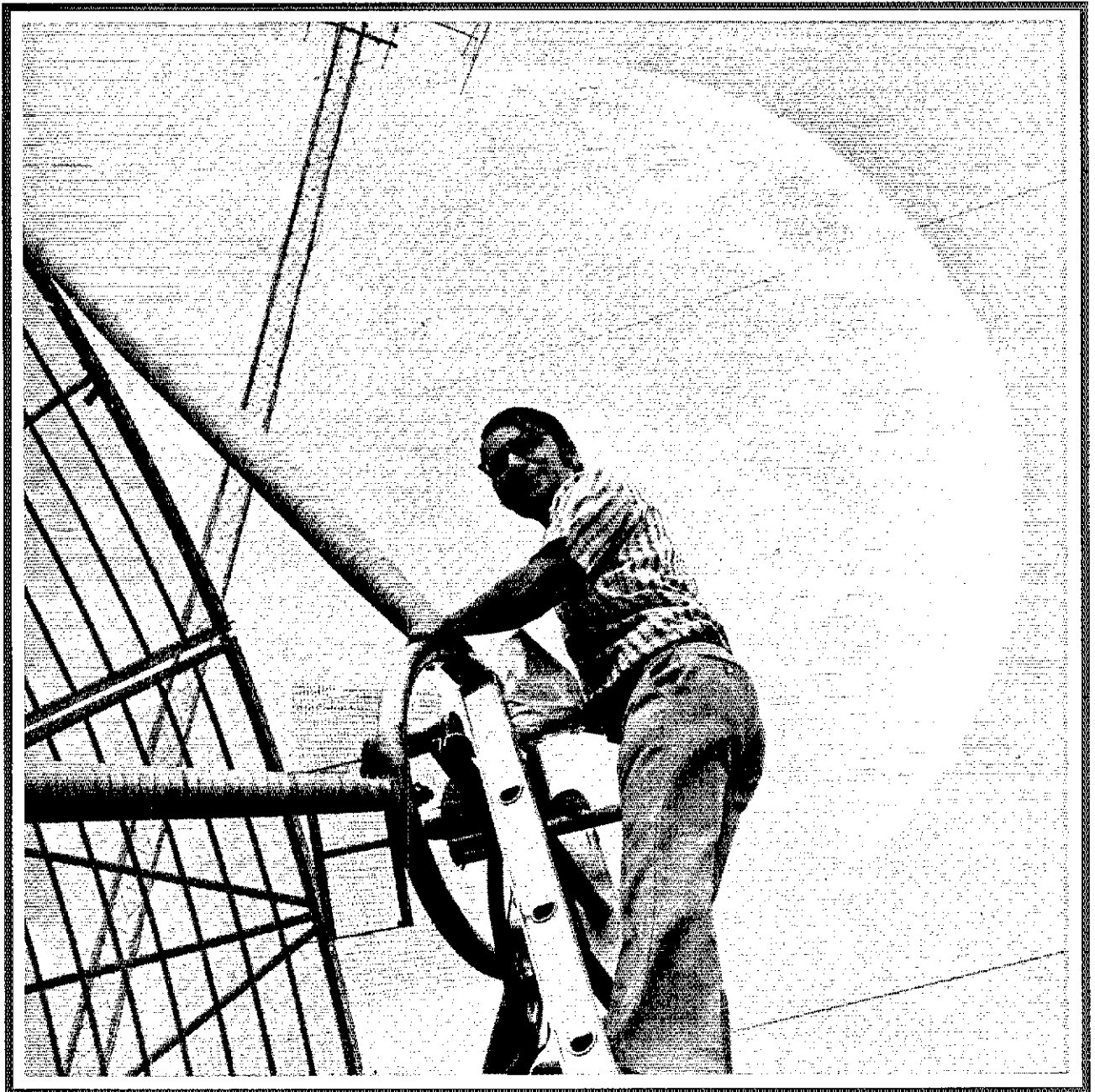


# QST

devoted entirely to Amateur Radio

September 1976

\$1.00



**WAC on 432 MHz!!!  
First-of-its-kind achieved  
by K2UYH via moonbounce.**

# INTRODUCING



- \*Phase lock-loop (PLL) oscillator circuit minimizes unwanted spurious responses.
- \*Hybrid Digital Frequency Presentation.
- \*Advanced Solid-state design...only 3 tubes.
- \*Built-in AC and 12 VDC power supplies.
- \*CW filter standard equipment...not an accessory.
- \*Rugged 614G-B final amplifier tubes.
- \*Cooling fan standard equipment...not an accessory.
- \*High performance noise-blanker is standard equipment ...not an accessory.
- \*Built-in VOX and semi-break in CW keying.
- \*Crystal Calibrator and WWV receiving capability.

# The TEMPO 2020

**A BRILLIANT NEW SSB TRANSCEIVER PROVIDING AN UNBEATABLE COMBINATION OF ADVANCED ENGINEERING AND UNIQUE OPERATING FEATURES.**

**YOU MAY NEVER HAVE OWNED A TRANSCEIVER THAT OFFERS SO MUCH.**

Send for descriptive information on this fine new transceiver, or on the time proven Tempo ONE transceiver which continues to offer reliable, low cost performance.

- \*Microphone provided.
- \*Dual RIT control allows both broad and narrow tuning.
- \*All band 80 through 10 meter coverage.
- \*Multi-mode USB, LSB, CW and AM operation.
- \*Extraordinary receiver sensitivity (.3u S/N 10 db) and oscillator stability (100 Hz 30 min. after warm-up)
- \*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.
- \*Built-in speaker.
- \*The TEMPO 2020 ...\$759.00.
- Model 8120 external speaker...\$29.95.
- Model 8010 remote VFO...\$139.00.

## 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

# Now...more than ever--- the TEMPO line means solid value

## Tempo VHF/ONE

the "ONE" you've been waiting for

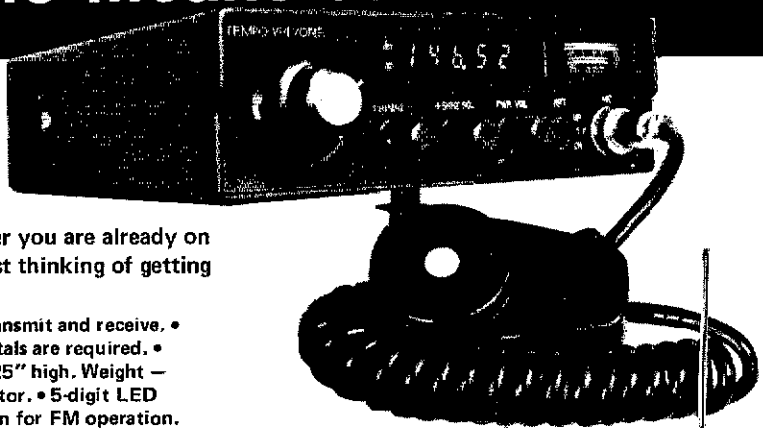
No need to wait any longer — this is it! Whether you are already on 2-meter and want something better or you're just thinking of getting into it, the VHF/ONE is the way to go.

- Full 2-meter band coverage (144 to 148 MHz for transmit and receive, • Full phase lock synthesized (PLL) so no channel crystals are required, • Compact and lightweight — 9.5" long x 7" wide x 2.25" high. Weight — About 4.5 lbs. • Provisions for an accessory SSB adaptor, • 5-digit LED receive frequency display, • 5 KHz frequency selection for FM operation, • Automatic repeater split — selectable up or down for normal or reverse operation, • Microphone, power cord and mounting bracket included, • Two built-in programmable channels, • All solid state, • 10 watts output, • Super selectivity with a crystal filter at the first IF and E type ceramic filter at the second IF, • 800 Selectable receive frequencies, • Accessory 9-pin socket, • \$495.00

### TEMPO SSB/ONE

SSB adaptor for the Tempo VHF/One

- Selectable upper or lower sideband, • Plugs directly into the VHF/One with no modification, • Noise blanker built-in, • RIT and VXO for full frequency coverage, • \$225.00

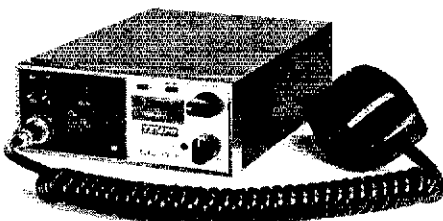


### TEMPO/fmh

So much for so little! 2 watt VHF/FM hand held 6 Channel capability, solid state, 12 VDC. 144-148 MHz (any two MHz), includes 1 pair of crystals, built-in charging terminals for nicad cells, S-meter, battery level meter, telescoping whip antenna, internal speaker & microphone.

FMH-MC for Marine & Commercial service also available.

\$199.00



### TEMPO/CL 146A

... a VHF/FM mobile transceiver for the 2 meter amateur band. It is compact, ruggedly built and completely solid state. One channel supplied plus two channels of your choice FREE

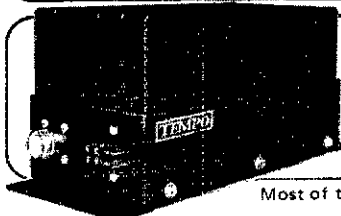
144 to 148 MHz coverage • Multifrequency spread of 2 MHz • 12 channel possible • Metering of output and receive • Internal speaker, dynamic microphone, mounting bracket and power cord supplied. A Tempo "best buy" at \$239.00.



### TEMPO CL 220

As new as tomorrow! The superb CL-220 embodies the same general specifications as the CL-146A, but operates in the frequency range of 220-225 MHz (any two MHz without retuning). At \$299.00 it is undoubtedly the best value available today.

**TEMPO 100A110** SOLID STATE VHF LINEAR AMPLIFIER. 144-148 MHz. Power output of 100 watts (nom) with only 10 watts (nom) in. Reliable and compact.



### TEMPO VHF/UHF AMPLIFIERS

Solid state power amplifiers for use in most land mobile applications. Increase the range, clarity, reliability and speed of two-way communications.

VHF (135 to 175 MHz)				UHF (400 to 512 MHz)			
Drive Power	Output	Model No.	Price	Drive Power	Output	Model No.	Price
2W	130W	130A02	\$199	2W	70W	70D02	\$270
10W	130W	130A10	\$179	10W	70W	70D10	\$250
30W	130W	130A30	\$189	30W	70W	70D30	\$210
2W	80W	80A02	\$169	2W	40W	40D02	\$180
10W	80W	80A10	\$149	10W	40W	40D10	\$145
30W	80W	80A30	\$159	2W	10W	10D02	\$125

FCC Type accepted models also available

Most of the above products are available at 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

Prices subject to change without notice.

# Congratulations, somebody. You just bought the 27,000th Collins KWM-2A transceiver.



That's right. In the last 15 years some 27,000 Collins KWM-2A units have been sold. Sold to amateur operators worldwide, governmental agencies, public and private emergency services, exploration parties. And used in such diverse climates as those of the polar ice-caps and the jungles of Southeast Asia.

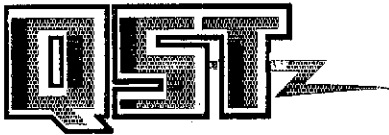
Behind this popularity is Collins' basic philosophy: "A conservative design makes a high-reliability design." And KWM-2A reliability is legend. So is its high stability and its high resistance to electrical and physical punishment. And, as a result, it enjoys high resale value.

KWM-2A utilizes only U.S. standardized tubes and components. Because of its conservative, high-reliability design, maintenance is comparatively simple. In fact, many maintenance operations can be performed by most any operator. And good parts availability means air time, not downtime.

When you add the technical assistance, service and support by Collins' factory professionals, you have plenty of good reasons to see your Collins distributor about becoming the owner of KWM-2A number 27,001.

Amateur Radio Marketing, Collins Radio Group, Rockwell International, Cedar Rapids, Iowa 52406.  
Phone 319/395-4507.





September 1976  
Volume LX Number 9

Published monthly as its official journal by the American Radio Relay League, Newington, Conn., U.S.A. Official organ of the International Amateur Radio Union.

**STAFF**

Richard L. Baldwin, W1RU  
*Editor*

William I. Dunkerley, Jr., WA2INB  
*Managing Editor*

Doug DeMaw, W1CER  
*Technical Editor*

Gerald L. Hall, K1PLP  
*Associate Technical Editor*

Lewis G. McCoy, W1ICP  
Thomas McMullen, W1SL  
Tony Dorbeck, W1YNC  
*Assistant Technical Editors*

Jay Rusgrove, WA1LNQ  
*Beginner and Novice Editor*

Charles Watts, WA6GVC  
*Editorial Assistant*

Perry F. Williams, W1UED  
*Organizational News Editor*

David Sumner, K1ZND  
*International*

George Barker, WB8PBC  
*Correspondence*

Marjorie C. Tenney  
*Conventions*

George Hart, W1NJM  
*Operating Activities Editor*

Ellen White, W1YL  
*Associate Operating Activities Editor*

R. L. White, W1CW  
*DXCC*

Jim Cain, WA1STN  
*Contests*

Robert J. Halprin, WA1WEM  
*Public Service*

Rod Newkirk, W9BRD  
Louise Moreau, W3WRE  
John Troster, W6ISO  
William A. Tynan, W3KMW  
*Contributing Editors*

Rosalie Cain, WA1STO  
*Club Notes*

Robert C. Gay  
Julie MacGregor  
Christine Powers  
Judith Gorski  
*Editorial and Production Assistants*

E. Laird Campbell, W1CUT  
*Advertising Manager*

Linda McLaughlin  
*Advertising Assistant*

J. A. Moskey, W1JMY  
*Circulation Manager*

John H. Nelson, W1GNC  
*Assistant Circulation Manager*

**OFFICES**

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

Subscription rate \$8.00 per year postpaid, U.S. funds, U.S. & Possessions, \$10.00 in Canada, \$10.50 elsewhere. Single copies \$1.00. Foreign remittances should be by international postal or express money order or bank draft negotiable in the U.S. and for an equivalent amount in U.S. funds.

Second-class postage paid at Hartford, Conn. and at additional mailing offices. Postmaster: Form 3578 requested.

Copyright © 1976 by the American Radio Relay League, Inc. Title registered at U.S. Patent Office. International copyright secured. All rights reserved. *Quedan reservados todos los derechos.* Printed in U.S.A.

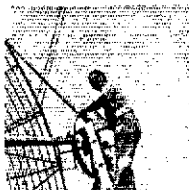
QST is available to the blind and physically handicapped on magnetic tape from the Library of Congress, Division for the Blind and Handicapped, Washington, DC 20542.

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**

K2UYH readies his 28-foot dish for Worked All Continents — the hard way! See page 57.



# Contents

## Technical

- 15 Meet the Microprocessor, Part 2 *William L. Thomas, WB6FGR/9 and Stephen E. Belter, WN9SGP*
- 20 The Mini-Miser's Dream Receiver *Doug DeMaw, W1CER*
- 24 VHF-FM Receiver Troubleshooting *Carlos H. Daniels, WB4IFR*
- 26 The Tower Shield *Baker Springfield, W4HYY and Richard Ely, WA4VHM*
- 29 Technical Correspondence
- 32 Hot and Cold Resistors as UHF Noise Sources *Benjamin L. Lowe, K4VOW/WA5UVM*

## Basic Radio

- 11 The Code Box *Thomas McMullen, W1SL*

## General

- 41 RFI Grows Up *Hal Steinman, K1FHN*
- 44 OSCARs Help Dedicate New Air and Space Museum *Joel P. Kleinman*
- 46 California to Hawaii on 2 Meters — 1976 Edition *Wayne Overbeck, K6YNB*
- 49 A Fist from the Sky *Leonard Withington, KH6CKJ, Pat Corrigan, KH6GQW, Gary Belcher, KH6GMP and Robert Halprin, WA1WEM*
- 53 Morse Decoded *Charles J. Harris, WB2CHO*
- 55 Radio Scouting at NORDJAMB-75 *Don Wibel, K9ECE*
- 57 K2UYH — Moonbounce WAC *James M. Morris, KH6HQG*

## Operating

- 82 DXCC Honor Roll *R. L. White, W1CW*
- 85 1976 Novice Roundup *Jim Cain, WA1STN*
- 89 Rules, 1976 VE/W Contest

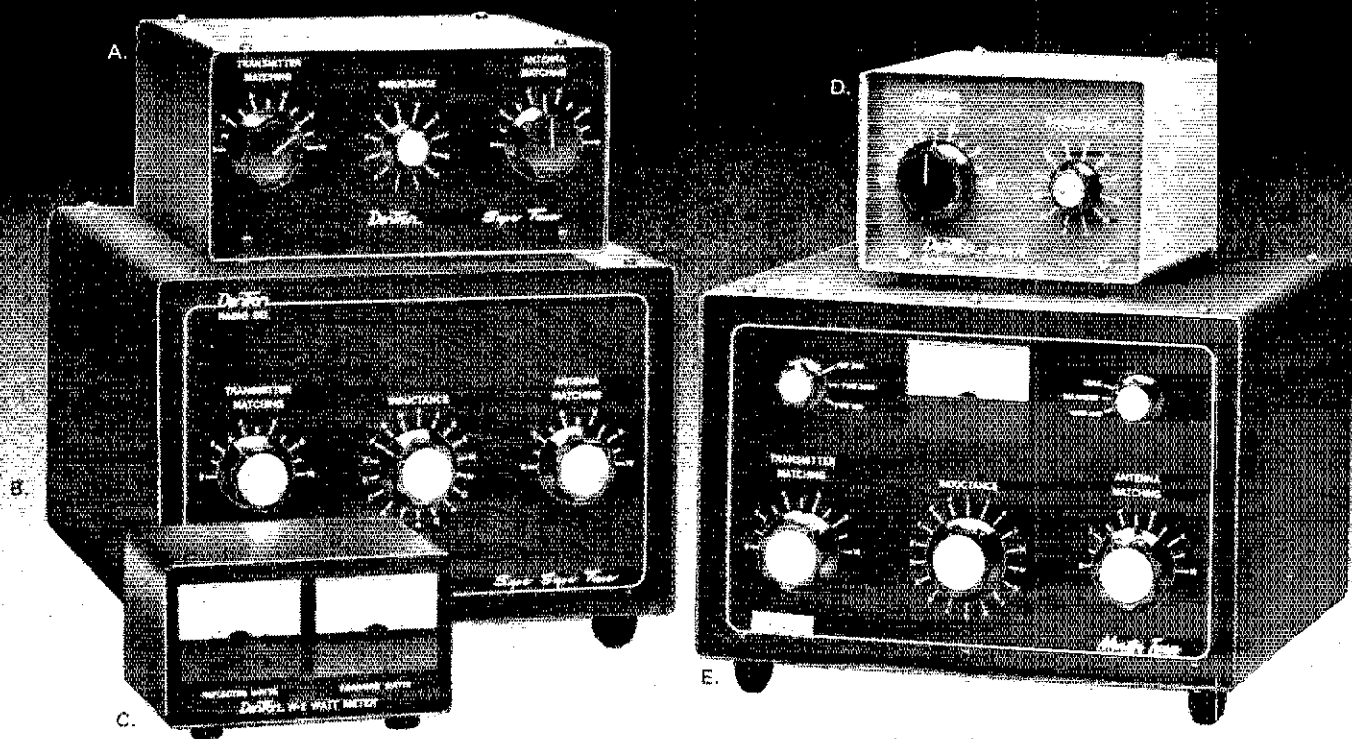
## Organizational and Regulatory

- 9 The Pursuit of Happiness
- 61 Upbeat at 5,280 Feet *Perry F. Williams, W1UED*
- 62 Moved and Seconded. . .
- 68 Canada Tests OSCAR for Emergency Location
- 74 Botswana Hosts First IARU Southern Africa Conference

## Departments

- |                       |                           |
|-----------------------|---------------------------|
| 70 Coming Conventions | 91 Operating Events       |
| 72 Correspondence     | 90 Operating News         |
| 76 FM Repeater News   | 35 Product Review         |
| 70 Hamfests           | 83 Public Service         |
| 68 Happenings         | 67 Silent Keys            |
| 39 Hints & Kinks      | 93 Station Activities     |
| 79 How's DX?          | 73 Washington Mailbox     |
| 74 International News | 77 The World Above 50 MHz |
| 9 It Seems to Us      | 75 YL News & Views        |
| 10 League Lines       | 73 25 & 50 Years Ago      |

# Does Your Transmitter Love Your Antenna?



If you're fighting the constant battle of limited band width, high SWR ratios, inefficient low-pass TVI filter operation due to high SWR you're not alone.

## DenTron makes the Problem Solvers.

The DenTron tuners give you maximum power transfer from your transmitter to your antenna, and isn't that where it really counts?

Our Super Tuners (A. B. & E.) are the only tuners on the market that match everything between 160 and 10 meters. Whether you have balanced line, coax cable, random or long wire the DenTron Super Tuners will match the antenna impedance to your transmitter.

**NEW:** The Monitor Tuner (E.) was designed because of overwhelming demand. Hams told us they wanted a 3 kilowatt tuner with a built-in wattmeter, a front panel antenna selector for coax, balanced line and random wire. So we engineered the 160-10m Monitor Tuner. It's a life time investment at \$299.50

The DenTron 80-10 AT (D.) is a random wire, 80-10 meter tuner which is ideal for portable operation or apartment dwellers.

Every serious ham knows he must read both forward and reverse wattage simultaneously for that perfect match. So upgrade with the DenTron W-2 Dual in line Wattmeter. (C.)

The flexibility we build into our Tuners make any previous tuner you might have owned obsolete.

A. Super Tuner 1KW PEP . . . . .	\$129.50
B. Super Super Tuner 3 KW PEP . . . . .	\$229.50
C. W-2 Wattmeter . . . . .	\$ 99.50
D. 80-10 AT 500 W PEP . . . . .	\$ 59.50
E. Monitor Tuner 3 KW PEP . . . . .	\$299.50

All DenTron products are made in U.S.A.

**DenTron**  
Radio Co., Inc.

2100 Enterprise Parkway  
Twinsburg, Ohio 44087  
(216)425-3173

*Dedicated to Making Amateur Radio MORE FUN!*

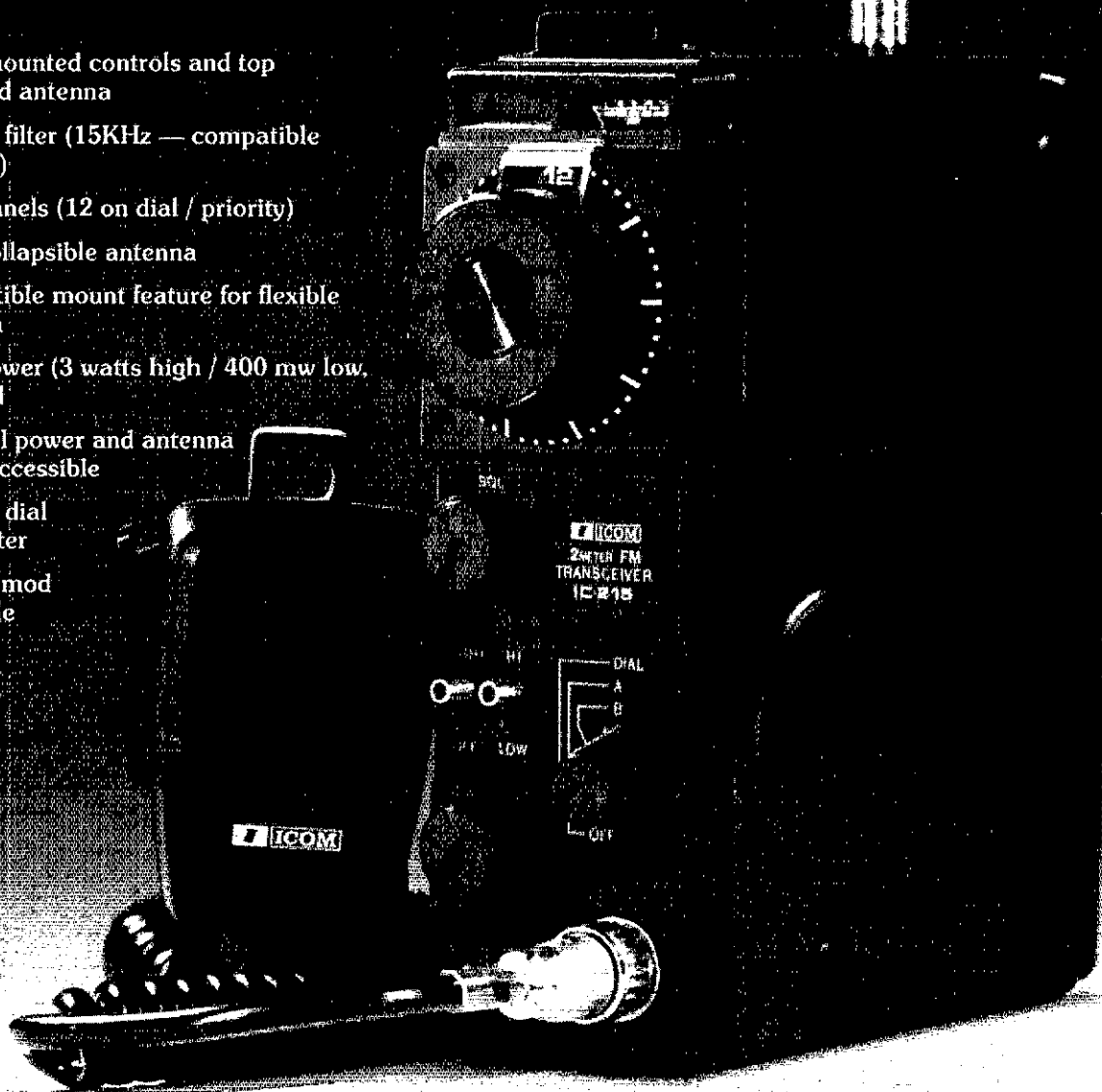
Now ICOM Introduces  
15 Channels of FM to Go!

## The New IC-215: the FM Grabber

This is ICOM's first FM portable, and it puts good times on the go. Change vehicles, walk through the park, climb a hill, and ICOM quality FM communications go right along with you. Long lasting internal batteries make portable FM really portable, while accessible features make conversion to external power and antenna fast and easy.

Grab for flexibility with the new **IC-215** FM portable.

- Front mounted controls and top mounted antenna
- Narrow filter (15KHz — compatible spacing)
- 15 channels (12 on dial / priority)
- Fully collapsible antenna
- Compatible mount feature for flexible antenna
- Dual power (3 watts high / 400 mw low, nominal)
- External power and antenna easily accessible
- Lighted dial and meter
- Ni-Cad mod available



Your new **IC-215** comes supplied with: 5 popular channels; handheld mic, with protective case; shoulder strap; connectors for external power and speaker; 9 long-life C batteries.

VHF UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

Distributed by:



# ICOM

**ICOM WEST, INC.**  
Suite 3  
13256 Northrup Way  
Bellevue, Wash. 98005  
(206) 747-9020

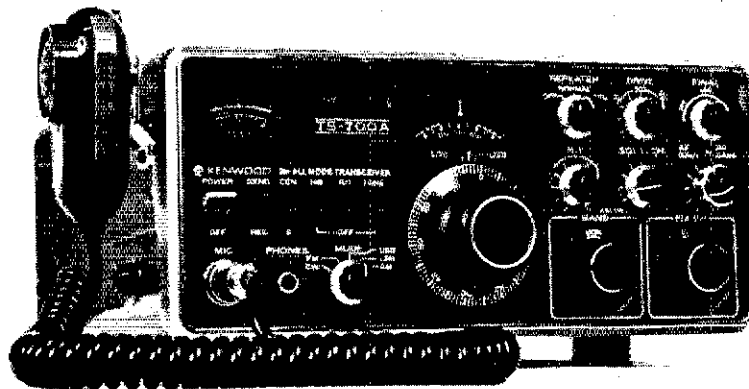
**ICOM EAST, INC.**  
Suite 307  
3331 Towerwood Drive  
Dallas, Texas 75234  
(214) 620-2780

**ICOM CANADA**  
3891 Oak Street  
Vancouver B.C. V6H 2M6  
Canada  
(604) 733-9819

# KENWOOD GIVES YOU A CHOICE FOR 2-METER SSB



**KENWOOD'S TV-502 TRANSVERTER PUTS YOUR TS-520 OR TS-820 ON THE 2-METER BAND...SSB AND CW. SIMPLY PLUG IT IN AND YOU'RE ON THE AIR**



**OR GO ALL THE WAY WITH THE BEST...THE TS-700A**

Ever tried 2 meter SSB or CW? How about the OSCAR satellite? Tune the band with a VFO instead of fixed channel crystals and experience DX-ing on VHF. In fact, there's a VHF QSO party coming up on September 11 thru 13. FMers improve your scores...beginners try it for the first time. You don't need a big antenna to do it either...anything from a coat hanger to ---? The OSCAR satellites (6 & 7) are waiting for you too! Or go exotic with meteor scatter or tropospheric ducting. The "Sky is the limit" on VHF SSB and CW.

TRIO-KENWOOD COMMUNICATIONS, INC.  
116 EAST ALONDRA/GARDENA, CA 90248

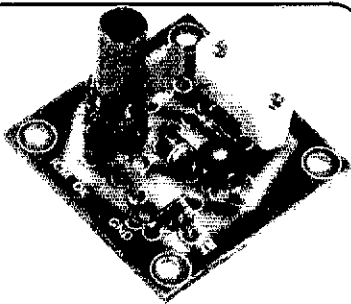
 **KENWOOD**  
...pacesetter in amateur radio



# for the experimenter!

INTERNATIONAL CRYSTALS & KITS

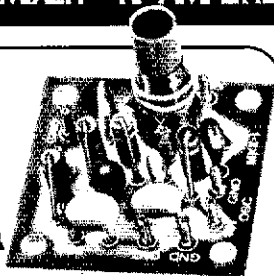
OSCILLATORS • RF MIXER • RF AMPLIFIER • POWER AMPLIFIER



### 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.*

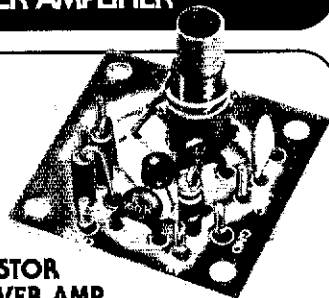
\$3.95 ea.



### 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.*

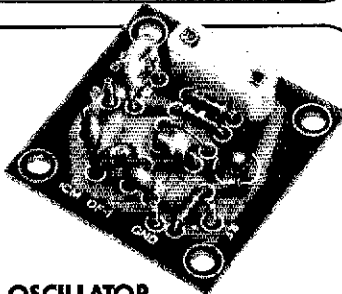
\$4.50 ea.



### 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.*

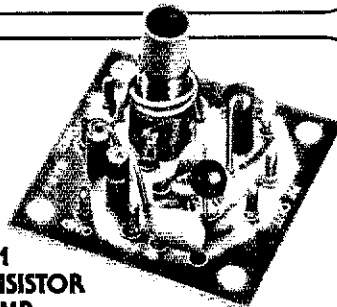
\$4.75 ea.



### 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.*

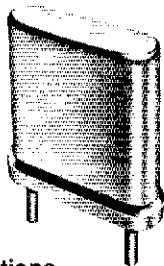
\$4.50 ea.



### 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 <i>Specify when ordering</i>	\$4.95 ea.
031081	20 to 60 MHz — For use in OX OSC Hi <i>Specify when ordering</i>	\$4.95 ea.
031300	3 to 20 MHz — For use in OF-1L OSC <i>Specify when ordering</i>	\$4.25 ea.
031310	20 to 60 MHz — For use in OF-1H OSC <i>Specify when ordering.</i>	\$4.25 ea.

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

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



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

10 North Lee  
Oklahoma City, Oklahoma 73102

## Directors

### Canada

RONALD J. HESLER, VE1SH  
P.O. Box 418, Sackville, NB E0A 3C0  
Vice-Director: William W. Loucks, VE3AR  
155 Brentwood Rd. N., Toronto, ON M8X 2C8

### Atlantic Division

HARRY A. MCCONAGHY, W3SW  
8708 Fenway Dr., Bethesda, MD 20034  
Vice-Director: Jesse Bielsman, W3KT  
RD 1, Box 66, Valley Hill Rd., Malvern, PA 19355

### Central Division

PHILIP E. HALLER, W9HPG  
6000 S. Tripp Ave., Chicago, IL 60629  
Vice-Director: Edmond A. Metzger, W9PRN  
1520 South Fourth St., Springfield, IL 62703

### Dakota Division

GARFIELD A. ANDERSON, W0KE  
5820 Chowan Avenue South, Minneapolis, MN 55410  
Vice-Director: Tod A. Olson, W01YP  
292 Heather Lane, Long Lake, MN 55356

### Delta Division

MAX ARNOLD,\* W4WHN  
612 Hogan Rd., Nashville, TN 37220  
Vice-Director: Malcolm P. Keown, W5RUB  
213 Moonmist, Vicksburg, MS 39180

### Great Lakes Division

RICHARD A. EGBERT W8ETU  
6479 Red Fox Rd., Reynoldsburg, OH 43068  
Vice-Director: William E. Clausen, W8IMI  
1615 Scottsdale Ave., Columbus, OH 43220

### Hudson Division

STAN ZAK, K2SJO  
13 Jennifer Lane, Port Chester, NY 10573  
Vice-Director: George A. Diehl, W2IHA  
20 Wilson Ave., Chatham, NJ 07928

### Midwest Division

PAUL GRAUER, W0FIR  
Box 190, Wilson, KS 67490  
Vice-Director: Claire Richard Dyes, W0JCP  
2933 Dudley St., Lincoln, NE 68503

### New England Division

JOHN C. SULLIVAN, W1HHR  
Whitney Road, Columbia, CT 06237  
Vice-Director: John F. Lindholm, W1DGL  
P.O. Box 1695, Bristol, CT 06010

### Northwestern Division

ROBERT B. THURSTON,\* W7PGY  
7700 31st Ave., N.E., Seattle, WA 98115  
Vice-Director: Dale T. Justice, K7WWR  
1369 NE Sunrise Lane, Hillsboro, OR 97123

### Pacific Division

J. A. "DOC" GMELIN, W6ZRJ  
10835 Willowbrook Way, Cupertino, CA 95014  
Vice-Director: William W. Eitel, WA7LRU  
Box 120, Dayton, NV 89403

### Roanoke Division

L. PHIL WICKER, W4ACY  
4821 Hill Top Road, Greensboro, NC 27407  
Vice-Director: Donald B. Morris, W8JM  
1136 Morningstar Lane, Fairmont, WV 26554

### Rocky Mountain Division

CHARLES M. COTTERELL W0SIN  
430 S. Swadley St., Lakewood, CO 80228  
Vice-Director: Maurice O. Carpenter, K0HRZ  
1310 South Tejon St., Denver, CO 80223

### Southeastern Division

LARRY E. PRICE, W4DQD  
P.O. Box 2067, Georgia Southern Branch, Statesboro,  
GA 30458  
Vice-Director: Bev B. Cavender, K4VW  
P.O. Box 1083, Lake Placid, FL 33852

### Southwestern Division

JOHN R. GRIGGS,\* W6KW  
1273 13th St., Baywood Park, Los Osos, CA 93402  
Vice-Director: Jay A. Holladay, W6EJJ  
5128 Jessen Dr., La Canada, CA 91011

### West Gulf Division

ROY L. ALBRIGHT,\* W5EYB  
107 Rosemary, San Antonio, TX 78209  
Vice-Director: Jack D. Gant, W5GM  
521 Monros, NW., Ardmore, OK 73401

\*Members Executive Committee

## Section Communications Managers of the ARRL

Reports Invited: All amateurs, especially League members, are invited to report station activities on the first of each month (or preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio club reports are also desired by SCMs for inclusion in QST. ARRL Field Organization station appointments are available in areas shown to qualified League members. General or Conditional Class licenses or higher may be appointed QRS, QPS, QO and OBS. Technicians may be appointed OVS, OBS, or VHF PAM. Novices are eligible for ORS - II. SCMs desire application for the leadership posts of SEC, EC, RM and PAM where vacancies exist.

### Canadian Division

*Alberta*  
\*Sydney T. Jones, VE6MJ, 10706 - 57 Ave., Edmonton, AB T6H 0Y6  
*British Columbia*  
H. E. Savage, VE7FB, 4553 West 12th Ave., Vancouver 8, BC  
Steven Fink, VE4FQ, 14 Grandcrest St., Winnipeg, MB R2V 2X2  
*Manitoba*  
Aaron D. Solomon, VE1QC, 8 Crichton Park Road, Dartmouth, NS B3A 2N8  
*Ontario*  
L. P. Thivierge, VE3GT, RR 1, Renfrew, ON K7V 3Z4  
*Quebec*  
Lawrence P. Dobby, VE2YU, 157 Sedgefield Ave., Point Claire, PQ H9R 1N8  
*Saskatchewan*  
Percy A. Crosthwaite, VE5RP, RR 3, Saskatoon, SK S7K 3J6

### Atlantic Division

*Delaware*  
Roger E. Cole, W3DKX, 345 E. Roosevelt Ave., New Castle 19720  
*Eastern Pennsylvania*  
George S. Van Dyke, Jr., W3HK, 4607 Convent Lane, Philadelphia 19114  
*Maryland-D.C.*  
Karl R. Medrow, W3FA, 718 W. Central Avenue, Davidsonville 21035  
*Southern New Jersey*  
Raymond E. Clancy, WB2GTE, 222 E. Knight Ave., Collingswood 08108  
*Western New York*  
Joseph M. Hood, K2YAH, 67 Mountain Ash Dr., Rochester 14615  
*Western Pennsylvania*  
Donald J. Myslewski, K3CHD, 359 McMahon Rd., N. Huntingdon 15642

### Central Division

*Illinois*  
Edmond A. Metzger, W9PRN, 1520 South 4th St., Springfield 62703  
*Indiana*  
Michael P. Hunter, WA9ED, 701 Bobs Court, Beech Grove 46107  
*Wisconsin*  
Roy Pedersen, K9FHI, 510 Park St., Juneau 53039

### Dakota Division

*Minnesota*  
Franklin B. Leppa, K0ZXE, 2021 Swan Lake Rd., Duluth 55811  
*North Dakota*  
Mark J. Worcester, WA0WLP, 1523 N. 20th St., Bismarck 58501  
*South Dakota*  
Ed Gray, WA0CPX, Rt. 3, Salem 57058

### Delta Division

*Arkansas*  
Sid Pokorny, W5UAU, P. O. Box 4071, Horseshoe Bend 72512  
*Louisiana*  
Robert P. Schmidt, W5GHP, 5100 Prass Dr., New Orleans 70126  
*Mississippi*  
William L. Appleby, W5DCY, 28 Linda Lane, Long Beach 39560  
*Tennessee*  
O. D. Keaton, WA4GLS, Rt. 1, Medearis Dr., Old Hickory 37138

### Great Lakes Division

*Kentucky*  
Ted H. Huddle, W4CID, 604 Amanda Furnace Drive, Ashland 41101  
*Michigan*  
Allen L. Baker, W8TZ, 4145 Eighth Street, Newport 48166  
*Ohio*  
Henry R. Greeb, W8CHT, 6580 Dry Ridge Road, Cincinnati 45247

### Hudson Division

*Eastern New York*  
Gary J. Ferdinand, WA2PJJ, Sunst Trail, Clinton Corners, 12514  
*N. Y. C. & Long Island*  
John H. Smale, WB2CHY, 764 Milligan Ln., West Islip 11795  
*Northern New Jersey*  
\*Louis J. Amoroso, W2ZZ, 180 Pleasant Ave., Bergenfield 07621

### Midwest Division

*Iowa*  
Max R. Otto, W0LFF, 733 W. Benton St., Iowa City 52240  
*Kansas*  
Robert M. Summers, K0BXF, 3045 North 72nd, Kansas City 66109  
*Missouri*  
Larry G. Wilson, K0RWL, 509 West Ivy, Lee's Summit 64063  
*Nebraska*  
Claire R. Dyes, W0JCP, 2933 Dudley, Lincoln 68503

### New England Division

*Connecticut*  
John J. McNassor, W1GVT, 218 Berlin Ave., Southington 06489  
*Eastern Massachusetts*  
Frank L. Baker, Jr., W1ALP, 65 Beechwood Rd., Halifax 02338  
*Maine*  
Edward B. Bristow, WA1MUX, 54 Lee St., Lincoln 04457  
*New Hampshire*  
Robert Mitchell, W1SWX, Box 137-A, Chester 03036  
*Rhode Island*  
Ronald H. Simonton, K1GMW, 100 Surtolk Dr., North Kingstown 02852  
*Vermont*  
Joel Breakstone, WA1PSK, Box 231, Johnson 05658  
*Western Massachusetts*  
Percy C. Noble, W1BVR, Bailey Rd., P. O. Box 5, Lanesboro 01237

### Northwestern Division

*Alaska*  
Roy Davie, KL7CUK, Star Route - Montana Creek, Willow 99688  
*Idaho*  
Dale Brock, WA7EWW, 1508 Alder Drive, Lewiston 83501  
*Montana*  
Robert E. Lao, W7LF, RFD 3, Box 104, Bozeman, MT 59715  
*Oregon*  
Dwight J. Albright, W7HLF, 1878 Orchard Home Dr., Medford, OR 97501  
*Washington*  
Mary E. Lewis, W7QGP, 10352 Sandpoint Way, N.E., Seattle 98125

### Pacific Division

*East Bay*  
Charles R. Breeding, K6IWR, 3130 Raleigh Ct., Fremont 94536  
*Nevada*  
John D. Weaver, W7AAF, 1501 N. 22nd St., Las Vegas 89101  
*Pacific*  
J. P. Corrigan, KH6GQW, P. O. Box 698, Kaneohe 96744  
*Sacramento Valley*  
Norman A. Wilson, WA6JVD, Route 1, Box 730, Woodland 95695  
*San Francisco*  
Charles K. Epps, W6OAT, 35 Belcher St., San Francisco 94114  
*San Joaquin Valley*  
Ralph Saroyan, W6JPU, 6204 E. Townsend Ave., Fresno 93702  
*Santa Clara Valley*  
James A. Maxwell, K6AQ, P. O. Box 473, Redwood Estates 95044

### Roanoke Division

*North Carolina*  
Charles H. Brydges, W4WXZ, 4901 Tiffany Ave., Winston-Salem 27104  
*South Carolina*  
Thomas L. Lufkin, WA4DAX, 4337 Flynn Dr., Charleston 29405  
*Virginia*  
Robert L. Follmer, W4QDY, 1057 Dune St., Norfolk 23503  
*West Virginia*  
Mrs. Kay Anderson, W8DUV, 209 Childers Court, Huntington 25705

### Rocky Mountain Division

*Colorado*  
Clyde O. Penney, WA0HLC, 1626 Locust St., Denver 80220  
*New Mexico*  
Edward Hart, Jr., W5RE, 1909 Moon N.E., Albuquerque 87112  
*Utah*  
Ervin N. Greene, W7EU, 4326 Hermosa Way, Salt Lake City 84117  
*Wyoming*  
Joseph P. Ernst, W7VB, 802 Ryan St., Thermopolis 82443

### Southeastern Division

*Alabama*  
James A. Brashear, Jr., WB4EKJ, 3002 Boswell Drive, Huntsville 35811  
*Canal Zone*  
Roderick J. Isler, K2EPI, 352 Aviation Det. Box H, Albrook AFB, APO NY 09825  
*Georgia*  
Alpheus H. Stakely, K4WC, 2220 Lyle Road, College Park 30037  
*Northern Florida*  
Frank M. Butler, Jr., W4RKH, 323 Elliott Rd., S.E., Fort Walton Beach 32548  
*Southern Florida*  
Woodrow Huddleston, K4SCL, 219 Driftwood Lane, Largo 33540  
*West Indies*  
David Novos, KP4BDL, Paseo Arce 2430, Levittown, PR 00632

### Southwestern Division

*Arizona*  
Marshall Lincoln, W7DOS, Box 1490, Wickenburg 85358  
*Los Angeles*  
Eugene H. Violino, W6INH, 2839 Canada Blvd., Glendale 91208  
*Orange*  
William E. Haitritter, WB6AKR, P. O. Box 521, Hemet, CA 92343  
*San Diego*  
Arthur R. Smith, W6INI, 4515 Melissa Way, San Diego 92117  
*Santa Barbara*  
D. Paul Gagnon, WA6DEI, 1791 Hedon Cir., Cambrillo 93010

### West Gulf Division

*Northern Texas*  
Leland F. Heithecker, W5EJ, 1409 Cooper Dr., Irving, TX 75061  
*Oklahoma*  
Leonard R. Hollar, WA6FSN, RFD 1, 710 South Tenth St., Kingfisher 73750  
*Southern Texas*  
Arthur R. Ross, W5KR, 132 Sally Lane, Brownsville 78521

\*Official appointed to act temporarily in the absence of a regular official.

# THE AMERICAN RADIO RELAY LEAGUE, INC.



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 worth-while 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 pre-requisite, although full voting membership is granted only to licensed amateurs.

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

## Past Presidents

H. P. MAXIM, W1AW, 1914-1936  
E. C. WOODRUFF, W8CMP, 1936-1940  
G. W. BAILEY, W2KH, 1940-1952  
G. L. DOSLAND, W0TSN, 1952-1962  
H. HOOVER, JR., W6ZH, 1962-1966  
R. W. DENNISTON, W0DX, 1966-1972

## Officers

**President,** HARRY J. DANNALS, \* W2TUK  
16 Arbor Lane, Dix Hills, NY 11746

**First Vice-President,**  
VICTOR C. CLARK, \* W4KFC  
12927 Popes Head Road, Clifton, VA 22024

**Vice-Presidents,**  
NOEL B. EATON, VE3CJ  
Box 660, Waterdown, Ontario L0R 2H0  
CARL L. SMITH, W0BWJ  
1070 Locust St., Denver, CO 80220

**Secretary,** RICHARD L. BALDWIN, W1RU  
**Treasurer,** JOHN HUNTOON, W1RW

## Honorary Vice-Presidents,

F. HANDY, W1BDI C. COMPTON, W0BUO  
W. GROVES, W5NW R. DENNISTON, W0DX  
R. BEST, W5QKF R. CHAPMAN, W1QV  
D.H. HOUGHTON

**General Manager,**  
RICHARD L. BALDWIN, \* W1RU

**Communications Manager,**  
GEORGE HART, W1NJM

**Technical Consultant,**  
GEORGE GRAMMER, W1DF

**Assistant Secretaries,**  
PERRY F. WILLIAMS, W1UED  
HAROLD M. STEINMAN, K1FHN

**Assistant General Managers,**  
E. LAIRD CAMPBELL, W1CUT  
DAVID SUMNER, K1ZND  
225 Main St., Newington, CT 06111

**General Counsel,**  
ROBERT M. BOOTH, JR., W3PS  
1302 18th Street, N.W., Wash., DC 20036

**Associate Counsel,**  
B. ROBERT BENSON, VE2VW  
1010 St. Catherine St. West, Montreal,  
PQ H3B 3R5

\* Executive Committee Member

# "It Seems to Us..."

## The Pursuit of Happiness

Any American would have to have a soul of flint not to have been stirred by our nation's Bicentennial celebration. There were the best-ever parades and fireworks. There were the ceremonies at Independence Hall and the Tall Ships. There were the spine-tingling strains of America the Beautiful, and our national anthem. And there was Old Glory, waving as proudly in the skies as ever in history. Few of us had anticipated the upsurge of patriotism that rolled like a tidal wave from the Atlantic to the Pacific.

Perhaps, as the *Washington Post* observed, we were caught up by a force beyond our immediate comprehension. We sensed an historic occasion and there was an urge to be part of it. Even the media were overpowered. For one glorious day, they spared us the normal diet of muckraking and served as the vehicle for inspiring this great nation. Even crime took a holiday as Americans from all walks of life savored the blessings and greatness of our nation. Everyone shared, I believe, the sentiment of my 3-year-old granddaughter who, after watching from her grandfather's shoulders the parade down Washington's Constitution Avenue, said, "Grandpa, I want to come back tomorrow."

No scenes were more unforgettable than those of our newest Americans swearing their allegiance. There were 7,500 of them at Miami, and thousands elsewhere. Those scenes brought home the simple fact most vividly that, despite America's faults and shortcomings, and the traumatic experiences of the recent past, the Statue of Liberty's call is still heard by the world's tired, poor and huddled masses, yearning to breathe free. This is a unique phenomenon. No other nation on the face of the earth is such a sought-after haven.

July 4, 1976, was indeed a time for counting our blessings. And among Americans, the amateur radio fraternity had cause for gratitude. As beneficiary of the nation's dedication to the pursuit of happiness, the amateur service, in magnitude and advancement, surpasses that of any other nation. Long a respected facet of American life, amateur radio is encouraged by our government, performs invaluable service, and is enjoyed by more than a quarter of a million of our citizens.

It is no surprise that amateur radio flourishes in the world's greatest democracy. There appears to be a correlation between the health of a nation and the

health of amateur radio. That the latter is somewhat of a barometer of the state of modernization of contemporary societies is suggested by mere reference to the census of radio amateurs throughout the world.

Having only recently returned from a month's safari in the Middle East, my mind has inevitably focused on the challenges which face our friends in that region. In Cairo, dining on the banks of the Nile with one of our fellow amateurs, I learned that the greatest barrier to more widespread amateur activity in Egypt is the shortage of foreign exchange, which is necessary to purchase the equipment so readily available to Americans and other amateurs. In Saudi Arabia and Iran, money is not a problem, but there remain certain psychological barriers which tend to restrict the number of licenses issued, expatriates often being considered safer than local nationals. Totally unrecognized is the tremendous capability which amateur radio has for training the technicians so critically required to man the vast development programs being launched by those countries. The same is true in Iraq, where I was emphatically told that amateur radio is strictly and unequivocally forbidden. Particularly tragic is the situation in Lebanon. Torn by unbelievable civil strife, the very survival of the country is at stake. Amateur radio, which once thrived in what was considered to be the Switzerland of the Middle East, is among the casualties.

The challenge for American amateurs is to keep the spirit of amateur radio hale and hearty, even as we as a nation rededicate ourselves to the spirit of '76. Liberty does not mean license. Our unalienable right is not happiness itself, but the pursuit of happiness. It is in our behavior where our strength lies. This means, as so well set forth in the ARRL's amateur code, being considerate, loyal, progressive, friendly, balanced and patriotic. If we remain true to these qualities, we can be sure of the future of the amateur service in our own country. We can also be confident that the peoples of other nations will better appreciate its value and will increasingly join with us in permitting amateur radio to contribute to international peace and understanding. *Remarks by Ambassador Armin Meyer, W3ACE, ARRL Central Division Convention, Milwaukee, July 10, 1976.*

# League Lines...

Cancel that August "Happenings" item which began, "Loucks New Director." The personal considerations which led Canadian Director Ron Hesler, VE1SH, to submit his resignation have moderated, and Ron accordingly was able to withdraw his resignation before the effective date. He continues, then, as director of ARRL from Canada until the end of the term, January 1, 1978; Bill Loucks, VE3AR, similarly continues as vice director.

Last Call! Deadline for receipt of nomination as a candidate for director or vice director in elections currently being conducted in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions is noon, September 10, rather than the twentieth as in past years. Full details were in Happenings, July and August issues of QST.

Last Call, again! September 10 is also the deadline this year for members who are receiving QST at an address outside the division they consider home to notify the Secretary that they'd like a ballot in the home division, if it is one of those mentioned in the previous paragraph. Just drop a note to Secretary, ARRL, mentioning "absentee ballot for director election," your permanent address and the address to which QST now goes.

Gaithersburg Hamfest scheduled for October 17 has been cancelled for this year. A new Maryland Trader's Tax Law effective July 1 has been ruled by the state to include the tailgate activity—almost impossible to enforce. Steps being taken for remedial legislation. Details to follow.

At the July Board Meeting member fees were removed from the ARRL Awards Program. In brief, only ARRL members (W/VE), Novices and DX, will be eligible to participate in both WAS and DXCC. Those submitting cards for all ARRL awards will, however, be required to include enough for their safe return. Write Hq. for a handy chart of approximate return sums. S.A.S.E., please.

A new League appointment was also approved by the Board of Directors in July - that of Technical Advisor (TA). Appointees will be chosen by the Hq. technical staff, then approved by the director of the respective division. TAs will be called upon as consultants in areas of high technical specialization to comment on contributed technical papers and offer technical advice as it is needed by the Hq. staff.

OSCAR demonstrators needed! People who have worked through the OSCAR satellites and can demonstrate their use to science classes at nearby schools are needed throughout the U.S. and Canada. Contact the OSCAR Educational Program Department, Hq.

The June 16 W1AW Qualifying Run certified the following ops at 40 wpm: W2CSQ, W2KLA, WA2PJL, W2UYQ, W3FU, WA4SBC, WB4ZRW, W6KZJ, K7BN, WA7VXP, W8PRM, WB9NOZ, W0JS, and VE3CDK. The W6OWP September 8 run and the W1AW December 17 run will include sessions at 40 wpm. QRV?

Hot off the press . . . the ARRL Ham Radio Operating Guide, everything you always wanted to know about how to operate, from beginner/novice to first time on SSTV. . . from collecting awards to handling a message. The new book is easy to read and profusely illustrated. Cost? \$4, postpaid.

Want to get CBers into ham radio? Show the new half-hour presentation package, "Moving up to Amateur Radio!" The complete package with film, speech, publicity and handouts can be reserved now through the Club and Training Department or your local Public Relations Assistant.

# The Code Box

Flip a switch and break a mysterious international code — Morse, that is!

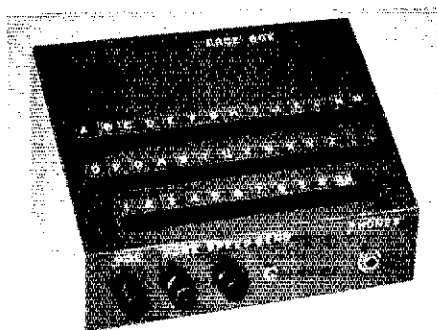
By Thomas McMullen,\* W1SL

**F**riends, radio club officers, instructors, rejoice! Your salvation is at hand. No longer must you gear your code-sending sessions to the speed of the absolute beginner while the slightly more advanced sit and fret. Got a student that is hung up on a Z or Y or Q? Hand him this box, a pair of headphones and let him sort it all out — at his own speed. As a construction project, it will introduce the neophyte to the technical end of things too.

Pssst! Hey, beginner — afraid to let your buddies know how weak you are on certain letters? Take one of these boxes into your room and bone up on 'em. It'll even work under the covers in the dark!

The impetus for this idea was started at a lunch-time session between the author and John Johnston, K3BNS, of the FCC. We were discussing means of helping people become amateurs, and several of the available training aids were mentioned. At one point code-practice tapes were mentioned, to which John replied, "Those tapes are great to build up your speed, but what do you have to offer the guy who doesn't know the code at all?"

Well, that did it! John ruined my flight back from Washington, DC. Instead of enjoying the scenery, I sat musing about the problem. Suddenly the proverbial light bulb flashed. However, instead of jumping up with a cry of "Eureka," I indulged in a flurry of activity in getting my briefcase from under the seat and finding a pad and pencil. I suppose people who travel a lot are accustomed to having their fellow passengers do strange things, but I thought that the least the guy in the seat next to me could have done was to cock a quizzical eyebrow about those



hieroglyphics that were appearing on the paper I held. Oh well . . .

## How It Works

There is no great magic hidden away in the box. The generation of code elements by scanning a diode matrix has been used for purposes as diverse as creating TV images and for providing call letters for repeater identification. It is done the same way here, with only minor modifications. Instead of sending a whole string of letters it sends only one — as selected by a switch on the panel. It will send it once and wait. To hear it again you have only to push the start button.

There is no need to go into a detailed description of how a matrix works here — it is not necessary to know all of the theory to get the box to work. The basic premise is that we have a crosshatch pattern of conductors: Horizontal rows and vertical columns. At the appropriate points diodes are connected between the conductors. A series of pulses "scan" across the columns and wherever there is a diode between a row and a column a current path exists. This flow of current is used to trigger an oscillator. Proper spacing of the pulses and correct locations of the diodes will cause the oscillator to be

turned on to form "dits" and "dahs" of international Morse code. The letter to be formed is selected by means of a simple switch that selects the proper row of diodes.

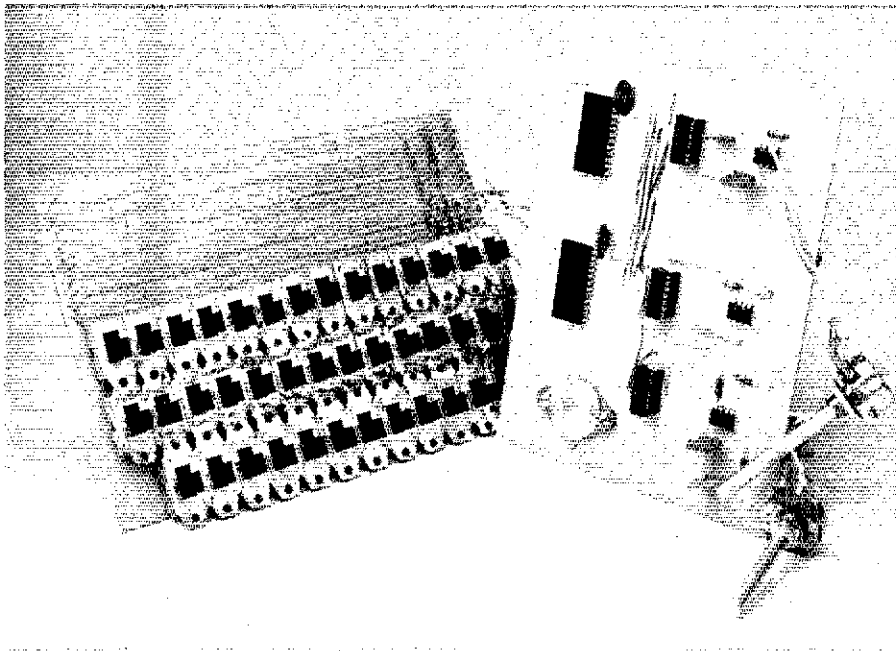
Timing for the whole thing is taken care of by an integrated-circuit oscillator (555) that has an adjustment for speed. Thus you can hear the letter at any speed that you like. The string of pulses that emerges from the oscillator must be translated into something that will scan the columns, and this is done by first dividing the number of pulses by 16, then translating the resultant pulses into "one-of-sixteen" to apply them to the matrix. Actually, since the longest character to be sent (a zero) requires more than 16 columns (or code elements), it is necessary to add a second IC for a total scan of thirty-two lines. A few additional ICs are required to perform switching functions between parts of the circuit and to stop the proceedings after a letter has been sent once.

## Putting It All Together

The watchwords in designing the circuit and the package to put it in were "simplicity, low cost, and ease of assembly." Someone asked why I didn't make it like a keyboard keyer. One big reason — slide switches in this quantity cost between 17 and 20 cents each, and you'll need 40 of them. Push-button or keyboard switches cost \$1.50 and up, unless you make a lucky find at a surplus house or flea market. With this in mind, the circuit board was designed to fit the connections of an inexpensive slide switch. If any builder wants to try more exotic switches, you are on your own.

Printed-circuit construction is recommended because there is little room for error in assembly. Parts should drop

\* Assistant Technical Editor, *QST*



A prototype timing and driver board is shown here on the right, with the matrix and selector switch assembly at the left. The two controls will be mounted on the enclosure panel. Overhead wires in the matrix, not completely wired at the time the photograph was taken, will be separated by strips of heavy paper insulation to prevent short circuits between rows. The use of double-sided pc board would result in a cleaner matrix layout. The large "transistor" near the bottom of the driver board is the LM-309K voltage regulator.

right into place and a good soldering job will keep them there. The only chance for error is in orientation of the ICs. Close attention will keep this straight.

The model constructed in the ARRL laboratory was made from single-sided pc-board material, which meant that the many crossover connections between ICs had to be taken care of by wire jumpers rather than copper paths on the board. This also required that the row connections on the matrix be made of pieces of tinned copper wire suspended above the board to allow space for the diodes to make connection. The use of a double-sided pc board would simplify the layout greatly, and it is likely that most of the commercially manufactured boards for this project will be designed with double-sided board, eliminating the

overhead-wire trick for the matrix rows.

An enclosure with a sloping front was made for the unit shown here, but there is nothing sacred about this. The entire pc board and switch assembly will fit into a low-cost 8 × 12 × 3-inch chassis. Rather than go through the painful process of making an oblong hole for each switch, three slots are made across the panel or chassis. If done neatly and the edges are smoothed, the appearance is not unpleasing. Pres-Appl, Dyno-Tape or decal labeling will suffice to identify the switch associated with each letter and number.

A regulator IC is provided to obtain the +5 V that is required for the circuitry. The primary source of voltage to the input of the regulator should be greater than 8 volts, and can be supplied

by a built-in transformer and rectifier combination or by a battery pack, either internal or external.

Assembly and testing can be done in stages, and if done in a logical order will allow checks at each important phase to minimize any troubleshooting later on. As an example, if the audio oscillator and its triggering IC are put in place first, you can check that part of the circuit by temporarily grounding the test point provided. If all is well a tone will be heard. This same test point will allow the builder to test each diode for performance and polarity before soldering it into the matrix. More about this later.

The next stage should be to insert the clock, frequency divider, and decoder ICs. These stages can be checked by means of an oscilloscope at the output pins, or by listening with a high-impedance headset. A test jumper from the input of the audio oscillator will also enable you to hear the pulses, which will sound like ragged tones or clicks. These pulses can be followed through the circuit to ascertain what is happening. A test point (TP2) is provided to allow insertion of an additional timing capacitor in the clock circuit. This extra capacitance will slow the rate of the pulses to make it easier to test the circuitry and check the placement of diodes in the matrix. After the unit has been completed and everything seems to be working right, this test capacitor can be removed to allow the code to be sent at a higher speed.

### Wiring the Matrix

There are lots of diodes to be connected in the matrix but don't be discouraged. We'll try to make the process as painless as possible and in a sequence that will help a beginner learn something about code elements at the same time.

The basic timing unit for a "dit" is one pulse, which will be 16 times as wide as that coming out of the clock, and at 1/16th the frequency. Correct spacing for letters requires that there be one pulse width between two dits, between a dit and a dah, or between two dahs. A dash, or dah, will require that we assemble three pulses in a row with no spacing between them. A diode connected between a row and a column will provide a dit pulse. Absence of a diode at that point will create a space. Three diodes at adjacent crosspoints will create a dah.

Just to make sure things are started right, let's wire up an "F" first. Check a diode by touching the leads across TP1. If it is a good diode, a tone should be heard. If there is no tone, reverse the leads — to work properly the cathode (bar) end should be toward ground. This is important because the cathode must

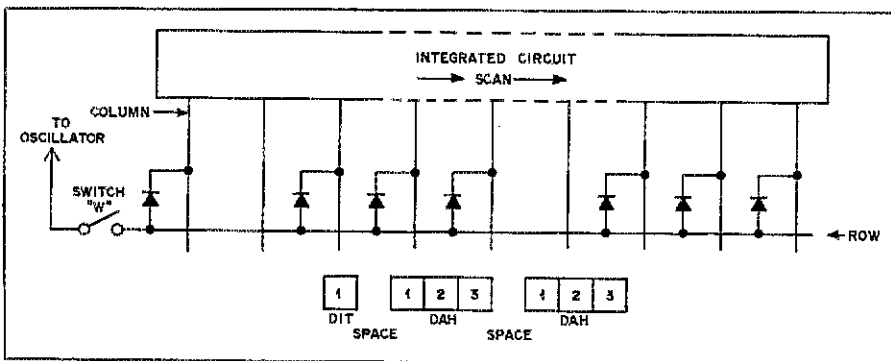


Fig. 1 — Letters in international Morse code can be formed by scanning across a matrix with a series of pulses. Diodes connected at the proper intervals cause current flow which is used to trigger an audio oscillator. The letter formed in this example is W.

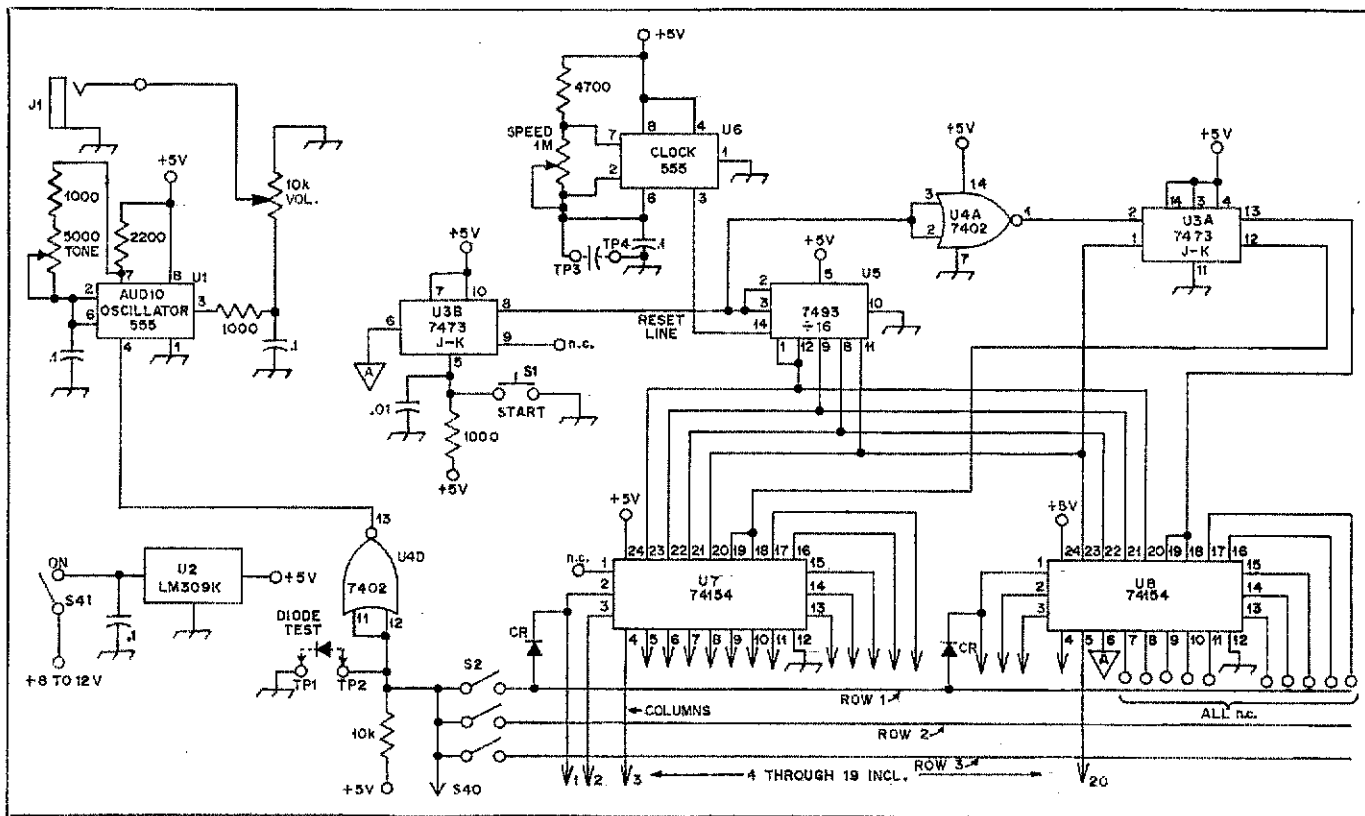


Fig. 2 - Schematic diagram of the code-box circuitry. The rows and columns of the matrix are not shown completely. TP1 and TP2 are insulated terminals used to test diodes; a good diode will activate the oscillator. A key jack for sending practice can be connected across these two test points as well. TP3 and TP4 allow the addition of a capacitor to decrease the speed of the clock for easier troubleshooting.

CR - Silicon diodes, 1N914 or equiv. Nearly 300 diodes are required; "bargain-pack" types can be used by taking advantage of the test feature described in the text.  
 S1 - Spst push-button switch.  
 S2-S41, incl. - Spdt slide switch; H. H. Smith 8613 or equiv. Note: Only an spst function is required but most available po-

mount slide switches are spdt. Any inexpensive switch that will mount to the matrix board will be acceptable.  
 U1, U6 - Timer IC; Signetics NE555V or equiv.  
 U2 - 5-V regulator IC; National Semiconductor LM309K or equiv.  
 U3 - Dual J-K flip-flop  
 National Semiconductor DM7473

(SN7474) or equiv.  
 U4 - Quad 2-input NOR gate; National Semiconductor DM7402 (SN7402) or equiv.  
 U5 - Divide-by-16 IC; National Semiconductor DM7493 (SN7493) or equiv.  
 U7, U8 - Decoder/demultiplexer IC; National Semiconductor DM74154 (SN74154) or equiv.

be connected to the column for proper current flow. If there is no tone with either polarity at TP1, the diode is no good and should be discarded. The same is true if you get a tone with both polarities, indicating a shorted diode.

When you have ascertained that the diode is good, it should be wired to the matrix pc board between row 5 (foil trace from the switch marked E) and the first column. Be sure that the cathode end is toward the column, thus connected to the IC.

Now, the big moment! Push the "E" switch up, press the start button and see what happens. You should hear a single dit. The logic circuitry should reset the divider after a delay of a few seconds. If things are not working right, and you hear nothing (or something other than a single dit), this is the time to go looking for the trouble. Most likely causes of problems would be a bad IC or a poor solder connection. Check them carefully, using a bright light and magnifier to inspect for cracked circuit traces.

Sockets are recommended for the ICs so that substitutes can be plugged in for suspect components.

Once you have the dit going for you, move on to bigger things. Let's assemble a dah - the letter T. Check the diodes the same way (do it each and every time before soldering them in; take nothing for granted). The switch for T should be the seventh one from the left, middle row. Connect three diodes, with the anode (arrow) to the row that comes from switch T, and the cathode (bar) to the first three columns that the row crosses. This will provide a current path for the first three pulses with no space between them. Again, that magic moment! Press the button and enjoy hearing a perfect dah. If it doesn't sound so good, go back to square 1, "troubleshoot" and try again. A hole in the middle of the dah means that there is something wrong with the middle diode or whatever circuitry it is connected to. If the dah is not three times as long as the dit, one or more of the diodes is bad.

OK, feeling pretty good? Fine. Take a deep breath and let's go for the biggie; wire up the zero (0) next. It is a long one and we might as well get it over with. Check out fifteen diodes the same way you did before. Wire them in by starting with three adjacent to each other just as you did for the letter T. The switch for 0 should be the fourth one from the right in the bottom row. Don't get lost following the foil traces. Connect the diodes right across the matrix, three at a time but be sure that there is one, and only one, space between each group of three. The last diode should have its cathode connected to column 19.

Yep, you guessed it - push the button again and follow the code right across the board. With the slow-speed capacitor in the timing circuit, the rate will be low enough that you can actually time the pulses as they go; 1-2-3 space 1-2-3 space (one-two-three-rest, one-two-three-rest, remind you of music lessons?) until five dahs have gone by.

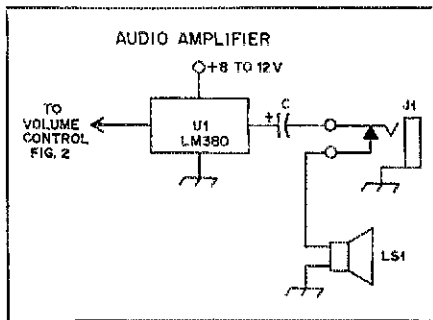


Fig. 3 — If audio output greater than headset level is needed, an amplifier can be added to drive a speaker or several headsets. An integrated circuit such as the National Semiconductor LM380 should provide 1 to 1.5 watts output with a supply of 8 to 12 volts. The value of C, the output coupling capacitor, should be between 100 and 500  $\mu$ F, with a voltage rating of 25 minimum. Miniature electrolytic or tantalum types work well here. In all cases follow the manufacturer's recommendations for circuit connections.

Whew! That was the high point and it's all downhill from here, but the grade is a long one with plenty of diodes to be hooked up yet. From this point onward you can program the matrix (we're progressing rapidly — at the start it was wiring up the circuit; now it's programming a matrix) in any order you choose. To relieve the tedium you might want to do a simple letter, then a longer one. Be sure to test each letter as you go, and

check the switches to see that one didn't get bumped during handling. The product of two switches on at once would be confusing, if not embarrassing.

Use the international Morse code table from the *ARRL Handbook* as a guide to forming the letters. Divide each one up into dits, spaces, and dahs and allot the proper number of diodes to each element, following the example in Fig. 1.

Because of space limitations a pc-board pattern could not be published here, but a pattern and parts-placement guide can be obtained by sending 75¢ to cover preparation and handling, and an s.a.s.e. to ARRL, 225 Main St., Newington, CT 06111. For those who would like to purchase a pc board (or several) in ready-made form, a short request and s.a.s.e. will bring a list of suppliers who have informed us that they have the boards in stock.

#### Some Suggestions for Using the Box

As a teaching device for one person, the audio output level from the oscillator should be enough for one headset. For group sessions it would be best to include the audio amplifier and loudspeaker (Fig. 3). The amplifier should provide enough drive for several headsets to be plugged in if sound from the speaker would disrupt other classes nearby. An added feature is the key jack by means of which a key can be used to

turn the oscillator off and on. Thus the box can serve as a code-practice oscillator for both receiving and sending. When you think you have the letters down pat, try sending in step with the letters from the matrix!

For an individual who is not able to get to a club or group for practice, the Code Box not only offers a means of learning the code but also provides a means of testing. You can hand it to anyone — they don't have to know the code at all — and have them select a letter and press the button. When you can identify all of the letters correctly, you are ready to increase the speed of the code. Keep going until you have a good margin above what is required for passing the exam. Nervousness can knock 50 percent or more from your usual speed.

Now you are ready for the code-practice tapes. Go to it. And when you work your way up to that ARRL Code-Proiciency Certificate, remember that it all started when K3BNS asked a question that W1SL had to answer.

#### Acknowledgement

The author would like to express sincere appreciation to Jim Kearman, WA1WVK, ARRL Technical Assistant, for his work in constructing and testing the Code Box. Without his patience and long hours at the workbench, this article would have been delayed by a considerable degree.

QST

## Strays



When he bites, that ham bug really chomps. In less than six months 17-year-old Tom Moulton, AA2BAW, passed from Novice through the ranks to Amateur Extra. He's shown here at his station where he still runs his Novice rig, a Globe HG-303, cw only.



Marv Jones, WB0PXV, foreground, operates special convention station NC0ARL while visitors ragchew on the 21st floor of the Denver Hilton during the July 16-18 ARRL National Convention.

I would like to get in touch with . . .

□ any Delaware ham for a WAS schedule. Dave Schaefer, WB7CBA, 2838 S.E. Holgate Blvd., Portland, OR 97202.





# Meet the Microprocessor

**Part 2:** Can we really talk to a microcomputer, and will it talk back? Sure this can happen, if we use the right kind of language.†

By William L. Thomas,\* WB6FGR/9 and Stephen E. Belter,\*\* WN9SGP

This is the second of a three-part series written to introduce the radio amateur to microprocessors. Part 1 included a brief introduction to how the microprocessor follows instructions to perform its job. In this article, we will look in some detail at machine, assembly, and high-level languages, the vehicle used to tell the microcomputer what to do. Also included is an example of typical assembly language statements, and a glossary of common microprocessor jargon.

The microprocessor, a small computer on a single integrated circuit, is one of the most versatile pieces of electronic circuitry available today. Microprocessors are being used in hundreds of different applications: Automotive, medical, industrial, military, aviation, communications, retailing, and even in several home appliances. In Part 1 we talked briefly about possible uses for microprocessors, what a microprocessor contains, and how it works. Now let's turn to programming a microprocessor, what it involves, and how best to approach it.

A microprocessor is designed to follow a limited set of instructions. Each instruction directs the central processing unit (CPU) to perform a specific task. For example, the instruction to *clear* the accumulator (ACC) would cause the CPU to set the ACC contents to zero. A list of instructions designed to perform a specific job, like controlling a repeater, is called a program. Consider the following illustration.

## Operating a Receiver

Bill, an experienced amateur of many years, loaned his receiver to Steve, a green Novice, so that Steve could listen to the code practice on WIAW. Since Steve was not familiar with using this receiver, Bill left the following note.

\*315 N. Maple Ave., Apt. 1-G, Oak Park, IL 60302

\*\*465-1/2 Vine St., West Lafayette, IN 47906

†Part 1 appeared in *QST* for August, 1976.



Much to his surprise, Steve didn't hear anything when he closed the key, but Fido let loose with a loud howl.

"Steve, if you follow these instructions exactly, you should have no trouble listening to WIAW or conversations among hams in your area. Start with one and continue in order down the list, unless directed to do otherwise. 73, Bill.

- 1) Connect the antenna and turn on the POWER switch.
- 2) Select the desired band by using the BAND switch.
- 3) Roughly tune the PRESELECTOR to the correct band.
- 4) Tune in a station using the FREQUENCY knob.
- 5) Fine tune the PRE-SELECTOR for the maximum signal.
- 6) Listen to the station or QSO between stations.
- 7) If you want to change frequency, but still on the same band, go back to step 4 above and continue from there.
- 8) If you want to listen to a frequency on a different band, go to step 2.
- 9) Turn off the POWER switch."

Each of the numbered statements above is an instruction to Steve explaining exactly what is to be done next. All nine statements make up a program which spells out specifically how to operate Bill's receiver in a step-by-step fashion. In a similar manner, to make a microcomputer perform

a given job, you must tell it what it is supposed to do, instruction-by-instruction in a language it understands. This list of statements comprises a program to do your task. The most basic language for any computer is its *machine language*.

## Machine Language and Assembly Language

As its name implies, machine language is the language the microprocessor understands. It is the set of numbers which the machine will interpret as instructions. For example, if 15 means "read input No. 5" and 48 means "add the ACC and data memory location 8," then 15 and 48 are part of this microcomputer's machine language. As we explained in Part 1, it is these numbers which are stored in the program memory and which are decoded into commands by the instruction decoder.

In general, each manufacturer will have a different machine language for its microprocessor. A Motorola M6800 has a different machine language than Intel's 4040, because each one has a different set of instructions it recognizes.

As you might imagine, writing a program in machine language is difficult and prone to errors. To make things easier, most programmers use *assembly language* instead of machine language when working with microprocessors.

Instead of referring to each instruction or address by its number (15 or 48), assembly language associates a *mnemonic* with each instruction and allows the assigning of names to locations. A mnemonic is a code or abbreviation used to assist your memory. For example, we will use the mnemonic "INP 5" to stand for "read input 5." Similarly, we could use "ADD 8" for "add the ACC and data memory location 8." Certainly most people find INP 5 much easier to remember than 15.

If in memory location 8 we were storing our total number of contacts on Field Day, we could name location 8 as

"TOTAL." Then our machine language instruction 48 would become "ADD TOTAL" in assembly language. Addresses in program memory can also be given names. An example of this will be given later.

### The Dy-no-mite Four

To help explain the concept of programming, we will use a fictional microcomputer, the Dy-no-mite Four. Our imaginary machine will be a 4-bit microprocessor, which means that the accumulator and data memory are four binary bits wide. Each location in data memory can, therefore, hold the numbers 0000<sub>2</sub> through 1111<sub>2</sub> or 0<sub>10</sub> through 15<sub>10</sub> in decimal or 0 through F in hexadecimal. To remember larger numbers, we will use two or more locations in data memory.

The instructions in the *instruction set* of the Dy-no-mite Four we will use are listed in Table 3. Note that we have listed both the machine language numbers and the assembly language mnemonics. Although this is a 4-bit microprocessor, it uses 8-bit machine language instructions just like the Intel 4040 microprocessor. Unlike most commercial microcomputers which allow 12 to 16 bits for addresses, the Dy-no-mite Four only uses 4 bits for addressing. The X's under the column for machine language numbers will be replaced with the address of the location which corresponds to "name" in the assembly language mnemonics column.

To demonstrate, let us look at a very simple example, a code-practice oscillator. Fig. 5 shows a block diagram of the Dy-no-mite Four external connections. Remember that a microcomputer can only work with numbers, so two interfaces are needed. The first one detects whether the key is up or down. If it is up, a 0 is passed to the microprocessor. If it is down, the Dy-no-mite Four will see a 1 on that input line. Each grouping of four input lines is called an input port. Similarly, a group of four output lines is referred to as an output port.

The second interface converts the numbers from one line of output port 1 to current used to drive the speaker. A 1 on that line causes 10 mA to flow through the speaker coil, while a 0 shuts the current off. If the program in the microcomputer alternates writing 1s and 0s to that line, a tone (square wave) will be heard in the speaker.

### The Code-Practice Oscillator

Our Novice friend Steve drew the diagram or *flowchart* in Fig. 6 to help himself program his Dy-no-mite Four to act as a code-practice oscillator. The flowchart shows the logical sequence of events his program will follow to produce a tone when the key is down.

There are almost always several ways

### Glossary of Microcomputer Terms

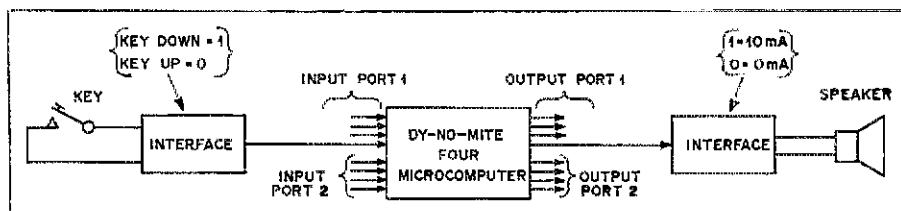
- Accumulator (ACC)** — The register which holds the result of ALU operations.
- Address** — An expression, either numeric or symbolic, which specifies a location in memory.
- Algorithm** — A set of directions which describes how to perform a certain task.
- Architecture** — Organizational structure of a computer system.
- Arithmetic Logic Unit (ALU)** — The part of a CPU that performs the mathematical operations.
- Assemble** — To convert a symbolic assembly-language program into a machine-language program.
- Assembler** — Software that converts an assembly-language program into machine language.
- Assembly Language** — A symbolic language (English-like) which represents machine language in a more easily usable form.
- Benchmark** — A program which is written for two or more computers which is used as a basis for comparison.
- Binary** — A number system in which there are two characters (0, 1).
- Bit** — The most basic piece of information with which digital computers work, an abbreviation of "binary digit." A bit can have only two values, usually represented as 0 and 1.
- Bit-Slice** — A type of microprocessor where the CPU is built from several identical ICs, each one containing the logic for 2 or 4 bits of the CPU registers (ACC and PC).
- Central Processing Unit (CPU)** — The part of a computer which makes decisions and performs arithmetic operations. This is accomplished by interpretation and execution of instructions.
- Clear** — To set the contents of a register or memory location to zero.
- Compiler** — Software that converts a program in a high-level language (like FORTRAN) into a machine- or assembly-language program.
- Cross-Assembler** — An assembler that runs on a computer other than that for which it produces the machine language.
- Cycle** — An interval of time during which any set of operations is repeated.
- Data Memory** — Memory locations which hold data.
- Debug** — The process of detecting, locating and correcting omissions or mistakes in a program.
- Decimal** — A number system in which there are ten characters (0 through 9).
- Decode** — A conversion process involving the interpretation of machine-language instructions.
- Display** — A device which presents information in a visual form.
- Documentation** — Reference material which explains in detail a subject or piece of equipment.
- Event** — A change of present conditions which leads to the necessity of performing a task.
- Execute** — The process of interpreting an instruction (or instructions) and performing the indicated operations.
- Flowchart** — A graphical representation of the structure of a program.
- Hardware** — Physical equipment composing a system, such as a computer.
- Hexadecimal** — A number system in which there are sixteen characters (0 through 9 and A through F).
- Instruction** — A statement (set of bits) that defines a computer operation.
- Instruction Set** — The group of instructions that is available with a given computer.
- Interface** — The hardware that links the computer with the outside world and does the conversion of voltages and current levels.
- Interpreter** — A program which directly executes a high-level language (like BASIC) without first translating it into machine or assembly language.
- I/O** — A general term used to denote input/output.
- Jump** — An instruction which causes a departure from the normal sequence of executing instructions.

Table 3

Some instructions and their meanings for the Dy-no-mite Four microprocessor. The X's in the Machine-Language Numbers column will be replaced by the address in program memory which corresponds to "name."

MACHINE LANGUAGE NUMBERS	ASSEMBLY LANGUAGE MNEMONICS	INSTRUCTION MEANING
11 <sub>16</sub>	INP 1	Read input port 1 into the accumulator.
21 <sub>16</sub>	OUT 1	Write the contents of the accumulator to output port 1.
30 <sub>16</sub>	CLR	Clear the accumulator (set it to 0000 <sub>2</sub> ).
4X <sub>16</sub>	JMP "name"	Jump to address X and begin executing instructions there.
51 <sub>16</sub>	IAC	Increment the accumulator (add 1 to it).
6X <sub>16</sub>	IFZ "name"	If the accumulator equals zero, jump to address X. Otherwise continue with the next instruction.

Fig. 5 — Connection of the hypothetical Dy-no-mite Four microcomputer to be used as a code-practice oscillator.



**Keyboard** — A set of keys or switches used to control or enter data into a system.

**Label** — One or more characters used to identify the location of a statement or an item of data in a computer program.

**Machine** — A term for a computer. Can also be used when describing a software simulation of a piece of hardware.

**Machine Language** — The numeric form of specifying instructions used by a computer.

**Memory Location** — The address or name which refers to a storage location in a computer memory.

**Microcomputer** — A computer in which the CPU is a microprocessor.

**Microprocessor ( $\mu\text{P}$ )** — A set of one, or a few, integrated-circuit chips capable of performing the functions of a CPU.

**Mnemonic** — A symbol chosen to assist the human memory. The symbolic name is used to represent instructions, memory locations, registers, etc.

**Monitor** — (1) A display device, usually of the CRT type. (2) A permanent program resident in a computer for the purpose of performing certain basic operations (such as displaying the contents of a storage location).

**Octal** — A number system in which there are eight characters (0 through 7).

**Printer** — A device similar to a typewriter which produces a permanent copy of computer output.

**Port** — A set of connections for communicating with a computer, usually organized into input and output groups.

**Program** — A collection of instructions properly ordered to perform some particular task. Also used to indicate the process of writing the set of instructions.

**Program Counter (PC)** — A register (usually in the CPU) which specifies the address of the next instruction to be executed.

**Program Memory** — The portion of a computer memory which is used for storing a program.

**RAM (Random-Access Memory)** — Memory which has both read and write capability. It is random in the sense that all memory locations are accessible in a fixed amount of time independent of the storage-location address.

**Read** — The process of copying the contents of a memory location or an input port to the accumulator.

**Return Address** — The address which a subroutine will place in the PC when it is completed. The computer will then execute the instruction at this address. The address usually refers to the location immediately following the original call to the subroutine.

**ROM (Read-Only Memory)** — Memory which cannot be easily rewritten. The storage locations are usually randomly accessible.

**Second Source** — A manufacturer who supplies a compatible electronic part. This usually occurs as a result of an agreement between the original manufacturer and the second source manufacturer.

**Software** — A computer program or a set of programs.

**State** — A mode or condition that a computer is in. This may be as the result of either hardware or software control.

**State-Transition Diagram** — A diagram showing all states in a process and the events leading to these states.

**Subroutine** — A program that is reached from more than one place in a main program.

**Write** — The process of copying the contents of the accumulator, a memory location, or an output port.

**Table 4**  
The code-practice-oscillator program. Location 0 in program memory was given the name **START** in the assembly-language program.

PROGRAM MEMORY ADDRESS	MACHINE LANGUAGE NUMBERS	ASSEMBLY LANGUAGE PROGRAM
0	11	START: INP 1
1	21	OUT 1
2	30	CLR
3	21	OUT 1
4	40	JMP START

to program a microprocessor to perform a specific task. Steve picked the following *algorithm*:

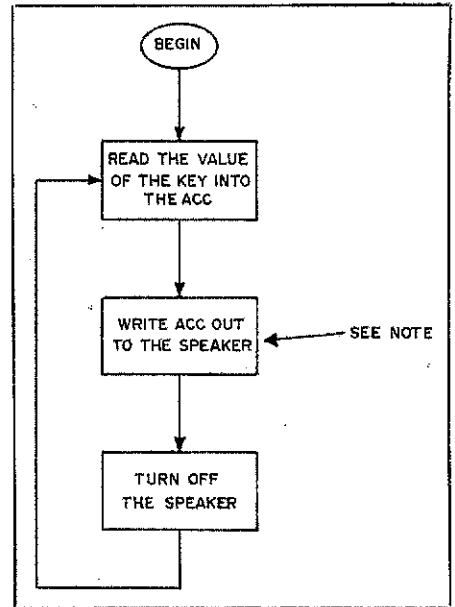
- 1) If the key is down, turn the speaker current on, then turn it off.
- 2) If the key is up, turn the speaker current off twice in a row.
- 3) Go back to step 1.

After convincing himself that this method would work, Steve wrote the program shown in Table 4. After he had written the assembly language program, he *assembled* the program, or translated it from assembly language to machine language. Like most hobbyists, Steve

did the assembly by hand using a book he received with his Dy-no-mite Four to look up the machine-language numbers.

There are programs which will do the translation from assembly language to machine language automatically. If the program runs on the same kind of microprocessor, the program is called an *assembler*. If the program runs on a different computer system, then it is called a *cross-assembler*.

After finishing the assembly, Steve carefully loaded the machine-language numbers of his program into the program memory of his Dy-no-mite Four.



**Fig. 6** — Flowchart for a code-practice oscillator on the hypothetical Dy-no-mite Four microcomputer. Note: If the key was down, the ACC will contain a 1 which will cause current to flow in the speaker circuit when written. If the key was up, the speaker current will stay off.

With great anticipation, he started the microprocessor at location 0 in program memory and pressed down the telegraph key. Much to his surprise he didn't hear anything, but Fido, his faithful dog, let loose with a loud howl.

After thinking for a few minutes, Steve drew a graph of the current through the speaker when the key is down. His graph is shown in Fig. 7. Since his Dy-no-mite Four takes  $10\ \mu\text{s}$  to execute an instruction, the speaker was on for  $20\ \mu\text{s}$  and off for  $30\ \mu\text{s}$  each cycle. A quick calculation shows that the fundamental frequency of the tone was 20 kHz, a little high for Steve to hear, but apparently well within Fido's audible range!

Rather than letting his friends think Fido could howl in Morse code, Steve added some additional statements to his program to slow it down. The result is shown in Table 5. When the microprocessor first executes the instruction at label WAIT1, the location named WAIT1, the accumulator is incremented from  $0000_2$  to  $0001_2$ . The IFZ instruction checks to see if the accumulator is  $0000_2$ . Since the ACC is not zero, the

**Fig. 7** — Diagram of the current flowing in the speaker circuit when the key is down.

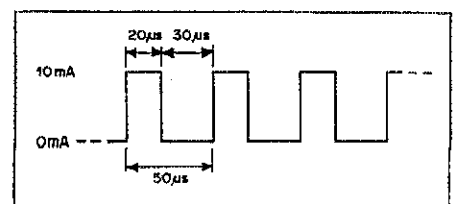


Table 5

The revised code-practice-oscillator program with two delays built in so that the tone frequency is about 1 kHz.

PROGRAM MEMORY ADDRESS	MACHINE LANGUAGE NUMBERS	ASSEMBLY LANGUAGE PROGRAM
0	11	START: INP 1
1	21	OUT 1
2	30	CLR
3	51	WAIT1: IAC
4	66	IFZ OFF
5	43	JMP WAIT1
6	21	OFF: OUT 1
7	51	WAIT2: IAC
8	60	IFZ START
9	47	JMP WAIT2

Table 6

The two instructions used to call and return from subroutines for the Dy-no-mite Four microprocessor.

MACHINE LANGUAGE NUMBERS	ASSEMBLY LANGUAGE MNEMONICS	INSTRUCTION MEANING
7X <sub>16</sub>	CAL "name"	Save the address of the next instruction for use by a RET instruction, then begin executing the subroutine with the label "name."
80 <sub>16</sub>	RET	Begin executing instructions at the address saved by the last CAL instruction.

microprocessor continues with the statement at address 5. The JMP instruction causes the CPU to start executing instructions at location 3 again. This time the IAC increments the accumulator from 0001<sub>2</sub> to 0010<sub>2</sub>.

The microprocessor will continue to execute this loop of three instructions (IAC, IFZ, JMP) until the accumulator contains 1111<sub>2</sub>. Remember that the Dy-no-mite Four has a 4-bit accumulator and that it can only hold the numbers 0000<sub>2</sub> through 1111<sub>2</sub>. Eventually the IAC instruction will increment the ACC from 1111<sub>2</sub> to 0000<sub>2</sub>. Now the IFZ instruction at location 4 will succeed since the accumulator is zero and will cause the processor to continue executing the program at the location of label "OFF." The three-instruction loop at addresses 7 through 9 will operate in a similar manner.

Since the microprocessor has to execute both loops sixteen times each cycle, the end result is that the speaker current will be on for 490 μs and off for 490 μs. The fundamental frequency of this square wave is 1020 Hz, a big improvement over Steve's first try.

There are two important things to be noticed in this example. The first is how a microprocessor can be used for timing and how it uses numbers to make "decisions." Second, fixing the code-practice oscillator only required changes to the program or software. *The hardware or circuitry did not have to be*

*modified.* As an exercise, how would you change the program to also key Steve's transmitter, assuming the proper interface was added to output port 2 and given that the "OUT 2" instruction will write the contents of accumulator to output port 2?

### More Assembly Language

Other typical machine- or assembly-language instructions include adding, subtracting, and shifting, which are used for performing arithmetic. Multiplication, division, and other mathematical functions are usually performed by repeated adds, subtracts and shifts. In order to allow you to work with large numbers, there will be instructions for reading values from the data memory into the accumulator, and likewise for storing a value from the ACC into a location in data memory.

One other important concept to programming is the *subroutine*. A subroutine is a series of instructions which are grouped together in a program in such a way that they can be used in several different places without having to be stored more than once in program memory. There are two instructions which are used in conjunction with subroutines, the "call" and "return" instructions.

The "call" instruction is very similar to our JMP instruction that we used earlier, except that it causes the microprocessor to save the address of the next instruction before making the jump.

This saved address is used to continue the execution of the program at the statement following the "call" instruction whenever a "return" instruction is executed. These instructions are summarized in Table 6.

Another version of the code-practice oscillator is shown in Table 7, where the two delay loops and output statements have been inserted into a single subroutine. After reading the state of the key into the accumulator, the microprocessor executes the first CAL statement. It does this by saving the next address and then jumping to the label WRITE. Exactly how the Dy-no-mite Four saves the *return address* (in this case location 2) is not of particular concern to us. (There are at least four common ways used by microcomputers on the market today.) What is important is that the return address is saved for later use.

The WRITE subroutine executes the OUT instruction and then the delay loop. After the delay loop has incremented the accumulator to zero, the RET statement is encountered. This forces a jump to the location saved by the last CAL statement that was executed. In our case, the CPU jumps back to location 2, where a second CAL statement is located and the whole subroutine process is repeated.

### High-Level Languages

As you might guess, it takes a lot of machine- or assembly-language statements to do any nontrivial task. For example, the adaptive Morse code decoder program which will be described briefly in Part 3 took more than 400 instructions on an Intel 4040. It is not uncommon for a large program to use 1000 to 2000 instructions. Not only does it take a lot of time to write such a program, it also takes a lot of time to *debug* it, or correct all the mistakes.

To make the job of programming easier, various high-level languages, like BASIC and PL/M, can be used with some microprocessors. A program in assembly language to print the square root of a decimal number might easily take 50 to 100 statements. In BASIC it takes three lines:

```
10 READ X
20 PRINT SQR (X)
30 END
```

There are several disadvantages of high-level languages: (1) they require a large amount of memory. Most versions of BASIC require 4000 to 16,000 words of memory; (2) a program written in a high-level language usually takes longer to execute than one written in assembly language; (3) the high-level language *compiler* or *interpreter* programs usually cost money, typically between \$100 and \$1000, to purchase. All of this is not to imply that using high-level lan-

Table 7

The program of Table 5 rewritten to use a subroutine. The subroutine is comprised of statements starting with the label WRITE and continuing through the label DONE.

PROGRAM MEMORY ADDRESS	MACHINE LANGUAGE NUMBERS	ASSEMBLY LANGUAGE PROGRAM
0	11	START: INP 1
1	74	CAL WRITE
2	74	CAL WRITE
3	40	JMP START
4	21	WRITE: OUT 1
5	30	CLR
6	51	DLOOP: IAC
7	69	IFZ DONE
8	46	JMP DLOOP
9	80	DONE: RET

languages is inferior to assembly language programming. On the contrary, if you have access to it, use it!

To summarize, we have given a brief,

simple introduction to programming. We have covered the basics: Flow-charting, machine language, and assembly language programming. With this

background, we hope you are ready to read the literature available from the microprocessor manufacturers on programming their products. There are still many things which were beyond the scope of this series of articles, including interrupts, addressing modes, and stacks. Most of these topics would have required discussing specific machines, something we wanted to avoid in this introductory series.

In Part 3 we will talk about two specific amateur applications for microprocessors: A repeater controller and an adaptive Morse code decoder. We will also present some guidelines for buying or building a microcomputer for hobbyist applications and give a list of microcomputer-kit makers and microprocessor manufacturers. Part 3 will appear in a subsequent issue of *QST*.

**QST**

## Strays



□ The Vicksburg (MS) Amateur Radio Club went all-out and presented sets of ARRL publications to the Vicksburg Public, Vicksburg High School, and Warren Central High School libraries all at once. Shown in the photo to the upper right is Malcolm Keown, W5RUB, club president and ARRL Delta vice director (standing center) making the presentation to (left to right) Mrs. Mattye Havard, Warren; Mrs. Irene Cook, Vicksburg High; Miss Julia Johnson, Warren; and David Bosca, Vicksburg Public. (*Vicksburg Evening Post* photo) In the upper left photo Bill Porter, WA4PRA, vice president of the

Reelfoot Amateur Radio Club of Union City, TN, presents Union City High School librarian Mrs. Ottis Parrish with 13 ARRL publications on behalf of the club. (*WB4CYX* photo) Similarly receiving a set of ARRL publications is Nicholas Smith, director of the Ogdensburg (NY) public library. Making the donation is the Ogdensburg Amateur Radio Club President Hugh Inness-Brown, WB2DWU. (*V. Aldrich* photo)

□ Get in on the action: Has your club made amateur radio literature available to the town libraries? If not, take inspiration from these clubs.

□ Reminder to radio clubs wishing to spread the word about amateur radio by donating a complete set of League publications to the local library: *We've got a deal for you!* Your club can get a complete set of ARRL publications for this purpose at half price. Three conditions: (a) Yours must be an ARRL affiliated club, (b) It must send with the order a letter from the local library agreeing to display and circulate the manuals, and (c) \$25.00 with order.

## Old Sol Comes Alive

Though small short-lived spots of the new cycle have appeared sporadically for nearly two years, the first major activity of Cycle 21 came around the east limb of the sun June 22. Its classic shape and color were visible daily, until it disappeared around the west limb July 2. The most durable Cycle 21 activity seen previously was a group of three small spots that lasted four days in April.

The propagation effects of the June activity were barely discernible (see October *QST* Propagation feature) but the size and duration of the new activity area are considered significant. New-cycle spots appear on the solar disk roughly 30° above or below the solar equator, moving toward it as the cycle develops. Spots of the old cycle run close to the solar equator, and thus tend to have maximum effect on the earth's ionosphere. Add to this the fact that there is less variation in F-layer muf in the summer months, and we see why the apparent effects of this rather large activity center were slight.

More enlivening of the DX scene was associated with a surprise burst of what appears to be Cycle 20 activity in late July and early August. Overall, July was the quietest month in about ten years, with no easily seen spots from July 2 through 30. After running close to the quiet-sun level for three weeks, the solar flux started up. From 66 July 26, it rose to 67 (three days), then 69, 70, 73, 76, 80, 80, 82, through Aug. 5. The largest sunspot group seen in several months brought what appeared to be F-layer-propagated Europeans into northeastern USA, Aug. 5.

The real import of this summary is that, new cycle or old, occasional high levels of solar activity can bring our DX bands to life *anytime*. — *WIHDQ*

# The Mini-Miser's Dream Receiver

KISOC — Keep it simple old chap! Flea-market bartering + six active devices = a hot little 40-meter receiver for less than \$18!

By Doug DeMaw,\* W1CER

**G**oodman was on the right track when he described his five-tube Junior Miser's Dream receiver on page 130 of the 1968 Handbook. Simplicity can provide good performance, and his design was an example of that concept. While reviewing the WIDX circuit, it seemed that a solid-state counterpart would be fun to attempt, and the end product should be considerably smaller in size than if tubes were employed. To make the challenge even more stimulating, the flea market at the Orlando ARRL S.E. Division Convention in 1976 was selected as the cornucopia for obtaining most of the parts for the project. Nearly everything needed was collected during the two-day sortie through the crowd-infested marketplace. Only a few components had to be garnered separately, and the bill of goods came to approximately \$18 when the tally was run.<sup>1</sup>

## Circuit Description

There are some departures from the WIDX design, mainly to minimize cost and package size. The major compromise was the elimination of agc and multiband coverage. There is ample room inside the cabinet of this receiver to accommodate one or two small converters for reception of bands other than 40 meters. This main frame is designed for 7- to 7.175-MHz coverage.

Fig. 1 shows an IC being used as the receiver front end — a CA3028A which is configured as a balanced mixer. The input tuned circuit, T1, is designed to match a 50-ohm antenna to the 2000-ohm base-to-base impedance of the mixer IC. The transformer is broadband

in nature (300 kHz at the 3-dB points) and has a loaded  $Q$  of 23. This eliminates the need for a front-panel peaking control — a cost-cutting aid to simplicity.

The output tuned circuit, L1, is a bifilar-wound toroid which is tuned approximately to resonance by means of a mica trimmer, C2. The actual setting of C2 will depend upon the degree of i-f selectivity desired, and typically the point of resonance will not be exactly at 3300.5, the i-f center frequency.

Goodman used a half-lattice filter (two crystals) in his design, but the flea market did not yield two crystals which were related properly for such a filter, plus a BFO crystal. For this reason an older circuit was employed — a single crystal filter with a phasing capacitor, C3. This approach provides reasonably good single-signal reception (at least 30 dB rejection of the unwanted response) and assures much better performance than is possible with the simpler direct-conversion receivers in vogue today. The latter have equal signal response each

side of zero beat, which often complicates the QRM problem.

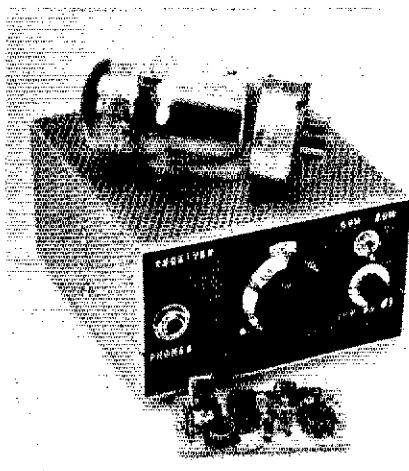
A single i-f amplifier, U2, is used to provide up to 40 dB of gain. R1 serves as a manual i-f gain control, and will completely cut off the signal output when set for minimum i-f gain. No audio gain control is used. T2 is designed to transform the 8000-ohm collector-to-collector impedance of U2 down to 500 ohms, and has a bandwidth of 100 kHz. The loaded  $Q$  is 33.

A two-diode product detector converts the i-f energy to audio. BFO injection voltage is obtained by means of a crystal-controlled oscillator, Q2. RFC2 and the 1- $\mu$ F bypass capacitor filter the rf, keeping it out of the audio line to U3.

Audio-output IC U3 contains a pre-amplifier and power-output system. It will deliver approximately 300 mW of af energy into an 8-ohm load. RFC5 is used to prevent rf oscillations from occurring and being radiated to the front end and i-f system of the receiver. The 0.1- $\mu$ F bypass at RFC5 also helps prevent oscillations.

A three-terminal voltage regulator, VR1, supplies the required operating voltage to U3. It also provides regulated voltage for the VFO and buffer stages of the local oscillator (Q2 and Q3). The latter consists of a stable series-tuned Clapp VFO and an emitter-follower buffer stage. A single-section pi network is placed between the emitter of Q3 and the injection terminal of U1. It has a loaded  $Q$  of 1, and serves as a filter for the VFO output energy. It is designed for a bilateral impedance of approximately 500 ohms. The recommended injection-voltage level for a CA3028A mixer is 1.5 rms. Good performance will result with as little as 0.5 volt rms. A 1-volt level is available with the circuit shown in Fig. 1.

A red LED is used at DS1 as an



<sup>1</sup>Circuit boards, negatives and parts kits for this project are available from WA0UZO. Check other ARRL pc suppliers for board availability.

\*Technical Editor, QST

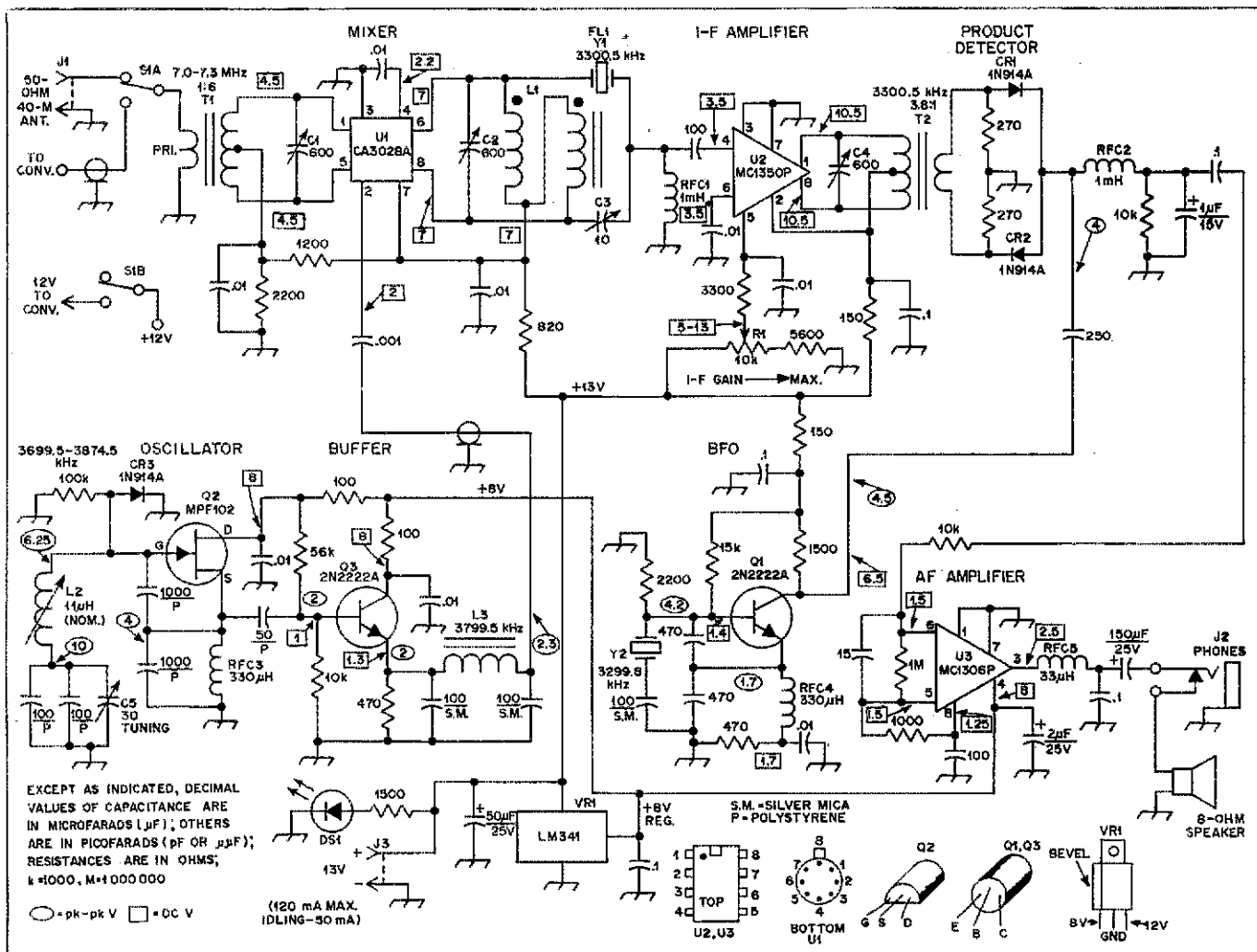


Fig. 1 - Schematic diagram of the 40-meter receiver. Fixed-value capacitors are chip or disk ceramic unless noted otherwise. Capacitors with polarity marked are electrolytic. S.M. indicates silver mica, and P is for polystyrene. Fixed-value resistors are 1/4- or 1/2-W composition. C1, C2, C4 - 170 to 600-pF mica trimmer (Arco 4213). C3 - 10-pF subminiature trimmer. Ceramic or pc-mount air variable suitable. C5 - Miniature air variable, 30-pF maximum (Millen 25030E or similar). CR1-CR3, incl. - High-speed silicon switching diode. J1, J3 - Single-hole-mount phono jack. J2 - Closed-circuit phone jack. L1 - Toroidal bifilar-wound inductor,  $Q_L = 100$  at 3.3 MHz,  $Q_T = 33$ , BWL = 0.1 MHz,  $L = 5.8 \mu\text{H}$ , 8 turns No. 28 enam., bifilar wound on Amidon FT37-61 ferrite core. Note polarity marks. L2 - Slug-tuned inductor (see text), 11  $\mu\text{H}$  nominal. J. W. Miller 42A105CBI or equiv.  $Q_M = 125$ . L3 - Toroidal inductor, 17  $\mu\text{H}$ , 19 turns No. 26 enam. wire on Amidon FT50-61 ferrite core. R1 - 10,000-ohm miniature composition control, linear taper. RFC1, RFC2 - Miniature 1-mH rf choke (Millen J302-1000 or equiv.). RFC3, RFC4 - Miniature 330- $\mu\text{H}$  rf choke (Millen J302-330 or equiv.). RFC5 - Miniature rf choke, 33  $\mu\text{H}$  (Millen J302-33 or equiv.). S1 - Miniature dpdt toggle. T1 - Toroidal transformer. Primary has 2 turns No. 24 enam. wire. Secondary has 14 turns No. 24 enam. wire on Amidon T-50-2 core. Turns ratio - 6:1,  $Q_L$  of 23, BWL = 0.3 MHz,  $L = 1 \mu\text{H}$ . T2 - Toroidal transformer. Primary has 9 turns No. 26 enam. wire on Amidon FT37-61 core.  $Q_L = 33$ , BWL = 0.1 MHz,  $L = 5.8 \mu\text{H}$ , turns ratio = 3.8:1. Secondary has 3 turns No. 26 enam. wire. Primary winding has center tap. U1 - RCA IC. Bend pins to fit 8-pin dual-in-line IC socket. U2, U3 - Motorola IC. VR1 - Three-terminal 8-volt regulator IC (National Semiconductor). Y1, Y2 - Surplus crystal in HC-6/U case or International Crystal Co. type GP with 32-pF load capacitance.

on-off indicator. Since it serves mainly as "window dressing," it need not be included in the circuit.

### Construction Notes

The front panel, rear panel, side brackets, and chassis are made from double-sided circuit-board material which was purchased for 25 cents at the flea market. The chassis is an etched circuit board, the pattern for which is given in Fig. 2. There is no reason why the top and bottom covers for the

receiver can not be made of the same material by soldering six pieces of pc board together to form two U-shaped covers.

The local oscillator is housed in a compartment made from pc-board sections. It measures (HWD) 1-3/8 x 1-5/8 x 2-3/4 inches. A 1/4-inch high pc-board fence of the same width and depth is soldered to the bottom side of the pc board (opposite the top partition) to discourage rf energy from entering or leaving the local oscillator section

of the receiver (rf doesn't like to climb over right-angle barriers). Employment of the top and bottom shields stiffens the main pc board, and that helps prevent mechanical instability of the oscillator, which can result from stress on the main assembly.

Silver plating has been applied to the main pc board and to the front and rear panels. This was done to enhance the appearance and discourage tarnishing of the copper. It is not a necessary step in building the receiver. The front panel

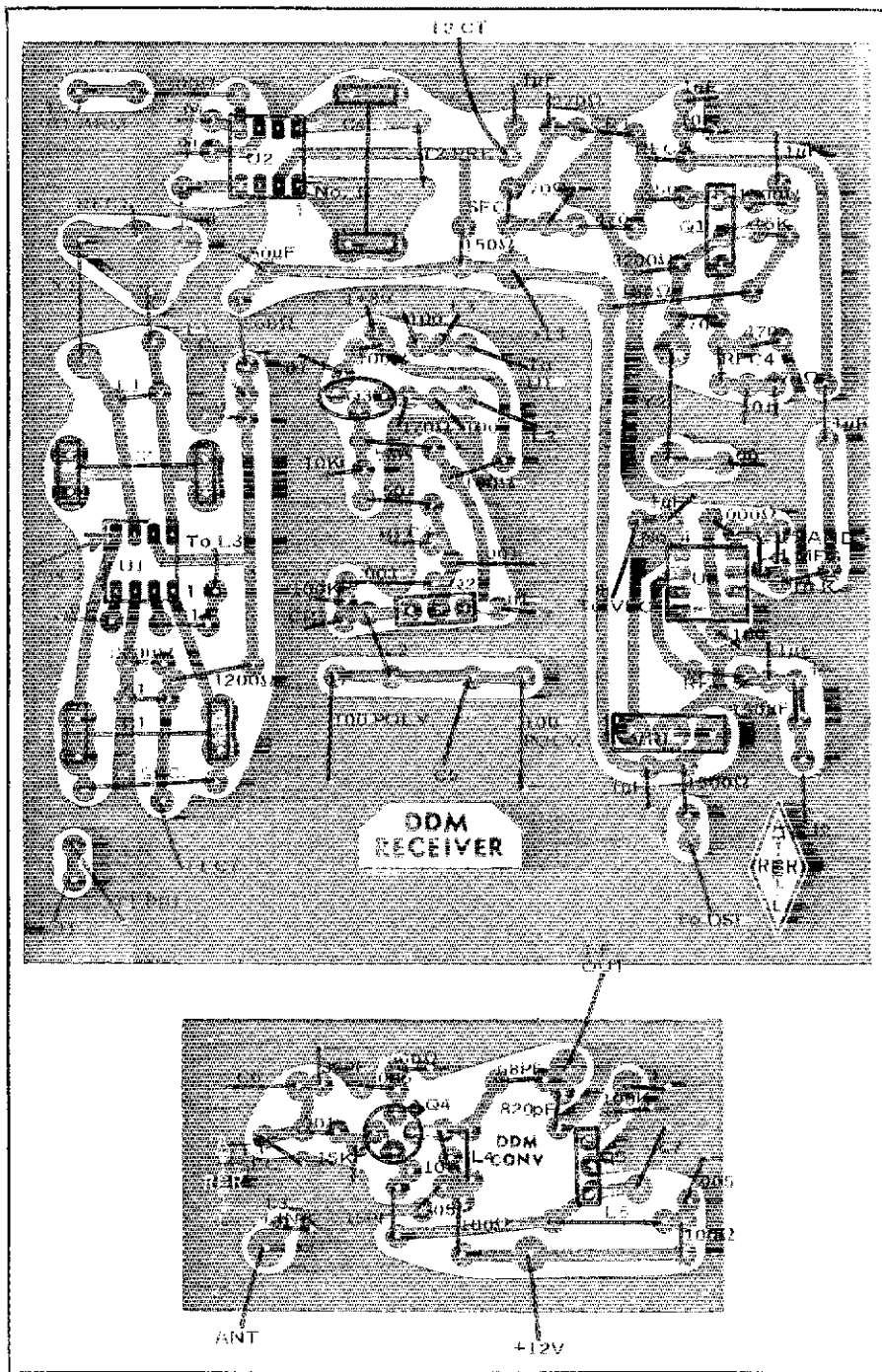


Fig. 2 — Foil-side scale pattern of the pc board. Circuit board is double-sided glass-epoxy material. Ground-plane copper should be removed directly opposite Q2 and related components (oscillator) for area of 1-1/2 X 1-1/2 inches. Remove copper in similar manner on ground-plane side of board opposite L1, C3, and Y1 (1 X 1-1/4 inch area). Removal of foil will prevent unwanted capacitive effects in those critical parts of the circuit. Ground-plane side of board should be electrically common to ground foils on opposite side of board at several points.

has been sprayed with green paint, then baked for 30 minutes by means of a heat lamp. A coarse grade of sandpaper was used to abrade the front panel before application of the paint. The technique will prevent the paint from coming off easily when the panel is bumped or scratched. Green Dymo tape-labels are used to identify the panel controls.

There is ample room inside the cabinet, along the rear inner-panel surface, to install a small crystal-controlled converter for some other hf band. A switch, S1, is located on the front panel to accommodate a 20-meter converter which the writer will add to the box later on. A suitable circuit is given in Fig. 3.

All of the toroidal inductors are

coated several times with Q dope after they are installed in the circuit. The VFO coil is treated in a like manner. The polystyrene VFO capacitors should be cemented to the pc board after the circuit is tested and approved. This will help prevent mechanical instability. Hobby cement or epoxy glue is OK for the job. Use only a drop or two of cement at each capacitor — just enough to affix it to the pc board.

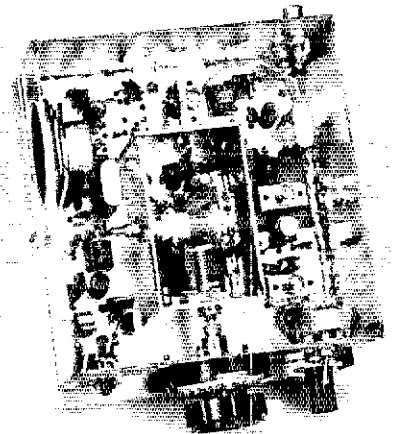
#### Alignment and Operation

The VFO should be aligned first. This can be done by attaching a frequency counter to pin 2 of U1. Coverage should be from 3699.5 to 3874.5 kHz for reception from 7.0 to 7.175 MHz. Actual coverage may be more or less than the spread indicated, depending on the absolute values of the VFO capacitors and stray circuit inductance and capacitance. Greater coverage can be had by using a larger capacitance value at C5, the main tuning control. Those interested in phone-band coverage (only) can align the VFO accordingly and change Y2 to 3400.8 kHz.

Final tweaking is effected by attaching an antenna and peaking C1, C2 and C4 for maximum signal response at 7085 kHz. To obtain the selectivity characteristics desired (within the capability of the circuit), adjust C2 and C3 experimentally. C2 will provide the major effect. C3 should be set for minimum response on the unwanted side of zero beat. A fairly strong signal will be needed to hear the unwanted response.

For reception of lower sideband it will be necessary to use a different BFO frequency — 3400.5 kHz. The crystal

Interior view of the receiver. The front end is at the lower right. The leads of U1 are bent to align with an 8-pin dual-in-line IC socket. The rim of the speaker is tack-soldered to the pc-board side wall at two points. The 20-meter converter mounts on the rear wall inside the receiver (upper left corner).







# VHF-FM Receiver Troubleshooting

Communications gap between you and your fm box? Grab a few common test instruments and find out what the hang-up is!

By Carlos H. Daniels,\* WB4IFR

**C**ommunications receivers in the vhf-fm category are not much different from those used at hf. Because fm, repeaters and transistors are all relatively new on the scene, some amateurs avoid trying to repair or align their "black boxes" when trouble appears. By applying a few simple techniques and utilizing some non-exotic test equipment, amateurs should be able to find and fix the problems that appear in the normal course of operation.

I have tried many testing procedures from several different manufacturers, but the one presented here has given me the greatest success. With few exceptions, this system can be used on all narrow-band ( $\pm 5$  kHz) fm communication receivers. If this outline is followed, it will quickly lead you to a defective stage or help attain the best receiver sensitivity possible.

After the unit is repaired, the receiver still has to be aligned, so it makes sense to combine the two and use alignment of the receiver to help troubleshoot the unit. Once the defective stage is found, simple voltage and ohmmeter checks will invariably find the defective component.

## Test Equipment You Should Have

The following is a list of recommended test equipment:

**Oscilloscope** — Capable of displaying 455 kHz at 50 mV, preferably 10 mV.

**Generator** — Crystal-controlled at the incoming frequency, or an on-frequency transmitter.

**Generator** — Crystal-controlled or very accurate at 455 kHz.

**VOM** — 20 k-ohms/volt, such as a Simpson 270.

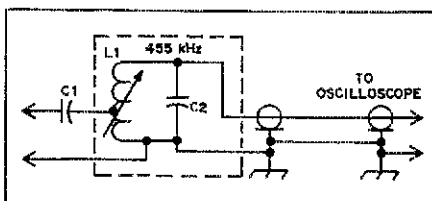
\*2026 Valencia Circle, Kissimmee, FL 32741

**Generator** — 455 kHz to 20 MHz, reasonable stability.

The first step in the procedure is to build a 455-kHz, or low i-f, test probe. This probe will enable us to look at the i-f signal amplitude without appreciably affecting or loading the circuit. Thus when the alignment and repair is completed, we can remove the probe without detuning the circuit.

This probe is built from an i-f transformer and RG-58 coaxial cable, Fig. 1. C1 should be 10 pF or less if you have a sensitive oscilloscope. Ten pF at 455 kHz represents a capacitive reactance of 35 k-ohms. This high impedance together with the high impedance of the tuned circuit provides a probe with very little loading. The value of C2 is calculated by adding 30 pF/ft. of RG-58 and the input capacitance of the oscilloscope, then subtracting this from the value of what is needed for resonance at 455 kHz. For example 3 feet of RG-58 is 90 pF, plus 30 pF for the average oscilloscope, equals 120 pF. A 700 NH inductor for L1 requires 180 pF; thus  $180 - 120$  gives a value of 60 pF for C2.

Fig. 1 — A high-impedance test probe can be assembled from an old i-f transformer, or from a shielded inductor and capacitor. C2 should be less than the normal value for resonance with L1, to compensate for the capacitance of the cable and input circuitry of the oscilloscope. See text for a discussion of obtaining a value for C1 and C2.



The probe is now tuned by feeding 455 kHz at C1 and peaking L1 for maximum signal as observed on the oscilloscope. The key item for the test procedure is now fabricated.

The second step is to solder two test points to the circuit under investigation. The test points are made by bending an eye at one end and L at the other end of a short piece of No. 20 or 22 AWG solid wire (Fig. 2). A block diagram of typical receiver circuitry is shown in Fig. 3 along with some possible test points.

The test point minimizes the chance of the probe slipping and causing a short circuit. The first test point is soldered to the discriminator output. The second one is soldered to the base of the limiter transistor or to the input of the integrated circuit, if the unit has one. Most integrated-circuit 455-kHz amplifiers are single-limited (saturated) at the output, so if an IC is used, solder the test point to the input circuit. The low impedance in the circuit, coupled with the high impedance of the probe is very desirable.

## Test Procedure

Connect a direct probe to the discriminator. Connect the 455-kHz tuned probe to the input of the IC or to the base of the limiter transistor. Set the oscilloscope vertical attenuator for 0.1 V/cm. Apply power to the unit under test.

At this time, assuming that all power-supply voltages are correct, you can tell which half of the receiver has a problem. If noise is present, then the audio portion is at least amplifying. If there is no noise heard in the speaker, the audio or squelch circuits are at fault. The defective stage can be found by measuring the noise levels from base to

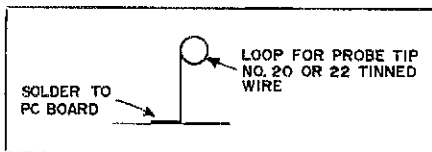


Fig. 2 — Small loops of tinned wire are soldered to appropriate points in the receiver circuitry to serve as test-probe connections.

collector of each transistor working toward the speaker. Apply an on-frequency signal to the antenna input. The noise as observed on the oscilloscope should disappear when the signal is applied. If the noise doesn't disappear, the problem is before the discriminator.

Apply an unmodulated signal from a crystal oscillator of 455 kHz, through a .01- $\mu$ F capacitor, to the base of the second mixer. The oscilloscope should show a straight horizontal line with no noise. The discriminator secondary adjustment should swing this dc line plus and minus 0.1 to 0.2 volt. Adjust the discriminator secondary to the 0-volt position. Temporarily disconnect the i-f probe from the input to the IC and connect it to the discriminator secondary. A convenient point would be the side of the diode connected to the discriminator secondary. Adjust the primary for a maximum 455-kHz indication as observed on the oscilloscope. Reconnect the i-f probe from the input to the IC and recheck the discriminator to make sure it is 0 V on the 0.1 V/cm scale. There has been one exception encountered by the author in the form of a pulse-averaging discriminator. In this case there are no adjustments for the discriminator; the rest of the procedure is the same.

Connect the output of the 455-kHz probe to the oscilloscope vertical input. Adjust all of the tuned circuits in the low i-f chain. If any adjustment was very far off, the procedure should be repeated because of the interaction of the tuned circuits. If any circuit could not be adjusted, break out the VOM and troubleshoot that stage. Ascertain that none of the stages are limiting, or you will be unable to see a peak of the 455-kHz signal on the oscilloscope.

The second LO and mixer functions can now be checked by feeding in the high i-f signal at the same point that 455 kHz was applied, i.e., the base of the second mixer. Whereas the low i-f is nearly always 455 kHz, the high i-f is as varied as the desires of the designer. Some of the more common frequencies are 11.7, 14.5, 19, and 10.7 MHz. The author has even found some units in which only one crystal was used for both the first and second LO, using different multiplication factors to obtain the injection voltages. These units

have a variable high i-f, dependent upon the incoming-signal frequency. The high i-f can be found by calculations made from the formulas given by the manufacturer. When the high i-f signal is fed to the base of the second mixer, a 455-kHz signal should be observed on the oscilloscope. If this signal is not present, check the second LO and mixer stage. The mixer can easily be checked by moving the 455-kHz generator output from the base to the collector. If the signal, as observed on the oscilloscope, reduces in amplitude, the mixer is amplifying and the problem, if any, is probably in the second local oscillator. A common cause the author has encountered is a cracked or broken crystal.

Connect the high i-f unmodulated signal to the base of the first mixer. Again the 455-kHz carrier should be observed. It is not recommended that the high i-f be tuned unless it is really necessary. Apply a signal frequency to the base of the first mixer. If a signal is not observed on the scope, proceed to check the first LO, multipliers, and mixer. The mixer can easily be checked by injecting the high i-f signal at the collector of the mixer instead of at the base.

Observing the 455-kHz signal on the oscilloscope at this time isolates the problem to one stage, the rf amplifier. In every instance we have narrowed the problem to one single stage, or to the IC. One stage is easy to troubleshoot by using voltage and resistance measurements. One tends to lose his fear of a single stage, whereas the receiver viewed overall sometimes appears complex.

Feed an unmodulated on-frequency carrier directly to the antenna input.

Monitor the discriminator and adjust the first local oscillator coil or capacitor for zero voltage as observed on the oscilloscope.

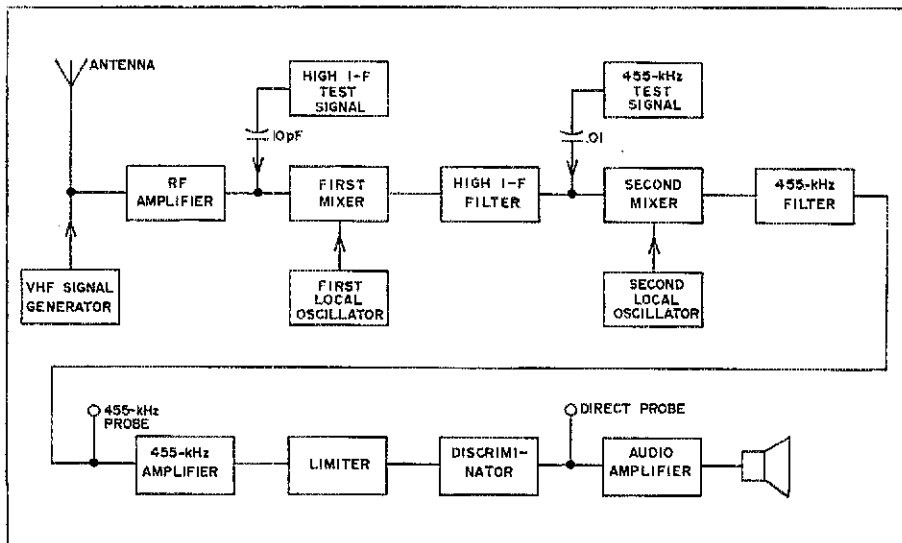
Connect the output of the i-f probe to the oscilloscope; adjust each of the high i-f tuning adjustments for maximum 455-kHz amplitude. Adjust the rf-stage tuning and input tuning for maximum 455-kHz amplitude.

If at this time the sensitivity is not up to par, which should be between 1 and 0.1 microvolt, each adjustment can be repeated, with the exception of the first LO adjustment and the primary and secondary of the discriminator, for a maximum amplitude of the 455-kHz signal. If the sensitivity still is not too good, look for low-gain transistors or stages.

One of the big dividends of this procedure is that by using the 455-kHz probe that is left in the circuit, the oscilloscope can be used as a relative-signal-strength indicator. If one has access to a calibrated generator, the oscilloscope can be calibrated in microvolts. Another dividend is that by using the direct probe on the discriminator, the oscilloscope can be used as a relative indicator of deviation. Calibration for deviation purposes can be accomplished by moving the signal-generator frequency above and below center by 5, 10, and 15 kHz, making appropriate markings on the scope face with a grease pencil.

With a bit of practice and some very common test equipment, you should be able to pinpoint a trouble area and align your receiver for top performance in a small amount of time. The knowledge and confidence gained will be worth far more than the service fee saved. **QST**

Fig. 3 — A functional block diagram representative of many vhf-fm receivers on the market. In some instances several functions may be combined in one IC, especially in the 455-kHz amplifier, limiter, and discriminator (or quadrature detector) portions of the circuit.



# The Tower Shield

Cover your tower and yourself. Use the Tower Shield.

By Baker Springfield,\* W4HYY and Richard Ely,\*\* WA4VHM

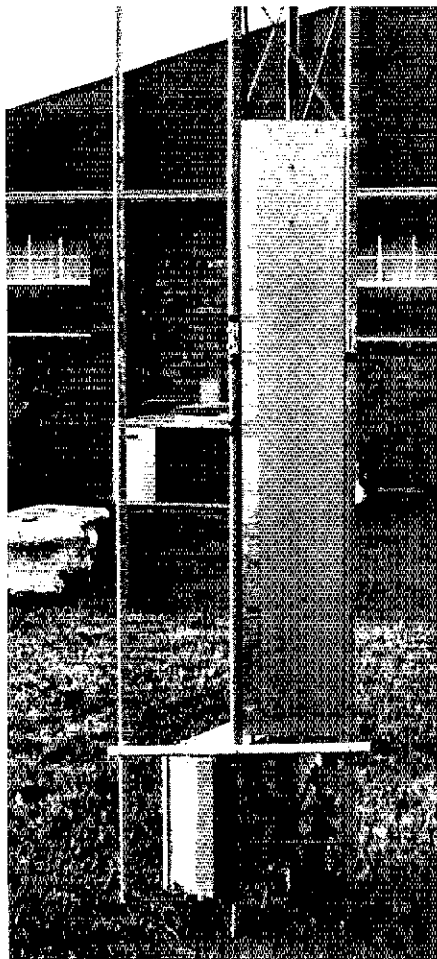
That "attractive nuisance" in your back yard can be a problem. Whether the nuisance is your neighbor's wife or your tower is for you to decide. Legally though, a tower can be classified as an *attractive nuisance* that could cause

injuries unless some precautions are taken. The tower shield should eliminate the worry about one nuisance; the other is your problem.

Generally, *attractive nuisance* doctrine is based upon the theory that one who maintains upon his premises an agency or condition which is dangerous to children of tender years by reason of their inability to appreciate danger and which may reasonably be expected to attract children to the premises, is under a duty to exercise reasonable care to

protect them against dangers of the attraction. With this factor in mind, we should be careful about such items on our property. Serious considerations should be given to anything that is attractive, inviting, enticing, unusual, curious, or interesting. An example might be something painted brightly with a strange or unusual shape on which children could play. If you have anything on your property that could be considered an *attractive nuisance* then perhaps a few changes could alter

\*6041 Fox Ridge Dr., Memphis, TN 38138  
 \*\*3961 S. Lakewood Dr., Memphis, TN 38138



Installed tower shield. Note the holes for using the handles.

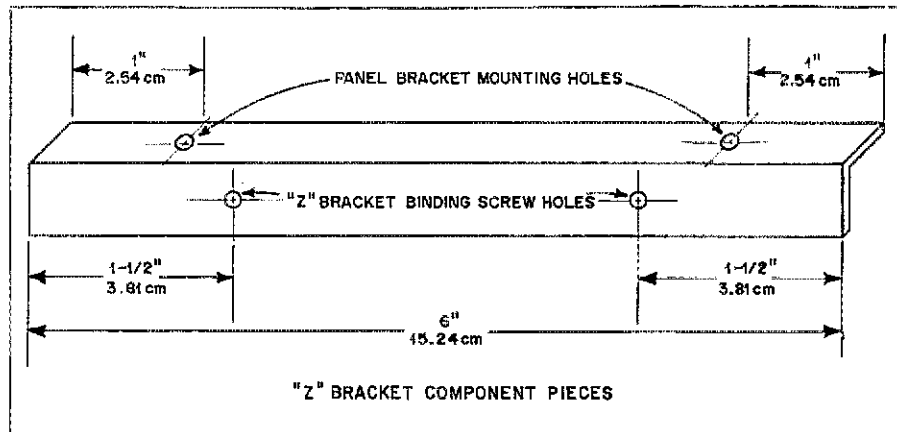


Fig. 1 — Z-bracket component pieces.

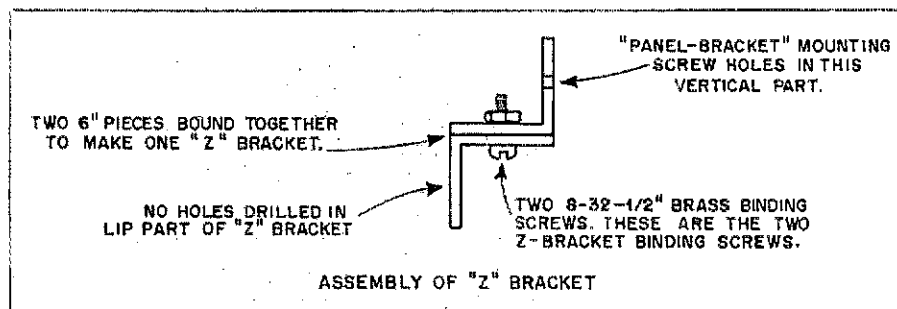


Fig. 2 — Assembly of the Z bracket.

