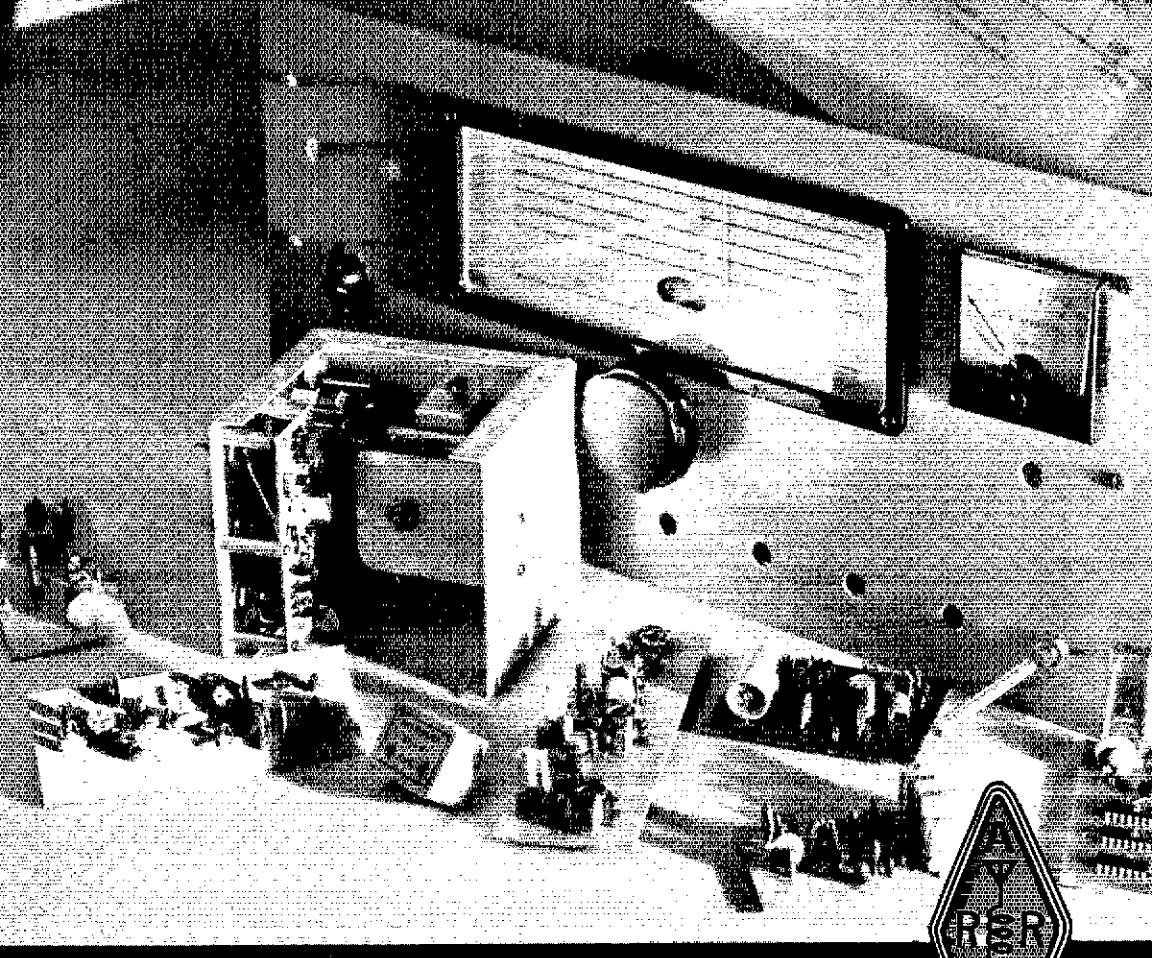


January 1971  
75 Cents

# QST

devoted entirely to

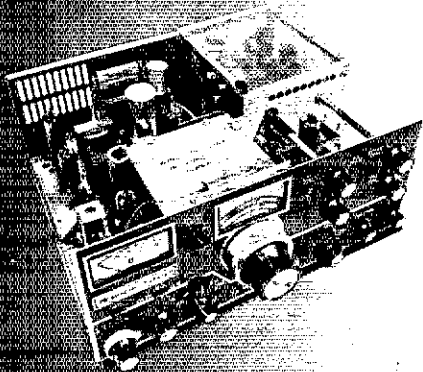
# amateur radio



OFFICIAL JOURNAL OF THE ARRL



# LOOK INSIDE!



## THE SWAN 500CX 550 WATT 5 BAND TRANSCEIVER

Look for the finest high frequency crystal lattice filter providing outstanding audio quality coupled with unequalled ultimate rejection.

Look for Single conversion design, an exclusive Swan feature that results in greatly reduced image and spurious response.

Look for velvet smooth tuning provided by Swan's exclusive dual ratio, zero back lash drive mechanism.

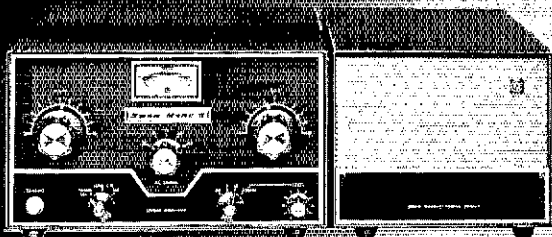
Look for craftsmanship, performance, and rugged reliability which make the Swan 500CX the finest transceiver value made anywhere.

**\$565**

 **SWAN**  
ELECTRONICS

305 Airport Road Oceanside, California 92054  
A Subsidiary of Cubic Corporation

# OUR GREAT BOOSTER



## SWAN MARK II LINEAR AMPLIFIER

With a conservative power rating of 2000 watts P.E.P. Provides full coverage of the amateur bands from 10 through 80 meters, and MARS frequencies. Planetary vernier drives on both plate and loading controls for velvet smooth tuning of the amplifier. Complete with two Eimac 3-500Z Triodes.

**\$395**


## MATCHING POWER SUPPLY

Component quality is of the highest caliber.

**\$265**

 **SWAN**  
ELECTRONICS

305 Airport Road  
Oceanside, California 92054  
A Subsidiary of Cubic Corporation



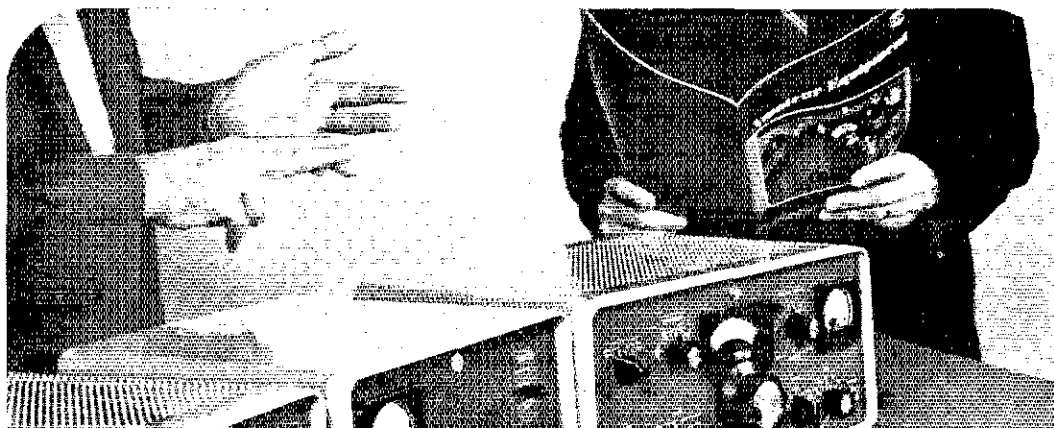
ROHN, as the largest tower manufacturer in the United States, provides outstanding commercial quality equipment for amateurs. We're best known

in this field for our crank-up, fold-over and #25G towers. Like all our big commercial towers, they're hot-dipped galvanized after fabrication according to EIA specifications. We also make commercial hardware and accessories amateurs use, too, and it's all designed with an understanding of your needs, particularly in the area of quality. And don't overlook our constant search for new ideas, processes and products — just for you. Keep an eye out for the ROHN name. It's well worth your while.

# ROHN® THE QUALITY PEOPLE

Home Office—Factory  
P.O. Box 2000  
Peoria, Ill., U.S.A. 61601  
Phone 309-697-4400  
TWX 309-697-1488

**ROHN®**



## talk with an expert

He will help you plan your amateur station . . . give you detailed information on products and services . . . and assure you of complete satisfaction.

Talk with an expert . . . your Collins distributor.

### ALABAMA

Birmingham—Ack Radio Supply Co.

### CALIFORNIA

Anaheim—Henry Radio Company, Inc.  
 Burlingame—Ham Radio Outlet  
 Fresno—Dymond Electronics  
 Los Angeles—Henry Radio Company, Inc.  
 Riverside—Mission Electronics  
 San Diego—Western Radio  
 San Jose—Quement Electronics

### COLORADO

Denver—Burstein-Applebee Co. of Colorado

### CONNECTICUT

Hartford—Hatry Electronics

### FLORIDA

Miami—Amateur Radio Center, Inc.  
 Miami—International Electronic Systems, Inc.  
 Pensacola—Grice Electronics, Inc.  
 Sarasota—The Ham Shack

### GEORGIA

Atlanta—Ack Radio Supply Co.  
 Atlanta—Specialty Distributing Co., Inc.

### HAWAII

Honolulu—Honolulu Electronics

### ILLINOIS

Peoria—Klaus Radio & Electric Co.

### INDIANA

Indianapolis—Graham Electronics Supply, Inc.  
 South Bend—Radio Distributing Co.

### IOWA

Council Bluffs—World Radio Laboratories

### LOUISIANA

New Orleans—Sterling Electronics

### MARYLAND

Wheaton—Electronic Distributors, Inc.

### MASSACHUSETTS

Boston—DeMambo Radio Supply Co., Inc.  
 Reading—Graham Radio, Inc.

### MICHIGAN

Ann Arbor—Purchase Radio Supply  
 Detroit—Radio Supply & Engineering Co., Inc.  
 Muskegon—Electronics Distributors, Inc.

### MINNESOTA

Minneapolis—Electronic Center, Inc.

### MISSOURI

Butler—Henry Radio Company, Inc.

Kansas City—Burstein-Applebee Company  
 St. Louis—Ham Radio Center

### NEW HAMPSHIRE

Concord—Evans Radio, Inc.

### NEW YORK

Amsterdam—Adirondack Radio Supply, Inc.  
 Farmingdale—Harrison Radio Corporation  
 Jamaica—Harrison Radio Corporation  
 New York—Harrison Radio Corporation  
 New York—Harvey Radio Company, Inc.

### NORTH CAROLINA

Freck Radio & Supply Co., Inc.

### OHIO

Cleveland—Pioneer Standard Electronics, Inc.  
 Columbus—Universal Service  
 Dayton—Srepro Electronics  
 Toledo—Selectronic Supplies, Inc.

### OREGON

Portland—Portland Radio Supply Co.

### PENNSYLVANIA

Drexel Hill—Kass Electronic Distributors  
 Pittsburgh—Cameradio Company  
 Willow Grove—"Ham" Buerger

### SOUTH DAKOTA

Watertown—Stan Burghardt

### TENNESSEE

Nashville—Electra Distributing Company

### TEXAS

Abilene—Howard Radio  
 Corpus Christi—Douglas Electronics  
 Dallas—Electronic Center, Inc.  
 El Paso—McNicol, Inc.  
 Houston—Madison Electronics Supply

### WASHINGTON

Spokane—HCJ Electronics  
 Tacoma—C & G Electronic Company

### WISCONSIN

Milwaukee—Amateur Electronic Supply



**STAFF**

JOHN HUNTOON, W1RW  
*Editor*

E. LAIRD CAMPBELL, W1CUT  
*Managing Editor*

DOUG DE MAW, W1CER  
*Technical Editor*

GERALD L. HALL, K1PLP  
DOUGLAS A. BLAKESLEE, W1K1K  
ROBERT M. MYERS, W1FBY  
ROBERT E. ANDERSON, K1TVF\*  
*Assistant Technical Editors*

EDWARD P. TILTON, W1HDQ  
*V.H.F. Editor*

LEWIS G. McCOY, W1ICP  
*Beginner and Novice*

ROD NEWKIRK, W9BRD  
WILLIAM SMITH, K0CER  
LOUISE MOREAU, W6BBO  
JOHN TROSTER, W6ISQ  
*Contributing Editors*

MARK W. DANE, W1FKJ  
*Advertising Manager*

EDGAR D. COLLINS  
*Advertising Assistant*

J. A. MOSKEY, W1JMY  
*Circulation Manager*

JOHN H. NELSON, W0DRE  
*Assistant Circulation Manager*

\*On military leave of absence

**OFFICES**

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

Subscription rate \$7.50 per year post-paid, U.S. funds, in Canada and U.S.; \$8 elsewhere. ARRL Membership, including QST, available only to individuals with a bona fide interest in amateur radio: \$6.50 per year, U.S. funds, in Canada and U.S.; \$7 elsewhere. Single copies, 75 cents. 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. Copyright 1970 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

# QST

**JANUARY 1971**

VOLUME LV NUMBER 1

PUBLISHED MONTHLY, AS ITS OFFICIAL JOURNAL, BY THE AMERICAN RADIO RELAY LEAGUE INC., NEWINGTON, CONN., U. S. A. OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO UNION

## -CONTENTS-

**TECHNICAL -**

More Thoughts on Solid-State Receiver Design  
*Doug DeMaw, W1CER* 11

Receiving FM, Part I . . . . . *Douglas A. Blakeslee, W1K1K* 21

Gimmicks and Gadgets:

The Compact-A-Fest . . . . . *Bob Palmer, G5PP* 27

The Morse-A-Verter . . . . . *Raymond C. Petit, W7GHM/4* 30

"Five For Five" . . . . . *J. E. Kear, K4MI* 40

PEP, Average Power, and Related Matters  
*James N. Thurston, W4PPB* 43

Technical Correspondence . . . . . 44

Recent Equipment:

Varitronics-Inoue IC-2F FM Transceiver . . . . . 48

**BEGINNER AND NOVICE -**

U.S. Regulations, Part 97, Section 97.73. . . . .  
*Lewis G. McCoy, W1ICP* 36

**OPERATING -**

September VHF QSO Party Results . . . . . *Al Noone, W1KQM* 58

Annual ARRL Novice Roundup Announcement . . . . . 56

Distress Call . . . . . 65

Annual DXCC List . . . . . 97

**GENERAL -**

Ham Radio Broadens Horizons for Handicapped  
*Janice Robidoux, W0QXA* 52

CW Communications for the Deaf . . . . . 54

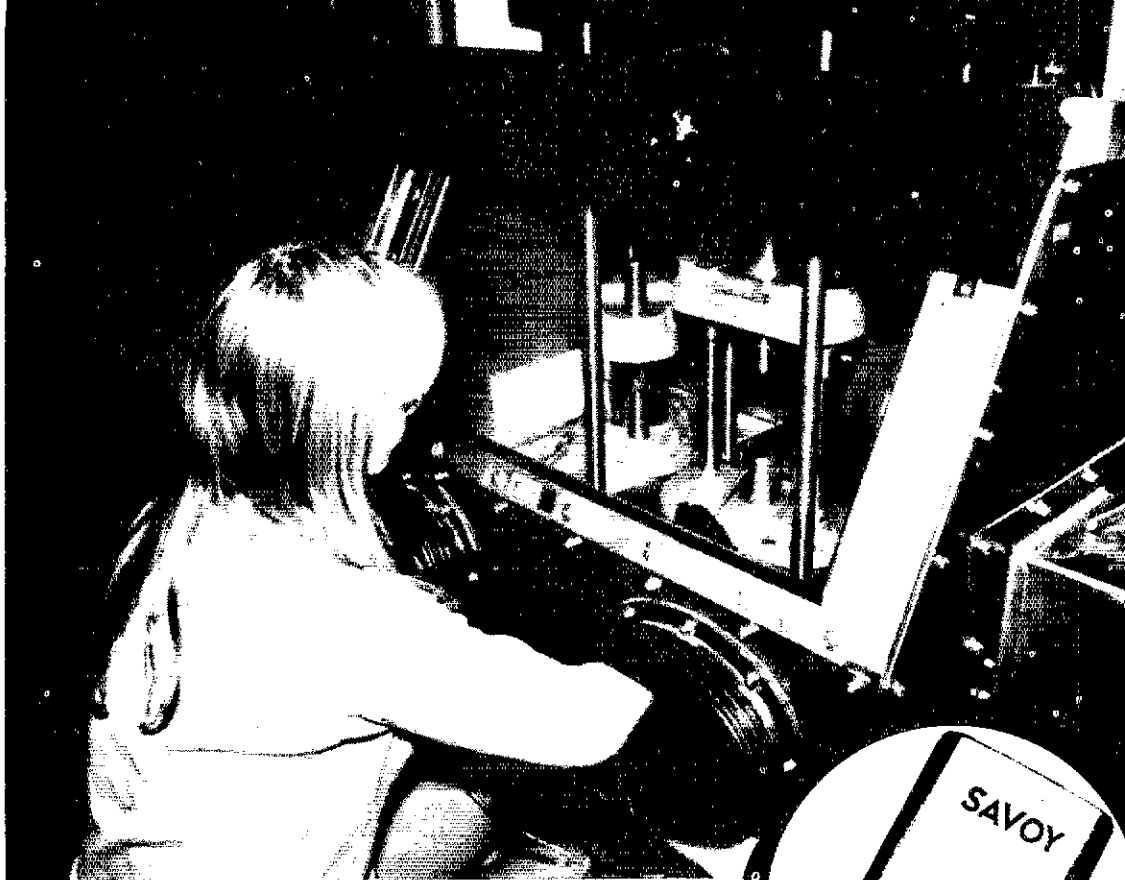
Hurricane Celia . . . . . *Bill Reichert, W1NFS* 62

ARPS	65	"It Seems to Us . . ."	9
ARRL Museum	47	League Lines	10
ARRL QSL Bureau	77	New Books	39
Coming Conventions	55	Operating Events	92
Correspondence	74	Operating News	93
Feedback	86,96	Silent Keys	83
Hamfest Calendar	55	Station Activities	102
Happenings of the Month	70	World Above 50 Mc.	78
Hints & Kinks	46	Y1, News & Views	84
How's DX?	87	W1AW Schedule	95
IARU News	76	25 and 50 Years Ago in QST	35

**OUR COVER**

Homemade receivers are not difficult to build. See page 11 for some ideas.





**IF AGING IS YOUR PROBLEM...  
"GOLD WELD" IS THE ANSWER!**

For absolute accuracy and superb frequency control, specify Savoy Crystals.

You will find them in use around the world in every field of communication where accuracy and dependability are a must.

We invite you to contact us for one, or a million, or just write for our free catalogue.



**Savoy Electronics, Inc**

P.O. Box 7127 - Fort Lauderdale, Florida - 33301

Tel: 305-566-8416. or 305-947-1191

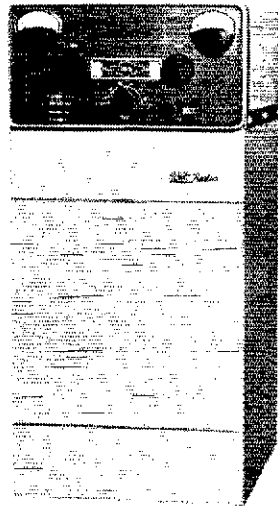
Henry Radio's  
**KENWOOD**



Never before has there been an amateur receiver and transmitter like the KENWOOD R-599 solid state receiver and T-599 hybrid transmitter. The wait is over . . . the promise of the transistor has been fulfilled, KENWOOD promises to be the new pacesetter in the field of short wave radio equipment . . . setting new standards of performance, reliability, flexibility, high styling, and value. Deliveries start in November. Order yours today. Become the proud owner of the world's most technologically advanced amateur Receiver/Exciter combination.

The R-599 Receiver . . . . . \$298.00  
The T-599 Transmitter . . . . . \$345.00

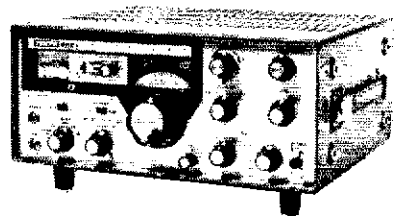
Henry Radio's  
**2K-3**



The 2K-3 in a few short years has established itself as pre-eminent among amateur linear amplifiers. The reason is simple. It is designed and built better. And above all, the 2K-3 is truly "Linear" . . . Why not own the best — treat yourself to the big clean signal of the 2K-3.

The 2K-3  
(console or desk model) . . \$745.00

Henry Radio's  
**TEMPO "ONE"**



The Tempo "ONE" SSB transceiver represents the culminating achievement of many years of experience in the amateur radio field. Modern design, superb performance, sturdy construction, outstanding reliability . . . at a surprisingly low price makes the Tempo "ONE" the best buy in transceivers today. Please come in or write for complete specifications.

The Tempo "ONE" . . . . . \$298.00  
AC/one, 110-220 volt 50/60 cycle power supply . . . \$99.00  
DC/one, 12 volt DC power supply . . . \$107.00

Now, meet Henry Radio . . .



Walt Henry  
W6ZN  
ANAHEIM



Ted Henry  
W6UOU  
LOS ANGELES



Bob Henry  
W0ARA  
BUTLER

Plus a large staff of highly qualified sales and service personnel pledged to serve you. Henry Radio carries large stocks of all major brands. We take trade-ins, sell used equipment and offer better terms because we carry our own financing. Our reconditioned equipment carries a 15 day trial, 90 day warranty and may be traded back within 90 days for full credit toward the purchase of new equipment. Export inquiries solicited. Also, military, commercial, industrial, and scientific users . . . please write for information on our custom line of high power linear amplifiers and RF power generators.

**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

"World's Largest Distributor of Amateur Radio Equipment"

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 (for preceding month) direct to the S.M. or the administrative ARRL official elected by members in each Section. Radio club reports are also desired by S.M.s 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 GRS, OVS, OPS, OI and ORN. Technicians may be appointed QVS, OVS, ORS at V.H.F. PAM. Notices may be appointed OVS. S.M.s desire application leadership posts of SEC, P., RM and PAM where vacancies exist.

ATLANTIC DIVISION

Delaware	K5NYG	John L. Penrod	RED 1	Crownsend 19734
Eastern Pennsylvania	W3HK	George S. Van Dyke, Jr.	4607 Convent Lane	Philadelphia 39114
Maryland-D.C.	K3LFD	John Mumford	306 Holland Rd.	Beesons Park, Md. 21146
Southern New Jersey	W2TFF	Charles E. Travers	State Police Drive	Freemont 08628
Western New York	K2RFA	Richard M. Intarsese	407 Woodland Rd.	Stratouse 13119
Western Pennsylvania	W3NEM	Robert E. Caswyle	146 J.N. Allen St.	State College 16801

CENTRAL DIVISION

Illinois	W9PRN	Edmond A. Abtzer	1520 South 4th St.	Springfield 62703
Indiana	W9BUQ	William C. Johnson	2848 Hillside Ave.	Indianapolis 46118
Wisconsin	W9NRP	E. M. Pukorny	R. 4, Box 179	El. Atkinson 53538

DAKOTA DIVISION

Minnesota	W9MVI	John H. Halstead	1315 North Cleveland Ave.	St. Paul 55108
North Dakota	W4WDM	Harold L. Sheets	21 Euclid Ave.	Grand Forks 58703
South Dakota	W4CPX	L. D. Gray	P.O. Box 147	Salem 57088

DELA DIVISION

Arkansas*	W4SVWH	Jimmie N. Lowrey	2818 N. Albert Pike	Fort Smith 72907
Louisiana	W5FM	I. Allen Swanson, Jr.	RED 1, Box 399	Covington 70433
Mississippi	W5NCR	Walker J. Coffey	RED No. 2	Oxford 386590
Tennessee	K4RCT	Harry A. Phillips	1700 Oak Meadow Ave.	Memphis 38128

GREATER LAKES DIVISION

Kentucky	W4CJD	Ied H. Prindle	694 Amanda Furnace Dr.	Asland 41101
Michigan	W8ZBT	Dwory J. Klinghouse	1727 Rose Dr.	Niles 49120
Ohio	W8FTD	Richard A. Egbert	6479 Red Fox Road	Reynoldsburg 43068

HUDSON DIVISION

Eastern New York	K2MNI	Graham G. Berry	50 Parent Ave.	New Rochelle 10801
N. Y. C. & Long Island	K2HIC	Fred I. Bruner	22 Ivy Drive	Jericho, L. I. 11753
Northern New Jersey	W2ZZ	Louis L. Amoroso	180 Pleasant Ave.	Bergenfield 07621

MIDWEST DIVISION

Iowa	K0EYU	Al Gilbert	P.O. Box 386	Charles City 50616
Kansas	K0BKI	Robert M. Summers	Box North 72nd	Kansas City 66109
Missouri	K0HW	Robert J. Dwyer	Route 4	Kirksville 63501
Nebraska	K0GAI	Y. A. Johnson	334 Pine St., Box 488	Chadron 69347

NEW ENGLAND DIVISION

Connecticut	W1HVF	John J. McNassar	218 Berlin Ave.	Southington 06489
Eastern Massachusetts	W1ALP	Frank L. Baker, Jr.	85 Solar Ave.	Braintree 02138
Maine	K1LEV	Peter K. Stearns	78 Latham St.	Sec. Portland 04006
New Hampshire	W1SWY	Robert Mitchell	Box 147-A	Chester 03034
Rhode Island	K1AAV	John E. Johnson	30 Fruit St.	Pawtucket 02860
Vermont	K1MPN	I. Reginald Murray	J. Hillcrest Drive	Montpelier 05602
Western Massachusetts	W1BVR	Derry J. Noble	P.O. Box 5	Conshohog 01237

NORTHWESTERN DIVISION

Alaska*	K1TEVO	Kenneth R. Klopf	2112 ml. Steele Cr. Rd.	Fairbanks 99701
Idaho	W7ZNN	Donald A. Crisp	1508 Alder Drive	Leviston 83601
Montana	W7RZY	Harry A. Roylance	P.O. Box 621	Harlowton 59036
Oregon	K7WVR	Dale I. Justice	136 N. E. Sunrise Lane	Hillsboro 97123
Washington	W7IWI	Harry W. Lewis	10351 Sandpoint Way, N. E.	Seattle 98125

PACIFIC DIVISION

East Bay	W8BDH	Paul J. Parker	2236 Whyte Park Ave.	Walnut Creek 94595
Hawaii	K1HJZ	Lee R. Wical	45-601 Luluia Rd.	Kaneohe 96744
Nevada	W7PHV	Leonard M. Norman	652 Utah St.	Boulder City 89004
Sacramento Valley	W6KYA	John E. Minke, III	6230 Rio Bonita Drive	Carmichael 95608
San Francisco	E6SRM	Kenneth S. McLaughlin	484 4th St., E.	Sonoma 95476
San Joaquin Valley	W6LPU	Ralph Saroyan	8204 E. Townsend Ave	Yreka 96097
Santa Clara Valley	W6VZT	Albert T. Gietano	415 Adobe Rd.	San Carlos 95030

ROANOKE DIVISION

North Carolina	W44DQ	Calvin M. Dempsey	1604 West Canal St.	Tarboro 27886
South Carolina	W44EP	Mrs. Elizabeth Y. Miller	1509 Highland Ave.	Camden 29010
Virginia	K4IRI	Robert J. Single	3514 - 35th St., N.	Arlington 22207
West Virginia	W8JM	Donald B. Morris	1116 Morningstar Lane	Fairmont 26544

ROCKY MOUNTAIN DIVISION

Colorado	W8SIN	Charles M. Cotterell	440 South Swadley St.	Lakewood 80228
New Mexico	W5NUI	James R. Price, O. V. M.	P.O. Box 1178	Los Alamos 87544
Utah	K7SUI	Carroll J. Soper	4422 Migration Canyon	Salt Lake City 84108
Wyoming	W7YQI	Wayne M. Moore	142 South Montana Ave.	Casper 82601

SOUTHEASTERN DIVISION

Alabama	W4WLG	Donald W. Bonner	2208 Rodgers Dr.	Huntsville 35811
Canal Zone*	K5SDA	Edward K. Johnson	Drawer 942	Fort Clayton
Eastern Florida	W4KJG	John E. Porter	P.O. Box 7297, Midland Branch	Miami 33155
Georgia	W4WQJ	A.L. Garrison	3529 Blueberry Dr.	Augusta 30906
West Indies	KP4IG	Jose Medina-Hernandez	Box 1480	Mayaguez, P. R. 00709
Western Florida	W4RKH	Frank M. Butler, Jr.	374 Hilltop Rd., S. E.	Fort Walton Beach 32548

SOUTHWESTERN DIVISION

Arizona	W7CAI	Gary M. Hamman	281 E. Campbell Ave.	Phoenix 85016
Los Angeles	W6AKZI	Harvey D. H. Helland	2908 Cedar St.	Alhambra 91801
Orange	W6MNY	Jerry L. VarDuff	8372 San Gabriel St.	Yorba Linda 92686
San Diego	W6VGF	Richard E. Laffer	6119 Manchester Rd.	San Diego 92115
Santa Barbara	W6WKN	Cecil D. Hinson	19311 Country Court	Thousand Oaks 91160

WEST GULF DIVISION

Northern Texas	W5LR	C. E. Harrison	1144 Holly Glen Drive	Dallas 75234
Oklahoma	W5PML	Cecil C. Cash	1802 South Ave.	Lawton 73501
Southern Texas	K5HZR	Emmanuel T. Grey	6215 Dissant Drive	San Antonio 78220

CANADIAN DIVISION

Alberta	VE6EK	Don Sutherland	444 25th Ave., N. E.	Calgary, Alta.
British Columbia	VE7JB	H. L. Savage	4553 West 12th Ave.	Vancouver 8, B. C.
Manitoba	YD4JH	Keith Watney	1728 Valme Rd.	Winnipeg 17
Maritime	VE1NR	William J. Galtis	Shediac Road, P.R. 6	Moncton N. B.
Ontario	VE3DV	Holland H. Shepherd	4016 Cowan Cres.	Ottawa 10
Quebec	VE2ALE	Joseph Unsworth	183 Mgr. Bourget	Vaudreuil, P.Q.
Saskatchewan*	VE5RO	Harry Ogden	2533 Macdonald Ave.	Prince Albert

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



# INTERNATIONAL frequency meter

- Tests Predetermined Frequencies 25 to 1000 MHz
- Extended Range Covers 950 MHz Band
- Pin Diode Attenuator for Full Range Coverage as Signal Generator
- Measures FM Deviation

MOBILE

## FM-2400CH

The **FM-2400CH** provides an accurate frequency standard for testing and adjustment of mobile transmitters and receivers at predetermined frequencies.

The FM-2400CH with its extended range covers 25 to 1000 MHz. The frequencies can be those of the radio frequency channels of operation and/or the intermediate frequencies of the receiver between 5 MHz and 40 MHz.

Frequency Stability:  $\pm .0005\%$  from  $+50^\circ$  to  $+104^\circ\text{F}$ .

Frequency stability with built-in thermometer and temperature corrected charts:  $\pm .00025\%$  from  $+25^\circ$  to  $+125^\circ$  (.000125% special 450 MHz crystals available).

Self-contained in small portable case. Complete solid state circuitry. Rechargeable batteries.

FM-2400CH (meter only) .....	\$595.00
RF crystals (with temperature correction).....	24.00 ea.
RF crystals (less temperature correction).....	18.00 ea.
IF crystals .....	catalog price



CRYSTAL MFG. CO., INC.  
10 NO. LEE • OKLA. CITY, OKLA. 73102

WRITE FOR CATALOG!

# 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 prerequisite, although full voting membership is granted only to licensed amateurs.

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



## Past Presidents

HIRAM PERCY MAXIM, W1AW, 1914-1936  
EUGENE C. WOODRUFF, W8CMP, 1936-1940  
GEORGE W. BAILEY, W2KH, 1940-1952  
GOODWIN L. DOSLAND, W0TNS, 1952-1962  
HERBERT HOOVER, JR. W6ZH, 1962-1966

## Officers

President . . . . . ROBERT W. DENNISTON,\* W0DX  
First Vice-President . . . . . CHARLES G. COMPTON,† W0BUO  
Vice-Presidents . . . . . ROEMER O. BEST, W5QKF  
CARL L. SMITH, W0BWJ  
Secretary . . . . . JOHN HUNTOON, W1RW  
Treasurer . . . . . DAVID H. HOUGHTON  
\* \* \* \* \*  
Honorary Vice-Presidents . . . . . WAYLAND M. GROVES, W5NW  
FRANCIS E. HANDY, W1BDI  
\* \* \* \* \*  
General Manager . . . . . JOHN HUNTOON,\* W1RW  
Communications Manager . . . . . GEORGE HART, W1NJM  
Technical Consultant . . . . . GEORGE GRAMMER, W1DF  
Assistant General Manager . . . . . RICHARD L. BALDWIN, W1RU  
Assistant Secretaries . . . . . PERRY F. WILLIAMS, W1UED  
WM. I. DUNKERLEY, JR, WA2INB

225 Main St., Newington, Connecticut 06111

General Counsel . . . . . ROBERT M. BOOTH, JR., W3PS  
1150 Connecticut Avenue, N. W., Washington, D. C. 20036

Associate Counsel . . . . . ARTHUR K. MEEN, Q.C., YE3RX

## DIRECTORS

### Canada

NOEL B. BATON\* . . . . . VE3CJ  
Box 660, Waterdown, Ontario  
Vice-Director: A. George Spencer, VE2MS  
171 Kipling Ave., Beaconsfield, Quebec

### Atlantic Division

HARRY A. McCONAGHY . . . . . W3EPC  
3708 Fenway Dr., Potomac Bethesda, Md. 20834  
Vice-Director: Jesse Bieherman . . . . . W3KTT  
RD 1, Box 66, Valley Hill Rd., Malvern, Pa. 19355

### Central Division

PHILIP E. HALLER . . . . . W9HPG  
6000 S. Tripp Ave., Chicago, Ill. 60629  
Vice-Director: Edmond A. Metzger . . . . . W9HFN  
1520 South Fourth St., Springfield, Illinois 62703

### Dakota Division

LARRY J. SHIMA . . . . . W7PAN  
1417 Goodrich Rd. S., Bloomington, Minn. 55431  
Vice-Director:

### Delta Division

MAX ARNOLD . . . . . W4VHN  
612 Hogan Rd., Nashville, Tenn. 37220  
Vice-Director: Franklin Cassen . . . . . W4WBK  
925 N. Trezevant St., Memphis, Tenn. 38108

### Great Lakes Division

ALBAN A. MICHEL . . . . . W5WVC  
359 Bonham Rd., Cincinnati, Ohio 45215  
Vice-Director: Cuirin L. Skut . . . . . W8F8Z/K8F8T  
119 N. Foster St., Lansing, Mich. 48912

### Hudson Division

HARRY J. DANNAIS\* . . . . . W2TTR  
16 Arbor Lane, Dix Hills, N.Y. 11746  
Vice-Director: Stan Zak . . . . . K28JQ  
13 Jennifer Lane, Fort Chester, New York 10870

### Midwest Division

STANLEY H. FOSTER . . . . . W0GQY  
2110 Goblin's Gully Dr., S.J.S., Cedar Rapids, Iowa  
52403  
Vice-Director: Ralph V. Anderson . . . . . K0N1L  
528 Montau Ave., Holton, Kansas 66436

### New England Division

ROBERT YORK CHAPMAN . . . . . W1QV  
28 South Road, Groton, Conn. 06340  
Vice-Director: Roger E. Corey . . . . . A1AXX  
60 Warwick Drive, Westwood, Mass. 02090

### Northwestern Division

ROBERT B. THURSTON\* . . . . . W7PGY  
7700 31st Ave., N.E., Seattle, Wash. 98115  
Vice-Director: David O. Bennett . . . . . W7QLF  
Box 455, St. Helens, Ore. 97051

### Pacific Division

J. A. DOC GAELTIN . . . . . W6ZRJ  
10835 Willowbrook Way, Cupertino, Calif. 95014  
Vice-Director: Hugh Cassidy . . . . . W6ABD1  
77 Coleman Dr., San Rafael, Calif. 94901

### Roanoke Division

VICTOR C. CLARK\* . . . . . W4KFC  
12927 Popes Head Road, Clifton, Va. 22024  
Vice-Director: L. Phil Wicker . . . . . W4ACY  
4821 Hill Top Road, Greensboro, N. C. 27407

### Rocky Mountain Division

CHARLES M. COTTERELL . . . . . W0STN  
430 S. Swadley St., Lakewood, Colo. 80228  
Vice-Director: Allen C. Anten . . . . . W0EON  
2575 South Datura St., Denver, Colo. 80222

### Southeastern Division

H. DALE STRIETER . . . . . W4DQS  
928 Trinidad, Cocoa Beach, Fla. 32931  
Vice-Director: Charles J. Bolvin . . . . . K4KQY  
2210 S.W. 27th Lane, Miami, Fla. 33133

### Southwestern Division

JOHN R. GRIGGS . . . . . W6KW  
8122-B Opal Circle, Huntington Beach,  
California 92647  
Vice-Director: Arnold Dahman . . . . . W8TUI  
14940 Hartland St., Van Nuys, Calif. 91405

### West Gulf Division

ROY T. ALBRIGHT . . . . . W5EYB  
107 Rosemary, San Antonio, Texas 78209  
Vice-Director: Leon Vico . . . . . W5VCF/W5OBC  
330 Rusk Ave., Houston, Texas 77002

\* Member Executive Committee

## "It Seems to Us..."



### THIS WAS 1970!

*All sorts of things and weather  
Must be taken in together  
To make up a year, and a Sphere.*

— Ralph Waldo Emerson

THE SPHERE of amateur radio in 1970 was made up, among other things, of such weather as the tornado which devastated Lubbock, Texas, on May 11, killing 26, injuring 2,000, and destroying 8,800 dwelling units. Normal means of communications were almost completely disrupted; once again, the amateur radio service met the challenge, earning a citation from the Governor of Texas for providing emergency communications. There were also tornadoes in Minnesota and Mississippi, a gale in Ontario, an ice storm in Oregon — all of which hampered normal communications and necessitated assistance from hams. The scarcity of amateurs in Pakistan and the Philippines, on the other hand, left those two nations without sufficient backup talk-power when a cyclone and a typhoon, respectively, slammed in.

Not weather, but another terror of Mother Nature, the earthquake, wracked Peru, triggering mudslides and avalanches which multiplied the damage. Again, radio amateurs on the scene (including ARRL's assistant general manager, now W1RU) used their skills and their equipment to help in rescue work. Amateurs also used their gear to help after many auto accidents, forest fires and similar local incidents. As a group, our skills are kept sharpened for such service by regular participation in traffic nets; by participation in AREC drills; by assistance to other groups putting on parades, boat, road and air races; by the Simulated Emergency Test in January; and by Field Day each June — which also is a social and fraternal event of great enjoyment for many of us.

The fraternal and social needs of amateur radio were further met by a magnificent National Convention in Boston during September's last weekend; by six division conventions, three state, and at least a gross (of which Hq. was notified) of hamfests, picnics, auctions and banquets. Fifty years of affiliation with ARRL were marked by the South Jersey Radio Assn. (which held a special program to celebrate); by the Massachusetts Institute of Technology Radio So-

ciety; and by the Milwaukee Radio Amateurs' Club, Inc. We said sad farewells to Honorary Vice President Gilbert L. Crossley, W3YA, and ARRL co-founder David L. Moore, ex-1WK, in the ranks of Silent Keys. More-cheerful goodbyes and well wishes went to George Grammer, W1DF, and "Lil" Salter, W1ZJE, on their retirements from full-time Hq. service. Kudos, too, went to "Soupy" Groves, W5NW, for his 35 years on the Board, 20 of them as first vice president; he was also elected as an honorary VP. Charles Compton, W0BUO, at the same meeting in May became first vice president, and Carl L. Smith, W0BWJ, joined "Doc" Best, W5QKF, as an additional vice president. Doug DeMaw, W1CER, became technical editor of *QST*.

Speaking of the technical department, interest in home-built receivers — revived a few years ago by Ted Crosby (also an SK in '70) with his HBR series — continued strong, with help from solid-state techniques and refinements in direct conversion. With solid-state solidly entrenched now in amateur radio, *QST* helped tube-type amateurs catch up with a background series on transistors (incidentally, so well received we had to make it into a booklet); a two-part article on operational amplifiers; and a piece on solid-state design. In a more-traditional area of amateur technical interest, low-frequency antennas — including one by the famous W8JK — were featured prominently in our journal.

Elsewhere on the technical front, Oscar 5 climbed upstairs on January 23 and talked to us for more than forty days. The product of the Wireless Institute of Australia's Project Australis, launched by NASA through the cooperative efforts of Project Oscar, the Radio Amateur Satellite Corporation (AMSAT). ARRL and scores of individual amateurs, Oscar 5 carried beacons for both 28 and 144 MHz; the 28-MHz rig was switched on and off from the ground, proving the feasibility of amateur satellite work in shared bands. Just in time, too — preparations were well along for the World Administrative Radio Conference on Space and Radio Astronomy to be held in June, 1971. The ARRL/AMSAT paper filed as part of U. S. preparations for the conference was able to cite the success of Oscar 5's command system to back up a plea for maximum

*(Continued on page 57)*

## League Lines . . .

Sparkplugged by WA9EZV, KETC-TV in St. Louis is producing a half-hour pilot introduction to amateur radio, first of a projected series for local telecast and distribution via Central Educational TV network and hopefully nationally. The pilot and series could ultimately be available on film for club and community showings. Hq. is providing staff support and counsel for the project.

Prints of our own film, "The Ham's Wide World," in its first year through a commercial film-distributing service were shown 145 times on TV, with a viewing audience of 5,904,500; and 1300 times to various civic, church, school, and other groups with a total audience of 59,464. In addition, League directors arranged for hundreds of showings to other local groups and TV stations, adding a good many thousands more to the number who have seen this exciting film.

More than 25 members have been nominated for the DX Advisory Committee, shortly to be organized. We don't envy WØDX's task of having to select a third that number from such an impressive list of qualified DX chasers.

Did you get upset by that "other" editorial last month, reporting that EIA was asking for 146-148 MHz to be assigned to CB? Relax! The proposal was shot down within the association, and was never filed with FCC.

"Television Interference, Its Cause, Effect and Cure," produced by the Washington (DC) TVI Committee, has long been a most helpful booklet for those plagued with TVI difficulties. Additional copies are still available to hams or others directly involved in TV service; write Harold Richman, Editor, WTVIC Aids, 3908 Lake Boulevard, Annandale, VA 22003. No charge, but requests must include a 9x12" self-addressed envelope with 24 cents postage.

WAZAAD has proposed that we have a corps of amateurs and equipment that could be dispatched on short notice to such disaster spots as Peru or Pakistan, to provide disaster communications. Who has thoughts on the subject?

Drop the first three letters from "contest" and what you have left is TEST. This is the month for THE test of the year, the SET January 30-31. It reveals the extent of our emergency preparedness locally and our long-haul traffic facilities nationally. Check page 77, December QST. QRV?

W8ZCQ of the W8 QSL bureau crew says there are gobs of unclaimed DX cards for Novices clogging the files. He wants to operate as a QSL forwarding agency, not a warehouse! So -- a note to all Novices in all call areas: send your bureau manager a s.a.s.e.; see page 77 this issue for the info on procedure.

ARRL VP WØBUO points out that shut-in handicapped amateurs wishing to upgrade to Advanced can take the exam by mail from another Advanced licensee -- doctor's certificate, Form 610 with the examiner's affidavit about the code test, and the \$9 fee go to FCC, Gettysburg, PA 17325.

A news story the other day told of a bill for consumer protection being "sneaked" past the lobbyists, including the U.S. Chamber of Commerce, who were trying to stop or bottle it up in committee. With the auto industry's Nader problems, NAB unable to get a commemorative stamp, tobacco industry losing the right to advertise cigarettes on TV, etc. -- well, maybe the day of the organized lobby is running out?

# More Thoughts on Solid-State Receiver Design

BY DOUG DEMAW, W1CER

THE DESIGN information outlined in this article was gathered over a two-year period while engineering a ham-band receiving package which could be described in the *Handbook*.<sup>1</sup> During the period of development a great deal of redesign and revision of the individual circuit sections was necessary in order to secure good performance and reliability. The circuits given here are the result of those efforts, and should be of interest to those individuals who are looking for ideas to incorporate into circuits of their own. It should be stressed, however, that this is not a construction article. Rather, it is a potpourri of practical circuits which can be used for a variety of receiver projects which the reader may undertake.

## Design Philosophy

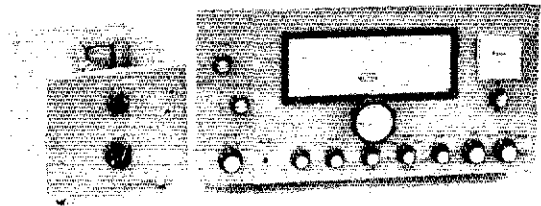
One of the problems faced by vhf operators is the matter of having a main station receiver perform as the tunable i-f for outboard vhf converters. Such an installation requires separate power supplies for the converters, numerous patch cables, additional space on the operating table, and a complicated switching arrangement if fast band changing is desired. By designing the tunable i-f to cover 28 to 30 MHz (single conversion), then building the 6- and 2-meter converters as parts of the composite receiver, the aforementioned problems are resolved. The block diagram shows the author's method for accomplishing the desired end result.

The tunable range of the 10-meter receiver is divided into four 500-kHz segments, thus eliminating the need for crystal switching in the vhf converters, as would be the case if the i-f tuned but 300 kHz (which is a popular scheme used in many homemade receivers).

In the interest of reducing unwanted responses, coverage of the hf amateur bands from 1.8 to 21 MHz is accomplished through the "up-converting" technique. That is, the converter i-f falls in the 28 to 28.5 MHz range. The crystal oscillator in the converter, Fig. 5, produces signals which fall above the 28 to 30 MHz tunable i-f, and are, of course,

\*Technical Editor

<sup>1</sup>Complete construction data for this unit are given in the 1971 *Handbook*.



Front view of the completed hf/vhf solid-state receiver. The smaller unit to the left of the photo is the hf-band up-converter, shown with its top cover removed.

well above the 9-MHz fixed-tuned i-f of the main receiver. A further aid to the reduction of birdies is the shielding and filtering of the individual signal modules in the main receiver. RF decoupling is employed in the power leads to each assembly, and rf energy is carried by coaxial cable to and from one assembly to another. Each signal module is shielded separately to prevent stray pickup of unwanted energy. A thorough check of the receiver's tuning range shows no birdies to be present in any of the bands.

## VHF Converters

The converters used in this equipment are described in detail in Oct., 1969 *QST* and in recent editions of the ARRL *Handbook*. The mixer FETs in both units have been changed from MFE3008s to RCA 40673s to take advantage of the built-in gate-protective diodes. However, the MFE3008s will offer otherwise comparable performance. Vhf converters of different design, but having a 28-MHz i-f, can be used in place of those specified here. Similarly, converters for other vhf or uhf bands can be substituted for the 6- and 2-meter units.

