater VE3KBR operating successfully with a new collinear antenna. Georgian College, Barrie held a demonstration on HF and SSTV at the Georgian Mall to interest prospective amateurs in their college course on amateur radio. Scarborough ARC had 145 names added to their guest book during their two phase film and tech sessions for amateur hopefuls. Guelph ARC held their annual banquet. VE3FSF promoting amateur radio at Niagara College. Welland, with "Moving up to Amateur Radio." VE3FRG new VP of the Oakville ARC. VE3APK has recruited VE3s ITK and ITN as asst. ECs. Twenty-five amateurs visited VE3HB/3 at the Annual Steam Era Show at Milton. SCM VE1OC and APN net mgr., VE1ACU extend their thanks to all the Ont. amateurs who handled traffic and helped make the International Girl Guide Jamboree such a success. This resulted in great publicity for the hobby. VE3GFN has rebuilt his half kilowatt final. The 1978 RSO Convention will be hosted by the

London ARC on Oct. 13, 14 and 15th at the Holiday Inn, City Centre. Congrats to VE3BR on being elected Director OCWA. Regrettably I announce VE3s BEB FTB and HQN have become Silent Keys. From VE3GOL, Asst SCM, and myself, a most sincere "Merry Christmas" and a "Happy and prosperous New Year." Traffic: (Sept.) VE3BE 284, VE3GOL 221, VE3CDK 172, VE3ISW 162, VE3DPO 150, VE3GFN 131, VE3GT 120, VE3HGJ 83, VE3VDW 73, VE3EBG 65, VE3DV 64, VE3BDM 39, VE3DVE 32, VE3ATR 25, VE3GNW 16, VE3IFP 12, VE3APK 9, VE3FGV 7, VE3JGJ 7, VE4DH 4. (Aug.) VE3GCC 4, VE3FHQ 2.

**QUEBEC:** SCM, Ed Sieb, VE2BAQ — Congratulations to VE2SP and crew of 18 amateurs at St. Hubert air rally. A first for Canadian amateurs. As your new SCM, I welcome all traffic reports and news items for inclusion in this column. Traffic: VE2UN 82, VE2CTA 29.

**SASKATCHEWAN:** SCM, P. A. Grosthwaite, VE5RP — I would like to report that VE5AAE is our SATN manager. Norm will also carry out the duties of Route Manager formerly held by VE5XC. I certainly appreciate the work that Moose Jaw and area are doing in supporting the CW nets. The club has come along very well in promoting amateur radio in their community. Any person who wishes to promote Amateur Radio in their community and require help please give me a call. Traffic: VE5AAE 87, VE5EK 35, VE5WM 36, VE5RP 12, VE5QY 11, VE5ABN 8, VE5ABK 7, VE5BO 7, VE5YI 6, VE5QI 4, VE5QO 2, VE5AAJ 1, VE5NR 1.

## ATLANTIC DIVISION

**DELAWARE:** SCM, Roger E. Cole, W3DKX — SEC: W3P-C. RM: W3QQ. PAM: W3WD. PSHR: K3YHR 49, WA3WVY 47, W3PQ 44, W3KET gave one of his usual interesting and informative talks at the Sept. 1st State ARC meeting with RTTY as his subject. W3ENF is now an Extra. WA3TNP completed his WAS by working NV. He also met W3ZNF at the New England ARRL Convention. 1977 Field Day Trophy awards were as follows: Multiple Xmttr Del. ARC: Single Xmttr 1st State ARC; VHF DARC. Scores were 3934, 1108 and 62 points respectively. WB3FOE WB3FUP WB3FUO WA3QLS WA3QBD and WB3ENF from the DARC provided 2-meter communications for the Muscular Dystrophy Bike-A-Thon. DTN QNI 337, QTC 86, DEPN QNI 62, QTC 9. Traffic: W3PQ 144, W3QQ 105, WA3WVY 60, WA3WVY 37, W3DKX 26, W3WD 20, K3YHR 20.

**EASTERN PENNSYLVANIA:** SCM, G. S. Van Dyke, Jr., W3HK — SEC: W3FBF. RMs: K3NGN K3KW. PAMs: WA3PZO W3AVJ. Net reports: EPA QNI 478, QTC 211; PTTN QNI 271, QTC 128; PFN QNI 347, QTC 873; EPAEP&TN QNI 307, QTC 108; CM6 QNI 33, QTC 12; AREC 2 QNI 11. OBS reports W3CL W3AVJ W3ATJ W3ID. OO reports W3KEK W3NC K3RDT W3ATJ K3NSN WA3RPG. OVS reports W3GOA W3CL WA3BJQ WA3NDQ W3DZI. PSHR: WA3NDQ K3SD K3YL N3HR WA3PZO. BPL: W3CUL W3V1R K3NSN N3HR. W3CUL reports that when one pile of ftc is cleared another shows up. Glad to see all nets reporting this month. K3YL chasing TVI one band at a time! WA3PHQ is now K3SD. To new appointees be patient it takes a little time to fill the pipeline. Abington RC has new class with 46 students, good doing! I guess the cold weather will bring some of the guys back into the shack! W3ID still looking for some encouragement on the VHF nets. Looks like the Pack Rats did it again with their Hamarama! W3BUR erected a 26-ft. boom antenna and put it up 68-ft. all by himself, must have wings! OO reports are slim, guess you guys are behaving! W3EJ bought a spare rig, one for Murphy! W3ABN sent in an article showing three hams W3ABN W3AQN & W3LMA representing 154 years of hamming! Hope you all took the time to vote for vice-dir. and SCM when the ballots were mailed out. Don't complain if you don't vote! When clubs elect new officers please underline in your paper, I may miss it. Notice: clubs not reporting to ARRL are being dropped from the active list. Traffic: (Sept.) W3CUL 3856, K3NSN 2887, W3VR 942, N3HR 794, WA3ZRY 438, K3KW 356, WA3WQP 278, K3NGN 209, K3YL 174, WA3THT 160, W3IPX 125, K3SD 85, WA3PZO 80, WA3NOQ 76, W3ATJ 62, W3AVJ 47, K3RC 42, W3BKV 22, W3WRE 20, W3VA 20, WA3OFD 17, WA3YHR 17, WA3WAC 16, W3AXA 12, W3ID 11, W3ADE 10, WA3YDC 9, W3BUR 7, WA3CKA 7, W3CL 7, W3DZI 4, W3HK 3, W3KEK 1, WA3BJQ 1, N3AI 1, WA3TMP 1, W3EJ 1, W3BIH 1, W3GOA 1. (Aug.) WA3YDZ 53, W3BKV 6. (July) WA3YDZ 1.

**MARYLAND—DISTRICT OF COLUMBIA:** SCM, Kari R. Medrow, W3FA — The Section still needs volunteers for ARES. Get in touch with N3II or your EC for details. WA3PRW and K3ORW are neck and neck for Sept. PSHR. OO reports from WA3KCY W3MR WA3JSZ W3WBY and WA3RSK. N3RC is ex-WALGM now in W.D.C. WA3ZAK is N3IT. WA3UJH is W3MR. N3RL spent a quiet summer, but anticipates a traveling fall schedule. WA3FYZ is impressed with WB3DBU's 2-mtr rig. WA3KCY joined the WPRC. W3IDF has started one Novice and one General class at the Hagerstown Jr. Col-



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## OLD TESTAMENT

**H**erefore the Lord himself shall give you a sign; Behold, a virgin shall conceive, and bear a son, and shall call his name Immanuel (which means God with us)."

Isaiah 7:14 740-687 BC

**B**ut thou Bethlehem, though thou be little among the thousands of Judah, from you shall come forth one who is to be ruler in Israel, whose origin is from old, from ancient days.

Micah 5:2 740 BC

## NEW TESTAMENT

... the angel Gabriel was sent from God to a city of Galilee, to a virgin betrothed to Joseph, of the house of David; and the virgin's name was Mary... The angel said to her "Do not be afraid Mary, for you have found favor with God. And behold, you will conceive in your womb and bear a son, and you shall call his name Jesus."

Luke 1:27-31 70-90 AD

**K**ing Herod was troubled and inquired where the Christ was to be born. They told him in Bethlehem of Judea; for so it is written by the prophet (Micah).

Matthew 2:4-5 60-70 AD

Historical evidence clearly points to Jesus as the man God, who fulfills the literal prophecies of Isaiah and Micah within 800 years. The same God who chose the Virgin Mary to bear Jesus and who chose Bethlehem for the birthplace reveals himself in holy scripture today. We thank him for the birth of Christ this Christmas.

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And the angel said unto her, Fear not, Mary: for thou hast found favor with God. And, behold, thou shalt conceive in thy womb, and bring forth a son, and shalt call His name Jesus.

Luke 1: 30,31 KJV

Then said Mary unto the angel, How shall this be, seeing I know not a man? And the angel answered and said unto her, The Holy Ghost shall come upon thee, and the power of the Highest shall overshadow thee; therefore also that holy thing which shall be born of thee shall be called the Son of God.

Luke 1: 34,35 KJV

And she brought forth her firstborn son, and wrapped him in swaddling clothes, and laid him in a manger; because there was no room for them in the inn.

Luke 2:7 KJV

For God so loved the world, that he gave his only begotten Son, that whosoever believeth in him should not perish, but have everlasting life.

John 3:16 KJV

Nearly 2000 years ago, God reached out and touched the world with his love. He is still reaching out today seeking the lost.

Let his love reach into your heart this Christmas season. Become a member of God's family by turning from your way, and trusting in God's way today.

May you and your family reach out and accept the joy he has for you this Christmas.

*Joy to the World...*

Lee, Andy, Denny, Don, Bill, Denny, Linda, Lydia, Billie,  
Kim, Lee, Rick, Jane, Deb, Barb, Les, Merrill, and Paul.

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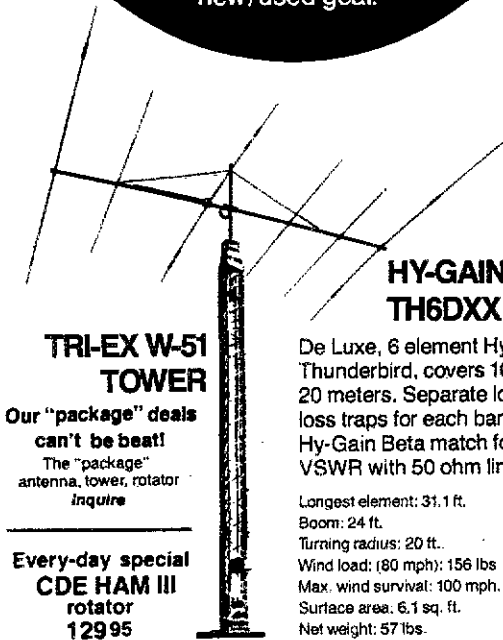
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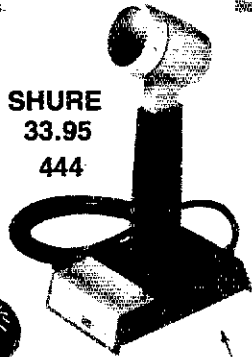
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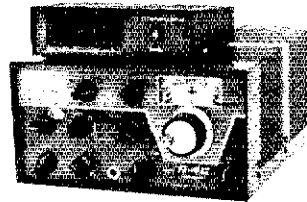
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VHF transceiver  
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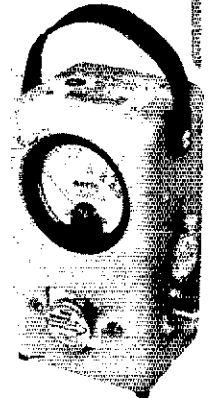


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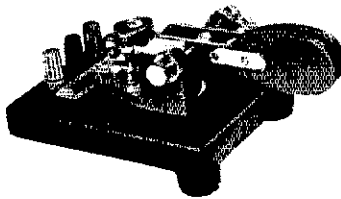
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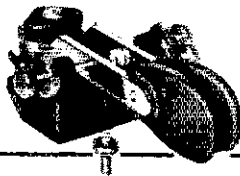
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- Dual-lever squeeze paddle
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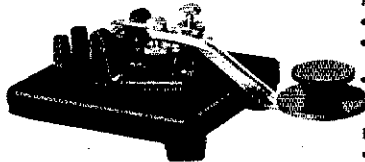
**\$29<sup>95</sup>**



### Model HK-2

- Same as HK-1, less base for incorporation in own keyer

**\$19<sup>95</sup>**



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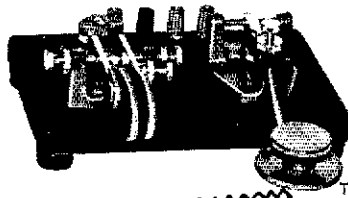
- Deluxe straight key
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Navy type knob, only **\$2.75**



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lege. WA3RSK has been conducting classes on 2 mtrs. K3RA puts the bulletins on the BARC repeater. W3WBY finds CBers on 2 and 40 yet! WA3ZTW reports WB3DCA made Novice WAS. Congrats. WA3UYF finds school driving him crazy. WB3PEN has Georgetown ARC putting on demonstrations of ham radio to the students. W3BHE spent the summer going to hamfests. WB3AOB leads in traffic this month. WB8ZV3 is picking up his old skeds. K3ORW has the dipole higher and trimmed. W3DFW and W3OYY have two very popular nets. W3FZY and K3KU switched net nights. WA3PRW is getting all set for winter. With the nets: Manager, sessions/QTC/QNI/avg. MDC PON, W3OYY, 5/19/22.6. WR PON, W3DFW, 17/48/14.4. MDC TN, K3ORW, 17/39/14.6 with WB3AOB K3ORW and W3DKX taking top honors. MERN, WA3PRW, 23/62/20.9 with K3RIJ as topper and others. W3ADQ WB3AUK W3HWZ and WA3PRW. Aug. MDD, W3QQ, 61/144/6.5 with top brass W3KA WA3WPY and W3QQ. For Sept. 60/153/7.2 with WA3WPY W3FA and W3QQ top brass. Things are looking up. The PONs meet on 3905 kHz at 5:15 PM local. MERN/MDC TN 3920 at 6 PM local. MDD on 3843 at 7 and 10 PM local. WB3ANV upgraded to Advanced. Congrats. Traffic: (Sept.) WB3AOB 105, W3FA 95, WA3UYF 62, WB8ZV3 29, W3FZY 20, N3IT 20, WA3PRW 20, W3WBY 18, K3ORW 12, W3IDF 9, WA3FYZ 4, N3RC 2. (Aug.) W3BHE 3, WB3PEN 2.

SOUTHERN NEW JERSEY: SCM, Raymond F. Clancy, WB2GTE — SEC W2HOB OK's K2NE as new EC for Camden Co. and WA2YAV as new EC for Atlantic Co. W2AEJ now N2MR. WB2IYB now N2BK wins 25 wpm Code sticker. WB2TUL now K2UL. WA2NBM WB2LCH WB2ERI new Generals. W2DUE WA2MGV WA2OMP made Advanced. WA2GFG made Extra. WA2IGS 14 years old made Extra. N2UT made DXCC in NM. W2JW1 back from Cape Cod. WB2LCC started new Novice class Oct. 13. W2ZQ out of hospital and on air at Quaker Bridge Maul for Xmas msgs 4 days. WR2AJY 146.925 a new auto patch repeater at Willingboro sez W2XQ. W2PEN sez Cumberland Co. ARC 2M AM net meets Tue. 6 PM. W2DEE sez Mapleshade ARC has its semi annual FD in Jersey Pines date not picked yet. W2ASGR 147.075 is Robbinsville Repeater. SPARC features "NAVY MARS" at meeting. Newspaper ads have drawn over 150 inquiries on new Novice class sez K2MYS WB2EYF. SJRA's 29th annual Hamfest Prize winners W2KF WA2MGV W2FGY WB2BNE have some new goodies. WA2LXY likes CW on 15M. Gloucester Co. ARC's WB2LNR Edits, Types, Prints, Circulates Crosstalk. K2JF tells all on propagation article. RCA Astro Electronics ARC now are ARRL affiliate. Congrats to pres. WA2ZYU. W2PU Princeton Univ. RC reorganizes. Burlington County RC holds annual Xmas dinner Dec. 16 Vincetown. Traffic: W2ZQ 157, WB2LCC 106, W2HOB 61, W2AWU 50, WA2WSV 28, K2UL 15, W2J1 12, K2BG 10, N2UT 4, W2PU 1.

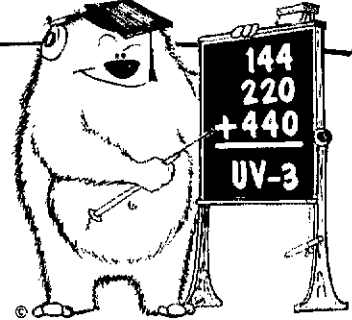
WESTERN NEW YORK: SCM, Joseph M. Hood, K2YA — Asst. SCM: W2MTA. SEC: N2JC. The sun didn't exactly shine on the Hamburg International Hamfest this year but it was considerably drier than in years past. They had a good crowd too. Thanks to the Kodak Park Radio Communications Club for inviting me to speak at their ARRL Affiliation Charter Party. Speaking of affiliation congratulations to the Rochester Institute of Technology ARC on their recent League affiliation. WA2GIS ran an Amateur Radio demonstration at the Corning Trade Fair in Sept. More two letter calls: W2ECH now W2XT, W2EMX now N2JM, WA2EHF now N2IG, WA2KND now K2HC and WA2ZRI now K2IH. Welcome to WA2RCZ WA2RUK and WA2RUB all new WNY Novices. WB2ELB reports several Aurora openings on 50 MHz in Sept. K2GJC is planning an Amateur Radio course in cooperation with BOCES starting Oct. WA2AWK W2CM WB2EAK WA2GWN WB2ICE WA2LOX and K2RXG are all running classes in the Syracuse area. WA2ZJP motorcycled or should that be motor Hz to Cape Cod, W1AW, N2YLW2CS for vacation. RRRRA had a very successful FM clinic in Sept. Dick Holbert WA2OXJ of the FCC Canandagua LEO spoke at the Sept. RARA meeting. WA2BEH is now operating from Europe and N2ED is now 11 in Vermont. Happy to report that WB2FPT/4 is home from the hospital and doing well. W2RCK will soon be N4LR. WA2WVL has applied for an Sta to allow him to operate a beacon on 432.044 MHz. Traffic: WA2ELD 300, W2OE 268, W2MTA 133, W2FR 121, WA2AIV 84, WA2HSB 81, W2RUF 75, W2TZ 70, WA2ZJP 58, WA2SDY 27, W2RQF 24, K2GJC 23, WB2VND 15, K2VR 11, WB2KHT 10, WB2IPX 6, WA2UAR.

WESTERN PENNSYLVANIA: SCM, Donald J. Myslewski, K3CHD — SEC: WA3VUP. Asst. SECs: K3SMB WA3LJW. PAM: K3SMB. RMs: K3AT W3NEM W3KUN.

Net	kHz	Time/Days
WPA CW Traffic	3585.0	7:00 PM Dy
WPA Phone Traffic	3983.0	6:30 PM Dy
Pa. Tfc & Training	3810.0	6:30 PM Dy
WPA RACES	3990.5	9:00 AM Su

New appointments: WA3YEO as ORS, WB3GZR as OVS, and WB3HGL as OPS. It is with deep regret to note the Silent Key of W3NSX. Get well wishes to WA3FSH and W3YD. W3LOS, past RM and ORS as well as Net Mgr. for many years on the WPA CW Traffic Net has retired to Clearwater, FL. Good luck and the WPA Section thanks you for the many years of dedicated traffic handling. WB3FWC WB3FXC WB3EHQ WB3HND have upgraded to General Class and W3BZN upgraded to Extra. WA3SYB W3SVJ and W3UUH are sporting new towers for their antennas. WB3IGH is a proud owner of an SB-1015. The Mercer County ARC conducted an Amateur Radio display at the Shenango Valley Mall "Charity Fair." A new traffic net in the Butler area meets every nite at 2200 (local) on 147.90/30 WR3AGY repeater. Two Rivers ARC officers for 1977-78 are: WB3BRD, pres.; WA3UFI, vice pres.; W3OFM, secy.; WA3NLE, treas. Special thanks to WB3EHR W3UHM WB3DQV WB3BRY and W3VSL of the Steel City ARC who erected a new antenna for W3DHU who is 89 years young and still ac-

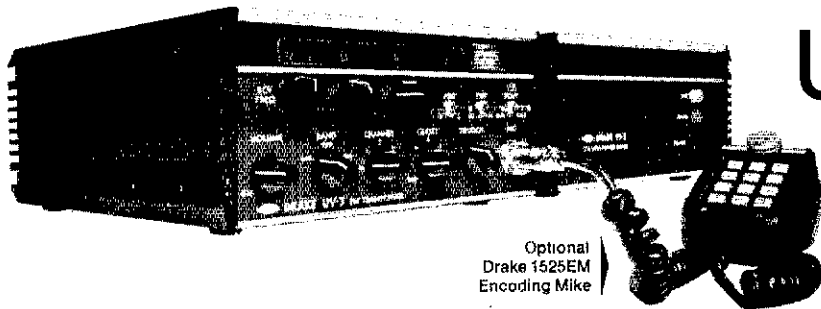
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Optional  
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only \$995 for 3-band UV-3

*How does the cost of the Drake system really compare to  
alternative methods of getting on 144-220-440 MHz fm?*

**A** First of all, there is *no* direct comparison possible, because the Drake UV-3 is the only rig in the world offering 144-220-440 MHz fm in a single box — and it is fully synthesized on each band.

**B** The nearest comparison would be to add the suggested list prices of 3 separate units of the most popular fm rigs presently available. It would work out approximately as follows:

2 Meters (Synthesized to 5 kHz)	.....\$ 400.00
220 MHz (12 channels, crystal)	..... 230.00
440 MHz (12 channels, crystal)	..... 300.00
Crystals (Assuming 20 per radio)	..... 200.00
<b>TOTAL</b>	<b>\$1130.00</b>

*But wait— even at that price you'd be missing features included in the UV-3:*

1. Full synthesis on all three bands
2. Extra diode-programmable fixed channels on each band
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5. Everything in a *single* box!

For your homework, then, ponder the following — at a suggested amateur net of \$995.00, the Drake UV-3 (144-220-440) is, to say the least, an incredible value.

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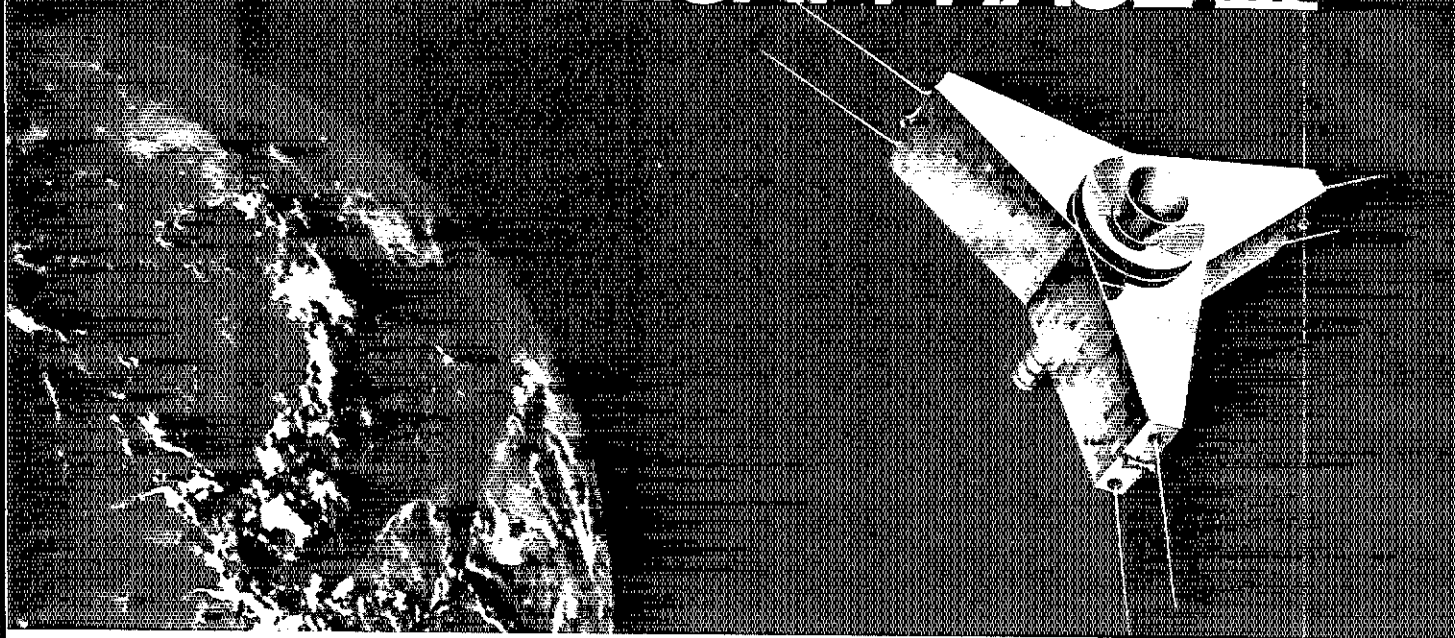


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AMSAT, with members and contributing groups worldwide, and headquarters in Washington, D. C., has been responsible for our current satellite program. Many people feel that perhaps the greatest value of the amateur satellite program is the dramatic demonstration of amateur resourcefulness and technical capability to radio spectrum policy makers around the world.

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 \$10 Annual membership     \$100 Life membership  
 Send information on sponsoring larger satellite components.

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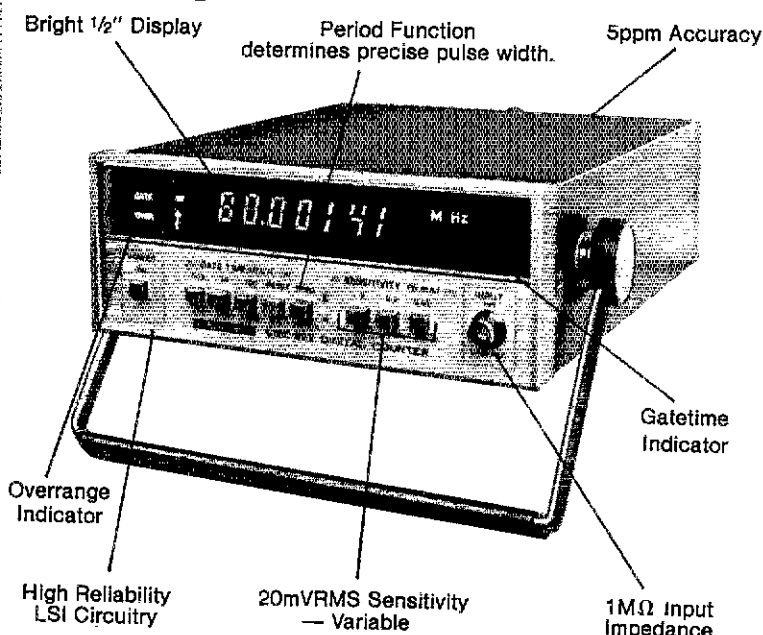
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time on the air. The WPA CW Traffic Net had 30 sessions in Sept. with 421 check-ins and handled 151 messages. The WPA Phone & Traffic Net had 30 sessions in Sept. with 330 check-ins and handled 57 messages. Best holiday wishes to all the members of the WPA Section along with a Happy New Year 1978. Traffic: K3AT 172, W3YQ 153, N3FM 137, WB3CDA 94, WB3DKT 78, W3EGJ 77, W3KUN 53, WB3DKU 45, K3CHD 42, K3SMB 30, W3RUL 26, W3SN 17, W3LOS 14, W3GQJ 13, K3HCT 9, WA3YXJ 8, W3TTN 5, W3AS 4, WB3HND 4, WA3UDZ 4, N3EE 3, W3UT 3, K3VQV 2, K3UA 1.

### CENTRAL DIVISION

**ILLINOIS:** SCM, Edmond A. Metzger, W8PRN — Asst. SCM: Harry Studer, W9RYU. SEC: W9AES, PAM: WA9KFK, RM: W9NJP, Cook County EC: W9HPG.

Net	Freq	Gmt	Days	Tfc.	Sess.
ILN	3690	2300/0300	Dy	226	56
Ill Ph	3915	1300/1800	M-S	199	30
NCPN	3915	1300/1800	M-S	193	50
ICN	3940	1400	Su	8	4

WB9JSRs new QTH is Lansing, IL. W9OBS has a new Century in his shack. W9HPG, secy. of the Chicago Area Chapter of QCWA reports that the Chicago Chapter now has 118 members. He also has just passed the 50 year mark of continuous ARRL membership. New two letter calls include: WA9VLK now W8BV, W9ZAV now N9NA, WA9GBX now N9MX, K9EIV now K9EV, WB9UIF now K9BK. The Sangamon Valley Radio Club, Inc. (Springfield) Annual Hamfest was an FB get together according to Chairman K9IDQ. K9GOK has a new junior operator who was born on Sept. 10. WB9QIO received his Advanced license. New Novices are WD9FTI, WD9FTH and WD9GIB. K9KOM is now an Advanced licensee. WD9EDR is the proud owner of a YAESU FT200 but has to share it with his XYL who has just received her Novice ticket. MARC (Marissa Amateur Radio Club) has a repeater on 147.81-21. K9ZQK is on two meters with a new FT 221R. WD9DIO upgraded to General and WD9DIN is a new tech. A new licensee from Steelville is WD9GCO. WB9SSM is now K9SF and WA9MMI is now K9SR. Lewis McCoy of ARRL headquarters, Don Miller, Central Division Director and Edmond A. Metzger, Vice Director and SCM were featured speakers at the highly successful Expo '77 at Grays Lake, Sept. 17th. Congratulations to the CFMC and Squish Tale for having won first prize in the "B-2" category Club newsletter contest sponsored by Amateur Radio News Service. WB9ZHZ passed her General Class exam. The ILN held their annual meeting at the Peoria Hamfest, and then went on to Cambridge Inn for their annual dinner and get together for their families. CAND report for Sept. includes traffic of 338 in 60 sessions. Y RN 81.5 percent. The Central Ill. Radio Club will hold its 3rd, 2-meter Jack Benny contest on Jan. 7-8 and also 14-15. Contact W9AMJ for further details. Traffic: (Sept.) W9NXG 265, W9JIJ 182, N9TN 147, WA9KFK 117, K9DAC 115, W9KR 97, WA9BGW 95, W9OK 84, W9HOT 76, WA9EBT 66, WB9SR 62, W9NLP 58, W9FLF 54, W9OBS 45, W9LNO 45, N9MX 37, W9HPG 24, W9PRN 20, W9OYL 18, K9EEA 17, WB9RGZ 9, W9BV 4, WD9BCX 3, K9EI 2, N9NA 2. (Aug.) K9EEA 16, WB9RGZ 7.

**INDIANA:** SCM, M. P. Hunter, W9LF — SEC: W9UMH. The FWRC Hamplatter won 2nd place in the International Club Newsletter Contest by The Amateur Radio News Service. Oct. marks the end of the formal hamfest season — hope you enjoyed them. K9OTB is now sporting a new 90-foot self supporting tower. WA9NPM is relocating near Brownsburg. K9HZY has moved to Tenn. Richmond ARA has their repeater back on the air after increasing the antenna height. New Richmond ARA officers are WA9WGO, WB9AND and K9OUP. Congrats to Porter Co. ARC on their recent ARRL affiliation. Also to WD9AEW for his upgrade from Novice to Extra. Lake Co. ARC started the latest license classes in Sept. The fall meeting of IRCC was held at Indy Red Cross. New officers are WA9BVS, W9LF and WA9OHX. Several locals are now battling time to get antennas up before bad weather sets in. Net Tfc: QIN 264, ITN 329, INTN 75, IPON 6, IGN 6, Hoos VHF 19. Traffic: W9FC 244, W9ICB 208, W9LTU 182, W9HUF 139, W9EI 133, W9QLW 123, WB9IHR 118, K9DC 106, W9MR 105, W9BCF 101, WB9FOT 66, WB9PIR 44, W9UEM 43, K9FG 38, K9YBM 37, WB9HC 33, K9ECT 32, K9TFE 32, K9FZX 23, W9PMT 27, WB9YXN 26, WB9QEZ 24, K9RWQ 19, WB9VKO 19, W9DLF 15, K9KT 14, WB9DIX 12, W9ENU 12, WA9OHX 12, WB9SLV 12, K9DCX 10, W9ZW 9, W9RTH 7, K9CGS 6, WA9GJZ 5, W9BDP 1.

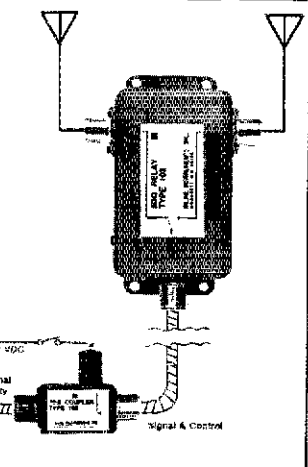
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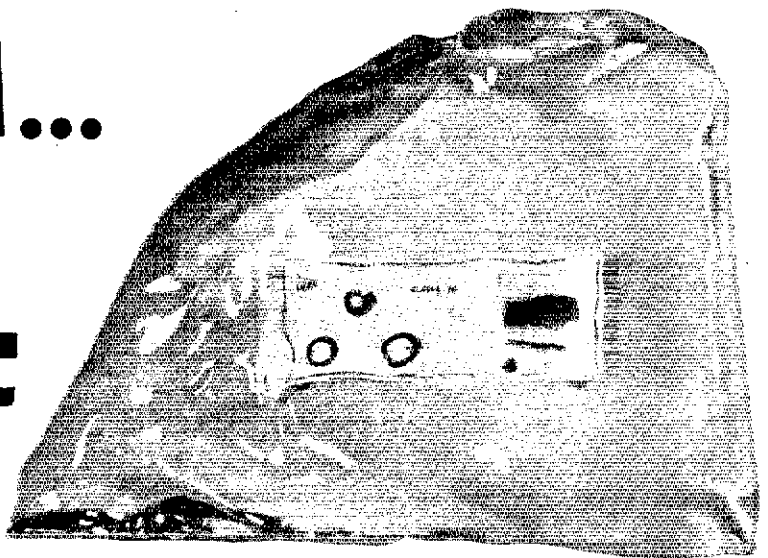
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**WISCONSIN:** SCM, Roy A. Pedersen, K9FHI — SEC: K9ZZ. PAMS: W9AYK, W9IEM, K9UTQ. RMs: WB9ICH, K9KSA, W9SFL, K9LGU, K9EN. Nets, Freq, Time, QNI, QTC, Mgr: BWN, 3985, 1145Z M-S, 641, 564, W9AYK, BEN, 3985, 1700Z Dy, 749, 127, W9IEM, W9SBN, 3985, 2300Z Dy, 1245, 168, K9UTQ, WNN, 3175, 2215Z Dy, 34, 0, WB9ICH, WIN-E, 3662, 0000Z Dy, 284, 112, W9SFL, WIN-L, 3662, 0300Z Dy, 222, 88, K9LGU, W9SSN, 3662, 2300Z M-W-F, 42, 2, K9KSA, WRN, 3662, Sat, 0030Z, K9EN, WI ex Po, 3925, 1701Z M-F, 580, 37, W9A9IX. OPS to WB9E5M, BEN to WD9DHF, WB9E5M, YTARC, FLARC, CWRA and MARA provided communications for state 4-H dog show in Portage. Central Division convention in Milwaukee in 1979. WD9DIT, WD9FRI new Novices in Beloit area. Tri-County swapfest will be in Jefferson Co. fairgrounds Mar. 19, 1978. WB9REC has Advanced. WD9CWJ has General. WB9DKS now W9Z1. Swapfest in Waukesha Jan. 21, 1978. Don't forget to check the D9RN 3940 4 PM local. BWN to W9FG, WB9MPF, WA9KXN. Mancorad club has 25 taking Novice and General. ARC in Stevens Point formed new club known as Central Wisconsin Radio Amateur at UWSP. WD9AJA, pres., WD9AUC, vice-pres., WB9BC, secy-treas., WD9ESX, act. mgr. WNN certificate to WD9AUD, W9UKR has Extra. WB9PAW mother is a Novice WD9GRH. WB9SBD is Extra. WB9UKO is Advanced. WB9SPC has Tech. WB9S2C has General. '34-'94 repeater on in Madison. The EAA convention well attended and handled a lot of traffic using the call W9KKK9. K9CPM made BPL. Traffic: (Sept.)

# ALPHA...

## The Cool Kilowatt



It's no trick to make a compact linear amplifier that'll put out a kilowatt or two . . . for a while.

What distinguishes **ALPHA** amplifiers from the rest is their ability to operate *indefinitely* at a full kilowatt average—2+ KW PEP—and *stay cool*.

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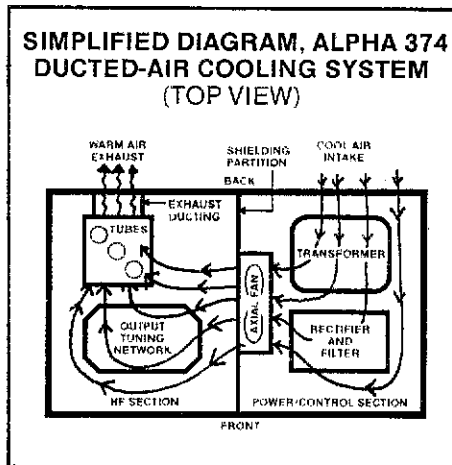
- Robust, conservatively-rated parts
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Short-cutting even one of these areas practically guarantees major failures!

Every **ALPHA** is engineered around ETO's exclusive and highly efficient 'ducted air' cooling system. Cool air is circulated around the power transformer and throughout the cabinet, then ducted through the tube cooling fins and directly out of the cabinet at the rear.

The standard **ALPHA 76** that ran key-down for 18 days at 1000 watts d-c input was finally shut down for inspection. It was in perfect shape, ready to go on indefinitely.

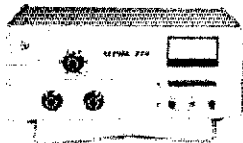
26,000 minutes key-down at full ratings! That typical **ALPHA** performance illustrates why every model—including the value-packed **ALPHA 76** and the No-Tune-Up **ALPHA 374**—can carry both a No-Time-Limit (NTL) full-power rating and an 18 month factory warranty!



(In shopping for a linear, it pays to investigate very carefully. Most manufacturers *do not* provide positive cooling for critical power supply or plate circuit components. Some widely-distributed models have their transformers located in virtual 'heat chambers'—with even natural air convection cut off—and blow heated air (from the tubes) over other circuitry before exhausting it *forward!*)

Buying or home-brewing, either way you may pick up useful do's and don'ts from ETO's guide, "Everything You Always Wanted To Know About (Comparing) Linears . . ."—It's yours free for the asking.

**ALPHA: Sure you can buy a cheaper linear . . . but is that *really* what you want?**



### ALPHA 374

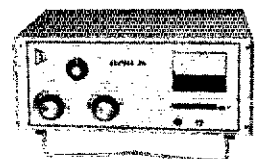
- No Tune Up, 80-10 meters!
  - 2+ KW PEP, 1 KW avg., *NTL*
  - RF output typically 1200+ watts PEP into 1.5:1 SWR
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New split band speech processor can boost your "talk power" 10db or more when conditions get rough. Very low distortion, easy to install and use with any rig.

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FMMC-1 Microphone with Built-in Touch Tone Pad.

- LED indicator
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- only 3-3/4" x 2"

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- **FREQUENCY RANGE:** Receive and Transmit: 144.00 to 148.995 MHz, 5KHz steps (1000 channels) INCLUDING NEW BAND 144.5-145.5MHz + MARS-CAP.\*
- **LED DIGITAL READOUT.**
- **4 CHANNEL RAM SCANNER WITH IC MEMORY:** Program any 4 frequencies and reprogram at any time using the front panel controls-scan all or part of the memory-search for occupied (closed) channel or vacant (open) channels. Internal Ni-Cad included to retain memory (no diode matrix to wire or change).
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First in the world with an all solid state 2 meter FM transceiver.



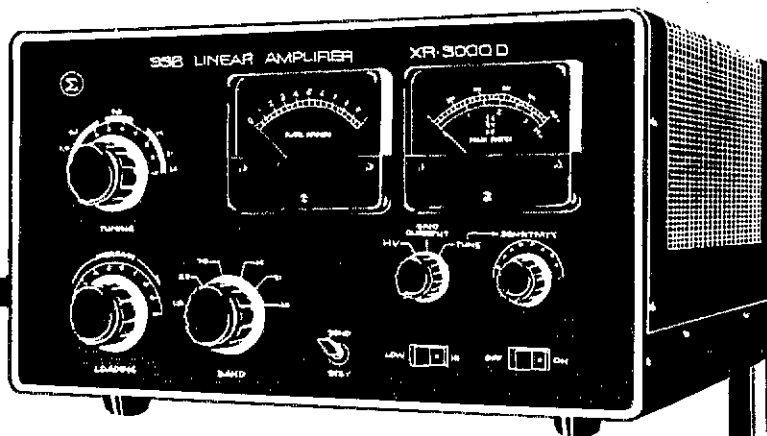
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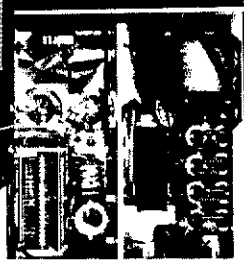
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- Full band coverage 160-10 meters including mars.
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- All major HV and other circuit components mounted on single G-10 glass plug in board. Have a service problem? (Very unlikely) Just unplug board and send to us.
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- Weight: 90 lbs. Size: 9 1/2" (h) x 16" (w) x 15 1/4" (d).