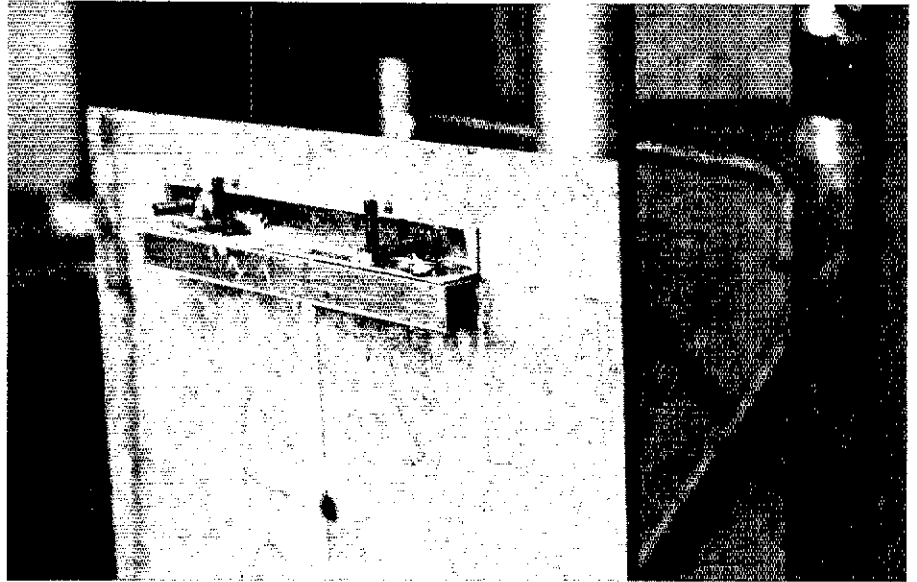
this condition and render it almost unnoticeable, or at least less appealing. Eliminating or reducing the appeal of an object should help in preventing an accident.

### The Shield

The tower shield is simply composed of panels that enclose the tower and make climbing practically impossible. These panels are five feet in height and are wide enough to fit snugly between the tower legs and flat against the rungs. A height of five feet is sufficient in most every case. The panels are constructed from 18-gauge galvanized sheet metal obtained and cut to proper dimensions from a local sheet-metal shop. A lighter gauge could probably be used, but the extra physical weight of the heavier gauge is an advantage if no additional means of securing the panels to the tower rungs are utilized. The three types of metals used for the components of the shield are supposedly rust proof and nonreactive. The panels are galvanized sheet steel, the brackets aluminum, and the screws and nuts are brass. Total cost of all parts was about twenty dollars. The tower shield consists of three panels, one for each of the three sides, supported by two brackets. These brackets are constructed from six-inch pieces of thin aluminum angle stock. Two of these pieces are bolted together to form a Z bracket (see Figs. 1 and 2). The Z brackets are bolted together with flat-head (binding-head) brass machine screws.

The panels were laid flat for the measuring, marking and drilling. The first measurement is from the top of the upper mounting rung on the tower to the top of the bottom rung. These mounting rungs were selected to position the panel on the tower. This distance from rung to rung was then marked on the panel. Using the same size brass screws and nuts, the top vertical portion of each Z bracket is bolted to the panel. The mounting-screw holes were drilled about one inch from the end of the Z brackets so that an offset clearance occurred between the Z-bracket binding-screw holes and the panel bracket mounting-screw holes. The panel holes were drilled to match the Z-bracket holes.

The panels are held on the tower by their own weight. They are not easy to grasp because they fit snugly between the tower legs. If the need exists for added safety against deliberate removal of the panels, this can be accomplished by means of tie wires. A small hole can be drilled in the panel just above, just below, and in the center of each Z bracket. Run a piece of heavy galvanized wire through the top hole, around the Z bracket, and then back through the hole just below the Z



Panel with mounted Z bracket.

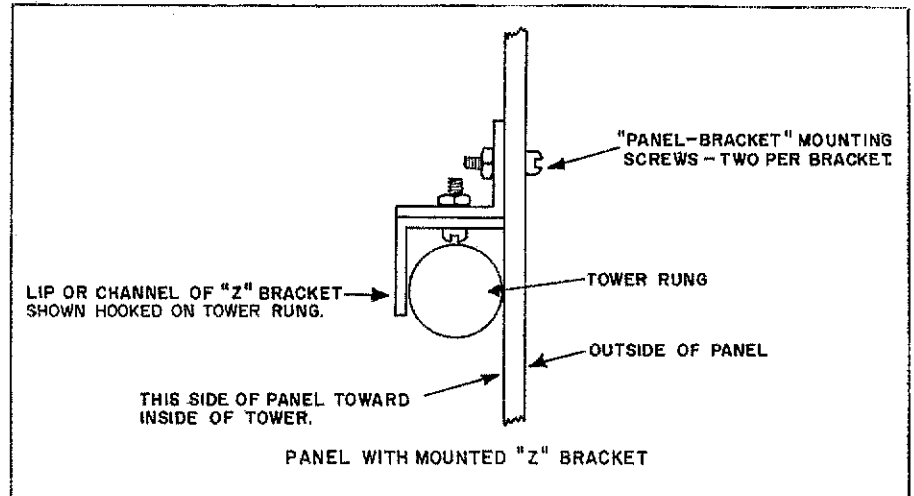


Fig. 3 — Installation of the shield on a tower rung.

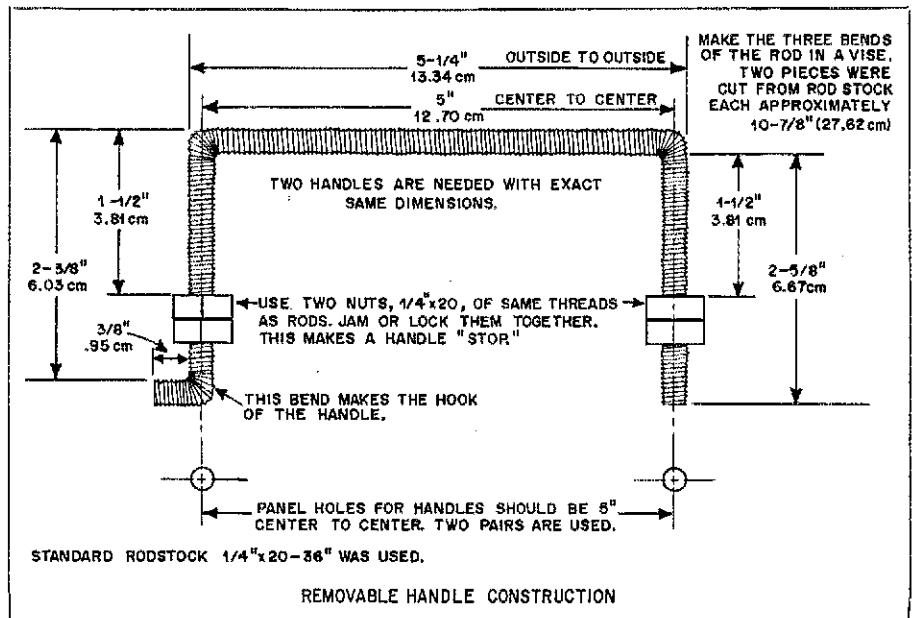


Fig. 4 — Removable handle construction.

bracket. Twist together the two ends of the wire. One tie wire should be sufficient for each panel, but use two if desired.

The completed panels are rather bulky and difficult to handle. A feature that is useful if the panels have to be removed often for tower climbing or accessibility is a pair of removable handles. The removable handles can be

constructed from one threaded rod and eight nuts. The two pairs of handle holes were drilled in the panels a few inches below the top Z bracket and several inches above the bottom Z bracket. For panel placement or removal, the handles are hooked in these holes in the panels. The hook, on the top of the handle, fits into the top hole of each pair of the handle holes. The

handle is optional, but for the effort required it certainly makes removal and replacement much safer and easier.

This tower shield is most simple but effective! Better ways can be devised, but this is a basic guide. The low cost and simplicity make the tower shield well worth the protection and security that most hams need! Can you really afford the lack of this protection?

QST

## Strays



Miss Pennsylvania, Connie Horness, sends a message while Andrew Doles, WBUDG, watches at the recent American-Canadian Sports Show in Cleveland's Public Auditorium. Miss Ohio, Susan Banks, also got on the air during the ten-day event.

### NEW BOOKS

□ *A Sourcebook of Modern Transistor Circuits*, by L. G. Cowles. Published by Prentice-Hall, Inc., Englewood Cliffs, NJ. Hard-cover version 6-1/8 × 9-1/4 inches. Page count, inclusive of index, 360. Price at the time of this report, \$17.50.

Here is another of those neat books which is written in plain electronics language — the distinctive mark of Prentice-Hall and its authors. Any radio amateur with a motivation to learn what solid-state circuitry is all about should be pleased with the narrative and information available in this book.

There is no visible sign in the volume that the material is hackneyed. The circuits do not appear to be lifted from

industry application notes and data sheets — a refreshing turnabout in this period of editorial proliferation! Mathematical solutions to design problems are offered throughout the book, but only where it is necessary. If you can handle basic high-school algebra — you're in!

Chapter 1 treats practical transistor theory, with coverage of integrated circuits, feedback, gain-impedance relations, power dissipation, heat sinking, and transistor gain. Single-stage amplifiers are discussed in chapter 2. Chapter 3 gets into the design of two-stage amplifiers of all popular types. FETs are the theme of chapter 4, and MOSFET amplifiers are the subject of chapter 5.

Next come power supplies and regulators (chapter 6), and from there the author migrates to low-noise amplifiers

and preamplifiers in chapter 7. Audio power amplifiers are highlighted in chapter 8, and linear integrated circuits are focused upon in chapter 9. The remaining eight chapters deal with filters, tuned amplifiers, video amplifiers, diode circuits, oscillators, inverters, and agc circuits. Coverage is provided on the subjects of transistor switching circuits and lab instruments and methods. The book contains an appendix.

Schematic diagrams are present in large numbers throughout the book. In most instances the author has provided practical component values for his examples, suggesting that most of the circuits could be "lifted" and applied by the amateur or professional. But, the information is there for those who wish to actually *design* a circuit for use in a specific project.

The paper grade and binding of this book seem to be "top drawer." Although the price may seem a bit high when comparing it to what one pays for amateur publications, any ham who takes his *technical* pastime seriously should be delighted to add this publication to his personal library — or, perhaps one could persuade the boss to acquire a copy for the firm's library! — *WICER*



The Directors picked "Using the Double Balanced Mixer in VHF Converters" as the best article in March 1975 QST. Here its author, Edward L. Meade, Jr., K1AGB, belatedly claims the Cover Plaque from New England Director John C. Sullivan, W1HHR.

# Technical Correspondence

## LEARNING ICS POWER SUPPLY

I am following with continued interest the *QST* series "Learning to Work with Integrated Circuits," by Jerry Hall and Charles Watts,<sup>1</sup> and I am now obtaining the necessary parts for construction of their digital voltmeter design. After reading Part 1 of this series, in which the power supply design and construction was discussed, I observed some disadvantages of the published circuit and I have attempted to improve the design. Your readers may be interested in these proposed improvements of the power supply circuit.

The original published power supply schematic diagram is found in Fig. 1, page 29 of the January, 1976, *QST*. The dc voltage for the 5- and 12-V regulators is obtained by connecting two full-wave rectifier circuits to a center-tapped transformer of 33 V rated at 1 ampere. Hall and Watts explain, "The 5-volt leg of the power supply uses a 3-terminal 5-V IC regulator but because the rectifier output is 23 volts ( $33/2 \times 1.4$ ), a 10-ohm, 10-W resistor is placed in series with the dc line from the rectifier filter circuit to the input of the 5-V IC regulator. This resistor drops the input voltage so that under varying load conditions, the maximum dissipation the IC will be required to handle is 6.5 watts. The remainder of the power is dissipated in the 10-ohm resistor. This scheme was chosen over others which could have been used, such as a separate power transformer for the 5-V supply."

Apparently, a superior alternative circuit was overlooked by Hall and Watts for this particular application. The main problem is to obtain a rectified output voltage for the 5-V regulator which is about one-half that of the voltage input for the 12-V regulator. If this can be done, most of the power now wasted

<sup>1</sup>Hall and Watts, "Learning to Work with Integrated Circuits," Part 1 appeared in *QST* for January, 1976.

in the input resistor to the 5-V regulator can be eliminated since considerably less voltage drop will be needed. On page 333 of the 1966 *Radio Amateur's Handbook*, the "economy" power supply circuit is shown in Fig. 12-17 which provides dc output voltages of  $E$  and  $2E$  from a single center-tapped transformer. The  $E$  voltage is the voltage obtained at the transformer center-tap with a full-wave center-tap rectifier circuit, and the  $2E$  voltage is obtained with a full-wave bridge circuit (which also comprises the rectifiers required for the center-tap circuit). The common anode terminal of the rectifier bridge is the ground return.

The 33-V transformer recommended in the article has more voltage than necessary for this application. A more suitable transformer is the Stancor P-8604, 20 V ct at 1 A and is listed in the Newark Cat. No. 102, Stock No. SF1460, at \$3.50 in 1-9 quantities. A power supply using the suggested circuit and transformer, Fig. 1, was constructed and tested. After four hours of continuous operation at full load, the temperature on the outside surface of the transformer was 50°C, or a temperature rise of 30°C above the 20°C room ambient temperature. The lower power dissipation of this recommended circuit should produce a corresponding lower temperature and longer life of the components within the voltmeter case as compared to the originally published power supply circuit. — Ed Wetherhold, W3NQN, 102 Archwood Ave., Annapolis, MD 21401.

[Editor's Note: For proper voltage regulation the potential at the input of each regulator must be at least 3 volts greater than the regulated output. Below this minimum the regulator becomes a "voltage follower," tracking changes in input level. Dc voltmeter readings can be misleading for they do not show ripple, and input voltages near the lower limit can result in unwanted ripple at the regulated output. For this reason, elimination of the series input resistors shown in Fig. 1 may be in order.]

## THE BROADBAND DOUBLE-BAZOOKA ANTENNA — HOW BROAD IS IT?

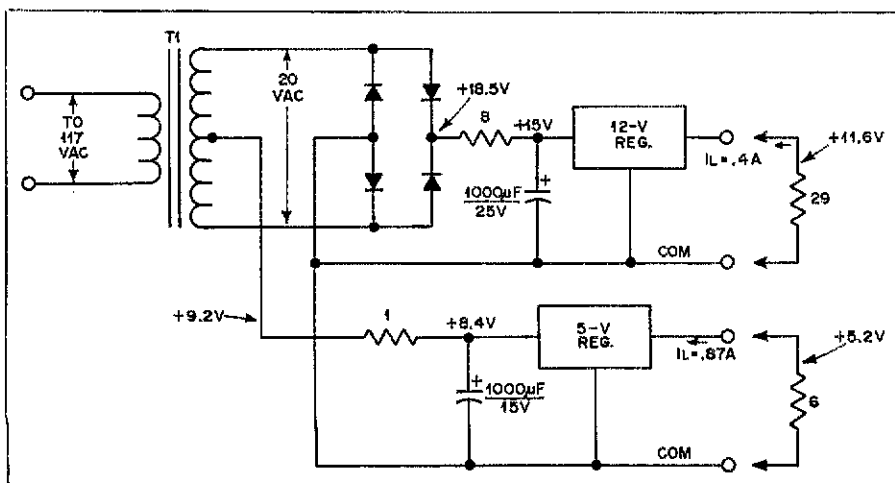
In view of the results of an analysis and some experiments I performed several years ago, the increasing interest in using the coaxial dipole (sometimes called the Double-Bazooka antenna) for its increased bandwidth is disturbing. The antenna, with its inner section of coax and its end sections of open-wire line, was popularized by W8TV for amateur use (*QST* for July, 1968). It appears in all recent editions of *The Radio Amateur's Handbook*, although it has never appeared in *The ARRL Antenna Book*. My results indicate that the coaxial stubs in the coaxial-dipole configuration in general use by amateurs cannot provide the degree of bandwidth that users of the coaxial dipole appear to be measuring. Thus it appears that features other than the shunt-compensating reactance provided by the coaxial stubs within the dipole must be responsible for achieving the bandwidth credited to the coaxial feature.

Here's why the coaxial feature cannot make any significant contribution to bandwidth when the feed-line impedance is the usual 50 ohms. Depending on the height above ground, the input impedance of the average 40-meter or 80-meter amateur dipole generally runs from 50 to 80 ohms at resonance. Thus at resonance the mismatch on a 50-ohm line is generally quite low, from less than 1.1 to around 1.6, at worst. On either side of resonance, the mismatch increases rapidly due to reactance appearing in the dipole impedance. With the addition of the coaxial, reactance-compensating shunt stubs, the dipole reactance is either canceled, at best, or at worst, reduced somewhat by the opposite shunt reactance provided by the stubs.

Let's assume cancellation is achieved; it is obtained by a parallel-connected reactance, which raises the series resistance of the dipole impedance to its equivalent parallel-circuit value, which is much higher. This is the crucial point, because, when using a feed line having an impedance which already matches the dipole resistance rather well at resonance, the higher mismatch off resonance will not be significantly different whether it is caused by the reactance of the uncompensated dipole or by the increased resistance received in exchange for the canceled reactance.

To illustrate with an example, consider an 80-m dipole at a height which yields a resonant impedance of  $55 + j0$  ohms at 3.75 MHz. The mismatch is 1.1, referred to 50 ohms. At 3.55 MHz, 200 kHz below resonance, the series impedance of the dipole is approximately  $50 - j90$  ohms, which yields a 5.04:1 mismatch. Now a 90-ohm inductive reactance in series with the dipole would cancel the 90-ohm dipole reactance and would leave the resistance at 50 ohms. And we would indeed have a perfect match. Unfortunately, the reactance provided by the stubs in the coaxial dipole is in parallel with the dipole impedance, not in series. And what

Fig. 1 — Suggested circuit for the 12- and 5-V power supply for the *QST* DVM/frequency counter.



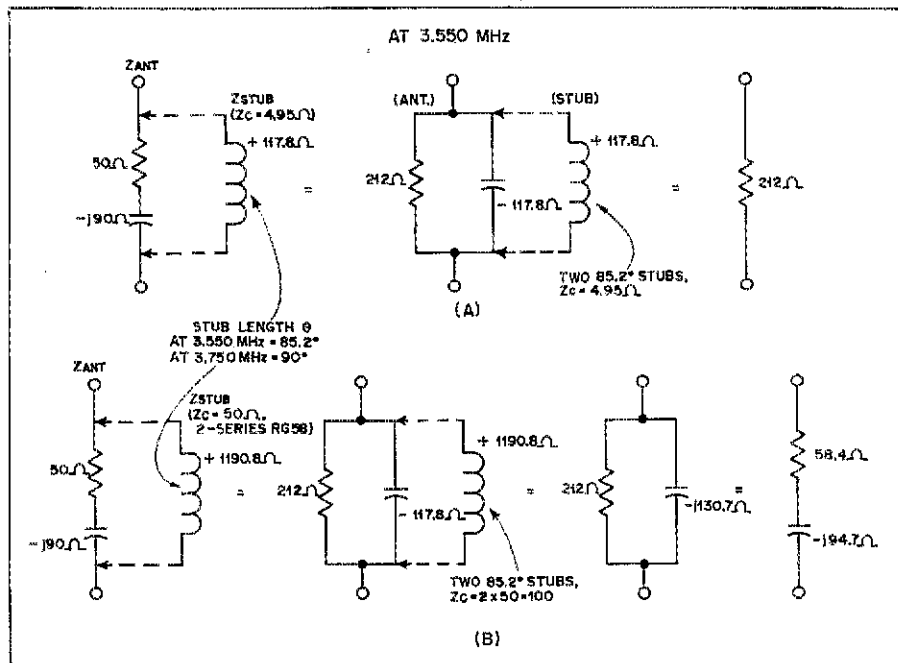


Fig. 2 — Showing the impedance transformations for (A) 4.95-ohm center coaxial section and (B) 50-ohm center section. At both A and B the SWR without coaxial stubs is 5.04:1; with stubs at A it becomes 4.24:1, and in the practical case at B, 4.9:1.

a difference it makes! The values of the equivalent *parallel-circuit* components of the dipole impedance are  $R_p = 212$  and  $X_p = -117.8$  ohms as shown in Fig. 2. When the 117.8 ohms of capacitive dipole reactance is completely canceled by an equal inductive reactance in parallel with the dipole impedance, the resulting impedance is  $212 + j0$  ohms. Bad news! Canceling the dipole reactance with *parallel* circuitry has raised the resistive component by a factor of 4.24, from 50 ohms up to 212 ohms, and coincidentally, the mismatch is now  $212/50 = 4.24:1$ . This is the lowest mismatch obtainable with parallel compensation, because even though the dipole reactance has been completely canceled, we're stuck with the 212-ohm load resistance.

Obviously, a reduction in mismatch from 5.04:1 to 4.24:1 is hardly worthwhile, even if it could be accomplished. But it can't. Why? Because a canceling reactance of 117.8 ohms would require 4.95-ohm coax for stubs — impractical to build. Here's more bad news: Stubs made from 50-ohm coax yield a reactance ten times too high — useless. What about 75-ohm coax? — 1.5 times worse. Incredible, you say? Example continues: A short-circuited stub, quarter-wave resonant at 3.75 MHz made from 50-ohm coax, yields an inductive reactance of 595.4 ohms at 3.55 MHz, again 200 kHz below resonance.<sup>2</sup> The stubs in each dipole half are connected in series with each other through their center conductors, so the total inductive reactance of the series combination is twice the single stub value, 1190.8 ohms. This is the value appearing in parallel with the dipole impedance when using 50-ohm stubs. (Stubs of 75 ohms would yield 1786.3 ohms.) The com-

<sup>2</sup> At 3.55 MHz, stub length  $\theta = \frac{3.55 \times 90^\circ}{3.75} = 85.2^\circ$ ; shunting reactance  $X = Z_c \tan \theta$ ; and stub impedance  $Z_c = X \cot \theta$ .

bined parallel components of the dipole impedance and shunt-stub reactance ( $R_p = 212$  ohms and  $X_p = -117.8$  ohms in parallel with stubs of +1190.8 ohms) yield total parallel-circuit component values of  $R_p = 212$  ohms and  $X_p = -130.7$  ohms. The series-equivalent impedance is now  $58.4 - j94.7$  ohms, also shown in Fig. 2. The result? A whopping big reduction in mismatch from 5.04 (less stubs) all the way down to 4.9:1! Conclusion? Isn't it obvious the stubs are ineffective? And shouldn't it be disturbing?

So you ask what other features can be responsible for the *lower* mismatch values measured by many coaxial-dipole users. First, the mismatch values shown here are those which appear at the feed-line/antenna junction, while values measured at the feed-line input will always be lower because of line attenuation. Second, increased radiator thickness, especially when the stubs are constructed from RG-8/U, reduces the dipole characteristic impedance, resulting in less reactance than with the thinner wire dipole for the same frequency excursion away from

resonance. Third, the extensions for building out from the shortened ends of the coax stubs to obtain an external half wavelength are usually of multiwire construction such as ladder line, which further increases the effective radiator thickness. This reduces the off-resonance reactance still further. Fourth, the external dielectric material covering the stub coax increases both dipole capacitance (increasing the electrical length) and effective diameter of the radiator. However, indications under investigation suggest this increase in effective diameter is accompanied by increased ohmic loss, which decreases the  $Q$  and thus increases the bandwidth at the expense of efficiency. And fifth, in the range above 3:1, many SWR indicators show readings considerably lower than the true value.

The reader who is interested in pursuing the subject further is invited to read my paper entitled, "A Revealing Analysis of the Coaxial Dipole Antenna," appearing on page 46 of *Ham Radio* for August, 1976. — M. Walter Maxwell, W2DU, Box 215, Dayton, NJ 08810.

## A TOTAL SOLAR ECLIPSE AND RADIO PROPAGATION

The diurnal effect of solar radiation on the ionosphere is obvious to the DX specialists, who note the effects of sunrise and sunset on radio reception. An eclipse of the sun has much the same effect. The total solar eclipse of October 23, 1976, presents an opportunity for hams to observe the effects on radio propagation, especially on the 10-, 15-, and 20-meter bands.

Table 1 depicts the progress of the moon's shadow over the earth from west to east, marking out a line of totality that stretches from Africa across the Indian Ocean and Australia in the vicinity of Melbourne. I suggest plotting the various points on a map or globe, connecting them with a line to show the path of totality. Regions well outside, to the north and south of that path, will observe a partial eclipse.

During the passage of the eclipse, DXers should observe a brief return to nighttime transmission conditions for paths more or less centered on the track of totality. Some interesting and useful scientific experiments are possible. Try to set up a DX schedule at least a week in advance of the date of totality, October 23. Plan to continue such communication for a week or so afterward. These

Table 1

### Path of Total Solar Eclipse, Oct. 23, 1976

(Taken from the *Canon of Solar Eclipses*, by Meeus, Grosjean, and Vanderleen, published by the Pergamon Press.)

UT H	M	LONG DEG	LAT DEG	DURATION	WIDTH KM
3	36.4	-31.39	-4.09	2 04	144
4	00	-63.00	-14.63	3 30	188
4	24	-74.31	-20.54	4 11	198
4	48	-83.20	-25.46	4 36	200
5	12	-91.70	-29.72	4 46	199
5	36	-100.92	-33.36	4 41	196
6	00	-112.04	-36.25	4 20	190
6	24	-127.12	-37.94	3 41	181
6	48	-156.30	-36.10	2 32	158
6	50.9	-171.29	-33.43	2 04	145



observations will establish the norm, so that the effect of the eclipse will be evident. In particular, note signal strength or any other peculiar behavior of the signals. On eclipse day, again on a prearranged schedule, repeat the observations and detect the possible differences.

Many amateurs will find such experimentation an interesting exercise. I should be very pleased to hear the results of the experiments. The data may be sent to me at the Center for Astrophysics, Harvard College Observatory and Smithsonian Astrophysical Obs., 60 Garden St., Cambridge, MA 02138.

For those fortunate enough to be in the belt of totality, the eclipse is one of longer duration, attaining a maximum of four minutes and 46 seconds near the center of the track. The diameter of the lunar shadow is about 200 kilometers, at maximum. — Donald H. Menzel, W1JEX/WB4PHH.

[Editor's Note: Dr. Menzel is the author of the book, *Our Sun*, which continues to be a best seller in the field of sunspots and radio propagation. The book can be purchased at the price of \$9.50 directly from the Harvard University Press, Customer Service, Cambridge, MA 02138.]

## GHOST ECHOES, PHASE 2

In the June, 1976, issue of *QST*, Hans Lohmann Rasmussen, OZ9CR, reports a second moon echo which was delayed an additional two seconds and heard for 20 minutes of operating time.<sup>3</sup> He attributes this echo to an ionized cloud of particles, emitted by the sun and traveling toward the earth at approximately 1000 kilometers per second, the front of which is the reflector.

<sup>3</sup> Rasmussen, "Ghost Echoes on 1296 MHz," Technical Correspondence, *QST*, June, 1976.

I do not think this is the case. The two-second time delay from the normal moon echo would seem to indicate the reflector could not be located more than approximately 186,000 miles beyond the moon. If the reflector is the ionized cloud moving toward earth at 1000 kilometers per second, the time delay should decrease noticeably in a few minutes of observation and the received echo should be somewhat higher in frequency because of Doppler effect. — Antone Garibaldi, W6NWO, 35 Willotta Dr., Suisun, CA 94585.

## TWO-METER ECHOES — OR MAGNETIC-TAPE PRINT-THROUGH?

I read with great interest the Technical Correspondence in June *QST*. However, in regards to the observations of Alan Goodacre (VE2AEJ),<sup>4</sup> I believe the phenomenon he is describing is somewhat less mysterious than a long-delayed echo. As related by Mr. Goodacre, the echoes heard were not noticed at the actual time of reception but rather on a tape recording of the event. Also it appears that these echoes were so weak that he himself had not noticed them until they were pointed out to him by a fellow ham who had listened to the tape. From this account it appears that what Mr. Goodacre may have heard was a phenomenon known as "print-through."

Tape print-through occurs when the magnetic domain alignments of one layer of tape on a spool cause the magnetic domains on the preceding and succeeding layers to attempt to align with it. An analogy to this situation would be to place a piece of clay on

<sup>4</sup> Goodacre, "More Ghost Echoes," Technical Correspondence, *QST*, June, 1976.

a table, and cover it with a piece of thin paper. Then press a coin down on the paper covering the clay. When both the coin and the paper are removed, a ghost image of the coin will remain imprinted in the clay. In this case the mylar or acetate base of the recording tape represents the paper while the coin and clay represent the magnetic oxides. The greater the thickness of the base material, the less noticeable the print-through effect will be.

In light of this phenomena it would be advisable to check any tape recordings of long-delayed echoes to be sure that the echo effect neither precedes nor succeeds the actual event by a length of time equal to the time of one revolution of the tape spool.

Mr. Goodacre should be congratulated for his thorough report of the exact circumstances surrounding this event. It is incomplete reporting which often hampers serious scientific investigations by hiding answers rather than providing them. — Curtis Eickerman, WB6PUS/7, 1652 N. 52nd St., Apt. 49, Phoenix, AZ 85008.

## FURTHER DATA FOR YOUR QUAD-VS.-YAGI DISCUSSIONS

In the continual discussion of the merits of the quad vs. the Yagi antenna, I would like to contribute one more piece of evidence based on a year's study. I have used both types mounted on a mast on top of my garage. The number of pigeons landing on my quad is much less than with a Yagi. A corollary of this is that my garage roof is much cleaner with the quad. Unless you are a pigeon fancier or want to raise the nitrogen content of your soil, install a quad antenna. The wires must confuse the poor birds! — George M. Adams, W9TJY, 12032 S. 70th Ave., Palos Heights, IL 60463. QST

## Strays

□ A. Stanley, Kansas, amateur radio operator has been named the first recipient of the Association of Saints Church Radio Amateurs' Arthur B. Church Distinguished Service Award. Gerald P. Foster, W0QWH, received the award recently at the Association's first biennial meeting in Independence, Missouri, from Executive Director, David C. Bland, K0LCB. The award cited W0QWH's emergency communications during the 1974 hurricane *Fifi* and his long-term service to the field officers and missionaries of the Church by providing health, welfare and morale traffic to their friends and relatives.

Arthur B. Church, for whom the award

was named, was an early amateur (9WU) and commercial radio pioneer. A member of the Saints church, Mr. Church served on the board of the National Association of Broadcasters and was part owner of Midland Broadcasting Company. Now retired, he resides in Colorado Springs.

## STOLEN EQUIPMENT

□ ICOM IC-230, Serial No. 2406312, stolen from locked auto on June 15. Rear chassis inscribed with CA driver's license number G516583 and call sign K6ICS. Dr. Michael K. Gauthier, K6ICS, 9550 Gallatin Road, Downey, CA 90240 or telephone collect 213-923-0131.

□ Stolen from car in April in Dallas, TX. \$8144, Serial No. 60388, identified with TX driver's license number 1976485. Keith Ackley, W5SQS, 7724 Dentcrest Drive, Dallas, TX 75240, tel. 214-233-6984.

□ Regency HR2, Serial No. 04-0429. Identified with social security number 313-40-1690 on inside frame. \$50 reward. Bob Walker, W4LPV, 4713 N.W. 3rd Ct., Plantation, FL 33317, tel. 305-792-7015.

□ ICOM IC-22A, Serial No. 340-2547, taken from auto on June 29. Steve Bauer, WB6FZU, P. O. Box 162, Goleta, CA 93017.

□ Stolen in Columbus, Ohio. Drake TR22, Serial No. 340232. Paul J. Kramer, WA8OOL.

□ Drake PR22C, Serial No. 120816. Glenn Packard, K3ZOT, 836 Mason Ave., Drexel Hill, PA 19026.



Talk about proud moments: Otto H. Richardson, W5IGU, left, had the unique pleasure of presenting a QCWA membership certificate to his son, Lowell, W5UBW. Together, the sum of their years in ham radio totals 79.

# Hot and Cold Resistors as UHF Noise Sources

Using the Gaussian Distribution of White Noise Generated by Carbon-Film Devices That Are Subjected to a Thermal Gradient in a Pseudo-Laboratory Environment for Ascertaining the Ability of Quiescent Amplifiers to Resolve Low-Energy Quantum. How's that again?

By Benjamin L. Lowe,\* K4VOW/WA5UVM

**H**ere is a method for obtaining an accurate measurement of the noise performance of your preamplifier. The equipment needed is inexpensive (if you don't have an oven and a freezer, you can get them and split the cost with the household budget). If your wife will not let you into the kitchen, she can make the measurements, even without a cookbook.

When a requirement exists to determine the noise figure of an amplifier, it is difficult to obtain an absolute measurement for very low-noise devices. Simple diode noise generators allow the amateur, as well as other designers, to adjust equipment for minimum noise, but the question eventually arises, "How good is the noise figure?" This is a valid question in determining the system capability.

Popular automatic noise-figure-measurement systems, which are practically standards in today's electronic industry, can yield errors in the order of 0.5 to 1 dB in some cases, such as 432-MHz preamplifier measurements. It is not meant here to fault such equipment, because very good measurements were obtainable on vacuum-tube amplifiers that had noise figures of 5 to 10 dB. However, a 1-dB error in the measurement of an expected 1.5-dB noise-figure device can certainly produce disappointing results. This can readily be seen by observing the decrease in the signal-to-noise ratio for a 2.5-dB noise-figure preamplifier in a system when a 1.5-dB noise figure is expected. The resulting signal-to-noise ratio decreases about 2 dB at 432 MHz,

which is disastrous when only a 3-dB ratio might be expected in the first place!

It may be beneficial to make a few comments in laymen's terms on what the noise figure is and why it is important. For any receiver system to produce signals through its audio amplifier, a signal must be applied to the detector that is strong enough, or has enough energy, to operate the detector and, hence, be converted from an rf or i-f signal into an audio signal. In order to produce this necessary signal at the detector, the incoming energy at the antenna terminals must be amplified many times. This is accomplished by the use of preamplifiers, mixers, i-f amplifiers, and sometimes a second or third i-f stage. Different frequencies are used in obtaining the required gain in order that the gain at any one frequency is not so great that the receiver oscillates.

Unfortunately, the devices that provide this amplification also generate noise. At vhf and uhf this noise is usually greater than the atmospheric noise presented to the receiver by the antenna. Hence, the noise generated by the amplifying stages is the limiting factor that must be overcome by the signal. Minimizing this noise reduces the required incoming signal for a given signal-to-noise ratio. The noise figure is simply a measurement of the noise generated, or added, by the amplifiers.

The following expression is generally used in calculating noise figure.

$$NF = 10 \log F_T = 10 \log \left( F_1 + \frac{F_2^{-1}}{G_1} + \frac{F_3^{-1}}{G_1 G_2} + \text{etc.} \right)$$

where

$NF$  = noise figure, total

$F_T$  = total noise factor

$F_1$  = noise factor of the first amplifier stage

$F_2$  = noise factor of the second amplifier stage

$G_1$  = gain of the first amplifier stage

$G_2$  = gain of the second amplifier stage

It can be seen that most of the total amplifier noise is generated at the first stage if the gain of the first stage is high enough. This is why a low-noise-figure preamplifier is so important

## How Can Noise Figure Be Accurately Measured at Home?

In this section the technique for measuring noise figure is described. For those who are interested, the theory of this approach is discussed in the following section.

As is mentioned earlier, any device that amplifies also generates noise. Along with this principle, any device which is at a temperature above absolute 0°,  $T = -273^\circ\text{C}$ , also generates noise. While it is difficult to measure noise power at low levels, the temperature can be measured. Therefore, a relationship is determined (given in the next section) between the noise figure and the temperature, or equivalent temperature, of a device. This principle is now applied to apparatus for noise-figure measurements that are available to most hams. The scheme utilized here is to adjust the temperature of two resistors to known values, apply the noise power generated from each resistor to the preamplifier stage under test,

\*Stanford Research Institute, 306 Wynn Dr., Huntsville, AL 35805

and determine the noise figure from the resulting increase in noise at the receiver's audio output. Note that the noise power generated by the resistors depends on the temperature of the resistors, not the resistance value. Resistor values close to 50  $\Omega$  are used, since this will eventually be the source impedance applied to the preamp by the antenna. The apparatus required to do this are: (1) an oven, such as found in a kitchen, (2) a freezer, (3) a thermometer, (4) a receiver for the frequency under consideration and (5) a VTVM or VOM. Additionally, two 49.9  $\Omega$  resistors and two 152.5-cm (5-foot) feed lines are needed that will withstand the operating temperatures to be used. (The XYL is going to be overjoyed to see this ham project headed for the kitchen!)

A procedure which can be followed is to connect the two resistors to the two feed lines with as short a lead as possible to minimize the SWR. The freezer is set to  $-17.8^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ) and allowed to stabilize at that temperature. Of course, the thermometer is used to measure this temperature. The test setup is shown in Fig. 1. Using one of the specified resistors, the resistor and 30.5 cm (1 foot) of feed line are placed inside the freezer. This allows 122 cm (4 feet) of feed line to be outside the freezer to connect to the preamp. Also, a resistor with 30.5 cm of feed line is placed in the oven, leaving 122 cm outside the oven for connection to the preamp. The room temperature, which is the temperature of the feed lines external to the freezer and the oven, is assumed to be  $+21^{\circ}\text{C}$  ( $70^{\circ}\text{F}$ ),  $T_1$ .

It is necessary to operate the receiver in its linear range, i.e. the rf and af gain controls in the linear region and the AVC "off." Also, it is best to connect the VOM or VTVM to a high-impedance point, such as the headphone output, in order to obtain a readable voltage level with the receiver gain set in the linear region. Now place the thermometer in the oven with the hot resistor and begin increasing the oven temperature. The preamplifier is switched back and forth between the hot and cold resistors (noise sources), and the noise voltage is observed on the VOM until the noise from the hot resistor is 1 dB greater than the noise from the cold resistor. Most VOMs have a dB scale which can be used, or the "hot" voltage level should be 1.12 times the "cold" voltage level ( $20 \log 1.12 = 1 \text{ dB}$ ). When the 1-dB increase in noise power at the receiver output is achieved with the oven temperature stable, quickly remove the thermometer and record the temperature,  $T_2$ . Be sure to use heat pads (pot holders) because the thermometer is going to be hot. From the graph shown in Fig. 2, use the oven-

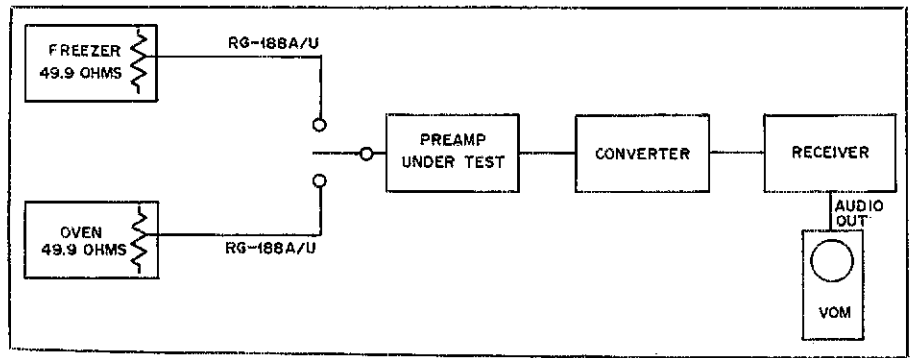


Fig. 1 — Noise-figure-measurement test setup.

temperature reading to determine the amplifier noise figure.

Several points should be noted about this test procedure. One is that precision carbon-film resistors, type RN55C with a value of 49.9 ohms, are used for two reasons: (1) the value changes only about 0.5 ohm at  $150^{\circ}\text{C}$ , thereby maintaining a good match, and (2) the maximum operating temperature rating of  $175^{\circ}\text{C}$  ( $347^{\circ}\text{F}$ ) for the resistors is above the expected oven temperature preventing destruction of the resistor. Other resistors meeting the same criteria can be used. A similar point concerns the type of coax used to connect the resistors to the preamp. Type RG-188A/U semi-rigid can be used up to  $200^{\circ}\text{C}$ , and its attenuation characteristic, 23 dB/100 ft. (100 ft. = 30.48 meters), is used in deriving the chart in Fig. 2. For resolving any questions about the linearity of the receiver or the accuracy of the VOM, attenuators can be placed between the converter and receiver in the test setup shown in Fig. 1. In this case a given VOM reading could be established with the preamp connected to the "cold" resistor and a 3 dB attenuator between the converter and the receiver. When "hot" resistor measurements are made the attenuator is changed to 4 dB, and the "hot" resistor is heated until the original meter

reading is obtained. 3 dB and 4 dB attenuators for 50  $\Omega$  are shown in Fig. 3 and can be constructed with 1/4-watt carbon-composition resistors.

Even this method isn't completely fool-proof, because a receiver input SWR of 2:1 could change the difference in attenuation between the 3- and 4-dB attenuators to 0.9 dB. The attenuation factor is only completely accurate for matched systems.

### Theory and Calculations

Since not all amateurs will want to produce identical test setups as just described, the method of deriving the graph in Fig. 2 may be of interest. The output noise power from a system with gain and with a source impedance at some temperature is given as

$$N_1 = GK(T_1 + T_e)B_n$$

where

$N_1$  = output noise power for temperature  $T_1$

$G$  = system gain

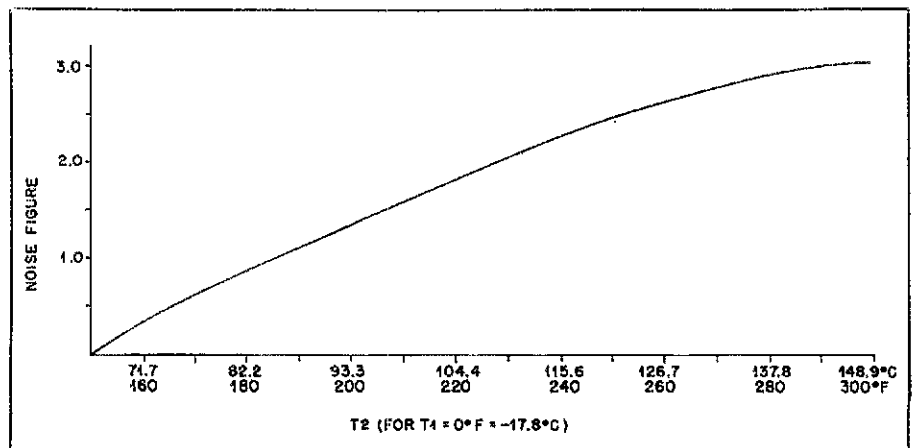
$K$  = Boltzmann's constant ( $1.38 \times 10^{-23}$  joules/degree Kelvin)

$T_1$  = temperature of the source impedance

$T_e$  = equivalent input temperature of the amplifying device

$B_n$  = the noise bandwidth

Fig. 2 — Noise figure vs. "hot" resistor temperature.



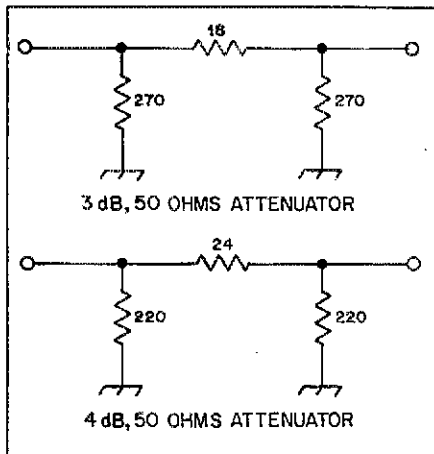


Fig. 3 - Attenuator values.

Note that the noise power from the input impedance, assumed to be resistive, is

$$N_i = K T_1 B_n$$

and the equivalent input noise power for the amplifier is

$$N = K T_e B_n$$

By increasing the temperature of the input resistor to  $T_2$  the output noise power becomes

$$N_2 = GK (T_2 + T_e) B_n$$

Now, suppose we wanted to measure a difference between the output powers of 1 dB. Hence,

$$10 \log \frac{N_2}{N_1} = 1 \text{ dB}$$

and

$$\frac{N_2}{N_1} = 1.26 = \frac{GK (T_2 + T_e) B_n}{GK (T_1 + T_e) B_n}$$

yielding

$$T_e = \frac{T_2 - 1.26 T_1}{0.26}$$

Also, a power ratio of 1.26:1 is a voltage ratio of 1.12:1.  $T_2$  and  $T_1$  would be the temperatures of the hot and cold resistors if we could connect our amplifier directly to the resistors. But, since we must use a length of feed line that has some loss, the equivalent temperature including that feed line must be determined. The type of line chosen, so as not to melt, is RG-188A/U

semi-rigid coax. This cable has a loss factor of 23 dB/100 ft. (0.755 dB/m) at 432 MHz. Now, it is assumed that 152.5 cm (5 ft.) will be used to connect the resistor to the input of the preamp. Furthermore, it is assumed that 30.5 cm (1 ft.) will be inside the freezer or the oven at the same temperature as the resistor, and the remainder, 122 cm (4 ft.) will be outside the oven at room temperature, 21.1°C (70°F or 294.1°K). Now we can determine the equivalent noise temperature of the resistor as viewed looking through the coax. This temperature, now defined as  $T_{e1}$ , is

$$T_{e1} = T_{r1} + T_{e1} + \frac{T_{e2}}{G_1}$$

where

$T_{r1}$  = the resistor temperature in °K

$T_{e1}$  = the equivalent temperature of the 30.48 cm (1 ft) of line in the temperature chamber

$T_{e2}$  = the equivalent temperature of the 122 cm (4 ft) of line outside the temperature chamber

$G_1$  = the gain (in this case, the loss) of feed line in the temperature chamber

Also

$$T_{e1} = (L_1 - 1) T_{L1}$$

where

$L_1$  = the feed-line loss for 30.48 cm

$T_{L1}$  = the actual temperature of the length  $L_1$  in °K

and

$$T_{e2} = (L_2 - 1) T_{L2}$$

where

$L_2$  = the feed-line loss for 122 cm

$T_{L2}$  = the actual temperature of the length  $L_2$  in °K

A calculation is now made to determine one point for the curve in Fig 2. The resistor temperature,  $T_{r1}$ , and the 30.48-cm feed-line loss is 0.23 dB = 1.055 =  $L_1$ .

So,

$$T_{e1} = (L_1 - 1) T_{L1} = (1.055 - 1) 255.2^\circ \text{K}$$

$$T_{e1} = 13.88^\circ \text{K}$$

and

$$T_{e2} = (L_2 - 1) T_{L2} = (1.236 - 1) 294.1^\circ \text{K} = 69.41^\circ \text{K}$$

for

$$T_{L2} = 21.1^\circ \text{C} = 70^\circ \text{F}$$

So

$$T_1 = 255.2^\circ \text{K} + 13.88^\circ \text{K} + 1.055 (69.41^\circ \text{K}) = 342.33^\circ \text{K}$$

Similarly, for the hot resistor at a temperature of 93.3°C = 200°F and feed line connected to that resistor

$$T_2 = 366.3^\circ \text{K} + (1.055 - 1) 366.3^\circ \text{K} + 1.055 (1.236 - 1) 294.1^\circ \text{K} = 459.7^\circ \text{K}$$

Knowing  $T_1$  and  $T_2$ , the equivalent noise temperature for a 1-dB increase in output noise power is

$$T_e = \frac{459.7^\circ \text{K} - (1.26) (342.33^\circ \text{K})}{0.26}$$

$$T_e = 109.1^\circ \text{K}$$

From this temperature the noise figure is calculated from:

$$T_e = (F - 1) T_o$$

where

$F$  = noise factor

$T_o = 290^\circ \text{K}$ , IEEE definition

For

$$T_e = 109.1^\circ \text{K}$$

$$F = \frac{T_e}{T_o} + 1 = \frac{109.1^\circ \text{K}}{290^\circ \text{K}} + 1 = 1.38$$

and

$$NF = 10 \log F = 1.39 \text{ dB}$$

where

$NF$  = noise figure

If an error in the measurements of the temperature was made (for example, the "cold" resistor was actually 2.77°C (5°F) lower than measured and the "hot" resistor was 2.77°C (5°F) higher than measured), the resulting noise-figure error would be in the order of 0.2 dB. It is felt that most amateurs can make temperature measurements at least this accurate, and consequently, obtain a noise-figure reading very close to the actual noise figure. QST

## Strays

I would like to get in touch with . . .

□ retired Panama Canal Company employees. H. L. Clarke, WA4KER, 6981 De La Paix, South Pasadena, FL 33707.

□ World War II veterans who were in the Press Wireless Radio School, held in Hicksville, Long Island, New York during 1943-44. Richard H. Ward, W7AUX, 2611 N. Euclid Ave., Tucson, AZ 85719.

□ Harold D. Hupp, WA4BRJ, or anyone knowing his whereabouts. Fred L. Slaughter, WB8IJX, 2073 Grange St. Oregon, OH 43618.

□ high school amateurs who would like to get together on 20-meter phone. James F. Norman, WB5SEE, 8410 Bangor Bend, Austin, TX 78758.

# Product Review

## The Clegg FM-DX Two-Meter FM Transceiver

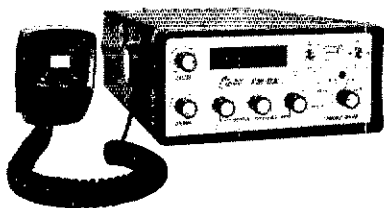
The popularity of 2-meter fm is such that a person just getting into this aspect of amateur radio can be hard put to pick out a suitable transceiver. To say that the market is loaded would be an understatement. By the same token we see plenty of transceivers come in to ARRL hq. for product review so one tends to get a little blasé. But every once in a while, a unit will show up that makes us perk up. The FM DX 2-meter transceiver, a completely American-made product, is just such a radio.

For example, most transceivers are in the 1- to 10-watt class and many amateurs feel they must add amplifiers to obtain desired power levels. The FM-DX is rated at 35-watts output (the unit we tested showed 38 watts). One certainly doesn't need "shoes" when using this piece of gear. But for those users who don't want to run "high" power all the time the FM-DX also has a 500-milliwatt position.

The transceiver is completely solid state and employs digital technology using a phase-locked loop scheme to provide frequency coverage from 143.5 to 148.5 MHz. This extended frequency range provides coverage for non-amateur users, as well as the two-meter amateur frequencies, in 5-kHz steps. A six-digit direct-frequency readout is provided using numeric LEDs. The desired frequency is selected by setting four rotary switches. The first position sets the one-MHz steps, the second switch sets the 100-kHz steps, the next takes care of the ten-kHz settings and the last, five kHz.

Another switch is used to select the differential between transmit and receive, either plus or minus 600 kHz, using the standard international repeater pairings. In addition, simplex operation is provided plus three additional switch settings for non-standard frequencies, up to and including any input/output spread of 4.5 MHz.

The heart of the FM-DX is the frequency control system which uses a digital frequency synthesizer. A digital counting technique and a phase-locked voltage-controlled oscillator (VCO) is used for direction generation of the injection signal for the receiver. The same



VCO output is combined in a mixer along with the output of a crystal oscillator to obtain the transmitter frequency. In other words, the transmit frequency is always slaved to the receive frequency, a desirable feature. The VCO operates over a range from 33.2 to 34.45 MHz. The output is multiplied by four to give a range of 132.8 to 137.8 MHz, the receiver injection frequency (10.7-MHz i-f).

At the same time, the VCO frequency is divided by four to yield a signal between 8300 and 8612.5 kHz. This signal feeds five cascaded programmable counters. The net count of these counters can be programmed by the switches (panel mounted) described earlier. The switches can be set up so that they divide the input frequency by a selected number from 13,280 to 13,780. Output from the divider string provides one of two inputs to a phase detector. The second input is a fixed 625-Hz signal derived from a precise 4000-kHz crystal oscillator and a fixed divide-by-6400 digital circuit.

The phase detector (MC4044) is of the type wherein a steady-state voltage exists only when both input and output signals are identical in both frequency and phase. In this application, this condition is satisfied only when the divided-down VCO frequency equals the 625-Hz reference frequency.

To illustrate how this works assume that the programmable divider is set to divide by 13,600. The phase detector filtered and amplified output will force the VCO to  $13,600 \times 4 \times 625$  Hz or 34,000 kHz. If the VCO tends to drift higher, the 625-Hz resultant will also increase and the phase detector will respond with a corrective output voltage returning the VCO to the correct frequency. With the VCO locked on 34.0 MHz the receiver will be tuned to  $34.0 \times 4 + 10.7$  or 146.70 MHz.

The FM-DX controls and LED display have been programmed to do the above arithmetical computation internally. Consequently, when the received frequency controls are switched so that 146.70 is displayed on the LEDs, the divider is automatically set to the corresponding 13,600 value and the receiver is tuned to 146.70 MHz.

The transmit frequency is produced by combining two signals in a double-balanced mixer, one signal from the second harmonic of the VCO and the other from the output of a switchable crystal oscillator. The sum of these two frequencies is doubled in frequency and becomes the transmitter output frequency.

For example, using the receive frequency of 146.70 MHz, the VCO is therefore at 34.0 MHz. This VCO frequency is then doubled to 68 MHz and is applied to the doubly balanced mixer. The crystal oscillator is on 5.35 MHz and is also applied to the mixer. The mixer output, at 73.35 (68.0 plus 5.35), is amplified and doubled to 146.70 MHz which gives us simplex operation. If the crystal oscillator is switched to 5.05 MHz the resulting transmit signal is at 146.10 MHz, 600 kHz offset from the receive frequency.

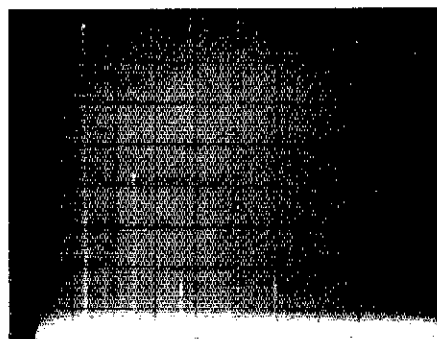
### Receiver Features

The receiver section of the FM-DX consists of two modules. The first module houses a MOSFET rf stage with a four-pole high-Q band-pass filter and a MOSFET mixer to the 10.7 MHz i-f, followed by a four-pole monolithic crystal filter. The second module includes two 10.7-MHz amplifier stages followed by another four-pole crystal filter. The remainder of the module contains the discriminator, limiter, audio and squelch circuits.

Of course, with any piece of gear, the final judgment is made when an amateur uses the equipment. In the Hartford area, it is possible to trigger up (and listen to) most of the repeater channels, including splits. In the reviewer's experience, the FM-DX was outstanding as far as handling adjacent channel interference — we observed none. This is certainly not true of some other makes we have tried.

We did have one complaint but that didn't concern performance. The six-digit LED readouts used are great at night or out of direct sunlight. However, on any bright day it is well nigh impossible to read the darn things. In any case, the FM-DX is easy to set on frequency — you can always count the clicks on the frequency-setting switches. In fact, we recommend this method rather than looking at the LEDs while in motion or you are not likely to be in motion long!

In summing up, the reviewer is impressed with the heavy-duty construction of the FM-DX. There has been some talk lately that it would be a real problem to design a transceiver that would cover *all* of the 2-meter band without the operator having to retune the unit. We checked the power output from the FM-DX from 143.5 to 148.5 MHz. The variation from 40-watts output was *less* than 2 watts across the frequency range, which speaks very well for the unit. As far as this reviewer is concerned, the FM-DX gets a high rating. — *W1ICP*



Spectrum-analyzer display of the FM-DX output. Vertical scale: 10 dB/div. Horizontal scale: 50 MHz/div. Power output: 40 watts.

### Clegg FM-DX 2-Meter Transceiver

Dimensions (HWD): 3-1/8 × 7 × 11-1/2 inches.

Weight: 7-1/2 pounds.

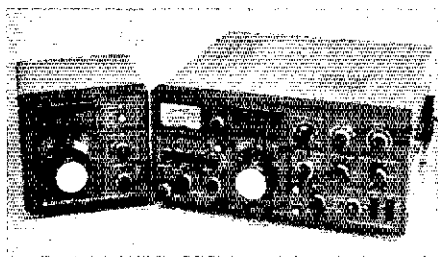
Power requirements: 13.5-13.8 V dc (recommended), approximately 110 watts current drain in high-power transmit position.

8 A current drain. Low-power position, 4 A (transmit), 1.3 A receive.\*  
 Power output: 35 watts, high-power position, 500 milliwatts, low-power position.\*  
 Selectivity: 14 kHz (min.) at 3 dB; down 40 dB at  $\pm 1.1$  kHz; down 60 dB at  $\pm 15$  kHz; down 80 dB at  $\pm 20$  kHz.  
 Image rejection: 66 dB minimum.  
 Receiver sensitivity:  $0.35 \mu\text{V}$  (max.) for 20 dB quieting;  $0.15 \mu\text{V}$  (max.) squelch threshold.  
 Price class: \$600.  
 Distributor: Clegg Communications Corp., 208 Centerville Rd., Lancaster, PA 17603.

\*Measured in ARRL laboratory.

## KENWOOD TS-820

If you're a transceiver enthusiast and find yourself wondering what could possibly be new about another gray "import" box, stand by, for there are some interesting features to report concerning the new TS-820 by Kenwood. It is similar in overall appearance to the TS-520, if the examination is a cursory one. But, a close look will dispel any doubts that may suggest a mere updating of an old piece of equipment.



If the buyer is amenable to spending \$170 for digital frequency readout, he'll see a bright set of blue LEDs at the upper center of the front panel, and the frequency display includes hertz. For example, if the rig is on 10 meters, the operator will see something like 28,606.3 kHz, if that's the frequency he happens to settle on. However, analog readout is provided also, permitting frequency resolution to 1 kHz. Concerning the latter, the dial mechanism is a smooth-running one, requiring very little torque to move it. No evidence of backlash could be found, even when using the 500-Hz i-f filter.

The frequency counter and digital-display modules can be installed (if the accessory is desired) in a few minutes. The shielding and decoupling seem to be rather effective, for nary a spur or birdie has been found in any of the tuning ranges, despite a careful search for them by this reviewer. A front-panel switch enables the operator to actuate a digital-hold feature. Its usefulness can be realized when it is necessary to "freeze" the frequency of operation on the display while tuning elsewhere in the band. That is, once the DIGITAL HOLD is punched up, the readout retains the operating frequency for later reference. Returning to that operating frequency is an easy matter by observing the readout, unlatching the hold circuit, and

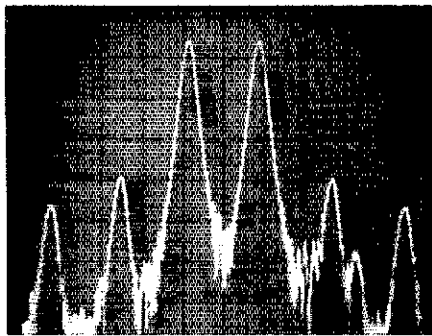


Fig. 1 — Two-tone test for IMD products. The reader will note the different display for the Hewlett-Packard analyzer. The 3rd order products are approximately 39 dB down from full output. A comparison of the old Singer-metric spectral display can be seen in Fig. 1 of the FT-101 review appearing elsewhere in this Product Review column.

tuning the dial back to the original frequency. The analog readout can be used while the digital one is placed in the hold position.

Available also as accessories are the 500-Hz cw filter (\$45) and the dc-to-dc converter for mobile operation (\$59). The ac power supply is built in. The VFO-820 is available to those who desire one as an outboard frequency-control element (\$139). The VFO contains an independent RIT control, just as the TS-820 does by itself.

As part of the package one receives the built-in rf type of speech processor. A level control is located on the front panel. Tests made with the processor actuated indicated that the ssb signal was clean, crisp, and effective under adverse band conditions. It was used only when "the going was a bit rough," for under normal band conditions there is little point in using processed speech.

The TS-820 includes i-f passband tuning. This feature can be extremely helpful when QRM is present, for it permits the operator to manipulate the front-panel I-F SHIFT control for nulling out interference or tuning the passband of the i-f. The receiver does not change frequency as the control is adjusted. In other words, the operator moves the signal across the i-f passband — not the passband across the received signal.

The Kenwood engineers must have been boning up on the proper way to achieve good

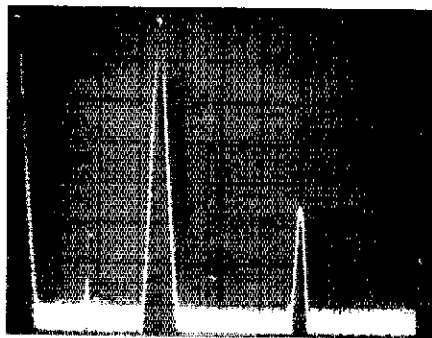


Fig. 2 — 80 meter output. The display is calibrated for 1-MHz per horizontal division. The second harmonic is 45 dB down from the fundamental.

dynamic range in a receiver: They went for *single-conversion* system, which is rather unusual in a transceiver design. The fewer the conversions, the better the dynamic range and the ARRL lab tests bear this out. The MDS (minimum discernible signal) or noise floor of the TS-820 came out at  $-136$  dBm. Blocking (1dB above noise floor) was 114 dB and IMD for a two-tone test (20-kHz signal separation on 20 meters with the 500-Hz i-f filter in operation) was 85 dB. ARRL tests were conducted in accordance with the W7ZOI QST article, "Defining and Measuring Receiver Dynamic Range." To the best of our knowledge the measurements are accurate within  $\pm 3$  dB.

Evidence of acceptable dynamic range was noted during operation of the TS-820 by this writer at WICER, two blocks away from the W1AW 1-kW "gravel grinder." No serious problems were encountered with IMD or cross-modulation. On 80 meters there was evidence of cross-modulation when the signal level received were S9 or less. The 20-dB front-end attenuator was actuated, and the problem vanished. W1GQO used the '820 during the 1976 Field Day — a site where multiband kW stations were in operation. He reported no serious problems with reception in the band of interest — 20 meters.

Transmitter performance thus far has been as smooth as velvet. The Japanese equivalent of the 6146 tube is contained in the PA (two each). That's right; the rig is not totally solid-state. Transmitter IMD is excellent, as noted in the accompanying spectral display. This cleanliness results in part from the application of negative rf feedback between the PA and driver stages. The linearity of the amplifier is enhanced considerably by this feature.

Laboratory tests revealed no significant local-oscillator drift from a cold start to full warm-up. The TS-820 utilizes a phase-locked loop LO (PLL). The primary advantages are that a single-conversion receiver circuit is made possible, and when the operator switches from upper to lower sideband, or from ssb to cw, the receive frequency remains the same. As a result it is not necessary to recalibrate the tuning dial.

Other "goodies" in this new box include VOX, 25-kHz calibrator, audio monitor, heater-power standby, full-range metering, front-panel VOX controls, and semi break-in for cw. But, here comes the elegant feature Kenwood saw the need for coverage of 160 meters! It is included in the transceiver, thereby providing use from 1.8 to 30 MHz. Included also as a standard feature is the noise blanker. Tests on short-duration noise pulses (automotive in particular) showed that the circuit is very effective. There was no evidence of receiver dynamic-range degradation with the blanker operational.

Decor is similar to that of the TS-520. Gray paint is used on the well-shielded box and as a result of the latter the TVI characteristics seem to be good. No TVI was observed on the writer's solid-state Zenith set while operating from 160 through 10 meters, even though no low-pass filter was used with the TS-820.

It would seem that this transceiver should appeal to the traveler and fixed-station operator. It has a handle on one end, and is no

<sup>1</sup> Hayward, "Defining and Measuring Receiver Dynamic Range," QST for July, 1975.

too heavy for comfortable carrying through air terminals or hotel corridors. There should be ample room under most automobile dashboards to mount the transceiver during mobile operation.

The only "glitch" noticed during use was that of a "rubbery" effect when tuning the RIT control. That is, while adjusting it the station being received sounded like it had a severe warble on it. Once the control was released, however, normal signal quality resulted.<sup>2</sup> — WICER

<sup>2</sup>[Editor's Note: After a discussion with the folks at Kenwood, they assured us that the difficulty with the RIT was unusual, and that it was not the normal operation of the control.]

#### The Kenwood TS-820 Transceiver

Dimensions (HWD): 6 x 13 x 13-1/2 inches. Power capability: 200 W PEP, 150 W dc input.

Power requirements: 117 V ac 50-60 Hz; 13.8 V, 15 A transmit; 1 A receive.

Price class (without accessories): \$830.

U.S. distributor: Trio-Kenwood Communications, Inc., 116 E. Alondra, Gardena, CA 90248.

#### NEW BOOKS

*Handbook for Electronics Engineering Technicians*, by Milton Kaufman and Arthur Seidman. Published by McGraw-Hill Book Co., New York, NY. Hard-cover edition, 6-1/4 x 9-1/2 inches. Page count, inclusive of index, 520. Price at time of reporting, \$19.50.

Despite this book having been written for professional electronics technicians, the contents seem ideal for amateurs of various skill levels. The book is a cross between a textbook and a highly expanded electronics dictionary. Most of the subjects treated are commonplace in the design, building and repairing of modern amateur equipment.

Minimum rhetoric is applied by the authors, and the terms and math should be simple to assimilate by even the less-experienced amateur. The equations are not ponderous. They are used only where it is essential to include algebra as part of an explanation or to illustrate the solution to a design problem.

The volume contains 695 illustrations, many of which are rendered photographically. The half-tone quality is excellent. Photographs are used to show the physical properties of numerous modern components, both active and passive.

There are 18 chapters in the book. Among the subjects covered are resistors, thermistors, varistors, capacitors and all significant parameters related thereto. A similar treatment is given to coils, magnetic circuits, transformers, practical circuit analysis, meters and measurements, semiconductors (all types in current use), tuned circuits and filters. The authors provide in-depth descriptions of amplifiers and oscillators, op amps, digital-circuit fundamentals, power supplies, batteries and even vacuum tubes!

Unlike many of the present-day professional text books, this publication leans toward originality rather than a hackneyed compilation of time-worn data from manufac-

turers' application notes. Although there is some borrowed information contained in the volume, source credits are given, and the material used is essential to assure a complete explanation of the subject under discussion.

Although the cover price may seem a bit lofty as compared to most amateur technical books, those wanting to learn theory and prepare for FCC examinations should find this publication extremely useful as an addition to the existing amateur library. — WICER

#### HAL 2550/ID KEYS

What, *another* keyer? The HAL 2550 keyer, by itself without the optional ID feature, might at first be construed as just that, another keyer. It does all the work of making code in the usual fashion, plus having dot memory and iambic keying and other nice features. We'll deal with the basic keyer first, then discuss the optional identifier feature.



The keyer employs 14 integrated circuits in a more or less standard configuration, ending up with a husky 2N5655 keying transistor. The manual gives instructions for determining whether or not the circuit to be keyed is within the unit ratings. In the unlikely event that the output transistor might be endangered, further instructions for simple protective measures are also provided. As is the case with nearly all solid-state keyers, the only hard and fast rule is that one side of the circuit to be keyed must be at electrical ground. No modern amateur transmitter is otherwise, so no problem there.

A small keyer such as the 2550 is invaluable for moving around from place to place — taking on Field Day, on a DXpedition, to a friend's house for code practice (the unit has both a monitor *and* built-in speaker), or for moving from rig to rig at a multi-transmitter contest operation. The 2550 almost doesn't look right planted in one place . . . it seems eager to move to the next keying project.

A package within the shipping carton contains enough cables, plugs, and miscellaneous connectors to satisfy just about any set-up requirement. There is only one cable coming from the back of the keyer — the ac-power cord. All other connections are made via jack and plug combinations. A typical installation might proceed as follows:

Choose a cable with a single-circuit plug on one end and add the appropriate connector to fit your transmitter. Plug your paddle in, after adding the proper three-circuit plug, and so on. An extra cable and spst switch are even included for placing a remote TUNE switch anywhere around your operating position. There's an audio output from the internal monitor which can be fed to your receiver audio stages. Finally, you can even plug your trusty straight key into a jack in the keyer and then choose keyer or straight key at will. All the necessary hardware for the above operations are provided. No trip to the local radio store (if your town still has one) for the parts. In addition to normal 117/235-volt ac operation, the 2550 can also be powered by an external 12-V dc source, merely by plugging the volts into the back of the unit. The keyer draws 400 mA in normal service. This adds to the versatility we mentioned earlier. Another nice feature is the ability the operator has of adjusting the tone of the internal audio oscillator, as well as the volume. Many cw operators are driven crazy by the high-pitched hog squeals which pass for monitors these days in some keyers and transmitters. None of that with the 2550, since an internal pot allows for adjustment of the pitch as high or low as desired.

One hassle often associated with solid-state keyers is their susceptibility to the presence of strong rf fields. By using a totally sealed (and handsome) enclosure, bypassing of all incoming and outgoing cables, and by supplying shielded cable to assure proper hook-up, HAL has "done in" the problem for good. A hefty ground terminal on the back panel allows for appropriate grounding to the station, in addition to the automatic grounding through the cable shields. Running a full kW into open-wire feeders within the shack a matter of inches from the keyer didn't affect it in the least.

The manual gives advice on how to use the iambic features and dot memory. For us old-timers who insist on considering such features newfangled, the advice is of considerable use. Once the procedures are mastered, the keyer, with its master clock, will produce perfect code.

Some additional flexibility is obtained when one purchases the 2550 keyer with optional ID circuitry. The 2550/ID has provisions for one ROM (read-only memory), programmed at the factory, which will send upon command either of two sections, each having a capacity of 62 dots, dashes and spaces. Each half of the ROM has room for a contest CQ or net call-up of reasonable length. The 62 "locations" available are counted as follows: Each dot, dash and intercharacter space is one location, and a word space is three locations. One factory-programmed ROM (to your specifications) comes with the 2550/ID, and additional ones are available. One ROM per contest, net, or operating requirement is the idea. The control jack for the ROM is on the back panel, and the cable and switches for the message commands are included with the package (naturally). If you are unsure about the counting of locations in the messages you want, a call or letter to HAL will put you on the right track.

After using a 2550/ID with several different transmitters, in three different locations, it seemed the two words which summed it up were — easy and foolproof. Not much more one could ask, really. — WA1STN

## HAL 2550/ID Keyer

Dimensions (HWD): 3-1/2 x 6 x 6-1/2 inches.  
Weight: 3 pounds.

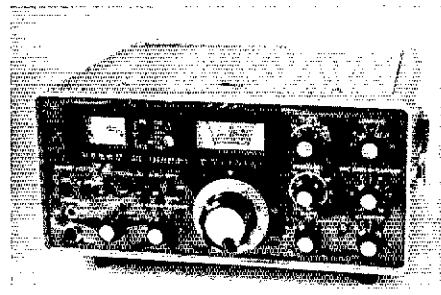
Power requirements: 117/230 V ac.

Price class: \$125 w/i-d; \$95 w/o i-d; \$10 per additional i-d.

Distributors: HAL Communications, Box 365, 807 E. Green St., Urbana, IL 61801.

## THE YAESU FT-101E TRANSCEIVER

Does equipment performance change when a new suffix is attached to the end of a model number; have new features been added? That is one of the most often asked questions attendant to commercial gear. The answer is usually, "yes." Certainly this is in the affirmative when one compares the original FT-101 to the current models. We thought it would be interesting to shake down the latest model of '101, as our last look at the attractive gray box was a few years back, as reported in *QST* for February, 1974.



One might look first at the front panel and note that the row of function switches just below and to the right of the meter has been changed to lever types. The earlier models had slide switches, which tended to wear and become intermittent after a reasonable period of use. The current style of switch seems more rugged and is easier to actuate because of its long, flat handle. Noted also on the front panel are two red LED indicators. One illuminates when the internal VFO is in use (an external VFO is available as an accessory for split-band operation — the FV-101B). The remaining LED indicates, when lit, that the RIT (receiver incremental tuning) is activated. In terms of cosmetics, these are the significant changes from the FT-101B version.

One can purchase either the FT-101EE or the FT-101E models. The double-E version comes without the speech processor. The single-E unit contains an rf type of processor which employs an XF-30A crystal filter. Upon release from the factory, the processor is set for optimum operation. The current version is not frequency sensitive. To secure optimum performance of the processor, it is necessary only to adjust the front-panel level control. The adjustments are done while observing the panel meter, and the steps are simple to follow. Our FT-101E was tested on 20- and 160-meter ssb. Audio quality reports were excellent on both bands, except that the voice naturalness was impaired somewhat

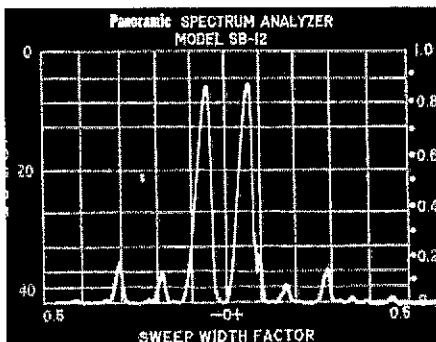


Fig. 1 — Spectrum-analyzer display of the output of the Yaesu FT-101E transceiver with a two-tone 240-W PEP input. The horizontal axis of the display represents frequency, and the vertical axis amplitude. Each "pip" represents a single-frequency component of the rf output. The display is adjusted so the amplitude of each component may be read from the scale at left, directly in decibels below the peak-envelope power (PEP) output, as rated by the manufacturer. Each reticle division represents 5 dB. Responses other than the two individual tones of the two-tone near the center are distortion products; third-order products 34 dB down may be seen here. Individual tones of the two-tone signal are down by 6 dB from the PEP output. This is because the tones are in phase, they add to produce a peak in the envelope wave-form pattern which is twice the voltage amplitude of a single tone alone. The power at the peaks of the envelope (PEP) is therefore four times that of a single tone, a 4:1 power ratio being equivalent to 6 dB.

during the processing function, which is normal with circuitry of that kind. When the processor was used as outlined in the instruction book, there was no evidence of distortion or signal broadness. Listeners reported that the ssb signal had considerably more "punch," but observed no increase in peak S-meter readings.

While on the subject of audio quality, it was noted by this writer and others who have used the FT-101 series of transceivers that the microphone supplied with the unit is fine for operators who do not have excessively bassy voices. The reviewer does not exhibit the ideal voice profile with his deep voice tones, and it was found that under marginal-copy conditions the readability suffered when using the factory microphone. Upon switching to a D-104 mic, the problem was cured.

Our review model was sent with the 600-Hz cw filter and the PA cooling fan. Copy is enhanced greatly on cw through use of the filter, and the bandpass characteristics seem better than those of the FT-101B which was tested earlier. That is, the skirt selectivity seems improved, which may suggest that some leakage was present across the filter in the B model. The cooling fan is recommended if the FT-101E is to be used in warm climates, such as the tropics. It will help in extending the life span of the sweep tubes used in the PA stage. The fan is exceptionally quiet, and one must listen carefully to hear it turning.

Various FT-101B owners have asked the ARRL technical staff if there is anything different about the receiver in the E version, as compared to the earlier models. The late

FT-101E units do have a factory modification which greatly improved the dynamic range of the receiver. Although we do not know what circuit modifications were made, we did observe during laboratory and on-the-air tests that IMD and cross-modulation effects were markedly less troublesome than was experienced with the FT-101B version. ARRL dynamic-range tests are performed in accordance with the *QST* paper by W7ZOL.<sup>3</sup> To the best of our knowledge the ARRL test procedure is accurate within  $\pm 3$  dB, as indicated by comparisons with figures supplied by various equipment manufacturers for units tested by both parties. For the late model FT-101E, we obtained a noise floor of -141 dBm. Blocking above the noise floor was 108 dB, and the IMD was 81 dB. The tests were performed at an i-f bandwidth of 600 Hz with a two-tone signal separation of 20 kHz on the 20-meter band. Practical tests were performed at WICER, only two blocks away from WIAW. During several months of use while WIAW was operating, no receiver problems were noted on 160, 40 and 10 meters. During operation on 80, 20 and 15 meters, it was necessary to switch in the 20-dB front-end attenuator to prevent cross-modulation of signals below S-9 on the '101E meter. Survival of a receiver under those severe strong-signal conditions suggests that in a normal signal environment there should be no need for the 20-dB pad. The FT-101B, on the other hand, was unsatisfactory (even while using the 20-dB pad) at the same receiving location.

The cabinet is well shielded and tight. Despite having the amateur station antennas less than 50 feet from the TV antenna, no TVI was observed on two solid-state TV sets — one a color type and the other a black-and-white receiver. High-pass filters were used with both TV sets, but no low-pass filter was employed with the '101E. Good earth grounding and ac line filtering were used with the transceiver, however. During daily use for many months there was no evidence of faulty circuit performance. Chirp-free cw signal reports were always obtained, and VFO drift was not noted by ear.

From a purely subjective point of view, the writer feels that the FT-101E represents a good buy for the price. It is a compact and functional one-package mobile or fixed-station transceiver which covers 160 through 10 meters, plus having receive capability for 27 MHz and 10 MHz. WWV is heard on the latter. — WICER

## The Yaesu FT-101E

Dimensions (HWD) and weight: 6 x 13-1/2 x 11-1/2 inches, 33 pounds.

Power requirements: Provisions for operation from 100 to 234 volts ac. Supplied with 117-V ac and 12-V dc cables. Maximum ac power drain — 350 W. Maximum 12-V dc current drain — 21 A.

Color: Two-tone gray with black knobs. RF power dc input to PA: 260 W on ssb, 180 W on cw, and 80 W on a-m (all levels slightly less on 10 meters).

Price class: \$750.

Manufacturer: Yaesu-Musen, Inc., 7625 E. Rosecrans Ave., Unit 29, Paramount, CA 90723.

<sup>3</sup>Hayward, "Defining and Measuring Receiver Dynamic Range," *QST* for July, 1975, page 15.



# Hints and Kinks

## THE GTX-200 AND INTERMODULATION

When I tried to make a few contacts in the June VHF QSO party using the GTX-200, I found that the front end was being rattled by the strong local signals to the point where we were losing contacts. The installation of a 22-element beam at 50 feet didn't help this problem. Obviously, something had to be done to relieve the problem.

In looking at the circuit, I noted that Genave built the rig with no rf stage. The bandpass filter and bipolar first mixer were not quite enough for the average ham operator, so Genave added a preamp using an MPF102. This does reduce the noise figure, but it adds enough gain that the first mixer overloads with carriers away from the tuned frequency. I have a great respect for the higher inherent dynamic range of FETs so I decided it would take very little effort to try one in the Genave. I did not want to have to

perform major surgery, however.

What resulted is shown in the accompanying diagram. The only thing that requires a little care is the correct CBE to DGS placement in going from the transistor to the FET; they are not always arranged in the same sequence. The manual has a rather complicated procedure for aligning the bandpass filter between the preamp and the mixer. I found that it was much easier to peak C101 at 146.0, C102 at 146.94 and C103 at 147.9. This has to be repeated several times, but most people don't have access to the equipment called for in the manual. I did not notice any change when I tried moving the oscillator coupling capacitor, C107, to the top of the receiver oscillator tank. No L designation was given for this coil.

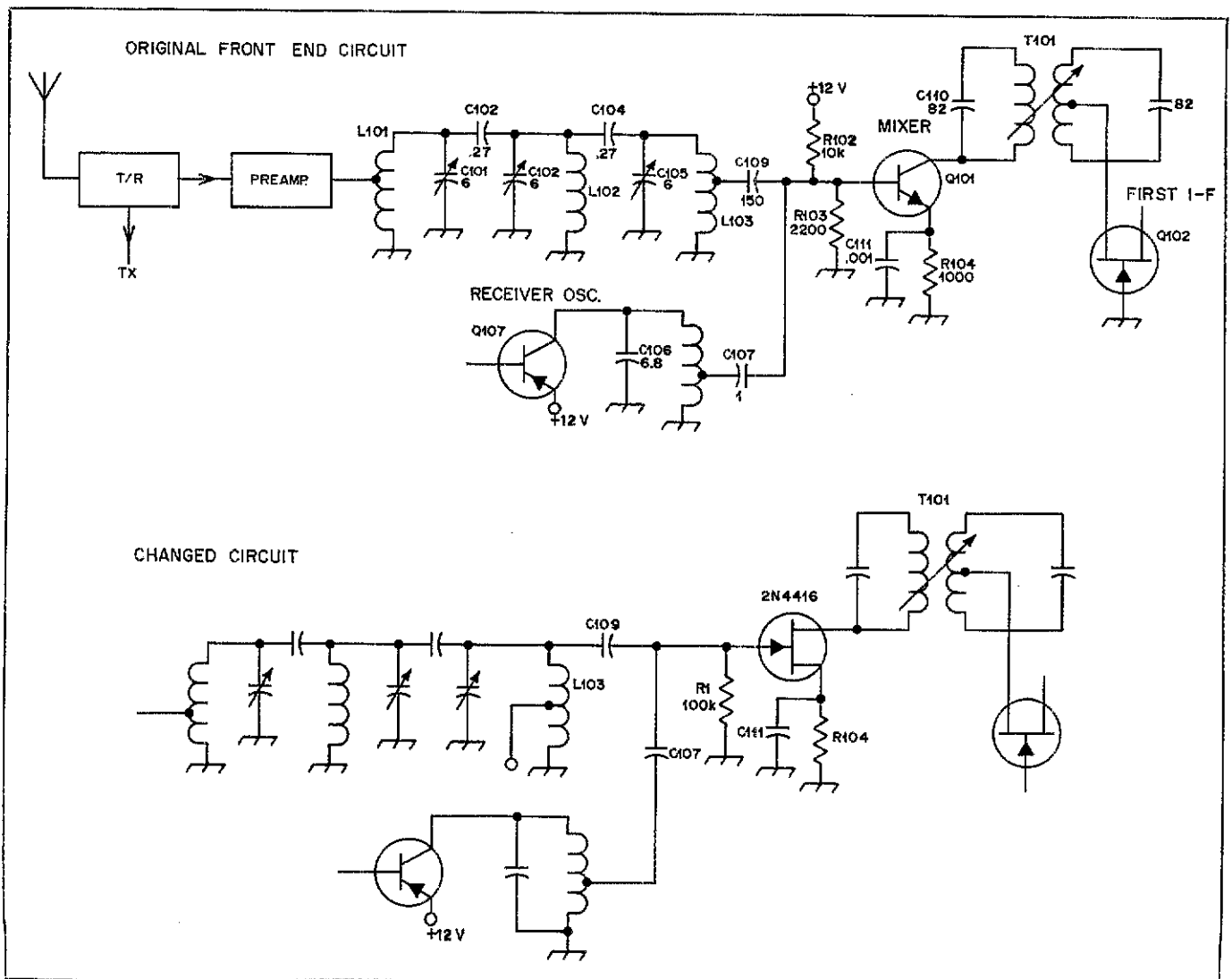
I am pleased with the change. I can detect no difference on overall sensitivity and have not been able to hear any of the intermodulation which was so prevalent before the change

was made. The simplicity and the benefits derived from this change should make it good reading for fellow owners of the Genave GTX-200. -- Richard Frey, W1FCC/3

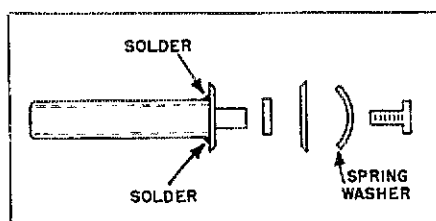
## CURING SLIPPAGE AND BACKLASH OF HEATH VFO DIALS

Some Heath equipment owners complain of tuning-dial slippage and backlash on the transceivers, receivers and transmitters. The referenced dial-drive assembly is identified as their part No. 100-450. Here is a simple modification to the dial-drive pulley, part No. 100-444, which will solve this problem.

The drawing shows the details. Disassemble part No. 100-444, the dial-drive pulley assembly, noting the position of pulley wheels in relation to each other. Now replace the first pulley wheel in its original position on shaft. Hold it firmly against the shoulder and solder it to the shaft through 360 degrees. Be



careful not to allow solder to flow back along shaft. Next, replace the spacer on shaft and then replace the second drive pulley. At this point a new part is added. Use a spring-tension washer, sometimes referred to as a dished washer, under the screw head which is now screwed into position. This completes the modification. When installing the dial-drive bushing in the keyhole slot, note whether the dial-drive pulley engages with the circular drive ring on the circular dial. It may not seat deep enough, in which case file out the keyhole slot to permit better grip. — *T. C. Galbreath, W2AXX*



### UPGRADE YOUR HAM-M WITH DELAYED BRAKING

Since I installed my Ham-M rotator some months ago, I have promised myself that I was going to install the modification which allows the brake solenoid to remain energized for a few seconds after ending rotation.

Now that I've had a chance to see the new Ham-M II control box, and the method used by CDE to solve the tower twisting problem, I was inspired to get started with a modification. In case you're not familiar with the Model II, it employs an additional brake-release switch requiring that you hold the brake-release switch a second or two after releasing the rotation switch.

Initially I started out to use WIFBY's approach, but after thinking about the size of capacitor needed, I decided to design something that would fit inside the present control unit case. My design does that without drilling a hole or making any major changes to the original wiring. Mostly, leads are unsoldered and tied together and taped.

#### Circuit Operation

The 5000-ohm relay is energized by the operating switch and held closed after release for approximately 1-3/4 seconds by means of the 500- $\mu$ F capacitor. The relay contacts supply primary 120 V to the main transformer, which continues to hold the brake off after rotation power is removed.

Note the addition of the 200- $\mu$ F capacitor in parallel with the original 50- $\mu$ F filter. This is required because the 500- $\mu$ F capacitor across the relay coil increases the control voltage, thereby causing approximately a 15% error between readings. The additional 200- $\mu$ F capacitor increases the control voltage such that identical readings are obtained during rotation or at rest. My modification also causes the unit to read position whenever it is plugged in. I have a master switch which removes all accessories when the station is not in use.

To increase the indicator lamp life I changed the lamps to 28 V types. The relay is approximately 2.5 cm  $\times$  3.5 cm and fits nicely near the left front just above the screwdriver-adjust calibration control. The ca-

pacitors are fitted easily near the rear of the meter. — *W. J. Short, WB4TBO*

### BATTERY-REPLACEMENT CIRCUIT NOTES

The "Battery-Replacement Circuit for the VTVM," described by K5LZT/9 (Hints and Kinks, *QST* for Jan., 1976) is a fine addition to most VTVMs. However, those contemplating making the change should be aware of some (usually minor) shortcomings observed while bench testing similar circuits prior to installing one in my Heath VTVM:

1) The regulator draws about 145 mA from the transformer which also supplies 450 mA to the pilot lamp and tube filaments. The added load will decrease the heater voltage approximately 0.5 V. Replacing the 6-V pilot lamp with a lamp across the 117-V ac line will keep the transformer output voltage at its former level.

2) When the ohmmeter probes are used to measure a small resistance, the regulator output will drop by a few tenths of a volt. This causes a measurement error of about 20 percent at 10 ohms and about 3 percent at 20 ohms.

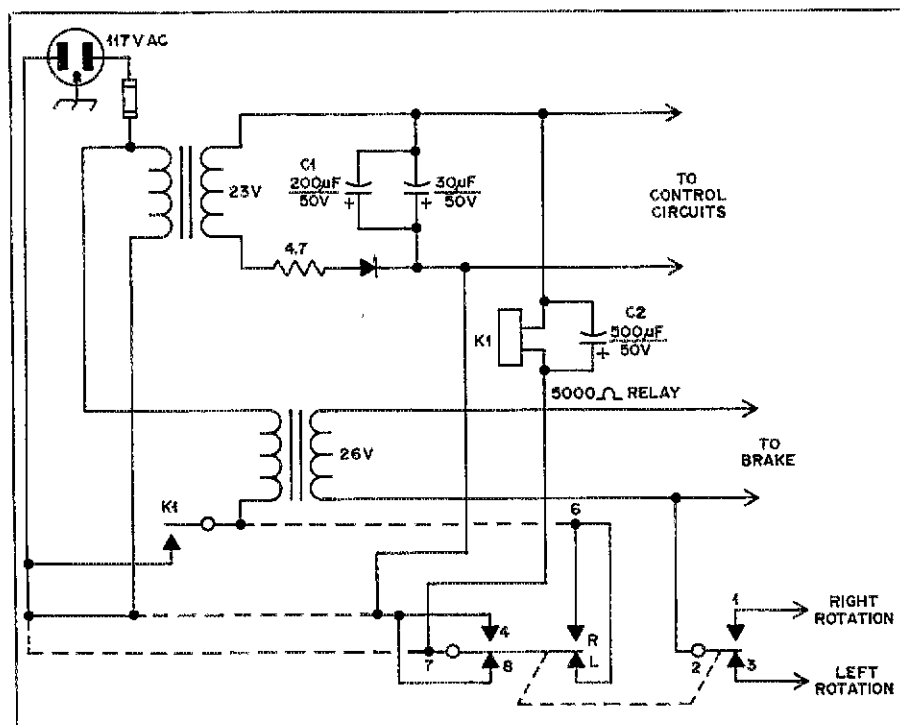
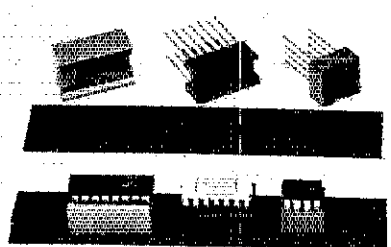
3) Even with a 1000- $\mu$ F capacitor in the supply, there is an appreciable amount of ripple in the output of the regulator. Ordinarily it will have no effect on a measurement, but it is well to know it is there.

I recommend two additional changes which have proven useful over the years: Bring out the (nominal) 1.5 V to a terminal on the front of the meter so that do-volts calibration can be readily checked at any time, and drill two holes in the side or back of the cabinet so that ac and dc volts can be recalibrated without taking the VTVM apart. The latter change may require relocating the calibration controls in some models. — *Donald F. Zawada, W9MJG*

### NON-SLIP DIP-SOCKET IDEA

Of several methods suggested for securing DIP IC sockets to perfboard for wire wrapping (with a drop of glue, by bending one pin, etc.), WA3LLJ seems to have found the most convenient.

As depicted in the photograph, apply a piece of black vinyl electrician's tape to the top of the perfboard, sticky side down. Then, simply push the socket pins through the tape and the perfboard holes from the top of the board. The tape will keep the socket from shifting position or falling off the board during wiring. The socket can be removed easily or repositioned. — *Edward Kalin, WA1JZC*



# RFI Grows Up

RFI — Once only a problem child; now a juvenile delinquent; soon to be a hardened criminal?

By Hal Steinman,\* K1FHN

**W**hat is this creature called RFI? Why does it suddenly seem to be receiving so much attention in amateur radio magazines? Why, in this session of Congress, are there two bills concerning it? Who is at fault when RFI occurs? Where can an amateur go for guidance when he is confronted with a tough RFI case? Is the future of amateur radio in danger because of the proliferation of RFI? Is it really worth all the attention it's been getting?

## What Is It?

For newcomers to amateur radio we should state that RFI stands for *radio frequency interference*. It occurs; rather, it has the potential to occur, whenever an electronic device finds itself surrounded by a field of radio frequency (rf) energy. The origin of the rf energy could be an amateur, citizens band, fire, police, commercial, a-m, fm, or TV transmitter. The electronic device subjected to the rf energy could be a television set, phonograph, fm radio, medical equipment or even an electronic anti-skidding device on board a truck or bus. RFI actually *occurs* when the electronic device in the midst of the rf field behaves or responds in an undesirable manner because of the presence of the rf field. Sometimes the transmitter is at fault — if harmonics or parasitic oscillations are not sufficiently suppressed. But more often than not, as FCC statistics show, the fault lies with the electronic device itself, due to insufficient filtering or shielding.

## How Bad Is It?

In fiscal 1974 the FCC received 42,000 complaints of radio frequency interference. 38,000 of these involved interference to home-entertainment devices such as stereos and TV sets. 34,000, or 89 percent, of these com-

plaints were found to be due to design deficiencies in the home-electronic devices themselves. That is to say that an amateur or CBer operating a "clean" station on authorized frequencies completely within the law could do absolutely nothing to his station that would prevent the RFI from occurring. In fiscal 1975 the FCC received 55,289 radio frequency interference complaints of all types, 45,002 of which involved home-entertainment equipment. Eighty-two percent, or 36,900, of these were found to be the fault of the entertainment equipment. We emphasize that this means 36,900 cases of RFI occurred regardless of any measures that could have been taken at the transmitting station itself. Late word at this writing is that FCC received 80,768 RFI complaints during fiscal 1976. This represents almost a 50-percent increase in one year!

---

**... it is the home-entertainment device itself that is to blame in well over 80 percent of the cases of RFI.**

---

Another way of looking at these FCC statistics is that well over 80 percent of RFI complaints concerning home-entertainment devices would never have occurred at all if the manufacturer had included proper filtering or shielding in his unit!

Why this rapid growth in RFI complaints? One reason is the substitution of solid-state devices for vacuum tubes in home-entertainment equipment. Solid-state components are less expensive, run cooler, have longer lifetimes and are easier to service when built in modular form. At the same time they are more susceptible to rf radiation. Another reason for the upsurge in RFI complaints is the simple fact that the probability of a home-entertainment de-

vice being located near a transmitter of some sort has increased markedly in recent years. The citizens-band explosion has contributed to this in no small way. Over 500,000 new licenses are being issued monthly in the Citizens Radio Service. Many of these transmitters are in homes or automobiles and in very close proximity to television sets, broadcast receivers and audio equipment used for home entertainment. Manufacturers used to say that only 1 percent of the population would ever be located close enough to a transmitter to experience interference. This is no longer the case. FCC now predicts that the probability of a home-entertainment device being located within a significant rf field, particularly in metropolitan areas, is in the neighborhood of 50 to 70 percent.

## Bad News for Amateurs

This tremendous increase in RFI complaints indicates that a problem exists, and that problem is coming to light. The more complaints, the more likely that action will be taken to solve the problem. What is wrong, though, is that most consumers tend to automatically put the blame for the interference on the operator of the station whose signal is being intercepted, and as we have seen, it is the home-entertainment device itself that is to blame in well over 80 percent of the cases of RFI. Moreover, regardless of what type of signal is being intercepted — amateur, CB, fire, police, commercial a-m, fm, or TV — the complainant is likely to believe he is being interfered with by a "ham" operator, even though in fiscal 1976 80 percent of the complaints of interference to home-entertainment devices involved citizens-band stations, and only 7 percent involved amateur stations. Although there is more public awareness now than there was only a few years ago, most of the population is

\*Assistant Secretary, ARRL

still confused by the distinction between amateur and CB radio. Moreover, when a consumer's expensive TV set or stereo is experiencing RFI, he is probably not interested at all in whether the station he is hearing is an amateur or a CB station. He simply wants the interference to stop. To sum it up, the fault is probably in the home-entertainment device itself; the station being intercepted is probably not an amateur station; and in all probability amateur radio gets the blame. It's a no-win situation, and the image of amateur radio suffers.

### RFI Legislation

The first RFI bill was introduced in the 92nd Congress in 1972, and again in the 93rd Congress in 1973, by the late Charles M. Teague, Congressman from the 13th District of California. The bill was never enacted into law, but it set a precedent, and again in the 94th Congress RFI legislation was introduced. In May of 1975 HR-7052 was introduced in the House of Representatives by the Honorable Charles A. Vanik of Ohio. In February of 1976 Senator Barry Goldwater introduced a similar bill, S-3033, in the Senate with these words: "Mr. President, I am pleased to introduce today a companion bill to legislation proposed by Congressman Charles Vanik of Ohio to drastically reduce the amateur and CB radio bugaboos of television interference, hi-fi interference, and other radio frequency interference to home-electronics equipment.

---

**... at present the FCC has no power to set standards for the susceptibility of home-entertainment devices to rf energy.**

---

"Most consumers do not understand that when they may encounter interference with their home television or radio set after an amateur or citizens band radio operator moves next door, the source is not a defect in the equipment of their neighbor but with their own radio or television..." (Congressional Record - Senate - February 25, 1976).

These bills are necessary because at present the FCC has no power to set standards for the susceptibility of home-entertainment devices to rf energy. This is sort of a "loophole" in the Communications Act of 1934 that the FCC wants to plug. Manufacturers of home-entertainment devices, in a competitive market place, are reluctant to take the initiative to RFI-proof their equipment. It is true that factory installed RFI protection would raise the price of a typical unit - estimates vary

from a few cents to perhaps as much as five dollars. There is no incentive for one manufacturer to install additional filtering or shielding if it would put him at a competitive disadvantage in the market place. But, if the law required it, no particular manufacturer would be put at a disadvantage. Others argue that these bills are anti-consumer since they would raise the price of entertainment equipment for everybody. But this argument is fallacious since the purpose of the bills is to improve defective equipment and it is far cheaper for a manufacturer to RFI-proof a piece of equipment at the time of manufacture rather than on a case-by-case basis.

### What's to Worry About?

We've stated that well over 80 percent of the reported cases of interference to home-entertainment devices is the fault of the entertainment equipment itself. We've also stated that in fiscal 1976 only 7 percent of these complaints involved amateur radio.

---

**An amateur . . . who is put off the air under such a law could undoubtedly have the ruling overturned - but not without costly litigation.**

---

Taking these facts out of context one would be tempted to conclude that amateur radio has little to worry about. *Nothing* could be further from the truth. We've seen that in many cases of such interference it is amateur radio that suffers. More public education on the distinction between amateur and CB radio is needed, but this does not address the real RFI issue - that the entertainment device needs corrective measures, not the transmitter. An amateur cannot rest easy after he convinces his neighbor that the strange voice coming over his TV set is that of a CBer, not an amateur. Perhaps he will even explain to his neighbor the difference between the amateur and CB services. Perhaps he will even, on his own initiative, help his neighbor clear up the interference, thereby earning his gratitude and gaining a supporter for amateur radio. We applaud these actions. It is much more constructive to solve a problem in a positive manner, even if one is not at fault, than to put the blame on someone else and be done with it. But can the amateur rest easy even after doing all these things? The answer is still no, for we are being attacked on a wider front. According to Ted Cohen, W4UMF, secretary of the ARRL RFI Task Group, there are already 47 states in which at least one municipality has a law on the books under which an amateur radio operator

can be cited for causing interference. These laws generally are of the "causing a public nuisance" variety. Such laws ignore the fact that the "cause" of the interference probably rests with the entertainment device itself. Such laws, if appealed, would no doubt be ruled invalid, as concerns RFI, since the Communications Act of 1934 reserves the regulation of transmitters to the federal government. But, sorrowfully, these laws are often put on the books with little publicity before anyone realizes what is happening or recognizes their implications. An amateur or CBer, operating a clean station and within the law, who is put off the air under such a law could undoubtedly have the ruling overturned - but not without costly litigation. So we see that amateur radio does have a great deal to worry about.

### Consumer Education

The point has been made that the crux of the RFI problem is that far more often than not the corrective measures must take place at the entertainment device. The proposed consumer legislation in Congress will help toward this end. But more immediate is the problem of consumer education. Whether you realize it or not, the fact that a TV set or stereo can be the "cause" of interference is a very difficult concept to comprehend. We, as amateurs, understand it because we are familiar with the problem. But to others it defies all logic. How can an apparently "passive" device such as a TV or stereo be a "source" of interference when obviously there is a transmitter out there somewhere that is spewing out rf energy very "actively," and that rf energy is entering one's home, uninvited, and interfering with a home-entertainment device that is just sitting there innocently? Expressed in these terms this might strike you as facetious,

---

**... how do you explain to an irate neighbor that his \$500 TV has a built-in defect?**

---

but it is not intended to be. This difficult-to-comprehend concept is the reason that a consumer's first impulse is to blame the "ham" down the block. It is also the reason that municipalities pass protection-against-interference laws that put the blame on the transmitter, thereby attacking the symptom but not the cause. But how do you explain to an irate neighbor that his \$500 TV has a built-in defect? How do you explain to a zoning board that is about to prohibit the owner of one lot from causing interference to the owner of another lot that it is preempting the authority of the federal government? How do you

write a letter to a newspaper to undo the harm which a previous letter or article has done? The League's RFI packet contains some hints, including a sample letter-to-the-editor. This author has encountered a particularly neat analogy that is useful in explaining to a person not versed in electronics how a "passive" entertainment device can be the cause of an interference problem. J. W. Swinnerton, G2YS, writes in the journal of the Radio Society of Great Britain, *Radio Communication*, "You point out that his equipment is receiving signals it should be proof against — and

... the fact that a TV or stereo can be the "cause" of interference is a very difficult concept to comprehend.

if it is only an audio amplifier it should not be receiving them anyway. It is acting like an ill-fitting door letting in the draught — the cure is not to try to halt the wind but to improve the door."

#### What To Do

It has been the purpose of this article to explore some of the history, causes and implications of the RFI problem. A book would be required to discuss in depth all ramifications of RFI, and, of course, this article did not deal at all with the technical aspects of RFI. But no article would be complete if it did not offer some concrete and constructive steps that one could take

to do his share to solve the RFI problem. We recommend the following:

1) Send for the League's RFI packet. It contains, in part, suggestions on how to organize local interference committees, sample letters-to-the-editor, reprints of Congressional RFI bills; a list of people to write to within certain companies for assistance in solving RFI complaints, a sample letter written to the manufacturer of a home-entertainment device experiencing radio frequency interference, a reprint of an article from *Radio-Electronics* called "Audio Signals You Never Bargained For," a copy of the FCC Statement to Television Receiver Owner, and a copy of FCC Field Engineering Bulletin No. 25: Audio Devices — Interception of Radio Signals. The packet may be obtained free of charge by writing ARRL, Newington, CT 06111.

2) Write your Congressman and Senator to express support for bills HR-7052 and S-3033 and similar bills to be introduced in Congress in 1977. Tell them in your own words that almost all RFI complaints related to home-entertainment devices would disappear if this legislation were enacted.

3) Write the manufacturers of home-entertainment devices which you or your neighbor are considering buying to express your displeasure that their equipment may be susceptible to RFI. If you are personally involved in an RFI case, even if you've solved it yourself, write the manufacturer and let him know if he was at fault. A list of addresses of manufacturers to write to is

contained in the RFI packet.

4) Solve your local RFI problems quickly, pleasantly, and amicably. Some manufacturers assist by supplying at no charge kits, parts and appropriate instructions. Have the RFI packet on hand to help you. Present amateur radio in the best possible light.

**Solve your local RFI problems quickly, pleasantly, and amicably. Have the RFI packet on hand to help you.**

5) Be ever alert to possible legislation or administrative rulings that could adversely affect amateur radio. If you find out that your local city council or zoning board is considering a protection-against-interference ordinance let Hq. know about it immediately. Otherwise, we may never find out about it until it is too late. Hq. will rush material to aid in the fight against such ordinances.

Think about this: If each League member wrote his representatives in Congress as suggested above, over 120,000 letters would be written to each of the parties involved. But 120,000 letters will be written only if each and everyone of us cares about the future of amateur radio. Do you care?

[Editor's Note: The author wishes to thank Ted Cohen, secretary of the ARRL RFI Task Group, whose "Interference" column, which appears monthly in *Worldradio News*, was a source of much of the background material for this article.]

## Strays



In celebration of the Radio Club of Quebec's 50th anniversary, members have been authorized the prefix, XL2. Observing the Quebec City mayor representative are club founder Alex Larivière (left), VE2AB, and club president Reynald St. Amand (right), VE2DAK.



Bicentennial WAS number 55 should go to whom else but, Illinois state trooper Phil McMillan, WA9ZAK!



Another recent member of "Who's Who Among Students in American Colleges and Universities" is A. Robert Spitzer, WB2DZL. At Columbia University he served as president of the radio club, editor-in-chief for the 1976 yearbook, and graduated with a B.S. in Electrical Engineering. What else could be on his shirt but Maxwell's equation.

# OSCARs Help Dedicate New Air and Space Museum

OSCAR 1 inside, OSCAR 7 outside, help dedicate Smithsonian's awe-inspiring National Air and Space Museum.

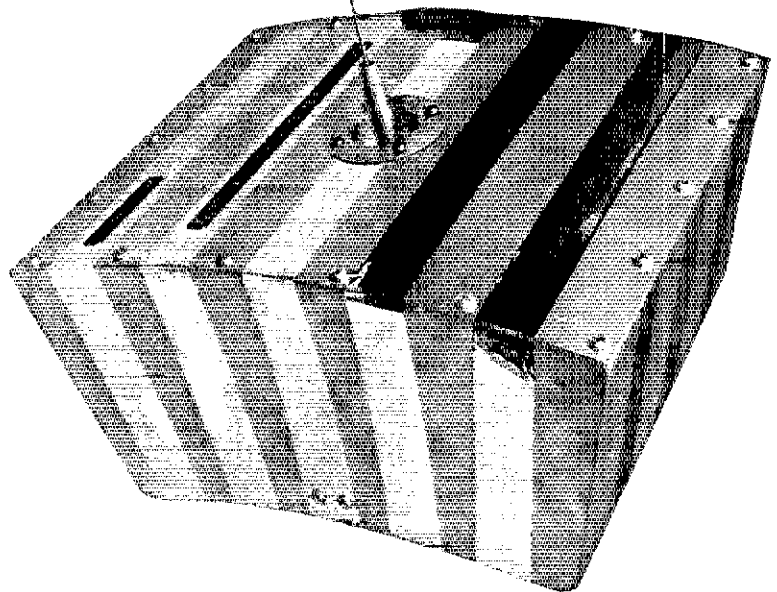
By Joel P. Kleinman\*

**S**itting unpretentiously alongside its larger cousins, the backup of the OSCAR 1 satellite was an impressive part of the spanking new National Air and Space Museum in Washington, DC. It was thus fitting that OSCARs 6 and 7 transmitted parts of President Ford's remarks at the Museum's dedication July 1.

A portable ground station designed and operated by AMSAT Executive Vice President Tom Clark, WA3LND, was used to transmit a tape of the President's speech just 15 minutes after he delivered it.

While AMSAT President Perry Klein, K3JTE, assisted with the transmission, Project OSCAR's Paul Schuch,

\*OSCAR Educational Program Assistant, ARRL



The first OSCAR: On Dec. 12, 1961, just four years after the first Sputnik, radio amateurs had their own satellite — a 10-pound package that transmitted HI HI HI in Morse code for three weeks. It was the world's first non-government satellite.



WA3LND (transmitting) and K3JTE QSO via OSCAR 7. (WA4DGU photo)

WA6UAM, aimed the antenna and simultaneously shooed curious spectators away from the cables.

## Loud and Clear

Interference marred the initial attempt, via OSCAR 6, but OSCAR 7 followed just 20 minutes later. As it rose up over the trees lining Constitution Avenue, the tape of the President's speech came back loud and clear. Traveling at 15,000 mph over the western Great Plains, the satellite soon passed behind the Washington Monument and out of range, but several QSOs were made, ranging from VE3SAT in Ontario and a station in Illinois to NN3SI, the new station at the Smithsonian's Museum of History and Technology barely a half mile away.

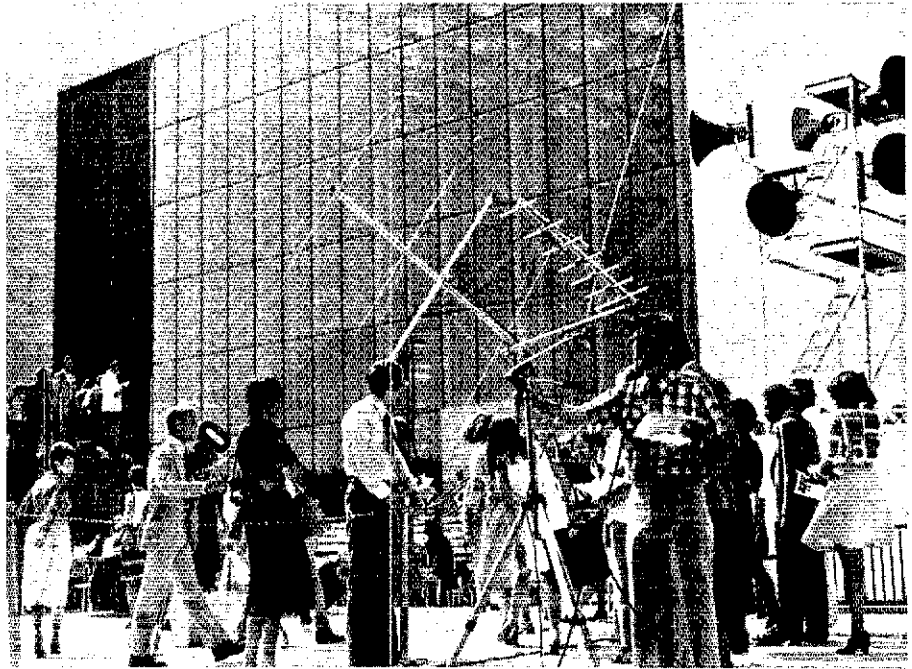
Although competing for attention

with the President and the Viking spacecraft circling Mars (which beamed back the radio signal that cut the ceremonial ribbon), OSCAR 7's signals attracted a great deal of interest from journalists and tourists alike. Two ARRL representatives, Club and Training Manager Charles Harris, WB2CHO and this writer, who works with the Oscar Educational Program, briefed members of the national and local media on the OSCAR satellites and the mechanics of the transmission that had sent the President's words across the U.S. and Canada. Some had heard of OSCAR, most hadn't; but all who stopped by the station came away with a new perspective on amateur radio.

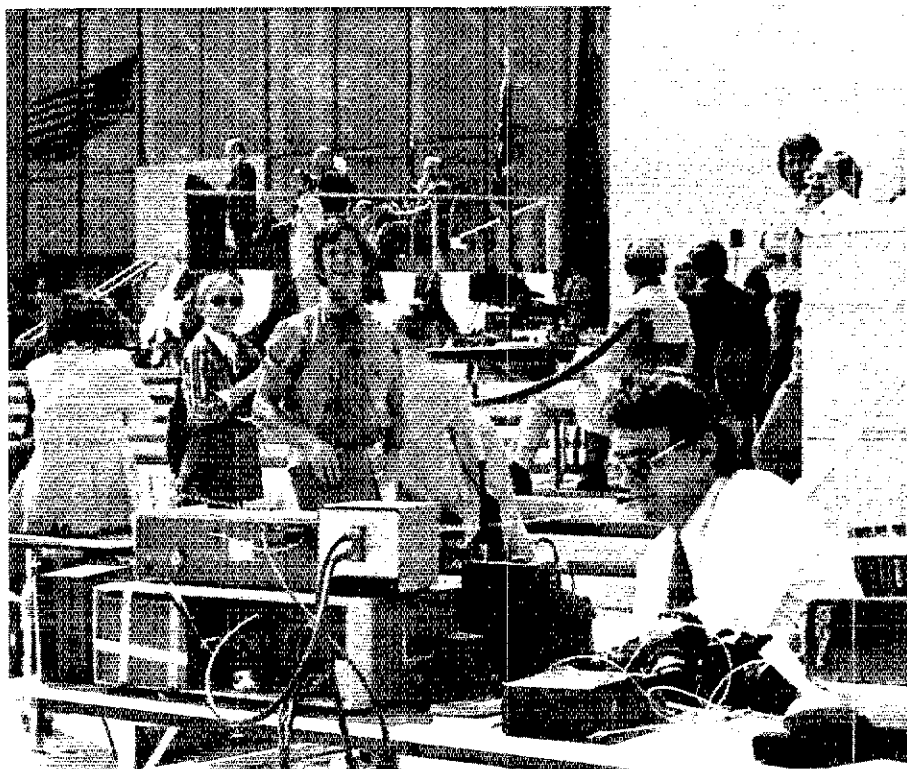
The ground station, set up just 100 feet from the speaker's platform, was built with financial assistance from the



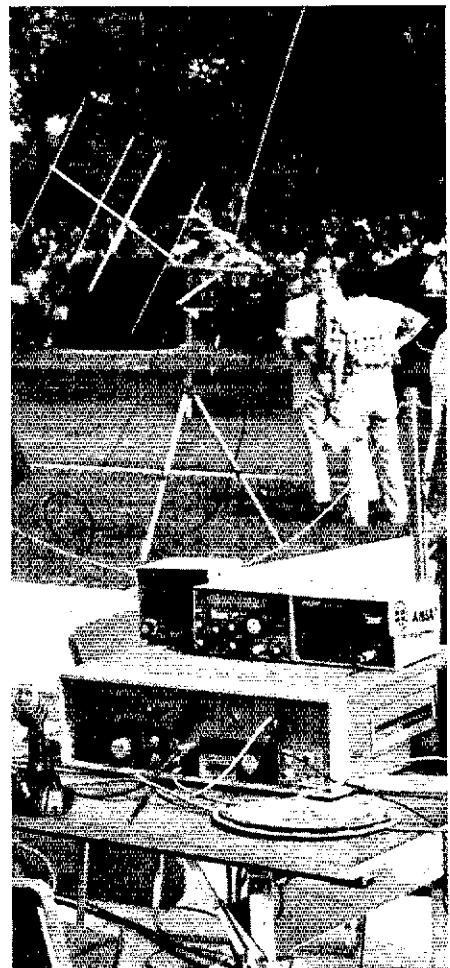
WA3LND mirrors the intensity of attempting a contact with a satellite speeding overhead. (WA4DGU photo)



As WA6UAM adjusts the antenna, members of the press gather around the OSCAR station, hidden behind him. (K2KHR/WB4UOX photo)



The portable OSCAR station competes with the President for spectator attention — fairly successfully. (WA4DGU photo)



The battery-operated portable OSCAR gear. Part of the several thousand spectators who lined up across the street to watch the President are visible in the background. (K2KHR/WB4UOX photo)

Northern California DX Foundation, which hopes to use similar terminals to expand OSCAR communications links with foreign countries.

Following the outdoor dedication ceremony, the first of the estimated seven-million persons who will visit the three-block-long, 40-million dollar

museum in its first year poured through its doors. Those who make their way to the OSCAR display, in the section reserved for communications satellites, will be able to hear a tape recording describing the OSCAR program and the space-age hobby that spawned it — amateur radio.

EST

# California to Hawaii on 2 Meters — 1976 Edition

That radio rainbow has just made its second showing within three years.

By Wayne Overbeck,\* K6YNB

*Everyone from amateurs to the U.S. military considered it an impossible feat until the late John Chambers, W6NLZ and Ralph Thomas, KH6UK, did it in July, 1957, after some 10 months of daily scheduling. The same pair repeated their incredible accomplishment on 220 MHz in June, 1959. But after that, it was 14 years until the next W6-KH6 QSO above 144 MHz. We recall the spectacular five-day-long 1973 opening and compare it with the shorter but equally dramatic opening this summer.*

**E**ver since those five warm, summer days in late July, 1973, Californian and

\*5113 Whitecap St., Oxnard Shores, CA 93030

Most temperature inversions have gradual changes with height. However, the one that ducted 2-meter signals 2500 miles across the Pacific Ocean had a very abrupt boundary as seen here on June 29, 1976, near Santa Maria, California.



Hawaiian hams have been waiting, hoping, wishing and praying for more of those thrilling days when vhf signals miraculously span 2500 miles of ocean to make each other sound like locals on 2 meters.<sup>1</sup>

Sure enough, it happened again on another hot, summer day — June 28, 1976. Conditions were the same in many ways, but different in others. For some vhfers the latest opening was better, but frustrating for others because it failed to last as long or travel as far north as the previous spectacular.

The basic mechanism that makes those line-of-sight signals cross an ocean on such rare occasions is a tropospheric duct. It might be likened to an enormous, flat, elongated pipe conveying vhf

<sup>1</sup>References appear on page 48.

signals thousands of miles close to the earth's surface. Unlike typical E- or F-layer ionospheric propagation or lower frequencies, the ducted signal never rises to any great height or bounces back down. Thus, sporadic E and F2 signals can rise over mountain while the tropospheric duct can be blocked by any large terrestrial object along the way.

Usually, the duct is fairly low at the California end, rises as it moves west and ends at both shorelines. The east elevation is less than 1500 feet while the Hawaii side lies between 5000 and 8500 feet above sea level. That means Californian stations with a clear shot to sea at modest heights have a big edge on their side of the path and Hawaiian mountaintoppers, or mountainside repeaters, have the advantage there.

## Characteristics of the Modern Openings

The original mainland-to-Hawaii duct was first worked by Jerry Gastil K6DYD, on July 28, 1973, when he keyed the 16/76 repeater at the 8300-foot level of Mauna Loa — 13,000 feet high. His kilowatt rig fed an 80 element Yagi array at his home 300 feet above the sea on Point Loma near San Diego. Since that day Jerry has maintained a daily morning ritual of attempting to key it again. Finally, his perseverance was rewarded at 1657 UTC on June 28, 1976, when he hit the Hawaiian repeater and quickly worked nine KH6 stations.

A difference this time was that the Mauna Loa repeater had changed to 22/82, a fact which made it much more difficult for California stations to work through it. There are busy 22/82 repeaters all along the California coast that covered the weaker Hawaiian sig-





Stations in the shadow of hills or islands had no success even with a kilowatt and large antenna arrays such as the author's, shown here.

nal. To their credit, though, most W6 repeater operators were very courteous during the opening.

An even more notable difference was that the tropo duct neither lasted five days nor moved all the way up the coast to San Francisco. Predictably, it moved to Santa Barbara within a few hours allowing WB6OBB to repeat his 1973 success by working numerous Hawaiians through the Mauna Loa repeater and at least two mountaintop mobiles on 146.52-MHz simplex. But the duct never extended much further north. Another 100 miles up the coast in Morro Bay, WB6PYD was the northernmost station to make a Hawaiian contact.

Worse still, this opening was alarmingly short. After the excitement of June 28, it was all but over. Jerry and a few others heard the Mauna Loa repeater until about 2100 UTC on June 29, but that was it. If the 1976 opening didn't move on up the coast and didn't last long, neither did it produce direct QSOs between urban Hawaii and California. Apparently, those in the islands worked the mainland only through the repeater or from a high elevation. Unfortunately, no Hawaiian station was readily equipped for the higher bands.

### Getting Across

On the positive side, the highlight had to be a mini-mountaintop expedition by Al Pacheco, KH6IAA, with a 10-watt Multi-2000 and four-element beam. It was good enough for him to put a potent signal into California and work dozens of W6s on 145-MHz ssb. Thanks to Al's multi-mode rig, more

vhfers made a simplex ssb QSO with Hawaii during that one evening than the entire five days of the 1973 opening. Then, only a few simplex QSOs were made into the islands, including a handful in low-level urban areas.

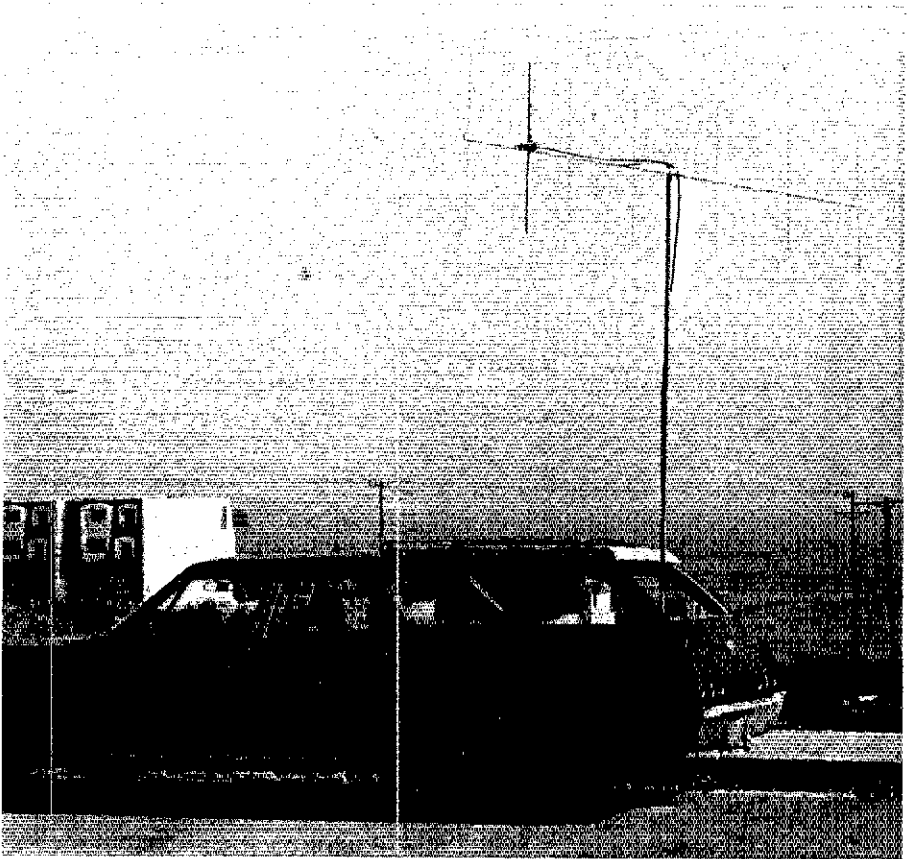
This is not to say that mainland signals never made it below the Hawaiian mountaintops the second time. During one peak period on June 28, K6YNB/6 at Malibu Beach was working a string of Hawaiians through the Mauna Loa repeater when Chuck Niemann, KH6IOR, broke in with a report that the direct signal was S5 at Hickam Air Force Base near Honolulu. The installation is 200 miles northwest of Mauna Loa and near sea level about 10 miles behind the Koolau range, which has peaks over 3000 feet high.

Hindsight says K6YNB should have dropped everything and tried to make direct contacts into Honolulu right then and there. Because of the previous experience, it was easy to assume the opening would last for days, affording plenty of time for that later. He kept working through the repeater unaware that the Hawaiian signals would fade into the noise so soon.

But the consolation had to be the quality of signals during those few hours on June 28. After K6DYD opened the

band more San Diego stations, including W6BLK, WA6OIL, WB6ROP, K6UA and others had the thrill of working numerous KH6s through the Mauna Loa repeater. As the duct moved up the coast, W7VQQ/6, WB6RIV and other Los Angeles stations joined the fun. Soon KH6IAA was mobiling up the active volcano with his ssb-ready rig. At first there was nobody to talk to on ssb, so he worked fm on 146.52-MHz simplex and killed time by trying to key the San Diego 04/64 repeater which he could hear. Meanwhile, K6YNB drove along the Malibu coast and monitored Mauna Loa with a 19-inch whip. Frantically, he broke in announcing a spot where signals were the loudest and worked KH6IAA/KH6 on simplex with full quieting signals both ways. They switched to 145.010-MHz ssb and immediately exchanged 59-plus reports.

Other Southern California ssb stations began to hear Al weakly at first, then more and more loudly, especially after he switched to horizontal polarization of his little beam. In one experiment, K6QEH reduced his kilowatt in steps down to an estimated 0.25 milliwatt and still maintained contact with KH6IAA/KH6. Al's signals peaked between 0500 and 0700 UTC, about local sunset over the path, but by 0900 he



During peak conditions of the tropospheric duct, modest installations such as this could work Hawaii from selected places with S9+ signals. Those hot spots were easily determined by monitoring with the rooftop whip antenna while driving along the California coast.

was gone and it was all over.

Meanwhile, K6YNB rushed home from his hot spot on Malibu Beach, determined there were no detectable signals 20 miles up the coast and hurriedly put together his camper-mounted portable station,<sup>2</sup> capable of a full kilowatt on bands through 432 MHz and scrambled back to Malibu. However, the signals were gone by then (local midnight).

On the following morning K6DYD and WB6PYD, 250 miles apart, worked into the Mauna Loa repeater simultaneously showing how broad this short-lived duct had become just before its demise. By 2100 UTC that day, stations in the best coastal areas were hearing the Hawaiian repeater for the last time.

### In the Right Place At the Right Time

Although its short life and failure to move up to San Francisco were big

surprises, the June, 1976, duct confirmed the 1973 observations. Again, the absolute necessity of a clear shot to the open ocean was proven on the California end. Stations that were only one range of hills inland had almost no luck, regardless of their power level, while stations with low power and modest antennas near the coast were very successful. Even the Channel Islands off California's coast proved insurmountable barriers although they are less than 2500 feet high. Several Oxnard stations on the beach, but behind the Islands, heard nothing. At the same time, others along the coast and clear of island obstructions copied Hawaiians above S9.

Like someone shouting into the end of a long pipe, one must aim directly into the duct with no obstacles in the way to get to the other end. In California that meant a clear view to sea at a low angle. In Hawaii, the right height was necessary. Neither the Haleakala

repeater at 10,000 feet, nor the Diamond Head repeater at 400 feet were directly heard in California. There are 100 and 200 miles northwest of Mauna Loa, respectively, to form linked triple-repeater chain.

By Tuesday night, June 29, no elevation or signal angle produced anything anywhere along the California coast. How do we know? We know because after the Hawaiian signals completely disappeared from K6YNB's Malibu hot spot, he and WB6RIV wasted three tanks of gasoline and a long day driving up and down the California coast. They tried site after site in a futile quest for the California end of the elusive trans-Pacific tropospheric duct. If it was there, it was well hidden. QST

### Footnotes

- <sup>1</sup> Tilton, "World Above 50 MHz," *QST*, September, 1973.
- <sup>2</sup> Overbeck, "The Cabover Kilowatt," *QST*, August, 1971.

## Strays



I would like to get in touch with . . .

- anyone who has a QSL card from Richard Murray, W6NNN, James R. Murray, W6WXA, 5811 Scottwood Dr., Rancho Palos Verdes, CA 90274.
- other amateurs interested in beekeeping. Jim Robinson, WB4RIS, 8023 Galveston Ave., Jacksonville, FL 32211.
- any hams who are astronomers, especially radio astronomers. Robert Demko, WA2GBW, 242-09 Conduit Ave., Rosedale, NY 11422.
- former members of the Mahoning Valley Amateur Radio Association with *Voice Coil* magazines, photographs or other historical data. Carl J. Schuller, W8EJP, 133 Brooklyn Ave., Youngstown, OH 44507.
- another 17-year-old ham, in the United States, to correspond with Alan D. Rae, GM4ENN, 15 Valleyfield St., Springburn, Glasgow G21 4DH Scotland.
- Scouts and Scouters interested in organizing an international Boy Scout soccer association as an adjunct to existing programs. Tom Rivera, K6MXO, 500 N-W St., Lompoc, CA 93436.

### QST Congratulates . . .

- George Jacobs, W3ASK, chief of the Voice of America's Frequency Division,

who recently became the first engineering recipient of the U.S. Information Agency's Superior Honor Award. Presented at the International Telecommunications Union conference in Geneva, the award recognizes W3ASK's role in drafting national and international telecommunications policy.

- Newly elected IEEE Fellows: Pier L. Bargellini, WA3KNN, John F. Clark, W3GYH, Sajjad Durrani, former editor of *AMSAT Newsletter* and Burton I. Edelson, director of Comsat Labs.

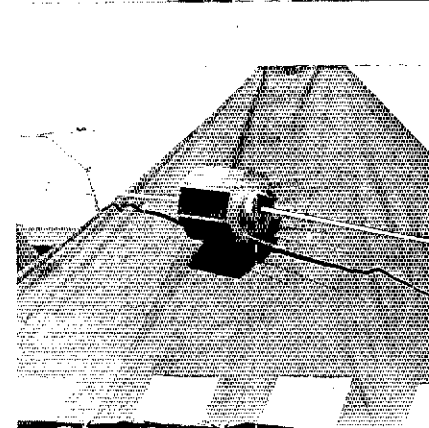
- John Jellema, W8SWN/1 (and ex-9M2JJ), on completing his Ph.D. work at Michigan State University and teaching Novice classes at the same time!

- Dr. Domenico Marino, IT9TAI, on the publication of his book, *La Scienza del Terzo Millennio*.

- William B. Shepherd, W3ZSR, for selection as planning chief of the White House Conference on Handicapped Individuals, Washington, DC.

- Glenn Schulz, WB9NDM, on election as 1976-77 student body president of Wisconsin Lutheran High School, Wauwatosa, Wisconsin.

- The Ak-Sar-Ben Amateur Radio Club, Omaha, Nebraska, upon citation by United Community Services. The national organization recognized the club's many volunteer projects during 1975, particularly in tornado activity.



Several youngsters get their first exposure to amateur radio at a display by the South Hills Brass Pounders and Modulators Amateur Radio Club as part of Community Day in Baldwin, Pennsylvania. The setup had two stations relaying message traffic and a full-size OSCAR 7 mockup built by W3BWU (WA3JPP photos)

# A Fist from the Sky

Hams take charge before, during and after a natural disaster devastates Guam.

By Leonard Withington,\* KH6CKJ, Pat Corrigan,\*\* KH6GQW, Gary Belcher,\*\*\* KH6GMP and Robert Halprin,\*\*\*\* WA1WEM

*Winds stronger than blasts from a jet engine. A roar from the sky. Shattering windows, collapsing walls, whirling tin roofs and trees stripped of every leaf. — Honolulu Star Bulletin.*

**T**hese are images of Guam in the midst of supertyphoon Pamela. Pamela was spawned in the area of the Western Pacific known as "Typhoon Alley." The first landfall was on the island of Truk in the Eastern Caroline Islands. On May 18, 1976 (though not yet supertyphoon status) she came ashore, bringing with her winds of 100 miles per hour and torrential downpours. Landslides occurred and ten people died.

A day later, ARRL Pacific Section Communications Manager KH6GQW received a telephone call from the Chief Postal Inspector in Honolulu. The official inquired if information could be obtained concerning the status of the U.S. postal facility in Truk. The previous year, KH6GQW had finalized an

agreement with the post office to supply them with emergency communications if the need should arise. ARRL Pacific Section Emergency Coordinator KH6GMP contacted KC6DK at Ponape, ECI, who managed to get through to Truk (at this time, communications with Truk were minimal). Within hours, KH6GQW was able to report to the Postal Service that their facility was intact and additional personnel weren't needed. By then, Pamela had turned her attention toward Guam.

---

**KH6CKJ coordinated to insure stations would be available 24 hours a day on the emergency frequency.**

---

"The first day of June found Guam still struggling from the aftereffects of supertyphoon Pamela, without most of its electrical power and with daily water shortages. The supertyphoon — a designation given to storms which sustain winds in excess of 130 miles an hour — ripped into Guam May 21 and 22, with winds up to 140 miles and gusts up to 160. Damage estimates are still incomplete, but are running as high as \$500 million . . ." — *Gannett News Service*

## Early Warning

Guamanians were taking precautions. Nearly 20,000 people were evacuated from low-lying coastal areas to shelters at inland schools, shortly before "the hit." At 0030Z on May 20, KG6JDR told KC6DK that the storm was near and then went off the air. About the same time, Guam ARRL Emergency Coordinator KG6JAH sent the "hit" message to Honolulu County EC KH6CKJ.

By this time, the winds were already in excess of 100 miles per hour. At 0200Z, with Guam experiencing full typhoon conditions, the Guam Civil

Defense authorities requested that three ssb emergency frequencies be set up on 20 meters: 14,290 kHz (emergency traffic), 14,320 kHz (all other outgoing traffic) and 14,355 kHz (incoming traffic). Until 0900Z, each frequency was manned by KH6s, KG6s and some mainland stations. KH6CKJ coordinated to insure stations would be available 24 hours a day on the emergency frequency to act as net control. The Honolulu Red Cross was notified that KH6BFF and KH6ECX were available to handle traffic into Guam. Pamela continued to pound at Guam and at 1030Z, all electrical power on Guam ceased; thus ended her communications with the outside world.

However, three Guamanian hams, using emergency power, were intermittently heard on 14,290 for the remainder of the night. They were KG6JFT, KG6JSU and WA6STC/KG6. While other stations in the Pacific area joined in the typhoon watch, not much was heard from Guam during the first night of the siege.

At 0500Z, May 21, with hundreds of amateurs standing by on 14,290 to relay reports to authorities and the news media (amateurs were the first to know

\*2107 Atherton Road, Honolulu, HI 96822  
\*\*P. O. Box 698, Kaneohe, HI 96744  
\*\*\*91-962 Akaholo St., Ewa Beach, HI 96706  
\*\*\*\*Communications Assistant, ARRL



Guam hams set up emergency communications headquarters station KG6JEE at the KUAM radio site. (KH6JAC photo)



The aftermath of a supertyphoon. (KH6JAC photo)



The morning after — KG6JAC's TH6DXX didn't make it. (KH6JAC photo)

the full extent of Pamela's onslaught), KG6JFT started to report what damage he was aware of, at his location in a concrete bunker at the Naval Air Station in Agana. The storm was directly over Guam, in full fury, with winds at close to 200 miles per hour. At 0652Z, KG6JFT announced that the eye of the storm was directly over his location. He went outside in this temporary calm and returned to say that not even a telephone pole was left standing.

#### Down but Not Out

All power was lost, telephones were out, and water sources had either been destroyed or contaminated. One wing of the Guam Memorial Hospital had collapsed but the patients had been evacuated safely. Luckily, most people were safe and sheltered during the worst of the storm. However, eight out of ten homes on the island were wrecked and 14,000 families had lost all their possessions. An 8 P.M. to 6 A.M. curfew went into effect.

Other preliminary reports were heard from Guam from those able to get on the air. WA6STC/KG6 operated mobile from various parts of the island and was able to reach the areas that



One of the many homes that was destroyed in the storm. (KH6JAC photo)

were in the most need of communications. KG6KFV established emergency communications headquarters at KUAM (the island's only functioning commercial radio station). KG6JBE loaned his S-Line to be installed at KUAM and KG6JCM took control.

#### KG6JFT announced that the eye of the storm was directly over his location.

Assuming net control on the 14,290 emergency net, KH6CKJ, along with KH6GQW and KH6GMP (plus many others), was soon busy relaying requests to the mainland concerning arrangements for disaster-relief teams and supplies. At this point, Pamela had departed Guam, heading toward Iwo Jima, losing strength. Typhoon status had ended but the work had just begun.

"I'm okay; don't worry about me." Many relatives on the mainland probably have been comforted by similar messages sent from Guam by ham radio. Thousands of general health and welfare messages have been relayed both to and from the island since supertyphoon Pamela . . . The 40 operators in the Marianas ARC have monitored radios during the past week for persons wanting to let their families know that they survived the storm and for government agencies with emergency messages. Both the Red Cross and civil defense have established continual contact with MARC operators." — *Pacific Daily News*

#### Communications Convene

Since most Guamanian hams had their antennas obliterated by the typhoon, they had to use makeshift radiators. EC KG6JAH was able to get a wire on the roof of his home and in the next few hours sent 130 messages to the states for his community. He received 60. Two of these messages, in particular, deserve mention. The first was signed by the Governor of Guam, requesting certain emergency supplies. The second

#### Typhoon status had ended but the work had just begun.

was sent to KH6AG, Continental Airlines communications officer. He obviously needed to know the condition of the air facilities on Guam. With the help of KG6JDR, the local airline representative was contacted via two meters and the information was obtained. KG6JFE passed 40 health and welfare messages on the Western Pacific Traffic Net for members of Guam's Naval Hospital staff. KG6KEO used the

emergency generator at an underground cable station to pass some 30 H & W messages. KG6JFT sent more than 80 messages while W7JRH/KG6 handled 275 phone patches with W6GNX and WA7ZLC. WA7NKN/KG6 lost his beam in the storm, but managed to scrounge up some wire and get on-the-air, handling quite a bit of traffic. The MARS station at Anderson AFB (control operator W1CCO/KG6) had a traffic total of 1,117, along with 235 phone patches. The Navy MARS communications station made 200 patches and originated 3,800 messages. At the KUAM c.d. hq. 3000 messages were handled, both internally on two meters and off-island.