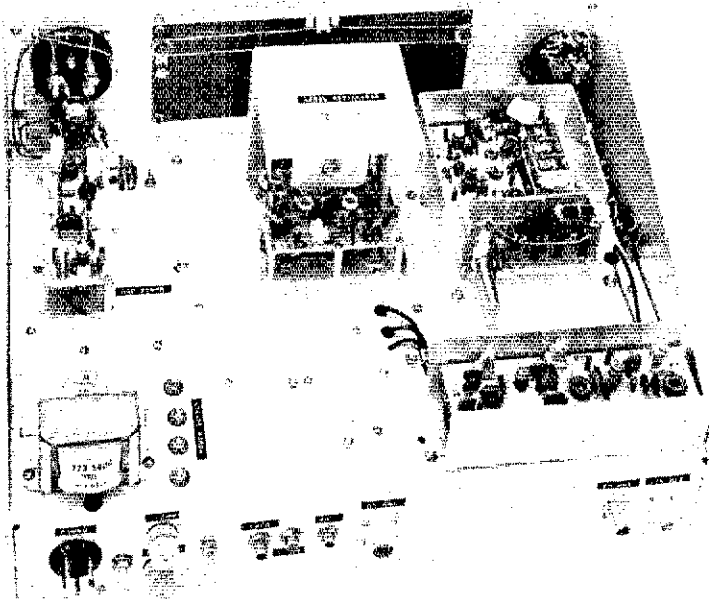
## Receiver Front End

Rf amplifier U1 (Fig. 1) uses a CA3028A which is connected as a differential amplifier. This device was selected because of its excellent age characteristics, high gain, and good stability. Furthermore, it is age-compatible with the two CA3028A ICs, U2 and U3, used in the 9-MHz i-f strip. A MOSFET could have been used in the rf stage, but this would have complicated the design of the age circuit.

*Here are some ideas which should interest the vhf man who wishes to operate 10, 6, and 2 meters while using a single piece of receiving equipment. The "up-converting" technique described in this article permits coverage of the high-frequency bands from 160 to 15 meters, plus WWV, and provides birdie-free reception by using oscillator frequencies which fall above the tunable i-f range of the main receiver.*



In this top-chassis view of the receiver the local oscillator is visible at the upper center. At the upper right of the picture one can see the front-end assembly. The i-f strip is at the lower right, and the agc board is at the upper left. In this view the shield covers are removed from the modules.



A double-tuned toroidal input circuit is used at U1 to provide good front-end selectivity. Unloaded  $Q$  of the inductors measures 180 with the cores specified. Since toroidal inductors are self-shielding, stray coupling is minimized — an aid to amplifier stability. A 3-gang, 20-pf per section variable tunes the inductors to resonance and is adjusted from the front panel (Preselector Tuning). Stability is excellent when the differential amplifier configuration is used, so no neutralization of the rf stage is necessary.

An RCA 40673 dual-gate MOSFET is used as the mixer, Q1. It offers high conversion gain, low cross-modulation, and light loading of the local oscillator. A CA3028A could be used in place of the MOSFET to obtain somewhat greater conversion gain, but its dynamic range would not be as good as that of the 40673. This would no doubt lead to some difficulties with IMD and overloading.

Mixer Q1 is followed by a 9-MHz i-f filter to establish the receiver's bandwidth. In this equipment a bandwidth of 2.4 kHz was chosen so that reception of ssb would be possible. The filter offers adequate selectivity for cw work, but those wishing to operate cw exclusively can install a 500-Hz KVG filter in place of the one used by the writer. Or, a switching circuit can be used to permit both filters to be utilized.<sup>2</sup>

A broadband toroidal step-up transformer, T1, is used to increase the oscillator injection level to gate 2 of Q1. Output from the local oscillator is

taken at low impedance from emitter-follower Q3. Mixer injection is supplied from 19 to 21 MHz.

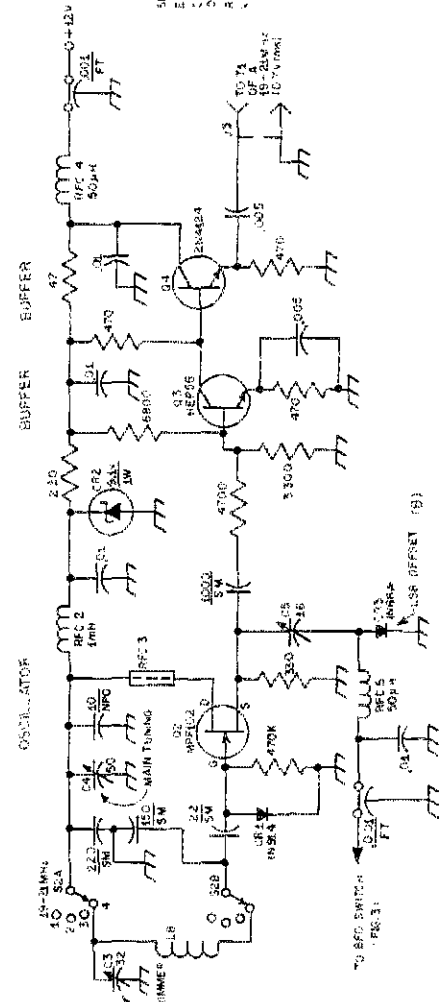
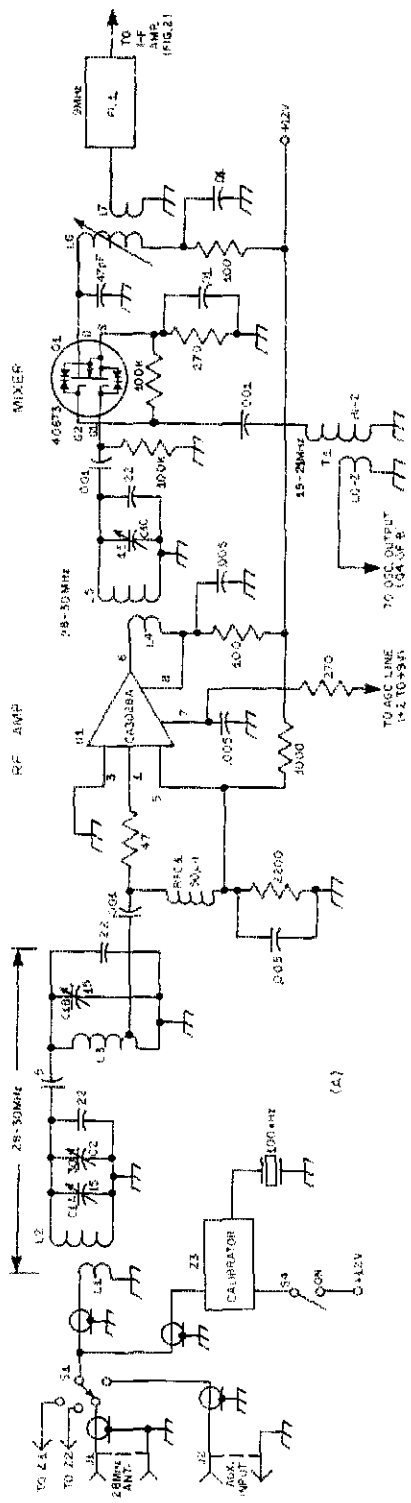
#### Local Oscillator

An MPF102 JFET is used for tunable oscillator Q2. A four-position band switch is used to select any one of four identical tuned circuits. The band positions provide four 500-kHz tuning ranges — 28 to 28.5 MHz, 28.5 to 29 MHz, 29 to 29.5 MHz, and 29.5 to 30 MHz. Circuit details are given in Fig. 1B. The high- $C$  oscillator tank assures reasonably linear readout on the main tuning dial, and contributes to good electrical stability.

A diode switch, CR3, is triggered by the BFO selector switch. It adds trimmer C5 to the source lead of Q2 during lower-sideband reception to provide a shift in oscillator frequency which matches that of the RFO. This is necessary to eliminate the need to retune local oscillator Q2 when changing sidebands.

Transistors Q3 and Q4 operate as buffer stages to prevent pulling of the tunable oscillator when the preselector is peaked, or when the rf gain control or agc circuit changes the bias on rf stage U1. This circuit is completely free of pulling effects. Oscillator drift is less than 2 kHz during the first hour of operation, and is less than 100 Hz per hour thereafter. The drift appears to result from changes in chassis temperature caused by a power transformer which runs fairly hot. An imported 24-volt transformer was used in this model, and the core material is apparently of inferior quality. A 2-ampere, 24-volt Stancor transformer can be substituted, and should remain cool over a long period of operation.

<sup>2</sup>See Recent Equipment, *QST*, Oct. 1970, p. 45. The KVG a-m filter for 3.75-kHz bandwidth is XF-9C, and XF-9D is for 5-kHz bandwidth. The 500-Hz cw filter is numbered XF-9M. Data sheet available from Spectrum International.



5M-50V MIC A  
EXCEPT AS INDICATED, NOMINAL VALUES OF  
CAPACITANCE ARE IN MICROFARADS (UF);  
OTHERS ARE IN PICOFARADS (PF OR PPF).  
RESISTANCES ARE IN OHMS.  
111070



Mechanical stability is an important consideration in circuits of this type. Because the oscillator operates at a rather high frequency (19 to 21 MHz), rigidity is important. The oscillator housing should be made from heavy-gauge metal, should be securely mounted to the chassis, and the chassis surrounding the box should be reinforced to prevent flexing. The VFO enclosure should be firmly secured to the front panel to prevent changes in frequency caused by panel/chassis flexing (which can exert pressure on the tuning capacitor shaft and linkage). Signal leads within the assembly should be kept short and direct. No. 16 or 14 bus wire is recommended for making connections between the coils, capacitors, and switch points. The main tuning capacitor should be of top quality, preferably a free-running, double-bearing type. A Millen 28050 MKBB is used in this circuit. An Eddystone No. 898 dial is used to provide a smooth vernier effect which is free of backlash. The flywheel tuning feature is useful when it is necessary to tune rapidly from one end of the dial to the other.

I-F Circuit

Fig. 2 shows the circuit of the i-f amplifier. Two more differential amplifiers are used here, U2 and U3. All three i-f tuned circuits are toroidal-wound to lessen the chance of interstage coupling and attendant instability. Capacitive dividers are used across the inductors to provide an impedance match at the input and output of the IC amplifiers. Age is applied to pin 7 of each IC, and varies from +2 volts at minimum gain to +10 volts during periods of maximum gain. The i-f signal is sampled at pin 1 of U3 and routed to age amplifier U4 of Fig. 4A. The power gain of this i-f strip is approximately 65 dB. Those wishing additional gain in this part of the receiver can add a third CA3028A, and can use circuit constants similar to those shown here.

Detector Section

A standard two-diode product detector is shown in Fig. 3A. It is changed to an a-m detector by switching CR5 out of the circuit. Since there is no conversion gain realized during a-m reception, audio output from the receiver is rather low when using the imported audio amplifier board employed in this model. If considerable a-m operation is planned, an additional stage of audio amplification can be added between the detector and the main audio amplifier, Z4. Or, an audio channel with more gain can be used at Z4.

The BFO

Separate BFO stages are used to provide upper- and lower-sideband reception (Fig. 3B). This system permits dc switching which is preferable to crystal switching. A common buffer amplifier, O7, isolates the oscillators from the load while increasing the BFO level to approximately 10 volts rms. Trimmer capacitors C9 and C10 are adjusted to place the BFO signal in the proper part of the i-f passband.

- RFC2 — 1-mH rf choke (Millen Co. J-300-1000).
- RFC3 — Three Amidon ferrite beads at drain terminal of Q2. Install on 1/2" length of No. 24 bus wire.
- S1 — Single-section, 2-pole, 4-position phenolic wafer switch, 4-position.
- S2 — Two-pole, 4-position, single-section, ceramic rotary switch.
- S4 — 8-pst wafer switch.
- T1 — Broadband toroidal step-up transformer. Secondary — (30  $\mu$ H.) 75 turns No. 30 enam. on Amidon T-50-2 core. Primary — 20 turns No. 30 enam. over sec. winding.
- Z1, Z2 — 6- and 2-meter converters described in October 1969 QST and in the 1970 Handbook.
- Z3 — 100-kHz crystal standard (Radio Shop Frequency Marker kit used here. Outputs on 5, 10, 25, 50, and 100 kHz. Radio Shop, Lab 1, 48 Elm Street, New Canaan, CT 06840).

- FL1 — 9-MHz, 2.4-kHz ssb lattice filter, KVG XF-9B. (Spectrum International, Box 87, Topsfield, Mass. 01983).
- J1 — SO-239 type coax chassis fitting.
- J2, J3 — Phono jack.
- L1 — 3 turns No. 30 enam. over L2.
- L2, L3, L5 — 13 turns No. 26 enam. on Amidon T-37-10 core (Amidon Assoc., 12033 Oisego St., N. Hollywood, CA 91607).
- L4 — 8 turns No. 26 enam. over L5.
- L6 — 5.5 to 8.6  $\mu$ H inductor (Miller 4505). J. W. Miller Co., 19070 Reyes Ave., Compton, CA 09221.
- L7 — 6 turns No. 30 enam. over B+ end of L6.
- L8 — 7 turns No. 18 enam. close-wound on Miller 4400-2 ceramic slug-tuned form (0.4 to 0.62  $\mu$ H). Four required. Cement turns with Q dope. RFC1, RFC4, RFC5 — Miniature 50  $\mu$ H choke (Millen Co. J-300-50).

- Fig. 1 — At A, the circuit diagram of the front end. At B, the VFO sections of the receiver. Numbered components not listed in parts list are for text reference. Resistors are 1/2-watt carbon. Fixed-value capacitors are disk ceramic unless otherwise stated.
- C1 — Three-section miniature variable (J. W. Miller 1460), 20 pF per section.
- C2 — 3-30 pF ceramic or compression trimmer.
- C3 — Miniature 32-pF air trimmer (4 required). E. F. Johnson 160-130, or Hammarlund MAC-30 suitable.
- C4 — Double-bearing 50-pF variable (James Millen 28050 MKBB used here).
- C5 — Miniature pc-mount 16-pF variable (Johnson 189-506-5), mounted on VFO board near O2.
- CR1 — High-speed silicon switching diode. 1N914 or equiv.
- CR2 — 9.1-volt, 1-watt Zener diode.



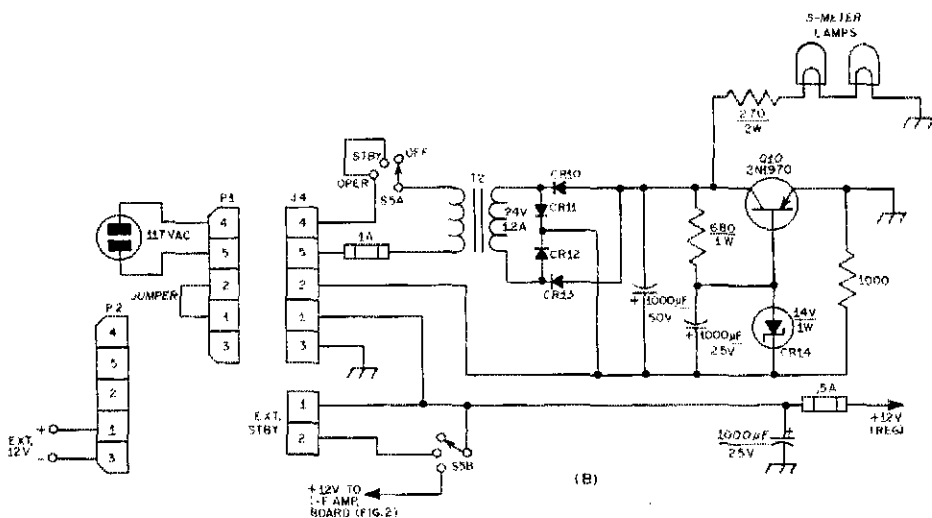
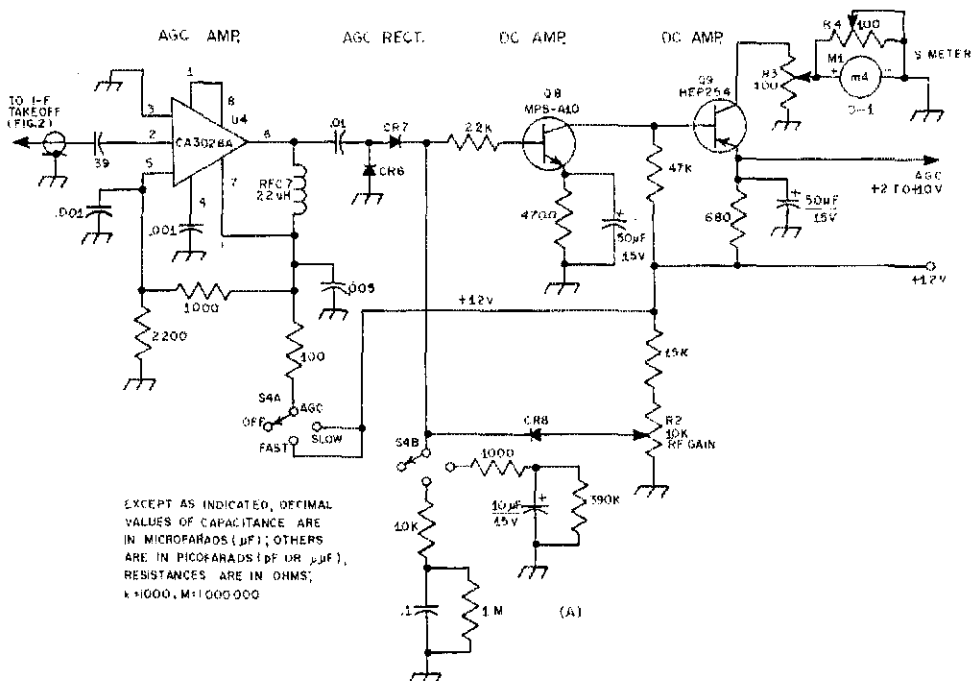


Fig. 4 — At A, the circuit for the agc system. The diagram at B shows the power supply section. Fixed-value resistors are 1/2-watt carbon. Capacitors are disk ceramic. Those with polarity marking are electrolytic.

- CR6, CR7 — 1N914 silicon switching diode.
- CR8-CR13, incl. — 50-PRV, 1-ampere silicon diode.
- CR14 — 14-volt, 1-watt Zener diode (see text).
- J4 — 5-pin male plug (chassis mount).

- M1 — 0 to 1-mA S meter (Latayette Radio 99E25140 with built-in lamps).
- P1, P2 — 5-pin female cable-end plug.
- Q8, Q9 — Motorola semiconductor.
- RFC7 — 22- $\mu\text{H}$  rf choke (Millen J-300-22).
- R2 — 100,000-ohm, linear-taper 2-watt carbon control (Allen Bradley).
- R3, R4 — PC-mount, 100-ohm linear-taper carbon control.
- S4, S5 — 2-pole, 3-position, single-section phenolic wafer switch.
- T2 — 24-volt, 1.2-ampere transformer.



TABLE I

Freq. (MHz)	L16	L17	L18	L19	C12	Y3
1.8-2.0	6T No. 30 Enam.	18.8-41 $\mu$ H (42A335CBI)	18.8-41 $\mu$ H (42A335CBI)	4-6 $\mu$ H 8T No. 26 Enam.	43 pF	30.3 MHz
3.5-4.0	5T No. 30 Enam.	6.05-12.5 $\mu$ H (42A105CBI)	6.05-12.5 $\mu$ H (42A105CBI)	3-5 $\mu$ H 7T No. 26 Enam.	51 pF	32 MHz
7-7.5	4T No. 30 Enam.	3.6-8.5 $\mu$ H (42A686CBI)	3.6-8.5 $\mu$ H (42A686CBI)	4-6 $\mu$ H 8T No. 26 Enam.	33 pF	35.5 MHz
14-14.5	3T No. 30 Enam.	1-1.87 $\mu$ H (42A156CBI)	1-1.87 $\mu$ H (42A156CBI)	2-4 $\mu$ H 5T No. 26	51 pF	42.5 MHz
21-21.5	2T No. 30 Enam.	4-1 $\mu$ H (42A106CBI) (Remove 2T)	4-1 $\mu$ H (42A106CBI) (Remove 2T)	2-4 $\mu$ H 5T No. 26	27 pF	49.5 MHz
WWV (15 MHz)	2T No. 30 Enam.	1-1.87 $\mu$ H (42A156CBI)	1-1.87 $\mu$ H (42A156CBI)	2-4 $\mu$ H 5T No. 26	51 pF	43.3 MHz

Coil, capacitor, and crystal data for the up-converter. Coil L16 is wound over the ground end of L17. Y3 is the 3rd overtone variety. All coils for L19 are close-wound on J. W. Miller 4500-4 iron slug forms. C12 is silver mica. All coils are available from J. W. Miller Co., 19070 Reyes Ave., Compton, CA 90221.

the main chassis of the receiver. Also, the input and output transformers each have one lead connected to the ground foil of the board. The ground foil should be cut away with a knife blade so that the 8-ohm and 100,000-ohm windings are floating with respect to the remainder of the board. This will permit normal connections to be made to the rest of the receiver, using shielded audio cable. Almost any pair of 1-watt pnp transistors can be used in place of the 2N599s. Substitutes should have medium beta and a  $V_{ceo}$  of at least 40.

### The "Up-Converter"

The circuit for this outboard accessory is given in Fig. 5. It uses a crystal-controlled local oscillator. Since the crystal frequencies fall *above* that of the tunable 28-MHz i-f, there are no birdies to contend with — the main reason for adopting this technique. The circuit is quite standard, so an in-depth explanation will not be offered.

The converter power supply is a duplication of that shown in Fig. 4B. It was made husky so that it could be used to power other receivers that might be built as companion units to the converter.

Those not interested in the 6- and 2-meter feature of this receiver may eliminate Z1 and Z2. If this is done, the up-converter can be built on the main receiver chassis, and its power can be taken from the main receiver supply. Alternatively, the power supply in the up-converter can be omitted, and the converter's power taken from a dry-battery supply.

### Construction

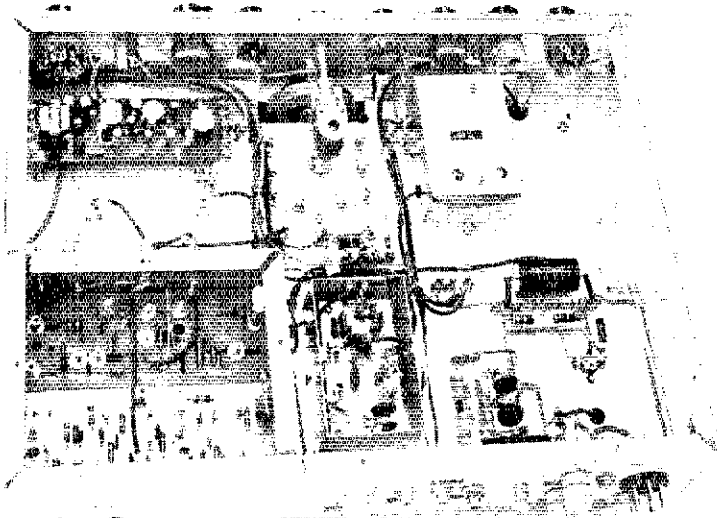
The primary thought in the assembly of this equipment is that the signal modules are isolated from one another by means of shield com-

partments, feedthrough capacitors, and interconnecting leads of small-diameter coax. This technique greatly reduces the possibility of spurious responses and unwanted signal pickup. The placement of the various modules is not critical when this method is used, hence, the builder can plan his own layout if he wishes. The audio amplifier, however, should be located as far away from the power supply as possible to reduce hum to a minimum. An iron shield compartment, made from galvanized furnace ducting or a tin can, could be used to enclose the power supply and audio system. This would greatly reduce the possibility of hum pickup.

The receiver shown in the photos is assembled on a 12 X 17 X 3-inch aluminum chassis. A 10 1/2-inch aluminum rack panel contains the Eddystone dial and panel controls. One inch of stock was removed from each end of the panel.

The local oscillator is controlled by the Eddystone dial, and gives linear readout across most of the tuning range. The 0-to-500 logging scale is used to read the 500-kHz band segments. However, this range reads backwards when using the up-converter, so one must interpolate. Of course, the dial face can be calibrated to provide whatever readout is desired.

One significant handicap resulting from the use of this dial mechanism is that its control shaft is situated rather high above the chassis when mounted as shown. This feature made it necessary to house the VFO in a much higher box than was wanted. Despite the use of heavy-gauge aluminum stock for the VFO box, some mechanical instability results when the receiver is bumped. If this mounting and construction technique is used, the VFO should be secured to the panel as well as to the chassis, and the chassis should have a thick aluminum plate mounted under the VFO box. The



In this bottom view of the receiver the vhf converters are at the lower left. The detector assembly is at the lower center. To its right is the power supply. The small box at the upper right contains the BFO. The imported audio board is at the upper left of the photo. To its right are the coil-slug screws and trimmer shafts for the local oscillator. The right-angle drive switch connects to the band switch in the oscillator box.

plate should extend as far beyond the box as practical. A different dial mechanism could solve this problem...or a different layout with the present dial assembly may be possible. The panel is finished in gray, and press-on decals identify the controls.

### Final Comments

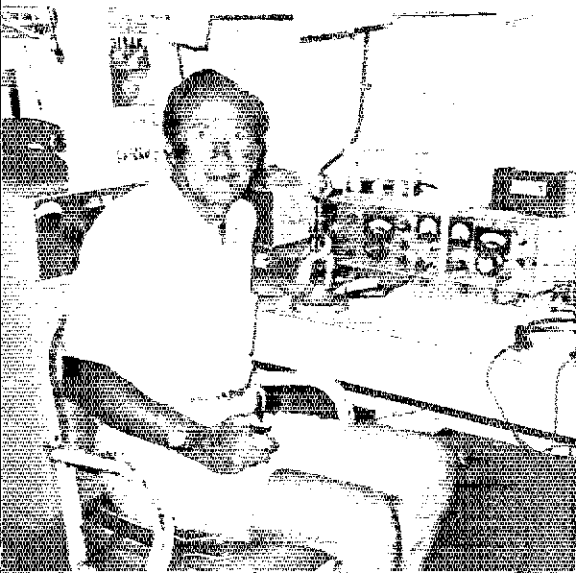
The design ideas offered here should be helpful to those who experiment with solid-state receiver circuits. Other types of transistors and ICs may offer improved performance in some respects. Since this equipment was built, a number of new solid-state components have been introduced by various manufacturers. For example, Motorola's MC1590G i-f amplifier might be an interesting substitute for the two CA3028As used in the i-f

strip. Because of its high gain characteristics a single MC1590G might be sufficient in that part of the circuit. The new MC1596G IC offers some interesting possibilities for mixer and product-detector service in a receiver of this kind. There are a number of new RCA ICs which the experimenter may wish to try in these circuits. Information on the newer RCA types is given in *RCA Linear Integrated Circuits*, Series IC-42. Typical circuits for many of the ICs are shown in the booklet.

Performance with the circuits shown is excellent. Good sensitivity and overall gain, immunity to overloading and cross-modulation, and proper electrical stability are features which the writer paid particular attention to. In this regard, operation is comparable to that of many well designed commercial units that were tested in the ARRI lab.

QST

## Strays



### Stolen Equipment:

A Swan 500C (Serial No. 1-295620) was stolen from my car which was parked in my own driveway. If anyone has information please contact the Aurora Police Dept., 9801 E. 16th Ave., Aurora, CO 80010, or me, Walter Modigan, W0LRY, Box 234, Aurora, CO 80010 telephone, 303-755-9710.

Best Zip code seen to date noted in W2FCR's address: 08873!

This is WB4LLR in the radio shack of the hospital ship *S.S. Hope* where he served as a volunteer physician for two months in Tunisia.

QST for

# Receiving FM

## Basic Principles and New Circuits

### Part 1

Part I of this article reviews the basic of fm reception using simple language. Parts II and III will appear in future issues.

BY DOUGLAS A. BLAKESLEE,\* WIKLK

THE INTRODUCTORY box included with an article on fm reception in *QST* for March 1941<sup>1</sup> stated, "... sign posts seem to point to narrow-band frequency-modulation as the eventual ham system." This bit of prophecy didn't envision the development of ssb, but, with inclusion of the words "vhf phone," 1971 soothsayers can certainly use the statement. Amateur fm activity has been held back, at least for the home experimenter, because reception of frequency-modulated signals cannot be accomplished satisfactorily with simple equipment. As pointed out by Cobb and O'Brien,<sup>2,3</sup> amateurs didn't start using fm extensively until high-quality transceivers, retired by the land-mobile services, became available at "give-away" prices. In spite of many *QST* features on the subject in the '40s, in most cases it took a surplus bargain or a week of listening on a quality fm receiver to convince hams to try the "wobbly-oscillator" mode.

The upsurge of fm activity has caused used-equipment prices to skyrocket. A number of manufacturers have introduced solid-state rigs designed for the amateur market, but the price tags on these transceivers put them out of the reach of

those trying to support a family or pay for an education. A homemade fm receiver or receiving adapter, however, can be built with only a modest investment. This article discusses the basic requirements of an fm receiving system, describes several fm adapters that can be used with older communications receivers, reviews a number of new solid-state device and circuit developments for fm reception, and covers in detail the construction of a 10-meter wide-band fm receiver. Any owner of a battery-eating tube rig can do his car a favor by constructing solid-state circuits similar to those presented here, adding them a section at a time to the old "klunker." The result can be a receiver with improved performance that draws 200 mA instead of 5 A from the automobile electrical system.

### The FM Receiver

Block diagrams of an a-m/ssb and an fm receiver are shown in Fig. 2. Fundamentally, to achieve a sensitivity of less than one microvolt, an fm receiver requires a gain of several million — 100 much total gain to be accomplished with stability on a single frequency. Thus, the use of the superheterodyne circuit has become standard practice. Three major differences will be apparent from a comparison of the two block diagrams. The fm receiver employs a different wider-bandwidth filter, a different detector, and has a limiter stage added between the i-f amplifier and the detector. Otherwise the functions, and often the circuits, of the rf, oscillator, mixer and audio stages will be the same in either receiver.

In operation, the noticeable difference between the two receivers is the effect of noise and interference on an incoming signal. From the time of the first spark transmitters, "rotten QRM" has been a major problem for amateurs. The limiter and discriminator stages in an fm set can eliminate a good deal of impulse noise,<sup>4</sup> except that noise which manages to acquire a frequency-modulation characteristic.<sup>5</sup> Accurate alignment of the receiver i-f system and phase tuning of the detector is required to achieve good noise suppression. Fm receivers perform in an unusual manner when QRM

<sup>4</sup>Landon, "Impulse Noise in F.M. Reception," *Electronics*, February, 1941; Crosby, "Frequency-Modulation Noise Characteristics," *Proceedings of the IRE*, April, 1937; Grammer and Goodman, "Wideband Frequency Modulation in Amateur Communication," *QST*, January, 1940.

<sup>5</sup>Hierath, "Noise Reflection in Frequency Modulation," *QST*, December, 1940.

\* Assistant Technical Editor, *QST*

<sup>1</sup>Grammer, "Some Thoughts on Amateur F.M. Reception," *QST*, March, 1941.

<sup>2</sup>Cobb and O'Brien, "Amateur FM and Repeaters," *QST*, October, 1969.

<sup>3</sup>Goodman, who wrote a number of the *QST* features trying to promote the fm mode in the '40s, made the same point in a letter to *Ham Radio*, February, 1970 edition.

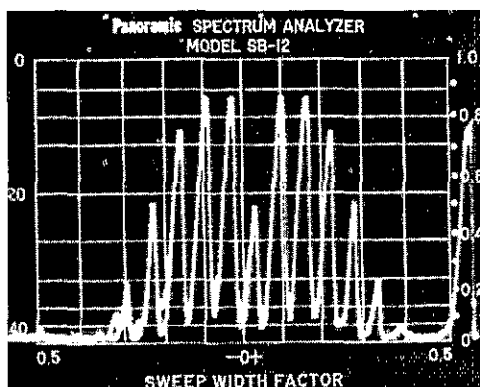


Fig. 1 — Output wave form of a narrow-band fm transmitter modulated by a 1-kHz tone.

## A-M RECEIVER

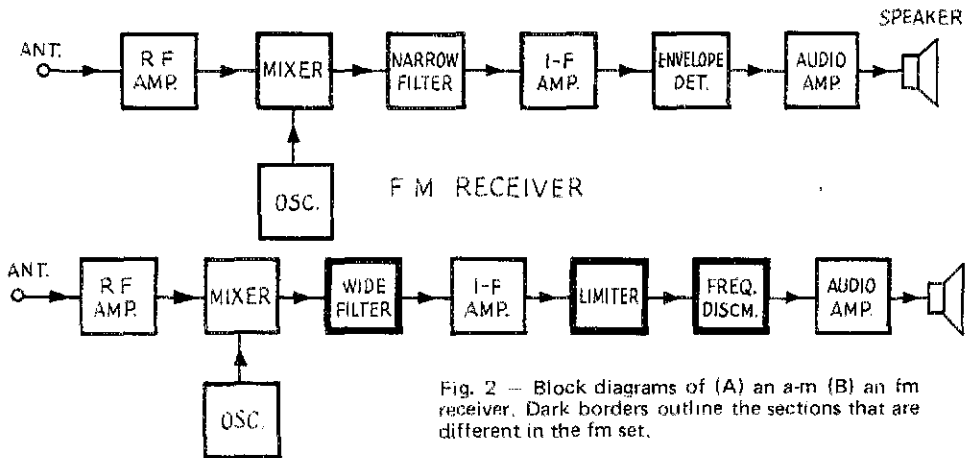


Fig. 2 — Block diagrams of (A) an a-m (B) an fm receiver. Dark borders outline the sections that are different in the fm set.

is present, exhibiting a characteristic known as the *capture effect*. The loudest signal received, even if it is only two or three times stronger than other stations on the same frequency, will be the only transmission demodulated. By comparison, an S9 a-m or cw signal can suffer noticeable interference from an S2 carrier.

### Bandwidth

An fm signal swings above and below a center frequency with voice modulation. The amount of peak swing allowed in the fm transmitter is called the *deviation*. Three deviation amounts are now standard practice: 15, 5 and 2.5 kHz, which in the current vernacular of fm users, are known as wide band, narrow band, and sliver band, respectively. (See box p. 25.) The 2.5-3 kHz deviation (called *nbfm* by OTs) was popular for a time on the vhf bands and 10 meters after World War II. Deviation figures are given for the frequency swing in one direction. The bandwidth required in an fm receiver is approximately 2.4 times the deviation — 36 kHz for wide band and 13 kHz for narrow.

Most fm sets that use tubes achieve i-f selectivity by using a number of overcoupled transformers. The wide bandwidth and phase-response characteristic needed in the i-f system dictate careful design and alignment of all interstage transformers. For those experimenters willing to take on a difficult challenge, the design procedure for fm i-f transformers is covered in *The Radiotron Designer's Handbook*.<sup>6</sup>

For the average ham, the use of a high-selectivity filter in a homemade receiver offers some simplification of the alignment task. Following the techniques used in ssb receivers,<sup>7</sup> a crystal or ceramic filter should be placed in the circuit as close as possible to the antenna connector — at the output of the first mixer, in most cases. Fig. 3 lists a number of suitable filters that are available to amateurs, and sources for the various units are listed in Appendix A. Prices for these filters are in the range of \$10 to \$30. Experimenters who wish

<sup>6</sup>Llangford-Smith, *Radiotron Designer's Handbook*, 4th Edition, RCA, Harrison, NJ.

<sup>7</sup>Goodman, "Whats Wrong with Our Present Receivers?", *QST*, January, 1957.

### F M FILTERS

Manufacturer	Model	Center Frequency	Nominal Bandwidth	Ultimate Rejection	Impedance (r) In Out	Insertion Loss	Crystal Discriminator
KVG (1)	XE-9E	9.0 MHz	12 kHz	90 dB	1200 1200	3 dB	XD9-02
KVG (1)	XE-107A	10.7 MHz	12 kHz	90 dB	820 820	3.5 dB	XD107-01
KVG (1)	XE-107B	10.7 MHz	13 kHz	90 dB	910 910	3.5 dB	XD107-01
KVG (1)	XE-107C	10.7 MHz	30 kHz	90 dB	2000 2000	4.5 dB	XD107-01
Heath Dynamics (2)		21.5 MHz	13 kHz	90 dB	550 550	3 dB	
Heath Dynamics (2)		21.5 MHz	30 kHz	90 dB	1100 1100	2 dB	
E.S. (3)	FB-6D	10.7 MHz	15 kHz	80 dB	950 950	2 dB	AR-1C
E.S. (3)	FB-1A	10.7 MHz	30 kHz	80 dB	2000 2000	4 dB	AR-1C
E.S. (3)	FL-3A	11.5 MHz	36 kHz	70 dB	50 50	4 dB	AG-3
E.S. (3)	DR-9	21.4 MHz	20 kHz	40 dB	150 150	5 dB	AR-10
Clevite (4)	TCF-4-12D30A	455 kHz	12 kHz	60 dB	40k 2200	6 dB	
Clevite (4)	TCF-4-18G45A	455 kHz	18 kHz	50 dB	40k 2200	6 dB	
Clevite (4)	TCF-6-30D55A	455 kHz	30 kHz	60 dB	20k 1000	5 dB	

Fig. 3 — A list of fm-bandwidth filters that are available to amateurs. Manufacturer's addresses are listed in Appendix A.



to "roll their own" can use surplus hf crystals, as outlined in ARRL's *Single Sideband for the Radio Amateur*, or ceramic resonators, following a computer-developed filter catalog.<sup>8</sup>

One item of concern to every amateur fm user is the choice of i-f bandwidth for his receiver, as both 15- and 5-kHz deviation are now in common use on the amateur bands. A wide-band receiver can receive narrow-band signals, suffering only some loss of audio in the detection process. However, a wideband signal will be badly distorted when received on a narrow-band rig. At this point it seems reasonable to assume that increasing fm activity and continued production of commercial narrow-band transceivers may gradually shift amateur operation to a 5-kHz deviation standard. But, as with the a-m operators, the wide-band enthusiasts will be around for some time to come, lured by inexpensive surplus wide-band gear.

### Limiters

When fm was first introduced, the main selling point used for the new mode was the noise-free reception possibilities.<sup>9</sup> The circuit in the fm receiver that has the task of chopping off noise and amplitude modulation from an incoming signal is the *limiter*. Most types of fm detectors respond to both frequency and amplitude variations of the signal. Thus, the limiter stages preceding the detector are included to "cleanse" the signal so that only the desired frequency modulation will be demodulated. This action can be seen in Fig. 5.

Limiter stages can be designed using tubes, transistors, or ICs. For a tube to act as a limiter, the applied B voltages are chosen so that the stage will overload easily, even with a small amount of signal input. A sharp-cutoff pentode such as the 6BH6 is usually employed with little or no bias applied. As shown in Fig. 4, the input signal limits when it is of sufficient amplitude so that diode action of the grid and plate-current saturation clip both sides of the input signal, producing a constant-amplitude output voltage.

Obviously, a signal of considerable strength is required at the input of the limiter to assure full clipping, typically several volts for tubes, one volt for transistors, and several hundred microvolts for ICs. Limiting action should start with an rf input of 0.2  $\mu$ V or less, so a large amount of gain is required between the antenna terminal and the limiter stages. For example, the Motorola 80D has eight tubes before the limiter, and the solid-state MOTRAC receivers use nine transistor stages to get sufficient gain before the first limiter. The new ICs offer some simplification of the i-f system as they pack a lot of gain into a single package, but the fm

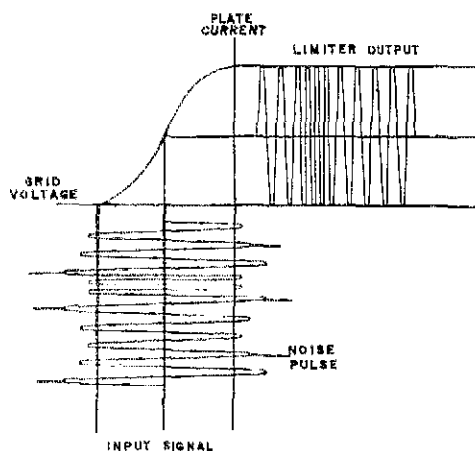


Fig. 4 — Representation of limiter action. Amplitude variations on the signal are removed by the diode action of the grid-and plate-current saturation.

equivalent of the "superregen" has yet to be developed.

The high gain used in fm receivers accounts for another requisite, an audio squelch. With 140 dB or more of amplification before the detector, a blast of noise emits from the fm-sel speaker when no signal is being received. To allow monitoring for long periods without having one's wife and children leave home, a squelch is employed to quiet the avalanche of noise until a signal is heard. Popular commercial squelch circuits were recently

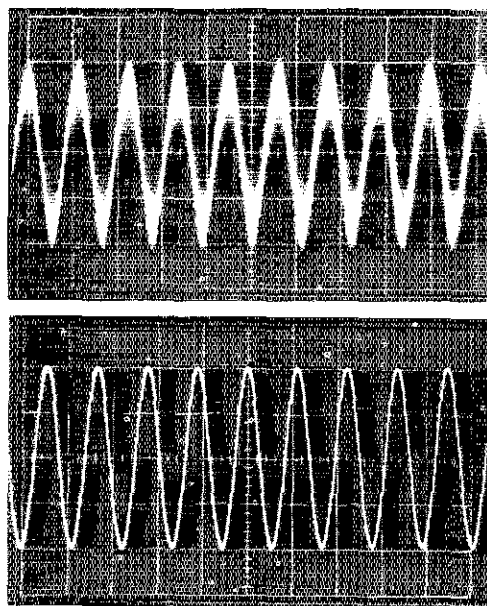
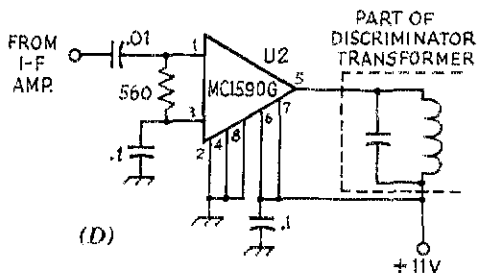
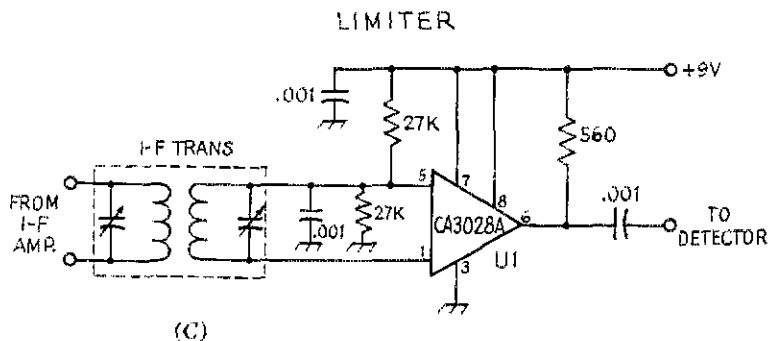
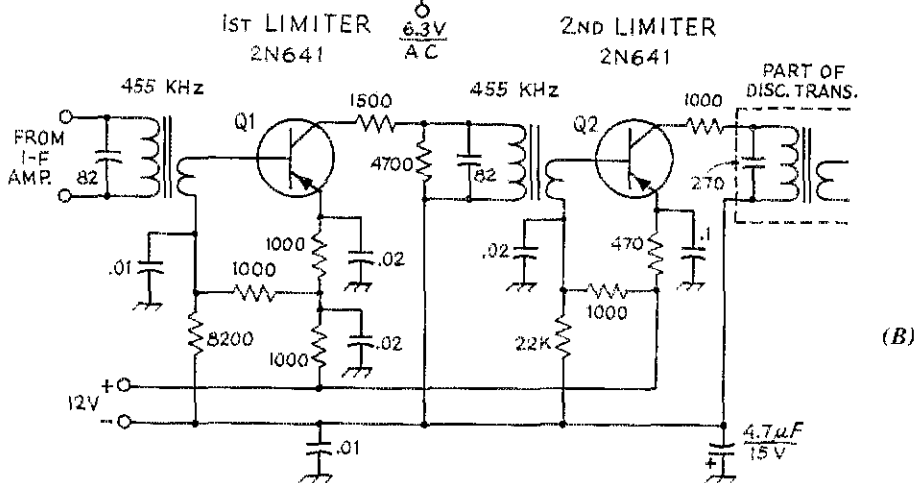
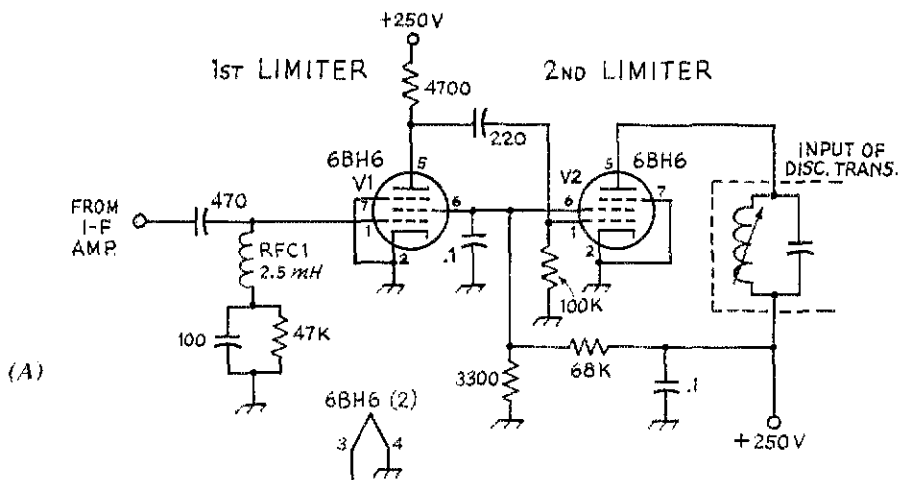


Fig. 5 — (A) Input wave form to a limiter stage shows a-m and noise. (B) The same signal, after passing through two limiter stages, is devoid of a-m components.

<sup>8</sup>Clevite ceramic elements can be used to produce a wide range of filter bandwidths following the design catalog in *Clevite Identical Resonators*, No. 94031, available from Regner Zimmerman, Sales Manager, Gould, Inc., 232 Forbes Road, Bedford, OH 44146. Clevite products are available through the distributor listed in Appendix A.

<sup>9</sup>Armstrong, "A Method of Reducing Disturbances in Radio Signaling by a System of Frequency Modulation," *Proceedings of the IRE*, May, 1936; Noble, "Frequency Modulation Fundamentals," *QST*, August, 1939.



EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS ( $\mu F$ ); OTHERS ARE IN PICOFARADS ( $pF$  OR  $\mu\mu F$ ); RESISTANCES ARE IN OHMS; K=1000, M=1000 000.