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**\$169**

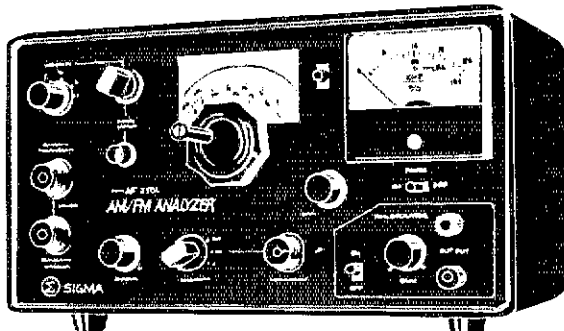
Fully Certifiable for Commercial Use

### Features:

Extremely stable local oscillator for easy measurement of HF, VHF, and UHF bands employing negative feedback to insure extremely high stability • Easy to read, accurate linear scale • Direct off the air signal measurement capability.

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Frequency: 1.8MHz-520MHz/3 range select (A, B, C, EXT), A range: 26.5 MHz-40MHz, B range: 48MHz-60MHz, C range: 140MHz-156MHz, EXT. range: 1.8MHz-520MHz (Need Signal Generator) • Generous overranges • Input level: (1) Through type input level: 1W-200W (RF Input Terminal) (2) Direct input level: More than 80db/50ohm impedance • Amplitude modulation degree: 0-100% • Frequency deviation: 0-20KHz • Accuracy: +/- 3% of full scale • Intermediate frequency: 10.7MHz • Local input frequency (EXT Range) • Measuring frequency +/- 10.7MHz • RF Attenuator: 0-60db variable • Audio signal oscillator: (1) Audio Frequency—1.000Hz (1 KHz), (2) Output level—More than 1V RMS • Power Source: AC117V • Dimensions: H-5 1/2" (140mm), W-10 1/4" (260mm), D-7 1/4" (184mm) • Weight: 7 lbs.

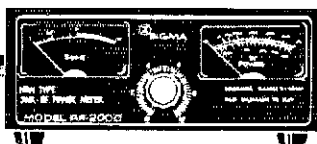


### SIGMA RF-2000 SWR & POWER METER



**\$29**

Introductory Price



Cal PWR Scales 200W-2000W Freq Range 3.5-150 MHz. Please do not confuse the RF2000 with similar appearing lower priced units. RF2000 is an individually calibrated professional quality instrument. Unequaled at many times the price. Size 7" (w) x 2 1/3" (d).

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FOR KENWOOD TR-7400A



14 Channel Programmable  
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FMSC-1 reg #169 — **\$99**  
7400 Scanner II Reg #189-#119

FMSC-1 Scanner for KDK FM 144 and 7400 Scanner II for Trio-Kenwood TR-7400A. • Full scan 146 and 147 MHz consecutively or 1 MHz, or any MHz range • Scan rate: 1 MHz/2 seconds (adjustable) • Controls: Scan/Hold, Latch/Delay, 600 KHz offset (off, up, down), program 1 MHz • Simple installation.



### SPECIAL SALE FM 144 Accessories

- FMTP-1 Touch Tone Pad ..... \$59
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- SC-12A Audible Tone Encoder Decoder \$85
- FMSC-1 Scanner-Random Any Range. \$99
- MARS-CAP Option Kit - Any Frequency, Any Split ..... \$12
- FMOF-1 Offset Option Kit - 2 Extra Positions, Crystals Required .. \$10

- FMOF-2 1 MHz Offset Option Kit (No Crystals to Buy) ..... \$10
- FMTF-1 Sub Audible Tone (100 Hz-Adjustable 67-203 Hz) ..... \$15
- Owners Manual (Extra) ..... \$5
- FM 2015R Accessories:
- FMPS-4R Regulated AC PS ..... \$49
- FMMC-1 Microphone with Built-in Touch Tone Pad ..... \$49
- MARS-CAP\* Option Kit - Any Frequency, Any Split ..... \$6
- FMAT-1 1/2 Wave Portable Antenna for Hotel, Motel or Apartment .. \$7.95
- Extra DC Cord & Plug ..... \$3.50
- Service Manual ..... \$2.00
- Mounting Bracket (Extra) ..... \$6.00

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- P13644 Leather Case ..... \$12
- AT 19 Rubber Ant and Whip ..... \$10
- NT-cads ..... \$30

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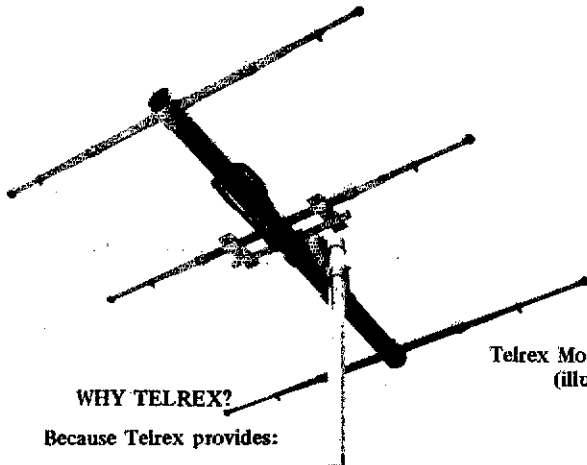
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### DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WB0HOX — SEC: W0SA.

Net	Freq.	Time/Day	QNI	QTC	Manager
MSN 1	3685	8:30 PM	225	118	WB0FOF
MSN 2	3689	10:15 PM	69	12	N0HY
MSPN N	3945	12:05 PM	691	108	WB0JYT
MSPN E	3925	5:45 PM	801	174	W0DUW
PAW	3925	9-12/1-5 PM	3808	109	WA0YVT
MSSN	3710	5:30 PM	167	40	K0CW
MWX	3925	6:15 PM	231	139	WB0PKG

The Minnesota Reps for Sept. Central Area net were WB0HOX W0RCQ W0RCK W0NO W0ONM W0EI W0OUH K0PIZ K0ZBI. K0EC has left MN for WY we will miss him but the bread and butter comes first. Hi, WB0LSI WB0FOF WB0HKU and WB0RIQ are the latest additions to the Extra Class, congratulations fellas. After being dormant for many years the Lake Region Club is on the move with their old call K0QIK and a new look. The MN section extends its heartfelt sympathy to Dr. Tom Peyla WB0GSZ and his children in the recent loss of his wife and their mother. Our sympathies also go out to the family of Roy Backstrom, WB0CHO. Traffic: WB0HOX 642, WB0PGZ 124, WB0ZAL 109, WA0VAS 93, WB0LSI 90, N0HY 71, WA0YVT 55, K0CW 60, WA0TFC 59, W0DUW 54, WB0PKG 82, WB0UIP 46, WB0FOF 42, K0JTW 37, K0PIZ 34, WA0QIT 32, W0NZZ 32, W0HZU 18, W0YC 17, K0CSE 15, N0JP 15, K0ZBI 15, WB0WJG 14, WA0CCA 13, WB0WXL 13, W0PNE 12, W0OPX 10, K0FLT 8, WB0OUH 7, WB0JUL 5, WA0TGM 5.

NORTH DAKOTA: SCM, Mark J. Worcester, WA0WLP — W0YRD is working for Area Chapter of QCWA for hams licensed 25 years or more. New hams at G. F. W0ECB and W0BFS. W0CUI and husband W0CUJ saw addition of a YL harmonic on the 17th of Sept. WA0UNA also received a YL harmonic on Oct. 1st. New ham at Minot W0DEP. All clubs reporting activities in Ham and Novice Classes. W0CZP has 21 States confirmed in 3 months. Nov. 1st the YL With. Net will be on at 7:30 AM CST and The DA TA Net will be on at 1700 and 1800 CST. W0RHX WB0GPW K0YST and WA0WLP playing with RTTY in Bis. on 2 mtrs. Hope to be on the H.F. bands in the future. Minot, G. F., and Bis. Clubs having "rabbit hunts" before club meetings: W0EHC won the G. F. Hunt, WA0IAT won the Minot hunt and W0EHC won the Bis. hunt. Net Reports: Net, kHz, CDT/Days, Sess., QNI, QTC, Mgr. DATA, 3996.5, 1800 S-S, 30, 243, 69, WA0SUF, Goose River, 1990, 0900 Su, 4, 35, W0CDO. Traffic: WA0SUF 56, W0DM 8, W0CDO 2, WA0JPT 2.

SOUTH DAKOTA: SCM, Ed Gray, W0SD — WB0GT Bob Reynolds, Box 288, Martin, SD 57551 is updating the SD Callbook last done by W0NEO and WA0PNB. New hams or those who have new addresses or would like a new write up should give this information to Bob right away. WA0ARZ is a new QTH west of Yankton and is building his antenna system. If interested in a slow speed CW Net contact WA0TNM. New two letter calls are K0PH formerly WB0PHW; K0GZZ now K0GZ; K0CXK now K0CX; WB0JHD now K0HF. New Novices are W0EY and W0EDS. Net reports: SDN CW, 108 QNI and 96 QTC; N0Q 671 QNI and 19 QTC; Morning net 614 QNI and 39 QTC; Evening net 1240 QNI and 60 QTC. Traffic: WA0VRE 103, WA0TNM 78, W0HOJ 54, WB0EVQ 47, W0MZI 15, W0SMV 2.

### DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC: WA5NVV. PAMs: W5POH WA5ZWZ K5MEA. RM: W5MYZ. Nets, kHz Times/Day QNI QTC Mgr. ARN, 3995 0030/Dy 824, 51, K5MEA. OZK, 3760, 0100/Dy, 200, 39, W5MYZ. APN, 3937, 1200/M-S, 752, 36, W5POH. M-Bird, 3928, 2230/M-F, 573, 10, WA5ZWZ. W5ASD of Ozark ARC has another Novice class going. N. Ark. AR Soc. officers are W5DQJ, pres.; W5ZPH, vice-pres.; W5SMS, secy/treas. Welcome to new amateurs in AR W5S EZL FAA FAK FBV FBX FBZ FCG FCD FCH FFJ FFT FGO FHU FIQ FLT FNJ FOH FOB FUN FUO FVC FVF FVT FWT FXL FXX FYI FYL. Saline Co. RC Net on 28.7 MHz Mon. 0230. The Fayetteville Public School Adult Education Program is running Novice Class Thur. from 7 to 9 PM. Radio Clubs Secy., send dope on your officers to ur SCM. PSHR: WA5HNN 47, W5POH 40, Traffic: WA5HNN 173, K5MEA 46, W5UAU 26, W5SGWU 21, W5POH 17, K5DW 12, W5GQH 3.

LOUISIANA: SCM, R. P. Schmidt, W5GHP — Asst. SCM: John Meyer, NSJM. SEC: W5CIC. RM: N5YL. PAM: W5NEZ. VHF PAM: W5VXB. Congrats to the Jefferson and VHF clubs and all others who assisted the division convention in New Orleans. Over 1450 people registered. At the convention Delta Div. Dir. WA5WHN announced that past dir. W5LDH will be organizing an old time Radio museum in the New Orleans area. WA5IBT upgraded to Extra, while his XYL W5DCMA, passed her General. Both are active on LTN LSN and LAN. New Novice classes began in Lafayette on Oct. 11. W5CIZ now N5DP. SEC W5CIC has had to resign due to work load. WA5IGU RN5 Net Mgr. back on the air. Asst. Dir. John now NSJM and very active on 2 mtr SSB with stacked QUADI. WA5AWF now K5WF. Delta DX Club had very successful DX Forum at the Gulf Coast Hamfest in Biloxi, MS. WB5LBR scored 16,800 points in the last CD party contest.

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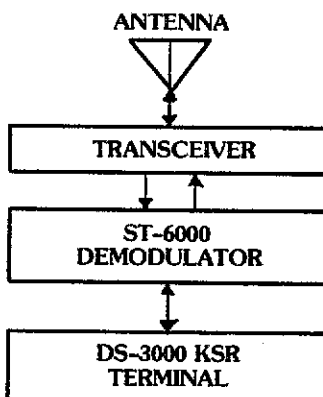


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- Autostart and antispace
- ATC and DTH
- KOS for keyboard break-in
- Scope or meter tuning indicator
- AM or FM limiter modes
- Table or rack mounting
- I/O interface to current loop, RS-232, MIL-188, and CMOS



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- MORSE also output as ASCII or BAUDOT
- I/O interface to current loop or RS-232
- New streamlined 12 inch display
- On-screen indicators of WORD & PAGE modes

ST-6000M (Meter) ..... \$495.00  
 ST-6000S (Scope)..... \$595.00

DS-3000 KSR V3 ..... \$1575.00  
 DS-3000 KSR V2 (NO MORSE) . \$1195.00

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AMECO	SC-6 6m conv	69	HP-23 AC supply	45
PV-144 2m preamp	CPS-1 Conv ps	12	HP-23A AC supply	49
PCLP Preamp/ps	TR-3 Xcvr	299	HP-23B AC supply	54
PS-1 AC supply	RV-3 Remote VFO	59	SB-104 Xcvr	599
AMPLIDYNE	TR-4 Xcvr	389	HP-1144 AC ps	79
621 VHF transmitter	TR-4/blanker	439	SB-604 Speaker	29
ATLAS	TR-6/NB 6m Xcvr	589	SB-230 Linear	349
210X 80-10m Xcvr	DC-3 DC supply	75	SB-640 External LMD	99
220-CS/VOX AC ps	DC-4 DC supply	85	HWA-17-T DC supply	15
200-PS Portable supply	WV-4 VHF wattmeter	59	HW-202 2m FM Xcvr	119
DD-6 Dig display	MC-4 Mobile console	49	HW-202L 2m HT/TTP	189
DMK Mobile mount	ML-2 2m FM Xcvr	119	HA-202 2m FM amp	49
B & W	TR-22 2m FM Xcvr	139	HY-GAIN	
361 Codax keyer	TR-22C 2m FM Xcvr	149	R-1530 SW Rcvr	\$895
BIRD	TR-33C 2m FM Xcvr	169	ITC	
4352 VHF Ham-Mate	AC-10 AC supply	39	Multi-2000 2m Xcvr	\$349
43 Wattmeter	AA-10 2m 10w amp	39	ICOM	
BRIMSTONE	AA-22 2m amp/preamp	99	IC-230 2m synth Xcvr	\$249
144 2m FM Xcvr	DYCOMM		TT-230 TT handset	69
CLEGG/SQUIRES-SANDERS	500E 2m FM amp	\$ 39	IC-211 2m FM Xcvr	549
22'er 2m AM Xcvr	500D 2m FM amp	49	IC-215 2m FM Xcvr	159
66'er 6m AM Xcvr	EICO		IC-21A 2m FM Xcvr	175
99'er 6m AM Xcvr	753 80-20m Xcvr	\$129	DV-21 Digital VFO	150
19'er 6m Xmt'r (RF)	751 AC supply	49	IC-225 2m FM Xcvr	189
417 AC supply/mod	GALAXY/GLOBE/WRL		IC-502 6m SSB Xcvr	179
418 DC supply/mod	Galaxy V Xcvr	\$189	KW matchbox/SWR	\$109
Zeus VHF Xmt'r	Galaxy V Mk II Xcvr	229	6N2 VHF Xmt'r (as-is)	49
Interceptor VHF Rcvr	Galaxy V Mk III Xcvr	259	KDK	
Interceptor B VHF Rcvr	GT-550A Xcvr	299	FM-144-10SX 2m Xcvr	\$249
Alfbander HF tuner	AC-35 AC supply	69	Multi-2000 2m Xcvr	\$369
416 AC ps for Venus	AC-400 AC supply	75	Multi-2000A 2m Xcvr	450
22'er FM 2m FM Xcvr	DC-35 DC supply	65	Multi-11 2m FM Xcvr	199
FM-27B 2m FM Xcvr	G-1000 DC supply	89	VFO-711 VFO	99
COLLINS	GONSET		PA-2-128 2m FM amp	39
75S-1 Ham Rcvr	Comm HIB 6m AM Xcvr	\$ 69	PA-10-70B 2m FM amp	99
75S-3 Ham Rcvr	GC-105 2m AM Xcvr	79	PA-10-140B 2m FM amp	139
75S-3B Ham Rcvr	G-50 6m AM Xcvr	119	Echo II 2m SSB Xcvr	229
75S-3C Rcvr (round)	910A 6m SSB Xcvr	189	TS-820S Dig Xcvr	\$849
75S-3C Rcvr (round)	911A AC supply	39	TS-520 Xcvr	499
75S-1 Transmitter	GSB-201 Mk 3 Linear	275	DFD-C Dig display	119
32S-3 Transmitter	HAL		TS-700A 2m Xcvr	450
32S-3 Xmt'r (round)	ST-6000 Demod/keyer	\$349	TR-2200A 2m FM Xcvr	189
312B-4 Station control	RVD-1002 Video disp	175	LAFALETTE	
Speaker for KWM-1	RVD-1005 Video disp	275	HF-90 VFO	\$ 34
KWM-2 Xcvr	HALLCRAFTERS		HA-350 Ham Rcvr	89
KWM-2/Waters rej tng	SX-111 Ham Rcvr	\$139	MIDLAND	
KWM-2/blanker	SX-130 SW Rcvr	139	13-500 2m FM Xcvr	\$109
KWM-2 Xcvr (round)	SX-133 SW Rcvr	195	MOSLEY	
KWM-2A Xcvr (round)	SX-146 Ham Rcvr	175	CM-1 Ham Rcvr	\$ 99
136B-2 Noise blanker	R-50 Speaker	15	NATIONAL	
351D-2 KWM-2 mount	H1-44 Transmitter	159	XCU-300 Xtal cal	\$ 15
516F-2 AC supply	SR-150 Xcvr	249	NCX-5 Xcvr	279
516E-1 KWM-1 DC PS	PS-150-120 AC ps	75	NCXA AC supply	69
MP-1 DC supply	PS-150-12 DC ps	49	NCXD DC supply	75
CC-2 Carrying case	MR-150 Rack mt	15	200 Xcvr	199
COMCRAFT	HA-1 Keyer	59	VFO-62 6, 2m VFO	34
CST-50 VHF FM Xcvr	HAMMARLUND		NYE	
CPS-6 AC supply	HQ-110 Ham Rcvr	\$109	275w matchbox/SWR	\$109
CTB-5 Tone burst	HQ-145X SW Rcvr	179	P & H	
COMTECH	HQ-170 Ham Rcvr	139	AFC-2 Compressor	\$ 19
Magnum 6 For Heath	HQ-180 SW Rcvr	249	PALOMAR ENG	
DATA SIGNAL	HQ-180A SW Rcvr	349	Freq modulator	\$ 15
Mighty MOS Keyer	HEATHKIT		PEARCE SIMPSON	
DENTRON	HR-1680 Ham Rcvr	\$189	Gladding 25.7ps	\$ 99
160-A1 160m w/atcher	SB-300 Ham Rcvr	199	REGENCY	
2 Wattmeter	SB-301 Ham Rcvr	229	HR-2 2m FM Xcvr	\$109
160-XV 160m Xvtr	SB-303 Ham Rcvr	269	HR-2A 2m FM Xcvr	119
DRAKE	HR-10-1 Xtal cal	9	HR-2B 2m FM Xcvr	149
2B Ham Rcvr	DX-60B Transmitter	69	HR-2C 2m FM Xcvr	149
2C Ham Rcvr	HX-30 6m Xmt'r	149	HR-312 2m FM Xcvr	179
R-4 Ham Rcvr	SB-401 Transmitter	249	HR-2S 2m FM Xcvr, ac	149
R-4B Ham Rcvr	HW-12 75m Xcvr	75	AR-2 2m FM amp	79
R-4C Ham Rcvr	HW-22 40m Xcvr	75	P-109 AC supply	29
FL-1500 1.5 KHz filt	HW-22A 40m Xcvr	85	P-110 AC supply	34
FL-4000 4 KHz filter	HW-32 20m Xcvr	75	HRT-2 DLX 2m FM HT	149
FL-6000 6 KHz filter	HW-32A 20m Xcvr	85	ROBOT	
MS-4 Speaker	SB-100 Xcvr	299	60 Viewfinder	\$149
SW-4 SWL Rcvr	SB-101 Xcvr	329	61 Viewfinder	199
SSR-1 SW Rcvr	SB-110A 6m Xcvr	295		
SPR-4 SW Rcvr	HP-13 DC supply	45		
DSR-1 SW Rcvr	HP-13A DC supply	49		
MSR-2 Marine Rcvr	HP-13B DC supply	54		

SBE	SB1-VOX VOX for 33	\$ 15	500CX/SS-16B	439	244 Dig display	139
SB-34 80-15m Xcvr	239	700CX Xcvr	459	200 VFO	49	
AC ps for SB-36	75	512 DC supply	59	210 AC supply	24	
SB2-MIC Microphone	9	117X AC supply/spkr	95	KR-20A Keyer	49	
SB-144 2m FM Xcvr	129	14C DC module	49	KR-2A Paddle	9	
SINGER		117X Basic AC ps	59	VHF ENGINEERING		
PR-1 Panadaptor	\$ 69	600T Transmitter	349	HT-144B 2m FM HT	\$ 89	
SPECTRONICS		600R Custom/SS-16B	399	PS-24C AC supply	75	
DD-1 Dig display	\$119	250 6m Xcvr	199	VARIATIONS		
STANDARD		250C 6m Xcvr	299	HT-2 2m FM HT	\$ 79	
826M 2m FM Xcvr	\$119	210 Remote VFO	75	IC-3P AC supply	39	
Horizon II 2m FM	149	NS-1 Noise silencer	24	WILSON		
14U 2m FM Xcvr	249	FM-1210A 2m FM, ps	139	1402 2m HT/charger	\$169	
146A 2m FM HT	189	SYMTEK		YAESU		
SWAN		Saba/5-3T Preamp	\$ 29	FTDX-400 Xcvr	369	
SW-12A DC supply	\$ 29	TPL		FTDX-560 Xcvr	399	
TCU Control unit	49	502B 2m FM amp	\$ 99	200S Xcvr	299	
SW-12 DC supply	29	1202C 2m FM amp	149	200S AC ps	75	
400 Xcvr/410 VFO	199	3A13AD AC supply	29	FT-101B Xcvr	499	
406 VFO	49	TEMPO		FT-301D Dig Xcvr	735	
412 DC supply	39	AC/One AC supply	\$ 75	FP-301 AC supply	99	
M8-80A 80m Xcvr	199	DC-1A DC supply	69	FP-301D AC ps/clock	149	
P-1215A AC supply	49	VHF-1 2m FM Xcvr	249	FL-110 Amplifier	129	
SS-200 Xcvr	349	FMP 2m FM Xcvr	79	SP-401 Speaker	15	
SS-200/SS-16B	399	TEN TEC		YO-100 Scope	149	
270 Cygnat Xcvr	299	Triton II Xcvr	\$375	YP-150 Dummy/watt	49	
270B/SS-16B	349	252 AC supply	75	FRDX-400 Ham Rcvr	249	
14A DC converter	39	Triton IV Xcvr	499	FR-101S Ham Rcvr	359	
350 Xcvr	259	262G AC supply	99	FR-101 Dig Rcvr	459	
500 Xcvr	299	207 Ammeter	7	FL-101 Transmitter	425	
500C Xcvr	339	240 160m conv	95	20DR 2m FM Xcvr	199	
		242 External VFO	119			

(1) This list was prepared from an inventory taken on the date shown above. The quantities vary. In some cases there are several of one item, others, maybe only one. Due to the lead and distribution time of this publication some of the items may have already been sold by the time you see this ad. On the other hand, due to the number of trades we are involved in each day, some items are in stock that are not listed. When ordering state more than one choice, if possible. (2) AES reserves the right to sell matching power supplies and accessories only with matching transmitters or transceivers, depending on our stock situation. (3) To insure quality, our used gear is serviced and made ready for shipment after we receive your order. Please allow 5 to 10 working days delay in shipping your order.

The following are NEW Close-outs, Overstock merchandise, New displays, Demos, etc. Most are factory-sealed, all carry New warranties. Limited quantity. First come, first served. Most Close-outs available at Milwaukee only. Terms of sale: Payment in full with order, Mastercharge, or BankAmericard (Visa); no trades.

ATLAS	reg. NOW	KLM	reg. NOW
DD-6B Digital display	\$229 179	Multi-2700 2m Xcvr	\$756 599
BIRD	reg. NOW	KENWOOD	reg. NOW
4350 2kw Ham Mate	\$ 94 69	TR-7200A 2m FM Xcvr	\$229 189
4351 1kw w/ Mate	94 69	CC-29A to CC-29 mod kit	5
4352 VHF Ham Mate	94 69	TS-700A 2m Xcvr	599 499
BRIMSTONE	reg. NOW	MIDLAND	reg. NOW
144 2m FM Xcvr	\$650 375	13-500 2m FM Xcvr	\$169 139
Tone dial option	39 19	13-505 2m FM Xcvr	229 199
Touch-tone interface	28 14	13-509 220 MHz FM Xcvr	149 145
100 Hz PL option	39 19	MOTOROLA	reg. NOW
130 Hz PL option	39 19	1-1670A AC supply	\$150 99
CLEGG	reg. NOW	NEWTRONICS	reg. NOW
FM-DX 2m synth Xcvr	\$599 450	48VT 40-10m vertical ant	\$ 99 79
22'er Rcvr xtal adapt	5	NYE	reg. NOW
COLLINS	reg. NOW	250-25-2 500w matchbox	\$179 99
75S-3C Receiver	2504 1995	250-25-3 With relay, SWR	212 150
32S-3A Transmitter	2957 2495	250-30-2 1kw matchbox	304 199
516F-2 AC supply	440 375	250-30-3 1kw w/relay, SWR	355 255
312B-4 Station console	546 346	PRA	reg. NOW
COMDEL	reg. NOW	10/80 10w/80w 2m FM amp	\$93 49
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L-4B 80-10m linear	\$995 799	HR-22S 220 MHz FM Xcvr	239 179
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FL-5306 6 KHz filter	80 70	Triton II 80-10m Xcvr	669 539
RPA-1530 Rack adaptor	170 70	STANDARD	reg. NOW
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ICOM	reg. NOW	117X AC supply/spkr	159 129
IC-230 Synthesized 2m FM	\$489 299	117X Basic AC supply	114 85
IC-21 VFO Receive VFO	119 79	14XP DC module, pos gnd	70 49
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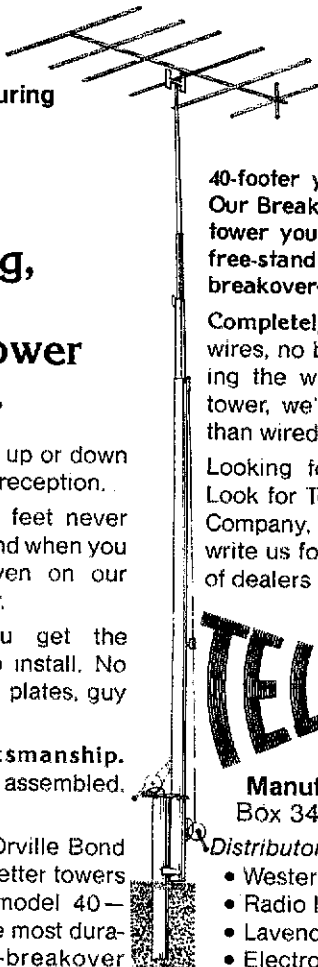
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Net Freq Time/Days QTC QNI Mgr.  
LAN 3615 7&10PM Dy 315 527 N5YL  
LTN 3910 6:30PM Dy 195 584 WB5NEZ  
LSN 3703 8:30PM M-F 24 86 WB5OQM  
LRN 3587.5 6:30PM Su 12 14 N5RB  
Traffic: (Sept.) N5TS 266, N5YL 263, W5GHP 253, K5MC  
221, WB5NEZ 214, N5RB 153, K5TTC 141, WB5OQM 99,  
WA5ICU 83, N5ES 80, WB5LBR 79, WA5IBT 55, WB5CIZ  
27, W5YN 18, K5BLV 6, WD5CMA 6, WB5IKT 3. (July  
N5YL 501.

MISSISSIPPI: SCM, E. Ed Robinson, W5YTN — SEC:  
WB5FXA. MSBN picnic held at Johnson State Park, Hat-  
tiesburg, Sun., Sept. 18 and good turnout as well as  
good prizes. New Orleans Hamfest enjoyed by many MS  
Hams and had good meeting with other Delta Division  
reps. MSBN check-ins nicely, need more check-ins on  
MTN and MSN. K5OWK reports CGCHN activated by  
hurricane Anita by K5OWK K5CWB WB5LW WA5LZB  
WD5CWB with 323 check-ins; also activity by hurricane  
Babe with K5OWK WD5BDC WA5LZB WB5LW  
WB5LSK. W5RN ex-W5SSB back on the air. N5XA set-  
ting up for Oscar, has joined AMSAT. Need more check-  
ins on DRN5-7200 KHz at 2030Z. WB5VFS has new FT101  
EE on air as mobile and emergency rig. WB5TZN reports  
plans for new repeater at Aberdeen on 147.8727, MSBN  
certificates being awarded and MTN, MSN certs also  
available. DRN5, W5KLV, Sess. 20 QTC, 262 MS rep. 30  
percent by W5QDC W5VKR, W5YXV, W5RUB WB5NGG &  
K5MK. CGCHN, K5OWK, QNI 2826, QTC 213. MSBN,  
WB5SNB, QNI 1588, QTC 96. MS-Lou Weather Net,  
K5VXY, QNI 109, QTC 3. Shannon ARN, WB5TZN, QNI  
21. Traffic: WA5OKI 84, K5MK 61, K5CAF 42, W5WZ 42,  
WB5SNB 34, W5YTN 20, W5LSG 19, W5RUB 12, K5VXY  
11, WB5NGF 6, W5BW 5, WB5VFS 5, N5XA 5, W5LL 4.

TENNESSEE: SCM, O. D. Keaton, WA4GLS — SEC:  
WB4DYJ. PAM: WB4PRF. RM: WB4DJU. Net reports:  
Net, Freq., Time/Days, Sess., QNI, QTC, Mgr. TPN,  
3.980, 1140 M.F., 1245 M-F, 2330 M-S, 1300 SuSu, 1400 M,  
82, 4003, 381, WA4EWW, WA4PP, WB4YPO, WB4WHE,  
TN, 3.635, 0000 Dy, 28, 185, 83, K4YFC, TNN, 3.710, 2330  
Th, 9, 45, 29, WA4CTV, ETVHFN, 30.4, 0200 MWF, 14,  
116, 1 WA4WZJ, ETVHFN, 145.2, 0200 TTh, 9, 47, 0,  
WB4DZG, MTIMN, 28.8, 0200 TTh, 7, 50, 0, WA4EY,  
WTVHFN 146.37, 146.97, 2330 Dy, 31, 996, 508, WA4VXX,  
TCDARCN 146.16, 146.76, 0200 W, 5, 283, 0, WA4ROC,  
WMARCN, 146.07, 146.67, 0100 MWF, 5, 85, 0, W4TZG.  
The ARRL Delta Division Convention in New Orleans, LA  
was a success. Sure was good to meet many of the  
neighbors; especially, Phil Spencer, former Dir. Delta  
Division; Bill Nixon, former SEC LA; Bob Schmidt, SCM  
LA; WB5NEZ, PAM LA; N5YL RM LA; Sid Pokorny, SCM  
AR; Ed Robinson, SCM MS, Max Arnold, Dir. Delta Divi-  
sion; Milo Ward, SEC TN; WB5CQJ, SEC LA. Clubs are  
getting well under way with their fall training classes,  
check with your local club officers and offer any support  
you can. May I remind you again to get your monthly  
reports to me early. Now that all hamfests are over for  
this year get on the air with us on one or more of the  
nets, will be a good way to keep in touch. Traffic: K4CNY  
287, WA4CNY 180, K4XE 94, WB4BKF 79, WB4ZSZ 76,  
WA4DKC 75, K4JSF 50, WB4DJU 46, K4WWQ 46,  
WA4GLS 41, K4YFC 41, W4ITZG 29, WB4YPO 28,  
WB4GZF 25, WA4BGH 24, WB4GBI 22, W4ZJY 20,  
WB4KSO 19, W4RUW 18, WB4HOI 17, WB4AYM 13,  
K4FSK 10, WA4VWV 9, WA4GZZ 8, K4XU 3, WB4BDL 1.

**GREAT LAKES DIVISION**

KENTUCKY: SCM, Ted H. Huddle, W4CID — SEC:  
WB4ZML.

Net	QNI	QTC	NET	QNI	QTC
KRN	224	31	KYN	148	46
MKPN	825	56	KNTN	379	157
KTN	1018	105	KPON	64	3
6DAREC	72	8			

Congrats to K4TXJ on 5BWAS. KYN RM WA4IGS is still  
looking for NCS's and KSN activity. If you're not familiar  
with net procedures, drop Bob or myself a line and we'll  
send you one of the CW net procedure booklets. KRC's  
Louisville Hamfest was well attended and all indoors!  
KRC has great plans for this event as it should develop  
into a major event not just for KY but the midwest. The  
Lexington Club has a successful demo in a local shop-  
ping mall. PAM WA4AVV is back after a hospital stint  
with a broken leg. Pappy tangled with his mobile rig the  
wrong way. WA4RIT has QSY'd back to Ashland to  
establish the eastern division of the Owensboro Club.  
Traffic: W4BAZ 124, K4HRF 67, K4TXJ 52, N4GD 50,  
W4CID 44, WA4ZMK 42, K4MNF 33, WBANPD 31,  
WA4JAV 30, WB4ZML 24, WA4FAF 17, WA4EAG 12,  
WA4AGH 11, WB4EQK 8, W4AANY 7.

MICHIGAN: SCM, A. L. Baker, W8TZZ — Asst. SCM:  
W8MPD. SEC: W8EFK. RMs: W8JYA, W8BNGD. PAMs:  
K8LNE W8SOP. VHF PAM: W8WVV.

Net	Freq	Time/Days	QNI	QTC	Sess.
MACS	3953	1600 Dy	912	334	34
QMN	3683	23/0200 Dy	630	209	58
W5SSB	3935	0001 Dy	1048	179	30
GLETN	3930	0130 Dy	776	73	30
UPEN	3922	2230 Dy	829	62	34
BRMEN	3930	2230 Dy	637	55	30

VHF  
PAM  
report  
284 7 16  
Election results: Big Rapids Area ARC, W8BMOD, pres.;  
W8LDOU, vice-pres.; W8KBD, secy-treas. Hazel Park  
ARC, WA8UJP, pres.; WA8UQP, vice-pres.; W8BXM,  
secy.; W8BIEJ, treas. Recent appointees: ECs: K8BTH  
W8BKBZ W8BJYT. OPS: WA8VDC. OVS: W8DJV.  
Sawyer ARC reports their 2282 repeater is back on the  
air. New licensees: Novices: W8BSAE, W8Bs ENV IAH  
IAL IAI IAK KCP KXF KXG LYG MGD MGE MGG MGH  
MGI MGJ MGK MGO NKC NZL OEP and OJL. Tech.  
W8Bs BVM IAG IAJ IAE JGI KBG MGF MOD. Generals.  
W8BQBQ WA8HOC, W8Bs IUE ULF CZU. Advanced.

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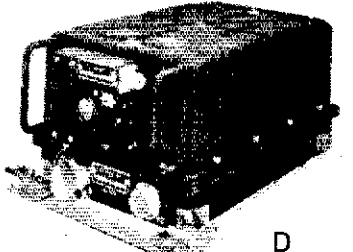
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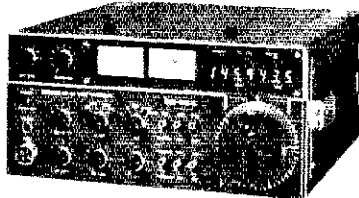
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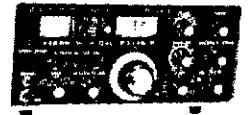
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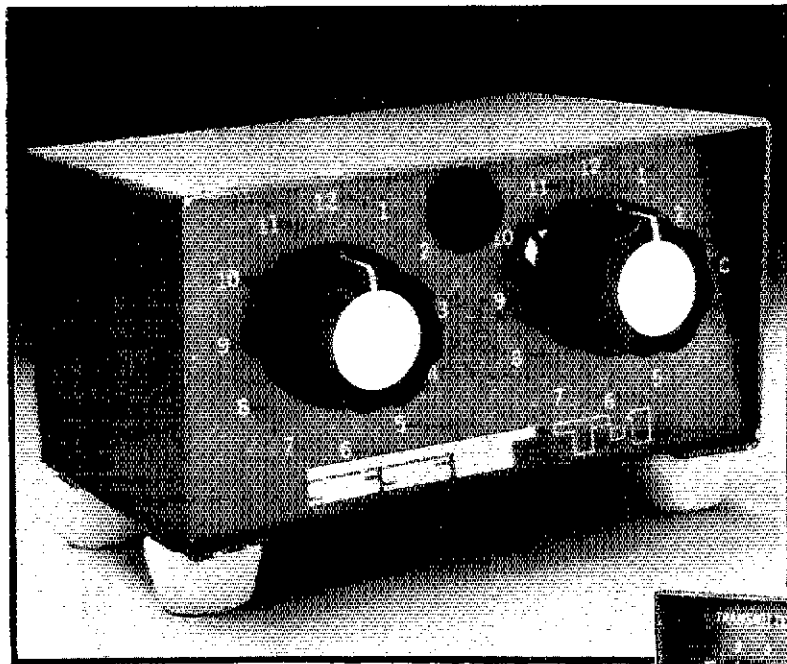
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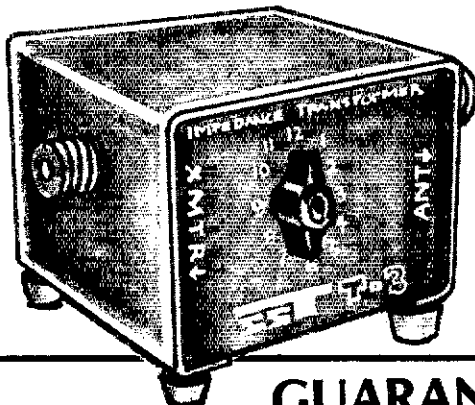
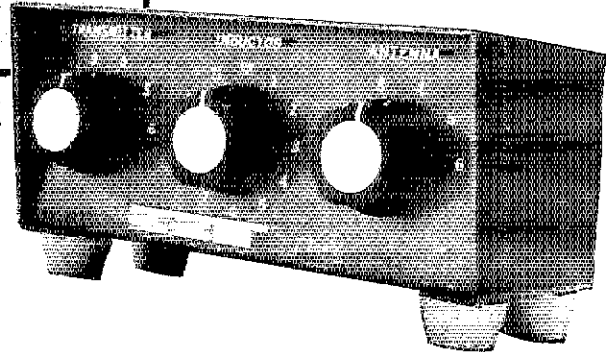
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**Model FM-28** Check these outstanding features: Fully-synthesized from 144 to 148 MHz in 5 KHz steps. Bright six-digit frequency display. Supplied with simplex, plus 600 and minus 600 KHz offsets. Up to two additional "non-standard" offsets available. Clean 25 watt transmitter. 0.25 UV receiver with helical front end. Modular construction. All solid state. Complete with base station and mobile mounts, hardware, DC cable, microphone and manual. **Introductory priced at only \$359.95.**

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**Optional accessories:** Include base station, power supplies, tone encoders, antennas and solid state power amplifiers. Write or telephone today for detailed specifications.

**Count on Clegg superior service.** Clegg's well staffed, well equipped organization is always available to you. Whether you need free product literature, replacement parts, service or just information, make a free Walls-line call from anywhere in the USA (except Pennsylvania) at no cost. Just dial 1-800-233-0250. In Pennsylvania, call (717) 299-7221 collect.

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*'73 Bill Salerno*

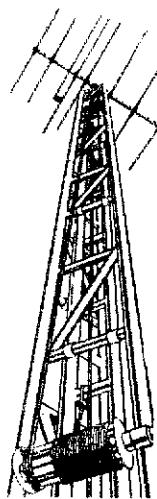
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**BILL SALERNO**  
(W2ONV)  
DIRECTOR

WB8TTA WD8BOH, Extra. WB8PRJ WB8UFU WD8DDV. Congratulations, Who's Who Dept. WD7DQV — K8KA, K8IBJ — K8IB, WA8WCZ — K8JM, WB8DCR — K8CC, WD8CUU — K8BZ, WB8MJL — W8KJ, WD8DQ — K8KA, WB8PRJ — K8DS. Regretfully I report W8LQ W8PPY and WB8JIP as Silent Keys. Traffic: (Sept.) WB8DKQ 507, WB8POL 158, W8YIQ 123, WB8YDZ 106, W7KQU8 102, K8LNE 100, W8VPW 97, W8JYA 95, K8DD 81, W8NOH 81, K8DYI 77, WA8DHB 71, WB8MTD 62, W8SOP 50, K8CN 42, WA8OIE 40, WD8JUV 38, K8ZJU 37, WB8ITT 29, K8AXL 27, W8TZZ 27, W8VIZ 27, WA8WZF 26, WB8JIX 25, W8PPD 25, W8IHX 24, WA8MAM 17, WA8QAF 16, K8BZL 15, K8JED 15, K8DTG 13, W8LDS 12, K8VA 12, WB8UJU 11, W8CUP 10, K8RNP 10, W8TBP 10, WA8WVV 10, WB8YIG 10, W8IUC 9, WB8SYA 8, K8FE 7, WA8FXR 7, K8GXV 7, K8TAK 7, K8BCV 6, W8HKL 5, W8SCW 5, W8SDB 5, WA8TBL 4, WB8VPM 4, W8JUP 3, W8RNQ 3, WB8VOM 3, W8JLD 2, WB8KJ 2, W8LOU 2, WB8GKB 1, W8TXM 1, W8WVL 1. (Aug.) WB8POL 169, W8SS 11, WB8VOM 8, W8BEZ 6, K8GXV 6, W8WGF 6.