For local two-meter communications, it was necessary to set up several simplex stations at various locations to pass important internal traffic as well as other messages. This was necessary since Guam's only repeater was knocked out by the storm. KH6GQW and KH6GMP put out a call on the emergency net for a replacement. WB6ILD, in Santa Cruz, CA, hearing the request, conducted a search via radio. He located a unit (through WR6ACU) in Fresno, which was owned by WA6SBM. After providing Guamanian hams with data on the repeater, it was decided to obtain it. To speed up the relief effort

#### To speed up the relief effort, WB6ILD decided to donate the purchase of the repeater.

WB6ILD decided to donate the purchase of the repeater. Fresno hams pitched in and readied the repeater for shipment. WA6ABM, WB6GUK, WA6BUH, K6BKX and WB6MFV worked through the night testing and packaging the unit. Due to problems in securing shipment via military, KH6GQW paid for air shipment of the repeater to Hawaii. Airline pilot K5LQZ delivered the repeater to Guam. The Marianas ARC rushed installation at the Naval Air Station (where power was available) and put the repeater into service five days after the typhoon. Guamanian hams were then able to efficiently coordinate emergency services throughout the island.

Things were still hectic on the low frequencies. KH6CKJ, continuing his net control duties, solicited the services of all Honolulu AREC members, as well as the services of the members of the Pacific Inter-Island Net and the Confusion Net. The Western Pacific CW Traffic Net (WPTN) held extended sessions and handled a major part of all outgoing traffic.

"The President declared Guam a major disaster area as a result of Ty-

phoon Pamela, which struck the island Thursday. The Governor of Guam had earlier declared that a state of emergency was in effect. Three persons had lost their lives; 85,000 residents were isolated from the outside world." — *Honolulu Star Bulletin*

But not quite. Hawaiian stations were coordinating most of the communications out of Guam. They were the primary net controls and handled countless messages regarding relief supplies, coordination with the Federal Disaster Assistance Administration, Red Cross and other agencies, as well as the H & W traffic for the general public.

---

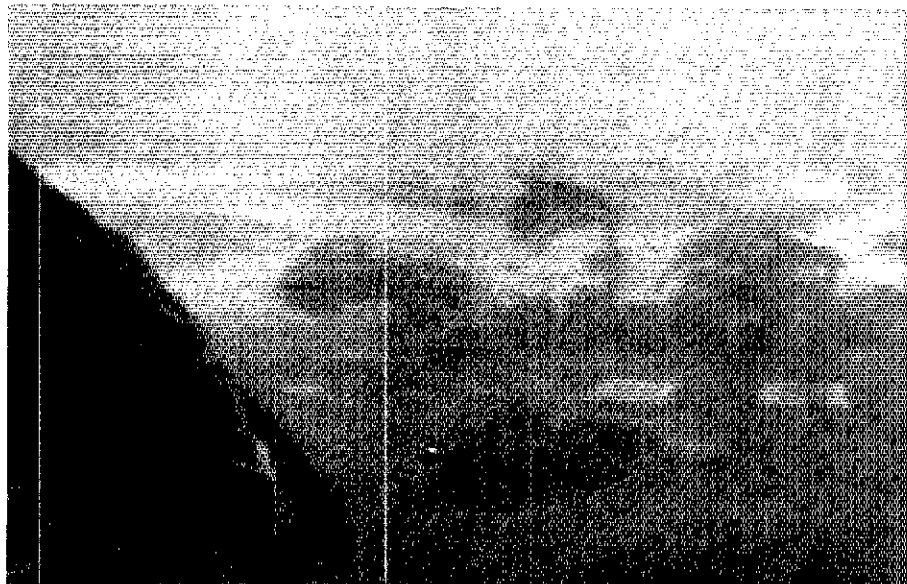
### Things were still hectic on the low frequencies.

---

At 0300Z on May 23, KG6ARH announced on the emergency net that he had been assigned the Guam disaster coordinator for hf and vhf. He stated that the Guam decision was to keep 14,290 as a coordination frequency for emergency and priority traffic. Assignments were made for special Guam stations to monitor 14,355 for the sole purpose of accepting incoming H & W traffic. KG6ARH, equipped with emergency power and both hf and vhf capability, was centrally located in the Pacific Daily News building, on the same floor as the FDAA. The site was selected so as to better coordinate with the FDAA. Official disaster relief messages, Red Cross messages and H & W traffic were all delivered by mobile units, fanning out from this central station.

#### Pacific Parley

After the 24th of May, it appeared that there weren't enough Guam stations to deal with all the activity on 14,290. On May 26, the Pacific Section SCM held a meeting with interested parties. At this meeting, plans were formulated for the remainder of the assistance period. It was felt that since telephones as well as other commercial means of communications were still ineffective, ham radio would have to continue to handle the bulk of the traffic in and out of Guam, for a minimum of ten days. Consequently, it was decided to drop the outgoing frequency of 14,320 and channel all efforts on 14,290 and 14,355 from 2100Z to 1000Z. At that hour, KX6LP, in the Marshall Islands and other Central Pacific stations, would control any late-hour traffic directly into the mainland. Two hf liaison managers were appointed to help out the Pacific Section operators at the Guam end. They were KG6JCM (located at the Daily News building) and Guam EC KG6JAH. Both of these



In the midst of the siege of Guam. (KH6JAC photo)

stations were able to maintain contact with each other on hf and vhf and both had emergency power.

As far as the daily operation of the net was concerned, all stations checking in on 14,290 would either be QRV for Guam outgoing traffic or would have priority or emergency traffic for Guam. All stations who had H & W traffic for Guam would check into 14,355, which was manned by members of the Confusion Net from 0000Z to 0430Z daily. At all times, KH6s would be standing by on 14,355 to assist the H & W effort. Several Guam stations also stood by on 14,355 to receive, disseminate and deliver traffic to residents in Guam. This plan remained in effect from 2100Z May 27 until 0400Z May 31. It worked well. KG6JCM and KG6JAH helped the effort by getting word out to all operating Guam stations, as well as making sure that all priority traffic to and from Guam was personally supervised so that the messages were properly expedited.

---

### Hawaiian stations were coordinating most of the communications out of Guam.

---

In general, most of the incoming H & W traffic was generated on ssb on 14,355. The bulk of the outgoing traffic was handled via the National Traffic System cw nets (WPTN, RN6), RTTY and MARS. It should be noted that NTS liaison continued uninterrupted during the disaster and its aftermath. All a ham anywhere in the U.S. or Canada needed to do to get traffic into Guam was to originate a message on his or her local or section net.

"One of our Bellingham (Mass) AREC members, WA1UQE, was timidly approached by a lady in a supermarket parking lot, who saw his call letter license plates. She asked if he was a ham and did they still handle messages all over the world? Her son was stationed at Guam and she had not heard from him in several months and had heard they were having typhoon weather out there at the time. Ron explained amateur radio and message handling and

---

### The bulk of the outgoing traffic was handled via the National Traffic System.

---

took some traffic from her right on the spot, saying we would attempt to get it through if possible. Since Ron was not on the low bands, he gave me the traffic, which I put in the net. In three



The accommodations at the Guam Hilton left something to be desired following the typhoon. (KH6JAC photo)

days, we had a reply from her son and she was most grateful to amateur radio for the assistance. We all felt good about this one." - *W1EQH*

### Cooperation

On May 29, it was decided that a KH6 net control would be stationed on 14,290 from 2300 until 0400Z each day to handle Guam traffic. The H & W frequency of 14,355 was abandoned at that time. After 0400Z, Guam stations were to assume NCS duties and handle traffic directly with the mainland stations that were standing by. At that time, it was also determined that from June 1, all traffic to and from Guam was to be handled via the regular cw and ssb traffic nets; 14,290 would be maintained only as a "watch" frequency by several of the Hawaiian hams who volunteered to help out when regular traffic nets had closed down. Officially, the Guam disaster assistance net was closed down at 0400Z on May 31, 1976.

**The efforts of these operators emphasize the true spirit of amateur radio.**

Two points are worth mentioning at this juncture. First, the ARRL Regional Emergency Coordinator, K6ITL, was in continuous contact with Guam stations during the operation. His presence provided direct contact with FDAA officials for disaster relief information/instructions. Secondly, the Federal Communications Commission, through its chief engineer in Honolulu, KH6AO, displayed an attitude of cooperation and assistance.

They offered to establish 14,290 as an official national disaster frequency but the Pacific Section SCM and SEC didn't feel this was necessary since no major problems had developed. FCC stated that this was another example of

the amateurs' ability to police their own operations. FCC was also willing to authorize ssb operation with Guam for KH6s on 7075 kHz, but this privilege was never invoked since 20 meters stayed open to allow most of the communications to be conducted on that band.

### The Lineup

All in all, the cooperation and professional attitudes of the Guam hams were most commendable. They maintained constant operations throughout the disaster, with the handicaps of emergency power, inadequate antenna systems and their own personal problems. They are the real heroes of this operation: KG6s AAY AAZ ARH ASO FAE JAH JAQ JBE JBX JCM JDR JDX JEE JEF JFE JFP JFT JFU JFV JFX JFY JFZ JSU KEO KFU. Portable in Guam: WA1EBN WA2SLJ WA3SMN WA3YSQ WA4ISG WA4VUG WA5SUM WB6CEA WA6EVX WB6EXM WA6STC WA6WKK W7JRH WA7NKN WA7QNA K8JEB WA9EZV WA0TXU KH6ILU.

Participants from elsewhere in the Pacific: C21KM/MR2 JA1WUD, KA6s AM RA RI RW, KC6s AQ BS CI DK JD JW RI RX SL SW, KX6s BU DC LJ LP MJ RA, TI7RT/MR2 P29CC P29PN.

Hawaiian stations: KH6s AG ARM BFF BK BYZ CA CBT CKJ CPW CXJ DA DE DTN DVT ECX EJ EKQ EQO FIC GF GKD GJN GMP GQW HJF HJM HML HPS HQX IBT IID IJ IJE IKL ILB ILD IMO IMQ INE IOZ IPN IPS IQU IRS JAC OO QB SP USA UL. Portable: K5LQZ WA8FTA K9KIC.

The efforts of these operators, along with all the amateurs from stateside who participated, emphasize the true spirit of amateur radio.

### Media Miracles


In addition to the immeasurable assistance provided by ham radio to the officials and residents of Guam, this

effort by amateurs was well publicized in the media in Honolulu. Several articles in Honolulu newspapers praised the work of hams. Even an editorial appeared in one paper, emphasizing the public service provided by hams and the need for additional frequency allocations.

The most impressive of the favorable publicity in Honolulu occurred on May 25. In conversations during that day among KH6GQW, KH6GMP and Bob Seavy, news editor of KGMB-TV, it was found that the television station had a satellite facility available on Guam and would like to have TV coverage of the Guam area for the viewers. Unfortunately, they couldn't contact their man on Guam because of the telephone outage. In a matter of moments, KH6CKJ arranged for direct contact between Seavy and his man on Guam. A satellite feed of 15 minutes was accomplished. The tape was edited and televised locally on the evening news. Although the pictorial

**The Federal Communications Commission displayed an attitude of cooperation and assistance.**

coverage was mostly of the storm damage to the community, a large portion was of Guam hams in action, providing communications. The announcement was made that the satellite coverage was made possible only through the efforts of hams in Hawaii and Guam. Seavy referred to them as "miracle workers."

At one time, a Guamanian amateur was heard to tell another on the air that he had running water again and invited the other operator and his family to come over and have a shower if they wanted. Shortly after that, one of the most active of the Guam stations announced that he was going QRT for a few minutes because it had started to rain at his location. He wanted to go outside and take a shower. 

## Strays



□ For some months, post offices in Australia have stopped date-stamping IRCs at the time of purchase. This seemed strange, but I was told it is now normal practice. I followed up the matter since the practice seems to be not known in other countries. The Australian Post Office Authority said, "The present policy is for the International Reply Coupons to no longer be date-stamped at the time of issue . . . only at the time of exchange for postage stamps. The procedure was changed following the 17th Congress of the

Universal Postal Union at Lausanne, Switzerland in 1974.

"If an overseas administration refuses to redeem our coupons because they are not date-stamped, they are in violation of Article 18063 of the Lausanne Convention, Detailed Regulations." - *VK2BC*

□ Roanoke Division Director Phil Wicker, W4ACY, opened his mouth and found himself to be a judge for the Eighth Annual National Hollerin' Contest at Spivey's Corner, North Carolina. Nationally recognized, it features greased flagpoles, watermelon rolling, singalongs, and of course, hollerin'. This year's event recognized a modern form of fellowship and message communica-

tion - amateur radio. Special event station NC4NHC was operated by the Cape Fear Amateur Radio Society to demonstrate our newfangled way of communication and originate traffic for those attending. It beats hollerin' that way. - *W4ACY*

### STOLEN EQUIPMENT

□ ICOM IC 230, serial no. 2840. Stolen July 13 in Ballmar, MD. Dave Mello W3FOR, phone 301-366-2157. Reward

□ Theft from auto in Gadsden, Alabama, on July 17. Regency HR212, serial no. 24-00759. Mel Brumbelow, Route 1, Box 430, Gadsden, Alabama 35901.

# Morse Decoded

Get off and running toward your amateur license with these simple steps to master the Morse code.

By Charles J. Harris,\* WB2CHO

**M**orse code — that's probably the prime topic of discussion among potential amateurs. No aspect of amateur radio sparks the racing pulse and queasy stomach as does the prospect of having to learn the Morse code. Yet unjustly so, for learning the code for the vast majority of new hams is probably a good deal easier than mastering the theory.

There is no single way to learn the code, just as there is no one method to learn anything. If there was, someone would be making a lot of money on it now. However, some simple techniques can smooth the way for the beginner and avert subsequent problems when the time comes to improve code proficiency.

Eyeball knowledge of the code differs greatly from mastery of it. It is relatively simple to learn the code well enough to communicate on a basic level; acquiring the code to the point of enjoyment and preference is something else. To obtain a Novice or Technician license, eyesight acquaintance with the code might be adequate. To continue to upgrade, however, some mastery of the code is essential. It makes little sense to learn the code in such a way as to cramp your later efforts to step up your code speed to that point where using cw becomes truly pleasurable.

In this respect, learning the code is very similar to learning to type. By starting with the hunt-and-peck method of typing, your initial rate will be greater than if you begin by touch typing. However, as you try to increase your typing speed and accuracy, this hunt-and-peck method quickly becomes a burden. And to acquire real facility with the typewriter via touch typing, you must unlearn the hunt-and-peck method. Thus, learning the code the "easy" way may be a very significant block as you try to accelerate, master and enjoy cw.

## Get the Habit

Learning the code is similar to learn-

ing to type in another way as well. You are trying to establish a habit when learning the code. How well you ingrain the habit of copying Morse code will determine your feelings about using the code. The more firmly fixed the habit is, the greater the pleasure you will experience in communicating via cw. It's that way with any skill you master. Think how awkward you felt with a tennis racket that first time or how uncomfortable that correct golf stance made you feel at the beginning. Remembering all those things necessary to perform a skill well was a real chore. The pleasure and fun came only when you didn't have to think about what you were doing any longer. Then it was a habit.

You pick up the code habit in the same way you pick up other habits — by repetition. The more times you repeat a certain action, the more firmly fixed it becomes. And if you've tried to give up smoking, you know getting rid of an undesirable habit can be more difficult than acquiring it in the first place. So don't double leash yourself; get the code habit in the right way from the beginning. Your eventual success in mastering the code hinges on it.

## Don't Start Off Wrong

First, you want to learn the code by sound only, not by sight. There is no reason ever to see the code in written form; in fact, this can handicap your mastery of the code. To illustrate this, consider what happens if you learn that the letter *a* is a dot followed by a dash. Your ear hears didah. Your brain translates that into a dot followed by a dash and then translates that into the letter *a*. Your hand writes *a*. Not a very efficient method of converting the sound into the letter on paper. As you try to increase your copying speed, this double translation rapidly curbs your efforts. This is frequently the source of the famous "10-word-per-minute plateau" in learning the code. By skipping one of the translation steps, this plateau can be completely avoided.

The "secret" is simply to learn the

code by sound only. That is, learn to associate a given sound with a given letter and not with a series of dots and dashes. Thus every time the ear hears the sound didah, the brain thinks *a* and the hand writes that letter.

## Speed-up Technique Prevents Dot-Dash Translation

There is a way to help ensure that you will be learning the code by sound and not as combinations of dots and dashes: Listen to the code at high speeds from the very beginning. At speeds of about 15 words per minute, it is very difficult to pick out individual dots and dashes. Instead your ear hears the letter as a single sound, not a grouping of short and long sounds. Thus possible translation to dots and dashes is prevented.

Of course, trying to learn to copy the code at 15 words per minute to start is rather difficult, so there is a way to "slow down" the effective speed of the code while maintaining the value of high-speed code practice. This is done by increasing the spacing between the letters (the silence) so that only 25 characters are sent each minute. The effective code speed is now about five words per minute, but the characters themselves are being sent at about 15 words per minute, preventing dot-dash translation.

WIAW has been using this method



The complete *Tune in the World* package, including cassette tape for learning the code.

\*Club and Training Manager, ARRL



WB2TNC conducts the code-practice portion of the Novice license class.

to send the slower speeds of code practice over the air for many years (see Operating News for WIAW code-practice schedule), and the cassette contained in the new *Tune in the World* beginner's package also follows this pattern. This, therefore, is not a new-fangled method of learning the code, but rather a time-tested, proven device for assisting beginners.

### Putting It on Paper

The writing of letters after hearing them is an important part of the habit. The ability to copy the code is always measured in terms of what you can write down, not simply what you can understand in your head. Thus writing the letters down every time the ear hears them is one of the ways to build your code habit quickly.

On the subject of writing the code, there is no need to begin to print again as you begin to copy the code. If you normally write down notes such as off the telephone, use the same style when copying the code. Why learn to copy the code and learn to write again at the same time?

We now have all the basics of a successful code-practice program: Code sent at high speed with long spacing and writing the code as the sound is heard to avoid learning the code by dots and dashes. All that is left is regular practice.

Any educator will stress the benefit of regular practice to learn anything. Repetition is the way in which habits are acquired, both annoying habits such as cracking knuckles and beneficial ones such as code ability. The key to both is repetition. And the key to repetition with code practice is to establish a rather fixed schedule for the daily practice.

### Keep It Short But Keep It Up

The fastest and surest way to learn the code is to set up a regular practice time everyday and stick to that schedule. As long as the code practice has a high priority in your day, you will devote the proper attention to the task and will quickly be copying at your desired code speed. As you begin to let

other events interfere with the code practice, your attention and dedication to the practice falters, as does your command of the code.

One or two short sessions each day is ideal. The sessions should not be more than about 20 minutes long. More than this and the average mind begins to wander; the practice starts doing more harm than good. Tying these short sessions in with a regular event each day helps to ensure that the code practice is not overlooked. For example, 20 minutes after dinner, or after breakfast, can be very effective.

### Here's What's Available

The content of each practice session should reflect both the prior precepts and the code ability of the student. Almost any method of listening to the code (in the proper format) is useful. Some of the available methods are on-the-air code practice, code-practice oscillators and code records and tapes.

The on-the-air practice has certain advantages. First, since it is at a regular time each day, this helps build in the discipline so important to fast, efficient learning. Also, listening through interference and noise provides good practice for actual contacts later on. A drawback to listening to code-practice broadcasts is that a receiver is necessary, and not every potential amateur has access to proper equipment. Also, copying code through the other stations and noise can be more of a task than learning the code. Finally, most code-practice broadcasts do not follow a progression through the alphabet for learning purposes; instead they are better suited for practicing the code and increasing speed, rather than for learning it in the first place.

These problems can be eliminated with the advent of code practice on vhf fm. This can be received through readily available public-service band scanners and receivers, without interference. In addition, by using tapes available from the League, this practice can be tailored to progressive learning of the code, and thus be of greater benefit to beginners.

Code tapes and records are another useful way to learn the code. The advantages of the tapes are that no expensive equipment is required to study and that the tape can be used and reused to fit your own schedule. This provides great individuality and flexibility in the practice, at the cost of losing the enforced daily schedule that on-the-air practice provides. The major requirements for the tape are that it adheres to the concepts presented above and that it uses a gradual method of introducing the different letters and characters. Ideally suited for this purpose, the cassette in the *Tune in the World* package meshes well with the broadcast

code practice and code classes offered by many radio clubs throughout the country.

If you find you are beginning to memorize the tape in *Tune in the World*, the League provides an additional practice tape of all code groups, using proper format and spacing. The tape has one-half hour each of 5 and 7.5 words per minute, and sells for \$5.00 postpaid direct from Hq.

A final method of home practice is using a code-practice oscillator. These little devices can be obtained from a large variety of sources, including *QST* advertisers. CPOs have the advantage that they can be exactly tailored to one's own needs for practice, and they can be used to work on the sending of the code as well. Also, using a code-practice oscillator is a good way to include the entire family in amateur radio.

The League provides free scripts for producing your own code-practice material, patterned after the system used in the code cassette from *Tune in the World*. In using the CPO be sure to send the letters quickly, allowing the long spaces between characters to reduce the speed.

Elsewhere in this issue in "The Code Box" is featured a unique way to involve other members of the family. With that code box any family member can send any letter as required, with perfect spacing and character formation.

### The Other Leg of CW Communicating

There is more to learning the code than simply the receiving, although sending is much easier to master properly. To send using the sound-only system, you only need to think about what sound you wish to make (which sound you associate with a given letter) and move the key accordingly. You want to duplicate the sound as heard from the tape or code broadcast as closely as possible. WIAW code broadcasts include texts from *QST* which can be used to practice your sending.

The best way to avoid poor sending characteristics is to tape record your sending, play it back the next day, and try to copy it. You will quickly discover which letters are confusing. If you have trouble copying your own code out of a tape recorder, think of the problems an amateur on the air will have. Always try to send the kind of code you want to copy.

Regular practice on a fixed schedule using good code-practice material is the essence of a code-learning program. And with the *Tune in the World* package, WIAW code practice and the Novice training program available from the League, it's easy to take the first step toward becoming a licensed radio amateur. See you on the air!



# Radio Scouting at NORDJAMB-75

At this World Scout Jamboree in Norway, leaders and Scouts demonstrated some recreational and instructional values of amateur radio in a prelude to the annual Jamboree-on-the-Air.

By Don Wibel,\* K9ECE

**T**hink of some 18,000 individuals assembling into a town, a town alive one week, gone the next, a town whose structures are only canvas of all shades and hues, a town whose residents are mostly teen-age males bubbling over with excitement and activity. That town, just outside Lillehammer, Norway, was the 14th World Scout Jamboree, NORDJAMB-75.

It was my good fortune to be invited to serve as a guest instructor presenting "Radio Scouting" to Scouts from more than 90 countries. I was part of an impressive international team — Josef Falzeder, OE5FJL, Yves Margot, HB9AOF, Paul Martin, EI2CA, and Jim Parnell, ZL2APE. Les Mitchell, G3BHK, founder of Jamboree-on-the-Air (JOTA) some 18 years ago and Len Jarrett, HB9AMS, of the World Scout Bureau,

HB9S, also jointly chaired the Radio Scouting Conference held during the Jamboree.

Boys and girls, all Scouts from the host Scandinavian countries, worked several hours a day getting equipment installed, antennas up, power lines strung, displays ready and everything else required to provide a Radio Scouting presentation for Scouts participating in the Jamboree. As well as the LC1J operation, Scoutronics activities included a slide show, beginners and QRP, advanced electronics, four large tents for the Combi-75 kit building and a foxhunting area.

## Scandinavian Hospitality

Prior to or after the Jamboree, attending Scouts were given an opportunity to spend a few days with a host family in a Home Hospitality program. This writer took part in an arrangement

not too different from the Scouts' except my hosts were amateur radio operators whom I had contacted during the years.

Side trips before the event included southern Finland, Aland Islands, Market Reef, Stockholm, Sweden and the territory of Morokulien. A highlight was signing portable OJØ along with traveling companion Bosse Ahnas, OH2BHU, at the Market Reef lighthouse which is manned by my old friend, Karl-Erik Eriksson, OJØMA/OHØNA. Immediately, the 20-meter band came alive even though Kee makes several thousand QSOs from there each year.

I met many wonderful people and visited several outstanding amateur stations with those large, high antennas that are the envy of amateurs in any country. Those antennas seem to grow wild — I'd sure like to find some of the seeds.

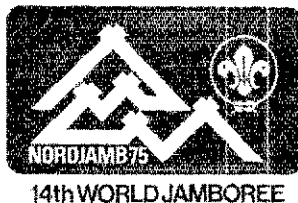
## Amateur Radio Station LC1J

After checking in with Jamboree headquarters, it was down to work getting the radio equipment installed and on the air. Several Senior Scouts and other adult Scouters were already busy at work. You will never see so many Scouts and Scouters work so hard and diligently as then.

Amateur radio station LC1J became operational on July 28 and ceased August 7. A total of 2362 contacts was made with amateurs in 105 countries using all popular modes: Ssb, cw, RTTY, SSTV and vhf. Separate operating positions were used for the various modes and amateur bands. Various rotary and wire beams were used along with verticals, inverted Vs and dipoles for the high-frequency bands and all were terminated at a main patch panel within the station tent to connect any antenna to any operating position. One station

\*5115 Delaware Ave., Fort Wayne, IN 46805

# LC1J



continuously monitored the Jamboree repeater, LA5JR, located on a mountaintop overlooking the campsite.

Vhf antennas included a 46-element Yagi for 70 cm and a 2-by-5-element circularly polarized antenna for 2 meters. Les, G3BHK, supplied a computer printout for minute-by-minute azimuth and elevation bearings to OSCARs 6 and 7 from that location.

Priority was given to making contact with as many of the Join-the-Jamboree stations as had been set up all over the world at the same time by other Radio Scouters. This was to show Scouts unable to attend the World Jamboree what Radio Scouting was about and allow them to contact LC1J. Our objective was to expose Scouts to amateur radio rather than make a quantity of contacts. Licensed Scouts were allowed a chance to operate the equipment. There were 107 licensed Scouts, including those of the host Radio Scouting group, from 19 different countries registered with the LC1J secretary.

### Color-Slide Show Tent

Narration to the visual display of color slides covered Jamboree-on-the-Air, Scout signaling, construction, fox-hunting, contests, Scout nets, awards, QSL cards, portable hiking and camping equipment, and a display of slides on how to get started in Radio Scouting. Considerable effort had gone into the preparation of this presentation and it was extremely popular with all Scouts and Scouters.

### Beginners and QRP Tent

Equipment on display in the QRP tent included a simple crystal set, code-practice circuit, audio amplifier, simple receiver, simple transmitter, and a transmitter-receiver combination. All equipment was homebrew and constructed of parts normally found in the average amateur's junkbox. A display was set up to show how, with a simple low-power transmitter and receiver combination powered by flashlight batteries, QSOs could be made while on a hike or during a camp-out.

### Advanced Electronics Tent

Housed in the advanced electronics tent was equipment commonly used in the electronics industry and communication fields. Displays included radio-teletype, facsimile, and equipment used in the transmission of audio signals via laser. These, plus other exhibits, were designed to expose Scouts to the electronics and communication industry and create an interest in the electronics field as a profession.

### Combi-75 Kit-Building Tents

The Jamboree Radio Scouting committee developed a simple multi-purpose

kit called the Combi-75. Large tents were provided where Scouts could assemble this Scouterics kit, and ample staff personnel were on hand to supervise and help kit builders. The Combi-75 kit sold for 10 Nkr and consisted of enough parts to construct a Morse code trainer, flash unit, interrupted flash, trainer and a flash, or an audio amplifier. By connecting the external wires or jumpers or both on the printed-circuit board included with the kit, all of the five circuits could be constructed.

### Foxhunting

Radio direction finding, radio orienteering or foxhunting, as it is termed in Scandinavian countries, proved to be a popular sport of the Scouts.<sup>1</sup> A participant must employ all the skills traditionally used in compass orienteering: Map reading, observation, exploring, physical fitness, and so on. Foxhunters use a receiver that can tune the fox's (hidden transmitter) frequency. Then, by using his orienteering skills the hunter goes in the signal-null direction. This sounds simple enough, but without a sense antenna on the receiver one may be 180° from the fox. He can be more elusive by being moved while the hunter is pinpointing his location or the signal can be periodically turned off. Incidentally, when I did find the sly old rascal, I almost stepped on him!

More than 1600 boys took part in introductory and full-scale hunts. An activity would have up to four foxes along a three-kilometer course. When they found their fox, the participants were awarded a certificate. The instructions were so easy to follow that some local children were able to find the fox in 10 to 15 minutes.

An excellent book on the subject has been written by Nicolai K. Holter, LA5CH.<sup>2</sup>

### JOTA Conference

On August 1st, national organizers, interested representatives and the Radio Scouting staff met for an informal Jamboree-on-the-Air Conference. Len Jarrett and Les Mitchell jointly chaired the gathering of Radio Scouters from all over the world. To the best of my knowledge, it was the first meeting of this kind ever held.

Ideas for the future and how to expand our present organization were discussed. Although the World Bureau, through the labors of Len, supports Radio Scouting, it is up to present Radio Scouters to "spread the word," and encourage national and international improvement and expansion. Radio Scouting, like amateur radio, has, and will continue to promote and encourage international friendship. Plans are being made to provide equipment to Scouts in less fortunate countries so

Radio Scouting can expand internationally.


The World Scout Movement will support amateur radio organizations in opposing any amateur radio frequency reduction at the next ITU Conference. This commitment was approved unanimously at the 25th World Scout Conference held in Denmark following NORDJAMB-75, by 97 countries representing 15 million members of the World Scout Movement by the following resolutions: No. 14, "Cooperation with Amateur Radio Service." The Conference requests all member organizations: (1) to urge their governments to resist any attempt to reduce the number and size of frequencies presently allocated to the Amateur Radio Service, and (2) to cooperate with their national radio organizations in the actions designed to this end.

### Radio Scouting Staff

One cannot find enough words of praise for the Radio Scouting staff and the some 50 members of the Senior Scout Camp, Troop 20 (Radio Scouting Troop). The hours of planning and preparation that go into a Jamboree such as this one sometimes go unnoticed as most of us have never had to plan an activity such as I experienced; but in anything we do, the results reflect the caliber of the planning.

### Summary

On the evening of August 6th, the Jamboree came to a close. From all over the world, boys and girls worked together and developed friendships that would last their entire lives. Each could keep in contact with their new-found friends via letters and for some, perhaps, overseas visits. The Radio Scouters, however, could keep in touch with each other via amateur radio.

The world has become smaller, because of transportation and communication advances. Therefore, Radio Scouters are attempting to provide a program of activities for today's youth that will bring youth once separated by several hours geographically closer together through the wonderful hobby of amateur radio. Each council should have a radio amateur willing to provide a Radio Scouting program at local district and council events to expose Scouts to amateur radio and what it has to offer. The October JOTA is just around the corner. Check *QST*, "Operating Events," and participate with your local Scouts. 

### Footnotes

<sup>1</sup> Holter, "Radio Foxhunting in Europe," *QST*, August, 1976.

<sup>2</sup> Holter, "Introduction to Scout Radio Orienteering (Foxhunting)," 130-page, bound volume, published 1975 by the author, \$5.00, P. O. Box 58, Oppsal, Oslo 6, Norway.

# K2UYH—Moonbounce WAC

Success! Years of dedicated work climaxed in a two and one-half second trip to the moon and back. For K2UYH, his final continent garnered via the joint efforts of fellow amateurs.

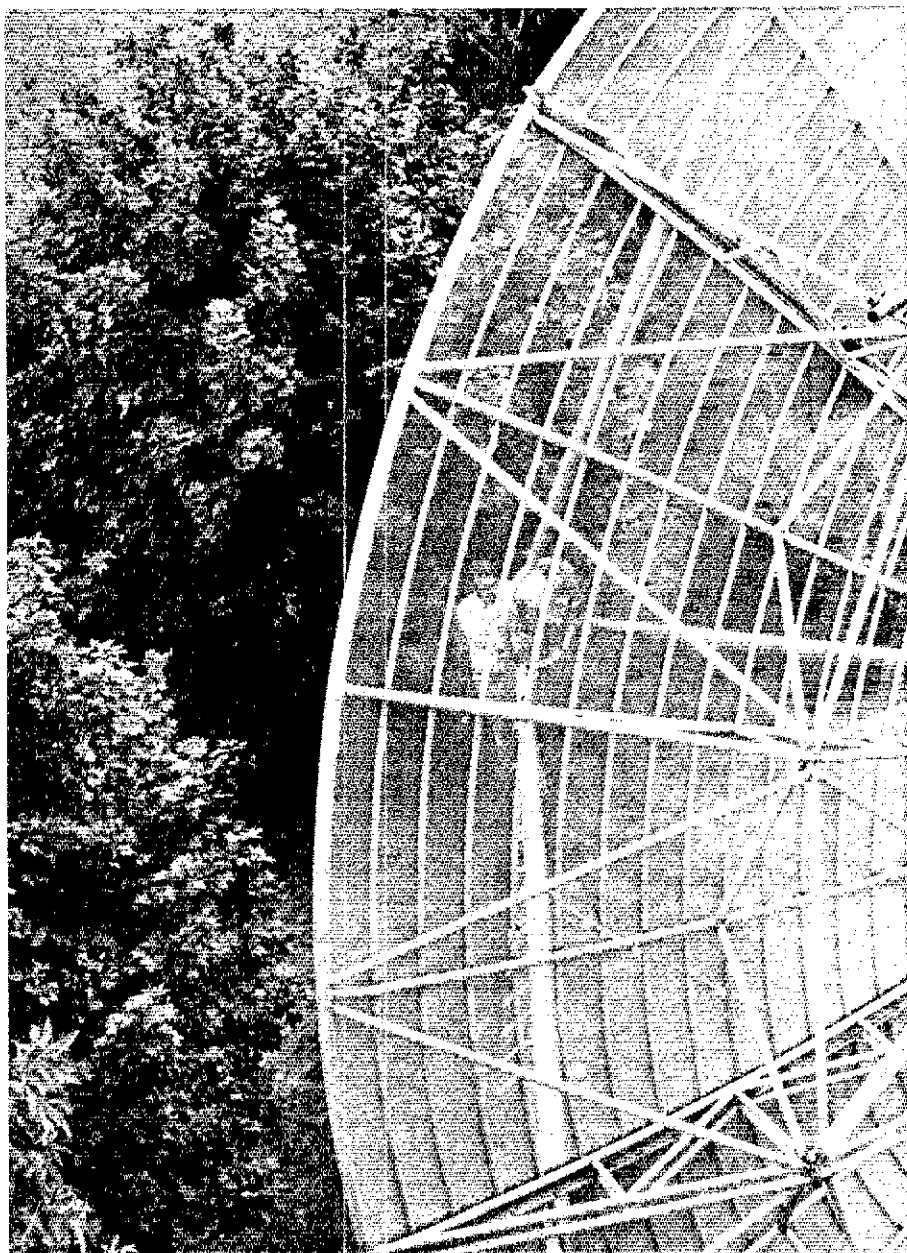
By James M. Morris,\* KH6HQG

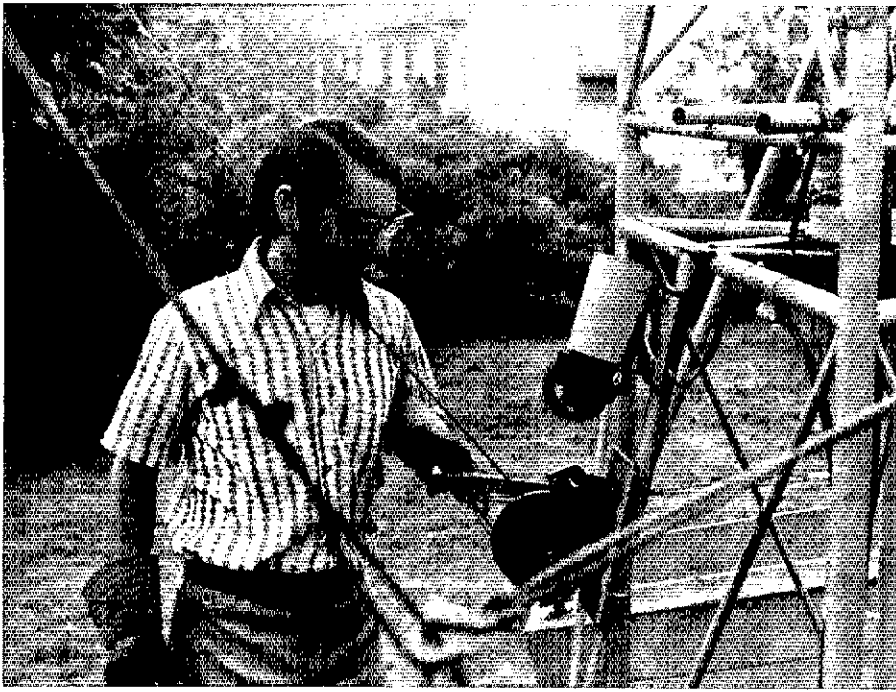
*All the elements of drama and adventure — international diplomacy, pioneering records, foreign expeditions, personal achievement — came alive in the week-long operation which climaxed on July 29, 1976, in the first Worked All Continents on 432 MHz and EME (earth-moon-earth) by Allen Katz, K2UYH. For Katz, the HK1TL (Tiere Luna) contact realized his "impossible dream."*

*When moonbounce work started in the early sixties, only a handful of radio amateurs tried, and fewer succeeded, because of the tremendous diminishing of signal strength. At 432 MHz, a reflected signal is only a miniscule fraction as strong as when it was originally transmitted. In EME circles this phenomenon is called path-loss obstacle. But with extremely high-gain antennas, efficient feed lines and amateur persistence, the radio art kept advancing until effective systems became readily available. After the latest series of National Radio Laboratories and Stanford Research Institute tests began in the early seventies, interest accelerated among more than 50 vhfers to make EME contacts commonplace, now. Activity dispersed to all corners of the globe, except South America. Early this year, however, the Mt. Airy VHF Club began planning to fill that gap with an expedition into Colombia from their Philadelphia, PA, home.*

Carefully listening to his receiver to identify the slow, deliberate cw in the noise, Al starts another EME schedule to help a fellow moonbouncer check out a new antenna. Yes, the familiar whoop of a signal going through Dop-

\*Editorial Assistant, QST





In preparation for maintenance work, he makes it look easy to bring the multi-ton structure to the horizon.

pler shift is there. In the backyard of his West Windsor, New Jersey, home a 28-foot diameter dish makes whirring noises as the azimuth, elevation and feed polarization are adjusted to peak the reflected signal. Just a few miles away at Grovers Mill, Orson Welles had imagined large dishes of a sort that were instead occupied by landing Martians in *The War of the Worlds* more than four decades earlier.

But, who is this person conducting a more real form of extraterrestrial communications and is the classic example of a serious vhf'er? How did he become the one to arrive at a major milestone of this difficult radio challenge?

Actually, Al is quite an ordinary family man. He has a wife, Sally, a five-year-old daughter, Alisha, and a dog, CQ. From their modest suburban home, he is chairman of the Engineering Technology Department at Trenton State College and she specializes in speech pathology.

### Young Pioneer

Always, Al has been a futurist and vhf'er. At the age of 12, in 1956, he obtained his Novice license and operated exclusively with the then-available 2-meter privileges. The only time he listened to high frequency was for WIAW code practice so that he could upgrade.

His bearded appearance and character are reminiscent of the late fifties. When most high schoolers and college types were digging the latest be-bop dances, Al was experimenting with the

latest vhf and up circuits. His interest focused on uhf and he began writing the "UHF Roundup" for *The VHF Amateur*. Later, in 1963, it was incorporated into *CQ* magazine. Some of the topics he covered included weak signal detection, amateur television, converters, transmitters, surplus equipment conversion, and of course, moonbounce.

### Early Moonbounce

Before amateur involvement, the only other known moon relay circuit was operated by the U. S. Navy between Washington, DC and Hawaii. Their 400 megawatts of effective radiated power carried four multiplexed radioteletype channels.

The first two-way amateur link took place between the Eimac Radio Club, W6HB, and the Rhododendron Swamp VHF Society, W1BU, on 1296 MHz in July, 1960. Only a few amateurs heard anything more than their own echoes over the following years.

Nevertheless, Allen maintained an interest in that activity, comparing various means of long-distance vhf work on a balance sheet.<sup>1</sup> Generally, for any communication over 500 miles at 432 MHz, moonbounce came out the winner over tropo for minimum loss. Amateurs at government and private institutions began conducting tests with other amateurs in the mid-sixties using very large arrays such as the 150-foot steerable dish at WA6LET or the 1000-foot di-

ameter parabolic surface at KP4BPZ. A significant factor he saw was that not one amateur heard another on 432 MHz.

"It was very discouraging . . . 1296 [MHz] is kind of like that now. There is stuff around, but nobody really was making a concerted effort." While still doing undergraduate work at Newark (New Jersey) College of Engineering, he built a 20-foot stressed wood parabolic dish<sup>2</sup> and rented a place in the country. That subsided for lack of activity and a masters program at Rutgers.

### A New Start

The catalyst that renewed his 432 EME interest came after VE7BBG worked WA6HXW in 1971. Immediately, he set out to rebuild the 20-foot dish and within a few months it was operational.

During the 1972-73 winter he obtained the surplus 28-foot dish that is his present antenna. In typical Pack Rat style he scrounged the supporting tower from the side of a road and made the mount in the college welding shop. It took until the summer to fully assemble, but the 28 dB of gain over an isotropic source made it worth the effort.

For more than a year, he kept skedding ZE5JJ without success, but at an afternoon tea with some of the college students, the signal came out of the noise so loud that Al projected the station speaker to the backyard. They have worked other times since on simple QRZeds. About the only other station that has had any success with the Rhodesian is G3LTF.

He feels that the key element for his success is the rotatable linear feed on his antenna. The dual dipoles and reflecting surface at the focal point of the dish can be rotated in the plane of the reflector. Faraday rotation is not as pronounced at 432 MHz as at 144 MHz, but the spinning of the signal as it travels is enough to place the received signal 20 dB or more down from a phased polarization with the antenna.

Much like two single-sideband stations chasing each other across the band for voice clarity, EME stations have to be aware that changing the polarization for reception will affect the other station's reception when the path is reversed.

### VHFer

We said that Al is a vhf'er, implying other phases of activity besides EME. Indeed, he does do other things in this world. On the same weekend as the Worked All Continents accomplishment he was at Trenton State participating in the antenna measuring contest. A loop Yagi he built for 1296 MHz measured more than 19 dB of gain. At the top of

<sup>1</sup> References appear on page 60.

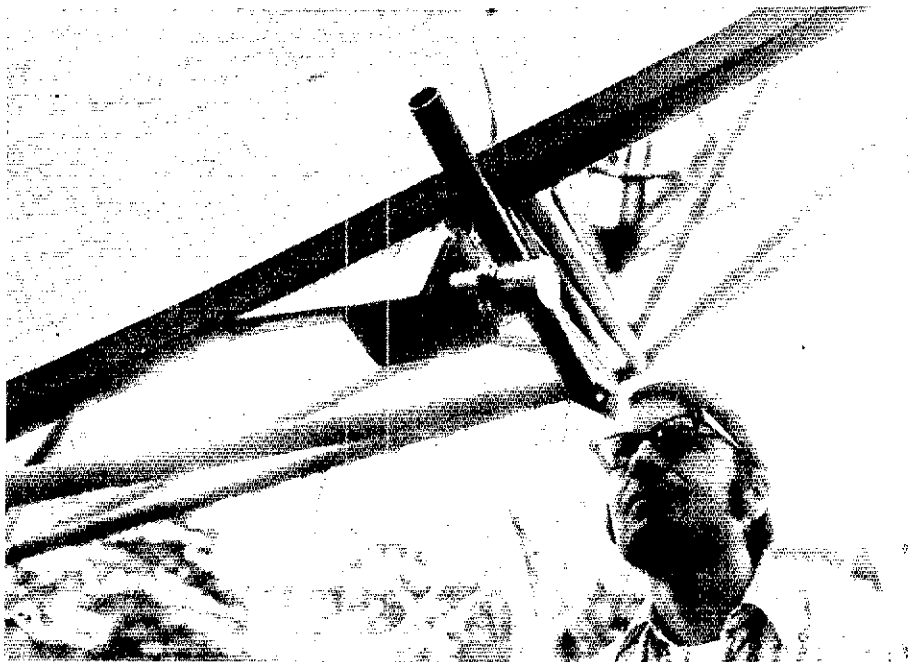
his 100-foot tower is an array of 16 8-element Yagis for 432 MHz tropo. That has helped to bring his states total for that band to 34. Another vhf interest is the OSCAR program, mode B, of course, since it uses his favorite 432 MHz frequency for input.

Vhfers have varying ideas about defining a valid contact because of the inherent weak signal work. He feels that an assertive policy is needed and looks back at the early meteor scatter days. Much was written about calls heard one way on a given day and portions of calls were heard the other way on another day. After several days of such partials, could it be considered a complete contact?

He, as most other moonbouncers, accepts the definition as an exchange of some unknown piece of information. They frequently use the T M O S system. After call signs have been established, the signal report, using one of those four characters, is sent at 3-4 words per minute as the unknown piece of information. The lowest report is T, indicating that something is there, like an SØ, M is the minimal report for copy of calls and information, with an O there is some margin and long pieces of copy, and 5 can be used with an actual S report.

#### Amateur Existence — Cooperation

The most major amateur cooperative effort that Allen has been a part of to date has been the HK1TL operation that made possible his 432 MHz WAC. Every month he publishes an EME newsletter sent to all known participants around the world. As the plans developed he helped to coordinate the



A high-gain antenna must be accurately aimed. With this dish the half-power beamwidth is 6°, about one click on a conventional rotator control. Al's indicators read to within 1°.

scheduling, for otherwise the bottom end of 432 MHz might have sounded like a 20-meter pileup.

It was a logistical achievement for international relations and technology. Amateurs, officials and relatives in both the United States and Colombia volunteered countless amounts of time, skill and money to make the expedition a success.

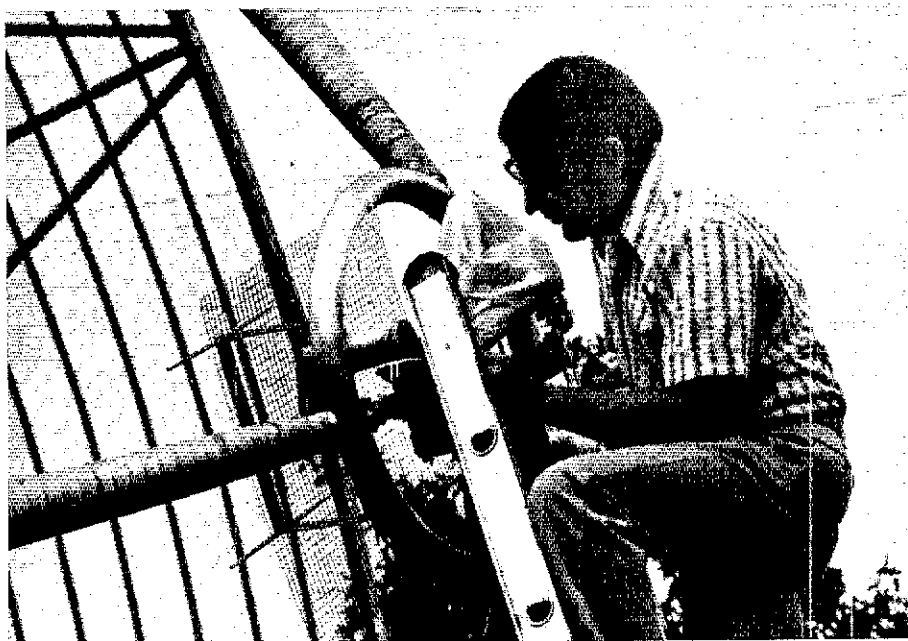
After missing K2UYH on the first attempt, the crew at the beachside location near Barranquilla physically

held the huge portable antenna array to keep the sharp antenna corrected for windage and enable the first 432 MHz and moonbounce Worked All Continents to be done. The full details of the Pack Rats' moonbounce expedition, however, is a story in itself.

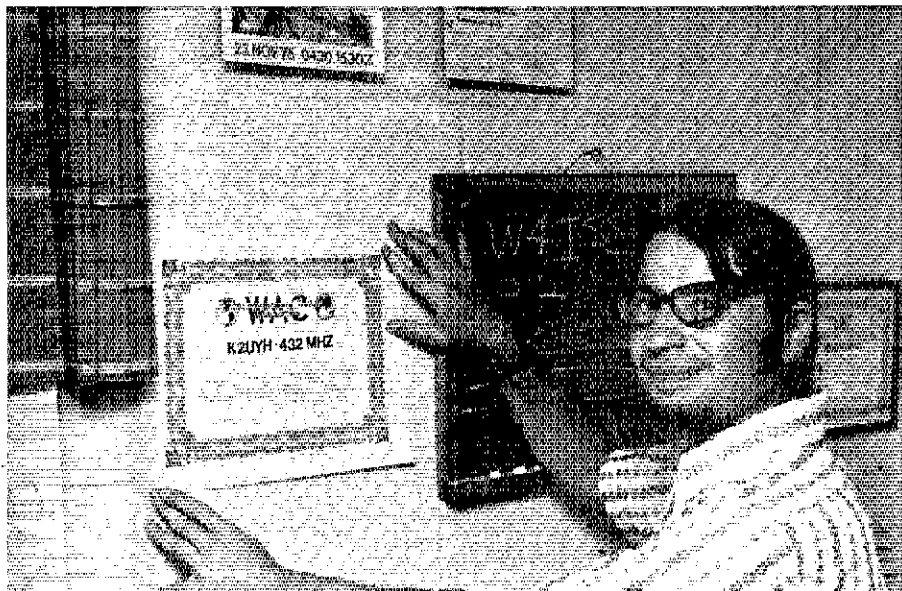
#### Futurist

Another classification we gave Al was that of futurist. For a pastime outside of amateur radio (!) he is a computer hobbyist. Microprocessor technology has advanced geometrically in the last few years to bring systems within reach of interested persons. Quite naturally, radio amateurs have become attracted to the processes and applications, such as controlling the aiming for an EME antenna. Right now, he says, the computer hobbyist is like the early radio listener. He has a device that is a novelty, but in a transition period, he becomes known as a hobbyist separate from the object. With some amateurs, like himself, the computer is still an adjunct to his primary interest of amateur radio. For others, like his friend, Doug Moser, WA2LTM, the involvement with microprocessors almost overtakes it. Al's system is still set up at his office, separate from his station.

At Trenton State College, the program that he oversees is a bit different from a traditional engineering curriculum. He has placed emphasis on courses that will attract and involve persons like a typical ham. Because of amateur radio, someone may feel that the logical step would be an electrical engineering course, but is turned off by



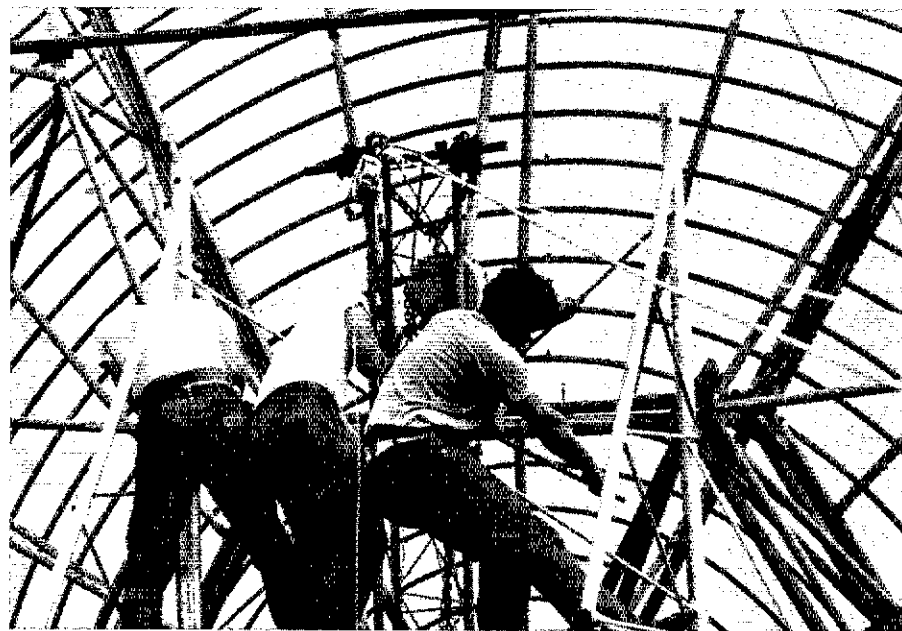
Al attributes the success of his installation to the linear feed that can be peaked rotating in the plane of the mesh reflector. (WA2LTM photo)



Al posts the certificate he achieved for the first Worked All Continents on a band above six meters. It truly represents the International Amateur Radio Union's goal of promoting technical and operating performance through worldwide cooperation.



Progress toward a 432-MHz Worked All Continents by moonbounce: In his home continent of North America, Al was inspired to resume activity by the work of Cor Maas, VE7BBG. This card confirms a contact between them on November 12, 1973. Almost a month earlier, on October 13, he worked G3LTF for Europe. Until the HK1TL expedition P. K. Blair was the only other operator besides Al to have accumulated five continents. After the 28-foot dish was installed, one of the first contacts was with the Wireless Institute of Australia station at Illawara, VK2AMW. That contact of March 10, 1973, set a 432-MHz distance record of more than 10,000 miles and stood for over a year-and-a-half. Only G3LTF had also worked the sole African representative, Peter Carey, ZE5JJ. Their two-way was done on April 5, 1974, after a year of fruitless scheduling. More stations, however, should be successful when Pete puts a 32-foot dish into operation this fall. Among the stronger signals out of Asia is Aki Munezuka, JA1VDV. He used a K2RIW-style 20-foot dish for their contact of March 27, 1975. No card was available at press time for Al's historic contact with the last continent in the International Amateur Radio Union, South America. On July 29, 1976, however, HK1TL completed two-way communication with K2UYH for the first 432-MHz Worked All Continents.




It is more than a one-man show. Constructing such a large device requires the cooperative effort of several fellow amateurs.

of placing ATV on fixed channels for five years, then reevaluating the situation. Having worked both sides as an operator, he sees viable development of each in the spirit of amateur radio. With a workable band plan, he feels, all amateurs' specialities can continue to coexist through their unique ability to self-police and cooperation.

### Epilogue

Signals from WB5LUA are peaked and the message goes across, "ANT WKS FB AL 73."

What next? Worked All States is a definite possibility and perhaps DX Century Club. Already, 14 countries are in the K2UYH log.

Of her husband, Sally Katz says, "Some women marry for money and goods, but he is the only one who can give me the earth, moon and stars." 

### References

- <sup>1</sup> Katz, "UHF Roundup," *The UHF Amateur*, August, 1963.
- <sup>2</sup> Katz, "Simple Parabolic Antenna Design," *CQ*, August, 1966.

the theory and lack of laboratory classes available. As every ham knows by Murphy's Law, theory and practice can be quite far apart. Thus, all classroom courses are matched as closely as possible to practical experience.

The other integration that he foresees is the reciprocal — technical and theoretical people into amateur radio. He views the proposed Communicator class type of license as an ideal way to attract those who are oriented along amateur

lines, but do not want the code.

Another FCC proposal that he has thoughts about is the bandwidth docket. In his primary band of 420-450 MHz much antagonism has arisen between users of wide-band fast-scan television and narrow-band weak-signal operators, like EMEers, over a band plan and value judgments of the different modes. Docket 20777 would eliminate fast-scan television from that band, but Al favors the League's counterproposal

# Upbeat at 5,280 Feet

ARRL Board meets at height usually used for repeaters; decisions should keep League soaring.

By Perry F. Williams,\* W1UED

The Board of Directors sat for three days at Denver — but not on its hands! Hottest problem on the regulatory front of the meeting July 14-16 at the Denver Hilton was, of course, Docket 20777, FCC's proposals for designating bandwidths rather than modes. (See "Happenings," June and July *QST* for details of the docket.) After intensive work by an ad hoc committee, two sessions as a Committee of the Whole, and a drafting committee — procedures which proved so successful a year earlier on Docket 20282, Restructuring — the Board passed fifteen motions based on the principle that no amateur should suddenly lose privileges or find his equipment obsolete overnight. The Board endorsed the concept that permissible emissions should be specified both in terms of bandwidth and of mode as appropriate. It would continue exclusive cw and RTTY segments of the hf bands, newly authorizing a wide choice of codes (such as ASCII) and speeds. Teleprinters using 850-cycle shift keying could continue to be oper-

ated but this use would be restudied five years hence. The Board rejected that feature of the FCC proposal which would have permitted RTTY in the hf phone bands. The Board also rejected the proposal of Docket 20777 to eliminate the use of double sideband a-m on frequencies below 28 MHz, but it did agree that a-m bandwidth in those bands should be no greater than 6 kHz. It further agreed to restudy the matter five years from now. On 10 meters, the Board made three bandwidth recommendations: That 28.5-29.0 MHz phone have a nominal bandwidth no greater than 6 kHz; that 29.0-29.7 have a bandwidth of 16 kHz; and that wide-band fm, 40F3 emission, should be permitted for five years and then be dropped, not only on the high end of 10 meters but also in 52-54, 144.1-148 and 220-225 MHz. Otherwise, the maximum bandwidths for these three bands should be 16 kHz, in the Board's view. The directors rejected any rule change which would exclude independent sideband emission in the hf voice bands, since this mode was seen as a prime area for amateur experimentation. It also decided to support present SSTV alloca-

tions without change and facsimile emissions of comparable bandwidths in the subbands where SSTV transmissions are presently permitted. The bandwidths proposed by FCC in the docket would have ended all amateur television (fast scan) use of the 420-MHz band; the Board rejected this idea. Instead, it proposed two channels, at 439.25 and 427.25 MHz, each a nominal 4 MHz wide, for ATV use, both direct and via repeaters. The matter would, however, be restudied five years after the ARRL filing. The directors felt that the provisions for purity and stability of emissions, currently expressed in section 97.73 of the FCC rules, should not be changed; they further felt that precise bandwidth criteria requiring the use of costly additional instrumentation were neither necessary nor desirable. ARRL's comments are to be filed with FCC along these lines by the comment deadline, set for August 4 as this article is being written.

Elsewhere in the regulatory field, the League will seek phone privileges for Novices in the 145.0 to 145.5 and 222 to 225 MHz bands, as an interim step toward the "Basic Amateur" license which the Commission cannot undertake right now. The Board also will request that the minimum age for volunteer examiners be lowered to 18. Explorations with FCC staff of several deregulatory matters in the vhf field are to continue: Multiplexing of audio and control functions for remotely controlled stations; relief from tape logging for automatically controlled stations; altering of present height-above-average-terrain and effective radiated power restrictions on the 6-meter band; and dividing responsibility for repeater operations between technical things and user matters. In the area of local legal problems, two new information packages are to be prepared, one for laymen, one for attorneys. There was also ordered, on a very limited trial basis, some

\*Manager, Membership Services



Informal QSOs are an important part of the legislative process, too. In the left photo: Canadian Counsel Bob Benson, VE2VW; Treasurer John Huntoon, W1RW; (seated) Vice President Noel Eaton, VE3CJ. Right photo: (from left) Directors Dick Egbert, W8ETU; Bob Thurston, W7PGY; Vice President Carl Smith, W0BWJ; Director Roy Albright, W5EYB.

financial assistance (not to include payment of attorneys' fees) to amateurs having problems arising from their amateur antenna installations or their operations.

The reports of the officers to the Board show the League to be alive, well and on the move. As President Dannals put it at the ARRL Forum in the National Convention which followed the meeting, "Each membership we accept in the lobby this weekend establishes a new all-time record for membership!" The June 30 figures show more than 130,000 entries on our roster. The new training programs authorized at the January meeting are well along, with portions being field-tested as the Board met, for release to clubs and instructors in September. Sales of League publications across the board are up; the new beginner package, *Tune in the World with Ham Radio*, and the new *Data Book* have been placed on sale; two more books and additional training materials are being produced; and the League hq. has developed new speedy ways to handle simple requests for forms and the like. All this adds up to a crying need for more space: Accordingly, the Board authorized a 60 percent increase in office area through a 15,000

square foot addition to the building in Newington with an estimated cost of \$800,000.

On matters of direct interest to individual amateurs, the Board voted that ARRL awards should be free to members (not counting return postage or insurance charges); that 160-meter and RTTY versions of the DX Century Club Award should be provided for on a 100-countries, no-endorsement basis; that there be appointments of members as technical advisors to assist the technical department; that an outgoing QSL Bureau be established by ARRL; that direct mailings be made to repeater licensees/trustees before each new edition of the Repeater Directory to improve its accuracy; and that direct (simplex) frequencies for fm in the 6-meter band be set at 52.97, 52.99, 53.01 and 53.03 MHz. A monthly propagation column is to be established in *QST* and a list of all materials available from Hq. will be published.

Guidelines for the new Technical Excellence Award for *QST* articles were adopted, and the 1975 award was conferred on Wes Hayward, W7ZOI, for his July, 1975, *QST* article, "Defining and Measuring Receiver Dynamic Range." Honorable mentions in the same pro-

gram went to George R. Steber, WB9LVI for "Slow-Scan to Fast-Scan TV Converter" in the May, 1975 issue and to Richard Bingham, WA6BDR, W7KWR, for the December presentation, "A Modular Transceiver for 129.75 MHz." The long-established ARRL Technical Merit Award for 1975 was conferred on Theodore Cohen, W4UMF, recognizing his work as secretary of the ARRL RFI Task Group and in seeking legislation to reduce the susceptibility of home-entertainment devices to radio frequency interference. M. F. "Bud" Cone, WA4PBG, was honored for his work with the Emergency Communications Advisory Committee since its inception, both as member and as chairman.

Studies were requested of national frequency coordination, an Amateur Radio Hall of Fame, possible realignment of subbands in the high frequency bands, the possible relocation of the Hq. station to a more-central part of the U.S., a movie for IARU use overseas, group liability insurance for clubs, and means for ex-amateurs to return easily to amateur radio.

More, much more, detail can be found in "Moved and Seconded" on the following pages. It was quite a meeting

## Moved and Seconded...

### MINUTES OF THE 1976 SECOND MEETING OF THE BOARD OF DIRECTORS THE AMERICAN RADIO RELAY LEAGUE, INC.

July 14-16, 1976

1) Pursuant to due notice, the Board of Directors of The American Radio Relay League, Inc., met in annual session at the Denver Hilton, Denver, Colorado, on July 14, 1976. The meeting was called to order at 9:10 A.M., M.D.T., with President Harry J. Dannals, W2TUK, in the Chair, and the following directors present: Roy L. Albright, W5EYB, West Gulf Division; Garfield A. Anderson, W0KE, Dakota Division; Max Arnold, W4WHN, Delta Division; Charles M. Cotterell, W0SIN, Rocky Mountain Division; Richard A. Egbert, W8ETU, Great Lakes Division; I.A. Gmelin, W6ZRJ, Pacific Division; Paul Grauer, W0FTR, Midwest Division; John R. Griggs, W6KW, Southwestern Division; Philip E. Haller, W9HPG, Central Division; Ron J. Hesler, VE1SH, Canadian Division; Harry A. McConaghy, W3SW, Atlantic Division; Larry E. Price, W4RA, Southeastern Division; John C. Sullivan, W1HHR, New England Division; Robert B. Thurston, W7PGY, Northwestern Division; L. Phil Wicker, W4ACY, Roanoke Division; Stan Zak, K2SJO, Hudson Division. Also in attendance, as members of the Board without vote, were Victor C. Clark, W4KFC, First Vice President; Noel B. Eaton, VE3CJ, and Carl L. Smith, W0BWJ, Vice Presidents; and Richard L. Baldwin, W1RU, General Manager. Also in attendance, at the invitation of the Board as non-participating observers, were the following Vice Directors: Jesse Bieberman, W3KT, Atlantic Division; Maurice

O. Carpenter, K0HRZ, Rocky Mountain Division; Bev B. Cavender, K4VW, Southeastern Division; George A. Diehl, W2IHA, Hudson Division; Claire Richard Dyas, W0JCP, Midwest Division; William W. Eitel, WA7LRU, Pacific Division; Jay A. Holladay, W6EJJ, Southwestern Division; Malcolm P. Keown, W5RUB, Delta Division; John F. Lindholm, W1DGL, New England Division; William W. Loucks, VE3AR, Canadian Division; and Edmond A. Metzger, W9PRN, Central Division. There were also present Honorary Vice Presidents R.O. Best, W5QKF and Charles G. Compton, W0BUO; Treasurer John Huntoon, W1RW; General Counsel Robert M. Booth, Jr., W3PS; Canadian Associate Counsel B. Robert Benson, VE2VW; Communications Manager George Hart, W1NJM; Senior Assistant Secretary Perry F. Williams, W1UED; *QST* Technical Editor Doug DeMaw, W1CER; Assistant Secretary David Sumner, K1ZND; and Public Relations Consultant Don Waters.

2) On motion of Mr. Gmelin, seconded by Mr. Sullivan, the agenda was unanimously adopted. On motion of Mr. Thurston, seconded by Mr. Griggs, unanimously VOTED that the minutes of the 1976 annual meeting of the Board of Directors are approved in the form in which they were issued by the Secretary.

3) At this point, extensive oral reports were offered by the Officers of the League. President Dannals briefed the Board on the latest developments in Docket 19759, FCC's proposal for a new Class E Citizens Band, proposed to be located in the 220-225 MHz Amateur Band. The text of a telegram which had been sent to the President of the United States was furnished to each member of the

assemblage. The President also related developments connected with the Basic Amateur license proposed by ARRL in Docket 20282. Vice President Eaton, who also serves as President of the International Amateur Radio Union, reported on the Region II and worldwide meetings of IARU in Miami; amateur emergency communications following the Guatemala earthquake; and his travels in preparation for the World Administrative Radio Conference (WARC) in 1979. First Vice President Clark, who also serves as President of the Region II Division of IARU, reported on the frequency plans for WARC adopted in Miami; the preparatory meeting conducted by FCC for WARC; his travel to the FRACAP Convention in Panama; the amateur radio display and station NN3SI at the Smithsonian Institution; and the work of the Radio Frequency Interference Task Group. General Manager Baldwin reported on League finances; the need for building expansion; staff matters, including the appointment of David Sumner, K1ZND, as Assistant General Manager, Membership Operations; his work in preparation for WARC; ARRL participation in the satellite program; repeater frequency coordination survey; and the experimental training program encompassing three phases: promotion, training and retention. Vice President Smith reported on the Sister Cities project and on membership contact trips. Treasurer Huntoon reported on ARRL investments. General Counsel Booth reported on rule making; legislation connected with RFI court cases; relations with attorneys; malicious interference cases; relations with FCC; and enforcement/prosecution matters. In the course of the above, the Board was in recess



from 10:40 A.M. to 11:00 A.M.; for luncheon from 12:24 P.M. to 1:15 P.M.; and from 3:15 P.M. to 3:35 P.M.

4) Mr. Albright, as Chairman, read the report of the International Affairs Committee.

5) Mr. Price, as Chairman, read the report of the Plans and Programs Committee. Moved by Mr. Grauer, seconded by Mr. Thurston, that the General Manager is directed to establish an outgoing QSL Bureau at ARRL headquarters operating for the benefit of members under such policies and procedures as the General Manager may prescribe. The bureau shall commence operation not later than January 1, 1977. After discussion, Moved by Mr. Gmelin that the motion is amended to include the establishment of a Headquarters-operated incoming QSL Bureau that will assume the operation of the present call letter incoming QSL Bureaus. But there was no second, so the motion to amend was lost. After further discussion, Moved, by Mr. Zak, seconded by Mr. McConaghy, that the matter be laid on the table, but the motion to table was lost. Whereupon, a roll call vote being requested, the matter was decided in the affirmative, ten votes in favor to six opposed. Those voting in favor were Messrs. Albright, Cotterell, Egbert, Gmelin, Grauer, Griggs, Hesler, Price, Sullivan, and Thurston. Those voting opposed were Messrs. Anderson, Arnold, Haller, McConaghy, Wicker, and Zak.

6) Vice President Clark, as Chairman, reported for the Ad Hoc Committee on Docket 20777 which had been appointed by President Dannals during the Executive Committee Meeting on July 13.

7) On motion of Mr. Price, VOTED, at 5:25 P.M., that the Board does now resolve itself into a Committee of the Whole to discuss staff matters, and that the Headquarters staff, exclusive of the General Manager, be excused. The designated people departed from the meeting. The Committee rose at 5:35 P.M. and reported to the Board.

8) The Board was in recess for dinner from 5:35 P.M. to 8:16 P.M.

9) Mr. Sullivan, as Chairman, presented the report of the Membership Affairs Committee. On his motion, seconded by Mr. McConaghy, it was unanimously VOTED to accept the guidelines presented by the Membership Affairs Committee for the annual selection of the QST author whose article is judged to have the highest degree of technical excellence for the previous year.

10) Moved, by Mr. Sullivan, seconded by Mr. Thurston, that an appointment for the Technical Department be instituted and known as a Technical Advisor. ARRL members wishing to serve the ARRL Technical Department in this voluntary position shall first secure an acceptable recommendation from this department in order to be presented to the appropriate division director for appointment. The term of this appointment shall be for one year and be renewed upon recommendation of the Technical Department. A suitable certificate of appointment shall be provided. After discussion, on motion of Mr. Price, seconded by Mr. Albright, VOTED that the matter be laid on the table.

11) Mr. Egbert, as Chairman, presented the report of the Management and Finance Committee.

12) Mr. Cotterell, as Chairman, presented the report of the Legal and Regulatory Committee. Moved, by Mr. Haller, seconded by Mr. Cotterell, that, on a trial basis until the next regular meeting of the Board of Directors, the out-of-pocket expenses (but not attorney fees) incurred by licensed League members in defending against law suits and similar actions arising from alleged violations of zoning ordinances and/or building codes and alleged interference be reimbursed in an amount to be determined by League Headquarters with the concurrence of the General Counsel, provided if, in the opinion of the General Counsel, after consideration of information then available, the case involves (1) a significant miscarriage of justice or harassment, (2) a potential legal precedent, and/or (3) a severe case of financial hardship upon the League member. After discussion, Moved by Mr. McConaghy, seconded by Mr. Grauer, that the motion be amended by adding the words, "not to exceed \$500 per case." On motion of Mr. Price, seconded by Mr. Sullivan, VOTED that the matter be laid on the

table.

13) On motion of Mr. Cotterell, seconded by Mr. Gmelin, unanimously VOTED that the General Counsel prepare two legal brochures, packets, or kits to replace the present legal kit, one for distribution to and for use by individual amateurs and clubs, and the other for distribution primarily to attorneys representing amateurs in amateur-type legal proceedings, with the January 1977 Board of Directors Meeting as the target date for the presentation of final drafts of this material to the Board.

14) Mr. Zak, as Liaison, presented the report of the Ad Hoc Committee on QSL Bureaus. Mr. Egbert, as Chairman, presented the report of the Ad Hoc Committee on electronic data processing. Mr. Smith, as Liaison, presented the report of the VHF Repeater Advisory Committee. Mr. Zak, as Liaison, read the report of the Contest Advisory Committee. Mr. Arnold, as Liaison, read the report of the Emergency Communications Advisory Committee. Mr. Price, as Chairman, presented the report of the DX Advisory Committee.

15) On motion of Mr. Price VOTED, at 10:25 P.M., that the Board does now resolve itself into a Committee of the Whole to discuss DX matters, and that the Headquarters staff, exclusive of the General Manager and the Communications Manager, be excused. The designated people departed from the meeting. The Committee rose at 11:35 P.M. and reported to the Board.

16) The Board recessed at 11:35 P.M., reconvening at the same place at 8:38 A.M. on July 15, with all persons herein before mentioned present.

17) On motion of Mr. Clark, seconded by Mr. Albright, unanimously VOTED that the Board does now resolve itself into a Committee of the Whole for the purpose of discussing FCC Docket 20777. The Committee rose at 12:26 P.M. and reported to the Board. Whereupon, the president appointed a Drafting Committee consisting of Vice President Clark, as Chairman; Honorary Vice President Compton; Vice Directors Diehl, Holladay, and Lindholm; and Technical Editor DeMaw. The Board recessed for luncheon at 12:27 P.M., resuming its work at 1:25 P.M. with all of the persons herein before mentioned present except Messrs. Best, Cavender and Booth. At this point, the Drafting Committee appointed above was excused to proceed with its work.

18) On motion of Mr. Price, seconded by Mr. Gmelin, after discussion, the following resolution was ADOPTED: Whereas, the League in its comments and counterproposal to the FCC in the matter of Docket 20282 proposed a number of innovative changes including an integrated single-ladder licensing structure in which each licensee would hold all the privileges of the license classes having lesser requirements, and: Whereas, the counterproposal also envisioned the creation of a new class of license below the Novice class to be called Basic Amateur with limited privileges in the 144 and 220 MHz amateur bands, and: Whereas, the FCC has recently issued a First Report and Order in the matter of Docket 20282, adopting the essential principles of an integrated single-ladder structure, and: Whereas, Commission personnel have informally indicated that the Basic Amateur class license cannot be adopted in the near future because of the existing overload of the Commission's license application processing facilities, now, therefore, BE IT RESOLVED, by the Board of Directors of the ARRL, that the FCC be petitioned to immediately add the following additional privileges for the Novice class license, these privileges being those which the League originally proposed for the Basic Amateur Class: 50-watts dc input on 145.0-145.5 MHz and 222-225 MHz, using A1, A3, and F3 emission. Mr. Hesler abstained, and Mr. Sullivan requested that he be recorded voting in the negative.

19) On motion of Mr. Griggs, seconded by Mr. Zak, it was unanimously VOTED that the General Manager effect a change in Field Day rules to encourage the use of sites where amateur radio would be on display to the public, instead of being hidden away in remote locations, so as to promote more awareness of amateur radio. During the course of the above, Mr. Cavender and Mr. Booth entered the meeting, at 1:40 P.M.

20) Moved, by Mr. Albright, seconded by Mr. Thurston, that the President appoint an Ad Hoc Committee to examine the need for a national frequency coordination system for amateur repeaters, to define the proper role of the ARRL in the implementation of such a system, and to make appropriate recommendations to the Board at the 1977 Annual Meeting. Further, Moved that the Committee is recommended to utilize the assistance of the VRAC, the staff, and such other information sources as may be available, in developing the study. After discussion, on motion of Mr. Sullivan, seconded by Mr. Price, VOTED to amend the motion so that the first line would read, "that the president assign to a Standing Committee examination of the need . . ." Whereupon, the motion as amended was ADOPTED. Mr. Griggs requested to be recorded as voting in the negative.

21) Moved, by Mr. Sullivan, seconded by Mr. McConaghy, that in order to accommodate the continuing growth of the League, the General Manager is authorized to contract the construction of an addition to the Headquarters offices of approximately 15000 square feet, at a cost estimated at \$800,000 with the General Manager to keep the Board continuously informed as to the progress of the construction. Further, the General Manager is to coordinate with the Management & Finance Committee all details of financing of the construction and furnishing of this addition. Moved, by Mr. Cotterell, seconded by Mr. Grauer, to amend the motion by striking the text and substituting therefor the following: Whereas, it is agreed that the present building at the Headquarters in Newington, Connecticut, is too small to provide the space necessary to deliver all services now being offered to the members of the League and to other amateurs and that its location in the extreme northeastern part of the United States removes it from the mainstream of Canadian and American amateur radio life, and that the League contemplates that more services will be initiated as the years pass, therefore, IT IS RESOLVED, that a Committee of five directors be formed, consisting of one American Radio Relay League director to be selected from each of the areas of the United States and Canada based as equally as possible upon lines of longitude from 65 degrees west to 125 degrees west of the principal meridian and chaired by the President of the League or designated officer designated by the President, and that a complete study be made to determine if a suitable location near or within a few hundred miles of the present geographical center of the continental United States might not be better suited as a permanent headquarters of the League than the present headquarters to bring to our members the myriad services of the League at a lesser cost than present plans and to a more representative body of members than at present, with the following guidelines: That the Committee consider the location of the League's station, so that all members of the League would be better served by its services, and that a study be made as to the cost and availability of such utilities now used and in the future for a term of 25 years, of the costs of transportation of League supplies to the headquarters and its subsequent reshipment to members in all parts of the United States and Canada; that the study further include the costs of travel necessary to and from such a new location compared to the present location to the various places required; and further, that it consider the depressed state of the market for commercial building in many areas as compared to the cost of constructing new buildings, and a comparison be made concerning the above and that other matters that may be brought to this committee in a timely fashion such as any problems concerning Headquarters personnel, and that a recommendation be made at the January, 1977 Board meeting, all in the best interests of the League, and that in the meantime, as necessary, suitable office space be leased for such a period of time as dictated by space requirements and time needed. A roll call being requested, the amendment was rejected, four votes in favor to twelve opposed. Those voting in the affirmative were Messrs. Cotterell, Gmelin, Grauer and Griggs. Those voting opposed were Messrs. Albright, Anderson, Arnold, Egbert, Haller, Hesler, McConaghy, Price, Sullivan, Thurston, Wicker

and Zak. After further discussion, a roll call again being requested the original motion was ADOPTED, fifteen in favor to one opposed. All of the directors voted in the affirmative except Mr. Griggs, who voted nay.

22) On motion of Mr. Haller, seconded by Mr. Wicker, unanimously VOTED that the ARRL 1975 Technical Merit Award be presented to Dr. Theodore J. Cohen, W4UMF, of Alexandria, Virginia, in recognition of his vigorous and persistent effort in articulating and publicizing the technical realities of the growing Radio Frequency Interference problem in his role as Secretary of the ARRL RFI Task Group.

23) On motion of Mr. Anderson, seconded by Mr. Arnold, unanimously VOTED that the Membership Affairs Committee be asked to study the League's procedures for proper recognition of long and meritorious service to the League by establishing an "ARRL Hall of Fame."

24) Moved, by Mr. Arnold, seconded by Mr. Zak, that By-Law 31 be revised to read as follows: Each such committee shall consist of at least three directors, one of whom shall be specifically designated as Chairman. At the option of the President, each such committee may include a Vice President as an additional member. Appointments shall be made by the President during annual meetings of the Board of Directors and shall be for a term of one year. Standing Committees shall make written annual reports at least thirty days prior to each annual meeting of the Board of Directors. On motion of Mr. Gmelin, seconded by Mr. Sullivan, VOTED that the matter be laid on the table.

25) On motion of Mr. Egbert, seconded by Mr. Anderson, unanimously VOTED that the General Manager, in cooperation with the Management & Finance Committee, prepare a projection of ARRL funding requirements for the years 1978 and 1979 and make appropriate recommendations to the Board of Directors within 120 days regarding any steps required to meet these funding requirements.

26) On motion of Mr. Zak, seconded by Mr. Griggs, VOTED that the President and General Counsel request the FCC to lower the amateur radio examiner's age to 18 and to petition for such a request if required. Mr. Hesler abstained.

27) Moved, by Mr. Grauer, seconded by Mr. Sullivan, that the President is directed to assign to a Standing Committee to study the desirability of the conversion of the present WIAW building into an ARRL Historical Museum of Amateur Radio and the relocation of the official League station to a site in the central portion of the United States so that it might better serve the needs of all members. A roll call being requested, the motion was ADOPTED, fourteen in favor to two opposed. All of the directors voted in the affirmative except Messrs. Anderson and McConaghy. The Board was in recess from 3:15 to 3:35 P.M.

28) On motion of Mr. Hesler, seconded by Mr. McConaghy, unanimously VOTED that a distinctive jeweled pin be designed and produced for the League President and Vice Presidents and that these pins designate the respective titles. Further, that similar pins be presented to past Presidents and past Vice Presidents.

29) On motion of Mr. Gmelin, seconded by Mr. Grauer, VOTED that since Article II of the League's Articles of Association is designed in part to prevent a conflict of interest between the League's Directors, Vice Directors and Officers, and commercial radio interests, the General Counsel is instructed to write definitive guidelines for determining if a conflict of interest in commercial radio does exist for any candidates for these offices. These guidelines shall follow and be based on any present guidelines used by the U.S. Government for determining conflict of interest for both political or appointive office seekers and in the hiring of individuals to work on Government contracts. These guidelines to be presented to the Executive Committee for approval by September 20, 1976. During the course of the above two discussions, Vice Director Carpenter acted as Director from the Rocky Mountain Division, while Mr. Cotterell was absent on business.

30) Moved, by Mr. Wicker, seconded by Mr. Gmelin, that the ARRL shall petition the Federal Communications Commission for

Rule Making to extend General class operating privileges in the seventy-five-meter voice band to include the segment 3825-4000 kHz. After discussion, on motion of Mr. Albright, seconded by Mr. Price, VOTED that the matter be committed to the Plans and Programs Committee for study.

31) On motion of Mr. Smith, seconded by Mr. Griggs, unanimously VOTED that the General Manager is directed to continue to explore with the FCC staff, informally and in line with previously established Board policy, the resolution of desirable rule changes relating to: (1) multiplexed audio and control signals on any of the frequencies employed by a remotely controlled station, and that there be no restrictions in the application of such multiplexing; (2) relief of the requirement for tape recording as a form of logging for repeaters under automatic control; (3) the extension of 16F3 operation from 52.5 to 52.0 MHz.; (4) altering ERP/HAAT specifications for the six-meter band, permitting such repeaters to operate at higher dc power input; (5) the recognition of the basic differences between the technical operation of a repeater and the responsibility for compliance with acceptable communication practices on the users rather than the repeater trustee. Mr. Hesler abstained.

32) On motion of Mr. Price, seconded by Mr. Grauer, unanimously VOTED that effective September 1, 1976, the 160-meter frequency utilized by WIAW for bulletins and code-practice transmissions shall be 1820 kHz.

33) Moved, by Mr. Griggs, seconded by Mr. Gmelin, that the General Manager authorize at a cost of approximately \$12,000 the production of a motion picture film suitable for use by IARU societies in foreign countries and utilizing foreign language narrative in the film as necessary to aid the amateur position for the 1979 World Administrative Radio Conference. After discussion, on motion of Mr. Arnold, seconded by Mr. Egbert, unanimously VOTED that the motion is amended to require the General Manager to study the matter and report to the November meeting of the Executive Committee. Whereupon, the question being on the motion as amended, the same was unanimously ADOPTED.

34) On motion of Mr. Albright, seconded by Mr. Price, after discussion unanimously VOTED that the General Manager is authorized to approve applications for Life Membership in the League in the name of the Executive Committee in those instances where the applicant obviously is in compliance with Life Membership requirements as specified in the Articles of Association and By-Laws.

35) On motion of Mr. Smith, seconded by Mr. Thurston, unanimously VOTED that the Headquarters staff consider the recommendation of the VRAC for designation of 52.97, 52.99, 53.01, and 53.03 MHz as direct (simplex) frequencies and that the editor of QST be directed to publish all of the ARRL band plans, including the recommendations relating to tertiary frequency channels in the 146-148 MHz band, in the Repeater Column at an early date, accompanied by editorial matter in support of acceptance. Mr. Price abstained.

36) Moved, by Mr. Smith, seconded by Mr. Griggs, that the General Manager is requested to consider the use of an insert card in QST in an appropriate month for the purpose of collecting accurate information required for preparation of the Repeater Directory and other information deemed desirable. On motion of Mr. Gmelin, seconded by Mr. Egbert, VOTED that the motion is amended to read: The General Manager is requested to consider the use of periodic mailings to licensees/trustees of repeater stations for the purpose of collecting accurate information required for preparation of the Repeater Directory and any other information deemed desirable. Whereupon, the question being on the motion as amended, the same was ADOPTED.

37) On motion of Mr. Zak, seconded by Mr. Cotterell, unanimously VOTED that the Public Relations Department develop a graphic acronym on amateur radio for use in Emergency and Public Relations work.

38) On motion of Mr. Sullivan, seconded by Mr. Thurston, after discussion, VOTED that all ARRL members be exempted from all fees presently being charged in the awards

program.

39) On motion of Mr. Sullivan, seconded by Mr. Zak, unanimously VOTED that photographs and resumes be prepared for the officers and such staff members having contact with the membership and the general public. Headquarters shall make this material available to the host or sponsoring organization for distribution to the communications media.

40) On motion of Mr. Price, seconded by Mr. Cotterell, unanimously VOTED that the Secretary is directed to prepare a comprehensive indexed list of all standing instructions of the Board now in effect. The list shall be accompanied by his recommendation for additions, deletions or changes as appropriate.

41) On motion of Mr. Wicker, seconded by Mr. Cotterell, unanimously VOTED that the Membership Affairs Committee study the feasibility of establishing an ARRL-type lapel pin for ARRL QSL Bureau Managers and QSL Bureau personnel.

42) The Board recessed for dinner at 5:23 P.M., reconvening at 8:15 P.M.; the Drafting Committee consisting of Messrs. Clark, Compton, Diehl, Holladay, Lindholm and DeMaw returned to the meeting at this point. Thus, all of the members were present, except for Mr. Eitel.

43) On motion of Mr. Thurston, seconded by Mr. Albright, unanimously VOTED, at 8:22 P.M., that the Board does now resolve itself into a Committee of the Whole to consider the work of the Drafting Committee. The Committee rose at 8:40 P.M. and reported to the Board.

44) On motion of Mr. Cotterell, seconded by Mr. Wicker, unanimously VOTED that, recognizing that it is advantageous to permit the Amateur Radio Service to use modes of emission not specifically provided for in the rules, and to encourage development and implementation of more efficient techniques for utilization of the radio spectrum, the Board now consider the proposals comprising FCC Docket 20777.

45) On motion of Mr. Price, seconded by Mr. Gmelin, unanimously VOTED that, acknowledging the need to encourage innovative development of new communications techniques and that established modes of communications used by a large majority of amateurs should also be protected, the Board endorses the concept that permissible emissions be specified both in terms of type of emission and nominal bandwidth, as appropriate.

46) On motion of Mr. Griggs, seconded by Mr. Thurston, unanimously VOTED that the Board endorses the present concept of exclusive cw/RTTY segments in the amateur bands.

47) On motion of Mr. Albright, seconded by Mr. Sullivan, unanimously VOTED that the Board endorses the continued use of 170-Hz shift RTTY on presently authorized frequencies; the continued use of 850-Hz shift RTTY on presently authorized frequencies is endorsed, with the reservation that the need for its continued use be reexamined five years from the date of the League's filing on Docket 20777.

48) On motion of Mr. McConaghy, seconded by Mr. Grauer, unanimously VOTED that the Board reaffirms its earlier position in supporting deletion of all reference to teleprinter operating speeds and to permit the use of any of the standard codes in military or commercial usage, employing state-of-the-art bandwidths, in amateur band segments presently available for RTTY emissions.

49) On motion of Mr. Haller, seconded by Mr. Zak, unanimously VOTED that the Board rejects the proposal which would permit the use of RTTY in present phone subbands.

50) On motion of Mr. Anderson, seconded by Mr. Egbert, unanimously VOTED that the Board rejects the proposal to eliminate the use of double-sideband a-m below 28.5 MHz but recommends that it be limited to a nominal bandwidth of 6 kHz; and recommends further that the use of a-m on these frequencies be reexamined after a period of five years from the date of the League's filing in response to Docket 20777.

51) On motion of Mr. Arnold, seconded by Mr. Cotterell, unanimously VOTED that the Board recommends a nominal bandwidth of 6 kHz in the frequencies from 28.5 to 29.0 MHz.

52) On motion of Mr. Egbert, seconded by

Mr. Arnold, unanimously VOTED that the Board reject any rule changes which would exclude the use of the independent sideband emissions in the high-frequency voice subbands.

53) On motion of Mr. Zak, seconded by Mr. Anderson, unanimously VOTED that the Board endorse the retention of present frequency allocations for SSTV without change.

54) On motion of Mr. Grauer, seconded by Mr. Haller, unanimously VOTED that the Board endorse the concept of permitting facsimile transmissions which conform to SSTV bandwidths in all subbands below 29.7 MHz where SSTV transmissions are presently authorized.

55) On motion of Mr. Sullivan, seconded by Mr. McConaghy, unanimously VOTED that the Board supports the use of 16F3 in segments of the 28, 50, 144, and 220 MHz bands where it is currently permitted; further, the Board recommends that 16F3 be expanded down to 52.0 MHz in the six-meter band.

56) On motion of Mr. Thurston, seconded by Mr. Albright, unanimously VOTED that the Board endorses the continued use of 40F3 in the segments 29.0-29.7 MHz and the amateur voice subbands between 52 and 450 MHz for a period of five years from the date of the League's filing on Docket 20777, at which time we would propose that its use on these frequencies be terminated.

57) On motion of Mr. Gmelin, seconded by Mr. Griggs, unanimously VOTED that the Board supports the concept that ATV (A5) not be permitted in all parts of the 420-450 MHz band and, instead, endorses the assignment of two nominal 4-MHz bandwidth channels, with a video carrier input frequency of 439.25 MHz and output frequency of 427.25 MHz for ATV repeater use, with these frequencies also being available for simplex ATV use; further, that the need for continued allocation of these segments for A5 use be reexamined five years from the date of the League's filing in response to Docket 20777.

58) On motion of Mr. Wicker, seconded by Mr. Price, unanimously VOTED that the provisions for purity and stability of emissions, as currently expressed in section 97.73 of the FCC rules, not be changed. Further, that no bandwidth criteria be imposed which require the use of costly additional instrumentation by each amateur.

59) On motion of Mr. Haller, seconded by Mr. Anderson, unanimously VOTED (Mr. Hesler abstaining) that the General Manager file comments with the Federal Communications Commission in response to Notice of Proposed Rule Making, Docket 20777, conveying the views of the Board as established in the above motions.

60) On motion of Mr. Cotterell, seconded by Mr. Zak, unanimously VOTED to lift from the table Mr. Haller's motion which would provide reimbursement of limited legal expenses. On motion of Mr. Cotterell, seconded by Mr. Zak, after discussion, unanimously VOTED to amend the pending amendment by striking the text therefore and substituting the following: That, on a trial basis until the next regular meeting of the Board of Directors, the out-of-pocket expenses (but not attorney fees) incurred by League members in defending against law suits and similar actions arising from alleged violations of zoning ordinances and/or building codes for amateur installations and/or operations, and against law suits and similar actions arising from alleged interference from amateur operations, and/or in appealing from denials of authorizations to erect, maintain and utilize amateur antennas and/or stations, be reimbursed in an amount to be determined by League headquarters with the concurrence of the General Counsel provided if, in the opinion of the General Counsel after consideration of information then available, the case involves (1) a significant miscarriage of justice or harassment, (2) a potential legal precedent, and/or (3) a severe case of financial hardship upon the League member; provided further, the maximum amount to be expended or pledged during said period will not exceed \$5,000.00. The vote then being on the amendment as amended, the same was unanimously adopted. Finally, the vote being upon the main motion as amended, it was unanimously ADOPTED.

61) On motion of Mr. Price, seconded by Mr. Gmelin, after discussion, unanimously

VOTED that the editor of *QST* shall establish a monthly radio propagation column in *QST*.

62) On motion of Mr. Griggs, seconded by Mr. Cotterell, unanimously VOTED that the General Manager investigate and report to the Board on the feasibility and cost of offering group insurance to radio clubs and repeater groups to provide coverage for liability at meetings, displays, special events, Field Day operations, SET, and related activities. During the course of the above, Mr. Eitel rejoined the meeting at 9:44 P.M.

63) Moved, by Mr. McConaghy, seconded by Mr. Thurston, that, whereas the Board has endorsed phone band expansion at its annual meeting of 1971, the Board direct the General Manager to study events concerning subband allocations by mode and license class since that time; this study to include band occupancy, needs, and the location of present subband divisions by license class and mode. As a result of the above study, the General Manager is further directed to propose a revised structure of subbands for the Board's consideration at its annual meeting in January, 1977. Moved, by Mr. Sullivan, seconded by Mr. Albright, that consideration of this motion be deferred until 1977. A two-thirds vote being required, the Chairman called for a vote by show of hands; there were eleven votes in favor, three opposed, and two abstentions. Accordingly, the motion to defer was ADOPTED.

64) On motion of Mr. Griggs, seconded by Mr. Albright, unanimously VOTED that the Board directs the General Manager to seek data on transmitting heights versus interference susceptibility to home-entertainment equipment and to report results at the next Board meeting.

65) Moved, by Mr. Zak, seconded by Mr. Sullivan, that the Membership Affairs Committee study the payment to authors for articles appearing in *QST*. But, after discussion, the motion was defeated.

66) On motion of Mr. Grauer, seconded by Mr. Sullivan, VOTED that Mr. Sullivan's motion relative to the appointment of Technical Advisors be lifted from the table. After discussion, on motion of Mr. Sullivan, seconded by Mr. Grauer, VOTED to amend the motion by inserting the words "for approval and recommendation to the president" before the words "for appointment." The motion was amended then reading, "Moved, that an appointment for the Technical Department be instituted and known as a Technical Advisor. ARRL members wishing to serve the ARRL Technical Department in this voluntary position shall first secure an acceptable recommendation from this department in order to be presented to the appropriate division director for approval and recommendation to the president for appointment. The term of this appointment shall be for one year and be renewed upon recommendation of the Technical Department. A suitable certificate of appointment shall be provided," it was VOTED.

67) On motion of Mr. Gmelin, seconded by Mr. Wicker, VOTED that the General Manager establish a list of printed and other materials available to members, both free and for sale, and make this list available to members.

68) On motion of Mr. Wicker, seconded by Mr. Gmelin, unanimously VOTED that the Membership Affairs Committee study the feasibility of establishing five-band DXCC and five-band WAS lapel pins compatible with DXCC-type pins.

69) On motion of Mr. Sullivan, seconded by Mr. Price, unanimously VOTED that when an applicant for DXCC meets all requirements for that award and in addition clearly demonstrates that he has contacted 100 countries on the 160-meter amateur band, that a DXCC certificate be issued suitably endorsed "DXCC-160 Meter." No endorsements shall be available for additional countries worked on 160 meters beyond the basic 100.

70) On motion of Mr. Griggs, seconded by Mr. Sullivan, unanimously VOTED that the 1975 ARRL Technical Excellence Award for *QST* articles be hereby conferred enthusiastically upon Wes Hayward, W7ZOL, for his article in the July, 1975 issue of *QST*, "Defining and Measuring Receiver Dynamic Range."

71) On motion of Mr. Thurston, seconded by Mr. Sullivan, unanimously VOTED that

the Board endorse the honorable mention of Dr. George Steber, WB9LVI, and Richard Bingham, WB6BDR/W7KWR, for their respective *QST* articles "SSTV to Fast-Scan Converter," and "A Modular Transceiver for 1296 MHz," which were considered during the selection of a winner for the ARRL Technical Excellence Award for 1975, and that suitable mention of these authors shall be made in *QST*.

72) The Board recessed at 10:53 P.M., reconvening at the same place at 3:40 A.M. on July 16th with all persons herein before mentioned present.

73) On motion of Mr. Zak seconded by Mr. Grauer, unanimously VOTED that the General Manager prominently display, at the entrance of Headquarters, the names of the past and present Directors in each Division and the years served.

74) Moved, by Mr. Gmelin, seconded by Mr. Grauer, that, in order to spend the least amount of League monies necessary for the holding of meetings of the Board of Directors and in order to have the maximum contact between the Board and Headquarters during such meeting, By-Law 20 of the League's By-Laws shall be changed by adding the following: "The location of any meeting of the Board of Directors shall not be changed from the vicinity of Hartford, Connecticut, unless by natural or man-made causes it is physically impossible to hold the meeting in the vicinity of Hartford, Connecticut." On motion of Mr. Arnold, seconded by Mr. Griggs, VOTED that the motion be laid on the table. Mr. Gmelin requested to be recorded as voting opposed to tabling.

75) On motion of Mr. Wicker, seconded by Mr. Griggs, unanimously VOTED that the Membership Affairs Committee in cooperation with the ARRL Public Relations Consultant consider a program of recognition in the Public Service Diary for those responsible for reports which generate favorable press, radio, or TV coverage, and study the feasibility of a "PR of the Month" feature in the pages of *QST* to recognize the outstanding contribution in the PR field.

76) On motion of Mr. Price, seconded by Mr. Thurston, unanimously VOTED that the Okeechobee Amateur Radio Club of Okeechobee, Florida, is hereby affiliated with the League.

77) Moved, by Mr. Albright, seconded by Mr. Griggs, that the General Manager petition the FCC to allow anyone who has previously held a valid U.S. amateur license, Conditionals excepted, to re-enter the amateur ranks by filling out the regular renewal form, paying the appropriate fee, and submitting the amateur license held at the time of its expiration. On motion of Mr. McConaghy, seconded by Mr. Haller, VOTED, eight votes in favor to seven opposed, that the motion is laid on the table. Mr. Hesler abstained.

78) Moved, by Mr. Haller, seconded by Mr. Sullivan, that there be established on a one-time-only basis, a DXCC endorsement for contacts made by the RTTY mode only. A roll call vote being requested, the motion was ADOPTED, twelve votes in favor to four opposed. Messrs. Anderson, Arnold, Egbert, Gmelin, Grauer, Haller, Hesler, McConaghy, Sullivan, Thurston, Wicker and Zak voted in the affirmative; Messrs. Albright, Cotterell, Griggs and Price voted in the negative.

79) On motion of Mr. Clark, seconded by Mr. McConaghy, unanimously VOTED that the Rules and Regulations concerning affiliated societies be amended to add the following: 8. In addition to meeting the normal requirements for affiliation, as outlined in the Rules and Regulations Concerning Affiliated Societies, an amateur radio club outside the League operating territory must submit a statement from the IARU member society of the country in which it is located approving ARRL affiliation of the club. Upon receipt of this letter and the usual forms, the club's application will be submitted to the Executive Committee for approval.

80) On motion of Mr. Clark, seconded by Mr. Eaton, unanimously VOTED that the General Manager is instructed to include the words "Headquarters Society of the International Amateur Radio Union," on official letterhead stationery of the ARRL, commencing with the next printing.

81) On motion of Mr. Clark, seconded by

Mr. Wicker, unanimously VOTED that the International Affairs Committee be assigned the responsibility of responding to the recommendation of the recent IARU World Conference that IARU headquarters establish a new operating award (separate from WAC) to promote interest in and knowledge of IARU itself; this to be undertaken in cooperation with the General Manager and the IARU President.

82) On motion of Mr. Cotterell, seconded by Mr. Griggs, VOTED that Mr. Albright's motion concerning renewal of licenses for ex-amateurs be lifted from the table. On further motion of Mr. Cotterell, seconded by Mr. Sullivan, unanimously VOTED that the Legal and Regulatory Committee study the motion.

83) At this point, Mr. Price, as Secretary of the ARRL Foundation, reported on the survey performed by Brakeley John Price Jones, Inc., on behalf of the Foundation. A summary of its findings reads: The study designed to ascertain the feasibility of obtaining private gift dollars by the American Radio Relay League (ARRL) was composed of personal, confidential interviews and a random-sample mail survey. It found that: It is feasible for the ARRL to consider private fund raising as a source of income to fund the costs of preparing for and participating in the World Administrative Radio Conference in 1979 (WARC-79) and of placing the satellite OSCAR VIII into orbit. The ARRL Foundation is acceptable as the fund-raising arm of the League. Hams generally are aware of the importance of WARC-79, but their recognition of its potential danger is not sufficient at this time to raise the amount of money necessary for adequate funding of either WARC-79 or the satellite program. The vast majority of hams thinks the satellite program is very important to amateur radio. With few exceptions, amateurs feel the ARRL has the qualifications and position to represent the interests of amateur radio. Over ninety percent of those interviewed and almost three out of four survey respondents felt that private funds should be raised for WARC-79. About two-thirds of both interviewees and survey respondents agree that private money should be raised to fund the satellite program. Gifts in the range of five figures are feasible, but a great deal of work is needed in identification and research of these prospective donors.

84) The Board was in recess from 10:05 A.M. to 10:20 A.M.

85) On motion of Mr. Arnold, seconded by Mr. Wicker, the following resolution was unanimously ADOPTED: Whereas, M.F. "Bud" Cone, WA4PBG, has served faithfully and well as a member of the Emergency Communications Advisory Committee since its inception, and: Whereas, Bud Cone served in outstanding fashion as the first Chairman of the Committee and: Whereas, despite personal hardship caused thereby, Bud Cone prepared reports for the Committee after the termination of his term as Chairman, now, therefore, BE IT RESOLVED, by the Board of Directors, in meeting assembled at Denver, Colorado, July 16, 1976, do heartily commend M.F. "Bud" Cone, WA4PBG, for his devotion to the causes of amateur emergency communications and the League.

86) On motion of Mr. Grauer, seconded by Mr. Haller, unanimously VOTED that any money requests from the Foundation to the Executive Committee be referred back to the Board for approval.

87) There followed informal remarks by all the members of the assembly. There being no further business, on motion of Mr. Gmelin, seconded by Mr. Thurston, the Board adjourned, sine die at 1:03 P.M.

88) Total time in session as a Board: 18 hours, 59 minutes; as a Committee of the Whole: 5 hours, 26 minutes; total authorizations, \$805,000. Respectfully submitted, Perry F. Williams, WIUED Secretary of the Meeting

#### MINUTES OF EXECUTIVE COMMITTEE MEETING No. 358 July 13, 1976

Pursuant to due notice, the Executive Committee of The American Radio Relay

League, Inc., met at the Denver Hilton, Denver, Colorado, at 2:30 P.M., July 13, 1976. Present: President Harry J. Dannels, W2TUK, in the Chair; First Vice President Victor C. Clark, W4KFC; Directors Roy L. Albright, W5EYB, Max Arnold, W4WHN, John R. Griggs, W6KW, and Robert B. Thurston, W7PGY; and General Manager Richard L. Baldwin, W1RU. A number of other officers, directors, and vice directors of the League were also present.

On motion of Mr. Griggs, Life Membership was unanimously GRANTED to the following applicants: William A. Abbott, Jr., WA5PPI; Jerald Abrams, WB2ZEX; Robert L. Adams, WA6VHU; Rudolf A. Adler, W1GUA; Roger B. Alden, WA4MSS; Charles L. P. Alfano, WA2GUG; John O. Allen, WA0CHK; Lee Allen, WB4DOR; C. E. "Mike" Allison, WB5HWJ; Paul F. Altmquist, WA9EMF; George E. Anestis, W3ANX; E. Richard Angle, WA6GUY; Laurence Aronson; John D. Arket, WB4ZLT/DJ0DI; Cleophs C. Atkins, WB4CKB; James E. Austin, WB6LYA; Fred Bagg, WB0AKN; Richard J. Bahl, WA0BXH; Bruce E. Baker, WA4GRO; Wayne G. Bamford, W6PDA; Frederick J. Barnes, WA8ZNV; Dale L. Bartholomew, K3TVT; Bruce Baskin, WA8PGD; Frank Bates, W6IPB; Donald J. Battell, WA6FYC; D.D. Battrum, VE7ARB/3; Paul R. Beavin, Jr., K4LRJ; Samuel E. Beckwith, WA9KVU; Clifford J. Bedore, III, WA3RSG; Richard P. Beebe, K1PAD; William E. Beitelspach, W7VRM; Gerald L. Belanger, WA1HOZ; Gordon Bennett, WA7WNI; Charles M. Berg, W6SUS; David R. Bernhardt, K7ZCB; Gaston Bertels; ON4WF; Frank G. Bird, WA6ODK; Ronald Black, WA7WQG; Martin Blackstone, WA6MFY; Douglas Blayne, WB6NCJ; E.B. Blunk, W4OBQ; Donald R. Bodine, W5TMO; Paul Boller, W8IRT; Thomas K. Boots, WN6JES; Albert V. Borsos, Jr., W8VPW; Thomas L. Bosscher, WA8URE; Stanley A. Branton, WB0HPB; Kenneth D. Britton, K3WGA; David R. Brooke, WA3TAC; William R. Bubinski, WB6GOL; Eugene A. Budahazy; Catello H. Buonocore, W2POV; Douglas M. Burghardt, WA9WWC; Dave Burr, WA8WMM; Clifford C. Butt-schardt, Jr., W6HDO; Gerald W. Campbell; James E. Carroll, WB6PYR; Robert L. Carter, W7INP; Norman J. Cartmill, W1LHY; Mark P. Chagnon, WA1HVK; Jeffrey Church, WB2CFT; Stuart P. Churchon, K6YS; John R. Clyde, WA6TML; Donald A. Coffey, K8USM; Burt C. Cohen, W3CRE; J. Donald Comeau, VE1WT; Jack E. Conner, II, WA1TCO; George H. Cooke, W2LOP; Robert M. Corbett, Jr., W2GSK; Arthur D. Coundjeris, WA2TLS; Paul A. Cox, Jr., WA9PQB; James C. Craig, W4LPG; Charles R. Crister, WA5ERC; Samuel E. Cron, WB4GRG; Gilbert J. Cross, K8EAG; Everette Custis, WB9ENL; Melvin M. Dalton, W6PDZ; Joseph A. Darden, K7LWA; Walter D. Davis, WA6ODQ; Marsha A. Deeg, WA6CUF; Donald G. DeMik, WA9BYF; William V. Deutermann, Jr., WA3NGG; John C. Dine, WA8DFD; William A. Dodge, WB0BGH/WA1PEL; Chester A. Dotes, W5UO; Raymond D. Donovan, W8KFA; Alan M. Dornhoffer, K2EEK; Robert A. Du Brul, WB9RJR/WA3SDR; Charles H. Dunlap, K1DYL; Larry R. Dykstra, KL7HDN; John C. Ebright, WA7NXP; Charles N. Edwards, Sr., W6MNO; Ronald G. Eichhorn, WA8MYT; Robert W. Ellis, WB9JBI; David R. Ely, K3KAJ; William Epperhart, Jr., WB2DTY; Lawrence C. Etherington, Jr., WA7SYV; Ronald C. Evans, WA2CEJ; William E. Ewing, WA0KAQ/7; Robert Eyster, Jr., K8BGI; Don C. Fall, WB6OLJ; James R. Faucett, WA4QJP/KL7JF; Richard Feldman, K8HGY; C.H. Foell, W3MC; William K. Forbes, Jr., WB0IKL; John H. Foss, W7KQW; Cris C.G. Furlow, K6EPA/W7JVZ; David J. Gardberg, W4AMH; Dwight G. Garretson, W5UOW; James D. Gibson, WB6MWW; Arthur S. Gillespie, Jr., K4TP; Sylvester G. Glancy, K8ACD; Truman C. Goodman, W5IAR; Leonard Goodnow, WA1UNN; F.L. Gracon, WB2FLU; Thomas G. Grau, WA8AFD; Ewald P. Greene, WN2IVK; Don Griffith, WB0NOU; Philip C. Gronewold, W0OET; Stephen J. Gross, WB2GDQ; Ronald H. Gruninger, WA8MJY; Gary Haddan, W6MHC; Robert E. Hallock, WA7GOO; T.M. Hamblin, VE2AKI; Leslie M. Hamilton, Jr., W9MGM; Richard Hamilton, WA6VEV; Joseph R. Hanson, Jr., WA4WEN; Loyal M. Hanson, W9MBW; Robert A. Hanson, WB2DHL; Robert E. Harmon, WA6NSZ;

Philip Hart, W3FNY; Paul H. Hartman, K4FAF; John W. Hartung, W7THY; E.G. Hastie, W4LZT; James W. Hebert, WA8OBG; William Heinzinger, WA9VOL; Carl G. Heinzl, WA3UEN; Paul Helwig, WA4GIL; John D. Hensley, Jr., WA5BQA; Carl D. Henson, WB4ZNH; Frederick W. Herdich, W2ZWB; Heriberto L. Hernandez, WB4IQI; David L. Hershberger, WA9QCH; Jim C. Hessler, WB8ESK; Charles L. Hett, K0THN; Curtis H. Heuberger, WA1IUR; William R. Hine, K8YJF; Mark E. Hoffman, WB6BJC; Leo J. Hogard, WB4FKE; Dan Hoskins, Jr., WA5ATK; John B. Howenstein; Robert A. Hulick, K1MXF; John G. Humphrey, WA4LWO; Vito R. Iacopelli, WB2WTJ; Edward C. Inskeep, WA6EGB; Wallace K. Izuo, KH6BWT; Gerald D. Jackson, Jr., WB4VGGZ; Seymour Jacobs, W3KSF; Edward J. Jars, K3TKZ; Jeffrey W. Jenks, WA1GFV; David P. Joblon, WB2UEV; John F. Jones, Jr., WA6JZE; Roger J. Jones, W8IR; Lyle B. Juroff, K9FIK; Donald A. Kasten, WB4SST; Charles A. Keil, WA4EPJ; Gerald J. Kersus, WA1FBX; Joseph G. King; Fred Kleber, WB9JEN; Wayne M. Knabb, WB5MUM; Garrison L. Kolhoff, WN2FGC; Michael Kondrat, WB7DXA; Myron K. Koyle, WA8FNM; David M. Kuyper, WB8QOD; Roland L. Kramer, K0CAF; Raymond F. Kubiszewski, W2VBP; Donald J. La Favor, K0WZA; Joseph L. Larabell, WB8QYR; David H. Larrabee, WA1NMW; Homer A. Lasitter, K7BR; Deane W. Laughlin, K7JWZ; Ivars Lauzumais, WB2QYT; Benjamin J. Layton, W0UTT; Farncomb Le Gresley, VE3BHQ; Philip C. Levinton, WA2CVD; Thomas F. Lewis, WA2CQW; David C. Libby, WB0JNP; Richard A. Link, WB0KDE; Frank J. London, W1IVB; Loyd G. Long, WA6LXM; George G. Lycan, W6OBZ; Edward G. Machak, Jr., W2GHD; M.L. MacMedan, W6IUU; John M. Magnuson, WB0EEG; Joseph G. Maley, WA3WKH; Emmanuel Marcel, W2BON; Dale Marks, K8GKX; Ed Marzola, WB3BKA; Lawrence H. Mason, W9NND; Charles A. Master, W8OU; Mitsuo Matsuo, W2SRZ; Gordon C. Matthews, VE1AJG; Royal R. Maxwell, WA0QFY; Stephen O. May, WA9ASM; Richard S. McCurdy, WA1GTP; Joseph F. McDonnell, III, W3GQC; R. McDowell, WB5FNS/WB4EMK; Harry E. McGuigan, WA3QAF; Patrick R. McKeely, WB4IGX; Richard S. Mead, K2UNY; George F. Mentzer, K3QGT; David E. Michael, WA0NXD; Charles J. Michaels, Jr., W7KWU; Thomas E. Michaud, WA3TQJ; Robert L. Miers, K0WHF; R.W. Milam, W5TCW; Brian D. Miller, WA9LZA; John R. Miller, W0IKT; Robert L. Miner, Jr., WA4CTM; Donko Mirko, K0HRT; George T. Mitchell, K6ZEZ; Dwaine Modock, WA8MEM; Jo Anne Moore, WB8NSU; Francis H. Morrison, K1WXZ; John A. Moseley, W6ERD; Danie Moses, WB2OLQ; Le Roy Moyer, K4ISW; William E. Moyes, K7ZVT; Louis A. Muhleisen, III; Arza L. Mumma, WA8GRC; James D. Murch, K8PMC; Robert M. Myers, Jr., W1FBY; Edwin Naujock, WB0MTC; Elmer T. Neal, WA4TSP; O.R. Nelson, HP1ON; Kenneth T. Neuffer, K9KWK; John M. Nicholson, WB6AHZ; Ronald Van Noord, WA6LUO; Alan K. Novakoff, WN2LDF; Robert G. Novas, WA3WWR; John Nowacki, W1GWM; Jon J. O'Brien, W6GO; Lawrence H. O'Brien, K6QJ; John G. Oehlenschlaeger, K0MOC; Lawrence L. Ogborn, W9QZT; John L. Ohm, Jr., WB81YJ; Edward W. Oleksak, WA2LDM; Anthony J. Oliva; John J. O'Neill, W3EJY; William S. Osborne, K4LRL; James V. Owens, WA7HRX; Lyle W. Parsons, W7HLU; Donald C. Partis, WA2AIV; F.L. Perrett, Jr., K4GCR; Ronald H. Peterson, K0LMD; James D. Pedock, W2KAT; Weston D. Phare, K8BJM; Richardson Phelps, Jr., W4KXV; Mark E. Phillips, WB9BPB; Alan J. Pickering, K0JTW; William C. Pierce, WB6CFU/WA0PJI; George D. Fixley, WB4DKN; Audrey A. Pizanie, WA5LHL; Richard G. Platt, W7VKB; Abele E. Polluconi, W7OPY; Robert E. Popela, WB9NUG; Donald T. Priebe, K4QKR; Joseph D. Provenza, W6UPN; James E. Pugh, W3VZV; William R. Pybas, WA3TQA; Lawrence A. Quinlan, W2NAQ; Ronald J. Ranahoff, WA2QKE; Rene R. Rancourt, KIAGA; George M. Read, WA9ZBT; Paul T. Reagan, WA2GTR; Dan T. Redman, K8IKB; Arnold Reinhold, K2PNK; Donald C. Reynolds, WA7YVP; Jerry D. Richardson, K5IKL; Richard E. Rinard, WB0JTC; William M.

Ritter, WA7AFE; Richard A. Roberts, WNSSNH; Donald N. Roden, Jr., WA4NPL; David E. Rogers, WB4JRO; William R. Rogers, W4YJS; Richard F. Roll, W9LUH; Bruce L. Rosen, K1FFX; William A. Rost; Cyrus B. Rowe, WA4FSA; Henry S. Rowland, W9MY; Thomas C. Rozzell, WB4ZTT; Jack A. Ruback, K7VKR; Leo W. Ruth, Jr., W6CNN; Duane M. Sanger, WB6TZW; Harry D. Saunders, K4GFH; Kenneth Schang, K8LUU; Dean Scheel, WB0DYO; Robert L. Schneider, KH6FNB; Wilbur C. Schroeder, WB6RIX/KA6SR; Walter P. Schwarzott, DK7ZE; Ronald J. Schwendt, W2ZEW; Michael A. Seijo, KP4DRR; Daniel J. Servais, WA9AJW; Raymond A. Shaub, W3AXC; Frank W. Shelton, WB0RHS; Frank M. Sicuro, W5KKZ; James S. Simmons, WB0IPL; Rod G. Sinks, WB0ERL; Wladyslaw J.J. Sklodowski, WN2BVB; Edward W. Sleight, K4DJC; Donald E. Smith, WA3VEA; T.E. Smithey, WA6FUJ; Raymond E. Smolenski, K8RDE; Raymond A. Sommers, WB9LKC; Clyde R. Sorensen, W9JAT; Charles R. Souter, WA4KZM; Thomas G. Spait, WB8RUS; Richard C. Sparling, K2DPA/W4MOR; Robert E. Spidell, W6SKQ; Glenn E. Stahl, WA6TFF; G.E. Staudacher, WB6KBZ; Edwin F. Steble, K3IXD; Lawrence J. Stein, K2OYJ; Gale A. Steward, K3ZOL; Carl C. Steavenson, K6WZ; Wayne Steele, WN4FFW; Arthur F. Steinke, Jr., WB9JKZ; William A. Stewart, K4JYS; Joseph B. Stio; Elton V. Stolberg, W1IT; Donald C. Strandberg, K1NKT; Ronald J. Strelecky, WA9JVT; William A. Taylor, WA2DHI; Charles E. Terry, W4FZX; D.C. Thomas, Jr., WB4HMM/WA4BYC; R.A. Thomas; Dan Thompson, WB9DTL; Noel J. Thompson, KH6FOX; Stephen K. Thompson, K4WVT; J.

Patrick Trabert, WB0LJN; Russell C. Treadwell, WA1TRQ; Gus Treewater, WA6WBC; Eric Tucker, WB6SXD; Kathryn K. Tucker, WB6SXG; Kent Tucker, WA6SXF; Hugh A. Turnbull, W3ABC; James F. Underwood, II, WB4WYJ; Charles W. Van Way, III, WA4YNE; Bernard W. Vatz, WA4OJ; James C. Vaughan, K4TXJ; Peter C. Vronides, WB2BIE; Terry L. Wagoner, WB9DXS; Donald M. Wahl, WA8BOV; David D. Wantz, WB6CCV; Martin B. Weinstein, WB8LBV; Donald G. Wells, WB0JTH; Urban W. Welsh, WA2VOY; Leonard A. Westbo, Jr., W7MCU; Alvin W. Wiechman, WA0YXK; Ralph O. Williams, WA3SNR; Jerry Williamson, WB2UIN; Archie R. Willis, W6LPJ; Ed Winkle, WA8RQQ; Joseph N. Winter, Jr., WA7IVO; Michael R. Wisch, WB0LGC; Michael S. Yancy, WA6AAH; Minot R. Yeaton, WB2GGE; Patrick Zamora-Benson, WB0FLT; Nicholas D. Zorn, K4BSS.

On motion of Mr. Clark, affiliation was unanimously GRANTED to the following societies: Delta Amateur Radio Association, Greenville, MS; Denton County Amateur Radio Club, Denton, TX; East Bay Amateur Wireless Association, Warren, RI; Forsyth Amateur Radio Club, Winston-Salem, NC; Northeastern University Radio Club-WIKBN, Boston, MA; Old Barney Amateur Radio Club, West Tuckerton, NJ; Southwest Dallas County Amateur Radio Club, Duncanville, TX; Spokane Radio Amateurs, Inc., Spokane, WA; Winnipeg Repeater Society, Winnipeg, Manitoba; Pacific Radio Amateur Transmitting Society, Kaneohe, Hawaii; Philadelphia Electric Co. Amateur Radio Club, Philadelphia, PA; Piedmont TEC Amateur Radio Club, Greenwood, SC; Pilgrim Amateur Radio Club, Provincetown, MA; Livingston Amateur

Radio Klub, Howell, MI.

On motion of Mr. Albright, unanimously VOTED to grant approval for the holding of a New York State Convention in Rochester, NY, on May 20-22, 1977 and a West Gulf Division Convention in Austin, TX, on July 15-17, 1977.

On motion of Mr. Baldwin, VOTED to revise rule 4 of the Communications Department Rules and Regulations to read as follows: Any candidate for the office of Section Communications Manager must have been both a member of the League for a continuous term of at least two years and a licensed amateur of General class (Canadian advanced amateur certificate) or higher immediately preceding receipt of a petition of nomination. Mr. Albright requested to be recorded as voting opposed.

During the course of the meeting the Committee examined, without formal action, the program of the 1976 National Convention. The Committee also discussed, without formal action, Regional Emergency Coordinators; traffic handling during the Guam typhoon emergency and the Idaho dam disaster; progress on the construction of additional parking facilities at the Headquarters site; a proposed cooperative agreement with the Salvation Army; FCC Docket 20777 (bandwidth/emissions); and the draft of a letter responding to the FCC action in Docket 20282 relating to permitted power in the Novice subbands.

There being no further business, the Committee adjourned at 3:57 P.M.

Respectfully submitted,  
RICHARD L. BALDWIN, W1RU  
Secretary

## Silent Keys

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

W1MWE, Lawrence C. George, Dalton, MA  
W1OLR, Earl C. Carpenter, Coventry, RI  
W1ONO, Harvey Erickson, Worcester, MA  
Ex-W1WC, Albert R. Sears, Whitman, MA  
W1ZXG, LeRoy E. Euvrard, Hingham, MA  
WA2BGU, Julian E. Raymond, Lincroft, NJ  
WA2CTM, Morris Blumkin, New Rochelle, NY  
W2FTF, Boyd P. Campbell, Altamont, NY  
W2GLX, Orlando S. Hinds, Brooklynt, NY  
W2KRI, William Frick, Linden, NJ  
Ex-WN2OIJ, Francis W. Maginn, Rochester, NY  
W2SY, Philip D. Stahl, Cherry Hill, NJ  
W3EXI, John A. Martin, Rockville, MD  
WA3MIL, Emile Zugby, Takoma Park, MD  
WA3MPH, Salvatore J. Rigoroso, Parkersburg, PA  
W3QCP, Roy W. Grimm, Connellsville, PA  
W4CPL, H. A. Voorhees, Winston Salem, NC  
WB4CXP, Hugh Baldwin, Maryville, TN  
K4DY, Louis Kipp, Pompano Beach, FL  
K4FII, John C. Slaek, Menands, NY  
K4JBO, William A. McCanness, Jr., Virgilina, VA  
Ex-W4LVR, Marjorie C. Chambers, Atlanta, GA  
W4OEM, Jack E. Thornton, Hanahan, SC  
W4PBK, James H. Hardy, Englewood, FL  
W4RQM, Edgar S. Miller, Deltona, FL  
K4VEZ, Paul B. Lombard, Ashland, KY  
K4WIQ, Harold B. Burnham, West Palm Beach, FL  
W5ENP, Willard R. Russell, Camden, AK  
Ex-K5GYZ, Lucille Miller, El Paso, TX  
K5HEZ, Jesse L. Kay, Ft. Worth, TX  
W5SJV, Thomas E. Johnson, Kerrville, TX  
W5TKK, Ray E. Winger, Port Arthur, TX  
W5WDD, James T. Adams, McAlester, OK  
W5WYN, Raymond H. Russell, Ferriday, LA  
W6BCW, Ray Lightfoot, Modesto, CA  
W6DAB, Robert L. Reineke, Granada Hills, CA  
W6FDV, Pete J. Antonino, Richmond, CA  
W6HWV, King D. Rodda, Alameda, CA  
WA6LDM, Ian Belangee, Carmel, CA

K6RL, Alden C. Packard, Newport Beach, CA  
W6SX, Hamilton M. Jeffers, Carmel, CA  
WA6WHU, Stewart W. Evans, Los Angeles, CA  
W6ZLN, Charles L. "Mike" McNichols, Encinitas, CA  
W7AMA, Henry Sturtevant, Lincoln City, OR  
W7FY, Arthur A. Thibodo, Portland, OR  
W7NUL, Lony B. Cary, Ajo, AZ  
K7YEX, Burt A. Collins, Phoenix, AZ  
WB8BFF, Victor G. Hawk, Sturgis, MI  
W8BZK, A. Paul Roth, Painesville, OH  
WA8DWL, Nellie G. Swain, Columbus, OH  
K8PLB, Hugo H. Gadge, Detroit, MI  
W8QHE, Julius S. Seidor, Cleveland, OH  
K8SAZ, Anthony O. "Tony" Demario, Monroe, MI  
W8WAM, Charles H. Uphaus, Saline, MI  
WA8YAY, Frank S. Aymer, Fairgrove, MI  
W9AUW, John A. Farquer, Indianapolis, IN  
W9BKD, Ronald I. MacDonald, Green Bay, WI  
W9CRP, Herbert C. Stamats, Warsaw, IN  
WB9CWL, William R. Slate, Green Lake, WI  
K9CZI, Delmar E. Brown, Jr., Sheboygan, WI  
K9GLL, Richard H. Gentry, Ft. Wayne, IN  
W9ILL, Carrie Jones, Alton, IL  
W9IUF, Dr. Ralph W. Taraba, Bloomington, IN  
W9IXH, Virgil H. Disney, Hinsdale, IL  
WB9NSU, John L. Lavey, Libertyville, IL  
WN9RGE, Ronald C. Navratil, Orland Park, IL  
WA9RYM, Frank E. Chambers, Cedar Lake, IN  
W9TPW, John Laban, No. Riverside, IL  
W9WVL, George W. Fields, Milwaukee, WI  
W0IMY, William L. Erickson, Duluth, MN  
W0KWC, LeRoy F. Bennage, St. Paul, MN  
K0OLE, Benjamin A. Pollard, Ankeny, IA  
KH6IJY, Richard C. Proctor, Honolulu, HI  
KH6TS, Edward K. Bell, Kalaupapa, HI  
VK3OR, John B. Battrick, Victoria, BC  
VE3SF, Earl Smith, Waterford, ON  
VE7CEW, Eric A. Wood, Vancouver, BC  
9M2DX, Tara Singh, Malaysia

## Strays



WB6MJV (left) is popular TV emcee, Johnny Grant, of KTLA Hollywood, shown interviewing WB6APW, Herbert (Pete) Hoover III about WARC. (W6VG photo)

## STOLEN EQUIPMENT

- Taken from locked auto in home driveway on June 3. Clegg FM-27B, Serial No. 27103-2788 and ICOM IC-502, Serial No. 3907669. Notify E. C. Gessert, K6CQR, 474 Ferne Ave., Palo Alto, CA 94306 or Palo Alto Police Dept. Case 3821.
- HW202 with homebrew Touch-Tone encoder stolen from locked car in home driveway on May 29. CA driver's license B0750707 etched on rear of chassis. Al Griffith, WA6SSP, 14976 El Soneto Drive, Whittier, CA 90605.
- Stolen from car at Berlin Farmer's Market, Berlin, NJ. Clegg 27B, Serial No. 3986, with pink trimline phone wired for autopatch. John M. Dunham, WA2SUJ, Penn Terrace, Apt. E-11, Pennsville, NJ 08070.
- Heath HW202 with push button and mini toggle switch installed left of panel meter. Charles Wooten, WA4IMC, 4004 Fletcher St., Panama City, FL 32401 or Bay County (FL) Sheriff's Dept.

# Happenings

Conducted By Perry F. Williams,\* W1UED

## Canada Tests OSCAR for Emergency Location

The Communications Research Centre (CRC) of the federal Communications Department in Ottawa has successfully demonstrated the feasibility of a new satellite-aided search and rescue concept that could reduce the time, fuel dollar and other costs associated with conventional methods of finding downed aircraft.

Recent proof-of-concept experiments employing the Radio Amateur Satellite Corporation (AMSAT) OSCAR-6 satellite and simulated distress signals have shown a relatively low-cost, low-altitude polar-orbiting satellite could pinpoint crash sites in Canada and elsewhere in the world to accuracies occasionally as good as one mile, and generally within 5 miles, in as little as 15 to 20 minutes after the spacecraft first "hears" the signal of an emergency locating transmitter (ELT), now mandatory equipment for aircraft in Canada and the U.S.

It works by measuring the Doppler shift in the frequency of the ELT signal as the satellite passes over the crash and then processing the signal by advanced computer techniques.

Since May, 1975, when the demonstration project began, the locations of some 60 "crashes" simulated by transmitters at locations as far away as Winnipeg have been fixed

by CRC computer processing of signals from OSCAR 6 with increasing degrees of accuracy.

Researchers conceive of an operational system that might involve three satellites (not on amateur frequencies, of course) with a design lifetime of 7 to 10 years, with total spacecraft and launch costs of around \$30,000,000. Over a 10-year period, that cost would be only a small fraction of what Canada spends today on aerial search and rescue.

As soon as the nearest satellite to a crash location appeared over the horizon visible from that site, it would alert ground stations that it had received an alarm. About 15 minutes later, at the conclusion of its pass, an immediate initial "fix" to within about 70 miles accuracy could be obtained. An optimized position, fixing the crash site to within one to five miles, would be delivered in anywhere from two to 15 minutes later, depending on the capacity of the computer employed.

The satellites would fly at an orbital altitude of about 700 miles — low enough to get fairly good signals from the low-powered ELTs, yet high enough to cover a sufficiently large swath of Canada (about 2,000 miles wide) with each pass. Not only would the system cover Canada, but it would probably

cover the entire earth and be used internationally. — [From a DOC news release]



Harry Dannals (W2TUK), ARRL president, tries to recruit Carl Cooper, KØFIG, of Neosho Falls, Kansas, as an ARRL Life Member. Dannals was guest speaker at the Central Kansas Amateur Radio Club Hamfest in Salina, Kansas, June 6, 1976. (WBØKDE photo)

## ADVISORY COMMITTEE NOMINATIONS

Input from members for League policy formation and direction comes in many different forms. One of the routes is through advisory committees for guidance on specialized subjects. Presently, there are four committees — Contests, DX, Emergency Communications

\*Manager, Membership Services



All southern California amateurs were recently commended for their public service in this resolution presented by California Assemblyman Herschel Rosenthal (right). Shown accepting the resolution is Southwest Division Vice Director Jay Holladay, W6EJJ. (W6VGG photo)

and VHF Repeaters. Each committee is made up of a maximum of 11 members (plus ARRL Board and Hq. liaisons) with initial appointments of terms of up to three years authorized. Full rules for organization and operation of these committees may be found as an addendum to the Articles of Association and By-Laws (copy on request to members; a stamped, self-addressed envelope of standard business size with the letters "AABL" on it would be appreciated).

Candidates for committee membership may be nominated at any time by three sponsors and each sponsor must be a full member of ARRL. Each candidate nominated must have been a League member for a minimum of two years; licensed as a Technician or higher for three or more; and be currently and consistently active and qualified in the specialty area of the field served by the advisory committee.

This, then, is a call for nominations. Convenient forms may be obtained by writing the secretary at ARRL headquarters. The president, in consultation with the committee chairman and liaison members, on or about November 1 of each year, will select replacements for members whose terms are expiring, or shall reappoint them for a subsequent term as appropriate. A file of eligible nominees will be maintained for use as a source of replacements.

A member's initial term of office will be either for two or three years as designated by

the president, with approximately one-half the initial members having two-year terms. Members may be reappointed for no more than one additional three-year term, but are eligible for appointment to committee membership after a lapse of one year.

The incumbents, with date of expiration of current term, are shown in Table 1.



Governor George Wallace of Alabama is shown holding a radiogram delivered by WN4TMG and WN4JVK, relayed through the Alabama Training Net (AEND). Since the photo, both amateurs have upgraded their licenses, continuing to operate in Alabama cw nets. If you'd like to participate, check with your SCM, (listed on page 8 of QST each month).

Table 1

**Emergency Communications Advisory Committee**

William E. Mixon, K5SVD, chairman, 1007 Green Oaks Dr., Baton Rouge, LA 70815; December 31, 1976.

William A. Sencabaugh, K1UAQ, 10 Harold Ave., Wilmington, MA 01887; December 31, 1977.

James P. Collinsworth, WB2EDT, 1040 W. Walworth Rd., Macedon, NY 14502; December 31, 1976.

Ellwood "Woody" Haldeman, W3PST, 1732 Loney St., Philadelphia, PA 19111; December 31, 1977.

Montie F. "Bud" Cone, WA4PBG, 317 Van Buren St., Falls Church, VA 22046; December 31, 1976.

Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego, CA 92117; December 31, 1976.

Robert L. Klepper, W7IEU, 7027-51st St., NW, Marysville, WA 98270; December 31, 1977.

Delf A. Norona, WA8NDY, Box 523, Buckhannon, WV 26201; December 31, 1977.

Robert J. Hajek, W9QBH, 235 Lawton Rd., Drawer H, Riverside, IL 60546; December 31, 1977.

Harry E. Legler, W0PB, 304 Miami St., Hiawatha, KS 66434; December 31, 1976.

W. H. Parker, VE5CU, 214 McMaster Cres., Saskatoon, SK S7H 4E3 Canada; December 31, 1977.

Board Liaison — Max Arnold, W4WHN, 612 Hogan Rd., Nashville, TN 73220.

Hq. Liaison — George Hart, W1NJM.

**VHF Repeater Advisory Committee**

John A. "Jack" Mason, W5NSQ, chairman, 7727 La Risa Dr., Dallas, TX 75420; December 31, 1976.

Lewis D. Collins, W1GXT, 10 Marshall Terrace, Wayland, MA 01778; December 31, 1976.

Frederick A. "Rick" Booth, WA2GCX, 206 Hillary Dr., Rochester, NY 14624; December 31, 1976.

J. Michael Cox, K3GEG, 4513 Orangewood Lane, Bowie, MD 20715; December 31, 1976.

Howard Kelly, K4DSN, 6563 Sapphire Dr., Jacksonville, FL 32208; December 31, 1977.

J. Jay O'Brien, W6GO, 6606 5th St., Rio Linda, CA 95673; December 31, 1977.

Clay Freinwald, WA7WMC, 8515 Idlewood Dr., SE, Tacoma, WA 98498; December 31, 1977.

Richmond B. "Pat" Shreve, W8GRG, 2842 Winthrop Rd., Shaker Heights, OH 44120; December 31, 1976.

Jack D. Forbing, K9LSB, 1416 Lakewood Dr., Fort Wayne, IN 46819; January 1, 1977.

Donald J. Manson, K0TVO, 2302 North Oakland, Columbia, MO 65201; December 31, 1977.

George A. Davis, VE3BBW, 1 Longhope Pl., Willowdale, ON M2J 1Y1 Canada; December 31, 1977.

Board Liaison — Carl L. Smith, W0BWJ, 1070 Locust St., Denver, CO 80220.

Hq. Liaison — Lew McCoy, W1ICP.

**Contest Advisory Committee**

Albert K. Francisco, K7NHV, chairman, Buckskin Rd., Pocatello, ID, 83201; January 1, 1977.

Kenneth M. Bolin, WA1SSH, RR 4, Pleasant Rise Cir., Brookfield, CT 06804; January 1, 1978.

Dennis G. McAlpine, W2FVS, 901 Lexington Ave., New York, NY 10021; January 1, 1978.

Eugene Zimmerman, W3BQV, 33 Brighton Dr., Gaithersburg, MD 20760; January 1, 1977.

John T. Laney, III, K4BAI, Box 421, Columbus, GA 31902; January 1, 1977.

Mike Badolato, W5MYA, 2 Country Pl., Bedford, TX 76201; January 1, 1978.

Wayne E. Overbeck, K6YNB, 5113 Whitecap St., Oxnard Shores, CA 93030; January 1, 1978.

Robert D. Epstein, K8HLR, 21820 Ridge-dale Ave., Oak Park, MI 48237; January 1, 1977.

Victor A. Shields, K9UIY, 1909 W. Revere St., Freeport, IL 61032; January 1, 1978.

Albert W. Vitt, WA0CVS, 7820 W. 96th Ave., Broomfield, CO 80020; January 1, 1978.

L.G. Sawkins, VE7CC, 25810-102nd Ave., Whonnock, BC V0M 1S0 Canada; January 1, 1978.

Director Liaison — Stan Zak, K2SJO, 13 Jennifer Ln., Port Chester, NY 10573.

Hq. Liaison — Ellen White, W1YL.

**DX Advisory Committee**

Louis A. Muhleisen, Jr., K5FVA, chairman, Box 927, Metairie, LA 70004; December 31, 1976.

George E. Hitz, Jr., W1DAL, 37 Easy St., Sudbury, MA 01776; December 31, 1977.

Hayden W. Evens, K2BZT, 11 Holly Tree Ln. Little Silver, NJ 07739; December 31, 1977.

Layfield L. Lamb, W3BWZ, Rt. 1, Whippoorwill Ln., White Plains, MD 20695; December 31, 1976.

William F. Christian, K4IKR, 2800 Cave Ave., NW, Huntsville, AL 35810; December 31, 1976.

Gary Stillwell, W6NJU, 7632 Woodland Ln., Fair Oaks, CA 95628; December 31, 1976.