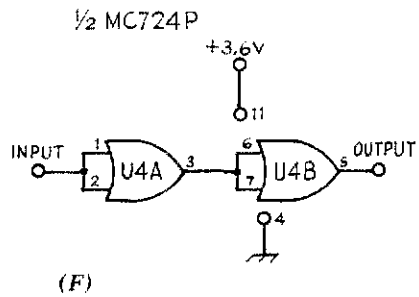
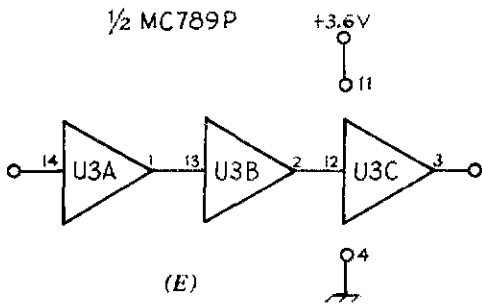


Fig. 6 — Typical limiter circuits using (A) tubes, (B) transistors, (C) a differential IC, (D) a high-gain linear IC, (E) digital inverters, and (F) digital gates.

FCC amateur regulations (Part 97.61) limit the bandwidth of F3 (frequency and phase modulation) to that of an a-m transmission having the same audio characteristics below 29.0 MHz and in the 50.1- to 52.5-MHz frequency segment. Greater bandwidths are allowed from 29.0 to 29.7 MHz and above 52.5 MHz.

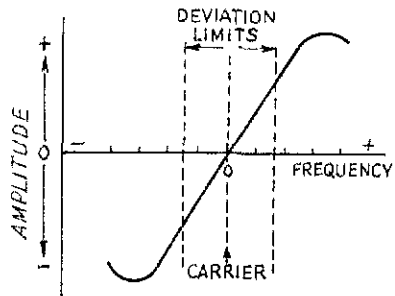


Fig. 7 — The characteristic of an fm discriminator.

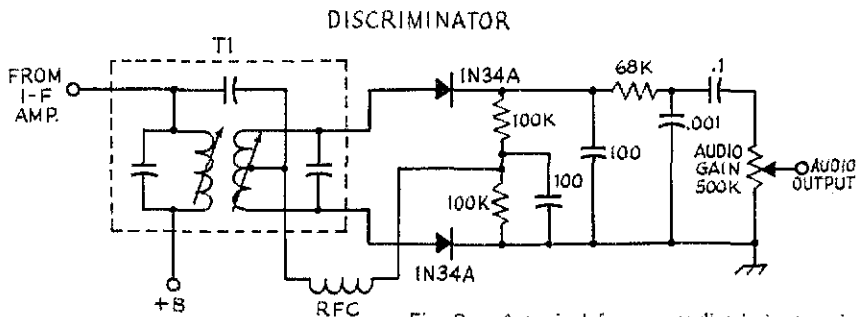


Fig. 8 — A typical frequency-discriminator circuit used for fm detection.

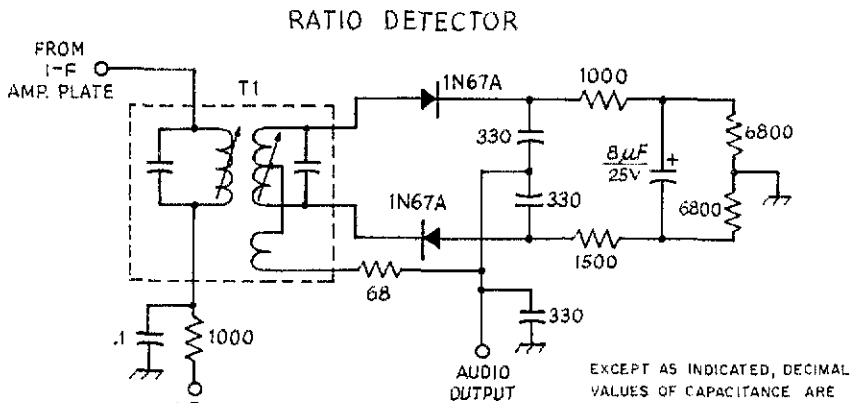


Fig. 9 — A ratio detector of the type often used in entertainment radio and TV sets. T1 is a ratio-detector transformer such as the Miller 1606.

EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS ( $\mu\text{F}$ ); OTHERS ARE IN PICOFARADS ( $\text{pF}$  OR  $\mu\mu\text{F}$ ); RESISTANCES ARE IN OHMS;  $k=1000$ ,  $M=1000000$

reviewed in *QST*,<sup>10</sup> and several homemade types will be described in Part III of this article.

When sufficient signal arrives at the receiver to start limiting action, the *set quiets* — that is, the background noise disappears. The sensitivity of an fm receiver is rated in terms of the amount of input signal required to produce a given amount of quieting, usually 20 dB. Current practice using the newer solid-state devices can produce receivers which achieve 20 dB quieting with 0.15 to 0.5  $\mu\text{V}$  of input signal.

A single tube or transistor stage will not provide good limiting over a wide range of input signals. Two stages, with different input time constants, are a minimum requirement. The first stage is set to handle impulse noise satisfactorily while the second is designed to limit the range of signals passed on by the first.<sup>11</sup> At frequencies below 1 MHz it is useful to employ untuned RC-coupled limiters which provide sufficient gain without a tendency toward oscillation.

Fig. 6A shows a two-stage limiter using sharp-cutoff tubes, while 6B has transistors in two stages biased for limiter service. The base bias on either transistor may be varied to provide limiting at a desired level. The input-signal voltage required to start limiting action is called the *limiting knee*, referring to the point at which collector (or plate) current ceases to rise with increased input signal. Modern ICs have limiting knees of 100 mV for the circuit shown in Fig. 6C, using the CA3028A or MC1550G, or 200  $\mu\text{V}$  for the Motorola MC1590G of Fig. 6D. Digital IC inverter and gate packages (Fig. 6E and 6F), which are also designed for saturated-collector operation, make good limiters. Because the high-gain ICs such as the CA3076 and MC1590G contain as many as six or eight active stages which will saturate with sufficient input, one of these devices provides superior limiter performance compared to a pair of tubes or transistors.

### Detectors

The first type of fm detector to gain popularity was the frequency discriminator. The characteristic of such a detector is shown in Fig. 7. When the fm signal has no modulation, and the carrier is at point O, the detector has no output. When audio input to the fm transmitter swings the signal higher in frequency, the rectified output increases in the positive direction. When the frequency swings lower the output amplitude increases in the negative direction. Over a range where the discriminator is linear (shown as the straight portion of the line), the conversion of fm to a-m which is taking place will be linear.

A practical discriminator circuit is shown in Fig. 8. The fm signal is converted to a-m by transformer T1. The voltage induced in the T1 secondary is 90 degrees out of phase with the current in the primary. The primary signal is introduced through a center tap on the secondary, coupled through a capacitor. The secondary voltages combine on each side of the center tap so that

the voltage on one side leads the primary signal while the other side lags by the same amount. When rectified, these two voltages are equal and of opposite polarity, resulting in zero-voltage output. A shift in input frequency causes a shift in the phase of the voltage components that results in an increase of output amplitude on one side of the secondary, and a corresponding decrease on the other side. The differences in the two changing voltages, after rectification, constitute the audio output.

In the search for a simplified fm detector, RCA developed a circuit that has now become standard in entertainment radios<sup>12</sup> which eliminated the need for a preceding limiter stage. Known as the *ratio detector*, this circuit is based on the idea of dividing a dc voltage into a ratio which is equal to the ratio of the amplitudes from either side of a discriminator transformer secondary. With a detector that responds only to ratios, the input signal may vary in strength over a wide range without causing a change in the level of output voltage — fm can be detected, but not a-m. In an actual ratio detector, Fig. 9, the dc voltage required is developed across two load resistors, shunted by an electrolytic capacitor. Other differences include the two diodes, which are wired in series-adding rather than series-opposing, as in the standard discriminator circuit. The recovered audio is taken from a tertiary winding which is tightly coupled to the primary of the transformer. Diode-load resistor values are selected to be lower (5000 ohms or less) than for the discriminator.

The sensitivity of the ratio detector is one half that of the discriminator. In general, however, the transformer design values for Q, primary-secondary coupling, and load will vary greatly, so the actual performance differences between these two types of fm detectors are usually not significant. Either circuit can provide excellent results. In operation, the ratio detector will not provide sufficient limiting for communications service, so this detector also is usually preceded by at least a single limiting stage.<sup>13</sup>

In Part III we will return to the discussion of detectors to look at a number of the new types, including the digital, phase-locked loop, and transformerless discriminator.

(Part II will appear in a future issue)

QST

### Appendix A

Addresses for the manufacturers (or distributors) of the filters listed in Fig. 3 are as follows:

- 1) Spectrum International, P.O. Box 87, Topsfield, MA 01983.
- 2) Heath Dynamics, Inc., 6050 N. 52nd Avenue, Glendale, AZ 85301.
- 3) E. S. Electronic Labs, 301 Augustus, Excelsior Springs, MO 64024.
- 4) Semiconductor Specialists, Inc., P.O. Box 66125, O'Hare International Airport, Chicago, IL 60666. (Minimum order \$5.00).

<sup>10</sup>Danz, "Squeal Circuits," *QST*, September, 1969.

<sup>11</sup>Browning, "F.M. Limiter Performance," *QST*, September, 1940.

<sup>12</sup>"A New F.M. Detector Circuit," *QST*, January, 1946.

<sup>13</sup>The design of discriminator and ratio-detector transformers is given in the *Radiotron Designer's Handbook*. See footnote 2.



## The Compact-A-Test

A Complete Test Instrument for the Amateur Station<sup>1</sup>

BY BOB PALMER,\* G5PP

**M**ANY TEST instruments have been designed for radio amateur use, and if all were to be built a great deal of expense would be incurred, particularly for meters in things which are only used occasionally. Individual units take up a fair amount of space in the shack. In view of these considerations a basic design was drawn to find how many functions would be practicable in a compact switchable instrument.

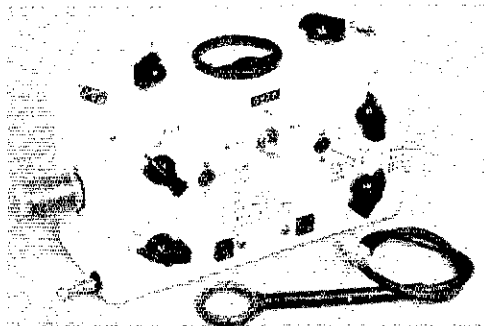
Having an 8 1/2 X 4 3/4 X 3-inch box available, all that remained was to find out just what could be fitted into it. A 6-position, 8-pole, 4-section switch, S1, was used as a means of function selection. (See Fig. 1.) A field-strength meter with a-m phone-monitor facilities was the first unit built. A transistor-radio type telescopic antenna was added for making more distant measurements. Apart from using the coil L1 as a pickup medium, a link was connected to a coaxial socket so that a probe could also be used. Construction information for the probe is shown in Fig. 2.

The second unit built was a grid-dip meter. This oscillator also drives the third unit, an antenna impedance bridge. A tube oscillator is used. (A transistor oscillator would perhaps have been more convenient but would not have provided sufficient drive.) The coil, L1, is wound to suit the frequency to be covered, and is tapped at 1/7 of the total turns from the cold end to provide a cathode tap for the 6C4 tube. The tap can be used to feed the diode of the field-strength meter in place of the link, L2, which is shown in Fig. 1. The probe output and telescopic antenna are switch-connected to the circuit to widen its use.

The third function is that of an antenna impedance bridge. The bridge is driven by the GDO by means of the probe link coil, L2. The circuit whose impedance is to be measured is connected at J3. The bridge may be calibrated by means of known-value composition resistors placed across this jack, and the range is approximately 10 to 500 ohms. The meter is driven to full scale by advancing the GDO gain control, R1, and when the bridge knob is turned, a null or dip in meter reading will be noted. The impedance is read off against the calibration. The 150-pf differential capacitor must be insulated from the chassis and also shielded from the rest of the circuit.

\*22 Sherlock Road, Coventry, Warwickshire, England.

<sup>1</sup>Adapted from *The G5PP Compact-A-Test*, published by the Midland Amateur Radio Society.



The Compact-A-Test, a device which performs many functions while using a single meter. The probe is seen in the foreground, and the telescoping antenna and probe-link coil are seen on the left end of the instrument.

### SWR Indicator, Frequency Marker

The fourth function is that of a standing-wave-ratio indicator. This circuit is built into the top 8 1/2 X 3-inch face which contains the SWR-meter gain control and GDO gain control, together with the input and output coaxial sockets for the SWR indicator. The FORWARD/REVERSE switch is on the front panel. SWR is determined by the following ratio:

$$\frac{FWD + REF}{FWD - REF}$$

First, drive the meter to full scale by adjusting the gain control, R2, using the FORWARD position of the switch. This value will be read as 1. A second reading is now taken with the switch in the REVERSE position. If this was, say, 0.2, then using the formula, the SWR would be:

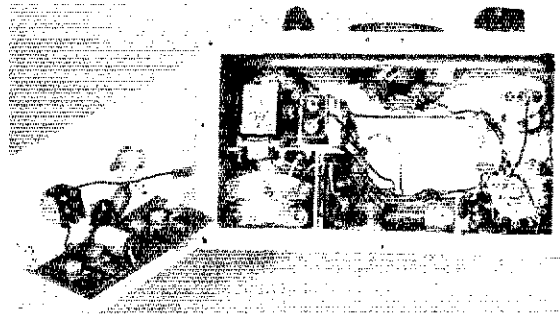
$$\frac{1 + 0.2}{1 - 0.2} = \frac{1.2}{0.8}$$

or a ratio of 1.5 to 1.

The reflectometer pickup line is made from 1/4-inch OD copper tubing approximately 9 inches long. A solder lug is attached to each end of the tubing. The hole in each lug fits over the center conductor of the coax sockets, and is soldered there. The tube is bent to fit between the box flange and the meter. At the exact center of the



The interior of the Compact-A-Test. In this view S1 is visible in the lower-right corner of the enclosure, with C1 positioned just above it. In the lower-left corner is the 145-MHz marker generator circuit, and partially hidden by the crystal, is S3. The copper tubing in the SWR-indicator circuit is seen along the top edge of the enclosure. The two-tone oscillator board is visible on the side panel.



tube the metal is filed away on one side to form a slot in the wall of the tubing. The inner core of a length of 1/4-inch coax is now fed through the tube from each end and brought out via the slot in the center. The center of this coax inner conductor is returned to the chassis through a 33-ohm resistor. The far ends of this conductor connect to the diodes.

The fifth unit is a 145-MHz frequency marker. This consists of an OC44 transistor oscillator, with its 20th harmonic falling at 145 MHz. The signal is quite readable on this frequency and is also usable in the 70-cm band. The telescopic rod is used to radiate the low-level signal. By keying the battery lead, cw is obtained for Morse code practice and is receivable on 7250 kHz, or at any harmonic thereof.

The last unit controlled by the 6-position switch is a voltmeter/milliammeter and short-circuit tester. This could be calibrated for ohms, if

required. The voltmeter series resistors and the current-metering shunt resistors can be calibrated by Ohm's law to individual requirements, taking into account the resistance of the meter itself.

Having completed the units and checked that they worked, it was found that a large vacant space remained in the middle of the box. At the suggestion of G3OVQ, who kindly supplied the circuit, a two-tone oscillator was incorporated and made to fit into this space. See Fig. 3. This all-transistor unit is powered from the internal 9-volt battery, the negative lead being picked up with a small plug and socket, and fed through an ON/OFF switch.

(continued on page 42)

Fig. 2 — The probe is constructed from 1/4-inch diameter coaxial line such as RG-58/U. The shield is stripped from the coax and the center conductor is used to form the four turns.

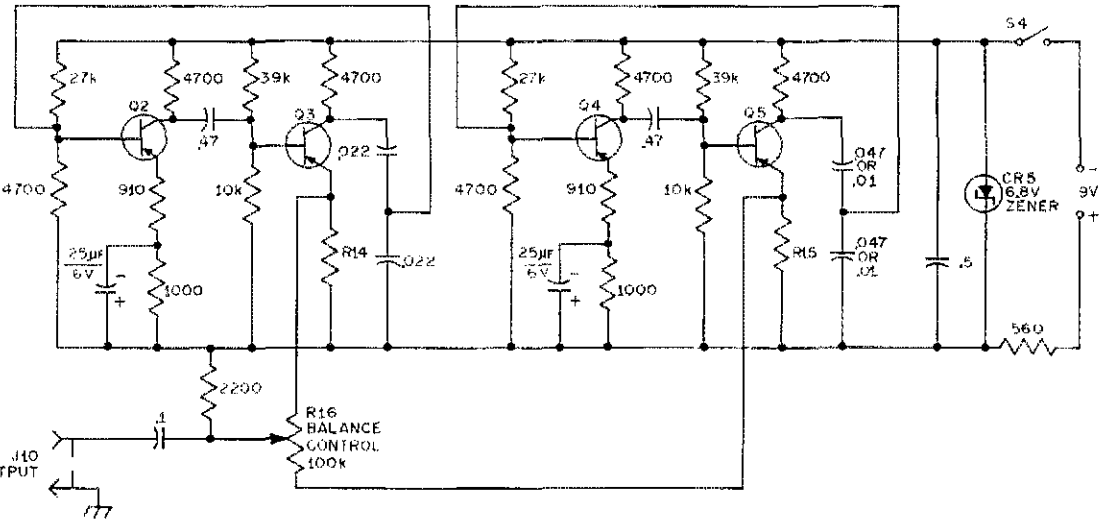
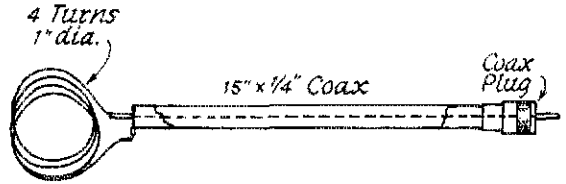


Fig. 3 — Two-tone oscillator.  
J10 — Phono jack.  
Q1 — Q5 incl. — Silicon pnp audio or rf transistor (BCY30 or 2N4059).

R14, R15 — Approximately 3000 ohms. Determine value experimentally to give sine-wave output.  
S4 — Spst.

# The Morse-A-Verter - Copying Morse Code by Machine

BY RAYMOND C. PETIT,\* W7GHM/4

FOR SEVERAL years I have been fascinated by the possibility of making a machine that could read Morse code in addition to sending it. It was my desire to make a machine which could read hand-sent code at any speed, taking the audio output of the station receiver (desired cw signal plus noise) and converting it to "hard" copy with the aid of a standard teleprinter machine.

## Requirements For a Practical Code Reader

The code reader should operate successfully under wide variations of input-signal characteristics without attention or adjustment. If the device is to be placed on a cw net frequency, it should be able to make a good record of all the activity in progress, even when the operator is out of the shack. To achieve these capabilities, I designed the five-section translator shown in Fig. 1.

### Detector

The detector must accept the audio output from a receiver and convert it into dc pulses corresponding to the Morse code being received. It must recognize the code even when the signal is fading, and distinguish it from pulse interference and static. The detector is somewhat analogous to an RTTY terminal unit.

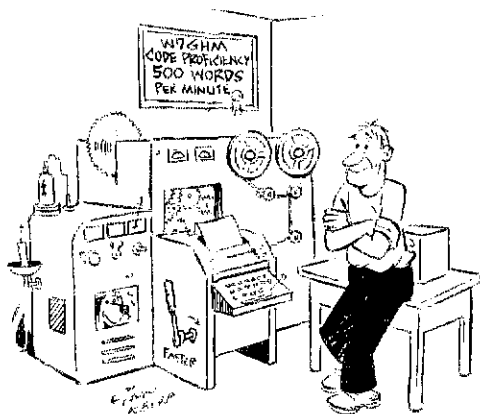
### Element Recognizer

The recognizer classifies each key-down and key-up interval as a dot, a dash, an element space, a letter space, or a word space. Then it groups all dots and dashes received between any two letter spaces into patterns, and sends these patterns, plus word-space pulses, to the matrix. A recognizer which can handle machine-sent Morse code at a constant speed is easy to build. But to be of practical value, the recognizer must identify elements successfully under tremendous extremes of code speed and timing, and it is this requirement that leads to the impressive complexity of the recognizer.

### Matrix

The matrix receives the patterns from the recognizer and converts them into new digital

\*6848 Toney Avenue, No. 100; Alexandria, VA 22304.



patterns representing the teleprinter code. For each letter, numeral, punctuation mark or other symbol accepted by the translator, the matrix produces a single unique output which includes information as to whether the letter or symbol is lower or upper case on the printer.

### Buffer

The buffer determines when to insert LETTERS-SHIFT or FIGURES-SHIFT codes into the sequence which eventually reaches the printer, and also supplies CARRIAGE-RETURN and LINE-FEED signals at appropriate times. Signals coming from the matrix and the signals coming from the ITRS, FIGS, CR, and LF logic are stored in a small memory until they are accepted by the transmitter distributor (TD).

### Electronic TD

The TD converts the binary coding it receives from the buffer into appropriate pulse chains which are fed to a keyer connected to the teleprinter loop.

### Detector

The simplest detector is merely a full-wave bridge rectifier and RC filter to convert audio tones to dc, followed by a transistor switch. This works well provided that the signal-to-noise ratio is extremely high and there is no signal fading. For practical on-the-air use, a much more sophisticated detector is required. I am presently designing a digital detector-correlator which would accept the *i*-1 output of a receiver which has hang age, a noise

*This device, without adjustment or attention, will accept hand-sent International Morse code at speeds between 5 and 60 wpm and translate each letter, number, or punctuation mark, plus spaces, into the teleprinter code. In an impressive demonstration in the ARRL laboratory with the instrument connected to a 60-wpm Teletype machine, a perfect printed copy of an entire WIAW cw bulletin transmission was obtained, with no operator present at the receiver.*



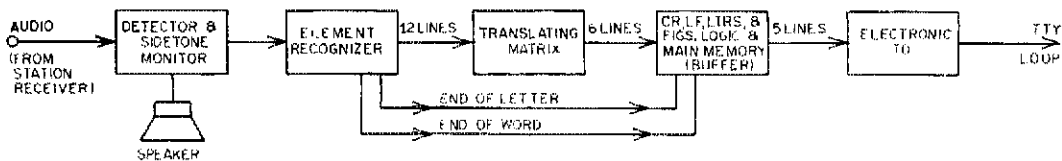


Fig. 1 — Block diagram of the Morse-A-Verter.

blanker, and steep-skirted 500-Hz selectivity. I expect that this device will permit good copy under average ham-band conditions.

### Element Recognizer

Approximately 90 RTL digital ICs are used in my element recognizer, although in retrospect a smaller number would have sufficed. From an amateur standpoint, this section of the translator is perhaps the most unusual.

When learning to copy Morse code by ear, we listen to successive tone intervals and compare the ratios of their lengths. This is the key to the design of a translator which can read code from 5 to 60 wpm without adjustment. In properly-sent code, the length of a dash is three times the length of a dot, regardless of speed. To allow for gradual changes in speed and irregularities in timing, the machine identifies dots and dashes by the following rules.

- 1) If the new element is at least twice as long as the immediately-preceding one, the new element is a dash.
- 2) If the new element is less than half as long as the immediately-preceding one, the new element is a dot.
- 3) If the new element is more than half as long but less than twice as long as the immediately-preceding one, the new element is the same as the preceding one.

(Note that until the machine has samples of the sender's dot and his dash, it cannot guarantee the accuracy of its translation. The machine identifies spaces according to rules 4 and 5.)

- 4) If a key-up interval occurs which has a length equal to or greater than 3/4 the length of the last dash that was sent, the machine decides that a letter has been completed.
- 5) If a key-up interval occurs which has a length equal to or greater than twice the length of the last dash, the machine decides that a word has been completed.

As successive dots and dashes are received, they are stored in sequence in a small memory. When the machine identifies the end of a letter according to rule 4, the memory will contain a pattern of six bits representing dots and dashes plus a three-bit code giving the number of elements the letter contained. For example, if a comma was sent, the memory will contain 110011 and a binary representation of the number 6. If the letter L was sent, the memory will contain 010000 and a binary representation of the number 4; for the letter E, 000000 and a 1. The binary representation of the number of elements is then converted to a positive voltage on one of six lines.

The translator measures ratios of element lengths by taking the logarithm of the time interval of the new element and subtracting it from the logarithm of the length of the preceding element. There are at least two possible ways of making this computation with a simple machine. The first is to increase the current through a logarithmic diode in proportion to the time elapsed, and measure the voltage across the diode. Then rules 1 through 5 could be applied, using the differences in voltages as indicators of ratios.

The second method is to make a binary counter and to note that the location of each flip-flop in the chain is proportional to the log (base 2) of the time interval which elapses before that flip-flop first changes state. Suppose you make a counter chain and connect it to a pulse generator which delivers one pulse per second (Fig. 2). Reset the chain at time  $T = \text{zero seconds}$ . A brief analysis of Fig. 2 will show that the number of the highest counter flip-flop that has changed state for any time interval,  $T$ , is the maximum integral value of  $\log_2 T$ . Thus, if two separate time intervals were to be measured, the difference between the locations of the highest flip-flops that changed state for each of the two intervals would be proportional to the ratio of the time intervals, accurate to the nearest factor of two.

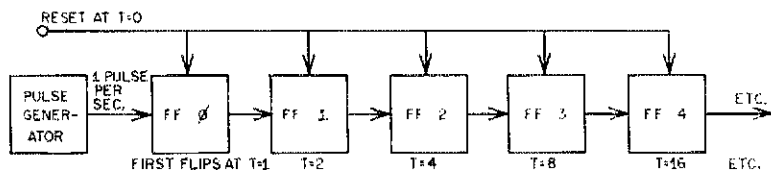
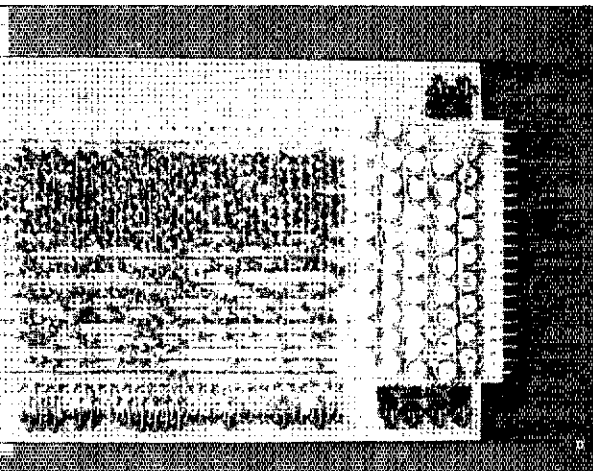


Fig. 2 — Simplified block diagram of the logarithmic counter. The location of the highest counter flip-flop that has changed state is the maximum integral value of  $\log_2 T$ .



In order to successfully read code at varying speeds without making errors, more resolution in measuring intervals is required. This is done easily by wiring gates along with the flip-flop chain to provide pulses at time intervals between the existing values. This is shown in Fig. 3.

### The Matrix

The matrix contains 48 transistors, 3 integrated circuits, and approximately 500 silicon diodes. It consists of two sections, an array of diode AND gates with which to identify each letter or symbol, followed by an array of diode OR gates which converts each letter or symbol into its corresponding teleprinter code plus one bit (a shift bit) which specifies whether the printer must be positioned for figures or letters in order to print the proper symbol. Associated with the inputs and outputs are inverters and drivers. A schematic diagram of a portion of the matrix is shown in Fig. 4.

There are twelve input leads to the matrix, six to receive the dot-dash pattern from the memory of the element recognizer, and six more to specify how many elements the letter contains. These inputs go to inverters and transistorized matrix drivers, and then to the matrix itself, made from surplus silicon diodes. There are 40 output leads,

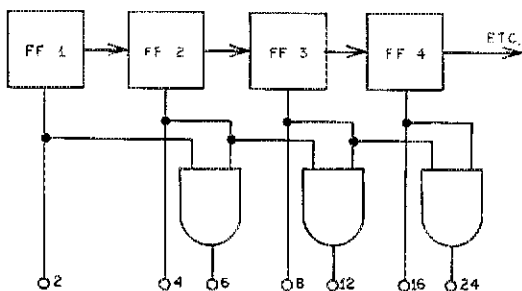


Fig. 3 -- AND gates wired along the chain of flip-flops provide more resolution in measuring code element lengths.

A close look at the matrix, which converts voltages representing Morse code into appropriately coded signals for the teleprinter. The author has made his matrix reversible, so that by switching power on or off to appropriate input and output drivers, the matrix will also convert signals from a teleprinter keyboard into voltages for keying Morse code.

one for each of the 26 letters, 10 numerals, the comma, question mark, virgule or slash (/), and period. Of course any symbol the designer wants to have the translator recognize can be included, provided he can find a suitable symbol for it on the printer. There may also be operations which are appropriate for particular applications -- for example, transmission of the sequence dahdidahdidah might ring the bell, or the traffic handler's BT could initiate a carriage return and line feed.

At any given time, there can be a signal voltage on only one of the 40-odd letter-line wires connecting the first diode array with the second. Each of these lines connects in six possible places through additional diodes to the appropriate teleprinter mark bus lines, plus the shift-bit bus. Transistor current-amplifier stages then bring the output up to the levels required to drive the next section of the translator.

Because I wanted the capability of using the matrix as a reversible device, to convert Morse code to TTY or TTY to Morse Code, mine uses additional components and matrix bus lines over those shown in Fig. 4. Switching between the two types of operation is done by switching the power on or off to appropriate input and output drivers.

### The Buffer

A simplified circuit for the buffer is illustrated in Fig. 5. A total of 67 IC's is used in the buffer-memory logic circuits. Upon receipt of a signal from the element recognizer indicating that a letter has been completed, the buffer opens its input gates to read what the matrix is sending. The information is stored in a six-bit memory. The gates are then shut off so that changes in the matrix output which accompany the process of receiving the next letter do not interfere with the steps which follow.

The buffer compares the "shift bit" with its own special one-bit memory which indicates whether the printer will already be upshifted or downshifted at the time it will receive the letter under consideration. If a shift is required, the appropriate 5-bit teleprinter coding is inserted into the main memory and then the coding for the symbol as it was received from the matrix is inserted in the memory. Then the shift-bit memory is updated in preparation for the next incoming letter.

As each letter- or space-symbol signal comes from preceding circuits, a counter records their passage. When 48 letters and symbols have come, the carriage-return/line-feed logic waits for the next occurrence of a space. Upon receipt of the space, the coding for CR followed by LF is quickly

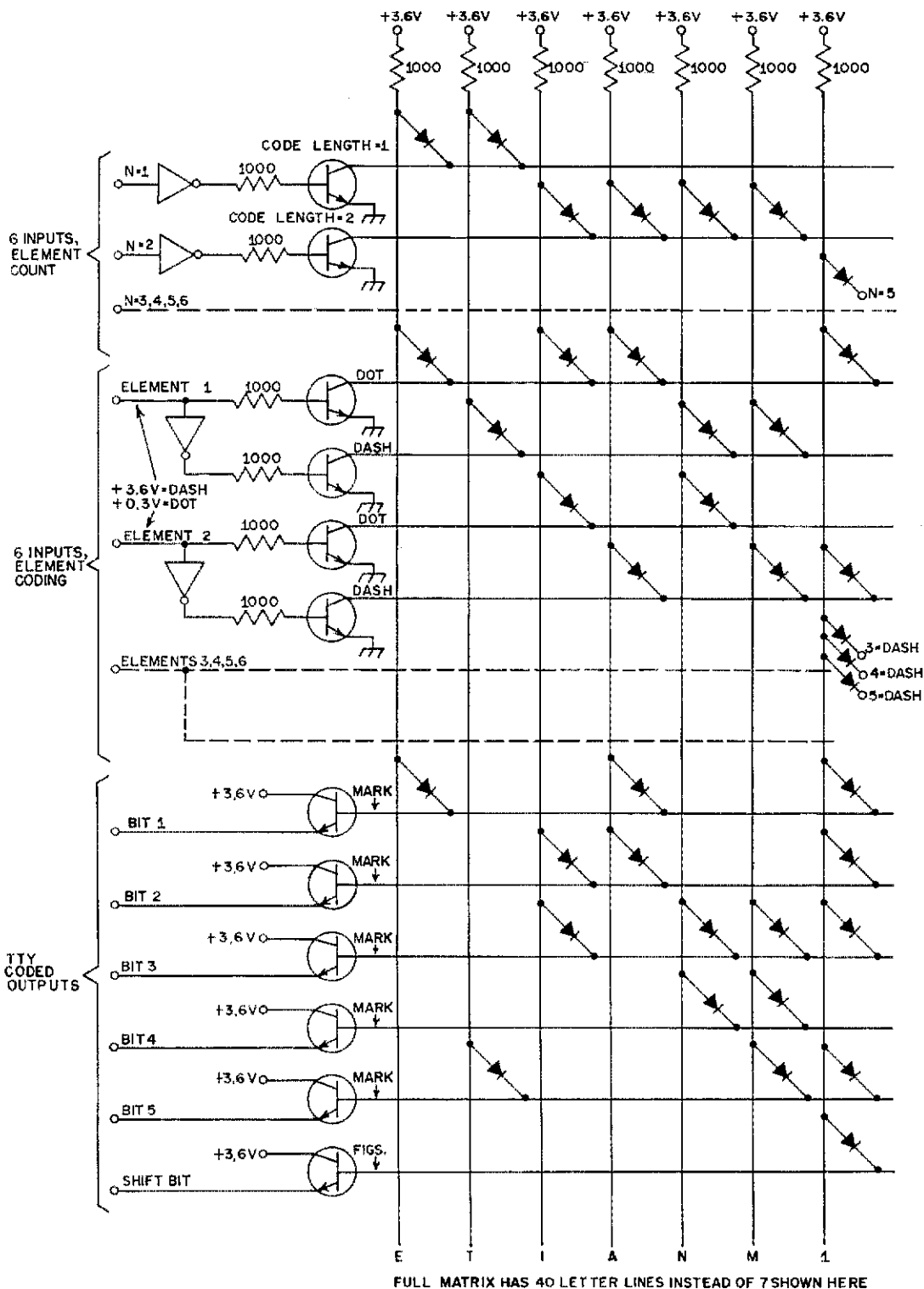


Fig. 4 - A small section of the matrix used in the Morse-A-Verter. The matrix receives signal patterns from the element recognizer and converts them into new digital patterns representing the teleprinter code. All transistors are germanium npn, with beta greater than 50. Each inverter is 1/6 of a Motorola MC889P integrated circuit. The 1000-ohm resistors near the top of the diagram function as both the collector load resistors for the input transistors and as the base-current-limiting resistors for the output transistors.

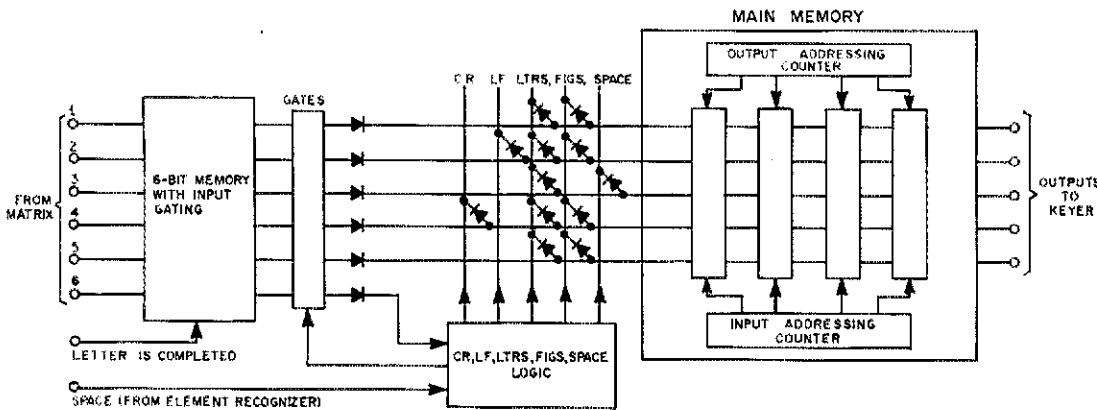


Fig. 5 — Simplified block diagram of buffer and logic circuit for teleprinter nonprinting functions. Briefly, the operating sequence is as follows. 1) Information from matrix output is stored. 2) Bit 6 of stored input compared with bit 6 of last input from matrix. 3) LTRS or FIGS code inserted as result of above comparison, or nothing inserted if bit 6 has not changed. 4) Contents of first five input memory locations sent to main memory. 5) If a space character comes from element recognizer, check made to see if more than 48 letters, characters and spaces have come through since last carriage-return/line-feed. If so, a CR-LF substituted for the space. If not, space sent. 6) Main memory stores each successive code as fast as it comes, and supplies the successive codes to the keyer as it requests them.

inserted in the memory instead of the SPACE coding, and the counter is reset to zero.

The main memory stores a maximum of four 5-bit teleprinter characters. This memory is required because the length of the incoming Morse-code letters varies tremendously, and because the extra instructions described above must be inserted between incoming letters. Consequently, there are times when teleprinter coding is being generated faster than the machine is capable of printing. The buffer memory thus stores the characters until the machine can print them out.

### Electronic TD

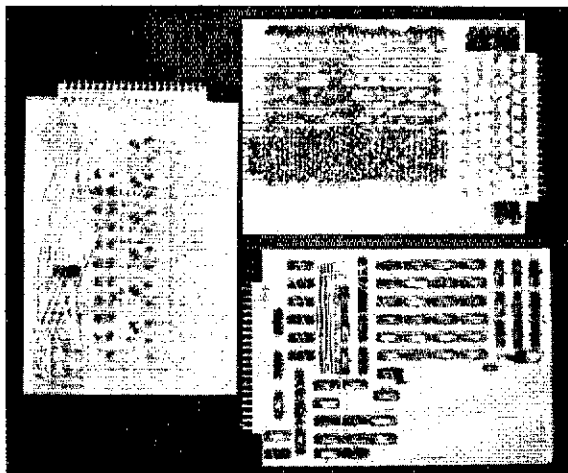
In his article, "Attache Case RTTY,"<sup>1</sup> David Krupp has already supplied *QST* readers with an excellent TD circuit, and he saved me the need of designing my own. Readers are referred to his article for details.

### Performance

The translator will produce good copy from code sent with a hand key or electronic keyer. With a simple diode detector connected to a Collins 75A4 receiver in Cambridge, Mass., the translator read an entire code-practice run from WIAW, giving solid copy during an extended portion at 25 wpm. The only adjustments which were made during the run were on the receiver's rf gain control, to compensate for fading. Occasional pulse-type interference accounted for virtually all errors made. (Indeed, it was this run which stimulated the design of a more sophisticated detector circuit.)

Operation of the translator gives one a tremendous appreciation for the resilience of the human mind in reading Morse code. Whereas the human operator frequently knows what the sender intends to send and can make astonishing allowances for the idiosyncrasies of the sender, the machine reads *exactly* what was sent. If you heard dah—dit-dah-dit dah-dah—dit-dah, you would prepare to answer, but the translator faithfully gives "TR MA," just as it was sent.

<sup>1</sup>Krupp, "Attache Case RTTY," *QST*, February, 1968.



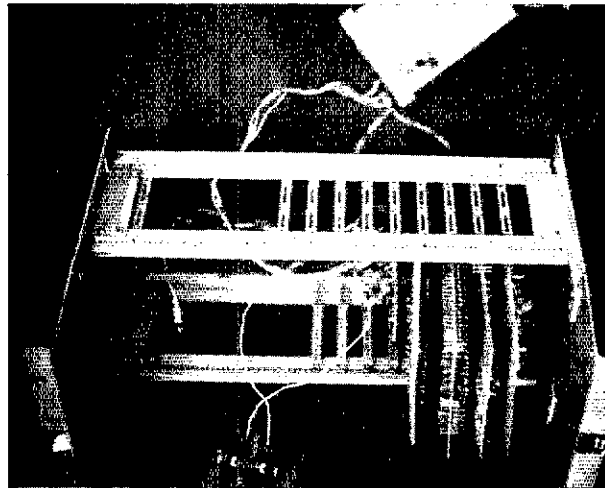
Three of the plug-in sections of the Morse-A-Verter. At the top left is the buffer-memory character-logic board. At the right is the element recognizer, and at the bottom is the reversible matrix.

The Morse-A-Verter during development. Components for the various logic sections are mounted on perforated Vectorboards fitted with plug connectors. Point-to-point wiring is used between board-mounted components. Each plug-in board measures 6 X 8 inches.

There are two common timing errors which practically every operator makes, and which the translator unforgivingly records; leaving excessive space between dots and dashes of a single letter, and leaving insufficient space between letters. The former is illustrated by the above example, and the latter causes the translator merely to stop until it gets a letter space.

### Conclusions and Prospectus

The educational value of this project has far outweighed its practical value for the time being. It has given me increased insight into the nature of hand-sent Morse code and the problems of logic design. Although it is possible to build the Morse-A-Verter using small-scale integrated circuits for around \$300, I do not recommend that you attempt to do so except as an educational exercise. The reason is simply that a much better and simpler Morse-A-Verter can be built with medium-scale ICs for less cost. I am now working on the design of such a machine, and it may be the subject



of a future construction article should enough interest be shown.

In conclusion, I express my appreciation to Ernesto A. Alcivar for his extremely helpful encouragement and assistance which greatly aided the completion of this project. QST



January, 1921

... Although cw operation is coming along, it appears to the author of an unsigned article (probably K. B. Warner) that most of the traffic is still perking through on spark. Tubes with any substantial power rating are scarce and hard to come by. It's a general discussion of antennas, rotary gaps, transformers, etc.

... The Editor offers cash money for practical articles - fifty bucks first prize, in an effort to improve QST. He gives out the rules.

... Charles W. Eliason, Jr. claims he has a receiver system which makes vast improvements in the QRM and QRN situation. He uses a big antenna and a very small one, which increases signals a lot without increasing QRM, QRN. Dunno about this one.

... A rotary gap with high-quenching characteristics is described. Ernest Oke of Peterboro, Ont. is responsible for the idea. This is very complicated, having two concentric rotors revolving in opposite directions. Looks like it might be a mechanical monster.

... "Speedo" Vermilya gives a short course in "Theoretical Principles of Radio Telegraphy." Want a chuckle? Read this one, by all means.

... There's a Stray which reads, "As Dr. Goldsmith says, 'There is a discouraging decisiveness about the action of a vacuum tube when it burns out.'"

... The Paragon RA 10 receiver receives a double spread. Anybody got an RA 6 they'd like to donate to us?



January 1946

... K. B. Warner has a ball recounting some of his adventures in getting back on the air - ten meters especially. Apparently he had a narrow squeak and goes on to speak earnestly about safety. He is thinking, too, about the 1938 tragedy of Ross Hull. And so am I. There's a special box concerning this matter.

... Paul Robbiano, W6PKM, has a fine article about radar jammers developed at the Radio Research Laboratories in Harvard. These devices resulted from a great deal of concentrated effort and the new techniques and tubes have a direct bearing on microwave ham techniques. This is a sort of preview of what we may be getting into in the future. Plenty of power is possible.

... The cover photo shows the "dishes" used in accomplishing duplex phone on 5600 Mc by Reuben Merchant, W2LFG, and A. F. Harrison, W6BMS. They also have an article describing the gear which uses reflex klystrons, frequency-modulated in a very simple manner.

... A half rhombic directional antenna for vhf is described by Capt. John H. Mullaney, W4HGU. It looks like the present popular inverted V, except that it is end-driven. He says it is impractical at lower frequencies on account of height required. However he is talking about heights of up to 3.5 wavelengths!

... Oswald G. Villard, W6QYT, tells about listening to Doppler whistles from meteor trails. Very interesting.

- W74A-A

## • Beginner and Novice

# U.S. Regulations. Part 97, Section 97.73. . . "Spurious Radiation. . . Shall Be Reduced"

BY LEWIS G. McCOY,\* WUICP

ONE OF the stickiest situations the Novice faces is that of harmonics or spurious-signal radiation. The majority of Novices have the problem of undesired signals being radiated. Unfortunately, it is the nature of transmitters to generate, and radiate, signals other than the desired one. If these spurious signals have sufficient strength they can cause interference to amateur and other radio services. This article will treat the causes and cures for spurious radiation and show you how to comply with section 97.73 of the FCC regulations.

### What are Spurious Signals?

Any signal, other than the desired one, that is generated in a transmitter can be classed as a spurious signal. There are two categories of unwanted signals — harmonics and parasitics. In the case of harmonics, such signals have a direct mathematical relationship, while parasitics may or may not have such relationship, and usually not.

To illustrate harmonics, let's assume we have a two-stage transmitter consisting of a crystal-controlled oscillator and an amplifier. Further, suppose we want to generate and radiate a signal on 3700 kHz. Normally, the crystal will oscillate only on 3700 kHz, but, unfortunately, the oscillator stage will also produce multiples of 3700 kHz. There will be some energy from the oscillator at twice the crystal frequency, 7400 kHz, also at three times, or 11,100 kHz, and so on. Normally, the second harmonic is the strongest, with each succeeding harmonic getting weaker as the frequency increases.

The harmonics from the oscillator are fed to the amplifier stages and can be amplified. Additionally, the amplifier stage can generate harmonics on its own, and unless precautions are taken, the harmonics can be fed to the antenna and radiated. When these unwanted signals are radiated by the antenna they may cause interference to other services because they don't necessarily fall in

Here is some "must" reading for all amateurs, particularly the newcomers. Have you checked your station recently? Does it meet the requirements of Section 97.73?

amateur bands. A good example is the region around 7450 kHz which accommodates many commercial stations. It doesn't take much of a Novice second harmonic from 80 meters to cause interference to these services.

### Parasitics

There are two basic types of parasitics — low frequency and vhf. Nearly every rf power stage can generate parasitic oscillations. In fact, it is unusual when such an amplifier *doesn't* have vhf parasitics. These parasitics usually fall in the 80-MHz region and up. If you happen to have a local television channel that is near the frequency of the parasitic, it is easy to have TVI (and such TVI would be *your* fault).

The low-frequency parasitic (self oscillation) is a little more unusual. Most rigs use a screen-grid type amplifier tube, and the screening between the tube elements is usually sufficient to prevent these tuned-grid, tuned-plate oscillations. However, the important point is that it is *possible* to have a low-frequency parasitic oscillation that can give you problems. If the parasitic is strong enough, and it is quite likely to be so, you can get an FCC citation for transmitting a signal outside your band.

### Other Spurious Signals

Another problem with undesired radiation is feedthrough of multiplier signals. For example, let's assume the Novice wants to operate on 15 meters and starts off with a 7040-kHz crystal, then multiplies up to 21,120 kHz in the Novice band. If there isn't enough tuned-circuit selectivity in each of the stages in the rig, or if the tank circuits are not tuned correctly, it is possible to have the 7040-kHz oscillator signal pass through the rig without much attenuation. This signal could reach the antenna and be radiated. In addition, depending on the tuning of the various stages, the second harmonic of the crystal, 14,080 kHz, could be amplified and radiated. This means that it is possible to have two spurious signals coming from

\*Novice Editor



your rig, both of which could win you an FCC "QSL card."

Still another problem is the matter of tuning up on one band when you think you are on another. With many transmitters, either commercially made or home built, it is quite easy to tune up on two bands for any given setting of the band-switch control. It is very common to hear Novices in the 20-meter phone band. They think they have tuned up on either 40 or 15 meters, when actually they are on 20. If you are one of those hams who has been filling up log pages while calling CQ and getting no answers — you had better check your tuning!