OHIO: SCM, Hank Greeb, W8CHT/N8XX — Net Reports (Sept.)

Net	Freq.	Time(Z)	Sess	QNI	QTC
OSN	3.577	2310	30	207	79
BN	3.577	2345/0300	58	397	221
BNR	3.605	2300	28	94	97
ONN	3.708	2330	28	126	44
OSSBN	3.9725	1530/2100/2345	90	2236	680

06mN 50.16 0200 30 312 34  
Concise, specific reports of tornado relief in SW Ohio were received from WD8ALH and K8CO. Participants in the effort include WD8APL WD8BOY WB8BZD WA8CKB WA8DFD WA8EIF W8HOK WA8GFF WB8IPV WB8LXJ W4PII WB4QIT W8SMC WB8VNL WB8WQO WB8WQU and other members of SW Ohio ARES and QCEN. W8JKB is General secy. for QRP ARC. Central OH ARES provided communications for Sunrise Road Rally. Triple States FC manned W8WPO/8 at the Belmont County Fair. W8IQ informs me that Burning River Traffic Net (Cleveland) elected WD8IYO, Mgr.; WB8OZA, Training Mgr.; WB8UDA, Emergency Prep. Mgr. Newly affiliated clubs include Adams-Brown County ARES; Crea Amateur RC (Columbus); and Triple States ARC. Lake Erie ARA (Cleveland) provided communication for the American Heart Assn.'s Heart-a-Thon. WD8DIP is new trafficcker from St. Clairsville. Williams Co. ARES provided communications for a canoe race. W8FY was active at the Van Wert County Fair. WD8BUO has a new TR-4CW. BPLs by W8FY & W8WPO/8. Do you want your individual or group activity reported in this column? Then send the info in, before the 7th of the month following the activity. Traffic: W8PMJ 378, WA8MCR 268, WB8KWD 256, WB8WTS 182, WB8KKI 164, W8LTA 160, WB8YVI 150, W8FY 131, WB8JGV 125, WB8WPO/8 118, WA8HGH 102, WA8ZNC 101, K8BYR 82, W8BKDR 81, N8CW 78, W8IQ 74, WB8VLR 73, WB8PIY 70, K8AN 68, W8QZK 66, WB8CJU 57, WB8YBJ 54, K8LXA 53, WB8MHL 52, WB8OMO 49, W8CXM 48, W8FN 46, W8GGX 46, K8DL 45, N8TM 45, WA8SSI 43, WA8WVW 42, W8TP 39, WB8TRK 38, WD8AVY 36, WB8MZZ 33, W8TH 33, W8IM 28, K8JE 27, W8LZE 27, WB8UQ 25, WA8VWH 25, W8FU 23, N8XX 22, WB8BGX 21, WD8BZD 21, WD8COS 21, WB8GGR 21, WD8LIU 21, WA8RQ 16, WD8MGP 14, WB8UJM 14, W8BHL 13, W8OE 13, W8RTSX 13, W8RG 11, W8CUC 10, WB8SIQ 10, N8JR 8, K8MR 8, WA8BOV 6, K8ONA 6, W8OUU 6, K8LT 5, N8AA 4, WD8CTX 4, WD8DIP 4, WD8DMO 3, WB8TCZ 3, WA8VEC 2, W8WEG 2, W8DYF 1.

## HUDSON DIVISION

EASTERN NEW YORK: SCM, Guy L. Olinger, K2AV — SEC: WB2VUK. Asst. SEC: K2YQ. PAMS: WB2QEI N2YL RMs: W2CS K2OYG WB2IXW. Net Reports: Net, Freq., Time(EDT). NY Public Operations, 3913, 5 PM. Empire Slow Speed (ESS), 3590, 6 PM. NY State Phone Tfc & Em, 3925, 6 PM. NY State CW (NYS), 3677, 7 PM & 10 PM. WB2RGL not in at CalTech in Pasadena. NYS going to miss that regular Rockland outlet. Good luck in the books. John. New ORS: N2JK N2EF. N2EF a reg on NYS. N2JK NTSer from late 50s returning to active duty. Welcome guys. Congrats to new grads from S. Orangetown ARC radio course WB2QZE WA2RJO. Thank info WA2WFH. WA2EQO reports local net swearing off using telephone. Bet old folks like that. Congrats to K2DW making OO-1. Both W2DW & K2DW OO ENY for plenty CD party confusion. W2CS N2YL WA2YYM on 160 with TS520S boxes. W2CS sez has 260-ft wire to load on 160. OBS WB2COY has new f8B omni at 65-ft. Sympathies to WB2QOH who reports being wiped off air with work. Sept. PSHR: N2YL W2CS W2YJR K2AV. Traffic: (Sept.) W2YJR 288, N2YL 235, W2CS 110, K2AV 80, WB2TGL 57, W2ACQ 53, N2EF 39, WA2EQW 32, WA2YYM 28, WA2CJY 16, K2HNW 8, WA2PU 7, (Aug.) WA2PAU 29, N2EF 29, WA2EKW 12.

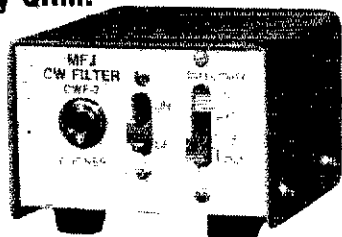
NEW YORK CITY—LONG ISLAND: SCM, John Smale, WB2CHY — SEC: K2HTX. PAM: WA2ECO. The following are traffic nets in and around the section.

Net	KHz	Time/Day	Manager
NLI*	3630	19/2200 Dy	WB2IDP
NLI ph*	3928	1730 Dy	WA2ECO
NLS*	3730	1800 Dy	WB2JAY
Clear house			
Mic	3925	1100 Dy	WB2AEK
Farad	3925	1300 M-S	W1DFT
Ess	3590	1800 Dy	K2UIR
NYS-			
TPEN	3925	1800 Dy	WA2RSP

\*Denotes section net, all times are local. Please try and QNI the nets, help is needed in all parts of the Section. At this time, on behalf of myself, the XYL and the 3 jr. ops, I would like to wish each and everyone Merry Christmas and Happy New Year. Now is the time to think about all that will be happening in '78, like getting

## This MFJ Super CW Filter . . .

gives you 80 Hz bandwidth, and extremely steep skirts with no ringing for razor sharp selectivity that lets you pull signals out of heavy QRM.



# \$29<sup>95</sup>

Can you imagine hearing ONE CW signal on the crowded Novice bands on a Sunday afternoon? That's what 80 Hz bandwidth, extremely steep skirts, and no ringing will do for you.

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Don't wait any longer to eliminate QRM on all bands. Order today.

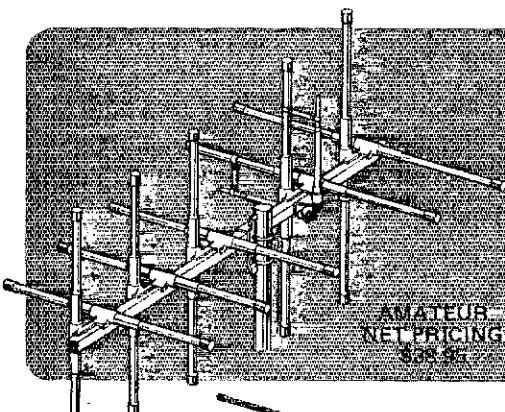
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# LOOK OUT The FINCO Stingers are here!



**FINCO** Is introducing its new Stinger Series Amateur Antennas.



## FINCO STINGER A 2+2

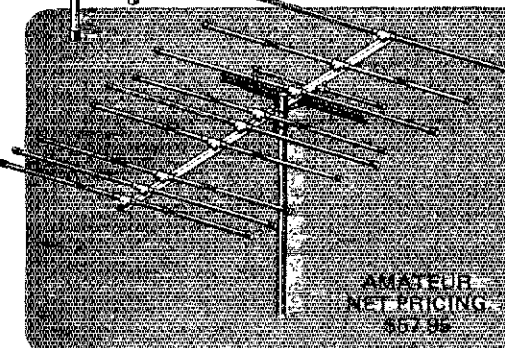
2 Meter

The model Stinger A 2+2 is a ten element, dual polarization 2-meter antenna designed for OSCAR communications or where switching from horizontal to vertical polarization is required. The A 2+2 can even be phased to operate on both horizontal and vertical polarization at the same time (circular polarization). This is not only ideal for OSCAR work but gives your station versatility for ground communications.

Wide, non-linear element spacing gives the A 2+2 superior gain. However, since it is a five element beam in one given plane, the half power beam width does not make satellite tracking difficult because of sharp directivity. The dual gamma match assemblies provide for a very low V.S.W.R., and will withstand 2,000 watts P.E.P.

The Stinger construction features make the A 2+2 extremely heavy duty. Provisions are made for mounting the antenna at the end of the boom — for azimuth control — or at the middle of the boom for normal applications.

AMATEUR NET PRICING \$38.95



## FINCO STINGER A62

6 & 2 Meter

The model Stinger A 62 is a truly remarkable combination 6 and 2-meter beam designed for optimum performance on both bands yet only requiring ONE transmission line. This is accomplished through the use of exclusive phasing elements to accomplish dual band operation with no sacrifice to either band — NO SWITCHING REQUIRED!

On 2-meters, the A 62 has 6 collinear elements — equivalent to three 172 V 6-Element Yagi stacked side by side — thus giving outstanding performance. Maximum forward gain is assured on 6-meters through the use of four solder spaced elements. The heavy duty Stinger construction is used throughout so that the antenna will withstand 100 mph plus wind loads.

The A 62 is ideal for mounting on the same mast as your tri-bander or other antenna thus easily opening up the world of 6 and 2-meter VHF communication.

AMATEUR NET PRICING \$57.95

### OTHER FINCO STINGER AMATEUR BEAMS AVAILABLE:

MODEL	AMATEUR BAND	ELEMENTS	BOOM LENGTH	AMATEUR NET PRICING	MODEL	AMATEUR BAND	ELEMENTS	BOOM LENGTH	AMATEUR NET PRICING
A10-4	10 Meter	4	16'	46.95	A2-5	2 Meter	5	5 1/2'	21.95
A6-3	6 Meter	3	6'	23.95	A2-10	2 Meter	10	10'	34.95
A6-5	6 Meter	5	13'	35.95	A1 1/2-10	1 1/2 Meter	10	8'	24.95

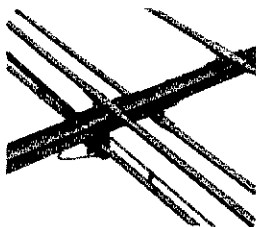
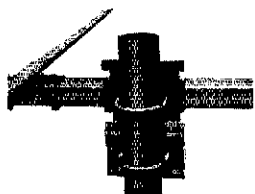
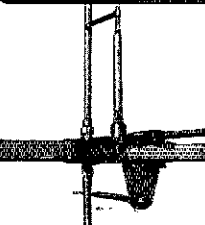
### ENGINEERING FEATURES:

All Stinger Series Amateur Antennas incorporate heavy duty fully adjustable gamma matching systems to allow for maximum power transfer. The design provides for minimum V.S.W.R. and a wide bandwidth. A built in SO-239 type connector assembly is utilized plus the matching systems are power rated at 2,000 watts P.E.P.

A 4" x 6" x full 1/8" thick heavy duty plated steel mast to boom mounting assembly is used on all Stinger Series of Amateur antennas. The bracket assembly locks permanently on the square boom and thus withstands high wind loads and torque without twisting or becoming misaligned. The assembly accepts mast diameters of up to 2" O.D. Provisions for mounting either in a vertical or horizontal plane is incorporated in several models.

Exclusive Stinger square boom construction is used on all amateur antennas. The 1 1/2" square booms are of .064 wall high tensile strength aluminum which is many times stronger than its round counterpart. Also, special bracket assemblies have been developed to allow instant element to boom alignment — plus they stay aligned in the highest wind and ice loads. All elements are of thick wall high tensile strength aircraft quality aluminum.

Antenna design engineering is a specialty at FINCO. Top quality lab standard test equipment is used throughout the development and design of all antennas. The FINCO antenna test range has been carefully checked for erroneous reflection characteristics that could cause errors in antenna designs. Shown is the sophisticated stub and matching system that has been developed for the Stinger A62, 6 and 2-meter dual band beam. No traps or coils to burn out or detune, thus assuring you of the highest possible performance on both 6 and 2-meters.



Write for Catalog No. 20-827, Department 36



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# NOW! INTRODUCING

## Programmable Morse Keyboard Morse Video Display

### The AKB-1 Programmable Keyboard

ALLOWS YOU TO  
TYPE, STORE, AND TRANSMIT  
PERFECT MORSE CODE

### The AVR-1 Decoder

CONVERTS MORSE CODE TO  
PLAIN TEXT FOR DISPLAY ON  
A VIDEO MONITOR



### AKB-1     \$299.00

**MICROPROCESSOR CONTROLLED** using a Motorola 6800 system.

**128 CHARACTER TEXT MEMORY** let you type at any speed while keyboard sends code at your desired speed.

**64 CHARACTER MESSAGE MEMORY** lets you store up to four often used messages and send desired message with a single command.

**MEMORY STATUS LIGHT** indicates when text memory is getting full.

**REPEAT COMMAND** allows selected segments of text to be repeated.

**ADJUSTABLE SPEED** from 5 to 75 words per minute.

**SIDETONE MONITOR** and speaker are built in. Internal speaker may be disabled.

**SOLID STATE KEYING** for grid block, cathode, and solid state transmitters. Simple two wire hookup.

**ATTRACTIVE HEAVY DUTY** aluminum enclosure, featuring a high reliability 63 key keyboard.

**SPECIAL CHARACTER KEYS** AR, AS, BK, BT, KN, SK, plus a full alphanumeric character set.

### AVR-1     \$349.00

**MICROPROCESSOR CONTROLLED DIGITAL PROCESSING** automatically interprets Morse code at variable speeds.

**UNIQUE SIGNAL ANALYSIS TECHNIQUE** permits copy of code with large variations in speed and weight. It will receive code sent by a straight key, bug, electronic keyer, and keyboard.

**FULLY AUTOMATIC** after initialization. No tuning is required. Unit has built-in narrow band filter and AGC for optimum signal conditioning.

**CALIBRATE SWITCH** automatically initializes system.

**VIDEO DISPLAY** of 8 lines at up to 62 characters per line is generated. Scrolling and automatic line feed at end of line without breaking most words.

**SIMPLE HOOKUP** lets you connect to speaker terminals of your present receiver. Auxiliary input is provided for key or other external input.

### VIDEO MONITOR     \$149.00

All Microlog products carry a one year warranty. Write for information on RTTY and other available options. Add \$4.00 shipping and handling per item. Maryland residents add 5% sales tax.

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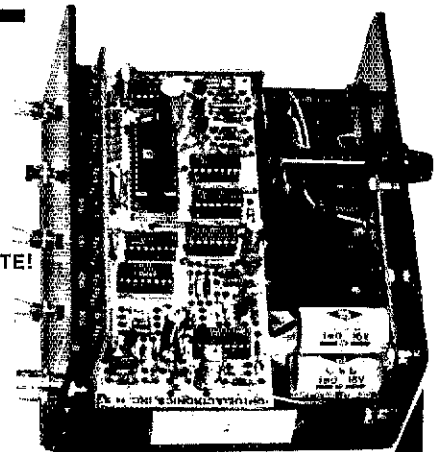




NEW LSI TECHNOLOGY  
**FREQUENCY COUNTER**

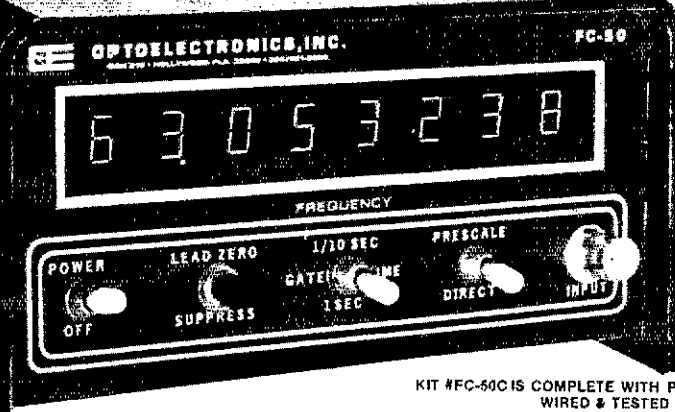
TAKE ADVANTAGE OF THIS NEW STATE-OF-THE-ART COUNTER FEATURING THE MANY BENEFITS OF CUSTOM LSI CIRCUITRY. THIS NEW TECHNOLOGY APPROACH TO INSTRUMENTATION YIELDS ENHANCED PERFORMANCE, SMALLER PHYSICAL SIZE, DRASTICALLY REDUCED POWER CONSUMPTION [PORTABLE BATTERY OPERATION IS NOW PRACTICAL], DEPENDABILITY, EASY ASSEMBLY AND REVOLUTIONARY LOWER PRICING!

- KIT #FC-50C ..... 60 MHZ COUNTER WITH CABINET & P.S. .... **\$119<sup>95</sup>** COMPLETE!
- KIT #PSL-650 ..... 650 MHZ PRESCALER [NOT SHOWN] ..... 29.95
- MODEL #FC-50WT ..... 60 MHZ COUNTER WIRED, TESTED & CAL ..... 165.95
- MODEL #FC-50/600 WT ..... 600 MHZ COUNTER WIRED, TESTED ..... 199.95



SIZE:  
3" High  
6" Wide  
5 1/2" Deep

**FEATURES AND SPECIFICATIONS:**  
 DISPLAY: 6 RED LED DIGITS .4" CHARACTER HEIGHT  
 GATE TIMES: 1 SECOND AND 1/10 SECOND  
 PRESCALER WILL FIT INSIDE COUNTER CABINET  
 RESOLUTION: 1 HZ AT 1 SECOND, 10 HZ AT 1/10 SECOND  
 FREQUENCY RANGE: 10 HZ TO 60 MHZ. [65 MHZ TYPICAL]  
 SENSITIVITY: 10 MV RMS TO 50 MHZ, 20 MV RMS TO 60 MHZ TYP.  
 INPUT IMPEDANCE: 1 MEGOHM AND 20 PF.  
 [DIODE PROTECTED INPUT FOR OVER VOLTAGE PROTECTION.]  
 ACCURACY: ± 1 PPM [± .0001%]; AFTER CALIBRATION TYPICAL.  
 STABILITY: WITHIN 1 PPM PER HOUR AFTER WARM UP [1.001% XTAL]  
 IC PACKAGE COUNT: 6 [ALL SOCKETED]  
 INTERNAL POWER SUPPLY: 5 V DC REGULATED.  
 INPUT POWER REQUIRED: 8-12 VDC OR 115 VAC AT 50/60 HZ.  
 POWER CONSUMPTION: 4 WATTS



KIT #FC-50C IS COMPLETE WITH PREDRILLED CHASSIS ALL HARDWARE AND STEP-BY-STEP INSTRUCTIONS. WIRED & TESTED UNITS ARE CALIBRATED AND GUARANTEED.

**PLEXIGLAS CABINETS**

Great for Clocks or any LED Digital project. Clear-Red Chassis serves as Bezel to increase contrast of digital displays.

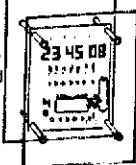
- CABINET I**  
3"H, 6 1/4"W, 5 1/2"D Black, White or Clear Cover
  - CABINET II**  
2 1/2"H, 5"W, 4"D \$6.50 ea.
- RED OR GREY PLEXIGLAS FOR DIGITAL BEZELS  
3"x6"x1/8" 95¢ ea. 4/83

**SEE THE WORKS Clock Kit**  
Clear Plexiglas Stand

- 6 Big 4" digits
- 12 or 24 hr. time
- 3 set switches
- Plug transformer
- all parts included

Plexiglas is Pre-cut & drilled  
Kit #850-4 CP

Size: 6"H, 4 1/2"W, 3"D  
Assembled \$23<sup>95</sup> ea. 2/45. \$29<sup>95</sup>



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Will enable Digital Clock Kits or Clock-Calendar Kits to operate from 12V DC. 1"x2" PC Board Power Req: 5-15V (2.5 MA. TYP.) Easy 3 wire hookup Accuracy ± 2 PPM #TB-1 (Adjustable) Complete Kit \$4<sup>95</sup> Wir & Cal \$9.95

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**PRIME - HIGH SPEED RAM**  
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LOW POWER - FACTORY FRESH

1-24	\$1.75 ea.	100-199	\$1.45 ea.
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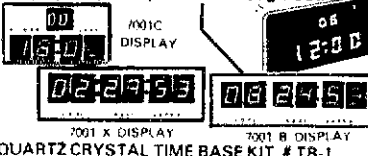
1000 AND OVER \$1.29 ea.

**6-DIGIT LED CLOCK CALENDAR KIT**  
DATE-TIME-SNOOZE ALARM & MORE... KIT 7001

FOR THE BUILDER THAT WANTS THE BEST. FEATURING 12 OR 24 HOUR TIME - 29-30-31 DAY CALENDAR. ALARM, SNOOZE AND AUX. TIMER CIRCUITS

Will alternate time (8 seconds) and date (2 seconds) or may be wired for time or date display only, with other functions on demand. Has built-in oscillator for battery back-up. A loud 24 hour alarm with a repeatable 10 minute snooze alarm, alarm set & timer set indicators. Includes 110 VAC/60Hz power pack with cord and top quality components through-out.

- KIT - 7001B WITH 6 - 5" DIGITS ..... \$39.95
- KIT - 7001C WITH 4 - 5" DIGITS & 2 - 3" DIGITS FOR SECONDS ..... \$42.95
- KIT - 7001X WITH 6 - 8" DIGITS ..... \$45.95



KITS ARE COMPLETE (LESS CABINET)  
ALL 7001 KITS FIT CABINET I AND ACCEPT QUARTZ CRYSTAL TIME BASE KIT # TB-1

PRINTED CIRCUIT BOARDS for CT-7001 Kits sold separately with assembly info. PC Boards are drilled Fiberglass, solder plated and screened with component layout.

Specify for 7001  
B, Cor X - \$7.95

**AUTO BURGLAR ALARM KIT**

AN EASY TO ASSEMBLE AND EASY TO INSTALL ALARM PROVIDING MANY FEATURES NOT NORMALLY FOUND. KEYLESS ALARM HAS PROVISION FOR P.M.S. GROUNDING SWITCHES OR SENSORS. WILL PULSE HORN RELAY AT 1/2 RATE OR DRIVE SIREN. KIT PROVIDES PROGRAMMABLE TIME DELAYS FOR EXIT, ENTRY & ALARM PERIOD. UNIT MOUNTS UNDER DASH - REMOTE SWITCH CAN BE MOUNTED WHERE DESIRED. CMOS RELIABILITY RESISTS FALSE ALARMS & PROVIDES FOR ULTRA DEPENDABLE ALARM. DO NOT BE FOOLED BY LOW PRICES! THIS IS A TOP QUALITY COMPLETE KIT WITH ALL PARTS INCLUDING DETAILED DRAWINGS AND INSTRUCTIONS OR AVAILABLE WIRED AND TESTED



KIT #ALR-1 \$9.95  
#ALR-1WT WIRED & TESTED \$19.95

**VARIABLE REGULATED 1 AMP POWER SUPPLY KIT**

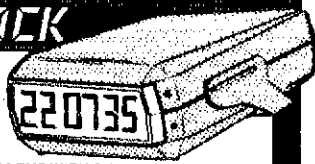
- VARIABLE FROM 4 to 14V
- SHORT CIRCUIT PROOF
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- 2N3055 PASS TRANSISTOR
- CURRENT LIMITING AT 1 Amp

KIT IS COMPLETE INCLUDING DRILLED & SOLDER PLATED FIBERGLASS PC BOARD AND ALL PARTS (Less TRANSFORMER) KIT #PS-01 \$8.95

TRANSFORMER 24V CT will provide 300MA at 12V and 1 Amp at 5V. \$3.50

**MOBILE LED CLOCK**

12/24 HR .4" DIGITS!  
MODEL 12 VOLT AC or #2001 DC POWERED



- 6 JUMBO .4" RED LED'S BEHIND RED FILTER LENS WITH CHROME RIM
- SET TIME FROM FRONT VIA HIDDEN SWITCHES • 12/24-Hr. TIME FORMAT
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- OPTIONAL CONNECTION TO BLANK DISPLAY [Use When Key Off in Car, Etc.]
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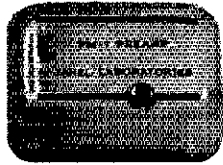
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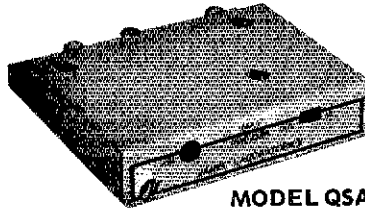
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ready for the SET, and perhaps this will be the year that you will try checking into the traffic nets, and maybe this year Murphy will stay away from your Field Day site. WA2HTP is now active in MARS and ACM2HTP. WB2SHL is now back on the air with a new QTH. WA2YEI picked up a DX-60 and his brother WB2KHR now has an SCR 522 for 2M AM. WA2JKG now has his Advanced. W2GKZ now has a new beam for 15/10 meters. The Peter Rouget ARS of 188 in Brooklyn is now affiliated with the ARRL, the pres. is WB2DWP, the club would appreciate hearing from all other NYC Jr. H.S. Radio Clubs. WB2JKJ can be found on 50.1 every evening and would appreciate hearing from other 6m enthusiasts. For those that have picked up CB rigs to convert to 10 m, WA2SUH reports there is an active AM group in Naasau County on 28.720 MHz, in addition to the ARES net which meets every Mon. at 2000 local, and bunny hunts, for further info, contact WA2SUH. Suffolk County ARC had Pete O'Dell of the ARRL as their guest speaker at their Oct. meeting. Congratulations to WA2JMY on getting his Extra, WA2PQV and WB2CDD their Techs. The New York Road Runners Club sponsored a 26 mile, 5 borough race on Oct. 23, more details of stations who participated will be included in an upcoming column. WB2KWU and W2LRT passed their Generals. Welcome to newly Affiliated Clubs: Forest Park ARC in Woodhaven with W2OEO, pres., and the Glenhurst Radio Society with WA2MJK, pres. in Elmhurst. Traffic: (Sept.) WA2ECO 227, WA2BML 192, WA2HTP 189, W2MLC 75, WB2JAY 52, W2EC 48, WB2LZN 37, WB2HIQ 35, K2CRT 33, N2LI 17, WB2SHL 9, WA2YEI 9, K2JFE 8. (Aug.) WA2JKG 185, W2GKZ 188, WB2JAY 37, W2HXT 26.

**NORTHERN NEW JERSEY:** SCM, Bob Neukomm, WA2MVQ — Net Reports: Net, Mgr., Freq. Time(PM)Days, Sess., QNI, OSP. NJN, W2ZEP, 3695, 7:00 Dy. 29, 286, 96. NJN, W2ZEP, 3695, 10:00 Dy. 28, 124, 35. NJPN, WB2LCC, 3950, 6:00 Dy. 30, 486, 193. NJPN, WB2LCC, 3950, 9:00 A Su, 4, 39, 3. NJSN N2MW, 3730, 8:15 Dy. 15, 63, 16. PVTEN, WA2OPY, 145.7, 8:00 Dy. 30, 10, 15. NNJ RTTY, W2PSU, 145.51, 7:00 Dy. SEC: WB2VUF. PAMS WB2LCC & WA2OPY (VHF). RMs W2ZEP N2MW & W2PSU. New Generals: WB2CNF and WA2IJJ. WA2NPP Rutgers ARC is running a Novice and General class. WA2QIO now K2MS. K2SHR now K2EX. WB2YKB now N2WV. WB2FHB passed Extra Class. WA2FBP now Advanced. WB2MEE now K2ZO. WB2VUP was W2LA now W2RU. City of Ramsey rejected a request for a 60-foot tower to K2UPD. WB2DMB has moved back from Chicago and will check into NJSN. The following worked from K2BR "Miss America" Pagent, K2TJ WB2VFT N2CW and WA2PCF. WB2VFT now has 269 for DXCC. N2CW took first place USA in 1977 PACC Contest. The "Ocean County Emergency Phone Net" in operation every Wed. at 8:45 PM (0445Z Thur) on 28.650 MHz. W2KB now has a new Denton MLA-2500 amplifier. New quads have appeared at the following QTHs: WA2LNL and WB2FHB, the latter "home-brewed" his own tilt-over crank-up tower. K2BJG is on RTTY. Let's hear from all the RTTY gang in NNJ and join us on 145.51 daily. K2BJG says RTTYes are welcome on WB2AHD's 220 repeater. W2RQ was portable "one" in VT, the second weekend in Oct. K2ETN is running classes in both Novice and General. My job was easier this month as most stations got their reports to me in plenty of time. Deadline for news is always the sixth of the month — thanks! Don't forget the "CD" party! Traffic: (Sept.) N2GM 173, W2RQ 130, N2MW 86, W2SWE 82, W2ZEP 66, W2WHB 56, WA2PCF 42, WA2NPP 41, WA2EPQ 32, N2GJ 31, WA2MVQ 30, N2CW 28, N2GM 27, W2LTP 26, K2TJ 23, K2ZFI 13, N2NS 12, WB2JVE 10, WA2DLJ 9, WB2VFT 9, W2GD 7, W2CC 6, WB2CNF 6, WA2QJ 6, W2KB 2. (Aug.) K2AM 10.

## MIDWEST DIVISION

**IOWA:** SCM, Max R. Otto, W0LFF — SEC: W0IYW. RM: K0EVH. PAM/VHF: K0LKH. PAM/VHF: W0AVV. Almost 3000 attended the Cedar Rapids Hamfest. Muscatine ARC new officers: W0BQQ, pres.; W0YRN, veep & public affairs; K0EVU, treas.; W0DCCW, secy. Congrats to W0BYNA, W0YWW, W0BBE, W0BCC for new General tickets and to W0GCVZ for Tech. Iowa again 100 percent on NTS-TEN via K0EVH W0SS W0YLS WA0SSU K0FLY W0OMV WA0LKM and W0BPDY. W0VHL and WA0AUX gave Iowa 100 percent on DTRN. Red Cross HQ at Cedar Rapids has new 60 ft. tower thanks to Cedar Valley ARC. WA0DYZ at Canon City, Co. W0BGGZS new QTH at Struble, IA. WB0TBV no employed in Ames. W0GN moving to Anamosa and former Ft. Dodge W0GPO is W0QKR. New calls: WA0ONL is K0ZZ. W0JGO is N0HI and WA0ODB is K0EK. W0MEW WB0OTW and W0BQCD active on 2 and 6 FAX, and W0BQCD has 46 states on 6M with 10 watts to earn the "600" point award, first known in IA. W0BPIU WB0ZXU K0ISK W0BQCD and W0BQCC active on 2M RTTY. W0BQJ in TX and AZ for the winter. K0IIR new member of Old Timers Club. Iowa Code Net (ICN) M-W-F at 6:45 PM on 3713 getting popular. W0B0GXA new NCS for LCN. Happy Holidays and hope Santa is good to you. Tall Corn, 3560 kHz, 0300/0400. W0YLS, mgr., QNI 373, QTC 130, Sess 59, IA 75-M, 3870 kHz, 0000Z, K0RN, mgr., QNI 1136, QTC 59, Sess 25, 1830Z, K0JVO, mgr., QNI 1586, QTC 78, Sess 26. Traffic: (Sept.) K0DVI 375, WA0AUX 352, W0SS 166, W0YLS 143, W0YX0 117, W0JFX 66, W0B0GXA 18, W0LFF 16, W0B0SS 15, W0B0V 14, W0B0PYD 9, W0IKT 6, W0AVV 5. (Aug.) W0B0PYD 23, W0IKT 12, W0BQJ 4.

**KANSAS:** SCM, R. M. Summers, K0BFX — Hiawatha ARC club officers for 1978 WA0UHW, pres.; WA0UQA, vice-pres.; W0PB, secy/treas.; WA0DKC, act. mgr. All clubs please take note and send in your list of new officers as soon as elections are over. W0KLL reports the Section ARPSOC is going to be in full swing again next SET and is hoping more of you will check with your EC to find out how you can participate. ARES now standing 794 members strong, registered members that is. Sept. net results are: KPN QNI 228, QTC 25; KSNB QNI 873,

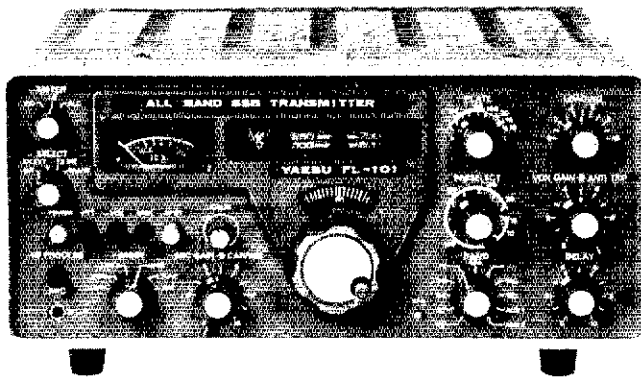
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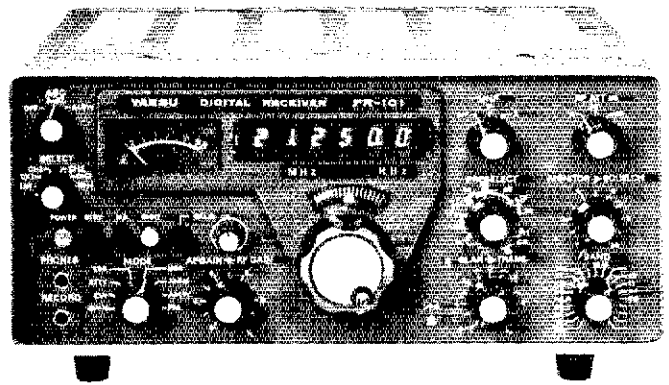
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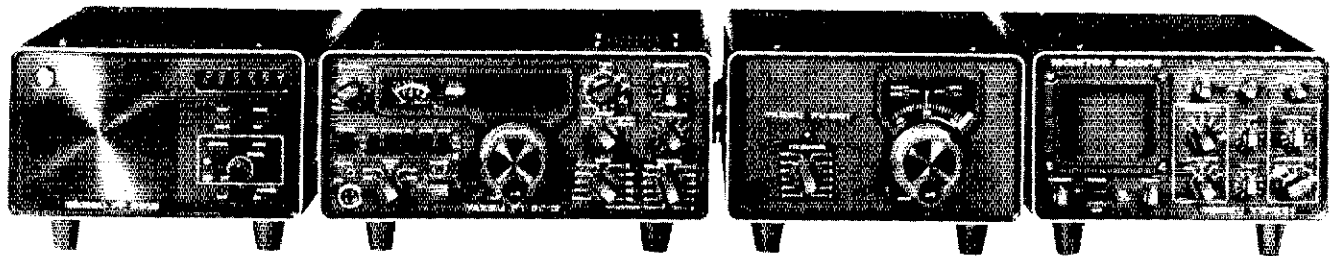
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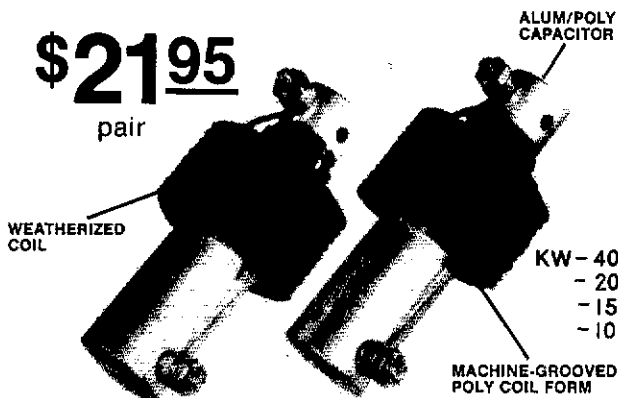
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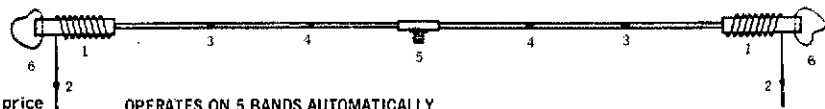
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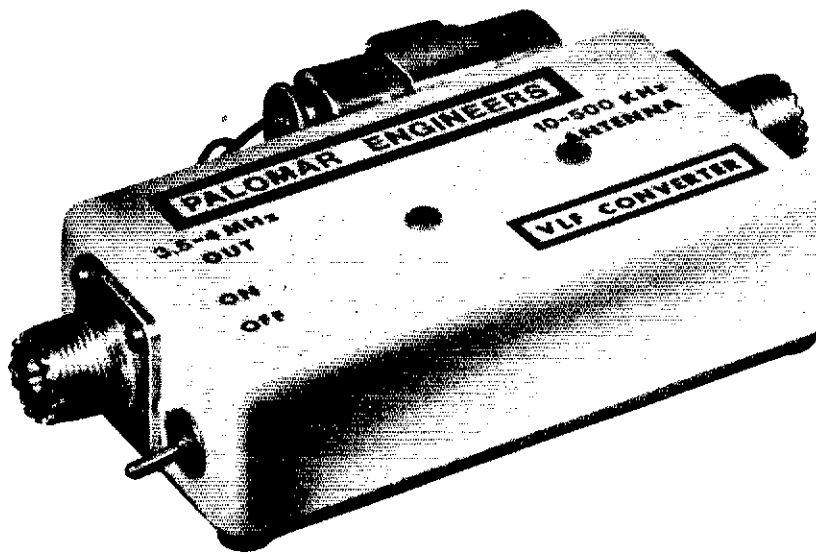
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QTC 105, QKS QNI 445, QTC 173, QKS-SS QNI 95, QTC 35, KWN QNI 654, QTC 310. For those of you who do not know what the net system in KS is all about, why not give us a look. For you who prefer the more reliable means of communication, CW, try 3610 kHz each evening at 7 and 10 PM. If your bag is in the weather, then the KWN on 3920 kHz at 6 PM daily is for you. The Phone traffic handlers use KSNB 3920 kHz daily at 6:30 PM. We also use 3920 kHz Mon, Wed, and Fri, 0645 AM and Sat, 0800 and Sun, 0800 AM Central time. Join Us For A Little Public Service. Traffic: (Sept.) W0AM 191, W0HI 156, W0OYH 150, K0EZ 128, W0FIR 108, W0RFF 77, W0VEZ 77, W0CHJ 73, K0BXF 68, W0LBB 67, W0FT 63, W0IX 49, W0LKA 47, K0JDD 24, W0FDJ 16, W0KDE 14, W0PB 12, N0IN 12, W0RBO 12, W0HGG 6, N0LL 6, W0SEV 6, W0WXY 5, W0BBI 4, W0SRQ 4, W0ONH 3. (Aug.) W0FIR 211, W0VEZ 28, W0KL 12. (July) W0VEZ 50.

MISSOURI: SCM, L. G. Wilson, K0RWL — Asst. SCM, Joe Flowers, W0OTF. SEC: W0BFKY. New officers for the Warrensburg ARC for the coming year are W0OKK, pres.; W0ONN, vice-pres.; W0OLA, secy-treas.; W0SSTY, prog. dir. The West Central Missouri FM Assn. has elected new officers. They are W0SGZ, pres.; W0UKF, vice-pres.; W0PMP, secy.; W0LIK, treas. Congratulations to W0SGZ on his recent marriage. K9YMB will be sharing air-time with a new daughter. W0TVI is home from the hospital we hope, feeling much better. Our deepest sympathy goes to the family and friends of W0TJX who passed to the ranks of the Silent Keys. Net Reports: Net, QNI, QTC, MSN, 67 24, MON 2, 110, 45, NEMOE, 79, 0, HBN, 276, 24, SCEN, 56, 7, MON, 200, 105, PHD, 31, 8, MOSSBN, 000, 168, The Carthage Amateur Radio Society is presently conducting Novice Classes. Congratulations to the following on receiving their Novice: W0ELG, W0ELL, W0ELU, W0EMP, W0EMS, W0EMW, W0ENA, W0ENL, W0ENN, W0ENP, W0ENS, W0ENV, W0ENY, W0ENZ, W0EOO, W0EOT, W0EPA, W0EPG, W0EPJ, W0EPK, W0EPT, W0ERO, W0ERU, W0ERZ and W0ESA. Also congratulations go to W0YBC on his Tech, W0SNZ on her General, W0YXV on his Advance, W0OCU on new call N0WM, W0YBW on new call K0CB and to W0TGB and W0ZHB on making DXCC. W0RSL is sporting a new beam and 50-ft antenna system. Kansas City area repeaters along with W0CAY, Lee's Summit's Civil Defense station were active during the recent flood and received heavy traffic. Traffic: K0ONK 561, K0SSN 209, W0HH 104, W0BV 101, W0LFY 100, W0SND 88, W0OTF 61, W0EEE 48, W0SSB 43, W0QAU 39, W0FKD 34, W0BVL 32, K0BM 29, W0CUD 29, W0WDO 25, W0LCV 22, N0WMM 21, W0VHN 20, K9SI 19, W0EPI 17, W0LMW 16, K0RWL 15, W0MOF 7, W0BFKY 3.