Allen T. Clark, W7YTN, 2216 S. 120th St., Seattle, WA 98168; December 31, 1976.

Dr. John R. Sheller, WA8ZDF, 4925 Hamilton Rd., Groveport, OH 43125; December 31, 1976.

Robert C. Locher, Jr., W9KNI, 1145 Osterman, Deerfield, IL 60015; December 31, 1977.

Robert W. Wood, K0HUD, 1012 E. Main St., Vermillion, SD 57069; December 31, 1976.

Harold E. Parsons, VE3QA, RR 3, Metcalfe, ON K0A 2P0 Canada; December 31, 1977.

Board Liaison — Larry E. Price, W4RA, P. O. Box 2067, Georgia Southern Branch, Statesboro, GA 30458.

Hq. Liaison — Robert White, W1CW.

**K1ZND NAMED AGM FOR MEMBERSHIP OPERATIONS**

It is our pleasure to announce the promotion of Dave Sumner, K1ZND, to the position of assistant general manager for membership operations. In this post Dave will have responsibility for four of the League's eight headquarters departments: Clubs & Training, Communications, Membership Services, and Technical. Dave is an excellent choice for the job for he has, through the years, worked for three of these four departments. The exception is Clubs & Training, which came on the scene only a few months ago.

Dave is 27, a National Merit Scholar, and a graduate of Michigan State University. He first became interested in amateur radio at the age of 12 when he wrote a research paper on the history of radio. A year later he was K1ZND, and a founding member of his junior high school radio club. After waiting the mandatory two years, he obtained his Extra at the age of 15. He was both president and vice president of his high school (Norwich Free Academy) radio club, and also of the MSU radio club. He was very active from W8SH (the MSU club station); Dave likes to

say that he "majored in amateur radio" at college. One of his signal accomplishments at W8SH was the first two-way amateur slow-scan television transmission between the U.S. and Europe. Dave and Ralph Taggart, WA2EMC, were operating W8SH on the



American end, and Art Backman, SM0BUO, was on the European end in Sweden.

A complete list of Dave's amateur radio accomplishments would no doubt occupy several columns — this writer recalls that the walls of Dave's shack were literally covered with awards and certificates when he was still in high school. Dave is a well known cw contest operator, chases DX, and also maintains an interest in vhf, both "weak signal" and fm mobile. He is trustee for Murphy's Marauders' 220-MHz repeater, WR1AEP. He holds the 5BDXCC award, Satellite 1000 award, and ARRL code proficiency certificate for 40 wpm. He is a member of the First Class CW Operators' Club and A-1 Operator Club.

Dave has been assistant secretary for membership services since May 1972. He has been primarily involved in preparation for the 1979 World Administrative Radio Conference (WARC-79) on both the domestic and international fronts, and has traveled extensively toward this end. His interest in WARC-79 will continue in the future, and as you read this he will be attending an ITU frequency management seminar in Geneva.

Dave brings much experience and expertise to his new post. Congratulations and good luck!

# Coming Conventions

September 3-5  
Pacific Division, San Jose, CA  
September 10-12  
New England Division, Boston, MA

October 1-3  
Dakota Division, St. Paul, MN

October 2-3  
Tennessee State, Memphis, TN

October 8-10  
Midwest Division, Omaha, NE

October 30-31  
Louisiana State, Metairie, LA

November 6-7  
South Florida Section, Clearwater, FL

November 13-14  
Hudson Division, McAfee, NJ

## DAKOTA DIVISION CONVENTION

October 1-3, 1976, St. Paul, Minnesota

The St. Paul Radio Club, Inc., KØAGF, will host the 1976 ARRL Dakota Division Convention at the St. Paul Civic Center.

Friday activities will include FCC examinations of all classes and Novice examinations by the club volunteer examiner, beginning at 3:00 P.M. Exhibits and displays open at 5:00 P.M. There will be meetings, C.O.D. bar and the Wouff Hong initiation. A professional "all licensed hams" band will entertain throughout the evening of eyeball QSOs.

A 7:00 A.M. 2-meter breakfast starts off the big Saturday with the technical forums and programs scheduled for 9:00 A.M. Many facets of amateur radio will be covered such as fm and repeaters, DXing, basic trouble shooting, lightning effects, RTTY, ATV, antennas and several sessions oriented toward the prospective ham or CBER who wants to "convert." An ARRL Forum and a FCC Forum are also scheduled. A noon "dutch-style" buffet lunch is arranged adjacent to the convention floor. A special all-day ladies' program is also planned. Saturday's activities will be closed by a full-course banquet, with a guest speaker from the FCC.

An informal Sunday breakfast is planned, followed by arranged tours which will include a choice of visiting the FAA Regional Control

Center, the largest TV broadcast station in the area or an electronics manufacturing plant.

Advance registration-general admission is \$4.50 (\$6.00 at the door). Banquet ticket is \$10.00. Hotel/motel registration cards and further convention information are available by writing to: St. Paul Radio Club, Inc., P. O. Box 30313, St. Paul, MN 55175, telephone 612-777-6463.

## TENNESSEE STATE CONVENTION

October 2-3, 1976, Memphis, Tennessee

The Tennessee State Convention/Memphis Hamfest will be held at the State Technical Institute, Interstate 40 at Macon Road, on Saturday and Sunday, October 2-3, under the sponsorship of the Mid-South Amateur Radio Association.

Demonstrations, displays, MARS meetings, flea market - ladies' flea market, too! There will be a hospitality room, informal dinners, XYL entertainment, and many outstanding prizes. Guest speakers will be QST Technical Editor Doug DeMaw, WICER, ARRL headquarters staff, and Steve Bodnar, Chief, Army MARS.

Motels and restaurants nearby. A great location for a great event! Contact Harry Simpson, W4SCF, Box 27015, Memphis, TN 38127, telephone 901-358-5707, for further information.

## MIDWEST DIVISION CONVENTION

October 8-10, 1976, Omaha, Nebraska

The Ak-Sar-Ben Amateur Radio Club proudly hosts the 1976 Midwest Division ARRL Convention, October 8-10 in Omaha, Nebraska. Tie up your horses at the 72nd and Grover (I-80) Holiday Inn convention complex. Convention center boasts the resort complex featuring indoor golf, billiards, Ping-Pong, shuffleboard, game rooms and two indoor swimming pools (watering horses prohibited). A 22,000 square-foot exhibition hall will feature more than 20 major exhibitors. Call toll free 800-453-5555 for room reservations.

FCC exams will be held Friday from 1:00 to 5:00 P.M. In the evening, a special guest speaker will welcome the conventioners before a social hour(s) featuring musical entertainment.

Technical sessions start Saturday when the chickens get up (8:00 A.M.). We are pleased to present: Tony Dorbeck, W1YNC, QST assistant technical editor, "Recent Equipment"; John C. Lawrence, W3CEG, "Com-

puter Controlled Amateur Radio Station" (2 hours); Bill Leatherwood, WAØZUR, "CW Networks"; Mike Hunter, M.I.T.S., "Introduction to Microprocessors"; Motorola "M6800 Microprocessor Applications for Amateur Radio"; Adrian Weiss, K8EEG/Ø "QRPP"; Jim Wickham, WBØSLL, Bell Telephone, "RTTY Repair of Model 19s and 28s"; Bob Conley, WBØLYU, "Novice Forum"; Denny Had, K8KXX, Dentron Radio Co., "Antenna Matching Devices"; James Zoller, National Weather Service, "Weather Seminar"; National Red Cross Representative, "Disaster Communication Requirements"; John McKinney, WØAP, "FCC Direction-Finding (Complete with Van!); Sam Morford, Bell Telephone, "Science is Not Magic"; Strategic Air Command, "Worldwide SAC Communication Demonstration"; Doyle Kernes, WBØIUT, and Jim McKim, WØCY, "AMSAT" (with full-scale models); Naval Commander, "Navy Marine Corps MARS Forum"; Jim Wilson, Jr. WBØJXY, "New Generation SSB."

These programs will be televised and recorded for later viewing on the Holiday Inn television system.

We are especially pleased to welcome the ARRL president, Harry Dannals, W2TUK, to preside over the ARRL forum. Co-hosting will be Paul Grauer, WØFIR, Midwest Division director.

Saturday evening program will include the grand banquet featuring Harry Dannals and Armond Noble, W6AJY, editor of *Worldradio News*, who will speak on "What Direction Will You Take, Amateur Radio?" Prizes include \$2,000 worth of merchandise including a Midland 13-500, Brimstone 144 and a microwave (FCC-approved) oven for the ladies.

Ladies program will feature arts and crafts, a full-time hospitality room (for cards, bingo, etc.) and for \$3.50 a double-decker bus ride to the Westroads Shopping Center for shopping, lunch and live theater.

More?! You bet Pardnah! FCC forum, homebrew contest (bring your best original homebrew project and enter it for a prize!), QCWA program, AREC forum, vhf/uhf, flea market, radio astronomy and more!

Advance mail registration for the convention and banquet is \$14.00 per person (\$15.00 at the door). Make checks payable to the 1976 Midwest ARRL Convention, P. O. Box 1173, Omaha, Nebraska 68101. Additional convention information may be obtained by sending a s.a.s.e. to the same box number.

The Ak-Sar-Ben Radio Club insists that this convention will present a totally new experience for all hams!

# Hamfest Calendar

**Arkansas:** The Queen Wilhelmina Hamfest 1976 is Saturday and Sunday, September 11-12, at Queen Wilhelmina State Park, Rich Mountain, Mena, AR. Excellent accommodations and food at the newly restored historic Queen Wilhelmina Castle. New equipment displays, flea market, camping area with

utilities and rest rooms, amusements for harmonics. Talk-in on 146.52. Write WB5CXX, P. O. Box 5191, Texarkana, TX 75501.

**Florida:** The 11th annual Melbourne Hamfest is Saturday and Sunday, September 11-12, from 9 A.M. to 5 P.M. each day in the air-conditioned Melbourne Civic Auditorium located on Hibiscus Blvd. Donation is \$2.50 per adult. Full program includes forums, meetings, auction, swap tables, commercial exhibits, awards, etc. Talk-in on 25/85 and 52. Sponsored by Platinum Coast Amateur Radio Society. Write P. O. Box 1004, Melbourne, FL 32901.

**Illinois:** Radio Expo '76, September

18-19, Lake County Fairgrounds, Rtes. 4 and 120, west of Waukegan. Forums featuring FCC's John Johnston, ARRL's Lew McCoy, ATV, OSCAR, synthesizing HTs and much more. Giant indoor/outdoor flea market opens Friday night. Campers welcome, overnight parking available with electricity. Dozens of exhibits by manufacturers, distributors. Full-service cafeteria for breakfast lunch. Make overnight reservations at Holiday Inn, Mundeline. Advance tickets \$1.50. Write Box 1014, Arlington Heights, IL 60006.

**Illinois:** The Peoria Area Amateur Radio Club, Inc.'s 19th annual hamfest is Sunday, September 19, at the Exposition Gardens northwest edge of Peoria on Northmoor Rd.



just west of University Ave. Campsite open and a Chuckwagon Dinner is Saturday night at 6:30 P.M. at the ham site. For dinner reservations, \$6 apiece, write Larry Pearsall, W9FDY, 2224 W. Herold, Peoria, IL 61604 (deadline September 9). Sunday, free coffee and donuts 8:30 to 9 A.M., free parking, swap sessions and activities for the entire family. Advance tickets \$1.50 (\$2 at the gate). Write Earl Kimzey, WA9SCA, RFD 1, Hanna City, IL 61536.

**Illinois:** The Sangamon Valley Radio Club Hamfest is September 26 at the Sangamon County Fairgrounds, New Berlin, twelve miles west of Springfield on Rte. 36. Food and programs, covered pavilion. Nearby camping. See Lincoln shrines. Talk-in 28/88 AF9AFA. Tickets \$1. Write K9HDZ, 622 Magnolia, Rochester, IL.

**Kansas:** The Wichita Amateur Radio Club Hamfest is September 12th. Located at Edgemore Park (9th and Edgemore) Wichita. Registration begins at 8 A.M. Food and beverages on site, speaker from ARRL board of directors, covered-dish dinner. "Practice" hamfest on evening of September 11 at Heritage House in Wichita; talk-in on 34/94 and 3920 MHz. Contact K9CKM for further info.

**Kentucky:**\* The 6th annual Greater Louisville Hamfest is Sunday, September 26, at the Kentucky National Guard Armory on Crittenden Dr. at I-65 in Louisville. A large indoor exhibit area with a gigantic outdoor flea market on a paved lot; also, meetings and forums. Free ladies bingo. Food and refreshments available. \$2 admission, under 12 free. Flea-market vendors pay admission price plus \$1 per flea-market space. For info or motel/hotel reservations contact Denny Schurr, K4GOU, 2415 Concord Dr., Louisville, KY 40217, telephone 502-634-0619.

**Kentucky:** The Central Kentucky Hamfest is October 3 at the Countryworld Convention Center on I-75 between Lexington and Georgetown. Indoor flea market; talk-in on 16/76. Admission \$2.50 advance, \$3 at door. Open at 8 A.M. Write Hamfest, Box 4411, Lexington, KY 40504.

**Massachusetts:** The NE DXCC Banquet is October 2 at the Waltham Mass. Holiday Inn. For info write W1JFL.

**Michigan:** The 4th annual L'Anse Creuse ARC Swap n' Shop is September 19 at the L'Anse Creuse High School in Mt. Clemens. Open from 9 A.M. to 3 P.M. EDST. Talk-in on 146.52 and .94. Admission \$1.50 at door, \$1 in advance. For tickets enclose \$1 and s.a.s.e. and send to Robert Harder, WB8ILL, 51769 Base, New Baltimore, MI 48047.

**Michigan:** The Adrian Amateur Radio Club's hamfest is at the Lenawee County Fairgrounds, Adrian, September 26 from 8

A.M. to 3 P.M. Tickets \$1.50, \$2 at gate. Flea market, trunk sales; large display area table \$3, 1/2 \$1.50. Ample parking, more and better refreshments. Talk-in on 46/52 and .94 MHz.

**Michigan:** Blossomland Swap n' Shop is October 3 at Berrien County Fairgrounds, Berrien Springs. Greatly expanded facilities, 150 tables, entertainment, refreshments. Advance ticket donation \$1.50, tables \$2. Write John Sullivan, P. O. Box 345, St. Joseph, MI 49085. Make checks payable to Blossomland Hamfest.

**Minnesota:** The 6th annual Southern Minnesota Swapfest is October 10 at Waseca Community High School, Waseca. Sellers bring your own tables. Write Viking Amateur Radio Society, Box 3, Waseca, MN 56093.

**Missouri:** On Saturday, September 11, is the University of Missouri-Rolla Club's 2nd annual W0EEE Electronics Extravaganza, a buy, sell, trade affair.

**New Hampshire:** A hamfest is September 17-18 at Saunder's Bay, Lake Winnepesaukee in Guilford. Includes ham auction and banquet. Advance ticket reservations for the banquet should be arranged with Beatrice Beane, RFD 5, Penacook, NH 03301. Info available on the net, weekday mornings from 6:30 to 8 A.M., 3945 kHz.

**New Jersey:** The South Jersey Radio Assn. 28th annual hamfest is September 12 from 10 to 5 P.M. at Molia Farms, Malaga. Lake, picnic grounds and food available. Tailgate sales, swap n' shop. Family tickets advance sales \$2.50, gate \$3.50. Send s.a.s.e. to Jack Koch, Box 103, Cherry Hill, NJ 08002. Talk-in 146.52.

**New York:** The Hamburg International Hamfest is at Hamburg, September 18. Advance registration \$2.50, \$3 at gate. Featuring flea market, lectures, meetings, displays. Talk-ins 31/91 7.255 (ECARS), 3.925 MHz. Write Bert Jones, W2CUU, 143 Orchard Dr., Kenmore, NY 14223.

**New York:** Elmira New York Hamfest is September 25, Chemung County Fairgrounds. Flea market, dealer displays, technical talks. Talk-in 10/70 - 146.52. \$2 advance sale, \$2.50 at gate. Write WA2SMM, 320 W. Ave. Elmira, NY 14904.

**New York:** The Greater Syracuse Hamfest is October 9 at the Syracuse auto auction bldg. in Lafayette. This is 4 miles south of Syracuse on Rte. 11. Tickets at \$1.50 before Oct. 1, \$2 after. There is plenty of food on grounds, camping facilities nearby. The Lafayette Apple Festival is the same day. Program includes Dave Sumner of ARRL; Frank McElroy; UNYREPCO panel discussion; Navy MARS and more. Write R.A.G.S. Hamfest, Box 88, Liverpool, NY 13088.

**Ohio:** Saturday, September 11, the annual Cleveland Hamfest and flea market. The theme is "Help a Friend become a Ham." At the Berea Fairgrounds with easy access from Hopkins Airport, I-71, I-90 and the Ohio turnpike. Park free in a patrolled lot at the Eastland Rd. entrance. Mobile check-in from 0700 through 1300 on 146.520 MHz. Call W8QV for your check-in number or local info, or use standard repeater pairs. Many commercial displays and events; XYL activities, movies, foxhunt on 2 meters. Tickets \$1.50 before August 31st, \$2 at gate. Children under 12 free. Flea-market "Gold Rush" for sellers at 0700. Bring your own tables. For info and advanced tickets write Cleveland Hamfest Assn., P. O. Box 43413, Cleveland, OH 44143.

**Ohio:** The 34th annual Findlay Hamfest is September 12 at Riverside Park, Findlay. Talk-in 146.52. For advance tickets and/or info write (s.a.s.e.) Clark Foltz, W8UN, 122 W. Hobart St., Findlay, OH 45840.

**Ohio:** The Cincinnati Hamfest 40th Anniversary is Sunday, September 19, at the new improved Stricker's Grove on State Rte. 128, one mile west of Ross (Venice). Flea-market exhibits, contests, model-aircraft flying. Food and beverages all day. Advance-ticket sales \$7, at gate \$8, covers everything. Write Lillian Abbott, 1424 Main St., Cincinnati, OH 45210.

**Pennsylvania:** The Central Pennsylvania Repeater Assn.'s hamfest is Sunday, September 19. Park n' Shop parking garage at 200 Block Walnut St. in Harrisburg. Gates open at 9 A.M. Registration \$3 per ham, XYLS free; no charge for tailgating. Talk-in 16/76 WR3ABV, .94. Food available. No vehicle over 7 ft. high. For info write W3ABF or WA3AVX.

**Pennsylvania:** The Skyview Radio Society's Swap n' Shop is September 19 at Skyview Radio Club, New Kensington. Registration \$1. Check-in on .52 and 04/64.

**Pennsylvania:** The Mt. Airy VHF Radio Club (The Pack Rats) "Hamarama 76" at the Bucks County Drive-in Theater, Rte. 611, Easton Rd., Warrington is on Sunday, October 3, from 8 A.M. to 4 P.M. Registration is \$1, tailgating \$2; bring your own table. Parking for 1,000 cars. Talk-in W3CCX/3 on 52.525, 146.52 and 222.98/224.58 MHz. Write Lee Cohen, K3MXM, 8242 Brookside Rd., Elkins Park, PA 19117. Phone 215-ME5-4942.

**Pennsylvania:** The Radio Assn. of Erie's Hamfest and Flea Market is Saturday, October 9 at the Kuhl Hose Co. grounds on PA Rte. 8, 1-1/2 miles south of I-90. Admission is free, \$1 per car for flea market. From 10 A.M. to 4 P.M. with the dinner to follow at 6 P.M. Write RAE, Box 844, Erie, PA 16512. \*ARRL Hamfests

QST

## Strays

September 25-26 is the date for fabulous DXPO76 and the ARRL DX Technical Symposium at The Tyson's Corner Ramada Inn, near McLean, Virginia. The Symposium is first, Saturday 9 to 12. \$3 in advance, \$3.50 at the door, including copies of the papers presented. DXPO Saturday P.M. session includes Navassa, Indonesia, Cocos, San Fernando expedition stories; PVRC slides, DX contesting, 160-meter DXing, DXAC update. Saturday night, the banquet, at \$12.50 advance, \$13.50 at the door. Sunday, DX Breakfast (\$4.50/\$5) followed by QST Bureau presentation, towers, propagation, OSCAR DX, and expedition stories, St. Brandon and Malpelo. General registration \$5/\$6 - contact Rosie Lamb, WA3NGS, Rte. 1 Box 297, White Plains, Maryland 20605.

Saugus, Massachusetts, amateurs became suspicious when an obviously inexperienced operator came on the bands shortly after a radio was stolen from a fellow ham. While alerting police, they arranged to meet him at a

local restaurant on the ploy that they were interested in "buying" the gear. On signal, officers moved in, arrested the suspect, and charged him with possession of the stolen equipment.

### Certificates Available

Stations outside Europe who contact four members of the YU DX Club will earn the WYUDXCM certificate. Send a certified list of contacts and 7 IRCs or \$2.00 to YU DX Club, Box 82, 62250 Ptuj, Yugoslavia. Members are YU1s AG AHI BCD ELM NPG NSX ODO QBC SF SJ, YU2s AKL BHI BOP CAW CBE CBM DX HDE LA NEJ OB OK OZ RAZ REO RKC, YU3s BU CM DJK DQ EP EY TDX TXT ZV, YU4s EBL and HA.

The Amateur Radio Mobile Society offers two awards for international work. Mobilers can earn certificates for confirmed contacts in all six continents (WAC/M) and in 100 or more ARRL countries for the Mobile Century Award (MCA) with endorsement stickers. Further information may be obtained from

Awards Manager Christopher J. Page, G4BUE, "TatWorth," Station Road, North Chailey, Lewes, Sussex, England.

Amateurs working all 14 Massachusetts counties may receive an appropriate certificate from the South Shore Repeater Association. Submit a log certified by another amateur and self-addressed stamped envelope to: WR1ACT, SSRA, Box 284, East Milton, MA 02186.

The Worked All Manitoba Award will be issued for confirmed contact with amateur stations in specific numbers of the province's different municipalities, local government districts, provincial parks, forest reserves and national parks. It is available in the following classes: E - 50, D - 75, C - 100, B - 125, and a special honor plaque for A - all 134. Contacts made after January 1, 1976, are valid. A record book, application forms, maps, rules and conditions are available for \$1 from Douglas Bowles, VE4QZ, 1104 First Street, Brandon, Manitoba, Canada R7A 2Y4.

# Correspondence

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

## OLDSPEAK

□ WA3YNK is apparently not familiar (Newspeak 7-76 "Correspondence") with the European method of writing the date. Roman numerals are used for the month, Arabic for the day. Thus 11 June 1976 would be 11/VI/76 and 6 November 1976 would be 6/XI/76 with no possibility of error. If we are to start a new system we ought to incorporate one that already exists wherever possible. — *David H. Kaplan, WA1OUI, Bloomfield, CT*

## COVERED

□ For some time I have felt that your girly pictures on the front cover of QST were not appropriate for a technical journal. Now the July issue has a front cover that looks like one for a comic book. The "innards" are good but you sure can't tell it from the cover. — *Jack Mackinder, K7ZIQ, Portland, OR*

□ Re: May QST cover. I tried to explain the can, radio-in-can and friendly cat to a Brazilian communications engineer who had heard of Ham Radio. She understood only after rejecting the perfectly swell cat as an engineering non-entity. Then too, my spoken Portuguese wasn't the best. — *L. A. Carter, W7HCE, Rio De Janeiro, Brazil*

□ I immediately enjoyed the front page of May QST. Very clever! The cat looks like it was suddenly interrupted by the camera, ready to connect power and try out the rig. Keep up the good work on low power. You may or may not know it, but you're really concentrating on an aspect of our future life — energy conservation! — *John W. Baldwin, W1KUO*

## MAKING IT

□ I seldom hear any more the proud cry "Rig here is homebrew." Now that I've taken a breath and dived in again, I can see why! Very few reliable suppliers of the necessary "res exotica," poor delivery by mail, and no local dealers with bin on bin of parts. The result is that if one does have a yen to heat up the soldering iron, the best he can do is to buy a kit. Although the Heath Company has done an excellent job in this line, it is still no substitute for hammering out a design or the old cut and try. . . . The thrill of accomplishment is missing. — *J. W. Millard, K4JVT, Camden, NC*

□ Thank you for the fine QRP rig in the May issue of QST. My first QSO with it lasted 25 minutes with a signal report of 569. Later, 579 and 599 — can't believe it. I would like to see a similar size rig for 80 meters in a future issue. Keep up the good work. — *Alfred Pooler, K1ZYM, Southwick, MA*

## HOW Q YOU?

□ Re: Correspondence July 1976 QST. In response to KBKUZ's request for a Q signal for "is this frequency in use," try "QRM?" — *Steve Sombar, WA0PRI3, Baltimore, MD*

□ One thing about two meters irks me. Often I hear so-and-so decided for calling CQ. Granted, this is not wise on repeater frequencies unless local use has dictated that a

repeater be primarily for ragchewing. But on simplex frequencies, a CQ is the proper method to call. Most people here in Denver call "QRZ?" which is incorrect. There is no one calling them, therefore no one to ask, "QRZ?" — *William Leahy, WA3ZLG/Q, Denver, CO*

## DELAYS, DELAYS . . .

□ Recently (?), I applied for Novice exams by mail after giving the appropriate code tests. To date, the written exams have not arrived which makes it almost five weeks. Other examinees have had to wait longer, and then even longer for their licenses after they passed the written exam. These people work hard and put forth effort to join the ranks of amateur radio. Why is it that the CBER can operate immediately with no more effort than filling out an application, when we are losing discouraged Novices due to the excessive waiting period? — *Donald Collins, WBSQXJ, Houston, TX*

□ Here's a possible solution to the FCC problem: The new (or upgraded) ham, after passing his exam, should be given the option of paying an extra fee (say \$20) to have his application *hand-processed*. Stay away from the \$%&! computer! Something like special delivery or registered mail. The fee would cover the two or three hours of a clerk's time required for the research, typing, and filing. Think of all the benefits. Hundreds (thousands?) of new jobs would be created. The FCC would come a little closer to breaking even (without conflicting the courts' cost-recovery fee rulings, since this would be an optional service). The computer would have that much less work, thus speeding regular processing. And not least, amateur radio would gain many less cynical operators.

The only stipulation would be that if the application is not processed within five working days, the extra fee must be refunded. Add the normal two-way first class mail time, and the ticket would arrive in four weeks instead of twelve.

Most hams would gladly pay the fee. With prices rising as fast as they are, you could save \$20 or more by not waiting the extra eight weeks to buy a rig! And look at the cost of aspirin, antacids, sedatives . . . even psychiatric analysis!

So let's put a little capitalism back into a part of our government — a reasonable service for a reasonable price. — *Michael Aronoff, Burnsville, MN*

□ It would seem that amateurs should be given equivalent treatment as the CBERs and the waiting period eliminated, particularly in cases where an advance in class is involved. This would be a stimulus for the whole incentive system. — *Richard W. Kingerley, W3WNG, Wilmington, DE*

□ My federal taxes come faster, my state taxes come faster; even my ARRL membership comes faster than my General ticket seems to be coming. It's really disgusting to just sit without any sense of accomplishment after passing such an exam! — *Bob Heron, WN6LSO, Canoga Park, CA*

## OUR OWN BACKYARD

□ The amateur radio fraternity has been very quick to condemn the unlawful operation that appears to be commonplace on the citizens band. Supposedly, amateur radio operators, having proven themselves before an FCC examiner to be proficient in code and theory, are far above such practices. Well, don't believe it. There really can't be any difference between the operation on 11 meters and much of the name calling, four-letter words, violent arguments over frequencies, and intentional QRM-ing that is far too often heard on 75 meters. Gentlemen, in the immortal words of the late Walt Kelly a la Pogo — "We have met the enemy and they is us!" — *J. D. Unruh, WB3BRE, Erie, PA*

## REMEMBER CW?

□ Certain aspects of the present technology have caused me to reflect on the proper place for certain machines now in use. I was listening to two owners of memory storage devices showing off the amount of information they had stored for use in contests and discussing expansion to include additional information. Further, they discussed how easy the use of the machines had made their last few contests. It would appear that the use of such devices in contests would add an additional factor of man vs. machine and I question the ethics of such a factor. When you can push a button and dump out a pre-programmed contest QSO segment, I don't think that is quite playing the game. — *Maxwell G. Smith, K7DK, Phoenix, AZ*

□ Re: July letter from WA7VCE. I have been trying for my license for some time now. I failed on my last try.

The point I want to make is I haven't given up. I want that license very bad. The code seems to be a barrier to many. My HW-16 has taught me more about code and operating procedure than any book could. I used to tune past the poor senders until I realized that even the Extras are Novices that have learned a lot more. I used to think once I got my Extra Class license I would forget about code. Not anymore. I love it — the faster the better. Send on the good and bad. Listen and copy!

Unlicensed, but not for long! — *Harold R. Stephenson, Lebanon, OH*

## NIGHT AND DAY

□ I'm sure you've heard the joke about the astronaut who wanted to be the first man on the sun, but decided to go at night so he wouldn't be burned. Absurd? Turn to page 41 of the ARRL License Manual (I have the September 1975 edition); the answer to question 4 of the Advanced class section reads in part: "The sun's output varies of course between night and day. . . ." — *Will Valentine, K1TVW, West Ossipee, NH*

## WORDS OF PRAISE

□ Both my wife, Bela, TG9HS, and I wish to express our most profound gratitude to the ARRL for having considered us for and having recognized us with presentation of your Public Service Certificate. I cannot find the proper way to tell you how deeply touched Bela and I are, but we assure you and the wonderful American people, and especially all amateur radio operators, that if this ever-changing world of ours should follow a basic set of morals and good conduct, every body should try to imitate the average American ham radio operator.

Looking towards your beautiful Statue of Liberty in this Bicentennial year of your much admired nation, I can see her torch flaming brighter than ever. — *Moises Russ TG9MH, Guatemala, C.A.*

# Washington Mailbox

Q. I know it's a tall order, but can you briefly summarize the main points of the First Report and Order in Docket 20282?

A. The principal points are: Technician class licensees now have full Novice privileges; a Novice who allows his license to expire may retake the Novice exam immediately if he wishes; Novices may run 250-watts dc input power and all other licensees are limited to 250 watts on the Novice segments; Conditionals are "grandfathered" into Generals, and Technicians (C) into Technicians; the future availability of mail exams will be limited to Novices only, except in physician-certified cases of protracted disability.

Q. Under this Report and Order, are there any changes in the procedure of conducting the Novice exam?

A. There are two changes. First, the volunteer examiner must be unrelated to the applicant. Second, the examiner must be at least 21 years of age and hold an Extra, Advanced, or General class license. No longer are holders of Commercial radiotelegraph operator licenses, or those employed in the service of the United States as the operator of a manually operated radiotelegraph station, allowed to conduct the Novice exam.

Q. Are there any license-fee changes under the new rules?

A. No.

Q. If my Novice license expires, and I retake the test within a short time after expiration, can I get my old call sign back?

A. A specific unassigned call sign may be assigned to the most recent holder thereof. So, upon request, you could be assigned your old call if it were still available. Whenever a specific call sign is requested, an additional \$25 fee is required. If your requested call sign were unavailable, the \$25 would be refunded.

Q. Are there any changes in the procedure for FCC-conducted exams?

A. Yes. Under the old rules an applicant who failed an amateur radio operator exam could not take another examination for the same or higher-class license within 30 days. This 30-day wait now applies only to those who fail a written exam. If an applicant fails the code test before he even gets to the written test, he may come back the next day (if that FCC office conducts amateur exams that often) to try again.

Q. The new rules state that Conditionals will be "grandfathered" into Generals. Can a present Conditional class licensee supervise a Novice exam, or must he first modify his license to show General privileges?

A. Under the new rules those present holders of a Conditional class ticket now possess full General privileges. The only difference between a Conditional and General class license is the spelling. Yes, a Conditional class licensee may supervise a Novice exam, provided he is at least 21 years of age and unrelated to the applicant.

Q. If I possess a Conditional or Technician (C) class license, how do I go about having it

"grandfathered" into a General or a Technician license?

A. Please do not send your license to the FCC just to have it modified to show the name of your new license class. To do so would require a \$3 modification fee and would put an even greater strain on FCC's license processing office in Gettysburg, PA. Your present license carries the same privileges that it would if it were issued by virtue of taking an FCC-administered exam. Keep it until it comes up for renewal, or until you need to modify it for some other reason, such as a change of station location. At that time a renewed and/or modified license will be issued to reflect your new license class.

Q. The new rules state that full credit will be given for exam elements taken through the mail-examination procedure. The rules also state that Element 2 (the Novice theory) is now a requirement for all license classes. I have a General, but never took the Novice exam. Does that mean that if I want to upgrade to an Advanced, I'll have to take Element 2?

A. No. You will only have to take those examination elements of the higher-class examination that are not included in the requirements for the license which you presently hold. This means that a General class licensee need only take Element 4A (Advanced theory) to upgrade to an Advanced.

[Note: Send your FCC questions to Hal Steinman, K1FHN, ARRL, Newington, CT 06111. 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 Amateur and Citizens Division of the FCC. Numbers in parentheses refer to specific sections of the FCC rules.] **QST**

## 50 Years Ago

September, 1926

Break-in has lots of advantages, as John Clayton explains, and it is simple if receiving and transmitting wavelengths are not too close and you have separate antennas. He suggests keying the plate transformer primary for "soft" keying to be easy on your ears.

General Electric furnishes data on the new UX210, which *QST* says will be ideal for hams - but we'll laugh at the 12-watt rating, 'cuz the thing will work fine with the plate element red- (but not white-) hot.

Radio regulation is in deep trouble; Congress has failed to act on proposed legislation and so the inadequate 1912 law is still in effect. This means that any station can operate at will below 200 meters; but the League will stand by the informal Hoover agreements and amateurs will observe the unofficial band limits - the only choice to avoid chaos.

IARU hasn't worked out too well as an individual membership structure, and the

Editor plugs for reconsideration of the original idea of a federation of national societies.

General Radio is offering 160-meter crystals at \$15 each, plus the mounting.

Boyd Phelps points out a major difficulty in building a 5-meter rig - the grid-plate capacitance has a large effect on the output frequency.

6EL solves the power-supply problem for a portable rig by using Ford spark coils; he says the signal is steady, but we bet the note isn't pure d.c.

ARRL's financial statement for the second quarter shows a gain of \$631.

## 25 Years Ago

September, 1951

Civil defense is a major subject these days, and the fine AREC setup described by Detroit amateurs could be a pattern for many others. WIFTX assists the program with a mobile converter for 28- and 50-Mc. use.

But TVI remains a headache, and not all from amateurs; Phil Rand and others illustrate

methods of reducing QRM from r.f. heating machines (diathermy, industrial, etc.) often blamed on us. And the Dayton ARA presents its plan for handling TVI complaints as guidance for newer clubs.

The need for maximum plate current change on receipt of a radio signal limits radio control receiver design to superregens, and the Good brothers show us the latest designs as well as the mechanical features of escape-ments.

That new twin triode 6BQ7 has some interesting applications for v.h.f. work, as W1HDO and W1JEQ point out from experiments in the Hq. lab.

WSRXA suggests that complete shielding of

the rig is another attack on TVI, and has designed a "rackabinet" covered with copper screen.

W1PH has updated his "Coffee Can VFO" by adding a 6L6 amplifier, resulting in a pretty good signal all by itself.

We are teased with a cover picture of W9FKC showing the joys of operating c.w. mobile, with a promise of details later.

RCA police rigs are coming on the surplus market, and W1QNM finds it an ideal design for conversion to the 10-meter band.

The Editor dramatizes his plea for safety practices in the ham shack with a striking title - "Your Private Electric Chair." - *W1RW*

## Strays

### STOLEN EQUIPMENT

Stolen on June 25 in Utica, NY. HW202 with tone-burst encoder and HD-1982 modulator. Transceiver identified inside with

K4GET or W1HDL. J. F. Myers, 16 Olde Village Drive, Winchester, MA 01890 or notify New Hartford Post, NY State Police.

Midland Model 13-509, Serial No. 30700872, with CT driver's license number

171869415 engraved on back. Stolen from auto June 11. Contact WA1OU1.

Drake TR-72, Serial No. 750228, taken from car in Arvada, CO, on June 18. Ron Bradley, WB0QES, Arvada, CO.

Midland 13-505, Serial No. 0430236, stolen on June 13 in Chicago. Reward. Ken Louks, WA8REI, 6656 Saylor Dr. No. 1103, Saginaw, MI 48603.

## Botswana Hosts First IARU Southern Africa Conference

Amateur radio history was made on June 6 when delegates from seven African countries met in Gaborone, Botswana, for the first Southern Africa Conference of the International Amateur Radio Union (IARU). The purpose of the meeting was to discuss the prospects of success for amateur radio at the 1979 ITU World Administrative Radio Conference (WARC) and to lay the foundation for the formation of national amateur radio societies in those countries in the region which do not presently have such a society. Organizers of the Conference were Barrie Clark, 9J2CL and Ed Thompson, A2CED.

The Southern Africa Conference was opened with remarks by the Director of Posts and Telecommunications for Botswana, Mr. Tumelo, whose comments reflected his appreciation for the work of the radio amateur in emergency communications and in technical training. He expressed the hope that Botswana would soon have more amateurs indigenous to the country, because "When Botswana has technical communication experts it will be due to the training given by the radio amateurs."

The delegates then heard remarks by H. Walcott Benjamin, EL2BA, president of the Liberian Radio Amateur Association and member of the IARU Region I Executive Committee. Ben described the role of the Amateur Radio Service in Africa, stressing its usefulness as a voluntary emergency com-

munications facility in light of the relatively undeveloped state of the *intra*-continental telecommunications network. He observed that the continued existence of amateur radio depends on the allocation of suitable frequencies for its use, and that in Africa the high-frequency allocations are especially vital.

Then, 9J2CL reported on the 1975 Region I Conference in Warsaw, which he had attended for the Radio Society of Zambia. (A report on this conference appeared on page 86, July, 1975, *QST*.) It was at Warsaw that the need for regional conferences in Africa was identified, which led to the convening of this meeting in Gaborone. The other delegates then reported on the attitudes of their own administrations toward the Amateur Radio Service. Discussion on matters of mutual interest ensued.

The IARU Southern Africa Conference adopted several resolutions relating to WARC and to the future of amateur radio on the African continent. Here are some highlights:

- The IARU Region I frequency proposal which was adopted at Warsaw was endorsed unanimously, with the recommendation that those societies which have not approached their licensing authorities do so immediately.
- A positive program of promoting amateur radio amongst the indigenous population was endorsed, with the recognition that prospective amateurs in Southern Africa often are unable to acquire the necessary equipment because of lack of money and availability of such articles. National societies in other parts of the world are urged to sponsor club stations and to make components and kit-form equipment available in the following countries: Botswana, Lesotho, Rhodesia, Swaziland, and Zambia.

□ Southern African amateurs are urged to become more active in supporting the IARU Monitoring Service (Intruder Watch).

□ Southern African societies are requested to support the annual Jamboree-on-the-Air sponsored by the World Scout Organization.

□ Southern African amateurs are asked to assume a more positive attitude with respect to the exchanging of OSL cards.

□ Another Southern African Conference should be held early in 1978 prior to the Region I Conference in Budapest.

The amateur radio community in Botswana, which hosted the Conference, is well on its way to the formation of a national organization which will be able to take its place in the IARU federation. Rod Haverson,

A2CRH, served as chairman of the meeting, and ZS1AZ served as secretary. Our thanks go to ZS1AW for supplying this report.

A similar conference is scheduled for West Africa later this year, again involving amateurs from countries where there is at present no IARU society in addition to those which are represented in the Union.

### GIBRALTAR AR SOCIETY APPLIES FOR IARU MEMBERSHIP

The Gibraltar Amateur Radio Society has applied for membership in the International Amateur Radio Union. The society has a membership of 19, including all ten licensed amateurs in Gibraltar. The president is James Bruzon, ZB2BL, and the secretary is James C. Risso. The secretary is responsible for IARU liaison, and the president is responsible for government liaison. The society's address is P.O. Box 292, Gibraltar, which is also the address of the OSL bureau.

Present IARU member-societies are now voting on the application, which was submitted to them for consideration in the June 1976 IARU *Calendar*. The *Calendar* is the official means of communication between IARU hq. and the member-societies and is issued twice a year.

New officers of the International Amateur Radio Club, which operates special station 4U1ITU at ITU hq. in Geneva, Switzerland, were elected at the Annual General Meeting in May. Here are (l-r) Len Jarrett, HB9AMS treasurer; Ted Robinson, F8RU, president; Dick Kirby, W0LCT, retiring president; and Jerzy Rutkowski, SP5JR, secretary.

Here are the delegates to the first IARU Southern Africa Conference: (l-r) seated, EL2BA, 9J2CL, 3D6BG and ZS1AW; standing, 7P8AC, ZE5JJ, ZE1JE, A2CRH and ZS1AZ.



# YL News and Views

Conducted By Louise Moreau,\* W3WRE



## 1976 YLISSB Convention

Neither the airport bus strike nor the incorrect listing of the town affected attendance at the 1976 YLISSB Convention at the King's Grant Motel in Plainview, L.I. The United States was represented by all ten call areas, as well as KH6 and KL7. Among the 101 members who were present, the DX members came from several Canadian districts, the West Indies, Easter Island, and Germany.

It was a time of discussion, of advancing and perfecting the procedures of the System and of planning new policies of service. And it was a social time of putting names and faces on calls, visiting the "antenna farm" of

W2HCW, viewing Theodore Roosevelt's home or swimming at Jones Beach.

From a technical perspective, the biannual convention was sessions covering SSTV; Understanding Antennas demonstrated by W2LH and W2EEO; Father Dave, CE0AE, with his multi-media show on Easter Island. We had sessions on OSCAR satellite communications, aviation electronics, and the problems and benefits of OM/YL DXpeditions per the WB2AQC/WA2BAV globe-trotting team. Many of us were turned on by DJ2LR/W2's all-band synthesized digital transceiver that applied computerized design to amateur gear.

The general session included an award presentation to V. Mayree. K4ICA; W0UUE's plans for system emergency communications with Central American member stations and an address on the influence of YLs on amateur radio by W3WRE.

The Saturday night banquet was highlighted by VE2CK's reception of the Top Flight Operator Trophy, taped greetings from VK3LC, and gifts that ranged from 1000-year-old eggs via KH6PLC to Father Dave's handmade jewelry. But most of all, these four days were YLISSB members demonstrating their theme of worldwide understanding and friendship through amateur radio.

## YLRC ITALIANO CERTIFICATE

The YLRC Elettra Marconi, the YL club of Italy, is sponsoring a certificate for all amateurs who will have made two-way contact with "Jolly" stations through December 31, 1976. The certificate will acknowledge the "Let's Save Venice" project and the following rules are to be observed: Italian amateurs 10, European 8, and Extra European stations 6 points. Scoring: YLRC Elettra Marconi members count 3 points, amateurs in Tre Venezie count 2, with E. Marconi contacts count 3 + 1. All other Italian contacts count 1, with 3 + 1 for E. Marconi member contacts. Send logs

to Comitato Organizzatore L.S.V., YLRC Italiano Elettra Marconi, Sezione A.R.I. Trento.

A trophy will be awarded to the YL with the highest score.

## YLRL AND YLISSB MEMBERSHIP

YL News and Views receives many requests for membership information for these two worldwide YL clubs. All requests should be directed to the membership chairpersons of each organization. YLRL, Beth Taylor, W7NS, 14637 S.E. Fair Oaks Ave., Milwaukie, Oregon 97222 or Marge Campbell, K4RNS, 65 N. Arbor Dr., Ormond Beach, Florida 32074. YLISSB, Dr. Fred Holzappel, W0UUE, 422 Cloverleaf Dr., Golden Valley, MN 55422. The club is open to OMs and YLs.

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



Argentina and Japan are precisely at opposite ends of the world, but at the IARU Region II Conference, they converged as Pat, LU1BAR, presented Radio Club Argentino pennant to Hisako Hara, JG1QIK. (LU2DX photo)

No one bothered to take a list of names, but if you were at the YLISSB 1976 Convention, you are there — somewhere.



## RUSSIAN YLS

Looking for Russian YLs? UA0CDD informs us that there are 344 YLs licensed in USSR, with 206 of them in RSFSR. The others are as follows: UB5 53, UC2 9, UD6 2, UF6 4, UG6 2, UH8 4, UI8 8, UJ8 2, UL7 23, UM8 3, UO5 3, UP2 5, UQ2 12, UR2 8. This does not include the vhf licensees or those with the first call letter R. The Central Radio Club in Moscow has noted that the number of YLs in amateur radio has grown rapidly the past couple of years and that the rate of growth somewhat exceeds that of OMs. YL News and Views thanks UA0CDD for this information.

## THE TRILLIUM WEEKEND

The Ontario Trilliums' annual Trillium Weekend Contest has been scheduled November 5-6, 1976. All amateur radio operators are welcome to participate. Please send the contest logs to the custodian Eva Colback, VE3EVA, 155 Midland Avenue, Scarborough, Ontario, Canada M1N 3Z8. The contest rules are listed in detail in Operating Events, QST.

## HARMONICS DIRECTORY ISSUE

The Directory of YLRL Membership with addresses for 1976 has been published for all members in the July/August issue of YL Harmonics.

QST

## National Frequency Coordination Plan Questionnaire

A questionnaire was prepared by ARRL using input from the repeater advisory committee, VRAC. The questionnaire was mailed, in May, to all the repeater owners or trustees who were listed in the *Callbook* as of January of this year. There were slightly over 2000 licensees listed. Over 700 repeater owners responded; a very good percentage return for any survey.

The questionnaire was concerned primarily with a national frequency coordination plan but also touched on many other subjects. For example, 38 percent of the repeaters in the USA have autopatch facilities while 50 percent of those that don't have them do plan on installing such facilities. Also, 68 percent of the repeaters have emergency power capabilities and 57 percent offer some type of special service such as emergency dialing, taped messages, and so forth.

Over 80 percent felt that there is a need for a national plan and the same number

supported an ARRL-sponsored plan. Some 63 percent felt that recognized coordinators should have some "official" sanction by FCC but the number dropped to 60 percent when asked if frequency coordination should be a condition of repeater licensing.

However, 52 percent of those responding *do not* believe that ARRL should provide funding for official coordinators. Similarly, 70 percent of those responding do not believe that coordinators should be required to be League members.

A report of the survey was made to the Board of Directors of ARRL at their July meeting. As a result, the following motion was made and passed. "Moved that the President assign to a standing committee examination of the need for a National Frequency Coordination System for amateur repeaters, to define the proper role of the ARRL in the implementation of such a system, and to make appropriate recom-

mendations to the Board at the 1977 annual meeting. Further, moved that the committee is recommended to utilize the assistance of the VRAC, the staff and such other information sources as may be available in developing the study."

We want to thank all of the repeater owners and trustees who filled out their questionnaires and returned them. Some potent information was obtained that will be extremely useful in the future, particularly in matters of defending our occupancy of vhf and uhf. A few more interesting statistics before we close the subject: The average number of user stations per repeater is slightly over 55 and the total user number for about 700 machines is 51,000! The ARRL Repeater Directory has a listing of about 2000 repeaters so if the 55 number of average users per machine is used, this adds up to an awful lot of hams on vhf and uhf -- but there is room for plenty more!

### MT. WASHINGTON REPEATER

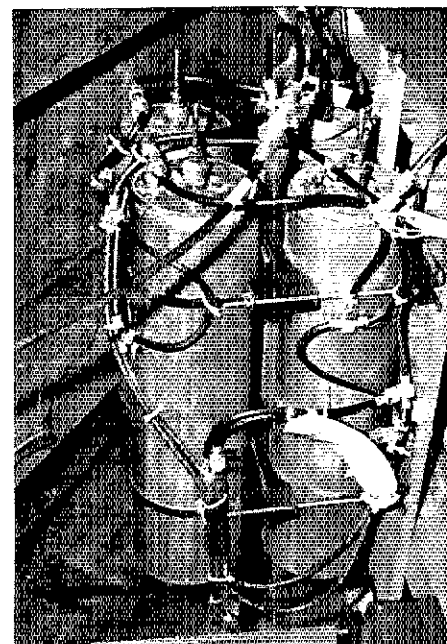
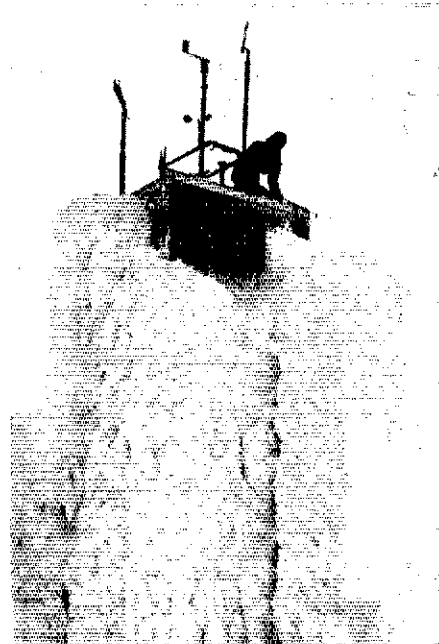
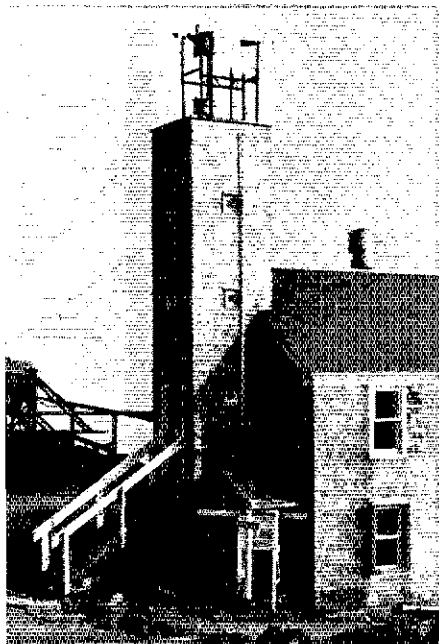
At Oxford, K1OIQ, of the Mt. Washington Observatory staff is the trustee of WR1AAL, an 07/67 machine operated from the highest mountain in northeastern USA. The photographs show the problems involved in maintaining this repeater. With an annual wind-speed averaging 30 mph and winds reaching 230 mph (!), free-standing antennas would just blow away. The antenna, a Stationmaster,

is lashed to the side of the observatory's wooden tower. The tower causes only minor variations in the pattern. During the winter, the antenna is encased in a 3-inch plastic drainpipe for extra protection. (The pipe is not visible under the normal one to three feet of snow and ice covering the building!)

Effective radiated power from the station is 13 watts from a Phelps-Dodge Model 220 Stationmaster specially constructed with a 5-degree downtilt. Downtilt is needed to get the maximum signal down on horizon from 6300 feet up. One of the photos shows the

Sinclair F201G duplexer which deserves special mention. The duplexer is installed in the attic, the only space available. While outside temperatures sometimes reach 60 degrees below zero, enough heat from the living quarters finds its way into the duplexer when it is covered with a layer of insulation to keep it within the broad operating temperature range. Todd Oldenburg, WB2VXY, of Sinclair Radio Labs assembled this unit especially to withstand the world's worst weather. Photographs and information are credited to Gordon Pugh, W1JTB.

\*VRAC Liaison, ARRL Hq.



# The World Above 50 MHz



Conducted By  
William A. Tynan,\*W3KMV

## The Standing Boxes

Judging from the mail, the standing boxes are for many readers an outstanding feature of this column. Indeed, they can provide a concise picture of the accomplishment in the world above 50 MHz if they are kept up to date and if those who qualify for listing submit their data. For one reason or another a number of stations have not submitted updates to their totals or have never filed their information at all. To make the standing boxes meaningful, all qualifying stations should be included. It's not simply a matter of ego, believe me. Just as they review the contest scores, many perspective vhfers scan the boxes to see what can be done on the frequencies above 50 MHz and make a decision with regard to their future operations. So, if you have never sent in your totals or have not updated recently, by all means do so. It would help to submit such information

on a sheet separate from other comments, such as accounts of openings, since all data for the boxes go in a file devoted only to standing box information.

Many have asked that we publish guidelines for getting their calls listed in the boxes. At present, the entrance requirements are somewhat flexible. Generally speaking, if a station has more states than the lowest number of any station listed in the particular call area, it is qualified for listing. On the other hand, there are often special circumstances under which a station might have fewer states but still be listed. For example, all 5s are not equal. Everyone would agree that it is more difficult to amass states on 2 meters or 70 cm from New Mexico than it is from the coast of Louisiana. However, with all the new activity coming on the bands, it would appear that a more firm policy should

be established for becoming listed and staying listed.

What do you think these policies should be? I would like reader input on the matter. Some questions I have are: What about the coverage of the boxes? Should U.S. states be the principal means of ranking? What about Canadian provinces or countries? Does the mileage column mean anything in these days when EME is an important factor in vhf/uhf DXing? What about a standing box for 6 meters? At present, all that is presented for that band is the occasional publication of the WAS list. Many stations with good records are not and may never be on that list. What would be appropriate in this case? Your thoughts on these questions, as well as other comments, will be very helpful in formulating criteria for the standing boxes in the years to come.

## ON THE BANDS

**6 Meters** - The year 1976 may well go down in history as one of best yet for Es with many intense openings recorded particularly during late May and throughout all of June. The "big day" was, of course, the Sunday of Field Day when many stations, including this writer, had no difficulty in working all 10 call areas. Several Field Day groups with 6-meter capability were able to add 200 to 300 contacts to their totals. Home station, K8III, near Cleveland accomplished the nearly impossible feat of contacting 48 states in about 8 hours. Paul, newly on 6, must be impressed! What wasn't workable on single-hop or double-hop

\*Send reports to Bill Tynan, W3KMV, P.O. Box 117, Burtonsville, MD 20730 or call 301-384-6736 and record your information.

Es could be had via the backscatter route. The fact that backscatter was so strong on that particular day is interesting as it was the same way on July 20 last year when 2 meters burst forth with "E skip." For the story of 2-meter operation on June 27, 1976, see the 2-meter section which follows. Another correlation with other conditions is worthy of note. In a letter dated 3 May, K9KQR, reporting on the aurora of May 2, pointed out that the event could repeat on Field Day!

The weekend of the VHF QSO Party was also notable, especially Sunday evening. Of particular interest is the information that KL7HLE, Juneau, worked a total of 116 stations in 14 ARRL sections during the contest.

In addition to the contest weekend and the big day of June 27, neither of which can be reported in detail because of their sheer magnitude, other highlights of the season were the many WAS awards won (No. 137 issued as of July 10), the operation of DX stations such as ZF1XW, WA2HJF/C6A, VP2LAW and YV5ZZ, as well as the double-hop conditions which brought KL7IBG and KL7HLE within reach of most of the continental U.S. Alaska contacts were available as far east as Ohio and both KL7IBG and KL7HLE were reported as heard by the fellows running the C6A DXpedition on Grand Bahama over the weekend of the contest. Dave and Ed also heard a station on 50.195 signing ELCB. Does anyone have information on this one? At any rate, despite some trouble in getting their gear through customs (and a midnight visit from two uniformed gentlemen representing the local authorities who apparently thought that the two visiting hams were some kind of secret agents sending messages somewhere), WA2HJF/C6A made 225 contacts in 39 ARRL sections and 4 foreign countries. Equipment consisted of a TR6 cut back to 50-watts input to conform to the provisions

of their license and a 3-element Cushcraft beam stuck out of their 5th-floor hotel window. Dave, WA2HJF and Ed, WB2ANJ, report a great time despite their trials and tribulations and they sure made many 6-meter operators happy with a pretty rare country. VP2LAW is another rare catch for 6-meter DXers. Probably the first St. Lucia station to work the States on 6 meters, John has not let the fact that he has been temporarily limited to cw slow him down. He has worked plenty of stations every time band conditions allowed it. Phone operation had to await the arrival of a tube for the SB-110 provided by Bob, WB4PXW/WB2RLK/ZF1XW.

YV5ZZ writes that he still can't believe his first weekend on the band (June 26 and 27). With 25 watts to an FT620B and a homebrew 4-element beam, Ed worked 120 W/VE stations in a wild 2-hour period which he termed "one of the biggest pileups in my life." The next weekend he was at it again, much to the relief of this writer who missed him the first time around. Operation is weekends only because 6 meters is used only at YV5ZZ's beach home which is to the north of the mountains while Caracas, his home QTH, is to the south and is therefore shielded from North America. QSLs for YV5ZZ should go to Edgar Muller, P.O. Box 76093, Caracas, Venezuela, S.A.

Out in the Pacific, word comes via the Honolulu *Star Bulletin* newspaper column authored by KH6IJ that at 1700 Hawaii time on June 24, KH6IJ worked 20 W6s during a 2-hour band opening. The column also states that 2 days later, KH6GRU heard WA1NE and K1ZSE, both CT, and "may have worked" K8TQK and WASHFY, OH.

Although much of the work done on 6 these days is accomplished on ssb or cw, there is still DX awaiting those using a-m. As an example, WSQCB of Amory, MS, reports hooking up with almost 100 stations in 13 states on June 27 and the 2 days following.



YV5ZZ of 6-meter and OSCAR fame. Ed forecasts 70-cm EME as his next challenge.

Junior uses an HA460 and a homebrew quad. So far this year he has worked 25 states.

**2 Meters** — This year will certainly go down in hf history as the best so far for 2 meter Es. Whether it is that more activity is present or that nature was just being kind is a question which probably won't be answered for quite a while. But judging from 6-meter records and the fact that a number of evenings produced 10-meter contacts between North America and Europe probably caused by multi-hop Es it would appear that 1976 was especially good for that mode of propagation. To date, I have received reports of some 2-meter Es activity on June 4, 18, 27 and 28. On the 4th, W5KHT, Guthrie, OK reports reception of fm repeater and simplex signals from PA but no QSOs. WA1OUB, NH passes along information of a cw contact between himself and W0RLI, MN at 2333 UTC on the 18th. Signals were only 559 both ways. As just about everyone knows by now, the big day was Field Day and a field day it was for 6- and 2-meter enthusiasts. Although no official reports have been received, we know that Field Day stations made a number of 2-meter "skip" contacts on fm but the real rip-roarer came after the close of Field Day. Indeed, participation was undoubtedly down with many stations still torn down from Field Day and with lots of operators completely bushed from the weekend's grind. Those that were on hand in the eastern part of the country were treated to an exhibition of 2-meter DX that could probably only be rivaled by some of the bigger July 4th Bicentennial fireworks displays. In the mid-Atlantic states the band erupted about 2330 UTC and remained open for almost 2 hours. The report of WA3UFU in Allentown, PA, is fairly typical. Tom lists QSOs with 15 stations, including one earlier in the day at 1732 UTC with W4ZXL, FL. On the evening opening he added contacts with MS, LA and TX to his total with 10 stations worked in TX alone. All signals were reported to be "solid S9++." K1HTV of CT said that he had been trying without success for 15 years to work TX on m.s. skeds, aurora or anything he could get. On the night Rich hooked up with 17 stations from the Lone Star State, including six above 145 MHz and quite a few running 10-watt rigs. Many eastern stations took advantage of Side-winders On Two (SWOT) net frequency of 145.1 to grab some additional contacts. Since quite a few Easterners worked 2 or more SWOT members, they now qualify for admission to this worthy activity-boosting organization. It is hoped that they will avail themselves of the opportunity to join so that they can propagate the group along the East Coast. For information send an s.a.s.e. to W5JTA, 1704 Glenn Dr., Fort Worth, TX 76131.

Letters and other reports give some indication of the geographical range of that June 27 opening. While New York and Connecticut area stations described signals as very strong, it is noted that they did not hear the Oklahoma stations which were worked here in Maryland. At the same time, the Norfolk, VA, area stations were able to contact Kansas which was not heard in Maryland. For example, WA4GPM reports working 2 KS stations, W0PMN and WB0BVC. Buzz also came up with 4 OK contacts: K5WVX, AC5WAX, K5BXG and WA5NRT. Other successful 2-ways were made with K0MQS and K0WOW IA, K9UYK and W9AAG IL, K5WXX and W5KJB TX, K5MWH AR, K5PKV LA and K4RUW and W4ZXL FL. Not all contacts were made during the evening session; some occurred earlier in the day. In Manchester, NH, WA1OUB characterized signals as "marginal" although Bob was able to work K5MBE and W5SKQ both LA. W5KJB TX was heard but no QSO resulted. Indicating the boundary for the other end of the path, W5UWB writes from Kingsville, TX, 40 miles southwest of Corpus Christi that he was unable to work any stations despite running a kW to a 14-element KLM at 45 feet. John was able to hear WA1FFO, K8III, K2GUG and K3QCQ. He speculates that propagation to him may have been via tropo added to Es. K8III did come back but reported signals as weak and no confirmation was received. John wants badly to work some states and is willing to run m.s. skeds with anyone. Address him at Box 501, Kingsville, TX 78363.

A couple of Canadian stations participated in the fun despite being farther away from the E cloud. VE3FVN writes from Ottawa that he was able to work stations in LA, including some in the New Orleans area which is just over 1300 miles. Ray also made the grade with W5JTL, MS as did VE2DFO, Montreal. VE3FVN noted that all stations which we worked lay in a relatively small area about 180 miles north-south by about 120 miles east-west.

Closer to the apparent location of the reflecting patch of ionization, W4LNG of Atlanta, GA, says that his impression of the character of the signals which he heard approached that of m.s. except the bursts were of longer duration. Nevertheless, Ruddy was able to hook up with W0RLI MN and K9OXY WI for two new states. Neither contact lasted long. Other stations, such as WA1FFO CT, W9CAW IN, and K9KQR IL were heard with strong signals but for brief periods only so contact could not be established.

Reports received from the upper Midwest list work with Florida and the southeastern states. K9OXY Hudson, WI, near Minneapolis notes 2-ways with K4NTD, K4RUW, K4IXC and K4YRZ/4, all FL: W4ISS and W4LNG GA as well as SC stations K4KAE and W4USW. W9YYF near Chicago nabbed K4IXC, K4RUW, WB4NEA and K4ELB in FL plus W4USW SC. From Parkville, MO near Kansas City, WB0OTA reports QSOs with 4 NC stations K4TYW, WA4ZIA, K4AGV and K1FJM/4. Ed was running a T5700A and an 8-element beam. This is only one example of the 10-watt class rigs getting in on the fun.

Many of the fm boys also took advantage of the fine Es opening of June 27. K4RTG in Pen Hook, VA, managed a 146.49 simplex contact with WB0NTZ in southwestern MO. Dave complains that this was the only activity to be found on 49, which he understands has been established as the simplex channel for DX. He notes that 52 seemed overrun with high-power stations. One of these could have been W9LXM near Chicago. Rick runs a kW to a pair of 11-element Yagis which netted QSOs on 52 with FL stations W4VWH and WB4OMG. Checks of 55 and 46 revealed little activity.

The following night, June 28, produced a smaller return engagement with W0MIS, Duluth, MN, nabbing W4WDH, GA. Also a number of stations in the New York City area worked into south Florida about 0300 UTC June 29. For approximately 45 minutes, stations in the mid-Atlantic states heard a strange-sounding, chirpy signal which could be received from about 144.105 to 144.120 MHz. The modulation was some sort of pulsed fsk with a repetition rate of approximately 2 per second. Does anyone have any information on the origin of this signal? This writer had a near miss with K4RYR in central Florida during this session as well as picking up six new states on the previous day. As can be seen in the accompanying Standing Box, the state totals for many stations were swelled by conditions during June.

The eastern U.S. was not the only place that was treated to 2-meter E skip during late June. The Europeans were also having some fun of their own, according to a report from G3IOR related to K1HTV via the OSCAR satellites. Pat's account tells of numerous contacts made by British 2-meter stations with such exotic southern European prefixes as 9HI, YO, YU and I. Best days appear to have been June 25 and 27.

As partial compensation for being left out of the fantastic Es sessions, the southern California gang came up with the kind of opening which they seem to have all to themselves. See "California to Hawaii on 2 Meters — 1976 Edition" by Wayne Overbeck, K6YNB, in this issue for a detailed account of this tropo duct phenomenon. According to a letter from K6GAO of San Diego, the duct which sometimes forms between them and Hawaii, did its thing starting about 1000 PDT June 28. A number of contacts were made through fm repeaters. Then, about 1900 PDT, KH6IAA took his ssb mobile rig 7500 feet up on Nanaa Loa resulting in KH6 contacts for K6GAO, K6DYD and many others.

More in line with the kind of propagation we normally expect this time of year on 2 meters, W9YYF passes along info on a tropo

session which occurred June 10. On that occasion Jack worked W5SLUA, K5WXX W5SSID and K5AXH all near Dallas as well as K5MWH, Rogers, AR.

## Two-Meter Standing

Figures are states, call areas and best DX in miles.

WA1FFO	40	10	2624	W5SXD	25	6	1265
K1WHS	39	10	10749	W6PO	32	10	8000
K1HTV	38	9	2616	K6QEH	18	7	5500
K1ABR	35	8	1478	W6GDO	15	5	1326
WA1AZK	34	8	1412	W6WSQ	16	4	1390
WA1OUB	31	8	1525	K6HRA	13	4	2580
K1UGO	30	8	1370	K6IYO	13	4	1240
W1JSM	30	8	1290	K6HMS	11	4	1258
K1PXC	30	8	1207	WB6NMT	10	4	1250
W1VTU	29	8	1296	WA6JKA	8	5	2591
K1BKK	29	8	1275	K6GAO	6	5	2500
W1FZA	29	10	2750	WA7KYZ	30	10	6000
W1AAI	29	7	-	K7NII	30	8	2289
K1MTJ	26	7	1250	W7JRG	28	6	1320
W1HDQ	24	7	1040	WA7BJU	27	10	2600
K1RJH	22	7	1450	WA7B8M	21	7	2175
K2RTH	41	10	11000	K7ICW	18	4	1278
W2A7L	39	9	2500	K7CVT	11	4	1225
W2CUX	38	8	1334	W4WNH/8	42	10	1050
W2NLY	37	8	1300	W8KPY	42	10	2050
W2CXY	37	8	1360	K8AXU	38	8	1275
W2ORI	37	8	1320	K8HWW	36	8	1100
W2BLV	36	8	1150	W8IDU	36	8	1150
WA2CJK	35	8	1160	W8YIO	36	8	1100
WA2BIT	34	10	10000	W8IDT	36	8	1150
WA2FGK	33	8	1340	K8DEO	35	8	1200
WB2WIK	32	8	1080	W88PIE	34	8	1100
W2CRS	30	8	1230	W8NOH	31	8	1165
K2EVW	29	8	1232	W8ABLY	28	8	820
K2CEH	29	8	1200	W8BHTL	27	8	1102
WB2VWW	27	8	1350	W8TJU	24	8	1000
W2CNS	27	8	1150	W8KBC	24	7	900
K2DNR	27	7	1200	K8ZES	22	8	675
WA2PMW	25	7	1245	K9UIF	45	10	1874
W82SIH	25	6	1000	W9YYF	43	10	4500
WA2UDT	24	7	1020	K9HMB	43	10	1827
WA2EMB	23	6	1335	K9UGD	42	9	1300
K2BWF	23	7	1350	WA9DOT	41	9	1303
W2DWJ	23	6	860	W9AAG	41	9	1200
W3BHG	40	10	2488	K9AAJ	41	9	1200
K3QCC	37	8	1375	W9QII	37	8	1075
K3CFY	37	8	1250	W9BRN	36	9	1260
W3RUE	36	8	1250	WA9WHJ	36	-	-
WA3QVW	33	10	2500	K9UNM	36	8	930
W3BPD	32	8	1275	W9CAW	35	-	-
W3TMZ	31	9	2410	WA9EUA	35	8	881
WA3UFU	31	8	1280	W9PBP	34	8	820
W3OMY	31	8	1200	K9UYK	33	9	1600
W3KMV	31	8	1200	K9KQR	31	8	1105
W3LNA	27	8	970	K9VWY	30	8	1052
K3CFA	25	8	1200	W9JDJ	28	8	1000
W3ZD	24	8	1350	K9QXY	27	8	1350
W3TFA	21	8	1342	K0MQS	48	11	1060
K30BU	21	7	930	WA0CHK	45	10	1650
K4GL	43	10	4850	W0LEH	44	9	1440
K4IXC	40	10	4850	W0DGY	41	9	1300
WA4HJQ	40	10	2000	W0LGN	39	9	1450
WA4CGG	39	8	1350	W0RLI	39	9	1293
W4HHK	38	9	1280	W0EMS	35	10	1320
K4EJQ	37	8	1125	W0PWF	35	9	1380
K4QIF	36	8	1225	W0ENC	35	9	1360
W4VHH	35	8	1125	W0PMN	34	9	1285
W4DFK	35	10	1200	K0DAS	34	8	1138
K4VW	35	8	1440	W0DRL	27	9	1295
W4MKJ	34	-	1285	W0MJS	26	8	1118
W4FJ	34	8	1150	W0OHU	26	8	1073
W4ISS	33	8	1000	WB0BVC	24	-	-
WA4GPM	30	8	1200	K6HNS	3	7	6000
WA4WS	29	8	1350	VE1ZN	7	2	500
K4KAE	29	8	1200	VE2FO	41	10	1060
WA2CJK/4	29	8	1175	VE2YU	32	8	1200
W4LNG	29	-	-	VE2HW	18	6	800
WA4MVI	20	7	1100	VE3ASO	38	9	2140
W5ORH	45	10	1715	VE3BN	37	8	1250
K5BXG	44	10	4500	VE3EZC	33	8	1283
W5UGO	43	10	1398	VE3AIB	29	8	1340
WA5UNL	42	10	1725	VE3DSS	29	8	1200
W5RCI	42	9	1289	VE3EJV	29	8	1100
K5WXZ	40	10	1450	VE3EKS	27	8	1100
W5SLUA	39	10	1570	VE3FKX	23	7	1070
W5WA	39	10	1370	VE7BQH	12	3	7920
K5HFV	38	10	1285	SM7BAE	12	7	1055
W5HN	37	10	1500	VE3MC	7	7	1000
K5VWW	37	10	5200	VE3CK	7	7	1000
W5UKQ	33	9	1290	VK3ATN	4	4	10417
W5LO	33	7	1325	SM6CKU	4	4	4200
K5PTK	29	9	1350	ZL1AZR	2	2	11055
W55BK Y	29	9	1407				



# How's DX?



Conducted By Rod Newkirk,\* W9BRD

## For Sale—Your Very Own Country

What can you buy for the ham who has everything? We vote for the posh item described in a Wall Street Journal clipping forwarded by WB9JOR:

### Private Kingdom

Entire archipelago with six islands in the Indian Ocean for sale. International flight connections. Total land area 665 acres. Ideal beaches, drinking water, heavily wooded. Excellent water sports. Coral reef protected lagoon 20 miles in diameter. Ideal climate and accessibility (airstrip). Pound Sterling 480,000; U.S. dollars 885,000. Single island, Pound Sterling 200,000. Contact Boehm & Vladi, 2000 Hapsburg I, West Germany.

Power supply and other accessories undoubtedly will run up the tab somewhat, and upkeep could be considerable. But we agree that a neater conversation piece and prestige gimmick for the hamshack would be hard to find.



HC1XG/HC8, the handiwork of HC1XG (operating, left) and K4ERO, provided thousands of Galapagos contacts on 10 through 160 meters, mostly cw, in May. The one-man antenna crew seems to have some difficulty following Pete's and John's instructions to reel out their 130-foot wire in the proper cactus-infested direction. Several stations were worked on six bands, and much DX was collected on 20 and 40 with that three-watt HW8 transceiver. (W4BRB photos)

## GETTING 'EM ON THE WALL

**NORTH AMERICA:** For confirmational comebacks considerably quicker than customary, "How's" correspondents Ws 2QXA 4LVP 7HPI, WAs 1UAX 1VYF 3SWF 5LUM 6HAV 8FIO 8YTL, WBs 4WHE 5KUJ and KH6CF commend your "QSLers of the Month": A35NN, AH3FF, BV2s A B, CE0AE, CRs 6IK 9AJ, CT1UF, CX7BF, DK5WL, EP2EA, FGs 7AR/ES7 0BKZ 0MM, FO8ER, FR7ZL/g, G3MXJ, HB9AOU, HI8MOG, JY9CR, KCs 4AAC 6AQ, KH6EJ, KV4AA, KZ5R, LZs 1XL 2FG, OH0NI, OJ0MA, PJ0USA, PZ1DR, SV0s WKK WZ, TA1MB, UI8LK, VEs 1APY/SU 8LG, VKs 4MY 9XX, VPs 2DX 2EEG 2MB 5SF, VR6TC, W8LKW/C6A, WA1RFM/VP9, YO6EX, ZK2AQ, 3B9DA, 4X4s FU JU, 5X5NK, 5W1AZ, 9H1ED, 9N1MM, 9Q5SW and 9V1QM, as well as QSL agents Ws 2KV 3HNK 6HS 8CNL, Ks 1LPA 2FJ 7ODK 9OTB, WAs 1JKJ 6AHF, WB7ABK, VE1NC, DL1YW and F6BBJ. Any wallpaper whizzes we missed? . . . Those needing Barbados QSLs can rely on obtaining cards from W8JUY/8P6GU, WICKK/8P6FJ (my XYL), and me for coming October-November activity. Self-addressed stamped envelopes, or s.a.e. plus International Reply Coupons where appropriate, please. (W1CER/8P6EU) . . . Contrary to some misbelief, K3CR does not manage QSLing for FP8BS. (WA3VJA) . . . ARRL's Bureau branch in Fourland continues to supply DXcellent service. (K4KCK) . . . Canadians used the XJ prefix through July and I was issued the call XI7ITU for International Telecommunications Union Week. (VE7TK) . . . As VP5MA's new QSL manager I can confirm all contacts past and present. (WB4LFM) . . . KV4AA, lately AJ3AA, should receive full honors as QSLer of the Century. (W4LVP) . . . I now hold the original VE1ASE Sable Island log dating from December 22, 1965, to June 13, 1967, plus VE1ZQ's Sable records for QSOs from May 7, 1965, to August 2, 1966. (VE1BDT) . . . As for VP2DE confirmations, I handle only those for my own activity from that station on March 19-22, 1976. (F6BBJ) . . . I'm noticing carelessly filled out QSLs from overseas. Let's all try to be more accurate with call

signs, times, etc. (WA1UAX) . . . An influx of QSL requests for unlogged QSOs causes me to state that I can confirm only ZF1JH contacts made by me since November, 1974. (WA6VNR) . . . I still invite QSL inquiries for my several K3SWZ/VP9 operations. (K3SWZ) . . . TD76VN (TG9VN) and other TG9s radiated Guatemala City's centenary prefix. (DXNS) . . . 'ALP! Numerous parenthesized aid applicants on this run: (W7HPI) ZF1AK, ZL1AA/c; (K3SWZ) 8R1W; (KSKEZ) ZD7PS; (K5MWZ) CR5AR 59, F88BZ 58; (WA1UAX) YS1MV; (WA5LUM) XV5DA 74, 5A3TW 68; (WA6EVX,KG6) A2CDN, CR7WD, ET3TRC, FR7ZU, VR3AJ, XE1s AAN QP, XQ3CZ, ZC4DI, 7Q7RM, 8Q6AC; (WA8FIO) ZXs 1ITU 0ITU,

ZY4ITU; (WB8BPY) CT2BK 74, EAs 6BG 8JJ 74, F8BC/CN 70, HI3PC 70, HP1XMF 72, TU2DV 74, UJ8AC 74, VP2s AAC 72, ST 72, VQ9K 74, VU2DX 74, ZD7SD 74, 3B8DA 72, 5T5CJ 72; (WB9NMN) DUIPOL, 4U1ITU, 4Z4AI, 5T5AC, 8R1AE, all 74; (WB0GGO) KW6GO, VP2s KM VAW, VR6TC, WA4KPH/HK0, YO7DL, ZB2CU, 7P8AT; (KA6DX) AC3PT, JW8L, TG9MY, TN8BI, 3A2GX and 6Y5SR. Any 'alp? . . . W7HPI, K0s DPO WMW, WA9MGK, WBs 2SXD 9KLB and 0PHW will gladly consult with ops at the DX end in need of Stateside QSL tenders.

**ASIA:** Prefix rebriefing on some rarer Russian regions: UH8, UK8B-E-H-Y; UI8, UK8A-C-D-



W6AM has farmed your QTH of the Month for thirty years, raising a fine crop of rhombics on Palos Verdes peninsula. Firing in eighteen directions, nine diamonds fill the 24-acre plot on poles as high as 140 feet. Don's ham shack here is just as impressive, enough state-of-the-art equipment to keep W6AM battling for top spot on ARRL's DX Century Club Honor Roll. Somehow the Wallaces still find time to keep up their main Long Beach dig ten miles away. (W6ANH-W6TCG photo)

\*c/o ARRL, 225 Main St., Newington, CT 06111



ZS6s DW LK, PY1s FI FC, VK3s XB and KS, from the left in these three snaps, are among the best known husband-wife DX teams in handdom. Bill and May radiate from Johannesburg, Therezhina and Walter from Rio de Janeiro, Ivor and Mavis from a Melbourne suburb. Beside the latter is Eric Trebilcock, renowned Australian short-wave monitor and QSL manager. (W4OKL-W9DH photos)

F-G-I-L-O-T-U-Z; UJ8, UK8J-R-S; and UM8, UK8M-N-P-Q. (WCDXB) . . . 7Z1AB contacts by operator Hank, W3ACE, may be confirmed through DJ9ZB. (DXNS) . . . 419s B and DX operated from Chelvabinsk, 4L5F from the Ukraine, in recent contest flurries. (DXNS) . . . J1s ABC and EZW display Japan's latest label, and KA6YL busies herself as proprietress of the Yauks-on-Okinawa bureau. (WCDXB) . . . 9V1QM, whose card arrived 44 hours after QSO, evidently prefers to QSL first. Aw It Haw says his *Callbook* QTH is incorrect. (WA6HAV) . . . Ex-CP1JV has been reassigned to Conakry by the State Department, address in the listings to follow. I hold all logs for Tony's activity as XW8HJ. (K3BWZ) . . . A9KBW's Bahrain QSL bureau deals only with A9 and ex-MP4B confirmations. Also, A2-3-4-5-6-7-9 prefixes should not be confused with the U.S. Bicentennial variety. Note, too, that USA stations operating portable receive cards via their home ARRL Bureau branch; e.g., K4WVT/8 via the Fourth, not Eighth. (DXNS)

**EUROPE:** Lack of logs from F2CD means I can no longer act as his QSL manager. Cards on hand are being returned to senders. (W4KA) . . . After a pleasant European visit I hold logs and QSLs for PA0CDJ, May QSOs only. (K9YBC) . . . DL4-5 calls are reverting to German nationals. Qualified noncitizens continue as DAs. (VERON) . . . Operators Hugo and Terry of HB0XAA specify QSLs via DJ0LC and DA1TH respectively. OH2NM clubbers vow 100-percent QSL for their Alands May fling as OH0AC. Thousands of IE9CBM pasteboards were to hit the mails last month. (DXNS) . . . Regarding recent Austrian commemoratives, OE503PUW is really OE3PUW, etc. (WCDXB)

**SOUTH AMERICA:** I manage my own QSLing on this simple basis: Every QSL received is answered within one or two weeks of arrival depending on available time, provided the QSO shows up in my log at the indicated UTC time and date. Cards with s.a.e. and three IRCs are answered by air, those with s.a.e. and one or two IRCs get surface mail reply, and QSLs received without s.a.e. and/or IRC are answered via bureau; likewise those received via bureau. (CE6EZ) . . . Anyone still in need of an HC8GG card for my 1971 Galapagos tour should contact me. (K9YBC)

**AFRICA:** Fresh prefix assignments by the International Telecommunications Union include D2-3, Angola; D4-5, Cape Verde; D6, Comoros; and D7-9, Korea. (WCDXB) . . . The former LREM QSL Bureau now is disbanded at Maputo, old Lourenco Marques, but Portugal's bureau may help you reach ex-C9s-CR7s. (DXNS) . . . Please call attention in your QTH section to my current correct address for the benefit of those seeking 6W8DY confirmations. (VE4SK)

**OCEANIA:** Typhoon Pamela, according to word from our Guam QSL Bureau, ruined an outbound batch of my SWL/QSL replies. Anyone not receiving a card in reasonable time should reapply. (WA6EVX/KG6) . . .

QSLs for recent resounding Yasme Foundation Pacific productions by W6s DOD and KG are being processed by K6RM, WA6GSN, WB6s CUA and DOQ. (WCDXB) . . . Now for another glossary of individual QTH recommendations but keep in mind that each suggestion is not necessarily accurate, complete or "official" . . .

- A2CED (K4EBY)
- C21KM (WA6AHF)
- C31JB (SK7DP)
- CO2FR (FRC)
- DM8FJM (DM2CUI)
- EL0V/mm (LA7RF)
- EP2EA (see IJ2ACK)
- EP2EJ (DA1JU)
- FP2LA (WB8IKQ)
- EP2RG (JY9RA)
- EQ2ITU (K4OD)
- F0AOJ/FC (HB9ASZ)
- F0AOZ/FC (DK1DY)
- F0AYZ (K5QHS)
- F0BSD/FC (ON6WT)
- F0CH/FC (HB9TLL)
- FC2CD (see text)
- FG0CRZ/FS (W5SJS)
- FM0BKZ (F6BBJ)
- FP8BS (see text)
- FP0BB (VE3ECP)
- EY7AX (W3HNK)
- GB2USA (G3AKG)
- GM2QY (G2QY)
- HB0XAA (see text)
- HC2TV (I0WDX)
- HC8GG (see text)
- HC8RG (GRC)
- HH9DL (REF)
- HI50RCD (PA0UKW)
- HR2GK (WB9LHI)
- II0ITU (I0ZV)
- IM0BYR (IS0BYR)
- IW7FD (LA5NM)
- IW9WT (LA5NM)
- K3SWZ/VP9 (K3SWZ)
- KV4CK (K0WMW)
- ex-KW6EJ (KL7IU)
- LG5LG (LA2ZN)
- OE5GML/YK (OVSV)
- OH5MJ/OH0 (OH5MJ)
- OJ0MJ (OH5MJ)
- PA0CDDI (see text)
- PJ7VL (W2BBK)
- PJ8AS (W0IPU)
- SV0WSS (WA3UUZ)
- ID76VN (see text)
- VK5CRG (WBSGZ)
- VP2KA (W7OK)
- VP2KAA (W3HNK)
- VP2MEE (F6BBJ)
- VP2MJS (W5SJS)
- VP2MKY (WB0MRY)
- VP5MA (WB4LFM)
- VR3AH (K2BT)
- VR3AK (KH6AHZ)
- VR8A (ZL2BJU)
- W8IRT/HB9 (W8IRT)
- WA1RFM/VP9 (VP9BDA)
- WA0EGL/VQ9 (W4FLA)
- WB6EWH/VQ9 (K4OSE)
- WG1JFK (K2AA)
- WN0QFB/HR (WN9RZS)

- XE1UFA (WB4KPZ)
- XJ3ZZ/1 (VE3BMV)
- XW8HJ (K3SWZ)
- YK5AAA (OK1AAA)
- ZB2DN (RSGB)
- ZB2YL (G3VGW)
- ZB30ANV (GARS)
- ZF1IH (see text)
- ZF1RE (WA8TFE)
- ZF1SP (W4HET)
- ZK1DX (ZL3DX)
- ZL3FM/VR1 (ZL3FM)
- ZL4AB/a (WA2DIG)
- 3A0HL (DL7SP)
- 4S7JK (DJ7TK)
- 5Z4VF (LA4VF)
- 7J1RL (JARL)
- 7Z1AB (see text)
- 8P6FX (WA4RRB)
- 8P6GN (K0WMW)
- 9G1GE (G3USE)
- 9J2GF (9J2LK)
- 9M0EXP (MARTS)
- 9Q5SW (JA8JN)
- 9Q5Z2 (DJ9RB)
- 9V1RW (SM5CAK)
- 9V1SH (W7PHO)
- 9XSRK (ON4ER)
- 9X5SP (DL8OA)

- A2CSD, P.O. Box 70, Orapa, Botswana
- A6XP, B. Schmidt, German School, P.O. Box 1465, Sharjah, U.A.E.
- ex-A9KU, O. Jackson, 44 Barrington av., Beith, Ayrshire, Scotland
- AP2ZR, Zubair Ahmad, Box 479, Rawalpindi, Pakistan
- C21ME, Box 29, Nauru
- C31s DL JV JW, P.O. Box 280, CH-1009 Pully, Switzerland
- C31s JX KA (via DK9FE)
- CF3AKX/T12, J. Pastor, Box 114, Moravia, Costa Rica
- ex-CP1JV, A. Malesic, Conakry, Dept. of State, Washington, DC, 20520
- CT2BU, P.O. Box 602, Terceira, Azores
- CT5ITU, ARP, P.O. Box 446, Porto, Portugal
- D2ACK, c/o ISWL, E. Chilvers, 1 Grove rd., Lvdney, Glos., GL15 5JE, England
- DA1JU, E. Diehl, Jr., Litton-AmeCom, P.O. Box 170, U.S. Embassy, APO, New York, New York, 09080
- DA2DW, D. Waldridge, Litton-AmeCom, P.O. Box 170, U.S. Embassy, APO, New York, New York, 09080
- DJ0ZV, B. Bogin, Litton-AmeCom, P.O. Box 170, U.S. Embassy, APO, New York, New York, 09080
- FL8DH, Box 215, Djibouti, T.F.A.I.
- FL8KW, P.O. Box 573, Djibouti, T.F.A.I.
- HC5s LM NW PC, Box 307, Cuenca, Ecuador
- HM1J, Lim Sang Ki, Changsindong 23-82, Seoul, Korea
- HR1CV, P.O. Box 1220, Tegucigalpa, Honduras
- IF9s AVV AZU FIB JOY ZGY (via IT9TAI)
- IM0DTK, P.O. Box 19, Carbonia, Sardinia, Italy
- IS0s AEW LYN (via WA1VSI)
- JT0AQ (via CRC, attn. UY5LK)
- JW2CF, S. Solheim, N-9710 Longyearbren, Svalbard Radio via Tromsø, Norway

# DX Century Club Awards

Administered by R. L. White, W1CW

The following listings show DXCC Awards issued by Headquarters during the period from June 1, through June 30, 1976.

## New Members

### CW/F

226 DJ1BV	WA8JUN 125	113 WB6QBJ	108 LZ2VP	106 JA4BLH	WA8PPF 104	W4RKV W6NZX	K4KKJ K4OAF
200 WA3VQP	W9NZS 124	112 K3BGZ	107 WA4BTQ	K4PHE WB9HIP	WA4HHG WA5SDV	WB9E1W 101	WA4GIT WB8FLE
198 SM6CST	WA3TOE 118	109 DK7PX	105 YA6UJF	105 KH6GI	102 K4LNC	WB6DPV 100	WB9KHK WA0VBW
186	F5IB	K5KEZ/3	YO6KAL	WB2TSL	WA3JCE	DK5IZ	

### Radiotelephone

242 W9RXC	129 DJ9UI	117 WA3TOE	105 WB9HIP
200 DJ1BV	123 XE1DU	115 W5SAA	103 K0CKX
161 IT9IUS	122 WA6HAV	108 WB6QBJ	101 DK2UP
142 G4DYO	121 EA8IX	107 EA3CR	100 W6ORD
		108 W4LVM	100 WA8PPF

### CW

141 WA3SZI	K5KEZ	WA6DNM	WA4FDR
123 DL6EN	109 K5KEZ/3	103 SM0CCM	101 W1YN
111 I0WLS	108 W0BW	102 F6DBX	100 K9UIJ
110	104	VE3GPO	VE3DU
		WA2RLQ	W4NBP

## 5BDXCC

#498 DL3AR	#500 K6OM	#501 OH0NJ	#502 W5LUJ	#503 DJ5JH	#504 XE3EB	#505 JA6BSM	#506 SM2COR
#499 K5QHS							#507 UK9AAN

## Endorsements

In the endorsement listing shown, totals from 120 through the 240 level are given in increments of 20, from 250 through 300 in increments of 10, and above 300 in increments of 5. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

### CW/F

340 W5KGX	315 HB9AHA	305 K8UDJ	290 VO1FB	W3YX W7DH	JH1VRQ KH6CF	W6HJP W7OK	140 EA3AEA
335 YV5BX	I2DEZ	WB2VYA	W4VJH	W7JWE	W1RL	180 K6UGS	EA4KB
330 W9KXK	K1NOL	W4WWG	280 WA9WJE	W8QFR	W2TO	180 VE3HBD	K7YUR
YV5BZ	K4GXO	WA9WJE	JA3BG	250 W1WQC/4	WA3LJP	WA2WBE	K9FRZ
	W1SEB	SM6DBB	W2MB	W5IRG	WB45JG	WA3SXH	OZ6AQ
	W6MUM	300	270	W89LHI	200	W6CQ	WA2KFN
	W9TKR	DL1YA	DL1LD	YU1SJ	JA2BP	W6ONV	W4DZZ
	W0TDR	K1GUD	K45GL	240	JA4BBN	W6RQ	WB4WFT
		K4MG	WA9IBT	W6PQZ	K9HQM	WA6NBY	WB6JOT
		ON5KD	YV5BNR	W07BPS	PY7VNY	160	WB0HOG
		PY5ATL	260	W0IUB	VE3DU	K30IO	120
		WA2HN	220	W2MIG	WA3NGS	K5KEZ	WA2ERJ
		W9HK	DK5WL	DK5AD		K0RQF	WB2SZS
		ZP5EC	K2AAC				

### Radiotelephone

340 W2CKY	18YRK	315 W4QBK	305 DJ5DA	WB2VYA	250 I3ZNG	W2MIG	WA3VQP
W9WHM	JA1MIN	W4GAF	W6QOG	280 ZP5EC	W4LUN	W6ONV	W6NBY
335 DL1KB	K1DRN	W8JTD	300 K4MG	270 K2LGJ	W7AE	W6NBY	WA6EVX/
	K6EC	W9WYB	W4WSF	200 K5FKD	W7ZH	W9DPS	KG6
	K6EV	310 DL1JW	W8FET	260 WB4JLO	W9DPS	YV4YC	160 WA1PEL
	W1AA	G3TJW	W9DH	290 W9KXX	HB9CQ	180 K9HQM	140 W0PRY
	W4MUB	HB9AHA	290 K6MA		IS0SHU	VE3DU	120 JA1TNV
	W6KNH	YV5ANQ			JA2LHG		
	WAGMWG				PY1FI		
	W9TKD						

### CW

140 F3AT	K9KEV	JA2BP	WA6MWG
K2TQC	W9OHM	K6RLY	W9MR
K4LRO	120	W4WSF	WB9LHI
	JA1EMX	WA5VDH	W0PRY

York, New York, 09223  
VE1s ASE ZQ (see text)  
VE3CQV/VP2A (to VE3CQV)  
VE4SK, S. Skaptason, Box 11, Grp. 112,  
RR 1, Winnipeg, Manitoba, Canada R3C  
2E4  
VP1PTL, Box 827, Belize, Belize  
VP2MI, Box 266, Montserrat  
VP5TI, R. Francis, Pvt. Bag No. 1, Grand  
Turk, Turks & Caicos, W.I.  
VR1AF, c/o BPC, Ocean Island, Gilbert  
Islands  
ex-VR3AJ, J. Watt, 9 Donmouth ter., Bridge  
of Don, Aberdeen, Scotland  
ex-VU7GV, G. Sulu, VU2GV, Wireless Qtrs.,  
Nizamuddin E., New Delhi 110-013,  
India  
WA6EVX/KG6, R. Ault, Box 15, ConNavMar,  
FPO, San Francisco, California, 96630  
XJ7s ITU TK (to VE7TK)  
XW8ER, Box 196, Vientiane, Laos  
YS1GWE, R. Woody, Calle Jose Ceutilo del  
Valle No. 3, Colonia, Escalon, San  
Salvador  
4J9s B DX (via CRC, attn. UK9s AAN ABA)  
5N2BSJ, All-Africa Boy Scout Jamboree,  
P.O. Box 448, Apapa, Lagos, Nigeria  
5N2ESH, E. Sherlock, CFAO-Nigeria Ltd.,  
Electro Hall, P.M.B. 5119, Port Harcourt,  
Nigeria  
9M6KT, K. Johnson, P.O. Box 1241, Kota  
Kinabalu, Sabah  
9M6MB, P.O. Box 113, Kota Kinabalu, Sabah

For the preceding directory all thanks to  
Ws ICDC ICW 2QXA 4KA 5BZK 7AMM  
7HPI 7YF 8IRT 9LNQ 0EFFK, Ks 3CR 3SWZ  
4KCK, Was 1UAX 6HAV 6VNR 8FIO  
8YTL, Wbs 4WHF 5CRG 5KUJ 6UJO, KH6s  
AHZ CF, EL7RT and EP2OD, along with  
literature of clubs, groups and individuals to  
be credited next month. Your turn?

## Strays

While operating a station for Boy Scouts, Bob May, WA4DBG, became a victim of vandalism to his antenna installation. Guys and the winch cable were cut and the crank-over arm of his tower crashed to the ground. A tribander, 2-meter beam, and rotator were destroyed. Fortunately, insurance covered the loss, so Bob is back on the air. Take heed - be wary of your site and check your insurance coverage.

Along with the traditional events, both OSCAR satellites participated in our nation's bicentennial celebration by sending messages to amateurs in the country and around the world.

An OSCAR-7 Codestore message was broadcast all day July 4th with the words, "Greetings to the world via OSCAR 7 on the 200th anniversary of the independence of the United States." For its part, OSCAR 6 relayed a bicentennial message from the people of Brevard County, Florida, to stations across the eastern United States. W4DWN, Miami, transmitted the 300-word greeting as the satellite passed over Florida at 10:30 A.M., local time. W2GN, Albany, New York, W1NU, Fairfield, Connecticut, and three others responded with a message of their own during the pass. They relayed their "best wishes for another 200 years of freedom."

The OSCAR-6 transmission idea came from the Brevard County Bicentennial Commission. ARRL hq. Club and training staff members, K1HTV, VE3SAT and W1NU assisted with details.

The National Industry Advisory Committee is coming to life again. It comprises members from various industries to advise the FCC regarding emergency communication, during war and peace, and has subcommittees from various radio services. Those include broadcasting, aeronautical, common carrier, maritime, and other services, as well as amateur radio which is considered an "industry" for participation purposes. The Amateur Radio Subcommittee will continue work on an overall plan for emergency communications by amateurs. Chairman is W1NJM and present members are WA1FCM, WA1WEM, W2CFP, W3PYF, WA3VUP, K4CJZ, W4TE, K5TRY and W0HG.

IY9RA, H. Rabe, P.O. Box 183, Amman, Jordan  
K6QHC/KG6, G. Bogdanoff, Box 74, Ground Electronics, NAS, Agana, c/o FPO, San Francisco, California, 96637 (or via K6TBQ)  
KA6DX, J. Corson, PSC Box 25913, APO, San Francisco, California, 96230

KS6DV/KB6, L. Gandy, Box 1333, Pago Pago, U.S. Samoa, 96799  
OX3OA, Box 44, Sondrestrom 3910, Greenland  
P29JS, J. Smith, Box 2053, Konedobu, Papua-New Guinea  
SV1KW, P.O. Box 39, Corfu, Greece  
SV0WTT, C. Jackson, Box 722, APO, New

## HONOR ROLL

The DXCC Honor Roll consists of the top ten numerical totals in the DXCC. Position in the Honor Roll is determined by the participant's total countries credited less any credits given for deleted countries. The number shown following the call is the participant's total countries credited. The number shown at the start of each group indicates the participant's total when deleted countries, for which credit has been given, are subtracted.

### CW/F

<b>321</b> G3FKM/351 G3FXB/351 K2BK/348 K4LNM/348 K6ZO/358 LU6DJX/358 W1BIH/357 W1HX/354 W1NU/348 W2AGW/358 W2BXA/358 W2CTO/354 W2NUT/350 W2OKM/352 W2SSC/350 W2TP/343 W3CWG/350 W3KT/357 W4EX/358 W4OM/356 W4VPD/351 W5KC/357 W5MMK/355 W6AM/359 W6BZE/353 W6CYV/352 W6KZL/350 W6PT/351 W7MB/355 W7PHO/352 W8BF/355 W8HT/350 W8GZ/357 W8JBI/353 W8MPW/352 W8PHZ/349 W9BG/359 W9LNM/357 W9BW/355 W9DU/356 W9ELA/357 4X4DK/352	W1HZ/351 W2AO/350 W2CR/350 W2GLF/346 W2LV/350 W2QM/348 W3EUV/354 W3MP/355 W3WGH/348 W4BYU/351 W4GXB/354 W4LRN/345 W4QCW/349 W6CHV/351 W6OSU/345 W6WWG/350 W7AQB/345 W7KH/356 W8DAW/357 W8LKH/352 W8QK/344 W8ZCQ/347 W9DWQ/346 W9MLY/349 W9QGI/349	W9RCJ/344 W9SFR/347 W9LWG/342 ZL1HY/356 4X4JU/347	<b>318</b> DL1JW/343 G13IVJ/346 IT9TAI/347 K2TQC/338 K4PDV/343 K6OJ/352 K8ONV/340 K9ECE/340 PY2PA/331 W2AX/347 W2BMK/343 W2GKZ/333 W2POB/342 WA2RLQ/332 W3DJZ/338 W4IF/342 W5FFW/347 W5GKZ/338 W6EL/334 W6GPB/352 W6ID/350 W6KG/343 W6REH/337 W6RKP/345 W6ZO/351 W7CMO/341 W7SGN/347 W9FKC/351 YV5AB/349	W3NKM/346 W4AIT/352 W4BQY/342 W4DQS/336 W4EES/345 W4MCM/340 W5AO/347 W5EJT/335 W5HDS/345 W5GO/342 W5UX/344 W6EPZ/350 W6FF/343 W6ONZ/341 W6ZD/349 WA6EPQ/333 W8CUT/336 W8KIA/352 W9GFF/341 W9MQK/340 W9TKD/339 W9WB/337 W9PGI/345 W9SYK/347	W4BJ/340 W4TM/350 W5GC/337 W5HJA/337 W5LCI/339 W5NMA/345 W5OB/338 W6DOD/327 W6HYG/340 W6PO/342 WA6MWG/329 W7ENW/348 W9CH/336 W9GIL/345 W9ILW/334 W9RKP/345 W9ZTD/335 W9AIH/342 W9BK/337 W9GKL/340 YV5AIP/337 ZL3IS/341	W6CAE/344 W6FOZ/345 W6KNH/323 W6KZS/329 W8JQ/327 W8KBT/340 W8KT/333 W8QJR/344 W8WZ/349 W9CJD/328 W9CJZ/331 YU2DX/323	<b>313</b> DJ7ZG/327 DL7EN/342 G8KS/344 H8BJ/350 JA1DM/341 JA3UI/335 K1SHN/330 K6AM/334 K6MA/331 K6RN/336 K8WOT/331 PA6FX/346 PY2BKQ/327 PY2CKO/327 PY2SO/327 VE3BWW/340 W1BPW/334 JA2JW/338 K2LE/328 K4MPE/327 K5QHS/323 K6KA/322 K6OW/334 K8IKB/338 LA7Y/349 OK3MM/341 SM6CKS/323 Y6FMJ/326 VE3WT/327 W1CKA/337 W1MIJ/334 W2BHM/341 W2FZY/340 W3LMA/349 W4ML/347 W4ZX/325 WA4WIP/326 W5FT/344	YV5BPJ/32 Z56LW/339	<b>312</b> CE3AG/348 F3AT/337 G3AAE/344 G3JEC/323 G4MJ/342 HB9KB/339 JA1MIN/32 K2LGJ/324 K2SHZ/336 K2UVU/33 K2YLM/325 K4DJ/324 K4YFQ/321 K4ZCP/323 K5AAD/321 K5LIL/323 K6AHV/325 K6AM/334 K9WEH/320 KV4FZ/320 OZ3Y/339 SM7ANB/33 VE5RU/337 W1GKK/351 W2CKY/342 W2IRV/341 W2AW/342 WA2IDM/32 W4EEO/335 W4OPM/340 W4PLL/340 WA4MUB/33 W5ABY/342 W5LZ/323 W6ANB/321 W6FET/324 WA6OET/33 W7ENW/340 W7QK/338 W8DC/311 W8LY/337 W8NGO/347 W8RP/325 WA8NYB/33 W9HJ/344 W9NDA/345 W9OH/322 W9TK/344 WA9IVL/32 WA9NUQ/33
---	---	---	---	---	---	---	---	------------------------	---

### Radiotelephone

<b>321</b> W2BXA/356 W2TP/340 W3CWG/348 W4EX/356 W6AM/357 W8BF/355 W8BT/350 W8GZ/357 4X4DK/352	<b>319</b> DL6EN/344 I0AMU/350 W1JFG/347 WA2RAU/333 W3WGH/341 W5LZW/339 W8MPW/341 W9ILW/338 W9LNM/343 4X4JU/343	W0GAA/334 YV5AB/349 YV5ANF/329 ZL1HY/354 5Z4ERR/351	<b>317</b> DJ2BW/340 K5JEA/339 K6LGF/339 K9ECE/338 LU4DMG/346 PY2PA/331 VE3QA/345 W2GK/331 W4NJF/332 W5IO/348 W5JWM/339 W6REH/332 W9DWQ/333 W6RKP/344 W6ZM/336 W9CM/348	<b>316</b> K1IXG/326 SM5CZY/332 W1DQJ/333 W2FGD/330 W2NT/331 W3KT/346 W4EEE/345 W4OM/345 W4SSU/334 W6EL/331 W6EUF/327 WA8AJI/330	LU9DAH/339 PY2PE/329 TI2NP/350 W2HTI/343 W2GK/329 W2YY/331 W3DHM/342 W3NKM/344 W4UWC/330 W5GC/337 W6KTE/329 W7SGN/334 W9JT/327 W9SFR/344 W9GKL/339 YV5AJK/335 YV5AXQ/330 YV5AIP/337	I6FLD/334 I8AA/325 I0ZV/334 IT9JT/323 K6QHS/323 OK1ADM/327 PA0HBO/343 SM3BIZ/343 VE3MJ/326 VK5MS/346 W2PV/329 W2HXP/324 W3AZD/330 W3GRS/331 W3JK/326 WA4WIP/326 W6CHV/339 W8CUC/331 W8QJR/344 W9AA/327 ZP5CF/343	<b>313</b> DJ2YI/341 EA2HX/331 EA4JL/321 F2MO/327 I2KMG/326 K4HEF/324 ON4DH/341 PY2PC/324 PY7YS/336 VE3WT/326 W1HX/338 W2GKZ/327 WA2EQQ/326 W5NMA/338 W5PQA/340 W6NJU/334 W6YMV/331 W7QPK/330	W9HPS/329 W9NZM/330 Z56LW/338	<b>312</b> DJ7ZG/326 G3JEC/323 G8KS/339 G13IJM/335 I2KMG/326 K2YLM/325 WB2HXD/33 WBPTS/319 W7CMO/325 W9HB/337 W9JGD/320 W9NDA/345 W9MLY/337 W9QGI/331 YV5BPJ/32
---	---	---	---	--	--	--	---	-------------------------------------	--

### CW

<b>241</b> W9KNI/243	<b>212</b> K4YFQ/214 K6GA/214	<b>202</b> W1DAL/203	<b>196</b> W6PT/197	<b>189</b> OZ1VY/189	<b>183</b> K9UTN/183	<b>170</b> K9WEH/170 164 K2SHZ/164	<b>162</b> W8ZCQ/162 161 W3KT/161
-------------------------	-------------------------------------	-------------------------	------------------------	-------------------------	-------------------------	---	--

## Awake at the Switch

A quick glance at the U.S. amateur regulations shows that public service is the number one justification for the Amateur Radio Service. It's outstanding when hams participate in a full-scale overseas or domestic emergency and we get much favorable publicity as a result. Accounts of the emergency communications provided by amateurs have appeared time and again in these pages. However, many of those participating seem to have had very little training. In fact, participation may be a once-in-a-lifetime opportunity. Between reincarnations, hams shouldn't ignore public-service responsibilities. Here's how three groups stay involved.

Chuck Bino, K4CJZ, emergency coordinator for Guilford County, North Carolina, and a team of assistants have developed the nucleus of an effective public-service system, operated jointly by local hams and the county office of civil preparedness. The group is called the "Greensboro-Guilford County Civil Preparedness Repeater Association" (GGCCPRA), whose function is to organize local amateurs into public-service activities. The club repeater is WR4ANP (147.72/147.12 MHz). The repeater is thought to be unique in that it is owned and maintained by the office of civil preparedness, but it is used as any other repeater under normal circumstances. In emergencies, the machine functions under the joint auspices of the AREC/RACES systems. K4CJZ, who is also the county RO, believes that the union of the two systems is more effective than either one independently.

The repeater is located on city-owned facilities and can switch automatically to full emergency power. It also has direct dialing to the local police by a limited-access autopatch, which connects the user to police headquarters (where the repeater is located). The usefulness of the repeater has attracted the support of local government and local industry. (The preceding was taken from a press release written by K4CJZ.)

Some of the communications that

GGCCPRA provides are: Handling roadside emergencies, providing a local broadcast station with "hazard reports," and picking up pledges during Heart Fund drives. They were active during the Guatemalan disaster and during the Simulated Emergency Test. They have also *formally* integrated with a REACT team, perhaps the first group in the country to do so.

According to WA6OKV, there's an operation going on in California that illustrates the public service provided by amateur radio, while at the same time informing the public that ham radio is doing the service. The operation is known as the California Weather Net. It is common for nearly one hundred amateurs to check into this early morning net to report weather conditions in their area. All the information is logged by W6ERE, an engineer for a local radio station. He then passes the log to K6BH, host of the station's morning show. K6BH is able to inform his listeners about statewide weather conditions as a result.

Stations who assemble on the net frequency (3954 kHz) represent the entire Pacific Coast, including Canada. At times, stations check in from as far east as Kansas. This group has been meeting Monday through Friday for many years and all one need do to become an official member is to check in.

Like the non-contending baseball team in August or September, some AREC groups suffer from lack of interest. On the other hand, the Milwaukee area AREC organization never seems to run out of interesting exercises (led by Emergency Coordinator Bob Fauman, WB9NNJ). In July *QST's* SET write-up, we described the simulated blood shortage they staged in January. So it goes. On May 29, St. Mary's Hospital (in Milwaukee) had to move 182 critically ill patients (mostly cardiac cases) from the 75-year-old hospital to a new building across the street. This required transit through a very hazardous underground tunnel. The object was to have constant surveillance from the time the patient entered the elevator in the old building (to descend to

the tunnel), while they were being transported through the tunnel, until they entered the new building. This operation suddenly became much more important when the hospital's paging system malfunctioned. Hams with Handie-Talkies were assigned to the elevators (in fact, they operated the elevators), the tunnel and accompanied all key hospital and emergency personnel, maintaining contact with a control center at all times. In this manner, control-center personnel were able to monitor the progress of each patient. Difficulties such as patients who developed medical problems on the way, or traffic jams in the tunnel, didn't materialize, thanks to the communications network set up by the AREC.

These organizations are providing a public service and having fun at the same time. Perhaps other groups may wish to pattern themselves after the Wisconsin, California or Carolina "caucuses." As WICIE pointed out, "You're not living, unless you get involved."



This is a glimpse of the action at the St. Mary's Hospital control center (as described above). Sitting at the table at the far left is assistant EC K9UUT, who planned the entire operation and acted as net control on 146.67 MHz. Next to him is EC WB9NNJ. In the foreground, WA9TPO operates on the second frequency of 146.94, assisted by K9KJT. (WB9ODO photo)

## PUBLIC SERVICE DIARY

San Francisco, CA - April 22. While monitoring WESCARS (7255 kHz), W6PNS heard a frantic message from a ham operating mobile who had lost a wheel on the Golden Gate Bridge. W6PNS called the highway patrol. (W6LY)

Glen Ellyn, IL - May 16. The Dupage Co. civil defense RACES net activated immediately during the evacuation of Glen Ellyn because of dangerous ammonia gas escaping from a derailed tank car. Approximately 20 amateurs provided vital communications and assisted in crowd control. (K9GHR)

Roanoke, VA - May 29. Roanoke Valley ARC members swung into action following

\*Communications Assistant, ARRL

notification of a flood emergency status in the area. Communications were supplied for two local police forces. (WA4EPW)

Kohler, WI - May 31. An eight-year-old boy was reported missing near the Sheboygan River. Hams provided communications for ground search parties and the Civil Air Patrol. The boy was found after a three-hour search. (WA9SNU, EC Sheboygan Co.)

Reno, NV - June 14. Amateurs assisted in communications for the search for a boy who had become lost while hiking in the Sierra Nevada mountains, southwest of Reno. The boy was found safe the following day. (K7VYT)

Plymouth, MI - June 16. A MAYDAY from W8KWF, who said he was suffering from a heart attack, was intercepted by K9FYL on 75 meters. He, in turn, contacted K9TXJ who

called the paramedics in Plymouth. Within four minutes, the paramedics were on the scene. (Mrs. C. J. Courtney)

Lexington, OH - June 20. When the Lexington area sustained a power failure, the Richland Co. AREC provided emergency communications by request of the local police. (WB8GGR, EC Richland Co.)

Owensboro, KY - June 19. At the request of the civil defense director, local amateurs coordinated an extensive search for four youths missing following a fishing trip. (W4OYT)

Baxter Co., AR - June 26. The Ozark ARC interrupted their Field Day operation to provide communications for the county sheriff and the Coast Guard Auxiliary, who were dragging Bull Shoals Lake for a drowning victim. (W5POH)

□ For the month of June, 33 SEC reports were received, showing a total AREC membership of 11,981. Last year at this time, 32 reports were submitted, with a total membership of 11,393. Sections reporting were: Alaska, Alta, Ariz, Ark, Colo, Conn, ENY, EMass, Ga, Ind, Ky, Me, Mich, Miss, Mont, NLI, NC, NFla, NNJ, Ohio, Okla, Ont, Org, SV, SDgo, SCV, Sask, SFla, SNI, Utah, Va, WV, WVa, WPa.

□ Repeater Log. According to reports received to date, repeaters were used to report 32 automobile accidents and related occurrences, four fires and once to notify police when a citizen was disturbing the peace. Repeaters involved were: WR1AAC, WR2AAA, WR3ACY, WR4s ADD AEJ AJQ, WR5ADC, WR6ACJ, WR9ADZ, WR0ABF and VO1GT.

## NATIONAL TRAFFIC SYSTEM

NTS lost one of its major "architects" with the passing of Bill Overbeck, W3EML. Bill was director of TCC-Eastern from 1963 until late 1974, when he resigned because of health reasons. January 1975 QST reported that "Under his leadership TCC-E grew from a scant dozen participants to double that in 1974 and a waiting list of stations desiring to pick up a TCC function." Since then, despite failing health, his activities were unceasing and exceptionally reliable. He left us shortly after completing a TCC assignment. What more can we say than W3EML was a real ham radio operator.

## June Reports

1	2	3	4	5	6
EAN	30	1312	43.7	1.052	96.1
DEAN	55	549	9.8	.527	85.2
CAN	30	978	32.6	.866	100.0
DCAN	52	114	2.1	.100	80.0
PAN	30	1146	38.2	.918	98.3
DPAN	43	119	2.7	.175	64.4
CTN	26	270	10.3	.310	86.7
1RN	48	359	7.5	.475	97.1
1RNd	26	89	3.4	.245	70.4
2RN	88	503	5.7	.480	89.0
2RNd	53	248	4.6	.433	73.3
3RN	60	270	4.5	.371	97.7
3RNd	30	92	3.0	.359	100.0
4RN	59	511	8.6	.347	95.4
4RNd	56	262	4.6	.325	55.6
RN5	56	600	10.7	.352	84.3
RN5d	29	191	6.5	.265	73.8
RN6	60	773	12.8	.537	100.0
RN6d	30	167	5.6	.199	91.5
RN7	60	519	8.6	.539	93.1
RN7d	42	36	.8	.086	25.2
8RN	39	202	5.1	.297	59.0
8RNd	30	110	3.7	.400	84.4
9RN	57	419	7.4	.350	87.5
9RNd	30	98	3.2	.221	85.0
TEN	57	370	6.4	.381	53.1
ECN	60	257	4.2	.345	91.7
TWN	57	469	8.2	.305	89.3
TCC Eastern	96 <sup>1</sup>	512			
TCC Central	74 <sup>1</sup>	455			
TCC Pacific	105 <sup>1</sup>	731			
Sections <sup>2</sup>	4108	14843	3.6		



K0AZV, the Kirkwood, Missouri, High School ARC, was in the thick of the TG activity following the Guatemalan earthquake (see June QST); from left, logger Clay Melugin, WB0OIZ and WB0PJH.

Summary 5402 27574 5.1  
Record 5083 27092 15.9

<sup>1</sup> TCC functions not counted as net sessions.  
<sup>2</sup> Section and local nets reporting (120): BCEN (BC), MTN (MB), GBN ODN OPN OSN (ON), AENB AEND AENJ AENM AENR AENW SENS (AL), ASN (AK), ATEN HARC (AZ), AMBN APN ARN OZK (AR), CWN (CO, WY), CN CPN (CN), FMTN FPTN GN NFPN QFN QFNS SRN TPTN (FL), GSN GSSBN (GA), IMN (ID, MT), ILN (IL), QIN (IN), I75MN TLCN (IA), KPN KSBN KWN (KS), KRN KTN KYN MKPN (KY), LAN LRN LSN LTN (LA), PTN (ME), MDCTN MDD (MD), EMRI EMRIPN EM2MN WMN (MA), MACS MNN M16MN QMN WSN (MI), MSN MSPN MSSN PAW (MN), MSBN MSN MTN (MS), MON MOSSBN MSN (MO), WNN (NE), BARTEN NJN NJSN (NJ), SWN (NM), NLI NLIPN NLS RTN WDN NYS (NY), CN CNN NCCSSBN PX SCSSBN THEN (NC, SC), BRTN COAREC-10 MASER OSSBN O6N (OH), OAN OFON OLZ OPEN OTWN STN (OK), BSN (OR), PAC (PaC), EPA PFN WPA (PA), TNP TPN (TN), TEX TTN (TX), BUN UCN (UT), VSN (VA), NSN (WA), WVMDN WVN WVPN (WV), BWN WIN WNN WSNB (WI).

1 - NET  
2 - SESSIONS  
3 - TRAFFIC  
4 - AVG.  
5 - RATE  
6 - % REP.

## Transcontinental Corp

The dedication that W3EML displayed in all the years of his activity in the System lives on in the "hearts and minds" of TCC. During a June Delta sked with WA1WEM, WB0QOT was experiencing a violent storm in his area. It wasn't long before his location suffered a direct hit by lightning. Among other things, he lost his 20 meter beam and his amplifier. Nevertheless, after a minute or two to catch his breath, he proceeded, using an 80 meter inverted vee. The remaining traffic was sent (including one with a check of 103) and the sked was a success.

1	2	3	4	5
Eastern	120	86.5	1419	512
Central	93	82.2	866	455
Pacific	120	87.5	1505	731
Summary	333	85.4	3790	1698

1 - AREA  
2 - FUNCTIONS  
3 - %SUCCESSFUL  
4 - TRAFFIC  
5 - OUT-OF-NET TRAFFIC

## TCC Roster

The TCC roster (June): Eastern Area (W2FR, Dir.) - W1s NJM QY, K1s EJR GMW, WA1WEM, W2s FR GKZ, K2HI/VE2, WA2s DSA ICB PJL, WB2s CST UBW, W3EML, K3MVO, WA3VBM, WA4UQ, K4KNP, W8PMJ, K8KMQ, WA8HGH, WB8ITT, VE3s GOL SB, Central Area (W5GHP, Dir.) - K4KPI, WB4SKI, W6s GHP MI RB UGE UJJ, K5TTC, WA5IGU, W9s CXY DND NXG, WA9EED, WB9NOZ, W0s HH HI INH LCX QMY, K0CVD, WA0TNN, WB0HSP, Pacific Area (K5MAT, Dir.) - W5RE, K5MAT, WB5KSS, W6s BGF EOT MLI TYM VZT ZRJ, K6HW, WA6DEI, W7s DZX GHT, K7s IWD NHL QFG, WA7WXY, W0s ETT JW LQ, K0s DRL TER, WA0KKR/7, WB0s DJY QOT, VE7ZK.

## Independent Nets (June)

1	2	3	4
Central Gulf Coast			
Hurricane	30	81	1752
Clearing House	30	257	552
Hit & Bounce	60	1124	478
Hit & Bounce Slow	16	32	159
IMRA	26	380	1004
Mike Farad	27	36	231
North American SSB	23	302	361
75 Meter SSB	30	402	1065
7290 Traffic	44	400	1729

1 - NET  
2 - SESSIONS  
3 - TRAFFIC  
4 - CHECK-INS

## Public Service Honor Roll June 1976

This listing is available to amateurs whose public service performance during the month indicated qualifies for 40 or more total points in the following nine categories (as reported to their SCM). Please note maximum points for each category: (1) Checking into cw nets 1 point each, max. 10; (2) Checking into phone/RTTY nets, 1 point each, max. 10; (3) NCS cw nets, 3 points each, max. 12; (4) NCS phone/RTTY nets, 3 points each, max. 12; (5) Performing assigned liaison, 3 points each, max. 12; (6) Phone patches, 1 point each, max. 20; (7) Making BPL, 3 points regardless of traffic total; (8) Handling emergency traffic directly with a disaster area, 1 point each message; (9) Serving as net manager for entire month, 5 points.

69	WA2DSA	K5MAT	WB4ARJ
WB5RLR	W2MLC	W6RFF	WB4DJU
KH61QU	WB2OYV	W7GHT	WA4EUU
68	WA2UYK	K9KHI	WB4GHL
W7OCX	K4BKX	W9MFG	WB4LCF
67	WB4CAK	K9ZTV	WB4PDG
WB0HOX	W5GHP	K0CVD	WB5KU
65	WA5YEA	K0MRI	WA5ZZA
WA5RKU	W6RNL	W0OTF	W6BGF
64	VE3JGJ	VE1AAQ	W7VSE
WB5KGP	55	VE3FRG	W9NXG
WB5NKD	WB5NUM	VE4UL	W9SFL
63	WA6TVA	48	WB0NUB
WB2VTT	53	WB2EMU	WB10EF
62	W5UGE	47	VE3GQZ
K1PAD	K3YHR	WB2CST	VE3GOL
WA4FBI	51	AA3QIA	VE3GT
61	WB2SJJ	WA0KKR/7	43
W2MTA	WB4OXT	46	W4OGG
WB2RUZ	50	WA1TBY	W9LFC
WB2WRT	WA2PJJ	WA3VBM	WB5PVL
WA4EPJ	WB4TPR	45	WB5MTQ
WB4OBZ	WB4WQL	WB4DXN	42
WA5ANV	WA6DEI	WB5FMA	W5UJJ
WB0OAG	W9MMP/0	WB5MDR	WA5VBN
59	49	KL7JDO	WA6LBC
WA3QOZ	W1RWG	44	WB8NCC
WA0GLI	WA1VMV/3	W1BVR	41
58	WA2AIV	WA2RKI	WB5KPL
WB8JGW	WB2LZN	WA2VEN/0	W7LG
57	WA2WIV	WB2YKG	K7NTG
WA7MEL	WA3YJG	K3O1O	K9TKE
56	WB4EKJ	WA3WPY	WB0HCK
WA1FCM	K4FLR	WA3SWF	40
		AA3YKK	KL7HD

## Brass Pounders League June 1976

BPL Medallions (see December, 1973 QST p 59) have been awarded to the following amateurs since last month's listings: K5H2R, WB6YID, W7TZK, K7VWA, WA0RWM. The BPL is open to all amateurs in the United States, Canada and U. S. possession who report to their SCM a message total of 500 or a sum or originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours or receipt in standard ARRL form.

## Winners of BPL Certificates for June Traffic

1	2	3	4	5	6
W3CUL	367	1271	1456	41	313
W0WYX	57	1272	428	644	220
WA1UAX	295	295	295	295	118
K3NSN	75	500	480	20	107
W3VR	251	231	363	12	85
K9CPM	1	392	52	352	79
WB0MTA		337	367		70
K6JZR	19	294	264	23	60
WB5NKD	11	273	282	19	58
AB0HOX	22	289	241	10	55
W7DZX	34	237	267	3	53
WB5RLR	13	238	258	17	52
K7VWA	52	244	76	136	50
AB2CST	9	226	236	33	50
WB6EIG (May)	21	330	304	7	67

## BPL for 100 or more originations-plus-deliveries

WA3ATQ	212	KC6DK	104
K0YFK	188	K4JPF	103
W0FIR	175	W4YZC	103
W5TI	158	KL7HDX	102
K4TH	155	K1BCS (May)	127
W7TZK	128	WB8DQX (Apr.)	127
WA3YJG	113		

1 - CALL  
2 - ORIG.  
3 - RECD.  
4 - SENT  
5 - DEL.  
6 - TOTAL

# 1976 Novice Roundup

## February 7-15 Results

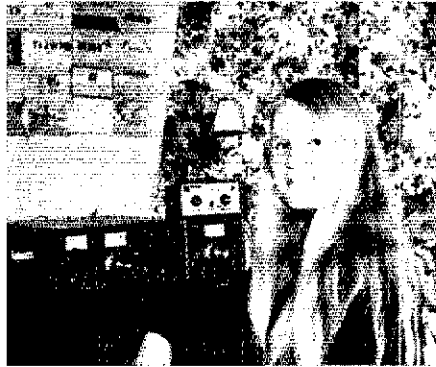
By Jim Cain,\* WA1STN

Today's Novices are tomorrow's Elmers. Another crop of newcomers have completed their Novice careers and moved on into the ranks of permanently licensed amateurs, capping their Novice careers with the 1976 Novice Roundup. 392 Novices reported their NR successes (and failures) to Headquarters this year, down markedly from 495 last year. Surmounting such problems as the almost useless condition of 15 meters and the total absence of any worthwhile activity on ten, our Bicentennial Round-uppers still made the usual gains in operating proficiency, code speed and Worked-All-States totals.

Alabama was the scene for this year's victory, WN4KKN, rounding out his career with a substantial margin over Connecticut's number-two man, WN1UWR. Almost every successful Novice has someone in the background,

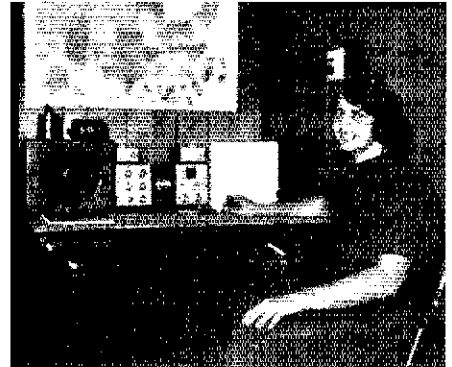
\*Asst. Communications Mgr., ARRL

Perhaps the neat and functional layout of WN9SBC's station allowed him to rack up a respectable 26k, while leading the Illinois section.



Judy Regennitter, WN0PMA/4, came in second in the North Carolina section. Her 3-element beam on 15 meters and dipole on 80 meters enabled Judy to work 53 sections and 6 countries to score 15k.

giving advice. Trey Garlough, WN4KKN was lucky to have long-time contesteer W8FAW (now living in Alabama) as his teacher, and it showed. Young Trey (he



John O'Mara, WN4NFS, and his Heath HW-101, which, coupled to a 2-element beam on 15 and dipoles on 80 and 40 meters, were good for 424 contacts and 23,436 points to lead the Virginia section.

can't even call himself a teenager yet) jumped from second place in 1975 to the top spot this year.

Seven different call areas are represented in the Top Ten, reminiscent of the last few November Sweepstakes contests. Five U.S. ARRL sections conspicuously had no Novice entrants: San Francisco, Hawaii, Nevada, Alaska and North Dakota. Michigan again lead the country in quantity and overall score of all Novice entries, followed by Ohio, North Texas, South Texas, and Connecticut. It looks like those sections will continue to be the hotbeds of contest activity that they have traditionally been.

Our award for most persistent operator has to go to WN8TXE, who operated as a Novice using the call sign W8LT, hardly one recognizable as being a beginner. That's a tough way to go about it, since a large proportion of most Novices' logs are made up of non-Novice contacts. Quite possibly "most popular Novice" was WN7ZTA, who handed out 258 contacts from rare Wyoming. We'll be looking for that call sign in future contests and hoping he stays in Rock Springs for a while. Novice appreciation award to Extra-Classer WA1WEM, who stuck it out to

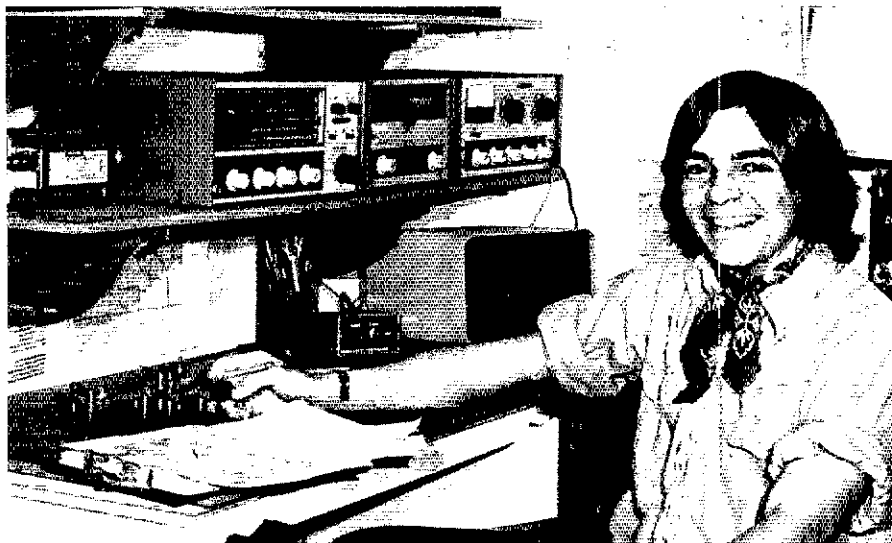
work an even 300 Novices. And, of course, thanks to *all* the old fogeys who ventured into the Novice segments and turned down their keyers. It does take some kind of patience!

The 1977 Novice Roundup will be different. Next Novice Roundup Novice licensees will be allowed an increased-power level (250 watts). Combined with their VFOs, such power capability will make many Novice stations something to be reckoned with. In addition, *all* licensees operating in the Novice segments will be allowed a maximum of 250 watts. Finally, Technician class licensees will have Novice license privileges, and activity in the Novice bands will undoubtedly pick up.

Several thoughts come to mind when the above changes are considered. First, sentiment has been greatly in favor of doing away with the usual admonition that non-Novices avoid calling "CQ" during the Roundup. All indications point to the conclusion that such CQing, used in moderation, is beneficial to the Roundup, and most Novices and upperclassmen alike are in favor of it. Additionally, all higher classes will be running the same power allowed to Novices, so there seems little reason to retain the unofficial rule about non-Novices calling CQ NR.

At this time, the position of Technicians in the NR is uncertain; the ARRL Contest Advisory Committee is awaiting comments and suggestions upon which to base a recommendation. While the Techs are, in essence, Novices when they operate in those frequency bands, most of them are hardly "beginners." Even if they are put on an equal competitive basis with the Novices, they would be at a disadvantage, since they do not have Novice call signs. Probably the best approach (editorial) would be to place them in a separate class, competitive with each other but not with

The happy look on WN3ALS's face is for a good reason. Pete's 51,048 not only took top score in the Western Pennsylvania section, but also gave him third place nationwide.



A DX-60B and dipoles on 40 and 15 meters accounted for 461 contacts and a score of 24,752 for Howard Kraus, WN2AUD, in Western New York.

the Novices. As such, they would be eligible for awards, same as the Novices. Write to the CAC, c/o ARRL headquarters, if you have strong feelings on the matter either way.

#### Soapbox

Received my license Thursday, set up my station Friday, and jumped into the NR Friday evening. Quite a way to start out in ham radio! -- (WN4HCC) I thought there was supposed to be incentive licensing. This (NR) makes you want to stay a Novice! -- (WN2DFO) Only 12-watts input and a small antenna, I did not work many stations. . . I had only one QSO before the NR, so I had a lot to learn. . . P.S. Lee's just making excuses for such a poor showing in the Novice Roundup. -- (WN3BCF, P.S. by his XYL) Many thanks to the higher-class licensees who made up a majority of my contacts. -- (WN9QVY) Had terrible QRN from leaky power line, so I called the power company. . . they came out and repaired it. . . the day after the NR was over. -- (WN0OHJ) The top of a DX-60 makes a nice pattern on toast. -- (WN1UZK) After 5 hours of operation had to use the 1000-watt dryer to cool the finals in the transmitter. -- (WN6HEU) Sure wish a KL7 had visited the Novice bands! -- (WN5MHO) Working on log sheets was harder than the contest. -- (WN3YIR) I had to quit after Wednesday because my Advanced ticket came in the mail. -- (WN4MGF) Been on the air for 6 months and am now firmly convinced that North Dakota is a figment of someone's imagination. -- (WN5PGH) Did not start in NR until I got an OO Card. Then I knew my xmt was getting out. -- (WN8UEH) Good news -- your new Heathkit came. Bad news -- you have 24 hours to build it before the NR.

-- (WN9SAK) Contest was fun, but my new rig catching fire and burning shad wasn't. -- (WN8VBW) I am brand new at this game but I find NR a challenge. A little frustrating, but good for the ear. -- (WN2CPH) It was a real thrill to be informed in the middle of the contest



Minnesota section leader, WN0OHJ, at the controls of his Tempo One xcvr. Using an inverted vee on 80 meters and dipoles on 40 and 15 meters all at 50 feet, Bill managed 361 contacts in 26 hours.

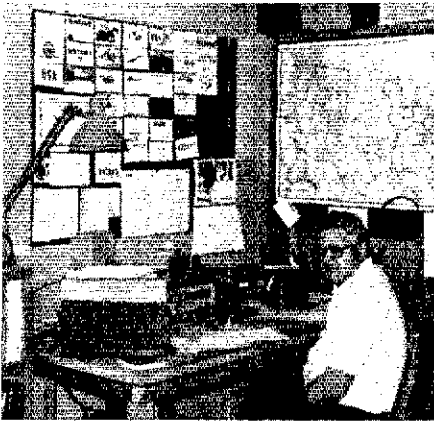
WN2PRG's logs were as neat as her station; Pat is the 1976 NR Gold Pencil award winner.







WN6JGK, ten years old, took third place in the Santa Barbara section.



A 3-element beam on 15, an inverted vee on 40, and a dipole on 80 meters, helped Jeff Smith, WN7BBQ, to 9.9k and fourth place in the Washington section.

that due to an FCC computer error I had been issued the wrong call sign. — (WN4DIW now WN4ERM) I have just one question to ask after 30 hours of wearing headphones and listening to cw. Does anyone know how long it will be before the ringing in my ears goes away and I quit hearing cw from the television, refrigerator etc.? — (WN2AZH/5) To average over 100 points per hour with only 5-watts input shows how good the Novice operators are to pull me through the QRM. — (WA4GRO) . . . the contest gave me the practice. I picked up 15 new states and got my code speed up past 13 wpm. I think I will go take my General test now. — (WN4DBK) Just one question, was there anyone participating in the contest from the great and apparently rare state of Maine? — (WN3AHV) Heard many excellent fists. — (WN2AUD) With the XYL and children gone for the whole week, I thought that I might really do great, but having to answer their phone calls, fix my own meals and pack my lunch bucket, it seems that I made the wrong decision. — (WN8SNO) I would think that a weekend contest would be better, unless it is the intent for this to be an endurance as well as an operating contest. — (WN0OQV) I'm kicking

myself for not having a 40-meter antenna. 80 was poor in the daytime and 15 only popped in once in a while. — (WN8STZ) I worked almost half the states running 2 and 3 watts with a couple of dipoles — one strung up in the kitchen. — (WN6EDQ) Short CQs (2x1) very effective in getting higher-class license answers and half of my score. — (AK2CFN) It was so much fun, I wish it could have lasted longer. — (WN8VBG) Was only able to get on for 10 hours due to a broken leg. — (WN4CYN) This was my first contest and my first run-in with old Mr. Murphy. — (WN8VEF) Being both a ragchewer and a contest fan, I can sympathize with those who are literally put "out of business" on the crowded weekends. — (WN6DCL) . . . turned out to be quite rewarding, picked up 7 states, including Wyoming and 1 new country. — (WN7CBA) I loaded up on 80 meters through my picture-window frame. I'm gonna have to get my act together for these things. — (AK6FFI) I'm hooked!!! Can't wait to pass my General so I can participate in more contests. — (WN1VGP) Would like to have had a higher score — no such luck. (If it were raining soup, I'd be locked outdoors with a fork!) — (WN3ZLV) Fifteen meters did not seem to be open or used that much; 40 meters seemed to be all QRM with some QRN at times for an added attraction . . . did not have an 80-meter antenna, so did not try that band. Maybe it would have helped some. — (AK5NRH) My girlfriend said that I need the experience. — (WN8TJO) Went through two and a half pens making out QSL cards! — (WN5PVL) How about next year asking all schools to abolish homework during Novice Roundup? — (WN8UXD) Great way to round out my Novice career, as I just passed my General exam. But I'll be back! (WN0PMA/4) . . . it was almost one week after the end of the NR before I could bear to look at a key again. — (WN4SVC) I was delighted to already receive a QSL from 9-year-old YL, WN0QLB. — (K4EJG) My most notable experience was working 3 stations in one minute while eating dinner and listening to my mother nagging about the noise! — (AK6BFL) I was sick the first weekend of the contest, and the band was sick the second weekend. — (WN5PGE) I enjoyed the contest very much, but once a year is enough. — (WN5POP) I wanted the NR to not only be my last activity as a Novice, but also my best. And it certainly was! — (WN1UWR) Thirty hours is a lot of rounding up! — (AK1UUF) Wait 'til next year! — (WN9SEI)

Certificates will be mailed to 1976 Novice Roundup section winners around September 15. See you in the Sweepstakes!



A vertical antenna on 40 and 15 meters, driven by the HT-40 in this photo, gave Judy, WN2ZRC, 10.9k and fourth place in the Southern New Jersey section.



Doug Stevens, WN2BBS/7, section leader in Montana.

#### TOP TEN

WN4KKN	63,920
WN1UWR	52,836
WN3ALS	51,048
WN5POP	49,533
WN5NXQ	48,519
WN5PGH	46,531
WN5MWQ/7	44,238
WN8RTJ	42,910
WN6DYZ	42,705
WN5QDX	40,880

#### DIVISION LEADERS

Atlantic	WN3ALS
Central	WN9RZS
Dakota	WN0OHJ
Delta	WN5POP
Great Lakes	WN8RTJ
Hudson	WN2YYT
Midwest	WN0PAT
New England	WN1UWR
Northwestern	WN7AHS
Pacific	WN6DYZ
Roanoke	WN8SNO
Rocky Mt.	WN0PEA
Southeastern	WN4KKN
Southwestern	WN5MWQ/7
West Gulf	WN5NXQ
Canadian	



# Rules, 1976 VE/W Contest

## A New Format to Encourage Activity

The Montreal Amateur Radio Club Inc. invites all W/K and VE/VO amateurs to participate in the 1976 VE/W contest to be held the weekend of September 18-19.