While not a Novice problem, there is another thing you'll have to watch for when you get that first VFO. Many VFOs have two basic frequencies for the oscillator, namely 160 meters and 40 meters. The 160-meter VFO, if used, can create problems. It is easy to transmit a signal at three times the VFO frequency. For example, assuming you would want a signal at 3,850 kHz, and if there wasn't adequate selectivity in the transmitter tuned circuits, or if they were incorrectly tuned, it would be an easy matter to have a signal going out at 5775 kHz, the third harmonic of the VFO. It would also be possible to have a signal at the VFO frequency itself (1925 kHz).

Along the same lines, many of the transceiver and sideband units have their VFOs in the 5-MHz region, and feedthrough of undesired signals is possible, plus unwanted output resulting from the various signal combinations.

### TVI Problems

While we can't cover TVI (television interference) in detail, a few words about the problem are in order. There are two basic causes of TVI. One is the fault of the amateur, and is caused by harmonic radiation from his transmitter. The other (which is the responsibility of the set owner) is caused by fundamental overloading of the TV set's front end.

Fundamental overloading takes place when a strong radio signal, other than the TV signal, reaches the receiver. Any TV set operated within a few hundred feet of an amateur station can be affected by this interference. Simply, the TV set front end doesn't have enough selectivity to reject strong amateur signals. When such an rf signal reaches the input of the rf stage in the TV set, the stage cannot handle the signal and becomes a nonlinear amplifier, and acts as a harmonic generator. The harmonics generated in the rf stage are fed throughout the set, resulting in interference to the picture and sound channels. Fundamental overloading can be cured by installing a high-pass filter at the antenna input terminals of the TV set, directly at the tuner. This device will reject the amateur signals below 50 MHz, but will permit the TV signals to reach the tuner without significant attenuation.

It is the amateur's responsibility to reduce the level of harmonic energy coming from his transmitter. If the harmonics fall in the TV channels which are used in his area, he can expect

to have TVI. There is a definite relationship between the strength of the incoming TV signal and that of the ham-station harmonics where the matter of TVI is concerned: The interference ratio is roughly 100 to 1. That is, if the harmonic energy has a strength (at the TV tuner) of 1  $\mu$ V, it can cause visible interference to a TV signal whose level is 100  $\mu$ V. Interference of this kind is most likely to be a serious problem in TV "fringe areas."

Unfortunately, while most transmitter or transceiver manufacturers make some effort to shield their equipment, there isn't a single rig we know of that could be considered "TVI-proof" in a fringe area.

The ideal way to prevent TVI harmonics from being radiated is to use a properly designed and installed low-pass filter. This device greatly reduces harmonic radiation. But, and this is a *big but*, the transmitter case must be completely shielded, and tightly, for the low-pass filter to do its job. For the benefit of the Novice, tight shielding means clean metal-to-metal surfaces (no paint), no holes larger than 1/4 inch, and all leads coming into the equipment properly rf-filtered. To repeat, the rig must be *completely* shielded for the filter to be really effective.

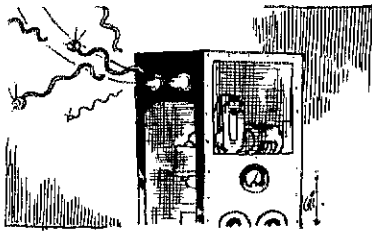


### Do you have Spurious Signals?

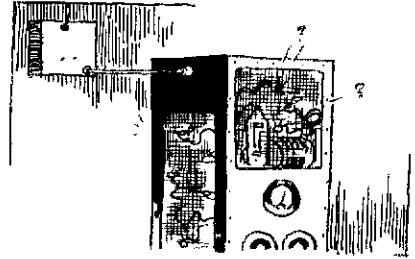
Many readers may not be aware that the ARRL has an Official Observer Program.<sup>1</sup> This program is carried out by volunteer hams who are referred to as "OO's." One of their duties is to check for spurious amateur signals. When they find such signals they notify the amateur. If you should receive an OO notice, it is a good idea to take quick action. If the OO cited you, the FCC may not be far behind! And if there is one thing you don't need, it is an official notice of violation from the Federal Communications Commission.

There is no simple way of determining whether your spurious radiation is causing harmful interference. There *are* easy methods to find out if you have undesired signals getting out of the rig. If possible, have a close-by ham check your harmonics by listening to his receiver on the harmonic frequencies. Don't pick a ham next door

If you are interested in becoming an Official Observer, you can write to your Section Communications Manager (SCM) for details. See page 6 of this issue for his address.



TO KEEP TVI-HARMONICS FROM RADIATING...



...THE RIG MUST BE TIGHTLY SHIELDED

as that would be too close to provide useful information. A ham a mile or two away can provide more meaningful data. By the same token, your receiver shouldn't be trusted for harmonic checking when it is close to your transmitter.

Another method of checking for harmonics is with an absorption wavemeter. This instrument can be used as an rf indicator. It consists of a tunable detector that usually covers from about 2 MHz to 300 MHz. Most of the amateur wavemeters rectify the rf energy and feed it to a dc voltmeter which serves as a visual indicator. When such a device is coupled to the antenna feed line, and tuned through its range, it is possible to get an indication at the various harmonic and spurious frequencies that are coming out of the rig. The wavemeter is particularly useful in detecting parasitic oscillations. Also, if you get *any* indication when the wavemeter is coupled to a feed line, you can be fairly sure that your harmonics are strong enough to cause troubles.

The safest method of preventing harmonic or parasitic radiation is to merely assume you have them, and take steps to eliminate them!

### Cleaning up the Problem

Some Novices (and higher-class license holders for that matter) are in error about the use of a low-pass filter. A low-pass filter will attenuate signals only in the TV range. Usually, the filters are designed with a cutoff frequency just above the 10-meter band. This means that the filter will pass *any* frequency below the cutoff frequency with very little attenuation.

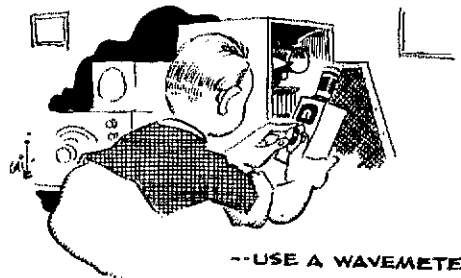
Harmonic radiation should be treated as two separate problems; low frequency radiation (below 10 meters), and TVI. You may or may not need the TVI protection, but it should be kept in mind that TVI can be a problem.

In order to help keep harmonics from being radiated, additional selectivity between the transmitter and the antenna system is helpful. This means that additional circuitry is required at the output of the transmitter — a filter or a Transmatch. The average transmitter tank circuit provides little more than 30 dB attenuation of the second harmonic. This is about the best that can be expected. Translating this to power (and assuming 50-watts output from a Novice rig), the second harmonic would be 50 milliwatts. This sounds like a low power level, but 50 mW can provide a rather husky signal. More important, the 30-dB atten-

uation figure can be expected *only* if the transmitter is tuned correctly. Be sure to read the instruction manual that comes with the rig. Never use more than rated grid current for each stage in the transmitter, since excessive grid drive will nearly always increase the harmonic output level. Additionally, make sure that each stage is tuned to resonance, because mistuned circuits can increase the harmonic level too. Each stage of the transmitter should be operating stably, too. If neutralizing circuits are provided, they should be carefully adjusted to prevent self-oscillation of the various amplifier stages in the transmitter.

Assuming you have the transmitter correctly adjusted but still have problems, you may need more selectivity and filtering. This article won't treat construction of the different devices, but the bibliography provides all the references needed.

Probably the best device for reducing spurious radiation is a Transmatch. If designed properly, it has the required impedance-matching flexibility to work with any rig and antenna system, and will also provide harmonic attenuation. The Transmatch provides selectivity and a better antenna match for the receiver too, if installed so that it can be used when receiving. Typical attenuation of harmonics through a properly adjusted Transmatch (and *properly* designed) is on the order of 30 dB. This, added to the final amplifier tank circuit attenuation, is usually adequate for harmonic suppression.



The other device commonly used for harmonic reduction is a half-wave filter. This type of low-pass filter will pass the fundamental frequency but will attenuate harmonics. It doesn't require adjustment. A disadvantage of this type of filter is that it is a one-band device. In fact, you would probably burn out the unit if you used it on the



wrong band! These filters are designed for use in coaxial lines where the SWR is below 2 to 1. This isn't true of a Transmatch. The latter can be used with any type of line, and is normally a multiband device.

Some amateurs believe that certain antennas will reject harmonics. Any antenna will accept and radiate harmonics. How well each one does the job is a detailed story in itself. For example, the popular trap-dipole antennas will accept practically any harmonic signal without rejection. On the other hand, a resonant 80-meter coax-fed dipole would tend to reject a 40-meter harmonic simply because the antenna is highly reactive to 40-meter energy. However, you cannot depend on the 80-meter antenna rejecting the 40-meter harmonic completely because there are many other factors involved that can get into the picture to mess things up. The safe approach is to keep all harmonics from reaching the antenna!

## Bibliography

### Transmatch:

McCoy, "The Ultimate Transmatch," *QST*, July, 1970.

McCoy, "A Complete Multiband Antenna System," *QST*, November, 1967.

Also, pages 211, 212, and 213 of *Understanding Amateur Radio*.

### Filters for low-frequency harmonics:

Pages 213, 214, and 215 of *Understanding Amateur Radio*.


### Wavemeter:

McCoy, "Are You Putting Out The Correct Band?" *QST*, March, 1967.

Also, pages 264, 265, 266, and 267 of *Understanding Amateur Radio*.

### Filters for television interference:

Pages 564, 585, 586, and 587 of the 1970 *Radio Amateur's Handbook*.

Note: Many back issues of *QST* are still available from ARRL Headquarters, 75 cents each. 

## NEW BOOKS

**RCA Receiving Tube Manual**, Technical Series RC-27, by RCA electronic components division, Harrison, NJ 07029. Paperback, 5 1/4 X 8 inches. Price \$2.672 pages including index.

Here is the new edition of a very old friend, the "tube manual." The designer's library just isn't complete without this publication. Those who still work with tubes (and amateurs who repair their own commercial gear) will rely on the tube manual for many years to come. A current copy is important to have on hand so that the most recent tubes can be referenced when the need arises.

The first 97 pages of the manual deal with basic vacuum-tube theory, encompassing such themes as detection, classes of service, age, various amplifiers, oscillators, and regulators. This part of the book is followed by an applications guide which helps the experimenter to select the right tube for a particular job.

The tube tables occupy the next 445 pages of the manual. Complete electrical specifications are given for each tube, plus a base diagram for each type. The last part of this section lists obsolete tubes and gives recommendations for substitute types where applicable. Then, following this information, comes a set of RC-coupling charts for various triodes and pentodes. Recommended values of capacitance and resistance are called out versus operating voltages and amplifier frequency response.

Tube outlines and dimensions are given next — a useful compilation of data for those planning a chassis layout and cabinet size for vacuum-tube gear. This part of the book is followed by the circuits section, wherein a host of practical ideas are presented for the tube experimenter. Typical parts values and operating voltages are given with each schematic diagram. Among the circuits offered are a-m and fm superheterodyne receivers, fm tuner, ham-band preamplifier, audio mixer and amplifiers, audio generator, VTVM, vhf tuner, power supplies, and TV circuitry.

In the reviewer's view this is a whale of a bargain for the small price asked by the publisher.

The "tube manual" has long been a mainstay in the ham operator's library. The current edition is bigger and better than earlier releases. Inflation does not seem to have affected the quality of this book! — *WICER*.

**FM Schematic Digest — A Collection of Motorola Schematics**, by Sherman M. Wolf. Published by Two-Way Radio Engineers, Inc., Boston, Mass. 11 1/2 X 17 inches, 136 pages, illustrated. Price: \$6.50.

Sherman Wolf has compiled a collection of wiring charts, abbreviated alignment instructions and schematic diagrams for the Motorola fm equipment manufactured during the 1950s for the land-mobile services. Included in this latest edition are the early Motrac sets. The book begins with two pages of equipment photographs — a good guide to aid in the identification of surplus fm gear. The charts and diagrams presented are copies of Motorola originals, often with clarifying notes, added by the author, in the margins. To aid the amateur faced with repairing an inoperative set, Motorola's unusual circuits — squelch, IDC and discriminator — are explained in some detail.

In addition to alignment information, some of the popular conversions, such as changing the 432-MHz T44s to ac operation, are included. The accessory-equipment diagrams, for test sets, control heads, and ac power supplies, are a help when one tries to reassemble a complete set, or when it is necessary to build an otherwise unobtainable item. It is impossible, of course, to have all of the models included, that Motorola has produced but the popular 30D, 80D, 140D, and Dispatcher transceivers, plus many others, are covered in sufficient detail to make this book a valuable addition to any fmr's library.

The book is being marketed directly by the author; orders should go to S. Wolf, 1100 Tremont Street, Boston, MA 02120. — *WIKLK*

— \* \* \* —  
The Post Office Department promises faster mail service with the new Zip codes. Use yours when you write League Headquarters. Use ours, too. It's 06111.

# "Five For Five" (Five Decibels for Five Bucks)

*Every ham likes to save a buck. Here is a simple two-band beam that really works, and only costs a few dollars.*

BY J.E. KEAR,\* K4MI

**B**EING THE owner of an inexpensive, lightweight TV-type crank-up tower, I decided to use it as support for a "boomless" three-band cubical-quad antenna. However, the quad project was delayed, so the author decided to put up some kind of a beam for 20 meters as soon as possible.

A trap vertical for 40 through 10 meters mounted on top of the roof had been in use for some time, and had worked moderately well. However, QRM from unwanted directions has always been a problem, especially on 20 meters. The ideal beam for this particular tower had to be lightweight, easy to build from readily-available materials, and last, but by no means least — inexpensive. An article was recalled that described the construction of just such a beam, "A Shortened ZL-Special."<sup>1</sup> The antenna is a two-element beam using folded dipoles, one as a driven element and the other as a reflector with both elements being fed, and approximately 3/8-wavelength long. A 135-degree phasing line is used to connect the driven element to the reflector. The antenna is fed with RG-8/U, and a bazooka-type balancing device is used at the feed point. The beam was constructed according to the dimensions given in the article, using 14,175 kHz for the design frequency.

## *Checking the Antenna*

As soon as the antenna was completed it was installed on the tower and checked out. The first thing noted was that the antenna seemed to have a resonant frequency much too high — well above the 20-meter band. An SWR check across the band verified that the antenna was peaked outside the band. Murphy's Law seemed to be in effect, so it was decided to take the antenna down and check it out.

A six-foot-high wooden stepladder was placed on the porch roof, and the beam was set on top of the ladder. This put the antenna about 18 feet above ground and enabled me to get at the antenna to make the tests. This was not an ideal height for adjustments but was the best that was readily available.



First, the phasing line was disconnected and removed from both elements. A small loop of wire, just large enough to accept the grid-dip meter coil, was attached to the feed point of each of the elements. Using the lightest coupling possible, the two elements were grid-dipped to determine their resonant frequencies. (It is a good idea to check your grid-dip meter's frequency against a well-calibrated receiver to be sure of the dipper's accuracy.) The reflector was found to be resonant just below the 20-meter band, while the driven element was resonant above the band, and not on 14,175 kHz as originally assumed. It was decided to prune the reflector and bring it up to 14,175 kHz, and use it as the driven element. About an inch of the Twin-Lead at a time was removed from each end of the element, and the ends were then twisted back together. At a length of 26 feet and 7 inches the element was resonant at the desired frequency. Extensions were then added to the former driven element to make it 27 feet, 11 inches long (about six percent longer than the driven element). After this was done, the driven element was again checked to see if the reflector adjustments had made any changes in the resonance of the driven element. The change, if any, was negligible. If you build this antenna make the element lengths a little longer than expected, then prune accordingly, using the grid-dip method to get the driven element resonant at the desired frequency. Then, make the reflector six percent longer.

Using a grid-dipper, a Knight Z-52 antenna bridge, and a 50- $\mu$ A meter as a null indicator, the impedance of the driven element was checked out and was found to be approximately 250 ohms. This checked pretty close to the theoretical value

\*2401 East Fourth St., Greenville, NC 27834.

<sup>1</sup>Schick, "A shortened ZL-Special Beam," CQ, July, 1959.

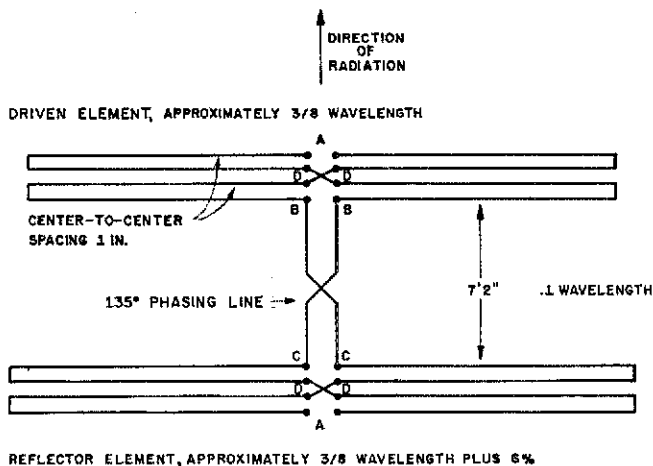


Fig. 1 — Details of the shortened ZL-Special.  
 A — Open about 3/4 inch, no connection.  
 BB — Transmission feed line and phasing-line connection.  
 CC — Phasing line connected to reflector (note half twist in line for phase reversal).  
 DD — Notice cross connection of folded dipoles. Antenna elements and phasing line made from 300-ohm Twin-Lead.

Typical dimensions for 14,175 kHz:  
 Driven element, 26 feet, 7 inches.  
 Reflector, 27 feet, 11 inches.  
 One-tenth wavelength spacing between elements, 7 feet, 2 inches. 135-degree phasing line, 7 feet, 9 inches. Formula for phasing line is:

$$\frac{110}{F \text{ MHz}}$$

of 225 ohms. Just for a comparison, the reflector was checked at its resonant frequency, and it showed the same impedance. Next, the two elements were connected together with the phasing line (being careful to transpose the line for correct phase) and the impedance at the feed point was checked again. The impedance was found to be about 125 ohms, but with a slight reactive component, no doubt due to the connecting of the reflector, which is, of course, lower in frequency. An SWR bridge was inserted in the feed line and power was applied to the antenna. The SWR read slightly over 2 to 1, indicating that the array impedance of 125 ohms was fairly accurate.

### Construction Information

A "bazooka" type balun is used at the antenna to provide balanced feed. This is shown in Fig. 2. The balun consists of a 1/4-wavelength section of RG-8/U, 16 feet, 5 inches long for the design frequency of 14,175 kHz. The inner conductor and outer shields of the balun are soldered together at each end. Then, each end of the balun is soldered to the outer shield of the feed line. Plastic spacers are used to maintain a 1-inch spacing between the balun and the feed line.

The boom and end pieces are constructed of 2 X 2-inch fir, using a length of 7 feet, 2 inches for the boom, and two 8-foot pieces for the cross arms. Bamboo fishing poles<sup>2</sup> are lashed to the end pieces to support the folded dipole elements. The antenna elements are made from 300-ohm Twin-Lead. The one-inch center-to-center spacing be-

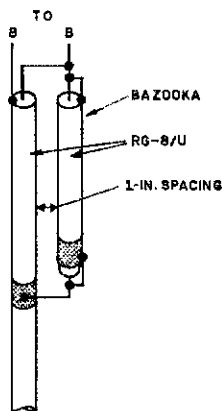


Fig. 2 — Details on the "Bazooka" balun. The bazooka length is 1/4 wavelength multiplied by the velocity factor of the line used. At the point where the bottom end of the bazooka is soldered to the outer shield of the feed line, the outer covering of the feed line should be removed to make the connection, and then resealed with tape to provide a moisture seal.

tween the sections of the folded dipole elements is maintained by heat bonding tabs of Twin-Lead plastic material (wires removed of course) and placing the tabs at 18-inch intervals along the dipole elements. A hot soldering iron will melt the tabs and dipole insulating material sufficiently to secure the tabs in place.

### How It Works

All of the information we have seen on these antennas points out that this is a one-band-only antenna. But, it was discovered that the antenna received quite well on 15 meters. In fact, switching back and forth between it and the multiband vertical showed that the beam consistently outperformed the vertical on 15 and 20 meters. In true ham spirit, we decided to feed some power to the antenna on 15 meters and check the SWR. After all, nothing ventured, nothing gained! We were quite surprised to find that the SWR checked out at 1.5 to 1 at 21,260 kHz, and was fairly flat across the band.

The antenna has a spacing of 0.15 wavelength between the elements at 21 MHz, and what is a 135-degree phasing line on 20 meters becomes 202 degrees on 15 meters. There seems to be no more

than a couple of dB difference on front-to-back ratio. In any case, the real proof is how the antenna performs, and in that respect we have no complaints. A lot of rare DX was worked on 21 MHz, and excellent reports were obtained.

Does the shortened ZL-Special work on 20? I'll say it does! No claims are made for forward gain, but I would guess it to be about 5 dB. Front-to-back ratio checks show that the antenna has about 20 dB of rejection off the back. With the antenna up 40 feet, and while running 350-watts input, about 50 new countries were worked in ten days of random operating. Many of them came back on the first call. The antenna hasn't been tried on 10 meters, it might even work there too. The 21-MHz results came as an unexpected bonus from what was built as a 14-MHz-only beam. One thing for sure, you can hardly beat the cost and simplicity of the antenna. **QST**

## Gimmicks & Gadgets

(Continued from page 29)

### Switch Functions

Perhaps the easy way to understand the wiring is to follow the switching functions which are next described.

**Position A: FIELD-STRENGTH METER AND A-M PHONE MONITOR:** The coil and tuning capacitor are connected to the OAS diode, then through the meter and closed-circuit jack to ground. The probe circuit is energized from the link coil and the telescopic antenna is connected.

**Position B: GRID-DIP OSCILLATOR:** The coil and tuning capacitor are now connected to the 6C4 grid capacitor. The coil tap is connected to the cathode. The grid lead is returned to ground via the meter, whose positive terminal is grounded. The probe circuit is energized from the link coil, and the antenna is connected.

**Position C: ANTENNA IMPEDANCE BRIDGE:** The meter is switched to the output of the bridge diode. The 6C4 grid resistor is returned directly to ground. Output from the GDO (which remains operative in this switch position) is used to drive the bridge, again using the link coil which feeds the probe in positions A and B. The connection to the bridge for measuring the antenna impedance is made at J3. The impedance value is read on the calibrated dial associated with C2. The drive to the bridge is controlled by the GDO gain control, R1.

**Position D: STANDING-WAVE-RATIO INDICATOR:** The meter is transferred to the output of the two rectifiers, CR3 and CR4. The transmitter and station antenna are connected together by means of coaxial sockets, J4 and J5. Full-scale deflection in the FORWARD position is obtained by advancing the SWR sensitivity control, R2. The SWR is determined as outlined previously.

**Position E: 145-MHZ FREQUENCY MARKER:** The meter is not used in this circuit. The collector of Q1 is connected to the telescopic antenna, the 9-volt battery is switched on, and the

key is plugged into the closed-circuit jack in the battery lead.

**Position F: VOLTS - MILLIAMPERES AND SHORT-CIRCUIT TEST:** The meter is transferred to the voltmeter-control switch.

The negative battery terminal is connected in the short-circuit test position (ohms).

### Conclusion

Having set out to save money by doing away with the extra meters that would be required for separate instruments and using only one for the complete set, it seems logical to isolate the meter completely from the other functions. In this way it may be used for any other purpose which may come along. This is done by moving the selector switch to position F and the mA switch to position 6. The meter is thus available at the test leads. **QST**

### Back Copies and Photographs

Back copies of *QST* referred to in *QST* issues are available when in print from our Circulation Department. Please send money order or check — 75c for each copy — with your order; we cannot bill small orders nor can we ship c.o.d.

Full size (8 by 10) glossy prints of equipment described in *QST* by staff members (*only*) can be furnished at \$1.50 each. Please indicate the *QST* issue, page number, and other necessary identification when ordering, and include full remittance with your order — we do not bill nor ship c.o.d.

Sorry, but no reprints of individual *QST* articles are available, nor are templates available unless *specifically* mentioned in the article.

# PEP, Average Power, and Related Matters

BY JAMES N. THURSTON,\* W4PPB

WHEN an amateur picks up a catalogue and looks at the power ratings of transmitters or amplifiers, it is more than likely that he will be confused, dismayed or possibly convinced that manufacturers have double or triple standards when it comes to power ratings. It is my purpose to clear up some of this confusion by discussing what some of the power ratings actually mean.

The maximum input power that a transmitter can run is usually determined by the final amplifier stage. On one hand we have the problem of not exceeding the tube capabilities, especially with respect to dissipation. With the linear amplifiers that are used in s.s.b. service, the maximum input is also limited as to the amount of distortion in the form of flattopping that can be tolerated.

As explained in the ARRL *Handbook*, PEP is an abbreviation for peak envelope power. PEP is the power resulting with key-down operating conditions, or conditions that occur on the highest audio peaks. Thus, a PEP input of 100 watts means that the dc input power to the amplifier would be 100 watts if the maximum allowable steady signal were applied, if someone whistled the maximum allowable sine wave into the microphone, or if a two-tone input were applied so that the peaks would just reach 100 watts. In many linear amplifiers (except class A), the dc input power rises from a small value at zero signal input to a maximum with the drive signal applied. Also, if the amplifier is truly linear, the input signal and the output signal must be linearly related.

Perhaps some numerical examples will help to illustrate some common situations. For our first example let us suppose that we have an a-m signal with a carrier rating of 100 watts. Assume that single-tone, sinusoidal modulation is applied so as to modulate the carrier 100%. Since the carrier amplitude doubles on modulation peaks with amplitude modulation, the input power on peaks will be four times the carrier value. Thus the amplifier must have a PEP input rating of 400 watts. The average input power with 100% modulation will be 150 watts, since 50 watts will be supplied for the side frequencies. With a final amplifier stage that is 50% efficient, there will be 75 watts of power dissipated in the final amplifier tubes, for a steady 100% modulated input. Thus this final stage has the dual requirement of being able to handle a PEP input of 400 watts without distortion and also of being capable of dissipating about 75 watts without overheating. Of course voice waveforms are not

sine waves, and the average power figures given above are conservative as far as voice input is concerned.

As a second example let us use the same amplifier rated at 400 watts PEP and use it for ssb operation. If a single-tone input is used, the peak power input of 400 watts which would result could not be permitted to continue for more than a very few seconds. The reason being that the input of 400 watts would mean that the tubes would be dissipating 200 watts which is beyond the 75-watt dissipation rating previously assumed. Fortunately however, the nature of the human voice with its pauses and variations in amplitude is such that the average power input is far less than the peak power input. An average power dissipation rating of 75 watts should normally be more than adequate for a 400-watt PEP ssb input. The ratio of PEP ratings to average dissipation ratings is often six or eight to one which explains why many s.s.b. transmitters must be tuned quickly, and why many are tuned up at a low level.

As a third example let us take a linear amplifier that is used for cw operation. In effect, it is either full on or full off, depending upon whether the key is up or down. Obviously the transmitter is heating up when the key is down, and is cooling off when the key is up. The duty cycle is a measure of the percentage on time, and is considerably less than 50% for average cw operation. Such factors as pauses, spaces between dots and dashes, and letters and words are of course taken into consideration. Usually a linear amplifier will run hotter with a given maximum input on cw than it does on ssb because the usual duty cycle for cw is greater than it is for ssb. Because of this, many transmitters have cw ratings which are about 75% of their ssb ratings.

As an example, the word "amateur" followed by a standard 7-unit space, has a duty cycle of slightly less than 50%. This is probably higher than that of an average text. A 40% duty cycle, with a maximum input of 400 watts, would mean an average power input of 160 watts, and a plate dissipation of 80 watts at the 50% efficiency level previously assumed. Under such conditions, the transmitter, if rated at 75 watts allowable dissipation, would overheat somewhat. The key-down input should therefore be reduced to 75/80 of 400 watts or 375 watts on cw as compared to 400 watts PEP on ssb.

Much discussion over power measurement is heard on the air, and much of it is confusing. The term "dc input" is often used in conjunction with ssb equipment. Without definition or

\*212 Seneca Road, Clemson, South Carolina 29631.

(Continued on page 92)

# Technical Correspondence

## SWITCHABLE-IMPEDANCE BALUN

Technical Editor, *QST*:

After building "The Ultimate Transmatch"<sup>1</sup> I found I had excellent results in matching my open-wire-fed dipole except on bands where the feeders presented a very low impedance. With the balun described in the article, a 1-to-4 step-up ratio is attained; I found I needed a 1-to-1 ratio. After experimenting, I developed a balun which can be easily switched to either ratio.

The balun is a combination of two baluns described by Turrin in April 1969 *QST*. It is constructed with a toroid core using, in combination, a single winding and a bifilar winding. The single winding consists of ten turns of No. 12 wire occupying one-third of the winding space; the bifilar winding is two sets of ten turns of No. 12 wire which occupy the remaining two-thirds of the space.

The circuit is shown in Fig. 1. The windings are connected as shown pictorially in Fig. 2.

The balun was constructed, using a single core, from the parts supplied with the Kilowatt Broadband Balun kit available from Amidon Associates as advertised in *QST*. On-the-air tests were performed to measure the current in each feeder with the balun operating in the 1-to-1 mode and the 1-to-4 mode in each band, 80 through 10 meters. In no case did the difference in feeder currents exceed 5 percent, even on 10 meters, thus indicating surprisingly good balance. No arc-over or insulation leakage problems were encountered in either mode while operating at a power level of 500 watts PEP. — D. C. Mead, W2LT, 235 South Irving St., Ridgewood, NJ 07450.

<sup>1</sup>McCoy, "The Ultimate Transmatch," *QST*, July, 1970.

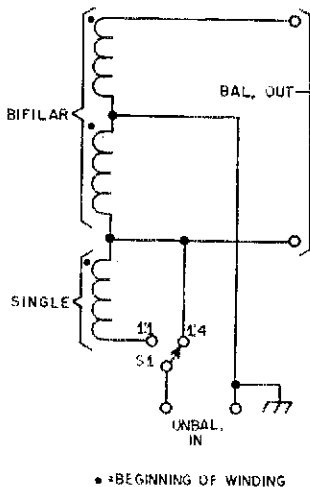


Fig. 1 — Switchable-impedance balun.

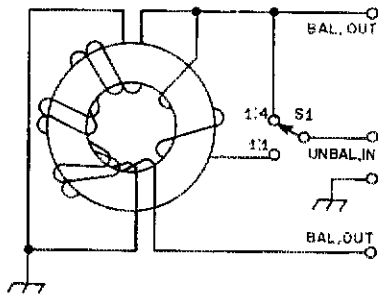


Fig. 2 — Pictorial diagram showing method of winding the switchable-impedance balun.

## TWO-METER PULSED-QRM MYSTERY UNVEILED

Technical Editor, *QST*:

The recent experiences of Battle Creek amateurs probably could be called "Intruder Watch *ala* VHF." As an active vhf amateur, I spend quite a bit of my time on the 2-meter band. I recently began receiving pulsed signals in the lower portion of the band. These signals never identified themselves. In my particular instance the received frequencies were 144.609, 144.847, and 144.910 MHz. With the use of two receivers and spectrum analyzers, I soon discovered that these signals were related. The addition of a strip-chart recorder gave even more interesting information. The pulses were found to be of 0.1-second duration with a repetition rate of 0.6 second. However, at certain times the normal sequence would stop and a given carrier would remain on for an undetermined time in the typical range of 2 to 20 seconds. Signals at my station were weak but good most of the time, with a definite azimuth bearing.

I contacted other local hams who were able to hear the signals. Now the search was on. K8AEM and I spent a whole day talking to various agencies and facilities that might have equipment of such a degree of sophistication — results, zero. Checking with a primary monitoring station nearby, we were told, "If you find it first let us know, and if we find it we'll let you know."

Loading down K8AEM's car with a Yagi antenna, converter, receiver, and panoramic indicating oscilloscope, and adding W8TIC and Jim Brangwyn, a local TV repairman, we were off to find what fantastic electronic device could be capable of such strange tendencies. In a 10-mile radius of the city numerous probings were made, all leading toward a central point. At last we stood in front of a large utility company. After introducing ourselves, we received excellent cooperation. As we were standing in front of a wall of mechanical and electronic instruments, our eyes shifted to one small box with a row of red lights going blink, blink, blink... a scanning police monitor. Subtracting 10.7 MHz (its intermediate frequency) from the local 150-MHz police- and fire-department frequencies, *bingo!* The results were the frequencies of interference. Now the mystery came to light. The 0.1-second pulsing was the normal search, and holding of certain carriers was caused by the monitor locking on a channel during the presence of a signal.

Because of a very good antenna at an exceptional height, enough local-oscillator signal from the monitor was being radiated from the antenna to cause interference. Since then, we have found two other monitors that radiate to a lesser degree. It appears that under certain conditions, the maximum spurious radiation levels as set forth in Part 15 of the FCC rules can be exceeded by these units. Considering the possible frequencies involved, the results could be harmful to other public services, if such a device were used in critical areas. — *Ted Hartson, WA8ULG, 31 Sanderson St., Battle Creek, MI 49017.*

### INEXPENSIVE 5/8-WAVE VERTICAL ANTENNA WITH COAXIAL TRANSFORMER

Technical Editor, *QST*:

W0JF reminds us of the useful low-angle radiation of the 5/8-wave vertical antenna in his article in August, 1970, *QST*.<sup>2</sup> Some hams may have missed the article by W2JTJ in *QST* for June, 1961.<sup>3</sup> These two go well together.

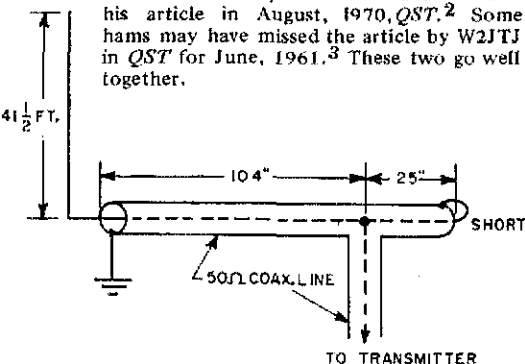


Fig. 3 — Coax-line transformer for 20-meter 5/8-wave vertical antenna.

My hastily-constructed 5/8-wave vertical antenna (inspired by W0JF's results) consists of a supporting structure made from sections of 2 X 2-inch lumber upon which four lengths of 300-ohm TV ribbon are affixed. Each section of ribbon line is 41 feet, 6 inches long. A length of this line is attached to each side surface of the 2 X 2 support mast, then the ends (top and bottom) of all four line sections are connected in parallel to form a single vertical conductor. The coax-line dimensions are near those of W2JTJ, and are shown in Fig. 3. The SWR varies from a flicker of reflected power at 14,000 kHz to 1.5:1 at 14,350 kHz. (My next task is to get that lowest-SWR point shifted to 14,275 kHz.) The whole thing is leaning against a tree, almost vertical, and seems to work well. — *Robert J. Earl, W1DRV, 26 Crestwood Dr., Framingham, MA 01701.*

### UNUSED-VFO SIGNAL RADIATION

With reference to the article, "An External VFO for the SB-100 Transceiver," which appeared in the October 1970 issue of *QST*, I should like to submit the following information and suggestions. Approximately three years ago I constructed a tube-type version of the adapter which Mr. Mather describes. Connection to the SB-100 was also

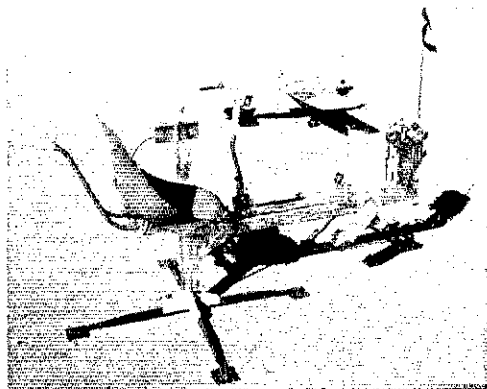
<sup>2</sup>Beers, "Short Antennas for the Lower Frequencies," in two parts, *QST*, August and September, 1970.  
<sup>3</sup>Czerwinski, "Coaxial Transformer for Voltage-Fed Antennas," *QST*, June, 1961.

identical. This unit was used for approximately one year.

Shortly after placing my adapter in operation, I became aware that under certain circumstances, a spurious signal was being transmitted along with the desired signal. The spurious signal was the result of the unused-VFO signal being processed by the mixing circuitry of the transmitter. I determined this to be a result of intersection coupling in the tube, V5, the pentode section of which is the first transmitter mixer in the SB-100. In my adapter, I cured the problem by installing a small relay which automatically grounds the output of the adapter when the transmitter is turned on. Although this method does prevent using the external adapter as a frequency control while transmitting, it has the added benefit of helping to keep a U.S. amateur in the proper portion of the band. Modification of the OSC MODE switch is possible if one desires to retain the original features of the adapter. While the spurious signal is considerably weaker than the desired signal, it is definitely present, at least in my adapter.

An added feature of the adapter I constructed was WWV coverage. By padding the 5- to 5.5-MHz oscillator to 4.5 MHz, WWV may be heard on 15 MHz with the adapter. The required additional capacitance may be switched in or out of the oscillator circuit with a spst switch. The rf circuits of the SB-100 are sufficiently wide so as to permit adjusting the crystal calibrator while tuned to WWV in this manner. — *Edward W. Sleight, K4DJC, 4165 Williamsburg Dr., College Park, GA 30337.*

### **Strays**



Now isn't this neat! Called a Fly Seat, the gadget was constructed by Ed Henry, K0GPD, and it consists of full-scale cockpit controls for operating a fully proportional 50-MHz radio controlled model airplane. The pilot positions himself in the bucket seat and operates the controls exactly like a full-size airplane while flying the radio-controlled model. The 50-MHz transmitter is attached to the forward end of the pivoting transmitter boom. If you're interested in building a Fly Seat, Ed has construction plans, which include drawings and information, available at \$6.75 per set.



# Hints and Kinks

## For the Experimenter



### CURRENT LIMITING FOR A REGULATED LOW-VOLTAGE POWER SUPPLY

A current limiter, adjustable to no limiting at all, can be added easily to a simple series-transistor voltage regulator, such as the one shown in Fig. 12-24 of the 1970 *Radio Amateur's Handbook*. The arrangement shown in the diagram is particularly useful when trying new circuits, since it protects components in case of a wiring error. Additionally, it provides protection for the power supply. The experimenter should first determine what current drain is expected of a new circuit, and set the limiter about 20 percent greater than that value. Then, power can be applied with confidence.

The control dial can be calibrated by hooking a milliammeter directly to the power-supply output and marking various values of short-circuit current. With the control set at 50 ohms, the short-circuit current will be about 10 mA. — *Julian M. Pike, WAØTCU*

Schematic diagram of the current-limiting power supply. Q2 and R3 are the two components added to the original circuit. Additional information concerning this design can be found in the power-supply chapter of either the 1969 or the 1970 *Radio Amateur's Handbook*. The unused positions of S2 can be used to select different values for CR5.

C1, C2 — 2000- $\mu$ F, 50-volt electrolytic (Mallory CG23U50C1).

C3 — .01- $\mu$ F disk ceramic.

CR-1-CR4, incl. — 50 PRV, 3-A silicon diode.

### EASY GROUND-ROD INSTALLATION

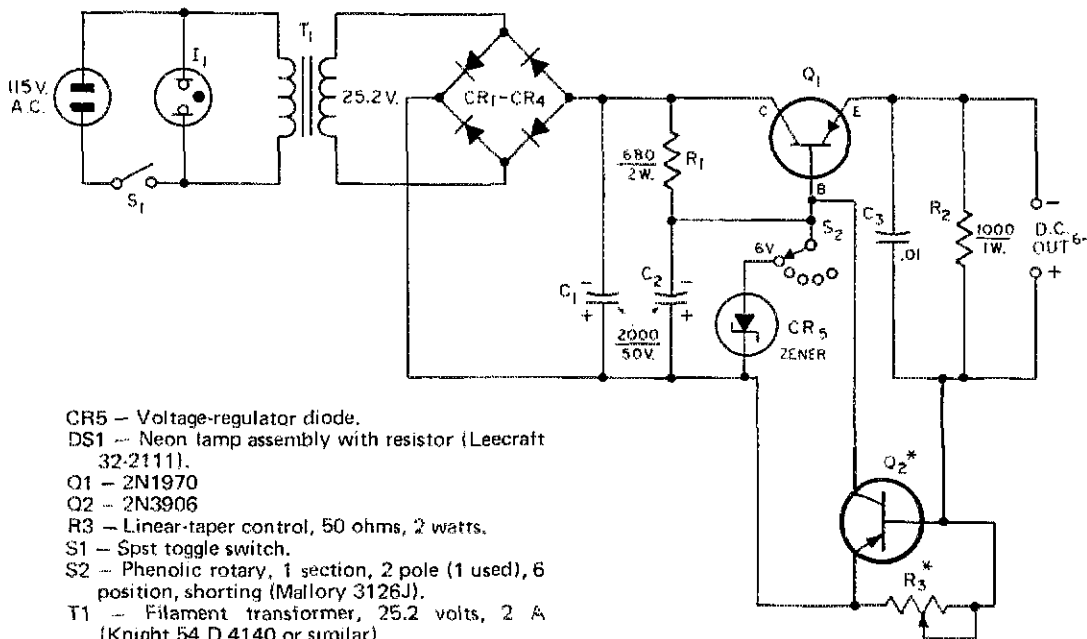
Dig a hole five or six inches deep and six inches in diameter. Fill the hole with water. Set the pointed end of the rod in the center of the hole and start tamping with the rod as though you were tamping a post. Pull the rod up so the water goes down in the hole. Insert the rod in the same hole and push down again. Repeat this procedure until the rod is down to the desired depth. — *Clarence E. Berry, K9TAT*

### ETCHING ALUMINUM

Recently, I built a version of McCoy's Transmatch. Unfortunately, the aluminum shows scratches and fingerprints. So, I etched the material in a solution of washing soda and hot water. I used two tablespoons of sal soda per gallon. The aluminum to be etched *must* be clean. Immerse the parts in the solution for three to five minutes, then remove and dry them. — *Geoffrey S. Vore, W9QBJ/WA9MZH*

### COILED CORD FOR THE SOLDERING IRON

There must be a special section of Murphy's Law covering soldering irons. No matter how carefully you set the iron down, you always end up burning holes in its cord — or the schematic that you are working on. One cure is to replace the present cord on your soldering iron with one of the coiled appliance cords available at electrical supply houses. The cords stretch out to five feet, but coil up to about nine inches when the iron is not in use. — *WIKLK*





## SIMPLE AUDIO SELECTIVITY

Many articles have been written covering audio selectivity for use on cw. Some of the units are quite complicated while others are simple. The cheapest audio selectivity I have found is built into a very inexpensive headphone set. The C.F. Cannon Company type-number 15, called "Alnico Magnetic," costs under \$3. When used with my receiver, this headphone set shows pronounced resonances at 600 Hz and at 1200 Hz.

Anyone desiring good audio selectivity at low cost should try different models. The cheaper they are, the better the chance of getting a strong peak somewhere in the audio range. Expensive phones are usually quite flat in response and will not show resonance peaks. — *R.F. Herbig, W6ME*

## KEEPING SWITCHES CLEAN

Owners of commercially-built transmitters may experience such intermittent conditions as low grid current (or no grid current at all), erratic plate current, and similar conditions. This is especially true for those operators (like the writer) who spend most of their time on only one or two amateur bands.

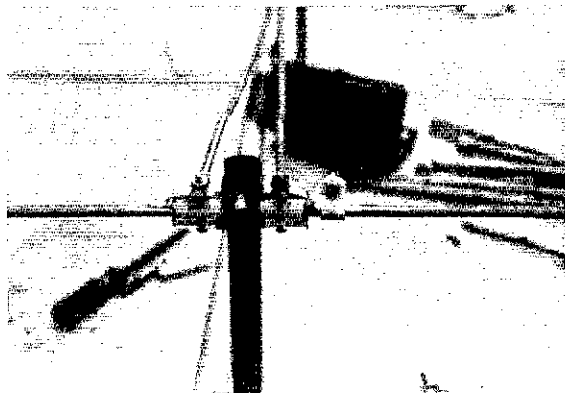
These problems are generally caused by the band-switch contacts not being cleaned by normal wiping action during band changing. The cure is to make a weekly habit of rotating each band switch through all of the positions several times. — *Ken Stewart, W4SMK*

## NOISY FAN MOTORS

Most of the small fans in modern exciters and amplifiers use shaded-pole motors. The thrust of these motors is against the back bearing, which is usually surrounded by a thin hardened-brass oil well stuffed with wadding. Between the end of the armature shaft and the thin brass shell is a small ball bearing that pinpoints the motor thrust against a small spot on the brass shell. Excessive end play (which causes noise) results when this pinpointed thrust finally pushes the brass shell outward. Press the brass shell flat and the motor becomes quiet again.

Many of these shells are fitted to the motor frame in the same manner that an on/off switch is crimped on a volume control. If it is necessary to remove the shell, be careful to bend the tabs slowly

as the hardened brass will break easily. Also, be careful not to lose the small ball bearing. — *Al Hudson, W9SCD*



## CORROSION CURE

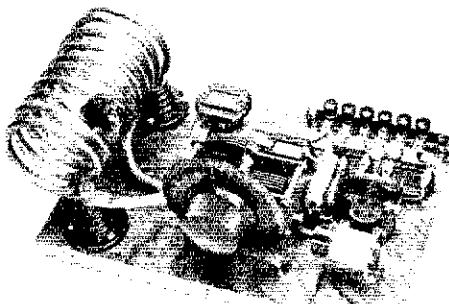
A perpetual problem in maintaining collinear arrays is removing corrosion from the elements (caused by the joining of dissimilar metals). Typically, stainless steel and aluminum are used on the same antenna, and where these two metals connect an insulating layer of aluminum oxide forms. In the advanced stages, this condition can be detected by checking the various connections with an ohmmeter.

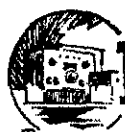
One solution is to disassemble the antenna frequently, and clean the joints. After growing tired of this method of maintaining the arrays at W1QXX (96 elements on 2 meters, 128 elements on 1 1/4 meters, and 196 elements on 70 cm), we sought an alternative cleaning method.

The accompanying photograph shows our answer to the problem. A small strap of aluminum flashing "bypasses" the offending joint. The aluminum strap is held against the phasing line by the element mounting bolt. At the other end, the strap is fastened to the element by a conventional hose clamp. Thus, all of the electrical connections are aluminum to aluminum. The resulting improvement in performance of our arrays has been nothing short of spectacular. — *John C. Wilson, Jr., W1QXX, and Lewis D. Collins, K4GGH/1.*

## From the Museum of Amateur Radio

This is a nice specimen of the famous TNT (tuned, not-tuned) transmitter which was very popular among amateurs around 1930. It derived its name from the fact that it had a tuned, low-loss tank circuit and an untuned grid circuit. The antenna was coupled to the tank through a small mica condenser. It was easy to build, adjust and operate and it worked just fine. Many new hams in the early 1930s cut their eye teeth on this rig, a staple of several *Handbook* editions. — *W1ANA*





# Recent Equipment

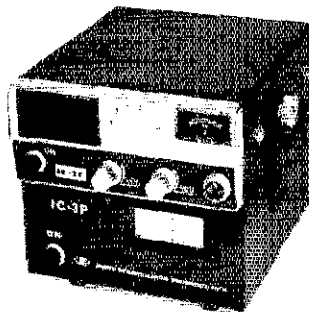


To acquaint you with the technical features of current amateur gear.