NEBRASKA: SCM, Claire R. Dyas, W0JCP — W0GFQ not W0FQB was elected to the board of directors of the CQWA. Congrats. The Lincoln ARC had lots of visitors and interested individuals come by their booth at the Neb. State Fair. W0MKP now a resident of FL, and W0LCE now living in CO. Net reports: Morning Phone Net, QNI 1046, QTC 60; Western Nbr Net, QNI 446, QTC 13; Cornhusker Net, QNI 1122, QTC 82; Sandhills Wx Net, QNI 225, QTC 3; PM Net, QNI 252, QTC 16; Neb. Storm Net, QNI 1032; QTC 84; Platte Valley 2-mtr net, QNI 22, QTC 0; CQWA, QNI 52; AREC, QNI 135, QTC 3. Traffic: W0FQB 129, W0VEA 127, W0GKK 109, W0SGA 26, W0VDR 32, W0CJ 31, W0TOP 28, W0JDJ 24, K0JFN 18, K0TUH 16, W0HTA 15, W0EUT 13, W0AUP 12, W0QEX 12, K0SFA 10, W0YX 10, W0PCC 9, W0NIK 8, W0SYV 6, W0GAK 7, K0HNT 7, W0JH 7, W0GMQ 6, W0DJU 4, W0NGF 4, W0RJA 4, K0FJT 2, W0YFR 2, W0ZNI 2, W0IXB 1.

### NEW ENGLAND DIVISION

CONNECTICUT: SCM, John McNassar, W1GVT — SEC: W1XX. RM: K1EIR, PAM: K1EIC, VHF PAM: WA1ELA. Net Freq. Time/Days Sess QNI QTC CN 3640 1912200 Dy 60 277 198 CPN — 3965 1800 M-S 30 338 146

VHF 2 28/88 2130 Dy 30 382 120 HI QNI: CN — K1GF & W1KV. CPN — WA1ZVS W1NCO & K1BSB. SEC W1XX adds "Second Shift" to his many other duties — he is teaching Novice Class at Bristol High School. Please continue to send him your EC Reports. Director W1HHR very pleased to meet so many Conn. amateurs at the Convention in Hartford. Please keep him up to date on your activities. The Convention was well attended, sorry if I didn't meet you there. Program great, Lectures very interesting but sorry they did not include a Net Meeting for Traffic Operators. IORC "Time-Out" notes 99 percent up time for their repeaters, also notes abuse of autopatch. Please use discretion when using autopatch. Good operators always do! Stamford ARA "Speech Burst" thanks WA1NDS and K1FOK for interesting talks at recent meetings. Southington ARA General and Tech Class, also Novice Class — WA6RDE & W1XX instructors. Manchester RC "Short Skip" took second Place in Amateur Radio News Service National competition and also tied for second place in W1HHR N. E. Directors Club Papers Award. Shoreline ARC now has Repeater antenna up! Meriden ARC completed another fine Auction. Congratulations to W1TR for Sept. BPL; WA1HYN for Extra Class; and WB1BSI General Class! Sincere thanks to all for your help and activity during the past year. A Very Merry Christmas to All! Traffic: K1GF 337, W1TR 185, K1XA 91, W1AW 35, W1CPR 34, K1DM 32, WA1ZVS 32, W1GVT 30, W1KV 29, K1OOG 26, K1DPS 22, WA1HYN 17, W1BDN 14, W1QV 9, W1BDI 5, W1CUH 3.

EASTERN MASSACHUSETTS: SCM, Frank Baker, W1ALP — Asst. SCM: WA1QW. SEC: WA1AQ. W1ZMO new EC for Danvers. WA1TAK new OBS OVS. WA1FNM endorsed as OPS, W1TC as EC. W1DJ moving to NH. K1GFH new OO. NEEN had 214 QNIs, 119 QTC, WA1YUJ is new Net Mgr. WA1ZAZ is member of TOC, asst. mgr of EMRI. W1XA has new Heathkit Elec. Keyer. W1GXT on

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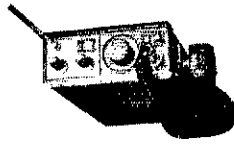
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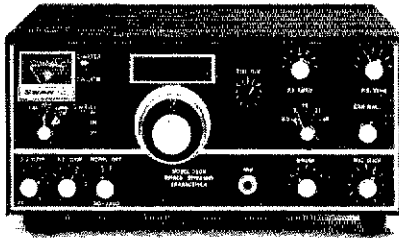
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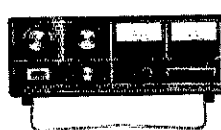
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144.1 MHz CW/SSB & 220.075 MHz CW. South Shore ARC held a meeting. NEEPN had 63 QNLs, 10 QTC, Cape Code & Ist. ARA held a meeting. EASN had 130 QNL, 28 QTC in June, and 102 QNL, 16 QTC in July. WA1QSK has a new HW202, W1MX & WA1ZAZ made BPL, WA1ZXB new OBS, WA1YGI and others are forming a new club, Concordian ARC, he is on the EMRI, EM2MN had 172 QNLs, 44 QTC. W1AOG received reports from W1s: BK III BHD BAB, K1PAD K1CCW, WA1RTR W1XA WA1ZLO K1NFW. To all ECs: SEC W1AOG will be in FL in Jan. Feb. & Mar., so send your reports to W1ALP. HHTN had 257 QNL, 50 QTC. WA1UWF is Net Mgr. for HHTN. Walleley ARS Novice Net on 21.120 Sun. at 0030. WA1TAK is NCS. W1BVL W1LMO W1ATO are on L.F. work on 160-190 KB2 band. W1MYF has an FM-144 & Ringo Ranger. WB1DHW is ex-WA1TYX. WA1YMN is asst. mgr. of EASN. N1DL is ex-DL2AAW1. W1VTP has a ICOM 22-S. K1DTE has his Advanced, WA1OJX in the hospital. WA1BXJ has his General, also WA1MEJ, WA1-GAA has his 96-ft. tower up. Capeway RC met at W1AN's QTH. K1VR is ex-WINJ1. WA4LVE is his roommate. K1PAD has a new son. W1DMS had XE3L at his QTH. Chelmsford ARA & Billerica ARC have a Novice class with over 100 enrolled. W1JCS on Thur. on 1st Region Fone Net 3950 at 4 PM. WA1YHM on 75 with HW-12A. K1WQ was ex-WA1TJP. WA1UZH has IC22S. K1RAW on SSTV. W1FRZ has 18220. K1WVC has MLA2500. W1LRD working DX, has 58220. W1JFG in Europe. K1LWI says 10 looking good. WA1ZXB on nets on 75. EASN had 43 QNL, 10 QTC in Aug. W1BP is a Silent Key. W1PBE now W1IK. Gunnappawit RA held a meeting, and an Auction. W1CUY & W1EIF showed pictures of their trip to "England & Ireland" at the Massachusetts ARA. WA1TJG has a new job at the Pentagon. WA1MRV has moved to Brazil. WA1NUJ has his Extra. Framingham RC had a cookout at WA1GL's, also a meeting. W1GEV has retired. K1BTN does a lot of nice work phone patching. WB4PVT ex-WA1ODY is a Silent Key. W1BDS on 2 fm. Our sympathy to W1AFD on the death of his wife. W4CEH ex-W1BNU is a Silent Key. The Texas tower net had its 7000 consecutive session on Oct. 9. Quite a record, they're on at 12.30 PM on 3933. Many from this section were at Saunders Bay where the CNEH holds its annual affair. WA1LUNC made BPL. Traffic: (Sept.) W1MX 603, WA1LUNC 548, WA1ZAZ 509, K1BA 294, WA1UWF 231, K1PAD 191, WA1VEI 178, K1GN 157, WA1EY 128, WA1TBY 128, W1DMS 105, K1ES 95, W1EMG 62, WA9NEW 56, W1FJ 42, WA1OW 35, W1DMH 34, K1BSO 29, W1RVZ 18, W1HL 14, WA1YMD 11, WA1FE 8, K1TR 8, K1LW 8, K1LQ 4, W1NF 2. (Aug.) WB1DHW 48, K1LQ 10, WA1PQ 1. (July) WA1TAK 7.

MAINE: SCM, Bill Mann, W1KX — Ham radio important in trans-Atlantic balloon flight from Bar Harbor through the efforts of W1ZB W1FNL WA1PXD and others. Volunteered to give exams to handicapped hams yet? Forms available from ARRL. Rockland rpt. 146.385/995 now on Ragged Mtn. with good results. Windsor Hamfest FB. WA1GWU resigned as Oxford Co. EC. Pine State ARC puts out fine newsletter. Club pres. K1AHD suggests assn. of ME clubs. Contact Cliff. K1RQG 1st recipient of Ellsworth AWA's W1MTL Memorial Award. Central ME Emerg. Net on 146.1070 Mon. Wed. Fri. at 2030 local time. Hoss Trader's Net Sun. 3940 kHz at 1600 provides valuable service to hams. Watch Operating News Jan. QST for first solicitation for SCM nominations for Maine. Be thinking! Seasons Greetings. Sept. reports:

Net	Freq.	Time/Days	Sess	Tfc.	Ck-in
PTN	3596	7 PM Dy	30	165	239
SGN	3940	5 PM M-S	26	95	1033
MSN	3596	6:30 PM	9	11	60

M-W-F  
BYN 3690 8 AM M-S 26 34 893  
Traffic: W1KX 276, WA2ERT/1 148, W1RWG 108, K1EF 83, W1ERW 80, N1RP 58, W1HDC 47, N2KC/1 42, K1M2B 37, WB1AOD 32, K1T2H 32, W1CTR 18, WA1RDX 13, WA1QFX 10, WA1JCN 3, WA1NKE 3.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1SWX/W1NH — SEC: K1RSC. RM: WA1GCE. The Central New England Net held another enjoyable outing at Saunders Bay. New officers are W1EOF, mgr.; W1OHG, asst. mgr.; K1RSC, sec-treas. Congrats to WA1ALM & XYL on their first harmonic. W1RRN K1LHW K1AYZ K1DSS W9NOT WB4DEX W2LJ W4YKH & K7DI vacationed in NH. K1RD, ex-WA1DGH moving to Bedford. WB3DTC attends school in NH. WA1REL used ham radio for rescue when his plane crashed in the NH mountains. W1JY lost his Life Member pin and is awaiting a new one from ARRL. WB1ASY passed the exam in Hartford. K1POV endorsed as ORS. W1JBF checks into the Medicare Net on 3825 at 9 AM regularly. Anyone wishing to join the Concord Brassponders the officers are WA1QWC, pres.; WA1FSZ, vice-pres.; WA1RWP, secy-treas. W1GAB mountain climbed in NH. The century kids, W1MPP & K4RO (ex-W1PS) summered in NH & now enroute to the sunny south. The GSPN has 372 check-ins & 130 traffic. W1EJ now has 64 elements on 1296. The NHVT Net had 159 check-ins & 118 traffic. Enjoyed meeting many of the NH gang at the Hartford Convention. Merry Christmas and a Happy New Year to all. Traffic: K1BCS 648, W1TN 135, N1NH 59, K1NH 51, K1P-QV 35, W1JB 6, K1SHR 5.

RHODE ISLAND: SCM, John Titterington, W1EOF — SEC: K1YDA. RM: WA1POJ. PAM: WA1RFT. EMRISN Net, sess. 10, QNL 42, QTC 11. RIEM 2-Mtr Net, sess. 28, QNL 137, QTC 33, WA1GSO, mgr. For the first time in my ancient memory, RI has a Vice Director of New England Division. Congratulations to Fred Evans, W1JFF, K1CFD again active. WA1TFE making plans for DX-pedition to Barbados in Feb. WA1RFT is new OO. More two-letter calls: K1GMW is K1AO, K1ABR is W1XJ, WA1UZK is K1UZ, WA1TCG is W1ZY with WA1POJ & W1RFT still waiting! EBAAW put out first new letter, a real good effort. WA1ZFS WA1YS WB1DGD all new Generals. K1FGK is pleading for 6-meter check-ins. Most clubs are running Novice classes, several also training Generals and Advanced groups. Traffic: WA1POJ 48, W1EOF 15, WA1TFE 2.

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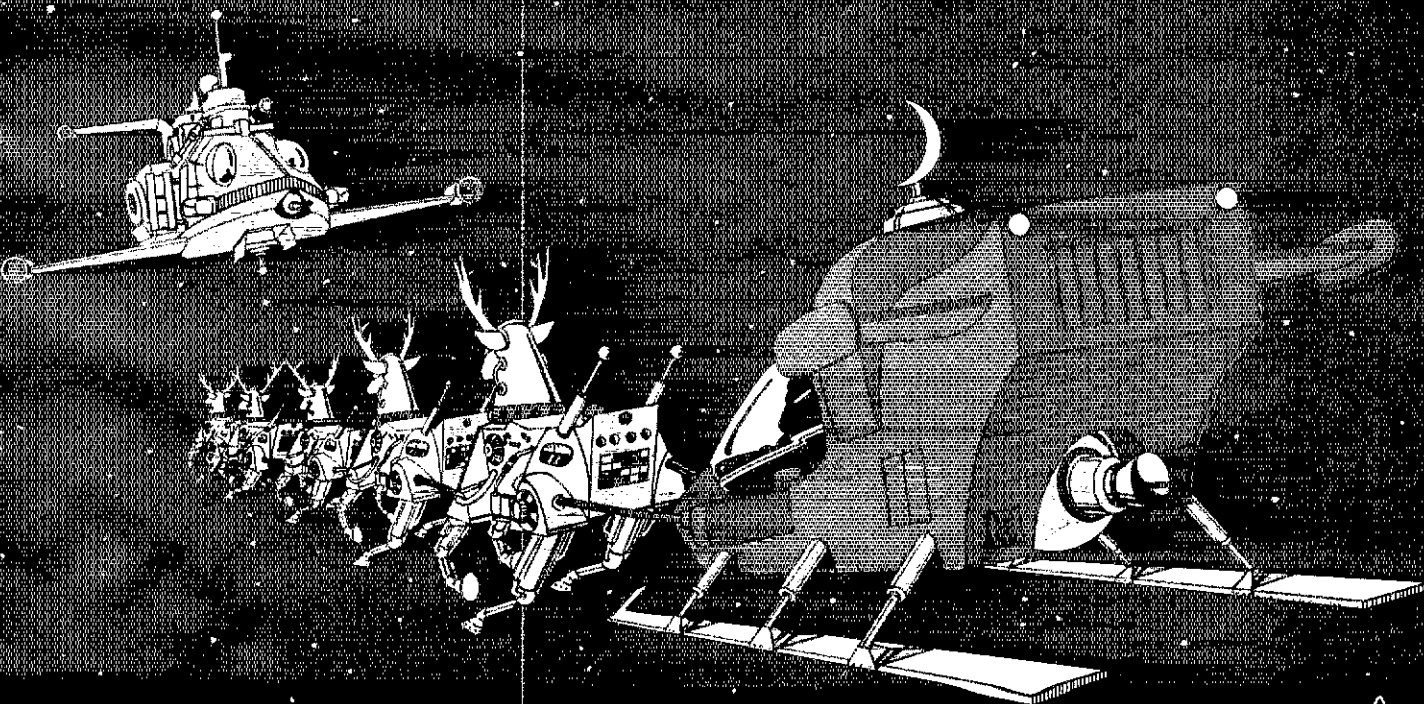
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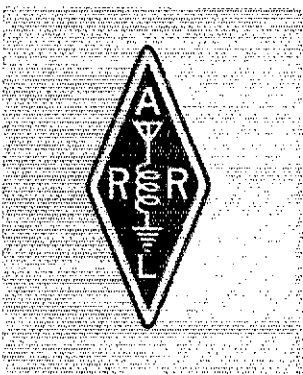
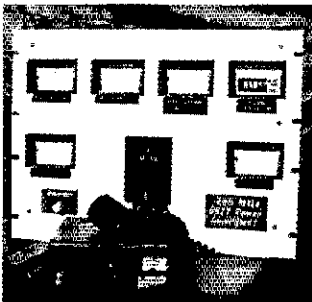
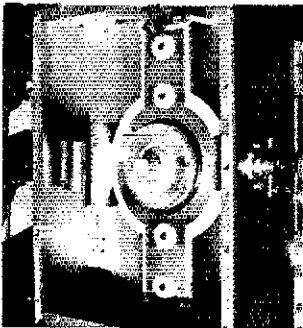
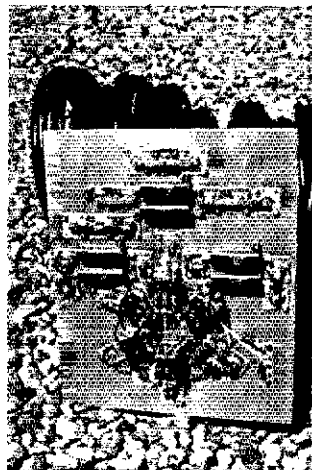
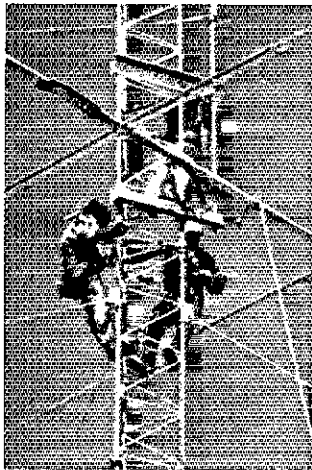
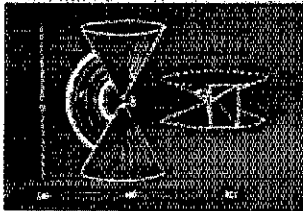
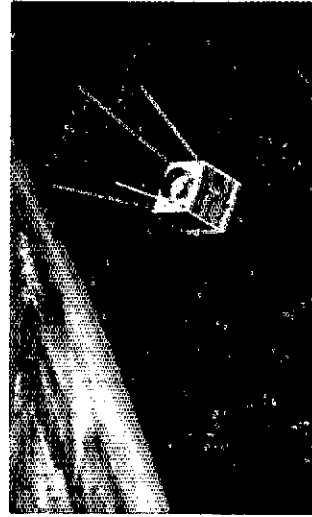
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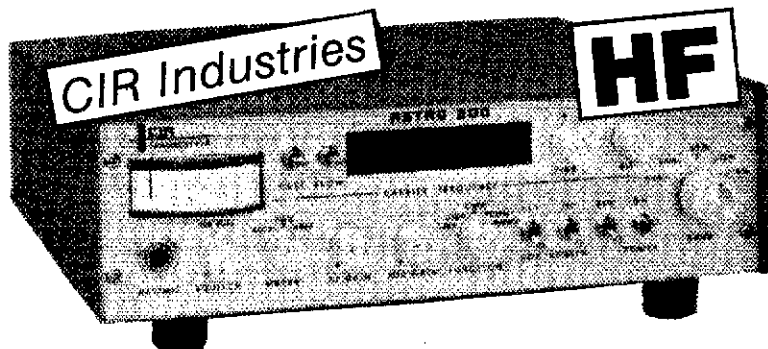
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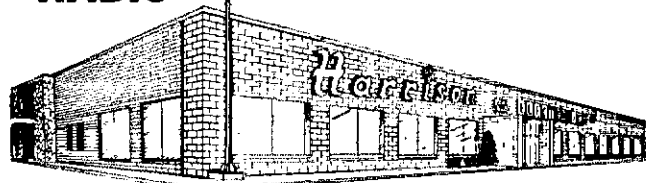
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**VERMONT:** SCM, Bob Scott, W1RNA — SEC: W1VSA Repeater ECs: K1LEC WA1UQY & WA1YEH. WA1YEH replaces WA1SVR who has had to resign due to his work load. Thanks to SVR for doing a fine job. The BARC has 48 new hopefuls undergoing training to be amateurs. W11AEA Emergency Net ops on Sun. 1100 146.34-94. The Central VT ARC whose pres. is W1A1M, has started their Fall, Winter & Spring activities. BARC new pres. is K1NKK. W2AP is now N1AK in Rutland. GMN 26/572/101; Carrier 26/551/33; VT FN 4/63/10; VT RFD 4/62/18. VT SSB no report. Traffic: K1BQB 117, WA1AFY 16, WB1ABQ 14, W1RNA 7.

**WESTERN MASSACHUSETTS:** SCM, Percy C. Noble, W1BVR — As of Jan. 1st West. MA will have a new SCM. Both W1BVR and W1TM were nominated. W1BVR withdrew his nomination so W1TM was elected without any voting. I have know Bill Lowe W1TM for some years, and I can assure you that he will do an outstanding job. He has my best wishes. Why did I withdraw? Well, in 1934 at age 26 I was elected SCM. I am now 72, and if I can figure correctly that is 44 years. For 42 years I have been an elected ARRL official (SCM, ARRL VP & New England Director). If that isn't long enough for anyone to hold office, what is? W1YK (Worcester Poly) is now OPS & ORS. W1GAJ now EC for Hampshire Co. WA1HHN has designed three new types of multi-polarized antennas. WA1DNB for Western MA Emergency Net; 4 sess., QNI 199, 87 SSB & 112 from 2-meter repeaters. W1DWW for WM CW Net; 30 sess., traffic 153, 17 different stations. WA1MJE for WMPN; 22 sess. QNI 281, traffic 42, 64 different stations. Traffic: WA1MJE 173, W1TM 153, W1UD 109, W1ZPB 101, W1DWW 98, W1BVR 96, K1KK 72, WA1OUZ 66, WA1OPN 25, WA1TY 22, W1DOY 16, W1YK 15, K1JUV 9, WB1CWH 8, K1RQG 6.

**NORTHWESTERN DIVISION**

**ALASKA:** SCM, Roy Dawe, KL7CUK — Sorry to report the Silent Key of KL7HEK. Art was very active on the "Eye Bank Net." We had two emergencies this month where the ARES provided very vital communications. Please see the Public Service Diary for particulars. The Fairbanks Club reports they are having problems getting news items for their monthly publication "Short Circuit", how about some help? The Anchorage Club is in the process of rewriting the By Laws and Articles of incorporation. The 22/82 repeater has been moved to a mountain location East of Anchorage and now provides excellent coverage from Kenai, Anchorage, Lake Minchumina, Fairbanks and the highway for many miles around. The AK Snipers Net continues to grow. The new 1977-78 Net Directory is out. With the restrictions lifted relative to repeaters it is wise to check with the frequency coordinator before deciding what frequency you want to operate on. He does have a list of suggested frequencies which are less apt to have intermod problems. The Frequency Coordinator for this section is your SCM KL7CUK.

**IDAHO:** SCM, Dale A. Brock, WA7EWW — SEC: W7JMH. PAM: WA7HOS.

Net	Freq	Time	QNI	QTC	Manager
FARM	3.935	0200 Dy	949	40	W7CJC
RACES	3.99	1415 M-F	427	30	WA7WXI
IMN	3.635	0300 M-F	147	54	W5GHT

W7GHT has received the 40 wpm Code Proficiency Award. W7NRP reports the Cassia Co. Emergency Net meets Sat. at 8:30 PM on 146.94 kHz. OBS WB7NSW is transmitting the Official Bulletins on Mt. Harrison, 146.4/147.0. W7IY has received the WAC Award on 20 SSB. WA7QQD now K7QD; WB7OUO now N7PB, his initials. W7KDB has resigned as OO; N7DH has resigned his RM position to write a book. Thanks to both men for jobs well done. Traffic: W7GHT 286, W7GBO 33, W7LIM 8, WB7UQU 2.

**MONTANA:** SCM, Robert E. Leo, W7LR — W7TYN busy recruiting new ECs: W7IXD W7IDK W7AVD. Renewed OO WA7OBH. OPS WA7VTD. W7GHT continues FB work with IMN. Check into IMN 3635 0230Z CW QTC work. IMN Sept. 22 sess., QNI 147, QTC 54. WA7OBH puts Hardin on 2 meters. WA7JNA new Hardin ham. W7IXD K7CCZ put on FB RACES drill Oct. 3. MT hams need more such drills. Sorry W7DXK a Silent Key. Mullen Pass repeater 147.63, .03 covers Missoula to Spokane. W7DB sent bulletins 666 thru 671. W7IDK Havre has Novice class of 25. W7LR has Bozeman Novice class. K7ABV QSO FH0 and S2. WA7PDC in VHF QSO Party. W7HAH on 70 cm. WA7PDC has WR7AAB on. W7JRG now W7JF. MTN Aug. QNI 984, QTC 111. Traffic: (Sept.) W7IXD 68, W7HDE 18, WA7P2O 8, W7LR 6, W7NEG 6, W7DB 2, W7HAH 1. (Aug.) W7IXD 148, W7IXD 30, W7DEO 13.

**OREGON:** SCM, Dwight J. Albright, W7HLF — Asst. SCM: WA7UJU. SEC: W7LBH. Chief PAM: WA7SSO. PAM: WA7GFE. RM: K7OUF. BSN, 3908 kHz, 8:45 PM, 530 QNI, 55 QTC, 77 contacts, WA7GFE, mgr.; ARES, 3993.5, QNI 369, QTC 17, 23 contacts, 4 QST, WA7BWM, mgr.; ARES, 147.06, JC QNI 252, QTC 16, 9 sess., WA7UJU, mgr.; PDX ARES, 871 QNI, 6 QTC (autopatch), K7WVW, mgr. LINN-BENTON ARES 146.19/79 just started with about 20 members. Some updating of licenses in Coosbay area are WB7PQU WB7OZN WB7THT WB7BGQ WB7BCH W7WYU. It is wonderful to listen to the Oregon Amateur Radio Services net on 3993.5. 21 stations checked in including ECs W7YLV K7BOQ K7JUGF W7LBH SEC, W7HLF SCM, Oct. 8. Understand N7SC did very good in the FMT test. OBS WB7DIP rpts he gave OB 37 times this month. K7HSU in K. Falls now WA7TDU. OVS rpts. K7ZCB rpts Oscar VII Mode in good shape. Grande Ronde Radio Club at Lagrande has applied for ARRL affiliation. Also have largest Novice class to date. W7NCO W7IRZ W7LNG chasing DX. K7WVW rpts the Autopatch has increased activity in the Hillsboro Portland area, 147.33 repeater. Traffic: (Sept.)

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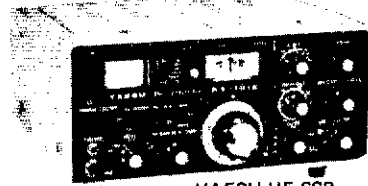
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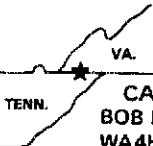
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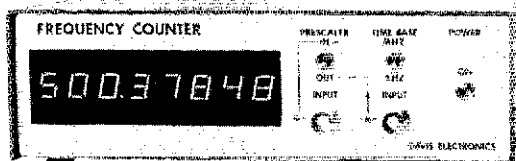
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W7VSE 458, W7IWD 112, W7HLF 105, N7NO 81, WA7GFE 58, K7VM 55, W7DAN 50, WA7IHS 45, WA7TXV 43, WA4HRG/7 33, K7WWW 28, WA7ZAB 22, WA7UJO 21, WB7AAK 18, W7LT 16, WB7CBA 15, WB7CSA 8. (Aug.) W7HLF 105.

### PACIFIC DIVISION

**NEVADA:** SCM, Leonard M. Norman, W7PBV — SEC: K7ZAU. WR7ABI out of the RED and in the BLACK thanks to those who donated their finances. It's OK in Las Vegas with K7OK N7OK W7OK and K7ZOK each chasing DX but maybe confusing to the DXer. W7UIZ looking for additional help for the club bulletin and instruction class. WA7RPZ home from touring the Northwest, has a new Airstream Trailer. N7OK K7OHX N7SD and W7VH have 38 students in training for their amateur radio operators license. VK4AK and VK4FJ visiting W7OK. W7CTK has new OTH with tower and beam. WB7SSK Grandmother of WB7SSL age 11 were graduates of the same class. W7JUO now has 250 DX confirmed. W7PBV was a visitor to EXpo '77 Chicago convention. W7OK accepting applications for NV 3.9985 MHz and 78/18 RACES net. All NV amateurs are urged to send in activity reports to the SCM. Traffic: W7ILX 284.

**PACIFIC:** SCM, Pat Corrigan, KH6DD — SEC: KH6CKJ. RM: KH6JAG. Don't forget to plan for SET in Jan. Contact KH6CKJ to offer your help in planning your participation. Pac Section had good SET last year. Let's make 1978 even better. Hawaii was privileged to have Dept. Comm. Mgr. W1YL from ARRL to address several groups in Oct. Ellen (who used to be KH6QI) hadn't been back in almost 30 years. KH6BZF recently provided state number 50 on Oscar for another ham, K9SM. Lee reports K6KLY W5BE VK5CBG as visitors. Emerg. ARC looking for volunteers sporting new quad ant. KH6GDR built great new ham shack just off of his house. KH6XX regularly working Eur. on 75m. KH6ILA and KH6IRT really smokin' on 160 with 1800-1810 segment open. KH6EBO now KH6IO; KH6GPN now KH6ES; KH6ARG now KH6JF; KH6AIO now KH6JW; KH6IDC now KH6PP; KH6IKJ now KH6AM. Mele Kalikimaka to everyone. Traffic: KH6IJE 48, KH6BZF 16, KH6GQW 14.

**SACRAMENTO VALLEY:** SCM, Norman Wilson, N6JV — SEC: W6SMU. The River City Amateur Radio Comm. Society meets on the third Mon. of the month at Hiram Johnson High School in room D-5 at 7:30 PM. WB5TXC has a new Tempo 2020. WB6YUM has a new 2-meter rig for Oscar work and a new Advanced ticket. WA6AUS now has a Tech. W6CZC is a new Novice in Woodland. K6RPN has a homebrew KW for CW traffic work. WB6KAJ has a new 2-meter transceiver. New officers for the RAMS are: WA6THL, pres.; WA6VSO, vice-pres.; WA6IKG, secy.; W6RTK, treas.; W6QHP WA6ITE and WA6PGV, dir. RAMS News is edited by WA6UAF. WB6VLC is getting a new repeater ready to replace the GEARS WR6AJE machine. N6DM is gathering parts for a new push-pull 304TL amp. N6JV has his 5th single band KW amp on line and considers buying stock in PG&E. Traffic: W6DEF 33, K6RPN 18.

**SAN FRANCISCO:** SCM, Mark Nelson, WB6NHF — The contest arena seems particularly intense as SF section activity continues to increase. More stations are showing interest in tic nets too, and clubs are reporting high attendance. HARC and FWRA (Eureka) furnished March-of-Dimes Bike-a-Thon communications, with W6RNL as NCS. Participants were: W6S, FBK, KZ, LDE, K6S, IIC, KGA, WA6S HFC, ICB, NBC, WB6S AAR, DOD, EGV, IUA, JAA, LOR, RTE, SXJ, and TFX. Kudos to all. Need EC for SF? Water wheel power at W6EAJ, despite drought. CCRRC reports ham classes at Foothill College — call 415-948-8590 for info. W6GGR and W6ACAL now on 2M RTTY, and WA6ICB getting from Eureka to Eugene direct via 2M FM. NCCC offering Sweepstakes Proficiency Awards — contact N6BT. Traffic: W6RNL 226, W6NL 60, K6PB 52, W6GGR 18, WA6CAL 10, WB6NHF 10.

**SAN JOAQUIN VALLEY:** SCM, Charles R. McConnell, W6DPD — Asst. SCMs: WA6YAK and W6TRP. W6UBA new EC for Western Kern Co. Appointment renewed: W6YEP as EC. New officers Turlock ARC: WA6OYP, pres.; WB6ZQY, vice-pres.; WA6KHL, secy.; W6SM, treas. Officers Stockton ARC: N6OZ, pres.; WA6WRR, vice-pres.; K6YK, secy-treas. WB6LRO active at Firebaugh High School with 5 prospective Novices. WB6HIG again active at Wawona Jr. High in Fresno with 8 prospective Novices. WA6BXI worked his 50th state on 15m. WB6ETR now Advanced, WB6IUB General, WA6PRE Tech. K6OZI now N6OZ. WA6EPP is N6EP. Congrats to W6YEP, now chmn. of NARC. N7EUJ8 active from Clovis. WB6IUB has a TS520. WB6SWV is on 2M FM. WA6YAB has a new rotor and now working DX in the Pacific on 15m. WB6KHR WA6CPP N6IP WB6DSV N6EE K6AYA WA6KMW N6UR WA6YAK WB6ITM WB6SWV and W6DPD were active from the SJV during the CA QSO Party. Congrats to our new Dir. and Vice Dir. I wish everyone a Merry Christmas and a Happy New Year. Traffic: WA6GJV 8, WA6JDB 5, W6DPD 2, WA6CPP 1.

**SANTA CLARA VALLEY:** SCM, Jim Maxwell, W6CF — SEC: WB6IZF (reporting). RM: W6RFT. WA6AUC has been appointed Communications Chairman for Lions Clubs in their District 4C4. N6AU expects to operate portable — a mini-Field Day — during the Calif. QSO Party. RM W6RFF reports that NCN activity is holding up well. The VHF segment at 1930 on WR6AOC, 147.84/24, is proving particularly attractive and convenient. WA6EEP, the new EC for the Half Moon Bay area, reports the 10 ARES members meet regularly on 21.375. WB6JNN is busy working on a VHF translator and teaching Novice classes. W6BWB worked XE2IO on 2-meter 558. WA6PLE WA6NOU K5JIC6 WA6LMN K6TEH WA6TAB N6YR WB6IZF and WB6CHN worked a March of Dimes Walkathon in King City. SCV ARES Net is Sun. at 1000 on 3955. WR6ADE held a flea market on Sept. 10. Traffic: W6YBV 137, WA6AUC 118, W6RFF 114, W6WNV 37, W6KZJ 23, N6AU 12, WA6HAD 4, N6VB 4.

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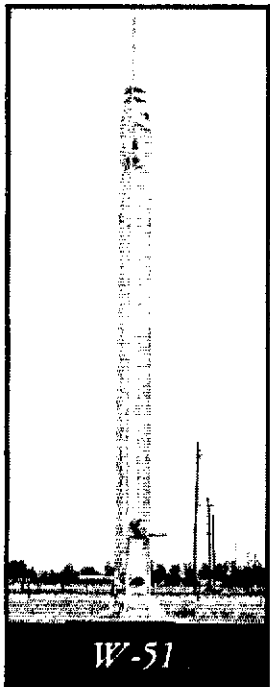
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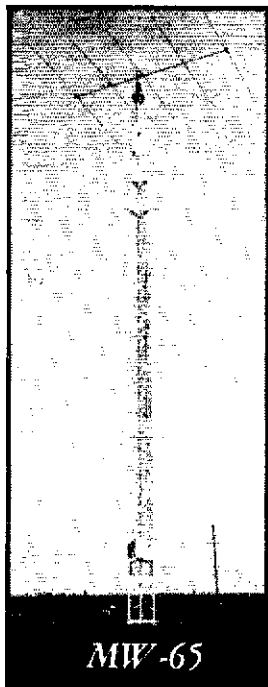


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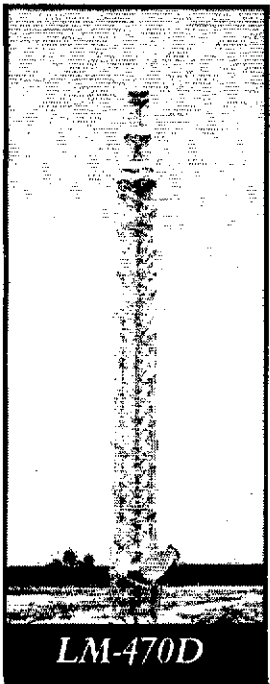
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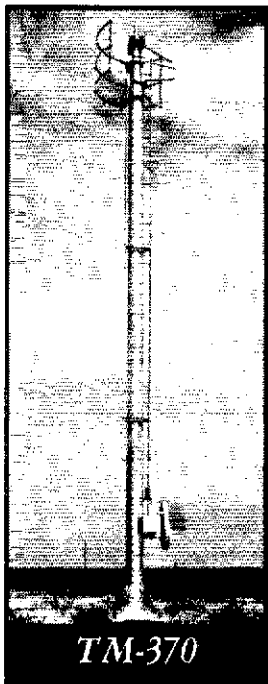
W-51



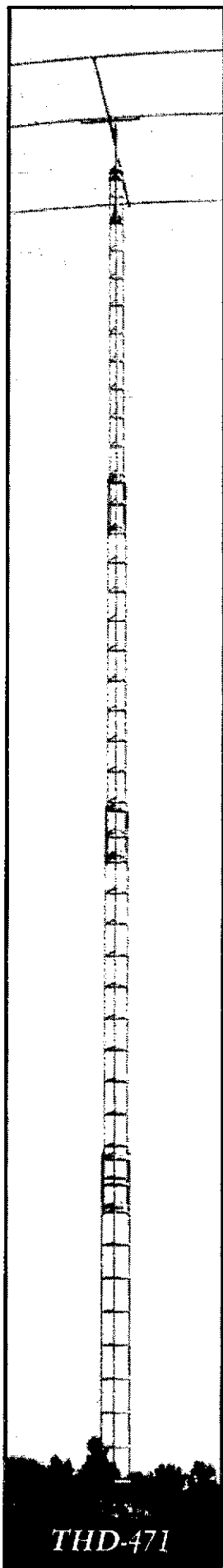
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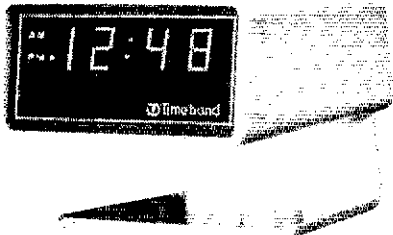
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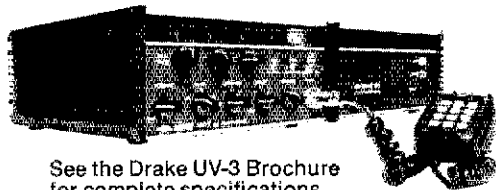
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### ROANOKE DIVISION

**NORTH CAROLINA:** SCM, Bill Parris, K4GHR — SEC: W4EHF, PAM: W4OFO, RM: K4MC, VHF PAM: WB4VIM, W4EHF K4TL & N4UE held a working session with North Carolina State Civil Preparedness officials to renew Amateur Radio involvement in the state plans. Attending from CD Hq. was WB4SLW W4GLK & N4NC. New officers of the Cary ARC are: WA4NRR, pres.; WA4TLI, vice-pres.; WA4AFV, secy.; WA4PID, treas. The JFK Net reports membership has increased by 48 over last year. W4AOJ & WB4ZIQ are new Directors and WB4KHZ is secy of the JFK Net which meets each evening at 2230Z on 3923 kHz. The Carolinas Novice Net, being directed by WA4QGS, invites all to check in with them at 2130Z on 3718 kHz. Two large VHF Tlc Nets continue to report high levels of activity — the Central NC Tlc Net on 13/73 and the Triangle Radio Alert Net on 34/94 (Durham). New ARRL appointees include WD4FFJ as EC Iredell, and W4EHF & W4OFO renewing as SEC and PAM respectively. Congratulations to the Cabarrus ARS, now affiliated with the League. The Brightleaf ARC (Greenville) reports membership now at 60. K4BE reports good results in latest Frequency Measuring Tests. N4UE received a personal letter from Governor Hunt thanking him for handling a message for him; also expressing appreciation to all Amateurs in NC for their many contributions. Remember NC QSO Party Dec. 3-4, and with 10 meters opening up good let's get on during the ARRL Ten Meter Contest Dec. 10-11. Have a very Merry Christmas and Happy New Year. Traffic: (Sept.) WA4PSL 225, WB4ZIQ 179, W4EAT 164, W4OFO 105, WB4MXG 90, K4FTB 86, W4FMN 64, WA4UTC 48, N4ZH 47, K4MC 44, WA4QGS 31, WB4ULP 28, WB4GOP 26, WB4OXT 25, W4PCN 24, K4GHR 16, W4EHF 13, WB4CYN 8, WA4SHD 6, WB4CES 3, W4PBG 2. (Aug.) N4UE 31, WA4SRD 8.