Rules for the 1976 contest include some changes from last year, and therefore should be read carefully by everyone intending to participate. These changes were incorporated at the request of many amateurs participating in last year's contest.

A 10X multiplier is continued for W/K participants in an attempt to equate U.S. and Canadian scores, thus encouraging more competition between the two areas.

Stations should look for each other in the "General" part of the phone and cw bands, and are reminded to check all bands for openings.

Log sheets, regardless of score, will be of definite interest in preparing the contest summary. It will also be of definite interest in preparing "soapbox" comments, unusual occurrences, etc.

1) *Eligibility:* The contest is open to all licensed amateurs located in the ARRL sections listed on Page 8 of any QST.

2) *Classes of Entry:* The contest is divided into two classes, cw and phone. Cw and phone scores must be logged, tabulated and submitted separately.

3) *Types of Entry:* There are two types of entry - single operator and multioperator. A single-operator station is one manned by an individual amateur who receives no assistance from other persons during the contest, such as log keeping or spotting stations.

Stations where two or more amateurs operate a station, or where a single operator receives assistance in operating the station, must be placed in the multioperator category.

4) *Contest Period: CW Class* - All cw contacts must be made during the period 0001 GMT Saturday, September 18 and 0000 Sunday, September 19. Only 18 hours total operating time may be used during this period. Times on and off the air must be shown in the log. Minimum time-off period allowed is 15 minutes. Listening time must count

as operating time.

*Phone Class* - All phone contacts must be made during the period 0001 GMT Sunday, September 19, and 0000 GMT Monday, September 20. Only 18 hours total operating time may be used during this period. Times on and off the air must be shown in the log. Minimum time-off period allowed is 15 minutes. Listening time must count as operating time.

5) *Bands:* All bands and modes for which the participating entry is licensed may be used. A station may be worked once on each band in each contest classification. The use of repeaters for contest exchanges is not permitted.

6) *Exchange:* W/Ks will work VE/VO stations and vice-versa. W/K to W/K and VE/VO to VE/VO QSOs do not apply. Valid points can be scored by contacting stations not in the contest if complete exchanges are made. The exchange consists of RS or RST report, a consecutive number beginning with 100 for the first cw contact made at the beginning of the contest, and the number 200 for the first ssb contact, and the ARRL section for W/Ks and geographical areas listed below for VE/VOs.

Newfoundland	VO1	NFLD
Labrador	VO2	LAB
P.E.I.	VE1	PEI
Nova Scotia	VE1	NS
New Brunswick	VE1	NB
Quebec	VE2	QUE
Ontario	VE3	ONT
Manitoba	VE4	MAN
Saskatchewan	VE5	SASK
Alberta	VE6	ALTA
British Columbia	VE7	BC
Yukon	VE8	YUK
Northwest Territories	VE8	NWT

Example cw exchange might be W9XXX DE VE4YYY 579-165 MANK; and example ssb exchange might be VE1WWW this is W7ZZZ. Your report 5 and 9 and 296 Oregon go ahead.

7) *Scoring:* Each completed contact is 2 points times the number of sections worked on each band, plus a 10-times multiplier for U.S. stations participating. E.g.: 25 contacts in 10 sections on

21 MHz, 10 contacts in 10 sections on 14 MHz, and 20 contacts in 10 sections on 3.7 MHz = 25 + 10 + 20 = 55 contacts  $\times$  2 = 110 points  $\times$  (10 + 10 + 10) 30 = 3300 points for Canada, but 3300  $\times$  10 = 33000 for U.S. stations.

8) *Contest Submission:* Log sheets and a summary sheet are required with every submission. The summary page will be submitted as the first page of each entry showing number of contacts, multipliers and total scores. Any 200-plus contact entries are also required to have check sheets (ARRL, Operating Aid 6) for listing or awards. A separate submission for each class (cw and ssb) is mandatory. All entries must be postmarked no later than October 31, 1976, and become the property of the contest committee.

9) *Operating Aids:* Check and summary sheets are available from the VE/W Contest Committee, P. O. Box 2206, Dorval Station 780, Quebec, Canada. Include s.a.s.e. (legal size), IRCs or Canadian stamps with your request. Official sheets are not necessary and reasonable facsimiles are acceptable. No forms will be sent unless sufficient postage accompanies your request.

10) *Awards:* Plaques will be awarded to the high-scoring Canadian and to the high-scoring U.S. entry for both classes, cw and ssb, donated by the Montreal Amateur Radio Club. A minimum of 25 QSOs is required to qualify. Entrants operating under reciprocal licensing agreements are not eligible for plaques.

Certificates will be awarded for the high-scoring stations in each section for each class and type of entry providing at least three entries in each class and type are received from each section.

11) *Disqualification:* If the claimed score of an entry is reduced by 2 percent or more, logs may be disqualified. Score reduction does not include corrections for arithmetic errors. Score reductions may be made for taking credit for unconfirmed QSOs and/or multipliers, duplicate contact, or other scoring discrepancies.

The ruling of the VE/W contest committee will be final in all instances of doubt.

# Operating News

Conducted By George Hart,\* W1NJK

## Have You Considered Low Power?

The amount of "power" used by an amateur station has been a prime consideration for many years — in regulatory matters, in discussions, ragchews, debates, bull sessions. Most amateurs want to run as much power as they can, up to the legal limit — and some, let's face it, even over that. In the old "spark" days, powers of a kilowatt were fairly common, but not very effective by today's standards. Then came the vacuum tube, and little rigs running 5 or 7-1/2 watts (the UV202 and the UX210 respectively) often outperformed kilowatt sparks. As spark died out, there was an era during which amateurs abused 210s to get higher power, or acquired "50-watters" (UV203s) if they were affluent enough and abused them.

Running low power was an economic necessity in those days. Only the wealthy could afford high power — 852s, 204As and the like. The average ham ran a single '10 in a self-excited Hartley or other circuit, or maybe a pair of them driven by a crystal oscillator, or a MOPA setup. Whatever he used, the aim was to get as much power as he could out of it.

The high-power syndrome is still with us, as we discussed in a previous column. But also with us is an increasing number of amateurs who have had enough of this and who are interested in seeing and showing what can be done on low power — not 100 watts, not 75 or 50 watts or whatever is standard for the current crop of manufactured rigs, but inputs on the order of 1 or 2 watts or less. It represents a challenge, both technical and operating — and is a lot of fun, too!

When you are running QRPP, one of the biggest factors in success is your antenna. You might be able to "get out" with a kilowatt loading a wet rope, or some other kind of antenna with a super-high SWR, but you

won't "make it" on QRPP unless you put up a super-efficient skywire.

There are now some low-power rigs available commercially, both on hf and vhf (we are considering mainly the former in this discussion), but why not have a crack at building your own, especially the transmitter? It isn't all that difficult. In fact, working with transistors and ICs is a lot easier than working with tubes, once you get the hang of it.

But we'll leave all that to the technical people. What we're interested in is the operating aspects of QRPP. Is it different from any other kind of operating? Well, not really, but there are some slight differences worth mentioning. For example, if you are used to having a commanding signal, better forget it on QRPP. If you have a well-designed rig and an efficient radiator, you'll get there, all right, but the chances of your making anybody's receiver jump off the table are slim. If you call CQ a lot, quite a few of them will go unanswered. Even in calling other stations, you will often lose out to another caller whose signal is making a bigger dent than yours. The average CQ-er answers the louder of the signals calling him.

Then there is the matter of the signal report. It won't always be 599 or "five by nine." You may occasionally get strength reports as low as 8 — which will definitely tab you as a "weak" signal, the way amateur signal reports usually go. Your satisfaction with performance of your equipment will be in getting *answers* to your calls, not so much in getting good signal reports. The latter are pretty superficial and meaningless anyway, in the main. If the guy at the other end hears you and copies you, it means you're getting there, and *that's* what's important.

Yes, for many years the trend has been

toward higher power, until today a high percentage of amateurs can muster a kilowatt input if they wish — and many of them do wish, whether they need it or not. Perhaps it's time we try to put this trend in reverse and tout the glories of *low* power. Some say we should petition FCC to reduce the maximum legal power. Is this the way to go about it? Experience has indicated that if you ask for restrictions, you might get them — including a few you didn't want! No, we ask for privileges, not restrictions. It is our responsibility, then, to use them for the betterment of the service. This is our highly-touted "self-regulation," an appellation it would be greatly to our advantage to live up to.

A little-known amateur regulation (97.67(b)) requires that we use the minimum amount of power "necessary to carry out the desired communications." This means that if you use 500 watts when 100 watts would do the job, you are technically in violation. If you use 25 watts when 5 watts would be sufficient, you are just as guilty.

The amount of power you really *need* for most communications is surprisingly low. QRPP enthusiasts would contend that it is almost infinitesimal, given a decent radiating system. Take a look at some of the 10-watt battery-operated Field Day performance (when it is written up in *QST*) and bear in mind that all these contacts were made in the midst of the greatest possible competition, usually under the most unfavorable operating conditions. A kilowatt input? Who needs it? Conceivably, at times it would be useful, but 99 percent of the time a small fraction of that power will do the job just as well.

As for QRPP — well, that's a whole new ball game. Why not give it a try?

### WIAW OPERATING SCHEDULE

Operating-visiting hours are Monday through Friday 1 P.M. to 1 A.M., Saturday 7 P.M. to 1 A.M. and Sunday 3 P.M. to 11 P.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 details and the general contact schedule are available upon request. All frequencies shown are approximate. If you wish to operate, you must have your original operator's license with you. Please note that the station will be closed Sept. 6.

Staff: Chief Operator/ARRL Asst. Communications Mgr. C. R. Bender, W1WPR; Alan Bloom, WA3JSU; Chris Schenck, WB2SEZ.

### Code Practice

Approximate frequencies: 1.820 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. For practice purposes the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries

\*Communications Manager, ARRL

checking references. Details on Qualifying Runs appear monthly in *QST* Operating News. The 0130Z practice is omitted four times a year on designated nights when Frequency Measuring Tests are sent in this period.

Speeds	EDST	UTC
5-7½-10-13-20-25	9 A.M. MWF 9:30 P.M. TThSSu	1300Z MWF 0130Z MWFS
10-13-15	4 P.M. M-F 7:30 P.M. Dy	2000Z M-F 2330Z Dy
35-30-25-20-15	9:30 P.M. MWF 9 A.M. TTh	0130Z TThS 1300Z TTh

To improve your fist by sending in step with WIAW (but not over the air!) and to allow checking the accuracy of your copy on certain tapes, note the UTC dates and *QST* text to be sent in the 0130Z practice from the May issue of *QST*.

9/10 It Seems to Us	9/21 Public Service
9/16 Correspondence	9/24 World Above
9/20 League Lines	9/29 YL News

### Bulletins

Columns indicate times in EDST-PDST-UTC(Z)

Phone Bulletins (1.82 3.99 7.29 14.29 21.30 28.59 50.19 145.588 MHz):

2100 Dy	1800 Dy	0100Z Dy
2330 M-S	2030 M-S	0330Z T-Su

CW Bulletins at 18 wpm (1.82 3.58 7.08 14.08 21.08 28.08 50.08 145.588 MHz):

1630 M-F	1330 M-F	2030Z M-F
2000 Dy	1700 Dy	0000Z Dy

CW Bulletins at 10 wpm (same frequencies as above):

0000 M-S	2100 M-S	0400Z T-Su
----------	----------	------------

RTTY Bulletins at 170-Hz shift are repeated at 850-Hz shift when time permits (3.62 7.095 14.095 21.095 28.095 MHz):

1730 M-F	1430 M-F	2130Z M-F
2300 M-S	2000 M-S	0300Z T-S

OSCAR Bulletins (15 wpm on cw frequencies):

0840 M-F	0540 M-F	1240Z M-F
1400 M-F	1100 M-F	1800Z M-F
1600 Su	1300 Su	2000Z Su

OSCAR RTTY:

1700 Su 1400 Su 2100Z Su

In a communications emergency monitor W1AW for special bulletins as follows (times in UTC):

Phone: On the hour.

RTTY: At 15 minutes past the hour.

CW: On the half hour.

NEW A-1 OPERATORS

W1IUY W2HXT K2KAU K4TH WA5PQX  
W6WY K8VHB DM2CXE.

5-BWAS AWARDS

(Updating the August listing) Nr. 251  
WB4VTM, 252 K0TVJ, 253 AD8HBN.

SCM ELECTION RESULTS

Balloting results: In the Northern Texas Section, Mr. L. F. "Ted" Heithecker, W5EJ, Mr. James F. LaPorta, W5QGZ and Mr. Oscar E. "Gene" Smith, W5GSN were nominated. Mr. Heithecker received 439 votes, Mr. Smith received 248 votes and Mr. LaPorta received 184 votes. Mr. Heithecker's term of office began September 15, 1976.

In the Montana Section, Mr. Edward R. Bodenberger, WA7PZO and Mr. Robert E. Leo, W7LR were nominated. Mr. Leo received 93 votes and Mr. Bodenberger received 89 votes. Mr. Leo's term of office began September 9, 1976.

STAFF NOTES

We have not previously recorded the addition to the CD staff of Bill Jennings, WA1AH. Bill comes to us from North Haven, CT, is a graduate of Northeastern Univ., and holds an Extra Class license (nine of us in the CD). Bill will be working with Jim Cain, WA1STN, in the Contest Branch.

Also, long before you read this we will have aboard one Bruce Johnson, WA6IDN, who will soon be the tenth Extra-Classer on the CD staff. Bruce is a graduate of Claremont College, Claremont, CA, and comes highly qualified in the public service and other fields of amateur radio. He'll be working with Bob Halprin, WA1WEM, in the Public Service Branch.

With all the reorganizing at Headquarters, the CD staff is now down to 14 people. All but one of these are licensed amateurs. What's the matter with that one? We're working on it (her).

# Operating Events

SEPTEMBER

4: N6V Operation, commemorating the Viking II landing on Mars. Further details p. 87 July.

4-5: Savaria C.C.S. Contest (HA), p. 86 Aug.

4-6: Four-Land QSO Party, p. 87 Aug.

5: Frequency Measuring Test, LZ DX Contest, p. 87 Aug.

8: West Coast Qualifying Run (including 40 wpm!), W6OWP prime, W6ZRJ alternate, 10-40 wpm at 0400Z (Universal Coordinated Time, abbreviated UTC, Z used as a designator), on approximately 3590/7090 kHz. This is 2100 PDST the night of Sept. 7. Please note that dates are always shown at least two months in advance and times are always the same local "clock time," i.e. 9 P.M. local Pacific time. Underline one minute of the highest speed copied, certify that the copy was made without aid, and send to ARRL for grading. Please include your full name, address, call (if any) and enclose an addressed stamped envelope (legal size).

11-12: VHF QSO Party, p. 84 Aug. WAE Contest phone, p. 87 July, Washington State QSO Party, CLARA Day Contest, p. 87 Aug.

14: WIAW Qualifying Run, 10-35 wpm at 0130 UTC, transmitted simultaneously on 1.805 3.58 7.08 14.08 21.08 28.08 50.08 and 145.588 MHz. (Note, please, that this is 2130 EDT, 9:30 P.M., local eastern time the night of Sept. 13.) Underline one minute of the highest speed you copied, certify that the copy was made without aid (use of a typewriter is, however, OK), send to ARRL for grading. Please include your full name, call (if any), and complete mailing address. A large s.a.s.e. will help to expedite your award/endorsement.

16-18: YLRL "Howdy Days," p. 87 Aug.

18-19: Scandinavian Activity Contest cw (SAC), p. 87 Aug.

18-20: Maryland-DC QSO Party, sponsored by the Maydale ARS, starts 2300Z Sept. 18, ends 0100Z Sept. 20. Exchange QSO no., RS(T), and QTH. (County for MD stations except Baltimore City and Washington, DC, ARRL section and country for all others.) The same station may be worked on each band and mode for QSO points as well as band multiplier. Count two points for each complete QSO. Multiplier: MD-DC stations use ARRL sections and countries. All others use MD counties and independent cities. Scoring: Multiply the total QSO points by (for MDC) sum of sections and countries from each band; (non-MDC) sum of MD-DC counties/cities. On the hf bands operate about 75 kHz from the low end of the cw band on

even hours, 25 kHz from the top of the band on phone on odd hours, on the half hour try 10 and 15 meters. Awards. Submit separate logs for each band and mode as well as a check sheet for each band and mode over 100 contacts. The overall summary for all bands/modes must include name, call and address and the usual signed declaration. The mailing deadline is Oct. 6. Entries go to: Maydale ARS, c/o C.E. Andersen, W5TWT/3, 14601 Claude La., Silver Spring, MD 20904.

20: CWA High-Speed Code Test, p. 87 Aug.

25-26: SAC phone, p. 87 Aug.

25-27: Delta QSO Party, p. 87 Aug.

OCTOBER

2-3: California QSO Party, sponsored by the Northern California Contest Club, 1800Z Oct. 2 to 2359Z Oct. 3; 24 hours operation permitted out of the 30-hour period. Times "out" must be not less than 15 minutes and clearly indicated in the log. All bands may be used, and stations may be worked once on phone and once on cw on each band. A CA station which changes counties (a mobile or a portable) is considered to be a new station and may be contacted again on each band and mode. CA stations send consecutive QSO numbers and county. Non-CA stations send consecutive QSO numbers and state. Canadian province, or country. CA stations may work each other, but contacts between stations outside of CA have no contest value. Each complete QSO counts 2 points, no partial credit. The multiplier for CA stations is the no. of different states, plus VE call districts (VE/VO 1-8, max.8). CA stations may count the state of CA as one multiplier. (Note, DX may be worked for QSO points, but does not count for multipliers.) Non-CA stations use the no. of different countries worked (58 max.) as the multiplier. QSO points times the multiplier = final score. Suggested frequencies: Cw, 1805 3560 7060 14060 21060 28060; ssb, 1815 3895 7230 14280 21355 28560; Novice, 3725 7125 21125 28125. Try 10 meters on the hour and 15 on the half hour between 1800-2200Z. Usual log info., number each new multiplier as worked. Include standard summary, with band/mode QSO breakdown. Indicate whether the entry is single or multioperator. Certificates include club awards. Postmark entries no later than Oct. 15, include a large s.a.s.e., and send to Doug Docherty, WA6DQM, 2306 Monserat Ave., Belmont, CA 94002. VE2 Contest, sponsored by the Radio Amateurs of Quebec, Inc. (RAQI), 2100Z Oct. 2 to 2100Z Oct. 3, hf bands only, all modes. Score 1 point for

each phone contact, 2 points for each cw QSO, 10 points for each RTTY or SSTV contact, 25 points for a contact with VE2AQC. Usual log info., including RS(T) and consecutive serial no. Awards. Postmark entries by Oct. 30 and send to HF VE2 Contest, RAQI, C.P. 7388 Station "A," Montreal, P.Q., Canada H3C 3L4. VK/ZL/Oceania Jubilee DX Contest phone, sponsored by the Wireless Institute of Australia and the New Zealand Amateur Radio Transmitting Society, 1000Z Oct. 2 through 1000Z Oct. 3 (cw Oct. 9-10). Non-VK/ZL/O stations score 2 points for each QSO on a specific band with VK/ZL; 1 point with Oceania stations other than VK/ZL. Final score: Multiply total QSO points by the sum of VK/ZL call areas worked on all bands. (The same area worked on different bands counts as a separate multiplier.) Send RS(T) plus serial starting with 001. Usual log info., underline each new VK/ZL area worked. Log each band separately. Separate summary to include call, name, address, equipment details and band breakdown delineating QSOs and areas worked on each band. All-band score uses the sum of multipliers worked on all bands. Usual signed declaration. Special jubilee certificates/plaques. Logs should be posted to reach the committee before Jan 31, 1977. Every log welcomed and the NZART urges you to celebrate this jubilee year of the society. Logs go to: NZART Contest Mgr., Jock White, ZL2GX, 152 Lytton Road, Gisborne, NZ.

2-4: Canadian Amateur Radio Teletype Group (CARTG, VE3RTT), 16th annual RTTY DX "Olympics 21" Sweepstakes, 0200Z Oct. 2 to 0200Z Oct. 4. No more than 30 hours of operation is permitted. Non-operating periods can be taken at any time during the contest (indicate "off times" in the log). 30-10 meters. Countries per ARRL Countries List with KL7/KH6/VO to be considered as separate countries. Classifications are single operator (single transmitter), multioperator (one transmitter), SWL printer. Individual operators of multioperated stations may submit their logs singly instead of a group entry. Messages to include message no., time in UTC and zone (see chart p. 52 Sept. 74). All complete contacts with one's own zone count 2 points, all others will receive points listed in the zone charge. Additional contacts permitted on different bands. Each country contacted (including your own) counts as a multiplier. Each U.S. and VE district counts as a separate multiplier. Final score: Total exchange points times number of multipliers times number of continents (maximum of 6). Add 100 bonus points for each VE/VO contact on all bands. Separate logs for each band. (Note, logs and zone charts available from the CARTG for an s.a.s.e.) Logs must be received before Dec. 1. Haques, medallions, certificates. Mail entries to: Canadian Amateur Radio Teletype Group, 85 Fifehire Road, Willowdale, Ontario, Canada M2L 2G9.

3: ATV Contest, sponsored by the Tu-Boro Radio Club, on 439.25 MHz from 9 A.M. to 11 P.M. Eastern time. Any station working 3 or more Tu-Boro members will receive an

award. The following stations are currently active and are club members: WB2TCC W2LXC WA2WAK WB2KEK W2JMU WA2NXB. Further info. from and reports to: Tu-Boro Radio Club, Inc., c/o Odd Fellows Hall, 149-14 14th Avenue, Whitestone, NY 11357.

#### 7: West Coast Qualifying Run.

9-10: CD Party, phone, open to all ARRL officials and appointees, notified separately by bulletin. (Note it starts 2300Z Oct. 9 and ends 0500Z Oct. 11.) VK/ZL/Oceania Contest cw, see Oct. 2-3 listing.

10: RSGB 21/28 MHz Telephony Contest, open to all. A station, whether fixed, portable or mobile may be worked only once on each band, single op. only. Each complete QSO with a British Isles station earns 3 points. Final score is the no. of points times the total no. of British Isles prefixes worked on each band. Pertinent prefixes: G/GC/GD/GI/GM/GW 2, 3, 4, 5, 6, 8. Contacts with GB stations do not earn points or multiplier credit. Entries should be sent to D. J. Andrews, G3MXI, 18 Downsview Crescent, Uckfield, Sussex, England. They should be posted to arrive not later than December 6, 1976.

#### 13: WIAW Qualifying Run.

16-17: CD Party, cw. Scouts Jamboree-on-the-Air, the full weekend local time, or starting Friday evening, if convenient to the individual operation. Official World Scout frequencies are: Cw, 3590 7030 14070 21140 28190; phone, 3740 3940 7090 14,290 21,360 28,990. RSGB 7 MHz DX Contest, cw, from 1800Z Oct. 16 to 1800Z Oct. 17 (phone next month). Exchange report and serial (starting with 001). Non-British Isles stations score 5 points for each contact with the British Isles (those outside EU 50 Points). All may claim a bonus of 20 points for each British Isles numerical prefix worked (i.e. G/GC/GD/GI/GM/GW 2, 3, 4, 5, 6, 8). GB contacts invalid. (Non-EUs must have at least 10 QSOs to qualify for an award.) Entries must be addressed to the HF Contests Committee, c/o J. Bazley, G3HCT, Brooklands, Ullenhall, Solihull, West Midlands, England, to arrive no later than Dec. 13 for the cw contest and Dec. 27 for the phone event. WADM Contest, celebrating the anniversary of the foundation of the German Democratic Republic, from 1500Z Oct. 16 to 1500Z Oct. 17. Cw operation only, all bands from 80 through 10. Call CQ WADM. Send RST plus consecutive serial starting with 001. Work only DMs. Each station may be worked once per band. A complete QSO 3 points,

incomplete contacts or logging errors make the contact worth 1 point. Each DM district per band counts one multiplier. The final multiplier is determined by the sum of all districts worked on all bands. The special stations DM7, DM8 and DM count for a multiplier only on the band on which the station is worked for any missing district. The DM districts are the last letter of calls (A through O). Maximum multiplier of 73. Categories are single operator all band, multi-operator stations all band and SWLs. Please use separate logs for each band and include the usual summary and declaration. Mail logs within 30 days to: Radio club of the GDR, DM Contest Manager DM2ATL, DDR 1055 Berlin, P.O. Box 30, German Democratic Republic. (Applications for all DM Awards may be sent with the logs but please use separate application sheets for each award.)

17-18: Manitoba QSO Party, from 0001Z Oct. 17 through 0300Z Oct. 18, sponsored by the Amateur Radio Clubs of Manitoba. The same station may be worked on each band and mode. VE4 to VE4 and 2-meter simplex QSOs are permitted. Exchange RST, name and QTH (municipality). Each QSO counts 1 point. VE4s multiply the number of QSOs times the number of states, VE provinces and DX countries worked. All others multiply the number of QSOs times the number of Manitoba municipalities, local government districts, provincial parks and forest reserves (maximum of 134). Suggested frequencies: Ssb, 3770 3905 7195 7230 14190 14285 21245 21355 28600; cw, 3705 7105 14065 21205 28205. Awards. Mailing deadline November 12. Send log data and usual signed declaration to Doug Bowles, VE4QZ, 1104 First St., Brandon, Manitoba, Canada.

19-20: YL Anniversary Party, cw, sponsored by the Young Ladies' Radio League, from 1800Z Oct. 19 through 1800Z Oct. 20; open to all licensed women operators. YLRL members only are eligible for the cup awards. OM contacts will not count. Call CQ YL. All bands, no crossband. Only one contact with each station, regardless of bands used. Exchange call, QSO number, report and ARRL section or country. Usual signed log info. Note that phone and cw are separate, requiring separate logs (phone Nov. 9-10). All YLs within a section score one point for a YL QSO in a section, two points for a YL not within an ARRL section (i.e. DX). Contestants running 150-watts input or less on cw multiply score (contact points X sections/countries) by 1.25; ssb contestants running 30-watts PEP or less may multiply the score by the same 1.25 factor. Signed logs must be postmarked by November 22 and sent to the

YLRL Certificate Custodian, Beth Newlin, WA7FFG, 826 W. Prince Road - 06, Tucson, AZ 85705.

#### 25: WIAW Special Qualifying Run.

30-31: CQWW Contest, phone, full period UTC, 160 through 10 meters. Single op. both single band and multiband, multiop. (all band operation only) with single transmitter and multitransmitter. Exchange report plus CQ zone. A multiplier of one for each different zone on each band and a multiplier of one for each different country contacted on each band. You may work your own country and zone for multiplier credit. CQ Zone Map, ARRL Countries List, WAE country list and IARU WAC boundaries are standards. Contacts between stations on different continents are worth 3 points, between stations on the same continent but in different countries one point. Note: For North Americans only contacts between stations within the N.A. boundaries count two points. Contacts between stations in the same country are permitted for zone or country multiplier credit but have zero point value. Final score is the result of multiplying total QSO points by the sum of your zone and country multiplier. Single ops. must show a minimum of 12 hours of operation to qualify for an award, multiops. a minimum of 24 hours. A single band log is eligible for a single band award only. Awards. Usual log format and a summary with all info. and signed declaration. Logs, summary and zone maps available from CQ, send a large s.a.s.e. with sufficient postage. Postmark entries no later than Dec. 1 for the phone section and Jan. 15, 1977, for the cw section (cw event scheduled for Nov. 27-28). Logs go to: CQWW Contest Committee, 14 Vanderventer Ave., Port Washington, LI, NY 11050.

### NOVEMBER

3: West Coast Qualifying Run.

6: Frequency Measuring Test.

6-7: Sweepstakes cw, RSGB 7 MHz Contest phone, Toronto Ontario Trilliums (YLs) contest.

9-10: YL/AP phone.

11: WIAW Qualifying Run.

13-14: WAE RTTY.

14: OK DX Contest.

20-21: Sweepstakes phone.

27-28: CQWW, cw.

Dec. 4-5: 160-Meter Contest.

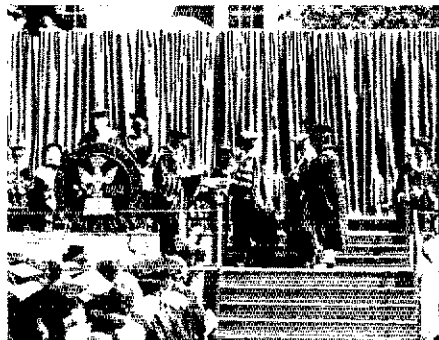
Dec. 11-12: 10-Meter Contest.

Dec. 31: Straight Key Night.

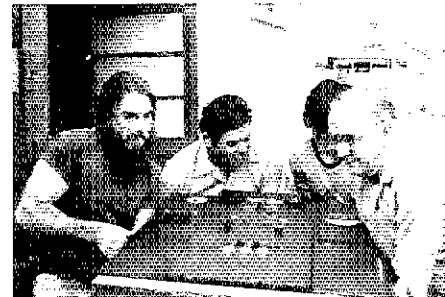
## Strays



New England Division Director John C. Sullivan, W1HHR, presents the Cover Plaque award to Carl F. Buhner, W1GNP, of Framingham for his article in *QST* for January, 1976.



QST congratulates: William J. Halligan, Sr., W9AC/W4AK, on receipt of an honorary Doctor of Science at Tufts University, Medford, Massachusetts. Founder and former president of Hallicrafters Radio, he was acclaimed as a "devoted and enthusiastic radio amateur," and a "credit to the field. . . ." In his early years he was a coast vessel radio operator and is now retired.



From the estate of Col. Julian E. Raymond, WA2BGU, a Hallicrafters SCR-299 HT-4 was donated to the American Red Cross, Monmouth County (New Jersey) chapter. The local emporium, Atkinson & Smith, made a donation for the equipment to the Garden State Amateur Radio Association of which Raymond was a former president. Loading the 750-pound piece of gear are (left to right): WA2NOG, Leon Burnett, Tom Burnett and W2LNB. (W2QND photo)

# Station Activities

SCM 5 AREC 5 ORS 5 OVS 5 SEC 5 OBS 5 TCC 5 OO 5 NTS 5 WAC 5

CP 5 A-1 OPR 5 EC 5 DXCC 5 CLUBS 5 RM 5 OPS 5 RCC 5 PAM 5 WAS

## CANADIAN DIVISION

**ALBERTA:** Acting SCM, Sydney T. Jones, VE6MJ — SEC: VE6XC. The Red Deer Picnic was a big success and enabled those who attended to discuss the many problems concerning amateur radio in view of the proposed amendments to our regulations. Most of those I have contacted seem in favor of the proposed Novice type certificate, but are very much opposed to the other type with no code requirements. Express your view to the DOC as soon as possible. VE7's EO YS and SHI were visitors to Edmonton during June. VE7XL is back on the air after an absence of several years. Traffic: VE6AMM 29, VE6YW 6, VE6AAC 2, VE6AFW 2.

**BRITISH COLUMBIA:** SCM, H. E. Savage, VE7FB — You're SCM is somewhere in BC for 60 days and has visited RM VE7CDE. Am writing this in our trailer parked in VE7AED's yard. Many 2-metre contacts. BC CWCA chapter's first dinner and business meeting elected VE7KM, chmn., VE7FB, secy. BCEN has applied to join NTS. We'd like to be counted as an active CW Net and be an active part of the NTS.

**MANITOBA:** SCM, Steve Fink, VE4FQ — RM: VE4JP. PAM: VE4JP. The summer doldrums have set in again, but Field Day was quite successful, with reports received from VE4BB/4 VE4I4/4 VE4W/4 and VE4OW/4. VE4ABE is new to MTN while VE4s HX VE4Y and UO are newcomers to MFPN. VE4JUL has a new 3-up 50 ft. to 200 ft. when he is not handling traffic. If you art, to call work, DX, make sure you have a supply of envelopes at the VE4 QSL Bureau. VE4OX, 647 Academy Rd., Winnipeg in charge. Even with lower summer activity, traffic totals are up. VE4CR reports a 41% increase from last month. Reports are always welcomed for this column. Traffic: VE4OW 65, VE4JU 52, VE4I4 43, VE4AAW 31, VE4QU 15, VE4E 14, VE4JP 8, VE4HR 7, VE4FQ 6, VE4GB 6, VE4LN 5, VE4M 5, VE4CR 4, VE4NE 4, VE4JW 2, VE4LB 2, VE4QJ 2, VE4FK 1, VE4RV 1, VE4XN 1.

**MARITIME & NFLD:** SCM, Aaron D. Solomon, VE1OC — Asst. SCM: Maurice Gladden, VO1GRI and APN Mgr.: VE1AAO. Nfld. Traffic Net Mgr: VO1GW. It is with deep regret to report VE1ATL & VE1AQN are Silent Keys. Recent hospitalization include VE1IR VE1RD VE1YA. Many reported a very successful Field Day with bonus points for "natural power and Oscar Satellite contact giving added interest and incentive this year. VE1WC operating VE1AJ made many contacts. VE1AIF continues to supply Wx info to C.B.C. The Wx Net, 3770 kHz at 1000Z growing steadily. VE1NF and XYL recently celebrated 55th Wedding Anniversary. VE1UB VE1ABD and VE1DD in Montreal, VE1APP in Vancouver and VE1LZ in Bangor, NS VHF Assn. held successful picnic in Truro, NS Queens Co. ARC running classes for new amateurs and Moncton Area ARC class ready to graduate. Lions in the Sky Certificate of Appreciation awarded to VE1AAO VE1BDT VE1BFV VE1RO. New VO amateurs: VO1AL VO1AS VO1BK VO1CA VO1CA VO1CJ VO1D VO1E VO1FL VO1GL VO1LL and YL VO1CO VO1IR RCP and Forest Fire Patrol thank VO1DR VO1FN VO1FR VO1FX VO1LR VO1MB VE2AS/VO1 for assistance during a fire. VO1MO reports temp. inversion opening on 6 meters to W-Land. VO1KP operating MM on Labrador run. APN sections 30, QNI 108/19, QTC 72. Traffic: VE1AAO 21, VE1AQB 10, VE1AB 59, VE1RO 41, VE1AQU 37, VE1YO 28, VE1OC 21, VE1APY/SU 18, VE1ST 10.

**ONTARIO:** SCM, Larry Thivierge, VE3GT — I am sure you will all join with me, your newly elected SCM, and VE3G in expressing our sincere thanks to VE3DV for the time and effort he exhausted on our behalf during the past six years as SCM. Good luck and best wishes from all. Shep, I would be most grateful to the Ont. ARCs if they would add my name to their bulletin address lists. St. Catharines ARC treated a group of 20 people and volunteers to a special day and lunch at Niagara Falls. VE3CDK earned his Bicentennial WAS, 40 worm sticker and other awards before heading for VE8 and KL-7-Land. Don't forget the Boy Scouts 19th Jamboree on the air will be held on the week end of Oct. 16th and 17th. This is South Communications Year. Offer your services to your local group and help make it a success. Repeater VE3TS going live with the help of VE3s OZ AIG GD AA5 and VE2SD. VE3AYZ stepping down as PAM for the NWOPN after a job well done. RI and active amateur VE3ACE transferred to Ottawa from the So. VE3AXL has a new tower, VE3HTM hoisting a new Quad. VE3ACL the new EG for VE3ZY on those long trips with you and GLY as assistants. VE3JA off to Lunenburg with WF4WBC for the annual Watly Byram Airstream International Rally which is attended by many Canadians. VE3GFN having a ball on the DX bands with new tribander. G3YBR was a visitor at recent Burlington ARC meeting. Grimsby ARC welcomes both amateurs ops to their meetings. AFGT recent visitor in the area. SARG giving tribute to VE3BMG for his untiring work and VE3BUL received the club's technical achievement award. Tip for next years FD — don't forget the 50 point bonus for sending the SCM a message indicating the number of operators and AREC members. Hope all enjoyed the summer months especially on those long trips with your new call, letter license plates. Traffic: (Net) VE3GO 231, VE3SB 164, VE3FQZ 147, VE3JG 146, VE3FRG 124, VE3DV 97, VE3GFN 96, VE3GT 95, VE3DPO 94, VE3DZK 87, VE3CDK 78, VE3EKC 57, VE3DVE 54, VE3GCE 47, VE3AAE 44, VE3EWD 43, VE3ATR 38, VE3HGJ 30, VE3EHL 17, WABETX/VE3E, VE3DH 8, VE3FH 7, VE3GNW 7 (May) VE3BZ 6, VE3DVE 60, VE3BZR 20, VE3EHL 12, VE3FHQ 8.

**SASKATCHEWAN:** SCM, P. A. Crosthwaite, VE5RP — Our Sask. Amateurs were very active during the series of summer storms handling emergency traffic for government services such as Sask. and Sask. Power. VE5XC during the winter of '75-76 sent

weather information to Bismarck, ND via the NTS. Since then there has been more interest for a Weather Net. VE5XC and VE5LO will be heading up a weather net this fall and would therefore appreciate your help. All the Prince Albert Amateurs should be praised for their fine Hamfest, an excellent job well done. Traffic: VE5BO 84, VE5ET 42, VE5LO 55, VE5SZ 4, VE5AL 2, VE5E 2, VE5CB 2, VE5CL 2, VE5CQ 2, VE5CU 2, VE5CX 2, VE5DN 2, VE5DR 2, VE5EDF 2, VE5EH 2, VE5EMO 2, VE5EO 2, VE5GG 2, VE5GN 2, VE5HE 2, VE5HO 2, VE5IG 2, VE5JM 2, VE5JS 2, VE5KG 2, VE5LJ 2, VE5LN 2, VE5LQ 2, VE5MF 2, VE5OQ 2, VE5OG 2, VE5OJ 2, VE5ON 2, VE5OR 2, VE5PD 2, VE5QL 2, VE5QO 2, VE5RB 2, VE5RQ 2, VE5RX 2, VE5TG 2, VE5TN 2, VE5TW 2, VE5UG 2, VE5UN 2, VE5UX 2, VE5VM 2, VE5XB 2, VE5XG 2, VE5XL 2, VE5XU 2, VE5XW 2, VE5YC 2, VE5YD 2, VE5YE 2, VE5YK 2, VE5YG 2, VE5YZ 2, VE5WM 1.

## ATLANTIC DIVISION

**DELAWARE:** SCM, Roger E. Cole, W3DKX — SEC: K3KAJ. PAM: W3BDUM. RM: W3EEB. FSHR: K3YHR 52, WA3WPY 44. The DARC is running Novice classes at George Road Middle School Blount Rd. & Basin Rd. New Castle on Thur. at 7:30 PM in the Wood Shop with W3CJ in charge. YLs VE3VIT and WA3FK are adding new DX. The Army MARKS nets. DE clubs are reporting "Highest Ever" FD scores resulting from excellent propagation and the absence of "Murphy". We understand the DARC got a head start on the 4th by popping balloons. The First State Club and DE Repeater Assn. assisted in communications for the final "Powder Puff Derby" which terminated at the Greater Wilmington Airport. DTN QNI 361, QTC 52; DEPQ QNI 63, QTC 4. Traffic: WA3WPY 59, W3EEB 44, W3DKX 40, WA3DUM 33, AD3YHR 26, WA3UUN 13, WA3WIY 12, W3WD 7.

**EASTERN PENNSYLVANIA:** SCM, George S. Van Dyke, Jr., W3HK — SEC: W3FBF. PAMS: WA3PZO W3AVJ. RMS: K3MVO. WA3OGM. WA3PHQ. WA3FWW/3 Net reports: EPA QNI 261, QTC 116; PFN QNI 388, QTC 353; EPA (AREC) QNI 22. BPL: W3CUL K3NSN W3VR WA3ATQ WA3YJG. PSHR: WA3QOZ WA3YJG K3OIO WA3OGM WA3UKZ WA3CFU. OBS reports: WA3QOZ WA3SXU WA3AVJ WA3ID W3CL W3ZRQ. OVS reports: WA3ZRE WA3BQJ W3GQA WA3NDQ WA3BSV. OO reports: K3NSN K3OIO. W3CUL reports: rain getting to her QTH instead of the farms. WA3OGM reports nets struggling thru summer slump. W3WRE reports one more key for her collection. K3MVO says keep smiling, wonder what he is up to? W3BNR on the road again. WA3YMV reports greatest satisfaction is in delivery of traffic. W3ID has problems trying to set up trap for outlets on the final "Powder Puff Derby" which W3KFK WA3NQX. Novice and General classes start at North Penn Evening School, see W3ZGG for details. New officers MI Airy VHF: K3MXXM, pres.; W3HMU, vice-pres.; WA3NGK, corr. secy.; WA3NFV, rec. secy.; K3GAS treas.; WA3AXV K3IGK K3JZZ W3MGT W3YJG, dir. of Anthracite Repeater Assn. got a nice newspaper writeup. Rose Repeater Newspaper looks FB. The Tamaqua Area Sideband ARA ran an operational net during the Bicentennial Wagon Trains stay in Tamaqua. Special QSL on way to those who helped. Stations were WA3BJL K3NYX W3VA W3LDL K3SHG K3HXS W3ZRQ. FD messages were sent from Ocean ARC, Seaboard ARC, Central ARC, ARA, Lehigh Val ARC, Abington ARC & Tloga Co ARC, RF Hill Radio Club. Just rec'd word that W3EML Joined Silent Keys. Bill will surely be missed, he was an anchor cw man on all tlc nets. WA3SXU sending WJAW bulletins 3610 kHz, 2130Z and 2315Z. He would like reports and will transmit any information requested (within reason!) WA3YHR reports getting started in tlc. GL OM. Band condx have been bad but K3GJL got AROUND it this way, checked into net sent msg to WA3YJG, relayed to WA8DKQ, relayed to WA2SYR WNY relayed to WA2DAS ENY finally sent to WA2YWQ for delivery. Airling 70 miles. No distance about a thousand but it got there in 1-1/2 hours! Northeast Phila ARC reports plenty of action on FD, building a 450 MHz repeater, new novice classes will start this fall, and WN3CNG finally got his Novice ticket. Also they received good publicity over KYW-TV of their FD event! Hope you all had a good summer and attended at the conventions. Traffic: W3YJG 446, WA3ATQ 331, WA3QOZ 248, WA3SXU 137, WA3THT 125, WA3OGM 88, K3OIO 70, WA3UKZ 60, W3AVJ 58, W3WRE 54, W3ITX 50, K3MVO 48, W3ATQ 40, WA3CFU/3 31, W3BNR 27, WA3YMV 26, K4GJL 24, WA3EAC 23, W3ID 20, WA3YV 19, WA3MQP 17, W3CL 14, K3RVC 6, WA3THT 4, K3HXS 2, W3ZRQ 2, W3YJG 1, WA3BIQ 1, WA3BSV 1, W3BUR W3EU 1, W3GMK 1, W3GOA 1, W3HK 1, W3KCM 1, AA3QLG 1, WA3VDQ 1, WA3YHR 1. (May) WA3CFU 26. (Apr.) WA3CFU 23, WA3SXU 13.

**MARYLAND — DISTRICT OF COLUMBIA:** SCM, Karl Madow, W3FA. MDVA/W3FA 7 and 10 P.M. local 3643 kHz daily. MFPN/W3MWD, 6 P.M. local 3920 kHz MWF and 1 P.M. 55. MDCTN/W3EOP, 6 P.M. local 3920 kHz TTSS. WR PON/W3DFW, 5:15 P.M. local 3905 kHz except Sun. WA3ZEE moved to MS last of June. W3BHE says W3ZEE and W3BZZ are an active OM/XYL team in Cumberland. W3BHT makes an FB EC report for St. Marys, and all 7 stations successfully went to emergency power during a drill. That's better than most of us. Congrats on the good clipping of FD activities. Many FD reports received from an active section with a good turn out of AREC members. W3BALK plays the band and he an ex-3. W3EOV finally got off on that VO, VE1 and VE2 trip. WA3KCY experiences tremendous 15-meter openings. W3FCI enjoyed FD this year. W3CQD says her wintage experience paid off at the YLRL convention in Houston. W3JPT has 40 states on 6 meters with 17 watts of SSB. WA3SYJ looking toward that summer vacation. Congrats to W3CI Advanced and W3E1OB General upgraders. And new ops W3N3CLG Frederick.



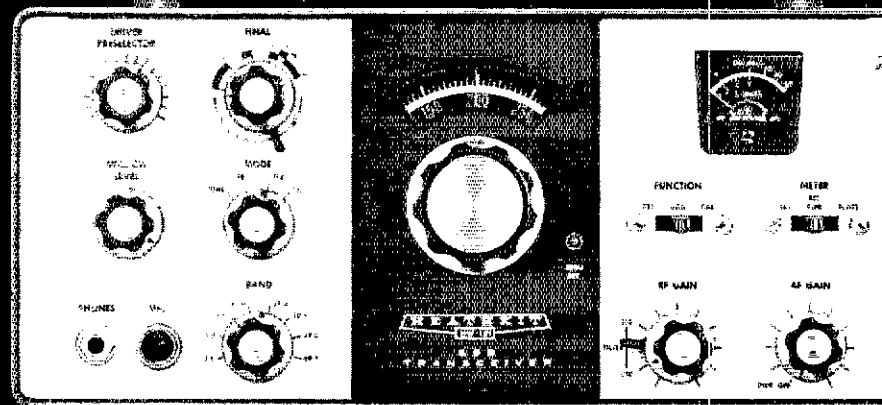
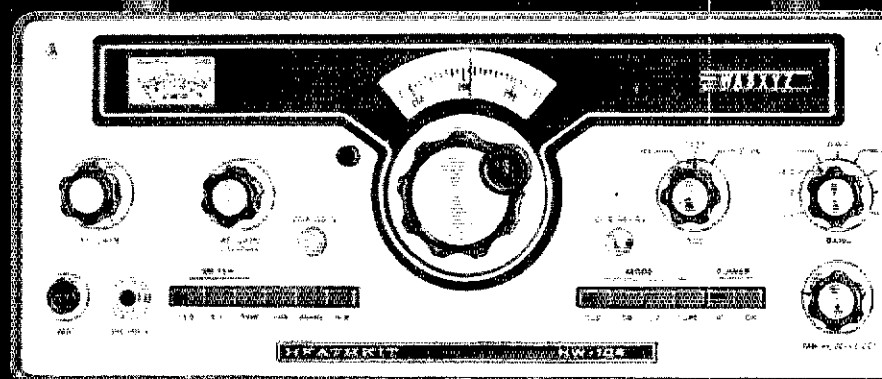
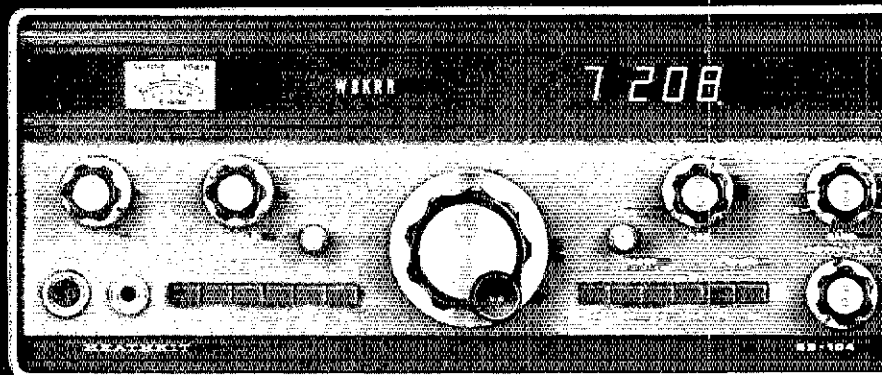
You should purchase your new Yaesu gear from Amateur Electronic Supply because our Service Department is one of the Finest if not the Best in the business. This is Very Important because the "Selling Yaesu Dealer" is responsible for the Warranty.

- FT-101E 160-10m Xcvr w/processor.. 749.00
- FT-101EE As above, but no processor . 659.00
- FT-101EX AC only, no mic, etc..... 599.00
- FV-101B Remote VFO ..... 99.00
- SP-101B External speaker..... 19.00
- SP-101PB Speaker/patch ..... 59.00
- FA-9 Fan ..... 19.00
- MMB-1 Mobile mount ..... 19.00
- RFP-102 RF speech processor ..... 89.00
- XF-30B AM filter ..... 45.00
- Labor - install AM filter ..... 12.00
- XF-30C CW filter, 600 Hz ..... 45.00
- DC-1 DC-DE converter for FT-101EX ..... 57.00
- Optional crystals..... each 5.00
- FR-101S 160-2m solid-state SW Rcvr . 489.00
- FR-101 As above, but digital readout. 629.00
- FC-6 6m converter ..... 30.00
- FC-2 2m converter ..... 40.00
- FM-1 FM detector ..... 20.00
- Crystals For Aux/SW ..... each 5.00
- XF-30B AM filter ..... 45.00
- XF-30C CW filter, 600 Hz ..... 45.00
- XF-30D FM filter ..... 49.00
- SP-101B Speaker ..... 19.00
- SP-101PB Speaker/patch ..... 59.00
- FL-101 160-10m solid-state Xmtr.... 545.00
- RFP-101 RF speech processor ..... 89.00
- FT-401B 80-10m tube Xcvr (AC only) 599.00
- YD-844 Base station mic ..... 29.00
- YD-845 Hand microphone ..... 16.00
- FV-401 Remote VFO ..... 99.00
- SP-401B Speaker ..... 19.00
- SP-401PB Speaker/patch ..... 59.00
- XF-31C CW Filter, 600 Hz ..... 45.00
- FL-2100B 80-10m linear, 1200w PEP. 399.00
- FTV-650B 6m transverter ..... 199.00
- FTV-250 2m transverter ..... 229.00
- YC-355D 200 MHz freq counter ..... 229.00
- YC-601 Digital readout ..... 179.00
- YO-100 Monitor scope ..... 199.00
- YP-150 Dummy load/wattmeter ..... 74.00
- FT-224 24 ch 2m FM Xcvr ..... 249.00
- FT-2 Auto 8 ch 2m FM Xcvr w/scan .. 379.00
- MMB-2 Mobile mtg bkt for FT-2 Auto 19.00
- 200R 10w synthesized 2m FM Xcvr ... 449.00
- MMB-3 Mobile mtg bkt for 200R... 19.00
- FT-620B 6m SSB/CW/AM Xcvr..... 449.00
- XF-90B AM Filter ..... 45.00
- PB-1424 Marker Unit ..... 17.00
- FT-221 2m FM/SSB/CW/AM Xcvr ..... 679.00
- MMB-4 Mobile mt for 620, 221 ... 19.00



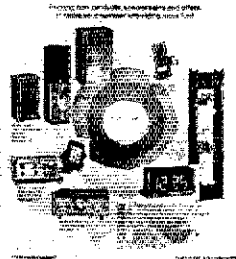
**AMATEUR ELECTRONIC SUPPLY**  
 4828 West Fond du Lac Avenue  
 Milwaukee, Wisconsin 53216  
 Phone (414) 442-4200  
 Branch Stores in:  
 Cleveland, Ohio & Orlando, Florida

# Heathkit Transceiver



# FREE

## HEATHKIT



Read about these and all other outstanding Heathkit Amateur Radio products in the NEW Heathkit Catalog. Yours FREE! Send coupon today!

Heath Company, Dept. 9-21  
Benton Harbor, Michigan 4902



# ...YOUR BEST CHOICE

THE SB-104. Acclaimed as the world's finest Amateur Transceiver. For features and operating convenience, for specifications and performance, you simply won't find a better transceiver than the SB-104. Completely solid-state, totally broadbanded, TRUE digital readout with resolution 100 Hz! Instant QSY - choose the band, dial the frequency, select your mode and go - no more preselector, load or tune controls. The transmitter delivers 100 watts output and, for QRP'ers, a front panel switch selects 1 watt out. The signal is clean and strong, with harmonic and spurious radiation below 2  $\mu$ V, third order distortion down 30 dB and unwanted

sideband suppression down 55 dB. Receiver sensitivity is 1  $\mu$ V for 10 dB S+N/N; selectivity is 2.1 kHz at 8 dB down. There's a 15 MHz WWV position on the bandswitch; 30 kHz per revolution spinner knob; tune button for loading linears; ALC/relative power/"S" meter and more. The SB-104 operates directly from a 12-volt electrical system; for fixed station operation, use the HP-1144 power supply.

KIT SB-104 .....\$669.95

Fixed Station Power Supply.

KIT HP-1144 .....\$89.95

Speaker and cabinet.

KIT SB-604 .....\$29.95

THE HW-104. Broadbanded design for instant QSY at a new low price! Has the same outstanding features and specifications of the SW-104 above, but with calibrated dial and 3.5 MHz to 29.0 MHz amateur band frequency coverage. A built-in 100 kHz and 25 kHz calibrator assures dial accuracy to within 2 kHz, the dial is calibrated in 5 kHz increments with 15 kHz per knob revolution. The VFO uses the same basic circuitry as the SB-104 and

provides extremely stable operation with less than 100 Hz/hr drift after warm-up. Operates from a 12-volt electrical system, use the HP-1144 power supply for fixed stations.

KIT HW-104 .....\$489.95

Speaker and cabinet.

KIT HS-1661 .....\$19.95

KIT HWA-104-1, 10-meter accessory for coverage to 29.7 MHz. ....\$16.95

THE HW-101. A truly exceptional Amateur radio value. Has the features you NEED for operating ease, convenience and versatility. 180 watts input PEP, 170 watts input CW gives you the power you need for first-class operation. Receiver sensitivity is 0.35  $\mu$ V for 10 dB S+N/N (SSB) and selectivity is 2.1 kHz minimum at 6 dB down. Has a stable FET VFO; PTT and VOX with anti-trip; triple action level control. The smooth dial drive has a 36-1 ratio and a built-in 100 kHz crystal calibrator lets you accurately calibrate the dial at 100 kHz intervals. A four-function front panel meter

shows signal strength, ALC transmit voltage, relative power output or final cathode current. Has full controls, inputs and outputs, full 80-10 meter amateur band coverage. Operates fixed station or mobile with power supplies below.

KIT HW-101 .....\$339.95

Fixed Station Power Supply.

KIT HP-23B .....\$57.95

Mobile Power Supply.

KIT HP-13B .....\$84.95

400 Hz CW Crystal Filter.

SBA-301-2 .....\$29.95

Prices and Specifications subject to change without notice.

Heath Company, Dept. 9-21  
Benton Harbor, Michigan 49022

Please send my FREE Heathkit Catalog. I am not on your mailing list.

HEATH

Schlumberger

Name \_\_\_\_\_

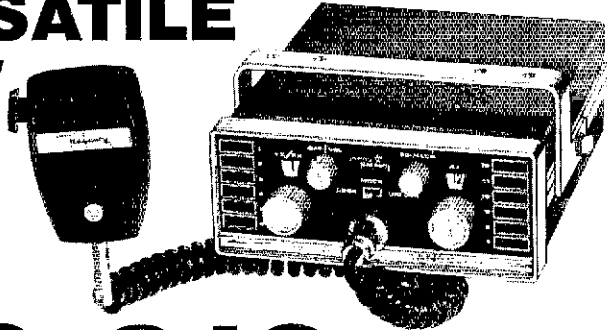
Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_



**Regency**  
the first name in solid state

**INTRODUCES THE  
VERSATILE  
NEW**



**HR-312**

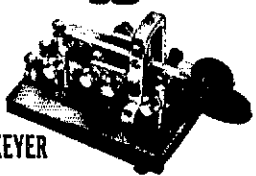
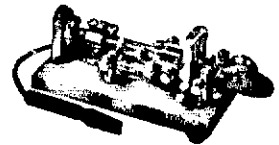
- More Channels...at the flip of a switch  
Unlock the unique mode switch and 12 channels become 144
- More Sensitivity, Less Interference  
.25  $\mu$ V Sensitivity plus 75 db adjacent channel selectivity and 70 db image rejection
- More Power Out  
35 watts nominal with a minimum of 30 watts across the band

... for a lot less  
**\$269<sup>00</sup>**  
Amateur Net

**Regency** ELECTRONICS, INC. 7707 Records Street  
Indianapolis, Indiana 46226

ENJOY EASY, RESTFUL KEYING

With **VIBROPLEX**



VIBRO-KEYER

Sending becomes fun instead of work with the SEMI-AUTOMATIC Vibroplex. It actually does all the arm-firing nerve wrecking work for you. Adjustable to any desired speed. Standard models have polished Chromium top parts and gray base. Del.uxe models also include Chromium Base and red finger and thumb pieces. Five models to choose from. Priced at \$31.50 to \$66. for the deluxe "Original" Vibroplex.

FREE Folder

Works perfectly with any Electronic Transmitting Unit. Weighs 2 1/2 lbs., with a base 3 1/2" by 4 1/2". Has Vibroplex's finely polished parts, red knob and finger and thumb pieces. Standard model \$33; Del.uxe model includes Chromium Plated Base at only \$43.75.

Order today at your dealers or direct

**THE VIBROPLEX CO., INC.** 833 Broadway New York, N. Y. 10003

and WN3CLO in Edgewater. WB2HLP moves to Cambridge, welcome. Add W3IGN Edgewater. EC WA3ZCE getting Prince Georges prepared for emergencies with a new net planned. WA3UYF is dabbling with color bar generators. DCU reportees are WA3NSA AA33H WA3KCV WA3JGZ WA3ACBZY/3. AA3YKK is awaiting that MARS ticket. The Chesapeake Rptr Assn. participated in the Lions regatta with WA3ZLM WA3JGC, K3UJY W3ENL W3GMG K3SSX K3NXR WA3V7K K3GUX W3TF1 K3DRV WA3UMC and W3LDD actives. WA3JSJ braves the QRN on 160 meters. WB3EY is an active cw liaison man. AC8BZV leads the brass band. WA3I1VM/3 is a multi-mode man. WA3ZAS is back to his Tue. NCS jobs, but after that FL vacation. No more bones for a while for AA3QIA the archeologist. W3FZV did an 92/15 OK job in the PVRC reunion. WA3PRW is planning ahead with 10 meters hot. WA3EOP is on the program for the Atlantic Div Convention. WB3BUA is a new OPS. With the nets: Sessions/Tto/ani Avg. MDD 57/141/7.4 with top brass WA3WPV. MDCT 17/35/16.1 with top honors to WA3ZEE AA3YKK WA3PRW and W3FA. MEPN 22/57/22.1 with W3ADQ WB3AUK toppers and WA3PRW WA3ZEE others. W3OPK now residing in WPA. Traffic: (June) AC8BZV 105, W3EY 82, AA3JSJ 88, W3FZV 78, AA3YKK 76, WA3EOP 75, WA3UYF 47, WA1VM/3 40, AA3QIA 30, WB3BYT 16, W3EOP 13, WA3PRW 10, WA3ZAS 6, WA3JSJ 2, W3BHE 1. (May) WB3AJQ 28, WA3ZAS 10, W3FC1 1.

**WESTERN NEW YORK:** SCM, Joseph M. Hood, K2YAH - Asst. SCM: W. D. Thompson, W2MTA. SEC: WB2EDT. Hope everyone enjoyed Field Day. Had an enjoyable Field Day working 40 cw with W2MPM/2 and the Ban Jlt-dahs. Received FD messages from W2ZJ/2 W2AE/2 W2LCA/2 K2IQ/2 W2PE/2 W2FR/2 W2RR/2 and W2MPM/2. WA2YA1 reports the new Western District Net meets at 2130 local on Mon., Wed. and Fri. on the 04/64 repeater. The net is primarily for traffic handling and liaison to NYS and plans to expand to week days soon and to daily by year's end. New GRAM officers for the '76-'77 season are: WB2KYQ, pres.; WAZDHB, vice-pres.; WB2Y2L, secy.; K2ZUT, treas. Congratulations to WAZ2EJ on his new position. WAZ2JF got that tribander up. WR2ADF in Oswego now has 200-ft. higher antenna and a new 6db gain colinear and reports are that coverage is much improved. K2AOU and WAZRYT have 8080 microcomputer systems going and are interested in hearing from other amateurs who ring in this area. RAGS really out did themselves with a feature article on amateur radio in the Empire magazine section of the Sun, Herald American. The excellent article was written by WA2PUU who writes a weekly column on amateur radio for the same paper. Both fantastic PR for ham radio! Syracuse VHF club officers for next year: WA2DGC, pres.; WA2AJQ, vice-pres.; W2PJQ, secy.; W2LUKA, treas.; W2RHQ, programs. New calls from the RAGS area include WB2ASH WN2FOF and WN2FDY WA2OVN WA2PQG W2GLN WN2DSV WB2VFC are awaiting their Advanced Class licenses. WN2EOZ awaiting his General. Regret to report WB2OCN and WA2PA are silent keys. Auburn ARA officers for '76-'77 are: WA2FSJ, pres.; WB2IMJ, vice-pres.; WB2NGN, secy.; WA2VCM, treas. WA2SFT and WN2AEC held an amateur radio demonstration at the Lacawanna Bicentennial Celebration for the South Town ARS. RRA officers for next year are: WA2BQA, chmn.; K2EAW, vice-pres.; WA2NRY, secy.; W2JZK, pres.; W2JHF, treas. W2JHF of Rochester has voted to become an affiliate of RRA. Finally, yours truly will be operating /1 from Maine during the third week of Aug. Hope to work WNY ops on the low end of 40 cw. Traffic: WA2UYK 281, W2RUF 280, WA2SET 176, W2MTA 155, W2QE 135, W2PZL 53, WB2OLK 42, W2RQF 37, WA2TPC 37, W2FZ 35, WA2ZJQ 19, W2ZJK 17, WB2VND 15, WA2DRC 14, K2OFV 13, WA2AIV 9.

**WESTERN PENNSYLVANIA:** SCM, Donald J. Myslewski, K3CHD - SEC: W3ZUH. Asst. SECs: K3SMB WA3LW. RM: K3SMB. RM: W2KA1/3 W3NEM W3OS W3KUN.

Net	kHz	Time/Days
WPA CW Traffic	3588.0	7:00 PM Dy
PA Phone Net	3960.0	5:00 PM M-F
WPA RACES	3990.5	9:00 AM Su

New appointments: K3SMB as PAM (Phone Activities Manager); K3RKK and WN3AJQ as PRA (Public Relations Assistants). It is with deep regret to announce the Silent Key of W3MED. Welcome to K8MYU who will be residing in the WPA Section. The annual WPA picnic will be held at Cook's Forest on Sun, Sept. 12. If you hold an appointment or are interested in obtaining one in the WPA Section, and wish to attend the picnic, contact W2KA1/3 or myself for details. W3KQD finished a Novice class in which seven passed the code exam and resulted in a new Novice WN3CIM. K3IVE W3GUL and WA3ZBJ upgraded to Advance Class. K3MIY operated exhibit station W3MTR/3 for the WPA Laurel Festival. WA3OVN W3R51 WA3TV3 WB3CML WA3UDZ WA3JMP and K3YIR provided communications thru the WR3AFZ repeater for the Annual Boat Race on the Youghiogheny River. Oil City is installing a repeater on 147.81/21 MHz - contact W3DTW for details. K3OYB is the proud owner of an HW-2021 and K3EXU acquired a T5-700A. K3LVO makes phone calls to his XYL using auto-patch from his company in England. W3EVI is the finishing touches to the WR3AFZ 440 MHz repeater. The Etna Radio Club has changed its name to The North Hills ARC of Pgh. WA3YDP WA3LUM AA3QER and K3CHD will operate on 10 meters fm at 29.600 MHz simplex. The WPA CW Traffic Net report for June will appear in next month's column. -HF credits: WA3VBM 46 and WA3SWF 44. Traffic: WA3VBM 302, K3CHD 54, W3EGJ 49, K3MIY 30, WA3ZAO 30, W3KUN 26, W3SN 22, K3HCT 21, K3SMB 20, W3SAV 19, WA3SWF 16, WA3AHP 15, K3RKH 12, W3JUT 9, W3YD 8, K3VQV 4, WA3MDY 4, W3KQD 4, W3IDO 2, K3OYB 2.

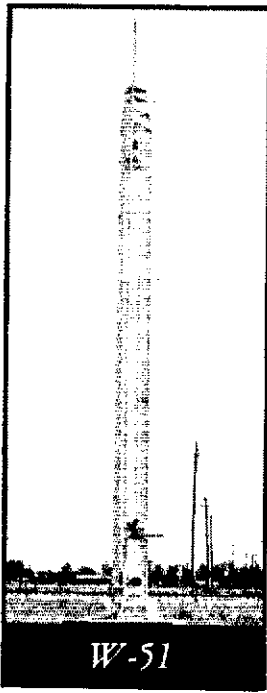
**CENTRAL DIVISION**

**ILLINOIS:** SCM, Edmond A. Metzger, W9PRN - Asst. SCM: Harry Studer, W9RYU. SEC: W9AES, RM: K9ZTV, PAM: WA9KFK. Cook County EC: W9HPG.

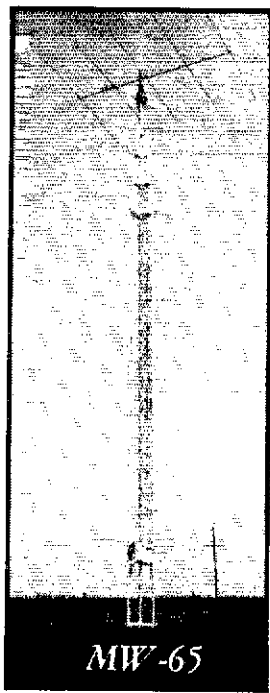
Net - Freq.	Time(Z)/Days	Sess.	QNI	QTC
ILLN - 3690	2330/3000 Dy	60	462	211
ILL Phone - 3915	2145 Dy	-	426	246
NCPN - 3915	1200 M-S	26	714	134
NCPN - 3915	1700 M-S	26	617	9
ISSB		32	232	246

W7PRW was a guest of W9-Land working two meter mobile. New officers of the Chicago Suburban Radio Assn. are WA9VCU WB9LEU WB9LNO W9PBJ WB9DRS and W9KWA. W9DYP is directing their

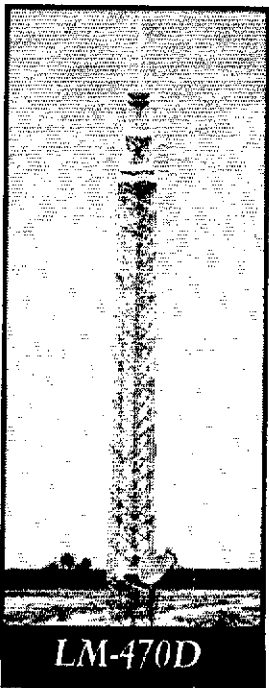
**NOW.**  
*Top-of-the-Line*  
**Tri-Ex Towers**  
*for HAM operators*  
*at basic prices!*



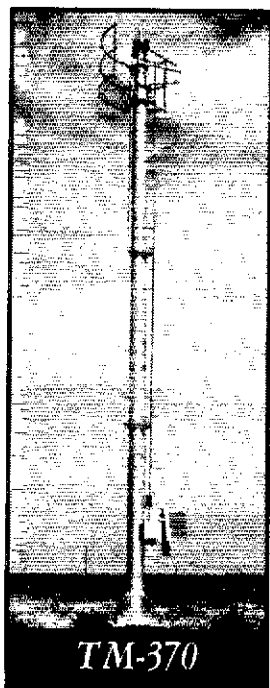
**W-51**



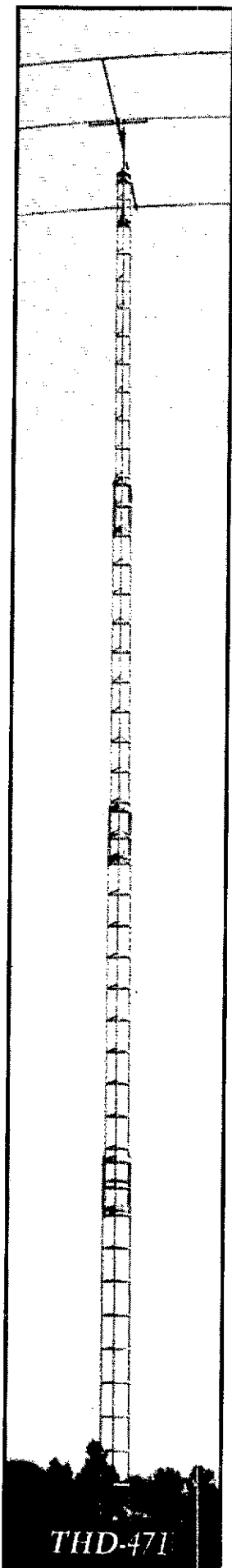
**MW-65**



**LM-470D**



**TM-370**



**THD-471**

Now you can afford the best! Free-standing or guyed, Tri-Ex Towers stress quality. All towers are hot dipped galvanized *after* fabrication for longer life. Each series is specifically engineered to HAM operator requirements.

**W Series**

An aerodynamic tower designed to hold 9 square feet in a 50 mph wind. Six models at different heights.

**MW Series**

Self-supporting when attached at first section — will hold normal Tri-Band beam. Six models.

**LM Series**

A 'W' brace motorized tower. Holds large antenna loads up to 70 feet high. Super buy.

**TM Series**

Features tubular construction for really big antenna loads. Up to 100 feet. Free-standing, with motors to raise and lower.

**THD Series**

Very popular. Low Cost. Holds Tri-Band antennas. Eight models — all support 7 square feet of antenna at full height in 70 mph winds. Guyed.

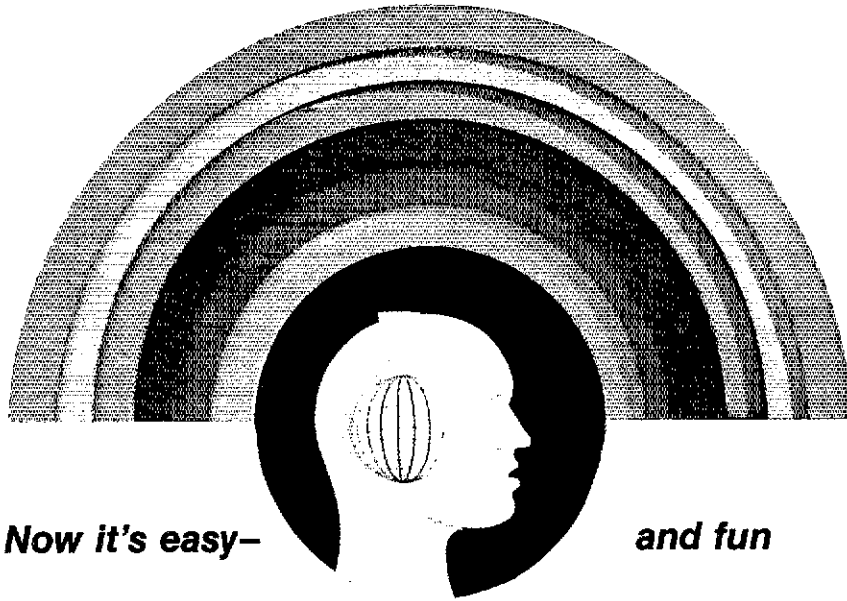
Start with Top-of-the-Line Tri-Ex Towers. At basic prices. Write today, for your best buy.



**TOWER CORPORATION**

7182 Rasmussen Ave.  
 Visalia, Calif. 93277

# TUNE IN THE WORLD WITH HAM RADIO



*Now it's easy—*

*and fun*

Here at last is everything a beginner needs to know to become a radio amateur—a ham.

It's all in one complete package . . .

- a lively, copiously-illustrated manual
- a Morse code cassette (with an introduction by noted TV star Jean Shepherd)
- an official U.S. call area color wall map.

Everything is covered to fulfill the novice license requirements, assemble an amateur station and get on the air. Best of all it was produced by hams at ARRL, the people who know amateur radio best. **The whole package is just \$7.00**—at your favorite electronics dealer or from ARRL headquarters.

Order now from:  
**THE AMERICAN RADIO RELAY LEAGUE**  
Newington, CT 06111



NAME \_\_\_\_\_  
STREET \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

Check

Money Order

theory classes. WB9NOZ is actively working cw mobile. The annual ILN gathering will be held during the Peoria Hamfest on Sun. Sept. 19th. WB9NVN was a member of the Traffic Forum at the Central Division Convention in Milwaukee. Many of this Section's amateurs were present at this two day affair. WN9JP has a new 100 watt VHF vertical antenna. K9DDA has received his Bicentennial WA9S certificate from ARRL. The local Decatur amateurs were active in providing Emergency Communications for the tornado stricken Dunlap area. Reports received indicate a record breaking number of stations active during the annual Field Day exercise. Scores also seem to be excellent. The Sarrancon Valley Radio Club, Inc. (Springfield) will hold their first annual hamfest at the New Berlin Fairgrounds, Sun. Sept. 26th. WB9GQ has passed his General Class exam. WN9PTO is also waiting for her General. The Chicago FM club will hold their annual Radio Expo on Sat. and Sun., Sept. 18th and 19th at the Lake County Fairgrounds, Rts. 45 and 120 in Grayslake, IL. WN9UUM and WN9UJM are new Novices in the Liberty-Mundelein area. W9HPG was guest speaker at the July meeting of the Metro Amateur Club (MAC). The Wheaton Community Amateurs have received their FCC repeater license with the call letter of WR9AGS. The operating frequencies are 147.84 MHz input and 147.24 MHz output. Traffic: W9HOT 164, WB9TWT 164, W9NXXG 154, WB9SNA 107, WN9JKT 104, K9KHI 98, WA9VGV 98, WA9JLE 91, WB9JXK 91, WA9JLK 85, K9ZTV 83, WA9AQN 61, WB9NOZ 49, AB9DED 32, W9OVL 31, W9KR 29, W9PRN 28 and WA9CJG 6.

**INDIANA:** SCM, M. P. Hunter, WA9EED - SEC: W9UMH. At the request of several persons, I am listing the following net information: ITN, 3910 kHz, daily at 1330, 2130, 3000; QIN, 3850 kHz, Sat. at 1000, 0300; INN, 3740 kHz, daily at 2330; Hoos. VHF, 50.58 MHz, daily. If there are any mistakes, let me know. QIN continues to set new highs on QNI and QTC. FWRC has a very good series on lightning and protection in its Ham Splatter. It would be worth trying to get a reprint. WB9KTC has now taken the reigns of the ninth region net. WB9SM reports he will be traveling to SP-Land but will probably have no chance for operation. Field Day activity appeared good this time around. W9UMH held his own version of Field Day on the week after the official one - seems the storm got his power. WN9THY reports some good DX this mtr. Congrats to WN9UQC and WN9UGD on their new tickets. Word from several novices indicate negative response to the 250 watt limit - "even worse than it is now". Much feedback from the section indicates negative toward the bandwidth restriction proposal. I regret to report the passing of W9FWH. Don was a steady supporter of ITN and a past SCM. He will all miss Don. Net Tfc: ITN and a past SCM. He will all miss Don. Net Tfc: ITN 333, ITN 589, IPDN 5, Hoos. VHF 23, Traffic: W9IOH 367, WB9KTR 223, WB9IHR 146, W9QLW 144, WA9TJS 138, K9TKE 136, K9DCX 129, WB9QZV 129, WB9SNA 115, WB9QMC 109, WB9JOT 100, WB9LTL 100, W9VWV 99, W9HUF 88, WB9JFM 84, W9GGW 78, W9JEM 63, WB9PK 52, WB9NAG 52, WB9JEM 49, K9RFP 28, K9LZN 27, WA9QCF 27, WA9OKX 26, W9N8Z 22, K9WVY 23, K9YBM 23, K9EQT 21, WN9THY 20, WA9OKK 18, WB9DIX 17, W9KWB 16, W9ENU 15, K9HMC 15, W9DLF 14, K9FZV 13, K9RWQ 12, K9JQY 10, WB9KGR 9, WB9QBM 8, WB9HCH 6, WB9GHS 5, W9RGM 5, W9RTH 5, K9DIY 4, WA9UXP 3, W9BDP 1.

**WISCONSIN:** SCM, Roy A. Pedersen, K9FHI - SEC: K9PKQ. PAMS: W9AYK WA9LRW K9UTQ. RMs: WB9ICW W9MFG K9KSA K9LJU. Nets, Freq. Time, QNI, QTC, MURF, BWN, 3985, 1145Z M-S, 5d1, 420, W9AYK, BEN, 3985, 700Z Dy, 5d, 121, WA9LRW; WNN, 3725, 2215Z Dy, 64, 19, WB9ICW, WSBN, 3985, 2230Z Dy, 992, 234, K9UTQ; WIN-E, 3662, 0000 Dy, 202, 128, W9MFG; WIN-L, 3662, 0300Z Dy, 227, 121, K9LJU; WSSN, 3662, 2330Z M-W-F, Summer Vacation K9KSA; Wis. Ex. PO Net, 3925, 1701Z M-F, 5d, 25, W9NIX. I report to report K9CZI and W9BOM as Silent Keys. New Novices are WN9UQT, WN9UQS. K9GSC had series of novice classes last year with a good turnout. WSBN certs to WB9RRV WB9TNG. Madison Swapfest Sept. 19. Casseville fish fry had 130 present. WB9ECO WB9SGBG W9HSY K9PKQ with WB9MRF as NCS helped at the State High School Robotics at Baraboo June 27. W9HPG and K9FHI were guests at the YTA RC on June 15. WA9SNU reports they are working on a 450 repeater for Sheboygan area. WA9QTV moved to a new address in Milwaukee, W9PVH and WB9DFZ helped. Hope everyone had fun on FD. Hamtrix reports WB9DZ moved to the Mount Carmel nursing home in Milwaukee, he reports no visitors. K9CPM received cert from Navy MARS for recognition, devotion, dedication, and individual efforts, congrats, also made BPL Niagara hams participated in Bicentennial parade providing 2-meter communications. WB9TNG asst. EC Marinette Co. WB9NME worked GA, VT, NH, MA on 6 meter am. WN9RWZ passed General Class. WB9LW has great 100 watt antenna setup. New Novices in Stevens Point WN9UKW. WIN-L certs to W9SFL WB9PYG. Traffic: (June) K9CPM 797, W9PVH 223, W9DND 198, W9SFL 134, K9FHI 117, W9MMP/9 103, K9MZJ 101, K9LJU 86, W9MFG 80, W9ICW 65, WB9JW 57, W9RWZ 57, WB9LW 54, W9JHW 52, WA9GJU 49, K9JPS 42, WB9PYG 42, WB9VY 34, W9RTP 34, WB9RRV 34, K9UTQ 34, WB9TNG 29, WA9QTV 27, WB9IDU 20, WB9TNG 16, WB9OEC 11, WB9LKC 9, WB9HLS 8, W9KHH 8, K9ANV 7, W9RTP 3. (May) W9KHH 10, W9YFW 9, W9RTP 4, WB9ORO 2. (Apr.) W9RTP 3.

**DAKOTA DIVISION**  
**MINNESOTA:** SCM, Frank Leppa, K9ZXE - SEC: WA9QFZ. PAMS: K9ZBI WA9VVT AB9HOX. RMs: K9CVD WB9AG WB9DFQ. This hamster is abounding with antenna construction, as evidenced by works at WA9JUK WA9URW WB9NAA WB9OAG WB9OCT and K9ZXE. Sizes of towers and antennas hint of DX and contest activity in the future. WA9ERW is back, after a ten year hiatus, with a TR-4 mobile, welcome back OM. Congratulations and greetings to new Novices WB9TQ and WN9ND. Up the ladder to General are WB9PGZ and WB9SBC. The Heartland ARC, Staples, received their club call, WB9TZZ. K9QOQ celebrated his 93rd birthday and is currently active on 75 ssb with an excellent signal. The ARRL convention is drawing near. Lets all get together in St. Paul Oct. 1, 2, and 3. Duluth amateurs provided communications for 100 mile Cancer Bike-a-thon. WA9BJY, event chmn., sez things went well. AB9HOX received a Certificate of Merit from Guatemalan Embassy authorities for her efforts in handling gov. and medical traffic during the earthquake after-

# Let's Make Yours DRAKE!

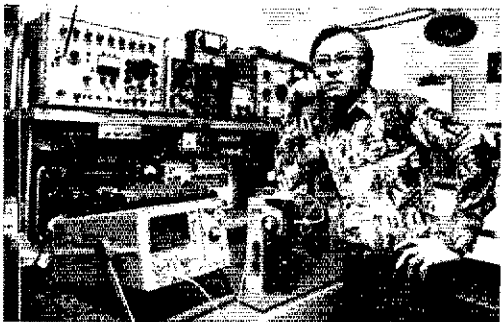
It's time to get on the Bandwagon and join the large number of Discriminating Hams "who know" and who choose DRAKE gear for their serious operating. Find out just why they will not consider anything else. Let yourself enjoy the Total, Reliable and Convenient operation of the equipment with the famous name. If you ever have a problem, the R.L. DRAKE CO. provides terrific Factory Warranty and Out of Warranty Service. Just ask any DRAKE owner.

**AMATEUR ELECTRONIC SUPPLY** - Just ask around! We're the Ham House with the Solid Reputation. We have nearly 20 years in the business and have built a large organization with a Mail Order Headquarters and two fine Branch Stores employing 30 Licensed Hams to serve you. Large Stocks, Fast Service and Top Trades. Write or Call Today for information. If you have Clean, Late Model SSB Gear to trade, Get our Deal! Otherwise, just Get our Price

- R-4C 160-10m receiver ..... \$599.00
- FL-250 250 Hz filter ..... 52.00
- FL-500 500 Hz filter ..... 52.00
- FL-1500 1.5 KHz filter ..... 52.00
- FL-4000 4 KHz filter ..... 52.00
- FL-6000 6 KHz filter ..... 52.00
- 4-NB Noise blander ..... 70.00
- MS-4 Speaker ..... 24.95
- 2-4XC 160-10m transmitter ..... 599.00
- AC-4 AC supply ..... 120.00
- TR-4C 80-10m transceiver ..... 599.95
- 34PNB Noise blander ..... 100.00
- RV-4C Remote VFO/speaker ..... 120.00
- FF-1 Crystal control adaptor ..... 46.95
- DC-4 DC supply ..... 135.00
- MMK-3 Mobile mounting kit ..... 7.00
- L-4B 80-10m 2 KW PEP linear ..... 895.00
- Optional Crystals ..... 5.25
- Fixed frequency crystals ..... 7.85
- 7072 Hand-held microphone ..... 19.00
- 7075 Desk microphone ..... 39.00
- C-4 Station control console ..... 419.00
- MN-4 Matching Network ..... 110.00
- MN-2000 Matching Network ..... 220.00
- W-4 Wattmeter ..... 72.00
- WV-4 VHF Wattmeter ..... 84.00
- TV-42-LP 100w low-pass filter ..... 10.95
- TV-3300-LP 1000w low-pass ..... 19.95
- TV-300-HP High-pass filter ..... 7.95
- RCS-4 Remote antenna switch ..... 120.00
- SSR-1 General coverage rcvr ..... 350.00
- SPR-4 Programmable rcvr ..... 629.00
- 5NB Noise blander ..... 70.00
- AL-4 Loop antenna ..... 29.00
- DC-PC DC cig. lighter cord ..... 5.00
- RY-4 Teletype adaptor ..... 20.00
- SCC-4 Crystal calibrator ..... 20.00
- TA-4 Transceiver adaptor ..... 35.00
- Plain crystal selector dial ..... 3.00
- Aeronautical overseas xtal kit ..... 36.40
- Amateur bands xtal kit ..... 31.20
- Citizens band xtal kit ..... 5.25
- Marine bands xtal kit ..... 57.20
- MARS bands xtal kit ..... 26.00
- Commercial teletype xtal kit ..... 20.80
- Time & freq std, WVWV xtal kit ..... 26.00
- Tropical broadcast xtal kit ..... 15.60
- DSR-2 Digital receiver ..... 2950.00
- TR-72 2m FM Xcvr ..... 320.00
- TR-22C Portable 2m FM xcvr ..... 229.95
- AA-10 10w amplifier ..... 49.95
- MB-22 Deck mount ..... 10.00
- MMK-22 Mobile mount ..... 10.00
- AC-10 AC supply ..... 49.95
- Crystals for TR-22, TR-72 ..... 5.00



Here's Ray Grenier, K9KHW operating and enjoying his latest DRAKE equipment. Watch for him on your favorite band. Ray is National Sales Manager at AES - Write or Call him today.



Meet Miles Cundy, K9HMQ our Service Manager. His job is making sure the quality of our repair work does not deviate from the standards we have become famous for over the years.



## TO: AMATEUR ELECTRONIC SUPPLY

4828 W. Fond du Lac Ave, Milwaukee, Wis. 53216

I am interested in the following new equipment:

---

I have the following to trade: (what's your deal?)

---

Ship me: \_\_\_\_\_

I Enclose \$ \_\_\_\_\_; I will pay balance (if any):

COD (20% Deposit)  American Express

Master Charge\*  BankAmericard

Account Number: \_\_\_\_\_

Expiration DATE \_\_\_\_\_ \*Master Charge Interbank number \_\_\_\_\_ (4 digits)

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City & State: \_\_\_\_\_

Send latest new and used gear lists

# AMATEUR ELECTRONIC SUPPLY

4828 W. Fond du Lac Avenue  
 Milwaukee, Wisconsin 53216  
 Phone (414) 442-4200

Branch Stores in:  
**Cleveland, Ohio & Orlando, Fla.**  
 Send Orders and Inquiries to Milw. Hq.

# How You Can Convert Your Rohn 25G Tower to a FOLD-OVER

**CHANGE, ADJUST OR JUST  
PLAIN WORK ON YOUR  
ANTENNA AND NEVER LEAVE  
THE GROUND.**

If you have a Rohn 25G Tower, you can convert it to a Fold-over by simply using a conversion kit. Or, buy an inexpensive standard Rohn 25G tower now and convert to a Fold-over later.

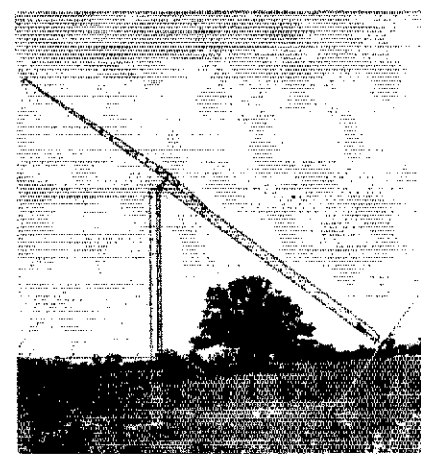
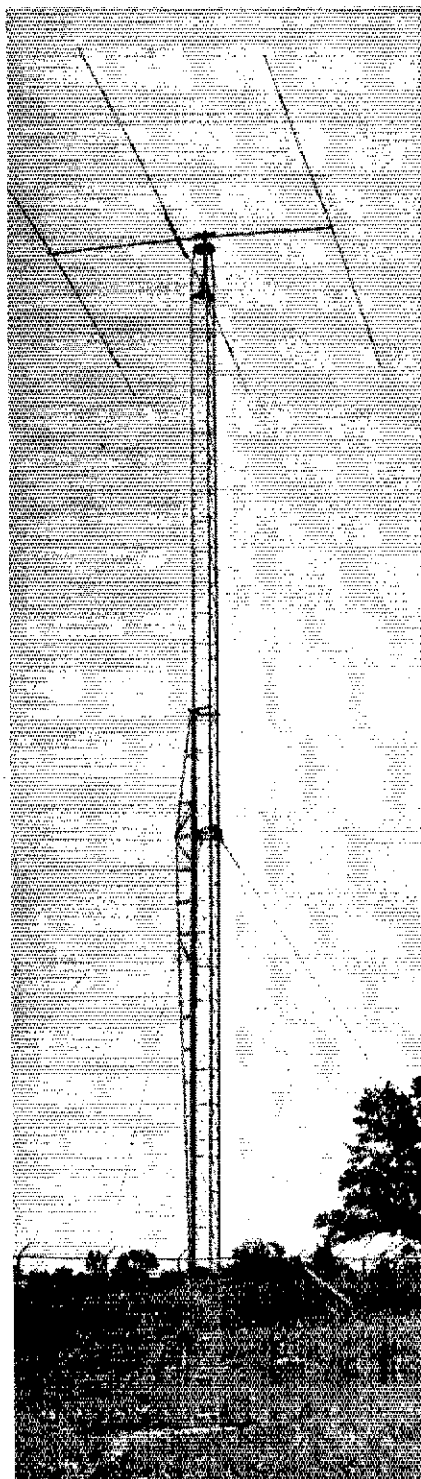
Rohn Fold-overs allow you to work completely on the ground when installing or servicing antennas or rotors. This eliminates the fear of climbing and working at heights. Use the tower that reduces the need to climb. When you need to "get at" your antenna . . . just turn the handle and there it is. Rohn Fold-overs offer unbeatable utility.

Yes! You can convert to a Fold-over. Check with your distributor for a kit now and keep your feet on the ground.

**AT ROHN YOU GET THE BEST**



**Unarco-Rohn**  
Division of Unarco Industries, Inc.  
P.O. Box 2000, Peoria, Illinois 61601



math. Field Day stations were active in June with FD messages received from W0IR W0NE W0MXW W0WCL W0WAS K0ZXE W0LSI and W0SVA. Some wild weather added to the FD excitement. K0CVD arrived at FD at midnight and operated phone wearing a tuxedo. Mobile AR Corp. plans to have a six meter repeater at this printing. New CO WB0CT is active and enjoying his new field appointment. RPL AB0HOX. Traffic: AB0HOX 552, K0CVD 266, K0ZXE 111, WA0VVT 90, WB0OAG 82, AB0LDW 70, W0NO 52, WB0CPC 47, K0PIZ 43, WA0TFC 41, K0ZBI 40, WB0OCT 39, WA0LUR 39, WB0OFG 35, WB0PKG 33, K0JTW 28, WB0GL 28, WB0JJA 28, WAT0ZL 22, WB0NZB 22, WB0VT 17, WB0PMZ 17, WB0GCW 14, WA0LIS 13, W0DUW 12, WA0JPR 11, K0FLT 9, K0CSE 8, WA0W0V 7, WN0PGZ 4, WB0KTH 2, WB0PBN 2.

**NORTH DAKOTA:** SCM, Mark J. Worcester WA0WLP - OSS: K0PVG. The three Rivers Amateur Radio Club participated in Field Day with 14 operators, including 7 AREC members. The Dickinson Radio Club set up Field Day at Lake Tschida with good participation. After Field Day, K0PYZ entered hospital with pneumonia. WA0YSF working on an antenna farm at Baco, with some help from WA0MSJ. Please skip polecat, Fargo, Bismarck, Fergus Falls, and Jamestown with WB0RCX joining the group. This SCM is looking for people who would like to be EC, OO and etc., please drop me a line if you are interested in an appointment.

**Nets - kHz** CDST/Days Sess. QNI QTC  
Manager  
DATA - 3996.5 2300 S-S  
WA0SUF  
Traffic: WA0SUF 114, W0MYF 14, WB0BMG 5.

**SOUTH DAKOTA:** SCM, Ed Gray, WA0CPX. K0TVJ has earned the first 5BVA award in SD. Congrats! The Medicine Butte ARC planning the SD Picnic for next June in Chamberlain. A number of new Novices are getting on the air or will be shortly. Won't you make a special effort to help them along with their station and operating procedures. Don't forget the Dakota Convention the first week end in Oct. at St. Paul. The FCC has announced that they will be giving exams twice a year in Sioux Falls instead of three times per year. A rapid city test will be given twice a year instead of once. Examination dates are available from the SCM. W0IT has worked WA5 through the Satellite and has them confirmed. SD Morning Net meets at 8:00 A.M. Daylight (CST) 3.960. NJQ Noon Net meets at 12:15 P.M. on 3.955. SD Evening Net meets at 9:30 P.M. Daylight (CST) on 3.955. SDNCV meets at 7:00 P.M. Daylight (CST) on 3.650 MHz.

## DELTA DIVISION

**ARKANSAS:** SCM, S. M. Pokorny, W5UAW - SEC: WA5VNY. PAMS: W5POH K5FOY WA5ZWZ. RM: W5MYZ. Nets, kHz, Time/Day, QNI, QTC, Mer. OZK 3760, 0000 GMT/Dy, 156.34, W5MYZ; APN, 393, 1100 GMT/MS, 769, 38, W5POH; M-Bird, 392, 2130/M-F, 552, 12, WA5ZWZ; ARN, 3995, 2330/D, 325, 34, K5FOY. Welcome to AR WB5S SQJ 5TB 5T, SXZ SZA, TDY, WNS5 SQJ 5RB 5RF 5RT 5ST, SUQ 5VJ SVZ SWR 5XC 5XZ SXT SZZ TAI, TAJ, TAZ TBD. Regret reporting as Silent Key W5BAB and W5ENP, our sympathy to their families. W5SGZR received emergency call from W5VCW thru Hot Springs repeater requesting ambulance for W5FQX who suffered an apparent heart attack while camping on Lake DeGray. The following participate in FD: FL Smiley, River Valley AR, IAARC, Jonesboro ARC, OZARC. Your SCM visits several FD sites. Traffic: WA5HNN 179, W5QFU 6, W5UAW 26, W5MYZ 24, W5POH 20, W5SGWU 1, W5SGQH 3, W5SHY 2.

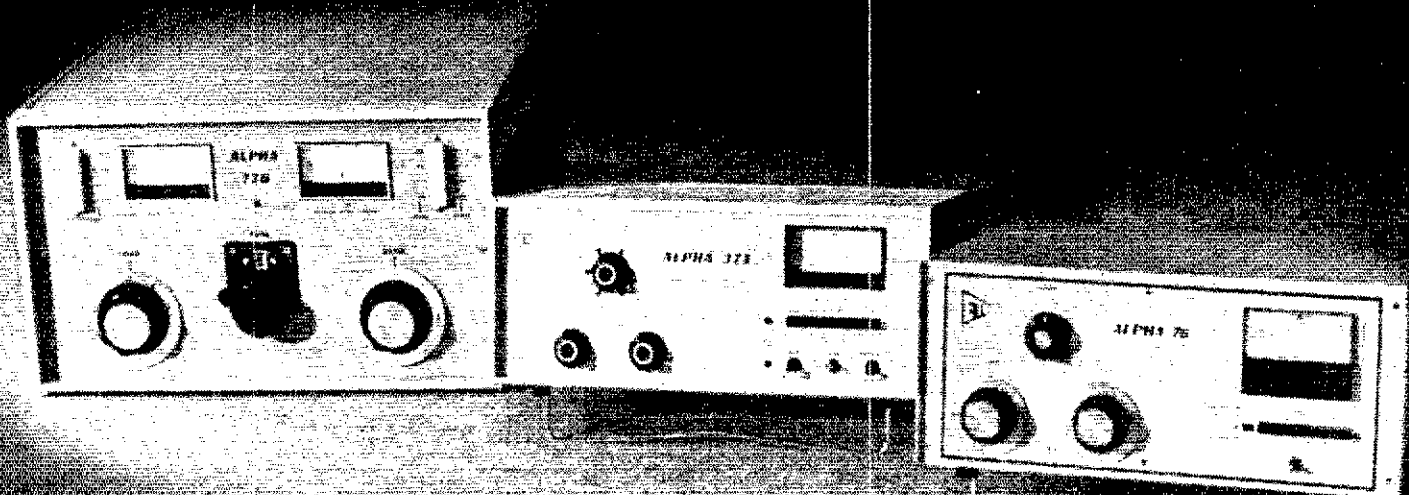
**LOUISIANA:** SCM, Robert P. Schmidt, W5GHP. Asst. SCM: John Souvestre, WA5NYY. SEC: W5CIG. RM: W5PRI. PAM: W5EKU. VHF PAM: W5VBX. All areas report an excellent Field Day with NO. D Club doing very well in their first try. Excellent publicity was obtained in New Orleans papers and TV as we were the twin cities club. W5YCU, Monroe reports excellent 2-meter openings Sun. after Field Day, and he worked 6 states plus Canada. His total now is 17 States plus VE3 on 2-Mtr sb/cw. The Jefferson Amateur Radio Club, with the New Orleans Micro-Computer Club will have their annual New Orleans contest on Oct. 30-31. This will be a two day affair with the flea market open Sat. and Sun. special Luncheon of the computer group will be held Sat. For info contact WA5RMC at P.O. Box 1011, Jefferson, LA 70181. WB5PTH passed Advance exam. K5BLV is new RACES officer for East Feliciana Parish. K5CALV advises that the Southeastern Louisiana Univ. ARC now an ARRL affiliate. The 5 LA Repeater is on the air on 164.40/147.00. WB5NWO back on the air and active on LRN and RTTY net.

**Nets - Freq. Time/Days QNI QTC Manager**  
LAN - 3615 7 & 10 Dy 163 130 WA5P  
LTN - 3910 8:45 PM Dy 195 39 WB5K  
LSN - 3703 8:30 PM M-F 120 41 WA5N  
LRN - 3587.5 7:00 PM Su 21 8 WB5FH  
Traffic: W5GHP 445, K5TTC 260, WA5IQU 17, W5MI 173, WA5ZZA 114, WA5ANV 81, WA5VQ 68, WA5TQA 53, WB5LBR 43, K5TFG 37, WB5PT 26, WB5NVB 25, W5YN 10, K5BLV 6, WB5NWO

**MISSISSIPPI:** SCM, W. L. Appleby, WB5DCY. Welcome new MS Novices, WN5S TJK TFG TFF T.J. TIK TCU TUL TJI TJM TJN TJJ TFZ TJH SOQ S. SKM SJQ SJR SOI SQK SUD TAW SXI TBG TA SXX SYT TCS TBU TBF TBR SXV TBY SX SYP SYM SXU SXL Join us on the 8MS slo net. Be a turnout ever for FD. Vicksburg ARC Novice class opened with 35 students. Hernando Hamfest a success. MSBN picnic and Swapfest in Hattiesburg this fall. WB5QCB, OVS; WA5DPO EC; WB5PXE WB5SN OPS; WBSLG ORS. WB5QCB has 26 states on 6 mtr. MS Gov. Finch issued a proclamation declaring July 15-30 as MS Amateur Radio days. WB5V recd ARRL 50 year plaque. Welcome to other MS amateurs WB THG THP TJS TIW TIB SIS SIL SKJ SPX SNJ S. SQL SVX SSN SVY SVA SSG SYR SWQ DRNS h 66% in June. WB5OAV on MSBN. WB5QCB working on Oscar year. North Biloxi Repeater 37-97 WR5AL Meridian 10-70 WR5AHY; Corinth 25-85 WR5ADV Starkville 12-24 WR5ALU. Report WB5DE and W5HRW as Silent Keys. Newcomers on MT W5EPW WB5GNU WB5PXE W5IQU on 160 mtr. Heard K5BER W5RUT K5HUW K5IJX K5GRV K5RSS on VHF-FM. MTN cert to W5LSG WB5SN Emerg. Amateur Repeater System, McComb, Laura Jones Co. ARC, Jackson Co. ARC new ARRL affiliates MTN QNI 148, QTC 61, LRN QNI 90, QTC 99; MSN QNI 60, QTC 26; CGCHN QNI 175

# ALPHA POWER

## IS IN THREE CLASSES BY ITSELF



### ALPHA 77D IS 'THE ULTIMATE'

- Runs cold and whisper-quiet at maximum legal power, any mode, with No Time Limit [NTL] and lots of reserve.
  - Tunes 10-160 meters (3-30 MHz continuous).
  - Full vacuum relay QSK (CW break-in) standard.
  - Basic design proven in toughest commercial and amateur service since 1970.
  - 1/3 the size of any amplifier of comparable power; easy to handle & ship. ALPHA 77D is the standard of excellence around the world.
- \$2995 U.S.; built on order. Contact ETO for schedule.

### ALPHA 374 IS SUPER CONVENIENT

- The smallest and lightest of all true [NTL] kilowatts at only 0.9 cubic ft. and 52 pounds.
- No-tune-up operation 10-80 meters, thanks to factory-pretuned bandpass filters, yet built-in controls allow manual antenna matching and amplifier 'tweaking' when necessary for maximum efficiency and power output.
- Thoroughly proven performance and durability through more than two years' worldwide contest, DX, FSK, SSTV, and general use. \$1395 U.S.; prompt delivery from factory stock.

### ALPHA 76 SETS THE VALUE STANDARD

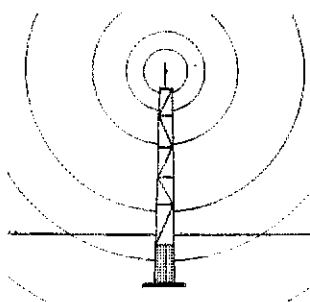
- An honest, rock-crusher [NTL] kilowatt in all modes, like the ALPHA 374. You can lock the key at a full d-c kilowatt and leave town... if you have a very husky dummy load!
  - Full coverage 10-160 meters - no other [NTL] kilowatt linear (except a '77D) covers 160.
  - Standard 45 pound plug-in transformer (1.5 KVA CCS) itself outweighs some so-called 'kilowatt' amplifiers. (The only way we know to make any true [NTL] kilowatt lighter than the '76 is to use special tape-wound Hipersil® transformers like those standard in the ALPHA 77D and '374, and optional in the '76.)
- \$895 U.S.; factory stock.

Every ALPHA HF Linear Amplifier has a combination of quality and convenience features that's available in no other true kilowatt d-c, 2+ KW PEP linear amplifier: • modern, rugged ceramic grounded-grid triode tubes; • silver-plated copper tubing main tank coils; • a 1.5 KVA CCS (or larger) plug-in transformer; • full-cabinet, ducted air cooling; • self-contained desk-top convenience; and a full year of free factory service for any defect. NEW! Expert factory demonstration, advice, sales, and service is conveniently available in the Midwest and in Southern California. Write or phone ETO direct for full information, illustrated brochure, and personal service.

# ETO

EHRHORN TECHNOLOGICAL OPERATIONS, INC.  
BROOKSVILLE, FLORIDA 33512 (904) 796-1428

# QUICK RETURN COVERS



CQ CQ .....  
CQ DX DE .....  
QSL--73--SK

Send and receive QSL cards in a reusable mailer.

## ● Protective

Quick Return Covers completely shield QSL cards. No addresses, stamps, postal off-sets, or cancellations will deface your QSL collection.

## ● Quick Returns

Return QSL's go directly to you. Your address and call are correctly printed on every Quick Return Cover, avoiding errors and lost cards.

## ● Personalized

You no longer need an exact address on your QSL cards. Don't buy new cards when you move, just order new, less expensive mailing sleeves.

## ● DX Returns Simplified

The best way to receive a QSL card from that rare DX or hard to get state is to provide return postage. Quick Return Covers make it easy to send International Reply Coupons or stamps for a prompt reply.

## ● Reusable

The same Quick Return Cover can be reused many times, just by replacing the personalized mailing sleeve. The more you use them the more you save.

## ● Convenient

Quick Return Covers eliminate time consuming, self-addressed stamped envelopes. The Quick Return Cover you send is used for return mail.

## ● Economical

Quick Return Covers enable you to mail several QSL cards for the price of one first-class letter. Send a few Quick Return Covers to your QSL Bureau to collect any missing QSL's.

## ● Quick Return Covers

with mailing sleeves are available in the following quantities:

♦ 10 for \$2.50 ♦ 50 for \$11.50  
♦ 100 for \$20.00

Extra personalized mailing sleeves:

♦ 50 for \$2.50 ♦ 100 for \$4.00

Write to us for an order form or more information. Orders over \$10. will be shipped postpaid. Otherwise please add \$7.75 for postage and handling. New York State residents please add sales tax. Cash, Check, or money order preferred: no c.o.d.'s.

**Egis Mailers**

P.O. Box 4846  
Poughkeepsie, N.Y. 12602

## NYE VIKING SPEED-X Telegraph Keys

Best for beginners . . . preferred by pro's!

Everything every brass-pounder insists on having! Smooth, sure-operating NYE VIKING heavy duty keys are mounted on a heavy die-cast base with baked black wrinkle finish and nickel-plated hardware. All models have smooth, adjustable bearings and heavy duty silver contacts. With or without switch. Brass, chrome, or nickel-plated finish.

8 models priced from \$6.65



Model 114-322-003

\$9.95 (Brass)

Manufactured by the maker of famous NYE VIKING SUPER SQUEEZE KEY



At leading dealers throughout the world or write for descriptive catalog

WM. M. NYE COMPANY, INC. 1614 130th N.E., Bellevue, WA 98005

QTC #1, Traffic: WB5FHA 111, WB5LXX 92, W5EDT 71, WB5KJU 66, K5OAF 53, WB5DCY 52, WB5MTQ 36, WB5NPM 25, WB5EIN 20, W5L5G 16, W5NGB 16, W5ASYZ 16, WB4FKR 9, WB5HVY 7, W5L1 5, W5B5J 3, W5AF11 2, W5B5NB 2, W5B5NB 2, W5B5NB 2, W5B5AS 1, W5B5MDR 1.

TENNESSEE: SCM, O. D. Keaton, WA4GLS - SEC: WB4DYJ, PAM: WB4PRF, RM: WB4DJU.  
Net - Freq. Time(Z)/Days Sess. QNI QTC  
Manager  
TN - 3980 1040 M-F 7B 3626 414  
W4EWW 1145 M-F  
W4PEP 0030 M-S  
WB4YPO

TN - 3635 1400 SSuH 28 210 113  
K4YFC 0030 Dy  
ETVHFN - 50.4 1900 MWF 8 75 3  
WA4WZJ  
ETVHFN - 145.2 1900 TTH 8 41 1  
WB4DZG  
MTTMM - 28.8 0100 TF 8 66 0  
W4EAY

WTVHFN - 146.37146.97 0130 F  
The following amateurs were awarded the Certificate of Merit for participating in the United Nations visit to TN June 7: W4CYL WB4EBZ K4IAW K4ALK W4IMX & WB4VZQ. The following amateurs were awarded the Certificate of Merit for participating in the "American Revolution Bicentennial Wagon Train" as it made its pilgrimage across TN: WB4PRF WA4YFG K4TKR WB4MQJ WA4GCS W4CYL WA4GOF K4ALK W4IMX W4LQW WB4ACE K4HRY W4RIJW W4HPL WB4DDV WB4YPO WB4MRA WA4IRH K4CNY & WA4AKF. Everyone make plans now to attend the 1976 Memphis to be held Oct. 2 & 3. WB4PRF has been endorsed as PAM. Endorsements: WA4EWW WA4MPJ WB4ANX WB4DYJ W4TYV WA4TWL W4SGI W4PEP K4UNW W4PSN W4OGG K4QKW WA4CGK WA4JNW as OPSs; K4PUZ K4YFC W4OGG OPSs; W4SGI WB4ANX W4PEP WB4BK F OPSs; K4RTA K4MZE W4IYU OOS; WAHHC W4KC W4WQZ OVSs. Traffic: K4CNY 240, K4YFC 127, WB4DJU 95, K4YFC W4OGG OPSs; W4SGI WB4ANX W4PEP WB4BK OPSs; K4RTA K4MZE W4IYU OOS; WB4BK 21, K4KCK 18, WB4YPO 16, WB4MPJ 15, WA4UAZ 10, W4SGI 8, W4TYV 8, WB4VZQ 7, WB4GTW 5.

## GREAT LAKES DIVISION:

KENTUCKY: SCM, Ted Huddle, W4CID - SEC: WA4GHQ.  
Net QNI QTC Net QNI QTC  
KRN 303 37 KYN 381 145  
MKPN 965 116 SDAREC 63 8  
KTN 1085 159 SDAREC 83 10  
KPN 50 30 SEKYEN 30 4

SEKYEN is the new SE KY emergency net meeting on Mon. at 2100 EDT. Don't miss the freq. as yet but will report it as soon as I get it. Lots of Field Day activity again this year. Morthead now has a repeater on 31.9.1. The NOAA Weather Network is now in operation in KY. The RXs for this freq. are very inexpensive and are a worthwhile addition to the ham shack. Our own weather nets can use this service to improve our effectiveness. Freqs. are 162.40-162.55. New Novice in Covington is WN4DBT. Lexington hamfest is Oct. 3 at Georgetown. NE KY ARC graduated 22 new novices in their recent code class. WA4IGS and K4TXJ are running phone patches for servicemen to local wives. WA4HTM is erecting new beams. Traffic: K4TXJ 129, WB4IGX 56, WB4GNS 44, K4HRS, WB4EOR 34, K4FLUM 54, WB4AUN 50, K4HRE 44, W4CID 37, WB4ZM 37, W4CDA 28, WA4GHQ 27, W4IGS 25, WA4FAF 19, WA4AVV 18, WA4AGH 9.

MICHIGAN: SCM, A. L. Baker, W8TZZ - SEC: W8MPD. Rms: W8JYA, K8KMQ, W8YIQ. PAMS: W8BJX, K8LNE VHF PAM WA8WVV.

Net - Freq. Time/Days QNI TFC Sess.  
MAC5 - 3935 1500 Dy 858 290 35  
QMN - 3663 2200/ 573 239 59  
0200 Dy  
BRMEN - 3930 2130 Dy 627 115 30  
GLETN - 3932 0030 Dy 760 90 30  
WSBN - 3935 2301 Dy 558 78 30  
MNN - 3720 2130 Dy 149 48 25  
LPEM - 3922 2130 Dy 83 48 25  
MGM - 50.7 2300 Dy 303 32 27  
NAREC - 3932 2200 S 64 16 4  
VHF PAM Report \$44 10 27

Received 5 Field Day messages this year. Thank you. W8QFQ sez his RX failed - after only 35 years of service. They just don't make them like they used to. Copper County election results: W8BQZ, pres.; W8MZB, vice pres.; W8BTL, secy.; WA8BT, treas. Milford ARC bought new Tribander for FD. I am told the Southeast Michigan still meets nightly on 28.6 MHz. W8RX celebrated 50 years in Amateur Radio this June. May appointments: ECs: K8YWY K8UPE WA8ICK; June: W8BFLK EC, Cherryland Amateur RC is boasting an all time high in membership - 88. New Gear reported by: W8VOM two-element quad; W8SPFB HW 202; K8STK Clegg HT; W8BKKA TS 520; W8N8JF TH6DXX WA8TMP Clegg HT; K8HKM HR 212; W8BECZ Metrum II; W8KKKZ R8QA & 270C; WA8WFF 520BX; W8M2B FT 101; K8VOA SB 200; WA8JSF SR 150; W8BTL SB 200; W8BRH HW 12; W8BAIM Houghton repeater now operational on 28.68. New Novices: W8B ZS ZWB ZY. Congratulations. Traffic: (June) W8BBY 362, W8BTKQ 296, K8LNE 185, W8BPOL 182, W8B1TT 160, K8KMQ 148, W8MO 124, K8DYI 93, W7KQU/8 87, W8BNC 83, W8JYA 82, WA8BOE 82, W8NOH 66, W8OW 65, W8RTN 48, K8JED 46, W8HXX 45, W8WZ 42, W8YIG 41, W8HJ 40, K8VOA 40, K8WBJ 38, W8BFG 38, W8BVG 37, W8BOB 32, W8IUC 24, W8VOM 23, W8BMDK 18, WA1SHO/8 14, W8DT 12, K8DTG 12, W8BTL 12, K8JIA 11, W8QBE 11, W8SDB 10, W8BKBZ 8, K8ZJU 8, W8DCN 7, W8WVV 7, W8JUP 6, K8RNP/8 6, W8RNQ 6, W8BZF 5, W8JAX 5, W8LDS 5, K8AMU 4, W8UCP 4, W8SWW 4, W8TXM 4, W8HKL 1, W8WVL 1. (May) K8KMQ 248, W8RTN 120; W8BFB 6.

OHIO: SCM, Hank Greeb, W8CHT - Due to vacation schedule of your SCM, W8CHT, this will be an unusual report. The Hams of OH, IN, IL, MO, KS and CO were very cordial and helpful on this vacation, making a vacation a very much more pleasurable experience. OH contacts to be reported in upcoming section, with over 140 active affiliated clubs, and over 5100 ARRL members. Six section-wide NT5 nets hold several



YEARS AHEAD



WITH YAESU

# THE "WOW" DESIGN!

## YAESU'S NEW FT221 — ENTIRE 2 MTR. BAND!

FM-AM-USB-LSB-CW

PHASE LOCK LOOP!

# AND WOW! ONLY \$629.

Price and specifications subject to change without notice.

No crystals needed!

Broadbanded — no transmitter tuning! — 20 watts input — FM and CW!

Phase lock loop circuit!

Full band coverage —  
144-148 MHz!

Pulse noise blanker!

3-way metering, discriminator,  
zero center!

1 kHz dial accuracy!

AC-DC power supplies  
built-in!

Repeater offset — up, down,  
(standard or special)!

Crystal calibrator!

FM-AM-USB-LSB-CW!

Clarifier offset tuning!

No-mar feet!

Auto-patch input!

0.5 microvolt receiver  
sensitivity!

24 watts SSB PEP input!

PTT or VOX operation!

Mike, plugs, connectors  
supplied!

Plug-in computer quality  
circuit boards!

See your Yaesu Dealer or write:  
YAESU-MUSEN USA, INC., 7825 E. Rosecrans,  
No. 29, Paramount, CA 90723

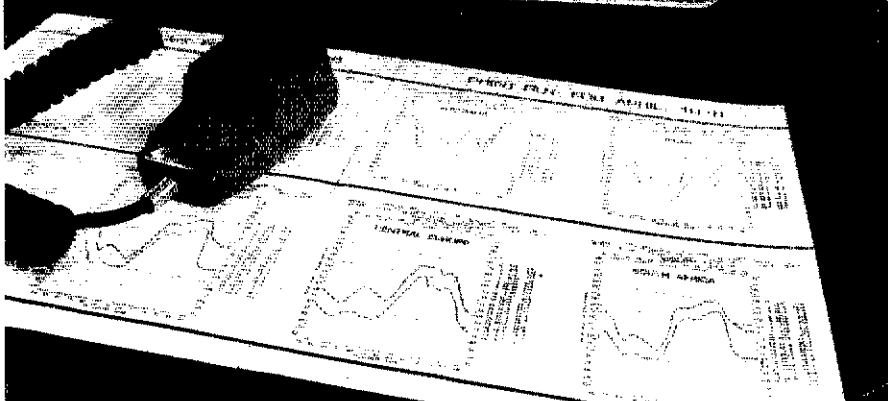
YAESU-MUSEN USA, INC., Eastern Service Center,  
613 Regna Terrace, Cincinnati, Ohio 45215



# YAESU

## The radio.

# CAN A COMPUTER PREDICT DX?



## Yes indeed!

It's been doing it for years. Trouble is, only big corporations and government communicators could afford it. Not anymore.

May we introduce you to Compu/Prop... computerized DX predictions.

Now you can have computer print-outs of precise times of band openings to your favorite parts of the world. Plan your operating for maximum DX. Know what hours of the day that "rare one" will come thru. These are just a few ways Compu/Prop can increase your enjoyment of ham radio.

Compu/Prop is a monthly computer print-out to 8 major DX areas of the world. And it's 90% accurate. The computer program was originally developed over many years by the government Office of Telecommunications. This multi-million dollar data base is now available to you via Compu/Prop.

Main Electronics is making these monthly computer predictions available on a special introductory offer.



You can receive a FREE print-out to any one of eight DX areas of the world by simply filling out and mailing the coupon below. You will also receive full details on how to obtain a subscription to Compu/Prop.

**Start planning your DX NOW!**



**ELECTRONICS, INC. / EDC Division / 225 Ida / Wichita, Ks. 67211**

Yes, I would like a FREE print-out for my area to the point checked below. (check only ONE)

- Japan  Central Europe  S.E. Asia  S. Central Asia
- Central S. America  Australia  Mideast  S. Africa

NAME \_\_\_\_\_ CALL \_\_\_\_\_

STREET \_\_\_\_\_

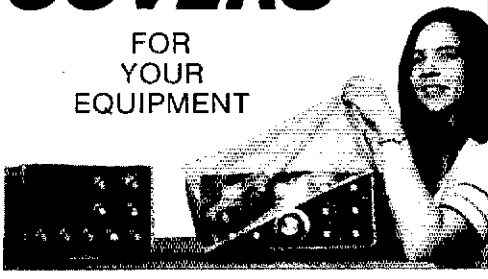
CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

**NOTE!  
OUR NEW  
ADDRESS**

## DUST COVERS

FOR  
YOUR  
EQUIPMENT

- PROTECT ANY RIG
- ADD PROFESSIONAL LOOK
- MADE OF DURABLE VINYL
- NOW GIFT CERTIFICATES



**COVER CRAFT**  
P.O. BOX 555, AMHERST, N.H. 03031

- MOST COVERS \$2.95, \$3.95, \$4.95
- SEND FOR LIST OF OVER 100 CUSTOM COVERS
- SPECIAL COVERS CAN BE MADE TO ORDER

hundred sessions per month. These nets are: OH Six Meter Net, 1100, 1000, Daily, WA8551 Net, Mgr.; OH 55B Net, 3.9725 MHz, 1430, 2000, 2245Z Daily, W8DIL Mgr.; Ohio Novice Net, 3.708 MHz, 2230Z, Sun., Tues., Thur., K8IKD, Mgr.; Buckeye RTTY Net, 3.605 MHz, 2200Z, Daily, K8NCV Mgr. OH Slow Net, 3.577 MHz, 2210Z, Daily, WB8JGW Mgr.; Buckeye Net, 3.577 MHz, 2210Z, Daily, WB8JGW Mgr.; W8DIL Mgr. your support and traffic are welcomed. WA8MCR is Asst. SCM, with overall responsibility for coordinating traffic efforts within the section. WA8KPN continues a stellar job as SEC, with over 44 active ECs under his wing. Normally individual, net, and club activities are reported in this column. Reports are solicited from individuals, nets, clubs, emergency coordinators, and are due by the 7th of the month. Club bulletins are useful for this purpose, but the best way to ensure that your club, group, or individual activities appear is to send reports of activity so they arrive between the first and the seventh. Your activity is important — report it!

Traffic: WA8MCR 3A, WA8HGH 247, WB8KWD 122, WB8MRL 112, WB8UIN 107, WB8KKI 93, WB8JGW 85, W8JD 64, K8LJA 63, WA8VWH 63, W8LTA 54, W8KAJ 50, WA8GPO 45, WA8SF 45, K8BYR 43, WA8551 42, K8VMI 42, W8FGD 38, W88CU 31, K8LGA 28, AC8IBX 25, W8GCU 23, W8RTK 23, WA8MAZ 21, W8CST 20, WA8KPN 19, W8WEG 9, W8GGE 9, K8GAY 17, K8CKY 14, W8ARW 12, WA8STX 12, WB8AYC 11, K8ONA 9, W8DPW 8, W8PNP 8, K8BNL 7, W8GXQ 6, WA8ETX 5, WA8TSX 5, WB8WEK 3, WA8FSX 1.

## HUDSON DIVISION

**EASTERN NEW YORK:** SCM, Gary J. Ferdinand, AA2PJL, SEC, AD2AYQ, PAM, AB2QEI, RMs AD2IXW(cw), AD2QRT (V), Happy Birthdays USA; notes/reflexes below. New Novice for Albany club AK2FJZ AK2FKI. Congrats to K2AXJ or passing the General. Now our SEC, AD2AYQ was presented with a plaque during the Glens Falls AREC dinner in recognition of his 12 year service as EC. New ALB county repeater, 04/84, is AF2ALB. Field reports were received from AB2BJZ, AB2ZCM/2, AC2FSL/2, AC2FWG/2, AD2AE/2, AD2DN/2, AD2KN/2. Maple Hill High ARC AB2YCR, had first page coverage in the local section of an Albany paper — picture and all! AA2YPC reports he is now living in NJ. AB2TGL in NH to summer studio. AB2GHC back on HW-7 after his recent marriage. AB2EMU's Christmas presents, four elements of 20, now up thanks to: AA2YAW, AA2WKH, AB2FLF, AB2PYM, AB2GOJ, AB2RUZ. A 313-mile path was worked via Middletown repeater by AD2RPZ's ten watter. AC2OOJ reports Albany AKA gave 34 students Novice exams. A new tower is planned. AD2YR enjoying increased power with his new HW-12. ENY can expect to see some camp traffic reports counselor AB2TDX. AB2OTK worked AZ over 2-meter sb; AB2YQU reports similar excellent conditions and activity there. AA2PJL received 40 wprms code proficiency award. PSHR to: AA2RKL, AB2EMU, AB2RUZ, AA2RJL Net totals: NYS (QNI 696, QST 236); RTN (QNI 75, QST 24). Traffic: (June) AB2EMU 369, AA2PJL 301, AA2YUL 265, AD2OYG 58, AB2RUZ 54, AB2WZL 50, AC2YJ 42, AA2RKL 36, AB2TGL 30, AB2WBO 20, AB2ZCM 18, AD2OJA 15, AD2HNW 12, AA2PAJ 12, AA2YKY 12, AB2EKM 10, AB2TKM 10, AB2GOJ 7, AA2CJY 6, WA8ADZHNW 11, AB2ZCM 8, AC2DW 2. (Apr.) AB2ZCM 10.

**NEW YORK CITY — LONG ISLAND:** SCM, John H. Smale, WB2CHY — Asst. SCM: Art Malatzy, WB2WFL, SEC: K2HTX, RM: WB2LZN, PAM, WB2PYM. The following are major AREC/RACES Nets: Join one!  
Bronx 28.64 MHz 90.35 MHz 146.88 fm  
Kings 28.64 MHz 50.35 MHz 146.88 fm  
Richmond 146.88 fm  
New York 29.5 MHz 146.88 fm  
Queens 29.5 MHz 50.52 MHz 145.62 am/fm  
Nassau 28.75 MHz (Hunt) 145.68 am  
W. Suffolk 28.65 MHz (Smith) 147.21 fm  
28.65 MHz (Babylon) 146.94 fm  
E. Suffolk 146.82 fm  
Note: Net times between 2000 and 2100 local or Mon. There is a very strong possibility that WA2KX will be EC for town of Brookhaven, I hope that everyone will give him their full support. Now is the time to make your plans for the Hudson Div Convention, its the week end of Nov. 13th and 14th. That's right between Sweepstakes so contesters don't have any excuse for missing the Convention, contact Stan Zak for further info and details. WB2LZN is looking for more helping hands with the NLI CW net for NCS and 2RN nets, you're interested, QNI 3633 kHz 1900/2200 local any night. Welcome to newly affiliated Pace Univ. ARC and Coney Island ARC. WB2YKG will be attending NYS music camp and will be operating /2. W2HXT received his A1 Op Certificate. W2PF along with W2AIM and W2FZ attended the National Conv in Denver in July. Congratulations to K2OVS on becoming a GB5, look for him at 145.940/29.490 ssb (Oscar 6) 8 to 9 PM local. K2GCE received a section net certificate. The Great South Bay ARC now has their club call of WB2FKZ. W2EV received the "William J. Merritt Memorial Award" for the "outstanding MARS operator for 1975, congratulations! W2ZYEI built the "Tuna tin2 transmitter" with good results, he also has an all surplus 2M station and has a converted ARC5 VFO for the transmitter. WA2ROD returned from three weeks in DL-Land, hope that everyone read the article about the new appointment, it's OO Class 5, qualifications are the same but the appointment is open to Techs and Conditional Class licenses. The basic functions are also the same, except the activity is restricted to 6, 1 1/4 meters and below, anyone interested please contact me, and plan to take part in an upcoming FMT (see QST W1AW Op Activities for further details). WA2ECO is getting very active with the traffic net and enjoying it. Traffic: (June) W2GKZ 334, W2EC 238, WB2LZN 181, W2EZE 84, WB2YKG 45, WB2OYV 60, WB2WRT 57, W2MML 49, W2HXT 16, WA2CZY 41, K2GCE 20, WN2ZPV 16, AB25JG 13, W2PF 10, WA2YEI 5, K2JFE 4, WA2JX 2. (May) AB25JG 22. (Apr.) AB25JG 24.

**NORTHERN NEW JERSEY:** SCM, Louis J. Amoroso  
W2ZZ  
Net Freq. Time(PM)/Days Sess. QNI QT  
Manager  
NJN — 3695 7:00 Dy 30 393 14  
WB2CST  
NJN — 3695 10:00 Dy 30 198 7  
WB2CST

# DON'T BROADCAST THE FACT THAT YOU'VE GOT A HAM RIG.



Now you don't have to let everyone know that you've got a mobile ham transceiver. Our model ASPR798 gain disguise antenna looks and acts just like a normal Ford antenna, operating on AM and FM broadcast\* as well as the 2 meter band. We know the disguise is effective because we've been making them for law enforcement agencies for years. Antenna Specialists has an entire line of disguise antennas to prevent the theft of your VHF FM rig. Exact replacements for Chrysler and Ford products and universal mounts for everything else on wheels.

When it comes to choosing the right amateur antenna, don't settle for less than the best. Look for the Stripes of Quality. At your Antenna Specialists Dealer.

\*When used with corresponding antenna coupler.



® "Stripes of Quality"

**the antenna specialists co.**

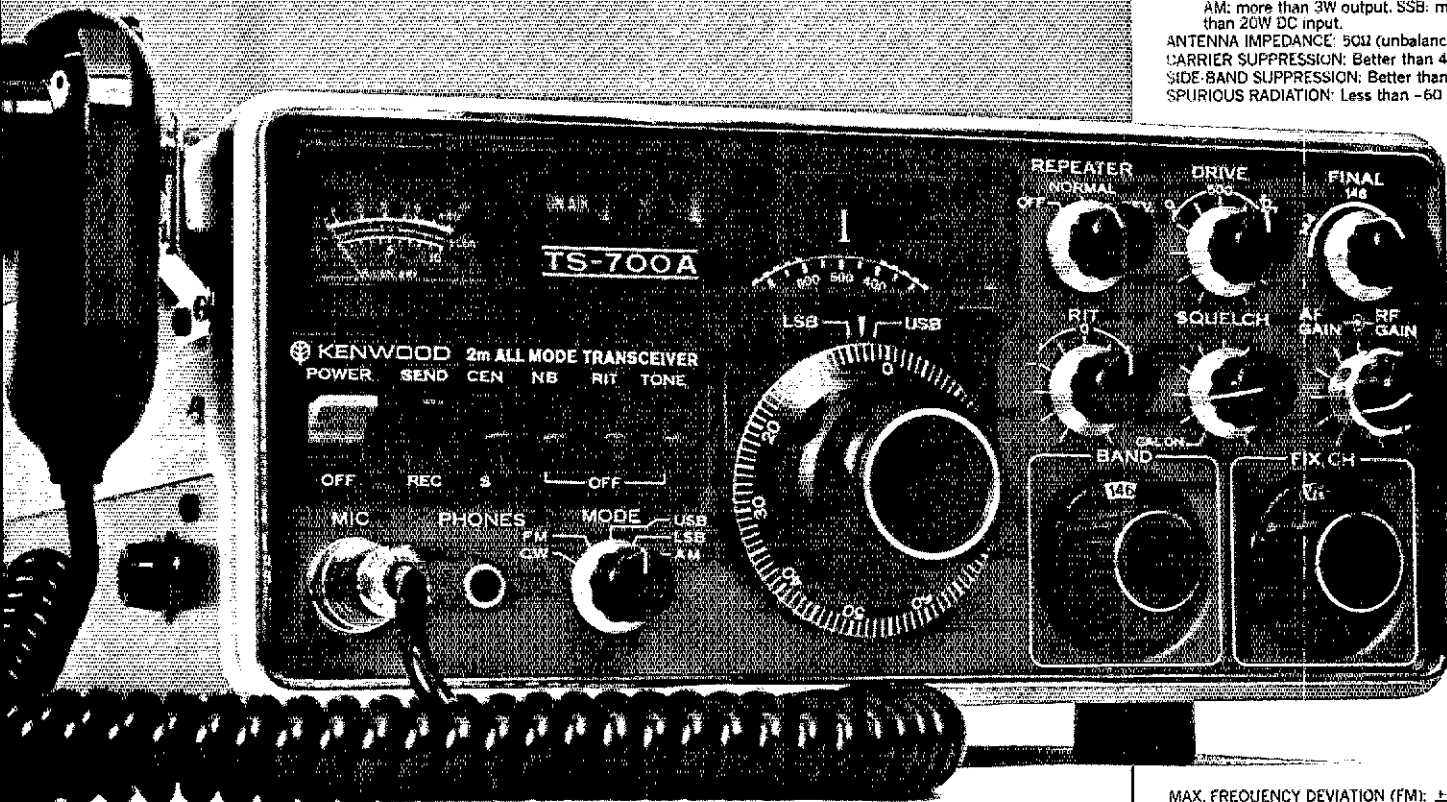
a member of The Allen Group Inc.  
12435 Euclid Avenue, Cleveland, Ohio 44106  
Export: 2200 Shames Drive, Westbury, L.I. New York 11590  
Canada: A. C. Simmonds & Sons, Ltd.

© 1976 by The Antenna Specialists Co.

# When you get tired of compromises...

## TS-700A Specifications

TRANSMIT/RECEIVE FREQUENCY RANGE:  
144-148 MHz  
MODE: SSB, FM, CW, AM  
RF OUTPUT: CW, FM: more than 10W output  
AM: more than 3W output. SSB: more  
than 20W DC input.  
ANTENNA IMPEDANCE: 50Ω (unbalanced)  
CARRIER SUPPRESSION: Better than 40 dB  
SIDE-BAND SUPPRESSION: Better than 40  
SPURIOUS RADIATION: Less than -60 dB



**KENWOOD'S TS-700A finally fulfills the promise of 2-meters... more channels, more versatility, tunable VFO, SSB-CW and, best of all, the type of quality that has placed the Kenwood name out front.**

- 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. Can operate from your car, boat, or as a base station through its built-in power supply
- 4 MHz band coverage (144 to 148 MHz) instead of the usual 2
- Automatically switches transmit frequency 600 KHz for repeater operation. Just dial in your receive frequency and the radio does the rest... Simplex repeater reverse
- Or do the same thing by plugging a single crystal into one of the 11 crystal positions for

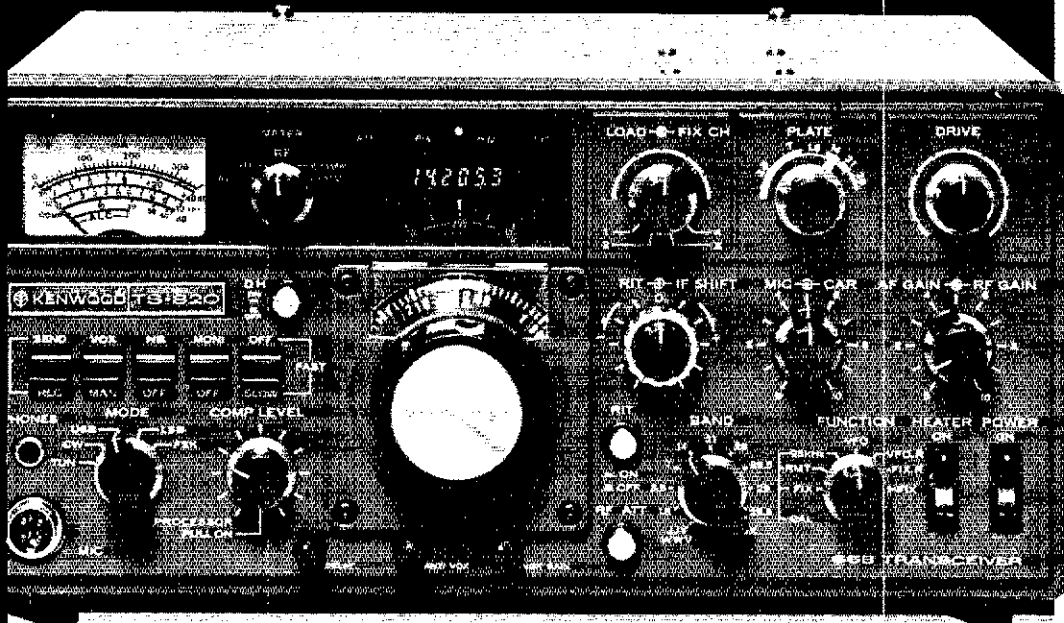
- your favorite channel
- Outstanding frequency stability provided through the use of FET-VFO
- Zero center discriminator meter
- Transmit/Receive capability on 44 channels with 11 crystals
- Complete with microphone and built-in speaker
- The TS-700A has been thoroughly field-tested. Thousands of units are in operation throughout Japan and Europe

The TS-700A is available at select Kenwood dealers throughout the U.S. For the name of your nearest dealer, please write.

MAX. FREQUENCY DEVIATION (FM):  $\pm 5$  kHz  
REPEATER FREQUENCY SHIFT WIDTH:  
600 kHz  
TONE BURST TIME: 0.5-1.0 sec.  
MODULATION: Balanced modulation for SSB  
Variable reactance frequency shift for  
Low power modulation for AM  
MICROPHONE: Dynamic microphone, 500Ω  
AUDIO FREQUENCY RESPONSE: 400-2600  
within -9 dB  
RECEIVING SYSTEM: SSB, CW, AM: Single-  
superheterodyne. FM: Double-  
superheterodyne.  
INTERMEDIATE FREQUENCY: SSB, CW, AM:  
10.7 MHz. FM: 1st IF: 10.7 MHz. 2nd  
... 455 kHz.  
RECEIVING SENSITIVITY: SSB, CW: S/N =  
dB or better at 0.25μV, 20 dB noise  
quieting = Less than 0.4μV. AM: S/N =  
10 dB or better at 1μV.  
IMAGE RATIO: Better than 60 dB  
IF REJECTION: Better than 60dB  
PASS-BANDWIDTH: SSB, CW, AM: More than  
2.4 kHz at -6 dB. FM: More than 12 kHz at  
-6 dB.  
RECEIVER SELECTIVITY: SSB, CW, AM: Less  
than 4.8 kHz at -60 dB. FM: Less than  
24 kHz at -60 dB.  
SQUELCH SENSITIVITY: 0.25μV  
AUDIO OUTPUT: More than 2W at 8Ω load  
(10% distortion)  
RECEIVER LOAD IMPEDANCE: 8Ω  
FREQUENCY STABILITY: Within  $\pm 2$  kHz du-  
ring one hour after one minute of warm-up  
and within 150 Hz during any 30 minute  
period thereafter  
POWER CONSUMPTION: Transmit mode: 9  
(AC 120/220V), 4A (DC 13.8V), max.  
Receive mode (no signal): 45W (AC 120  
/220V), 0.8A (DC 13.8V).  
POWER REQUIREMENTS: AC 120/220V,  
50/60 Hz. DC 12-16V (13.8V as referen-  
ce)  
DIMENSIONS: 278 (W) x 124 (H) x 320 (D)  
WEIGHT: 11 kg  
SUGGESTED PRICE: \$700.00

TRIO-KENWOOD COMMUNICATIONS INC.