## Varitronics-Inoue IC-2F FM Transceiver

IF ONE is willing to believe that good things really do come in small packages, then the IC-2F must qualify. Here is a solid-state package that is scarcely larger than the *Handbook* — about the same width, not quite as long, and about three times as thick. Contained in this not-so-mysterious black box is a 6-channel, double-conversion superheterodyne receiver, complete with ceramic i-f filters, squelch, and an audio-output capability of 1 watt. The transmitter, also a 6-channel device, is capable of providing a minimum of 10 watts output into a 50-ohm load. The mobileer can connect the transceiver directly to the 12-volt electrical system (negative ground), attach antenna and microphone, then begin enjoying the adventures of fm and repeater operation. The stay-at-home operator can power the unit from the mating ac-operated 12-volt dc supply — the IC-3P — and get into the thick of things from the comfort of his ham shack.

Perhaps one of the most desirable features of the IC-2F is its compactness, especially in situations where the operator does not wish to fill the car's trunk space with amateur equipment. Those who have used surplus commercial two-way fm transceivers, especially the vacuum-tube variety,



The IC-2F is shown here attached to the IC-3P ac power supply. For mobile operation, only the top section of this package is used.

can appreciate the desirability of miniature equipment. But, in addition to the space-saving feature, a solid-state package of the IC-2F species greatly reduces drain on the car battery, thus offering greater overall efficiency of operation to the mobile enthusiast.

### The Receiver Section

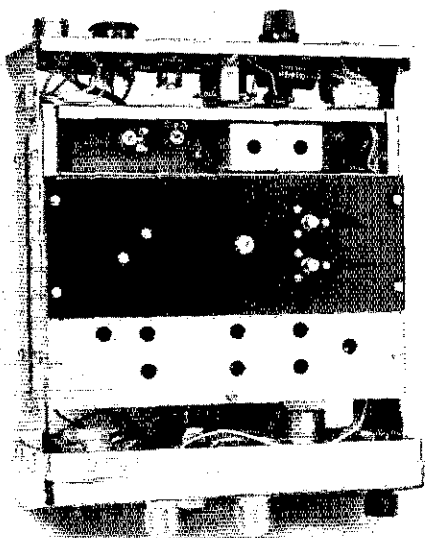
There are 13 bipolar transistors, 1 FET, and 1 integrated circuit in the receiver section of the transceiver. The lineup is shown in the block diagram, Fig. 1. Rf stage Q1 is a JFET whose output is coupled to the first mixer, Q2, through an LC bandpass filter, FL1. The filter provides the front-end selectivity needed to prevent strong out-of-band signals from reaching the first mixer and contributing to cross-modulation effects.

Since the receiver is of the double-conversion variety, i-f filters are used at 10.7 MHz and at 455 kHz. There are two 10.7-MHz filters, and one 455-kHz filter. All three units are ceramic and provide an i-f bandwidth of 15kHz, measured at the 6-dB points on the response curve.

I-f amplification is provided at 455 kHz by two bipolar transistors, Q6 and Q7, and by a portion of integrated circuit U1. The remaining part of U1 serves as the limiter. After limiting, the signal is detected by discriminator diodes CR1 and CR2, and is then routed to the squelch and audio-amplifier channels.

### Squelch Circuit

The squelch circuit, shown in Fig. 2, operates smoothly and without evidence of thermal drift. A thermistor, R2, in the bias divider at the base of



The rf power stages of the transmitter are located beneath the large black cover at the center of the photo.

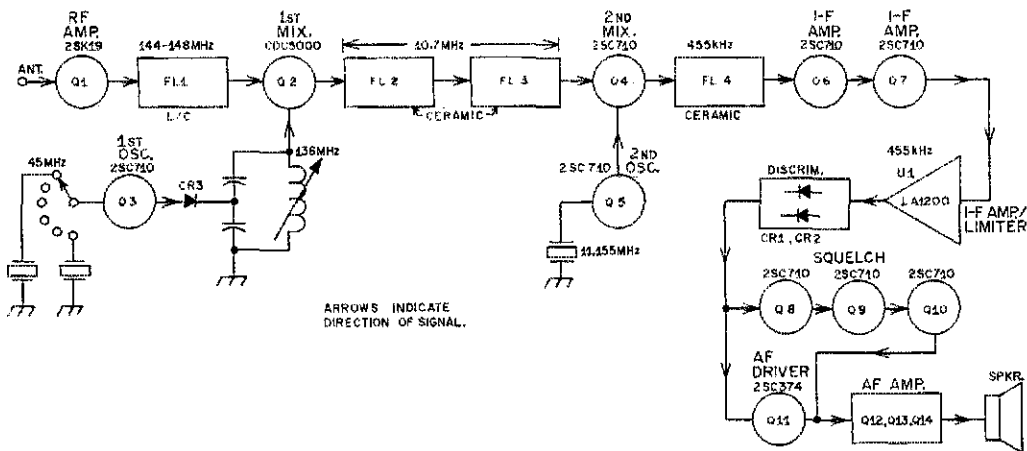


Fig. 1 — Block diagram of the receiver section.

Q8, enhances thermal stability. Tests performed with a Model 80 signal generator indicate that a signal of  $0.3 \mu\text{V}$  or greater will open the squelch. Of course, the squelch control can be turned off (fully counterclockwise) to permit reception of signals weaker than  $0.3 \mu\text{V}$ .

Squelch action is provided by sampling receiver noise at the output of the discriminator. This noise is amplified by Q8 and Q9, then is rectified by voltage-doubler CR4 and CR5 to produce a positive dc voltage which then operates squelch-control transistor Q10, a dc amplifier. Some forward bias is always present at the base of Q10, but the actual amount is governed by the setting of control R1. When no incoming signal is present, the receiver noise, after rectification, drives Q10 into saturation, causing it to act as a switch. When the switch is closed (saturated) the junction of Q10 shorts the audio-input signal and base bias of audio driver Q11 to ground, thus silencing the receiver. When a signal is received ( $0.3 \mu\text{V}$  or stronger) the quieting action caused by the signal reduces the developed squelch voltage to Q10 and opens transistor switch Q10 to permit reception. The greater the value of forward bias placed on Q10 by the setting of R1, the greater the incoming signal level must be to open the squelch.

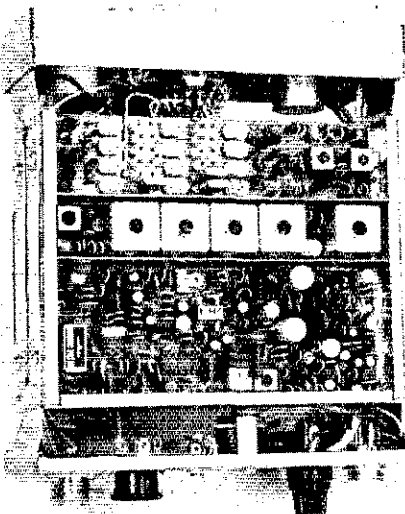
### Receiver Performance

No difficulty was experienced in getting the receiver "on frequency" when using crystals recommended by the manufacturer. Each transmit and receive crystal has its own trimmer capacitor, and adjustment of frequency is a simple matter. Crystals should be ground for a load capacitance of 20 pF and housed in HC-25/U holders. Receive crystals are cut for 45-MHz and are the third-overtone variety.

The receiver has an S meter, which is useful when relative signal-strength comparisons are desired. During operation from the writer's home station no difficulty was experienced with regard to receiver selectivity. K11G, which operates 146.28/146.88 MHz, and which is line-of-sight from the reviewer's station, drives the IC-2F S

meter to full scale. When the K11G repeater is in operation it does not interfere with reception of the K1ZJH repeater (146.34/146.94 MHz), which is many miles away, and which delivers an S-6 signal (relative) to the IC-2F.

The manufacturer claims 20 dB of quieting for  $0.4 \mu\text{V}$  or less signal input. Our tests show 20 dB of quieting at  $0.35 \mu\text{V}$ . A homemade dual-gate MOSFET preamp was tried ahead of the receiver. During that test it was possible to obtain 20 dB of quieting at  $0.25 \mu\text{V}$  input. In this writer's view the receiver meets or exceeds all of the manufacturer's performance specifications.



The transmit and receive crystal sockets and trimmers are on the circuit board at the far left. The receiver pc board is at the far right. The transmitter strip is at the center of the chassis.

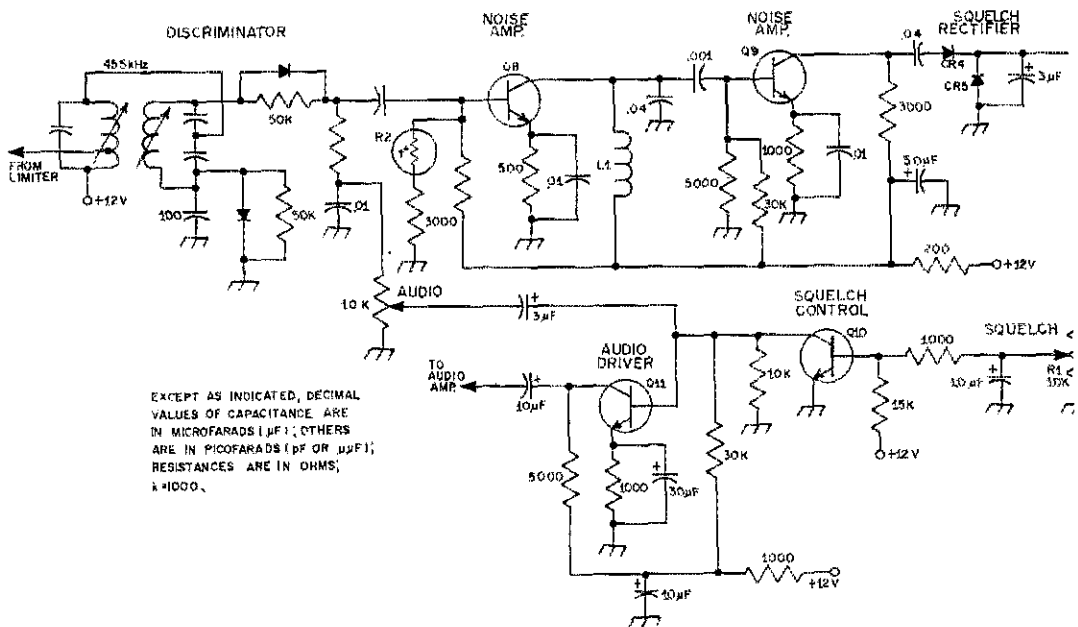


Fig. 2 — Circuit diagram of the squelch circuit used in the IC-2F. Parts values not given are not listed in the operating booklet. Polarized capacitors are electrolytic.

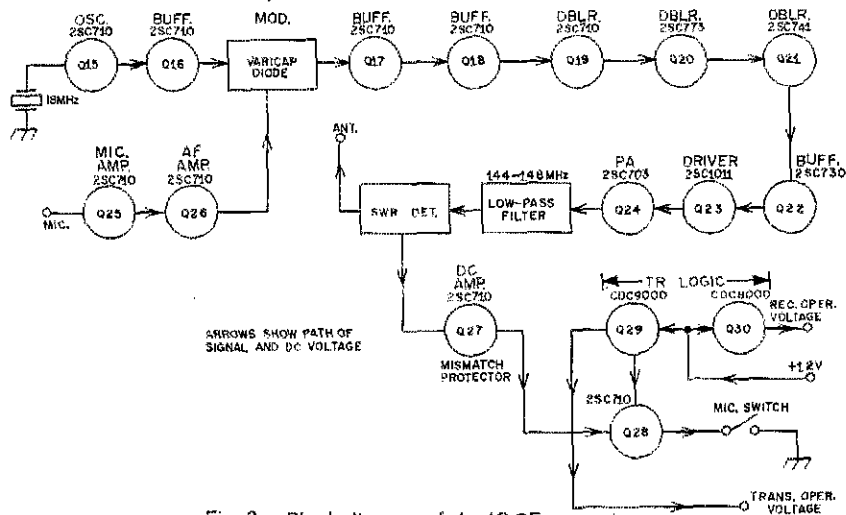


Fig. 3 — Block diagram of the IC-2F transmitter.

### The Transmitter

There isn't a great deal to say about the solid-state transmitter strip used in the IC-2F except that it performs as specified, transmits a quality signal, and has proved itself to be reliable. It is designed to operate at 20 watts dc input, providing a minimum output power of 10 watts. We found the output to be 13 watts into a 50-ohm load.

The deviation is adjustable up to 15 kHz. Oscillator crystals are of the fundamental type, cut for 18-MHz operation. Each crystal has its own trimmer for adjusting the transmitter to frequency.

Crystal ovens aren't used, but no drift problems have been experienced during two months of daily use under varying temperature conditions.

During transmit, the S meter serves as a relative rf-output indicator. The meter is activated by the forward-power sampling circuit in the Monimatch-type SWR detector shown in the block diagram, Fig. 3. The reflected-power leg of the SWR detector is used to activate a mismatch-protection circuit, Fig. 4, which cuts off the supply voltage to the low-level stages of the transmitter when the antenna becomes shorted, or when an unreasonable amount of reflected power exists. A sensitivity

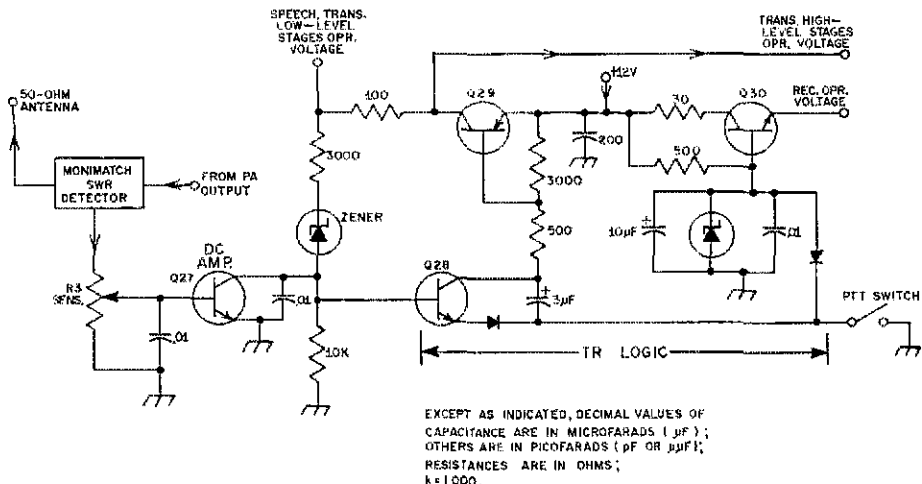


Fig. 4 - Circuit of the TR logic and mismatch-protection circuit. Polarized capacitors are electrolytic.

EXCEPT AS INDICATED, DECIMAL VALUES OF CAPACITANCE ARE IN MICROFARADS (µF); OTHERS ARE IN PICO FARADS (pF OR µµF); RESISTANCES ARE IN OHMS; k = 1000.

control is used in the reflected-power leg of the circuit, thereby enabling the operator to adjust the protective circuit for the trip-out point desired. It should be no secret to the reader that PA transistors can be destroyed instantly if the load they look at is highly reactive. With this unique measure of protection it is unlikely that the owner will be privileged (?) to become a member of "Junction Busters, Amalgamated."

### The Protection Circuit

Details of the mismatch sensor and control circuit are given in Fig. 4. Reflected-power energy is rectified and fed to the base of dc amplifier Q27. The reflected-power level at which Q27 saturates is determined by the setting of R3. When saturated, Q27 acts like a switch and shorts out the forward bias on Q28, in turn causing Q28 to be a switch in the "open" condition. When this happens, Q29 can no longer pass dc operating voltage to the transmitter, thus removing drive from the PA stage. The push-to-talk switch on the microphone also operates transistor switch Q28. Removing dc from the transmitter strip when the microphone switch is released. During receive, pass transistor Q30 is saturated to allow operating voltage to reach the receiver portion of the equipment. When the microphone switch is closed, forward bias to Q30 is shorted to ground. This action opens switch Q30 and removes operating voltage from the receiver. Simply stated, the mismatch-protection circuit operates the solid-state TR switch electronically. Normal send-receive operation is effected manually with the PTT switch.

Antenna switching is carried out by means of two diodes which are connected in the output lead of the PA stage, just ahead of the low-pass harmonic filter.

### Some Final Remarks

The workmanship used in the manufacture of this transceiver is superb. The layout is compact and orderly. Servicing should not be difficult

because most of the parts are easy to reach. Parts-placement photos are included in the operating manual - a real aid to the home repairman. A number of test points are provided to help in locating any trouble spot that may exist.

One criticism is worthy of mention. The instruction manual has a few inconsistencies which may confuse the owner. That is, the block diagram does not agree entirely with the schematic diagram. The schematic diagram has a few minor errors too, but this is not an unusual situation when dealing with imported electronic products. Some of the parts values aren't given on the diagram, perhaps because these resistors and capacitors are factory-selected to assure proper performance.

As is true of the receiver section of the IC-2F, the transmitter meets or exceeds all advertised specs. Operation during a two-month period has been 100 percent trouble-free. The unit is rugged, neat appearing, and small enough to fit into any automobile. . . American or foreign.

This is a 6-channel transceiver, provided one does not wish to transmit "direct" on the repeater output frequency. Direct operation is possible, but, if this is done in addition to normal repeater channelizing, the unit becomes a 3-channel device.

WICER.

**Varitronics-Inoue IC-2F FM Transceiver**

Height: 2-3/4 inches.  
 Width: 6 1/4 inches.  
 Depth: 7 1/4 inches.  
 Weight: 4-3/4 pounds.  
 Power Requirements: 13.5 volts dc, negative ground, +1.5 volts. Receive current -125 mA. Transmit current -2.5 A.  
 Price Class: \$350.  
 Distributor: Varitronics, Inc., 2321 E. University Dr., Phoenix AZ.

# Ham Radio Broadens Horizons for Handicapped



Wheelchair teacher WAØRRA was one of the instructors for the 36 handicapped radio campers at Camp Courage. A Handi-Ham herself, Edna holds the Extra Class license. (Photo courtesy of MiSCCA)

BY JANICE ROBIDOUX,\* WØQXA

**T**HE WORLD of a physically handicapped person is often one room wide — unless he is an amateur radio operator. As a ham he has at his fingertips friends coast to coast and around the world. With this thought in mind, the Handi-Ham System of Minnesota together with the Minnesota Society for Crippled Children and Adults (MiSCCA) set three major goals for 1970 of importance to the handicapped persons of Minnesota. They are happy to report that these goals were successfully achieved.

The first goal was a weekend of orientation to acquaint the handicapped persons of Minnesota with amateur radio. This unusual event, called the May Convocation, took place on a cold, blustery weekend in May at Camp Courage, Camp Courage, located on a sparkling lake amid pine and birch in central Minnesota is a camp built and maintained for the handicapped by MiSCCA. The camp is supported by private and public donations.

WAØEPX, program chairman, planned a busy two-and-a-half days for the campers. On Friday evening, the campers viewed the ARRL film, "The Ham's Wide World," and heard about adapting tape recorders and other devices to their special uses.

Saturday morning included a full program of technical talks presented by WAØDOT, WØEQO, WAØRRA, and KØDEF.

Luncheon and rest hour were followed by a MARS presentation, and introduction to emer-

\*6775 East River Rd., NE, Minneapolis, MN 55432.

Ott Miller, Handi-Ham Chairman, conducts a class in General Class theory. From left to right are WNØBSC, WØEQO, WN9BSR, WNØVBS, and WAØWVR. (Photo by WAØOEJ)

gency preparedness. The remainder of the afternoon was taken by group discussions and a panel session. WØTLE, WAØ1AW, WØIRJ, and WAØEPX fielded a variety of questions from the campers. More than 90 handicapped and vertical persons attended all or part of the sessions during the weekend.

The second milestone was reached in June with the dedication of the building and radio shack at Camp Courage. Several Handi-Ham members were present to explain the radio shack to the many visitors. The huge room, which is on the second floor of the new activities building, is reached by winding up a wide ramp designed for wheel chairs. The room contains radio equipment and instructional materials donated to the Handi-Ham System. A club call has been applied for but has not yet been assigned.

The third and most ambitious goal was the August Radio Camp. The purpose of this camp was to provide an entire week of intensive instruction and study supplementing that at home during the year, to prepare candidates for the FCC amateur radio exams given at the camp.

WØEQO and his crew planned a full week of activities for the campers. Volunteer instructors assisted by giving theory classes on Sunday, Monday, and Tuesday. Novice and General class students were divided into separate groups during the day but attended combined classes in the evenings. Cw classes were held every morning. The





Ned Carman, W0ZSW, founder of the Handi-Ham system, looks over Don Murray's shoulder as the FCC Engineer In Charge examines the radio shack log. Looking on are Harold Allen, FCC Engineer, (lower left) and Jack Maus, W0MBD. (Photo by WA0OEJ)



WN0VBS shows WA0SGJ the novice station in the radio shack at Camp Courage. (Photo by WA0OEJ)



W0KJUO, second from right, leads the discussion as WN0WGX, WA0VUP, WA0WVR study for the FCC tests. (Photo by WA0OEJ)

instructors for the General and Advanced Class licenses were WA0TLE, W0CRO, WA0NQJ, W0KJUO, and WA0IAW. The instructors for the Novice Class license were WA0VTZ, WA0YAH, WA0ATX, WA0TFC, and WA0UWW.

Camp Courage counselors, who had planned recreational activities between the sessions, were at a loss to get anybody to go on nature tours and participate in other planned recreation. Instead, the campers preferred to grill the instructors and any licensed ham who happened to be around informally between the classes. Many felt these brainstorming sessions were the most beneficial times spent at the camp. The spirit of the camp was further demonstrated by Don Hietala, who drove up to camp using his feet to steer his truck. He also took the cw test by typing with his feet.

Wednesday was the big day. Don Murray, FCC Engineer in Charge, and Harold Allen, FCC Engineer, came from St. Paul and administered 19 tests. The following campers passed: John Coleman and Joe Shepardson - Novice; Jim Mowery, K0ZWG, Orlin Greening WB0APA, Dick Hietala (no previous license), Sister Berard, WA0WVR, Don Johnson, WA0EPX, Mike Peterson, WA0VUP, and Rueben Martineau K0ZLI - General; and Don Johnson, WA0EPX - Advanced.

All of the 36 persons attending the camp felt they had benefitted from it. Those who did not qualify or who did not take the tests moved much closer to the day when they too will obtain the sought after licenses.

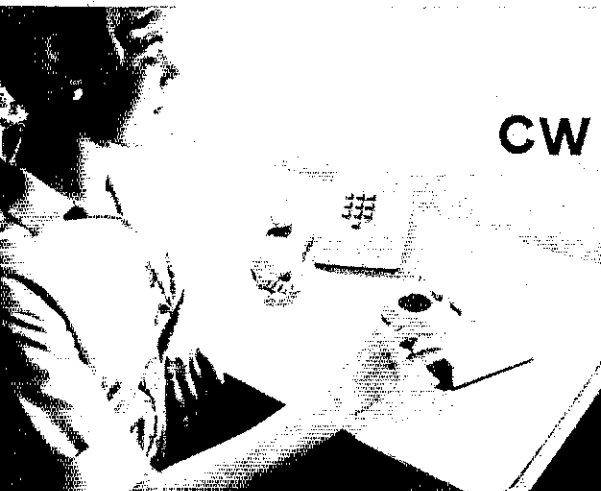
Handicapped persons interested in obtaining information about the Handi-Ham System, and radio amateurs willing to donate used equipment to beginning amateurs may write to: The Handi-Ham System, Inc., Box 532, Rochester, MN, 55901.



## Strays

A fitting epilogue to the above story is this photograph of Jean Heikkila, W0IRJ, and Orvin Fingarson who were married November 7 at the Mary Rondorf Home in Staples, Minnesota. The couple met in May at Camp Courage. Orvin took the Novice test in November.





## CW Communications for the Deaf

CODE-COM set manufactured by Western Electric for code use by the blind over standard telephone lines. The sighted party at the other end whistles or hums code characters for communication.

**T**HE TOTALLY DEAF, as you can imagine, are unable to communicate over telephone lines by normal means. They have been obliged to resort to a number of fairly-complicated schemes in which the sense of touch or vision is employed in place of hearing. (Deaf hams have the same problem and solve theirs in essentially the same way. Some deaf hams I know use RTTY and others receive code with gadgetry which inks dots and dashes on a moving paper tape.)

In case you wonder how deaf people know when someone is trying to reach them by telephone, the answer is that the telephone company furnishes a ringing relay which will turn on a customer-owned 115-volt ac appliance. The sighted deaf generally use floor or table lamps for signals — or occasionally a photoflood or strobe light. The deaf-blind usually rely on electric fans; when they feel a breeze they know they have an incoming call.

Deaf people can subscribe to regular teletypewriter service (TWX) or use teletypewriters coupled to the voice network through our Data-Phone data sets. A third alternative which is gaining rapidly in popularity is PTTY, in which teletypewriters are acoustically coupled to the telephone line through a coupler designed by a deaf ham on the West Coast, Bob Weibrecht.

A few deaf people communicate over telephone facilities with telewriting sets, coupled to the line through Data-Phone equipment. They can transmit handwriting and even sketches by this method. Acoustically-coupled facsimile equipment could be used, too, but I do not know of any instances where the deaf are doing this at the present time. Of course, all the deaf are looking forward to our Picturephone service, which will enable them to employ lip reading or sign language.

A popular trick among deaf businessmen requires an assistant who monitors a telephone conversation with a separate earphone and repeats, soundlessly, what the distant party says. The deaf

individual reads his assistant's lips and can reply so promptly that a caller not in the know would never realize he was talking to a deaf person.

Teletypewriters, telewriters or FAX restrict the deaf person to QSOs with other deaf people having identical or compatible equipment. A few deaf people have gotten around this difficulty by enlisting the services of a telephone answering bureau to act as a voice-PTTY relay. To phone a deaf person, call the answering bureau and they will forward your message to him by PTTY and read you his reply. This is a pretty expensive service, however, and is only available in a few of the larger cities.

Other deaf people, and especially the deaf-blind, can solve the problem by using Morse code. Special telephone sets are available which convert sound signals on the telephone line to flashes of light or vibrations of a tactile transducer. One such set, which has been around for several years, is the custom-built "Sensi-Call" set. Now Western Electric is manufacturing a standard CODE-COM set.

The CODE-COM set is simple and inexpensive and only the deaf person needs one. He can receive calls from any telephone anywhere in the world. All you have to do to communicate with him is dial his number and whistle or hum dots and dashes into your phone. The catch is that few deaf people are hams. They have to learn code before they can get on the air or on the wire. And it takes two to QSO, so their friends and relatives also have to master the code. That's where the ARRL code instruction manual should be most helpful, as I have recommended.

The deaf will need teachers as well as instruction books, and I can think of no people better qualified than the ham fraternity. If they hear of deaf people in their area wanting to learn code, let's hope hams will volunteer to help these handicapped people get started.

PTTY offers another opportunity for hams, especially the RTTY gang, to do community service work. Practically all the machines used by the deaf are obsolete 5-level units donated "as is" by the Bell operating telephone companies and other common carriers. Collecting and reconditioning of these old machines and distributing them to the deaf is coordinated by a non-profit organization, Teletypewriters for the Deaf, Inc., Box 622, Indianapolis, Indiana 46206. Anyone who is interested in doing volunteer work on reconditioning old 5-level teletypewriters can write to that address. — G. M. Smith, WB2KJI, Assistant Engineering Manager — Telephone Services for the Handicapped



**SOUTHEASTERN DIVISION CONVENTION**  
Miami, FL January 23 & 24, 1971

Miami in January! Pack your bag and have a week-end ball at the ARRL Southeastern Division Convention and Tropical Hamboree. See the latest in new equipment, sit in on a DX session with some of the most active DXers in the U.S. and Caribbean, get the straight scoop on Board activities from the Division Director or on headquarters operation from a Hq. representative. Meet other net members for an eye-ball QSO. Attend a mind-tickling tech session, or a slide show for an hour of sit-down relaxation. Pay for your trip by picking up some bargains in the biggest "flea market" in the Southeast. With two full days of buzzing action in Miami's Bayfront Park Auditorium, special rates at the Everglades Hotel just a block away, a banquet for six fifty, and an advance registration price of only one buck, the Dade Radio Club invites you to the biggest ham convention bargain of the year. All this and beautiful, warm, tropical Miami as a bonus!

Order your tickets now — registration will be \$2.00 at the door! Send all requests for hotel reservations (\$13 single, \$16 double) along with registration/banquet deposits to Dade Radio Club, Box 73, Miami, FL 33152. Do not send deposits for hotel rooms, but the special rates are assured only if the hotel reservation is requested through the club.

**COMING A.R.R.L. CONVENTIONS**

January 23-24 — Southeastern Division, Miami, FL  
April 16-17 — Great Lakes Division, Grand Rapids, MI  
June 19-20 — Rocky Mountain Division, Colorado Springs, CO  
July 3-5 — Pacific Division, San Jose, CA  
September 4-6 — Southwestern Division, Anaheim, CA

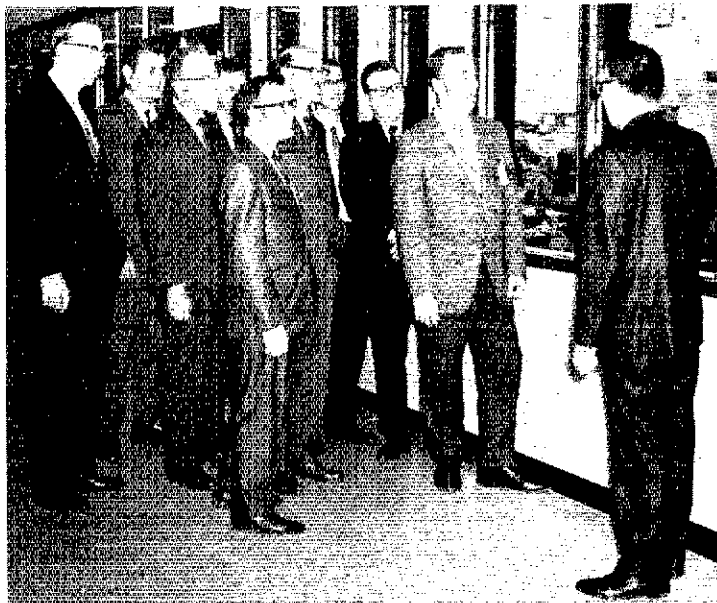
**Hamfest Calendar**

New York — The Cornell ARC will hold its annual flea market on Sunday, January 31 at 1:00 P.M. Bring any gear that you want to swap, sell, or trade to 401 Barton Hall on the Cornell Campus in Ithaca. For further information write: Cornell ARC, 401 Barton Hall, Ithaca, NY 14850.

Ohio — The Intercity Radio Club will hold its annual Ham Auction at the Naval Reserve Building on Ashland Rd. in Mansfield on February 5. Doors will open at 6:00 P.M., look, swap, and buy at 7:30 P.M., auction at 8:00 P.M. Eats. Donation of one dollar at the door.

**Strays**

The ARRL technical staff was recently the guest of RCA at its semiconductor plant in Somerville, NJ. Latest information on applications and fabrication techniques for rf power devices, FETs, and ICs was the subject of an all-day seminar. A technical session on RCA's new COS/MOS series ICs followed the dinner period, and lasted until midnight. In this photo the Hq. personnel inspect the "white room." Left to right are: John F. Wilhelm, K2OZW (Mgr. Commercial Engineering); Eugene W. Schlosser, K1MND (Tech. Field Rep.); George D. Hanchett, W2YM (Senior RCA Engineer); George R. Wood, W2LC/W1MTQ (Mktg. Mgr., RF Power); Gerald Hall, K1PLP (ARRL); Edward Tilton, W1HDQ (ARRL); Robert Myers, W1FBY (ARRL); Douglas Blakeslee, W1KLLK (ARRL); Doug DeMaw, W1CER/W8HHS (ARRL); and Merle V. Hoover, W3TLH (Mgr., Field Mktg. & Advanced Planning). The ARRL staff wishes to thank RCA and its host engineers for the time spent during the seminar. Much of the technical information gathered at this session will be passed along to QST readers in later issues of the journal. — W1CER.



# Annual ARRL Novice Roundup Announcement

February 6 through February 21

As February draws ever closer, its once again time to think about the Novice Roundup, a contest designed expressly to acquaint the newcomer to amateur radio with contest operating and at the same time help him improve his code speed and also QSO new states for his WAS.

WNS, this is your contest. Be sure to participate; you'll find it to be time well spent!

You can read the results of last year's NR beginning on page 62 of June 1970 QST.

Rules for the NR are simple. You may operate up to 40 hours during the contest period, exchanging a serial number and your ARRL section with other stations. Novices may work anybody; others may work only Novices. After the NR is over, send your contest log (along with comments and photos) to us here at ARRL HQ; results will appear in QST soon afterwards. Logs must be postmarked no later than March 5, 1971.

If you finish first in your section, you'll receive a handsome certificate award.

## How to Participate

Contest QSOs are much briefer than ordinary ragchews, and you should *not* repeat your information (call, number and section) umpteen times unless QRM is extremely bad. Here's the way a typical exchange might go:

CQ NR CQ NR DE WN2JAM WN2JAM WN2JAM  
NR K  
WN2JAM WN2JAM WN2JAM DE WN7MQW  
WN7MQW WN7MQW AR  
WN7MQW DE WN2JAM GE HR NR 27 ENY BK  
WN2JAM DE WN7MQW R TNX HR NR 5 OREG  
BK  
WN7MQW DE WN2JAM R INX 73 SK DE  
WN2JAM NR K

## Scoring

Count one point for each contact (you may work a station only once, regardless of band); add your ARRL Code Proficiency credit, then multiply by the total number of sections you worked. If you get 84 QSOs in 31 sections and have a CPC of 10 wpm from WIAW or W6OWP, then your score is 84-plus-10 times 31, or 2914 points. For details on the Code Proficiency program, see Op-News of this issue. By the way, you may work DX stations for contest credit, too, although there's no multiplier involved.

## Go To It!

Read the rules carefully. Keep a check-sheet of stations worked (we have Operating Aid #6 available free) so that you don't have duplicate QSOs. Log sheets, Op Aid 6 and a map of the United States are now available from your ARRL Headquarters. *Unless first-class postage is included with your request, log sheets will be sent by third-class mail.* To aid us in getting these forms to you as quickly as possible, please be sure to include with each request a self-addressed and stamped envelope containing: your full name, call and mailing address complete with Zip code. We suggest a minimum of 12 cents postage attached. This will assure your receiving 3 log-sheets (enough for 300 QSOs), 1 Op Aid 6 and a WAS map (if desired). Using this as a guideline you can adjust the postage according to the number of logs you anticipate needing.

B.C.N.U. in NR! - WAIKQM.

## Rules

1) **Eligibility:** The contest is open to all radio amateurs in the ARRL sections listed on page 6 of QST.

2) **Time:** All contacts must be made during the contest time indicated elsewhere in this announcement. Time may be divided as desired but not exceed 40 hours total.

(Continued on page 142)

## Novice Roundup

call WN5RWU

Version OKLAHOMA  
This page 6 (8/71)

OP		RECEIVED				SENT				TOTAL	
CALL	TIME	NR	SEC	OP	CALL	NR	SEC	OP	CALL	NR	SEC
15	2250	2051	1	30	W5KZC	2051	1	30	W5KZC	2051	1
		1854	2	17	W4GSC	1854	2	17	W4GSC	1854	2
		3301	1	17	W4GSC	3301	1	17	W4GSC	3301	1
		2105	2	20	W4JAW	2105	2	20	W4JAW	2105	2
		2111	1	14	W4JAW	2111	1	14	W4JAW	2111	1
		2114	1	14	W4JAW	2114	1	14	W4JAW	2114	1
		2123	7	25	W4JAW	2123	7	25	W4JAW	2123	7
		2127	2	42	W4JAW	2127	2	42	W4JAW	2127	2
		2128	8	48	W4JAW	2128	8	48	W4JAW	2128	8
		2135	10	60	W4JAW	2135	10	60	W4JAW	2135	10

Summary: (Enter below on last sheet used.)  
 Bands used: 15, 40, 80, 160, 3000 kHz.  
 Total hours of operation: 30:25  
 Type transmitter: 100W  
 Antenna: 20' dipole  
 Receiver: ICOM IC-71

Scoring: 10 points per contact, 10 sections = 21,262, obtained score.  
 I have accepted all competition rules as well as all regulations established for amateur radio in my country. My report is true and correct to the best of my knowledge.  
 Name: WN5RWU  
 Call: WN5RWU  
 Address: 1000 N. 10th St., Oklahoma City, OK 73102

QST for

## "It Seems to Us . . ."

*(Continued from page 9)*

freedom to experiment in the various bands, even those which we share with other radio services. Other efforts in preparation for the conference included broadening and strengthening the IARU; a Region 2 IARU Congress in Jamaica which pointed up the importance of the coming "WARC;" visits by our president, WØDX, to the IARU Region 1 Executive Committee meeting and to the Hq. of several member societies; attendance by our assistant general manager (WIRU) at yet another frequency management seminar in Geneva for "lobbying" at a particularly effective level; and keeping in close touch with the developing views of other countries. (See, for instance, the report in "Haps" this month.)

While we're thinking of space, W3GKP and W4HHK jointly received the ARRL Technical Merit Award for advancing amateur e-m-e technology to the 2300-MHz band — then, for an encore, established communications by that means on 2300 MHz, a first recorded earth-moon-earth QSO for that band and one which incidentally broke the distance record set earlier in 1970 by W4HHK and WA4HGN! The 220-MHz band also newly arrived on the e-m-e scene with WB6NMT/W7CNK and WB6NMT/K2CBA QSOs in March. The San Bernardino Microwave Society set new records of 214-mile QSOs on 3300 and 5650 MHz, blazing trails that many more of us must follow — and soon.

Back on earth, so to speak, this was the year that FCC proposed rules for vhf repeaters — but much more restrictive than the amateur fraternity had in mind. The ARRL VHF Repeater Advisory Committee won its spurs with a thick document which in essence became the ARRL response to the Commission on the repeater matter, and which insisted on maximum freedom to experiment and develop both the technical and operational sides of this fascinating field. The FCC also brought into question amateurs' traditional support of such good causes as the Eye Bank program, welfare agencies, etc., through interpretations of what its rules meant when they said "Licenses will not be issued to . . . organizations[s] . . . nor for [their] use . . ." At year-end, solutions to the problem were hopefully being worked out. No answer had been received from FCC, however, on ARRL's plea that it reconsider the fee schedule which had been adopted effective in August — \$9 for new, upgraded or renewed licenses, \$6 for duplicates, \$4 for modifications such as change of station location. Action was also awaited on ARRL requests for concurrent holding of Novices and Technician Class licenses; Technician use of 29.5-29.7 MHz and the whole of the

144-148 MHz band; on "1x3" type call signs for Extra Class licensees regardless of tenure; on automatic grants of Extra Class status to those who had held the earlier Extra First tickets in the 20s and 30s; on reduction to one year of time requirement for Extra; and on "counterpart" call signs when amateurs move from one area to another. On the other hand, action was completed on the rules changes which allow amateurs to count their time as licensees in another country toward the two years for Extra and toward the 25 years needed by Extras for a two-letter call; on shifts in 2-meter cw and 10-meter RTTY to the low ends of the respective bands; and on spectrum pollution control rules, regulating some of the myriad things which make noise in our receivers. The FCC also added an ITU resolution on shared use of 40 meters to our rules; its only immediate practical effect is to bar amateurs in Baker, Canton, Enderbury, Guam, Howland, Jarvis, Palmyra, American Samoa and Wake Islands from use of 7100-7300 kHz; they are located in Region 3, where that part of the band is assigned to the broadcasting service. The Commission rejected proposals by individuals that it drop the Extra Class code speed to 13 wpm and that it change the power measurement rules above 420 MHz from a kW input to 800 watts output. And the Senate passed and sent to the House Senator Goldwater's bill to allow future citizens to obtain amateur operating privileges, recognizing that the reciprocal operating rules do not apply for many immigrants who would like to get on the air.

Back on the organization front, 1970 was the first full year of circulation for "The Ham's Wide World," our half-hour movie on ham radio. (It may seem incredible, but we've already worn out several of the 80-plus prints with the continuous use they've had) and it saw the appearance of HWW's little brother, "This is Ham Radio," intended especially for high-school audio-visual library use. This was also the year when the two-year trial of advisory committees was completed; the experiment was termed a success, and the directors made them a permanent part of the League structure. To the existing committees on Contests and on VHF Repeaters we are about to add an advisory committee on DX; see the Executive Committee minutes in "Haps" this issue. A special committee of the Board continued its studies on formation of an ARRL Foundation, but a "green light" for the project turned yellow with new regulations affecting foundations. Meanwhile, the League itself continues as an entity to which gifts may be made and credited at U. S. income-tax time. Life Membership reached 882 fully paid (301 of which are Charter LMs) and 227 more in the instalment plan, an increase overall of more than 200 during the year.

*(Continued on page 61)*

# September VHF QSO Party Results



WA1MUG



WB2SIH

REPORTED BY AL NOONE,\* WAIKQM/WB6SAZ

**J**UDGING FROM your comments received, the September VHF QSO Party (despite the almost complete absence of  $E_5$  activity), was highly successful. East coast tropo conditions far exceeded those of past years. In the midwest, scatter communications provided most of the multipliers and way out west, a couple of short  $E_5$  openings sped up the action.

High score in the single-operator multi-band category was registered by **WB2SIH**. Bill with an outstanding score of 24,066. Andy, **WA2FGK** (with 70 total sections and a possible record) followed closely behind at 21,700. Bill's volume of QSOs on 50 and 144 MHz making the difference.

Multi-operator entries were led by none other than **WA1MUG**, the Mount Greylock group, their final score of 107,160 setting what is believed to be a record for the September party. The runner-up slot was taken by **WA8PLZ/8**, with a score of 65,700. **WAIIOX**, the Talcott Mt. UHF Society managed third with 53,040. Incidentally, theirs was the only QSO with  $EP\dot{O}CA$  during the contest period.

Section totals, particularly on 220 and 432 MHz, rose considerably over last year. Some of the more notable returns were: **K9HMB** - 29 on 50 MHz; **K4PCL/4**, **W8WFN**, and **VE3ASO** tied with 25 on 144 MHz; **W2CRS** - 15 on 220 MHz; **K2RIW** and **K2UYH** tied with 19 on 432 MHz and **K2UYH** again, with 3 sections on 1296 MHz and above. High multi-operator returns were as follows: **WA8PLZ/8** with 41 on 50 MHz and 28 on 144 MHz; **WA1MUG** with 16 on 220 and 22 on 432 MHz; **W1DC/1** with 4 sections on 1296 MHz and above.

Summing it up, some 308 entries were received from 60 sections of the USA and Canada. This being almost identical to last years turnout. Certificate awards are scheduled for a January 15th mailing.

Have any ideas for contest improvement? If so, the Contest Advisory Committee would welcome your suggestions. Please address your comments to

the chairman: Len Chertok, **W3GRF**, 8301 Temple Hills Road, Washington D.C. 20031.

Good luck in the January VHF SS.

## SOAPBOX

I really enjoyed signing portable 3 in Delaware on the cw portion of the 2 meter band. - **K1YLU/3**. This is my first try at a contest activity and I enjoyed it very much and hope to be more active in the next one. - **K3GUW**. This was the first contest for a couple of new preamps and boy did they make a difference. - **K3WRY**. I do not like the two 14 hour periods. - **W3KMV**. Very good conditions but little activity. - **WA3APQ**. Conditions on Saturday night were fantastic! It was a pleasure to have so much activity on the cw portion. One complaint, limiting the operating time probably hurts activity in the later periods. The VHF contests need all the time that is available to increase interest. - **W3TMZ**. This is the first VHF Party I have tried since 1950 when I was signing **G2FME**. Thoroughly enjoyed it. - **WA3LMG**. Only had limited time for operating but had seemed in very good shape on saturday night. Really hated to cease operation. - **W2WGL**. I am discouraged by the lack of activity in this section. In fact, I was unable to work my own section.

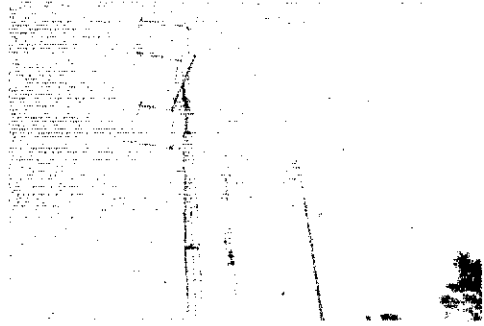
## DIVISION LEADERS

Single Op.		Multi Op.
<b>K3WRY</b>	Atlantic	<b>W3AD/3</b>
<b>K9HMB</b>	Central	<b>WB8HUC/9</b>
<b>K0CFR</b>	Dakota	.....
<b>WA4CGA</b>	Delta	<b>WA4PWO</b>
<b>WB8BGY</b>	Great Lake	<b>W8CCI</b>
<b>WB2SIH</b>	Hudson	<b>WB2GKE/2</b>
<b>W0PFP</b>	Midwest	<b>WA0PBO</b>
<b>W1EUI</b>	New England	<b>WA1MUG</b>
<b>K7BBO</b>	Northwestern	<b>W7HAK/7</b>
<b>WA6GYD</b>	Pacific	<b>K6GSS/6</b>
<b>K4PCL/4</b>	Rounoke	<b>WA8PLZ/8</b>
<b>W0A1Y</b>	Rocky Mt.	<b>W7RQT/7</b>
<b>W4CAH</b>	Southeastern	.....
<b>K6YNB/6</b>	Southwestern	<b>K6QFH</b>
<b>W5RAG</b>	West Gulf	<b>K5WVX</b>
<b>VE3ASO</b>	Canadian	<b>VE2RM</b>

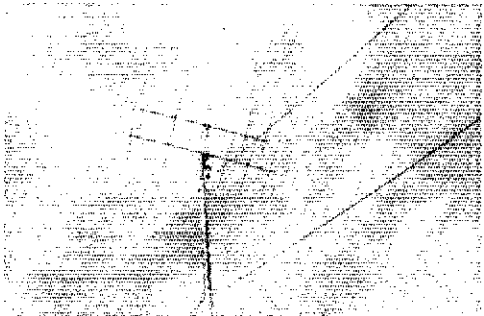
\* Asst. Communications Mgr., ARRL.