**VIRGINIA:** SCM, Robert L. Follmar, N4RF — SEC: WB42NB, PAM: WB4DBK, RMs: K4BKX WA4EPJ W4SHJ, WA4UUX 1st in tlc with 405. Says its a long way to BPL 500. Daylight 4RN (4ARN) doing FB job and getting bit with time. Kudos to K4ZM! K4GF says "Seemed to be a month of diversion here — Not even fighting with computer this month." WA4LJI EC has nice tlc total fm relaying msgs from Winch, Apple & Rockbridge Co. Festivals. He also found time to run ARES drills on 20 & 27 Sept; nice gng! N4FM rpts the Shenandoah Valley Club stn W4RKC sent over 100 msgs from portable 75 & 2 mtr stns also at the Winchester Festival. He thanks the VA stns who stood by on 3947 for tlc. N4LE pleased with new 80M Inv. yea. Old 40M + tuner on 80 was QNP across twm. New ant with 75 watts gets Q5 rpts fm Europe & W. Coast. WA4YIU CE/OPS demonstrated tlc handling out of Rockbridge Co. Festival. WB4PNY recovering fm her bout in hospital. W4NWM has HW101 wrking and now has a spare setup. Highlights of month was the Virginia Section ARRL Convention. This was an exceedingly well planned undertaking and was ALL business. WA4PBG and his group did a bang-up planning & operating job to make it a huge success. My hearty thanks for a well done job! Headquarters people were there in force tm Pres. Dannels; Director Wicker and Staff including Geo. Hart & Chod Harris. This entire column could not cover all the happenings and comments. So if anyone feels "left-out" the SCM apologizes. K4LEF among other hams offering congrats to a well done Conv. Job! Ron is the new Editor of the W4CA Log. W4OOL rpts the local club had busy month with Civic activities. K4JNA and W4OKN becoming active again. W4HIR also agn checking into our tlc nets and WASVG; welcome men! WA4NYZ sez that teaching activities & flying lessons twice a wk cut into hamming. VP W4KFC visited LMRE officers in Mexico City, attended meeting of Reg 2 IARU Exec. Committee in Panama, busy! WB2VYK4 and new Editor of the VA Ham is awaiting PRA appointment. W4YA nw QSL Mgr for EP21A. WB4UHC spent most of month putting up tower. Wmsbg. ARC started its 2nd Novice class at James Blair HS. Course is 10 wks. K4DHB traded houses (2 wks) with W4OAE (GA) DHB got the ocean, OAE got Washn. N4DR still using rain-gutter ant, hl. W4TY rpts lightning strike on stn in July and not yet back to normal. K4EJ bldg ham shack in bsement. WA4STO bk fm 2 wks vacation in Canada; wrking on new HW101. Nice OO rpts from W4HU N4NW K4ZVS & WB4ATB. Keep up the gud wrkl! Club papers: RF-79:AMRAD;YARC;W4CA;SPARK — Keep em coming! Traffic: WA4UUX 405, WB4DBK 332, K4BKX 283, WA4UQ 240, WA4EPJ 176, W4LXB 144, K4GR 143, WA4LJI 128, WB4ZNB 87, WB4FLT 85, W4SHJ 84, N4RF 83, K4JM 79, WB4KIT 71, N4FM 71, WB4DQZ 63, N4LE 53, WA4YIU 50, K4LEF 38, WB4PNY 31, N4FP 30, W4NWM 29, W4SUS 22, WA4PBG 19, W4OKN 18, WA4CLK 17, W4OOL 16, W4HIR 15, WA4QQI 13, WA4FDV 11, WA4NYZ 10, N4DW 8, WB2VYK4 8, WB4FNW 8, W4YE 7, WB4UHC 7, W4TMN 6, K4DHB 4, N4DR 4, W4KXE 2, WA4NOB 1.

**WEST VIRGINIA:** SCM, Donald B. Morris, W8JM — New State Radio Council officers: K8KT, pres.; WB8GDY, vice-pres.; WB8WVZ, secy.; K8SR, treas. New ORS K8MS, ex-WB8TEE. OPS: K8KT K8BT. East River ARC offices WB8NRK, pres.; WD4EVS, vice-pres.; WD8ESB, secy.; WB4YTH, treas. WD8CRR now has Extra. Congrats. WB8SAW active in CAND traffic nets. N8II active from Martinique during Oct. WD8JH new Tech. New repeater, Elkins, WR6AOH on 04/64. WB8DXF now K4TW. WB8VNO now K8BS. WB8CGC now K8LZ. KPC provided communications for Charleston Sternwheeler Regatta.

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Novice	3730	2215 Dy	156	37	30
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Phone	3990	2300 Dy	821	198	30
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Traffic: WB8ZTV 125, WB8SAW 73, K8BT 62, W8JM 52, WB8YMJ 51, K8MS 45, WB8VAZ 39, WB8ZTL 30, WB3JWX 29, WB8II 28, K8YL 28, WB8JYM 13, WB8EGW 9, WB8CKQ 9, WD8CDQ 9, WA8ZBM 7, K8ZDY 7, K8KT 7, K8MHR 7, WD8ILK 6, WA8RUZ 5, WD8CNM 5, WD8JYN 5, WB8LFW 5, K8CFT 4, K8QEW 4, WA8LFZ 3, K8JQ 3, WB8ZTY 3,

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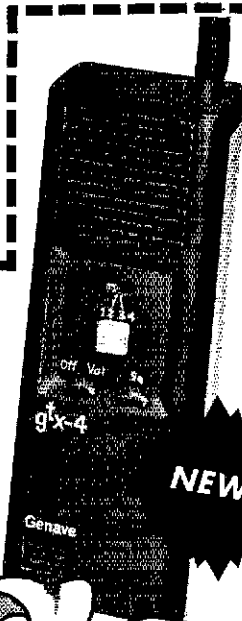
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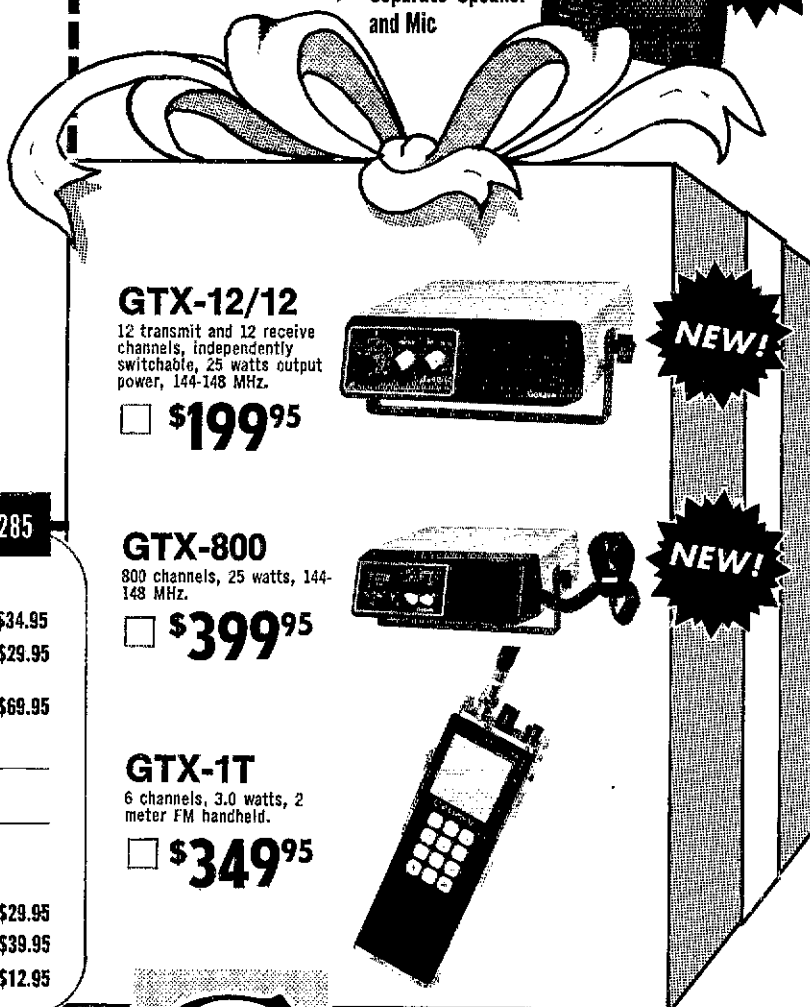
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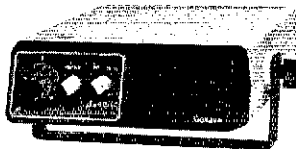
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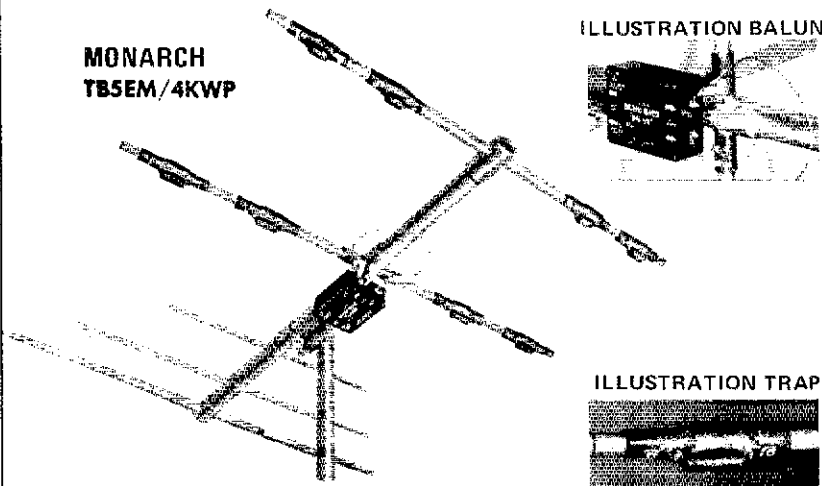
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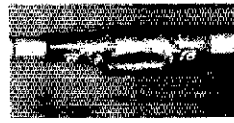


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#### ROCKY MOUNTAIN DIVISION

**COLORADO:** SCM, Clyde O. Penney, WA0HLQ — SEC: K0FLQ. RM: K0TER. PAMs: K0CNV WA0YQG. W0PHF received his Extra Class license, received WA5 on 160 meters, and received Bicentennial WAS. His new call is K0ZK. Newly elected officers of Colorado 10-X Chapter, Centennial Net are: W80FQD, pres.; W80KRL, vice-pres.; W0WWW, secy.; WA0YNO, treas. Net Trc. for Sept.: Columbine QNI 1241, QTC 157, Informals 140, QNF 1593; Hi-Noon Net QNI 1104, QTC 31, informals 138, sessions 28, QNF 1233. Late Net Trc. for Aug.: Columbine QNI 1304, QTC 168, informals 323, QNF 1605. Traffic: (Sept.) W0WYX 1920, K0YFK 866, W0NMW 728, K0DJ 514, W80QPO 115, W80MCL 109, W0EJD 90, W0LAE 78, W0RE 78, WA0YNP 78, W80PVI 77, K0OTU 68, K0TER 53, WD0BNL 38, K0SPR 15, WA0YED 11, W0GU 2, (Aug.) W0QFY 129, K0OTU 70, W80IZO 11, K0PVI 6, WD0BNL 1, (July) W80IZO 26.

**NEW MEXICO:** SCM, Joe T. Knight, W5PDY — SEC: W5ALR. PR: W5QNR. PAM: K5IKL. RM: K5KPS. Southwest Net (SWN) meets daily on 3585 kHz, at 2015 local time and handled 183 msgs with 181 stations reporting in. New Mexico Roadrunner Net (NMRN) meets daily on 3940 kHz at 1800 local and handled 76 msgs with 1376 stations reporting in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 97 msgs with 600 check-ins. SWN reports activity picking up. K5GMB doing FB job with NM Breakfast Club. Good to have W85YCF back after a long vacation. W5JOV reports ARTS TFX steadily increasing. Sorry to report the passing of the XYL of K5AVS. Traffic: W5DAD 806, W5JOV 289, W5UH 243, W5ENI 148, K5KPS 131, K5MAT 111, W5SOP 107, W5KH 102, N5NG 88, W5YQ 64, WA5MIY 16, WA5OHI 13, W85CAG 4, W5OLA 4, K5NM 2, W5PQN 2, W5YTX 2.

**UTAH:** SCM, Carl R. Ruthstrom, W7GPN — Highlight this month was an emergency test exercise involving simulated earthquake along Wasatch front. Test conducted from 3 emerg. op centers, Salt Lake, Weber and Box Elder Counties. Activity on 2-meter band. Traffic handled effectively and timely. Participants: K7AHB, W87BEW, WA7BWF, K7DJO, W87DMI, K7DOT, WA7ENF, WA7FVQ, W7FY, W7GPN, N7JE, WA7KHE, K7LQG, W7LFI, W7OCX, W7PBP, W7QDY, W7QNV, WA7SYV, K7YLT and WA7ZBO. Another highlight was amateur radio support of operation "HOOP IN", involving about 400 Boy Scouts. W7ITZ supplied communications along trail with WA7UJJ at the top and WA7ZBO at bottom of trail. Others were W87CCK, K7RJ, W87RXD and W87SUB. Contact to SLC from WA7ZBO's base maintained via WR7AGI and 40-meter SSB through W87EBO and W7ADE. An impressive demonstration of RTTY and SSB concluded the activity. Special credit to WA7ZBO's XYL for her work feeding the hungry hams. W87BEG and WA7YZK manned a 2-meter, HF and fast scan demonstration during "Friendship Days" at Ft. Douglas. Officers of the BYU Radio Club are: WA7SNV, pres.; WA7SSA, vice-pres.; W87DRI, secy-treas.; WA7PZT, sta. mgr. Traffic: K7HLR 97, WA7MEL 66, WA7JRC 49, W7BE 9, W7UTM 5.

**WYOMING:** SCM, Chester C. Stanwary, W7SDA — Asst. SCM: Tom Graham, W7KHH. PAM: WA7WFC. RM: K7KSA, W87BVT, ex-KH6JHE, now resides in Cody. W80JAX7 now living in Cheyenne. W87CLX now resides in Torrington. W8GCA, ex-WA7PCZ now resides in AR. W87AHL has new FT101E. K7ISG has new TS820S. W7CGK reports the Shy-Wy Amateur Radio Club as 31 enrolled in their tall Novice class. W87NGB upgraded to General. New Novices: W87TXX, W87TIF, W87TIG, W87TIH, W87TJP, W87TMT, W87TKH, W87TCG, W87THJ, W87THK, W87TLM, W87TEZ. K7SLM reports 22 sess. 547 QNI, 15 QTC for Wyoming Cowboy net for Sept. Traffic: W7TZK 437, K7VWA 427, W7SQT 317, K7SLM 21.

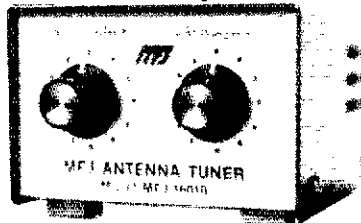
#### SOUTHEASTERN DIVISION

**ALABAMA:** SCM, Jim Brashear, W84EKJ — SEC: W4DGH. RM: N4MD. PAM: WA4JYU. Congrats to Lake City ARC, our most recent affiliated club. Also to W4LNN, our new SCM. The Birmingham ARC now publishing pictures of new club members in their Newsletter. Transmitter hunts catching on with Mobile, I-win Base and Huntsville ARCs sponsoring/planning them. Decatur ARC made BPL with 110 originations to the Good Sam Samboree (a RV group) at Point Mallard park recently. K4AOZ gained much publicity for ham radio and his station activities in an article published in the Birmingham Post-Herald. K4JK having problems with his new amplifier. K4HJM says interest in emergency operations still high and good turn-outs for their Sat. morning breakfasts. We need someone to assume net manager for daytime section nets per the schedule outlined in the new Public Service Communications Manual. I hope more of our members report monthly their traffic/station activities to our SCM — much traffic being handled but not reported. Appointed WA4JDH as ORS; WA4VKD as ORS-II. Traffic: (Sept.) N4MD 738, WA4JDH 730, W84EKJ 116, W4ATD 110, K4AOZ 86, N4OE 58, WA4RND 50, W4IBU 38, WA4VKD 25, W4EF 15, WA4WQH 14, W4TVY 4, W4ARMP 3.

**CANAL ZONE:** SCM, Paul F. Ebdon, K26TJ — K25VV administered the first FCC Advanced test to be given to the C.Z. He also gave a talk about Ham Radio to the local CB Club. Helping him with a two meter demonstration were K25S, AS DS FR and SD. K25BA has volunteered to be the Hamfest director for the second year in a row. Next year's Hamfest will be in Feb. and anyone interested in helping Bob, call him by phone or two meters. K25BA had an antenna party at his QTH.

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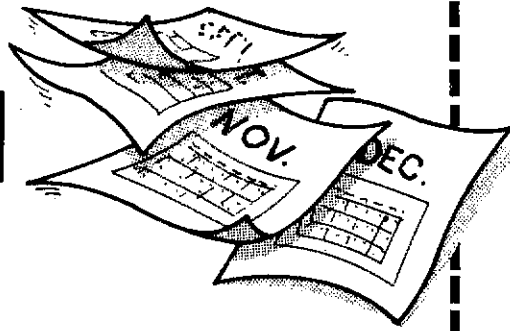
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 PS-1 Regulated AC Power Supply for use with all makes of transceivers 14 VDC-7 amp ..... \$69.95  
and the following **standard crystals**  
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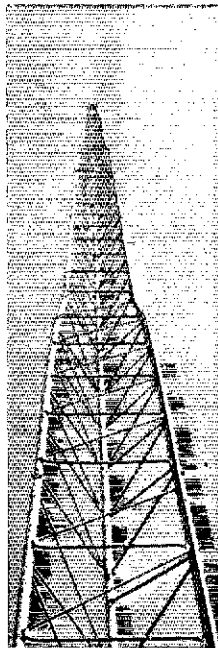
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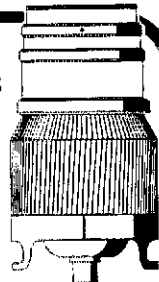
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**GEORGIA:** SCM, A. H. Stakely, K4WC — SEC: K4YRL, RM: N4UJ, PAM: K4JNL. Congrats to K4EV WA3NAZ4 and K4VHC making PSHR. That's not a new RM, just W4SHL with his new call. Net skeds. GSN meets 3:595 at 2300 and 0200Z daily. GBN meets 3:975 at 2330Z daily. GTN meets 3:718 at 2200Z daily. 4RN meets 3:567 at 2345 and 0130Z daily. D4RN meets 7:240 at 1700 and 2200Z daily. GARES meets 3:975 at 2100Z Sun. Ga. Cracker net meets 3:995 at 1100Z daily. C. A. 2-mtr Assn. net meets 10:70 at 0000Z. Sept. reports: GSN QNI 361, QTC 170; GARES QNI 112, QTC 3; CVEN No1 QNI 99, QTC 1; CVEN No2 QNI 1201, QTC 117; West Ga Emerg Net QNI 58, QTC 0; GA Cracker Net QNI 553, QTC 33. Sadly we report K4KCP, WB4SKO and WA4YGF are Silent Keys. W4BIA new OBS. K4VHC reports excellent results with 75-mtr mobile. New veep for QRP ARC International is WB4ZOU. Thomaston Area ARC and Ringgold ARC now ARRL affiliated. WA4CF1 and WB4TYF indoctrinating 12 new potential hams for Albany ARC. K4KZO and WD4IBV got their tower up. W4BTZ working mobile cw has WAC and 25 countries confirmed. Official Observers are needed. Contact SCM if you can help. Traffic: W4FOE 338, W4PIM 231, WA3NAZ4 108, N4UJ 63, W4BIA 51, K4VHC 48, W4GH 48, K4YRL 38, K4EV 33, W4HON 28, K4NM 28, K4WC 7, W4JM 4.

**NORTHERN FLORIDA:** SCM, Frank M. Butler, Jr. W4RHH — SEC: WA4WBM, RM: WB4GHU, PAMs: WA4TNC075, WA4TXM/40, WB4BSZ/VHF. Net Certificates earned by WB4JMN & WA4LJO on F2FYN, by WA4BZV K4CP WB4GHU W4JL WB4JMM W4KIX W4LDM WB4QBB N4SS N4WA & K4YX on QFN; by WB4QBB on CAN-D. New appts: WA4ZFQ as EG of Columbia Co., WA4STZ as OPS. Sorry to report WA4AYO and W4DFY Silent Keys. A training session in CW net procedure is being held on 3950 KHz at 0300Z for benefit of NFPN members — conducted by N4SS and W4VNY. WB4QBB now PSA for work in Apr. floods. Ten-meter activity growing in Pensacola — tune in on 28,600 KHz. WA4PMU earned WAS with all contacts made in the Novice bands. K4VYF again active in traffic handling. K4KHV looking for 160-meter activity in NW FL. WB4PHT, Boys' Ranch station, handled traffic during their recent Open House. Correction on ham tag fees — cost is still \$1.00. WA4TNC keeping track of NFPN statistics with help of 8080 microprocessor. Ed White H.S., WA4LDV, now active on RTTY. WA4EYR now N4KE, WB4ZQC now N4KT, W4VMO now N4NN, WA4ZNY is N4VU. WB4RIS raised quad to 45 feet. A Directory of NE FL hams prepared by WA4WXI; copies available through RANGE. WA4QCX is NOFARS rep, giving FCC exams to handicapped applicants. W4YYS reports about 150 stations throughout FL active on 145.1 MHz SSB. WA4ZLM making color slides of members' stations for LMARS. WB4GHU completed new ARES Plan for Volusia Co. W4YRL now asst. EC for West Volusia. Traffic: (Sept.) WB4QBB 421, WB4JMM 229, WB4GHU 220, WA4CRI 211, N4WA 202, N4PL 139, WB4PHT 103, W4LDM 91, WB4DTS 84, WD4II 77, K4VYF 75, WB4FJY 64, WB4TZR 63, W4JL 61, N4DY 57, W4KIX 57, N4SS 55, WA4FKE 46, WA4TNC 44, W4RH 40, WB4VDL 39, WB4RIS 33, WB4EXA 31, WA4EYW 30, WB4VAP 29, WB4NJI 22, WA4EYU 21, WA4IWW 21, W4MGO 13, WB3OWX 13, K4RNS 13, WA4STZ 13, W4MGO 13, WB4WYX 11, WD4HF 10, K4DDY 8, WB4IJR 8, K4IEX 6, WB4VMP 6, WB4YKV 6, WB4LNO 4, WA4YX 3. (Aug.) WB4VDL 55, K4YX 38, WA4BZV 16, WA4STZ 13.

**SOUTHERN FLORIDA:** SCM, Woodrow Huddleston, K4SCL — SEC: WB4ALH, Asst. SEC: W4WYR, RM: W4MEE, PAMs: WB4AID WA4NBE. New appointments, OPSs: W4ESH K4GRM W4KMN WB4WYG and W4ZJ, OBS: W4ZJ. Endorsement: W4DL OBS. Congrats to W4MEE for BPL again. W4IYT has finished the "ARES MANUAL" of operations for Dade County, now available to members. K4TH added a Ten-Tec Triton IV to his station. W4BNE operates ATV 439.25 MHz. A surprise emergency drill was held Oct. 4, 8 to 9 PM, with City of St. Petersburg, Red Cross and Bayfront Medical Center simulating collapse of bleachers at Al Lang Field injuring dozens of people. The SPARC Repeater Team provided communications with WB4YTY and WB4LLN going to Red Cross chapter, K4ISS and WB4PNV to Al Lang, and W4GPL to Medical Center. K4SCL acted as NCS on the SPARC Repeater, WR4ALM. WA4TJG alerted K4NAN and K4QCG who monitored 3651 and 3940 for possible emergency traffic. It was confusing as little information was available but Radio Amateurs responded promptly and efficiently to the emergency communications needs of their community, even though it was only a drill. At least a dozen others stood by ready to help if needed. WA4KCR and K4SCL are among those sponsoring solar cells for AMSAT Oscar VIII. Hope to see a lot of you at the Clearwater convention, Nov. 19 and 20. Traffic: W4MEE 691, K4SCL 332, K4TH 322, K4SJH 257, WA4GYR 160, WB4WYG 152, WB4AID 140, W4WYR 125, WA4NBE 95, WB4JNU 94, WA4PFK 89, WA4EIC 80, WB4ALH 77, W4KMN 69, W4GPL 64, W4DVO 62, W4IYT 53, W4GDK 52, W4NTE 52, WA4QGV 50, K4BLM 45, K4NAN 43, K4EUK 36, W4QM 34, WA4HDB 27, N4TW 27, W4IRA 26, W4KGJ 21, WD4COL 19, W4BNE 19, WB4P1B 16, W4ZJ 15, W4ESH 12, W4SMK 8, WA4ZQH 5, WA4ISB 2, WB4SSP 1.

**WEST INDIES:** SCM: David Novoa, KP4AM — The emergency communications plan has been implemented by SEC KP4CV and EC KP4BSO. Zonal ECs are: KP4s DXM MWD DDP DEC MEC DQS DAL ZC ABN and EGO. 23 new Asst. ECs have been appointed and ARES organization has 125 full members. The Radio Club de PR and the Club de Radio Hiccionados Boricuas began radio courses. The YLs Club and the DX Club of PR are also very active. K4VZ provides public service communications between contest and DXing times. KP4EGO passed the Extra Class exam. KP4EOD AND

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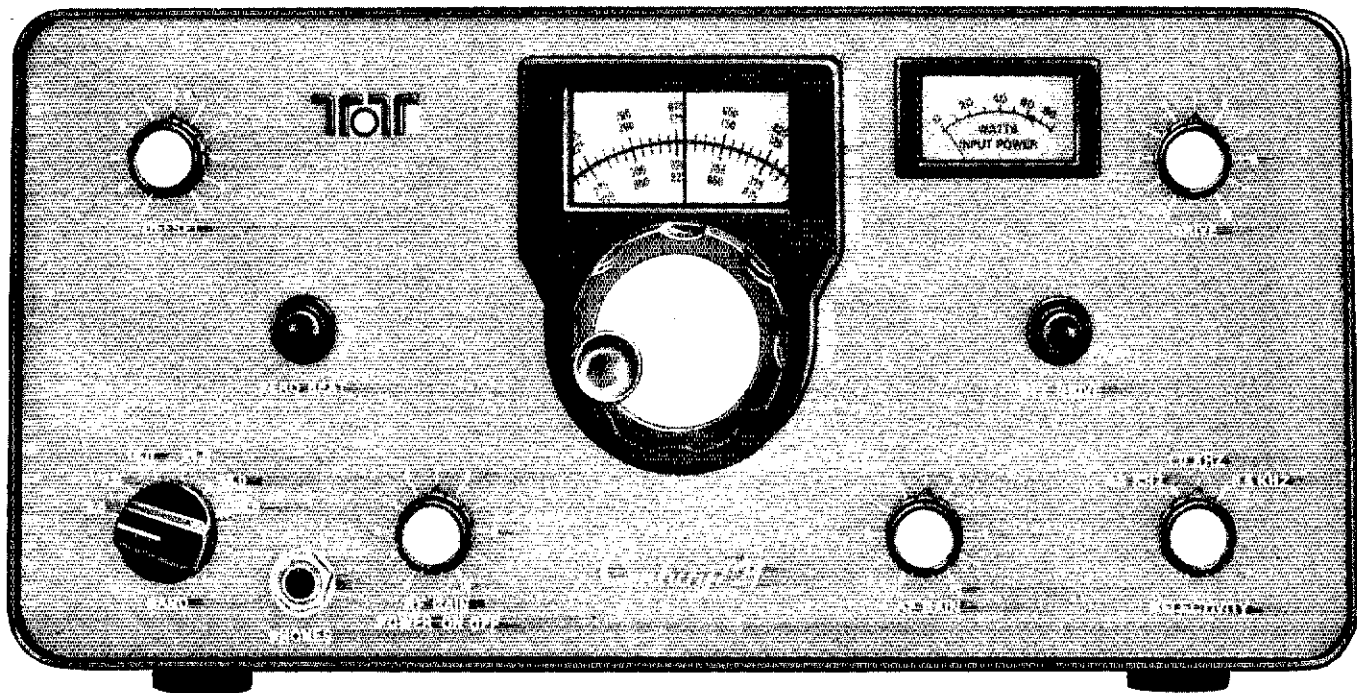
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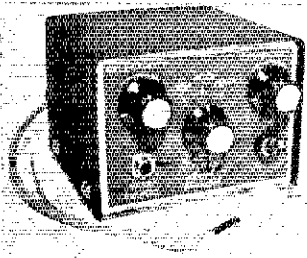
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KP4FCA got their General tickets and KP4EHH passed the Technician test. KP4FI is a new Novice in Bayamon. She is the XYL of KP4DMZ. KP4EMP applied for Leagues' Life Membership. He is also the Vice-Pres. of Leavittown's Lions Club. Felices pascuas y prospero ano nuevo con mucho DX

### SOUTHWESTERN DIVISION

**ARIZONA:** SCM: Marshall Lincoln, W7DQS — RM: W7EP. PAMS: W7UQO and WA7KQE. A hamfest sponsored by the Old Pueblo RC, to have been in Nov., has been re-scheduled for Apr. 23-30 at the Ramada Inn, Tucson. The Superstition ARC continues work on its own repeater, with members planning to homebrew or kit-modify as many items as possible for economy. The Metropolitan ARC at Tucson has a reverse autopatch on 3494, with club members maintaining control by radio. Congratulations to the Arizona Repeater Assn., observing its 10th anniversary. WB7CUP is new editor of the club paper, the Squelch Tail, and K7QWR and WA7YLM are new board members. New officers of Explorer Post 599 are WB7CUE, pres.; WB7RPG, vice-pres.; WB7PZH, treas.; WA7ZHJ, secy. Advisors are WA7SKJ and K7WVG. Welcome to WA7YIG, U of AZ RC, handling traffic on the Cactus Net and SWN. K7RDH has returned from London, where he was G5APS. WB7BGC is moving from Flagstaff to Tucson and has resigned as Coconino County EC. WB7TPY is a new ORS and OPS appointee. The Cactus Net received a certificate of appreciation from the Cochise AR FM Assn. for assistance in the Carr forest fire in June. Cactus Net 205, ATEN 78, SWN 183; Traffic: W7EP 276, K7LUXB 90, WB7TPY 87, WB7CAG 71, W7HFR 48, WA7KQE 43, WA7YIG 20, W7HFR 16, WA7WEB 15, W7RQ 13, W7DQS 13, K7NMQ 9, WB7CZL 4, K7JKM 2, K7GLA 1, K7ZMA1.

**LOS ANGELES:** SCM, Eugene H. Violino, W6INH — RM: W6BPKA. Well fellows this is the last of my columns. The new SCM is Mr. Stan Brokl, K6YQO. His address is 8437 Oswego St., Sunland, CA 91040. All Los Angeles Section members should send their reports to him. I want to thank everyone for the wonderful support given me in the last six and a half years. Club secys. please send the club bills to Stan, so that he may keep up with your activities. I am now retired and plan to keep active in many more activities than have in the past. Next Mar. I will have completed forty five years in the communication field, and as you know its a large field and still expanding. Stan has offered me the position of Chief RM for the section which I will be glad to fill for a while; this means that I will be active on SCN and RN-8 regularly, so my first suggestion is that the holidays are coming and we should be ready to originate and send some traffic soon. This means to polish up the rigs and wash the antennas, hi, its going to be a wet winter they tell me and we will want to do considerable hamming. Bad news for the LA Section is that we will be losing a good and steady SCN member who will be moving to Carlsbad in a mobile home. It is hoped that he will be able to get on with a restricted antenna. My best wishes to all the gang through the coming years. 73! Traffic: N6PZ 69, W6SGZ 69, W6INH 84, W6HJU 71, WB6YID 68, K6CL 32, W6BRO 31, W6BWG 25, W6BAIT 2, N6HE 2.

**ORANGE:** SCM, Wm. Heltritter, W6BAKR — Asst. SCM: K6KNC. SEC: W6AOB. RMs: WA6TYA W6BAKR. PAM: W6CPB. ECs: W6BARK K6GGS W6LKN K6KNC W6WPP WA6YWS. W6BNSX advises epidemic of "Kenwood Fever" in the Anza Valley resulted in K6VDS W6BMMMA W6BNSX and W6BSKL as owners of Kenwood TR 7400A transceivers. Anza Valley ARC Novice class has 20 students. New equipment of Hamet ARC members include: W6RSR — Clegg FM-28; W6JWU — Midland 13-510; WA6ZIR Icom IC-245 with SSB adapter. WA6JZZ now N6PE. Fullerton ARC reports W6GCL on 2 meters with Kenwood TR 7400A. South Orange ARC recent amateur radio classes resulted in Novices: W6DCXJ W6DCXK W6DCXL W6DCXT; Technician: K6MHV; General: W6AEM; Extra: K6BZM. Palm Springs Desert Rats ARC reports: WA6VXD has 1 technician; W6VXC has General. New amateur radio classes: Palm Springs, Thur., College of the Desert, contact WA6HUB; Yucca Valley, Wed., Community Center Bldg., contact WA6ATW; Fullerton, Mon/Wed. or Tue/Thur., Sunny Hills High/Western High, contact 870-4990 X27; Santa Ana, contact WA6LFF at 531-8717 or WA6MPI at 545-1298 for information; Mission Viejo, Mon. or Thur., Saddleback College, contact 831-9700 X235; Costa Mesa, Tue., Wed. or Thur., Orange Coast College, contact 556-5735; Huntington Beach, Mon. or Wed. Coastline Community College, contact 963-0811. Traffic: W6BEIG 613, K6JT 107, W6RE 48, W6CPB 38, WA6YWS 13.

**SAN DIEGO:** SCM, Arthur R. Smith, W6INI — SEC: W6INI. ECs by District: Northern N6AT, Eastern WA6UFY, Southern WA6UAZ, Central W6INI, Imperial WA6LAW. Only nine more months until the ARRL National Convention, San Diego, Sept 22-24, 1978. Poway ARS has provided the Poway library with a set of ARRL publications, an example for all clubs to follow. New appointments: WA6LAW EC for Imperial County, K6LKW to ORS. New ARES members: KL7JEB WB6VIQ WB6VAH WA6VMO WA6CFE K6US. Upgraded: W6BAFJ and WA6TIO to General. Call sign changes: WA1SAJ to WD6DBT, WA7IOK to WD6DL. CQWA members responding to a call for volunteer examiners are: K6AM W6BR W6JWU K6KX and K6NC. S. D. Chapter CQWA officers for coming year are K6UV, pres.; W6BZE, VP; W6QSD secy; K6AM, treas. Poway ARS licensing classes are held on Mon. and Wed. 1930 to 2130, at Poway High School Media Center, 15500 Espola Rd. ARC of El Cajon has class on Mon. 1830, at Emerg Opns

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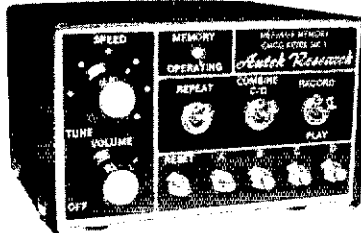
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Gen. Hacienda Dr. Welcome to newly affiliated clubs, Point Loma ARC and 220 club of S. D. WB6IEK K6OBP and W6TOO appeared on TV program with FCC Engineer Spillman. Traffic: WB6PVH 242, WB6FTY 117, WA6UAZ 112, N6GW 99, N6AT 43, N6RD 32, WA6UFY 31, WB6EY 30, W6SIF 19, K6LKW 18, K6JN 2.

**SANTA BARBARA:** SCM, D. Paul Gagnon, N6MA — N6NB scored over 32K points in the Sept. VHF contest from Mt. Pinos. K6MEP scored 16K. K6WI hosted the traffic breakfast at the convention in Santa Maria. Over 1400 attended the convention. Thanks to chmn. WB6H-JW and his crew for a great job. KH6IQU now maintains traffic schedules at all levels from section to TCC. W6SPT conducted an ARCS drill in Thousand Oaks to test their capabilities. WB6AGX has gone to Okinawa for duty. Congrats to all those who upgraded at Santa Maria. New licenses in Santa Barbara are: Novices WD6s BNH BMQ BJG BNF CIW BFC BXU; Techs. WA6s ZYG SRJ; General WA6s WXX RHZ DNN AGD WB6THA; Advanced WA6KTZ WB6TUD; Extra W6LNN. The slow speed cw net meets on 3598 at 8:30 P.M. daily at 14 wpm. A great way to get your code speed going. Sorry to hear that K6DSU and K6KV are Silent Keys. WA6BVL is the Asst. EC for Ventura Co. The ARCS provided communications for the Ventura Fair parade. Club news: Bruce Gordon spoke at SMRA on direction finding. Vice director W6EJJ spoke at Consejo Valley ARC. W6HS spoke at Pointsettia ARC in Ventura on Pitcairn Island and VR6TC. N6MA spoke on RTTY at Camarillo Mike and Key Club. WA6JGK W6IGH W6BDPL WB6NZL WA6GSA received operating awards from Pointsettia Club. K6KNC spoke on Emergency Comm. at SB Club. The Simi Settlers meet in Simi on the 3rd Thur. at B of A Levy. PSHR: WA6VBS 40, K6WI 34, N5MR 34, KH6IQU 34, N6MA 30, WB5KPL now N5MR. Traffic (Sept.) KH6IQU 241, WA6MBZ 153, WA6VBS 119, K6WI 83, N5MR 56, N5MA 9. (Aug.) WA6VBS 143.

### WEST GULF DIVISION

**NORTHERN TEXAS:** SCM, Ted Heithecker, W5EJ — SEC: K5PC. RM: W5LA. Best news in a long time — Texas CW Traffic Net Bulletin being published by WA5RKH contact Sam to get on the mailing list. Slow speed nets are beginning to appear, listen around 3770 for info. Big story now is Convention time, with something happening every weekend. West Gulf ARRL in Austin, Texoma, and others were scheduled for Oct. Will report on them next month. Heard comments that Novice classes are down in attendance from last year, as much as 50 percent could be local but all are urged to recruit as many as possible for classes. Irving ARC included time notes on coaxial dipole antenna. Contact WB5MCP if you want a copy. West Texas, W5QPX on the trail of intruders and possible hams in trouble sent three-page report, that's really doing an OO job. WA5UOC and WB5DMR up to their hip-pockets in every activity in North Texas amateur radio. K5IBI spelled out a bunch of good remarks on Club activities in the Panhandle ARC bulletin. The things said needed saying and Carl said "well. WB5JBP/WB5LWB and others going all out on SSTV — if you haven't seen SSTV recently make it a point to do so, it's goodoo! DARC published 26 page newsletter and is planning big show to introduce public to ham radio. Much interest in OSCAR and good info from WA5RAI/W5YF. Need to comment on work by W5SQO who provides labels for everyone in the region, and hours of personal time on behalf of ham radio. Thank him next time you see 'Im. RWK publishes excellent list of contests, worth the price of membership alone. FCC asks for volunteer examiners for physically handicapped applicants for amateur licenses. Write FCC, Dallas, if you can help out. K5NW published info on DXers. Good info, put together as a result of earlier poll. Many of the bunch not heard from this month. Keep the info coming in, we'll try to get it in the column. W5TI, as usual, top traffic man reports ARTS CW tic net ARRL registered open to all. W5ARV returns from 3 months in South America compliments American amateurs for clean operations. SEC, K5PC new address and phone 221-2222. W5PBN moved into the house, at last! Traffic: W5TI 244, WB5HQU 61, W5GSN 52, K5PC 33, WB5LAT 27, WA5INJ 14, W5PBN 10, W5YK 8.

**OKLAHOMA:** SCM Leonard Hollar, WA5FSN — Asst. SCM & PRO: Ray Miller, W5REC. SEC: WA5MLT, K5CAV new PAM for Sooner Traffic Net. Our thanks to W5VOR for 4 years of fine work handling this net. N5OK WB5UGE WB5UYH & WA5ZKI new ECs. West Central OK ARC has the Elk City Repeater up in line shape. We are slowly reaching our goal of an OBS on each area Repeater, plus on the HF bands. These OBS skeds can also help in spreading info of local interest. Okla. City & Tulsa have been doing this for a long time. With both 'live' and 'taped' messages. We need to improve the "Public Service" use of many of our repeaters. Several of our Club groups did a creditable job of displaying Amateur Radio at County fairs this fall. Sept. traffic totals over 400 more than last month from 29 Station Activity Reports, 6 more than last month. This is fine. I am very well pleased with Oklahoma's response to the Commission's request for Volunteer Examiners for Handicapped Amateurs. Traffic: W5REC 503, WB5NKD 414, WB5NKC 354, W5RFB 140, WB5SOH, 118, K5OWK 116, WB5OSN 73, W5UYH 65, K5ZDB 65, W5FW 62, WB5OCZ 60, W5VOR 44, WA5FSN 39, W5SUG 37, WB5PVL 33, WB5OYU 32, W5BYC 31, WA5OLV 30, WA5JGU 29, WB5ELG 28, WA5MLT 21, K5CAV 17, N5LW 13, WB5RLR 10, WA5LWD 9, W5FFW 4, WB5UCM 4, WA5FLV 2.