# KENWOOD'S TS-820 *the Pacesetter*



**KENWOOD HAS ATTAINED A HIGHER LEVEL OF ACHIEVEMENT IN ITS TS-820 THAN EVER REACHED BEFORE. THE DISCRIMINATING AMATEUR WHO WANTS THE VERY BEST NEED LOOK NO FURTHER NOR WAIT ANY LONGER. THE TS-820 PACESETTER™ WILL PROVIDE SUPERIOR PERFORMANCE, VERSATILITY AND FEATURES FOUND IN NO OTHER TRANSCEIVER.**

**THE NEW "PACESETTER" IS THE ULTIMATE PROOF OF KENWOOD'S DEDICATION TO OFFERING ONLY THE VERY FINEST.**

What makes the TS-820 the Pacesetter: Full 160-10 band coverage, QRM-killing IF shift, true R.F. speech processor, husky AC power supply, state-of-the-art PLL VFO system, rugged final amplifier, RF negative feedback circuit . . . all this and more built in to make the TS-820 the Pacesetter that it is.

We haven't forgotten the other standard Kenwood features either . . . efficient noise blanker, 25 kHz calibrator, built-in speaker, CW Sidetone and semi-break-in circuits.

Let's take a closer look at some of these important features. This month the Digital Readout:

The Digital Display Readout directly

Indicates the transmit and receive frequencies by counting the carrier, VFO, and heterodyne signals. Unlike dials using a VFO signal only, it indicates the accurate frequency in any operating mode. The readout accuracy is determined by the standard 1 MHz oscillator which is calibrated to WWV. The counter actually figures the frequency down to 10 Hz and the digital display reads out to 100 Hz. Frequencies are displayed in Kenwood blue digits for long operation without fatigue.

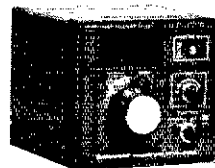
When the Digital Display is installed, the D.H. (display hold) switch is used as a memory device. By pressing the switch, the selected frequency will remain displayed.

## TS-820 Specifications

FREQUENCY RANGE: 1.8-29.7 MHz  
(160 - 10 meters)  
MODES: USB, LSB, CW, FSK  
INPUT POWER: 200W PEP on SSB  
160 W DC on CW  
100 W DC on FSK  
ANTENNA IMPEDANCE: 50-75 ohms, unbalanced  
CARRIER SUPPRESSION: Better than 40 dB  
SIDE BAND SUPPRESSION: Better than 50 dB  
SPURIOUS RADIATION: Greater than -60 dB  
(Harmonics more than -40 dB)  
RECEIVER SENSITIVITY: Better than 0.25uV  
RECEIVER SELECTIVITY:  
SSB 2.4 kHz (-6 dB)  
4.4 kHz (-60 dB)  
CW\* 0.5 kHz (-6 dB)  
1.8 kHz (-60 dB)  
\*(with optional CW filter installed)  
IMAGE RATIO: 160-15 meters: Better than 60 dB  
10 meters: Better than 50 dB  
IF REJECTION: Better than 80 dB  
POWER REQUIREMENTS: 120/220 VAC,  
50/60 Hz, 13.8 VDC (with optional  
DS-1A DC-DC converter)  
POWER CONSUMPTION: Transmit: 280 Watts  
Receive: 26 Watts (heaters off)  
DIMENSIONS: 13-1/8" W x 6" H  
x 13-3/16" D  
WEIGHT: 35.2 lbs (16 kg)

## Additional Features

**FINAL AMPLIFIER:** The TS-820 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 husky S-2001A (equivalent to 6146B) tubes. These rugged time-proven tubes are known for their long life and superb linearity. Tubes run cool with the aid of a noiseless fan (standard) mounted on the rear panel. The above tube and power combination minimizes the possibilities of TVI and helps to maintain the Kenwood reputation for excellent audio quality. Most modern SSB transceivers employ some type of ALC circuit in the final stage. The TS-820 uses R.F. negative feedback from the PA plate circuit to the driver cathode permitting a high degree of linearity at the high power level of the PA tubes. This accomplishes third order intermodulation products 35 db or greater below the output signal . . . you get one of the cleanest signals on the air today.



VFO-820

The VFO-820 is a solid state remote VFO designed exclusively for use with the Kenwood TS-820 Pacesetter. The VFO-820 has its own RIT circuit and control switch. It is fully compatible with the optional digital display in the TS-820. The perfect extra to any Pacesetter station.

### CW-820

500Hz CW Crystal Filter

### TV-502

The TV-502 transverter puts you on 2-meters the easy way. Simply plug it in to the TS-820 (or TS-520) and you're on the air. Operates in the 144.0-145.7 MHz frequency range with a 145.0-146.0 MHz option.

 **KENWOOD**  
... pacesetter in amateur radio

# Get twice the keyboard for your money.



The HAL DKB-2010 keyboard does double duty.

For the price of an ordinary keyboard, you can send both TTY and CW. At the flick of a switch, send TTY at all standard data rates, or perfect CW at 8-60 wpm. You get complete alphanumeric and punctuation keys, a "DE-call letters" key, even a "QUICK BROWN FOX..." diagnostic key for TTY. In both modes, you have a three-character buffer for bursting ahead (larger buffers available), and in the CW mode you can adjust the dot-to-space (weight) ratio to your liking.

Like all HAL products, the DKB-2010 is built to commercial standards—yet this solid-state unit is available at a price you'll appreciate. It's like getting two keyboards for the price of one.

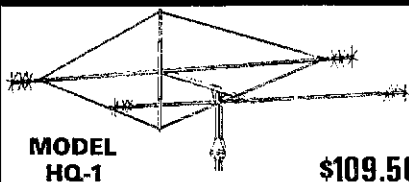
For all the details, write today. We'll answer you on the double.



HAL Communications Corp., Box 365, 807 E. Green St.  
Urbana, Illinois 61801 • Telephone: (217) 367-7373

## WANT SOMETHING REALLY SMALL AND EFFICIENT?

Then you want the antenna that's known around the world for its small size and superior performance...  
The Mini-Products Multiband HYBRID QUAD



MODEL HQ-1

\$109.50

- ELEMENT LENGTH - 11 ft.
- BOOM LENGTH - 54 INCHES
- WEIGHT - 15 POUNDS
- WIND SURVIVAL - 75 MPH
- BANDS COVERED - 6, 10, 15 & 20
- 1200 WATTS P.E.P.
- FEED LINE - 50 OHMS

Mini-Products, Inc.

1001 W. 18th St. Erie, Pa. 16502

If not stocked by your dealer order direct. We pay shipping in USA. Send for free catalog of other models and more data.

NJSN - 3730 8:15 Dy 30 165  
WA2WIW  
NJPN - 3950 6:00 Dy  
WB2VTT  
NJPN - 3950 9:00 AM Su  
WB2VTT  
SEC: WB2PBO. PAMS: WA2OPY (VHF) at  
WB2VTT. RMs: WA2WIW and WB2CST. Congratu-  
lations to WB2CST on making BPL and to WB2VTT  
WA2OSA WA2WIW and WB2CST on making t  
PSHR. New appointment, WB2CST as RM. P  
messages received from W2DED/2 W2EQK  
WA2DIW/2 K2YNT/2 K2GH/2 W2RU/2 W2GSA  
and WA2VY/2. The Morris and Farris Co. ARS  
groups put a combined effort together for FD with  
Ops and 3 Xmters. More of this should be done. T  
Novice station of the New Providence ARC broke t  
club Novice record with 177 QSOs on FD. Congratu-  
lations to WN2DLZ on passing his General. WA2BSU  
the new trustee of K2DEL. W2CVW has moved  
Eatontown. WA2GDR had Amateur Radio We  
proclamation signed by the Governor. K2QBW Oso  
DXCC total now 53. 00 reports from K2JFJ at  
WB2CST. OVS report from K2YFF. WB2KNS movo  
to Ocean and has second call of WA2FLB. Bewa  
contesters, WA2JOC purchased a new home with o  
acre in Hunterdon Co. and is planning his Antan  
Farm. The group at WA2RGV with an assist fr  
K2JAO added seven new Novices to the ranks dur  
the past year. Good luck to WB2CST the new N  
Mgr. for NJN and a big Thank You to WB2LCV t  
outgoing Mgr. I would like to inform everyo  
concerned that this report gets mailed out on the 7  
of each month. Please try to please try and g  
your reports in on time. All NCSs: please get yo  
reports to the Net Mgrs. promptly. Finally, thank y  
for welcoming me back as your SCM. We will try a  
give it our all as long as we have the job. Traff  
WB2CST 504, WA2DSA 205, AB2ASD 146, WN2P  
244, AA2WYI 72, AB2AT 12, WA2WVW 6  
AB2CLW 58, WB2RMK 53, WA2DIW 47, WA2SI  
34, WA2YWK 28, WAZCAK 19, WA2CYU 1  
WA2FLB 15, WA2RMZ 15, WB2VTT 15, WZZZ 1  
AA2CCF 12, W2SWE 12, WA2FUI 11, WZEP  
WN2DLZ 8, K2EPK 8, WB2KSN/2 8, WA2JOC/2  
W2ODV 5, WA2QJU 5, WB2TDI 5, WB2VVC/2 4.

### MIDWEST DIVISION

IOWA: SCM, Max R. Otto, W0LFF - SEC: W0LY  
PAM/VHF: AD0LKH, PAM/HF: W0AVW. Congr  
to W0EW for CW-DXCC. K0SVW for WA2  
W0HOG for DXCC. Humbolt welcomes WN0T  
and WN0TEJ. AD0LKH and WA0YXIM modified th  
FT226 to work Iowa City repair 28/88 now  
solid state. W0HOG has new position with Coll  
Radio Co. Congrats to W0SGP for becoming A  
vanced. The Ringgold Wireless RA is a duly affiliat  
society with 100% league membership. WA0CAE a  
W0RAA new ATCs in Mount Ayr area. KU0U  
appointed OVS. Yours truly gave 21 Novice exam  
K0IR first to apply for 00 Class V. could i  
more. WA0DXZ is keeping 2M hot with 12 over  
KLM up 60 feet, and new pre-amp in his FT221.  
will have a kw on 2M soon. W0QGF has no  
forty-elements up 75-ft. on 145.1 W0QUP gave  
Novice exams. Three hams under one roof in I  
Dodge. The fourteen year old son of WA0VZG a  
WA0VZH has become WN0TMW. Any chance of r  
using the ant. tonight folks. K0EVC near Storm La  
W0EMA near Coralville, W0NLK near Woodbur  
W0EJA near Jamaica, W0JV near Iowa City, W0C  
and WA0YAK near Dubuque were heard from on F  
K0IR has new Drake C line. AB0HOX says DTF  
heard from Iowa 42 times via WA0UX. K0LL  
received the annual QLF certificate for sending go  
cw with his left foot.

Net - Freq.	Time/Days	Sess.	QNI Q
IA 75M	1730 M-S	26	1603
WA0VZH	2330/	59	323
Tall Corn - 3560	0300 Dy		
K0AZJ			

Traffic: (June) WA0AUX 192, K0AZJ 119, W0TG  
96, W0YLS 82, K0EVH 60, WA0LKM 28, W0MC  
16, W0AVW 9, W0LFF 8, W0BW 5, W0FHE  
AD0LKH 2. (May) W0YLS 36, WA0YJW 6.

KANSAS: SCM, Robert M. Summers, K0BFX - RM  
K0MRI. PAMS: WA0SEV WB0BCL. VHF PA  
WA0EDA. Another FD has come and gone. P  
messages received from K0NL/0 AA0TKJ/0 W0SCE  
W0N1/0 W0KQL W0K9/0 W0EWH/0 W0EWH/0  
W0M1/0 WA0WB/0. If your Club Group originated  
message and it is not included in this report, it is th  
to check on your relaying station to find out where  
got side tracked. Congrats to all for another year  
fine participation. Don't forget QKS-55-KS slow spee  
net now operating daily 3735 kHz at 8 P.M. loc  
one. WA0VXY Net Mgr. Zone EC and ARPS  
memberships will hereby be informed that effectiv  
July 24, 1976, KS will have a NEW SEC - W  
Bemmel's W0KL, 40 Rockwood Drive, Ottawa, I  
66047. I am sure he is looking forward to serving y  
in his new effort towards Emergency Communica-  
tions. This month only Zones 4, 5B, 7, 13 report  
activity. June '76 Net Reports, and M0QK Q  
425, QTC 154, K0MRI; K5BN, 883/121, WA0SE  
KPN, 149/5, WA0SEV; CSTN, 778/59, WA0QM  
HBN, 254/40, K0DSG; KWN, 514/22, WA0LB  
Congratulations to W0JFJ on earning his EE at F  
and is now working for Bendix Corp. Traff  
WA2VEN 209, WB2R 199, WB2H 94, W0RKH 6  
WA0LBB 68, K0MRI 67, W0CH 63, W0RBS 3  
W0CYH 60, W0BML 59, W0BLKA 56, K0BFX 5  
W0GCJ 46, W0KDE 38, WA0SEV 37, W0RBO 2  
W0BLJ 15, WA0GSG 9, K0FPC 8, WA0KVP  
W0NYG 8, W0OCK 8, WA0YML 8, WA0DWH  
W0KL 4.

MISSOURI: SCM, L. G. Wilson, K0RWL - Asst. SC  
Joe Flowers, W0OTF. SEC: W00DBW. Congratu-  
tions to Novices WN0TMS WN0TSC and K0MFA  
passing Advance Class exam. Univ. of MO  
Rolla Club Station now has two complete five ban  
one kw stations operational. K0SGJ and W0M1  
have new antenna systems operational at this t  
Good news that K0YMU is home from the hospi  
and recuperating well. W0MFM and W0AVN h  
joined the ranks of Silent Keys. Their absence will  
greatly felt. MO and DA reports for June 1976  
were received from K0LR/0 W0BRN/0 and W0N2  
Net QNI QTC Net QNI Q  
MOSSBN 1103 138 INF\* 10  
MON 191 107 MON 2 129  
SCEN 139 8 MSN 124  
\*Indian Foot, Hills net, Amateur Radio Telegra  
Society (ARTS) new monthly 7103 kHz, da  
1300Z to 1900Z for traffic and emergencies f  
further information concerning ARTS cont  
WA0OCL. Very fine turn out of 100 plus at MOSS

# INTER MOD? SELECTIVITY? NUMBER OF CHANNELS?

Virtually  
None!  
Really  
Super!  
1 to 22

The GTX-202 is Adaptable Anywhere  
—at Half of the Price of Synthesis—  
SO, Buy Now at Low Acquisition Cost,  
and Add Crystals Later as You Want  
or Need Them



## Check these outstanding Features:

- Massive heat sink to maintain power over prolonged transmissions
- 30 watts (nom.) output
- 8-pole crystal filter
- 15-pin accessory jack
- Dual-gate MOSFET front end

Same Circuitry as used in Genave's famous Land Mobile transceivers...  
Manufactured in America by the same Government-Inspected facility that produces high quality reliable communications and navigations for marine and aircraft industries.



Be sure to look for  
the **MADE IN USA** tag.

4141 Kingman Dr., Indianapolis, IN 46226  
Phone-in orders accepted (317-546-1111)

NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_ CITY \_\_\_\_\_  
STATE & ZIP \_\_\_\_\_ AMATEUR CALL \_\_\_\_\_

## SPECIFICATIONS:

### GENERAL:

Front Panel Size: 6 1/2" x 2 1/2"  
Over-all Dimensions: 10 1/2" deep x 6 1/2" wide x 2 1/2" high  
Components: 13 Transistors, 10 Diodes, 6 FETS, 4 ICs  
Frequency Range: 144 to 148 MHz  
Number of Channels: 20 plus 2  
Weight: Approximately 6 lbs.  
Power Supply: 13.75v DC system, negative ground

### RECEIVER:

Sensitivity:  
12 db SINAD: .25 Microvolt  
Selectivity: ±7.5 KHz, @ 6 db or less  
Squelch Threshold: 0.1 Microvolt  
Modulation Acceptance: More than 5 KHz  
Adjacent Channel Rejection: More than 85 db (±30KHz)  
Intermod response: More than 70 db  
Image Responses: More than 70 db  
Spurious Response: More than 70 db  
Audio Output Power: 4 Watts at less than 15% distortion (5 Watts Max)  
Frequency Stability: ±.001%  
Circuit Type: Double conversion, Superheterodyne, Crystal Controlled, 8 Pole Crystal Filter  
Intermediate Frequencies: 10.7 mHz  
1st IF; 455 KHz 2nd IF  
Current Drain: (Squelched) .2 Amps.  
FCC Certified: Part 15, subpart C

### TRANSMITTER:

Power Output: Hi: 30 Watts nom., 25 Watts min., @ 14v DC input  
Lo: 1 Watt @ 14v DC input  
Output Impedance: Matches standard 50 Ohm amateur antennas  
Frequency Stability: ±.001%  
Audio Modulation Deviation: Adjustable to 10 KHz max. (Factory set to ±5 KHz)  
Current Drain: Hi. 6.0 Amps. Lo 1.7 Amps.

## Use This Handy Order Form

- GTX-202 2-Meter FM 22 Channels **\$239<sup>95</sup>**
- Ringo Ranger ARX-2 6 db 2-M Base Antenna @ \$29.95 \$ \_\_\_\_\_
- Lambda/4 2-M and 6-M Trunk Antenna @ \$29.95 \$ \_\_\_\_\_
- TE-I Tone Encoder Pad for plug-in installation on most amateur transceivers @ \$59.95 \$ \_\_\_\_\_
- TE-II Tone Encoder Pad for installation on most Hand-Helds @ \$49.95 \$ \_\_\_\_\_
- PS-1 AC Power Supply for use with all makes of transceivers 14 VDC-6 amps @ \$69.95 \$ \_\_\_\_\_
- and the following standard crystals @ \$4.50 each \$ \_\_\_\_\_  
Non-standard crystals @ \$6.50 each: \_\_\_\_\_ \$ \_\_\_\_\_

### Payment by:

- Certified Check/Money Order  Personal Check  
 C.O.D. Include 20% Down

Note: Orders accompanied by personal checks will require about two weeks to process.

20% Down Payment Enclosed. Charge Balance To:

- BankAmericard # \_\_\_\_\_ Expires \_\_\_\_\_  
 Master Charge # \_\_\_\_\_ Expires \_\_\_\_\_  
 Interbank # \_\_\_\_\_ Expires \_\_\_\_\_
- IN residents add 4% sales tax: } \$ \_\_\_\_\_  
CA residents add 6% sales tax: } \$ \_\_\_\_\_

All orders shipped post-paid within Continental U.S. (allow 8 weeks delivery.)

Add \$4 per Radio for Shipping, Handling, and Crystal Netting.

QST 9

CLIP OUT AND ORDER NOW

CLIP OUT AND ORDER NOW

MAKE  
PROFESSIONAL LOOKING  
P.C. BOARDS FAST  
AND EASY

**STAMP-IT  
ETCH-IT**



Reduces Printed Circuit Board Art Work From 2 Hours to 10 Min. . .

Simple as A.B.C.

A. Stamp Components on P.C. Board. B. Use Pen to Interconnect Lines. C. Etch Board.

- SENSATIONAL
- REVOLUTIONARY
- FANTASTIC

SEE  
MAY, 1975  
QST (page A2) NEW  
PRODUCTS  
REVIEW

**SE-2 KIT CONTAINS:**

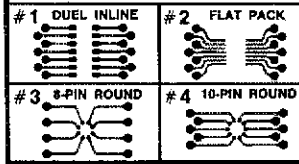
- CONNECTOR FINGERS
- 14 PIN DUEL IN LINE IC SOCKET
- 18 PIN ROUND IC SOCKET
- 8 PIN ROUND IC SOCKET
- TO-3 TRANSISTOR SOCKET
- TO-18 TRANSISTOR SOCKET
- LARGE & SMALL DONUT PAD
- RESIST INK
- INK PAD
- RESIST PEN

**ONLY \$9.95**

PLUS 1 LB. POSTAGE

**ADDITIONAL STAMPS:**

Bread board stamps for all integrated circuits "Grew" for experimenters.  
Only \$2.95 each or all four \$9.95



- RESIST INK... 95c per bottle
- RESIST PEN ea. 95c
- INK PAD ea. \$1.15
- Etching Containers . . . 10 for 95c

**RAINBOW INDUSTRIES**

P. O. BOX 2366 — DEPT. T8  
Indianapolis, Indiana 46206

IC-40 14 PIN DIP IC SOCKET \$4.95  
IC-36 16 PIN DIP IC SOCKET \$4.95  
IC-28 18 PIN DIP IC SOCKET \$4.95  
IC-24 14 PIN DIP IC SOCKET \$4.95  
IC-18 16 PIN DIP IC SOCKET \$4.95  
IC-16 18 PIN DIP IC SOCKET \$4.95  
IC-14 14 PIN DIP IC SOCKET \$4.95  
IC-8 18 PIN DIP IC SOCKET \$4.95

FOR COMPLETE KIT ORDER SE-2 KIT \$29.95

LOW PROFILE IC SOCKETS		WIRE WRAP	
EA	10	EA	100
8	1.17	3.53	\$14.45
14	.20	1.80	17.00
16	.22	1.98	18.70
18	.29	2.61	24.65
24	.38	3.42	32.30
28	.45	4.05	38.25
36	.63	5.67	53.95

Sold for our CATALOG...

**COAX CONNECTORS**

- PL 259 . . . . .55
- SO 239 . . . . .50
- PL 258 BARREL . . .1.15
- DOUBLE MALE . . .1.75
- M 358 'T' ADAPTER 2.95
- M 359 RIGHT ANGLE 1.49
- UG 175/U RE-DUCER (RG58/U) . . .25
- UG 176/U RE-DUCER (RG59/U) . . .25
- PL 259 P.O. (PUSH ON TYPE) . . . . .1.25
- UHF F to MOTOROLA M . . .1.50
- UG 255 BNC.M to UHF.F . . . . .2.95
- UG 273/U UHF.M to BNC.F . . . . .1.95
- UG 260B/U BNC CABLE END . . . . .1.15
- UG 274C/U BNC 'T' ADAPTER . . . . .2.45
- UG 306B/U RIGHT ANGLE . . . . .1.75
- UG 491B/U DOUBLE MALE . . . . .2.45

**PRINTED CIRCUIT BOARDS**  
G-10 FIBERGLASS

Size	1 Side	2 Sided
2"x 4"	.25	.35
2"x 6"	.35	.45
3"x 6"	.50	.65
4"x 6"	.65	.90
6"x 6"	.90	1.35
6"x 12"	1.50	2.50
12"x 12"	2.95	3.95

**QUANTITY DISCOUNT**  
(same size)

10 to 24	10%
25 to 99	15%
100 up	25%

\$5.00 Minimum Order  
PLEASE ADD POSTAGE

**FAN (MUFFIN TYPE)**



Rotron Mfg. Mod. MU2A2. 4 1/4" Square, no bezel. 80 CFM, Whisper Quiet, 115 VAC. 60 cy. BRAND NEW. \$9.95 ea.

**STEREO PREAMPS**



High Quality Module Type, wires easily into existing stereo where an equalizer pre-amp state is required, can be used in magnetic cartridges, tape decks, or heads, low impedance microphones, etc. 12 V power source. 20 to 20 KHZ Frequency response, very sensitive. 3"x4 1/4" 1/2" BRAND NEW WITH SCHEMATIC. LIMITED QUANTITY— 3 for \$2.00 — 10 for \$5.00.

**VIDEO PREAMPS**



Originally made for CARTAVISION VIDEO TAPE SYSTEM. Has many uses. 2/51 — 10/\$4

**3" CRT TUBES**

3EPI  
NEW GUARANTEED  
\$3.95 ea.—4/\$10.00

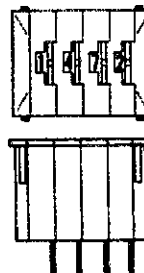
**DESOLDERING IRON**



Mfgd. by leading company (in U.S.A.) in the soldering tool field. These units are NEW! Slight plating blemish prevents factory from marketing. A 40 watt unit which may be used for soldering as well as desoldering. WE GUARANTEE!!  
ORIGINALLY SELLS FOR \$16.95  
PRICE \$8.95 each  
(Limited inventory)

**THUMBWHEEL SWITCHES**

**MODEL MF**  
FRONT MOUNTING SWITCH



BOARD CODE	DESCRIPTION	MF
12	10 Pos. Decimal, 1 Pole	\$3.25
12A	10 Pos. Decimal, Ext. Bd.	3.85
13	10 Pos. Decimal, 2 Pole	4.35
14	10 Pos. BCD Comp. Only	2.95
14A	10 Pos. BCD Comp. Ext. Bd.	3.45
21	10 Pos. BCD Only	2.70
21A	10 Pos. BCD, Ext. Bd.	3.15
22	10 Pos. BCD, + Comp.	4.45
22A	10 Pos. BCD, + Comp., Ext. Bd.	5.30
48	11 Pos. Decimal	4.10
55	16 Pos. Decimal	N/A
S7	16 Pos. BCD + Comp.	N/A
S7A	16 Pos. BCD + Comp., Ext. Bd.	N/A

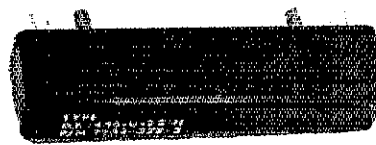
**ACCESSORIES**

End Plates	1.00
Divider Plate	1.50
Blank Body	.50

**Low-Cost Mechanical Filters**

**SAVE\$ — BUY FACTORY DIRECT**

CENTER FREQUENCIES of 455Khz or 500 Khz with standard band widths available from 500 hz to 12 Khz.



A new low-cost 6 KC mechanical filter designed for AM applications — especially for use in citizens band radio equipment —

DF 2850-AY17-B @ \$49.50 ea. for a limited time only.

**SPECIFICATIONS**

- Center frequency . . . . . 455 KC nom.
- Frequency Response
- Bandwidth, 3 db attenuation . . . . . 6 KC nom.
- Bandwidth, 60 db attenuation . . . . . 20 KC nom.
- Resonating Capacity . . . . . 130 pf nom.
- DC Voltage: 300 VDC maximum potential between terminals and ground.
- Source and Load Impedance
- Parallel Resonance (ohms) . . . . . 60 K nom.
- Series Resonance (ohms) . . . . . 500 nom.

**WHY USE MECHANICAL FILTERS?**

- Greater Selectivity — Q's of 6,000 to 10,000 up 120 times greater than conventional filters
- Flat Topped Response — 60 to 6 db shape factor lower than 2 to 1
- Electrically and Mechanically Stable — Freq.-shift of a typical mechanical filter is less than 2 parts per million/degree C
- Size — Typical size of a mechanical filter is 1/4 cubic inch

**DITTMORE-FREIMUTH CORPORATION**

2517 East Norwich Avenue • Milwaukee, Wisconsin 53207 • (414) 483-5100



# FIRST

Make this comparison:

The GTX-I gives the high quality performance that compares with Motorola, GE, RCA or any other hand-helds that sell for \$700 or more.

# THEN

Check these features:

Small: only 8"x2.6"x1.28" ... Appearance: slim silhouette all black metal ... Serviceable: easy access to separate receive and transmit circuit boards ... PLUS: 6 pole xtal filter for superlative receiver operation ... and: trimmers on receive and transmit xtals: standard 10.7 MHz 1st IF.

and specs:

Rec. Sens.:  $.2\mu\text{V}$  for 12 db SINAD ... Adjacent channel rejection:  $\pm 30$  kHz 55 db ... Spur. Resp.: more than 65 db ... Audio Output: 500 mw ... Power output: Hi 3 w, Lo 1 w ... Audio Quality: Distortion free, crisp, clear receive and transmit.

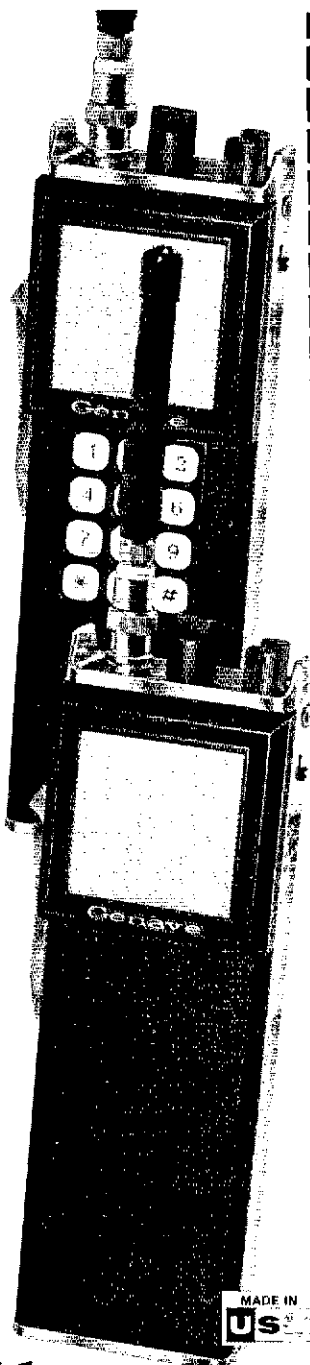
# NOW

Look at the Price:

**GTX-1**  
2 Meter 6 channel  
Hand-Held  
(without encoder)  
**\$249<sup>95</sup>**  
(Bat. Not Incl.)

**GTX-1T**  
with Built-In  
Tone Encoder  
**\$299<sup>95</sup>**  
(Bat. Not Incl.)

GENAVE stocks most common 2-M Xtals for immediate delivery



MADE IN US

Use This Handy Order Form

4141 Kingman Dr., Indianapolis, IN 46226  
Phone-in orders accepted (317+546-1111)

NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_ CITY \_\_\_\_\_  
STATE & ZIP \_\_\_\_\_ AMATEUR CALL \_\_\_\_\_

CLIP OUT AND ORDER NOW

GTX-200-T

2-meter FM, 100 channel combinations, 30 watts with factory installed tone encoder (Incl. 146.94 MHz)



**\$249<sup>95</sup>**

GTX-200

2-meter FM, 100 channel combinations, 30 watts (Incl. 146.94 MHz)



**\$199<sup>95</sup>**

GTX-10-S

2-meter FM, 10 channels, 10 watts (Xtals not included)



**\$149<sup>95</sup>**

GTX-2

2-meter FM, 10 channels, 30 watts with push-button frequency selector (Incl. 146.94 MHz)



**\$189<sup>95</sup>**

GTX-I

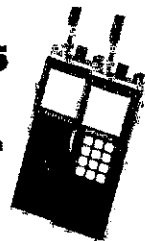
2-meter FM, 6-channel, 3.5 watts Hand-Held

**\$249<sup>95</sup>**  
(Bat. not incl.)

GTX-1T

Same as GTX-I, plus Factory installed Tone Encoder

Operate Auto Patch  
**\$299<sup>95</sup>**  
(Bat. not incl.)



Ringo Ranger ARX-2 6 db 2-M Base Antenna @ \$29.95 \$ \_\_\_\_\_

Lambda/4 2-M and 6-M Trunk Antenna @ \$29.95 \$ \_\_\_\_\_

TE-I Tone Encoder Pad for plug-in installation on most amateur transceivers @ \$59.95 \$ \_\_\_\_\_



TE-II Tone Encoder Pad for installation on most Hand-Helds @ \$49.95 \$ \_\_\_\_\_

PS-1 AC Power Supply for use with all makes of transceivers 14 VDC-6 amps @ \$69.95 \$ \_\_\_\_\_

and the following standard crystals @ \$4.50 each \$ \_\_\_\_\_  
Non-standard crystals @ \$6.50 each: \$ \_\_\_\_\_

### ACCESSORIES FOR GTX-1 and GTX-1T

- PS-18 Optional Nicad battery pack \$29.95 \$ \_\_\_\_\_
- PS-2 Charger for GTX-1(T) battery pack \$39.95 \$ \_\_\_\_\_
- GLC-1 Leather carrying case \$12.95 \$ \_\_\_\_\_
- TE-III Tone Encoder (for use with GTX-1) \$49.95 \$ \_\_\_\_\_

Add \$4 per Radio for Shipping, Handling, and Crystal Netting.

Payment by:

- Certified Check/Money Order  Personal Check
- C.O.D. Include 20% Down

Note: Orders accompanied by personal checks will require about two weeks to process.

20% Down Payment Enclosed. Charge Balance To:

- BankAmericard # \_\_\_\_\_ Expires \_\_\_\_\_
- Master Charge # \_\_\_\_\_ Expires \_\_\_\_\_
- Interbank # \_\_\_\_\_ Expires \_\_\_\_\_

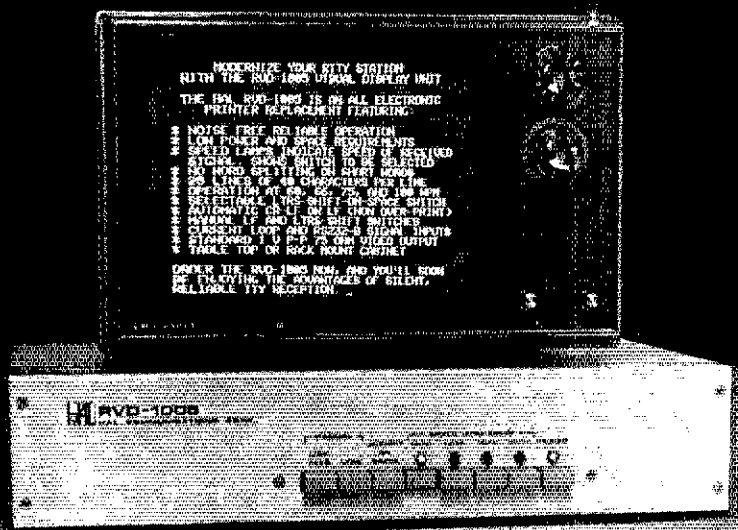
IN residents add 4% sales tax: \$ \_\_\_\_\_

CA residents add 6% sales tax: \$ \_\_\_\_\_

All orders shipped post-paid within continental U.S. (allow 8 weeks delivery.)

QST

# The HAL RVD-1005 video TTY unit puts all these features in the picture.



Picture the HAL RVD-1005 video TTY unit in your station. And start enjoying silent, trouble-free TTY reception.

The RVD-1005 converts the output of any TU into a clear, easy-to-read TTY video readout. The output signal can be fed to a TV monitor—like the RVD-2110 monitor shown—or, with slight modification, any standard TV receiver. The features speak for themselves. We've included everything the serious amateur requires for TTY receiving at its best.

Best yet, the RVD-1005 is built to commercial standards, yet is priced at a level the amateur TTY enthusiast will find very affordable.

For an in-depth picture, write today for complete information.



HAL Communications Corp., Box 365, 807 E. Green St.  
Urbana, Illinois 61801 • Telephone: (217) 367-7373

## amateur radio commemorative stein

(this is a limited first edition and a collectors piece)



Featuring a unique 3 color design including a 14K gold rim. This 20 oz. stein suitable for drinking is of superb quality. Limited production of 1000.

\$8.95

Personalized with call letters \$11.95

Other items available:

Belt Buckle 9.95  
Ladies Pendant 8.95  
Key Chain 4.95

Mail Check or Money Order To:  
Rusprint • P.O. Box 7575 • Kansas City, Mo. 64116

picnic in Jefferson City. New MOSSB officers for the coming year are WRBND, net mgr.; WBLRX, asst. net mgr.; KGAFF, secy./treas.; WBERI, editor. Current rig problems are being encountered by your SC along with a demanding vacation and work schedule. Thanks to WBOLFY for routing all traffic to me this month. Traffic: W0HH 202, W0TTF 121, W0NUJ 112, W0BY 109, W0BLMW 59, W0AFMC 59, W0AEMX 54, W0BNX 48, W0B0EC 43, W0B0E 48, K0RWL 36, W0B0LY 30, W0B0NE 28, W0BOCI 21, W0OUD 19, W0RVL 14, W0M0F 14, AB0LR 12, W0OQD 11, W0EPI 10, AA0FKD 9, K0AHL 8, W0EEF 4.

**NEBRASKA:** SCM, Dick Dvas, WRJCP -- SEC WA0ASM. W0VYV received his 50-yr. certificate. Q thanks to the many members on the Roseburg, O repeater, WR7AGX who assisted W0GEQ on his recent trip to OR. All reports indicate that the majority of the Radio Clubs had a good turn out for Field Day 15, 10 & 6 meter openings sure helped to pile up score. The AK-SAR-BEN Radio Club not only had a battle with the water bug had to send operators to Minden, IA to provide emergency communications for that town after it was severely damaged by a tornado. Net Reports: NSN 1, QNI 974, QTC 32; NMM QN 1111, QTC 46; WNN Wx net, QNI 384, QTC 3; ARE net, QNI 154, QTC 3; Afternoon Net, QNI 71; QCVW QNI 55; CHS, QNI 1054, QTC 3; NSN II, J04 422; QTC 23; 2-mtr AREC net, QNI 200, QTC 2; Sandhills WX net, QNI 77, QTC 1. Traffic: W0MW 7; W0SGA 40, W0VEA 31, W0HOP 28, K0SFA 21, W0GKK 27, W0JDI 27, W0JCP 20, W0QEX 20, W0VYX 16, W0PCC 14, W0FGB 10, K0HNT 1, K0DCW 7, W0DM 5, W0GEG 4, W0NIK 4, K0PJ 3, W0GHZ 3, W0JUN 3, W0AEC 2, W0AFV 3; W0B0MQ 2, W0YFR 2, K0BAB 1, W0DQX 1; W0GAK 1, W0LOY.

### NEW ENGLAND DIVISION

**CONNECTICUT:** SCM, John McNassor, WIGVT. SEC: WIDGL. RM: K1EIR. PAM: K1EIC. VHF PAM: WA1ELA.

Net - Freq.	Time/Days	Sess.	QNI	QTC
CN - 3640	1900/2500 Dy	60	358	29
CPN - 3965	1800 M-S	30	574	26
	1000 Su			

VHF-2 - 2K/88 2130 DY  
High QNI: CN - W1CTI and WA1GFH. CPN - WINQO WA1UOT WA1TCWEM in July QST - C Section was outstanding, thanks to all Directors. W1HHR reminds clubs to be sure of affiliation with ARRL and to be aware of the new Training Program. Field Day must have been the biggest ever, but we'll bill next year. Amateur Radio is growing at a rapid pace and your ARRL is showing and leading the way. Stamford ARA provided week-long Amateur Radio demonstration and display during Carnival. CD Bulletin explain appointment. Class Q on 10/10. VHF only and includes Field and Conditional Class licensees, see also the new SCM Election procedure which will be much better for all who are interested. WA1ELA VHF PAM extends thanks to all for over 500 QNTs during May on VHF 2 Traffic Net on 28/8. Congratulations to WA1UAX for June BPL number in a row and all over 500 Points! In making plans for the coming season, encourage others to join you in providing traffic outlets and AREC participation for your area. Hope your vacation was wonderful and that at least part of your contribution to the Bicentennial Celebration will include assisting one new amateur and providing one new member for ARRL Traffic: JUNE WA1UAX 17, WA1GFH 17, W1EFP 22, WA1WEM 162, WA1UOT 117, WA1RA 9, WA1RUR 81, W1CTI 80, WA1W 79, WN1VGP 5, WA1RZA 42, WA1KN 40, WA1VEN 38, W1GVT 30, WA1UHN 32, K1SRF 24, W1BDN 19, W1BCG/I 1, W1BDI 9, WA1VEN 38, W1GVT 36, WA1UHN 33, K1SRF 24, W1BDN 19, W1BCG/I 11, W1BDI 9, W1WVK 7.

**EASTERN MASSACHUSETTS:** SCM, Frank Baker. WA1ALP - K1UQA member of EGAC. SEC: W1AOC. New ECs: W1AYG for Hingham, W1LRM Harwich. Need more ECs. Write me or W2AOG. WA1TB ne ORS. Endorsements: K1BJZ K1EPL as OBSS; W1EY CO; W1LE EC for Greater New Bedford area; W1ZX Silent Trip to Sweden. W1CAN had 32 QTC. 88 QNI for May. W1TFP moving to Halifax, MA. W1GXT on 6, now in Wayland and went to ZF1-Lan on honeymoon. I received many FD messages. Lexington ARC now affiliated with ARRL. Pilgrim ARC has call WA1YFV. WA1ATL has General. W1N1YDQ ne in Hanover. Q1AOK & W1WAY visited W1M1W. W1N1F received his 60-year GCWA certificate. WA1PGY mgr. of the First Region Net (daytime). ARRL's NTS. Lets all originate some good traffic each week. NEEP had 59 QNTs, 10 QTC. WA1UR EC for Seekonk, WA1TCF asst., will be at W1MX in Sep. Officers of Arlesley: W1HVS, pres.; W1HVS, pres.; WA1HGA, vice-pres.; WA1TB, treas.; WA1UT, secy.; Tim McNamara, rec. secy. Officers of Quannawitt RA: K1NKA, pres.; W1PIN, vice-pres.; K1ZQI, secy.; W1QXS, treas.; W1N1N WA1FYN WA1AER dir.; they held their annual banquet and Father Day WA1HW was the speaker. WA1GQV was in the hospital. Officers of N1MRA: W1AFC, pres.; K1UAC, vice-pres.; K1YKB, secy.; W1ZYB, clerk; W1CMM W1WSN, dir. WA1TOW in EMRI. Bellingham AREC helped out in Centennial. WA1PAZ on 450 with a HT-200, WN1WMZ, pres.; WA1TCQ, vice-pres.; W1KEN, NURC. WA1MKB & W1JFH have TS-520 and on 10 CW. W1B has new 7th in NB. W1IO has RTTY. K1JGV has SW350. W1JW low band. WA1MKP still a sick man. K1UYF new job in TU. K1YOT at Tech. School in Sunapee, NH. W1U renovating shack. W4K171 on the Cape, also W1AL. K1CLM had their 25th anniversary and W1ALP had their 45th. W1LE took part in "All Snips Operation" Newport. Red Cross on 6 + 2. Officers of Chelmsford ARA: WA1TG, pres.; WA1QVM, vice-pres.; WA1EMN, treas. WA1TN has a new Drake C-line. On Chelmsford ARA FD, W1JAA manned the Oscar station for contacts with France and Netherlands. WA1URK working on Westford's "PART" program. Officers of MA Chapter 1A1AC: K1YBS, pres.; WA1VQ, vice-pres.; W1DKAS, secy.; WA1EZA, awards custodian; K1IEQ, trustee. Massachusetts ARA had a "MINI" Auction. W1OW has a Drake SSR-1 revr. WA1MHJ trustee for Norwood AREC. W1GKN has a new QTH. CW practice on the Dedham repeater #1-21 at 7 P.M. on Mon, Wed, & Sat. night. K1LH has SB200 linear, WA1DHM & DH week in Bermuda, they are officers of Whitman ARC: W1GJK, pres.; WA1EFR, vice-pres.; K1YBS WA1DUZ, board. K1PNB busy man between lodge, Repeater Assn. and AREC. I have appointed WA1OW as my Asst. SCM. EMRIPN had 422 QNTs, 78 QTC. EM2MN QNI 51, 17 QTC. NENN, QNI 8.

When you step up to big power we've got the block-buster linear amplifier that will give you a full 2000 watts P.E.P. — all the law allows — with the features you need for a clean signal with great linearity.

It's the Swan Mark II, an amateur radio standard for top power single sideband rigs. One-hundred watts of drive is all you need to go all the way on all bands from 10 to 80 meters. And with the Mark II, the price includes the separate, matching power supply. Both RF deck and power supply are forced-air cooled with high-volume, low-RPM, low-noise blowers.

But if you prefer finesse to force, our

Cygnets 1200X is your ticket to new kicks in amateur radio. Linearity is excellent, efficiency is exceptionally high, power supply is built in, and features like provision for external ALC give you the flexibility you want to get the most out of your rig on all bands.

And there's more to come: The Swan Cygnets 1200X gives you a solid 1200 watts P.E.P. on single sideband — as much power as most people ever need — and you come away with your pockets bulging with change.

Whether you do it by force or finesse, seize power today with a Swan linear amplifier. You can get it with a Swan credit card. Applications at your dealer or write to us.

Mark II 2000-watt linear amplifier with 120/220V power supply. . . . . \$849.95  
 Cygnets 1200X 1200-watt linear amplifier complete with built in 110/220V power supply. . . . . \$349.95

(Prices FOB Oceanside, CA)

Dealers throughout the world

 **SWAN**  
**ELECTRONICS**  
 A subsidiary of Cubic Corporation  
 305 Airport Road, Oceanside, CA 92054  
 (714) 757-7525

# WHETHER YOU GO FOR POWER OR FINESSE, SWAN LINEARS ARE THE WAY TO GO.



**W**

*Wilson Electronics Corp. FALL SPECIALS*

# SUPER FINE - 2 METER MOBILE . . . 24 CHANNEL • 10 WATT

PRIORITY CHANNEL "CALL BUTTON" • MODULAR CONSTRUCTION

## 10 DAY MONEY BACK GUARANTEE



MODEL WE-224 144 - 148 MHz

Only **\$199<sup>95</sup>**

thru Sept. 30, 1976

- \* LO POWER ADJUSTABLE: 0.5 WATTS
- \* TYPICALLY .3 μV SENSITIVITY FOR 20 dB QUIETING
- \* BUILT-IN ADJUSTABLE TONE BURST w/FRONT PANEL SWITCH
- \* TRIMMER CAPS FOR BOTH RECEIVE AND TRANSMIT XTALS
- \* USES SAME XTALS AS THE HAND HELD UNITS
- \* MOSFET FRONT END - HELICAL RESONATOR
- \* HIGH VSWR & REVERSE B+ PROTECTION CIRCUITS
- \* BUILT-IN SPEAKER WITH EXTERNAL, MINI PHONE JACK
- \* FILTERS: 10.7 MONOLITHIC & 455 kHz CERAMIC
- \* 10 FEET OF FUSED POWER CABLE WITH LIGHTER ADAPTER
- \* EXTRA FUSES, MOUNTING HARDWARE, BRACKET, 500 OHM MIKE, DIDDLE STICK, & 34 PAGE MANUAL
- \* SIZE: 6.6 x 2.5 x 9.5 in.      \* WEIGHT: 5.5 lbs  
2.5 x .98 x 3.7 cm      \*      2.5 kg
- \* CURRENT @ 12.6 VDC      RECEIVE: 45 mA  
   TRANSMIT: 750 mA  
   @ 1 WATT, 2.6A @ 10 WATTS
- \* 90 DAY WARRANTY & 10 DAY MONEY BACK GUARANTEE
- \* COMES COMPLETE. READY TO OPERATE ON 146.52 SIMPLEX
- \* YOU CAN PURCHASE EXTRA XTALS (TX or RX) FOR \$3.75 ea.
- \* FOR \$7.50 EXTRA, WE'LL PUT ALL THE XTALS ON FREQUENCY!

## 220 and 450 HAND HELDS

- SWITCHABLE 1 - 2.5 WATT (1 & 1.8W ON 450)
- 6 CHANNEL - ALL PLUG-IN XTALS WITH TRIMMERS ON BOTH TX & RX CRYSTALS
- 12 kHz CERAMIC FILTERS • BATTERY INDICATOR
- HAS .3 μV SENSITIVITY FOR 20 dB QUIETING
- 10.7 & 455 kHz IF ON 220 (21.4 & 455 kHz ON 450)
- CURRENT: 14 mA RX, 500 mA TX ON BOTH MODELS @ 12.0 VDC
- MICROSWITCH PTT BUTTON
- WEIGHT IS LESS THAN 22 OUNCES (w/o NI-CADS)
- SIZE IS 8.9" x 1.7" x 2.9"
- UNBREAKABLE LEXAN® CASE
- BOTH UNITS USE THE SAME ACCESSORIES AS THE 2-METER 1402 & 1405 HAND HELDS
- OPTIONAL 12 BUTTON TOUCH-TONE PAD AVAILABLE
- COMES COMPLETE w/RUBBER DUCKIE, NI-CAD CASE, (223.50 INSTALLED OR 446.00 ON THE 450)



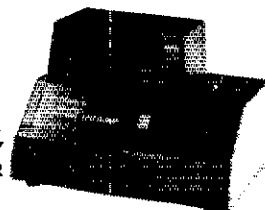
- \* 220 MHz MODEL 2202SM - \$239.95
- \* 450 MHz MODEL 4502SM - \$279.95

90 DAY  
WARRANTY  
10 DAY MONEY BACK  
GUARANTEE

### ACCESSORIES AVAILABLE

DESCRIPTION	SPECIAL PRICE
BC1 BATTERY CHARGER	\$34.95
BP1 10 EA. AA GOULD NICAD BATTERIES . . .	14.95
BT1 EXTRA BATTERY TRAY . . . . .	6.00
LC1 LEATHER CASE 1402 . . . . .	9.95
LC2 LEATHER CASE 1405, 2202, 4502 . . . . .	9.95
SM1 SPEAKER MIKE FOR EARLY MODEL 1402 9 PIN CONNECTOR . . . . .	24.95
SM2 SPEAKER MIKE FOR ALL NEW HAND HELDS WITH ROUND 6 PIN CONNECTOR . . . . .	24.95
TE-1 SUB-AUDIBLE TONE ENCODER . . . . .	34.95
TTP TOUCH-TONE PAD . . . . .	49.95
INSTALLATION AT TIME OF RADIO PURCHASE . . . . .	FREE
INSTALLATION AT LATER DATE, ADD . . . . .	15.00
XF-1 10.7 KC MONOLITHIC XTAL FILTER . . . . .	9.95
CRYSTALS TX or RX (Common Frequency Only) . . . . .	3.75

BC-1  
BATTERY  
CHARGER





# 2.5 and 5 WATT 2 METER

6 CHANNEL HAND HELD TRANSCEIVERS

- \* .3  $\mu$ V RECEIVERS - 12 kHz CERAMIC FILTERS
- \* OPTIONAL 12 BUTTON PAD AVAILABLE FOR ANY HAND HELD FACTORY INSTALLED
- \* AVAILABLE FOR MARS OR CAP • 10 DAY MONEY BACK GUARANTEE
- \* 90 DAY WARRANTY • INCLUDES 52 SIMPLEX and "DUCKIE" ANTENNA



2.5 WATT  
MODEL  
1402SM

- TRIMMER CAPS ON RX & TX
- ALL PLUG-IN CRYSTALS (Same as WE-224 Mobile)
- 10.7 and 455 kHz IF
- .3  $\mu$ V SENSITIVITY FOR 20dB QUIETING

CURRENT DRAIN @ 12 VDC

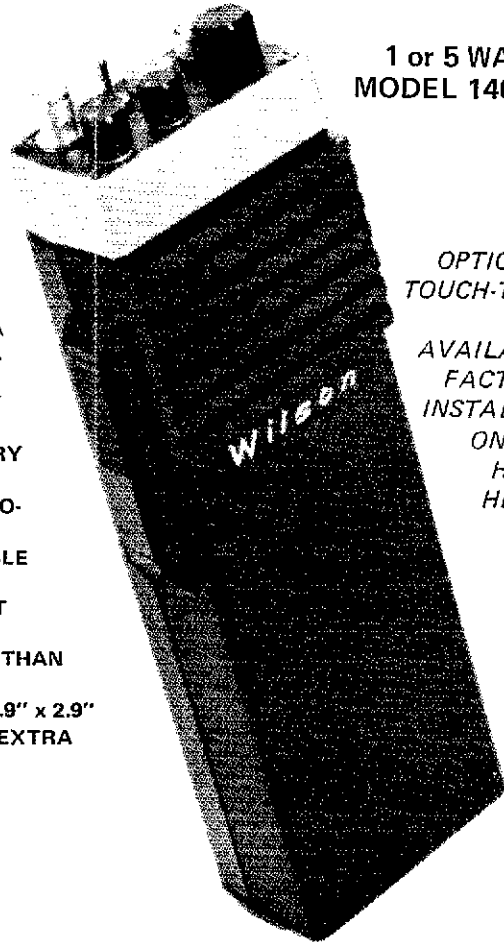
MODEL 1402SM:

RCVR: 14 MA - XMTR: 500 MA

MODEL 1405SM:

RCVR: 140 MA - TX @ 1W: 400 MA  
TX @ 5W: 900 MA

- 1402 HAS S METER & BATTERY INDICATOR
- 1405 HAS A SENSITIVE BATTERY INDICATOR
- BOTH MODELS FEATURE MICRO-SWITCH PTT
- THE 1405 CASE IS UNBREAKABLE LEXAN®
- THE 1402 CASE IS HIGH IMPACT ABS PLASTIC
- WEIGHT (w/o NI-CADS) IS LESS THAN 22 OUNCES
- OVERALL MEASURE IS 8.9" x 1.9" x 2.9"
- 10 NI-CADS (ORDER BP-1) ARE EXTRA @ \$14.95



1 or 5 WATT  
MODEL 1405SM

OPTIONAL  
TOUCH-TONE  
PAD  
AVAILABLE  
FACTORY  
INSTALLED  
ON ALL  
HAND  
HELDS

TO: WILSON ELECTRONICS CORP., 4288 S. Polaris Ave., Las Vegas, Nevada 89103, (702) 739-1931, Telex 684-522

## FALL SPECIAL DIRECT SALE ORDER BLANK

PLEASE PRINT CLEARLY

ENCLOSED IS \_\_\_\_\_  CHECK  MONEY ORDER  
 MC  BAC

CARD # \_\_\_\_\_

EXPIRATION DATE \_\_\_\_\_

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

STATE \_\_\_\_\_ ZIP \_\_\_\_\_ PHONE ( ) \_\_\_\_\_

SIGNATURE \_\_\_\_\_

SHIPPING & HANDLING PREPAID FOR SUMMER SPECIAL  
NEVADA RESIDENTS ADD SALES TAX  
SPECIAL PRICES GOOD THRU SEPT. 30, 1976

- \_\_\_\_ 1402SM @ \$164.95
- \_\_\_\_ 1405SM @ \$239.95
- \_\_\_\_ WE224 @ \$199.95
- \_\_\_\_ 2202SM @ \$239.95
- \_\_\_\_ 4502SM @ \$279.95
- \_\_\_\_ BC1 @ \$34.95
- \_\_\_\_ BP1 @ \$14.95
- \_\_\_\_ BT1 @ \$6.00
- \_\_\_\_ LC1 @ \$9.95
- \_\_\_\_ LC2 @ \$9.95
- \_\_\_\_ SM1 @ \$24.95
- \_\_\_\_ SM2 @ \$24.95
- \_\_\_\_ TE1 @ \$34.95

- \_\_\_\_ TTP @ \$49.95
- \_\_\_\_ XF1 @ \$9.95
- \_\_\_\_ EXTRA CRYSTALS @ \$3.75 ea.
- \_\_\_\_ PLEASE PUT ALL INSTALLED XTALS ON FREQ. (\$7.50 Extra per Radio)

INSTALL THESE CRYSTALS

	TX	RX	TX	RX
	52	52		
A.			G.	
B.			H.	
C.			I.	
D.			J.	
E.			K.	
F.			L.	

Specify Freq. on Tone Encoder TE-1 \_\_\_\_\_ Hz

**25 WATTS OUTPUT**  
**PRECISION PROFESSIONAL**  
**QUALITY • 2 YEAR WARRANTY**

**SPECIAL SALE!**



**\$499**

WITH 12 AMP FULLY REGULATED AND PROTECTED AC/PS..... \$569



**Yaesu FT-101E**  
**TRANSCIVER'S**

Please write For Special Deal

**NEW 25 WATTS OUTPUT**  
**SUPERB COMMERCIAL QUALITY**



STANDARD HORIZON 7  
 2 METER FM - 12 CHANNELS  
 25 WATTS OUTPUT - TRIMMER CAPACITORS AMIT AND RCV  
 XTALS • ASIRO RCVR - 60 Db ADJACENT CHANNEL SELEC  
 TIVITY - FULL SWR PROTECTION  
 • 610 CIRCUIT BOARDS •  
 DYNAMIC MICROPHONE •  
 BUILT-IN SPEAKER • 4 WATTS  
 AUDIO

REG. \$261

**SPECIAL SALE!**  
 \$199

WITH 12-AMP FULLY REGULATED AND PROTECTED AC/PS..... \$269

**STANDARD HORIZON "7"**

2 METER FM - 12 CHANNELS  
 25 WATTS OUTPUT - TRIMMER CAPACITORS AMIT AND RCV  
 XTALS • ASIRO RCVR - 60 Db ADJACENT CHANNEL SELEC  
 TIVITY - FULL SWR PROTECTION  
 • 610 CIRCUIT BOARDS •  
 DYNAMIC MICROPHONE •  
 BUILT-IN SPEAKER • 4 WATTS  
 AUDIO

**STANDARD**  
**NEW 2 METER FM**  
**TRANSCIVERS**  
**Model SRC-146A**

**SPECIAL SALE!**  
 • SRC-146A \$298.00  
 • 3 XTALS: 94/94 \$298.00  
 AND 94/94 N/C

• USA-7 DELUXE BASE \$40.00  
 CHARGER \$10.00  
 • P1 3644 LEATHER CASE \$6.00  
 • AT 19 RUBBER ANT AND WHIP \$30.00  
 • NI CADS

REGULAR \$384.00  
**OUR PRICE \$279.00**  
 Quantities Limited

**BRIMSTONE 144** REG. \$690.00

• COMPLETE BAND COVERAGE, plus MARS 143,000 to 149.99 Mhz digitally doted 5 KHz steps ANY FREQUENCY, ANY SPLIT • NO CRYSTALS TO BUY!  
 • COMPLETELY INDEPENDENT TRANSMIT AND RECEIVE FREQUENCY CONTROL YET SIMPLE OR HI-PEAK MODE WITH THE FLIP OF A SINGLE SWITCH!  
 • 25 UV SENSITIVITY • OPTIONAL PLUG-IN MODULES FOR TOUCH TONE, DIAL TONE BURST (selectable) AND SUBAUDIBLE TONE • TRUE FM—NOT PHASE MODULATION • HI FI EMPHASIZED EFFECTIVE AUDIO QUALITY • 510 GLASS PLUG IN BOARDS • GOLD CONTACT SOCKETS AND RELAYS • 100% AMERICAN MADE • AUDIO OUTPUT 2 WATTS • TWO TRANSCIVERS IN ONE AND MUCH, MUCH MORE.

**OPTIONAL PLUG IN ACCESSORY MODULES**

Touch-Tone™ interface \$28.95  
 Dial Tone (specify frequency) \$39.95  
 Sub-Audible Tone (specify frequency) \$39.95  
 Tone Burst 1800 to 2500 HZ \$39.95  
 142.00 to 149.99 MHZ extended range \$15.00

TOUCH TONE is a registered trademark of the Western Electric Co.

**KENWOOD TS-520**



Also New TR7200A, TR2200A and TS-820

... you need Kenwood's NEW TS-700A



Please write for special Package offers

**SPECIAL SALE!**



\$229

WITH FULLY REGULATED AND PROTECTED AC/PS..... \$289

13-505 2m FM Xcvr - 30w, 12ch w/16/76, 34/94, 94/94, mic & mt. (Reg. \$309.95)..... **SALE \$229**

**NEW— CDR HAM II ROTATORS** Reg. \$159.95 — \$125.00

**NEW! Rohn 50' Foldover Towers (Reg. \$515) \$369. 70' Foldover Towers (Reg. \$826) \$589. Shipping Paid on All Towers.**

**REGULATED DUAL PROTECTED POWER SUPPLIES**

**100RM 12 AMPS - DC AMP METER**

Output Voltage 13.6 ± 2VDC  
 Line/Load Regulation 20 mV  
 Ripple/Noise 2 mV RMS  
 Transient Response 20 uSec  
 Current Limit 12 Amp  
 Current Foldback 2.5 Amp

Case: 4 1/2" (h) x 7 1/2" (w) x 5 1/2" (d)  
 WEIGHT: 9.5 lbs. **OUR PRICE: \$82.00**

**109R 25 AMPS - DUAL METERS**

Output Voltage 13.6 ± 2VDC  
 Line/Load Regulation 20 mV  
 Ripple/Noise 2 mV RMS  
 Transient Response 20 uSec  
 Current Output 25 Amps Max  
 REGULATED  
 Current Foldback 5 Amps

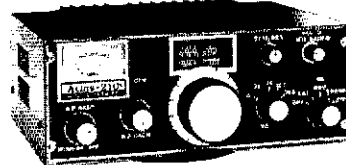

Over-Voltage and Over-Temperature Protected  
 Size: 4 1/2" (h) x 9" (w) x 4 1/2" (d)  
 WEIGHT: 15 lbs. **OUR PRICE \$129.00**

All power supplies feature short circuit, current overload, over voltage and thermal overload protection circuitry.

ATLAS, COLLINS, REGENCY, DENTRON, BRIMSTONE, CUSH-CRAFT, BIRD, STANDARD, KLM, HYGAIN, KENWOOD, TEMPO, MINI PRODUCTS, MIDLAND, VHF MARINE, ETC. — PLEASE WRITE FOR QUOTE.

**Atlas 210X**

PLEASE WRITE FOR SPECIAL BONUS AND PACKAGE OFFERS.

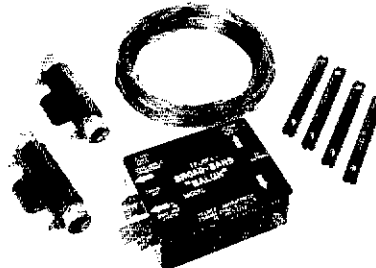
**OUR CREW**  
 GAIL SMITH-WAKELL, Mgr.  
 S. I. GREGORY-WAANGU,  
 Owner/Gen. Mgr.

**AMATEUR-WHOLESALE ELECTRONICS**  
 8817 S.W. 129th Terrace, Miami, Florida 33176  
 COURTEOUS PERSONAL SERVICE—SAME DAY SHIPMENT • Prices subject to change without notice.  
 Telephone: (305) 233-3631 STORE HOURS: 10-5 MON-FRI.



**STEP UP TO TELREX**


WITH A  
**TELREX "BALUN" FED—"INVERTED-VEE" KIT**  
 THE IDEAL HI-PERFORMANCE  
 INEXPENSIVE AND PRACTICAL TO INSTALL LOW-FREQUENCY  
 MONO OR MULTIPLE BAND, 52 OHM ANTENNA SYSTEM



Telrex "Monarch" (Trapped) I.V. Kit  
 Duo-Band / 4 KWP I.V. Kit \$62.50  
 Post Paid Continental U.S.

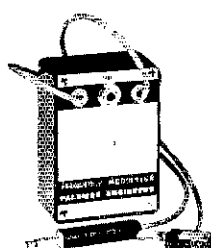
Optimum, full-size doublet performance. Not appreciably affected by ground conditions! "Balanced-Pattern", low TVI, BCI.  
 Minimal support costs, (existing tower, house, tree).  
 A technician can resonate a Telrex "Inverted-Vee" to frequency within the hour!  
 Minimal S/W/R is possible if installed and resonated to frequency as directed!  
 Pattern primarily low-angle, Omni-directional.  
 Costly, lossy, antenna tuners not required!  
 Complete simplified installation and resonating to frequency instructions supplied with each kit.

For technical data and prices on complete Telrex line, write for Catalog PL 7



COMMUNICATION SYSTEMS SINCE 1921 **telrex** Laboratories  
 6000 PARK NEW JERSEY 07112 U.S.A.

**FM YOUR GONSET**  
 (or your Clegg 22'er, Ameco TX-42, Polycorn 2 or PC-42, Johnson 6N2, Heath Seneca VHF 1, Hallicrafters SR-34)

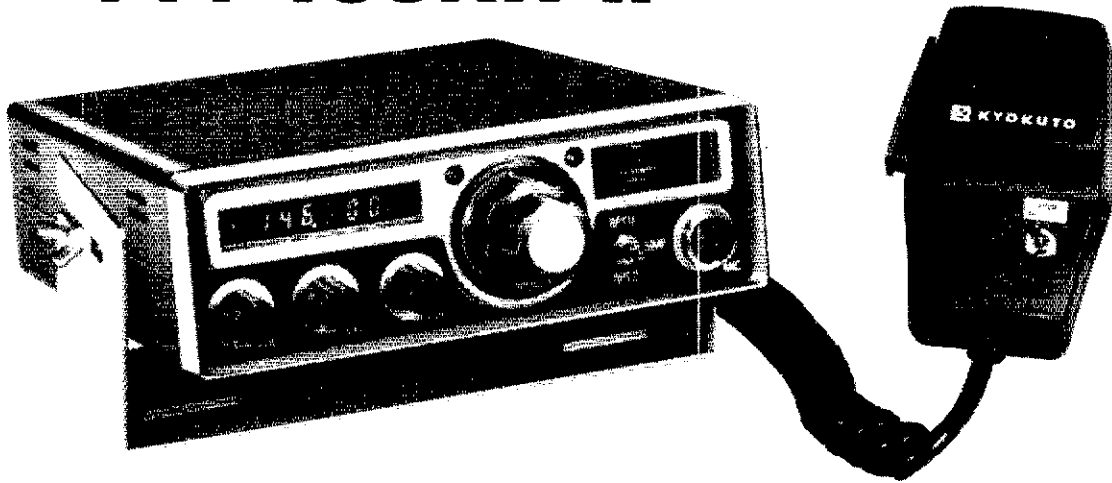


● Plug-in modulator puts the Communicator transmitter on FM.  
 ● No modification or rewiring on your Communicator. Just plug into mike jack and crystal socket.  
 ● For 2-meter band only.

● Works with Communicator I, II, III, IV and GC-105 and other rigs listed.  
 ● Frequency adjust for netting built in.  
 ● FM at a tenth the cost of a new rig.  
 ● Sharp, clean FM.  
 ● In daily use by MARS and Civil Defense nets nationwide.  
 ● Free brochure on request.  
 ● Order direct. \$37.50 postpaid U.S. & Canada. Specify transmitter model. California residents add 6 percent sales tax. (HC-6 / U crystal and 9-volt transistor battery not supplied).

**PALOMAR ENGINEERS**  
 BOX 455, ESCONDIDO, CA 92025  
 Phone: (714) 747-3343

# NEW! FM144-10SXR-II



All Solid State-PLL digital synthesized — No Crystals to buy! 5KHz steps — 144-148 MHz-LED digital readout.

Introducing the standard of comparison for years to come. No other unit begins to compare with the superb engineering and superior commercial avionics grade quality and construction of the FM144-10SXR-II

FM144-10SXR-11

**\$439<sup>00</sup>**

VALUE \$599<sup>00</sup>

Price subject to change without notice

Regulated AC/PS  
MODEL FMPS-4R . . . \$49<sup>00</sup>  
NEW! Touch-Tone Pad \$59<sup>00</sup>

- **FREQUENCY RANGE:** Receive: 144.00 to 148.995 MHz, 5KHz steps (1000 channels). Transmit: 146.00 to 147.995 MHz, 5KHz steps (400 channels).
- **FULL DIGITAL READOUT:** Six easy to read LED digits provide direct frequency readout assuring accurate and simple selection of operating frequency.
- **AIRCRAFT TYPE FREQUENCY SELECTOR:** Large and small coaxially mounted knobs select 100KHz and 10KHz steps respectively. Switches click-stopped with a home position facilitate frequency changing without need to view LED'S while driving and provides the sightless amateur with full Braille dial as standard equipment.
- **FULL AUTOMATIC TUNING OF RECEIVER FRONT END:** DC output of PLL fed to varactor diodes in all front end R-F tuned circuits provides full sensitivity and optimum intermodulation rejection over the entire band. No other amateur unit at any price has this feature which is found in only the most sophisticated and expensive aircraft and commercial transceivers.
- **TRUE FM:** Not phase modulation — for superb emphasized hi-fi audio quality second to none.
- **FULLY REGULATED INTEGRAL POWER SUPPLIES:** Operating voltage for all circuits, i.e., 12v, 9v and 5v have independently regulated supplies. 12v regulator effective in keeping engine alternator noises out and protects final transistor from overload.
- **MONITOR LAMPS:** 2 LED'S on front panel indicate (1) incoming signal-channel busy, and (2) un-lock condition of phase locked loop.
- **DUPLEX FREQUENCY OFFSET:** 600KHz plus or minus, 5KHz steps. Plus simplex, any frequency.
- **MODULAR COMMERCIAL GRADE CONSTRUCTION:** 6 unitized modules eliminate stray coupling and facilitate ease of maintenance.
- **ACCESSORY SOCKET:** Fully wired for touch-tone, phone patch, and other accessories.
- **RECEIVE:** .25 uv sensitivity. 15 pole filter as well as monolithic crystal filter and automatic tuned LC circuits provide superior skirt selectivity.
- **AUDIO OUTPUT: 4 WATTS**
- **HIGH/LOW POWER OUTPUT:** 15 watts and 1 watt, switch selected. Low power may be adjusted anywhere between 1 watt and 15 watts.
- **PRIORITY CHANNEL:** Instant selection by front panel switch. Diode matrix may be owner re-programmed to any frequency (146.52 provided).
- **DUAL METER:** Provides "S" reading on receive and power out on transmit.
- **OTHER FEATURES:** Dynamic microphone, mobile mount, external speaker jack, and much, much, more. Size: 2 1/8 x 6 1/2 x 7 1/4. All cords, plugs, fuses, mobile mount, microphone hanger, etc., included. Built in speaker.

Manufactured by one of the world's most distinguished Avionics manufacturers, Kyokuto Denshi Kaisha, Ltd.

## AMATEUR-WHOLESALE ELECTRONICS

8817 S.W. 129th Terrace, Miami, Florida 33176

Telephone (305) 233-3631

U.S. DISTRIBUTOR

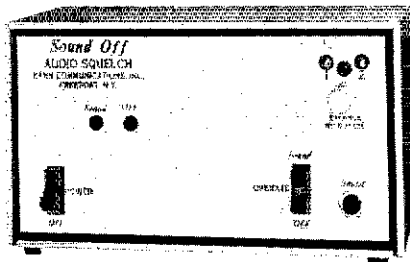


PLEASE WRITE FOR FURTHER INFORMATION

# SOUND OFF

AUDIO SQUELCH WITH PATENTED SIGNAL-TO-NOISE RATIO EVALUATION SYSTEM

Models SO-1 and SO-1-X



## FEATURES

- QUIETS NOISE WHEN CIRCUIT IS IDLE
- QUICKLY IDENTIFIES SIGNAL AND ACTIVATES CIRCUIT
- CAN BE INSERTED ANYWHERE IN AUDIO LINE
- IDEAL FOR SSB, AM, TELEPHONE, VHF SYSTEMS, VOX, AND OTHER VOICE OPERATED CIRCUITS.
- ALSO WORKS ON TONE AND OTHER NON-VOICE SIGNALS

The low cost "Sound Off" system can be placed anywhere in the audio line and will effectively squelch the signal whenever speech or other information is removed. The unit requires its own AC power supply and can be used in a wide range of applications from 1000 watt audio signal connections. The all solid state "Sound Off" automatically compensates for changes in noise and is insensitive to false triggering by impulse or other noise. The heart of "Sound Off" is a patented miniature signal analysis device which constantly monitors the content of the channel. Applications include VHF communications, SSB communications, telephone circuit systems, and voice operated tape recording devices.

Model SO-1 overcomes balanced or unbalanced lines and is capable of handling a level of -30 to +10 dbm at 1000 ohms and may be matched at impedance levels up to 10,000 ohms.

Model SO-1-X is designed for working with loudspeakers and includes a relay for opening a lead to a speaker whenever the speaker when signal is absent.

Both SO-1 and SO-1-X can be adjusted to be immune to various types of noise, yet they operate in approximately one-tenth of a second when signals are received.

Options available: 12 volt DC operation, variable hysteresis circuit and 220 volt, 50/60 Hz operation.

KAHN COMMUNICATIONS, INCORPORATED



**KAHN COMMUNICATIONS, INC.**

74 NORTH MAIN STREET • FREEPORT, NEW YORK 11520 • (516) 379-8800

GTC 24, EASN, QNI 52, QTC 17, WIRUUA/WB4GFD back for visit. EC reports from: WA1RTR WIBAB KINFW WIFMM KIUQA WIII WIEQH WIBHD KIPAD. Traffic: (June) WIPX 415, WA1BY 158, WUX 137, KIPAD 106, WIDMS 105, WN1YX 43, WAIOWG 39, WIEMG 33, WAIYY 26, WIDMW 13, WAIOW 9, WIFL 9, WIAOG 8, WAI 6, WIEGH 5, KILCG 1, WAIQAM 1, WAIQAZ 1. (May) WAITEH 10, KILCO 6. (Apr.) WAITEH 23. (Mar.) WAITEH 6. (Feb.) WAITEH 6.

MAINE: SCM, ED Bristow, WAIMUX — New ORS KIMZB. Renewed OO KIMZB. ORS: W150, PAM: KIGUP. Nets: PTN QNI 128, QTC 106; NE Barnyard QNI 866, QTC 32; MSSN resumes M-W-F 1630 local time schedule on 3725 Labor Day. New in Maine: WN1s YBZ YOD; WA1s YES(A) YCI(A) YCJ(T). PSNR: WIRWG WAIICM. KIGDI was first to contact CZZO (official Olympic sta) on 40-meter cw. May Mountain Radio Club has been born, with WAINVZ pres.; WIBBE, vice-pres.; KIFLO, secy-treas. Pine State ARC providing 10 mobile 2-mtr units for check points of the Marathon race of the Greater Bangor Open Invitational Track Meet July 10. Augusta Radio Club harness to be at the Windsor Fair grounds Sep. 15-18. NE DXCC banquet Oct. 2 at Watnam, MA. Holiday Inn, Info see W1JFL. SEC reports 40 full AREC members & 28 limited members; MPSN will meet Sun. 0900 local on 3940 kHz. WAIWUY & WAIMEX used WRIACI to help at accident. Phillips Academy Radio Club (3 ops), & K1M2B, WAIFCM (new affil) reported FD. W1CVC, W1EZZI, W1ECC, K1HHC, K1LMIJ mobilized thru VE1-L and W8SWN awaiting W1 call VE1ACY at UMPG for summer. WAIRE reports 50 MHz open to west coast. Traffic: WAIFCM 194, WIRWG 81, WAIMUX 39, W1BRW 29, KIDGI 22, WAIJCN 21, WIGU 18, ADIMZB 9.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1SWX. SEC: K1RSC, RMWALICE, PAM: open. Welcome back to OO reappointed WIEEF. The NHVTN had 139 check-ins, 87 traffic in 28 sessions. K1LMS has been coaching a prospective ham. Speaking of new ones, welcome to WAIYCF WAIYAE WN1YAZ WN1YEL WN1YFB WN1YCYZ WAIYEG WN1YDC WN1YED WN1YDS & WAIYCM. The new representative in the new Communications Advisory Committee Oct. 14 at Watnam, MA. W1BY5/WB4BCP is putting up antennas at the new QTH in Salisbury. WAIPI received centennial WAS No. 307. The Derry ARC WAIUBC/1 Field Day activity was a great success according to WAI1NH. It is with regret I must record the passing of our PAM K1YSD. Bob Cooper died in traffic handling but certainly be missed. Congrats to K1BCS as Public Relations asst. for NH and Director Sullivan. The Derry NH 25-85 repeater officers are WAI1NH, pres.; WINBB, vice-pres.; K1ORG, secy.; K1RGD, treas.; W1PVI, mbr.-at-large. Radio Clubs, send your list of officers and activities for Fall Traffic. (June) K1PGV 50, K1LMS 46, WAIQCE 40, ADIACL 27, W1SWX 2. (May) WAIQCE 36.

RHODE ISLAND: SCM, Ron Simonton, K1GMW — SEC: K1YDA, RM: WAIPOJ. PAM: WAIFR. Your SCM has been out of the Section during most of the last few months. Newport AREC under Fred Cross communications support during the Tall Ships event. Thanks to all who made the Tall Ships communications effort successful. RI FM Group public service activities have included communications for most of the parades in the Section this year including the Providence Christmas events. Check 147,96/36 for traffic at 1830 local time Mon. through Sat.

VERMONT: SCM, J. Breakstone, WAIPSK — SEC: W1VSA, NECSA, VT 55B 1905, M-S 2200, Su 1230, Mgr. WAI5V5; VT RFD 3905, M-S 2300, Mgr. K1BOB; Green Mtn., 3932, M-S 2230, Mgr. W1JLZ, 423/32; VT Fone, 3932, Su 1400, Mgr. W1KKM, 72/3; Carrier, 3935, M-Su 1330, Mgr. W2DSK, 470/25. Welcome new amateurs WN1YBG WN1YBQ WN1YDZ WAIYEH WAIYEQ WAIYER. Both the Burlington and Central VT ARCs participated in the ARRL Field Day effort. The former, WIKOJ/1, operated from W1BZD's QTH in Pleasant Valley, Underhill, VT. The latter, W1BD/1, from rest area on Mt. Mansfield transmitter site. K1BQB appointed VT secy. P.R. Asst. by W1HHR, New England Division Dir.

WESTERN MASSACHUSETTS: SCM, Percy C. Noble, W1BWR — Our sympathy to the family of Silent Key W1MWE, father of WN1UST and brother of W1BKG. New appointment: W1TM as Asst. SCM. Renewals: WAI1PJ ORS. NE DXCC banquet will be held Oct. 2 at the Ina Wham MA Holiday Inn. Info may be obtained from W1JFL, RM W1DVV; WM 7:00 P.M. daily on 3562; 30 sessions, QNI 140, tlc. 73. Tri-County VHF/UHF PAM WAIPLS: 22 sessions, QNI 79 (19 different stations). WMPN & WMEN will report June-July next month. W1TM's FD group may have hit top score again! CMARA: guest speaker WAI1B now has 15 new members. M1C, Tom ARA: now has a link with WM Civil Defense. Provided excellent communication for Westfield Wild-water Canoe races. NOBARC: new members: WAIWXP & WAIKFN/WAIMVP. New officers: WAIKFN, pres.; WAI1VP WAIMVP WAI1VPG, dir. 20 members provided excellent communications for the Housatonic River cleanup. Thru Sept. 27 contact between W1OBA and several others with W5HAD in MS, 1240 miles airline. As of July 6th W1BVR had a total of 40 years as an elected ARRL official. First as WM SCM in 1934, followed by 18 years as New England Division Director, then 6 years as an ARRL Vice Pres., followed by WM SCM to date. If you can put up with me, I will try my best. Traffic: W1TM 151, W1DVV 77, WAI1B 45, W1KK 27, WAI1NF 23, W1BBI 83, WAIPLS 5, W1DQY 2.

## NORTHWESTERN DIVISION

ALASKA: SCM, Roy Davie, KL7CUK — The summe has taken its toll with reporting from the field. All of the Techs and Novices are anxiously awaiting the 23rd which will open up a large field for them to use in spots of 1000 and 4000 Hz. We had 667 checks for the month. KL7JDO lost his long wire due to new housing project. We have lots of visitors on the 2-meter repeater due to the normal summer influx of people from the lower 48. K7MWC reports greater activity on the VHF spectrum when there are cloud coverings. KL7GHI and KL7HMA are both scheduled for the July 23rd checks. KL7CUK has a new TS-520 and working lots of DX on 75. KL7AE has his family in AK so activity is curbed some what. The Anchorage club had about 50 persons participating in the Field Day. Conditions were very bad. There are at least 2 more 2-meter repeaters planned for the greater

# VIDICONS

TOP QUALITY AT LOW, LOW PRICES

8823/8844/20PE13A

8929

only

20PE19

\$29.50

7735A

ea.\*

7262A

7038

20PE11

Fully Guaranteed in Factory Sealed Cartons!

8758A only \$42.00 ea.\*

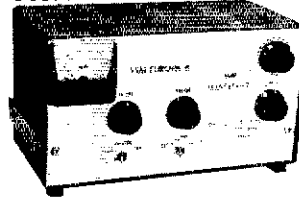
8507

8541A only \$61.95 ea.\*

\*in lots of five or more (any mix). For less than 5 add 10%. Terms: Check with order. Add \$2.00 for shipping charges.

**GBC CLOSED CIRCUIT TV CORP.** "World's Largest CCTV Supplier"  
74 FIFTH AVE. • NEW YORK, N.Y. 10011 • (212) 989-4433

## THE EUROPA "B"



## OSCAR—TROPO "TWO METERS" EME—FM

The EUROPA 'B', a SSB-CW-AM-FM-FSK 28 Mhz to 144 Mhz TRANSVERTER with 200 WATTS input on 144 Mhz for 200 mw of 28 Mhz drive. The Converter provides 30 db of gain on TWO meters with a 2 db noise figure. A direct plug-in to YAESU equipment, the EUROPA "B" can be used with any gear having a 28 Mhz capability. "At A New Location" Introductory Price \$299.95

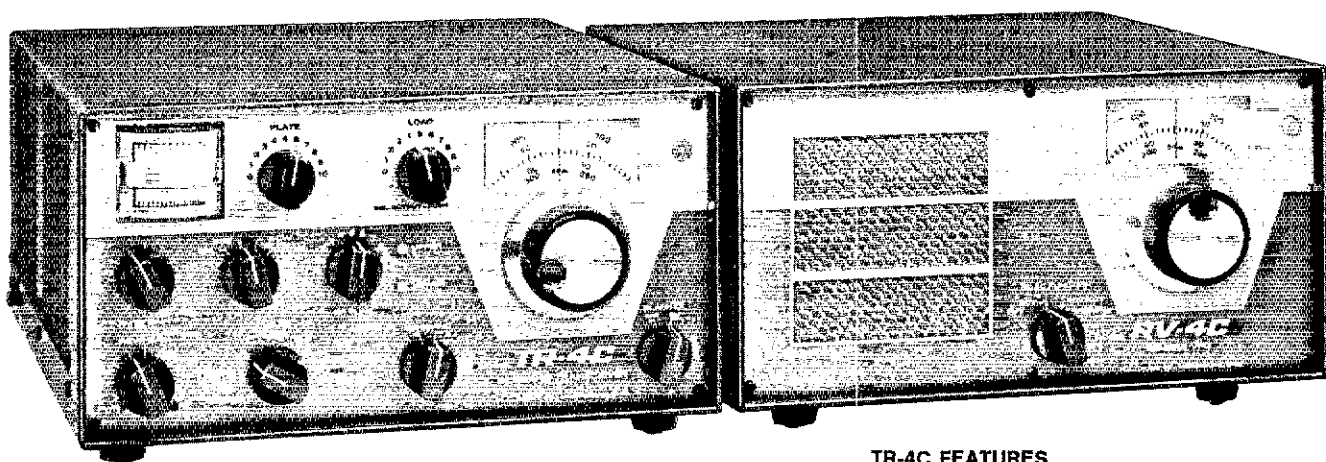
For additional information, send a QSL to:  
SOLID STATE MODULES  
94-1084 Lumi Street, Waipahu, Hawaii 96797



# The Drake TR-4C

## The Transceiver...

...for all <sup>license</sup> classes!



The "new" Drake Transceiver for the up-graded Novice/Technician class licenses is the same TR-4C we've always had. We're delighted and we think you will be too.

When you buy a transceiver for the new Novice/Technician class power level, be sure it runs the *full* 250 watt cw input. Ours does, and the Drake TR-3, TR-4, TR-4C have been doing it reliably for over 13 years. What more can we say?

#### TR-4C FEATURES

- 80 thru 10 Meters Frequency Coverage
- 1 kHz dual concentric dial
- Excellent PTO Stability
- Full Gating Noise Blanker Optional
- Transceive or Separate PTO
- Wide Range Receiving AGC
- Calibration constant mode to mode
- 300 Watts PEP input on SSB
- Shifted-Carrier CW 260 watts input
- Upper and Lower Sideband all bands
- Superb Receiver Overload and Cost-Mod characteristics
- VOX or PTT
- Output Impedance Adjustable with pi-net
- Traditionally high resale/trade-in value and excellent customer service

For more information on this and other fine Drake products, please contact:

**R. L. DRAKE COMPANY**



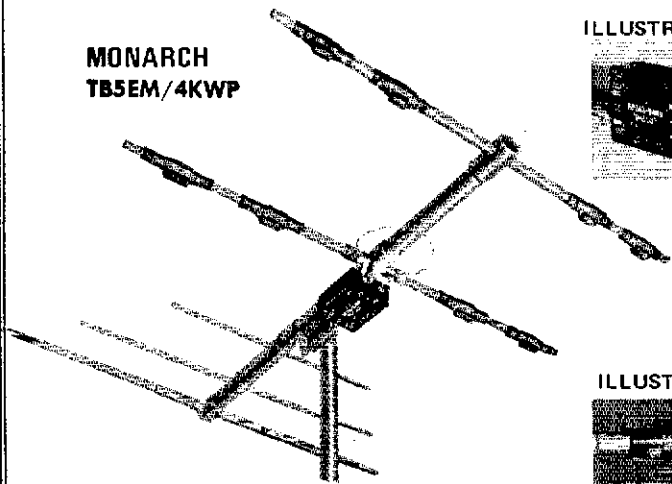
540 Richard St., Miamisburg, Ohio 45342 •  
Phone: (513) 866-2421 • Telex: 288-017

# STEP UP TO TELREX

## Professionally Engineered Antenna Systems

### Single transmission line "TRI-BAND" ARRAY

MONARCH  
TB5EM/4KWp



By the only test that means anything... on the air comparison... this array continues to outperform all competition... and has for two decades. Here's why... Telrex uses a unique trap design employing 20 HiQ 7500V ceramic condensers per antenna. Telrex uses 3 optimum-spaced, optimum-tuned reflectors to provide maximum gain and true F/B Tri-band performance.

ILLUSTRATION BALUN

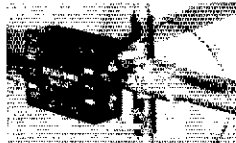


ILLUSTRATION TRAP



For technical data and prices on complete Telrex line, write for Catalog PL 7

COMMUNICATION SYSTEMS SINCE 1921 **telrex** Laboratories  
450URY PARK, NEW JERSEY 07112 U.S.A.

Anchorage-Palmer area. Welcome to all amateurs visiting AK this summer. Traffic: KL7HDX 144 KL7JDO 20.

IDAHO: SCM, Dale A. Brock, WA7FWV — SEC. WA7JMH. PAM: WA7HOS, RM: WA7KKR/7. Net — Freq. Time/Days Sess. QNI QTC Manager  
FARM — 3.935 0200 Dy 30 751 4  
WA7RQI  
IMN — 3.635  
W7GCHY, pres.; WA7ZCO, vice-pres.  
RACES — 3.99 1415 M-F 22 425 1  
W7KOB

W7IY made over 25,000 in the CD Party, congratulations Don. W7JUI is 77 from a Boy Scout camp this summer. W7OTL reports Emmett has formed the Emmett Amateur Radio Club and meets at the Railroad Park in Emmett. Lewiston-Clarkston Amateur Radio Club spend Field Day on Cottonwood Butte. Also attending were Hams from Grangeville and Orofino. Pocatello Amateur Radio Club offers some good bumper stickers promoting Amateur Radio. Interested contact WN7CCP. Traffic: W7GHT 455 WA7KKR/7 124, W7GBO 88, W7IY 1.

MONTANA: SCM, Harry A. Roylance, W7RZY. Asst. SCM: Bertha A. Roylance, K7CHA. SEC. WA7IZR. PAM: WA7PZO. Hellgate Radio Club had pot luck picnic in Rattle Snake canyon. Cutbaran Radio Klub is testing a repeater on 22-82. Butte Helena and Missoula Radio Clubs participated in the Field Day festivities. New officers of Hellgate Radio Club are K7GCHY, pres.; WA7ZCO, vice-pres.; WB7AGV, secy.; WA7RO, treas. WA7OBH reports five new Novices for Hardin. Recent get together Hams shows over half of them are also on C.B. W7L will be your new SCM as of Sept, 9th. Bozaman group is planning another repeater for their area. Comment on repeaters, it would be advantageous to have someone monitoring the band. Reported couple of them are never monitored. Nut said.

OREGON: SCM, Dwight J. Albright, W7HLF — Ass. SCM: Daniel T. O'Connell, WA7TDZ. SEC. WA7UJO. PAM: K7RQZ. RM: K7OUF.  
Net — Freq. Time(Z) QNI QTC Sess. Manager  
BSN — 3908 0030 267 19  
WA7MHP  
NTN — 3701 0200 45 162  
WA7UJO  
OSN — 3585 0145 210 126  
K7IWD  
AREC JC — 147.06/06 0215 WF 87 10  
WA7IAE  
AREC PDX — 146.05/64 0230  
K7WWR  
AREC — 3943.5 0200 417 5  
WA7NEQ

New appts K7ZCB, GVS. Field Day was a pretty good one. Willamette V. RC FD at Fern Ridge. K. Fal Club FD near Keno. K7TDX rpts Sunset Empire RC FD from Warrenton, OR. WA7RQS rpts Medford HI Club 5 ops. Anderson Butte WA7USX/7 rpts Co. G. RC near Beaver Hill repeater site. Textitah Club W7KMB rpts from near Timber GR. PARC FD Bald Peak State Park, K7WWR reporting. Grants Pa Club at the Madrona School. WA7RWM rpts 7 stations were on the BSN at roll call, W7HLF/NCS. W7VS reports Rogue Valley Club had 7 sta 14 ops. Traffic (June) W7VSE 332, K7IWI 133, W7IWN 90, WA7XV 83, K7OUF 61, W7HLF 59, WA7UJO 5, WA7QDC 41, W7DAN 34, WA7MHP 17, W7LT 1, WA7ZP 2. (May) W7DAN 63.

WASHINGTON: SCM, Mary E. Lewis, W7QGP — RM K7OZA. PAM: K7YRQ. VHF PAM: K7GWE. Ass. Sec: W7EBH W7WP & K7VAS.  
Net — Freq. Time QNI QTC Sess. Manager  
NWSSB — 3945 18:30 741 106 3  
W7VDR  
NTN — 3970 11:30 1522 73 3  
W7PWP  
WARTS — 3970 18:00 2063 89 3  
W7QGP  
WSN — 3590 0230 363 159 3  
W7LG

W7HAD doing mostly antenna work this summer WA7FWB, EC for Orcas Island sent newspaper clippings on Field Day, very good PR. K7IRO/7 has WA7LQ and guest ops during Field Day. SJCAR club sent Bicentennial msg. from atop Mt. Constitution, WA to mayors of each capital city U.S. and D.C. W7JFR attended the MINOW meeting at W7DK's club house. WA7IKZ one of several stations active during Idaho's recent flood from broken earth dam. WA7DKA has a new antenna on a band doubler. W7BS and guest with passed East Coast and awaiting their license. K7NXC WA7EJ WA7TIB with W7QGP attended National convention in Denver, CO to promote SEA-Q-DX our NW Convention, July 29, 30 & 31, 1977 Seattle Civic Center. This will be a family affair. CU there. Now the time to plan 1977's vacation sked. Contact WA7GSD for 7NXC for Early Bird tickets and get a IC202 drawing. CU Seattle 1977. Traffic: JMC W7DZX 537, W7OZA 86, W7LG 73, W7HAD 7, W7APS 52, WA7TWB 51, W7BUN 45, WA7BDD 3, W7IEU 28, WA7IKZ 17, WA7AIB 11, WA7DKA WA7OJI 5, W7BCS 3, WA7GVE 2, K7VNI 2. (May) W7HAD 57, W7JFR 10.

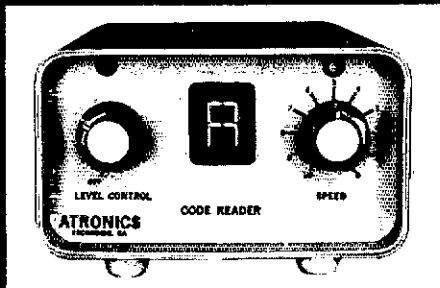
#### PACIFIC DIVISION

EAST BAY: SCM, Charles R. Breeding, K6UWR. Asst. SCM: W6ZP VE2AQV/W6. SEC: W6IHH. Ass. SEC: W6GDSI. RM: K6HW W6DII. PAM: WA6VEF. VHF PAM: WA6JUD. With a recent change in the Communications Dept. rules, it is now permitted to have more than one Asst. SCM in a Section. I am most pleased to announce that VE2AQV/W6 has been appointed as Asst. SCM. Art is a very active member in the Mt. Diablo ARC as well as being a Asst. Dir. The Comm. Dept. also has made an appointment. Now available for the VHF'er is DC. With a number of requirements this appointment also available to Technicians and I would like to hear from people interested in this appointment. T. Alameda Co. RC now an ARRL affiliate. Congrat. Even with a heat spell which broke all records, Field Day proved to be a success. The Mt. Diablo RC had a FD sight closed on Mt. Diablo due to the fire hazard. In the true spirit of FD the sight was changed at the last minute with the club having a good score and members having a good time. WA6JUD reports a most successful VHF QSO Party operation. He set a new Division record and we are all waiting to see how it ended up in the overall standings. It is with sadness v

# NEW! ATRONICS

## Visual Code Reader

### Kit \$149



Model KCR101  
ReadyMade Model CR101 \$225

#### USE YOUR BANKAMERICARD

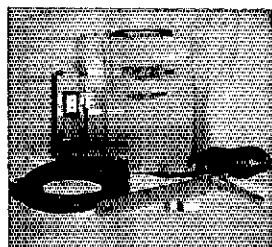
Now you can have the famous Atronics Code Reader, that displays decoded Morse Code signals visually, in kit form. Assembly is simple, and can be completed in as little as 5 hours. Complete, step by step, illustrated instructions are included.

#### The Atronics Code Reader:

- Displays letters, numbers, and commonly used punctuation visually as Morse Code signal is received.
- Operating speed 5 to 50 WPM at selected speed.
- All Solid State
- Make code learning faster and easier
- One single connection to your speaker receiver or transceiver puts it into operation
- Hard copy read out of CW available with TU-102 TTY interface Module accessory.

Buy Factory Direct & Save! Send for Free Literature Today.

**ATRONICS** P.O. Box 77, Escondido, CA 92025 Call (714) 745-1971



# TIRED OF CRANKING?

MOTORIZE YOUR TOWER WITH OUR ELECTRIC HOIST/WINCH

- STURDY—RELIABLE—EASILY INSTALLED
- IN USE ON E-Z WAY, HEIGHTS, TRI-EX, TRISTAO, ROHN, ETC.

**TOWTEC CORP.** Dept. Q13 **\$195**  
118 ROSEDALE RD., YONKERS, N.Y. 10710 Tel. (914) 779-4142

**Clegg**  
invites you to  
join us in our...

# 25<sup>th</sup> Anniversary Celebration!!



THE UNEQUALLED

## FM-DX

REGULARLY ~~\$645.00~~

- 35 Watts • 143.5 to 148.5 MHz • Digital Display •
- Fully Synthesized in 5 kHz Steps • .25 uv Receiver •

FACTORY DIRECT  
ANNIVERSARY SPECIAL \$599.00

### ORDER DIRECTLY FROM CLEGG

THESE TWO UNITS HAVE BEEN OUTSTANDING VALUES AT ~~\$189.50~~



10 Watt FM-76 for 220 MHz

THE *Clegg* ECONOMY LINE

12 Channels • Individual trimmers  
for Receiver and Transmitter  
crystal Netting • Big Clear Panel  
Meter • Superb Receiver • Crisp  
Clear Audio on Receive and Transmit • Rugged, Compact, Attractive.



15 Watt MARK-3 for 146 MHz

## ANNIVERSARY SPECIAL

10 watt FM-76 for 220 MHz only \$165.

15 watt MARK-3 for 146 MHz only \$169.50

Join us in celebrating our 25th Anniversary by calling  
TOLL FREE today and ordering any of these units at  
our special limited time prices!

Phone 1-(800)-233-0250 Mastercharge & BankAmericard orders welcomed.

# Clegg COMMUNICATIONS Corp.

208 Centerville Rd., Lancaster, PA 17603





**PLUG-IN DESIGN  
ALL SOLID STATE  
SUPERIOR SELECTIVITY  
200 WATTS P.E.P. INPUT  
NO TRANSMITTER TUNING**



**Atlas offers more performance per cubic inch than any other transceiver in the world!**

The performance of this compact, lightweight Atlas SSB transceiver is incredible! Measuring only 9½" wide x 3½" high x 9½" deep, and weighing only 7 pounds, the Atlas 210x or 215x is less than half the size and weight of other H.F. transceivers, yet offers more features and greater operating pleasure.

**5 BAND COVERAGE**

The 210x covers 10 - 80 meters, while the 215x covers 15 - 160 meters.

**ITS SOLID STATE DESIGN** not only accounts for the lighter weight of your Atlas transceiver, but assures you years of cool, trouble-free operating pleasure.

**MODULAR CONSTRUCTION** makes any service that may be required fast and inexpensive. Most of the circuitry is on printed circuit boards, with three plug-in boards for R.F., I.F., and A.F. circuits. All sections are readily accessible, and your Atlas dealer can provide you with the circuit boards you may need.

**TOTAL BROADBANDING ELIMINATES TRANSMITTER TUNING OR LOADING CONTROLS!** With your Atlas transceiver you get instant QSY and band change.

**200 WATTS POWER RATING!** . . . In a seven pound transceiver! Incredible, but true. Atlas transceivers give you all the talk power you need to work the world barefoot. Signal reports constantly reflect great surprise at the signal strength in relation to the power rating.

**PHENOMENAL SELECTIVITY.** The exclusive Atlas 8 pole crystal ladder filter used in our transceivers

represents a major breakthrough in filter design, with unprecedented skirt selectivity and ultimate rejection. As we showed on the graph in a recent ad, this filter provides a 6 db bandwidth of 2700 Hertz, 60 db down of only 4300 Hertz, and a bandwidth of only 9200 Hertz at 120 db down! Ultimate rejection is in excess of 130 db, greater than the measuring limits of most test equipment.

**EXTENDED FREQUENCY COVERAGE.** Adding the Atlas Model 10x Crystal Oscillator provides greatly increased frequency coverage for MARS and network operation. Frequency coverage with the 10x is: 1700-3000 kHz (Model 215x only), 3000-5200 kHz, 5800-10,000 kHz, 13,900-14,900 kHz, 20,600-21,600 kHz.

**ATLAS TRANSCEIVERS ARE THE BEST TRANSCIEVER BUY ON THE MARKET TODAY . . .** cubic inch for cubic inch, pound for pound, or feature for feature, and they're Made in the U.S.A.

210x or 215x . . . . . \$649.  
With noise blanker installed, \$689.

**ACCESSORIES**

- AC Console 110/220V . . . . . \$139.
- Portable AC Supply 110/220V . . . . . \$ 95.
- Auxiliary VFO Model 206  
includes Digital Dial . . . . . \$299.
- Model DD6-B Digital Dial only . . . . . \$229.
- 10x Osc. less crystals . . . . . \$ 55.

*For complete details see your Atlas dealer, or drop us a card and we'll mail you a brochure with dealer list.*

Made in the U.S.A.  
by Hams for use by  
licensed Ham operators.



**ATLAS  
RADIO INC.**

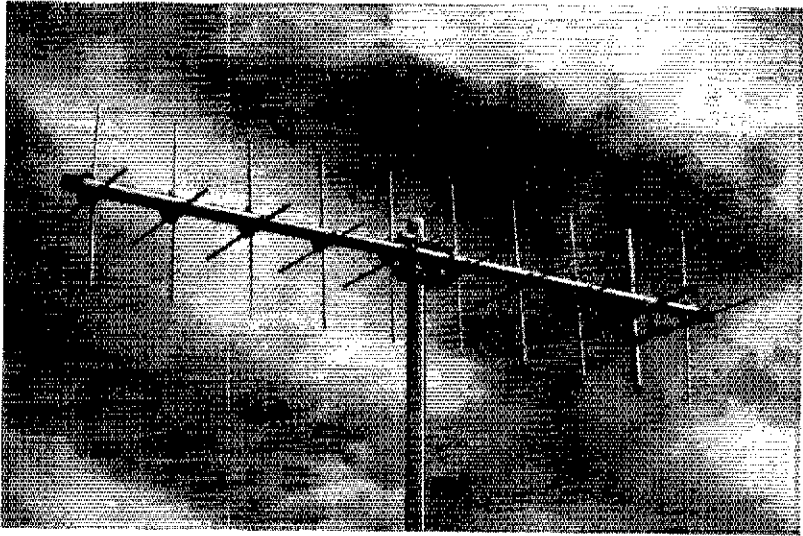
*Ask the ham who owns one!*

417 Via Del Monte • Oceanside, CA 92054 • Phone (714) 433-1983





# 2 METERS...



... *Alive* with activity at *both* ends of the band! Be a part of the total 2 Meter picture with the Cush Craft Twist Antenna. Actually two, easily assembled, 10 element yagis in one — the vertical elements are cut for the high end, the horizontal elements for the low end, and separate feed lines are used. The A147-20T is tailored to meet the demands of the operator who enjoys the best of both worlds

— FM and SSB/CW.

A147-20T

\$47.50

# CQ OSCAR

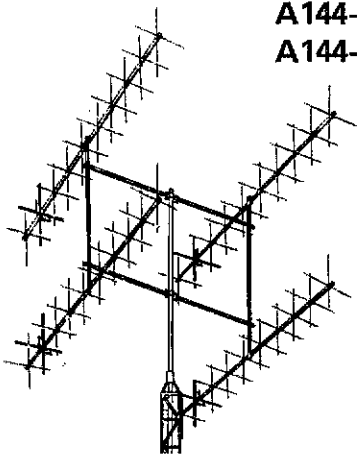
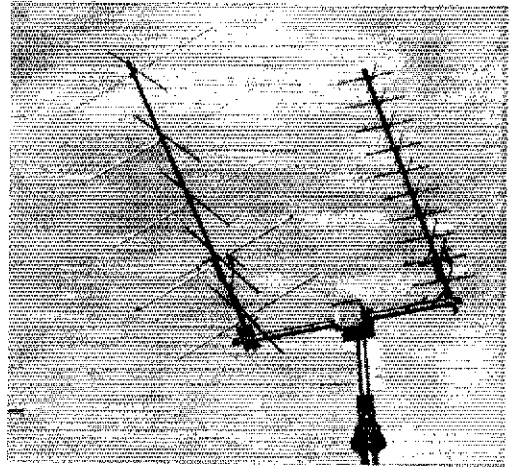
... *Extend your horizon* — Explore the exciting new world of amateur satellite communications using low power with our multi-polarized Twist Antennas. All models include phasing harness for selectable linear or right/left circular polarization. Two of these Twists may be mounted on the A14T-MB mounting boom which is complete with a pre-drilled plate for a readily available mast-through rotator. *Face this challenging frontier — Become a Specialist!*

A144-10T \$32.50

A432-20T \$45.00

A144-20T \$47.50

A14T-MB \$13.95



## PERFORMANCE ARRAYS . . .

Enjoy fade-free contacts on VHF/UHF with Twist Antennas and Arrays. Excellent for scatter and other long-haul techniques. Double your effective radiated power by stacking two Twists, or quadruple ERP by stacking four Twists. Arrays are easily assembled for your special communications requirement. Write for stacking and phasing harness details concerning amateur and commercial frequencies.

*Dependable communications — Now Yours!*

### SPECIFICATIONS

Model	A147-20T	A144-10T	A144-20T	A432-20T
Center Freq. (MHz)	144.5/148.5	145.9	145.9	432
No. Elements	10/10	10	20	20
Weight (lbs.)	6	3.5	6	3.5
Wind Surf. Area (ft. <sup>2</sup> )	1.42	.74	1.42	.37
Mounting	Center	Rear	Center	Rear
Dimensions (Inches)	40x40x140	40x40x70	40x40x140	14x14x57



IN STOCK WITH  
DISTRIBUTORS WORLDWIDE

# cushcraft

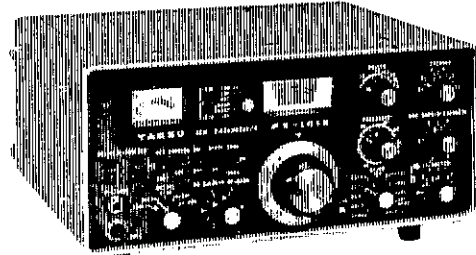
CORPORATION

621 HAYWARD ST., MANCHESTER, N. H. 03103

# If it's for Communications... Adirondack has it!

including the  
Yaesu FT101E

**\$749<sup>00</sup>**



**Largest selling  
amateur transceiver in the world**

- Built-in AC & DC power supplies
- 260 watts PEP; 180W-CW; 80W-AM
- RF Speech processor (E model)

## ADIRONDACK Radio Supply, Inc.

185-191 WEST MAIN STREET • P. O. Box 88 • AMSTERDAM, N.Y. 12010  
TEL. (518) 842-8350

**Just 5 minutes from N.Y. Thruway — EXIT 27**

**Complete  
inventory all  
major brands**

- Atlas
- Collins
- Dentron
- Drake
- Icom
- Kenwood
- TenTec

### ROCKY MOUNTAIN DIVISION

**COLORADO:** SCM, Clyde O. Penney, WA9HLQ — SEC; K0FLQ, RM; WB0HCK, PAMS; K0CNUV, WA0YGG, Amateur Radio Telegraph Society (ARTS) advises 7103 kHz monitored daily 1400-1900Z for emergencies and traffic. WR0ALE, operating on 146.28/28.8 will soon be in operation on Sunlight Peak. K0HPF reports good 17 day operations with 17 QSOs on 10 meters & 13 QSOs on 15 meters. A listing of active nets in CO section includes CO Code Net, 3715, daily, 0030 UTC; CO Emergency Phone Net, 3945, Sun., 1400 UTC; CO High Noon Net, 7240/3940, M-S, 1900 UTC; CO West Net, 3990, Mon. & Wed., 0001 UTC; CO Races Two Meter Net, 146.34/34.0, Sun., 0000 UTC; Pueblo Ham Club Net, 146.94, daily, 2100 UTC; Silver State Net, 1818, daily, 0200 UTC; Castle Rock Repeater Group Net, 146.07/67, Sun., 0100 UTC; CO Post Office Net, 3965, Sun., 1415 UTC; CO Weather Net, 3945, daily, 1300 UTC; Columbine Net, 3989, daily, 0200 UTC; Denver Area AREC Net, 146.44/44, Sun., 1500 UTC; North Metro AREC Net, 146.07/67, Sun., 1530 UTC; Rocky Mountain Radio League Net, 146.34/34, Sun., 0130 UTC; So. Metro AREC Net, 146.04/64, Sun., 0245 UTC; Twelfth Region Net (1WN), 3570 daily, 0130 & 0430 UTC. Net Tfc. for June: CWN, QNI 283, GTC 256, 30 sessions; Hi-Noon QNI 1213, GTC 23, normally 20-29 sessions, 129 min. SWN, QNI 75, GTC 17, 358 min. (May) CWN QNI 318, GTC 335, 31 sessions. Traffic: (June) W9WYX 2201, WB0MTA 704, K0YFK 376, WA8TNP 187, W0HXB 160, W0DQN 134, K0TER 114, W0ETT 89, WA0REX 86, W0LQ 78, K0TIV 64, W09WT 57, W0RE 55, K0WJN 50, W0MRU 43, W0BBAL 39, W0INS 31, W0BNHA 30, K0OTU 30, WA0YGG 28, W0KLE 26, K0RTO 22, W0LAE 16, W0MYB 13, WA0TMA 13, W0PT 8, W0GW 6, WA0HLQ 4, K0CNUV 3, W0BJT 1. (May) WB0HCK 1277, W0KLE 72, W0LQ 60, W0ETT 46.

**NEW MEXICO:** SCM, Edward Hart, Jr., W5RE — Asst. SCM; Joe T. Knight, W5PDI, SEC; W5ALR, PAMS; W5PNY, W5DMG, RM; K5KPS, SWN meets at 7:15 P.M. MST on 3585 kHz and will send to you at the same speed you use to check in. Try it, you may like it. SWN had 228 stations check in during June and handled 218 messages. NMRN meets at 8:00 P.M. MST on 3940 kHz and had 133 stations check in and handled 40 messages. K5HIO administered 4 Novice exams during June. A suggestion for anyone on cw with daytime tlc, call ARTS on 7103 kHz between 1300 and 1900Z. This is the only cw tlc gang or during the daytime in this area that I know of. W5JOV has a new 70-ft. crank-up tower. K5WJF of Farmington handled a msg about a lady with a heart attack in the 120 Mts., her husband had 2-meter rig in the car. W5YTX was not on much during May and June but managed to be on for FD. W5QNR reports much activity this month on forest fires. Traffic: W5UJ 335, W5JOV 303, K5MAT 224, W5KSS 197, W5ENI 132, K5KPS 103, W5PDI 75, W5YTX 35, W5RE 22, W5DMG 16, W5YQ 14, W5QNR 8, W5M1Y 2.

**UTAH:** SCM, Ervin Greene, W7EU — Many local people assisted this month in the flood disaster in the Teton Dam incident in ID. Many spent tiring hours assisting in communications. Traffic totals cannot possibly indicate the number of messages handled both to and from the area, only those who reported to you. SCM are listed at the end of the column. Many messages were handled with incomplete preamble without numbers in haste of the situation. All of the nets and repeaters were busy by another assisting. Sorry to hear our RM and former SCM W7OXX is in the hospital. WA7MEL reports UCN now on 3710 kHz at 0115Z with alternate freqs of 1840 and 7110 kHz. Would like to see more Novice check-ins now that the net has now moved to their part of the band. Reorganization of Lake County suits K7CZ. EC has a new complete plan of being drawn up benefiting from the experience gained in the assist with the Rexburg flood. A number of beneficial meetings have been held with county, state and other interested agencies. Traffic: WA7JRC 235, WA7MEL 128, W7OXX 40, W7DKB 24, W7EU 17, W7UTM 16.

**WYOMING:** SCM, Joe Ernst, W7VB — The Cody Radio Amateurs wish to thank all those who helped to make the WY 1976 Hamfest a success at Meadowlark this year. Repeaters in WY had a big summer with touring amateurs utilizing them on their way to Yellowstone and points of interest. The Laramie Peak repeater living up to forecasts of fantastic coverage for the eastern part of the state and into NC and SD. Welcome to the AREC W7DZH, W7ABC fm Torrington mobile and on 2 meters. W7VB is now the QSL manager for BY5TT who works twenty meters cw on the bottom of the band. WA7CG moved from Lander to Laramie and heard mobile around the state working at the archeological sites. Traffic: K7VWA 508, W7TZK 270.

### SOUTHEASTERN DIVISION

**ALABAMA:** SCM, Jim Brashear, WB4EKJ — Seem like FD participation and enthusiasm were up this year. K4MUD says the Birmingham AEC used their new 5 kw generator and it ran perfectly; his reports are above total. 000 points — Huntsville and other clubs take note. K4HJM says interest in the Anniston area for FD was extremely high and they are already working on plans for next year! He expresses "big thanks" to those in charge at Ft McClellan for their assistance and cooperation. WB4BFQ reports the Albertville group set up on a mountain above Collinsville in 1000' above sea level. Rain hit many areas (naturally), but no spirits dampened especially the Huntsville ARC. Talk about active! W4ZUP total QNI of 77 on various nets in June, congrats. Thanks to a who submitted copies of their papers publicity for FD/AL Amateur Radio Week. AEMN starting time back to 2330, 5:35, W4UAR still looking for contacts on 44.00 simplex. Good to hear WA4JDI back on our nets. AL was 1 of 16 states with 2000 or more points during 1976 SET. Thanks to all participants. Congrats to WB4CXD and the Birmingham group, the Jefferson Co. total was third highest in the USA by area of jurisdiction. Others of the Huntsville ARC are: B4DOR, PAMS, W4HOB, vice-pres. WA4LAF, secy-treas; WA4EUD, asst. secy-treas. Appointed WB8RUK/WB4QZN as OBS; WB4AYO as OPS. Traffic: (June) W4RGS 248, WA4EUD 118, WB4EKJ 109, W4RND 52, K4A0Z 35, K4UMD 22, K4GUL 19, WB4RCF 18, WA4MLK 12, WA4RMP 11, WA4MWF 10, W4ZUP 10, WB4TVY 9, K4CUL 8, K4HJM 8. (May) W4MFW 89, K4LUM 23, K4CUL 16, K4LYY 7.

UPC

*Unique*  
**WIRE TUNERS**

**IMPROVED**  
**Random Wire Antenna Tuners**

Continuous frequency coverage with long or short wires. Excellent for MARS operation. Choice of configuration for wide range impedance matching capability, plus harmonic suppression. Turns counting dial on rotary inductor for perfect match and exact resetability. Runs cold at 1500 watts output power. Five years of proven success.

- CONTINUOUS COVERAGE
- PERFECT MATCH (1:1 SWR)
- IDEAL FOR MARINE OR PORTABLE
- COMPACT, 5" x 6 1/2" x 10"
- FULL YEAR GUARANTEE

**SOLD FACTORY DIRECT ONLY TO GIVE YOU FULL VALUE.**

Prices F.O.B. factory.  
Standard: 3.0-30.0 Mhz ..... \$9.00  
Wide Range: 1.7-30.0 Mhz ..... \$129.00

W6's add state sales tax. Send check or money order (\$15.00 deposit on C.O.D.'s) to:

**Unique PRODUCTS COMPANY**  
1003 SOUTH FIRCROFT STREET  
WEST COVINA, CALIFORNIA 91791  
Tel: (213) 331-2430

## POOR SIGNALS?

Increasing the height of your antenna system can make a BIG difference.

Write us for literature on UNIVERSAL self-supporting ALUMINUM towers. Consider the advantages of aluminum - strong, lightweight, rust free (less maintenance), easy to assemble and erect. (Low cost, too.) Models available from 30 to 90 feet, with a choice of strength to meet your specific needs. ®

**AMATEUR ELECTRONIC SUPPLY**  
4828 West Fond du Lac Avenue  
Milwaukee, Wisconsin 53216  
Phone (414) 442-4200  
Branch Stores in: Cleveland, Ohio & Orlando, Fla.

## ALTEC COMMUNICATIONS

**HAM DEALER FOR THE ARK-LA-TEX**  
SWAN, KLM, TEN-TEC, TURNER, SHURE  
R.F. HARRIS R.P. COMMUNICATION

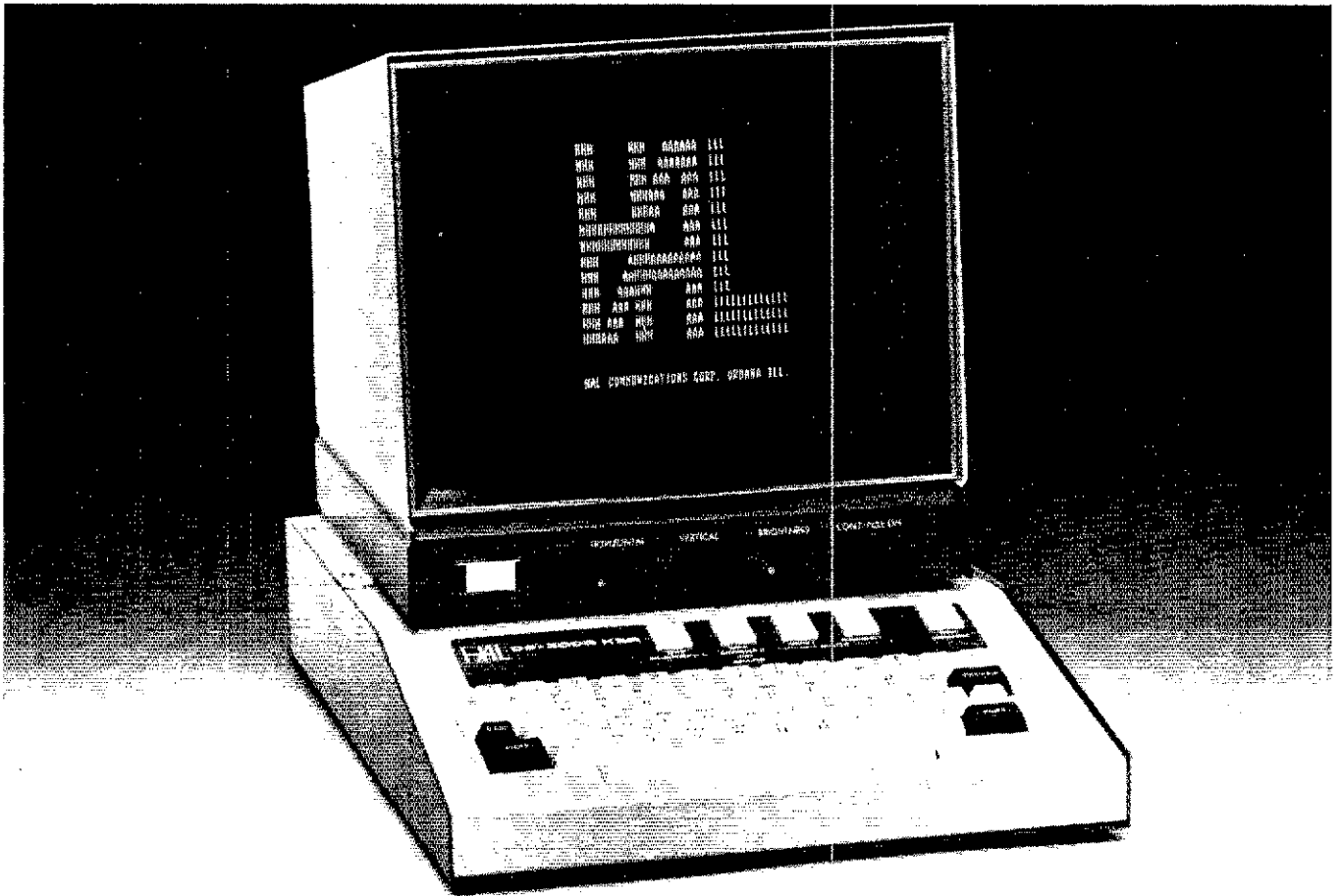
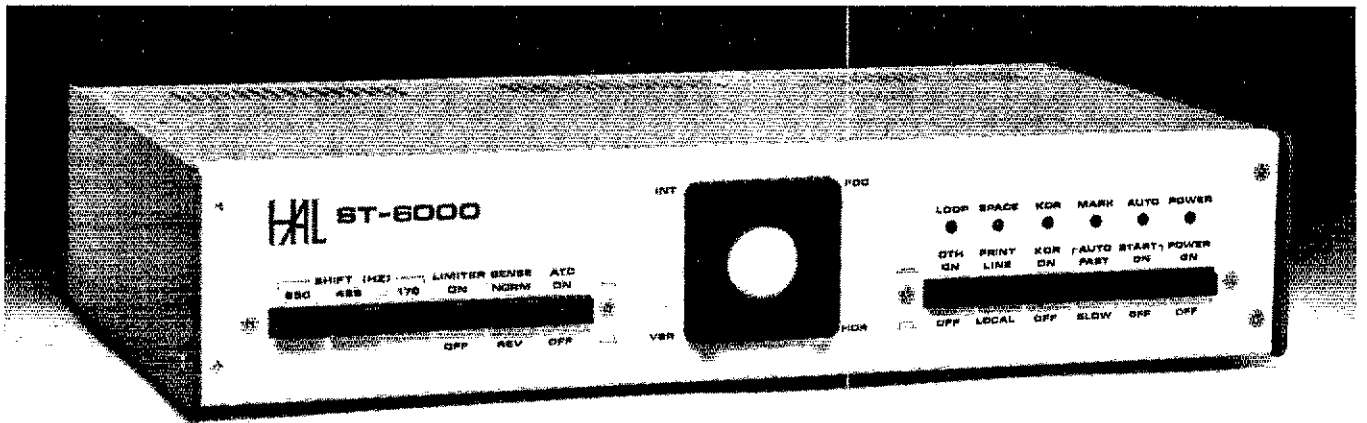
Phone: 1800 S. Green  
214-757-2831 Longview, Tx.  
Telex: 73-0623 75601

## THE "HI-Q-BALUN"

For Duplex-Toggle-Inverted Y - Doublet  
Full Legal Power 3-40 MC.  
Small - Light - Weather-proof  
1:1 Impedance Ratio - Coax Fitting  
Takes Place of Center Insulator  
Helps Eliminate TVI  
Fully Guaranteed \$9.95 PPD U.S.A.  
VANGORDEN ENGINEERING  
Box 305, S. Euclid, Ohio 44121



# Stay tuned for future programs.



The HAL ST-6000 demodulator/keyer and the DS-3000 and DS-4000 KSR/RO series of communications terminals are designed to give you superlative TTY performance today—and in the future. DS series terminals, for example, are re-programmable, assuring you freedom from obsolescence. Sophisticated systems all, these HAL products are attractively priced—for industry, government and serious amateur radio operators.

The HAL ST-6000 operates at standard shifts of 850, 425, and 170 Hz. The tone keyer is crystal-controlled. Loop supply is internal. Active filters allow flexibility in estab-

lishing different tone pairs. You can select AM or hard-limiting FM modes of operation to accommodate different operating conditions. An internal monitor scope (shown on model above) allows fast, accurate tuning. The ST-6000 has an outstandingly high dynamic range of operation. Data I/O can be RS-232C, MIL-188C or current loop.

The DS-3000 and DS-4000 series of KSR and RO terminals provide silent, reliable, all-electronic TTY transmission and reception, or read-only (RO) operation of different combinations

of codes, including Baudot, ASCII and Morse. The powerful, programmable 8080A microprocessor is included in the circuitry to assure maximum flexibility for your present needs—and for the future. The KSR models offer you full editing capability. The video display is a convenient 16-line format, of 72 characters per line.

These are some of the highlights. The full range of features and specifications for the ST-6000 and the DS series of KSR and RO terminals is covered in comprehensive data sheets available on request. Write for them now—and tune in to the most sophisticated TTY operation you can have today...or in the future.



HAL Communications Corp., Box 365, 807 E. Green Street  
Urbana, Illinois 61801 • Telephone: (217) 367-7373

# Superb price!!!! Supreme quality!

6-DIGIT  
FREQUENCY COUNTERS

**69.95**  
(30mHz Kit)  
\$99.95 assembled

**119.95**  
(250 mHz Kit)  
\$139.95 assembled

A counter-offer you can't refuse! It's rock-bottom price and sky-high quality make it your best possible buy! We've proved it to thousands. Let us prove it to you!



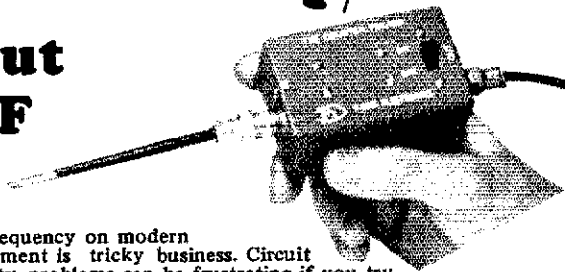
Perfect for: CBers, Hams, Service Techs, & Experimenters!

\*HAM, CB, & COMMERCIAL BANDS \*WIRED & TESTED AVAILABLE \*100HZ READOUT \*6 DIGITS  
\*CRYSTAL TIME-BASE \*1Hz OPTIONAL \*MASTER CHG./B. AMERICARD OK \*ADD \$2 SHIPPING

## Hufco

Incredible counters starting at \$45.95 are also available!  
All counters can be factory wired and tested. Write or call today!  
Box 357, Dept. 51, Provo, UT 84601 (801) 375-8566

## Counter Preamp/Probe Sniffs out weak RF



Measuring oscillator frequency on modern communications equipment is tricky business. Circuit density and accessibility problems can be frustrating if you try using clip leads, loops, or coils. You might short out something or pull the oscillator off frequency with close coupling and be unable to get a reading because there just isn't enough signal to drive the counter. Also the counter input cable itself may load the oscillator even though the counter is high impedance. The COUNTER PREAMP is designed to solve these problems. It has 20 dB of gain which increases the sensitivity of your counter ten times. The low capacity insulated probe can pick up the signal just by holding it near the oscillator crystal, coil, or any active component. Sometimes it is possible to read the oscillator thru a plastic case. The preamp has BNC connectors on both ends and can be used as an in-line preamp for scopes, detectors, RF meters, etc., as well as counters. Input is high Z and output is low Z to drive 50 ohm cable. Another serious problem when aligning receivers is that many signal generators shift frequency when the attenuator is moved from high output to drive the counter to low output to make adjustments or check receiver sensitivity. The preamp will give 20 dB of isolation and eliminate the error. Customers have commented that having used the preamp they are now unable to get along without it. Many have made repeat purchases. The preamps are battery powered with three pencils at 25 ma. Output level is 200 to 300 millivolts RMS. One year warranty, money back guarantee. Shipped with probe, less batteries, postpaid cont. USA. Foreign add \$5.00. Call 213/342-2714 for COD or save money by sending check to Pagel Electronics.

VHF Preamp, 100 KHz to 200 MHz ..... \$35.00  
UHF Preamp, 1 MHz to 500 MHz ..... \$49.00



6742-C Tampa Ave., Reseda, Ca. 91335

CANAL ZONE: SCM, Roderick J. Isler, K2SP1 - Fun was had by all at this year's Field Day Festivities. The score was not as high as last year which can be attributed to poor band conditions and lack of cw contacts. A lesson's learned packet is being compiled for next year's activities to increase contacts. More activity is heard on two meters especially on 52 simplex. Several CZ hams are planning 160-meter activity in Oct. thru Jan. A new station is set up in the Canal Zone License Section in Balboa CZ for use by visiting hams to the area. Many hams were on hand for the 4th of July '76 CZ parade and provided 2-meter communication throughout the festivities.

GEORGIA: SCM, A. H. Stakely, K4WC - SEC: K4YRL. PAM: K4JNL. RM: K4FLR. Net, Freq., Time and Day are: Albany, 146.22/82, 1800Z Sun. Atlanta RC, 146.22/82, 0100Z Mon.; CVEN No. 1, 3.950, 1730Z Sun.; CVEN No. 2, 146.34/94, 0130Z Dy.; GARS, 147.75/15, 0100Z Tue.; GSBN, 3.975, 2330Z Dy; members: remember that liaison to QFN5 now counts for NTS credit, as well (renewed - try it!); QCWA 3.830-1300Z Sun.; SEDX, 3.815, Tue., Warner Robins, 146.25/85, 0300Z Wed. Congrats to WN4QAR WN4QAS WN4QNC WN4QNE WN4QNF joining our ranks courtesy WN4MXM; K4KZP individual high score and WB4MZO club runner-up in 75CC-WE contest; WA4BZ passing Advanced; WA4BL getting married; K4JVN for shopping up Atlanta; QCWA; WA4BAA passing ExTra; WB4WQL making PSHR and getting 4RN certificate; K4FLR making PSHR. Terrific hamfest by Atlanta opened every nationwide attended by ARRL officers and board as well as FCC. Great organizational job by K4YRL on AREC. New EC, and W4BK, K4CRD, K4GCR, W4JAG, K4JFY, WB4JIB, WB4JNL, W4JNL did a great PR job at shopping mall during FD. W4VO/4 did well on Pine Log mtg, during VHF tray. Traffic: WB4WQL 98, K4FLR 90, WA4BAA 37, WA4LLI 53, K4SF 37, WB4SPB 28, W4AAV 26, K4NM 19, AC4HON 14, K4JFY 10, K4WC 10, W4BTZ 2.

NORTHERN FLORIDA: SCM, Frank M. Butler, Jr., W4RKH - SEC: WA4WBM. RM: WA4FBI. PAMs: WB4VDM/75; WB4BSZ/VHF. K4PPQ appointed EC of Levy Co. WN4HRG is newest ORS-II appointee. K4ELJ and WA4EYR earned 5NC's on FAST. Net. WA4EYR elected NW of TRN and secy of ESBA. Phone net members: remember that liaison to QFN5 now counts for NTS credit, as well as liaison to QFN and Daytime Region Nets. Gov. Askew proclaimed week of June 20-27 Amateur Radio Week. FD messages received from Pensacola, Jax Beach, Orlando and New Port Richey. QFN had state-wide picnic at Juniper Springs, near LICHA, WA4AU on 6m SWB with a Swan 50. W4CSS reports the GRM on 6 meters during FD and VHF QSO Party was most in years. He recently worked 7F1XW. WB4NLV new signing HR2BB. Okaloosa Co. has its new RACES call.

WA4AAE, W4K1X found a Super Pro for \$5; now has it working. Best of the new net is new net 2m from Alford. WA4BAK operating from W4DFU. U. of FL this summer. New officers of Tallahassee ARC are W4MNN, pres.; W4WSZ, vice-pres. WA4FAL, secy.; WB4VDL, treat. WA4EYR hosted picnic for N. FL DX Assn.; guests included W4DGE and W4GJM. Sorry to see 44DSN step down as FRC pres. WB4FHT filed for resignation between phone & cw traffic nets. W4EYP planning repeater for Palatka. WB4YTK, ex-WA1FS1, active on QFN - an Extra Class YL. WB4GHU now mobile on HF. K4G received QCWA 60-year pin. QFRA election results: W4JUL pres.; WB4YF, vice-pres.; WB4HXS, secy.; W4EZX, treat. Lightning tapped W4GFM. Repeater for a while. Traffic: (June) WA4FB1 285, WB4GHU 174, W4WNY 157, W4K1X 153, AB4DXN 119, K4KPI 111, W4LDM 91, WB4TRP 73, WB4DTS 68, K4BSS/4 65, W4JL 61, WB4FHT 52, WN4JMM 45, WB4HKP 45, W4RKH 38, WA4EYV 37, WB4JNL 35, WA4EY 23, WA4EY 22, WB4EY 18, K4EY 18, WB4VAP 10, W4IA 8, WB4YMP 4, WA4TXM 2 (May) WN4JMM 66, WA4BAX 48, WB4TRZ 41, W4IA 29.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCI - SEC: WB4ALH. Asst. SEC: W4WYR. RMs: K4EBE W4MEE, PAMs: WA4NBE W4OGX. Congratulations to WA4FBI (NFLA) for finishing out a very successful term as Net Manager of QFN (3651 kHz). W4MEE (SFLA) now takes over management for one year. We wish Doug the best of luck and urge everybody to continue to support the net. QFN5 (3715 kHz) has been reorganized as a slow session (3 wpm) of QFN and is under management of WB4GHU training officer. It is showing an up-trend in activity. We should soon have stronger signals on that net with 250 watt Novices and Technicians. Congratulations to WB4FHT a recent graduate of QFN5 and now a very active traffic net manager. He has a new net manager. K4CFV relieved WB4ALH on July 1st. Summer static and odd skip conditions are giving us problems, but lets get in there and make FAST the best net ever. As our new SEC, WB4ALH has been busy producing a section-wide emergency communications plan. It should be distributed soon. Other EC's are in the process of planning for the hurricane season and upgrading plans and equipment, testing emergency power, etc. W4IYT reports Dade AREC Planning Committee moving along good. Pinellas Co. Emergency Net (AREC) now operates on 147.66/147.00 and 28.720. K4DRN has been appointed Asst. EC to 10 meters. F4TH received A1 Operator certificate and earned "merit" badge. W4GFM has been promoted to "grade." We are very proud of this young and capable Radio Amateur. W4KER having good luck working DX and traffic with attic antenna. Traffic: (June) K4TH 411, K4SJM 388, W4MEE 384, K4SCL 288, W4GM 265, WA4SC 240, WA4NBE 203, W4EYH 180, WA4JPY 162, W4JIP 149, K4JIP 149, WB4HJ 130, W4JHF 74, W4DVO 61, WA4CTM 54, K4CFV 48, W4IRA 46, WA4EIC 44, K4BLM 36, W4IYT 20, K4SJA 20, WB4WYG 13, WA4LGT 11, WA4KER 9, W4SMK 9, W4LK 7, W4NTE 4, (May) WB4ALH 79, WA4CTM 47, W4IYT 22, WA4KE 18.

WEST INDIES: SCM, David Novoa, KP4BDL - Appointment: KP4DRT ORS. Congrats to KP4EA for his high score in the CW DX Competition. KP4AST is getting his terra farm ready for the fall contest season. KP4DBR has a new Henry 2 ham Linear, and a five-element monobander for 20 meters. KP4RK has a KWM-2 and an SB-220. KP4BDL - Drake C Line. Field Day participation was not as expected due to poor band conditions. AREC organization is growing fast. You have place in our corps join now. Contact your EC. WR4RN has a new net the new repeater on 146.10/146.50. KP45 CSM and CSO are active on two meters after a long QRT from the bands. KP4CK gave your SCM a 20-year collection of QSTs. Many Tnx! Traffic: KP4HT 42, KP4BP1 16, KP4BSQ 14, KP4DBK 11, KP4CNT 10, KP4GM 11.

SOUTHWESTERN DIVISION  
ARIZONA: SCM, Marshall Lincoln, W7DQS - PAMs:

# HAVE I GOT A NUMBER FOR YOU!!

Toll Free

## 800-325-3636

Call

### HAM RADIO CENTER ST. LOUIS

FOR NEW & USED  
AMATEUR RADIO EQUIPMENT

*We Trade on New or Used  
Charge it on Master-Charge or BankAmericard*



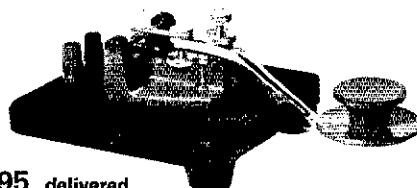
\$29.95 delivered

#### Model HK-1

- Dual lever squeeze paddle
- For use with all electronic keyers
- Heavy base with non-slip rubber feet
- Paddles reversible for wide or close finger spacing

## THE HAM-KEY

NOW 4 Models

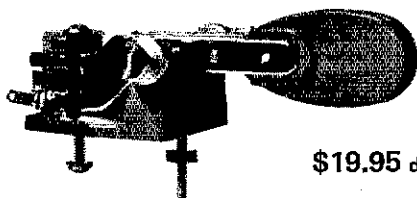


\$16.95 delivered

#### Model HK-3

- DeLuxe straight Key
- Velvet smooth action
- Heavy base with non-slip rubber feet.
- No need to attach to desk

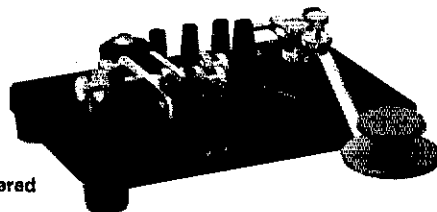
All keys are completely adjustable  
All plastic parts Hi-Impact styrene  
All have color coded binding posts



\$19.95 delivered

#### Model HK-2

- Same as HK-1, but less base for those who wish to incorporate in their own keyer



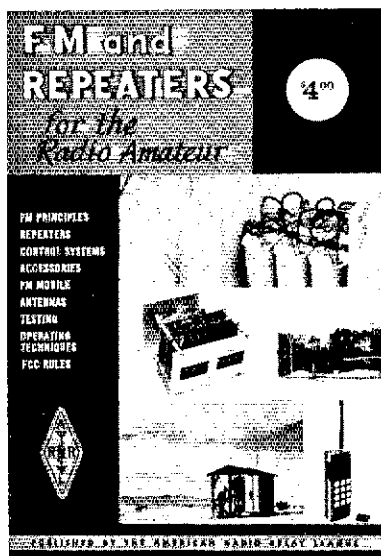
\$44.95 delivered

#### Model HK-4

- Combination dual lever paddle and straight key on same base
- Straight key may be used conventionally or as a switch to trigger a memory

### HAM RADIO CENTER INC.

8342 Olive Blvd., P. O. Box 28271  
St. Louis, MO 63132



This book is a must for the fm buff as well as the operator just breaking into fm and repeaters. Everything is covered! Fourteen chapters include: mobile installation, transmitters, receivers and antennas for mobile and base, and fm test equipment. Special sections treat alignment and troubleshooting gear as well as repeater technical problems and cures. Club organization, repeater location planning, and operating under the new regulations are all covered. If you operate fm or are just becoming interested, you cannot afford to be without this book. \$4.00 in U.S.A., \$4.50 elsewhere.