However, I will be plugging away again in January and I might even have a vfo by then! — WA2MDF. The Binghamton ARA enjoyed the September contest, 220 and 432 was especially good for us. — W2OW. Worked WA1MUG on 50-432 MHz - sure wish more people would aim their antennas toward Central PA for WPA. — K3HKK/3. This is the first time I have ever entered a VHF contest. — K9WJB. Conditions were poor but aurora brought a few more contacts. Where was the local competition? — WA0SBZ. Propagation conditions on 50 and 144 were not good with the exception of 50 MHz ionospheric scatter. Outstanding six-meter scatter signals heard in South Dakota were those of W8CCI and K8BBN. Heavy QRM in the east apparently prevented my making additional scatter contacts into W3 and W8. — K0CER. Other than a short aurora opening, things were slow here for a contest. — W8B8GY. High point of the contest was hearing KH6FRL but he was portable 8 in Michigan! — W8EOW. Band conditions to the west were really bad. — W8WEN. Just completed my first VHF party. Terrific! Loads of stations on until the early hours of Sunday morning — but where was Michigan and Illinois? — W88KIW. Had to work Saturday and was on the air Sunday only. Wish I was on earlier for the tropo. — WA2SPL/2. I was glad to see some cw activity above 144 MHz. Only wish it was there all the time. — WA2IKR. Was very pleased to work three new states; Ohio, WVA and N.C. — K2RIW. Worked our 20th state on 432, W4VQA in Kentucky. — K2UYH. Best contest to date. — W1ENZ. Got on 432 MHz after a long time off the band, mainly to give local club, WA1IOX a contact. Found band wide open for tropo and ended up working from Maine to NNJ, mostly with about 1 watt output. Finally got it peaked up to 3! Best tropo propagation I've seen in a contest in many years. — W1HDQ. Activity was good this contest with the tropo opening providing increased sections especially on 144 MHz with much excitement. — W1EUI. Thought I'd try a single band effort on 220 MHz this time. Lots of activity and good propagation. — K1AGB. Where was Vermont? — W1AAI. All QSOs on A1 mode. Nice tropo conditions, will have 432 MHz for January test. — K1ABR. Very good meteor scatter conditions around 11 PM and 8 AM local time, allowing contacts from Southern California to Alberta, Canada. There were 2 short "E" openings during the contest and fair ground wave conditions to Northern Washington. — WA7GCS. Meteor scatter activity was up this year, local activity was very slow. — W7FN. Activity here in the flatlands left a lot to be desired. — WB4CES. Biggest thrill was hearing and working the S9 plus signals of WA1MUG on 432 MHz. — K4GL. Operated from 4228 foot mountain top really helped. I kept pinching myself throughout the contest, not to stay awake, but to make sure I just wasn't dreaming, conditions were so great on two cw. — K4PCL/4. WA1MUG signals were consistent, his 432 MHz was S9 plus for hours, day and night. Conditions plus the location at 2600 ft. made the contest gratifying. — WA8PLZ/8. If this score is the highest on the West Coast, it will be the sixth time in the last seven VHF contests that I have led all western single operator stations. — K6YNB/6. 50 MHz scatter was fair, two short Es openings in the NW sped up the action, 144 MHz tropo was good. — K6QEH. I enjoyed the contest but was disappointed in the lack of band openings. Had only two short ones on 6 to Washington and Oregon. Looking forward to the June party and hope to add 432 MHz. — WA6ICZ/6.

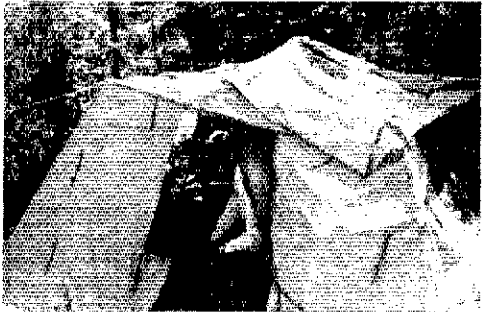
## WA1 "MUG" Shots



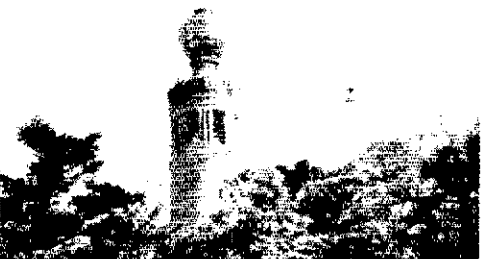
22 el on 144 MHz.



6 over 6 at 100 feet on 50 MHz.



220/432-MHz operating tent.



Mt. Graylock War Memorial

**SCORES**

In the following tabulation, scores are listed by ARRL divisions and sections. The top single-operator scorer in each section receives a certificate award. Multiple-operator scores are shown at the end of each section tabulation; in sections where at least three such entries were received, the top multiplier operator scorer receives a certificate award. A double asterisk indicates Novice award winner; one asterisk indicates lig. staff member, ineligible for award.

Columns show final score, total number of contacts, section multiplier, and bands used. A represents 50 MHz; B, 144 MHz; C, 220 MHz; D, 420 MHz; E, 1.215 MHz and above.

W41Z X/4 (8 oprs.) 2778-124-22 AB  
 W4BBB/4 (4 oprs.) 1918-137-14 AB

K2JWE/2 (3 oprs.) 16,544-352-47  
 K2DEL/2 (7 oprs.) 14,118-340-39  
 WB2MFC/2 (12 oprs.) 6448-208-31  
 WA2UDT (+WA2PKY) 2831-149-19  
 WA2UHW (3 oprs.) 1378-106-13  
 WB2UW/2 (+WB2DTT) 1150-115-10  
 WA2JNO/2 (4 oprs.) 392-56-7

**GREAT LAKES DIVISION**

**Kentucky**

K4WYN 458-35-13 A  
 K4AVX 4-2-2 A

**Michigan**

WB8BGY 2444-128-23 AB  
 K8EFS 2341-111-21 AB  
 K8HWV 1200-60-20 AB  
 W8ASYW 468-49-9-ABCE  
 W8BKD 306-34-9 B  
 W8KFW 144-16-9 A  
 K8AJC 21-21-1 A

**Ohio**

WSWEN 2400-96-15 B  
 W8BS1X 1335-89-15 AB  
 W8B1TS 1020-68-15 AB  
 W8ARKW 864-54-16 AB  
 W8ASZY 864-54-17 AB  
 W8RYHN 835-55-18 AB  
 W8AMI V 369-41-9 A  
 W81RN 128-16-8 AB  
 W8A1YF 84-10-7 AB1  
 WB8QV 2-1-1 C  
 WB8CI (8 oprs.) 26,676-334-76 ABD  
 K8ZCF/B (3 oprs.) 5112-142-36 AB  
 W8KFL/B (+WA8WLR) 1176-84-14 A

**HUDSON DIVISION**

**Eastern New York**

WB2SIH 24,066-432-63 ABCD  
 W2CRS 18,224-244-67 ABC  
 WA2SPL/2 16,902-288-54 ABCD  
 K2BGU 3768-157-24 AB  
 K2ARO 3672-108-27 BD  
 WA21SN 610-61-10 A  
 WB2HXZ 494-30-13 BC  
 WB2NPR 369-38-9 BD  
 WB2VYQ 248-31-8 A  
 W2HF 147-19-7 BC1  
 WB2VFO 130-26-5 B  
 K2YLL 15-5-1 A  
 WB21KJ/2 (6 oprs.) 4968-207-44 B

**N.Y.C.-I.L.**

K2RTH 14,625-174-65 ABCD  
 WB2GWU 4176-174-24 AB  
 WA2ZPX 2950-118-25 AB  
 WA2DHF 1686-166-6 B  
 WA21KR 2635-155-17 B  
 WA21FUZ 2530-110-23 AB  
 K2RIW 2166-57-19 D  
 WB2ZKT 1584-99-16 AB  
 WB2ZKS 858-66-13 AB  
 W2KXC 800-80-16 R  
 WA21US 720-36-16 ABCD  
 WB2LHB 451-41-11 B  
 WB2MZE (3 oprs.) 10,038-239-42 AB  
 WA2VKY (+WB2BON) 6154-181-34 AB

**Northern New Jersey**

WA2PGK 21,700-251-70 ABCD  
 WA2ANJ 6112-191-32 AB  
 W2UK 4200-97-35 BD  
 K2UYH 3654-61-29 CDE  
 WA2AQJ 1805-95-19 B  
 WA2FUJ/2 1230-82-15 B  
 W2CWV 896-60-14 ABCD  
 W2DZA 663-31-17 ABC  
 WB21LW 472-59-8 H  
 K2DUU 400-50-8 AB  
 WB2ZLI 57-24-3 B  
 K2RLW 10-5-2 B  
 WB2GKE/2 (9 oprs.) 34,965-508-63 ABCD  
 WB2KKO/2 (7 oprs.) 31,556-635-49 ABD  
 K2OWR (8 oprs.) 23,490-385-54 ABCDE

**ATLANTIC DIVISION**

**Delaware**

W3CGV 4510-7941-ABCDEF  
 K1YL/3 1344-56-24 AB  
 WA3HW 333-37-9 B  
 K3GOW 264-44-6 A

**Eastern Pennsylvania**

K3WRY (2,720-204-53-ABCD)  
 K3HUV 9828-124-52-ABCD1E  
 K1SEF/3 4084-74-33 AC1D  
 WA3JVO 3740-168-20-ABC  
 WA3BHE 2184-91-24-AB  
 W3FTB 1515-101-15-AB  
 W3TPM 1281-61-21-AB  
 WA3NGU 975-74-13-A  
 WA3JLU 806-62-14-V  
 W31ZU 630-38-18-B  
 WA3NAH 612-68-9-A  
 WA3FM1 340-34-10-A  
 WA3MRF 176-72-5-AB  
 WA3KE1 48-16-3-A  
 W3AD/3 (5 oprs.) 22,504-358-58-ABCD  
 K3MTRK/3 (5 oprs.) 20,938-324-88-ABC  
 W3IARW (4 oprs.) 17,748-220-68-ABCD  
 WB2LZD/3 (5 oprs.) 13,275-291-48-ABCD  
 WA3OOD/3 (3 oprs.) 9933-227-43-ABCE  
 WA3JWP/3 (4 oprs.) 2256-94-24-AB  
 W3DGB/3 (2 oprs.) 2034-113-18-AB

**Maryland-D.C.**

WA3APO 5412-164-33 AB  
 W3BMV 5084-164-31-AB  
 WA3JUL (WA3FOP, opr.) 4898-158-31-AB  
 W31UL 3216-134-24-B  
 W31MZ 2256-94-24-B  
 WA3KQQ/3 1173-69-17-B  
 WA3HEN 1056-88-12-B  
 WA3JMG 880-55-16-B  
 W31VC 708-59-12-AB  
 K1VRS 644-45-14-AB1D  
 W3MNS 572-44-13-AB  
 W3PZK 441-47-9-AB1D  
 W3HWZ 378-42-9-B  
 W3HH 352-32-11-A  
 WA3LGX 270-27-10-B  
 K31BD 240-40-6-B  
 W3PH 234-26-9-AB  
 W3GN 216-24-9-A  
 W3GEL 200-20-10-AB  
 W3MAR 140-28-5-A  
 K31YD 116-29-4-A  
 WA3WRM/3 80-20-4-B  
 WA3AJD/3 33-11-3-B  
 W3PGA/3 (5 oprs.) 9922-320-41-ABC  
 WA3NPD (4 oprs.) 1196-92-11-B  
 WA3IBA (2 oprs.) 312-52-6-A

**Southern New Jersey**

W2E1F 7515-113-45-ABCD  
 W2BLW 598-123-13-D  
 K2BWR (+K2ZR) 8800-163-50-ABC

**Western New York**

W2CNS 7360-147-40-ABCD

K2YCO 6528-108-51-ABCD  
 K2CIH 1248-50-24-AB1D  
 W2WGL 350-25-14-B  
 WA2HW 112-28-4-AB  
 WA2GPO 40-20-2-B  
 K21ZT 30-6-5-A  
 W2MYN 26-13-2-B  
 WA2MDF 24-12-2-B  
 WB2CHO 4-4-1-A  
 W2OW (11 oprs.) 19,341-278-63-ABCD  
 K2ERQ (9 oprs.) 6880-173-40-AB  
 WA2YHY/2 (3 oprs.) 752-47-16-AB

**Western Pennsylvania**

W3BWU 3718-141-26-ABC  
 WA3GSH 264-33-8-AB  
 W3DM 215-43-5-A  
 K3HKK/3 (7 oprs.) 21,964-290-68-ABCD

**CENTRAL DIVISION**

**Illinois**

K9HMB 5738-145-38-ABCD  
 W9QV 1080-90-12-B  
 WA9QPM 440-88-5-AB  
 W9DJZ 304-79-4-AB  
 W9JZR 294-42-7-B  
 WB9FDP 240-60-4-AB  
 W9ABA 18-9-2-A  
 G3PAUW9 (3 oprs.) 2232-184-12-ABCD  
 W9BGX (2 oprs.) 2044-226-9-AB  
 WN9EUW (+K9DTB) 42-21-2-B

**Indiana**

K9QCB 1024-64-16-AB  
 WB9AMB 986-83-12-A  
 WA9YXA 441-49-9-A  
 WB9FCF 330-50-11-A  
 W9GMI 170-34-5-B  
 WB8HHC/9 (WH8 GFK GEY) 2457-117-21-AB

**Wisconsin**

WA4SDC 896-64-14-AB  
 K9WFB 14-7-2-B

**DAKOTA DIVISION**

**Minnesota**

WA0SBZ 192-24-8-A

**South Dakota**

K0CER 476-28-17-AB

**DELIA DIVISION**

**Louisiana**

WA5OBX 110-22-5-A  
 W5JFB 26-13-2-AB

**Mississippi**

WA5KMS 1312-82-16-AB

**Tennessee**

WA4CGA 3780-104-35-ABCDE  
 WB4GG 605-55-11-A  
 WA4PWO (3 oprs.) 6336-194-32-ABD

**MIDWEST DIVISION**

**Iowa**

W0PFP 612-36-17  
 WA0UPS 319-29-11  
 Kansas

**Kansas**

WB0BBC 48-16-3  
 WA0VJE 38-19-2  
 WA0PBO (+WA0PKG) 600-60-10

**Missouri**

K0TLM 588-41-14-AB

**NEW ENGLAND DIVISION**

**Connecticut**

WA1ENJ 10,669-217-47-AB  
 K0HTV 5744-228-23  
 WA1LFO 3955-113-35  
 W1VU 3500-118-28  
 W1ELZ 1003-59-17  
 W1GZ 567-63-9  
 W1DHT (W1ZUQ, opr.) 500-50-10  
 W1HDQ\* 468-25-14  
 WA1GTP 338-23-13-AB  
 W1JL 70-10-7  
 K1UOAJ 6-3-2  
 WA1IOX (10 oprs.) 53,040-559-85-AB  
 K4GGU/1 (+WA2KZV) 160-9-8

**Eastern Massachusetts**

W1EUD 12,349-212-53-AB  
 K9AOPH 1152-32-18  
 K1AGB 896-32-14  
 K1HBY 820-22-10  
 K1COS 248-31-8  
 WA1MKP 189-21-9  
 WB3KX/1 105-21-5

W1MHL/1 (multiop)  
 WA1MHN (8 oprs.) 5174-197-26-AB  
 WA11FD (3 oprs.) 3608-163-22-AB  
 WA1KVI (+WA1KVK) 2464-84-28-AB  
 WA1A1 (+K1OJQ) 1700-100-17  
 1500-78-20

**Maine**

W1DC/1 (21 oprs.) 51,376-591-76-AB  
 WA1NDW/1 (+WB3WVY) 318-53-6

**New Hampshire**

WA1ZK 3672-33-36-B  
 W1ISM 2046-90-22  
 K1MFO 1580-79-20  
 WA1ESZ 846-34-18-AB  
 W2MKN/1 270-30-9  
 WA1JSD 147-21-7  
 WA11DR 90-18-6

**Rhode Island**

K1ABR 2526-80-29

**Vermont**

K1GYT 4402-142-31

Minimums MHz.	30	15	4	3	2	Minimums MHz.	30	15	4	3	2	Minimums MHz.	30	15	4	3	2	Minimums MHz.	30	15	4	3	2
	50	144	220	432	1215		50	144	220	432	1215		50	144	220	432	1215		50	144	220	432	1215
KIABR	9	20				K2DFL/2*	22	10	7			WB2GKE/2*	24	20	9	10		W4VHH		20			9
K1AGB			14			K2ERQ*	20	20				WB2HZ		7	6			WA4CA	13	19	1	1	1
K1DKX	23					K2WE/2*	26	21				WB2MZE*	24	18				WA4WZ/2*	20	4			
K1GYT	22	9				K2QWR*	20	18	7	8	1	WB2SHH	23	22	19	8		KSUVX*	21	11			
K1HTV		23				K2RIW			19			K3HKK/3*	26	22	10	10		K6GSS/6*	12	9	4	4	
K1MFQ	20					K2RTH	19	22	13	11		K3LUV	12	13	12	12	3	K6HXW/6*	7	6	5	4	
W1AAI*		20				K2UYH			6	19	4	K3MTG/3*	25	19	14			K6QEH*	11	8	4	3	1
W1AZK		23	7	6		K2YCO	21	15	6	9		K3WRV	23	13	9	8		K6YNB/6*	10	5	3	3	2
W1DZ/1*	26	22	13	11	4	W2AQT		19			W3AD/3*	21	18	10	8		W6GYD	8	5	2	3		
W1ENZ*		17				W2RLV				13		W3ARW*	19	14	11	14		W6HAP					5
W1EUJ	21	8	10	4		W2CNS	22	14	5	5		W3CGV	13	12	8	7	1	WB6NMT/6	7				5
W1HPO	6	7				W2CRS	24	24	15	4		W3IZH		18				WB6VZY*	5	5	3	3	3
W1JSM		6				W2EIF	9	11	13	12		W3LUL		24				K8EFS	20	1			
W1VTU		20	2			W2OW*	25	20	13	5		W3PGA/3*	13	16	12			K8CFE/8*	17	19			
W1FEO	16	19				W2UK		24		11		W3TMZ		24				W8CCI*	40	24			12
W1ESZ	9	6	3			W2ANT	15	17			W3AFQ	17	16				WB6WEN		25				
W1HED*	17	8	3			W2ADP		16			W3EOP/3		17				W8PLZ/8*	41	28			21	
W1IOX*	31	23	13	17	1	W2AUS	3	6	3	4		W3ALM		16				WB6OD/8*	20	2			
W1LNU	22	18	7			W2AFK	20	20	13	17		W3ANUL	16	15				K9HMB	29	5	2	2	
W1MUG*	29	26	16	22	1	W2AJR		17			W3AOD*	18	23	1		1	VE2FO		20				
WB2GLQ/1		22	1			W2AJU/2		15			K1SEF/3	9	11	13			VE2HW		13	5	6		
K4GGI/1*				6	2	W2ASP/2	22	17		5	10	K6LZD/3*	25	16	3	1		VE3AIB		2			3
K9AOP/1			10	8		W2AQT		19			K4GL	11	15		5		VE3ASO	16	25				
K2ARO		16		11		W2AVK*	14	20			K4EYV/4*	28	14				VE3EUV		17				
K2BWR*	23	21	6			W2AZX	8	17			K4PCL/4	21	25										
K2CEH	5	18	1			WB2FKJ/2*		24			W4FJ	4	17		12								

Multipoint Station.

WB2GLQ/1	1541-66-23-	BD	K6GSS/6 (3 oprs.)	Georgia	Oklahoma	
K1LJG	144-18-8-	AB	7511-230-29-ABCD			
WA1MAG/1 (+WA1JX)	2160-144-15-	A	1460-146-10-	AB	W4ISS 187-17-11- AB	
					W4WDH 60-10-6- B	
					W4LRR 54-9-6- AB	
Western Massachusetts			ROANOKE DIVISION		Southern Texas	
			North Carolina		West Indies	
K1DKX	2599-113-23-	A			KP4DFH	50-25-2- AB
K1JIX	1007-28-19-BCDE				SOUTHWESTERN DIVISION	
WA1LER	732-61-12-	A	WB4LDO/4	3059-133-23-	AB	
W1CGY	684-36-19-	A	WB4LDP/4	462-33-14-	AB	
K1ULZ	650-65-10-	AB	WB4KIB	287-41-7-	AB	
WA1MUG (24 oprs.)	107,160-1047-94-ABCFE		WB4CES	145-29-5-	AB	
WA1MVM (+WA2DRH)	12-4-3-	AB	K4LUVV/4 (+WA4VCC)	6552-234-28-	A	
				3192-133-24-	AB	
NORTHWESTERN DIVISION			South Carolina		CANADIAN DIVISION	
Oregon			K4GL		Quebec	
K7WXW/7	1836-100-17-ABCD		W4VHH	2077-61-31-	ABD	
WA7GCS	1836-94-18-ABCD		WB4LRK	1769-51-29-	BD	
WA7KAK	357-51-7-	AB		98-14-7-	AB	
W7TYR	138-18-6-ABCD		Virginia		Los Angeles	
K7HSJ	42-14-3-	AB	K4PCL/4	8648-188-46-	AB	
			K2UOP/4	4266-158-27-	AB	
			W4FJ	3201-76-33-	ABD	
			W1FHJ/4	325-25-13-	B	
			WB4FAX/4 (4 oprs.)	700-70-10-	A	
			West Virginia		Ontario	
K7BBO	2086-145-14-ABCE		W8AEC	2100-84-25-	AB	
W7FN	1696-106-16-	A	WB8FVL	539-49-11-	A	
W7QCV	44-44-1-	B	W8PLZ/8 (7 oprs.)	65,700-689-90-	ABD	
W7HAR/7 (3 oprs.)	1148-164-7-	AB	WB8DOD/8 (6 oprs.)	2662-121-22-	AB	
K7KOT (+W7GLS)	540-60-9-	AB				
W7EK/7 (WA7s JEG LZE)	33-33-1-	B				
PACIFIC DIVISION			ROCKY MOUNTAIN DIVISION		Foreign	
East Bay			Colorado		Northern Texas	
WB6NMT/6	540-34-12-	AC	W9AJY	64-32-2-	AB	
WA6JUD	252-36-7-	AB	K0GHC	45-15-3-	AB	
			New Mexico		WEST GULF DIVISION	
K7ICW	264-24-11-	AB			WASZUC	265-53-5- AB
			Utah			
			K5EFW	12-6-2-	A	
WB6NKO	480-48-10-	AB				
			SOUTHEASTERN DIVISION			
			Alabama			
			W4CAH	261-29-9-	AB	
			WB4EOW	38-19-2-	A	
			W4GHV/4	12-4-3-	B	
			Eastern Florida			
WA6GYD	1782-85-18-ABCD		K4PKV	68-16-4-	ABC	
WB6JON	836-76-11-	AB	K4BNC	44-22-2-	AB	
WA6UAP	140-14-5-	D				

"It Seems to Us . . ." (Cont. from p. 57)  
 Finally, this was the year QST switched to in-house composing with the acquisition of an IBM type-preparation computer - not without a few Excedrin headaches as the staff discovered little things we had taken for granted when our printer handled them! Nevertheless, the new type has apparently met the approval of most of our readers, and has produced a real saving in composition charges, as well as providing considerable flexibility in scheduling.  
 What things . . what weather . . will make up our amateur Sphere in 1971? Time will tell - and the staff and officers of ARRL hope it's a happy time for you! **QST**



# Hurricane Celia

BY BILL REICHERT,\* WAINFS/WA9HHH

SHE BEGAN her short, plundering career as a small, nearly insignificant tropical depression between Grand Cayman and Swan Island in the Caribbean on July 31. As weathermen watched her closely, Celia began to gather strength, becoming a tropical storm. Finally, late in the afternoon of Aug. 2, Celia officially became a full fledged hurricane when her winds topped the 75-mile-per-hour mark. Later described as an "almost perfectly shaped" hurricane, Celia was on a course that would soon bring her into contact with the land mass somewhere at the western end of the Gulf of Mexico.

As she came nearer, though, Celia's intensity diminished. While still 200 miles at sea early on the morning of Aug. 3, her winds were estimated at 90 miles per hour or less, not at all severe for a hurricane. But as she neared land, she began to reintensify. Her outer fringes passed over Mustang Island at 1815Z that afternoon and moved on toward the mainland. As the main body approached Port Aransas and Corpus Christi the winds were measured at sustained speeds of 125-miles-per-hour with gusts reaching more than 160. Celia's pressure caused damages estimated at \$500 million, including damage to more than 50,000 residences, 5000 commercial buildings and 40,000 automobiles. Power and telephone service was knocked out in most areas of the disaster scene and several of the smaller communities surrounding Corpus Christi were all but wiped out. As always, amateur radio played a major part in the disaster relief operations that followed.

Actually, amateur radio began preparing for Celia long before she came ashore. At first, it wasn't at all certain just exactly where the hurricane would meet land. The International Hurricane Net helped in tracking Celia as soon as she became a threat.

In the beginning, it appeared that the Galveston-Houston area would be the location of Celia's assault on the beaches, but early Monday morning, Aug. 3, she turned a bit to the south, putting Corpus Christi at the bull's-eye of the target. Hurricane warnings were extended to the coastal bend area until 1000Z. As soon as they

heard of the newly approaching danger, WA5TPY, Neuces County EC, and W5QEM began putting the Corpus Christi ARC station, W5MS, on the air. The station and the emergency operations center are located in the local police department building. The station kept in contact with a number of inland stations throughout the morning and early afternoon. Some of these stations, such as W5URW, K5BDQ, WASONC and WA5PJD, were already making plans to enter the affected area.

At this same time, W5HOR and W5AOK worked at setting up a two-meter intercom net among the EOC, several hospitals, the Red Cross, and some of the emergency shelters. W5HOR was slightly injured while erecting an antenna at one site and was later caught in the height of the storm because he had worked until the last moments to complete the communications system.

As the storm struck the city, W5MS was in contact with W5JUR, the Reynolds ARC, also of Corpus Christi. Winds at the EOC were being measured at about 75-miles-per-hour, but at W5JUR the anemometer had risen to velocities exceeding 135. In only a few minutes the winds had increased to 100-plus at the EOC. At that point, the tower holding the W5MS antenna and the wind gauge collapsed.

Even with the antenna on the roof, contact was maintained with K5FEZ, the club station at Bergstrom Air Force Base in Austin. These two stations later handled Corpus Christi Mayor Blackman's request for National Guard assistance and Senator Tower was able to contact his Washington office via phone patch to get the ball rolling for government disaster aid.

Late Monday evening, W5MS received a message from an amateur in Louisiana advising that a large microwave antenna tower had toppled across the KRIS-TV building in Corpus Christi, trapping a number of people. A teletype circuit that was still operating allowed those inside to communicate, but the only way to get word back to the disaster area about their plight was on amateur circuits. The police were alerted and a rescue team was dispatched.

Operations continued at W5MS for nine days, until Aug. 12, with sixteen amateurs having manned the station at one time or another. No accurate count of traffic was available, but estimates ran as high as 600 messages.

Other stations on in Corpus Christi immediately following the storm were W5IRO and WB4IBB/5. W5IRO was able to get on the air early Tuesday morning, Aug. 4, after borrowing a rig from W5YAO. Somehow the beam on W5IRO's tower had survived and after cranking the tower up he began operating on a net using the twenty meter band. W6YDK and WA7AEL were alternately controlling the net and the job of handling the large number of health and welfare inquiries was

\*ARRL Communication Dept.



WA5CEM (background) and W5ZPJ operate the ALCOA Radio Club station W5BQN in Point Comfort, Texas, during Hurricane Celia on Aug. 3.

begun. WB4IBB stationed with the Navy, had just moved in to his apartment the day before Celia struck. He, too, operated on the twenty meter net and together WB4IBB and W51RQ handled about 300 inquiries.

Naturally, with the telephone service interrupted, and with many people not at their former addresses, delivering the many health and welfare inquiries was an almost impossible task. K5SBU hit on at least a partial solution. He contacted a Sports Car Club of America chapter and a motorcycle club to enlist their aid in delivering the messages. About five hundred pieces of traffic were delivered this way in a period of about a week.

Corpus Christi has a two-meter fm repeater which was badly needed for the emergency relief operations, but Celia had dealt the repeater several blows. The antenna was badly damaged, the telephone control circuits were out of service and the power was off, leaving the repeater without electricity. Even worse, the top floors of the building housing the repeater were accessible only through elevators and an outside stairway. With the power off, the elevators weren't working. On Thursday, Aug. 6, K5UDU, W5LCN and W5SSRX braved the outside stairway even though its condition after having gone through the hurricane was unknown, and put the repeater back on the air. Even with the damaged antenna, it was giving good coverage.

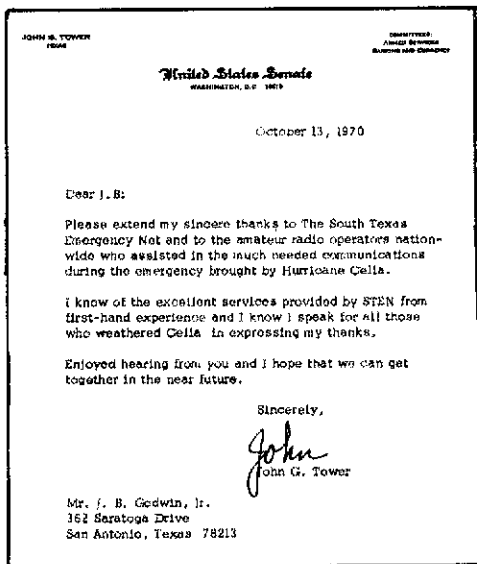


Amateurs coming in from outside the immediate disaster area played a big part during the aftermath of Celia. The San Antonio Radio Club station W5SC was operated portable in the Red Cross at San Antonio from Aug. 3 to 9. When the Red Cross in Corpus Christi asked on Thursday for operators to handle the large volume of health and welfare traffic, W5DZU and W5QMH, EC Bexas County, were the first to respond. At their disposal was a communications van. On Saturday, they were joined by W5ETG, K5IEG and W5AYU. Operations were held simultaneously on 75, 40 and two meters and approximately 450 messages were cleared.

Another group of amateurs, including W5FJU, W5SOYS, W5TXI, W5CJG and K5MVX, headed south for Corpus Christi as soon as their home area, Houston-Galveston, was out of danger. W5FJU offered the use of his "communications camper" to transport the bunch. Enroute K5VQY joined the group. While passing through Sinton, K5FRG, who was patrolling to help prevent looting, was met and assisted in locating a drum of gasoline so the trip could continue. When they arrived, the Red Cross was contacted and the Houston group was immediately put to work handling operational traffic. Back in Houston, W5KWU at Red Cross headquarters and W5OBC at the EOC operated continually for the next six or seven days in support of Corpus Christi operations.

K5LZO, also of Houston, packed his camper and headed for the disaster area. By 0900Z on Tuesday morning he had stationed himself at Rockport and was that city's only contact with the outside for some time. Working W5LES on 75 and 40 meters, K5LZO handled more than 150 messages. K5SJA and his XYL K5UNC of Harlingen mobiled throughout the disaster area handling disaster traffic, mostly on the South Texas Emergency Net.

W5URW, EC of Colorado County, and his son left Eagle Pass for Corpus Christi at 0100Z Monday evening. After reporting to the EOC, he operated from W5MS for several hours, then was sent mobile to cover some of the outlying shelter areas. About



Senator John Tower's letter commending amateurs on their performance during the communications emergency.



Left to right are W5ETG; W5QMH, EC Bexas County; and K5IEG operating from W5SC/5 at the Red Cross in Corpus Christi. There are only three of a large number of San Antonio amateurs that came to the disaster area to help with communications.

1100Z Tuesday morning he was sent to Sinton where he operated mobile near the police station all day. Early in the evening he returned to Corpus Christi where he took another shift at W5MS until relieved at midnight.

W5LTB and K5BMG left Port Lavaca for the disaster area Monday evening. After checking in at the EOC and W5MS, they helped install a new 75 meter antenna. Later they were assigned to a refugee shelter and finally they ended up at Corpus Christi Airport Tuesday morning. The airport was without communications and most of the day was spent relaying weather information to and from San Antonio.

W5OXZ arrived at the EOC from Point Comfort Tuesday morning and was assigned as a courier in conjunction with W5MS operations. He had to leave Corpus Christi on Aug. 6, but he was back on the ninth when he was assigned to duty in Taft. There he operated the amateur station at the



Civil Defense headquarters until normal communications were restored on Aug. 12.

W4JQK/5 of Port Lavaca, while operating WSBQN, the ALCOA ARC station, on Aug. 6, heard a plea from a Red Cross field hospital at Aransas Pass asking for xray film and developing chemicals. After contacting the necessary officials at the ALCOA plant, the supplies were obtained and W4JQK delivered them to Aransas Pass that afternoon.


Another Port Lavaca amateur, K5RJB, mobiled to Aransas Pass Monday night after the storm had subsided. He set up a station at the heavily damaged Lymann-Roberts Hospital and operated it until Tuesday morning. By that time W5PUS/5 had been set up at the Aransas Pass police station and K5RJB operated from there until Aug. 12.

W5CEM and W5ZPJ, EC of Calhoun County, left for Aransas Pass on Thursday morning. Using a generator furnished by ALCOA, their employer which had granted them time off to make the trip, the two operated from the May Allen School where Red Cross had set up an emergency inoculation center and shelter. About 150 messages were handled in four days.

Also operating from Aransas Pass was W5DWI of Richmond, who drove there soon after the hurricane passed by. He contacted W5ZLI and W5YBC operating from the Ft. Bend County EOC, W5YUB, and handled disaster related traffic for two days.

Thirteen amateurs from Victoria County journeyed to the disaster scene and were put to work in Corpus Christi, Port Aransas, Aransas Pass, Portland and several other small cities devastated by Celia. In several days of operation about 600 pieces of traffic were handled.

And, of course, no story of amateur disaster communications would be complete without a few words concerning the amateurs throughout the nation who operated during the Celia emergency. Unfortunately, we received only one report concerning activities outside the immediate disaster area. This was from the Apricot Message Net of Cleveland, Ohio, which began operating on Aug. 4 to handle health and welfare inquiries going toward the disaster scene. Fourteen area amateurs took part.

This is not, of course, the whole story of what amateurs did before, during and after Hurricane Celia began her coastal invasion. In the amount of space available it just isn't possible to mention every one of the hundreds of amateurs who helped, just as it isn't possible to relate every interesting personal occurrence. Every deserving amateur who did participate, however, should receive his ARRL Public Service Award in the near future. 

W5ZX attempts to deliver a message to a heavily damaged home in Portland, Texas.

# AMATEUR RADIO PUBLIC SERVICE

## NTS RACES AREC

*In the Public Interest, Convenience, Necessity*

CONDUCTED BY GEORGE HART,\* WINJIM

### *Distress Call*

**B**ACK IN the twenties, ARRL officials organized a network of stations to perform emergency backup communications for the Pennsylvania Railroad. The call "PRR" was used in activating this net, and since the net was activated only under emergency conditions, the signal "PRR" was generally recognized as an emergency alerting signal. Later, when the scope of such activities extended beyond emergency service for the railroad, the signal was changed to "QRR" (not at that time used internationally) and became the ARRL "land SOS" for amateur stations. While originally based on cw usage, QRR was also intended for use on amateur phone whenever or if ever a distress call was required.

Along came 1947 and the International Telecommunications Conference at Atlantic City. The signal QRR was adopted as applying to automatic transmission, and the League was left without a distress call. We solved it very handily (no pun intended) by adding another R, making it QRRR. Still no mention of a phone equivalent.

The subject was kicked around in *QST* (Jan., 1954) and reconsidered a number of times, the latest being Sept. '70 when WA1LK suggested we use "CQ Help" for a mild emergency. Prior to that, we tried to establish "CQ Emergency" as the phone equivalent of QRRR. Some phone net operators use the "emergency break" system, and this has had rather widespread acceptance. In a

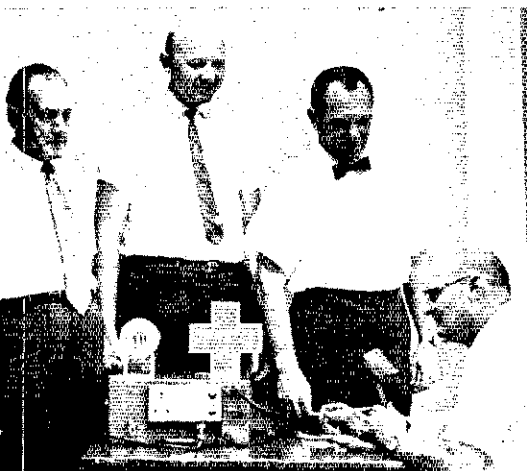
\*Communications Manager, ARRL.

recent issue of the "Monitor," published by W2CFP for ECARS, Net Manager K1LTO suggests the substitution of the words "Urgent - Urgent" for the double break and "Emergency - Emergency - Emergency" for the triple break.

And now, along comes WA5VVI with the suggestion that, to supplement "CQ Emergency" as the phone equivalent of QRRR we use "CQ Priority" instead of "CQ Help."

All this is fine and we are pleased to get such suggestions. It would be even better if it could be assumed that eventually all such suggestions would be considered and a decision made to adopt a standard procedure which would then forthwith be adopted by all concerned. Who makes the decision? The modern trend is rapidly getting away from having any individual do so. So, a committee? An advisory group? There is no such set up for that purpose, and no guarantee that the decision of such a group, if set up, would be observed anyway. Take a poll? A lot of trouble for a minor question, and polls have their shortcomings, too.

But we ought to get together, somehow. First of all, do we need a distress call? Why not use SOS and "Mayday" as is done commercially? If we do want our own distinctive distress or urgency call, let's get together on it. At present the ARRL recommendation is QRRR for cw emergency, "CQ Emergency" for phone emergency. In cw nets, the signal QRRR or a message precedence of EMERGENCY (no abbreviations, please!) stops the net in its tracks until the emergency situation is taken care of. On phone, a triple-break or a message precedence of "Emergency" should also stop net operation. At present, there are no established "urgency" calls, and such calls don't ordinarily stop nets. The matter needs further discussing.



W8SMIH (seated), Lima, Ohio, area EC, demonstrates a new six-meter fm rig donated to the Red Cross by West Ohio Gas Co. Looking on are (l to r) Frank Hempker, Lima and Allen Cos. Civil Defense Director; WN8DJE, secretary of the Lima Area ARC; and John MacDonell, Red Cross Chapter Chairman.



On Sept. 12 and 13, the Niagara Radio Club (N.Y.) operated in the Niagara Co. Peach Festival in Lewiston. In the station which was set up for the festival are (l to r) WA2ARB, WA2FDI, WA2GZC, WB2BMK and WB2WUB. The station was a big hit with visitors and made several hundred contacts. Outgoing traffic numbered 147 messages. A commemorative QSL is available for those who worked the special station, W2QYU.

On RTTY it is proper to use cw abbreviations. Not necessarily required, but proper. Ordinarily, an emergency call would not be made on RTTY anyway, although it is possible that a message with EMERGENCY precedence might appear on a RTTY circuit.

### Traffic Talk

Interesting letter from WA1DJC is the basis for our remarks this month. Tom doesn't say so in so many words, but he appears to have some familiarity with news commentators and compares their passing on news dispatches to the general public with amateurs passing traffic. The ham procedure is duck soup, by comparison. When the teletype copy shoved in front of an announcer reads "... carrying placards which said, 'Stop Yankee Peiloyftia'" or "... decisions and leadership, common sense and fjipHdbnjwtv," he has to ad-lib around it and hope he has it at least close. When the teletype prints something like "... zthmplaided three houses in London and selborjtheavy macmrlb. . . ." you can't open the lid and yell "fill!"

But in ham radio you can make sure you have it right, and no ad-libbing is necessary. The radio or TV announcer has to make a snap interpretation, combining what he thinks it's trying to say with what he thinks it means. The ham relay has no such hang-up. He can ask what it says and doesn't have to know what it means. Just make sure the check count agrees. Tom mentions the times he has been surprised at the sending operator's surprise that the word count is wrong. If you don't count it while copying it, at least count it before relaying it. If you fail to do that, don't be surprised if the receiving operator disagrees with your count.

When reporting into a net, be sure you are all set with your traffic list. It's very annoying to net control and net members alike to have to stand by while a check-in pores over his traffic and makes up his list on the spot. Make up your traffic list off the air, report in only when it's complete. What if you have just received a big batch and haven't sorted them yet? Report in *on time* just the same, to let the NCS know you're there with a batch of traffic and that you'll QNI with the list as soon as you break it down.

To adapt an old expression, "Pride cometh before an undeliverable message." If a message makes no sense at all to you, it may nevertheless make sense to the recipient. We're reminded of an exchange heard not so long ago between two expert cw operators. One rattled off a message to the other, stood by for an OK. The receiving

operator paused, sent "didit didit" a couple of times, then asked "Does that make sense?"

"No," said the sender.

"R, K." — WINJM.

*National Traffic System.* We should record herewith two NTS Area Staff meetings held in November within a week of each other. Central Area Staff met at Des Moines on October 31 and Nov. 1. There were four staff members present (W0INH, W0LCX, W5MI and W9HRY) and one invited guest who was subsequently elected a member-at-large and then chairman (WB9DPU). Two regular staff members (KSIBZ and W0LGG) were unable to be present. With the election of WB9DPU and also election (by the Staff) of W0HI to fill the member-at-large vacancy created by the resignation of K0AEM, the staff now consists of WB9DPU (Chairman and MAL), KSIBZ (RN5), W9HRY (9RN), W0LGG (1EN), W0INH (CAN), W0LCX (TCC), W5MI (MAL) and W0HI (MAL).

Although attendance was low, some noteworthy things were accomplished, in addition to the election of new members as noted above — especially the plans for future actions of the Staff in such areas as the following: (1) Combination of sections (into bi- or multi-section nets) to help clear traffic. (2) Letters of introduction and explanation to SCMs, RMs and PAMs explaining CAS functions. (3) Encourage every section to implement full NTS operation. (4) Prepare a document containing suggestions on how to have a successful section net, with inputs from SCMs, RMs and PAMs. (5) Encourage origination of more traffic. (6) Encourage more liaison between cw and phone nets. (7) RE-write the CAS Terms of Reference. (8) Have regular on-the-air meetings for informal discussion, with conduct of formal business by mail or at in-person CAS meetings.

The Pacific Area Staff meeting was held in San Diego on Nov. 7-8. In attendance was every staff member except the PAN manager, W6BNX. This included Chairman WA6BRG (MAL), W6LRU (RN6), W7BQ (RN7), K7NHL (TWN), W6VNO (TCC), W6BGF (MAL) and W7DZX (MAL). W6BGF was elected new chairman to succeed WA6BRG, who felt it necessary to resign because of pressure of business. WA6BRG also indicated his intent to resign as MAL and nominations for successor were discussed, with a vote by mail at a later date. The following were mentioned as possible candidates: K5MAT, W5RE, W6IPW, W6LCP, WA6LFA, K0JSP, VE7BDJ. The Staff renewed previous recommendations which had not been acted upon by headquarters (Oct. '69 QST, p. 87). The Public Service Honor Roll was discussed and several recommendations made. Use of RTTY in NTS was favorably discussed, with hope expressed that this mode would find usefulness in NTS, especially TCC, in the near future. The Staff recommended that RN7 be reconstituted by putting Saskatchewan in TEN, Alberta and Montana in TWN and that Alaska not be counted as a section in RN7 statistics.

PUBLIC SERVICE HONOR ROLL October, 1970

This listing is available to amateurs whose public service performance during the month indicated qualifies for 30 or more total in the nine categories below. In some cases scores have been adjusted to agree with new maximum allowable points which take effect with this listing. Use (1)-190 or submit equivalent information through your SCM. See page 75, Nov. '69 QST for initial description and page 72, Sept. '70 for latest point evaluations. Please note new maximum points for each category.

Category	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	Totals
Max. Pts.	10	10	12	12	12	20	5	-	5	5
WA8LIX	10	10	12	12	12					5
W6BNX	10		12		12	20			4	5
WA2KPL	10	10	12	12	12	3	3			5
W3EZZ	10	9	12	9	12	3				5
WA1HOL	10	10	12	12	12		3			5
WA2JHM	10	10	9	12	12					5
WA0OEL	10	5	12	12			13			5
WA2CIS	10	10	12	12	12					5
W9DSC	10	5	12	12	12					5
WA2KHQ	10	10	12	12	12					5
WB4OMG	10	10	12	12	12					5
WB8KBB	10	5	12	12	12					5
WA9BXX	10	10	12	9	12		3			5
K8BHH	10	10	12	12	6					5
WA3FMI	10	5	12	12		12	3			5
W3MPX	10	10	12		12		3			5
E3ZNP	10	5		12	12		8			5
W7OCX	10	10	3	12	12					5
W8IMI	10	10	12	3	12					5
W2OF	10	5	12	9	12		3			5
W4OGG	10	5	12	12	12					5
WA8UPL	10	10		12	12	1				5
WA2DRH	10	10	8	12	9					5
WA1ESI	10	3	12	3	12	2	3			5
WA1GCE	10	5	12	12	12					5
W4ZJY	10	10	12	12	12					5
K5ROZ	10	10	12	12	12					5
W5SBM	10	5	12	12	12					5
W6BCF	10	5	12	12	12					5
W6LRU	10	5	12	12	12					5
W6MNY	10	5	12	12	12					5
W7AXT	10	2	12	12	12		3			5
W7BQ	10	5	12	12	12					5
W7PL	10	10	12	12	12					5
WB8CWD	10	10	12	12	12					5
W8LF	10	10	12	12	12					5
WB9FFY	10	5	12	12	12					5
K9MRI	10	5	12	12	12					5
W9HRY	10	10	12	6						5
K7VZL		2	12	12	12					5
WA8NOQ	8	10		12	12	1				5
K1EIR	5	5	12	3	12					5
WA1MFB	10	5	12	12			3			5
WA2ICU	10	5	12	12	3					5
W7HLA	8	10	12	12						5
W7LBK	10	5	3	12	12					5
WB9BJR	10	5	12	3	12					42
8R1Y/W4	10	8	12	12						42
W1ZPB	10	4	12	12		2				40
VE4FQ	10	12	12							5
W1BJG	10	12	12							5
W2FR	10	12	12							5
WA2LCC	10	5	12	9	3					39
W2RHF	10	12	12							5
WA3JSU	10	12	12							5
W4LOS	10	12	12							5
K3MVO	10	5	12	12						39
W6JNH	1	5	12	12						39
WA9WMT	10	12	12							5
W8BV	10	5	12	12						39
WA0TZK	10	12	12							5
K2OQJ	10	10		6	12					38
K4KNP	10	12	12							38
W4QU	10	3	12	12						37
W7OGP		5		12		15				5
WA0VAS		5		9	20	3				37
W1BVR	10	2	12	12						36
W2HR	10	5	9	12						36
W0LGG	10	12	9							5
W8ZLQP	10	10	3	12						35
W6DEF	10	10	12	3						35
WA0UTT	9	5	9	12						35
K1EIC	10	10	12	12						34
WA1HSN	10	12	12	12						34
E1SXP	5	5	12	12						5
W3BFX	10	12	12	12						34
K2KIK	10	12	12	12						34
WA2LDX	10	12	12	12						34
WB2LGA	10	12	12	12						34
W2QC	10	12	12	12						34
K3HRK	10	12	12	12						34
WA3YC	10	12	12	12						34
WA6LEA	10	12	12	12						34
W6YBY	10	12	12	12						34
W7JWJ	5	5	2	12	10					34
WB8ALU	10	12	12	12						34
WA8DUL	10	12	12	12						34
K8LGA	10	12	12	12						34
WA9MZV	10	12	12	12						34
W8HL	10	12	12	12						34
WA8HTN	10	12	12	12						34
W6EIT	1	9		3	20					33
WA8VYV	10	5		12	6					33
W2MTA	10	5	12							5
WA0JFC	10	10	12							32
K6CJW	10	9		12						31
W7UU	6	5		20						31
WA0TSJ	10	5	12	4						31
WA0HRM	8		12	4						5

Category Key. (1) Checking into cw nets; (2) Checking into phone/RTTY nets; (3) NCS cw nets; (4) NCS phone/RTTY nets; (5) Performing assigned liaison; (6) Legal phone patches; (7) Making BP; (8) Handling emergency traffic; (9) Serving as net manager.