**SOUTHERN TEXAS:** SCM, Arthur R. Ross, W5KR — SEC: W5TOP. PAM: N5TC. RM: WA5RKH. OO's rptg: K5DL (Aug & Sept) W5VAH. OVS's rptg: WA5QCP. PAM N5TC is the Asst. SCM for the Southern Texas Section effec-

tive Oct. 15. ORS WA5YJH has new Novice classes going. ORS K5DG teaching part time at Univ. of Houston. OPS WA5RVT is NCS for Brazosport Emcy Net on 2 mtrs; runs on emcy pwr once a month. W5YF has new 2-mtr quad up. Brazosport ARC has 24 students in new Novice class run by W5SAAH. Honorary VP W5QKF retired. K5WA has new dipoles for 80, 40 & 20; sure beats cliff-dweller antennas. OPS WA5OBT is now OPS K5GE, he has completed his 6-mtr WAS and 5BWAS. From W5ES Bulletin: N5ES back on air at last; El Paso ARC held "Open House" for its new Novice class, complete with two operating stations and demonstrated with several QSOs. ORS WA5YEA is conducting on-the-air classes in cw net operation at the end of the Texas Traffic Net (TTN) sessions in an effort to obtain more CW net participation. The Traffic Seminar at the West Gulf Division convention in Austin was well attended; we're hoping for more traffic handlers from the work of N5TC and K5TM. Traffic: W5KLV 506, K5HZR 474, WA5YEA 367, K5GM 264, WA5RKH 214, N5TC 204, WA5YJH 113, K5DG 72, WB4KSG/5 66, K5WA 38, WB5LW 32, W5BGE 26, WB5TNN 20, W5KR 19, WA5RVT 19, K5RVF 12, K5RG 9, WB5YDA 6, W5AIR 2, K5RVF 2.

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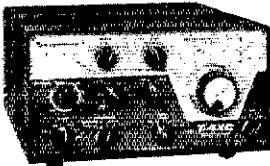
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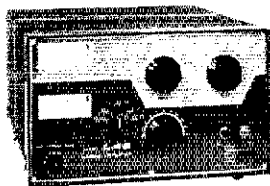
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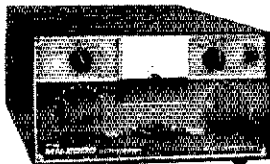
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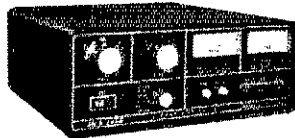


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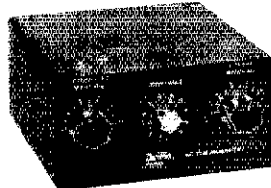
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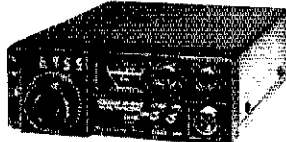


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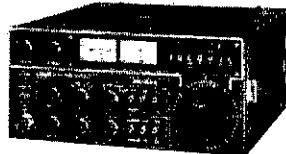
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ICOM Transceiver 2M FM  
IC 245 \$499.

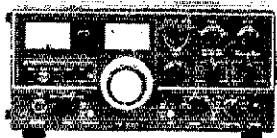


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KENWOOD Transceiver  
TS-820S 160 thru 10M \$1048.



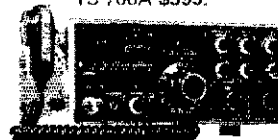
KENWOOD Transceiver TS-520S  
160 thru 10M \$649.



KENWOOD  
TX T-599D \$499.  
RX R-599D \$499.



KENWOOD FM/SSB  
TS-700A \$599.



KENWOOD FM/SSB  
TS-600 \$659.



KENWOOD 2M FM TR-7400A \$399.

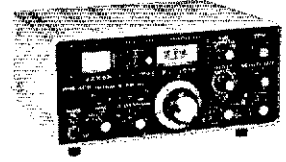


KENWOOD TR7500 2M FM  
Brand new...price to be announced.

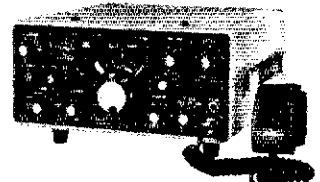


KENWOOD DG-5 Digital Frequency  
Display for  
TS-520  
\$179.

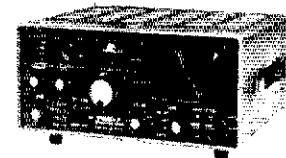
## YAESU



YAESU HF SSB  
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YAESU  
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YAESU Receiver  
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TR-2200A  
\$229.

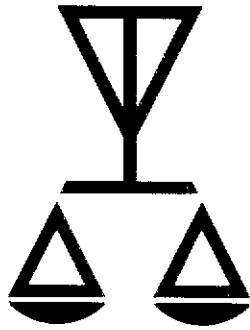
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## Legal research for the amateur radio and citizens band services.

The Personal Communications Foundation is a non-profit, tax-exempt California corporation established in November, 1976. Its Board of Trustees, Officers and Advisors consist of lawyers, judges and law school professors with substantial experience in the representation of users who have encountered communications related legal problems.

The Foundation has been organized expressly for the purpose of creating a comprehensive personal communications law library. The Foundation continues to collect available court decisions, briefs and legal memoranda relating to personal communications.

The Foundation has already expended thousands of dollars in funding special studies. One study on the issue of Federal Pre-emption has already been incorporated into a brief before the California Court of Appeals.

## Why you, the user, need the Personal Communications Foundation...

- 1** In 1976 there were over 7,000 legal matters involving all aspects of non-profit personal communications. In 1956 there were only 200.
- 2** *If you have an outdoor antenna*, you may be the subject of a criminal action for violating a zoning ordinance. If you are not now in violation of a zoning ordinance, be advised that they are being changed all over the country with the purpose of eliminating towers and outdoor antennas. You can be the subject of a civil action for violation of private deed restrictions.
- 3** *If you use a transmitter*, you may be sued if you interfere with a neighbor's TV or stereo, even if the interference is due to the inadequate designing of the TV or stereo.
- 4** Litigation of this nature can cost \$10,000 or more. It is estimated that 40% of that amount represents time expended in research. By providing your attorney with our research material, the Personal Communications Foundation can save you thousands of dollars in addition to helping your attorney better represent you.

## ...and why the Personal Communications Foundation needs you.

The Personal Communications Foundation is a membership corporation. Four classes of membership have been established, known as Associate Membership, for a yearly contribution of \$10.00, Full Membership, for a yearly contribution of \$25.00, Contributing Membership, for a yearly contribution of \$100.00, and Life Sustaining Membership, for a single contribution of \$250.00 or more. All contributions are completely tax deductible. All members of the Foundation will receive the newsletter.

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STATE

ZIP

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DATE

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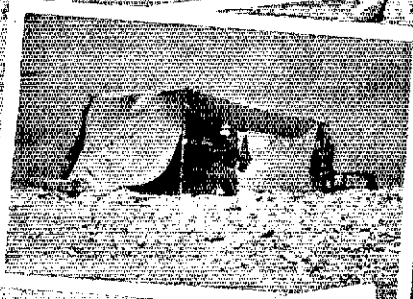
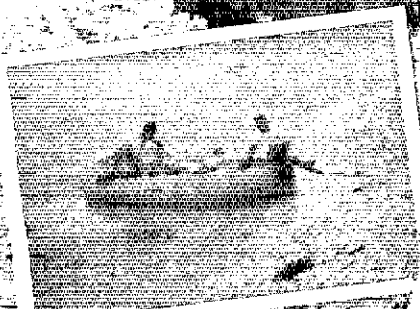
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If you're ever

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on an island so small that  
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are the traps on your beams—

## You'll be glad you're using a Drake C-Line



R.L. Drake Company  
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1977 DXpedition Group  
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A DXpedition to Kingman Reef requires the operators to have an uncommon amount of faith in their equipment. For this reason we chose the Drake C-Line. Our two C-Lines were subjected to what we feel were some of the most adverse conditions possible:

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3. AC-4 power supplies were sitting in water on several occasions due to severe rains.
4. During one rain storm, water was actually coming out of the R-4C headphone jack.
5. Numerous small lizards and spiders were crawling in and out of the C-Lines.

Despite all these adversities, the two Drake C-Lines were in operation for over 145 hours; the only "off time" was during the six hour trip from Palmyra Island to Kingman Reef. A total of over 16,000 contacts were made from KP6AL Palmyra and KP6BD Kingman Reef without a single transmitter or receiver failure.

I know that customer satisfaction has been the cornerstone of R.L. Drake Co. for 34 years. Let me say that as far as we are concerned, that cornerstone is firmly in place. Thank you for making a very reliable product.

*Barry J. Fairfax*

Barry J. Fairfax WB9KTA,  
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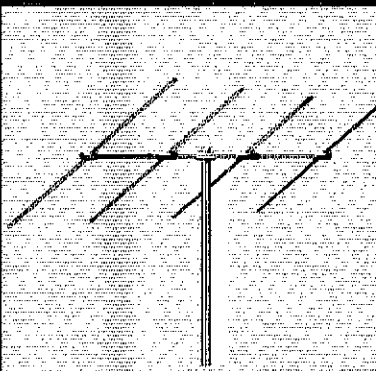
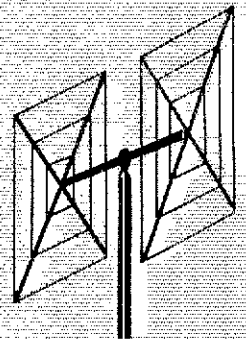
of simplicity in design providing reliability and contest winning performance, at rock bottom prices.

30 years of use test in all kinds of field conditions prove the quality of a Gotham antenna. The prices below prove the economy.

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Now check this super price: 10/15/20 quad, complete, ready for simple assembly... **JUST \$54.**



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In an age of compromise, Gotham beams stand out offering championship performance at modest prices. Adjustable to any frequency within band, at lowest SWR, these beams are built strong to resist adverse weather conditions. Each beam is full size for full size performance, not mini beams, or trapped beams; Including boom and all hardware; requires gamma match and single 52 or 72 ohm coaxial feedline; 7/8" and 1" aluminum alloy tubing for maximum strength and low wind loading.

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4 EL 10M Beam \$34  
4 EL 15M Beam \$43

FREIGHT PREPAID on 2, 6, and 10M beams shipped to the 48!

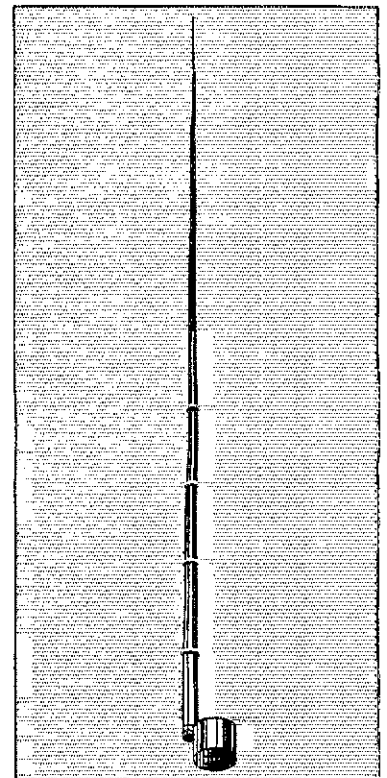
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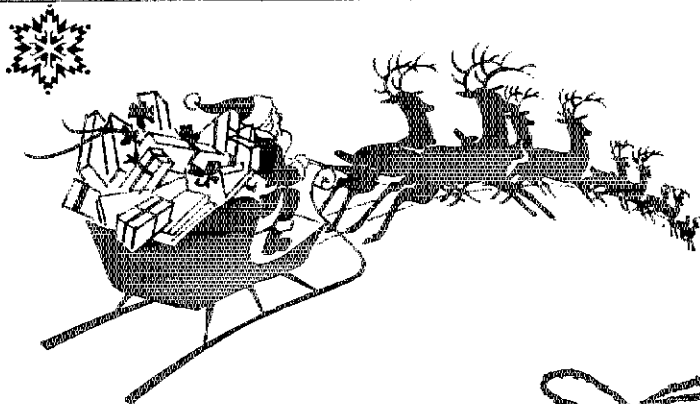
How to order: Remit total amount with order. We ship verticals, 2, 6, and 10M beams prepaid to the 48. Other beams and all quads sent freight collect cheapest way, due to size of package. Check your local truck lines for estimated freight rates.

For fast COD service on all prepaid antennas, call (305) 573-2080.

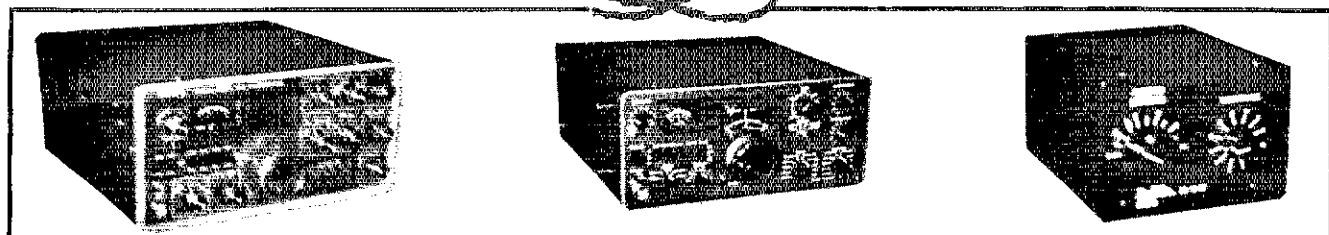
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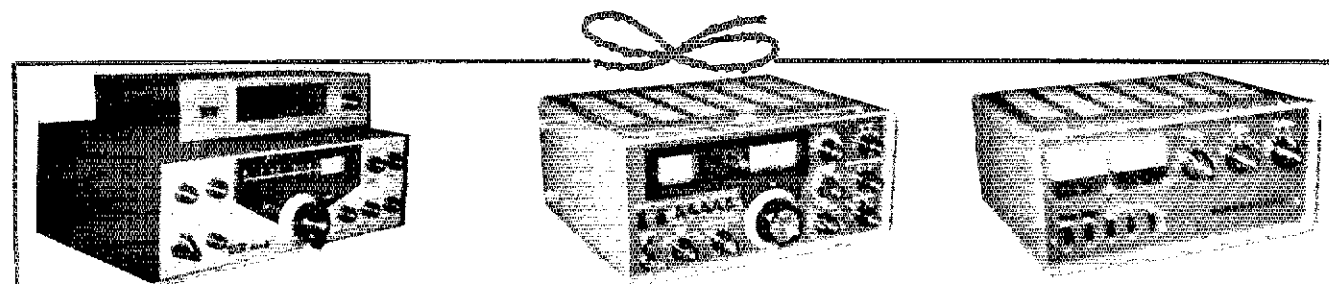
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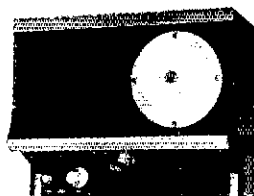
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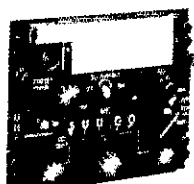
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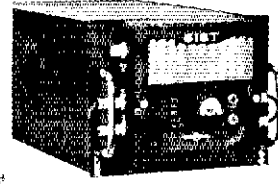
**ARC-51 Control Box**



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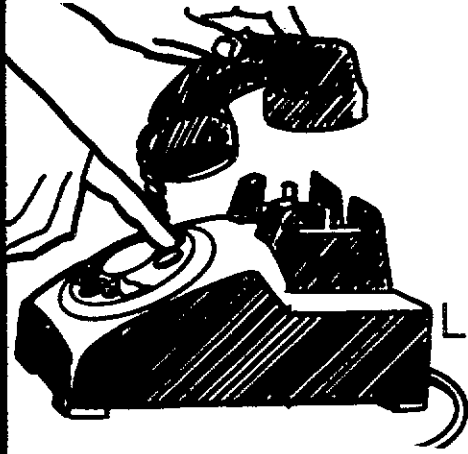
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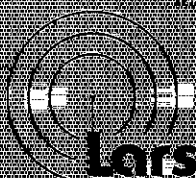
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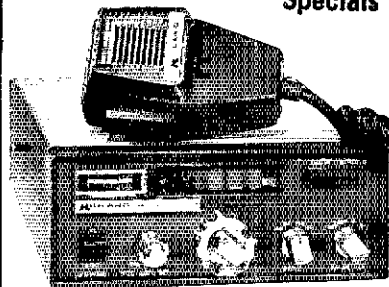
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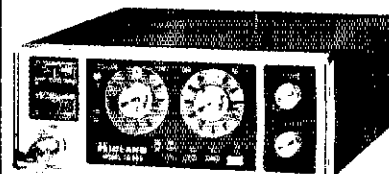
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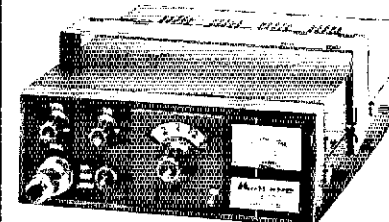
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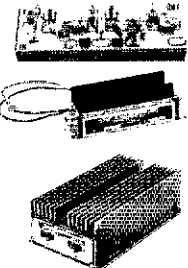
Note: Branch Stores are set-up to handle Walk-in business or telephone orders only. They do not have facilities to respond to written inquiries.

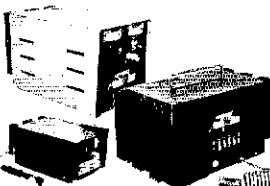
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RX50C W/T	same as above—wired & tested	104.95		RF144B Kit	2 mtr RF front end 10.7 MHz out
RX144C Kit	140-170 MHz rev w/2 pole 10.7 MHz crystal filter	69.95		RF220B Kit	220 MHz RF front end 10.7 MHz out
RX144C W/T	same as above—wired & tested	114.95		RF432 Kit	432 MHz RF front end 10.7 MHz out
RX220C Kit	210-240 MHz rev w/2 pole 10.7 MHz crystal filter	69.95		IF 10.7I Kit	10.7 MHz IF module includes 2 pole crystal filter
RX220C W/T	same as above—wired & tested	114.95		FM455 Kit	455 KHz IF stage plus FM detector
RX432I Kit	432 MHz rev w/2 pole 10.7 MHz crystal filter	79.95		AS2 Kit	audio and squelch board
RX432C W/T	same as above—wired & tested	124.95			


		TRANSMITTERS			
TX80	transmitter exciter, 1 watt, 6 mtr	39.95		TX220B W/T	same as above—wired & tested
TX80 W/T	same as above—wired & tested	59.95		TX432B Kit	transmitter exciter 432 MHz
TX144B Kit	transmitter exciter—1 watt—2 mtrs	29.95		TX432B W/T	same as above—wired & tested
TX144B W/T	same as above—wired & tested	49.95		TX150 Kit	300 milliwatt, 2 mtr transmitter
TX220B Kit	transmitter exciter—1 watt—220 MHz	29.95		TX150 W/T	same as above—wired & tested


		POWER AMPLIFIERS					
PA2501H Kit	2 mtr power amp—kit 1w in—25w out with solid state switching, case, connectors	59.95		Blue Line	RF power amp, wired & tested, emission—CW FM-SSB/AM		
PA2501H W/T	same as above—wired & tested	74.95		Model	BAND	Power Input	Power Output
PA4010H Kit	2 mtr power amp—10w in—40w out—relay switching	59.95		BLC 10/70	144 MHz	10W	70W
PA4010H W/T	same as above—wired & tested	74.95		BLC 2/70	144 MHz	2W	70W
PA50/25 Kit	6 mtr power amp, 1w in, 25w out, less case, connectors & switching	49.95		BLC 10/150	144 MHz	10W	150W
PA50/25 W/T	same as above, wired & tested	69.95		BLC 30/150	144 MHz	30W	150W
PA144/15 Kit	2 mtr power amp—1w in—15w out—less case, connectors and switching	39.95		BLD 2/60	220 MHz	2W	60W
PA144/25 Kit	same as PA144/15 kit but 25w	49.95		BLD 10/60	220 MHz	10W	60W
PA220/15 Kit	similar to PA144/15 for 220 MHz	39.95		BLD 10/120	220 MHz	10W	120W
PA432/10 Kit	power amp—similar to PA144/15 except 10w and 432 MHz	49.95		BLE 10/40	420 MHz	10W	40W
PA140/10 W/T	10w in—140w out—2 mtr amp	179.95	BLE 2/40	420 MHz	2W	40W	
PA140/30 W/T	30w in—140w out—2 mtr amp	159.95	BLE 30/80	420 MHz	30W	80W	
				BLE 10/80	420 MHz	10W	80W

		POWER SUPPLIES			
PS15C Kit	15 amp—12 volt regulated power supply w/case, w/fold-back current limiting and overvoltage protection	79.95		O.V.P.	adds over voltage protection to your power supplies, 15 VDC max.
PS15C W/T	same as above—wired & tested	94.95		PS3A Kit	12 volt—power supply regulator card with fold-back current limiting
PS25C Kit	25 amp—12 volt regulated power supply w/case, w/fold-back current limiting and ovp	129.95		PS3012 W/T	new commercial duty 30 amp 12 VDC regulated power supply w/case, w/fold-back current limiting and overvoltage protection
PS25C W/T	same as above—wired & tested	149.95			
PS25M Kit	same as PS25C with meters	149.95			
PS25M W/T	same as above—wired & tested	169.95			

		REPEATERS			
RPT50 Kit	repeater—6 meter	465.95		DPLA144	2 mtr, 600 KHz spaced duplexer, wired and tuned to frequency
RPT50	repeater—6 meter, wired & tested	695.95		DPLA220	220 MHz duplexer, wired and tuned to frequency
RPT144 Kit	repeater—2 mtr—15w—complete (less crystals)	465.95		DPLA432	rack mount duplexer
RPT220 Kit	repeater—220 MHz—15w—complete (less crystals)	465.95		DSC-U	double shielded duplexer cables with PL259 connectors (pr.)
RPT432 Kit	repeater—10 watt—432 MHz (less crystals)	515.95		DSC-N	same as above with type N connectors (pr.)
RPT144 W/T	repeater—15 watt—2 mtr	695.95			
RPT220 W/T	repeater—15 watt—220 MHz	695.95			
RPT432 W/T	repeater—10 watt—432 MHz	749.95			
DPLA50	6 mtr close spaced duplexer	575.00			

		TRANSCEIVERS	
TRX50 Kit	Complete 6 mtr FM transceiver kit, 20w out, 10 channel scan with case (less mike and crystals)	229.95	
TRX144 Kit	same as above, but 2 mtr & 15w out	219.95	
TRX220 Kit	same as above except for 220 MHz	219.95	
TRX432 Kit	same as above except 10 watt and 432MHz	254.95	
TRC-1	transceiver case only	19.95	
TRC-2	transceiver case and accessories	39.95	

		SYNTHESIZERS	
SYN II Kit	2 mtr synthesizer, transmit offsets programmable from 100 KHz—10 MHz, (Mars offsets with optional adapters)	169.95	
SYN II W/T	same as above—wired & tested	239.95	
MO-1 Kit	Mars/cap offset optional	2.50	
TO-1 Kit	18 MHz optional tripler	2.50	

		WALKIE-TALKIES	
HT 144B Kit	2 mtr, 2w, 4 channel, hand held transceiver with crystals for 146.52 simplex	129.95	
NICAD	battery pack, 12 VDC, 1/2 amp.	29.95	
BC12	battery charger for above	5.95	
Rubber Duck	2 mtr, with male BNC connector	12.95	

		OTHER PRODUCTS BY VHF ENGINEERING	
CD1 Kit	10 channel receive xtal deck w/diode switching	\$	6.95
CD2 Kit	10 channel xmit deck w/switch and trimmers		14.95
CD3 Kit	UHF version of CD1 deck, needed for 432 multi-channel operation		12.95
COR2 Kit	carrier operated relay		19.95
SC3 Kit	10 channel auto-scan adapter for RX with priority		19.95
Crystals	we stock most repeater and simplex pairs from 146.4-147.0 (each)		5.00
CWID Kit	159 bit, field programmable, code identifier with built-in squelch tail and ID timers		39.95
CWID	wired and tested, not programmed		44.95
CWID	wired and tested, programmed		59.95
MIC-1	2,000 ohm dynamic mike with P.I.T. and coil cord		12.95
TS1 W/T	tone squelch decoder		59.95
TS1 W/T	installed in repeater, including interface accessories		89.95
TD3 Kit	2 tone decoder		29.95
FD3 W/T	same as above—wired & tested		39.95
HI 144 W/T	4 pole helical resonator, wired & tested, swept tuned to 144 MHz band		24.95
HL220 W/T	same as above tuned to 220 MHz band		24.95
HL432 W/T	same as above tuned to 432 MHz band		24.95



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# NEWS Update

from **DRAKE**



## UV-3 uhf/vhf fm transceiver

Do you think prices on imported synthesized 2 meter fm transceivers are low? Think again! The new U.S. made model 1346 Drake UV-3(144-220-440) rig averages only about \$330.00 per band. Where else can you get synthesis on all 3 bands for that price — in a single box?



## TR-4's and TR-4C's updated with cw filters

We can now factory install the cw filter from the TR-4Cw on TR-4's with serial Nos. above 26000, and on all TR-4C's. Price is \$100.00 plus shipping. This includes filter, labor, parts and standard alignment. Contact service manager in either Ohio or Nevada for details and return authorization.



## TR-4Cw with R.I.T.

All TR-4Cw's now manufactured have Receiver Incremental Tuning as a standard feature. This, combined with the cw filter, provides a most versatile high power ssb/cw Transceiver. No. R.I.T. modifications available for earlier units.



## Drake C-Line, value plus!

As well as having the ability to cover any new hf amateur bands that may result from WARC '79, the Drake C-Line also offers you cw ops a full choice of cw filters — down to 250 Hz. From 160 thru 10 meters, the C-Line offers super wide flexibility.

*These items of interest provided by Drake —  
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	List	Display
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PS portable AC supply	100.00	85.00
<b>BRIMSTONE</b>		
144 2-meter XCVR (no warranty)	650.00	349.00
<b>DRAKE</b>		
TK 4CW with RIT	799.00	619.00
SSR1 gen. cov. receiver	350.00	259.00
MN4 antenna tuner	120.00	105.00
<b>DENTRON</b>		
160-10L/572B amplifier	574.50	499.00
<b>ICOM</b>		
IC 502 6-meter SSB	249.00	210.00
IC 202 2-meter SSB	259.00	220.00
IC 225 2-meter FM	299.00	249.00
IC 3PA AC supply	98.00	85.00
IC 215 2-meter portable	229.00	189.00
<b>KLM</b>		
Multi 2700 transceiver	756.00	666.00
<b>MIDLAND</b>		
13-510 2-meter transceiver	399.00	349.00
<b>SWAN</b>		
700CX transceiver	649.00	549.00
<b>TEN-TEC</b>		
Triton IV 80-10 transceiver	699.00	599.00

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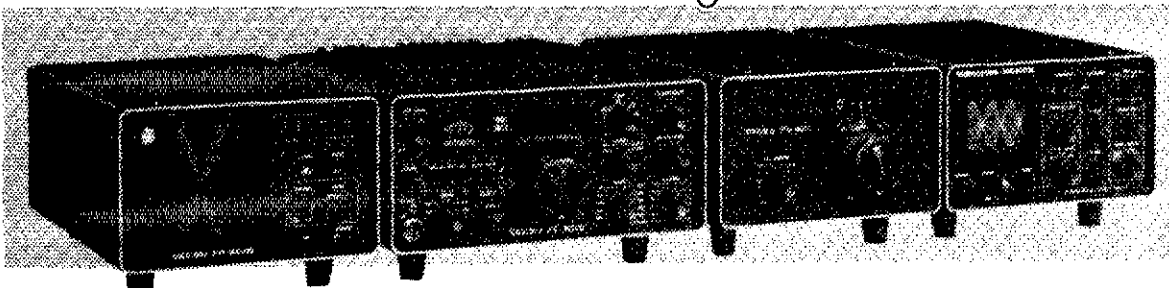
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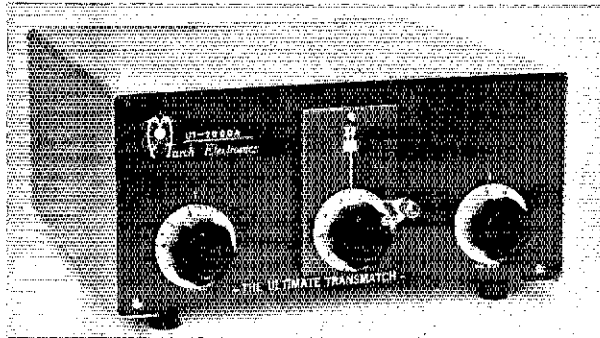
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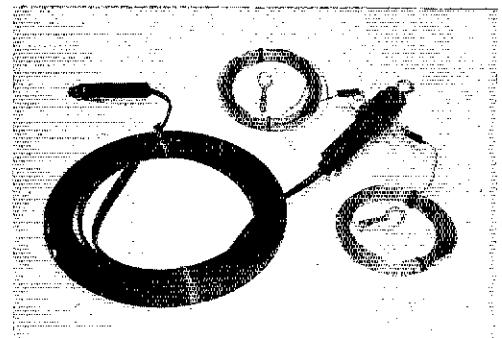
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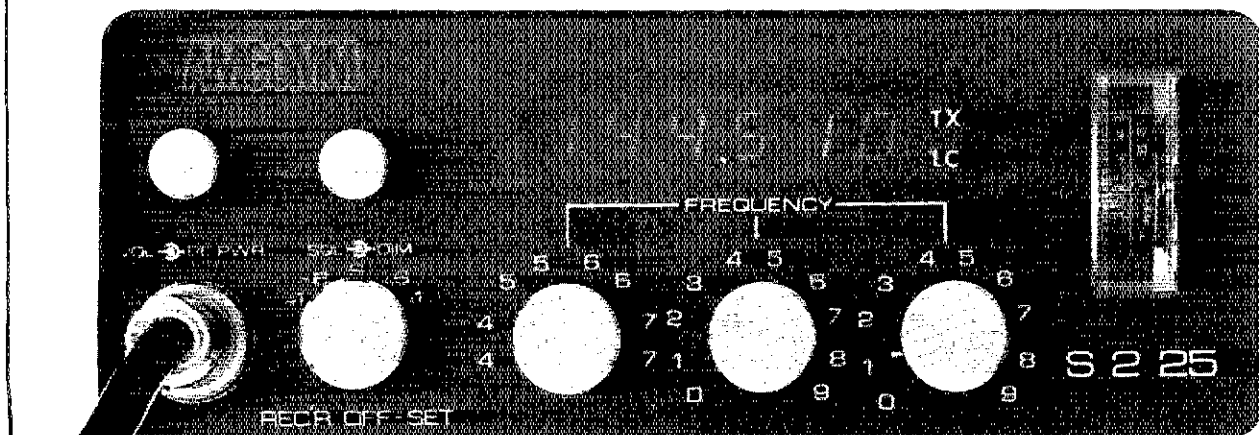
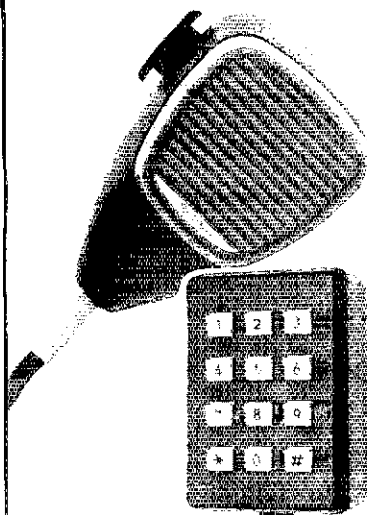
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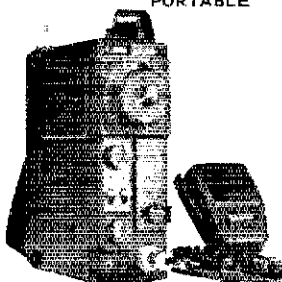


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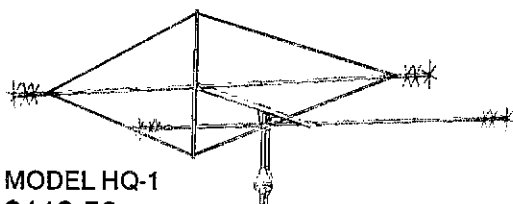
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- ★ **Built-in WWV receiver** for high accuracy correlation.
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5 band transceiver for 13.6VDC operation (less speaker) with dynamic frequency control hand microphone. . . .  
Suggested list **1095.00**

Matching Base Station Console with Phone Patch/VU meter/VOX/CW/24 hour digital clock/audio-visual 10 minute timer.  
Suggested list **379.00**

Power Supply/Speaker unit. Input 110/220VAC, output 13.6VDC @ 20A.

Suggested price **249.95**

**Freq. coverage:** 3.5000 to 3.999MHz  
7.0000 to 7.4999MHz  
14.0000 to 14.4999MHz  
21.0000 to 21.4999MHz  
28.0000 to 29.9999MHz

**Modes:** SSB w/USB/LSB (CW with base console accessory).

**Sensitivity:** 0.5 $\mu$ V for 10db S $\pm$ N/N.

**Selectivity:** Crystal lattice 8 pole filter. Shape factor 1.8.  
2.7kHz @ 6db  
4.9kHz @ 60db

**Image rejection:** >50db, 80-15 MHz  
-40db, 10M.

**AGC:** 6db change in audio level, 1 $\mu$ V to more than 0.1V (100db).

**Audio output:** 2W @ 10% distortion, 300-3000Hz.

**Power inp.:** 200W p.e.p. inp. @ 13.6VDC.

**Power out.:** 80W p.e.p. @ 13.6VDC (10M)  
100W p.e.p. @ 13.5VDC (80-15M)

**Two tone mod.:** 30db below peak power level.

**Harmonic output:** Meets or exceeds FCC 20777 requirements.

**Transmit control:** PTT (also VOX with Base accessory).

**Microphone:** Hi Z dynamic w/cord/plug (mic also has Up/Down frequency changing buttons).

**Operating voltage:** 13.6VDC nom. (no damage 10-15V). Neg. ground.

**Dimensions:** 3"H, 12.1"D, 10.5"W (depth includes heat sink).

**Weight:** 8 pounds.

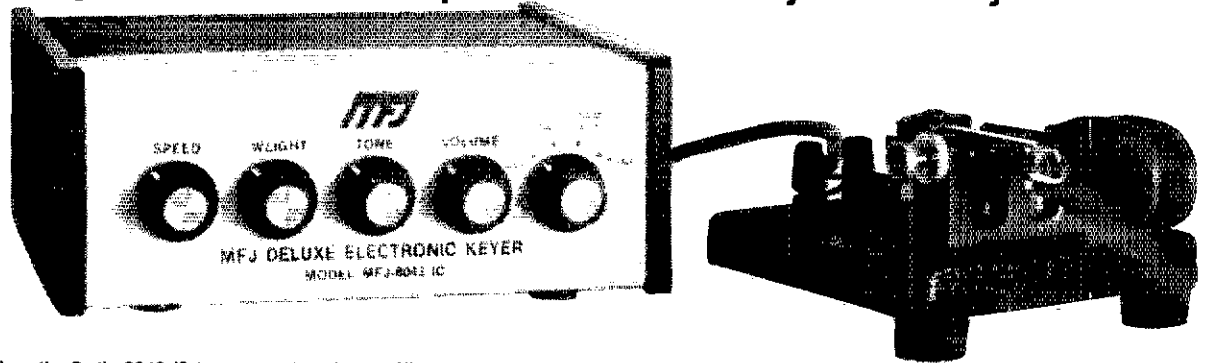
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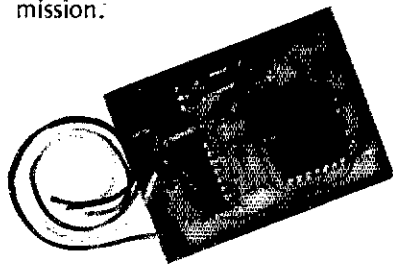
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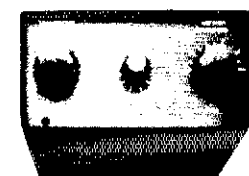
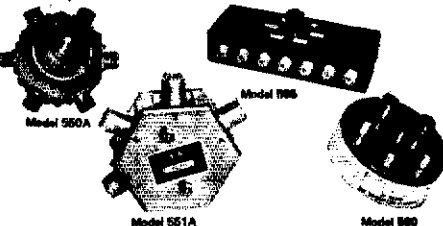
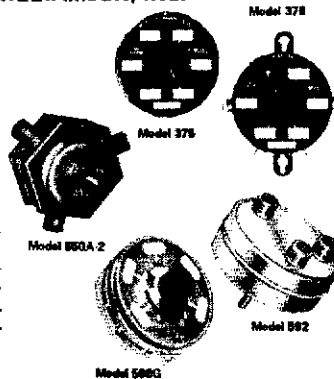


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376	18.95	6	Axial	PROTAX switch. Grounds all except selected output circuit.
376	18.95	5	Radial	PROTAX switch. Grounds all except selected output circuit. Sixth switch position grounds all outputs.
550A	14.00	5	Radial	
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551A	17.50	2	Radial	Special 2 pole, 2-position switch used to switch any RF device in or out of series connection in a coaxial line. See figure (over).
556	.95	-	-	Bracket only, for wall mounting of radial connector switches.
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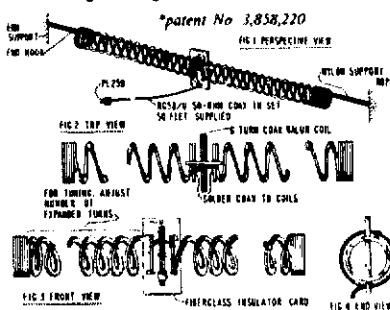
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Line/Load Regulation	20 mV	50 mV
Ripple/Noise	2 mV RMS	5 mV RMS
Transient Response	20 µSec	
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Current Limit	6 Amp	
Current Foldback	2 Amp	

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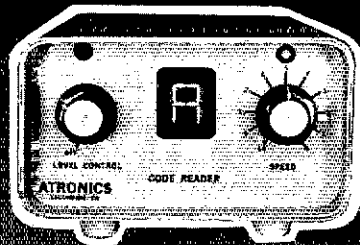
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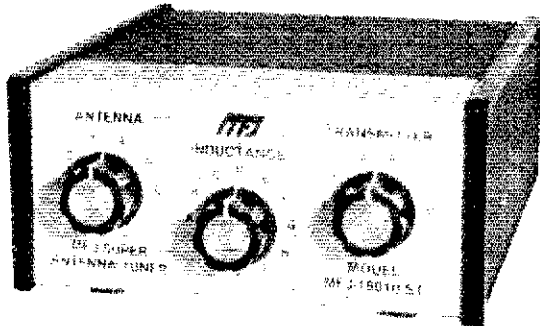
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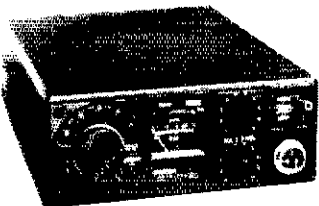
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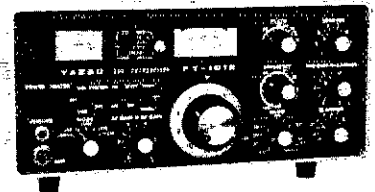
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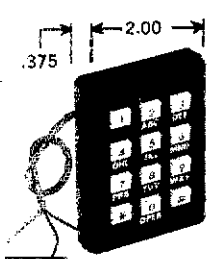
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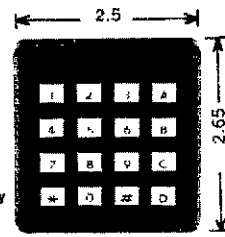
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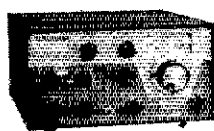
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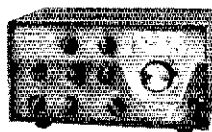
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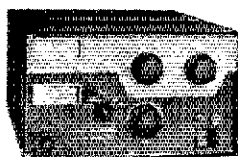
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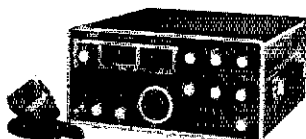
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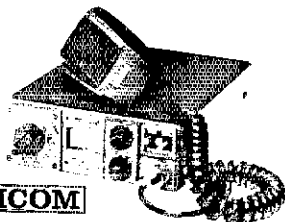
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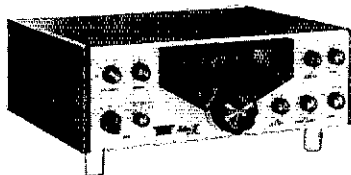
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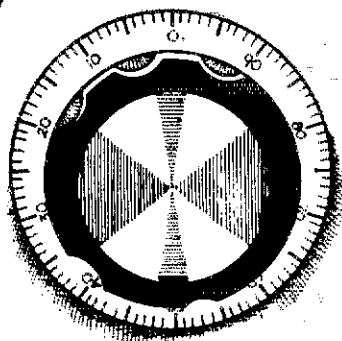
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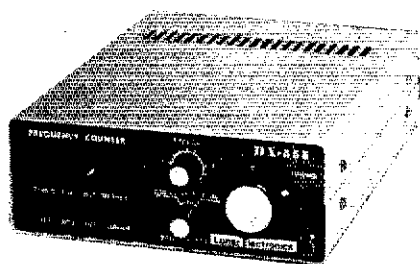
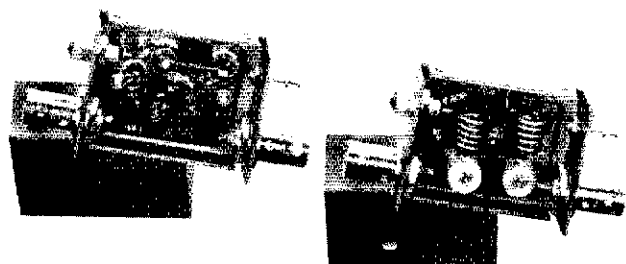
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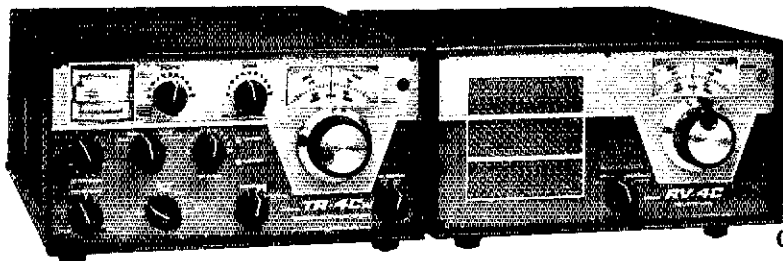