**THE AMERICAN RADIO RELAY LEAGUE**  
225 MAIN STREET  
NEWINGTON, CONN. 06111

**ANTENNA SUPERMARKET - PO Box 338, Chambersburg, PA 17201**

**DIPOLL AND WIRE ANTENNA KITS**, complete with HI-Q BALUN, 100' rope, copper antenna wire and insulators.

80/40/15 parallel dipole	\$36.95	160 short, 130' length	\$36.95
40/20/15 parallel dipole	\$30.95	80 short, 63' length	\$31.95
80/40 trap dipole	\$41.95	40 short, 33' length	\$28.95
40/20 trap dipole	\$36.95	Single band models from	\$24.95

**VERTICALS** — complete with Universal Mounting Base, Folds to 5' for Easy Transport, Hvy. Duty Aluminum Tubing.

20/15 trap, 13' hgt.	\$29.95	160 compact 23' hgt.	\$44.95
40/20/15 trap 22' hgt.	44.95	80 compact 20' hgt.	39.95
80/40/20 trap 30' hgt.	69.95	40 compact 15' hgt.	34.95
80/40/15 trap 20' hgt.	59.95	20/15/10 full size vertical	29.95
10 meter cov. for above add	9.95		



TO ORDER — Include \$1.95 shipping (\$2.95 West Coast)  
24 hour shipment. 30 day guarantee.  
For Info: SASE or 1st Class Stamp.



**NEW**  
**Apartment/Portable**  
apt. roof or patio,  
camper, trailer, mo-  
tor home. All bands  
80-10, folds to 5' easi-  
ly. 13' height.  
80-40-20-15-10 \$49.95

Include Interbank # and  
Expiration Date on  
Credit Card Orders.

WA7KQE & W7UQQ, RM: K7NHL. Field Day reports were received from Arizona ARC, Arizona Mountain Moguls, Motorola ARC, Old Pueblo RC, Scottsdale ARC, and Tucson Desert Rats RC. WA7ZMJ and W7REG are reported as Silent Keys. K7NTG has compiled a new list of all amateurs in AZ with breakdowns by county and license class — a really big job done all by himself. Anyone interested should contact him directly. W7Y's report giving 13 Novice exams in Flagstaff. W5UH, member of SWN, reports he monitors 7103 daily from 1300 to 1900 GMT for emergencies and traffic. Your SCM would like to hear from everyone who has regular monitoring habits on any band for such purposes, and would like to receive your comments. Requests in addition to state nets, to use in your area by anyone wishing to report an emergency or send a message. In other words, what is YOUR best monitored amateur ACTION frequency? This information is needed to draw up a modern, simple, workable amateur radio communications plan for AZ. Cactus Net QNI 1046, QTC 3700-ATN QNI 842, WIC 36, certifies to: WB7CAG, K7NTG, W7RQ; SWN QNI 228, QTC 318; Traffic: K7NHL 186, WB7CAG 112, K7LUXV 75, W7UQQ 65, WA7VTM 45, K7NTG 26, WA7YKM 20, WA7KQE 18, W7DQS 12, WA7WEB 8, WB7CZL 7, K7NMQ 1, W7CAF 1.

**LOS ANGELES:** SCM, Eugene H. Violino, W6INH — Asst. SCM: Kevin A. Berasley, WB6QYN. RMs: WB6ZVC WB6PKA K6UYK. Acting SEC: W6SPK. At this writing most of the clubs are making big plans for the coming Field Day. The United Radio Amateur Club of San Pedro is making plans for the Denver Convention. W6SZH polishing up his talk for the event. He is also finishing a digital readout communications receiver out of the 1976 Handbook. Other ARRL Handbook projects at present being built by other club members. The Telco RC reporting that W6LYC has retired and new QTH in NY. The club also has a couple of sets of climbing bolts for members who want to work on their towers. Surprising traffic in our area was rather light re the Recksburg Dam flood, at least it did not pass through the NIS and I heard very little on sideband. The Guam typhoon messages have dropped off and now its regular biz. Field Day was very active this year even though we had a very hot sun. The weather report started to the SCM as required. W6FO WA6SNK W6HDV W6KA WA6DN K6OX K6AA W6MPH and W6SD. WA6FEJ back on the air after installing new antenna at new QTH, we will be sending Official Bulletins long before you read this. W6NAA flew a 3 hour mission taking pictures of Field Day stations in a Cassia 172, I hope he has sent some of these to me. Many fires in the CA. Hills and the AREC boys are doing a great job helping out whenever possible. With summer vacations, the heat and dry weather reports are down this month, so I hope they get better next month. Copied from the LERC Bull: "Being a licensed Amateur Radio Operator is a privilege. Sure, we earned our rights to the frequencies we use and to most of us Amateur Radio is more than just a hobby because it becomes a part of our lives we are very proud of. Have you listened to 'CB' lately? Here is created chaos (FCC) that is hard to believe. With millions of CBers and only a few hundred thousand Amateurs, sheer numbers alone will force the FCC to expand or expand CB as it is today. CB is here to stay! It is a service that many people need and want. It may get worse before it gets better, but I do believe that CBers themselves will in time police their own ranks to eliminate the 'Funny Farm Operator'. They have to if they want to stay on the air. I don't have to say it. Amateurs have a public relations job to do. Let us explain to our friends and those around us the difference between Amateur Radio and CB. Condemning it can only give us a bad publicity in return. We talk to the World — let's tell the world about Amateur Radio Service!" The JPL ARC has been on the air with N6V the first 100 call in connection with the Bicentennial project of the Viking spacecraft landing on MARS. Traffic: WB6PKA 391, W6INH 270, W6HUJ 135, WB6YD 58, K6CL 22, W6BRO 16, WA6FEJ 8, WB6AIT 7, W6OEO 3.

**ORANGE:** SCM, William L. Weiss, W6CPB — Asst. SCM: Dick Blirbeck, K6CID. SEC: WA6TVA, RM/ PAM: WB6AKR. Hope everyone had a great time at their Field Day. The temperature reports varied from 70 to 105 degrees. It's mighty rough making contacts under these conditions. Congrats to all who braved the hot weather to make it a success. With the close of my term as SCM, Sept. 11, approaching I want to thank all the appointed members for their support during the past four years. My activities may be curtailed, somewhat, but I will be available to assist in any manner within my capabilities. Sorry to report that W6DQN has joined the Silent Keys. Archie passed away on June 27. Our condolences to the family. Hope everyone attended or contributed to W6DTR testimonial dance. A very worthy cause and a lot of fun. W6BUK says the summer heat has curtailed his operations. I think this is true with everyone. W6VQZ has installed a sixteen-element skeleton slot jay 2-meter beam. Bill is breaking all the repeaters in S.C.A. Glad to report that WA6YWS is out of hospital and feeling OK. California State College, Azusa, WA6NGB are doing an excellent job handling traffic, keeping the Hiway patrol informed of accidents and hazards on the hiway. They also help fire officials in brush and forest fires in the area. Congrats to all who participate. PS: WA6TVA Traffic: (June) WA6TVA 44, W6WLR 30, W6CPB 23, W6CRD 8, WA6IKH 6. (May) WB6EIG 673, WA6YWS 18.

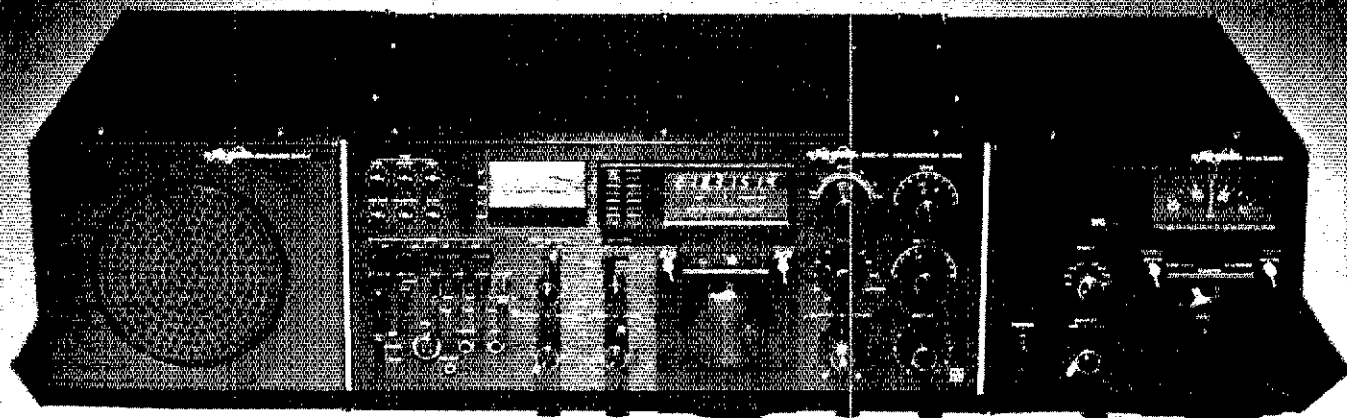
**SAN DIEGO:** SCM, Arthur R. Smith, W6INI — The San Diego Section has lost an ardent supporter of its operating activities with the retirement of W6GBF. Cy contributed as an EC, SCM, and SEC. He also maintained "home base" communications for S.D. Mountain Rescue Team. Cy and YL WA6HXB will soon be on the air from motor home in northern CA. Good luck! Time for clubs to get ready for Fall licensing classes. How about some Sat. sessions for the high schoolers? ARLS, ARLS, Cajon, So. Bay ARLS reported Field Day activities by message. An intense hot spell made operating uncomfortable. June program of SANDRA had Ranger Doug Allen telling how amateurs could help during Red Flag Alerts, periods of high fire danger. WA6HCA W6NFG WA6G9H WA6G6G provided communications for June 12 bicycle races. ARLS. Cy and YL WA6HXB by W6PJU and OM W6DEY. Communications for El Cajon's 4th of July celebration were provided by WA6HD WA6GQE K6QI WA6AQF WA6HCA W6EHR K6SEW WA6GVR W6INI. W6BGF handled LA flood traffic. WA6HK back on with long wire ant. SCRC needs members. It costs nothing to join. Contact: W6INI 271, W6PJU 223, W6NFG 225. Traffic: W6BGF 287, WB6HCF 254, W6PJU 57, W6DEY 23, K6GJFS 8, WA6JFY 4, WA6IKH 2.

There is no substitute for quality, performance, or the satisfaction of owning the very best.

Hence, the incomparable Hy-Gain 3750 Amateur transceiver. The 3750 covers all amateur bands 1.8-30 MHz (160-10 meters). It utilizes advanced Phase-Lock-Loop circuitry with dual gate MOS FET's at all critical RF amplifier and mixer stages. There's a rotating dial for easy band-scanning and an electronic frequency counter with digital readout and a memory display that remembers frequencies at the flip of a switch. And that's just the beginning.

Matching speaker unit (3854) and complete external VFO (3855) also available.

See the incomparable Hy-Gain 3750 at your radio dealer or write Department MM. There is no substitute.



3854

3750

3855

# There is no substitute.

**hy-gain**<sup>®</sup>  
Amateur Radio Systems.

Hy-Gain Electronics Corporation  
8601 Northeast Highway Six; Lincoln, NE 68505

© 1976 Hy-Gain

# Incredible Counter!

## Incomparable price!

A 500mHz (6-Digit) FREQUENCY COUNTER for under 40 cents per mHz! Figure it out. It adds up to unheard-of savings! With guaranteed quality to match and exceed overpriced brands. Let us prove it to you now!

# 169<sup>95</sup>

\$199.95 assembled

Perfect for: CBers, Hams, Service Techs, & Experimenters!

\*HAM, CB, & COMMERCIAL BANDS • WIRED & TESTED AVAILABLE • 100HZ READOUT • 6 DIGITS • CRYSTAL TIME-BASE • 1/2" OPTIONAL • MASTER CHG / B. AMERICARD OK • ADD \$2 SHIPPING

# Hufco

Incredible counters starting at \$45.95 are also available! All counters can be factory wired and tested. Write or call today!  
Box 357, Dept. 59, Provo, UT 84601 (801) 375-8566

(6-DIGIT/500mHz KIT) FREQUENCY COUNTER



SANTA BARBARA: SCM, D. Paul Gagnon, WA6DE — SEC: WB6JW, RM: K6QPH. PAMs: (VHF) W6KPS, (HF) K6YX. WB6IBO has been appointed a ORS. W6POU received a Spanish award from TUSA for help during the Guatemala earthquake. Ventura Co. has lost WB6IY to Nipomo and WB6EGW to McKinleyville. K6YNB set a national record in the June VHF contest with 60,000 points. K6YN K6QPH and K6GJD made over 4500 points in the single transmitter class on Field Day. WB6TW has h 50-ft. tower up over Santa Barbara. W6PFP finished construction on a new tower for the FMT. W6SMU has been working in Phila leaving a vacancy o the Teletype Bulletin Net. Do you have RTTY gear? We need your help on 3605 Mon. at 1730. WB6IB used WR6AEP and assisted an overturned vehicle o Hwy 101. WR6AEP now WR6AOK (28/88 Ventura Co.). The Santa Barbara Club had a display at L Gunbre Plaza thanks to WA6QDZ WA6GMB and WA6BLS. The Poinsettia ARC had Field Day o the Ventura Pier and followed up with a booth at the Bicentennial Celebration where over 300 msgs were passed in a day and a half. WB6DHW WB6DP WB6JKM WA6TMQ and W6PNM were kept busy Honolulu was again heard on 2 m with WB6OBS. WB6LJ WB6RZ and WA6SVNB getting in o the opening. W6APW gave an informative talk on the upcoming World Radio Conference at SBARC. The Satellite ARC Swapfest in July was a big success. Over 550 steaks were served. PSHR: WA6DEI 50, WA6LB 42, WB6CWE 26, WA6VBS 25, W6ITW 14. Traffic: WA6LBO 76, WA6MBZ 73, WB6CWE 68, WA6DE 33, WA6VBS 29, WB6IBO 14.

### WEST GULF DIVISION

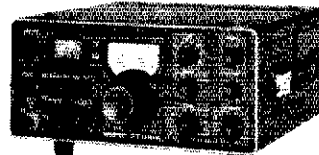
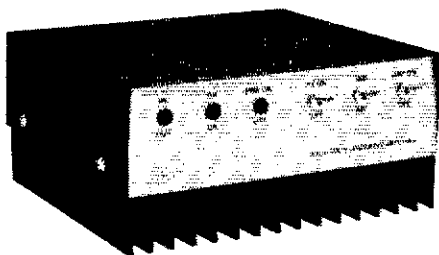
NORTHERN TEXAS: SCM, L. E. Harrison, W5LR Asst. SCM: Frank E. Sewell, W5I2U. SEC: W5DWW. PAM: W5G5N. Note upcoming changes in SCM effective Sept. New man is L. E. "Ted" Heathcke W5EJ, 1409 Cooper Dr., Irving, TX Tel 445-0053. P help him all you can. Next the intruder Watch under K. L. HIN has issued call for volunteers. FCC monitors stns NOTX closed. Kingsville open Tel. 512-592-2533. National ARRL Conv Now history. Dallas attendees include ex-W5ENE plus XYL. Comm. Dept. new publication June 76 updates SCM elections, established Deputy/Asst. SCM and new class of OO called CLS. Techs eligible provided four years service with present ticket. All OO appts require General Class or more and four years service with firm. If your appt. outdated (over 2 yrs old) send in for renewal. FD not complete. Only 5 NoTX stns rcvd points for sending SCM the required msg. Remember SET comes in Jan. The SoWest Advancement Tlc. Net meets at 0330 CD. TTS & 10:30 P.M. CDT MWF on 3935 KHL following the 10:30 on the same freq. per WA5WL net msg. Can meet Novices on 3746 kHz. RWK were all out FD. Congrats Pete, rcvd 7 new members in June. Total nw 93. We understand ARRL clubs will participate in a test program to qualify applicants for Novice license & FCC will issue license without further FCC exam. (How's them apples folks). Ft. Street P. Edith sez: FD in progress. 2 Advanced Tech. Senator Andujar will consider re-drafting of covering control of RF Electromagnetic Radiation & include the statement "The Regulations do not apply to Radio and Television stations licensed by the FCC. OO W5QPX again sends in a good report. Arlington ARC decays up for sale. FD plans fine form, W understands the 10:30 to be granted. Irving ARC pres. W5DIF report on FD plans at Northlake Pk. Classes started June 7th. Dale Strauss of Crowsb town wrote regarding location of Novice classes near his hometown. CDEPT issued recent checkup covering many items lately. Everyone rcdv same I'm sure. My answer was: FD in progress. Do not let us see who reads their bulletins. W5GNT of DARC off on OXpedition into islands of Honduras & Nicaragua period July 1-22 and Aug. 1-20 to; 4,260, 7280, 3888 FD msgs also rcdv from K5RWK, W5AW big Springs W5SH Ft Worth. Silent Key: K5HEZ, W5B8FX OR cancelled due to moving. W5G5N rpts full day activity in his area during 8. Had 7 rigs running on bands including 2 mtrs. Traffic: (June) W5TI 36, W5G5N 24, W5SDXB 19, W5YK 8, K5SOR 6. (May) K5SOR 12.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Net calls heard around OK WN5SWZ WN5SZX WN5TA WB5TLJ WN5QMF and WN5RLG. Recent upgrade include K5CTJ WB5PMF and WB5VB. W5REC continues to spread the good word via additional copies of the PRA tapes to stations in AR, KS and OK. K5CAV recently gave 6 Novice tests in one day. GR and OLZ continue to show up well on the monthly net reports. Miami's 22/82 repeater on the air and doing good job, specially during Storm Watches. Grace Country AREC Net meets Tue, 2100 local on Muskogee 25/82 machine. If you don't own your own ham and let me know. I cannot pass the word on via the column. Have had inquiries about the new Class V OC. Anymore? Also, can use more OOs of all classes. Ham Picnic was a success. Ham Holiday will be behind u when this gets printed so looks like next will be Texoma in Oct. CU there. Traffic: W5BTKD 585, W5BRLR 526, W5NKC 311, W5BKG 135, W5R 119, W5REC 103, W5BOYU 50, W5FKL 49, W5SAZ 30, WA5FSN 30, W5PVL 26, W5PML 22, W5SRL 15, W5FFW 12, WA5OUV 6.

SOUTHERN TEXAS: SCM, Arthur R. Ross — SEC: W5TQP. RM: W5UGE. PAM: W5SAMN. Oos report: In this month: WB5FMA K5HGB W5NGW, OV reporting WA5QCP. OFS WA5CBT rpts great openings on 6 and 10 meters; worked AK on 6 mtrs; he NR 11 Bicentennial WAS. OFS WA5GJ having trouble with electric line regulation. Sister Mary WA5VBM, busy taking care of Bassett bound following spinal surgery on the hound. RM W5UGE went to 9Y4-Land for vacation. W5SKPL rpts his code an theory class produced 5 Technician Class licensees including his wife, who said the test is easy. DR WA5ZBK has new 5B1V and W5B4V. W5B4V accumulator fever; will be in medical school in Galveston in Sep. K5Z5I is new ORS effective July 4 — sort o Bicentennial appt. EC W5TFW rpts WA5THK passed to Advanced; he also rpts radio classes going strong. ORS W5B5WV sez he hauled his antenna up to 50-ft. OPS K5RVF had nice DX visit from SM9GLF. O K5HGB spent 7 1/2 hours during 8. Houston Echo during June floods. PAM W5SAMN sez it feels good to be home from travels; reports excellent results from Echo Repeater (Houston) with autopatch call-in feature. OO W5NGW, operating FD at 9600-ft, had t put his milk in the ice chest to keep it warm! Traffic: (June) K5HZR 448, W5KLV 412, WA5VBM 311, WA5RKL 214, W5UGE 196, W5NUM 167, W5U 15, WA5V 145, W5G5N 135, W5BKG 135, W5R 119, WA5ZBK 44, W5L1TW 43, W5FMA 31, W5TQP 21, W5BIZN 26, K5Z5I 23, W5GO 14, W5SAMN 11, W5BHO 12, W5TFW 12, W5B5WV 10, K5RVF 7, K5HGB 2. (May) W5L1TW 33, W5BIZN 13. (Apr) W5BIZN 10.

## ANNOUNCING SCS's NEW HF-10-100L

for use with



YAESU FT-301 Series  
160-10M, 10W, SSB  
Available in Fall

HF-10-100L  
SPECIAL  
BI-CENTENNIAL  
OFFER \$177.60  
VALID THROUGH 9-30-76  
FOR DIRECT ORDERS ONLY

### HF-10-100L AMPLIFIER

Frequency Range	3-30 Mhz
Input Power	10 W Nom., 5-20 W PEP range
Output Power	100 W Nom., ± 1/2 dB across band, 200-250W PEP output
Input Impedance	50 Ω nom, adjustable to match exciter range under 2:1 across band
Output Impedance	50 Ω nom, up to 3:1 VSWR acceptable with little degradation
Current Drain	16 A nom, 20 A supply recommended at 13.6 VDC
Power Supply	13.6 VDC recommended for best results, 11-14 VDC acceptable positive or negative ground
Pre-amp	18 dB nom gain across entire HF band, 15 dB typ at 50 MHz, 3-4 dB NF
Size	19.1 x 16.5 x 8.9 cm wt 1 1/2 Kg

The high level of quality of workmanship and performance will make the HF-10-100L very popular in short order. Now being used by West Coast Amateurs. Includes built-in low pass filter which cuts off at 35 MHz. User to supply additional low pass filters for bands below 15 meters. Class AB operation insures proper linearity and min. distortion.

HF-10-100L \$219.95

Other models also available for HF — UHF

SEE YOUR FAVORITE DEALER OR ORDER DIRECT FROM:

# SCS SPECIALTY COMMUNICATIONS SYSTEMS, INC.

8160 Miramar Rd., San Diego, CA 92126 • Louis N. Ancliaux, WB6NMT, (714) 271-6310

**Bil Harrison, W2AVA, SAYS**

**"Don't scatter your signal!"**

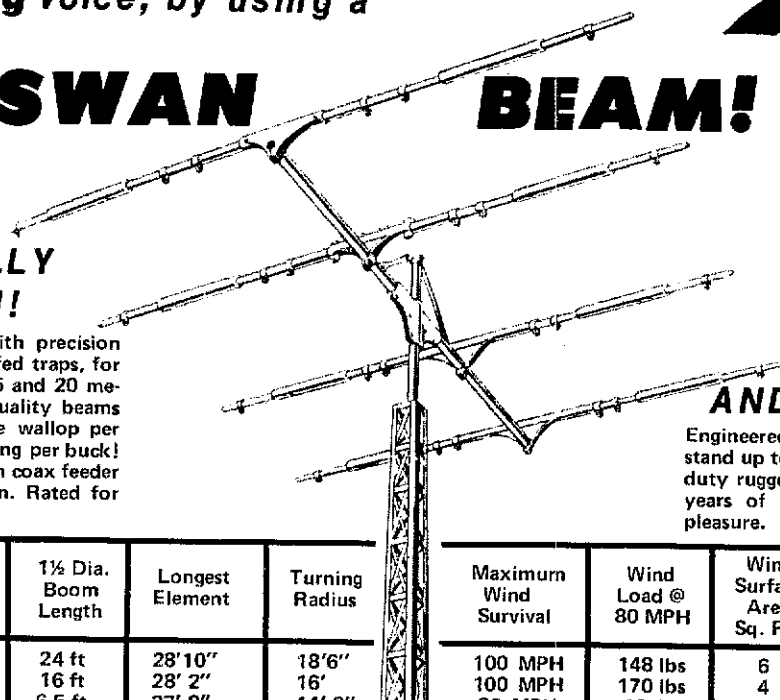
**You can concentrate your precious RF power and squirt it right where you want to be heard as the big voice, by using a**



**SWAN BEAM!**

**THEY REALLY PERFORM!**

Utilizing High-Q design, with precision pre-tuned and weatherproofed traps, for peak performance on 10, 15 and 20 meter bands, these superior quality beams will give your signals more wallop per watt, and give you more bang per buck! Low SWR match to 52 ohm coax feeder for high efficiency radiation. Rated for full 2,000 watts.



**AND, THEY LAST!**

Engineered and solidly constructed to stand up to really big winds, these heavy-duty rugged antennas will give you many years of reliable service and operating pleasure.

Model	Working Elements Per Band	1 1/2 Dia. Boom Length	Longest Element	Turning Radius	Maximum Wind Survival	Wind Load @ 80 MPH	Wind Surface Area Sq. Ft.	Net Weight Lbs	Ham Net Price
TB-4HA	4	24 ft	28' 10"	18' 6"	100 MPH	148 lbs	6	54	249.95
TB-3HA	3	16 ft	28' 2"	16'	100 MPH	170 lbs	4	44	189.95
TB-2A	2	6.5 ft	27' 8"	14' 3"	80 MPH	60 lbs	1.8	18	129.95

**HEAVY DUTY 2-ELEMENT 40-METER BEAM.**

Maximum forward gain and front-to-back ratio in the CW or phone portion of the 40-meter band is easily achieved for optimum performance. Large high-Q loading coils are weather-proofed. Rugged design.

MB-40H	2	15.75 ft	30' 4"	17' 6"	100MPH	80 lbs	2.5	40	199.95
--------	---	----------	--------	--------	--------	--------	-----	----	--------

**SWAN HIGH-Q 5 BAND SWITCHABLE MOBILECOIL ANTENNA**

High radiation efficiency across all 5 amateur bands at a 1000 watt P.E.P. rating is featured in this patented "High-Q" coil. Gold plated contacts of the manually operated vertical switch provide eight positive stops: one each at 10, 15, 20, and 40 meters plus four on 75 meters. Six-foot adjustable whip includes Kwik-On connector. Exclusive LEXAN unbreakable center post. Top quality materials throughout.

Includes base section, coil, and top section

Model 45

\$114.95

Easy Parking in our own fields.

**PROMPT ORDER DEPT.**

We carefully pack and ship ham gear, accessories and parts to most any part of the world. Address your orders to:

**20 Smith Street Farmingdale, N.Y. 11735**

Or - Phone your orders to (516) 293-7990

N.Y. residents only, add N.Y. Sales Tax

Since 1925...

**Harrison**

• FARMINGDALE, L.I. Route 110 at Smith St. 2 miles South of L.I.E. Exit 49 S (516) 293-7990

• NYC PHONE 895-4777

OPEN NITES 'til 9 Saturdays 'til 6

• VALLEY STREAM 10 Sunrise Hwy.

At Rockaway Ave. (516) 872-9565

**GOLDEN SWAN FINEST TRAP VERTICAL!**

Outstanding performance on 10, 15, 20 & 40 meters is yours with this omni-directional, low radiation angle, trap vertical antenna. Small installation space allows for either roof-top or ground level set-up. All hardware and ground-plane radials included. Patented "High-Q" adjustable traps are precision set at the factory for maximum radiation efficiency on each band, with low SWR across the entire band. Heavy duty construction withstands winds to 100 mph when properly installed. Designed for 52 Ohm coaxial feedline. Power rated at 2000 watts P.E.P. Overall height is 21 feet.

Model 1040-V

\$111.95

75MK Add-On Kit. Extends full band coverage of the Golden Swan to include 75-meter band. Adds 5 feet to antenna height.

\$38.95

TOP TRADE-IN ALLOWANCES

**CHARGE IT!**

Take up to 2 years to pay

MASTER OR BANKAMERICARD





The Continuing  
Adventures Of  
**SPLATTER AND SPARKIE**

Episode #1: Buying Used Ham Gear



Splatter and Sparkie are both looking for a used linear. Splatter has spent all night dredging through the classifieds and making dozens of phone calls only to find all the linears have been sold before he got there. He's even called his local dealers, however all their gear is either new or over-priced.

Sparkie on the other hand made his first call to BUYERS & SELLERS Ham Radio Brokerage, knowing they have the largest selection of used gear anywhere, constantly being replenished with new listings from all over the U.S. Sparkie knows he can get a good deal at Buyers & Sellers because there's no dealer markup, the seller sets the price. If he's looking for an uncommon linear they'll even put him on their buyers list and contact him at no charge when the unit comes in. He also knows he won't get a lemon from Buyers & Sellers because of their Mail Purchase Guarantee Plan.

Sparkie got the linear he wanted at the price he wanted to pay . . . Splatter is still running barefoot

Call our Ham Gear Hotline (617) 536-8777 or send an SASE for our weekly equipment summary and get the gear you want at the price you want to pay.

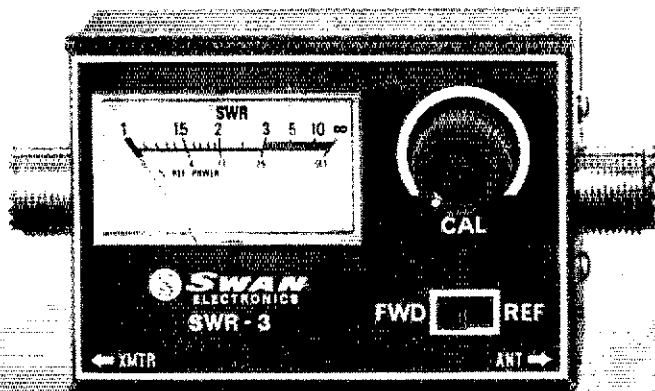
**BUYERS & SELLERS** BOX 73, BOSTON, MASS. 02215 • 617-536-8777 Monday-Friday, 9am-5pm  
Wednesday & Sunday, 7pm-midn.

# SWAN METERS HELP YOU GET IT ALL ON

Keep things in tune for a song.

Our SWR-3 SWR meter and FS-1 field strength meter help you make sure you've got it all on

the air and going in the right direction. Both are pocket sized with easy-on-the-pocket prices. Use your Swan credit card. Applications at your dealer or write to us.



**SWR-3 SWR Meter.** Why bother with big, bulky meters when this one does the job just as well? Measures 1:1 to 3:1 SWR from 1.7 MHz to 55 MHz with all the accuracy you need. . . . . \$10.95  
(Prices FOB Oceanside, CA)



**FS-1 Field Strength Meter.** Get field strength readings just about anywhere with this fit-anywhere meter. Telescoping antenna, level adjust knob, 1.5 MHz to 200 MHz, 0-10 relative scale meter. . . . . \$9.95

**SWAN ELECTRONICS**  
A subsidiary of Cubic Corporation  
305 Airport Road, Oceanside, CA 92054  
(714) 757-7525



# SSTV BREAKTHROUGH



## Robot Model 400

All solid state—digital  
random access memory \$ **695**  
SSTV Scan Converter

- All solid state Random Access Memory.
- Slow-to-fast and fast-to-slow conversion capability.
- SSTV picture display on any standard CCTV monitor.
- Frame freeze from any standard CCTV camera, broadcast video or video tape source.
- Permanent picture storage.
- Automatic or manual TV frame snatch.
- Internal grey scale generator precision adjustment standard.
- Capable of real time display of digitally processed fast scan video.

The new Robot Model 400 Scan Converter eliminates the problems—the mystery, and the high price from SSTV, and makes operating SSTV fun and inexpensive for everyone.

Our new solid state design and random access memory make operating SSTV simpler than ever before. You send and receive sharp, clear, complete pictures that are easily seen on a conventional TV monitor under normal room lighting conditions, and can be stored indefinitely for later viewing or photographing.

Slow-to-fast conversion capability lets you view a received or taped

image as a whole picture on a conventional television monitor, while the fast-to-slow conversion enables you to use standard fast scan video (such as CCTV or television receiver) as a source for SSTV transmission.

Operation is easy to understand, simple to work. If you can operate a camera and adjust a TV set, you can operate the new Robot Model 400 SSTV Scan Converter.

Our new price is really a breakthrough! Now you can get into the fast growing SSTV activity for just \$695! (Plus CCTV camera and monitor.)

For the complete story on our new Model 400 all solid state-digital-RAM Scan Converter, write or call today for our new brochure.



**ROBOT RESEARCH, INC.**  
7591 Convo Court  
San Diego, California 92111  
Phone 714-279-9430

Please send me complete information on your new Solid State SSTV Scan Converter.

Name \_\_\_\_\_ Call \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

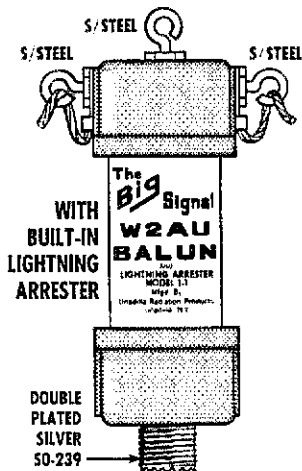
State \_\_\_\_\_ Zip \_\_\_\_\_

# THE BIG SIGNAL \$12.95

## "W2AU" BALUN

THE APPROVED LEADING HAM AND COMMERCIAL BALUN IN THE WORLD TODAY.

### THE PROVEN BALUN



IT'S WHAT'S INSIDE THAT COUNTS!

1. HANDLES FULL 2 KW PEP AND THEN SOME. Broad-Banded 3 to 40 Mc.
2. HELPS TVI PROBLEMS By Reducing Coax Line Radiation
3. NOW ALL STAINLESS STEEL HARDWARE. SO239 Double Silver Plated
4. IMPROVES F/B RATIO By Reducing Coax Line Pick-Up
5. REPLACES CENTER INSULATOR. Withstands Antenna Pull of Over 600 Lbs.
6. BUILT-IN LIGHTNING ARRESTER. Helps Protect Balun— Could Also Save Your Valuable Gear
7. BUILT-IN HANG-UP HOOK. Ideal For Inverted Vees, Multi-Band Antennas, Dipoles, Beam and Quads

NOW BEING USED BY ALL BRANCHES OF THE U.S. ARMED FORCES, FAA, RCA, CIA, CANADIAN DEFENSE DEPT. PLUS THOUSANDS OF HAMS THE WORLD OVER

THEY'RE BUILT TO LAST...

### BIG SIGNALS DON'T JUST HAPPEN — GIVE YOUR ANTENNA A BREAK

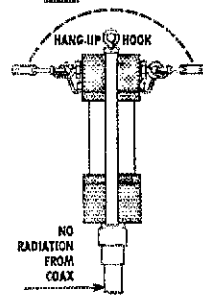
Comes in 2 models. 1:1 matches 50 or 75 ohm unbalanced (coax line) to 50 or 75 ohm balanced load. 4:1 model matches 50 or 75 ohm unbalanced (coax line) to 200 or 300 ohm balanced load.

AVAILABLE AT ALL LEADING DEALERS. IF NOT, ORDER DIRECT

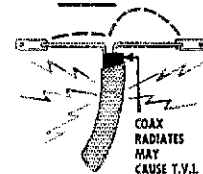
The big signal W2AU Balun reflects the type of quality that has kept our product out front and number 1 in Baluns the world over for the past 10 years.

The originator of the Balun with a built-in lightning arrester and hang up hook.

CURRENT DISTRIBUTION WITH W2AU BALUN



CURRENT DISTRIBUTION WITHOUT BALUN



We'll GUARANTEE no other balun, at any price, has all these features.

UNADILLA RADIATION PRODUCTS, Tel: 315-437-6444

Division of Microwave Filter Co. Inc. 6743 Kinne St. East Syracuse, N. Y. 13057

TWX 710-541-0493

Cable-Microfilco

## BUILDING A TRANSMATCH?

All Transmatch parts in stock. Here are some examples:

- Johnson 154-10, Single section, 23-347 pf for KW transmatch .....\$34.20
- Millen 16520, Single section, 37-203 pf for KW Transmatch .....\$35.30
- Millen 16520A, Single section, 37-203 pf for 300W transmatch .....\$24.75
- Johnson 154-507, Dual section, 15-196 pf for KW transmatch .....\$46.20
- Millen 16250, Dual section, 2-255 pf for KW transmatch .....\$43.25
- Johnson 229-203, 28 mH, variable inductor for KW transmatch .....\$32.00
- Millen 10031 Turns Counter .....\$25.50
- B & W Model 375 Protax Antenna Switch with automatic grounding, 6 position, rear mtd., SO239 connectors .....\$18.50
- B & W #CC50 Dipole Antenna Center Coaxial Cable Connector .....\$8.25
- Rugged Millen 2 KW Super Duty Transmatch with built in reflectometer .....\$199.00

Add \$1.50 per order for Shipping/Handling. Send first class stamp for Flyer.

G.R. WHITEHOUSE & CO.  
11 Newbury Drive, Amherst, N. H. 03031

## Need Help

For Your Ticket?

Recorded Audio-Visual

THEORY INSTRUCTION  
NOVICE GENERAL ADVANCED

No Electronics Background Necessary

For Additional Free Information:

AMATEUR LICENSE INSTRUCTION

P.O. Box 6015

Norfolk, Va. 23508

# Invest in us.

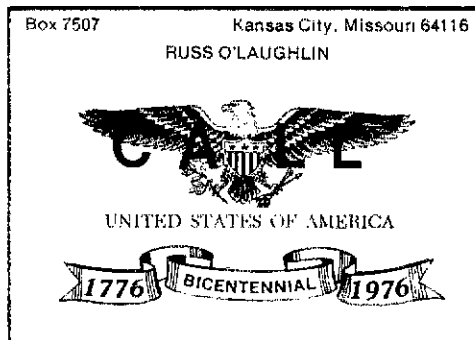
the good neighbor.

The American Red Cross

advertising contributed for the public good



## QSL — BICENTENNIAL CARD — QSL



- Call Letters—Blue
- Eagle—Gold
- Bicentennial—Red
- Size—3½ x 5½
- Glossy Stock
- Standard Report Form on Reverse Side

100 Cards \$8.00  
Additional 100 — \$4.00  
Write for Free Catalog

Mail Check or Money Order To:

RUSPRINT — P.O. BOX 7575 — NORTH KANSAS CITY, MO. 64116

# COUNT 'EM!

Count 'em — now Spectronics offers five digital frequency displays for use on most popular amateur rigs. It's the end of embarrassing off-frequency situations, and the beginning of direct digital readout of actual transmit and receive frequencies. Spectronics readouts are economically priced for every amateur's budget.

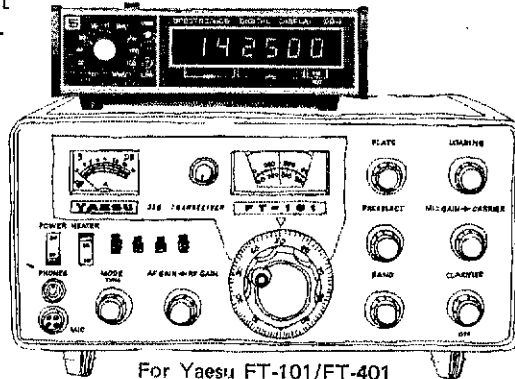
From turn-on, Spectronics crystal controlled readouts give you better than 100 Hz accuracy. From a cold start, they let you check a rig's VFO warm-up irregularity, as well as drift and linearity. The bright

easily read display can be seen even from across a room. Just plug the unit into 117 VAC and connect the cable (supplied) to the VFO receptacle on

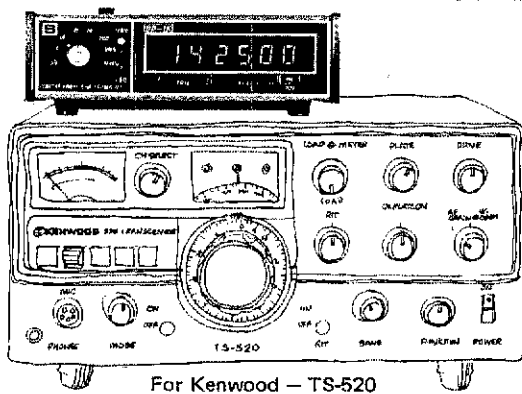
your transceiver or receiver. It's a totally hassle-free hook-up.

In addition to these great displays, Spectronics offers a high-quality frequency counter for your test bench. Model SC-30 covers 5 Hz to 30 MHz; the SC-250 from 5 Hz to 250 MHz.

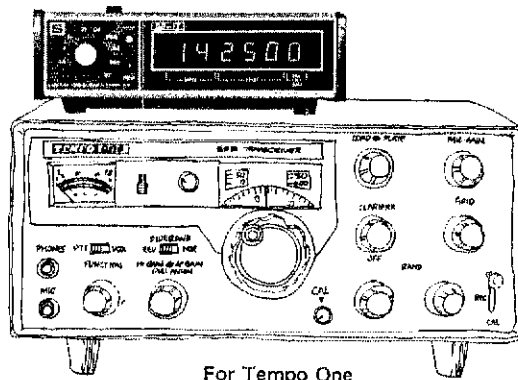
Until now, direct digital frequency read-out was incredibly expensive. But no more. So order the Spectronics unit that's right for your rig now. The Prices? Incredibly right. No matter how you count 'em.



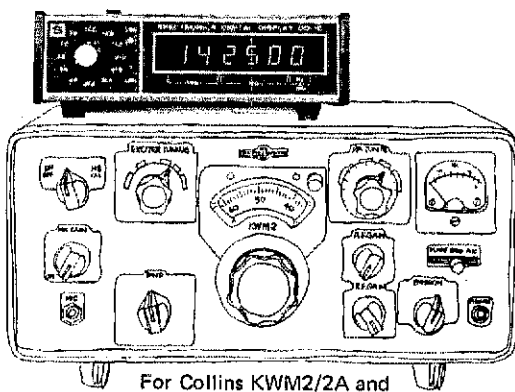
For Yaesu FT-101/FT-401  
—Order Model DD-1—\$169.95



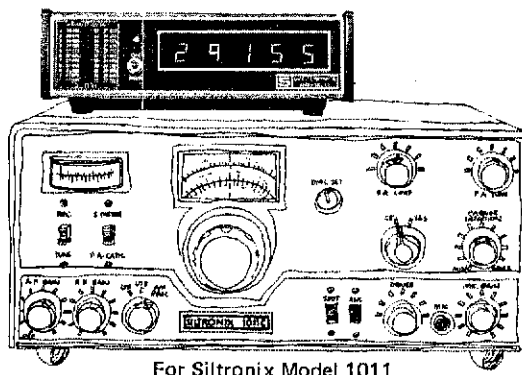
For Kenwood — TS-520  
—Order Model DD-1-K—\$169.95



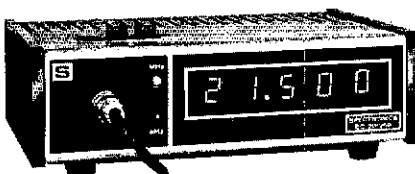
For Tempo One  
— Order Model DD-1T—\$169.95



For Collins KWM2/2A and  
75S series—Order Model DD-1C—\$169.95



For Siltronix Model 1011  
—Order Model DD-10/11—\$149.95



Model SC-30 Counter  
5 Hz—30 MHz—\$169.95.  
Model SC-250, 5 Hz—250 MHz—\$219.95

## SPECTRONICS INC. 1491 East 28th Street, Signal Hill, CA 90806

ENCLOSED IS \$ \_\_\_\_\_ PLEASE SEND:

- Model DD-1    Model DD-1-K    Model DD-1T    Model DD-1C  
 Model DD 10/11    Model SC-30    Model SC-250  
 Detailed data sheet on Model \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

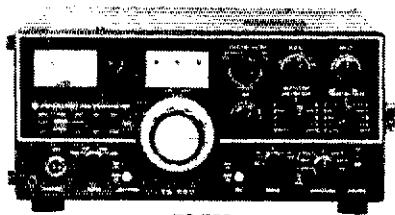
BankAmericard and Maste Charge accepted.

California residents add 6% sales tax. Add \$2.00 for shipping and handling within Cont. U.S.

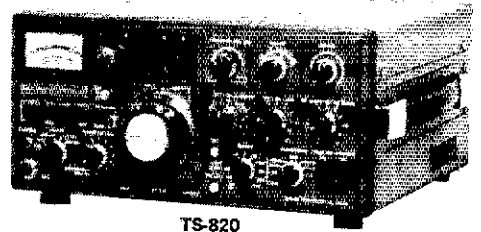
# SPECTRONICS INC.

1491 East 28th Street, Signal Hill, CA 90806

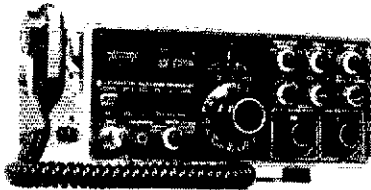
# KENWOOD HEADQUARTERS



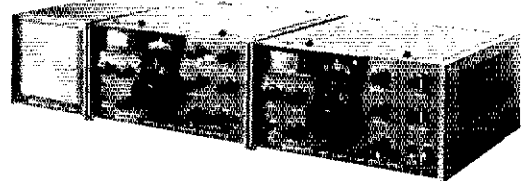
TS-520  
80-10M TRANSCEIVER



TS-820  
160-10M TRANSCEIVER

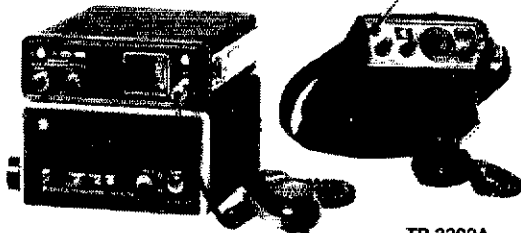


TS-700A  
2M TRANSCEIVER



R-599D  
160-10M RECEIVER

T-599D  
160-10M TRANSMITTER



TR-7200A  
2M MOBILE TRANSCVR

TR-2200A  
2M PORTABLE TRANSCVR

PS-5  
AC/DC POWER SUPPLY

Request EDI Wholesale Catalog Today!

All Models of Kenwood Gear and Accessories  
Always Available at:

**ELECTRONIC DISTRIBUTORS, Inc.**  
Communication Specialists for over 37 years  
1960 PECK ST., MUSKEGON, MICH. 49441  
TEL. (616) 726-3196 TELEX 22-8411

## \$ AND SENSE

NOW, FOR THE UMPTEENTH TIME IN OUR  
23 CONSECUTIVE YEARS IN QST:

### FREIGHT PREPAID ON OUR V40, V80, AND V160 VERTICALS!

Effective low-angle, omnidirectional radiation, easy assembly and operation, no guy wires needed, occupies little space, can be installed at ground level, exceptionally rugged, broad-banded, low initial cost, no maintenance, proven and tested design. Guaranteed Gotham quality at low Gotham prices. One of the best antennas for the 40, 80, and 160 meter bands regardless of price.

V40 VERTICAL ANTENNA FOR 40, 20, 15, 10 and 6 METER BANDS. ESPECIALLY SUITED FOR THE NOVICE WHO OPERATES 40 AND 15..... \$22.95

V80 VERTICAL ANTENNA FOR OUR 80, 40, 20, 15, 10 AND 6 METER BANDS. OUR MOST POPULAR VERTICAL. USED BY THOUSANDS OF NOVICES, TECHNICIANS, AND GENERAL LICENSE HAMS..... \$24.95

V160 VERTICAL ANTENNA FOR 160, 80, 40, 20, 15, 10 AND 6 METER BANDS. SAME AS THE OTHER VERTICAL ANTENNAS, EXCEPT THAT A LARGER LOADING COIL PERMITS OPERATION ON THE 160 METER BAND ALSO.. \$26.95

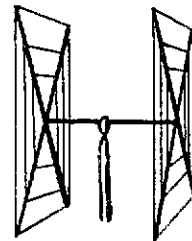
HOW TO ORDER: Remit with order. We ship verticals prepaid no charge to you; beams and quads sent collect cheapest way, due to size of package.

# GOTHAM

2051 N.W. 2 AVE.,  
MIAMI, FLA. 33127

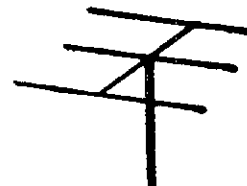
It makes sense to save dollars by getting your antenna from Gotham. Quality and contest-winning performance are built in, at rock-bottom prices.

### FAMOUS GOTHAM QUADS



10/15/20 quad, absolutely complete, all machined ready for simple assembly, the choice of the champs for maximum performance!... \$45.

### CHAMPIONSHIP BEAMS



Every beam is absolutely complete in every respect, fully machined and with hardware, ready for easy assembly.

- 12 EI 2M Beam..... \$40.
- 5 EI 6M Beam..... 36.
- 4 EI 10M Beam..... 34.
- 5 EI 15M Beam..... 45.
- 3 EI 20M Beam..... 40.

New! 2, 6, and 10M Beams Shipped Prepaid to the 48!

COD phone service on PREPAID antennas: 1-305-573-2080.

Send stamped envelope for literature on entire line.



3/8" single hole mount 5/8 wave \$31.50  
1/4 wave 11.50

## Larsen Antennas

Larsen Antennas to fit Any Mobile Unit

Magnetic Mount or Gutter Clamp 5/8 wave - \$38.50  
Specify, 2 meters, 220, 450 1/4 wave - \$18.50



310-003



322-001



SSK-1

Model 310-001: Standard Key, nickel plated hardware, no switch - \$6.65.

Model 310-003: Standard Key, nickel plated hardware, with switch - \$8.25.

Model 320-001: Standard Heavy Duty Key with nickel plated hardware, no switch - \$8.20.

Model 320-003: Same as -001 except with switch - \$9.35.

Model SSK-1 Code practice set with key \$18.50

See the September issue of 73 magazine for our complete catalog.

# TUFTS

## Radio Electronics

384 Main St., Medford, MA 02115  
Phone: 617-395-8280

NEW ENGLAND'S  
FRIENDLIEST HAM  
STORE

Open 9 AM to 9 PM  
Mon. - Sat.



## DENTRON

### 160-10AT SUPERTUNER™

Want an antenna tuner to match everything between 160 and 10 through balanced line, coax line and random line, pump out the full legal limit and look and sound good doing it? Supertuner™ is the one for you at just **\$129.50**

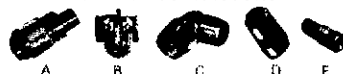
### 160-10AT-3K SUPER SUPERTUNER™

Designed and engineered to be compatible with the full-power highly efficient modern amplifiers now available to the amateur. In our opinion the finest tuner on the market today. **\$229.50**

### 80-10AT SKYMATCHERTM

Here's an antenna tuner for 80 through 10 meters, handles full legal power and matches your 52 ohm transceiver to a random wire antenna. 80-10AT is yours for only **\$59.50**

### UHF RF CONNECTORS



Low loss R-F connectors for Amateurs, Citizens Band and laboratory use. Silver plated for high RF conductiv-ity.

A	PL-259	Coaxial Plug	.....	\$ 80
B	SC-239	Coaxial Receptacle	.....	68
C	M-359	Coaxial Right Angle Adapter	.....	2.29
D	PL-258	Coaxial Junction	.....	1.31
E	UG-175/U	Adapter for RG-58/U	.....	.25
	DM	Double Male Plug	.....	1.60



**DRAKE**  
SSR-1  
Communications  
Receiver

- SYNTHESIZED • GENERAL COVERAGE
- LOW COST • ALL SOLID STATE • BUILT-IN AC POWER SUPPLY • SELECTABLE SIDEBANDS
- EXCELLENT PERFORMANCE

**PRELIMINARY SPECIFICATIONS:** • Coverage: 500 kHz to 30 MHz • Frequency can be read accurately to better than 5 kHz • Sensitivity typically .5 microvolts for 10 dB S+N/N SSB and better than 2 microvolts for 10 dB S+N/N AM • Selectable sidebands • Built-in power supply: 117/234 VAC ± 20% • If the AC power source fails the unit switches automatically to an internal battery pack which uses eight D-cells (not supplied) • For reduced current drain on DC operation the dials do not light up unless a red pushbutton on the front panel is depressed.

The performance, versatility, size and low cost of the SSR-1 make it ideal for use as a stand-by amateur or novice-amateur receiver, short wave receiver, CB monitor receiver, or general purpose laboratory receiver.

Price: \$350.00



## BOMAR

Crystal Company

\$4.50 each - LIFETIME GUARANTEE

Standard Regency Icom Wilson Heathkit VHF Eng Ken Drake Clegg And Others

Please enclose \$2.00 for shipping with your order.

### Crystals

Make/Model	Xmit Freq.	Rec. Freq.



## TVI MAY BE ELIMINATED WITH THESE DRAKE FILTERS

Have four sections for sharp cut-off and to attenuate other harmonics falling in any TV channel and the FM band 87-108.

TV-5200-LP (formerly TV-1000-LP)  
rated 1000 watts input 700 watts on 8 meters \$0-259 connectors built-in \$19.95

TV-3300-LP  
1000 watts max below 30 MHz Attenuation better than 80 dB above 41 MHz \$19.95

TV-42-LP  
is a four section filter designed with 43.2 MHz cut-off and extremely high attenuation in all TV channels for citizens band and other transmitters 30 MHz and lower Rated 100 watts input SC-239 connectors built-in \$10.95

TV-300-HP High Pass Filter  
provides more than 40 dB attenuation at 57 MHz and lower. Protects the TV set from amateur transmitters 8 thru 160 meters \$ 9.95



## PREAMPLIFIERS

### ALL BAND PREAMPLIFIERS



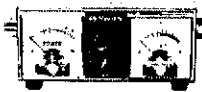
- 6 THRU 160 METERS
- TWO MODELS AVAILABLE
- RECOMMENDED FOR RECEIVER USE ONLY
- INCLUDES POWER SUPPLY

MODEL PLF employs a dual gate FET providing noise figures of 1.5 to 3.4 db, depending upon the band. The weak signal performance of most receivers as well as image and spurious rejection are greatly improved. Overall gain is in excess of 20 db. Panel contains switching that transfers the antenna directly to the receiver or to the Preamp.

Model PLF 117V AC, 60 Hz. Wired & Tested \$44.00

MODEL PCLP is identical in all respects to the PLF except that two nixies are used instead of the FET.  
Model PCLP 117V AC, 60 Hz. Wired & tested \$39.00

### why waste watts?



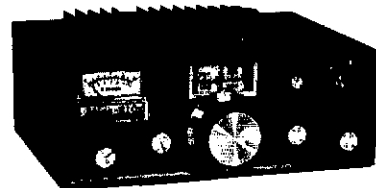
SWR-1 guards against power loss for \$21.95

If you're not pumping out all the power you're paying for, our little SWR-1 combination power meter and SWR bridge will tell you so. You read forward and reflected power simultaneously, up to 1000 watts RF and 1.1 in infinity VSWR at 1.5 to 150 MHz.

Get it all tuned up? Keep it that way with SWR-1. You can leave it right in your antenna circuit.



## Vhf engineering



### The Atlas 210x/215x

- Solid state SSB/CW transceivers
- 200 watts P.E.P. input
- No transmitter tuning
- The ultimate in sensitivity, selectivity, and overload immunity.
- Plus extended frequency coverage for MARS operation when used with 10x crystal oscillator.

210x or 215x	.....	\$649.
210x or 215x with noise blanker	.....	\$689.
AC Console 110/220V	.....	\$139.
Portable AC Supply 110/220V	.....	\$ 95.
Plug-in Mobile kit	.....	\$ 44.
10x Osc. less crystals	.....	\$ 55.

## FREE Surprise Gift With Every Order

Mastercharge and BankAmericard accepted on non-discounted orders

Orders over \$1000.00 may deduct 5% Add \$2.00 for shipping and handling on all orders

Mail your order to Distributor: TUFTS RADIO, 384 Main St., Medford, Mass. 02155. Phone (617) 395-8280.

PLEASE SEND ME: \_\_\_\_\_

Name \_\_\_\_\_ Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

(Prices F O B Medford, Mass. All units can be shipped U P S. Mass. residents add 5% sales tax.)

IN STOCK AT  
**H.R.O.** INC.



**cushcraft**

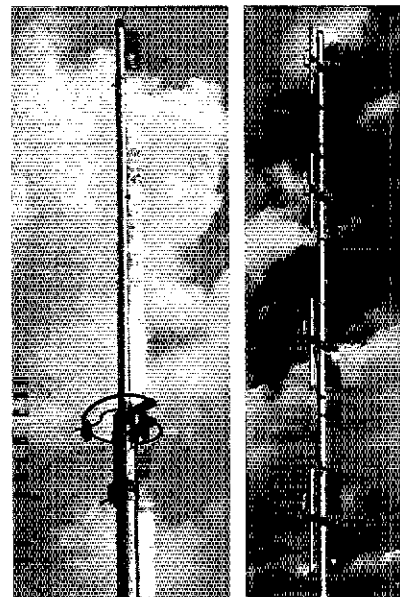
**VHF/UHF  
ANTENNAS**



**4-6-11 element yagi:** The standard of comparison in VHF/UHF communications, vertically polarized, cut for FM, rated at 1KW, 4 and 6 element models can be end mounted. Direct 52 ohm feed.

Famous "Ringo" 1/2 wave antenna has low radiation angle, 1:1 VSWR w/52 ohm line. Direct DC ground. 5 models: 135-175 MHz, (100W), 135-175 (500W), 50-54 (100W), 220-225 (100W), 440-460 MHz (250W). Most antennas pre-assembled and ready to install. Most models take 1-1/4" diameter mast.

**4 pole,** gives very substantial gain over 1/2 wave dipole. Length: 147MHz, 23' 220MHz, 15', 435 MHz, 8'. Includes 4 complete dipole assemblies on mtg., boom, harness, hardware. Less mast.



- Atlas • CDE • Collins • Cushcraft •
- Curtis • Dentron • Drake • Eimac •
- Hustler • Hy-Gain • Icom • Kenwood •
- KLM • Mosley • Swan • Tempo •
- Ten Tec • Tri-Ex • Yaesu • and more

30 day used equipment warranty.  
Credit terms available.

**Tuesday through Saturday,  
10AM to 5:30PM**

**H.R.O.** INC.  
**HAM RADIO OUTLET**

999 Howard Ave., Burlingame, CA 94010

(415) 342-5757

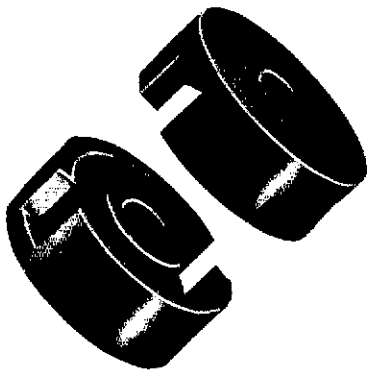
5 miles south on 101 from S.F. Airport.

Owner Bob Ferrero, K6AHV,  
other well known hams,  
give you courteous,  
personalized service.

Over the counter,  
phone, write.

Same day shipment  
most items

**POT CORES!**



Large Inductance with  
small Physical Size

Self-Shielding

Easy-to-Wind

Our FREE FLYER is still FREE. Write Today.

**AMIDON**  
*Associates*

12033 OTSEGO STREET  
NORTH HOLLYWOOD, CALIF. 91607

**NEW 500/50 MHz COUNTER**



The CTR-2 will put you on frequency. Measure transmitters, hand held transceivers, tone pads, repeaters, etc. Built-in TCXO insures an accuracy of  $\pm 2$ ppm ( $\pm .0002\%$ ). You can't afford to be without this versatile counter. Order yours today.

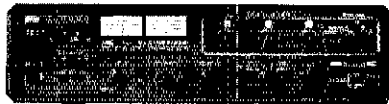
8 Digit L.E.D. Display 50 MHz Basic  
10 MHz TCXO  $\pm 2$ ppm 500 MHz with built-in prescaler  
Input sensitivity 30 mv @ 50 MHz, 150 mv @ 500 MHz.

CTR-2-50 MHz Kit \$199.95 — CTR-2-500 MHz Kit \$249.95

**DAVIS ELECTRONICS**

636 Sheridan Drive, Tonawanda, N. Y. 14150, Dept. N  
(716) 874-5848

**SAVE \$200**



**ITC Multi-2000**

Synthesized 2mFM/CW/SSB Transceiver.

**Regular \$695 - Now Only \$495**

With 30 Day AES Warranty. After 30 days repairs can be handled by the KLM people on a time and material basis. Order today direct from this ad. Allow \$10.00 for UPS shipping and handling.

**AMATEUR ELECTRONIC SUPPLY**

4828 West Fond du Lac Avenue

Milwaukee, Wisconsin 53216

Phone (414) 442-4200

**ENGINEERING OPPORTUNITIES  
WITH RF COMMUNICATIONS**

- SYSTEMS/ANTENNA DESIGN ENGINEERS  
HF Communications
- DIGITAL COMMUNICATIONS SPECIALISTS  
Modem/Synthesizer Design
- RF CIRCUIT DESIGN SPECIALISTS  
HF thru Microwave
- FIELD SERVICE ENGINEERS  
Foreign Travel

Excellent salary and benefits program. Send resume including salary requirements to: PERSONNEL DEPARTMENT—Q

RF Communications Division

**HARRIS**

COMMUNICATIONS AND  
INFORMATION HANDLING

1680 University Avenue  
Rochester, New York  
14610 U.S.A.

An Equal Opportunity Employer M/F



# HAMTRONICS USED GEAR • TEST EQUIPMENT • SPECIALS

30-DAY GUARANTEE ■ 90-DAY FULL CREDIT TRADE-IN ■ FREE SHIPPING VIA UPS ONLY

(if weight or size exceeds UPS max., we will ship freight collect)

ALLIED	EICO	HEATHKIT	KENWOOD	SBE	TEMPO
AX-190 Receiver \$159	720 Transmitter \$ 49	SB-300 Receiver \$199	T-599 Transmitter \$289	SB-34 Transceiver \$249	Tempo one Xcvr \$299
AMECO	722 VFO 39	SB-301 Receiver 229	R-599 Receiver 289	SB-33 Transceiver 189	AC One Supply 79
PV-60 \$ 9	730 Modulator 39	HR-10-B Receiver 69	TS-520 Transc 429	SB-144 2M FM 175	FMH 2M H.T. 149
CN-50 29		SB-303 Receiver 269	OR-666 259	SBZ-LP Linear 179	Cl-220 Trncvr 220 MC 179
CN-144 39	ELMAC	SB-220 Linear Amp 449		STANDARD	
TX-62 79	AF-67 Transmitter \$ 45	SB-102 Trivrcv 379	KNIGHT	T-80 Transmitter \$ 39	SRC-146 HT \$149
621 VFO 45	PMR-8 Receiver 79	SB-600 Speaker 15	R-100 Receiver 59	R-100 Receiver 59	826 M Trnscvr 195
CENTRAL ELECTRONICS	GENAVE	DX-60B Transmitter 69	TR-108 Trancvr 2M 79	HE-45 Transceiver 49	SRC-144 395
100V Transmitter \$325	GTX-22M FM \$165	HW-32 Transceiver 85	LAFAYETTE	HA-800 Receiver \$ 89	SRC-851T 395
CLEGG	GTX-200 2M FM 149	HW-100 Transceiver 249	HA-800 Receiver \$ 89	HR-350 Receiver 149	SWAN
22'er FM \$129	GLOBE/GALAXY	SB-100 Transceiver 299	HE-45 Transceiver 49	HE-45 Transceiver 49	700-CX Xcvr \$459
66'er 6M Xcvr 115	VHF 6+2 Transm \$ 39	SB-401 Transmitter 249	MIDLAND	509 H.T. \$149	260 Cyngnet 289
99'er 6M Xcvr 59	Chief Transmitter 39	SB-101 Transceiver 349	509 H.T. \$149	90651-A Grid Dipper 95	270 Cyngnet 329
Interceptor BRUR 275	Galaxy III Xcvr 159	SB-650 Digital Freq. Display 149	MILLEN	92200 Transmatch \$149	500 Xcvr 299
Ant Pre Amp 22	Galaxy V Xcvr 189	HW-100 Transceiver 249	92200 Transmatch \$149	90651-A Grid Dipper 95	500 CX Xcvr 389
All Bander 69	Galaxy V Mk II 239	HP-23 AC Supply 49	NATIONAL	NC-270 Receiver \$119	117-XX AC Supply 95
HT-146 125	GT-550 Xcvr 279	HP-23B AC Supply 59	NC-300 Receiver 129	NC-300 Receiver 129	14X DC Module 39
2 Vess 259	GT-500A Xcvi 329	HW-202 2M FM Xcvr 159	NCX-5 Transceiver 279	NCX-5 Transceiver 279	NK 11 Linear 475
COLLINS	AC-400 Supply 79	SB-620 Spectrum Analyz 120	NCX-5MK II Transcvt 299	NCX-5MK II Transcvt 299	KK V1 6 Meter 550
75 A4 Receiver \$395	FM-210 2M FM 95	ICOM	NCX-3 Transceiver 189	NCX-3 Transceiver 189	250 C 6M Xcvr 349
7553B Receiver 695	GONSET	IC-21 2M FM Xcvr \$299	NC-190 Receiver 149	NC-190 Receiver 149	FM 2X2M Xcvr 169
7651 Receiver 349	Com II 2M \$ 75	IC-230 Demo 369	REGENCY	HR-2B 2M FM \$169	FM-1210A 2M 249
KWM-2 Xcvr 595	Com II 6M 69	IC-22A 2M FM Xcvr 185	HR-220 FM 220 MC 185	HR-220 FM 220 MC 185	360 Transceiver 269
32S1 Xmitter 349	Com IV 2M 129	IC-30A 432 MCFM 269	AR-2 2M Amplifier 85	AR-2 2M Amplifier 85	350C Xcvr 299
PM-2 AC Supply 95	GC-105 2M 115	JOHNSON	HR-25 2M FM 225	HR-25 2M FM 225	600R Receiver 339
516 F2 AC Supply 139	G-28 Xcvr 149	1-KW Matchbox/SWR \$195	HR-6 Meter FM 189	HR-6 Meter FM 189	600T Transmitter 399
312B5 Console 425	G-50 Xcvr 149	Courier Linear 139			410 VFO 79
361D2 Mount 29	HALLICRAFTERS	Ranger I Transmitter 85			FT-401B Xcvr \$499
DRAKE	S-108 Receiver \$ 99	Ranger II Transmitter 139			FRDX 400SD Rec 325
2A Receiver \$149	SX-101A Receiver 159	Valiant I Transmitter 129			FT 2 Auto 2M FM 249
2B Receiver 189	HT-32 Transmitter 179				FT-101B Xcvr 549
2AQ SPKR QMULT 29	HT-32B Transmitter 269				FL-2100B Linear 295
R4 Receiver 289	SX-99 Receiver 79				FV-101 VFO 79
R4-B Receiver 349	SX-115 Receiver 349				101E Xcvr Demo 695
R4-C Receiver 399	HT-37 Transmitter 159				
M5-4 Speaker 19	HT-40 Transmitter 49				
2NT Transmitter 125	SX-99 Receiver 99				
2NT Transmitter 99	HT-40 Transmitter 49				
TR-6 695	SX-117 Receiver 189				
TR-22 2 Meter 140	R-48 Speaker 12				
T-4X Transmitter 339	SR-150 Xcvr 259				
TR-72 2 Meter FM 225	SR-160 Xcvr 159				
AC-4 AC Supply 95	SX-146 Receiver 175				
TR-4C Transceiver 449	HA-5 VFO 49				
CC-1 Console	HT-44 Transmitter 159				
CPS-1 Supply	HAMMARLUND				
SC-2 Conv	HO-110 AVHF Receiver \$189				
SC-6 Conv	HO-110C Receiver 119				
SC-1 Calibrator	HO-110AC Receiver 149				
The above all assembled complete pkg. Only 200	HO-145X Receiver 169				
BYCOMM	HO-170C Receiver 159				
1Q-0 2 M Ampl \$125	HO-180 Receiver 379				
35-0 401N 110 Out 130	HO-215 Receiver 259				
470-25 450 MC 120	SP-600 Receiver 179				
P-141B 16 Amp Supply 95	HX-50 Transmitter 169				

## Test Equipment Bargains

Boonton "O" Meter	\$295
Tektronix 5140	249
Tektronix 545A	950
5 3/54A Plug-in wide band preamp	75
Hickok 695 Generator	69
Bendix BC221 Freq Meter	39
Polarad Spectrum Analyzers A84T	1695
Hewlett Packard 400C	75
Precision E-400 Signal Generator	125
Electro Impulse Spectrum Analyzer	395
Dyna/Sciences Model 330 Digital Multimeter	195
Hewlett Packard 4905A Ultra Sonic Detector	550
Hewlett Packard 120A Scope	250
TS-323/UR Frequency Meter	175
Hewlett Packard 4910B Open Fault Locator	650
Bird Mod 43	80
General Radio 650A	150
Measurements Mod 80	195
Nems Clark 1400	495
Ballantine 300H	175
PACO Scope Mod-S-50	75
Singer FM-10C	3495
Simpson 260 V.O.M.	49.50

ANOTHER EXCLUSIVE  
AT HAMTRONICS  
NOW IN STOCK COMPLETE LINE OF

**MJ PRODUCTS**  
**MJ ENTERPRISES**

ALSO COMPLETE LINE OF  
**JAMES MILLEN PRODUCTS**



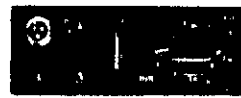
### MIDLAND 13-509

tired of 2 FM, try 220 Midland 3-509, 10 watts on 220 mc. FM, Reg. price \$229.95. Special at \$169.00.



### DRAKE TR-22C

regular \$229, save \$30; buy a TR-22C for \$229 (no trades) and take a \$30 credit for another purchase.



### ICOM 230

regular \$489, save \$100; buy a ICOM 230 for \$489 (no trades) and take a \$100 credit for another purchase.

MAIL & PHONE-ORDERS WELCOMED. BANK AMERICARD ACCEPTED. ALL UNITS GUARANTEED

# HAMTRONICS

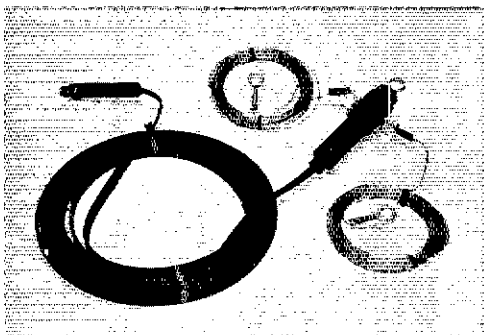
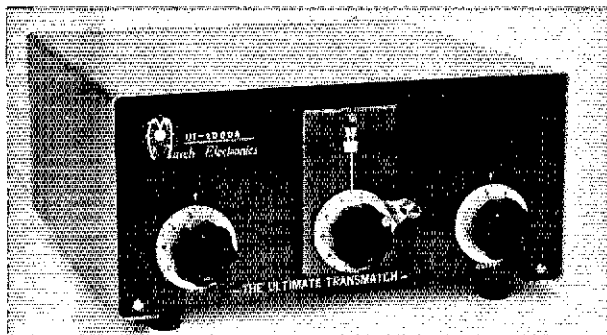
DIVISION OF

# Trevoze Electronics

4033 BROWNSVILLE ROAD  
TREVOSE, PA. 19047  
Telephone:  
(215) 357-1400  
(215) 757-5300

# FROM MURCH ELECTRONICS the UT2000A

## THE ULTIMATE TRANSMATCH MULTIBAND ANTENNA 10 - 80 M



Similar to the one in Lew McCoy's article  
July 1970 QST also 1976 Handbook

- Use with any coax or end fed random wire antenna, ideal for apartment dwellers
- 2 kW P.E.P. (1 kW continuous) 1:1 SWR to transmitter
- 10-80 continuous, including MARS
- Use with any wattmeter or SWR indicator
- Heavy duty throughout (4000 volt capacitors)
- Rotary inductor with turns counter for precise and rapid tuning

12" w 12" d x 5 1/2" h, 12 lbs shipping weight

- Field Proven 4 years
- Sealed center insulator, 102 ft wire, 30 feet heavy duty twin lead
- Coax fitting to connect twin lead to 52 ohm transmission line (68 feet or more, not included)
- Ready to use. Great on all bands when used with the Ultimate Transmatch

MODEL UT-2000A

\$139.95 FOB

MODEL 68A, 2000 w P.E.P.

\$44.50 p.p.

**MURCH ELECTRONICS INC.**

Box 35 Franklin Maine 04634

Phone 207-565-3312

## We're Fighting Inflation No Price Rise for '76



### FOR FREQUENCY STABILITY

Depend on JAN Crystals. Our large stock of quartz crystal materials and components assures Fast Delivery from us!



### CRYSTAL SPECIALS

Frequency Standards	
100 KHz (HC 13/U) . . . . .	\$4.50
1000 KHz (HC 6/U) . . . . .	4.50
Almost all CB sets, TR or Rec. (CB Synthesizer Crystal on request)	\$2.50
Amateur Band in FT-243 . . . . .	ea \$1.50
	4/\$5.00
80-Meter	\$3.00 (160-meter not avail.)

For 1st class mail, add 20¢ per crystal. For Airmail, add 25¢. Send check or money order. No dealers, please.



Div. of  
**Bob When & Son Electronics, Inc.**  
2400 Crystal Dr.,  
Ft. Myers, Fla. 33901  
All Phones: (813) 936-2387  
Send 10¢ for new catalog

## 2-METER FM ANTENNA KITS

Mobile "CARTOP" and Fixed Station

Mobile antennas mount to car roof with tough strap. No holes, no magnets, ideal for vinyl roofs. Complete assembly instructions, Antenna pre-tuned.



- 5/8 Wave "Cartop" \$11.95 ea \*
  - 1/4 Wave "Cartop" \$10.95 ea \*
  - Fixed Station Ground Plane 5/8 Wave . . . \$8.95 ea \*
- Mast Mount Hardware Included

NOW all models available for 220 MHz. Specify when ordering...prices as shown above.

\*Add \$2.25 Mailing Write for literature (Conn. residents—Sales Tax) Money-Back Guarantee

**MARSH Devices**

P.O. Box 154—Old Greenwich, CT 06870

## F.C.C. EXAM MANUAL

PASS FCC EXAMS! Memorize, study—"Test-Answers" for FCC 1st and 2nd class Radiotelephone licenses. Newly revised multiple-choice questions and diagrams cover all areas tested in FCC exams—plus—"Self-Study Ability Test" \$9.95 postpaid. Moneyback Guarantee.



COMMAND PRODUCTIONS P.O. BOX 26348-T  
RADIO ENGINEERING DIVISION SAN FRANCISCO, CALIF. 94126

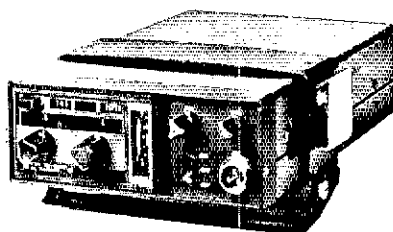
## ATTENTION DXers

We will forward your QSLs to DX stations for 6¢ each or 20¢ per dollar. Just send along your QSLs and the payment. You can find the other details of this service in the February 1976 QST.

**W3KT QSL SERVICE**

RD 1, Box 66, Malvern, Pa. 19355 USA

## SAVE \$100



Purchase a new ICOM IC-230 for the regular price of \$489.95 (without trade-in) and you may select \$100.00 worth of additional merchandise at no extra charge. Consider the accessories listed below.

- IC-3PA AC supply w/speaker . . . . \$89.95
- TTH-230 Touch-tone handset . . . . 99.95
- IC-230MM Extra mobile mount . . . . 13.95
- IC-DC Extra DC power cord . . . . . 4.95

Order today—direct from this ad. Send check or use your Mastercharge or BankAmericard. Allow \$5.00 for UPS shipping & handling. Quick Delivery.

**AMATEUR ELECTRONIC SUPPLY**  
4828 West Fond du Lac Avenue  
Milwaukee, Wisconsin 53216  
Phone (414) 442-4200  
Branch Stores: Cleveland, O & Orlando, Fla.

## 125Hz Crystal Filter for Drake R-4C

Cuts QRM. Ideal for DX and Contest Work. Does what no audio filter can do. A must for CW operators who want the best 125 Hz — 4 db, 325 Hz — 60 db, 8 poles

Sherwood Engineering, Inc.  
Department B  
1268 South Ogden Street  
Denver, Colorado 80210  
CF-125/8 \$125.00  
Return in 10 days  
for full refund  
if not satisfied.

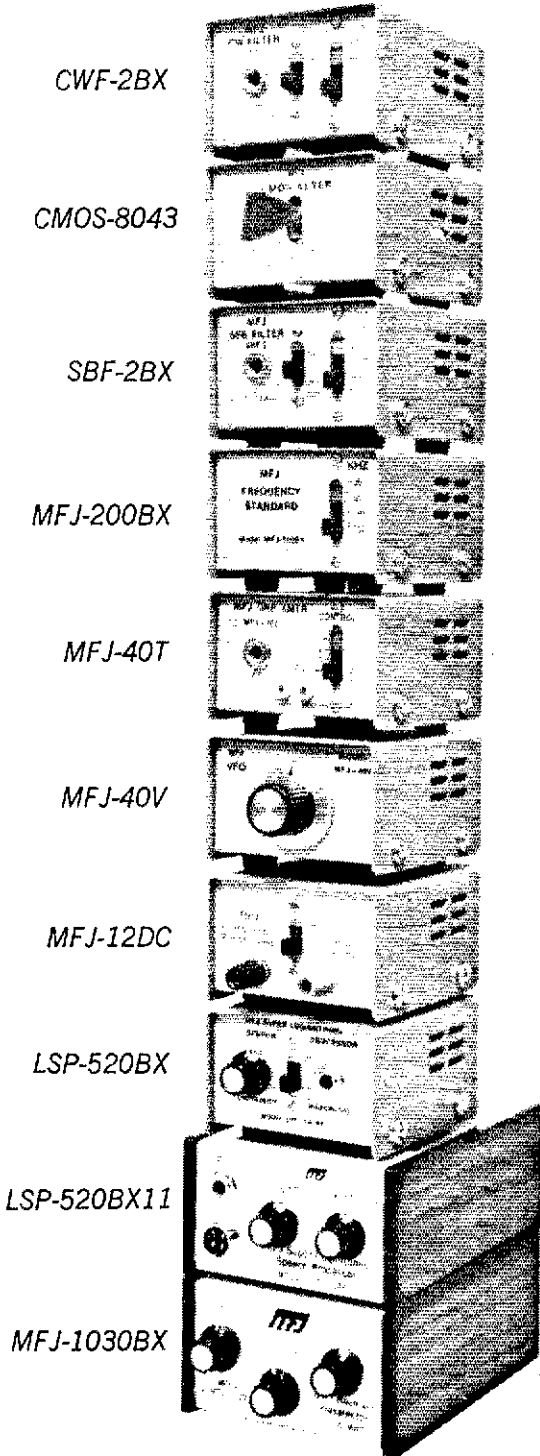
(303) 722-2257 Master Charge, BankAmericard



# Stacked in YOUR favor\*



YOUR COMPLETE SATISFACTION is our goal! And here is the offer that proves it! Order any MFJ Product and try it. If you're not completely satisfied, you may return it within 30 days for a full prompt refund (less shipping).



CWF-2BX

CMOS-8043

SBF-2BX

MFJ-200BX

MFJ-40T

MFJ-40V

MFJ-12DC

LSP-520BX

LSP-520BX11

MFJ-1030BX

**CW FILTER** — Over 5000 now in use. 80 Hz bandwidth and steep sided skirts separate even the weakest signal from the QRM. Works with any receiver or transceiver. CWF-2BX, assembled and tested ..... **\$27.95**

**CMOS KEYSER** — State of the art design uses Curtis 8043 Keyer on a chip. Dot memory. Self completing dots and dashes. 8 to 50 wpm. Sidetone and speaker. Built in key. CMOS-8043, assembled and tested ..... **\$39.95**

**SSB FILTER** — Here's a new and different kind of single sideband filter. Unintelligible signals become readable as you slide the selectivity switch to optimize the audio bandwidth. SBF-2BX, assembled and tested ..... **\$24.95**

**FREQUENCY STANDARD** — The MFJ-200BX provides strong precise markers every 100, 50, 25 kHz well into the VHF region. Gated for positive identification. CMOS. Accurately determines receive/xmit freq. MFJ-200BX, assembled and tested ..... **\$24.95**

**QRP TRANSMITTER** — Work the world on 5 watts with this Transmitter on 40 meter CW. No tuning required. Short circuit proof. Switch selects crystal or VFO frequency control (crystals and VFO not included). Requires 12 VDC. MFJ-40T, assembled and tested ..... **\$24.95**

**QRP VFO** — Companion VFO plugs directly into QRP transmitter above for stable variable frequency control from 7.0 to 7.2 MHz. Can be used with other xmtrs. 4V peak-peak output. MFJ-40V, assembled and tested ..... **\$24.95**

**QRP POWER SUPPLY** — This unit will eliminate receiver hum and chirp and buzz in your transmitted signal caused by power supply deficiencies. Delivers up to 1 Amp at 12 VDC. MFJ-12DC, assembled and tested ..... **\$24.95**

**SUPER LOGARITHMIC SPEECH PROCESSOR** — Up to 400% more RF Power is yours with this plug-in unit. Plugs in between mic and xmtr. Active filters concentrate power on those frequencies that yield max. intelligence. LSP-520BX, assembled and tested ..... **\$49.95**

**SIZES:** Units Above are 4 x 3 1/4 x 3 3/16; Units Below 5 9/16 x 3 3/8 x 2 1/8.

**SUPER LOGARITHMIC SPEECH PROCESSOR** — This option includes all the features of the unit above plus a rotary function switch, an uncommitted 4 pin mic jack and an extra special enclosure. LSP-520BX11, assembled and tested ..... **\$59.95**

**STATE-OF-THE-ART RECEIVER PRESELECTOR** — Connected between your antenna and receiver, this preselector dramatically improves weak signal reception. MFJ-1030BX, assembled and tested ..... **\$49.95**

Please add \$2.00 per item for Shipping & Handling.

*\*warranty*

All products manufactured by MFJ Enterprises are **UNCONDITIONALLY GUARANTEED** for a period of one year from the date of purchase. This means we will repair or replace free of charge any of our products which are defective for any reason.

Why not let MFJ add that extra something to your station. Order today and see just what convenience and capabilities we can add to your life.



P. O. BOX 494(A) • MISSISSIPPI STATE, MISSISSIPPI 39762 • 601-323-5869

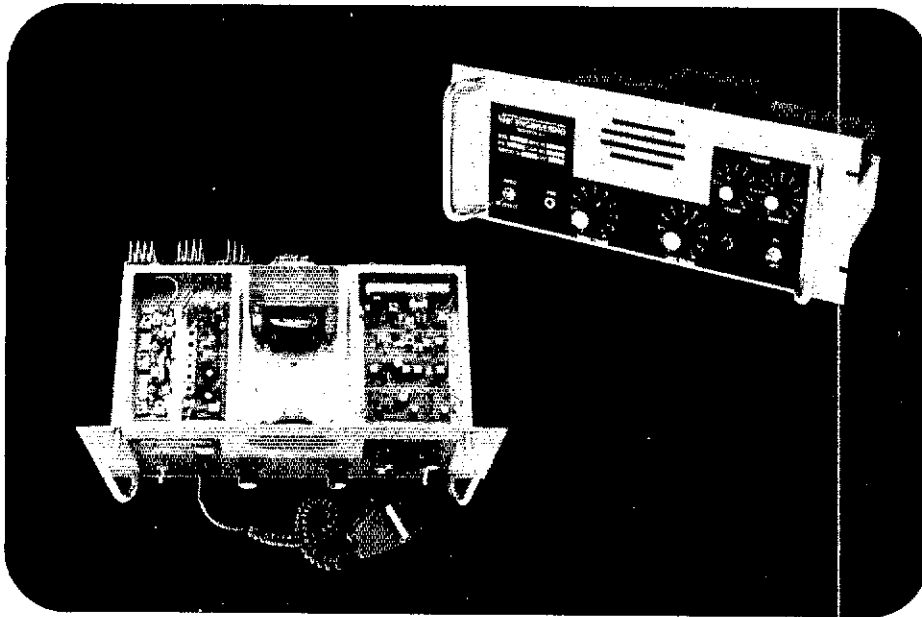
FREE CATALOG AVAILABLE.  
DEALER INQUIRIES INVITED.





# IF YOU ARE ON 144, 220 OR 432 AND HAVE WORKED A REPEATER...

It was probably this one.



The RPT 144B, RPT 220B and RPT 432 are self-contained — all solid state machines. Conservatively rated, high quality components, assures EXCELLENT RELIABILITY. Careful consideration has been given to both interfacing and control flexibility.

RPT 144B or RPT 220B Kit .....	\$465.96
RPT 432B Kit .....	515.95
RPT 144B or RPT 220B factory wired and tested .....	695.95
RPT 432B factory wired and tested .....	795.95
RPT 50B soon to be announced .....	N.A.
RPT 28B soon to be announced .....	N.A.

## WORK ALL REPEATERS WITH OUR NEW SYNTHESIZER II



The Synthesizer II is a two meter frequency synthesizer. Frequency is adjustable in 5 KHz steps from 140.00 MHz to 149.995 MHz with its digital readout thumb wheel switching. Transmit offsets are digitally programmed on a diode matrix, and can range from 10 KHz to 10 MHz. No additional components are necessary!

Kit ..... \$169.95    Wired and tested ..... \$239.95  
*Export prices slightly higher.*

### Available at these dealers:

- A-B-C Communications  
Seattle, WA 98155
- A-B-C Communications  
Everett, WA
- Alpha Electronic Labs  
Columbia, Missouri 65201
- Amateur Electronic Supply  
Milwaukee, Wisc. 53216
- Amateur Wholesale Electronics  
Miami, FL 33156
- Amateur Wholesale Electronics  
Ashland, KY 41101
- Ayre's Ltd.  
St. John's, Newfoundland
- Barry Electronics Corp.  
New York, NY 10012
- Frank L. Beier Radio, Inc.  
New Orleans, LA 70118
- Burghardt Amateur Center, Inc.  
Watertown, SD 57201
- C & A Electronic Enterprises  
Carson, CA 90745
- CDS Electronics & Hobbies Unltd.  
Emerado, ND 58228
- CFP Enterprises  
Horseheads, NY 14845
- Communications Electronics  
Fond du Lac, WI 54935
- Communication Specialties Co.  
Aurora, CO 80012
- Communication Systems  
Bourbon, IN 46504
- Communication Unlimited  
Whitmore Lake, MI 48189
- COSYSCO, Inc.  
Sodus, NY 14551 (Export only)
- Harry G. Crofts  
Northville, Mich. 48167
- Delmar Electronics, Inc.  
West Babylon, L.I., NY 11704
- Derrick Electronics, Inc.  
Broken Arrow, OK 74012
- Edison Electronics, Inc.  
Santurce, P.R.
- Electronic Enterprises  
Rio Linda, CA 95673
- GFL Electronics Co.  
Pickering, Ontario Canada
- Klaus Radio, Inc.  
Peoria, IL 61614
- Loflier Electronics  
Ogdensburg, NY 13669
- Radio Communications Co., Inc.  
Roanoke, VA 24106
- Radio Store, Inc.  
Oklahoma City, OK 73100
- Radio Supply & Engineering Co., Inc.  
Detroit, Mich. 48200
- SON Electric  
Fresno, CA 93727
- Soundcom (VHF-UHF Outlet)  
Akron, OH 44314
- Spectronics, Inc.  
Oak Park, IL 60304
- W. Spindler Electronic Service  
Rome, NY 13440
- Teco Electronics  
Garland, TX 75040
- Tele-Com Electronics  
San Jose, CA 95100
- Tufts Radio Electronics  
Medford, Mass. 02155
- Vegas Radio  
Las Vegas, NV 89106
- VHF Communications  
Jamestown, NY 14701
- Vickers Electronics  
Durham, NC 27702
- Westcom  
San Marcos, CA 92069
- West Indies Sales Co., Ltd.  
Miami, FL 33166

**Vhf engineering**

DIVISION OF BROWNIAN ELECTRONICS CORP.

320 WATER ST. • P.O. BOX 1921  
 BINGHAMTON, N.Y. 13902 • 607-723-9574



# SWAN METERS HELP YOU GIVE IT YOUR ALL

## SWR Bridge for 21.95

Our little dual meter SWR bridge indicates relative forward power and SWR simultaneously.

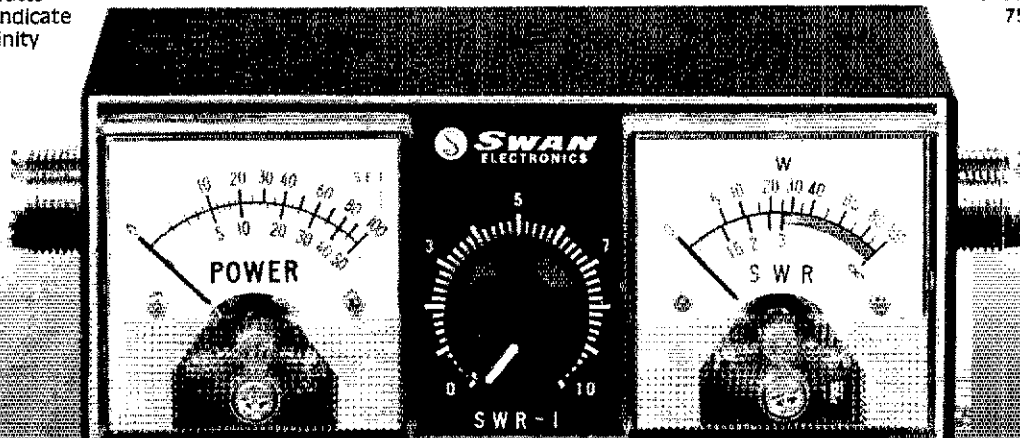
The unit is capable of handling up to 1000 watts and will indicate 1:1 to infinity

VSWR from 3.5 MHz to 150 MHz on 100 microampere meters. Ideal for mobile or home operation with low in-line insertion loss.

Use your Swan credit card. Applications at your dealer or write to Swan.

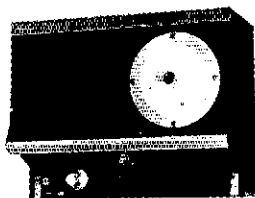


**SWAN ELECTRONICS**  
A subsidiary of Cubic Corporation  
305 Airport Rd. Oceanside, CA  
92054 (714)  
757-7525



Prices for Oceanside, CA

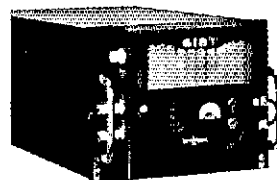
## WANTED FOR CASH



**490-T Ant. Tuning Unit**  
(Also known as CU1658 and CU1669)



R1051 or T827



**618-T Transceiver**  
(Also known as MRC95, ARC94, ARC102, or VC102)

Highest price paid for these units. Parts purchased. Phone Ted, W2KUW collect. We will trade for new amateur gear. GRC106 and PRC74 also required.

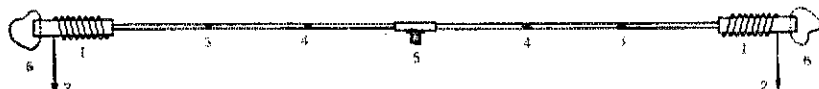
### THE TED DAMES CO.

308 Hickory Street  
(201) 998-4246

Arlington, N.J. 07032  
Evenings (201) 998-6475

### LRL-66 ANTENNA 66' LONG. 80 THRU 10M

Power rating 2 Kw. P.E.P. or over on 80, 40, 15 On 20 and 10 1 Kw. P.E.P. Transmitter input



price \$55.00 in Cont. USA ppd.

#### OPERATES ON 5 BANDS AUTOMATICALLY

1. Loading coils for 80 & 40M doublet operation
2. Adjustable ends to set 80 meter resonance
- 3, 4. Decoupling stubs for 20 & 10 meters
5. Center insulator with female coax connector to take PL-259 plug
6. Fittings on insulators to tie on rope

LATTIN RADIO LABORATORIES • Box 44 • Owensboro, Kentucky 42301

## WORLD QSL BUREAU

111 FARM HILL WAY LOS GATOS, CALIF 95030 U.S.A.

The ONLY QSL Bureau that will forward ALL of your cards...From anywhere to anywhere...Still 6¢ for DX cards...10¢ intra-USA and Canada...SASE brings details.

**DX'ERS SPECIAL**—For QSLs to Foreign stations only. Send 20 or more cards at a time and include just five cents each! For 100 or more cards at a time the price is four cents each.

Suggestion: Form a CARD POOL with your Buddy or Radio Club and split the extra Savings.  
73s Orm Meyer K6QX

## Synthesize Any FM Rig . . . With A GLB Channelizer!

- Easily changed from rig to rig
- Fastest lock-up • Several options available • 5 PPM stability
- Universal switching • Designed for mobile environment • 420-450 MHz version available

144-147.99 MHZ Model 400B  
\$134.95 Kit—\$194.95 Wired & Tested

WRITE FOR BROCHURE  
Available By Direct Mail Only

**GLB ELECTRONICS**  
60 AUTUMNWOOD DRIVE—BUFFALO, N.Y. 14227

# “They don't make 'em like they used to..”

*(lucky for you, if your next HF transceiver is a TRITON)*

The new ultra-modern fully solid-state TRITON makes operating easier and a lot more fun, without the limitations of vacuum tubes.

For one thing, you can change bands with the flick of a switch and no danger of off-resonance damage. And no deterioration of performance with age.

But that's not all. A superlative 8-pole i-f filter and less than 2% audio distortion, transmitting and receiving, makes it the smoothest and cleanest signal on the air.

The TRITON IV specifications are impeccable. For selectivity, stability and receiver sensitivity. And it has features such as *full* CW break-in, pre-selectable ALC, off-set tuning, separate AC power supply, 12 VDC operation, perfectly shaped CW wave form, built-in SWR bridge and on and on.

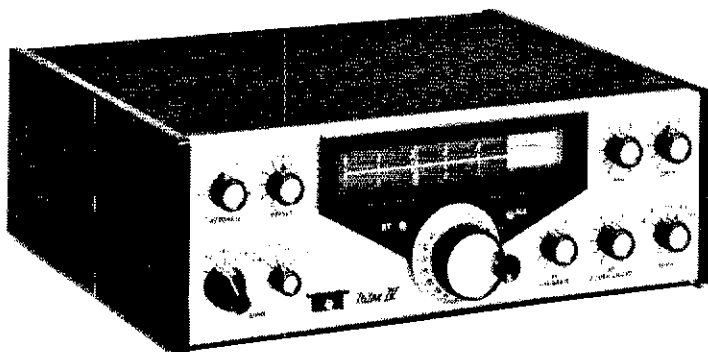
For new standards of SSB and CW communication, write for full details or talk it over with your TEN-TEC dealer. We'd like to tell you why “They Don't Make 'Em Like They Used To” makes Ham Radio even more fun.

TRITON IV \$699.00

#### ACCESSORIES:

Model 240 One-Sixty Converter.....\$ 97.00  
Model 244 Digital Readout ..... 197.00

Model 245 CW Filter .....\$ 25.00  
Model 249 Noise Blanker ..... 29.00  
Model 252G Power Supply ..... 99.00  
Model 262G Power Supply/VOX.. 129.00



**TEN-TEC**  
SEVIERVILLE, TN. 37862

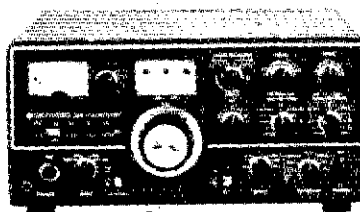
EXPORT: 5715 LINCOLN AVE.  
CHICAGO, ILLINOIS, 60646

**Webster** says:  
radio, inc.

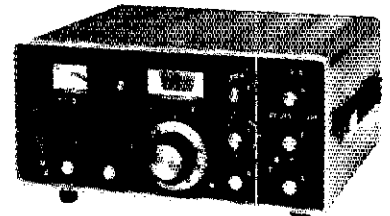
Everything from A to Z  
in quality **TRANSCEIVERS!**



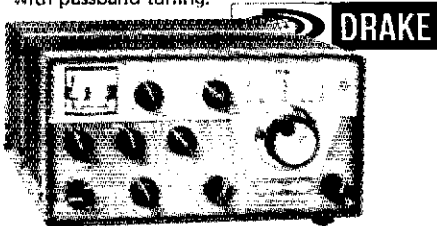
The TS-820 **KENWOOD** \$830.  
160 thru 10 meter. Solid state Transceiver  
with passband tuning.



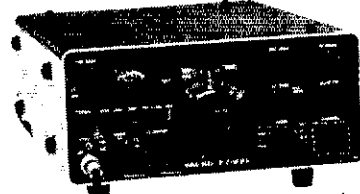
The TS-520 **KENWOOD** \$629.  
Transceiver. Solid state 80 thru 10 meters.



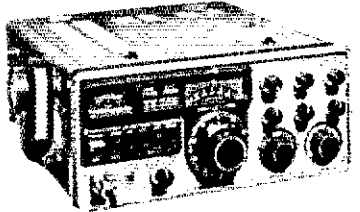
The FT-101E **YAESU** Transceiver  
with new RF Speech Processor.  
Solid state 160 thru 10 meters. **\$749\***  
\*FT-101EE (less processor) \$659,  
\*FT-101EX (less accessories) \$599



The TR-4C **DRAKE** Transceiver. 80  
thru 10 meters AC/PS. **\$599.**



The FT-221 **YAESU** Transceiver **\$679.**  
Solid state 2 meters SSB/FM/CW/AM



The TS-700 **KENWOOD**  
Transceiver. Solid state 2 meters  
SSB/FM/CW/AM. **\$700.**



The FT-620B **YAESU** Transceiver  
Solid state 6 meters SSB. **\$449.**

*CTC - UHF/VHF  
POWER TRANSISTORS FOR AMATEUR USE  
J101 UNDERWOOD CAPACITORS*



Order Direct 1. Check or M.O. with order.  
3 E-Z Ways 2. BankAmericard or Mastercharge.  
3. C.O.D. (20% deposit, please)

Write for FREE brochures and particulars on all models.

2602 E. Ashlan, Fresno, CA 93726  
Phone (209) 224-5111

**★ COIL KITS ★**

We Have Almost All Coils For  
Ham Gear in ARRL Handbook  
POSTPAID

- \* 2 M FM Transmitter-Receiver, L1, RFC1-3, T1 L1-5, RFC1-2, Z1 — Handbook, p. 453-4 \$11.35
- \* Ultramountaineer 40M CW Transceiver — QST, Apr. '75 p. 28 ..... \$ 6.00
- \* Transmatch QRP, L1-4 — Handbook, p. 350 ..... \$ 6.00
- \* Preselector 80 To 10 M L1-20 — Handbook, p. 265 ..... \$15.00
- \* SSB Transceiver For 80M L1-22 — Ham Radio, Apr. '76, p. 48 ..... \$18.75
- \* Balun For Transmatch — Handbook, p. 585  
1 kW ..... \$11.00  
2 kW ..... \$13.50

SEND S.A.S.E. FOR LIST 2A-COIL KITS  
Coil Winding Quick Quotes Stock Coils

**CADELL COIL CORP.**  
POULTNEY, VT 05764 802-287-4055  
WE LIKE TO WIND COILS—TRY US

**UR TRIPOLE MULTI-BAND**

The **TRIPOLE™** antenna is the first all-band antenna to cover 160 thru 10 without a tap change or retuning. +5 SWL bands, 80 to 120 ft long, 1 KW rated, inverted V & horizontal Built-in balun. \$54.95 kit cash PPD in USA. Add 5% tax in TX. Send stamped envelope for information.

Universal Radio Co. Dept. 01  
Box 26041, El Paso, TX 79926  
Telephone (915) 532-1910

**The BRIMSTONE 144**

in stock at

**REVCOM ELECTRONICS**  
Rod Hogg, KØEQH owner



Area. net 8686  
P.O. Box 111  
Garden City, Kansas 67846  
307 E. Johnson  
316-716-3470 after 5:00 P.M.

LARSEN-MIDLAND-BRIMSTONE-CUSHCRAFT-CALLBOOK

**CURTIS KEYSER CHIP** \$24.95

8043; IC only, 50-up group rate	\$ 7.95
8043-1; IC, PCB, Manual	\$ 24.95
8043-2; Semi-kit	\$ 49.95
Add for air postage and handling \$ 1.50	
(See Feb 75 QST, Apr 75 HR, Feb 76 QST, Radio Handbook 76)	
KB4200 Keyboard Keyer (Oct 74 QST)	\$549.95
EK4200/KM4200 Keyer/Memory (Oct 73 QST)	\$439.90
EK430 CMOS Keyer (Feb 76 QST)	\$124.95
IK440 Instructokeyer (Mar 76 QST)	\$224.95

Curtis Electro Devices Inc.  
(415) 944-9136  
Box 4090, Mountain View, CA 94045

**PICKERING** CODE INSTRUCTION TAPES SINCE 1966

**CODEMASTER**  
LEARN MORSE CODE — IMPROVE SPEED

CODEMASTER TAPES have been proven in over 9 years of successful instruction to thousands of people all over the world. This system offers a proven method, complete guidance and accurate sending.

Pickering Codemaster Co.  
Box 396  
Portsmouth, R.I. 02871  
(401) 683-0575

Single tape price ..... \$7.95  
Any two; save \$1.90 ..... \$14.00  
All three; save \$4.85 ..... \$19.00  
Post Paid 4th Class Mail in USA

**CM-1 BEGINNER (Novice Class)**

A complete course of instruction is on the tape. Practice material at 5, 7 and 9 WPM. Includes code groups and punctuation. Prepares you for the Novice examination.

**CM-1½ INTERMEDIATE (General)**

Especially for General Class examination study. No instruction. Just practice. ½ hour at 11 WPM, 1 hour at 14 WPM and ½ hour at 17 WPM. Includes coded groups and straight text.

**CM-2 ADVANCED (Extra-Class)**

Mostly straight text, some coded groups. 1 hour at 20 WPM, ½ hour each at 25 and 30 WPM. For real QRP, play this tape at twice speed!

Tapes are 2-Track Monaural

**7" Reel Cassette**

- (1 1/2 IPS) C-120
- CM-1
  - CM-1½
  - CM-2  C.O.D.

Air Shipment \$1.10 per reel, 80¢ per cassette in USA

BankAmericard No. \_\_\_\_\_

Mastercharge No. \_\_\_\_\_

Chg. Card Exp. Date: \_\_\_\_\_

Amt. \_\_\_\_\_ Check, Money Order etc. No Cash

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_



Modulation indicator lets you monitor peak output level. Transmitter has automatic envelope compression for maximum "talk power" with minimum distortion. Amplified automatic gain control prevents overloading from strong signals.

Can be used as fixed, mobile, or portable station by selecting appropriate power supplies and accessories. Connectors for linear amplifiers, automatic antennas, antenna tuners, multiple antennas, and phone patch.

Has selectable sideband, compatible AM, and CW modes. True AM reception is valuable for existing AM systems switching to SSB operation. A side-tone monitor lets you monitor keying.

Has 4 channels within frequency range of 2.7 to 15.0 megacycles (MHz). Full power output: 100 watts PEP. Receiver is fully solid state; transmitter. Solid state except for driver and final amplifier.



All operating controls are on front panel. Designed to be operated by non-technical personnel. Has compact (16.51 x 31.75 x 33 cm) aluminum cabinet. Completely sealed.

Has built-in circuit for frequency netting. No expensive test equipment needed. Built-in CW tone oscillator permits tuneup without external audio generator. Re-aligning is relatively simple.

## WE STOPPED ARGUING WITH SUCCESS.

With 20,000 of our compact CA-26A SSB transceivers in service, we wanted to make it more sophisticated. Customers said, "No." "It's simple; it's inexpensive; it's extremely reliable. Leave it alone." So we did.

The CA-26A is a winner. No other 4 channel, 100 watt SSB transceiver even comes close to matching its performance, versatility or price. (After all, why pay for channels you don't need?) It is easy to operate; easy to maintain; easy to service. Over 20,000 units (some marketed under different names) are providing dependable communications in every part of the world. Its reliability is almost legendary. We decided to leave well enough alone. See your CAI dealer for literature on the CA-26A and its accessories, or write:



COMMUNICATION ASSOCIATES, INC.  
200 McKay Rd., Huntington Sta., NY 11746  
Tel: (516) 271-0800/TWX: 510-226-6998.

# Ham it up for \$4.50.



Amateur crystals 143.99 - 148.01 only for this trim price (and it's postpaid).

Florida residents add 4% sales tax. Send frequencies, make and model when ordering. Our price includes most gear on our free Parts List.

For equipment not listed, we'll provide prices on request and slice up something special.

Master Charge & BankAmericard telephone orders accepted.

No C.O.D.'s.



## Savoy Electronics Inc.

P.O. Box 5727, Fort Lauderdale, Florida 33310  
305/563-1333

Manufacturers of Quality Quartz Crystals Since 1937

**BEST Buys at Barry Electronics — HAM Headquarters!!!**  
WRITE or CALL. Best Cash Deal or Trade-Ins. — Antennas -  
Collins - Drake - Bird Wattmeters stocked, Tubes & Chim-  
neys (3-500Z, etc.)

**BARRY** 512 Broadway NY, NY 10012 Icom, Slo - Scan  
DEPT. Q. 212-WA-5-7000 **ELECTRONICS** Cameras, Towers,  
TELEX 12-7670 Add shipping-excess refunded-Quoted FOB N.Y.C. Rotors, etc., etc.

# QST



I would like to become a member of ARRL and help support its many services to amateurs and amateur radio. Here's my \$9.00 (\$10.00 in Canada, \$10.50 elsewhere). Sign me up for a year's membership and twelve big issues of QST! Additional family members at the same U.S. or Canadian address, memberships only (no QST) \$2.00. Multiple year memberships in the U.S.: \$17 for 2 years; \$24 for 3 years; \$31 for 4 years and \$38 for 5 years.

My name..... Call.....

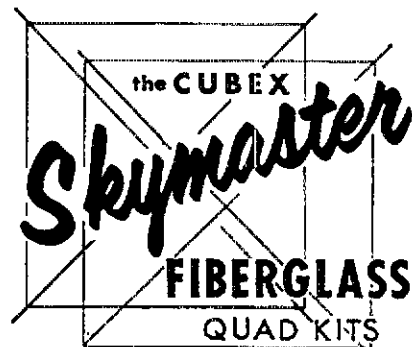
Street.....

City..... State..... Zip.....

(Please see the other side of this page for a list of available League publications.)

THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111

## "CHOICE OF THE DX KINGS"



All models available

"WIDE-SPACED"

2 ELEMENT—  
3 BAND  
KIT SPECIAL

ONLY  
**\$99.95**

Mailable APO  
Add \$9.50 for PPD  
Frt. Cont. U.S.

### CONTENTS

- 8 Fiberglass Arms—skyblue color
- 2 End Spiders (1 pc. castings)
- 1 Boom/Mast Coupler—h.d. aluminum
- 16 Wraplock Spreader Arm Clamps
- 1 CUBEX QUAD Instruction Manual

2:3-4 or more element Quads available. Send 25¢ (cash or stamps) for complete set of catalog sheets, specs & prices

## CUBEX COMPANY

P.O. Box 732, Altadena, California 91001  
Phone: (213) 798-8106

YOU CAN'T SAY "QUAD" BETTER THAN "CUBEX"

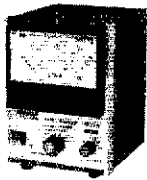


# TALK CLEAN

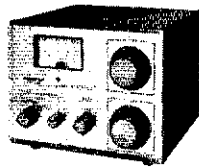
## Get the most from your rig with Leader test equip't

Cleaner, sharper signals in transmit or receive. Maximum power output. The perfect impedance match for your antenna. And, radiation that can't be beat. These are just a few advantages that can be yours when you choose Leader Test Gear as your personal "performance test center". They are easy-

to-use, moderately priced and absolutely basic to top flight operations. With everyone out for more and more air time you owe it to yourself to go with Leader. The results will be longer lasting contacts, better mileage and greater personal satisfaction . . . for you. Leader . . . your "performance test center".



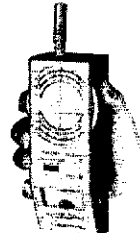
**LPM-885 SWR WATT METER**  
A sensitive, in-line type power meter which measures SWR of x'mission lines and power output from 1.8 to 54MHz. Facilitates adjustment of x'mitter and antenna systems for better results. May be left in circuit for continuous power output monitoring in the 1-1000W range. SWR Power Detector circuit assembly separates for remote measurements. Forward-to Reverse power ratio is used for accurate SWR readings. **\$99.95**



**LAC-895 ANTENNA COUPLER**  
Obtain cleaner signal reception and transmit at maximum power output with this dependable Antenna Coupler. Helps provide optimum antenna matching and virtually removes annoying TVI problems. The instrument features a built-in SWR and in-line power meter. Frequency range is: Amateur Band - 3.5, 7, 14, 21, 28MHz; input impedance - 50Ω; Load Impedance - 50Ω, 75Ω co-ax cable. **\$159.95**



**LIM-870A ANTENNA IMPEDANCE METER**  
Take your time. Adjust your antenna slowly for proper matching. This self-contained, battery operated Impedance Meter lets you make adjustments on your roof or at the antenna by combining with the LDM-815 Dip Meter. The combination also measures linear amplifier and receiver input impedance. Compact, lightweight with 1.8 to 150MHz freq. range; 0.1KΩ direct-reading impedance range. **\$99.95**



**LDM-815 TRAN-SISTORIZED DIP METER**  
Checks receiver, x'mitter and antenna in 1.5 to 250 MHz range. Determines LC network resonance freq'y. Helps align receivers and find parasitic oscill'ns. A handy instrument that combines with the LIM-870A for proper antenna matching. **\$99.95**

### Complete your Communications "Performance Test Center" by adding these valuable Leader Instruments . . .

**LA-31 RF Monitor Adapter**  
Use with any scope having direct deflection plate connections. Monitors waveforms and output of SSB & AM Xmitters to 500W. **\$22.95**

**LPM-880 RF Power Meter**  
Measures RF Xmitter output. Features pushbutton range selection; also measures power loss in low pass filters and coax cables. 1.8 to 500MHz. **\$149.95**

**LBO-310Ham 3" Scope. W/Built-in 2-Tone Generator & RF Monitor**  
Observe IF waveforms; monitor SSB and AM Xmitter signals to 500W. Check tuned condition for RTTY, DC-4MHz and an excellent general use scope. **\$269.95**

See your dealer or write direct

"Performance Test Center"  
**LEADER**  
Instruments Corp.  
Communications Division

151 Dupont Street Plainview, N.Y. 11803 (516) 822-9300  
In Canada: Omnitronix Ltd. Montreal, Quebec

Mail this coupon now. Place your order today!

**Leader Instruments Corp.** Communications Division, Dept. S.  
151 Dupont Street, Plainview, N.Y. 11803 (516) 822-9300

- I want to get the most out of my rig with Leader Test Gear . . .
- Send me your free Communications Instruments Catalog.
  - Send me your full line catalog of test instruments for Service, Industry, Education and Maintenance.
  - Ship me the following Leader Communications Test Gear:

- LPM-885 SWR Watt Meter . . . . . @\$ 99.95 . . . . .
- LBO-310Ham 3" Scope w/ built-in RF Monitor . . . . . @\$269.95 . . . . .
- LA-31 RF Scope Adapter . . . . . @\$ 22.95 . . . . .
- LPM-880 RF Power Meter . . . . . @\$149.95 . . . . .
- LAC-895 Antenna Coupler . . . . . @\$159.95 . . . . .
- LIM-870A Antenna Impedance Meter . . . . . @\$ 99.95 . . . . .
- LDM-815 Transistorized Dip Meter . . . . . @\$ 99.95 . . . . .

Total enclosed . . . . .

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State / Zip \_\_\_\_\_

Phone \_\_\_\_\_

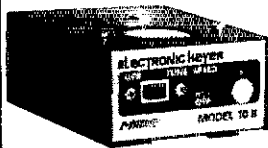
Payment by:

Personal Ck.  Money Order  Certified Ck.

Note: Do not send cash or stamps. Personal checks require 2 weeks processing.

CA. & N.Y. residents add Sales Tax For prepaid shipping & handling, enclose \$4 add'l. per unit with purchase price

# Your Next Purchase.



**ELECTRONIC KEYSER  
MODEL 10B**

Reed relay output (1 amp, 250V, 20VA). 10-30 WPM @ 6V-DC supply, 12 MA drain. 15-45 WPM @ 9V-DC supply, 15 MA drain. 3 MA idle current drain. Fixed spacing. Dots 1:1, Dash 1:3. Self-completing Dot/Dash. Manual dash in tune position. (Batteries not included.) Use the Model 10B Keyer with your paddle or our Model 11B matching paddle.

MODEL 10BWA KEYSER with Sidetone assembled \$39.95  
 MODEL 10BW assembled \$29.95  
 MODEL 10BK (KIT) \$23.95  
 200-2K PC BOARD KIT \$14.95  
 200-3K SIDETONE KIT \$ 5.95  
 Ship. Wt. 1 Lb., add \$ 1.00

(PA RES. ADD 6% SALES TAX)

**SEND FOR CATALOG & DEALER LIST.  
 ORDER FROM DEALER OR DIRECT.  
 FOR U.P.S., C.O.D SHIPMENTS—ADD 85¢**

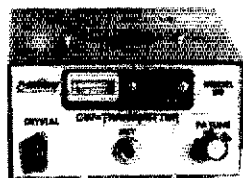


**PADDLE  
MODEL 11B**

Dit/Dah travel adjustment. No mechanical switches. No bearings to fail. Paddle assembly weight is 1.5 pounds. Reversible Dit and Dah connections. Rubber feet. Damping on paddle operator lever. Feather glide paddle movement.

MODEL 11BW assembled \$11.95  
 MODEL 11BK (KIT) \$ 8.95  
 Ship. Wt. 2 Lb., add \$ 1.35

(PA RES. ADD 6% SALES TAX)



**CW TRANSMITTER  
MODEL 50**

15 watts input. Full break-in keying. All solid state. Crystal control. 160, 80 or 40M plug-in coil. Zener regulated chirpless keying. Has built-in 120 Vac power supply. OPTIONS: Built-in keyer and/or sidetone. Paddle Model 11B is compatible with built-in keyer option.

MODEL 50K (KIT) \$49.95  
 MODEL 50W (Wired) \$69.95

Add-on options:  
 SIDETONE 200-21 Kit \$ 5.95  
 200-21 Wired \$ 8.95  
 KEYSER 200-22 Kit \$13.95  
 200-22 Wired \$18.95  
 Ship. Wt. 4 Lb., add \$ 2.10

(PA RES. ADD 6% SALES TAX)  
 (All units come with 40M plug-in coil unless otherwise specified. (Additional coil kits \$3.95 each postpaid.)



**ELECTRONIC KEYSER WITH PADDLE  
MORSE-1835  
MODEL 12**

C-MOS circuitry. Solid state output switch. (250V, 1 AMP MAX.) 8-45 WPM. Fixed spacing. Dot 1:1, Dash 1:3. Self-completing Dot/Dash. No on/off switch required. Sidetone has 2-inch speaker. Paddle travel adjustment. Rubber feet. 4 penlight batteries (not included).

MODEL 12 assembled \$49.95  
 Ship. Wt. 2 Lb., add \$ 1.35

(PA RES. ADD 6% SALES TAX)



**SPEECH PROCESSOR  
MODEL 60A**

200K/500 OHM inputs. PTT on connector. Instantaneous attack and release. 2, 9V-DC batteries (not included). 1.5 MA drain. Frequency is  $\pm 1/2$  db., 300-3000 Hz. Process gain control has an in/out switch. The process threshold is: 1.5 MV-RMS (HI-Z). 400 micro V-RMS (LO-Z). Output voltage 100 MV-RMS nom.

MODEL 60AW assembled \$29.95  
 MODEL 60AK (KIT) \$23.95  
 Ship. Wt. 1 Lb., add \$ 1.00

(PA RES. ADD 6% SALES TAX)

## THE WORLD AT YOUR FINGERTIPS!



RD-1 • BOX 185A • FRANKLIN, PA. 16323  
 TELEPHONE (814) 432-3647

# THE PEOPLE'S MAIL ORDER



Aladdin has been established for you, the Customer. Too many mail order companies guess as to your needs, Aladdin listens to your requests and suggestions. Simply write in and tell us how to make Aladdin a success by furnishing the items you need. We are also interested in any ideas you have for future kits.

FAIR-CHILD

We at Aladdin will do our best to find and offer to you, at reasonable prices, the parts you want in future ads.

### LINEARS

**555**  
 Timer ..... .65  
**LM 380**  
 2W. Audio Amp. 1.00  
**LM 741**  
 Operational Amp .25



**FND 70**  
 RED, .25 In. Char.  
 10mA per segment  
 Common Cathode.  
 \$1.25

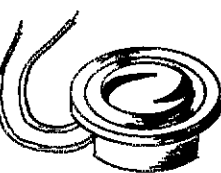
**FND 503**  
 RED, .5 In. Char.  
 10mA per segment  
 Common Cathode.  
 \$1.60

**.5 IN. CHAR.**  
 The Best on the Market.  
 Ideal for large readout  
 application..... \$4.95

### SPEAKER

1" Dia. 40 Ohms

REPRODUCED



1.50

### 16V LAMP

PC TYPE

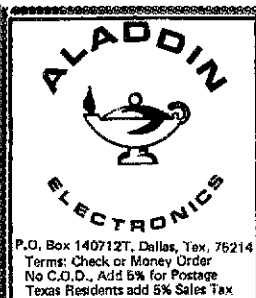
4/1.00



\$26.95



Ideal for Car, Boat, Camper, Etc.  
 with Built-in Back-up Power Supply.



P.O. Box 140712T, Dallas, Tex. 75214  
 Terms: Check or Money Order  
 No C.O.D., Add 5% for Postage  
 Texas Residents add 5% Sales Tax

### 'THE TRAVELER' 4 DIGIT AUTOMOBILE CLOCK

- FEATURES:
- 1.) .5" Inch Displays
  - 2.) AC-DC Operated
  - 3.) Automatic Cut-In and Recharging of Back-up Power Supply
  - 4.) Able to Keep Time While Changing from House to Car or Car to Boat Using Built-in Backup Power Supply
  - 5.) Protected From Noise and Voltage Spikes in Car and Boat
  - 6.) Direct Drive Outputs
  - 7.) Non-Multiplexed Output Circuitry

### A REAL BARGAIN!! \$11.95 4 DIGIT ALARM CLOCK

#### FEATURES:

- 1) Independent Digit Setting
- 2) Non-Multiplexed Output Circuitry
- 3) 24 Hour Snooze Alarm
- 4) Direct Drive Display Output
- 5) RFI Eliminating Circuitry
- 6) .25 Inch Readouts

#### KIT INCLUDES:

COMPONENTS, PC BOARD,  
 TRANSFORMER, and  
 CONSTRUCTION MANUAL

#### KIT INCLUDES:

COMPONENTS, PC BOARD,  
 TRANSFORMER, and  
 CONSTRUCTION MANUAL.

# The Drake SSR-1

provides real

# PORTABILITY and VERSATILITY

in a  
general coverage  
SW receiver ...



*For more information on this and other  
fine Drake products, please contact:*

**R. L. DRAKE COMPANY**



540 Richard Street, Miamisburg, Ohio 45342 • Phone (513) 866-2421 • Telex 288-017

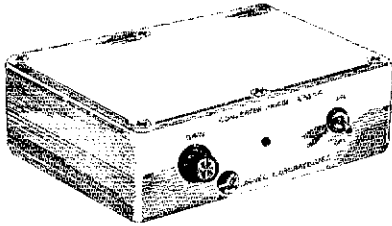
**Compare these features  
with any other general  
coverage SW receiver:**

- Complete general coverage operation from 500 kHz to 30 MHz with synthesizer circuitry. No range crystals to buy. Dial calibration accuracy within 5 kHz at all frequencies
- Built-in telescoping antenna with provision for external antenna.
- Built-in ac power supply. Provision for internal "D" cell batteries in built-in battery holder. Receiver automatically switches to batteries if ac power fails.
- Product detector for ssb/cw reception.
- Clarifier for extra fine ssb/cw tuning.
- 100% solid state. Dc power cord available for external 12V dc operation from auto or boat.

- Built-in loud speaker. Drake HS-1 cushioned, impedance-matched headphones also now available for SSR-1
- Small size: 13" wide, 11" deep, 5.5" high (33 x 28 x 14 cm). Weight 14 lbs (6.4 kg).

START HEARING  
THE WEAK ONES!

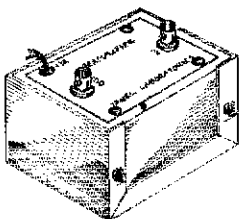
## VHF UHF CONVERTERS



Very sensitive crystal controlled converters for receiving the VHF bands with your present receiver or transceiver. Ideal for DX, FM, Satellite reception or for just talking to the gang. All have built-in supplies for operation from either 117 VAC or 12 VDC. 10 Meter output is standard. Beautifully built and carefully tested with modern equipment.

50CA	50-52 MHz	\$85.00
144CA	144-148 MHz	\$85.00
220CA	220-225 MHz	\$85.00
432CA	432-436 MHz	\$85.00

## SUPER SENSITIVE PREAMPS



Improves S/N  
Low Noise Figure  
MOSFET Circuit

JANEL makes a preamp for improving the performance of almost any receiver. All are resistant to overload and fully diode protected. Top quality construction.

APPLICATION	MODEL	FREQUENCY
OSCAR	30PB	28-30 MHz
6 Meters	50PB	50-52 MHz
6 Meter FM	53PB	52-54 MHz
2 Meters	144PB	144-148 MHz
220 MHz	220PB	220-225 MHz
432 CW, FM, ATV	432PA	420-430 MHz
Satellite	137PB	135-139 MHz
High Band	PB-H	146-174 MHz
UHF FM	432PA-U	450-490 MHz

PB models are only \$19.95 and 432PA models are only \$33.00. All are in aluminum cases, have BNC connectors (others available), require 12 vdc and are guaranteed. Specify model and frequency when ordering. Other models are available with AC power supply.

### Write for Free 1976 Catalog

JANEL can also supply a wide variety of receiving equipment for industrial applications. A quote to your specifications will be sent promptly.

**JANEL laboratories**  
3312 S.E. VAN BUREN BLVD.  
CORVALLIS, OREGON 97330  
TELEPHONE (503) 757-1134

## Ham-Ads

(1) Advertising must pertain to products and services which are related to amateur radio.

(2) The Ham-Ad rate is 60 cents per word. A special rate of 20 cents per word will apply to advertising which, in our judgment, is obviously non-commercial in nature.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. No cash or contract discount or agency commission will be allowed.

(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date.

(5) No Ham Ad may use more than 100 words. No advertiser may use more than two ads in one issue.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising, before their ad can appear.

The publishers of QST are unable to vouch for the integrity or for the grade or character of the products or services advertised except those obviously commercial in character.

### Clubs/Hamfests

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., 2012 Rockingham St., McLean VA 22101.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't, police, etc. invited to join Society of Wireless Pioneers - W7GAQ/6 Box 530, Santa Rosa CA 95402.

FREE sample copy Long Island DX Assn. bulletin. Latest DX news. Business size s.a.s.e. to the L.I. DX Assn., P. O. Box 73, Westbury NY 11590.

EDITING a club paper? Need public relations help? You should belong to the Amateur Radio News Service. For information write: Doris Demstedt, WA3HEN, 303 N. Hammonds Ferry Rd., Linthicum Heights MD 21090.

ELMIRA, NY Hamfest, Sept. 25, 1976, Chemung County Fairgrounds. Flea market, dealer displays, technical talks. Talkin 10/70 - 146.52. \$2.00 advance sale - \$2.50 at gate. For further information, WA2SMM, 320 W. Ave., Elmira, NY 14904.

CINCINNATI Hamfest: 40th Anniversary Hamfest - Sunday September 19, 1976 at the New Improved Stricker's Grove on State Route 128, one mile west of Ross (Venice) Ohio. Flea Market, exhibits, contests, model aircraft flying, food and beverages all day. Advance ticket sales \$7. - tickets at the gate \$8. - covers everything. For further information: Lillian Abbott, 1424 Main Street, Cincinnati OH 45210.

BLOSSOMLAND Swap-Shop, October 3rd, Berrien County Fair Grounds, Berrien Springs Michigan. Great expanded facilities, 150 tables, entertainment, refreshments. Advance ticket donation \$1.50. Tables \$2. Write: John Sullivan, P. O. Box 345, St. Joseph MI 49085. Make checks payable to Blossomland Hamfest.

NOW you all come, you hear. Where? Why ARRL Hudson Division Convention, November 13 and 14, Playboy resort and country club at Great Gorge, McAfee, New Jersey. Many exhibits, giant indoor flea market FCC and ARRL forums, FCC exams, special YL programs, technical sessions and a Saturday night banquet with Jean Shepard, K2ORS, world traveler, columnist and famed radio and TV personality as the speaker. For information write to Al Piddington, WA2FAK, 4 Acorn Drive, East Northport, New York 11733.

W3PIE annual gabfest, September 11, 1976, on the Club grounds, Old Pittsburgh Road, Uniontown, Pa. Details write Uniontown Amateur Radio Club, c/o 438 Braddock Ave., Uniontown PA 15401.

THE Sixth Annual Greater Louisville ARRL Hamfest - Sunday Sept. 26 - at the Kentucky National Guard Armory - Louisville. Indoor exhibitors, gigantic flea market, free ladies bingo. Registrars, adults \$2.00, children 12 and under free. Synthesizer campers only open Saturday - 1800Z. Write K4GOU - 2415 Concord Drive, Louisville, Ky. 40217.

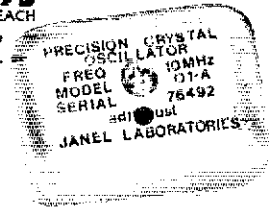
FLEA Market - LIMARC runs the largest NYC area flea market. Ham, CB, Electronics, Computers. Sunday October 10; N.Y. Institute of Technology Rte. 25A/Northern Blvd. Old Westbury, L.I. Talk-in 25/85 & 52. WB2ALW - Hank 516 484-4322.

RADIO Expo '76 - Don't miss this one! Sept. 18, 19, Lake County, Illinois Fairgrounds, Rts. 45-120 north of Chicago. Gates open 6 A.M. both days - flea market/camping open Friday night. Exhibit Hall: Over 40 top manufacturers. Forums: FCC's John Johnston (1 P.M. Sunday), ARRL's Lew McCoy & Tom McMullen, QST's ATV, Synthesizing HT 220's, DX, Ni-Cad batteries, FM, Microprocessors and more. Flea Market: inside or outside, set up Friday night. QCWA Brunch Saturday at 1 P.M. Camping space on-site. All for \$1.50 advance, \$2.00 gate. Write Expo, Box 1014, Arlington Heights IL 60006.

Accuracy  
You Can  
Count On!

\$79.95  
EACH

plus postage  
and handling.



Many oscillators used in amateur frequency counters can cause readout errors of 1 or 2 KHz at 2 meters due to instability of the time base.

A miniature Janel O1-A crystal oscillator uses a proportional oven to provide a time base of laboratory accuracy for your counter measurements. Designed to be incorporated in most popular counters available today, this highly stable oscillator holds its accuracy from the cold of Alaska to the heat of Arizona. 4 or 10 MHz Standard

Order direct or write for details

**Janel Laboratories**



3312 S. E. Van Buren Blvd.  
CORVALLIS, OREGON 97330

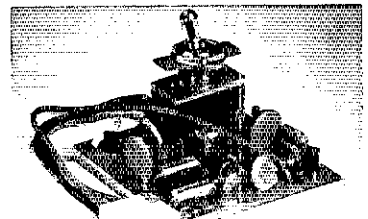
Telephone (503) 757-1134



The Fully Automatic Electronic Defense

## ENTRY SENTRY

Mobile Radio & Auto Alarm



Upon unwelcome entry or tampering with radio, the ENTRY SENTRY creates an instant alert by blasting the auto horn (or other sounder) 120 times in 60 seconds, and remains armed to repeat the cycle if necessary.

- Easily installed
- Fully automatic protection - it never forgets to set itself
- No special keys or setting rituals to forget
- Dependable defense in extreme temperatures
- One year replacement warranty

Model BA-1A (with Radio Guard) \$34.95  
Model BA-1 (without Radio Guard) \$29.95

Don't Be the Victim. Get Automatic Protection Now.

ENTRY SENTRY by THETA LABS, INC.  
10911 Dennis Rd. #405, Dallas, Texas 75229  
Phone (214) 241-1090

DEALER INQUIRIES INVITED

# For Spare Time Income, Your Own Business or a Career... LEARN TO SERVICE COMMUNICATIONS/CB EQUIPMENT...THE NRI WAY

**Career opportunities are opening up fast for the man trained in communications.**

The field of communications is bursting out all over. In Citizens Band alone, class "D" licenses grew from 1 to over 2.6 million in 1975, and the FCC projects about 15 million U.S. CB'ers by 1979. That means countless careers in design, installation and



maintenance. Start training now, the NRI way, to get your FCC license and qualify for one of these openings.

## Learn on your own 400-channel, digitally-synthesized VHF Transceiver.

The NRI Complete Communications Course teaches you to service and adjust all types of two-way radio equipment (including CB), using the one unit that is best equipped to train you for CB,



Commercial, and Amateur communications: a digitally-synthesized 400-channel VHF transceiver and AC power supply. This 2-meter transceiver gives you "Power-On" training. Then we help you get your FCC Amateur License with special instructions so you can go on the air.

The complete program includes 48 lessons, 9 special reference texts, and 10 training kits. Also included are: your own electronics Discovery Lab, a new Antenna Applications Lab, an Optical Transmission System, CMOS Digital Frequency Counter, and TVOM. The course covers AM and FM Transmission Systems; Radar Principles; Marine, Aircraft, and Digital Electronics; and Mobile Communications. You must earn your first class radio telephone FCC license or you get your money back.

## CB Specialist Course now available

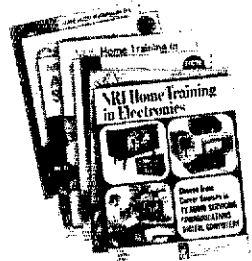
NRI now offers a special course in CB Servicing. You get 37 lessons, 8 reference texts, your own CB Transceiver, AC power supply and multimeter . . . for hands-on training. Also included are 14 coaching units to make it easy to get your commercial radio telephone FCC license—enabling you to test, install and service communications equipment.



## Over a million men have enrolled with NRI

Send for the free NRI catalog and discover why more than a million men like yourself have chosen the NRI way the right way to get ahead. Read how you learn from bite-size lessons, progressing at your own speed to your FCC license and then into the communications field of your choice. There's no obligation and no salesman will call.

**Send coupon now for FREE NRI catalog**



If coupon is missing, write to: NRI Schools, McGraw-Hill Continuing Education Center, 3939 Wisconsin Avenue, Washington, D.C. 20016

Rush the free catalog of my choice (select only one, please). No salesman will call.

- Complete Communications Electronics with CB
  - FCC Licenses • Aircraft, Mobile, Marine Electronics
- CB Specialists Course
- Amateur Radio
  - Basic and Advanced
- Industrial and Business Electronics
  - Digital Computer Electronics • Electronic Technology • Basic Electronics
- TV/Audio Servicing
  - Choose from 5 courses
- Appliance Servicing
  - Homeowner & Professional Repairs
- Automotive Mechanics
  - Mister Automotive Technician • Tune-Up and Basic Repairs
- Auto Air Conditioning
- Air Conditioning & Refrigeration
  - Basic Air Conditioning Servicing • Master Course in Air Conditioning, Refrigeration & Heating



**NRI SCHOOLS**  
McGraw-Hill Continuing Education Center  
3939 Wisconsin Avenue,  
Washington, D.C. 20016

19-096

**APPROVED UNDER GI BILL** if taken for career purposes.  
 Check box for details.

Name \_\_\_\_\_ Age \_\_\_\_\_  
(Please Print)

Street \_\_\_\_\_

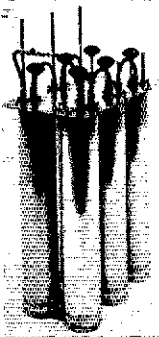
City/State/Zip \_\_\_\_\_

Accredited Member National Home Study Council

**DUPLEXER & CAVITY KITS...**

**Now**

**available for you fully assembled and tuned!**



- **UPGRADE YOUR REPEATER WITH A RF TECHNOLOGY DUPLEXER.**
- **ALL DUPLEXERS AND CAVITIES ARE TEMPERATURE COMPENSATED WITH INVAR® AND MEET ALL COMMERCIAL STANDARDS**
- **ONLY TOP QUALITY MATERIALS GO INTO OUR PRODUCTS.**
- **BOTH KITS & ASSEMBLED DUPLEXERS AND CAVITIES ARE AVAILABLE TO YOU AT A SAVINGS TO YOU.**

**Mod. 62-3...6 cav., 2 mtr., insertion loss 0.6 db with isolation 100 db typical; pwr. 350 w. Kit \$349 ea.-Assembled \$439.**

**Mod. 4220-3...4 cav. 220 MHz insertion loss 0.6 db with 80 db isolation typical; pwr. 350 w. Kit \$249 ea. - Assembled \$329.**

**Mod. 4440-3...4 cav. 440 MHz, insertion loss 0.6 db with 80 db isolation typical; pwr. 350 w. Kits \$249 ea. - Assembled \$329.**

**Mod. 30 Cavity Kits: 2 mtr. \$65 ea., 220 MHz \$65 ea., 440 MHz \$65 ea.,; 6 mtr. \$115 ea. Add \$15 for Assembled Kit.**

**Also available: 8 mtr., 4 cav. Kit \$399-Assembled \$499, 2 mtr. 4 cav. Kit \$249-Assembled \$329, 440 MHz TV Repeater Duplexer**

**Only hand tools are necessary to assemble Kits!**

**Send your order to: Distributor: TUFTS RADIO, 386 Main St., Medford, Mass. 02155. Phone (617) 395-8280.**

**(Prices F.O.B. Medford, Mass. All units can be shipped U.P.S.-C.O.D. orders require \$50 deposit. —Mass. residents add 5% sales tax.)**

**THE next Cedar Valley Amateur Radio Club Hamfest is Sunday, October 3, in Cedar Rapids. Hawkboye Downs Exhibition Building. Manufacturers and dealers welcome; ARL representation; ample parking; camping. Tickets \$1.50 advance; \$2.00 at gate. First table \$3.00; others \$5.00. Saturday afternoon setup available. Talk in frequency 146.167.76, 146.52, 3.970 MHz. Write: CVARC Hamfest, P. O. Box 994, Cedar Rapids, IA 52406.**

**QSL Cards**

**TRAVEL-PAK QSL Kit** Send call and 25c; receive your call sample kit in return. Samco, Box 203, Wyanntskill NY 12198.

**DELUXE QSLs, Samples 25c.** Petty, W2HAZ, P.O. Box 5237, Trenton NJ 08638.

**DON'T** buy QSL cards until you see my free samples. Fast service, economical prices. Little Print Shop, Box 9848, Austin TX 78766.