It was recommended that headquarters be more prompt in answering correspondence and filling requests and reflect more of what is said in formal reports in the monthly QST summary. The Staff then discussed the "restructuring" proposals at some length, but made no recommendation concerning the NTS proposal therein. The "woes" of NTS were discussed at some length, however, and it was recommended that NTS members be encouraged to "infiltrate" the AREC with the objective of making NTS the true outlet for inter-AREC communication.

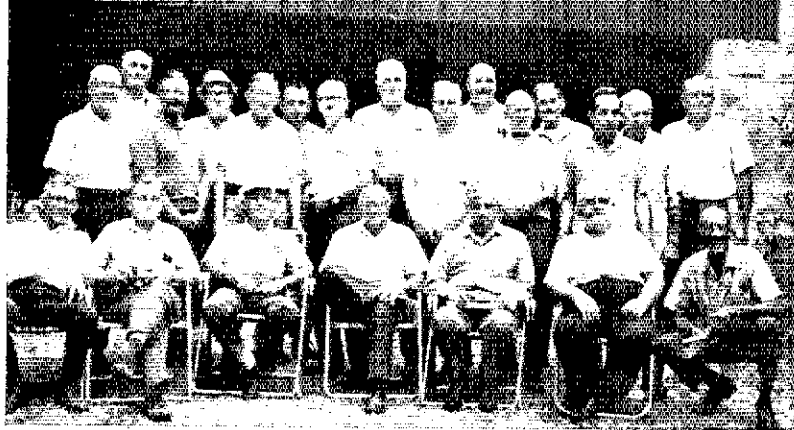
The Eighth Region ARPSC Conference was discussed and favorable consideration was given for a West Coast application of the same principle. Staff members were instructed to devote some study to these and other NTS problems and be ready with some concrete proposals at the next meeting, hopefully at the Pacific Division convention in July, 1971.

There are three Area Staffs of NTS, one for each of the three NTS areas. "Automatic"

members of each are the region net managers, the area net managers and the TCC directors. In addition, in each area there are three members-at-large (MAL) elected by the rest of the staff. One of the staff members is elected chairman in each area. Meetings are held both on the air and in person to discuss NTS problems and make recommendations to the communications manager. These advisory bodies existed prior to the formation of ARRL Advisory Committees as sponsored by the Board of Directors; for example, PAS has existed since 1952.

Public Service Diary

On July 17 at 0755Z, experimental station KW2XBP on Fletcher Ice Island transmitted a "mayday" signal in the twenty meter amateur phone band. The station leader had been accidentally shot and medical assistance was needed since the ice floe research post carried no medical personnel. ZL1AV was the first station to



A meeting of the Western Pennsylvania Net was held recently at Cooks Forest. In attendance were (front row, left to right): W3KUN; K3HCT; K3VQV; W3UCS; W31YI; W3KPJ, WPa SEC; W3SIJ; (back row) W3ATQ; W2KAE; W3KNK; W3UHN; W3LOS; WPA manager; W3NEM, WPa SCM and 3RN manager; W3SN; W31DO; W3LOD;

intercept the emergency call, but realized he was not in a position to offer much aid. KL7DNE on St. Paul Island, who had also monitored the transmission, immediately offered to assist. The ice station requested that medical aid be obtained and that arrangements be made to contact the Naval Arctic Research Center in Pt. Barrow.

The number of stations standing by on frequency was growing and several doctors were now available to advise the ice station personnel on medical procedures. One of these was W5SVP, of New Orleans, who had been summoned by WA5OKX; WA6YOC had another medic on the telephone and was prepared to patch and KL7DNE had also gotten a doctor to his shack. Unfortunately, at 0840, the victim stopped breathing and no pulse was heard. Efforts then turned to establishing contact between the ice floe and Pt. Barrow.

KL7HCN had been trying to contact Pt. Barrow and finally got through at 0900. Arrangements were made to have the stations contact on 6.5 MHz. Meanwhile, the amateur net stood by in case the efforts on commercial frequencies failed. At 0935 KL7HCN was able to report that communications had been established and the twenty meter operation was secured. — KL7DNE.

On Oct. 11 a hunter was reported missing in the Boreal Timber Limits, approximately 50 miles west of Thunder Bay, Ont. Seven amateurs, led by EC VE3AYZ, helped provide communications among the camp search headquarters, the search parties and Thunder Bay. While searching for the hunter, one of the searchers was separated from his party and became lost himself. The search continued for both men until 2100Z on Oct. 13 when both had been found. — VE3AYZ, EC Thunder Bay District, Ont.

Lakehead, Ont., amateurs were asked to help in another search on Nov. 1 and 2, when an elderly man was reported missing somewhere between that city and Thunder Bay. VE3s AJ EEW and EFI operated a station at the search camp at Oliver Lake and communicated with VE3ZCD, operated by VE3ECR and VE3AYZ, located in the Emergency Measures Organization building in Thunder Bay. The search terminated temporarily several hours later pending further investigation and more positive clues. — VE3AYZ, EC Thunder Bay District, Ont.

Six Connecticut amateurs, all ECs of their respective communities, helped with communications, under the direction of SEC W1HHR, for the Divisional Canoe Races held Aug. 9 at the Mansfield Hollow Recreational Area. Since two races are run simultaneously, race officials are kept

quite busy. Amateurs were able to assist in the starting and timing of the races and kept the official starter posted on changes in race scheduling. — W1HHR, SEC Connecticut.

An exhibit station was manned by several AREC members at the Green County Fair in Waynesburg, Pa., from Aug. 10 to 15 by W3MCL, W3LEV, WA3NAZ and WA3NYH. The exhibit attracted quite a bit of public attention while handling fifty-five pieces of traffic for spectators. — WA3NAZ, EC Greensboro, Pa.

On Aug. 15, Madison Co. (Ind.) RACES and AREC members took part in two communications drills from 1330Z to 1700Z. The amateurs provided communication for a public clean-up campaign of the White River shore around Anderson, Ind. One of the workers was stung a number of times when he came upon a beehive. After first aid was administered, WA9CWE rushed the worker to the hospital, calling ahead to WA9HKO to notify the hospital.

At 1700 a simulated fire department communications failure sent mobiles to several fire stations. W9VDK, the control station for this network, dispatched fire equipment on simulated runs through the amateur mobiles. The local two meter fm repeater was utilized for both exercises and ten amateurs participated. — WA9CWE.

While North Dakota was experiencing an unusual auroral display on Aug. 17, and band conditions were almost nil, WAØSJB of Bottineau received an urgent message for WAØHUD who was mobiling somewhere in the state. The local sheriff was contacted, but their communications facilities were also blanked by the northern lights. Finally the N. D. RACES net was tried and although skip was extremely short, WØBF was finally able to transmit the message to WAØHUD in Glenn Ullen. — WØDM, SCM North Dakota.

RACES, AREC and the Civil Air Patrol all cooperated in a drill on Sept. 5 and 6, simulating nuclear attack on the area surrounding Louisville, Ky. Fourteen amateurs participated in an effort to tie together the cities of Paducah, Somerset and Bowling Green for the CAP. W4OYI and W4TOY flew with CAP to give them coverage where none existed. — K4YZW, SEC Kentucky.

During a coast-to-coast telethon fund-raising campaign on Sept. 6 and 7, Columbus, Ohio,

amateurs helped their local drives by setting up two-meter stations at the local television station and the Veteran's Memorial Auditorium which was being used as fund-raising headquarters. Mobile stations were used to carry pledges from the TV studios to the headquarters as well as for delivering supplies and food for other volunteer workers. The operation lasted for a continuous 24-hour period with 23 amateurs taking part. EC W8ERD says the communications needed weren't very challenging but the service rendered was well worth the effort. - W8ERD, EC/RO Columbus, Ohio.

Amateur radio was represented at the Lodi, Calif., Grape Festival on Sept. 11-13. The Lodi Amateur Radio Club, WB6HUM, obtained a booth with the help of the Lodi Adventist Academy and set up a demonstration for the public. A two-meter link was also set up and was used to transmit outgoing traffic to WA6CPP who then cleared it on WCARS and NT's. Other amateurs taking part were W6YKS, WB6UFT, the club president, WA6ALH, WB6ALM, WA6NMT and WN6BFG. - WA6CPP.

Forty-two SEC reports, representing 13,762 AREC members, were received during the month of September, 1970. This compares with 45 reports representing 16,013 AREC members received during September, 1969, a decrease of three reports and 2251 AREC members. Sections reporting: Alta, Ariz, Ark, Colo, Conn, EFla, EMass, EPa, Ind, Iowa, Kans, Ky, Mar, MDC, Mich,

Miss, Mont, Nebr, Nev, NLI, NNJ, NTex, Ohio, Okla, Ont, Oreg, Que, SDgo, SF, Sask, SDak, SNJ, STex, Tenn, Utah, VA, Wash, WVa, WFla, WMass, WNY, WPa.

October Reports, K2KIR says he can't recall the last time there was 100 percent representation on EAN, then goes on to lament the lack of traffic to take advantage of it. On the other hand, W0INH, manager of CAN, reports through assistant WB9DPU that traffic is up more than 50 percent from October of last year. W2FR has issued a 2RN Certificate to WA2BFX for the second year in a row. W6LRU reports RN6 running smoothly with help from newcomers and old timers. Ninth Region Net Certificates were issued to WA9YSD and WB9BKY by 9RN Manager W9HRY. W6LGG congratulates her NCSS on having all reports in by Nov. 2. K7NHL is thinking of trying the late meeting of TWN on ssb and asks for any frequency suggestions.

Net	Sessions	Traffic	Rate	Average	Rep. (%)
EAN	31	1518	1,245	49.0	100.0
CAN	31	1223	1,048	39.5	100.0
PAN	31	1059	879	34.1	100.0
1RN	62	666	424	10.8	92.2
2RN	61	390	633	6.4	97.7
3RN	62	418	348	6.7	98.3
4RN	59	598	419	10.1	89.8
RN5	62	624	338	10.1	90.3
RN6	62	906	603	14.6	100.0
RN7	56	211	258	3.8	40.2
8RN	61	539	434	8.8	96.2
9RN	62	580	591	9.4	95.6
1EN	62	461	490	7.4	74.8
1CN	62	131	189	2.1	90.1
TWN	52	209	200	4.0	62.3
ICC Eastern	1241	706			
ICC Central	931	587			
ICC Pacific	1241	809			
Sections <sup>2</sup>	1822	10016	5.5		
Summary	2649	21,551	EAN 11.6	87.7 <sup>3</sup>	
Record	2930	30,735	1.408	15.2	

1TCC functions, not counted as net sessions.  
 2Section and local nets reporting (51): BUN (Utah); CN, CPN (Conn.); PTTN, EPA (Pa.); WMN (Mass.); OQN, G8N, W. Que, VHF (Ont.-Que.); FMTN, QFN, TPTN, GN, FPTN, VEN (Fla.); AENB, AENO, AENR (Ala.); WSSN, WSRN, WIN, BEN, BWN (Wis.); VBSN (Va.); NGN, SCN (Cal.); NLI, NYS (N.Y.); BN, OSSB (Ohio); CN (N. & S. Car.); MSN, M3N, MSPN (Minn.); MTN (Main.); WSN (Wash.); BSN (Ore.); GTN, GSN (Ga.); LAN (La.); PVFN (N.J.); QMN (Mich.); PTN, SGN (Me.); RISPN (R.I.); OZK (Ark.); CHNN (Colo.); RTN (Ky.); MDCTN (Md.-D.C.); ILN (Ill.); QKS (Kans.).  
 3Overall effectiveness percentage.

Transcontinental Corps. W6LXC has issued TCC Central Certificates to W5ML, W0INH and WB9DPU.

### October Reports.

Area	Functions% Successful	Traffic	Out-of-Net Traffic	
Eastern	124	96.8	1911	706
Central	93	95.6	1174	587
Pacific	124	97.2	1618	809
Summary	341	96.5	4703	2102

The TCC Roster: Eastern Area (W3EML, Dir.) - W1s BIG EJ1 NJM, K1SSH, WA1JFM, W2s FR GKZ QC, W3EML, K3MVO, W4s NLC SOQ UQ, K4KNP, WB4NNO, W8s HJ1 RTN RYP, K8KMQ, WA8ZGQ, Central Area (W0LXC, Dir.) - W4s CGG ZJY, W5MI, W9CXY, WA9VZM, WB9DPU, W4s HF INH LCX UC F ZHN, K8AEM, W4s DOU WEZ, Pacific Area (W6VNO, Dir.) - W5RE, W6s BGF BNX IPW MLE MNY VNO VZT, K6s DFX KCB, WA6s DEL LFA, W7s DZX FM KZ PL, K0JSP.

### Independent Net Reports.

Net	Sessions	Traffic	Check-Ins
Northeast Traffic	31	432	521
All Service	45	54	74
7290 Traffic	44	823	1972
Clearing House	27	230	421
20 Meter Interstate SSB	22	2021	452
North American SSB	27	434	586
Mike Farad E. & I.	27	269	345
Eastern U.S. Traffic	28	75	102

### BRASS POUNDERS LEAGUE

Winners of BPL Certificates for Oct. Traffic

Call	Orig	Recd.	Ret.	Del.	Total
W3CUL	371	3171	2881	215	6638
W3VVR	191	629	601	15	1436
W4QVAS	114	494	50	444	1102
W7BA	13	541	491	46	1091
W0LXC	19	547	450	17	1024
K9ZSQ	0	510	0	510	1020
E5TEJ	12	507	487	6	1012
W4DK	2	448	431	17	898
W91RO	3	394	378	7	782
W42EH	24	352	271	65	729
W91YO	207	254	257	6	723
W1QYY	20	287	326	54	687
W1PEX	43	308	232	30	613
WB9BXX	237	280	269	32	604
W6VNO	15	307	251	2	575
W48EXT	44	274	246	3	567
W4TOT	60	250	245	3	560
W4EYY	63	250	157	87	556
W1QJM	6	268	261	1	534
W42PRZ	11	294	207	27	539
K3NSN	100	150	270	0	526
WA2ICU	27	260	191	24	502
K9ZSQ (Sept.)	0	331	1	330	662
W1QJM (Sept.)	55	245	234	0	521

### More-Than-One Operator Station

W2DSU	44	242	175	45	506
-------	----	-----	-----	----	-----

BPL for 100 or more originations-plus deliveries

WA6JDB 270	WA2LHW 123	W1EMG 109
WA1MB 210	W39PX 123	W1PUE 108
W44MKH 200	W79F 122	WA1HOL 106
W4STN 192	W8QCU 119	W9F50 106
W3OMA 170	WA4QOQ 114	WB9BR 103
W8ANT 152	W6OLR 113	Late Report!
W1F53 127	W43MI 111	W0DAI/K16 (Aug.) 145
K2KQC 125	WA6BYZ 111	WA9QQQ (Sept.) 104

### More-Than-One Operator Station

W4DEU 190	W4NVU/4 155	W4OY1 153
-----------	-------------	-----------

BPL Medallions (see July, 1968 QST, p. 99) have been awarded to the following amateurs since last month's listings: W1DU, WA2ZDA, W6WLY.

The BPL is open to all amateurs in the United States, Canada and U.S. possessions who report to their SCM a message total of 500 or a sum of originations and delivery points of 100 or more for any calendar month. All messages must be handled on amateur frequencies within 48 hours of receipt in standard ARRL form.

# Happenings of the Month

## ARRL ELECTION RESULTS

Balloting by mail has been concluded in seven ARRL divisions. In the voting four directors and four vice directors were reelected; one new director and three new vice directors were picked. Earlier, three directors and one vice director were declared reelected as the only candidates for their respective offices: Messrs. Dannals, Thurston, Clark and Wicker.)

In the Central Division, Philip E. Haller, W9HPG, continues as director, the position he's filled since January, 1963, by defeating Ronald C. Williams, W9JVF, 2686 votes to 1184. A fourth term was won by New England Director Robert York Chapman, W1QV, who garnered 1998 votes to 831 for Daniel A. MacDonald, W1PEX, and 316 for William M. Maquire, W1HF. The Southwestern Division chose John R. Griggs, W6KW, over Fred Johnson Elser, W6FB, 2619 to 1019 - John's third term in a row, sixth in all, as director from the southwest. And Roy L. Albright, W5EYB, won a second term as director from the West Gulf, defeating former director Ray K. Bryan, W5IQ, by 1862 to 711.

The Rocky Mountain Division picked Charles M. Cotterell, W0SIN, of Lakewood, Colorado as its new director, replacing Carl L. Smith, W0BWJ, who is now a vice president. The contest showed 662 ballots for W0SIN and 545 for John H. Sampson, Jr., W7OCX, a former vice director of the division. "Chic," 54 years old, works in the heavy construction field as an operating engineer for Ebasco Services Co. He's ARRL Section Communications Manager for Colorado and has served as an assistant director for the past ten years. A past president and former director of the Denver Radio Club, Chic is editor of its bulletin *The Round Table* and writes a ham column for the *Denver Post*. He is also alternate radio officer for

Colorado Civil Defense and a member of the Amateur Radio Emergency Corps. His first amateur license was earned in 1954.

In vice director contests, Edmond A. Metzger, W9PRN, won a fourth term in the Central Division, outscoring Kenneth A. Ebner, K9GSC, 2166 to 1702. Stan Zak, K2SJO, who's been serving as vice director of the Hudson Division since 1965, won a resounding victory over Daniel A. Ostroy, WR2TUL; 2666 to 814. In the Northwestern Division, vice-director David O. Bennett, W7Q1E, tallied 900 votes to 761 for Dale T. Justice, K7WWR/WA7KTV, thereby securing a second term. Farther south, a three-way race saw Arnold Dahlman, W6UEI, win his second election with 1745 votes while Gary A. Stilwell, W6NJU, scored 1218 and Frank E. Bingham, III, WA6DRQ, had 646 in the Southwestern Division poll.

A "horse-race" for the vacant chair of New England Division vice director ended like this:

Roger E. Corey, W1AX	1485
Walter S. Rogers, W1DFS	653
John C. Sullivan, W1HHR	400
George C. Campbell, WA1DVE	394
Robert E. Thompson, W1TWG	216

Roger is 49, a staff engineer for New England Telephone and Telegraph, and lives in Westwood, Massachusetts. He served as assistant director of the New England Division in 1953-1954 and 1965-1966, and as Western Massachusetts SCM 1953-1954. He's a past president of the Hampden County Radio Association, The Connecticut Wireless Association, The 128 Contest Club and the Worcester Tech Radio Club - and past trustee of W1YK. W1AX is vice chairman of ARRL's Contest Advisory Committee; ORS, OPS and member of the A-1 Operator Club. First licensed in 1936 as W1JYH and active on phone and cw, 2 to 160 meters since then, Rog is on the DXCC Honor Roll, holds the seventh Five-Band DXCC and Five-Band WAS number 1!

Denver's Allen C. Auten, W0ECN, tallied 518 votes to 408 for Wayne M. Moore, W7CQL, and 278 for W. E. Wageman, W0BUR/K5MAT, to become the new vice director from the Rocky Mountain Division (where incumbent Tom Banks, W5HJ, was not a candidate). Allen has combined two of his interests effectively; he was communications officer for the 1963 Mount Everest expedition and operated 9N1ME. He's a director,



New England Division Director Robert York Chapman, W1QV, presented an ARRL Certificate of Merit to the Central Massachusetts Amateur Radio Association for its work in presenting a special TV program on WSMW-TV. Left to right: J. Morey Johnson, WA1FFB; W1QV; club president John Smith, K1VNT; and Anna Gillett.



Some 800 years of staff experience were gathered recently when 35 members of the Hq. Ten-Year Club got together for dinner. Being especially honored were: Sam Cowles, 25 years of ARRL service; Lillian M. Salter, W1ZJE, retirement after 41 years service; Miriam Y. Knapp, W1ZIM, retirement after 23 years; Arline Bender, newly joining the club with ten years service; Ed Tilton, W1HDQ, 25 years (full time — he actually started as a columnist for *QST* in 1939).



past president, and past vice president of the Denver Radio Club; trustee of DRC's station W00UI and WA0BRE, Troop 62 Radio Club; is OBS and a RACES member. In his other hobby, he's a past state president of the Colorado Mountain Club; eastern region director Rocky Mountain Division, National Ski Patrol System, Inc., and member, American Alpine Club. Auten is 44 and works as an assistant editor with the Cahners Publishing Co.

West Gulf voters gave 1567 marks to Leon Vice, W5VCE/W5OBC, against 999 for Pronto Poston, W5AJ; the present vice director, Les Harbin, W5BNG, didn't run. Leon, who is 43, is the full-time communications and warning officer for Houston Civil Defense and is a member of the State Industrial Advisory Committee of FCC. He's also president of the Houston Amateur Radio Club, past president of the Suburban West Amateur Radio Club and past vice president of the Houston Radio Relay Club. W5VCE is vhf PAM of South Texas and assistant EC for vhf in Harris County, and has been an amateur since 1952. (With a name and call like those, how could he lose?!)

## ITU CONFERENCE PREPARATIONS

ARRL continues active in preparation for the forthcoming World Administrative Radio Conference on Space and Radio Astronomy (as it has since the original announcement in June, 1968.) As part of that preparation, the League is keeping track of the proposals of other countries. Initial word from the UK is that it will propose a footnote permitting space techniques to be used by amateurs in all world-wide exclusive bands and a further footnote permitting the use of space techniques on a non-interference basis in the world-wide shared bands. The French Telecommunications Entity requests that amateurs be authorized to utilize the space techniques only in the bands allocated to them exclusively, on a

## GILBERT L. GROSSLEY, W3YA

It is our sad duty to report the death of Gilbert L. Crossley, W3YA, Honorary Vice President of ARRL and, from 1954 through 1969, director from the ARRL Atlantic Division; in State College, Pennsylvania, November 5. Gil was in amateur radio since 1915, was a Charter Life Member of ARRL and held the Extra Class ticket. He spent 44 years teaching electrical engineering at Penn State and guiding the amateur radio club there, one alumnus of which is ARRL's Communications Manager George Hail. W3YA was vice president of ARRL 1966-1968, a member of the Executive Committee the same time, and prior to his election as director had been an assistant director. He was SCM for Western Pennsylvania in 1926-1928; assistant State director, Army MARS; ORS, AREC, and A-1 Operator Club. He leaves his wife Navonne; sons Edward (W3SMF) and Donald; a daughter, Mrs. J. Richard Crandall; a brother and a sister.



Last year a testimonial dinner was held for Hunter J. Lohman, W3OC, in McKeesport, Pennsylvania with over 150 amateurs present. ARRL Atlantic Division Director Harry A. McConaghy, W3EPC, was the principal speaker and assistant director Bud Tryon, W3WFR presented an ARRL 50-Year Pin to W3OC. The photo here is courtesy of the *Daily News*, McKeesport.

world-wide basis. Canada specifies the 28-29.7 and 144-146 MHz bands for amateur space efforts as suitable for the purpose and allocated without exception exclusively to the amateur service world-wide. The US view is expected to be very close to the proposals of ARRL and Amsat set forth on pages 89-92, August *QST* - virtually any frequency where amateurs can operate, using ground control of satellite-borne repeaters to avoid interference in shared bands.

### TELEPHONE BOOST FOR HAMS

If you dial 212-964-6000 in New York City, you'll get a little newsy story about the world around us. One recent recording went like this:

Eugene H. Treadaway, a retired South Central Bell employee is a ham radio operator in New Orleans. Treadaway recently received an emergency radio message from Colombia, South America. A small boy bitten by a snake was near death because no antitoxin was available in his community. Treadaway arranged to have the serum flown to South America and it arrived in time to save the boy's life. Following the incident, Treadaway received a letter from President Nixon. We asked him about the letter and his reaction.

"I thought it was another ham letter but it was from the President. I'll read you the letter:

Dear Mr. Treadaway, A newspaper article telling of your help as a ham operator in saving the life of a 5-year-old youngster in Colombia recently came to my attention. The opportunity to do something vital for another is a challenging and special thing. Because of your skill as a ham and your ability to think and act quickly under pressure a little child will have a chance to grow up and to enjoy the years ahead. You deserve congratulations from all of the rest of us.

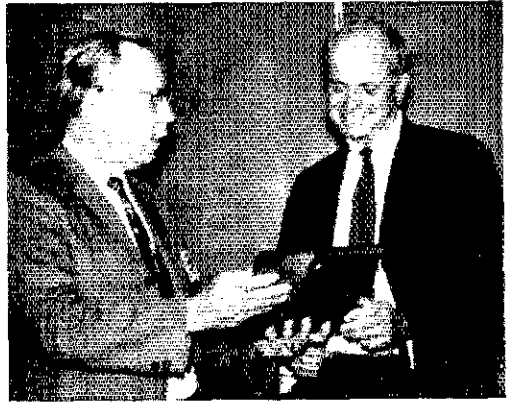
With my very best wishes,

Sincerely,

Richard Nixon.

But hams are doing that every day all over the world - unsung heroes - but mine got in the news. But I'm sure proud about it."

And we certainly share your pride, Gene.



Yardley Beers, W0JF, won the August Cover Plaque award with his article, "Short Antennas for the Lower Frequencies." Presenting the award is ARRL Vice President Carl L. Smith, W0BWJ (left).

### EXECUTIVE COMMITTEE MINUTES

No. 332

November 19, 1970

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc., met at the headquarters office of the League in Newington, Connecticut, at 9:10 A.M. November 19, 1970. Present: President Robert W. Denniston, W0DX, in the chair; First Vice President Charles G. Compton, W0BUO; Directors Victor C. Clark, W4KFC, Harry J. Dannals, W2TUK, Noel B. Eaton, VE3CJ, and Robert B. Thurston, W7PGY; and General Manager John Huntoon, W1RW. Also present were General Counsel Robert M. Booth, Jr., W3PS, and Assistant General Manager Richard L. Baldwin, W1RU.

At the request of the Chair, the meeting rose to a moment of silence in memoriam to the late Honorary Vice President Gilbert L. Crossley, W3YA.

The Committee next viewed, with approval, the new promotional film, "This is Ham Radio," produced by Dave Bell, W6BVN, with ARRL cooperation as a supplement to "The Ham's Wide World" intended for school audio-visual libraries.

On motion of Mr. Dannals, affiliation was unanimously GRANTED to the following societies: Associated Mountain Toppers, Anaheim Calif.; Association For Advancement of Amateur Radio, Owosso, Mich.; Center For Disease Control Radio Amateur Club, Atlanta, Ga.; Central Pennsylvania A.R.C., Sunbury, Pa.; Electchester VHF Society, Bayside, N.Y.; Murfreesboro Central (HS) Radio Club, Murfreesboro, Tenn.; Thunen Memorial Amateur Radio Club, Crescent City, Calif.; Virginia Commonwealth University Amateur Radio Club, Richmond, Va.

The Illinois Amateur of the Year is Byron C. Sharpe, W9BE, honored for his many years of work with the handicapped at Hines Veterans Administration Hospital and the Hadley school for the Blind. Hamfesters Radio Club makes the award each year and its president, Robert E. Hotz, W9NLF, is at right, while ARRL Central Division Director Phil Haller, W9HPG, beams approval at left. (Photo by Robert M. Seals, K9AHK, courtesy of the Chicago Tribune)



The Chester County Amateur Radio Club (whose president is Peg Hoover Brigham, WA3GTW, daughter of the late W6ZH) put on an antenna-raising party for Al Hoersch, K3RIV. Here's the skyhook and some of the participants: WA3AFI, W3ZAT, W3WCG, W3TTW, WA3JNX and Russ Hyde.



On motion of Mr. Clark, Life Membership was unanimously conferred to the following applicants: Robert Ackerly, WA2JIV; Frances B. Adrian, K2CEP; Robert M. Ahmann, W7SC; Joel S. Alexander, WA4ZVK; William W. Behmer, WB4BSH; Robert J. Bishop, W4FRX; Richard Brown, W1FEW; Kenneth N. Clark, K4OKZ; Arthur A. Collins, W0CXX; Jack A. Coneybeer, WA8NYS; Richard R. Cook, WA2BBI; Frederick R. Fine, W7TCI; David L. Fisher, W2TNI; Frederick S. Freer, III, K8YBH; William W. Fulcher, Jr., W4AST/K4RFA; Clark Fulton, W9GYN; Neil D. Ganter, WA4PFE; Carol Ann Gawle, WA1LGU; John Germany, W6TQG; Eric C. Gibling, VE7AKP; Charles Roy Griffin, Jr., K4ABZ; Donald B. Hall, W5OBS; George F. Hall, WB2TFH; Albert Harris, WA9VZR; Ronald E. Hesselbrock, WA8LOW; James L. Hoover, K8DFC; John C. Kanode, W4WSF/WA3LYH; Richard C. Kopplin, WA9EOO; Russell N. Kulp, Sr., W3VLE; Howard B. Leake, W3PUN; Richard G. Leis, W4UHO; Allan H. Lurie, W9KCB; Charles R. Marston, K0EKV; James E. McDonald, WA0OTE; Robert W. McFadden, W4WOY; John A. McLeland, WA6TAX; Olin E. McNeely, W4PQ7; John O. Norback, W6KRV; Joseph M. Pallitto, W2EDG; Harry L. Parrish, Jr., K4HXF; Thomas E. Pederson, W9NLL; Arnold C. Perry, KL7BT/WA7PSW; Howard H. Ragan, K7ATU; George Raymond, K7LET; Paul L. Rinaldo, K4YKB; George D. Rose, Jr., W4GCE; C. James Roux, K4THA; Thomas A. Russell, WA0SDC; Robert Sample, K9QNA; Galen K. Shubert, WA0JYK; James A. Smith, W8ZCD; Leland W. Smith, W5KL/W4AGI; James A. Tew, WA4ONZ; Robt. B. Thurston, W7PGY; J. W. VanArtsdalen, W3AXA; Sheldon P. Weiss, K2ONJ; Jack L. West, W6VD; Llewelyn Williams, W9GSB; Brian Byron Young, Jr., WA5GYK; David W. Zeeso, WA9BQQ.

The Committee next discussed the implementation of a DX Advisory Committee, as ordered by the Board. Mr. Thurston presented a petition as follows, which was thereupon unanimously APPROVED:

"This petition is intended to implement the establishment by the Board of Directors of an advisory committee on DX matters, pursuant to the Rules and Regulations Concerning Advisory Committees adopted by the Board on May 1, 1970.

"The name of the Committee shall be the ARRL DX Advisory Committee. The purpose of the Committee shall be to provide an additional channel of communication from the general membership to the Board of Directors and Hq. staff in matters involving DX activities; a forum to which the Board or staff may refer proposals in said field for appraisal and recommendations; and a source of expertise for proposals and recommendations on its own initiative.

"The Committee shall consist of nine members chosen to represent, insofar as feasible, (1) different geographical areas in the League's operating territory, and (2) different levels of DX interest and achievement. The President should name an interim chairman, who shall conduct a poll or vote to choose a regular chairman.

"It is expected that the Committee will conduct the majority of its activities by mail, limiting such items as telephone calls only to urgent problems, so that operations may be carried on within the established allocation of funds."

On motion of Mr. Thurston, unanimously VOTED that the General Manager is authorized to replace prints of "The Ham's Wide World" in the hands of directors as they become worn beyond further usefulness.

The Committee was in recess for luncheon from 12:20 to 1:00 P.M., then adjourning at 2 P.M.

In the course of its meeting the Committee discussed, without formal actions, the ARRL Foundation, travel expense accounts, election procedures, distinctive QSL cards for directors, and various FCC/regulatory matters.

Respectfully submitted,  
JOHN HUNTOON, W1RW  
Secretary QST



Amateur radio goes to the Minnesota State Fair — Tom Woods, WA0RBW (left) and Steve Root, WA0VPN man the exhibit. An excellent way to introduce the public to amateur radio!



# Correspondence From Members-

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

## SPECTRUM POLLUTION

● August *QST*, pages 87-88, reported on FCC's new rules to curb electronic pollution, but pointed out a weakness: the regulations so far don't cover such devices as noisy light switches or thermostats that "hang" in the sparking condition. I've been trying to locate an electric razor which has been treated to reduce interference, but almost none of the promotional literature and instructions on razors even mentions the subject. I finally found a Sears razor (number 92735) made in Austria, said to be free from causing interference.

Amateurs should encourage FCC to bring out at least a general requirement that household appliances be treated for reduction of electrical noise. Let's stir up a little thought on the use of the new Section 302 (of the Communications Act) to reduce QRM. — *E. H. Conklin, K6KA, La Canada, CA*

## STICKER?

● Every other cause has a bumper sticker: how about one for ham radio? Send me your ideas. — *Gabe Gargiulo, WA1GFT, 160 Elm St., North Haven, CT 06473*

## MARS MISCONCEPTIONS

● As to WA4YRU's letter in November Correspondence under the title, "Reverse Incentive?" my present work in MARS has required me to become quite familiar with the organization and operations and I have found nothing which would indicate "reverse incentive." On the contrary, the MARS programs are highly progressive. No other program can boast of having implemented things such as 60 and 100 wpm RITTY, vhf fm and repeater systems into everyday traffic handling operations. These are systems that involve many individual members, all of whom are required to hold amateur license. It is ludicrous to think that a person cannot learn *something* by being associated with such sophisticated happenings.

Mr. Plank alluded to "... basic licensed persons operating on all bands..." This is not true! One need not read far in the available MARS literature to find that, regardless of the MARS program involved, Novice class operators are restricted to crystal control, cw mode and 75 watts input to the final amplifier on all frequencies below 143 MHz. Above 143 MHz, voice modes may be employed, but crystal control and 75 watts input restrictions still apply. Persons assigned positions of responsibility within the MARS programs are generally required to hold an amateur license of the General (or Conditional) class or higher.

It is a common *misconception* that the government gives away equipment in the MARS programs. Again, one need only read the rules. Excess property is furnished on a *loan basis* to those members who will put it to a use which will *enhance* the MARS programs. Each person re-

ceiving custody-type equipment affirms, by his signature, that he will not sell, barter or otherwise dispose of the equipment, and acknowledges that it is subject to recall. Consumable items are issued with the stipulation that they be utilized in an authorized manner. Deviation from the intended purpose of the MARS equipment programs reflects on the scruples of the individuals concerned—not on the MARS programs!

Just looking at the quarterly traffic totals would convince most that someone must be doing something right somewhere! *Dave Stamps, W1UFU/NØKXS, Groton, CT 06340*

## FAITH IN OUR OFFICERS?

● The official ballot for New England Division Director and Vice Director arrived in the mail one October morning.

In view of the stand that the ARRL has taken on the matter of incentive licensing, many of us have taken up the challenge and earned an Extra Class license.

It seems most inconsistent that candidates for office in the League are not able to use all of the amateur band segments. Of the director candidates, two have Advanced and one has General. Of the vice director candidates, one has an Extra, two have the Advanced and two have General licenses.

How can we put too much faith in our officers if they refuse to follow the policy of the League in one of the hottest issues in "many a moon"? — *Robert E. Hall, W1EVL, Henniker, NH*

## PROVOKED!

● The letter headed "Provocative Proposal" in November *QST* made me so mad I just had to speak out. Amplitude modulation ain't dead and those who think it is are stupid. I'm a ham who takes personal pride in building my own gear and making it work right and sound good. One hundred watts is enough power on 10 meters but on 75 meters it takes a kW fully modulated a-m with speech compression and clipping.

Let's start a "75-75 net" like the a-m 10-10 net and talk real do-it-yourself radio so the sidebanders can learn something from us! — *J. Harvey Mewborn, W4KBQ, Kingston, NC*

● It is nice to have money so you can have ssb equipment. There are quite a few old-timers like myself who are retired and on pension and can not afford ssb and are happy with a-m.

A-m does *not* take "several times the width of ssb." Some ssb signals are very broad, improperly adjusted and splatter badly.

If width is so important to W3LDD, I suggest we all go cw and *really* have sharp signals! — *Basil Cutting, W1JB, Suncook, NH*

## DXC-RCC!

● Is there any possibility of making another certificate award, DXC-RCC? Contact a hundred countries and talk to each for one hour. It would

he tough sometimes with changing condx, but not impossible. I am sick of the present day dx contact which runs: "W2ABE de CEIDZ rst 569, name Mark, QTH Valpo QSL ok 73 sk QRZ?"

It would be so much nicer if we could exchange more information about brother hams in countries we don't know much about instead of the cold, hurry-up QSO. Then the relatively rare foreign stations wouldn't be so pressed for speed. Everyone I talk to on the air seems to think it would be a good idea. — *William H. MacGahan, W2ABE, Pompton Plains, NJ*

### RARITY!

● Doesn't anybody know what a KA8 prefix is? It sure doesn't seem like it here at KA8FY. Stateside QSOs are hard to come by and a couple of times when we did manage to scare one up the Stateside ops pointed their beams at Ohio and Michigan! Seems like most foreign amateurs know who we are: they are tickled pink to work a rare prefix like KA8. (There are only four separate KA8 stations at present.) Sure would be nice to hear what's going on back in the States. Try us on 20 sometime, both phone and cw. — *Edward R. Clark, WB2MRD, and Bill D. Slack, WB4HKM, Ops at KA8FY, Misawa, Japan*

### CONTEST ETHICS

● Among our ranks there is an ever-growing percentage of hams of unsavory character. I am talking about the widespread violation of FCC regulations and contest rules during competitions and DX work. Guilty parties are among the most skillful operators whose specific responsibility it is to set the finest examples of sportsmanship and honesty. New hams introduced to radio and contests by such persons or groups actually will believe that these violations are commonplace, which is true, but more damaging even that they are necessary and expected as the state of the contest art.

As solution I propose serious self-policing by all responsible amateurs. You must stand up and speak up when knowledge of such practice becomes available. If sufficient numbers of us — and specifically the outstanding competitors — decry the situation then shame will cause its demise. Specifically I call upon the leaders in the field, as for instance members of the Potomac Valley Radio Club and the Frankford Radio Club, to adopt my proposals and help begin a sane attitude towards amateur radio competition. — *Richard Klinman, K3OIO, Philadelphia, PA*

### SOREHEAD "TESTERS"

● I have been copying the WIAW code practice sessions regularly. Although my receiver has sufficient selectivity to weed out the "testers," I think if this hunch of soreheads would lift their fingers off the key and copy WIAW's code practice, they could get their Extra Class licenses. Then they would have no reason to pick on those who are trying to upgrade themselves. Most of them aren't good enough to get their signals exactly zero beat with WIAW, so perhaps they should study some operating principals too! — *Donald B. Wilhelm, W3FPR, Clarksburg, MD*

### BOOSTERS

● Now I know why I am a member of the League. I would like to thank you all for the most

enjoyable and interesting visit I recently had at Headquarters.

I truly believe that I have never been treated with more genuine consideration at any place I have ever visited. The interest you showed in my school radio project was most rewarding. I feel that the school radio club scheduled for this Fall will be better equipped for success with all the helpful hints that the total staff offered to me.

I wish every ham, member or not, could have the opportunity to visit ARRL Headquarters to see just what we are getting for our money.

Too bad I don't have the cash on hand for a life membership; it would be on the way right now. — *Bill Mac Etroy, WA2BLA, Elnora, NY*

● I am 15, I have been a member of the League for seven months, and a novice for ten months. I just passed the general exam six weeks ago. I don't think I would have passed without the code practice sent daily by WIAW. Although I've heard other members complain of late QST delivery, my QSTs come no later than the third of the month! There are always a few articles that interest me, but if nothing else, I like QST's style.

I am completely satisfied with the League and even though \$6.50 is a dent in my savings for the new General Class rig, I consider the ARRL a worthwhile investment.

I can't afford life membership, but you can bet that my \$6.50 will be in the mail again before long. Keep up the good work. — *Steve Thornburg, W8RFEN, Livonia, MI*

● I would certainly like to thank ARRL Hq. for the prompt and courteous reply to my letter about transmatches. The way things seem to be today it shocked me to get a reply so quickly. If this is indicative of the ARRL as a whole I see I have joined a fine organization. Many thanks again. — *Doug Robertson, Hide Park, NY*

### SHARP OBSERVERS

● During the year and a half that I have been licensed, I have noticed three major abuses on the part of my fellow hams:

- 1) Use of KW or excessive power for local contacts (under 300 miles).
- 2) Tuning up on a frequency obviously in use.
- 3) Total neglect of cw during a license term and use of "little white lies" when affirming cw ability for renewal.

In a day and age when everyone seems to want more freedom, what we need is responsibility, be it on the ham bands or elsewhere. That means self-discipline in our speech and actions. Let's always remember that freedom without responsibility is dangerous. — *Dave Mac Williams, WA3LTA, Wilmington, DE*

● As an official observer for the ARRL I feel it is a crime the way some of our licensed operators act on the air. Some act as though they feel that use of the airwaves is a right and it belongs to them alone. This is not true, and all of us as licensed amateurs owe a debt to society to use these frequencies in the interest of that society. Abuse of these privileges can result in the loss of those frequencies we have worked so hard to get, and retain, over the years. With the danger of encroachment on our frequencies we should clean house and check our operating habits, as well as our equipment. — *I. E. Miller, W5PBN, Richardson, TX*

# I.A.R.U. News



INTERNATIONAL AMATEUR RADIO UNION, THE GLOBAL FEDERATION OF NATIONAL NON-COMMERCIAL AMATEUR RADIO SOCIETIES FOR THE PROMOTION AND CO-ORDINATION OF TWO-WAY AMATEUR RADIO COMMUNICATION

## AMSAT REPORT RECEIVES U.S. APPROVAL

A report entitled the "Technical Feasibility of Frequency Sharing in the Amateur Radio Service When Using Space Communication Techniques" prepared by Amsat, the Radio Amateur Satellite Corporation has been approved by the U.S. National Committee of the CCIR. The International Radio Consultative Committee (CCIR) is the branch of the International Telecommunication Union which deals with studies of technical problems. The report, now with U.S. sponsorship will go to an international CCIR meeting in Geneva early this year for final consideration.

The Amsat report was prepared in response to views of some foreign governments that amateurs should not be permitted to utilize space techniques in bands shared with other services because of interference potential. The report indicates that interference problems would be minimal and that through use of ground-command techniques, amateurs could effectively alleviate any harmful interference which might occur.

Preparation of this report is an important step in the amateur preparation for the World Administrative Radio Conference on Space Telecommunication to be held in Geneva in June, 1971.

## RCP CELEBRATES ANNIVERSARY

The *Radio Club Peruano* recently celebrated its 40th anniversary. Commemorating the event, the society's official station OA4O operated with the special prefix "4T4" during December. Those amateurs who contacted the station while using the special prefix, can obtain a commemorative QSL from RCP, PO Box 538, Lima, Peru.



Recently, the Tokai Division of the *Japan Amateur Radio League* held the third Ham Festival at Nagoya. Pictured is a session on amateur TV.

## DX OPERATING NOTES

### Reciprocal Operating

United States Reciprocal Operating Agreements exist only with: Argentina, Australia, Austria, Barbados, Belgium, Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Finland, France\*, Germany, Guatemala, Guyana, Honduras, India, Indonesia, Ireland, Israel, Kuwait, Luxembourg, Monaco, Netherlands,\* New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, Portugal, Sierra Leone, Sweden, Switzerland, Trinidad and Tobago, United Kingdom,\* and Venezuela. Several other foreign countries grant FCC licensees amateur radio operating privileges on a courtesy basis; write League headquarters for details.

Canada has reciprocity with: Bermuda, France, Germany, India, Israel, Luxembourg, Mexico, Netherlands, Nicaragua, Norway, Peru, Senegal, Sweden, Switzerland, United Kingdom, U.S., Uruguay and Venezuela.

### Third-Party Restrictions

Messages and other communications — and then only if not important enough to justify use of the

\* Agreement includes overseas entities.

Here is a photo taken in the ham shack of the *Malaysian Amateur Radio Transmitter Society*, located at the Telcom Center in Kuala Lumpur. Shown from left are 9M2TT, 9M2CR, 9M2CM, visitor W1IRY, and 9M2AV.

QST for

Amateurs present at a Frequency Management Seminar sponsored by the International Telecommunication Union in Geneva last September included (standing, left to right) EP2CN, ex-W3BGU, VK2AMZ, W3OKN, W2NXX, G3IWL, 4X4RX, and 3A2BY, who is the wife of 3A2BF (kneeling). (Photo by W1RU, who was there on behalf of ARRL). Also present, but absent when this picture was taken, was 5A2TU.



regular international communications facilities may be handled by U.S. radio amateurs on behalf of third parties *only* with amateurs in the following countries.\*\* Argentina, Barbados (only U.S. stations/8P) Bolivia, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Greenland (XP calls only), Haiti, Honduras, Israel, Liberia, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela. Permissible prefixes: CE CM CO CP CX EL HC HH HI HK HP HR LU OA PY TI VE VO W or K/8P XE XP YN YS YV ZP 4X and 4Z. Canadian hams may handle these same type third-party messages with amateurs in Bolivia, Chile, Costa Rica, El Salvador, Honduras, Israel, Mexico, Peru, U.S. and Venezuela. Permissible prefixes are: CE CP HR K OA TI W XE YS YV and 4Z.

\*\*By special agreements, third-party traffic is also permissible with Australian amateurs for traffic regarding amateur satellites, and with 4U1TU.

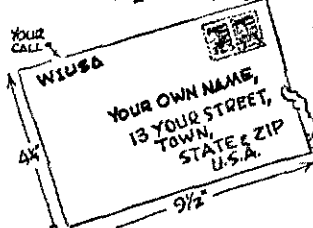
### DX Restrictions

U.S. amateur licensees are warned that international communications are limited by the following notifications of foreign countries made to the ITU under the provisions in Article 41 of the Geneva (1959) conference.

Cambodia and Vietnam forbid radio communications between their amateur stations and such of other countries. U.S. amateurs should not work XU XV or 3W8. Canadian amateurs may not communicate with Cambodia, Laos, Vietnam and Jordan. Prefixes to be avoided by Canadians are JY XU XV XW8 and 3W8.

**QST**

## IS YOURS ON FILE WITH YOUR QSL MGR?



### A.R.R.L. QSL Bureau

The function of the ARRL QSL Bureau is to facilitate delivery to amateurs in the United States, its possessions and Canada, of those QSL cards which arrive from amateur stations in other parts of the world. All you have to do is send your QSL manager (see list below) a stamped, self-addressed envelope, about 4 3/8 by 9 1/2 inches in size, with your name and address in the usual place on the front of the envelope and your call printed in capital letters in the upper left-hand corner.