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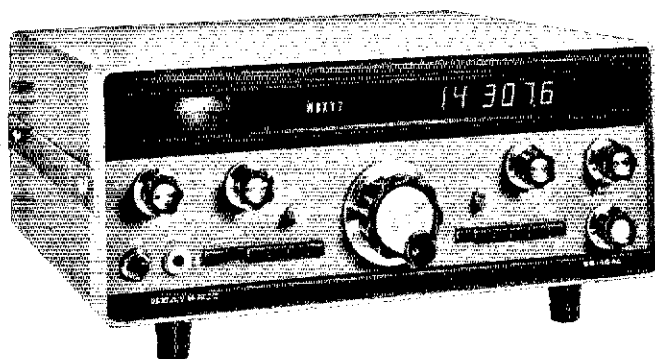
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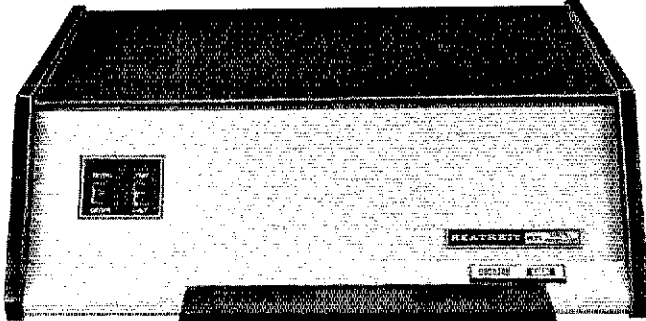
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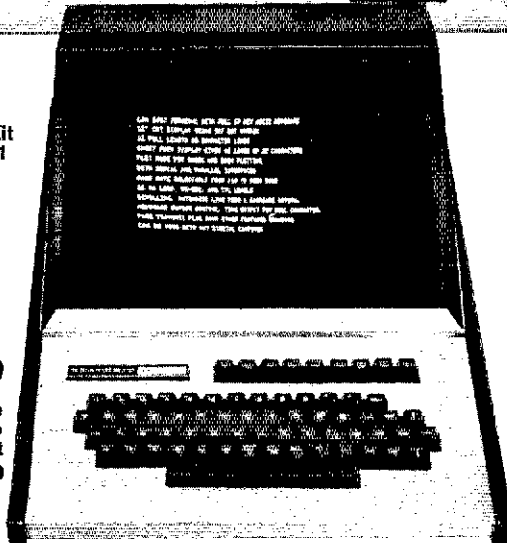
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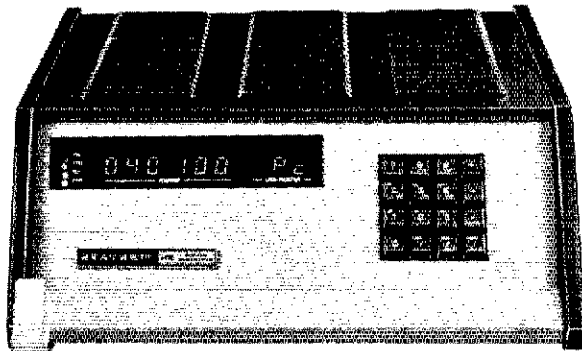
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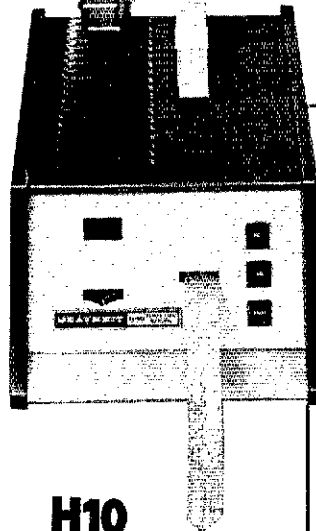
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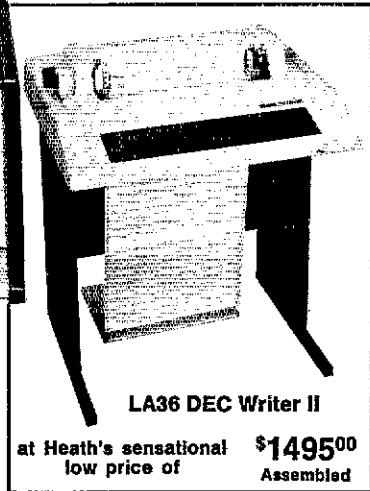
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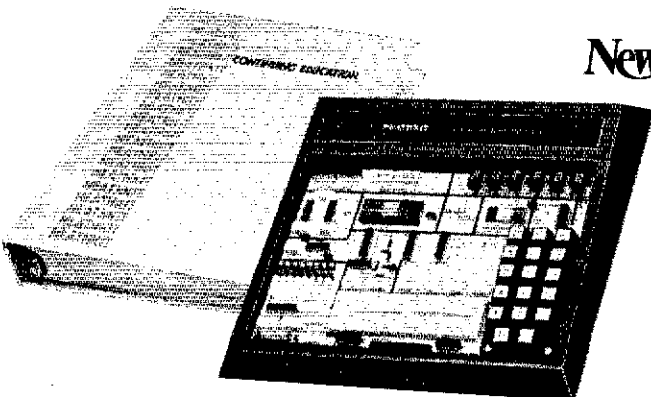
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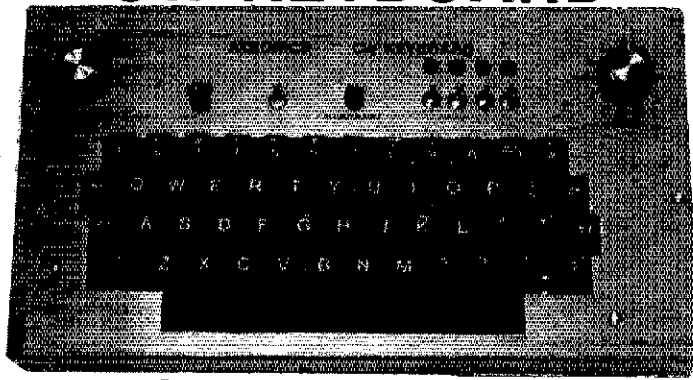
zons. When it comes to I/O devices you have a choice! There's the H9, a bright 12" CRT video terminal with ASCII keyboard, short and long form displays, erase, auto scrolling and plot modes. The H10 paper tape reader/punch features 50 cps read rate and 10 cps punch rate. For hard copy take a look at the famous LA36 DEC Writer II (fully assembled). This high-speed ASCII terminal employs 10, 15, and 30 cps printing speeds, 7 X 7 dot matrix print head, and half or full duplex operation. And it's offered at the lowest price we've seen anywhere! Does all this give you any ideas? If we know you, we'll bet the solutions are already clicking.



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Don't know much about microprocessors and you're itching to try out some fantastic new ideas? Then Heath's EE-3401 Microprocessor Course and Trainer can be the key to your development. Informative text, experiments, and audio presentations combine to unlock the mystery of microprocessors by teaching operation, machine language programming, interfacing techniques and much more. "Hands-on" experience is gained from 19 different experiments with the ET-3400 Trainer. The ET-3400 features the 6800 microprocessor-based chip, 256 bytes of RAM and a 1K ROM monitor for easy program control. In addition a large breadboarding socket has been incorporated for experiments and your own prototyping and design. Course EE-3401 is \$89.95, Trainer ET-3400 is \$189.95.

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conductor, foam,					
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range: 28-30 MHz,  
50-54 MHz and 144-  
148 MHz also  
standard  
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ohm BNC sockets  
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Model 201 price (5 200 MHz) ..... \$29.95  
201-350 MHz ..... \$34.95

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Excellent for weather satellite reception and recommended by Dr. Ralph E. Taggart in his Weather Satellite Handbook. Less than 2 dB noise figure and approximately 17 dB gain. Uses a low noise J-FET in a common source neutralized circuit. Available factory tuned to your choice of frequency from 135 MHz to 250 MHz. Bandwidth approximately 4 MHz. Supplied in a 2-1/4" x 1-1/8" x 1-3/8" die cast aluminum weather-proof case with a filter for powering it through the antenna. Requires 12 VDC @ 5 mA. Choice of VHF, type "N", or BNC receptacles.



Model 102 PRICE ..... \$36.95

### UHF

### 3 TO 5 dB MAX. N.F.

### 20 dB MIN. POWER GAIN

Uses 2 of TI's low noise J-FETS in our special circuit board design which gives a minimum of 20 dB power gain at 450 MHz. Stability is such that you can have mismatched loads without it oscillating and you can retune (using the capped openings in the case) over a 15-20 MHz range simply by peaking the maximum signal. Available tuned to the frequency of your choice between 300-550 MHz, 4-3/8" x 1-7/8" x 1-3/8" aluminum case with power switch and your choice of BNC or RCA receptacles. Requires 12 VDC @ 10mA.



Model 202 price ..... \$34.95

## CONVERTERS

### 2 METERS

This converter has a minimum of 20 dB gain and a noise figure of 2.5-3.0 dB which assures you of a sensitivity of .1 microvolt or better. The circuit uses a dual-gate MOSFET R.F. stage and a dual-gate MOSFET mixer (thereby giving you a minimum of cross-modulation products), 6 tuned circuits, a bipolar oscillator and .005% crystal. Covers 144-146 MHz at 28-30 MHz output with one crystal included and 146-148 MHz at 28-30 MHz with an extra crystal (available for \$6.00 more). The glass epoxy circuit board is enclosed in a 16 gauge aluminum case measuring 3-1/2" x 2-1/4" x 1-1/4" with your choice of either BNC or RCA receptacles. Also included is a power and antenna switch. Requires 12 VDC @ 15 mA. The converter is also available at other input and output frequencies. Call us for prices. PRICE: Model C-144-A available from stock at \$39.95 with one crystal. Additional crystal \$6.00 extra.



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2 RF stages with transient protected dual-gate MOSFETS give this converter the high gain and low noise you need for receiving very weak signals. The mixer stage is also a dual-gate MOSFET as it greatly reduces spurious mixing products — some by as much as 100 dB over that obtained with bipolar mixers. A



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Model 407A price:  
5-200 MHz ..... \$54.95  
201-350 MHz ..... \$59.95  
Prices include .005% crystal. Additional crystals \$8.95 ea.

### UHF 20 dB MIN. GAIN 3 TO 5dB MAX. N.F.

This model is similar in appearance to our Model 407A but uses 2 low noise J-FETS in our specially designed RF stage which is tuned with high-Q miniature trimmers. The mixer is a special dual-gate MOSFET made by RCA to meet our requirements. The oscillator uses 5th overtone



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## SYNTHESIZERS

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The STR series synthesizers are available for any transceiver operating from 20 MHz to 475 MHz that uses crystals in the 5 to 85 MHz range. It has a thumbwheel dial calibrated for your operating frequency plus a selectable transmit offset of plus or minus 600 kHz, plus or minus 1 MHz, and 2 spare offsets that you can add later. Frequency accuracy is .0005% and spurious outputs are 60 to 70 dB down. To process your order we must have the crystal formula of your transmit and receive crystals. If your transceiver uses 1 crystal for both transmitting and receiving (like the Motorola Metrum 11), you can use our receive synthesizer described to the right. Maximum tuning range per synthesizer is 10 MHz above 100 MHz and proportionally less at lower frequencies. Dial increments are in 1 kHz steps from 5 to 30 MHz and 5 kHz steps above.



Model STR synthesizer price:  
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151-475 MHz ..... \$279.95

### FOR VHF RECEIVERS

This synthesizer has 8000 channels and can tune a continuous 40 MHz segment of your choice from 110-180 MHz in 5 kHz steps. This will satisfy most of your requirements in the VHF range and can save you hundreds of dollars in crystals plus a lot of time. Stock units are programmed for receivers with the crystal formula  $F_c = F_s - 10.7$  divided by 3 but we can program it to almost any other IF at no additional cost at the time of your order. It is supplied with an interface for plugging in to your existing crystal socket. Requires 12 VDC @ 1/2 amp which is easily obtainable from a low cost power supply. The synthesizer has 4 voltage regulators therefore the power supply need not be regulated. Phase noise is not detectable as the VCO is coarse tuned by a DAC thereby easing the requirements of the phase locked loop. Not affected by vibrations encountered in mobile use. Enclosed in an 8" x 3-7/8" x 1-1/2" aluminum case and supplied with a combination tilt stand/mobile mounting bracket.



Price: Model SR 140D-05 ..... \$179.95

NOTE: We can make any synthesizer from audio to 475 MHz. Call us for prices.

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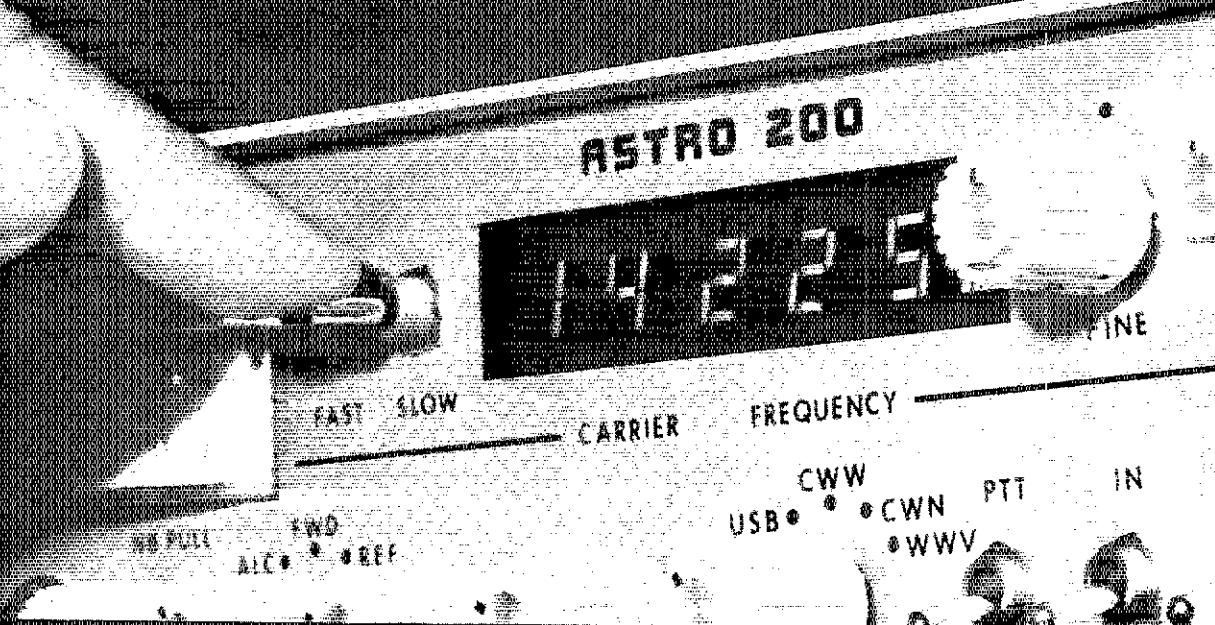
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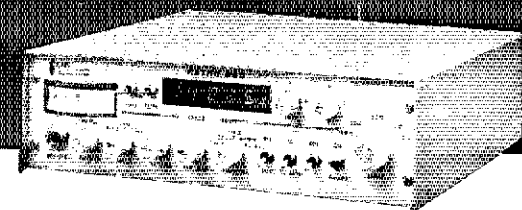
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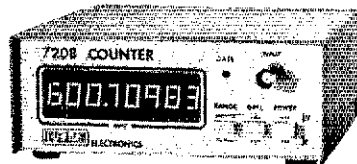
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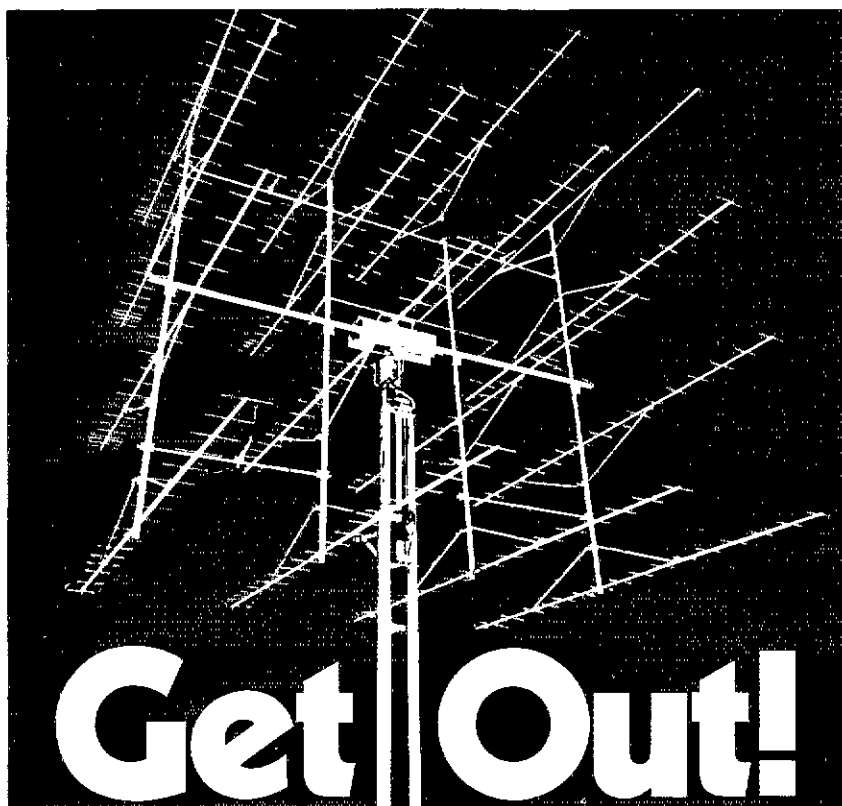
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**SPECIFICATIONS**

MODEL	FREQ RANGE (MHz)	WEIGHT (lbs.)	LENGTH (ft.)
20109 9 ft	144-148	4.2	11
20116 16 ft	144-146	9.7	23
20421 21 ft	432-435	5.7	15
20189 9 ft 18 ft	CONCAH 144-148 432-435	5.6	11



# NYE VIKING KEYS

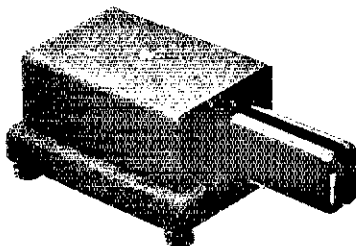
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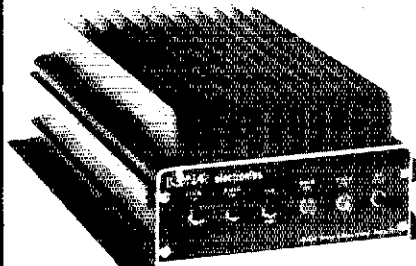
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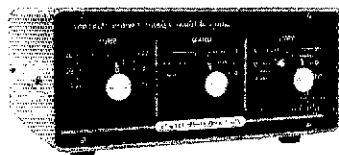
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QCWA Quarter Century Wireless Association is an international non-profit organization founded 1947. Any Amateur Radio Operator licensed 25 or more years is eligible for membership. Members receive a membership call book and quarterly news. Write for information. Q.C.W.A. Inc., 1409 Cooper Drive, Irving TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police, etc. invited to join Society of Wireless Pioneers — W7GAQ/8 Box 530, Santa Rosa GA 95402.

FREE sample copy Long Island DX Assn. bulletin. Latest DX news. Business size s.a.s.a. to the L.I. DX Assn., P. O. Box 173, Huntington NY 11743.

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QUALITY QSLs, Samples 35c, 1313 Willow, Chippewa Falls, WI 54729.

SAMPLE QSLs. S.a.s.e. WA4DPF, 3231 Moorewood Dr., Nash., TN 37207.

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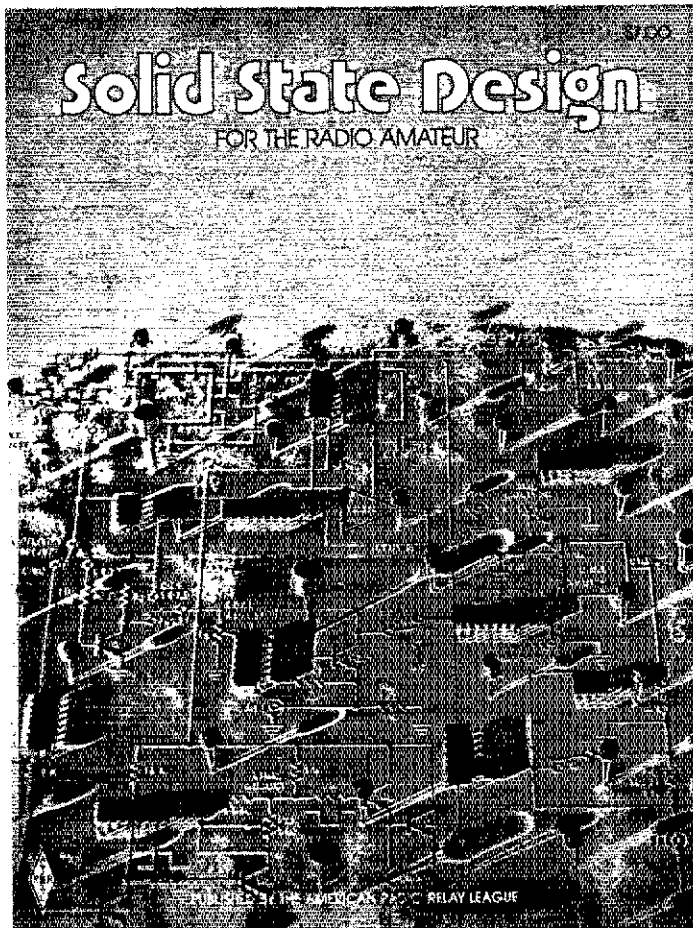
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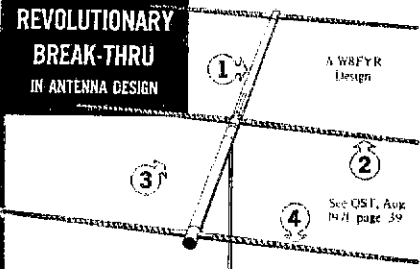
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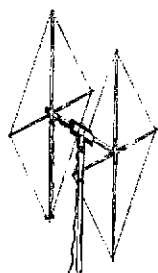
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RELIEF POT page 163, Oct. 1977, K6BOA.

WHOLESALE PRICES — on Antenna Specialists, Mosley, Hy-Gain antennas. S.a.s.e. brings quotation. Ask about our Century Sale. TALED Electronics Lyrical Lane, Sandy Hook, CT 06482.

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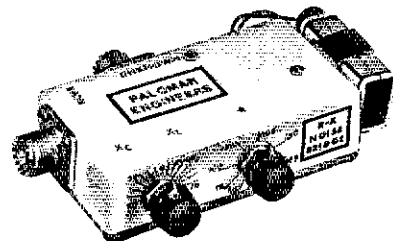
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WANTED: "Radio Antenna Engineering," E.A. Laport; "Antenna Theory and Design," Volume II, H. P. Williams and "Antenna Theory and Practice," Scheikunoff & Friis. W5QPH 128 South End Boulevard, Lutkin, TX 75901 713-632-1830.

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COLLINS 516F2 power supply round emblem serial#60030, \$100. Bohn W0RHW, 25 Pleasant Lane East, Tonka Bay, MN 55331, 612-474-8653.

TX82 with VFO 621 plus extra tubes \$75 or offer WB9EXI 330 N. Washington Hinsdale, IL 60521 312-323-1735.

WANTED (by individual) Collins 32S1 transmitter. Write W4ODO, 701 N. Grandview Street, Pensacola, FL 32505.

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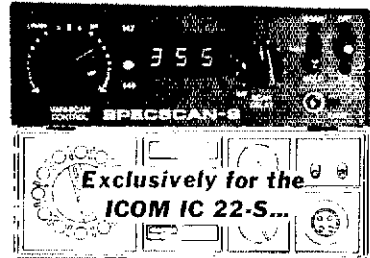
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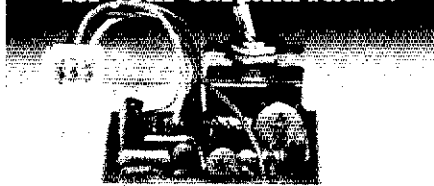
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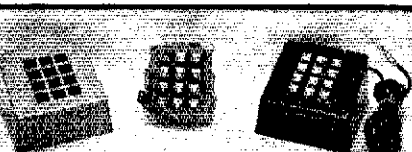
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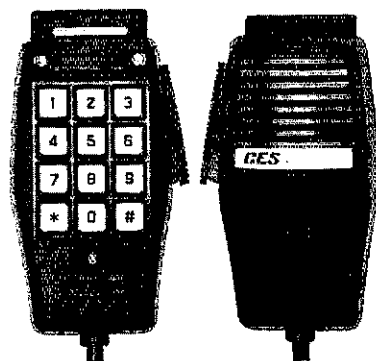
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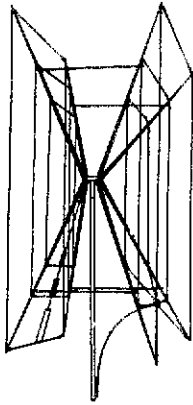
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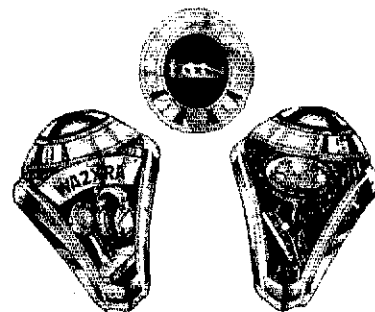
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WANTED Hallcrafters SX-101 with small window on left side of tuning knob showing band in use. Also Knight Model KG-886 R.F. signal generator, Eugene Sanfill, W3ETF, 2415 Martha St., Alliquippa, PA 15001.

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WANTED, heath 'Q' Meter and manual, good condition. Bruce Brown, 1241 Arroyo Seco Dr., Campbell, CA 95008.

HALLCRAFTERS: SX117 rcvr, HA-10 ll/mf tuner, HT44 xmtr, P.S. 150-120, \$250, U pay shipping. WA6UKA, 213-981-1161.

XYL says must sell. R-599 with 2m converter — \$325. CE-100V — \$200. WA0BGL 1625A North Center, Blytheville AFB, AR 72315. 501-532-5961.

TEN-TEC Argonaut 505 with 405 linear and 251 power supply for both. Mint condition. Package only \$350. W4GET, 2 Azalea Ct., Mount Dora, FL 32757 904-383-5053.

TRANSCO Coax switch no 1460-822, New, \$40 — WA6BUS.

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WANTED Hallcraft HT-45 amplifier schematic. Will pay any reasonable price for copy. Write J. C. Darby, WA5NIB 8005 Oxford Lubbock, TX 79413.

WANTED: Two 2A5 receiving tubes. W1BB.

WANTED C4 Drake station console, Gene Zepkin, K4SUH, P. O. Box 6610, Newport News, VA 23606, 804-595-9702.

COLLINS 312B-4 console (wing). Wrinkle finished cabinet otherwise original condition \$100. Heath SB401 transmitter with crystal pack and cables \$225 mint. Plus UPS. K4SUE 522 McGeorge Dr., Vinton VA 24179 703-890-2372.

WANTED: Collins 30SI, Charles. BLU 1623 St. Anthony Covington, Kentucky.

COLLINS: 75S3, 32S1, 30L1, 516F2. Includes cw filter. Best offer over \$1,400. WA4VHA, 2031 Zeta Ct., Orange Park, FL 32073. PH 904-269-1304.

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HEATH HW-16, with MFJ audio filter and Accu-Keyer, \$125. James Honey, WA9ZCK, 618-687-1937.

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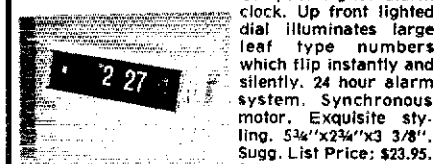
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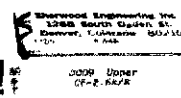
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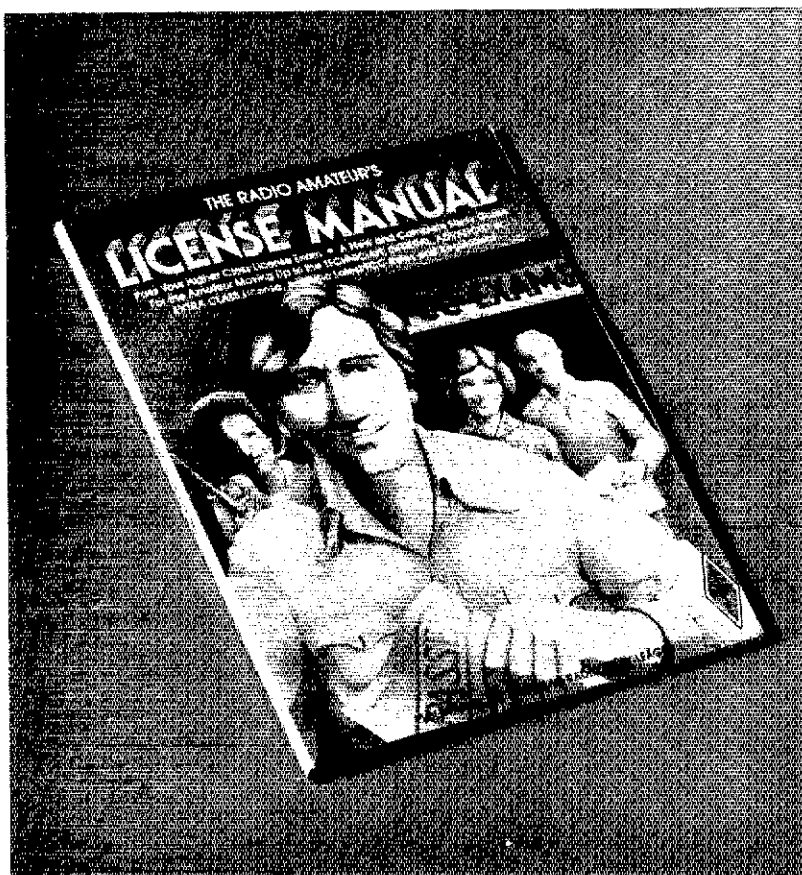
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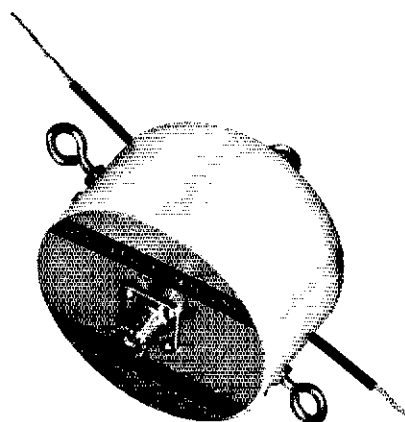
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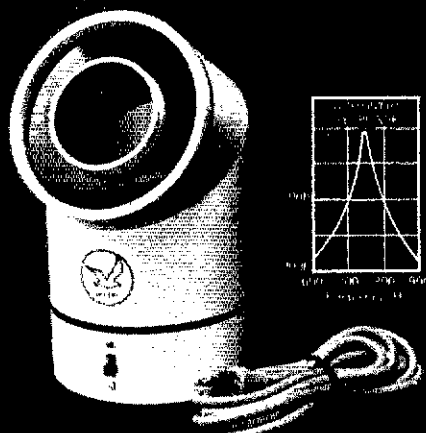
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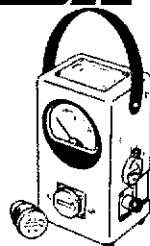
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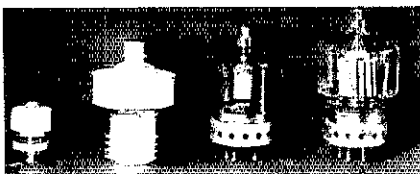
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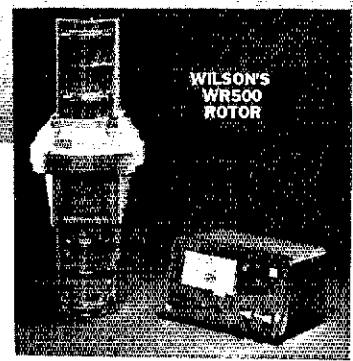
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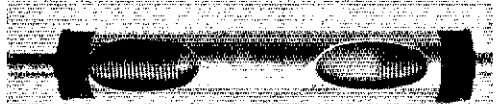
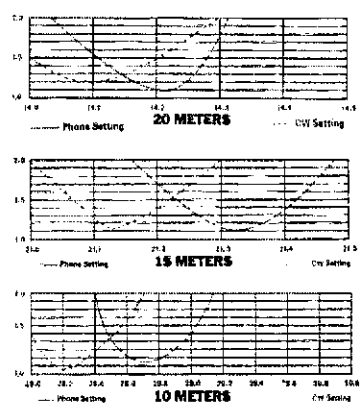
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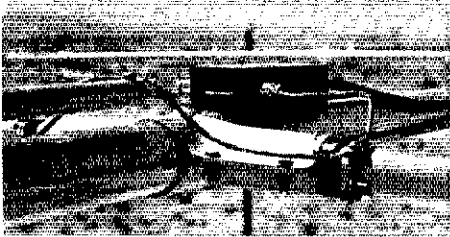
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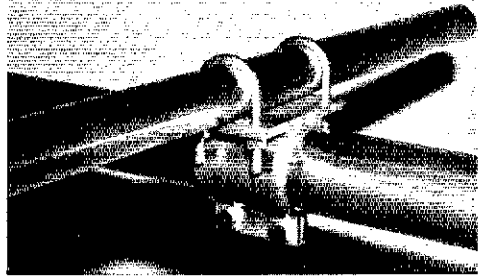
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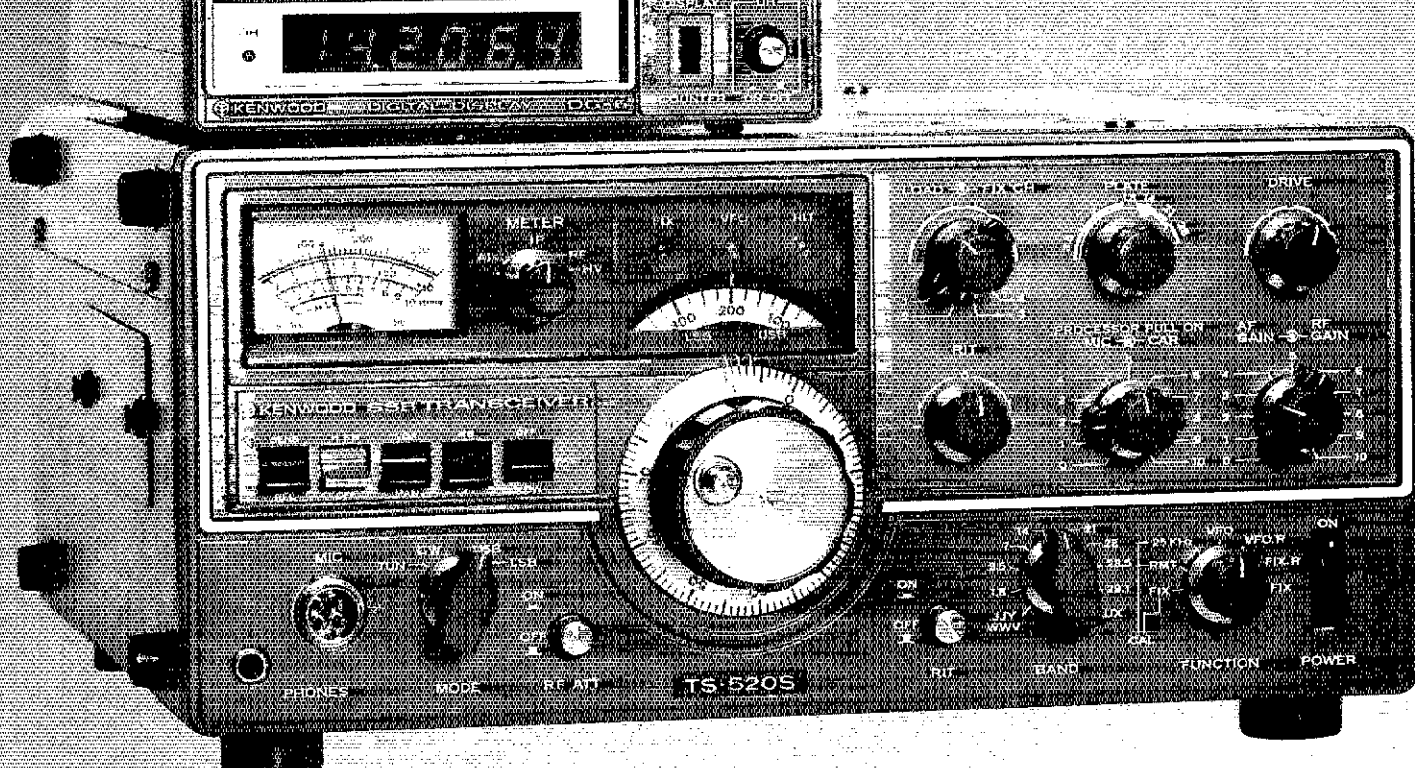
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**KENWOOD**  
pacesetter in amateur radio

# TS-520S

AND DG-5 DIGITAL FREQUENCY DISPLAY



The TS-520S  
has all of the fine  
character  
of the original  
TS-520 together with  
many of the ideas and  
improvements for  
amateurs worldwide.

#### FULL COVERAGE TRANSCEIVER

The TS-520S provides full coverage on all amateur bands from 1.8 to 29.7 MHz. Kenwood gives you 160 meter capability, WWV on 15,000 MHz., and an auxiliary band position for maximum flexibility. And with the addition of the TV-506 transverter, your TS-520S can cover 160 meters to 6 meters on SSB and CW.

#### DIGITAL DISPLAY DG-5 (option)

The Kenwood DG-5 provides easy, accurate readout of your operating frequency while transmitting and receiving.

#### OUTSTANDING RECEIVER SENSITIVITY AND MINIMUM CROSS MODULATION

The TS-520S incorporates a 3SK35 dual gate MOSFET for outstanding cross modulation and spurious response characteristics. The 3SK35 has a low noise figure (3.5 dB typ.) and high gain (18 dB typ.) for excellent sensitivity.

#### NEW IMPROVED SPEECH PROCESSOR

An audio compression amplifier gives you extra punch in the pile

ups and when the going gets rough.

#### VERNIER TUNING FOR FINAL PLATE CONTROL

A vernier tuning mechanism allows easy and accurate adjustment of the plate control during tune-up.

#### FINAL AMPLIFIER

The TS-520S is completely solid state except for the driver (12BY7A) and the final tubes. Rather than substitute TV sweep tubes as final amplifier tubes in a state of the art amateur transceiver,



Kenwood has employed two noisy S-2001A (equivalent to 6X4BB) tubes. These rugged, time-proven tubes are known for their long life and superb linearity.

**ANTI-IGNITION NOISE CIRCUIT**

An effective noise blanking circuit developed by Kenwood that virtually eliminates ignition noise is built into the TS-520S.

**ATTENUATOR**

The TS-520S has a built-in 20 dB attenuator that can be activated by a push button switch conveniently located on the front panel.

**EXTERNAL RECEIVER**

A special jack on the rear panel of the TS-520S provides receiver signals to an external receiver for increased station versatility. A switch on the rear panel determines the signal path to the receiver in the TS-820 or any external receiver.

**VFO-520 REMOTE VFO**

The VFO-520 remote VFO matches the styling of the TS-520S and provides maximum operating flexibility on the band selected on your TS-520S.

**POWER SUPPLY**

The TS-520S is completely self-contained with a rugged AC power supply built-in. The addition of the DS-1A DC-DC converter (optional) allows for mobile operation of the TS-520S.

**PHONE PATCH CONNECTION**

The TS-520S has 2 convenient RCA phono jacks on the rear panel for PHONE PATCH IN and PHONE PATCH OUT.

**CW-520 500 HZ FILTER OPTION**

The CW-520-500 Hz filter can be easily installed and will provide improved operation on CW.