**QSLs** — Variety, value, quality, custom. Samples and catalog 25c. Alkanprint, Box 3494, Scottsdale AZ 85257.

**QSLs** catalog. Samples 35c. Ritz Print Shop, 5810 Detroit Ave., Cleveland OH 44102.

**DISPLAY** and protect your QSL's with 20 frame plastic holders. Seven for \$3.00, prepaid. TEPABCO, Box 198T, Gallatin TN 37066.

**QSLs.** Second to none. Same day service. Samples 50 cents. Include your call for free decal. Ray, K7HLR, Box 331, Clearfield, Utah 84015.

**QSL's,** Amateur Radio Commemorative Cup, Stein, Plate, Belt Buckle, Key Chain, Ladies Pendant, free catalog, Rusprint, Box 7575, Kansas City MO 64116.

**QSL's** "Brownie" W3CJ, 3035A Lehigh, Allentown PA 18103. Samples with catalog 50c.

**QSL Cards** — Something completely different! Nothing even close to it on the market! Samples: 25c W5UTT; Box 1171C; Garland TX 75040.

**QSLs???** QSLs?? "America's Finest." Samples 75c. Deluxe \$1. Religious 50c. (deductible). Sakkers, W8DED, Box 218, Holland MI 49423.

**FREE** Samples — Stamp appreciated. Samcards, 48 Monte Carlo Dr., Pittsburgh PA 15239.

**CUSTOM** QSL's 36 page catalog! 300 illustrations. Card and ink samples. Twenty sample QSLs. 50c Cornelson's R.D. 1 Box 141A, Mt. Upton, New York 13809.

**QSLs???** QSLs?? "America's Finest!!!!" Samples 75c. Deluxe \$1. Religious 50c. (Deductible). Sakkers, W8DED, Box 218, Holland MI. 49423.

**General**

**CANADIAN** Surplus Catalog and flyers \$1. Etcoz Electronics, Box 741, Montreal Canada H3C 2V2.

**CANADIANS** — Collins 755-3, 325-3, 80L-1, 312B-4, 316F-2, 81-2 mint condition for sale. Asking \$2200. Phil VE2AUT 66 Summit Crescent, Westmount, Montreal, Canada 514-482-0936.

**WANTED:** SBE-2 codaptor for SBE 54 transceiver. VE3EYH, 50 Foothills Dr., Ottawa Canada. 613-828-4169.

**VP2M-land!** Modern house overlooking ocean, constant sea breeze. Hygain quad 70 ft. \$90 weekly. Doc Beverstein, 60 Amsterdam. Toronto M4B 2C2 Tel. 416-756-2117.

**JAMAICAN** Ham Villa, 4 BR. Pool, staff, antennas WB9HQI, 6418 Ham Ave., Minneapolis MN 55436.

**CASH** paid for your unused tubes vacuum variables and good ham and commercial equipment. Send list to Barry Electronics, 512 Broadway, NY NY 10012.

**CALL** toll-free (800) 327-7798. Ask for Bob Hoffman (Jaro Electronics Corp.) We buy all types of tubes. Top prices paid for Varian, Eimac, Amperex. Address: 412 27th Street, Orlando FL 32806. In Florida call collect (305) 843-9551.

**SPIDERS** for boomless quads. Hellarc welded aluminum. Al's Antennas, 1339 South Washington Street, Kennewick WA 99336.

**TRANSFORMERS** rewound, Jess Price, W4CLJ, 507 Raehn, Orlando FL 32806.

**NOVICES:** Need help for General or Advance Ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License Instruction, PO Box 6015, Norfolk VA 23508.

**WE** buy electron tubes, diodes, transistors, integrated circuits, semiconductor. Astral Electronics, 150 Miller Street — Elizabeth NJ 07207. (201) 354-2420.

**MOBILE** Ignition Shielding gives more range, no noise. Kits and custom systems. Literature. Estes Engineering, 930 Marine Dr., Port Angeles WA 98362.

**NEWLY** formed high school ham club needs your no low cost gear. Contributions are tax deductible. Write Scott Carlson: WB6GFX; 9855 East Lemon Ave., Arcadia CA 91006 for details.

**SIMPSON** 2600 Calibrator. Excellent condition. For sale. W2HBR, M. Vogel, 757 East 79th St., Bklyn NY 11236.

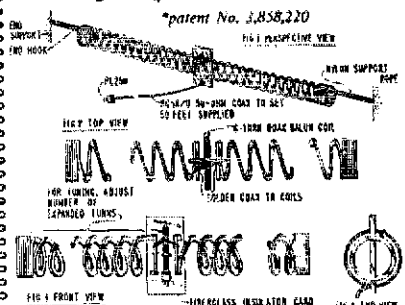
**QST's** complete from Dec. 1915-1952, each year bound separately in custom hard bound bindings. No photocopies, original editions in superb condition. Of the 25 or so known early sets, this is among the finest, binding alone cost over \$600. Shipping arranged anywhere, FOB NJ. Best offer over \$2,500. W4ZVCP.

**COLLINS,** 75A4 No. 187 w/2 filters \$300., 75A4 No. 326 w/2 filters for 75A4, 2.1 \$45., 5 \$70., Plus F455V1W2 \$40., F455C12 \$30., Two F250A20 \$25. FOB NJ W4ZVCP.

**HAM** Radio Repair. Expert repair and alignment in our new Lab. Prompt, reasonable. "Grid Gridley, W4GJO, 3824 Malec Circle, Sarasota, Florida 33581.

**SLINKY!**  
a lot of antenna in a little space

new Slinky® dipole\* with helical loading radiates a good signal at 1/10 wavelength long!



\*patent No. 3,858,220  
This electrically small 80/75, 40, & 20 meter antenna operates at any length from 24 to 70 feet • no extra balun or transmatch needed • portable—erects & stores in minutes • small enough to fit in attic or apartment • full legal power • low SWR over complete 80/75, 40, & 20 meter bands • much lower atmospheric noise pickup than a vertical and needs no radials • Kit includes a pair of specially-made 4-inch dia. by 4-inch long coils, containing 535 feet of radiating conductor, balun, 50 ft. RG58/U coax, PL259 connector, nylon rope & instruction manual • now in use by US Dept. of State, US Army, radio schools, plus thousands of hams the world over.

**Money Back Guarantee**  
when returned within 2 weeks

**TELETRON CORP.** AVAILABLE AT ALL LEADING DEALERS. IF NOT, ORDER DIRECT  
Suite 100  
Box 84  
Kings Park, N.Y. 11754

KR #80-40  
 Coils only (pair of 4" dia. special coils)  
(N.Y. residents add sales tax)

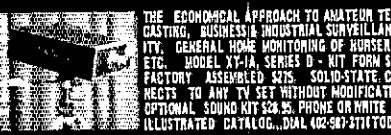
name \_\_\_\_\_  
street \_\_\_\_\_ zip \_\_\_\_\_  
town \_\_\_\_\_  
enclose check with order • we ship UPS upon receipt of order • CDS's \$1 extra

\$39.95 postpaid  
\$23.95 postpaid

**FIRST CLASS FCC LICENSE**

CIE will help you pass the government-administered First Class FCC License exam... broaden your career opportunities in electronics. In-depth electronics career training to help you add to your technical skills and knowledge, prepare for valuable First Class FCC License at the same time. Basic and advanced training. Study at home, spare time. Fully accredited career courses. Send today for Free FCC License booklet and school catalog. G.I. Bill info on request. For your convenience, we'll try to have a school rep contact you. No obligation. Write CIE — Cleveland Institute of Electronics, Inc., Dept. WQT-03, 1776 East 17th Street, Cleveland, Ohio 44114.

**BUILD YOUR OWN TV CAMERA!**  
"Ideal for home & business"



THE ECONOMIC APPROACH TO AMATEUR TELECASTING, BUSINESS INDUSTRIAL SURVEILLANCE, ETC. GENERAL HOME MONITORING OF HORSESHIES, ITC. MODEL XY-1A, SERIES D - KIT FORM \$16. FACTORY ASSEMBLED \$215. SOLID-STATE COMPONENTS TO ANY TV SET WITHOUT MODIFICATION. OPTIONAL SOUND KIT \$24.50. PHONE OR WRITE FOR ILLUSTRATED CATALOG...DUAL (02-98) 2114 TODAY.

BOX 453-QD ATV Research BAKOTA CITY, NEBR. 68731

**Shortwave Listening**  
1976 World Radio TV Handbook - \$10.95  
Gated 1000/100/50/25/10 kHz Calibrator - \$54.00  
Barlow Wadley & R.L. Drake Receivers  
1976 "Confidential" Frequency List - \$5.45  
**GILFER, Box 239, Park Ridge, NJ 07656**

# Poly Pak's EXCLUSIVE Avg. Ship. \$4.98 Wt. 6 ozs.



YOUR CHOICE OF ANY KIT

100'S OF BARRELS PURCHASED! TEST 'EM YOURSELF 'N SAVE!

For the first time anywhere, Poly Pak merchandisers introduce a new way in buying the economical way. Raw stock from the "barrel". Remember the "good ole days"? They're back again. The same way merchandisers

throughout the United States buy from various factories... their overruns in barrels. Poly Pak has done the same. Therefore you are getting the same type of material as the RE-TESTERS DO!

Every kit carries a money back guarantee!

<b>BARREL KIT #1</b> <b>SN7400 DIP IC'S</b> <b>75 for \$1.98</b> Marked 14 and/or with 1K pin clips, may include gates, registers, flip flops, counters, etc. Who knows! GUARANTEED SATISFACTION! Cat.No. 9M2415 Untested.	<b>BARREL KIT #2</b> <b>LINEAR OP AMPS</b> <b>DI'S 75 for \$1.98</b> May include 700's, 701's, 702's, 680 series, 555's include marked and unmarked. Cat.No. 9M2416	<b>BARREL KIT #3</b> <b>1N4148/914 SWITCHING DIODES</b> <b>100 for \$1.98</b> You never saw the before. Imagine famous switching diodes at these prices! Cat.No. 9M2418 Untested.	<b>BARREL KIT #4</b> <b>"4000" RECTIFIERS</b> <b>100 for \$1.98</b> These are the famous rectifier miniature rectifiers of the 1N4000 series. May include 25, 50, 100, 200, 400, 600 800 and 1000 voltors. Cat.No. 9M2417	<b>BARREL KIT #5</b> <b>SCR'S, TRIACS, QUADRACS</b> <b>40 for \$1.98</b> All the famous plastic power tab types Raw factory stock! All the 10 amp types. Cat.No. 9M2419 Untested.	<b>BARREL KIT #145</b> <b>MINI TRANSFORMER</b> <b>15 for \$1.98</b> Miniature transformer bank output, interlock and mid. Only 1/2" sq. Wt. 3 lbs. 9M2424	<b>BARREL KIT #147</b> <b>OVER-FLO FLUORESCENT NIXIES</b> <b>5 for \$1.98</b> Used originally in table top calculators. Brand new. Color package type, color Blue. Cat. No. 9M3224
<b>BARREL KIT #7</b> <b>VOLUME CONTROL BONANZAI</b> <b>40 for \$1.98</b> Singles, dials, variety of values, various, big ones small ones. Cat.No. 9M2421	<b>BARREL KIT #8</b> <b>SUBMINIATURE IF TRANSFORMERS</b> <b>100 for \$1.98</b> Amazing. Includes 400kc, 450 kc, 500 kc, etc. Includes 200 trans. radio trans. transformers. Cat.No. 9M2422	<b>BARREL KIT #10</b> <b>ROMS-REGISTERS</b> <b>50 for \$1.98</b> Untested	<b>BARREL KIT #12</b> <b>POWER TAB TRANSISTORS</b> <b>40 for \$1.98</b> PNP, plastic 1000 type. Assorted 2N numbers. Cat.No. 9M2426 Untested.	<b>BARREL KIT #13</b> <b>RESISTOR NETWORKS</b> <b>60 for \$1.98</b> Untested. By coring glass, in 14-pin dip packages. Cat.No. 9M2427	<b>BARREL KIT #158</b> <b>MOLDED CAPACITORS</b> <b>75 for \$1.98</b> Ass. size voltages, red, green, yellow, blue, plastic cases, axial leads. No. 9M3211	<b>BARREL KIT #159</b> <b>MODULAR SWITCHES</b> <b>24 for \$1.98</b> Central's "push-ON" switches. TV-mount, ass. Brand new. Cat. No. 9M3180
<b>BARREL KIT #16</b> <b>V. REGULATORS</b> <b>15 for \$1.98</b> LM309K TO-8 V.R.'s barrelled for the pound, but who wants to us em? You gain. No. 9M3330	<b>BARREL KIT #161</b> <b>"POP" PLASTIC TRANSISTORS</b> <b>25 for \$1.98</b> Calculator maker shops 2N3905's of 100% quality. TO-92. Preformed. Cat.No. 9M3242	<b>BARREL KIT #17</b> <b>LINEAR &amp; 7400 DIPS</b> <b>100 for \$1.98</b> Marked and unmarked, internal numbers of raw factory stock. Cat.No. 9M2431	<b>BARREL KIT #19</b> <b>DIPPED MYLARS</b> <b>60 for \$1.98</b> Finest capacitors made, shiny metal. Imagine factory comping 'em in barrels. Cat.No. 9M2597 100% good.	<b>BARREL KIT #20</b> <b>LONG LEAD DISCS</b> <b>150 for \$1.98</b> Factory distributor stock "junk sale". Prime, marked only. Long leads. Cat.No. 9M2598 100% good	<b>BARREL KIT #25</b> <b>METAL CAN TRANSISTORS</b> <b>100 for \$1.98</b> Includes TO-6, TO-18, etc. Assorted 2N numbers. untested. Cat.No. 9M2603	<b>BARREL KIT #26</b> <b>PLASTIC TRANSISTORS</b> <b>100 for \$1.98</b> Untested. Type TO-92 (TO-18), all manufacturers. Cat. No. 9M2604
<b>BARREL KIT #30</b> <b>PREFORMED RESISTORS</b> <b>250 for \$1.98</b> The good barrels of 1/4 and 1/2 watters for the use. You'll see even amount. 1000's, 100's, 10's, 1's. Cat.No. 9M2605 100% good	<b>BARREL KIT #31</b> <b>METALLIC RESISTORS</b> <b>100 for \$1.98</b> Made strictly by Corning, the finest resistor made. Mostly 1/2 watters, 1% to 5% tol. & a barrel of values. Cat. No. 9M2609	<b>BARREL KIT #32</b> <b>TRANSISTORS WITH A HOLE IN IT</b> <b>50 for \$1.98</b> Untested. Don't miss factory buy we bought barrels of 25 watters with mfg. hole in middle. PNP's and NPN's.	<b>BARREL KIT #35</b> <b>NEON LAMPS</b> <b>30 for \$1.98</b> 100% good. Famous NE-2's. All prime, but factory made millions and barrelled 'em. Your advantage. Cat.No. 9M2613	<b>BARREL KIT #36</b> <b>GERMANIUM DIODES</b> <b>200 for \$1.98</b> Famous maker, popular item. Never grows old. But this is the way the BESTERS buy 'em from the factories. Cat.No. 9M2614	<b>BARREL KIT #37</b> <b>1 AMP "BULLET" RECTIFIERS</b> <b>100 for \$1.98</b> Famous grade, ass. sold. Sold by the pound. Includes all types of voltages to 1KV. Cat.No. 9M2615	<b>BARREL KIT #39</b> <b>2N3055 HOBBY TRANSISTORS</b> <b>15 for \$1.98</b> 100% good. From factory to you, these barrels of 25 watters. 2N3055. We have 10 barrels. Cat.No. 9M2617
<b>BARREL KIT #40</b> <b>PNP HIGH-POWER TRANSISTORS</b> <b>20 for \$1.98</b> Popular germanium TO-3 case units, now available at "good ole barrel" prices. Cat.No. 9M2618 100% good.	<b>BARREL KIT #46</b> <b>6.3V 2-WATT AMPLIFIERS</b> <b>25 for \$1.98</b> Untested. Hobby type, factory fallout, we purchased them in barrels. These are unknown. Cat.No. 9M2624	<b>BARREL KIT #50</b> <b>SIGNAL SILICON DIODES</b> <b>200 for \$1.98</b> Includes many many types of switching, signal silicon types, all axial leads. Some may be zeners. Cat.No. 9M2628 Untested.	<b>BARREL KIT #52</b> <b>JUMBO RESISTOR PAK</b> <b>100-pc. \$1.98</b> Assortment metal films, precision, carbons, metal oxide powers, from 1/4 watt to 2 watts. Color coded. 100% good. Worth \$10.	<b>BARREL KIT #54</b> <b>8 DIGIT READOUTS</b> <b>7 for \$1.98</b> Bargain of a lifetime! All 8 digit readouts. Includes "display digit" types. Multiplexed. Cat. No. 9M2722	<b>BARREL KIT #56</b> <b>SLIDE SWITCHES</b> <b>30 for \$1.98</b> All slippers, sizes, spot, odd. Multiplexes, use. Transducers shop pack for 100% of switching parts. Cat.No. 9M2726 100% good	<b>BARREL KIT #59</b> <b>POWER TRANSISTORS</b> <b>40 for \$1.98</b> 10 watt Bendix 2N600 pellet transistors, ppm, all good, purchased from a protractor, have ballons. 100% good. Cat.No. 9M2727
<b>BARREL KIT #41</b> <b>POLYSTYRENE CAPS</b> <b>100 for \$1.98</b> Finest caps made. As a gamble we bought 100 barrels from factory, mixed values, all good. Cat.No. 9M2728	<b>BARREL KIT #65</b> <b>MIXED READOUTS</b> <b>15 for \$1.98</b> Factory returns... such numbers as MAN-2's, MAN-7's, MAN-8's, 11 barrels & no time to separate. Cat.No. 9M2733 Untested.	<b>BARREL KIT #68</b> <b>2-WATTERS</b> <b>100 for \$1.98</b> 100% good. Nobody seems to want 'em! So many numbers don't count, but they 'em in the barrel. It's a 1/4 watt max! All marked. Cat.No. 9M2735	<b>BARREL KIT #72</b> <b>CAPACITOR SPECIAL</b> <b>100 pcs. \$1.98</b> Empty stockrooms into barrels of mica's, plastics, ceramics, discs, etc. Nifty 100% good. Cat.No. 9M2738	<b>BARREL KIT #73</b> <b>TRANSISTOR ELECTROS</b> <b>50 for \$1.98</b> It "hangs" us why the factories dump 'em in barrels. We don't wish to separate wide ass voltages & values up to 300 mV. Cat.No. 9M2747	<b>BARREL KIT #75</b> <b>400MW ZENERS</b> <b>150 for \$1.98</b> Factory out of bin! Amazing offer to 300mV, 1.2 to 16V. You test. Hermetically sealed glass pins. Double plug. Cat.No. 9M2740	<b>BARREL KIT #76</b> <b>1-WATT ZENERS</b> <b>100 for \$1.98</b> Untested. Factory same as 400mw offer to 300mV, 1.2 to 16V, 8, 10, 12, 15, under glass, double plug. Cat.No. 9M2741
<b>BARREL KIT #77</b> <b>"BROWN" BODY TRANSISTORS</b> <b>40 for \$1.98</b> GE 12-40 series has hi-voltage, darlington, hi-current, etc. Factory line discontinued. Power tabs. Cat.No. 9M2742 Untested.	<b>BARREL KIT #81</b> <b>SUBMINI RESISTORS</b> <b>200 for \$1.98</b> 100% good. PC, upright type, color coded. These are unknown. Come to us in a barrel. Cat.No. 9M2744	<b>BARREL KIT #83</b> <b>LM-340T VOLTAGE REGULATORS</b> <b>15 for \$1.98</b> Untested. Factory returns! Get them in all kinds of mixed quantities. 5, 6, 8, 12, 16, 18 20 volts. Power tab! Cat.No. 9M2835	<b>BARREL KIT #86</b> <b>HOBBY LEDS</b> <b>40 for \$1.98</b> Untested. Wow! A lot of mixed quantities. LEDS, shapes, colors, good, poor, etc. No. 9M2859	<b>BARREL KIT #87</b> <b>NATIONAL IC BONANZA</b> <b>100 for \$1.98</b> Factory dumps into barrels. Types 2000, 7100 series, DTL's, ROM's, registers, clock & calc. chips, linear, etc. Cat.No. 9M2860 Untested.	<b>BARREL KIT #88</b> <b>LITHONIUM LED READOUTS</b> <b>10 for \$1.98</b> 747's, 727's, 800's, tri-poles, etc. 3d to 0.6. But from factory, all mixed. Buy fast! No. 9M2861	<b>BARREL KIT #89</b> <b>PHOTO ELECTRIC CELLS</b> <b>10 for \$1.98</b> Ass. GE types, CDS types. Mixed by factory. Big job for us to separate. 100% good! Cat.No. 9M3052
<b>BARREL KIT #93</b> <b>HALF WATTERS</b> <b>200 for \$1.98</b> Untested. Resistor factory tried to fool us by mixing 100's of color-coded resistors in barrel. But value is there. 4 oz. Cat. No. 9M3049	<b>BARREL KIT #101</b> <b>RESISTOR SPECIAL</b> <b>200 for \$1.98</b> Includes: 1/4, 1/2, 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000% good. 9M3054	<b>BARREL KIT #104</b> <b>SLIDE VOLUME CONTROLS</b> <b>10 for \$1.98</b> Used in hi-fi, volume control maker includes. Ass. values, what a buy. Worth \$1 ea. We've got barrels of 100% material.	<b>BARREL KIT #105</b> <b>MINI VOLUME CONTROLS</b> <b>25 for \$1.98</b> 1-Million pcs of 100%, 60K mini pots, ceramic case, long shaft. Ept maker includes. 9M3058	<b>BARREL KIT #108</b> <b>TO-8 PLASTIC TRANSISTORS</b> <b>40 for \$1.98</b> Includes PNP, NPN, 2N-3048, 2N5041, 2N5070 series, etc. Untested, but guaranteed to a 80% yield.	<b>BARREL KIT #109</b> <b>SILVER MICALS</b> <b>100 for \$1.98</b> Cat.No. 9M3018 For the first time silver mical's are low in price! Axial, red case, variety of physical sizes & values. Big savings from distributor prices. Wt. 1 lb.	<b>BARREL KIT #109</b> <b>SILVER MICALS</b> <b>150 for \$1.98</b> Wide ass. of terminal strip connectors, thru 1 contact thru 5 contact. Includes barrel dump in your gain. Wt. 1 lb. Cat.No. 9M3136
<b>BARREL KIT #112</b> <b>MICRO MINI LEDS</b> <b>40 for \$1.98</b> All the tiny leds, axial, upright of Monsanto, Litronix, variety of colors. Yield 60% or better. Cat.No. 9M3132	<b>BARREL KIT #115</b> <b>MOLEX SOCKETS</b> <b>200 for \$1.98</b> 100% good. Calculator maker dump! We got a million of 'em. Used for IC sockets, etc. Cat.No. 9M3144	<b>BARREL KIT #116</b> <b>BUTTONS 'N FEEDTHRU'S</b> <b>100 for \$1.98</b> 100% good. Truthfully, factory's don't count. Wide ass. of button-feedthru caps! BAMM YAKI 5000's! 1/4" dia. Wt. 1 lb. Cat.No. 9M3145	<b>BARREL KIT #118</b> <b>MINI SCRS</b> <b>50 for \$1.98</b> UNBELIEVABLE! TO-92 plastic SCRS in barrels... the famous CD4000 series. All voltages up thru 200. Dv. 9M3138	<b>BARREL KIT #119</b> <b>PRECISION RESISTORS</b> <b>100 for \$1.98</b> 100% good. 2 ozs. PHEPROM designed for printed circuit use. 100% good. Marked values 1 and 2% values. 9M3205	<b>BARREL KIT #126</b> <b>UPRIGHT ELECTROS</b> <b>40 for \$1.98</b> Wide ass. of values from 100 to 500mV in variety of voltages. 100% marked in good. Why barrelled? Cat. No. 9M3226	<b>BARREL KIT #127</b> <b>AXIAL ELECTROS</b> <b>40 for \$1.98</b> Truthfully the factories try to fool 'em in barrels! do all of us favor. BUY! Ass. capacitors and voltages. Cat. No. 9M3227
<b>BARREL KIT #128</b> <b>MINI DIP IC'S</b> <b>75 for \$1.98</b> Large mfg dumped 100's of lbs into barrels. Includes 741's, LM-380's, 702, 807, 812's, 555's... but who knows? Factory to you. All mixed. you test. Wt. 1 lb. Cat. No. 9M3248	<b>BARREL KIT #130</b> <b>CRYSTALS!</b> <b>12 for \$1.98</b> Large U.S. maker dumped frequency marked 100's of crystals in barrels. Some worth \$5. Precision. Many in 4 oz. case. 9M3250	<b>BARREL KIT #131</b> <b>TANTALUM ELECTROS</b> <b>30 for \$1.98</b> Mixed, marked prime, top grade ass. values, voltages. GE, Centralab, etc. Cat. No. 9M3255	<b>BARREL KIT #132</b> <b>C-MOS IC'S</b> <b>60 for \$1.98</b> Deliberately chosen in barrels, so we can't test 'em! The famous CD4000 series. How good? Who knows? Who cares? It's only 4 oz. Cat. No. 9M3257	<b>BARREL KIT #133</b> <b>CALCULATOR CHIPS</b> <b>15 for \$1.98</b> National type. Includes MC670's, etc. etc. They have discontinued these chips. PIND & DSE. In tested. Cat. No. 9M3258	<b>BARREL KIT #136</b> <b>KLIP IN DIODES</b> <b>50 for \$1.98</b> 100% good. 2 ozs. Snaps into fuse type cap holder. IN42 diodes. Metal ferrite type. No. 9M3261	<b>BARREL KIT #137</b> <b>OPYO SPECIAL</b> <b>25 for \$1.98</b> Untested. "Klippy-C-Thru's". New. Silver, infra-red led, photo darlington, photo transistors. 9M3262
<b>BARREL KIT #138</b> <b>PANEL SWITCHES</b> <b>30 for \$1.98</b> Did you hear of OAR? Another eqpt maker barrelled all types of rotating, electric, slides, etc. 9M3263	<b>BARREL KIT #142</b> <b>DARLINGTON TRANSISTORS</b> <b>40 for \$1.98</b> TO-92, a Motorola dump, unknown numbers, but big yield to good darlington. Resistors didn't get 'em! You will. 9M3265	<b>BARREL KIT #143</b> <b>75-PC TRANSISTORS</b> <b>\$1.98</b> 100% material. TO-92. Factory discounts. Includes pnp's mixed with apnp. 2N4400-1-2-3-4. Wet do you use, it's gud stuff. Cat. No. 9M3290	<b>BARREL KIT #144</b> <b>RCA PHONO PLUGS</b> <b>40 for \$1.98</b> 1,000,000 RCA phono plugs for this one. No hi-fi-ers know what they are. 100% material. Look at the price. 9M3293	Terms: Add postage. Rated: net 30 Phone: Wakefield, Mass. (617) 245-3829 Retail: 16-18 Del Carmine St., Wakefield, MASS. MINIMUM ORDER — \$6.00	<b>BARREL KIT #145</b> <b>MINI TRANSFORMER</b> <b>15 for \$1.98</b> Miniature transformer bank output, interlock and mid. Only 1/2" sq. Wt. 3 lbs. 9M2424	<b>BARREL KIT #147</b> <b>OVER-FLO FLUORESCENT NIXIES</b> <b>5 for \$1.98</b> Used originally in table top calculators. Brand new. Color package type, color Blue. Cat. No. 9M3224

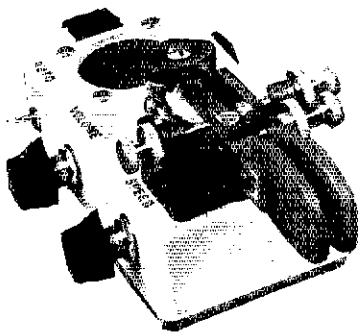
**POLY PAKS**  
 P.O. BOX 942W LYNNFIELD, MASS. 01940

G.O.D.'S MAY BE PREFERRED

Send for FREE Fall-Winter CATALOG

# NEW! IC KEYER

The World's Greatest Sending Device



Adjustable to Any Desired Speed

Now available from Palomar Engineers - the new Electronic IC KEYER. Highly prized by professional operators because it is EASIER, QUICKER, and MORE ACCURATE.

It transmits with amazing ease CLEAR, CLEAN-CUT signals at any desired speed. Saves the arm. Prevents cramp, and enables anyone to send with the skill of an expert.



SPECIAL RADIO MODEL

Equipped with large specially constructed contact points. Keys any amateur transmitter with ease. Sends Manual, Semi-Automatic, Full Automatic, Dot Memory, Squeeze, and Iambic - MORE FEATURES than any other keyer. Has built-in sidetone, speaker, speed and volume controls, BATTERY OPERATED, heavy shielded die-cast metal case. FULLY ADJUSTABLE contact spacing and paddle tension. The perfect paddle touch will AMAZE you.

Every amateur and licensed operator should know how to send with the IC KEYER. EASY TO LEARN. Sent anywhere on receipt of price. Free brochure sent on request.

Send check or money order. IC KEYER \$87.50 postpaid in U.S. and Canada. IC KEYER LESS PADDLE \$67.50. Add 6% sales tax in California.

Italy write i2VTT, P.O. Box 37, 22063 Cantu. Elsewhere send \$92.00 (U.S.) for IC KEYER or \$72.00 (U.S.) for IC KEYER LESS PADDLE for air parcel post delivery worldwide.

Fully guaranteed by the world's oldest manufacturer of electronic keys. ORDER YOURS NOW!

## PALOMAR ENGINEERS

BOX 455, ESCONDIDO, CA 92025

Phone: (714) 747-3343

TELETYPEWRITER parts, manuals, supplies, equipment. Toroids, S.a.s.e. for list. Typetronics, Box 8873, Ft. Lauderdale FL 33310. W4NYF. Buy parts, late machines.

TEFLON Stock. W9TFY Frank Wirt. Alpha IL 61413.

SERVICE by W9YKA, Professional grade lab, FCC commercial license. Amateur and commercial SSB-FM equipment. Repairs, calibration, modifications, consultation. Low overhead, reasonable rates. Write or call Robert J. Orwin, Communications Engineer, P.O. Box 1032, La Grange Park IL 60525. (312) 352-2333.

W2QNV - Wants your tubes - Will pay highest prices - (201)-279-7528.

RUBBER stamps \$2.50 includes postage. NJ residents add tax. Clinton Hoar, W2UDD, 32 Cumberland Ave., Verona NJ 07044.

WANTED: Radios, parts, books, magazines of the 1920s. W6ME, 417B Chasin St., Oceanside, CA, 92054.

MANUALS for ham gear before 1967. Large SASE for quote on specific manuals. W0JJK, HI-Inc., Box Q864, Council Bluffs, IA 51501.

RADIO Museum now open. Free admission. 15,000 pieces of equipment from 1850 telegraph instruments to amateur and commercial transmitters of the 1920's. Amateur station W2AN. Write for information: Antique Wireless Assn. Main St., Holcomb, NY 14469.

MOTOROLA HT220, HT200, Pagebox, etc. Service and modifications performed at reasonable rates. Hatfield, WA4FRV (804) 272-8403 evenings.

DESK console cabinet for your equipment. Build your own. Design drawings and photographs, \$4.75. Bill Morris, WA5RSC, P.O. Box 411, Lubbock TX 79408.

RADIO Books catalogs prior 1930 list \$1. Emporium, Box 19406 Dallas TX 75219.

TORIODS - Five 88MHz for \$3.50 P.P. M.L. Buchanan P.O. Box 74 Soquel CA 95073.

VERY interesting! Next 4 big issues \$1. Ham Trader Yellow Sheets, Sycamore IL 60178.

W6ME still looking for R-390A parts. Bob Herbig, 417B Chasin St., Oceanside CA 92054.

KEYBOARDS, for your microcomputer. I have a few of these new units left. See Advertisement in QST March 1976, Page 108. G. J. Layton, 680-2 Pond View Hgts, Rochester NY 14612.

WILL PAY \$100. for any Atwater Kent "breadboard" radio for my private collection. Parsons, 22 Forest St., Branford CT 06405, Tel. 203-488-4267.

HELP save our 450 MHz. frequencies through community based public service interactive educational ATV teaching electronics. Subscribe to LIMARC ATV Repeater Fund. Buy fluorescent bumper stickers promoting: "Friendship, Public Service, Technology through Amateur Radio" \$1 each, 6/8 Send to: LIMARC, c/o Ed Piller, W2KPK, 80 Birchwood Park Drive, Syosset NY 11791.

CALIBRATION & repair all receivers, transmitter, test equipments. DCS, 10 Schuyler Avenue No. Arlington NJ 07032 201-998-4256.

MUFFIN type fans - 4-11/16" x 4-11/16" x 1-1/2" 115V. 50/60 Hz, used, test ok, \$7.95 ea. postpaid. C. Taylor, Box 7324, Shawnee Mission Kansas 66207.

WILL pay \$150 for Heath SB-401. Bill Downs, KOMNA, 4805 Sullivan Wichita KS 67204. 316-838-5385.

FOR SALE: Swan Cynet 300B with 55-16B. Slinky dipole. Used only 40 hours. Best offer. Bob Tataronis 4 1/2 Hawthorne Ave., Methuen MA 01844.

LOOKING for used gear?? Buyers & Sellers has the equipment you want at the right prices. Call our Ham Gear Hotline: 617-536-8777, weekdays 9-5. SASE brings weekly list. Box 73, Boston Mass. 02215 (mailed Friday).

COLLINS 625-1 absolute mint condition, packed for export. \$800. Steve Kirschner 617-536-0657, 471 Commonwealth Ave. No. 8, Boston Mass. 02215.

WANTED: Tower 60' plus, crank up, tilt over. W2UGM, 415 Demarest, Closter, NJ 07624. 201-767-0123.

WANTED: SSB transmitter, receiver, (or transceiver), amplifier. Can be in non-working condition. W. Miller, 505 Roxbury, Ft. Wayne IN 46807.

CALCULATORS - T.I., H.P., Novus, and Corvus. Discount prices. Jerry Miel, 3395 S. Higuera No. 45, San Luis Obispo CA 93401.

HIGHEST prices paid for power tubes, 618T, 490T and related ground and aircraft radio equipment. Call station collect ask for Ted, W2KUW or Steve at Dames Communication Systems. 201-998-4246.

NEEDED - Manual for Model 26 teleprinter. Stan Brindle, WB3KQJ Box 11241, Newington CT 06111.

WANTED: Used ham equipment, all kinds. Send s.a.s.e. for quote WBSFXI.

MOUNTAIN Chalet 285 ft lakefront - 60 ft. New Rohn foldover tower - TH6DXX Beam - Ham M - 500 ft long wire over lake - 160-10AT Dentron Matchbox - 2000 sq. ft. living area - huge fireplace \$39,500. H.B. Yager Box 131 Cornellia GA 30531. Tel. 404-754-6130.

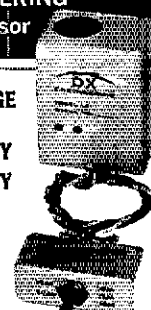
HEATH SB-100, SB-600, spkr & pwr, SB-610 monitor SB620 scanner, and SB-200 linear. 400Hz filter for cw only. Could reconvert. Excellent condition. \$350. Dave Learned, W8DFI, 164 Hlgman Park, Benton Harbor MI 49022. 616-926-8440.

BIRD Wattmeter, mint with assorted slugs, make offer. Drake TR-4 excellent condx. \$325. WA5VFK, Springfield, OH.

I can beat any quote you get on new Swan, Atlas, Ten-Tec, Lafayette. WB5FXI.

## YOU'VE SEEN THE MAGAZINE ARTICLES

Here's what you can expect from the DX ENGINEERING RF Speech Processor



- 6 db INCREASE IN AVERAGE POWER
- MAINTAINS VOICE QUALITY
- IMPROVES INTELLIGIBILITY
- NO CABLES OR BENCH SPACE REQUIRED
- EXCELLENT FOR PHONE PATCH
- NO ADDITIONAL ADJUSTMENTS - MIKE GAIN ADJUSTS CLIPPING LEVEL
- UNIQUE PLUG-IN UNIT - NO MODIFICATIONS REQUIRED



This is RF Envelope Clipping—the feature being used in new transmitter designs for amateur and military use.

Models Now Available  
Collins 32S, KWM-2 ..... \$ 98.50 ea.  
Drake TR-3, TR-4, TR-6, TR-4C,  
T-4, T-4X, T-4XB, T-4XC \$128.50 ea.  
Postpaid - Calif. Residents  
add 6% Tax

Watch for other models later!

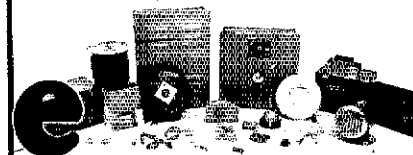
**DX Engineering**

1050 East Walnut, Pasadena, Calif. 91106

## TOMORROW SOMEONE MAY STEAL YOUR HAM RIG!

Well, what are you going to do about it? Now, you can install your own burglar or fire alarm system at a price you never dreamed possible. Our 1976 Alarm Catalog shows our full line of commercial security equipment. It has everything you need to produce a durable, custom installation - just as good as the professionals.

FREE CATALOG



**EML ELECTRONICS Dept. Q9**  
P.O. Box 146, Sheffield, Mass. 01257

## WIEP DX-QSL CENTER

Designed to efficiently process all your QSL cards to foreign QSL bureaus, QSL MGRS, or direct to DX stations, BY FIRST CLASS MAIL. Cost 5c each or 22 per dollar. PROMPT SHIPMENT GUARANTEED.

### SAFETY BELT AND LANYARDS

1. NYLON/NYLON S/B (NEW) ..... \$35.50 pp
2. NYLON/NYLON 5/B (USED) ..... \$33.50 pp
3. COTTON WEB S/B (USED) ..... \$25.50 pp
- New 1/2 inch nylon rope lanyard and one used snap supplied with above S/B.
- WAIST SIZE - Medium (34-42), Large (40-48).

### COLLINS MECHANICAL FILTER

Model F-455Z-1.0 Mechanical Filter, center frequency - 455 kHz, band width 1.0kHz 3dB. \$15.00 pp.  
LINK, 1081 ARON ST., COCOA, FLA. 32922





- ARRL HANDBOOK** The standard comprehensive manual of amateur radiocommunication. 53rd Ed.  
\$6.00 U.S. & Possessions, \$7.00 Canada, \$8.00 Elsewhere
- UNDERSTANDING AMATEUR RADIO** Written for the beginner — theory and how-to-build-it. 2nd Ed.  
\$4.00 U.S. & Possessions, \$4.50 Elsewhere
- VHF MANUAL** A new and thorough treatment of the amateur v.h.f. field. 3rd Ed.  
\$4.00 U.S. & Possessions, \$4.50 Elsewhere
- LICENSE MANUAL** Complete text of amateur regs, plus Q&A for amateur exams, 75th Ed.  
\$1.50
- TUNE IN THE WORLD WITH HAM RADIO** Everything the beginner needs to obtain the Novice license. Package includes easy-to-read, fully illustrated book, code practice cassette, and multi-colored WAS map. \$7.00
- A COURSE IN RADIO FUNDAMENTALS** For home study or classroom use. 5th Ed.  
\$3.00 U.S. & Possessions, \$3.50 Elsewhere
- LEARNING THE RADIO TELEGRAPH CODE** Based on the accepted method of sound conception. Covers the basics on up to high speed "copy" \$1.50
- ANTENNA BOOK** Theory and construction of antennas. 13th Ed.  
\$4.00 U.S. & Possessions, \$4.50 Elsewhere
- SINGLE SIDEBAND FOR THE RADIO AMATEUR** The best s.s.b. articles from QST. 5th Ed.  
\$3.00 U.S. & Possessions, \$3.50 Elsewhere
- FM AND REPEATERS FOR THE RADIO AMATEUR** For the fm buff. 1st Ed.  
\$4.00 U.S. & Possessions, \$4.50 Elsewhere
- HINTS AND KINKS** 300 practical ideas for your hamshack. Vol. 9  
\$2.00 U.S. & Possessions, \$2.50 Elsewhere
- ARRL HAM RADIO OPERATING GUIDE** Brand new! The techniques of operating your amateur station — DXing, ragchewing, traffic, emergencies, etc. 1st Ed.  
\$4.00 U.S. & Possessions, \$4.50 Elsewhere
- SPECIALIZED COMMUNICATIONS TECHNIQUES FOR THE RADIO AMATEUR** About ATV, SSTV, FAX, RTTY, Satellite Communication and advanced techniques. 1st Ed.  
\$3.00 U.S. & Possessions, \$3.50 Elsewhere
- ARRL ELECTRONICS DATA BOOK** 128 pages of useful tables, charts and diagrams. 1st Ed.  
\$4.00 U.S. & Possessions, \$4.50 Elsewhere

I would like these publications shipped to me postpaid. Ship to:

PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

NAME \_\_\_\_\_ CALL \_\_\_\_\_

STREET \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

Total enclosed or charge to MC or BAC Account: \$ \_\_\_\_\_

Charge to my: BankAmericard No. \_\_\_\_\_ Expires \_\_\_\_\_

Master Charge No. \_\_\_\_\_ Expires \_\_\_\_\_ Bank No. \_\_\_\_\_

**THE AMERICAN RADIO RELAY LEAGUE, 225 MAIN STREET, NEWINGTON, CT 06111**

# PALMER INDUSTRIES INTRODUCES THE NEW MODEL 52' TRISTAO SUPER MINI-MAST



Featuring an exclusive three-section, crank-up, self-supporting 52' mast with automatic brake winch. Constructed of high-strength steel tubing, designed to handle 9 to 10 sq. ft. of antenna and withstand winds of 50 to 60 MPH.

Only TRISTAO'S Mini-Mast features as an exclusive option, a rotor base assembly allowing rotor to be mounted at ground level for easy maintenance.

We offer a complete assortment of accessory bases and raising fixtures for the Mini-Mast.

**NORMALLY STOCKED  
FOR IMMEDIATE  
SHIPMENT**

**40' MODEL ALSO IN STOCK**

Call or write for **FREE** catalog covering all the other fine Tristao towers and masts.

**TRISTAO TOWER  
DIVISION**

**PALMER INDUSTRIES, INC.** Dept. QST  
3900 San Fernando Road Glendale, Calif. 91204

(213) 246-8333

TEFLON Stock, S.a.s.e. W9TFY, Frank Wirt, Alpha II 61413.

WANTED: Pre-1928 QST magazines, W6RVB, 529 Kevin Way, Placentia CA 92670.

WANTED: HO-13, W4GBB.

RUBBER Stamp, Name/call/QTH \$2.50 ppd. (CA residents add tax) LWM Press, Box 22161, San Diego, CA 92122.

STAINLESS and galvanized steel antenna guy wire our speciality. Wilcox Electronics, Box 1331, S.L.C., UT 84110.

WHOLESALE Prices — On Antenna Specialists, Mosley, Hy-Gain, Regency, Tempo products. S.a.s.e. brings quotation. Taled Electronics Pine Tree Hill Road, Newtown, CT 06470.

ICOM, Swan, KLM fm amps, CushCraft and Larsen. Call or write WONGS, Bob Smith Electronics, 1226 9th Ave., North, Fort Dodge IA 50501. 515-576-3886.

STANDARD RPT-1 Repeater with Hal ID-1 and Wacom Products duplexer. Now on 146.25/.85 and in perfect working condition. Will ship postpaid. \$1,000 K52CO 214-368-6258.

WANTED Collins 5151 and 2 kW Pep linear amplifier in good used condition. Send details to W5TPN, 3703 Washington Ave., Pascagoula MS 39567.

QUALITY Rubber Stamp with your call, name, address and zip. 4 lines only \$2.00 Ppd. Fast Service! IPC-T1 WN7DGB, Box 1251, Ogdon UT 84402.

MOBILE Ops. Tired of ignition noise? Please send \$3.44. for info on shielded ignition systems. Summit Enterprises, 20 Eider Street, Yarmouthport, MA 02675.

SALE: HP-400D VTVM \$40.; HP-212A \$40.; TS-510A \$250.; URM-250 \$175.; USM-24C \$65. Also receivers, components, tubes. Illustrated catalog 25c. E. French, P. O. Box 249, Aurora IL 60507.

WANTED — 1 or 2 BR apt. within 30 mile radius of Camden, NJ area for Elec. Tech. & wife needed Oct. 15. Want to set up ham station. Tom Howey, WB2IML, K-20 Fairways Apts., Blackwood, NJ 08012. 609-227-6609.

PROPAGATION Predictions made easy! New, proven development of a do-it-yourself DX forecaster tailored to your location and your equipment. For information send large S.A.S.E. Research Associates, Box 13237, Gainesville FL 32604.

160 and 80 meter top loading sections for short verticals. For information write Bill Turney WA9RFF, 1014 South Garfield, Junction City KS 66441.

MOVING to Massachusetts. WILF will find your new home with a perfect antenna location. 2 Ripley Lane, Weston MA 02195.

CIRCUIT Boards — Undrilled. Morse converter Oct. Nov. Dec. QST. MORSE/ASCII \$15, ASCII/TV \$10 postpaid USA. Send stamp for details. Bert Kelley, 2307 S. Clark Ave., Tampa FL 33609.

WANTED - HW202, HW12A, W2UGM, 415 Demarest Ave., Cloister NJ 07524. 201-767-0123.

JOHNSON Matchbook 375 watt excellent condition \$75.00 or trade for good rotor. WA7VRB. 503-882-3372.

YAESU OWNERS — Send a dollar (creditable towards dues) for August issue of Newsletter containing detailed chart of US replacements for FT-101 transistors. Or join up and get all 1976 Newsletters plus savings via our Purchasing Service. Still only \$5. International Fox-Tango Club, 248 Lake Dora Drive, W. Palm Beach FL 33411.

KWM-2 Mint, Waters Rejection tuning, DX engineering processor, 516-F2 supply, \$850. 312B-4 Station Console (Round) \$200. Henry 2K-3 \$650. Pick-up only. Drake 2C, \$150. J. M. Hoffer, W1DL, 24 Cherry Road, Framingham, MA 01701. 617-872-5084.

HT-41, SX101A, HT37 mint condition \$750 takes all. Panzeca, 11 Blacksmith La. East Northport, LI NY 11731.

WANTED: To correspond with someone who uses a Knight-kit 83V2945 dual trace lab scope to compare problems. O.W.H. Johnson, W1JV, Box 63, Bristol, RI 03222.

RETIRING in Arizona???? Super ham location. 5.63 acres, top neighborhood, 25 minutes to center of Tucson, Tri-Ex LM 470D motorized 71 crank-up with KLM 20 Meter Big Stick, 3 bdrm + den, 2 1/2 bath, beam ceilings, large patio, pool, \$69,900. W7UR. Tel 602-886-1702.

HALICRAFTERS SR400 with power supply. Mint condition. \$580. Barry Forrest—WA2B1T, 347 Beach 43 Street, Far Rockaway NY 11691. Tel. 212-327-4952.

WANTED a model L x L-One Hammarlund Linear also external VFO. WNBVDG, Tipton MI 49287.

WANTED: SBE — SBI-LA Linear amp. M.W. McMillan W4PNO Rt. 5 Box 54 Decatur, AL 35601.

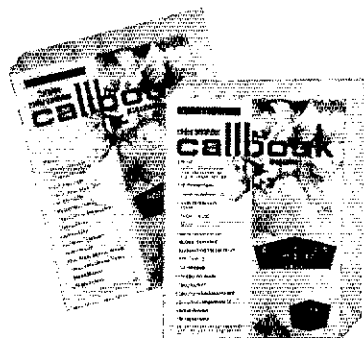
SELL — Model 15 teletype printer, \$60. "Hal" 51-5 RTTY demodulator, \$30, HW-202 2-meter xcvr, \$150. WA2SHR, 25 Villa Place, Eatontown NJ 07724. 201-542-7053.

WANTED: A and E coils for HRO-7. W51B, 910 Clearview, San Antonio TX 78228.

SELL: TH3-MKIII Triband yagi with balun \$125, pickup. K2ARO. 914-229-5760.

CE200V and 75A4. Both good with manuals, relays and connecting cables. \$600. Pick up only. Rotunno, WA2CKM 1816 Parkview Bronx NY 10461.

ADJUSTABLE Universal time conversion calculator \$1.00 ppd. Charles 5809 Hefner Village Circle Oklahoma City 73132.



There's nothing like it!

RADIO AMATEUR  
**callbook**

Respected worldwide as  
the only complete authority  
for radio amateur  
QSL and QTH information.

The U. S. Callbook has nearly 300,000 W & K listings. It lists calls, license classes, names and addresses plus the many valuable back-up charts and references you come to expect from the Callbook.

Specialize in DX? Then you're looking for the Foreign Callbook with almost 235,000 calls, names and addresses of amateurs outside of the USA.

Order from your favorite electronics dealer or write direct for your free catalog to:

RADIO AMATEUR  
**callbook** INC.  
Dept. A 925 Sherwood Drive  
Lake Bluff, Ill. 60044

## CQ de W2KUW

Highest price for 41AT T/R or 490T antenna tuning unit. Any Collins air, ground or Military or Commercial item wanted.

FOR SALE:

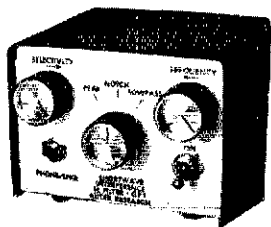
Gates HFL 2500 2-30 MHz 4 CX3000A.....	Special
Collins 30L 1 linear.....	Special
Collins 5151A Excellent.....	975.00
Collins PM2 P/S.....	79.50
Collins MP1 DC Supply.....	79.50
Collins Crystal Pack CP-1.....	Special
Collins KWM2A.....	Special
Collins 31J4 excellent cond.....	645.00
Collins 30S1 linear.....	Special
Collins 5151.....	Special
Collins 516F2 115 v.p.s.....	129.50
Collins 516E2 28 v.p.s.....	89.50
Collins 312-B5 New boxed.....	Special
Collins 399C1 5-Line vfo console.....	Special
Heath VHF-1 Seneca 4-M Xmtr.....	Special
National NCL 2000 Linear, as new.....	Special
R390A Excellent overhauled, cal.....	695.00 to 895.00
R390A, new.....	1150.00

Power Designs P/S Reg. Volt.  
Current Ltd. 15 V 10 Amp. .... 99.50  
Measurements Model 80 sig. gen. oh. & cal. .... 345.00  
G.E. Porta-mobile, like new with chargers .... 350.00  
Bonton test items available. Call for quote.  
H/P Model 400L VTVM ..... 125.00  
H/P 608D TS 510A Sign Gen., Cal. Exc. .... 595.00  
H/P 608C 10-480 MHz Excellent & cal. .... 795.00  
H/P 604A 50kHz-65 MHz Excellent & cal. .... Special  
H/P 410B vtvm ..... 125.00  
R.F. Comm. series 4500 uhf transceiver .... 395.00  
Eimac 8877s, new boxed..... 175.00  
News Clark 1302A 53-260 MHz ..... Special  
SP-400-JX17 Overhauled & cal. .... 325.00  
Tek 541A 33 MHz Scope, excellent ..... 395.00  
Tek 545 33 MHz Scope, excellent ..... 395.00  
Tek 453 portable scope ..... 1195.00  
Tek 544B portable scope ..... 1195.00  
Tek 575 curve tracer ..... 595.00  
Acme P/S 24V Solid State, new ..... 39.50  
Galaxy 530 Receiver (overhauled) ..... 625.00

**LOWEST PRICES ON NEW EIMAC TUBES**  
(This is a partial listing of hundreds of test items available. Write for specific requirements. We will buy for cash any tube, transceiver, receiver, or test gear at 5% over prevailing market price. 3047L 4-45A, 4-250, 4-400, etc. Eimac or Varian tubes wanted)

**The Ted Dames Company**  
308 Hickory Street, Arlington, N.J. 07032  
(201) 998-4246, Eves. (201) 998-6475

**New! The Finest Communications Filter Available**



**FOR ALL MODES!**

AT LAST! An "infinitely-variable" active audio filter for operators who demand the best reception in all modes. • Adjust its frequency CONTINUOUSLY from 250 to 2500 Hz in all 3 positions. Instantly zero-in on signals or optimize response! • Peak CW, voice, etc. with selectivity variable from a super-narrow 50 Hz to flat! • Reject whistles, CW, etc. with a deep, adjustable-width notch. • Reject SSB, AM, FM hiss and splatter in the sharp-cutoff lowpass position. • Don't confuse the QF-1 with simple designs. It has 80 dB skirts, notch to 70 dB, 8 IC op amps and a 1 watt spkr. amp. No batteries to replace. Just plug into your phone jack! Ready to improve your Yaesu, Collins, Swan, Drake, S/1, Tempo, Atlas, Kenwood, etc.—any rcvr or xcvr made!

Model QF-1 "The Finest" 115 VAC. 5x4x3 1/2". \$52.95

Model QF-2. Basic filter board less pwr. amp., etc. 6 to 30 VDC. Install in rcvr. Instructions \$32.95

SHIPPING: Add \$1.70 in U.S., \$2.70 in Canada. Add 10% outside N. Amer. (Airmailed), 1 yr warranty.

FREE BROCHURE AVAILABLE

AUTEK RESEARCH  
BOX 5127 E, SHERMAN OAKS, CA. 91403

**HW-202 OWNERS**



**NOW HEAR MORE OF WHAT IS HAPPENING. ADD A SCANNER TO YOUR HW-202.**

- SIX LED'S VISIBLE FROM FRONT WITH NO HOLES TO DRILL
- EASY TO INSTALL - ONLY TWO COLOR-CODED WIRES TO CONNECT
- NO WIRES TO CUT
- AUTOMATICALLY STOPS SCANNING EITHER WHEN SIGNAL IS RECEIVED, OR YOU MAKE PUSH-BUTTON SELECTION
- DOESN'T INTERFERE WITH NORMAL OPERATION
- COMPLETELY ASSEMBLED, TESTED AND GUARANTEED.

**ONLY \$24.95 PLUS \$1.00 SHIPPING**

Georgia Residents add 3% Sales Tax.

**DESIGNED BY WB4QDB/LARRY SANDLIN**

**SANDLIN ELECTRONICS ENGINEERING**

P. O. BOX 4909  
MARTINEZ, GEORGIA 30907  
TELEPHONE (404) 863-5852

FOR SALE: Heath Model 0-12 Oscilloscope price \$45. K3YKM. Phone 215-446-2337.

ARTS National Emergency and Traffic Frequency 7103 kHz monitored daily 1300Z to 1900Z. Call CQ ARTS on frequency and monitoring station will answer and move off frequency with you and take your traffic. All amateurs welcome. Amateur Radio Telegraph Society, 2730 South Tabor Ave., Silver City, NM 88061.

WILL Sell Heath: SB102, matching speaker, cw filter, homebrew AC pwr supply, \$380. SB650 display, \$120. SB500 Two meter xcvr, \$129. All vrv condx. WA2DTI, 210 Utica, Tonawanda NY 14150. 716-692-5451.

SALE or Trade - EMC 450 watt guitar amp. W/8-12 inch speakers. Excellent condition. Has mike mixer for PA use. Covers. Cost \$1200. and used 3 months. \$500. or will trade for ham gear of like value. Sam Moore, WBSKOD, Stigler OK 918-967-2034.

QUAD Kits from \$15. to \$27. Send s.a.s.e. for information. WAC, 404 Sanders Rd. SW, Huntsville, Ala. 35802.

QST - Wanted Mint years 33, 34, 35, State price. W8NN. 1006 Ashford Parkway, Houston TX 77077.

FT-101-E New condition \$600. With fan and cw filter \$625. W2ABE.

WANTED: Issues of QST Magazine from 1916. ARRL Handbook fifth edition. Ed Kalin WA1JZC. 75 Tumblebrook Lane, West Hartford CT 06117 203-233-9915.

NAT'L rec. 1 to 10 meters, never used. SW3 with coils best offer. W2BWU, 201-757-6765.

(4) Solar capacitors type JW200 .25MFD 20,000V DC (1) Westinghouse type EP.5 - .5 MFD 7,500V DC, all oil filled. Best offer. W2BWU, 201-757-6765.

WANTED: Hallcrafters Porta-mon CRX102 and CRX101. Billy Mobray, Keyes OK 73947.

COLLINS All mint Round Emblem 75S3C 14 months old new condx. \$995., 75S3C mint 5 years \$895., 3253 \$895., 516FZ \$165., Drake 2B \$150. 2BQ \$29., 2AC \$10. Just overhauled by Drake. Call evenings Lou Goetz, W2JHB, 4 Penn Drive Delran, New Jersey, 08075. 609-461-6191.

TS-520 - \$550. TS-700 - \$600. New Cond. Jerry Holmes, 17 Highfield La, Madison CT 06443.

SELL: Heath SB-230 linear. Perfect condition, less than 10 hours use. \$325. Phil Parke 12305 N. W. 5th Ave. Miami FL 33168. 305-681-1914.

WANTED - Heath SB-10 and Hammarlund HXL-I linear or similar full legal limit linear amplifier. Good working condition and complete manuals required. C. D. Ehinger, W8NPC, Box 57, Stanley KS 66223.

HEATH SB303 receiver/ssb, cw, am, filters, manual, test boards, excellent \$269. SB600 speaker \$14. F.O.B. Joe Harms, 905 Fernald, Edgewater FL 32032.

WANTED: 40' - 50' aluminum free stand tower. W2KIR, 201-697-5218.

SELL: J rotary dipole Mosley TA31 used very little 10-15-20 meters full length when assembled 24 ft. with diagram, clean, C.D.E. rotator AR 33, 100 ft. cable with control box, rotary guv ring all \$45. you ship. K21BZ, 243 Senator St., Bklyn NY 11220.

SELL EBC-144JR, Clegg 031 115VAC/12VDC PS, 5/8 wavelength mobile ant., 4-6i Cushcraft beam \$500. M. J. Fein, Box 307, Scarborough NY 10510. 914-762-4343.

SALE: Mini-products HQ-1 antenna, totor & 15' mast with thrust bearing & balun \$95., no shipping. WA3ZLM, 2100 Sherwood, Havre De Grace MD 21078.

KWM2, 516F2, 312B3 \$725. 312B4 \$135, 30LI \$350. Mint plus. WA5OXK 504-394-8851 nite, 367-8649 days.

WANTED, large hvy duty, oil filled, filter caps. State ut, volts, dem., price. Williams, P.O. Box 136, Greenville, SC 29602.

TRADE or sell mint 70 mm Camerz Classic professional camera with 127 mm matched lens, 100 foot electric magazine, negative numbering device and foam padded carrying case. Set of 3 photogenic lights with stands, powerpack and carrying case. Want Collins, Drake, Kenwood or Yaesu station. John KATNE, Columbus OH 614-846-6026.

GLOBE King 500A (reconditioned) \$195, DX-60 \$65, HG-10 vfo \$45, Heath GP-91 general coverage receiver \$15. HD-11 G-multiplier \$10. SE 30-watt Pre-Progress for 94-simplex \$45 Alan Wilcox, WB4KRE, 804-296-0945.

SB401/SB303 w/cw SB600 - 1-1/2 years old. Very nice. I paid shipping. Joe WB9ALF 314-427-6698.

SELLING everything, fast, convenient: R-4E, T-4XB, Magnum, SB-200, Wattmeter, Robot SSTV, Oscilloscope, tower, rotator, Monobanders. 144 Sonar transceiver. Accessories. WB2AQC.

SB650 6 intr xcvr SSB synthesized P.I.T. N.B. & Squelch 20W solid state with PS \$300. Edw. Miller, 1449 Bklyn. Blvd., Bayshore 11706 LI NY.

USB LSB Mod kit for Echo-II never used \$12. Drake 2nd excellent condx \$100. HW-7 w/ps \$50. HG-10 vfo \$20. WA1POJ, 46 Broad St., Warren RI 02885.

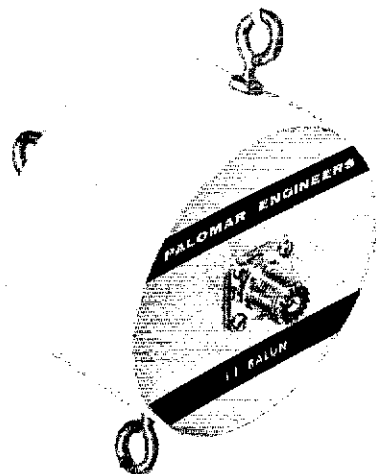
KIRK - 3-element 40-meter beam unused in original carton \$450. Wanted Trylon rotor in any condition F.P. Heinemann W1YG.

FOR SALE - Equipment to rebuild large vacuum tubes - picture tubes. Paul Hermanson R.R. 1 Chassel MI 49916.

ATLAS, Motorola FM and SSB Marine Radio. Motorola Pagers bought and sold. W5BCC, Ralph Hicks, P. O. Box 15633 Tulsa OK 74112. 918-266-2525.

**5 KW PEP INPUT**

WITH THIS NEW BALUN



on all bands 160 to 10 meters. Runs cool as a cucumber at its CCS rating of 2 KW (Continuous output power through the balun at matched load). 4" dia. Wt. 24 oz. \$32.50 PPD.

AND FOR FULL LEGAL POWER

the time tested Model 1K balun is still available. Rated at 1 KW CCS (3 KW PEP input). 2 1/4" dia. Wt. 9 oz. \$16.95 PPD.

ONLY PALOMAR BALUNS HAVE ALL THESE FEATURES

- Toroidal core for highest efficiency.
- Teflon insulated wire to prevent arc-over. OK for tuned feeders.
- Stainless steel eyebolts take antenna tension. Won't rust, won't pull apart.
- Epoxy filled case. Absolutely waterproof.
- Lightning protection built-in.
- Wideband 1.7 to 30 MHz.
- Hang-up hook provided.
- Now available in either 1:1 or 4:1 ratio. 1:1 ratio matches 50 or 75 ohm coax to 50 or 75 ohm balanced load (dipoles and inverted Vees). 4:1 ratio matches 50 or 75 ohm coax to 200 to 300 ohm balanced load.

Free descriptive brochure on request. Order direct.

Model 2K \$32.50 Model 1K \$16.95  
Center insulator without balun \$7.95  
Postpaid U.S. & Canada.  
Specify ratio 1:1 or 4:1  
California residents add 6% tax.  
Send check or money order to:

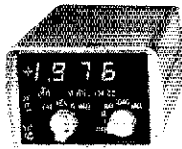
**PALOMAR ENGINEERS**

BOX 455, ESCONDIDO, CA 92025

Phone: (714) 747-3343

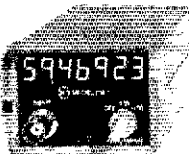
# NEW

## Battery and AC Operated...



**NLS LM - 3.5/LH Multimeter**  
3 1/2 digit .05% accuracy. Includes NiCad batteries, charger and tilt stand. price .... \$150.00

**NLS FM-7 Frequency Counter**  
60 MHz, 7 digit, TCXO, includes NiCad batteries and charger. price .... \$195.00



### A COMPLETE LINE OF ELECTRONIC TEST EQUIPMENT AVAILABLE



**The Instrument Mart**

330 Great Neck Road, Great Neck NY 11021

call or write  
(516) 487-7430  
for new catalog

**NEW from NRI**

## Home training in AMATEUR RADIO

NRI, leader in Communications, Television, Electronics and TV-Radio home-training, now offers the first in Amateur Radio courses, designed to prepare you for the FCC Amateur License you want or need.

### Don't lose your favorite frequency

The FCC has said "either-or" on licensing, but to pass Advanced and Extra Class exams, you need the technical guidance as offered by NRI. NRI Advanced Amateur Radio is for the ham who already has a General, Conditional or Tech Class ticket. Basic Amateur Radio is for the beginner and includes transmitter, 3-band receiver, code practice equipment. Three training plans offered. Get all the facts. Mail coupon. No obligation. No salesman will call on you. NATIONAL RADIO INSTITUTE, Washington, D.C. 20016.



**MAIL NOW**

NATIONAL RADIO INSTITUTE 50-076  
Washington, D.C. 20016

Please send me information on Amateur Radio training.

Name \_\_\_\_\_ Age \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

ACCREDITED MEMBER NATIONAL HOME STUDY COUNCIL

SELL Atlas 180, deluxe AC supply, deluxe mobile mount. All latest factory mods. Perfect except slight scratch top cabinet. Mobile one time. Package \$550. Dr. Jack Robinson, Box 466 Creston IA 50801.

WANTED - Collins 55G-1 Preselector at right price. Norman Swayne, W3AOL 815 W. 15th St., Tyrone PA 16686.

SELLING out SW-3 160 to 10 BS coils. FB7X with PS. QST from 1935. Some older. Also 73 and CQ. Several Antique pieces, transformers, type 3 dials, books. Hand wind antique code tape machine made for N.R.I. Meters and parts galore. Everything goes. Make offer on Lot. Pick up. Bud, 413-567-8623 anytime.

SELL: Drake T4XB, R4-B 10-160, AC-4 supply, MS-4 speaker, low pass filter, mint. Johnson 250W. match box, Jones Micro-Match, Heath IG-42 signal generator, with R.F., probe, I1-12 signal tracer. S.a.s.e. Dr. M.J. Billings Apt. No. 918 3800-South Ocean Drive Hollywood FL 33019.

COLLINS 7551 with Waters Rejection \$325. CE100V deluxe transmitter \$350. Hat S-6 \$125. All units in excellent condition. K7PHH 801-561-4430, 438 Roosevelt St., Midvale UT 84047.

FOR SALE: Collins KWM-2. 516/F2 AC supply. Mint condition, manual. Certified check, boxed, prepaid, continental U.S. \$250. Hoff U1-4 \$125. All units in excellent condition. K7PHH 801-561-4430, 438 Roosevelt St., Midvale UT 84047.

DRAKE TR-4, \$395; MS-4, \$15; AC-4, \$75; or all for \$75 prepaid. Late, Mint. K5YVI, 405-262-6303.

TSS20 - Brand new with cw filter \$600. 32S1, 75S1, 516F2. Mint. \$750. Wanted: Tylon rotor any condition. F.P. Heinemann, W1YG, Lyme, CT 06371.

WANTED: Heathkit Model VF-1 vfo, name price call collect 812-829-3446 or write Schneider, R 2, Box 79, Spencer Ind 47460.

COLLINS 30L1 Linear (new) never been plugged in, \$450. 32S-1 with 516F2 power supply DX Engineering Speech Processor complete \$450. (mint) Charles F. Lawhorn K8GWM 583 Johnson Rd Chillicothe OH 45601.

SELL: Lafayette HA-800B rcvr. 80 thru 6 mtrs. New condition. Best offer. H. Neylon 2135 Hassell Rd Hoffman Estates IL 60195.

DRAKE 2C & 2NT. Mint condition. \$215. Greenwood, Tel. 213-838-8190.

QRP - Heathkit HW-7 3-watt cw transceiver. Excellent condition. \$60 Write Jeff Moore, WABREN.

SELL HRO-60 with 4 coils, \$130. HQ-215 for \$215. You pay shipping. K9UKX 51625 Chestnut Road Granger In 46530.

BUY-Sell-Trade. Write for freemailer. Give name address and call letters. Complete stock of major brands. New and reconditioned. Call for best deals. We buy Collins, Drake, Swan, etc. sb & fm. Associated Radio 8012 Conser, Overland Park KS 66204. 913-381-5901.

DRAKE MS-4 and AC-3, Mint; \$80 FOB K5YVI. 405-262-6303.

FOR SALE: 50 years of QST 1924 to 1974. First best offer. S.a.s.e. please. W9EIK Route 2 Box 84 Wausau Wis. 54401.

KWM-2A S/N 30,000 recent overhaul by Collins with PM-2 Power Supply, MP-1 Crystal Pack 3-30 MHz. EV-664 Dynamic mike, Linear Systems 12VDC supply, New 312B-5 Console, noise blander, \$1700 firm. W9NTM, Jim Bennett, P.O. Box 372 Crystal Lake IL 60014. 815-455-0460.

HEATH SB-200 - Mint. \$200. W9NTM, Jim Bennett, P.O. Box 372, Crystal Lake IL 60014. 815-455-0460.

HALLICRAFTERS - 5X101A receiver for sale - good condition - \$100 plus shipping; WN3YIB, RDI Box 12, Jersey Shore PA 17740.

SB220A \$300. SB500 \$150. SB600/HP23A \$50. Mint Condition NC300 \$100 very good. WA2HRE, 914-223-5903, Rte 2, LaGrangeville NY 12540.

QST - 1953-1975 - 5 binders - W8TKZ Ludlow 830 W. 29th St., Lorain OH 44052.

TEKTRONIX 545A Scope with Type-CA Dual Trace plug-in. Mint condition. WB2GKF Stan Nazimek, 506 Mount Prospect Ave., Clifton NJ 07012. 201-474-4769.

DON and Bob New guaranteed buys. Hygain TH6DXX 192.00; 204BA 44.00; TH3MK3 160.00; Mosley classic 33 179.00; TA33 168.00; CDE HAM2 129.00; CD44 104.00; Belden 8 wire rotor cable 8448 14c/ft; KLM rotor 99.00; Belden 8214RG8FOAM 23c/ft; 8237 RG8 19c/ft; Amphenol PL259 99c; Dentron amplifier. Quote TS620; TS820; Atlas 210; Tempo 3020; 15c off lot. Tri-Stat. MW series Raytheon 811A. New, sealed, 15.00 pair; Kenwood TS700A; 18AVT/WB Plus 100ft. RG8Coax 100.00; Phosphor Bronze 22GA/75TD. Longwire 2.50/1000ft.; 18HT Hytower 218.00; Midland 13505 30W/2MFM 250.00; Collins. Prices FOB Houston. Good until Sept. 30. Madison Electronics, Houston, Texas 77002. 713-658-0268. Nite 713-497-5683. 713-497-5683.

RTTY - NS-1A PLL TU (Ham Radio 8/76) FSK/AFSK, wired/tested \$29.95 ppd Board \$4.75 ppd. S.a.s.e. for info. Nat Stinnette Electronics, Tavares FL 32778.

SELL New unopened carton, Tempo One with a.c. supply \$440. or will take in trade Swan VHF 150 amplifier or HQ180 receiver. Also Kenwood TS-700A 2-meter transceiver in unopened carton will take in trade Yaesu FT-101-B, EX or E, Kenwood TS-520 or 2KW amplifier Richard Schark 417 North Ferry, Ottumwa IA 52501. Tel. 515-682-5741.

FOR SALE: Ten-Tec PM3A 20 and 40 meters, 5 watts, break-in; \$59. - will deliver nearby. WB2OLQ, Dan Moses, 88 Round Hill Road, Armonk NY 10504.

SELL: Galaxy III good cond. with AC and DC supplies. \$180. W9ATS 901 Allen, Greenville IL 62246.

## ALDELCO SEMI-CONDUCTOR SUPERMARKET

**RF DEVICES**

2N3375 3W 400 MHz	5.50	2N6080 4W 175 MHz	5.40
2N3866 1W 400 MHz	.99	2N6081 15W 175 MHz	8.45
2N5589 3W175 MHz	4.78	2N6082 25W 175 MHz	10.95
2N5590 10W 175 MHz	7.70	2N6083 30W 175 MHz	12.30
2N5591 25W 175 MHz	10.95	2N6084 40W 175 MHz	16.30

**HEAVY DUTY RECTIFIERS**

200 Volt 100 Amp D08	.....	3.50
200 Volt 250 Amp D09	.....	12.50
400 Volt 2 Amp Silicon Rectifier RCA	.....	15 for .99
1000 Volt 2 Amp Silicon Rectifier RCA	.....	10 for .99
10,000 Volt Silicon Rectifier Erie	65 MA.	2.95

**ALDELCO KITS**

Digital Clock Kit, Hours Minutes & Seconds. Large Half Inch LED readouts. Elapsed time indicator. 12 Hour format with 24 hour alarm. Snooze feature, AM, pm indicator, power supply, power failure indicator. Complete with wood grain cabinet. \$23.95

**LOGIC PROBE KIT, LED Indicators** \$14.95

**LEDS**

Jumbo Reds, Long or Short bulbs	.....	6 for \$1.00
Jumbo Orange, Green, Clear Red or Green	5 for \$1.00	
209 Series, Green, Orange, Yellow or Red	.....	5 for \$1.00
RL2 Micro Red	.....	5 for \$1.00

**ZENERS**

1N746 to 1N759 400 Mw ea.	.25	1N4728 to 1N4764 1w.	.35
10 assorted zener diodes unmarked	.....	1.98	

TC106B SCR	.....	\$ .65	TTL's	
MPSA1AA	.....	.90	7400	.....
2N3055	.....	.99	7401	.....
MPF102 FET	.....	.45	7403	.....
2N3904 or 2N3906	10 for .99		7404	.....
2N5496 or 2N6108	.....	.40	7405	.....
FT10401 FET	.....	.99	7406	.....
40673 RCA FET	.....	1.55	7407	.....
741 or 709 14 Pin DIP	.....	.25	7411	.....
555 Timer	.....	.75	7413	.....
556 Dual 555	.....	1.75	7430	.....
200 Volt 25 Amp Bridge	1.00		7437	.....
1N 914 - 1N4148	10 for .99		7442	.....
1N34 - 1N60 - 1N64	10 for .99		7443	.....

we have others

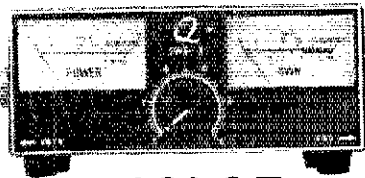
We quote on any device at any quantity. All items postpaid. \$5.00 min. order. Send stamp for catalog. NYS add tax.

# ALDELCO

2281 BABYLON TURNPIKE MERRICK, N.Y. 11564  
(516) 378-4555

## THE NEW, IMPROVED

### 'ORIGINAL BRIDGE'!



**\$21.95**

(ADD \$1.50 FOR POSTAGE)

**Reads forward power and SWR simultaneously. Handles full legal limit. Usable 3 thru 150 Mhz. Small enough for mobile use.**



**Quement Electronics**  
1000 So. Bascom Ave.  
San Jose, Ca 95128  
CALIFORNIA RESIDENTS ADD SALES TAX

## BRAND NEW COAX CABLE

- RG-8/U, 95% Shield Coverage,  
**\$20.00/100 ft.**
- RG-8A/U, 95% Shield Coverage,  
**\$21.00/100 ft.**
- "TIMES WIRE" RG-8/U Foam  
**\$23.00/100 ft.**
- "TIMES WIRE" FM-8  
**\$25.00/100 ft.**
- "TIMES WIRE" MIL TYPE  
RG-213/U, **\$26.00/100 ft.**
- "TIMES WIRE" RG-11A/U,  
**\$19.00/100 ft.**
- RG-58A-U/MIL TYPE  
**\$8.00/100 ft.**

**SATISFACTION GUARANTEED!  
GUARANTEED FRESH! NOT SURPLUS.**

COAX shipping—\$2.20/100 ft. anywhere in U.S.A.  
Continuous lengths up to 300 ft. available.

Antenna Wire #12 Solid base, \$6.60/100 ft.  
"Amphenol" Connectors—PL259 @ 63¢; SO239 @  
61¢; PL258 @ \$1.08; UG-175/U @ 21¢; UG-88/U  
@ 84¢; UG-1094/U @ 68¢

Connector shipping, up to 30 connectors any mx.  
\$1.20 anywhere in U.S.A. Mass. only 3% tax.

**E. D. Pinkham Enterprises Inc.**  
379 Pond St., Franklin, Mass. 02038  
TEL. (617) 528-6600

SELL — Drake R4B w/9.5-10 MHz xtal \$320, D104C  
mic w/stand \$30, W2HCA P. Francon RD 2 Hoffman  
Dr, Califon NJ 07830, 201-832-2371.

WOULD appreciate skeds on 160 meters with  
Vermont, Maine, and Alaska to finish my WAS.  
WASLTQ, 301 Sundown El Paso TX 79912.

SELL — Like New — Drake 2-C covr, 2-CQ-4prk-Q  
inult., \$195 W. E. Strack WA2RRB, R.D. No. 3,  
Cazenovia NY 13035.

SELL one Realistic solid state 23 channel am/ssh cb  
transceiver model TRC-47 mint \$185. One Realistic  
Petroleum-9 am/fm/sw2/vhf-lw-hi/uhf/aircraft bands  
receiver external/buitt antenna good, \$80. Hamid  
Ahmad Khan, P. O. Box 500, New York NY 10005.  
212-476-1889.

SELL QST's \$6. per year 1948, 1954 thru 1975  
complete. Also many single issues 1925 thru 1953.  
Send s.a.s.e. for list W2HNJ, 62 Gates Ave., Malverne  
NY 11565.

CLEANING Mouse Hammarlund HQ-145X like new  
with spkr and manual \$190. Ameco 2 mtr converter  
\$10. Hy-Gain 3 elem 2 mtr. beam \$15. BC-459 TX  
converted and TVI proffed \$20. Lots of other  
converted surplus gear plus large assortment of  
transformers, tubes, resistors, capacitors, etc. Send  
s.a.s.e. for list W2HNJ, 62 Gates Ave., Malverne NY  
11565 516-887-4346.

DRAKE TC2 \$395. TC6 \$275. SC2 \$75. SC6 \$60.  
CCI \$30. P & H 6-150 6M transverter \$120. Swan TV2  
\$160. Gonset Comm-3 6M \$45. Clegg 99 \$45. Wanted  
Drake TR3 TR4 KWMZ and accessories. W2FNT, 18  
Hillcrest Ter, Linden NJ 07036, 201-486-6917.

TELETYPE Model 19 with extra printing unit \$150.  
Model 14 typing reperf \$50. W2PAT converter \$25.  
Send B.O. with check. Pick up only. Hank Hunt, 6  
Pine Tree La, Glastonbury CT 06033.

SIMPSON R. F. Ammeters, new. 40% off list. Good  
selection. Write for list, Bill Conwell 62 Colchester  
Rd., New Providence, NJ 07974.

DISCOURAGE theft or unauthorized use of your  
2-meter rig. Attractive label identifies your rig as  
amateur equipment. Send \$1. plus s.a.s.e. for 2 labels  
to Conwill, Box 12297, Parkville MO 64152.

HY-GAIN 203BA 3el 20-meter beam with balun \$90.  
Pick up only, WA1EVX/2 Union NJ 201-687-3518.

RESISTORS 1/2 watt 5% Tol. 100 different values from  
10 to 10 megohm \$3. s.a.s.e. brings catalog. NuData  
Electronics, 104 N. Emerson St., Mount Prospect IL  
60056.

SB200 \$189; Drake 2B with X-tal calibrator, and 2BQ  
\$175; Drake WA wattmeter \$50; HW32, HP23 and  
HP13 \$100. HW32 requires slight work in transmitter  
section. K3PSU 2571 Saddle Drive, Lancaster PA  
17601, 717-569-3081.

ORD Digital Keyer DK-1 (new) and Hills FYD Paddle  
(mint). Both \$100. W4AX, Route 4 Box 71, Glen  
Allen VA 23060.

SELL: All Round Emblem KWM2-5925, 516F2 spkr  
\$145, COI xtal pack \$190, MPI-DC supply \$75.  
Regency Scanner 16 channel — 3 band — all xtals cost  
over \$300, only \$165. Call Marty 215-894-6101,  
WA3IFQ.

WANTED: 312B5 and 312B4, sell accu keyer with  
paddles \$65, call Marty 215-894-6010, WA3IFQ.

HEATH HW-12A, \$85. HP-23B, \$55. HP-13B, \$60.  
HS-24, \$6. Webster WWW-D Mobile antenna with  
80-meter coil, \$30. WA1EVX/2, 201-687-3518.

RTTY/Computer terminal 100wpm Kleinschmidt  
Baudot keyboard/printer and paper tape reader/punch  
with complete tech manual. \$200 plus shipping.  
WA4FAY/5 phone 713-833-2237.

## 2 METER CRYSTALS IN STOCK

FOR THESE RADIOS ON  
STANDARD ARRL REPEATER  
FREQUENCIES

Drake TR-22  
Kenwood TR-2200  
Genave  
Icom/VHF Eng.  
Ken/Wilson  
Regency HR-2A/HR212/  
Regency HR-2B  
S.B.E.

Standard 146/826  
Standard Horizon  
Clegg HT-146  
Temp FMH  
Lafayette HA-146  
Midland 13-505  
Heathkit HW-2021  
Heathkit HW-202

Send for free frequency Dept.  
list and order blank to: 30976

**KENSCO**  
COMMUNICATIONS INCORPORATED  
29 Independence Ave. Quincy, MA 02169  
Phone [617] 471-6427

**SEE  
PAGE  
124**

**GROTH-Type  
COUNTS & DISPLAYS  
YOUR TURNS**

● 99.99 Turns  
● One Hole  
Panel Mount  
● Handy Logging Area  
● Spinner Handle Available

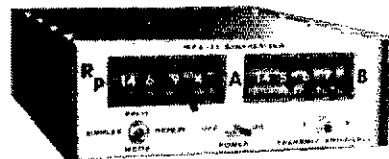
Case: 2x4"; shaft 1/4"x3"

PRICES	POST PAID
Model TC2: Skirt 2-1/8"; Knob 1-5/8"	\$8.00
Model TC3: Skirt 3"; Knob 2-3/8"	\$8.75
Spinner (S) — \$1.00	

Add \$0.75 for Airt of UPS

**R. H. BAUMAN SALES**  
P.O. Box 122, Itasca, Ill. 60143

## SUPER CRYSTAL THE DELUXE DIGITAL SYNTHESIZER!!



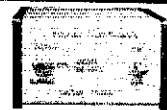
### MFA-22 DUAL VERSION

- **Transmit and Receive Operation:**  
All units have both Simplex and Repeater Modes
- **Accurate Frequency Control:**  
.0005% accuracy
- **Stable Low Drift Outputs:** 20 Hz per degree C typical
- **Full 2 Meter Band Coverage:**  
144.00 to 147.99 MHz. in 10KC steps
- **Fast Acting Circuit:** 0.15 second typical settling time
- **Low Impedance (50 ohm) Outputs:** Allow long cable runs for mobiles
- **Low Spurious Output Level:** similar to crystal output

Prices MFA-22 **\$325.00**

Shipping \$3.00 extra

SEND FOR **R<sub>p</sub> Electronics**  
FREE DETAILS **BOX 1201H  
CHAMPAIGN, ILL.  
61820**



### SSB & CW FILTERS

Loaded with features such as 100 Hz CW filters, 1500 Hz SSB filters, & 3W AF Amp. Filter plugs into receiver's phone jack & speaker plugs into filter.

- \* DE-102B SSB Filter 12 VDC \$39.95
- \* DE-103A CW & SSB 115 VAC \$59.95
- \* DE-103B CW & SSB 12 VDC \$48.95
- DE-104A CW Filter 115 VAC \$49.95

\*For CB or Ham radio use. Other filters are available.

Special Sale: Take 20% off for orders postmarked between 8-15 and 10-1-76. Add \$2 per order for shipping. One year warranty.

DEALER INQUIRIES INVITED  
**DYNAMIC ELECTRONICS INC.**  
Box 876 Hartselle, AL 35640

## INDUSTRIAL & GOVERNMENT SURPLUS ELECTRONICS

QUALITY PARTS AND PIECES FOR SCHOOLS,  
SERVICE SHOPS, HAMS AND HOBBYISTS.

SEND NOW FOR THE LAST THREE OF OUR  
MONTHLY PICTURE FLYERS. U.S. ONLY.

## STAR-TRONICS

P.O. Box 683, McMinnville, OR 97128

**SWITCH  
TO SAFETY!**



# MONOLITHIC CRYSTAL FILTERS



## for a professional NBFM rig

Building or modifying your FM Rig? We've got the highly selective, state-of-the-art monolithic and tandem monolithic crystal filters you need.

- Over 40 Stock Models
- Center Frequency: 10.7 and 21.4 MHz
- 6 dB Bandwidth: 13, 15, and 30 kHz
- Two, Four, Six, and Eight Poles
- And introducing 10.7 and 21.4 MHz monolithic crystal discriminators.

Monolithic crystal filters are smaller, simpler, and less expensive than old-fashioned discrete-element (lattice) crystal filters. Our wide selection lets you choose just what you need.

Write for data sheets and amateur net price list.

# Pi

**Piezo Technology, Inc.**

P. O. Box 1877  
Orlando, Florida 32804  
(305) 425-1574

The Standard in monolithic crystal filters.

## 1976 ARRL FLORIDA CONVENTION SHERATON SAND KEY, NOVEMBER 6 AND 7

REAL Convention with Exhibits, Tech. Sessions, FCC exams, Forums, QCWA, Floradoras, AWA, MARS; a real "How To" Convention. Family fun tours to area attractions with the Sheraton Hotel your playground on the Gulf of Mexico. Saturday eve Banquet with ARRL President Dannals as guest.



Tickets: \$3 adv'd spec'l, Banquet \$9. Full info on reservations and facilities contact: FGCARC Convention, P.O. Box 157 Clearwater, Fl. 33517.

**HOOSIER Electronics** — Your ham headquarters in the heart of the Midwest. Factory-authorized dealers for Kenwood, Collins, Drake, ICOM, Ten-Tec, Regency, Atlas, Tempo, Swan, Alpha, Standard, Hy-Gain, Mosley, Cushcraft, Antenna Specialists, Dentron, CDE, and others. For the best deal around on HF or VHF gear, see us first or see us last, but see us before you buy! Write or call today for our low quote and become one of our many happy and satisfied customers. Hoosier Electronics, P.O. Box 2001, Terre Haute IN 47802. 812-238-1456.

**ICOM-22A** Three months old. Has 18 crystals. Extremely mint condition. \$245. Includes shipping. Going synthesized. K8WEM 616-532-8196.

**WANTED** — Wheatstone keyer (transmitter) for 15/32 tape. Good working condition. Describe type, accessories, speeds, price. W1ZTK.

**YAesu FLDx-400** Transmitter, FRdx-400D Receiver FM-AM-SSB-CW, 6/2 Converters, \$525. Lesly Williams, Star Route, Box 109B, Townsend WI 54175, 715-276-6514.

**TECH Manuals** for Govt. surplus gear — \$6.50 each: SP-600JK, RUM-25D, OS-8A/U, PRC-8, 9, 10. Thousands more available. Send 50¢ (coin) for 22-page list. W3IHD, 7218 Roanne Drive, Washington DC 20021.

**WANTED:** Swan 1200X. A. F. May 16238 S.E. 144 St. Renton WA 98055.

**HW-101, HP-23B, SB-610, HM-15, \$190.** Will ship. Robert Nicholson, W1JHV, 18 South Street, Skowhegan ME 04976.

**SWAN SS-200** Transceiver/P.S.-20 power supply, \$575. Drake T4XC/AC-4 supply, \$575, R4C Receiver with 500Hz filter, extra xtals, \$400. Heath SB-610 \$65. Jay Sewell, W5DWN, 1618 Elmwood, Abilene TX 79605.

**KENWOOD TS-620, cw filter, year old.** Consider Triton, R599A in trade. W9OUM Rt 3 Box 244, Durango CO 81301.

**WANTED:** NC183-D or other gen coverage rcvr, any cond. call K2ENN collect, 516-785-332.

**SELL:** Gonset Communicator III \$75. Matching VFO \$25. Call K2ENN collect, 516-785-332.

**SELL** palomar RX noise bridge \$20. Unique wire tuner \$50. mints F. Shain 120 W Liberty Savannah GA 31401.

**AMPLIFIER** Sell — Hallicrafter HT 41 — \$175. W2DPP.

**SELL:** Robot 70 monitor \$200. Robot 80A camera, lens, tripod \$250. Package \$430 mint. WB2HSH 1145 Brinckerhoff Avenue Utica NY 13501. 315-724-6970.

**SWAP** like new Drake TR4-NB No. 30439, AC4 and MS4 for mint Collins receiver with cw filter. N. Konos 8 1/2 Summit Ave., Salem MA 01970.

**CRYSTALS, 1st-el-air:** Novice, active FT-243, all frequencies, minimum five, 40M, 15M 10M 99¢ each, 80M \$1.95. Less than five \$1.50, 80M \$2.50. Novice band edge marker-QSO combination package, 80M, 40M, 15M — three bands, six crystals, EBM-QSO-6, \$9.95. Same plus 10M pair — EBM-QSO-8 — \$11.95. Both novice packages for QSO just inside HI-LO band edge and calibration of receiver or VFO. Novice alignment packages — 3500, 3750, 7030 \$6.50. Go 160M, FT-243 pins \$2.95, four for \$9.80. Sockets 25¢. Crystals Since '33'. Bob Woods — W0LPS, Postage 20¢ per crystal. C-W Crystals, Marshfield, Missouri. 65706.

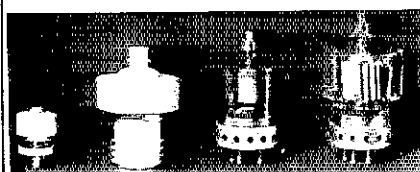
**FT-101B/FV-101B, 160, cw filter, mike, \$650.** Millen 2KW Transmatch \$125. K1LEC, Box 73, N. Springfield VT 05150. 802-886-8121.

**UPGRADE** your ham ticket now! Use Post-Check — original, expertly devised, multiple choice questions and diagrams covering all areas tested over in FCC exams. 120 sheets for self testing. Keyed answers with explanations. Novice Class, \$3.50; (General class including latest rules and regulations), \$5.30; Advanced class \$4.90; Extra class, \$5.15. Postage prepaid U.S.A. first class only. Also Radiotelephone Third Class, Elements 1, 2 and 9 \$10.15. Send check or money order to Post-Check, P. O. Box 3564, Urbandale Station, Des Moines IA 50322.

**MINT Collins 30L1 — 5 hours air time — \$580.** Clemente 914-246-7331 NY.

**MOVING.** Will sell multiband hybrid quad antenna model HQ-1. Repacked in original carton. Make offer. M. Green, 111 No. Clermont Ave., Margate NY 08402.

### WANTED FOR CASH



4CX150	4CX1000	4-65	4-250
4CX250	4CX1500	4-125A	4-400
4CX300A	4CX3000		4-1000
4CX350A	4CX5000		304TL
	4CX10,000		
	5CX1500		

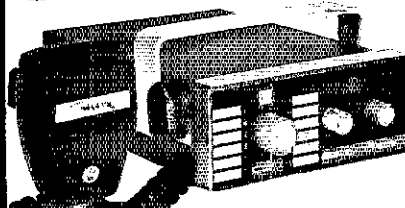
Other tubes and Klystrons also wanted.

### THE TED DAMES CO.

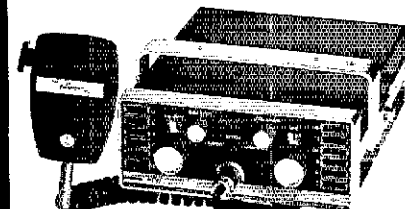
308 Hickory Street  
(201) 998-4246

Arlington, N.J. 07032  
Evenings (201) 998-6475

# SAVE \$50



**REGENCY HR-2B** 2m Fm Xcvr - 15w, 12ch w/94 crystals, microphone & mount. . . . . \$229.00



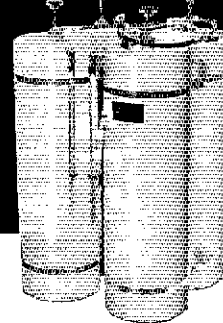
**REGENCY HR-312** 2m FM Xcvr - 30w, 12ch T/R w/94 crystals, microphone and mount. . . \$269.00

Purchase a HR-2B or HR-312 for the Regular Listed Price, without a trade and we'll give you **10 FREE CRYSTALS** of your choice. (1 Transmit and 1 Receive crystal are required per channel) Additional crystals - \$5.00 ea. Order direct from this ad! Send check or use your Mastercard or BankAmericard. Allow \$5.00 extra for UPS shipping & handling.

**AMATEUR ELECTRONIC SUPPLY**  
4828 West Fond du Lac Avenue  
Milwaukee, Wisconsin 53216  
Phone (414) 442-4200

Branch Stores in:  
Cleveland, Ohio & Orlando, Florida

# DUPLEXERS



\*Patent Pending

OUR NEW BANDPASS-  
REJECT DUPLEXERS WITH  
OUR EXCLUSIVE

## BpBr CIRCUIT\*

. . . provides superior performance, especially at close frequency spacing.

Models available for all Ham bands. Special price for Amateur Repeater Clubs

CALL OR WRITE FOR DETAILS:

**WACOM PRODUCTS, INC.**



Box 7307  
Waco, Texas 76710  
817/776-4444

**POLY PAKS**  
CUSTOMERS HAVE  
CLAMORED FOR  
THIS MONEY-SAVING

**REPEAT  
SALE**



Order by Cat. No. 9M1983 & Type No. below

Type	Sale	2 for	Type	Sale	2 for
SN7400	.22	.33	SN7494	.82	.83
SN7401	.22	.33	SN7495	.86	.87
SN7402	.22	.33	SN7496	.86	.87
SN7403	.22	.33	SN74125	1.29	1.30
SN7404	.24	.38	SN74126	1.29	1.30
SN7406	.36	.37	SN74132	1.95	1.96
SN7407	.46	.47	SN74141	1.12	1.13
SN7408	.22	.42	SN74145	1.69	1.70
SN7409	.52	.53	SN74148	3.25	3.26
SN7410	.22	.33	SN74150	1.12	1.13
SN7411	.27	.36	SN74153	1.10	1.11
SN7414	2.75	2.76	SN74154	1.53	1.54
SN7417	.62	.63	SN74157	1.09	1.10
SN7420	.22	.33	SN74158	1.56	1.56
SN7421	.55	.56	SN74160	1.59	1.60
SN7423	.47	.48	SN74163	1.50	1.51
SN7425	.37	.38	SN74164	1.79	1.80
SN7430	.28	.22	SN74165	1.75	1.80
SN7431	.36	.37	SN74173	1.69	1.70
SN7440	.22	.23	SN74174	1.42	1.43
SN7442	.97	.98	SN74175	1.48	1.48
SN7445	.97	.98	SN74176	1.59	1.60
SN7446	1.10	1.11	SN74177	1.59	1.60
SN7447	1.10	1.11	SN74181	3.75	3.76
SN7448	1.10	1.11	SN74182	1.09	1.10
SN7490	.22	.23	SN74184	2.15	2.20
SN7491	.27	.28	SN74190	2.75	2.76
SN7473	.44	.45	SN74191	2.75	2.76
SN7475	1.00	1.01	SN74193	1.29	1.30
SN7483	.99	1.00	SN74194	2.19	2.20
SN7485	1.41	1.42	SN74195	.89	.89
SN7486	.47	.48	SN74196	2.19	2.20
SN7488	3.95	3.96	SN74197	2.25	2.26
SN7489	2.25	2.26	SN74198	2.25	2.26
SN7490	1.00	1.01	SN74199	2.25	2.26
SN7491	.91	.92			

**MEMORIES**

Cat. No.	Type	Sale	2 for
9M2310	800B	\$19.95	\$19.95
9M2886	808D	49.95	49.95
9M2856	2102	3.50	3.51
9M2856	2102-1	3.50	3.51
9M2847	1101	1.50	1.51
9M1988	1103	2.95	2.96
9M2853	2202	3.95	3.96
9M2155-A	MMS203	12.50	12.51
9M2155-B	MMS202	9.95	9.96
9M2854	1702-A	12.50	12.51

Phone: Wakefield, Mass. (617) 245-3829

Terms: Add postage. Rated: net 30

**POLY PAKS** MINIMUM ORDER — \$6.  
P.O. BOX 942M LYNNFIELD, MASS. 01940

**FREQUENCY COUNTER**



**\$89.95**  
Kit

6 Digit 7 Segment LED Readout  
Crystal Timebase (.001%)  
Read KHz./Mhz. to over 30 Mhz.  
Input Sensitivity 100 mv. @ 1 Megohm  
Add \$2.00 Shipping—Allow to 4 weeks delivery.

**DELUXE 150 MHZ. COUNTER**



**\$139.95**  
6 Digit Kit

100 mv. Sensitivity @ 150 Mhz.  
Input Impedance 1 Megohm  
Crystal Timebase (.001%)  
Pushbutton Switches Select Hz/Khz/Mhz  
For 8 Digit add \$12.00  
Add \$3.00 Shipping—Allow to 5 weeks delivery.

**DIGITAL CAPACITANCE COUNTER**



**\$69.95**  
Kit

4 Digit LED Readout  
Ranges to over 1000 Mfd.  
±1% (±1 Pfd. below 100 Pfd.)  
Add \$2.00 Shipping—Allow to 4 weeks delivery.

Calif. Residents add 6% Sales Tax  
SEND CHECK OR MONEY ORDER TO

**LIN CORPORATION**  
15311 S. Broadway, Gardena, Ca. 90248  
(213) 532-8809

WANTED: Heath SB200 any condition, Ron WA1ABW 56 Stebbins St., Chicopee MA 01020. 413-536-7743.

FOR SALE — Swan 500C, Vx2, 117XC, 14C, with new tubes — \$400. Mint condition — pick up only. W2GUC, Tom Nolan, Wrightstown NJ. 609-758-2616.

HEATH — SB-300 w/a-m & cw filters & SB600 speaker \$175. HD-10 keyer \$25. IBD, Bug \$15. HW2021 2-mtr H-T xtals 16/76, 19/79, 34/94, 40/00 & 96/36 & case \$255. All mint w/manuals J. Ackerl — WA2TFT — 212-461-4174.

HEATHKIT — new unused Handheld 2m complete just put in perfect condition by factory \$170. WA2BSI P. O. Box 2323 So. Hackensack NJ 07606.

SWAN 270 ssb - cw Transceiver- \$225. Ameco TX 62, 2 & 6 Mtr. Transmitter \$65. Ameco VFO 621 \$35. Heath Harmonic Dist. Mtr. \$35. Q Multiplier \$5. Q Mtr. \$25. Sin & Square Gen \$20. Vibroplex Key Freq. Mtr. \$C 221 Millen VFO, EICO Sig. Tracer, Spkrs., Parts all excellent, all manuals, make offer W2FNE 61-29 77 St., Middle Village, NY 11379. 212-457-1410 after 6.

CIRCUIT Boards, Artwork, negatives, etching, s.a.s.e for details, Karl Raup, WB4OXG, Box 8013, Orlando FL 32806.

QST June 1935 through Dec. 1975, except July Aug. 1946 and April and Dec. 1973 \$120. BC-221-J with book \$25. Matchbox 250-23 \$25. Johnson T-R Switch 250-39 \$20. plus shipping. WA3DDB, 109 Cort St., West Newton PA 15089. 412-872-5479.

SIGNAL/ONE CX7A — \$1295. CX7B \$1595. Immaculate, warranty. Payne Radio 615-384-2224.

SWAN 1200W 230 volt model used less than five hours \$200. Murch UT2000 Ultimate transmatch \$100. Heath 22A \$75. All good condition. Philip Schwebler, W9GCG, 4536 N50 St., Milwaukee WI 53218.

FOR SALE — G/E voice-commanders - (2) on 146.10/70 with charger - \$225. WA1LQA, Ed Hanson, 116 Auburn St., Cranston RI 02910. 401-781-5363.

STAINLESS Threaded, washer, hardware! Guying Accessories! Insulators! Lists 20¢ WBBLR, 29716 Briarbank, Southfield Mich. 48034.

DRAKE R4B — Passband needs slight repair, \$290 - Bob Mauro 257 Center Lane, Levittown, NY 11756.

TRANSMITTER Tubes for a Kw. 8295/PL-172 \$15. Pair, \$27. W6BKY, Box 1633, Palo Alto CA 94302.

SWAN wanted: TV2-B or TV2-C 2-meter transverter. Contact WB2GWU, P. O. Box 568 Boro Hall Station, Jamaica NY 11424. Phone AC 212-224-2448.

PICKERING Electronic keyer, alphabet, numbers, 7 prosigns on keyboard. \$149. Jackson, 704-366-9230.

FOR SALE: SB-110A 6 meter transceiver HP-23 AC, SB-600 speaker, Factory reconditioned — \$350. Philip Roberts, Village, Patriot OH. 45658. 614-379-2200 Between 10-11 PM EST.

HW-16 \$20. Wanted — Tri-Band Beam, Mobile Ant., HP-13, Dummy, Joel, WN2ELV 914-623-4957.

COLLECTORS: Best certified check offer with s.a.s.e received by Xmas buys 50 years "QSTs". Prefer local pickup. Curran, Box 275, Fair Haven NY 13064.

SELL: Breadboard Honeycomb-coil receiver, Atlas horn speaker. Brought in direct overseas BC of Transatlantic Radiotelephone testing. Also KDKA! Curran, Box 275, Fair Haven NY 13064.

FOR SALE: HW32 20 meter ssb transceiver, with HP 23A Power supply, \$20. Two NEEE, Inc., Crud-O-Jects for ssb, \$20. each, Quasi-Logarithmic Speech Processor, \$50. Model 28 RTTY Machine, \$225. Model 28 Repet for \$125. Model 28 tape distributor, \$60. W3VDA, P. O. Box 1333, Harrisburg, PA 17105.

HEATHKITS professionally assembled. Send for quote, Parrish, 306 W. Amherst Ave., Melbourne FL 32901.

HT-44 5X-117 P5-150/120 spare finals and other tubes Realigned I ship \$35. WA2AEJ, 102 W. Park Ave., Maple Shade NJ 08052. 609-665-0640 aft 7 P.M.

WANTED: Mint Johnson Adventurer; Amateur radio transmitters made before 1940 in cheap repairable or good condition. WN5TSU, Box 317, Rhome TX 76078.

**INSTRUCTOGRAPH**

Is the world's foremost teacher of the

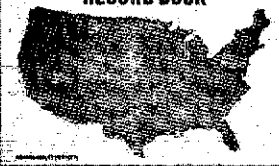
**MORSE CODE**

Check it out with any experienced ham and be convinced. Send card for details on RENTALS and SALES of the ALL NEW MODEL 500 with BUILT-IN SPEAKER. The only machine that YOU CONTROL the speed of sending and receiving from 4 to 40 WPM. INSTRUCTOGRAPH CO. Box 5032 Dept. A, Glendale, Calif. 91201. (213) 246-3902 or 245-2250.

**"INSTA-GRESS"<sup>(R)</sup>**

SHOWS THE WAY

**6 BAND WORKED ALL STATES RECORD BOOK**



**\$4.98**

U. S. A. & Canada

**\$5.98**

Elsewhere

CONCISE - ACCURATE - EASY TO USE

6 BAND WORKED ALL STATES RECORD BOOK containing unique "INSTA-GRESS" method for on-the-air use! Shows minute by minute progress made on each band! States worked! States confirmed! States needed! QSL's missing! Made of contact! - ALL AT A GLANCE! Avoid repeated Log hunts! ORDER NOW! KNOW at a glance where you stand!

RICHARD NORLEY (WA1CFT)

P. O. Box 543 SY

Derry, N.H. 03038

THE  
**ARRL**  
ANTENNA BOOK



PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE \$4.00

Thirteenth Edition

**What Antenna's Best for YOU?**

Dipole, long wire, vertical, beam quad?

Is space a problem?

The thirteenth edition of the Antenna Book is jam-packed with ideas for antennas of all types, for all bands.

More Quad information than ever before. A whole chapter on the construction of wire antennas, with ideas you may not have considered.

Get a copy of the ARRL Antenna Book and make use of the latest in antenna information and ideas.

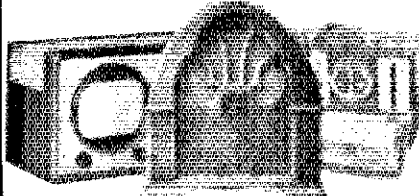
**\$4.00 U.S.A.**

\$4.50 Elsewhere

THE AMERICAN RADIO RELAY LEAGUE INC.  
225 Main St., Newington CT 06111

# Old Radio Treasures

There's a rare old radio waiting for you somewhere. Here's how to have year-round fun discovering valuable old sets in your attic, local swap meet or antique barn. You'll enjoy McMahon's fascinating books, true collector's references.



**VINTAGE RADIO, 1887-1929:** Picture history of pioneer days, 263 pages. Hard-cover \$10.95, handbook \$8.95.

**A FLICK OF THE SWITCH, 1930-50:** Picture history of home, military, Ham, professional radio-TV, 312 pages. Hard-cover \$10.95, handbook \$8.95.

**RADIO ENCYCLOPEDIA:** Gernsback's 1927 classic beautifully recreated, 175 pages. Hard-cover \$14.95, handbook \$10.95.

**RADIO COLLECTOR'S GUIDE, 1921-32:** Data book with 50,000 facts on 9,000 models by 1,100 makers, 264 pages, \$6.95.

**1926-38 RADIO DIAGRAMS:** Beitman's circuits of 600 sets, 240 pages. \$7.00.



**CIRCUITS:** We'll send you the circuit diagram of any pre-1951 radio. Send model number or tube layout and \$3.50.

**PRINTS:** Four beautiful 8 x 10 "Progress in Electronics" stamps \$7.50. Plaques \$18.50.

**FREE! Age Guide with each order. FREE!**

SEND TODAY to Vintage Radio, Dep't. Q, Box 2045, Palos Verdes, CA, 90274. We pay postage. Calif. residents add 6%.

\_\_\_\_\_ \$  
 \_\_\_\_\_ \$  
 \_\_\_\_\_ \$  
 \_\_\_\_\_ \$  
**TOTAL \$** \_\_\_\_\_  
 Name \_\_\_\_\_  
 Street \_\_\_\_\_  
 City \_\_\_\_\_ St. \_\_\_\_\_ Zip \_\_\_\_\_

**Year-round Fun!**

**SELL Complete First Rate Station.** 150 countries in 5 months from center-of-town apartment. Kenwood 15900 transceiver, PSU, remote VFO, 500HZ filter. Comdel speech processor. Desk mike. Vibroplex with carry-case. SB220 amp. SB610 monitor. TH6DX antenna. 14 el 2m paraband. 400ft Times foam cable. Ham II rotor. 200ft control cable. Bird 43 wattmeter. Bird elements. Hewlett packard DY2501 counter. All perfect, with documentation. View NYC. Want accurate frequency standard. Telephone Gold, 212-722-3416.

**FOR SALE** - Heath HR-10B, DX-60B, HG-10B, HM-102. all manuals, like new, \$199. Plus UPS charges. WB5MSL, P.O. Box 3253, Enid OK 73701. 405-233-1286.

**YAESU FT-101B** with desk microphone, Hygain 18AVT/WB-A vertical, 100 ft RG-8U. \$600. takes all, you ship, WA2EXU, 201-996-6496 after 6 P.M.

**SELL - T4XB** without power supply \$360. Ten-Tec ant. tuner S6. David Schwartz 1183 Southeast St., Amherst MA 01002.

**HOSS-Trader Ed** says "We refuse to be undersold: If you didn't buy it from the Hoss you paid too much. Shop around for the best price then telephone the Hoss last. New Atlas 210 Transceiver, \$499. Demo T-4XC, \$479. New display Swan 700CX, \$495. Demo T-4XC, \$469. Icom 230, Demonstrator, \$399. New Rohn 50 Foldover Tower Prepaid \$398. Demo Ham-2 Rotor, \$99. New Display Atlas 210X, \$498. Hoss-Trader, Specials: Dentron Match Boxes & Linears on sale, new Display L-4B Linear, \$709. Moory Electronics Company, P.O. Box 506, DeWitt Arkansas 72042. Tel. 501-946-2820.

**COLLINS S-Line** - 7553C, 3253, 5M-2, 312B4, 516F2 - Round Emblem, Less than 30 hours! \$2500. Henry 2-K ultra, same - \$775. WB2CHW 361 Hickory St., No. Massapequa, NY 11756.

**HEATHKIT'S** Wanted: SB-610 or HO-10 monitor scope, SB-110A 6 meter transceiver, SB-200, SB-220 linear amps. NYC area deal preferred. Contact K2AWA, P.O. Box 568 Boro Hall, Jamaica NY 11424. Phone AC 212-224-2448.

**DRAKE** Wanted: R-4, R-4A, R-4B receivers, T-4-X, T-4-XB transmitters, TR-6 6 meter transceiver, TC-2 2-meter transmitter, TR-4B amplifier. NYC area deal preferred. Contact WB2JXY, P.O. Box 568 Boro Hall, Jamaica NY 11424. Phone AC 212-224-2448.

**MINT** Heath SB-104. CW filter, power supply, speaker. Finals replaced and receiver front end modified at factory. Meets or exceeds all specs. Best offer over \$750. Will sell separate. Carl Mills, WA2ZFR, Box 257, RD 2, Stroudsburg PA 18360. 717-992-4538.

**NEW Television cameras** - \$149, with f1.9 zoom lens, standard interlace. Color VTRs \$245. Catalog from HAAS Enterprises, 6017 Majorca Court., San Jose CA 95120.

**SENIOR Citizen** need assistance to hang a tri-bander on a 40' self supporting tower - fee negotiable call (212) 969-8142 after 7 P.M. weekdays and all day Sat. or Sun. A Kruh, 70-16 171st St., Flushing NY 11365.

**FOR SALE:** Four items \$750. Viking Vallant transmitter; Collins 75AH receiver; Johnson matchbox antenna, tuner and SWR meter; Tentec kover, Pick-up only. Heggen, Box 391, Mattituck, N.Y. 11952. 516-298-8004.

**HARVEY Wells Bandmaster Deluxe** - wanted with VFO & power supply. Unmodified with spec papers if possible. Write Rittman, Box 7461, Las Vegas NV 89101.

**WANTED:** Car telephones and mobile telephone parts, heads, cables etc. Greg Hyman, 87 Yonkers Ave., Yonkers, NY 10701. 914-476-4330.

**WANT pre-1925 Marconi, DeForest, Grebe** and similar radio gear or parts. Spark gear, Loose couplers, crystal sets. Advise condition and price. Mike White, 118 Countryview Drive, Naperville IL 60540.

**ICOM, KLM, Cushcraft, Hy-Gain, Rohn, Regency, Drake, Kenwood, Collins!** For the best buy around. Write C & I Communications, P.O. Box 52, Cambridge City IN 47327. Tel. 317-478-1749.

## Jobs for Hams

**ELECTRONICS Instructor:** New York City Area to prepare lesson material and teach maintenance and repair of maritime radio communication & radio navigation equipment. ARATIME, 270 Madison Avenue, Rm 210, New York, NY 10016.

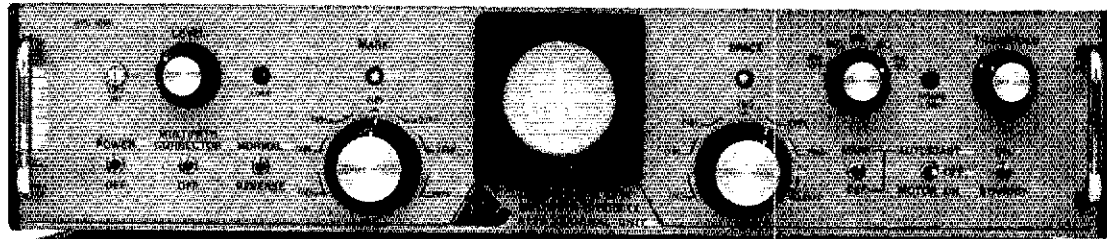
**EXPERIENCED Technician** Land Mobile Communications. Ham background preferable, with reliable firm. Our fiftieth year Seashore living Rogers, P.O. Box 338 Manasquan 08736 NJ.

## INDEX OF ADVERTISERS

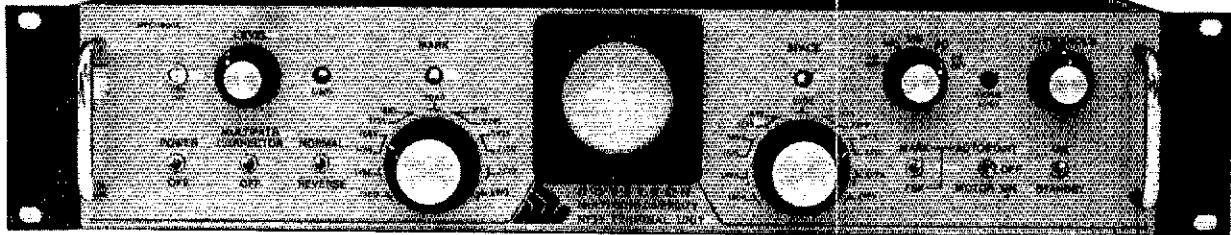
- Adirondack Radio Supply Inc.: 126
- Advs Electronics: 144
- Advance Sound Company: 144
- Aladdin Electronics: 152
- Aldelco: 162
- Altec Communications: 128
- Amateur Elect. Supply: 93, 99, 126, 140, 142, 144, 164
- Amateur License instruction: 136
- Amateur Wholesale Electronics: 116, 117
- American Radio Relay League
  - Antenna Book: 165
  - Repeater Manual: 130
  - Membership: 150
  - Operating Guide: 124
  - Publications: 159
  - Tune in the World: 98
- Amidon Associates: 140
- Antenna Specialists Co.: 105
- Antenna Supermarket: 130
- ARRL Florida Convention, 1976: 164
- Atlas Radio Inc.: 123
- Atronic: 120
- ATV Research: 156
- Autek Research: 161
- Barry Electronics: 150
- Bauman Sales: 163
- Burghardt Amateur Center, Inc.: 168
- Buyers & Sellers: 134
- Caddell Coil Corp.: 145
- Clegg Communications Corp.: 121
- Cleveland Institute: 156
- Collins Radio: 2
- Command Productions: 142
- Communication Associates, Inc.: 149
- Cover Craft: 104
- Cubex Co.: 150
- Curtis Electro Devices: 148
- Cushcraft: 125
- Dames, Ted: 146, 160, 164
- Davis Electronics: 140
- Dentron Radio Co.: 4
- Diffure-Freimut Corp.: 110
- Dollar Value Electronics: 122
- Davetron: 167
- Drake, R. L.: 119, 153
- DX Engineering: 158
- Dynamic Electronics: 163
- Egis Mailers: 102
- Erborn: 101
- Electronic Distributors Inc.: 138
- Emel Electronics: 158
- GBC Closed Circuit TV Corp.: 118
- General Aviation: 109, 111
- Gilfer: 156
- GLB Electronics: 146
- Gotham: 138
- Greater Louisville ARRL Hamfest: 124
- Hal Communications: 108, 112, 127
- Ham Radio Center: 129
- Ham Radio Outlet: 140
- Hamtronics: 141
- Harrison Radio: 133
- Heath Co.: 94-95
- Henry Radio: Cov. II, 1
- Hufco: 128, 132
- Hy-Gain: 131
- ICOM: 5
- International Crvstal Mfg.: 7
- Instructograph Co.: 165
- Instrument Mart, The: 162
- Jan Crystal: 142
- Janel Laboratories: 154
- Kahn Communications, Inc.: 118
- Kaufman Industries: 144
- Kensco Communications: 163
- Lattin Radio: 146
- Leader Instruments: 151
- Lin Corp.: 165
- Link: 158
- Main Electronics: 104
- Marsh Devices: 142
- Metric: 152
- M & D Electronics: 144
- MFI Enterprises: 143
- Mini-Products: 108
- Murch Electronics: 142
- National Radio Institute: 155, 162
- Norley, Richard: 165
- North Shore RF Tech.: 156
- Nye Co. Inc., William M.: 102
- Pager Electronics: 128
- Palomar Engineers: 116, 144, 158, 161
- Pickering Codemaster: 148
- Piezo Technology: 164
- Pinkham Enterprises, Inc.: 163
- Poly Paks: 157, 165
- Quement Electronics: 162
- Radio Amateur Callbook: 160
- Rainbow Industries: 110
- Regency Electronics, Inc.: 96
- Reveom Electronics: 148
- R. F. Communications: 140
- Robot Research: 135
- R. P. Electronics: 163
- Rusprint: 112, 136
- Sandlin Electronics Engineering: 161
- Savoy Electronics: 150
- Sherwood Engineering, Inc.: 142
- Skyline Products: 122
- Solid State Modules: 118
- Space Electronics: 144
- Specialty Communications Systems: 132
- Spepronics: 137
- Star-Ironics: 163
- Swan Electronics: 113, 134, 146
- Tetron Corp.: 156
- Tetrex Labs: 116, 120
- Ten-Tec Inc.: 147
- Theta Labs: 154
- Towtee Corp.: 120
- Tri-Ex Tower Corp.: 97
- Trio Kenwood: 6, 106, 107
- Tristao Tower: 160
- Tucker Electronics: 122
- Tufts Radio: 139
- Unadilla Radiation Products: 136
- Unarco-Rohn: 100
- Unique Products: 126
- Universal Radio Co.: 148
- Van Gorden Engineering: 126
- Varian, Elmae Division: Cov. IV
- VHF Engineering: 145
- Vibroplex Company: 96
- Vintage Radio: 166
- W1EP DX-QSL Service: 158
- W3KT QSL Service: 142
- Wacom Products, Inc.: 164
- Webster Radio: 148
- Whitehouse & Co., G. R.: 136
- Wilson Electronics: 114, 115
- World QSL Bureau: 146
- Yaesu Musen USA, The: 103, Cov. III



# THE AUTOMATIC "E" BY DOVETRON



AMATEUR  
MPC-1000  
\$495.00\*



COMMERCIAL  
MPC-1000C  
\$795.00\*\*

Our sixth generation RTTY TERMINAL UNIT (E-Series) is truly automatic, whether it is the Amateur MPC-1000, the Commercial MPC-1000C or the latest MPC-1000R REGENERATIVE model.

MULTIPATH CORRECTION (a Dovetron exclusive) and IN-BAND DIVERSITY operation are fully automatic, as is the CRT dot deflection circuit and the new AUTO-THRESHOLD control.

Even the intensity control of the CRT cross display is "hands-off". A front panel photocell senses the ambient light level and automatically adjusts the CRT for optimum viewing.

Another new feature, KEYBOARD ACTUATED AUTOSTART, provides local motor-start by merely depressing the keyboard's Break button, permitting fast message retrieval and full autostart operation even in split-site installations.

A Dovetron TSR-100 SPEED CONVERTER-REGENERATOR may be mounted inside to provide regeneration of all incoming and outgoing signals to less than 1% bias distortion. Its 80 character Ripple MEMORY provides a full line of storage, complete

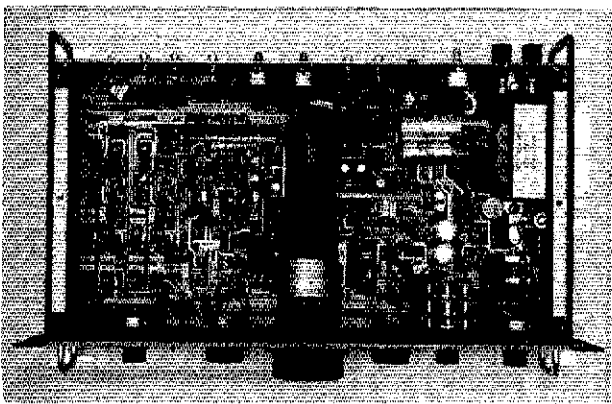
with Preload and Recirculate functions. The crystal-controlled Dual-Clock permits up-down speed conversion of 60, 67, 75, 100 WPM Baudot and 110 Baud ASCII signals.

A variable Stop-pulse control permits slower-than-machine-speed operation and a unique over-ride circuit prevents over-runs when down-converting from one Baud rate to another. Automatic Start-pulses may be generated for repetitious transmission of the BLANK character during long marking periods, and may be used for phasing crypto peripherals.

The MPC-1000R is the logical combination of the MPC-1000C and the TSR-100. Front panel controls are provided for speed selection, exercising the Memory functions and selecting one of three preset tone-shift combinations of the AFSK tone keyer. Two front panel LEDs indicate the status of the Ripple Memory.

The 12 month warranty applies on land, on sea or in the air.

An inquiry on your letterhead (or QSL card) will bring complete specifications, or call 213-682-3705.



627 Fremont Ave., South Pasadena 91030

\*CIA to amateurs only.

\*\*OEM discounts available.

Specifications and prices  
subject to change without notice.



# NEWS

# BULLETIN

## WE'VE GOT GOOD NEWS FOR YOU ! !

**DEAR OM:** It has oftentimes been said that "NO NEWS IS GOOD NEWS" or that "THERE IS NO NEWS LIKE GOOD NEWS!" Whatever the case, if you haven't yet heard the "GOOD NEWS" about BURGHARDT AMATEUR CENTER in Watertown, South Dakota — of all places!! — then you don't know what you've been missing, and that could well be classified as BAD NEWS!!

To begin with, at BURGHARDT AMATEUR CENTER, our whole structure of business is built upon a solid foundation of FRIENDSHIP and PERSONAL SERVICE. We do not pretend to be "BIG OPERATORS" or "WHEELER DEALERS" as this would defeat our whole purpose in giving YOU — our customer — the kind of FAST, DEPENDABLE SERVICE that you would expect — AND YOU GET!! — from a company whose reputation as "AMERICA'S MOST RELIABLE AMATEUR RADIO DEALER" is on the line every day of the year.

On the otherhand, we are by no means a small nor inexperienced outfit dealing on the fringes of the amateur radio market. In fact, Stan Burghardt, WØIT, has been serving the nation as your DIRECT LINE to every major manufacturer of ham radio equipment since the fall of 1937 — offering his customers the LATEST and the BEST in new amateur gear from our central location here in the Midwest. And, today we are still STOCKING & SELLING and GUARANTEEING & SERVICING all of the familiar brand names that are a factor in the amateur market, and we carry a complete line of accessories to fill virtually every ham need as well — but then, WHO DOESN'T??? And, WHAT ELSE IS NEW???

### FAST DELIVERY

Others have surely claimed it — but do you get it??? We ALWAYS ship your order the SAME DAY it arrives — unless for some GOOD REASON we are unable to supply the item from stock. Factory back-orders in recent months have made it a real challenge to keep many of the fast-moving NEW MODELS on hand, but we're doing ALL WE CAN to stay on top of things and keep you advised as to probable delivery schedules based on what information we have. In the event of ANY delay — however slight — you can count on us to notify you promptly and advise you SPECIFICALLY when we can & WILL deliver your order.

### HONEST DEALING

We'll be honest with you RIGHT FROM THE START!! We ARE in this business to make a living — but we don't intend to make it at YOUR expense. Our prices on new & used equipment are "down to earth" and squarely reflect the REALISTIC VALUE of the merchandise. Remember, we're licensed ham operators too, and if we cannot "honestly" admit to ourselves that we'd pay so much for a particular item — then you won't have to pay that price either!! When a TRADE-IN is involved — YES!! WE DO TAKE TRADES (both on new & used gear)!! — you'll always receive OUR top-dollar allowance for your gear. We know what the various items of used gear are worth on the resale market, and our STRAIGHT-FORWARD quotes will always speak for themselves.

**NEW STORE HOURS:**  
TUESDAY thru SATURDAY  
9:00 A.M. to 4:00 P.M.  
Closed Sunday & Monday!!

**WE'RE FOR REAL!!**

There's No Doubt About It!

WRITE TODAY FOR OUR LATEST  
BULLETIN/USED EQUIPMENT LIST!!

### DEPENDABLE SERVICE

We service WHAT WE SELL — and many that we don't!! OUR POLICY on the handling of defective merchandise is well known to those who have dealt with us before. Any and ALL complaints are handled PROMPTLY and EFFICIENTLY by our well-staffed SERVICE department with your COMPLETE SATISFACTION in mind. We are only human, and admittedly, we DO make mistakes — but failing to correct any errors for which we are responsible, is the one mistake we NEVER make. When we say "SERVICE with a smile" — we MEAN IT!!! — and it's YOUR smile that we're after.

### PERSONAL TOUCH

When you deal with us, you ALWAYS receive our prompt, PERSONAL ATTENTION and INDIVIDUAL CONCERN!! Each and every letter and phone call puts you in INSTANT TOUCH with someone who is ready, willing and able to give your order or inquiry his undivided attention — not put you on "HOLD!" We approach every transaction with a fresh frame of mind, and you'll never catch us using any stereotyped methods to handle your requests. We know that Watertown "ain't exactly the cornerstone of civilization — but we are ON THE MAP" and we'll go a LONG-LONG way to take VERY GOOD care of you and make you feel "WELCOME!" Remember, OM, ham radio is our only business and we're here to serve YOU!!!

### "THE BEST DEAL"

We realize that we will no doubt be "undersold" most of the time — insofar as the "price" goes — but we want you to be AWARE (before you buy!!) that there is much much more to a "GOOD DEAL" than just the lowest price. In the final analysis, it's the reputation of the dealer standing behind your purchase that's worth as much or more than the quality of the product itself. And that is WHY at BURGHARDT AMATEUR CENTER . . . "S-E-R-V-I-C-E" is our MOST IMPORTANT product — both technical service that you can RELY ON, and PERSONAL service that you can COUNT ON — and in terms of dollars & cents, these will NEVER be discounted.

In conclusion, your CONFIDENCE in us is our MOST IMPORTANT asset. We APPRECIATE the opportunity to serve YOU, and we look forward to each & every opportunity to do so. When it comes to FAST DELIVERY, HONEST DEALING and DEPENDABLE SERVICE, we don't just "advertise it" — WE GIVE IT!!

73's STAN BURGHARDT WØIT JIM SMITH WBØMJY  
BILL BURGHARDT WBØNBO

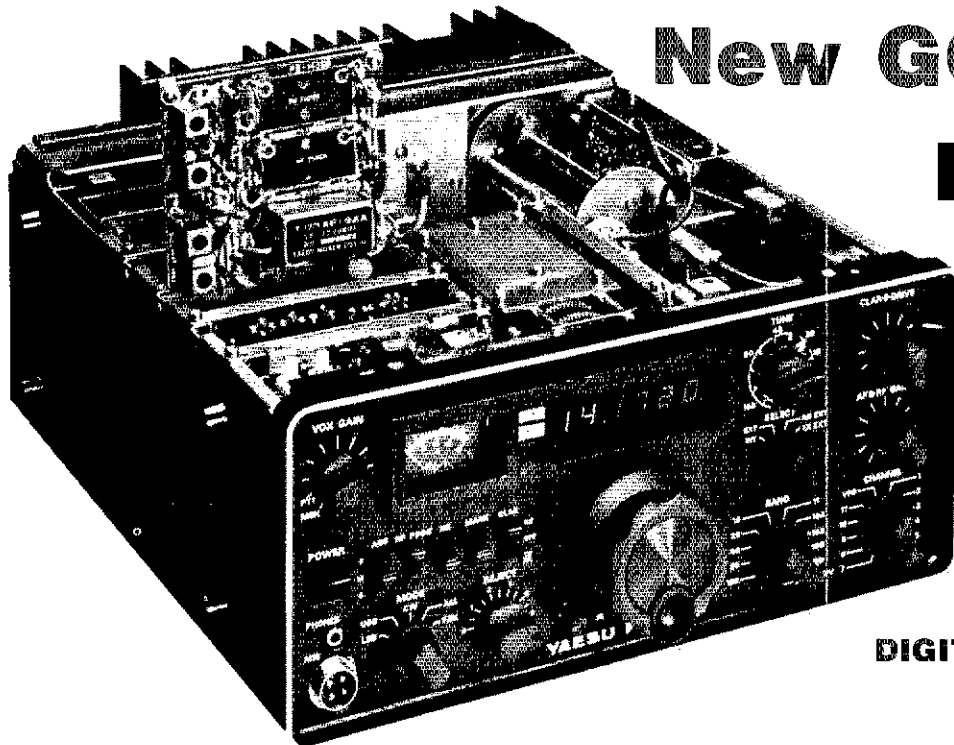
124 First Avenue Northwest  
P.O. Box 73  
Watertown, South Dakota 57201  
Phone 605-886-7314

**Burghardt** INC.  
**AMATEUR CENTER**

"America's Most Reliable Amateur Dealer"

**Your Full-Line Ham Dealer Where S-E-R-V-I-C-E is our most important product.**

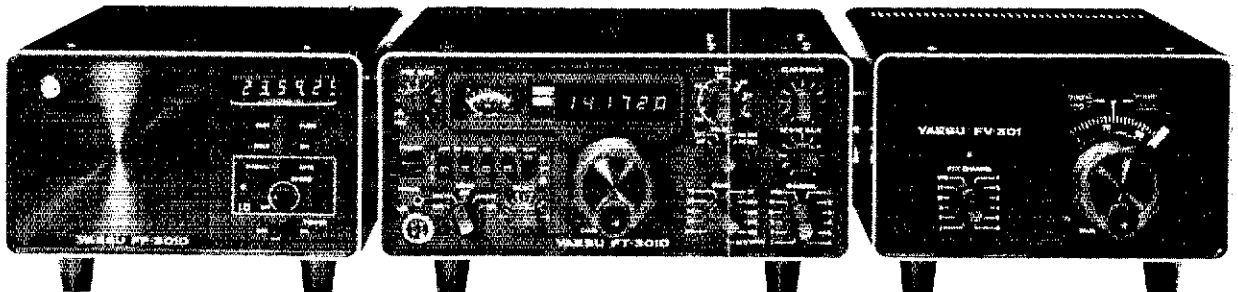
# From YAESU The Outstanding New GOLD LINE FT-301D



**ALL SOLID STATE**

**200W PEP**

**DIGITAL DIAL TRANSCEIVER**



- 6 - Digit Readout ■ All Modes – SSB/CW/AM/FSK ■ 160 thru 10 Meters ■ TX & RX Clarifier ■ RF Feedback ■ 3 - Position AGC ■ Rejection Tuning (Tuneable IF Crystal Filter) ■ Built-in DC Power Supply ■ Optional AC Power Supply & Speaker Unit with 12 or 24 Hr. Digital Clock ■ Noise Blanker ■ RF Speech Processor ■ Computer Type Plug-In Module Construction ■ Size: 11 in. (w) × 5 in. (h) × 13½ in. (d) ■ Light Weight: 22 lbs.

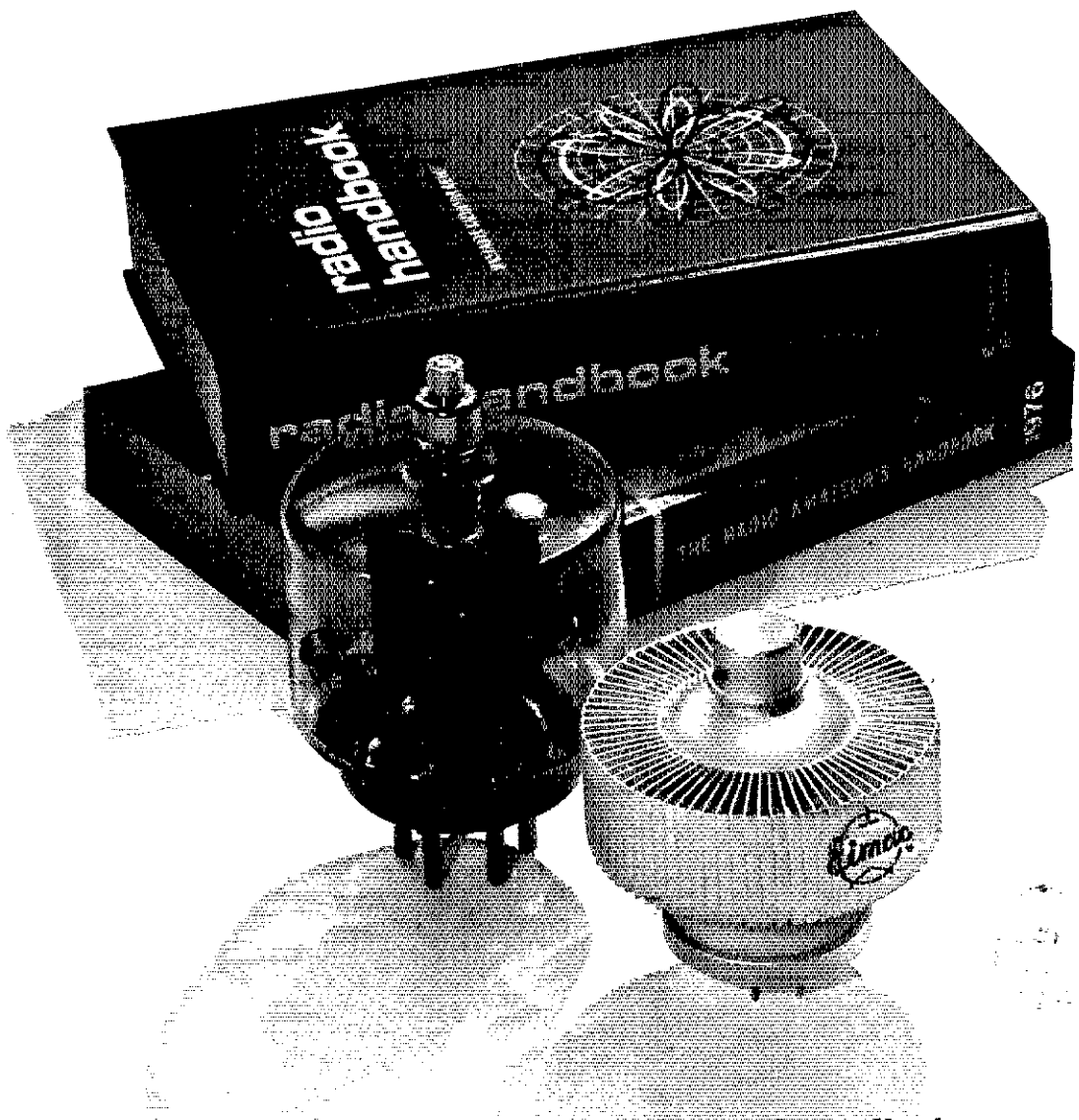
The Model FT-301D is a precision-built, all solid-state, compact high performance transceiver of advanced design. All circuits are fully transistorized with ICs and FETs for reliability. A wide-band tuning system with preset pass band tuning combined with wide-band amplifier eliminates final amplifier tuning for band change. Also available as an option is an automatic CW identifier (programmable).

*Whether you judge it on price, performance or operational features, the FT-301D comes out a winner!*

## YAESU *The radio.*

Yaesu Musen USA Inc., 7625 E. Rosecrans, No. 29, Paramount, California 90723

Yaesu Musen USA Inc., Eastern Service Center 613 Redna Terrace, Cincinnati, OH 45215



## Amateurs who build their own equipment go EIMAC.

Building HF or VHF power amplifiers? You'll find them described in detail in both the *ARRL Handbook* and the *Radio Handbook*. And you'll find that EIMAC tubes are the overwhelming choice of expert equipment designers for 1.8 to 1296 MHz service.

The *Radio Handbook* features a deluxe amplifier using the 3-1000Z for HF service plus other HF or VHF designs built around the 3-500Z, 4CX1500B, 8877 and the 8874. The *ARRL Handbook* describes a multiband HF amplifier using the 8877, plus other designs featur-

ing the 3-500Z, 8873, 4CX250B and 3CX100A5. And there's plenty of information about design and construction of transmitting equipment using EIMAC power tubes in both handbooks.

For tube information, contact Varian, EIMAC Division, 301 Industrial Way, San Carlos, California 94070. Or contact any of the more than 30 Varian Electron Device Group Sales Offices throughout the world.