**AMPLIFIED TUNE AID CIRCUIT**

The AGC circuit has 3 positions (OFF, FAST, SLOW) to enable the TS-520S to be operated in the optimum condition at all times whether operating CW or SSB.

The TS-520S retains all of the features of the original TS-520 that made it tops in its class: RIT control • 8-pole crystal filter • Built-in 25 KHz calibrator • Front panel carrier level control • Semi-break-in CW with sidetone • VOX/PTT/MOX • TUNE position for low power tune up • Built-in speaker • Built-in Cooling Fan • Provisions for 4 fixed frequency channels • Heater switch.

**TS-520 Specifications**

- Amateur Bands: 160-10 meters
- Modes: USB, LSB, CW
- Antenna Impedance: 50/75 Ohms
- Frequency Stability: Within  $\pm 1$  kHz during one hour. After one minute of warm up and within  $\pm 100$  Hz during any 30 minute period thereafter.
- Tubes & Semiconductors:
  - Tubes: 3 (5Y3QIA x 2, 6ZBY7A)
  - Transistors: 52
  - FETs: 19
  - Diodes: 101

Power Requirements: 120/220 V AC, 50/60 Hz, 13.8 V DC (with optional DS-1A)

Power Consumption: Transmit 280 Watts, Receive 25 Watts (with heater off)

Dimension: 333(13 1/4) W x 153 (6.0) H x 335(13.13 3/16) D mm(inch)

Weight: 16.0 kg(35.2 lbs)

**TRANSMITTER**

RF Input Power: SSB: 200 Watts, PEP, CW: 160 Watts DC

Carrier Suppression: Better than -40 dB

Sideband Suppression: Better than -50 dB

Spurious Radiation: Better than -40 dB

Microphone Impedance: 50k Ohms

AF Response: 400 to 2,600 Hz

**RECEIVER**

Sensitivity: 0.25  $\mu$ V for 10 dB (S+N)/N

Selectivity: SSB: 2.4 kHz/-6 dB, 4.4 kHz/-60 dB

Selectivity: CW: 0.5 kHz/-6 dB, 1.5 kHz/-60 dB (with optional CW-520 filter)

Image Ratio: Better than 50 dB

IF Rejection: Better than 50 dB

AF Output Power: 1.0 Watt (8 Ohm load, with less than 10% distortion)

AF Output Impedance: 4 to 16 Ohms

**DG-5 SPECIFICATIONS**

Measuring Range: 100 Hz to 40 MHz

Input Impedance: 5 k Ohms

Gate Time: 0.1 Sec.

Input Sensitivity: 100 Hz to 40 MHz: 200 mV rms or over, 10 kHz to 10 MHz: 50 mV or over

Measuring Accuracy: Internal time base accuracy  $\pm 0.1$  count

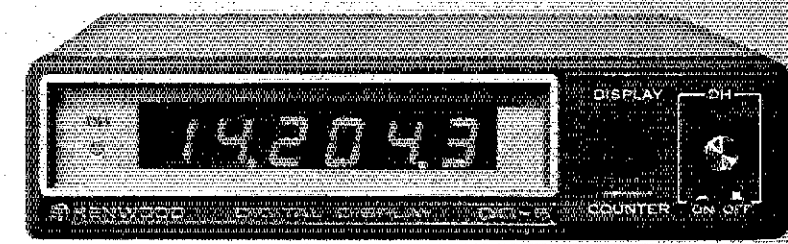
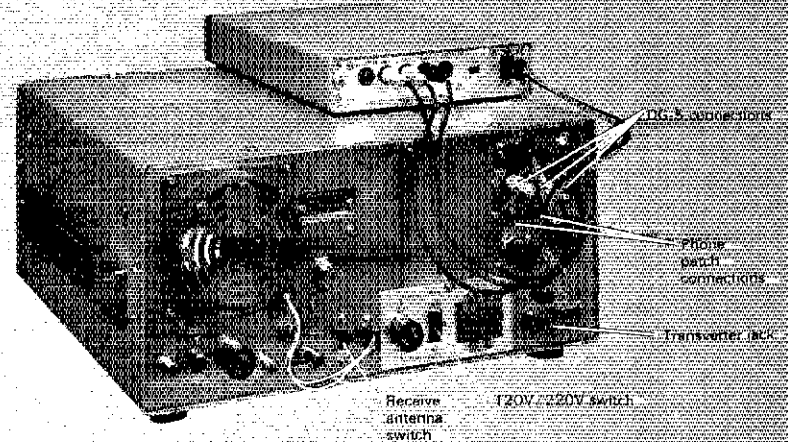
Time Base: 10 MHz

Operating Temperature: -10° to 50° C/14° to 122° F

Power Requirement: Supplied from TS-520S or 12 to 16 VDC (nominal 13.8 VDC)

Dimensions: 167(6-9/16) W x 43(1-11/16) H x 268(10-9/16) D mm(inch)

Weight: 1.3 kg(2.9 lbs)



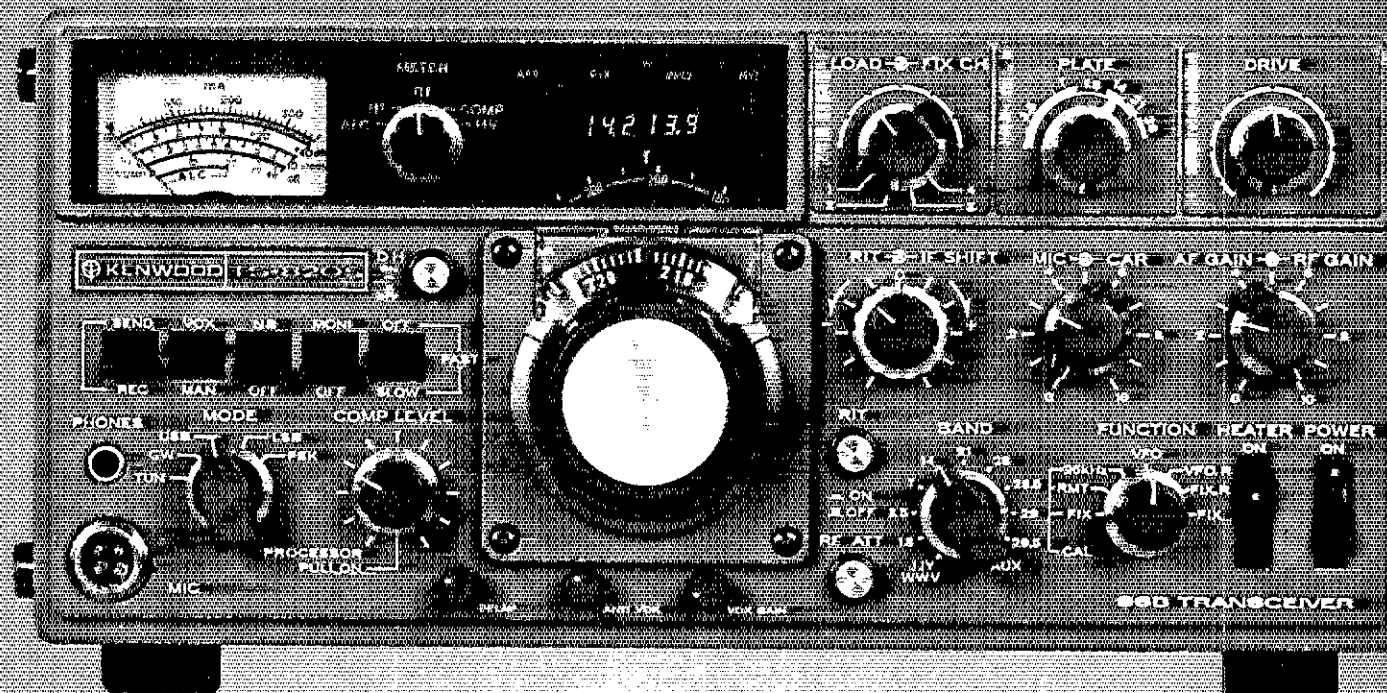
**DG-5**

The DG-5 digital counter is a precision instrument designed for accurate frequency measurement. It features a large liquid crystal display (LCD) showing the measured frequency in Hz. The counter is easy to use and provides high accuracy over a wide range of frequencies from 100 Hz to 40 MHz. It is powered by a 12V to 16V DC supply, which can be connected to the TS-520S or a separate power source. The DG-5 is a valuable tool for radio enthusiasts and professionals alike.

NOTE: TS-520S antenna and VFO-520 are sold separately.

# KENWOOD

... pacesetter in amateur radio



## TS-820S

### WITH DIGITAL FREQUENCY DISPLAY

We told you that the TS-820 would be best. In little more than a year our promise has become a fact. Now, in response to hundreds of requests from amateurs, Kenwood offers the TS-820S\*... the same superb transceiver, but with the digital readout factory installed. As an owner of this beautiful rig, you will have at your fingertips the combination of controls and features that even under the toughest operating conditions make the TS-820S the Pacesetter that it is.

Following are a few of the TS-820S\* many exciting features.

**PLL** • The TS-820S employs the latest phase lock loop circuitry. The single conversion receiver section performance offers superb protection against unwanted cross-modulation. And now PLL allows the frequency to remain the same when switching sidebands (USB, LSB, CW) and eliminates having to recalibrate each time.

**DIGITAL READOUT** • The digital counter display is employed as an integral part of the VFO readout system. Counter mixes the carrier VFO and first heterodyne frequencies to give exact frequency. Figures the frequency down to 10 Hz and digital display

reads out to 100 Hz. Both receive and transmit frequencies are displayed in easy to read, Kenwood Blue digits.

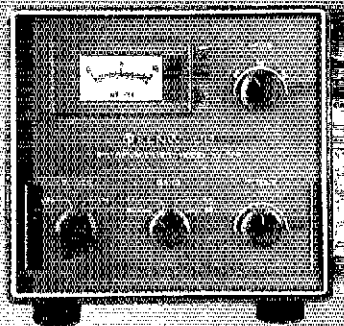
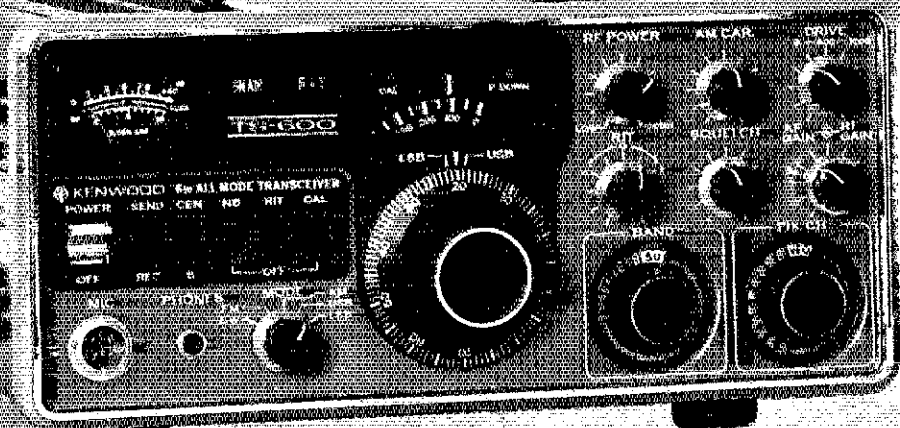
**SPEECH PROCESSOR** • An RF circuit provides quick time constant compression using a true RF compressor as opposed to an AF clipper. Amount of compression is adjustable to the desired level by a convenient front panel control.

**IF SHIFT** • The IF SHIFT control varies the IF passband without changing the receive frequency. Enables the operator to eliminate unwanted signals by moving them out of the passband of the receiver. This feature alone makes the TS-820S a pacesetter.

The TS-820 and DG-1 are still available separately.



# TS-600

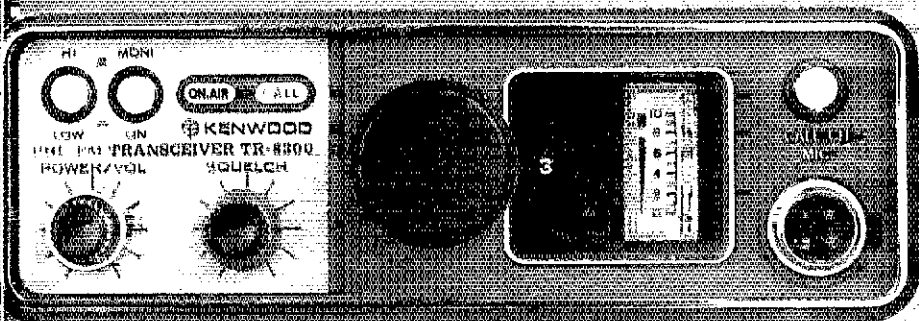


## TV-506

An easy way to get on the 6-meter band with your TS-520/520S, TS-820/820S and most other transceivers. Simply plug it in and you're on... full band coverage with 10 watts output on SSB and CW.

Experience the excitement of 6 meters. The TS-600 all mode transceiver lets you experience the fun of 6 meter band openings. This 10 watt, solid state rig covers 1.0-54.0 MHz. The VFO tunes the band in 1 MHz segments. It also

has provisions for fixed frequency operation on NETS or to listen for beacons. State of the art features such as an effective noise blanker and the RIT (Receiver Incremental Tuning) circuit make the TS-600 another Kenwood "Pacesetter".



# TR-8300

Experience the luxury of 450 MHz at an economical price. The TR-8300 offers high quality and superb performance as a result of many years of improving VHF/UHF design techniques. The trans-

ceiver is capable of F<sub>3</sub> emission on 23 crystal-controlled channels (3 supplied). The transmitter output is 10 watts.

The TR-8300 incorporates a 5 section helical resonator and a

two-pole crystal filter in the IF section of the receiver for improved intermodulation characteristics. Receiver sensitivity, spurious response, and temperature characteristics are excellent.

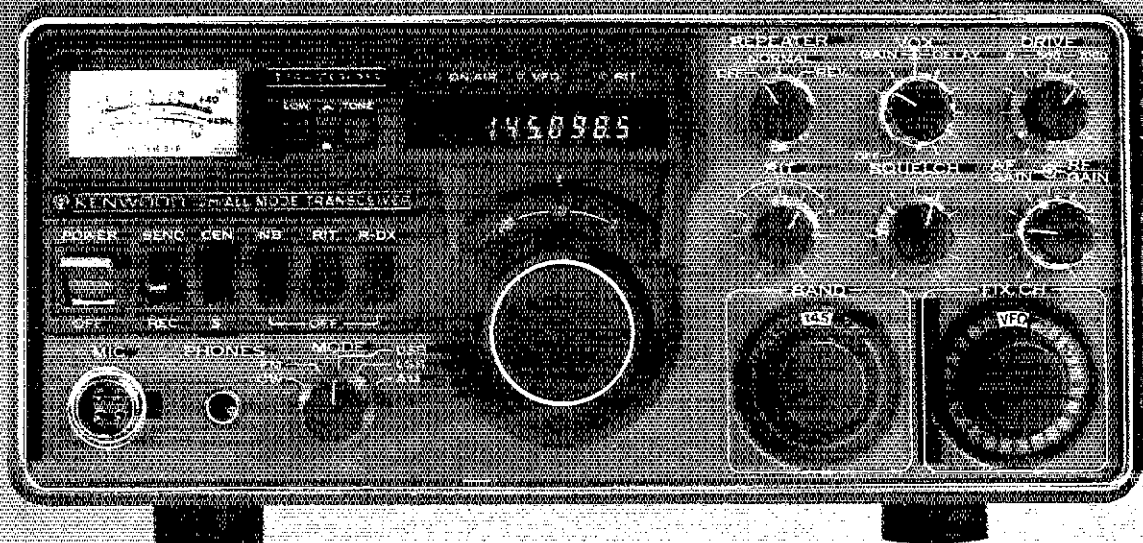


# KENWOOD

predecessor in amateur radio

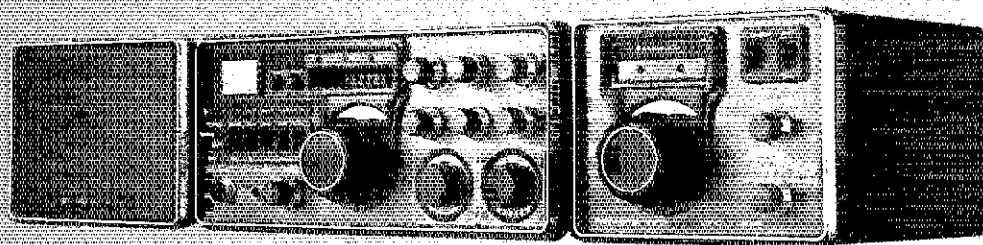
# TS-700S

## WITH DIGITAL FREQUENCY DISPLAY



Check out the new "built-ins": digital readout, receiver pre-amp, VOX semi-break in, and CW sidetone! Of course, it's still all mode, 144-148 MHz and VFO controlled.

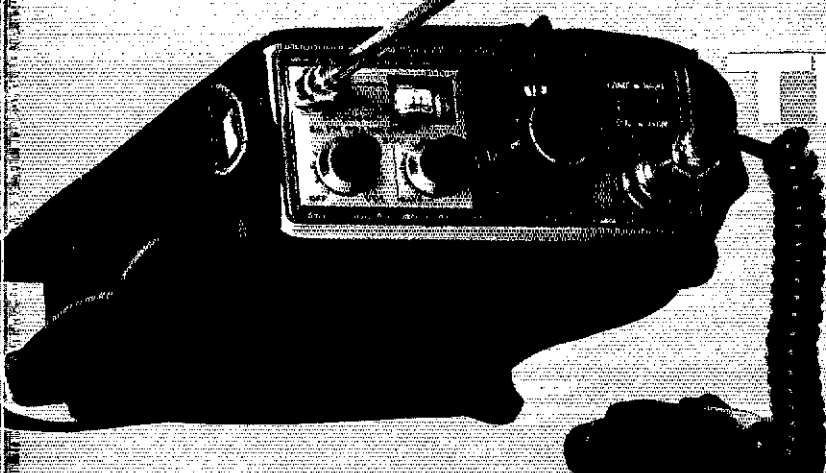
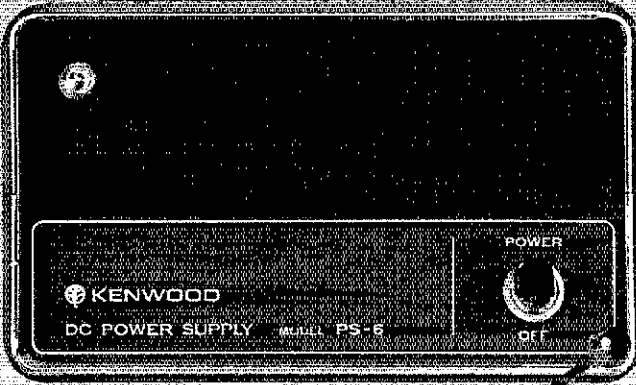
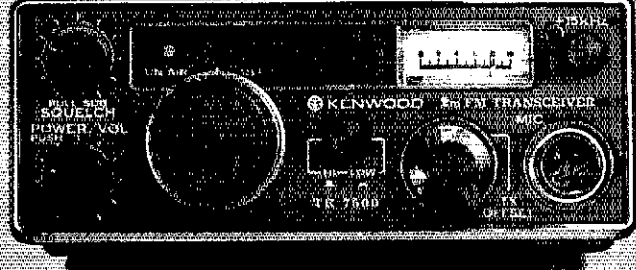
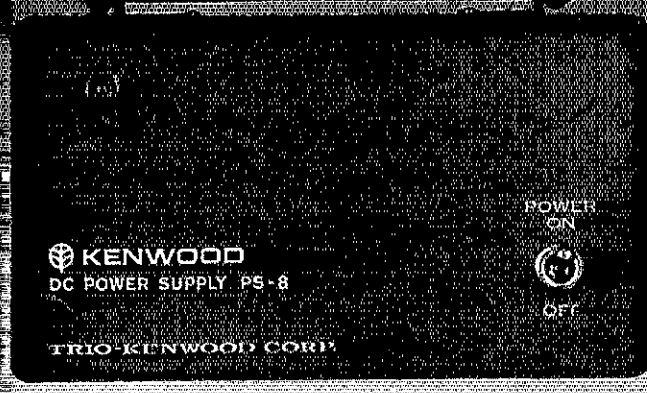
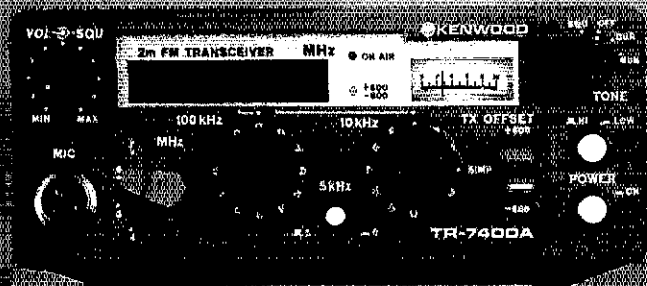
Features: Digital readout with "Kenwood Blue" digits • High gain receiver pre-amp • 1 watt lower power switch • Built in VOX • Semi-break in on CW • CW sidetone • Operates all modes: SSB (upper & lower), FM, AM and CW • Completely solid state circuitry provides stable, long lasting, trouble-free operation • AC and DC capability (operate from your car, boat, or as a base station through its built-in power supply) • 4 MHz band coverage (144 to 148 MHz) • Automatically switches transmit frequency 600 KHz for repeater operation. Simply dial in your receive frequency and the radio does the rest... simplex, repeater, reverse • Or accomplish the same by plugging a single crystal into one of the 11 crystal positions for your favorite channel • Transmit/Receive capability on 44 channels with 11 crystals.



## VFO-700S

Handsomely styled and a perfect companion to the TS-700S. This unit provides you with the extra versatility and the luxury of having a second VFO in your shack. Great for split frequency operation and for tuning off frequency to check the band. The function switch

on the VFO-700S selects the VFO in use and the appropriate frequency is displayed on the digital readout in the TS-700S. In addition a momentary contact "frequency check" switch allows you to spot check the frequency of the VFO not in use.



# TR-7400A

Features Kenwood's unique Continuous Tone Coded Squelch system, 146-148 MHz band coverage, 25 watt output capability, synthesized 800 channel operation. This complete package gives you the kind of performance specifications you've always wanted in a 2 meter amateur rig.

Outstanding sensitivity, large sized helical resonators with High Q to minimize undesirable out-of-band interference, and give a 2 pole 10.7 MHz monolithic crystal filter combine to give you TR-7400A outstanding receiver performance. Intermodulation characteristics (Better than -66dB), spurious (Better than -60dB), image rejection (Better than -70dB), and a versatile squelch system make the TR-7400A tops in its class.

Shown with the PS-8 power supply

(Active filters and Tone Burst Modules optional)

# TR-7500

This 100 channel PLL synthesized 146-148 MHz transceiver comes with 88 pre-programmed channels for use on all standard repeater frequencies (as per ARRL Band Plan) and most simplex channels. For added flexibility, there are 6 diode-programmable switch positions. The 15 KHz shift function makes these 6 positions into 12 channels. 10 watt output, 100 KHz offset and LED digital frequency display are just a few of the many fine features of the TR-7500. The PS-6 is the handsomely styled, matching power supply for the TR-7500. Its 3.5 amp current capacity and built-in speaker make it the perfect companion for home use of the TR-7500.

# TR-2200A

The high performance portable 2-meter FM transceiver, 146-148 MHz, 12 channels (6 supplied), 2 watts or 400 mW RF output. Everything you need is included, Ni-Cad battery pack, charger, carrying case and microphone.



# KENWOOD

*pacesetters in amateur radio*

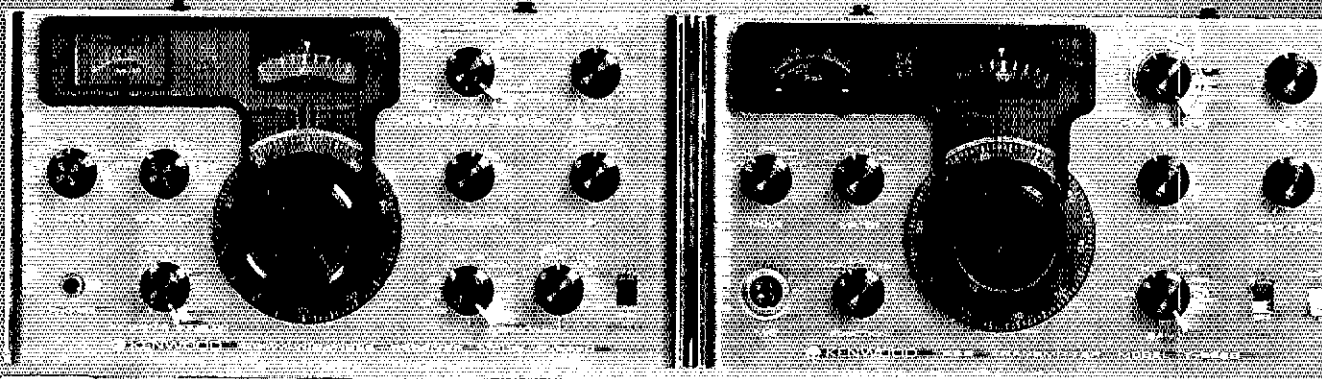
Kenwood developed the T-599D transmitter and R-599D receiver for the most discriminating amateur.

The R-599D is the most complete receiver ever offered. It is entirely solid-state, superbly reliable and compact. It covers the full amateur band, 10 through 160 meters. CW, LSB, USB, AM and FM.

The T-599D is solid-state with the exception of only three tubes, has built-in power supply and full metering. It operates CW, LSB, USB and AM and, of course, is a perfect match to the R-599D receiver.

If you have never considered the advantages of operating a receiver/transmitter combination, maybe you should. Because of the larger number of controls and dual VFOs, the combination offers flexibility impossible to duplicate with a transceiver.

Compare the specs of the R-599D and the T-599D with any other brand. Remember, the R-599D is all solid state (and includes four filters). Your choice will obviously be the Kenwood

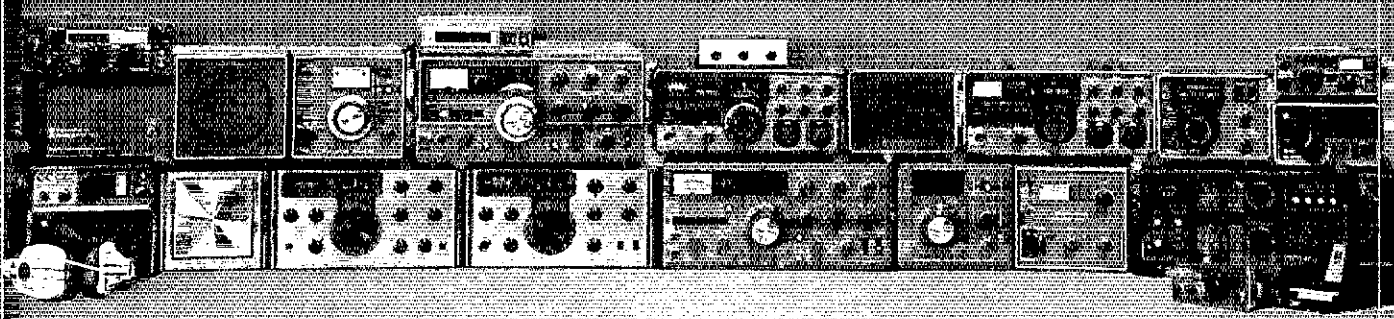


## R-599D T-599D

# R-300

Dependable operation, superior specifications and excellent features make the R-300 an unexcelled value for the shortwave listener. It offers full band coverage with a frequency range of 170 KHz to 30.0 MHz • Receives AM, SSB and CW • Features large, easy to read drum dials with fast smooth dial action • Band spread is calibrated for the 10 foreign broadcast bands, easily tuned with the use of a built-in 500 KHz calibrator • Automatic noise limiter • 3-way power supply system (AC/Batteries/External DC) take it anyplace • Automatically switches to battery power in the event of AC power failure





*Fine equipment that belongs in every well equipped station*

**520 Series**

- 820 Series
- TS-820S TS-820 with Digital Installed
- TS-820 10-160 M Deluxe Transceiver
- DG-1 Digital Frequency Display for TS-820
- VFO-820 Deluxe Remote VFO for TS-820/820S
- CW-820 500 Hz CW Filter for TS-820/820S
- DS-1A DC-DC Converter for 520/820 Series
- 520 Series
- TS-520S 160-10 M Transceiver
- DG-5 Digital Frequency Display for TS-520 Series
- VFO-520 Remote VFO for TS-520 and TS-520S
- SP-520 External Speaker for 520/820 Series
- CW-520 500 Hz CW Filter for TS-520/520S
- DK-520 Digital Adaptor Kit for TS-520

**599D Series**

- R-599D 160-10 M Solid State Receiver
- T-599D 80-10 M Matching Transmitter
- S-599 External Speaker for 599D Series

- CC-29A 2 Meter Converter for R-599D
- CC-69 6 Meter Converter for R-599D
- FM-599A FM Filter for R-599D
- 3-300 WAVE LISTENING
- R-300 General Coverage SWL Receiver

**700 Series**

- TS-600 6 M All Mode Transceiver
- TS-700S 2 M All Mode Digital Transceiver
- VFO-700S Remote VFO for TS-700S
- SP-70 Matching Speaker for TS-600/700 Series
- TR-2200A 2 M Portable FM Transceiver
- TR-7400A 2 M Synthesized Deluxe FM Transceiver

- TR-7500 100 Channel Synthesized 2 M FM Transceiver
- TR-8300 70 CM FM Transceiver (450 MHz)
- TV-506 6 M Transverter for 520/820/599 Series

**POPULAR SECTIONAL ACCESSORIES**

- HS-4 Headphone Set
- MB-1A Mounting Bracket for TR-2200A
- MC-50 Desk Microphone
- PS-5 Power Supply for TR-8300
- PS-6 Power Supply for TR-7500
- PS-8 Power Supply for TR-7400A
- VOX-3 VOX for TS-600/700A

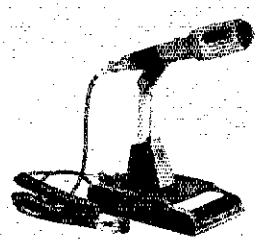
Trio-Kenwood stocks a complete line of replacement parts, accessories, and manuals for all Kenwood models.

**ACCESSORIES**

Description	Model #	For use with
Rubber Helical Antenna	RA-1	TR-2200A
Telescoping Whip Antenna	T90-0082-05	TR-2200A
Ni-Cad Battery Pack (set)	PB-15	TR-2200A
4 Pin Mic Connector	E07-0403-05	All Models
Active Filter Elements	See Service Manual	TR-7400A
Tone Burst Modules	See Service Manual	TS-700A; TR-7400A
AC Cables	Specify Model	All Models
DC Cables	Specify Model	All Models



The Kenwood HS-4 headphone set adds versatility to any Kenwood station. For extended periods of wear, the HS-4 is comfortably padded and is completely adjustable. The frequency response of the HS-4 is tailored specifically for amateur communication use. (300 to 3000 Hz, 8 ohms).



The MC-50 dynamic microphone has been designed expressly for amateur radio operation as a splendid addition to any Kenwood shack. Complete with PTT and LOCK switches, and a microphone plug for instant hook-up to any Kenwood rig. Easily converted to high or low impedance. (600 or 50k ohm).

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



# Call toll-free **800-647-8660** for products by **MFJ ENTERPRISES**



~~\$89.95~~  
**\$59.95**

### MFJ-16010 ST Super Antenna Tuner

This NEW MFJ Super Antenna Tuner matches everything from 160 thru 10 Meters; dipoles, inverted vees, long wires, verticals, mobile whips, beams, balance lines, coax lines. Up to 200 watts RF OUTPUT. Built-in balun, too!

- Operate all bands with one antenna • Works with all solid state and tube rigs • Ultra compact: 5 x 2 x 6 inches • Uses toroid cores



**\$39.95**

### MFJ-16010 Antenna Tuner

Now you can operate all bands — 160 thru 10 Meters — with a single random wire and run your full transmitter power output — up to 200 watts RF power OUTPUT.

- Small enough to carry in your hip pocket, 2-3/16 x 3-1/4 x 4 inches • Matches low and high impedance by interchanging input and output • SO-239 coaxial connectors • 12 position tapped inductor. Stacked toroid cores • At 1.8 MHz tuner matches 25 to 200 ohms



**\$29.95**

### CWF-2BX Super CW Filter

This MFJ Super CW Filter gives you 80 Hz bandwidth, and extremely steep skirts with no ringing for razor sharp selectivity that lets you pull signals out of heavy QRM. Plugs between receiver and phones or connect between audio stage for speaker operation.

- Selectable BW: 80, 110, 180 Hz • 80 dB down one octave from center frequency of 750 Hz for 80 Hz BW • Reduces noises 15 dB • 9 V battery • 2-3/16 x 3-1/4 x 4 inches • CWF-2PC, wired PC board, \$19.95.



**\$69.95**

### MFJ-8043 IC Deluxe Electronic Keyer

This NEW MFJ Deluxe Keyer gives you more features per dollar than any other keyer available.

- Uses Curtis-8043 keyer chip • Sends iambic, automatic, semi-automatic, manual • Use squeeze, single lever, or straight key • Dot memory, self-completing dots and dashes, jam proof spacing, instant start • RF proof • Solid state keying ±300 V max • Weight, tone, volume, speed controls • Uses 4 C-cells; external power jack • 6 x 6 x 2 inches • Sidetone and speaker • Optional squeeze key: \$29.95



**\$54.95**

### CMOS-8043 Electronic Keyer

State of the art design uses CURTIS-8043 Keyer-on-a-chip.

- Built-in Key • Dot memory • Iambic operation with external squeeze key • 8 to 50 WPM • Sidetone and speaker • Speed, volume, tone, weight controls • Ultra reliable solid state keying ±300 volts max. • 4 position switch for TUNE, OFF, ON, SIDETONE OFF • Uses 4 penlight cells • 2-3/16 x 3-1/4 x 4 inches



**\$59.95**

### LSP-520BX II Log Speech Processor

Up to 400% more RF power. Plugs between your microphone and transmitter.

- Gives your audio punch power to slice through QRM • 30 dB IC log amp and 3 active filters • RF protected • 9 V battery • Two Mic jacks: 1/4" phone jacks, uncommitted 4 pin jack • Output cable • 2-1/8 x 3-5/8 x 5-9/16 inches • LSP-520BX, in standard MFJ enclosure, electronically identical, \$49.95.



**\$29.95**

### SBF-2BX SSB Filter

Dramatically improves readability.

- Optimizes your audio to reduce sideband splatter, remove low and high pitched QRM, hiss, static crashes, background noise, 60 and 120 Hz hum • Reduces fatigue during contest, DX, and ragchewing • Plugs between phones and receiver or connect between audio stage for speaker operation • Selectable bandwidth IC active audio filter • Uses 9 volt battery • 2-3/16 x 3-1/4 x 4 inches



**\$29.95**

### MFJ-200BX Frequency Standard

Provides strong, precise markers every 100, 50, or 25 KHz well into VHF region.

- Exclusive circuitry suppresses all unwanted markers • Markers are gated for positive identification. CMOS IC's with transistor output. • No direct connection necessary • Uses 9 volt battery • Adjustable trimmer for zero beating to WWV • Switch selects 100, 50, 25 KHz or OFF • 2-3/16 x 3-1/4 x 4 inches



**\$49.95**

### MFJ-1030BX Receiver Preselector

Clearly copy weak unreadable signals (increases signal 3 to 5 "S" units).

- More than 20 dB low noise gain • Separate input and output tuning controls give maximum gain and RF selectivity to significantly reject out-of-band signals and reduce image responses • Dual gate MOS FET for low noise, strong signal handling abilities • Completely stable • Optimized for 10 thru 30 MHz • 9 V battery • 2-1/8 x 3-5/8 x 5-9/16 inches



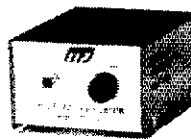
**\$29.95**

### MFJ-40T GRP Transmitter

Work the world with 5 watts on 40 Meter CW.

- No tuning • Matches 50 ohm load • Clean output with low harmonic content • Power amplifier transistor protected against burnout • Switch selects 3 crystals or VFO input • 12 VDC • 2-3/16 x 3-1/4 x 4 inches

MFJ-40V, Companion VFO ..... \$29.95  
MFJ-12DC, IC Regulated Power Supply,  
1 amp, 12 VDC ..... \$29.95



**\$17.95**

### CPO-555 Code Oscillator

For the Newcomer to learn the Morse code.

For the Old Timer to polish his fist.

For the Code Instructor to teach his classes.

- Send crisp clear code with plenty of volume for classroom use • Self contained speaker, volume, tone controls, aluminum cabinet • 9 V battery • Top quality U.S. construction • Uses 555 IC timer • 2-3/16 x 3-1/4 x 4 inches

TK-555, Optional Telegraph Key ..... \$1.95



**\$19.95**

### C-500 Digital Alarm Clock

This digital alarm clock is also an ID Timer. Assembled, too!

- Gives ID buzz every 9 minutes automatically, or after tapping ID/doze button • Pressing ID/doze button displays seconds • Large .63 inch digits • Easily zeros to WWV • AM and PM LED indicators • Power out indicator • Fast set, slow set buttons • 110 VAC, 60 Hz • 3-1/8 x 3-3/4 x 3-3/8 inches • One year warranty by Fairchild

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.

Order By Mail or Call TOLL FREE 800-647-8660 and Charge It On



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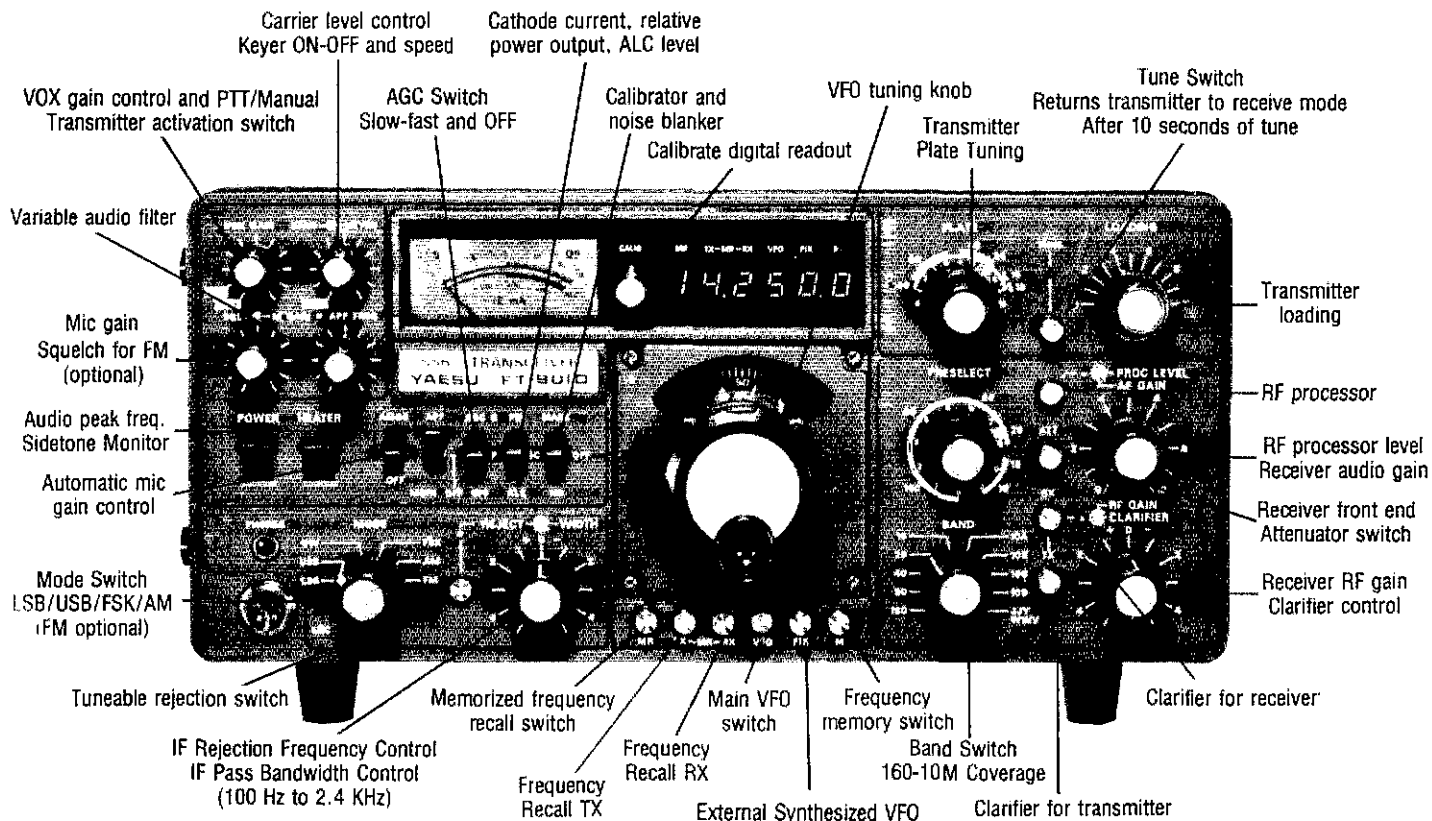
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