Cards for stations in the United States and Canada should be sent to the proper call area bureau listed below. Recent changes are in bold face.

- W1,K1,WA1,WN1<sup>1</sup> - Hampden County Radio Association, Box 216, Forest Park Station, Springfield, Mass. 01108.
- W2,K2,WA2,WB2,WN2 - North Jersey DX Assn., PO Box 505, Ridgewood, New Jersey 07451.
- W3,K3,WA3,WN3 - Jesse Hieberman, W3KT, RD 1, Box 66, Valley Hill Rd., Malvern, Pennsylvania 19385.
- W4,K4 - H. L. Parrish, K4HXI, RFD 5, Box 804, Hickory, North Carolina 28601.
- WA4, WB4, WN4<sup>1</sup> - J. R. Baker, W4LR, P.O. Box 1989, Melbourne, FL, 32901.
- W5,K5,WA5,WN5 - Kenneth E. Isbell, W5QMD, 306 Keatertield Blvd., Ft. Smith, Oklahoma 74701.
- W6,K6,WA6,WB6,WN6<sup>1</sup> - No. California DX Club, Box 11, Los Altos, California 94022.

- W7,K7,WA7,WN7 - Willamette Valley DX Club, Inc., PO Box 555, Portland, Oregon 97207.
- W8,K8,WA8,WN8<sup>1</sup> - Columbus Amateur Radio Assn., Radio Room, 280 L. Broad St., Columbus, Ohio, 43215.
- W9,K9,WA9,WN9 - Ray P. Birren, W9MSG, Box 519, Urburst, Illinois 60126.
- W0<sup>1</sup> - Reggie Hoare, W0QYP, P.O. Box 115, Mitchellville, Iowa 50169.
- WA0<sup>1</sup> - Lloyd Harvey, W0QGI, P.O. Box 7, Attica, Iowa 50024.
- K0 WB0 WN0<sup>1</sup> - Dr. Philip D. Rowley, K0ZFL, Route 1 Box 158, Alamosa, Colorado, 81101.
- KP4 - Alicia Rodriguez, KP4CL, PO Box 1061, San Juan, P.R. 00902.
- KZ5 - Gloria M. Spears, KZ5GS, Box 407, Balboa, Canal Zone.
- KH6,WH6 - John H. Oka, KH6DQ, PO Box 101, Aiea, Oahu, Hawaii 96701.
- KL7,WL7 - Alaska QSL Bureau, Star Route C, Wasilla, Alaska 99687.
- VE1 - C.J. Eader, VE1EQ, PO Box 663, Halifax, N.S.
- VE2 - John Ravenscroft, VE2NV, 353 Thorncrest Ave., Montreal 780, Quebec.
- VE3 - R.H. Buckley, VE3UW, 20 Almont Road, Downview, Ontario.
- VE4 - D.E. McVittie, VE4OX, 647 Academy Road, Winnipeg 9, Manitoba.
- VE5 - A. Lloyd Jones, VE5JI, 2428 Grant Rd., Regina, Saskatchewan.
- VE6 - Kari Jettelaar, VE6AAV, Sub. PO 35, N. Edmonton, Alberta.
- VE7 - H.R. Hough, VE7HR, 1291 Simou Road, Victoria, British Columbia.
- VE8 - George T. Kondo, c/o Ministry of Transport, Norman Wells, N.W.T.
- VO1 - Ernest Ash, VO1AA, PO Box 6, St John's Newfoundland.
- VO2 - Goose Bay Amateur Radio Club, PO Box 232, Goose Bay, Labrador.
- SWL - Jerry Waite, 39 Hannum St., Ballston Spa, New York 12020.

<sup>1</sup>These bureaus prefer 5x8 inch or #10 manila envelopes.

QSL Bureaus for other U.S. Possessions and for other countries appear in the June and December issues of QST.

Note: Stations operating portable should continue to receive their QSL cards at the bureau in their home call area; i.e., WA1QRX/VE8 gets his cards through the W1 Bureau.



CONDUCTED BY BILL SMITH,\* K6CER

### Cycle 20 Lives

THE WEEKEND of November 7 and 8, 1970 will be remembered 20 years from now. It was the occasion of the first confirmed U.S.-to-Japan 50-MHz contacts of Solar Cycle 20, and what one correspondent called "one of the wildest *E* events in history." Sporadic *E* on 2 meters covered distances exceeding 1300 miles, and at the same time KH6NS, Hawaii, was working east to West Virginia, on what was apparently 50-MHz multi-hop *E*.

A function of this column for 31 years has been documenting events which have become milestones in the spectrum above 50 MHz. The events of November 7-8 deserve special attention, and to record them, we're altering our usual format slightly. From many telephone calls and written reports, here is how we've been able to determine what happened. All times are in GMT.

Judicious juggling of statistics can prove or disprove nearly anything. So it is when correlating magnetic disturbances, aurora, *E* and *F*-layer to one another. Private institutions and government have spent many dollars searching for conclusive answers to the mechanics of propagation — and amateurs argue their own theories.

Apparently, the event that triggered the transpacific 50-MHz opening Nov. 7 happened at 0309 GMT, Nov. 5, on the sun's surface. That is when the Space Disturbance Forecast Center at Boulder, Colorado, reported that a proton flare erupted. The flare reached maximum at 0320 and ended at approximately 0700. Forty-six hours later a minor magnetic storm began around the earth, producing a brilliant visual aurora beginning at about 0300, Nov. 7. The aurora could be seen across nearly the northern one-half of the U.S., but the radio aurora was not exceptional. Nothing beyond the usual 200- to 800-mile contacts was reported. More important, the magnetic storm appears to have caused the muf to pass 50 MHz. For two weeks previous, the muf had hovered near 50 MHz as far north as New England and Quebec.

\*Send reports and correspondence to Bill Smith K6CER, ARRL, 225 Main St., Newington, Conn. 06111.

The 6-meter *F*-layer opening apparently began around 1800 GMT, Nov. 7, when WA6IYC began hearing KH6GRU, whose signals were heard for the next five hours. W6ABN says this may have been on of the longest transpacific *F*-layer openings ever. The first contact was at 1830 when W7FN, Seattle, worked KH6GRU. This was followed by dozens of Hawaiian contacts from California, Arizona and Nevada. W6ABN reports *F*-layer backscatter beginning at 2045 on signals from Arizona, Nevada and Northern California. WB6UYG worked ZK1AA, direct-path, at 2100. A CQ by K6QEH at 2221 was answered by JA1MRS, but Gary couldn't be sure of the call and WB6UYG got the first Japanese contact, followed by K6QEH, W6ABN and WA6JRA. Signals were weak, peaking around 255 degrees, indicating propagation by double-hop *F*-layer backscatter. Several other IAs were heard weakly, but not worked. Their signals disappeared at 2320, and 45 minutes later all trace of backscatter signals was gone. This is apparently the first bona fide U.S.-to-Japan 6-meter work of Cycle 20. There have been other claims, but no one has confirmed the alleged contacts.

While signals were fading on the West Coast, Texas stations began working Mexico and Central America on *E* and South America via an *E*-to-transequatorial link. K5UGM, Dallas, worked TG9KM, Guatemala City, at 2332. The contact was the first DX for TG9KM, who is now running 500 watts. He expects to be joined by another Guatemala station in January. K5UGM also worked XE1GE, Mexico City. WA5IYX, San Antonio, also worked TG9KM, and heard LU2BN, Argentina, for ten minutes, beginning at 0015 Nov. 8. So ended November 7, with WB6UYG commenting, "Cycle 20 is alive and well."

### The Second Day

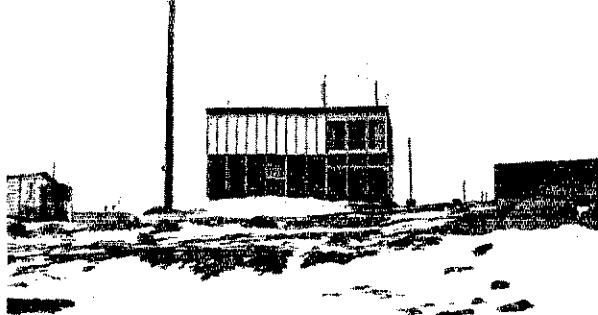
Word travels fast in vhf circles and by Sunday the entire North America six-meter DX corps was on duty. VE2AIO says the day began poorly, but between 1330 and 1350 the muf rapidly rose to 45 MHz, with Spanish-speaking stations being logged. At 1430 the muf was over 49 MHz and at 1448, VE2AIO heard K11KN, Rhode Island, on backscatter from the southwest. W2UTH, Rochester, was heard six minutes later on backscatter from the southeast. VE2AIO heard or worked many W1s, 2s and 3s and called repeated CQs in Spanish seeking South Americans, but without luck. This

We reported last month that the 50.098 VE8YT beacon is operational. The site is Clyde River, NWT, 1700 miles north of Ottawa. Detailed reception reports of the beacon should go to VE3QB and ARRL.

QST for



The 65-watt VE8YT beacon signal, radiated from a halo antenna, has been heard several times by VE2A10. He says TF3EA in Iceland has heard the signal often since October 4. Purpose of the beacon is to study the mysterious "auroral E" propagation.



### 220- and 420-MHz STANDING

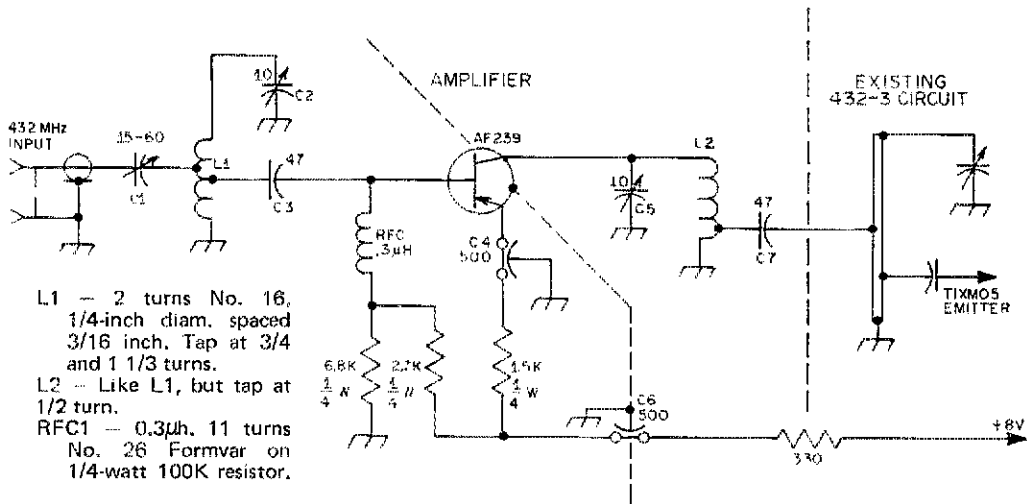
220 MHz		420 MHz	
		K2ARO ...15	6 740
		K2CEH ...14	7
WIHDQ ...13	5 450	W2CNS ...14	6 525
K1JX ...12	4 600	K2CYO ...10	6 675
WA1MUG ...11	3 306	K3JUV ...16	5 720
W1AZK ...10	3 375	W3RUE ...14	7 585
K1BFA ...10	3 225	W3UJC ...9	4 400
K2CBA ...19	7 2650	W4FJ ...20	7 995
W2DWJ ...15	5 740	K4QIF ...19	7 1065
K2DNR ...13	5 600	K4HJQ ...19	7 800
W2SEU ...12	5 325	W4HJZ ...15	5 560
K2RTH ...12	4 600	K4SUM ...15	5 462
W2CRS ...12	4 600	W4VHH ...15	4 750
W3UJG ...14	5 460	K4GL ...10	3 585
W3RUE ...10	5 480	K4NTD ...9	2 835
K3LUV ...10	4 310	W5RCI ...19	6 880
K4GL ...4	2 485	WSORH ...12	4 700
K4XC ...3	2 1090	W5AJG ...7	3 1010
WSRCI ...10	5 910	WSUKQ ...6	2 590
W5AJG ...3	2 1050	W5GVE ...3	1 365
W5LO ...2	2 660	W6DQJ ...4	2 360
W6WSQ ...6	4 1142	K7ICW ...4	2 225
WB6NMF ...3	3 2650	W7JRG ...2	2 420
W7JRG ...4	2 959	K8DED ...23	7 675
K7ICW ...4	2 250	W8YLO ...21	7 650
W8PT ...11	6 660	K8REG ...20	7 700
W0EYE ...10	4 950	W8HVX ...16	8 660
VE2HW ...5	2 225	W8CVO ...13	7 625
VE3A1B ...7	4 450	W8MNT ...13	7 600
		W8RQI ...10	6 425
		W8CVO ...10	6 400
		W8VHG ...8	6 625
		W8FWF ...7	4 450
		W9WCD ...20	7 825
		WA9HUV ...17	7 780
		W9IY ...15	6 550
		W9AAG ...15	5 800
		WA9NKT ...13	6 850
		K9AAJ ...12	5 425
		K9CNN ...12	5
		W0DRL ...19	6 1185
		W0LER ...11	4 709
		W0LCN ...11	4 700
		K0TLM ...10	5 700
		W0EYF ...7	2 703
		VE2HW ...6	3 750
		VE3DKW ...12	7 940
		VE3ALB ...9	5 600
		VE3FZC ...7	5 510
		VE4MA ...2	1 420

probably explains scattered reports of Spanish voice on 50.105 by W1s! VE2A10's report was the only *F*-layer observation of the day, but I imagine the fantastic *E* opening which began later wiped away memory of the earlier *F*.

Several theories have been offered on how the signals of KH6IJ and KH6NS covered paths of some 4500 miles to most of mainland USA. Several hops, perhaps as many as four, seems to be the most reasonable explanation, due to signal characteristics. Some think *F*-layer on the Hawaiian end coupled to *E* in the contiguous states. Whatever the mode or modes, and I doubt that many really care: the contacts were the thing!

Weak *E* began forming in the late morning hours over areas of the western half of the continent. California stations were working north to Washington and east to South Dakota. By 1530 GMT, the still weak opening was shifting south. Oklahoma and Texas stations began working Arizona and California. The weak and widely scattered *E* continued until 2300 when suddenly the band popped open with short-skip and *E* backscatter, in a line several hundred miles wide from New England to southern California. Some of the *E* paths were extremely short, usually an indicator of high *E* muf, as well note in the 2-meter report. W0EYE, Boulder, Colorado, heard or worked W5SEW, Amarillo, Texas, over a path of some 300 miles. Long-haul *E* began around 0000 GMT, Nov. 9, when K5HVC, Texas, worked KH6NS. KH6IJ and KH6NS were worked somewhat earlier on the West Coast. While Texas and Oklahoma stations were working Hawaii, single-hop *E* was beginning on the East Coast. K11KN, Rhode Island, heard only single-hop between 0013 and 0339. Beginning at 0348, K11KN worked 20 Southern California stations, and heard Arizona and Nevada. It was during this time that KH6NS worked a West Virginia station. The contact was heard by several stations but none reported the exact time or the call of the West Virginia station. Ohio stations apparently also worked Hawaii. A New York area station reported working KH6IJ, and hearing KL7FLA, but this is the only observation received from the northeast concerning Hawaii, and no other KL7 reports were filed, except for what appears to have been a Cleveland area hoax, reported by W8OIW.

WIHDQ has some observations on the surge of *F*-layer activity late in the current sunspot cycle. Ed says the November, 1970, activity was reminiscent of the same period in 1949, near the end of cycle 18. That cycle peak went from 1946 through 1950 with on-and-off evidence of *F*<sub>2</sub>. The big year was 1947, with openings starting late in October. The entire month of November was hot from New England to Europe and the U.S. West Coast. There was no transatlantic DX in 1948, or later years of cycle 18, but transcontinental work was good each fall for short periods. There was South American DX each fall and winter, due



mostly to consistent effort by HC2OT, LU9EV, and others. November 20, 1949 was very similar to November 7-8, 1970. There was an exceptional aurora the night of November 19, beginning at 1350 GMT. The following day, like Nov. 8, a Sunday, HC2OT began a series of contacts with W1, 2, 3, 4, 5, 8, 9, and VE1 and VE3, at 1350 GMT, running for two hours. Twenty minutes later  $F_2$  began between the U.S. coasts, lasting for 90 minutes. After eastern stations faded in California, the W6s worked Hawaii stations, winding up one of the last major DX sessions of cycle 18.

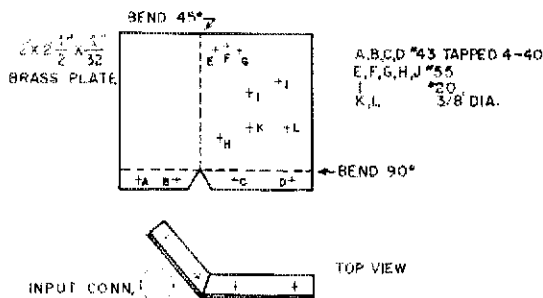
A number of operators worked their 50th state Nov. 8, with KH6IJ or KH6NS being number 50. The two Hawaiian stations worked hundreds on the Mainland. E was reported as late as 0530 in the western states.

WA1NNW, Massachusetts, received the slow-scan television signals of W4EFF, Alabama, for several minutes beginning at 0246, November 9. The 50-MHz TV picture was good, but WA1NNW could not break the Alabama station for what could have been a two-way E TV contact!

### Two Meters

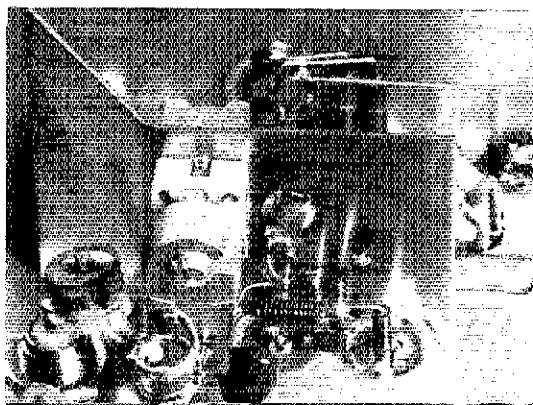
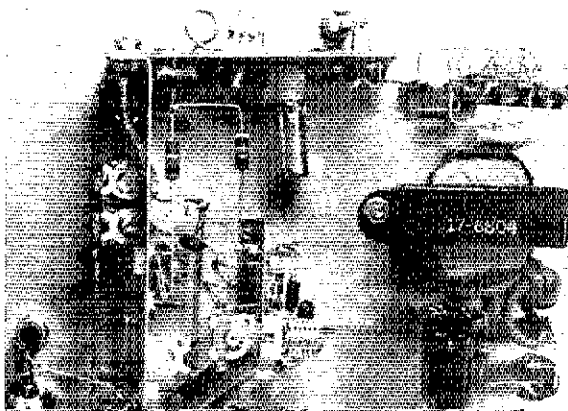
Probably most surprising of all was the 144-MHz  $E_3$  the evening of Nov. 8th. While six meters was churning with activity, the E-Jayer muf was soaring through the fm broadcast band, TV channel 6 and towards 144 MHz. The first reported 2-meter E contacts were made around 0030 GMT, November 9th. W5GVE, Waco, Texas, was calling CQ west, after hearing Los Angeles fm broadcast stations. He was answered by W9YYF, near

W0EYE preamp using a Motorola AF-239 uhf transistor for the popular Parks 432-3 converter.



Chicago, followed by W9AAG, K8DEO, Ohio, worked W5LID, Texas, at 0043 and heard K5WXZ. The Ohio to east-central Texas path remained open only some 7 minutes. K8BBN says K3CFY, Pittsburgh, worked several Ss, probably about this time. W0DRL, Kansas, worked WA4TTG, Virginia at 0100. At 0104, another W5GVE CQ netted K6HAA, San Diego. K5WXZ, K5PTK and K5PTG also worked K6HAA. And then at 0150, K7VTM, Wyoming, worked W0NXF and K5PTG, and heard W0EMS. According to K6GAO, his friend K6HAA and contacts with W5GVE, K5WXZ, K5PTK, K5PTG, all Texas, and W0EMS, W0LZO and W0NXF in Nebraska. W6KD and K6IBY worked several of the same stations. E signals were heard in

The W0EYE preamp submounts on the 432-3 chassis. Construction details of the input circuit are shown here.



San Diego from 0100 until 0245, an exceptionally long period for E at 144 MHz. K5PTK, near Galveston, worked WØRLI, Minnesota, while hearing W6s at the same time. K5PTK also worked K7VTM, Wyoming. K5UGH, Dallas, heard California, Minnesota, Kansas, and Arizona on E but could not attract their attention above 145 MHz. Except where noted, I do not have times for the reported contacts. Such information would have allowed drafting an E cloud map for 144.

That is the information we had on hand as of November 19 when this report was written. Several readers asked where I was that weekend. Yep, I missed it — for the first time in four years I took the family on a weekend vacation! Thanks to the following stations for their reports, and if I missed someone, please forgive me. K1BXE, K11KN, W1HDQ, W1JNNW, WB2WIK, K5PTK, K5UGM, K5WVX, W5GVE, W5WAX, W5YIX, K6GAG, K6JYO, K6QEH, K6RNR, W6ABN, WA6HXM, WB6UYG, K7ICW, K8BBN, K8DEO, WØDRL, WØEMS, WØEYE, WØLER, WØNEN, JA1MRS, KH6CRU and VE2AIO.

### A Preamplifier for the 432-3

During the past several years Don Hilliard, WØEYE, has checked the noise figure of some two dozen Parks 432-MHz converters with a Hewlett-Packard HP342A Automatic Noise Figure Meter and HP343A Noise Source, whose performance had been verified as being accurate within a half dB.

The measured 432-3 noise figures have run between 6 and 11 dB, with most above 6.5 dB. When adjusted for minimum noise figure, the converters could be improved 1 to 3 dB depending on the age of the unit, how much retuning had been attempted and exposure to too much rf. One late model was adjusted to a 4.5-dB noise figure. This unit had a Motorola AF-239 in the rf stage.

The AF-239 is a low-noise uhf pnp germanium transistor probably designed for use in uhf TV tuners. Its typical noise figure is 5 dB at 800 MHz. By adding another AF-239 rf amplifier stage ahead of the existing one in the 432-3 converter, it is possible to realize a noise figure of approximately 4 dB, depending upon equipment used for alignment, and the worker's patience.

WØEYE made similar additions to three 432-3 converters and never experienced any instability. The AF-239 stage has a gain of approximately 12 dB.

Most construction details are evident from the photographs. The preamplifier mounts to the converter plate with four 1/8 inch 4-40 machine screws. The input capacitor is mounted with a U-shaped piece of number 18 tinned wire whose ends extend through holes E and G. They are bent over on the back side of the plate and soldered to it along with the rotor tab of the capacitor. The output capacitor could have been mounted similarly on the back side, but adjustment would be difficult. Don soldered the rotor tab in place and fixed the capacitor in place with epoxy. Don used silver-mica button feedthrough bypass capacitors, which have excellent uhf characteristics and are much preferred in this application.

The input and output tuning capacitors, C2 and C5, are Johnson type U, having maximum capacitance of 8 to 10 pf. C1 is an Erie type 538-011F-15-60; C3 and C7 are Elmenco type DM15-470J. Disc ceramics could be substituted. The location of the tap on the existing input line may be seen in the photograph, but is not very critical.

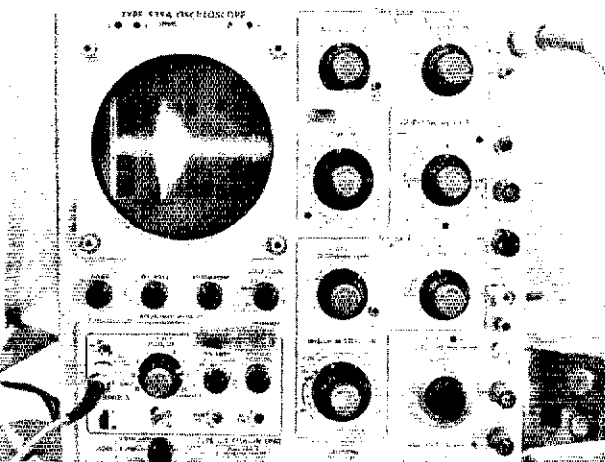
(Continued on page 82)

### 2-METER STANDING

K1ABR	...35	8	1478	W5HFV	...37	10	1285
W1AZK	...34	8	1412	K5WXZ	...36	10	1450
K1HTV	...34	8	1310	W5AJG	...33	9	1360
K1WHT	...31	8	1300	W5UKQ	...32	9	1290
K1UGO	...30	8	1370	W5LO	...29	7	1325
K1WHS	...29	8	1300	W5WAX	...28	7	1310
W1VTU	...29	8	1296	K5PTK	...23	8	1330
K1BKK	...28	7	1275	W6GDO	...18	5	1326
W1JSM	...25	7	1100	W6WSQ	...16	4	1390
W1HDQ	...24	7	1040	K6HAA	...13	4	1380
K1RJH	...22	7	1450	K6JYO	...13	4	1240
K1MTJ	...20	7	1225	K6HMS	...11	4	1258
WA1MUG	...19	5					
W1MX	...18	6	850	W7JRG	...27	6	1320
K1JIX	...18	6	800	K7NII	...25	5	1290
W2NLY	...37	8	1300	K7ICW	...18	4	1278
W2CXV	...37	8	1360	K7VTM	...10	6	950
W2ORI	...37	8	1320	W8PT	...41	9	1260
W2AZL	...36	8	1380	K8AXU	...38	8	1275
W2BLV	...36	8	1150	K2ZAT/8	...36	9	1310
K2RTH	...34	8	1215	W81DU	...36	8	1150
WA2FGK	...33	8	1340	W8YIO	...36	8	1100
W2CUX	...33	8	1334	W81DT	...36	8	1150
WB2WIK	...32	8	1080	K8DEO	...35	8	1200
WA2CJK	...31	8	1160	W8NOH	...31	8	1165
W2CRS	...30	8	1270	W8TIU	...24	8	1000
K2CEH	...27	8	1200	K8ZES	...22	8	675
K2DNR	...25	7	1200				
WB2SH	...25	6	1000	K9SGD	...42	9	1300
WA2EMB	...23	8	1335	WA9DOT	...41	9	1303
W2CNS	...23	8	1150	W9AAG	...41	9	1200
K2BWR	...23	7	1350	K9AAJ	...41	9	1200
W2DWJ	...23	6	860	K9UIF	...41	9	1150
WB2YOU	...22	6	850	W9YFF	...40	9	1050
WA2PMW	...21	6	1000	W9BRN	...36	9	1260
WB2FXB	...21	6	915	W9PPB	...34	8	820
K2YCO	...21	7	750	WØBFB	...45	10	1380
W3RUE	...36	8	1100	WØNXF	...45	10	1369
W3KWH	...35	8	1335	KØMOS	...44	9	1276
W3BHG	...32	8	1260	WØLER	...43	9	1440
W3GKP	...32	8	1108	WØDOY	...41	9	1300
K3CFA	...25	8	1200	WØLFE	...40	9	1100
W3BDP	...25	8	1100	WØEYE	...35	9	1380
W3HB	...23	8	1310	WØENC	...35	9	1360
W3TFA	...21	8	1342	WØEMS	...34	10	1320
K3CFY	...21	7	950	KØCER	...33	9	1276
K3OBU	...21	7	930	WØLCN	...31	9	1100
W3ZD	...20	7	850	WAØCHK	...30	8	
WA3GPL	...19	6	625	WØDRL	...27	9	1295
K4GL	...39	9	1270	VE1AUC	...7	2	500
W4HJQ	...39	9	1150	VE2DFO	...28	7	1340
W4WNH	...38	9	1350	VE2HW	...15	6	800
W4HHK	...38	9	1280	VE3BQN	...36	8	1250
K4EJQ	...37	8	1125	VE3ASO	...33	8	1290
K4IXC	...36	8	1403	VE3EZO	...33	8	1283
W4VHH	...36	8	1100	VE3AIB	...29	8	1340
W4CKB	...35	8	1440	VE3CWT	...27	7	1072
K4QIF	...35	8	1225	VE3FVW	...25	8	1100
W4FJ	...34	8	1150	VE7BOH	...9	3	1248
W4AWS	...29	8	1350	VK3ATN	...3	3	10417
WSUGO	...43	10	1398	ZL1AZR	...2	2	11055
WSRCI	...42	9	1289	SM7BAE	...1	1	11055

The figures after each call refer to states, call areas and mileage of best DX. Revised January 1971

Remember the "Let's Talk Transistors" series by Robert E. Stoffels, W9ESH? We've put together a reprint booklet of this 9-part transistor primer and it is available from ARRL for \$1 including postage.



VE3CUA observes auroras on a scope. This display is of the October 22 auroral signal from a 48.6-MHz transmitter operated by the National Research Council of Canada. The display allows VE3CUA to determine the distance to and depth of the radio aurora.

Initial adjustment should be made with a signal generator. The adjustment should be made with a signal generator. The adjustment of C1, C2 and C5 should be made with a good noise generator. However, good results may be obtained with a weak-signal source whose output looks like 50 ohms nonreactive.

Thanks to W0EYE for detailing this preamp.

#### Other VHF News

50-MHz DXers are listening for the signals of VR6TC, Pitcairn Island, and CE0AE, Easter Island. Both stations reportedly are operating beacons near 50-MHz. VR6TC, who is Tom Christian of hf band DX fame, is running a 5894 and CE0AE has an SB-110. Another 50.1 beacon is KH6EQI at Pearl Harbor. There is now permanent Grand Cayman Island activity. K2OLS, who holds Cayman license ZF1AA, has supplied Cayman resident Frank Scotland, ZF1GC, a Swan 250C.

A number of fellows are planning May and June DXpeditions to Central America and the Caribbean. It might be wise to coordinate this activity so two groups don't pick the same DX site simultaneously. May I suggest that those planning trips advise me of when and where? I'll keep the information confidential until plans are finalized except in the event that two or more groups select the same time and location.

Prior to the November openings, KH6GRU found some productive F-layer days in September and October. ZK1AA was twice worked in September, but October 23 through 26 was best. KH6GRU worked W6s on the 23rd, XE1GE the 24th, PY2CSS, JA1MRS and LU1MBJ on the 25th and JA1RDW the 26th.

144 MHz meteor scatter fans were active during the November Leonids. K3CFY, Penna., reports working W4CKB, Florida on the 16th. Many stations kept long-haul schedules of 1400 miles or more, with only a few pings heard.

The shower worked out well for KIHTV, Meriden, Ct. Rich found that predictions in *Sky and Telescope* were quite accurate. They estimated that the peak would be around 1400 GMT, Nov. 17. KIHTV worked K0AWU on 144 MHz at 1150, for state No. 35, and the North Dakota station's first W1. W5WAX, Muskogee, Okla., was worked at 1358, also for his first W1. K9UUT, Racine, Wis., was worked at 1505, using both cw and ssb in a record 2 1/2-minute burst. They arranged to check

again at 1600, but heard nothing at that time. KIHTV also heard W5HFV on a sked with W1AAI.

The October Orionids was productive. W9YYF, Chicago, worked K5AGI, Ia., on a 30-second burst, and W4ISS, Ga., on a series of short bursts. W3BHG, Delaware, clicked with K9IMX, Illinois, on a 25-second screamer, but a schedule with W5RCL, Miss., produced little. W0RLI, Minneapolis, worked K4EZU, VA.

220-MHz newsletter author WA6GYD says he, W6VMY, W6BGJ, K6DTR, W6UOV, WA6RUY, W8YFW, WB6NMT and K6QAX are keeping 220 active around San Francisco. They are attempting work with Los Angeles area stations K6lBY, WA6VQJ and W6JFU, but the path is proving difficult. WB6NMT ran Orionid schedules with W0EYF, Colorado, and W7JRG, Montana, with slim results.

432-MHz m.s. DXers continue their quest for the first m.s. contact on the band, W4FJ schedules W0DRL and W0LER. Ted hopes both can soon transmit simultaneously on 144 and 432, to test a theory that a meteor burst at 144 lasts nine times as long as at 432. W0DRL scheduled W2AZL, N.J., on October 21, a 1150-mile path. W2AZL was running 100 watts to a 52-element Yagi array and Al copied one complete set of calls from Carl on a 10-second burst. W2AZL heard several short bursts from Al and will soon have a kilowatt ready for further schedules. W0DRL has promised information soon on 432 m.s. techniques. From the practical viewpoint there is no one better qualified. K8DEO, Ohio, ran schedules for two weeks during mid October with K4IXC, Florida, and heard pings and one 5-second burst with complete calls. M.s. at 432 is difficult, but W0DRL says he's confident a contact will be made. Al says interest is growing and he is receiving frequent schedule requests.

Near New York City, K2RIW reports what is likely the first W2-to-VE1 contact on 432. He worked VE1AFB during a November 2 tropo opening. Other stations working VE1AFB were W1GAN, K1LOG and K1PXE. VE1AFB runs 50 watts and an 11-element Yagi. K2RIW further reports that K2UYH was successful in obtaining a reasonable group-rate purchase of TV cameras and this has caused a flurry of 432 ATV activity from Long Island to Pennsylvania. At least a dozen stations are now active, using a frequency near 439.25, to avoid the 432 DXing channel. The favorite Sunday morning ATV activity is copying television signals from K2KVT aeronautical mobile. K2RIW says live coverage of K2KVT landing his plane is the most thrilling. I wonder how Dick means that?

Next month we'll return to the usual amount of station activity news. Those of you who have requested a 1215-MHz states worked box, send me your contact list including the calls and locations of the stations worked, and the greatest distance.

#### Canadian FM Repeaters

Our friends to the north have taken to vhf repeaters in a big way. Here is recent information

on Canadian repeaters furnished by the Toronto  
FM Communications Association, Box 943,  
Toronto 5, Ontario.

Location	Call	Input (MHz)	Output (MHz)
<i>Atlantic Provinces</i>			
St. John's, Nfld.	VO1GT	146.46	146.94
Sydney, N.S.	VE1JD	146.46	146.94
Truro, N.S.	VE1XK	146.46	146.94
Halifax, N.S.	VE1ARC	146.46	146.94
Moncton, N.B.	VE1VHF	146.46	146.94
St. John, N.B.	VE1KI	146.46	146.94
<i>Quebec</i>			
Matane	VE2CSL	146.46	146.94
Riviere-du-Loup	VE2NY	146.46	146.94
Chicoutimi	VE2CRS	146.46	146.94
Quebec City	VE2OM	146.46	146.94
Quebec City	VE2VD	146.52	147.50
Trois Rivières	VE2AT	146.46	146.94
Sherbrooke	VE2FZ	146.46	146.94
Montreal	VE2CA1	146.18	146.64
	VE2CLA	146.10	147.30
	VE2MT	146.46	147.06
	VE2PY	146.28	146.88
	VE2RM	146.40	147.18
	VE2TA	146.52	147.50
	VE2XW	146.70	147.60
<i>Ontario</i>			
Ottawa	VE2CRA	146.46	146.94
Renfrew (Mt. St. Patrick)	VE3STP	146.34	147.06
Kingston	VE3KBR	146.46	146.94
Peterboro	VE3PBO	146.34	146.94
Oshawa	VE3OSH	146.40	147.12
Toronto	VE3MOT	146.58	147.18
	VE3RPT	146.46	146.94
	VE3RPT	146.46	147.06
	VE3SIX	52.76	52.525
St. Catharines	VE3NRS	146.22	147.24
Grimby	VE3LCR	146.49	147.09
Hamilton	VE3DRW	146.16	146.76
Kitchener	VE3KSR	146.34	146.94
	VE3KSR	146.37	146.97
London	VE3LAC	146.46	147.06
New Liskeard	Proposed	146.46	146.94
Sudbury	VE3SRS	146.46	146.94
Sault Ste. Marie	VE3SSM	146.46	146.94
	VE3SSM	146.34	146.94
Thunder Bay	Proposed	146.46	146.94
Orillia	Proposed	146.34	146.94
<i>Western Provinces</i>			
Winnipeg, Man.	VE4YK	146.46	146.94
Brandon, Man.	Proposed	146.34	146.94
Regina, Sask.	VE5SS	146.46	147.33
Calgary, Alta.	VE6AUY	146.46	147.00
Edmonton, Alta.	VE6WQ	146.46	147.33
Cranbrook, B.C.	VE7CAP	146.46	147.33
Nelson, B.C.	VE7BTU	146.46	147.33
Vancouver, B.C.	VE7BUZ	146.34	146.94
Vancouver, B.C.	VE7ACS	147.33	146.58
Prince George, B.C.		146.58	147.33

### WA9YJV Repeater Now W9INX

The fm repeater operated by the Allen County Amateur Radio Technical Society, of the Fort Wayne area, details of which appeared in May, 1970, *QST*, page 85, is now signing W9INX. Jack Forbing, K9LSB, president of ACARTS, tells us that this call has replaced WA9YJV, as a memorial to the former holder, Edward A. Rehberg, now deceased.

**QST**

## Silent Keys

IT IS with deep regret that we record the passing of these amateurs:

ex-WA1FSA, Paul Porcino, Gloucester, MA  
 ex-W1GW, James Wiley, Wenham, MA  
 WA1HDR, Eugene E. Campbell, Reading, MA  
 W1LKS, Ralph G. Matheson, Gloucester, MA  
 W2ABQ, Earl N. McCullough, Westmont, NJ  
 W2BEM, Frank Fitzgerald, So. Smithtown, NY  
 WA2FRP, Irving Daus, Buffalo, NY  
 WB2GEO, Sydney Davidoff, Scarsdale, NY  
 WN2KDL, George G. Revelle, Newburgh, NY  
 W2KFH, Ardell Lowing, Colts Neck, NJ  
 WB2PQA, William Murphy, Valley Stream, LI, NY  
 W2WZ, John A. Stohbe, Glen Cove, NY  
 W2ZYB, Joseph T. Sbedico, Elmira, NY  
 WA3ELU, James V. Rosso, Pittsburg, PA  
 W3EMZ, Charles Kasinoff, Pikesville, MD  
 W3GFG, Raymond E. Wenke, Philadelphia, PA  
 K3NSO, Frank Ikeler, Danville, PA  
 W3OJZ, Ernest E. Davenport, Mt. Pleasant, PA  
 W3QX, Theodore J. Geyer, Philadelphia, PA  
 W3WUQ, James L. Hollis, Silver Spring, MD  
 WA4BRW, George D. Ledbetter, Greenville, SC  
 K4FL1, Hubert Casey, Henderson, TN  
 WA4HCL, Lawrence Gresham, Memphis, TN  
 K4IZT, William N. Brown, Black Mountain, NC  
 WA4QPR, Leonard Wolford, St. Petersburg, FL  
 W4RBE, J. Robert Matzinger, Winter Park, FL  
 W5QAW, Thomas L. Forehand, Henderson, TX  
 W5QHY, Harold R. Kohler, Sr., Huntsville, AL  
 W5UKF, Joseph G. Landreneau, Mamou, LA  
 W5VAR, Richard T. Pursley, Hammond, LA  
 K5ZVV, Vera, Fletcher, Ballinger, TX  
 W6APH, Myron L. Conley, Los Angeles, CA  
 W6CWH, Paul F. Bickel, Paradise, CA  
 WN6EEF, Vernon J. Lesniak, No. Palm Springs, CA  
 W6EOZ, Harold E. Olson, Riverside, CA  
 W6FDH, Nazareno E. LaMarca, Los Angeles, CA  
 W6GBB, Homer C. Ford, Woodland Hills, CA  
 W6JJU, Jerry E. Gorman, Sunland, CA  
 W6KMY, Frank L. Walden, San Jose, CA  
 W6LJA, Rudolph J. Del Castillo, San Diego, CA  
 K6LPR, Milan S. Wakefield, Pasadena, CA  
 K6MG, Maurice J. Grainger, Redwood City, CA  
 WA6WEM, Wilbur G. Church, Orange, CA  
 K8HUX/ex-W8AAI, C. Jack Pitman, Grafton, WV  
 WA8RUE, Mark J. Molly, Detroit, MI  
 W8WEO, James L. Boothe, Ravenna, OH  
 W9AVO, Asa B. Magruder, Floyd Knobs, IN  
 W9HTY, Anthony J. Porto, Neenah, WI  
 W9THB, James H. Adamson, Edwardsville, IL  
 W0BFV, Lloyd V. Stenberg, Lincoln, NE  
 K0BHF, Arthur C. Smiley, Stafford, KS  
 WN0CHR, Mickey Archambeau, Duluth, MN  
 W0EQ, Otto L. Luhring, Milford, IA  
 K0KYM, Roger M. Tipton, Springfield, MO  
 W0RQS, Francis C. Miller, Omaha, NE  
 W0LSI, Lester D. Hampton, Crawford, NE  
 VE3APC, David A. Stewart, Welland, ON  
 VE3GK, Sidney Burnett, Willowdale, ON  
 DL11N, Hansheinrich, Heider, Cuxhaven, Germany  
 EI4J, Frank Halpin, Dublin, Ireland  
 VK2BR, Rev. W. H. L. Brooke, New South Wales, Australia

The Post Office Department promises faster mail service with the new Zip codes. Use yours when you write League Headquarters. Use ours, too. It's 06111.



# YL news and views

CONDUCTED BY LOUISE RAMSEY MOREAU,\* WB6BBO

## 1971 Plan Ahead

ON DECEMBER 31, as midnight looms closer, it is almost a sure bet that in every group gathered to watch the old year out someone is bound to say "I wonder what *this* year will bring?" Emerson had an answer that will cover about anything:

*"All sorts of things and weather  
Must be taken in together  
To make up a year . . ."*

For us the prospect is as wide as the radio spectrum, and just as varied. The "things" will come as nice crisp red and blue and green bordered certificates as evidence of our efforts to reach into the treasury of awards for our accomplishments in DX, in traffic, in the hard, nose-to-the-grindstone effort of finding one more state or one more county. The 365 days ahead will have some nail-biting moments of sweating out QSLs to verify a contact. For all of us 1971 is more hard work to acquire WAC-YL, DX-YL, YLCC, and that toughest of all WAS-YL, along with the many from the YL clubs and nets.

The next twelve months will bring first the annual "Guys and Dolls" delight when the masks of the calls are off in the YL-OM contest, with phone on February 27-28 and cw on March 13-14, 1971. And the resulting triumphant scores waiting for the gold cups, and other awards for the winners in each category. In May there is more hurly-burly of contact hunting in the YLISSB QSO party, held from the 21st. to the 23rd. Then comes return to full activity after the summer lay-off and getting ourselves back into the groove with the laziest and most relaxed of all contests, the YLRL "Howdy Days" in September. It's more of a way to chat and catch up on who's back on the air for most of us, but there are prizes for the winners. The easy way doesn't last for the YLRL Anniversary Party celebrating the birthday of the club for cw in October, and phone in November. In November, too, there will be the annual Trillium Memorial Contest with the possibility of a WAVE-YL before it is finished.

For those gals that are interested in traffic activities only, there are the nets that operate all 365 days of the year and a whole splash of colorful certificates just waiting to be earned, along with that coveted little white card with the bright red BPL that means plain hard labor, as well as the Public Service Honor Roll listing.

There is much activity ahead. For the new officers in the clubs there is busy planning for meetings, appointing committees, and the eternal hunt for fresh, interesting program material. For all who have meeting other YLs in mind, there are the coming hamfests, division or state conventions, and, on May 14, 15, 16, the gathering of YLs from all parts of the country for the Mid-West YL Convention in Cleveland Ohio.

For a number of YL clubs June will mean a Field Day operation where the gals will be working under the same emergency conditions as their OM counterparts. And 1971 will mean, for the women in the tornado and hurricane areas, the nerve jangling experience of working under real disaster conditions as they assist in maintaining the vital communications links for their own communities.

The new year, as Omar Khayyam put it, revives "old desires," and we will work during 1971 to complete the requirements for a certificate, or reach out a little farther for a new country. For some it will be a determined effort to smash through that block in the mental barrier in the code for a new speed to change the class of license.

The weather? Emerson never dreamed of the kind of weather we know, but it is a sure prediction that the weather of 1971 will be everything that the ionosphere can throw at us.

## 1970 YLRL Howdy Days Results

K5YIB, 86 points; K71PZ/VE7, 86; W7QGO, 46; WA5JFZ, 41; K8ITF, 37; WA0PWY, 37; K8ONV, 36; K5PFF, 34; WB2JCE, 33; K5JFJ, 28;



Need Nicaragua for DX-YL or hunting the YL suffix? Add YN1YL Nancy Parker, daughter of YN1AA in Managua.

K7WRS, 24; WAILGU, 22; VE3EZI, 20; K2OYG, 18; WA7FLC, 14; AZ3KS, 12.

K5YIB and K7LPZ/VE7 tied for first place in the YLRL member class. No non-member submitted a log. However, there were many non-members in the contest, as well as brand new licensees.

#### 1971 Club Officers

The TASYLs Michigan's state-wide YL Club announces that the new officers for the coming year will be:

President, W8UTM, Sylvia Ryder; Vice-president, WA8OCD, Marion Van Til; Secretary, WA8VXE, Rosemary Davidson; Treasurer, WA8CXF, Nona Schneider.

The TYLRUN 1971 officers are:

President, K5UJK, Cory Needles; Vice-president, K5MPI, Mary Lawrence; Sec./Treas., WA5TYH, Daisy Cooper; Grapevine Editor, WA5LJL, Barbara Wynn; Publicity Chmn., K5TKO, Evalyn Ewing.

TYLRUN meets on 3940 kHz, on Thursday mornings at 8:30 EST. TYLRUN announces a change in their YL-OM Net Certificate requirements. Contact with 10 full members of the Texas Round-up Net is now required, instead of the former 25 contacts.

#### 1971 Mid-West YL Convention Plans

The Mid-west YL convention will be held at the Airport Ramada Inn, Cleveland, Ohio, May 14, 15, 16, 1971, with the Buckeye Belles, and Chix-on-Six as hostesses for this annual affair.

Eila Russell, WA8EBS, and Louise Gambill, K8CEN, co-chairmen, have announced the following committee chairmen: Publicity: K8CEN, WA8EBS, and Marian Hinman; Registration: WA8LJW, Dot Baumgardner; Hospitality: WA8ZMU, Florence Killeur; Decorations and YL Souvenirs: K8OVF, and K8IFF; Prizes: WA8BWD, Lucy, and girls in each district K8CKI, K8RLS, K8PAM, WA8EKQ, K8BLZ, WA8QLL; Convention Picture: W8WRJ, Carol Iams; Shopping Center Transportation: WA8DXY, Martha; Mens' Activities: WA8EBS, Eila; Station W8YL, W8NAL, Carmella; Program: WASZOC, Marion Russell; Square dancing K8CEN, W8WRJ, Skit K8VMY, Games, W8DRP, Betty; Program Printing: WA8HWL, Marion.

Five months may seem long but right now is a good time to start thinking about attending. If you have doubts just ask the gals who were there last year. See you there.

#### The Lady behind the Director, W5DUR

If Beth Groves, W5DUR, had had her way there would have been a YL column in 1934, but there weren't enough YLs to keep it going at that time.

Her friends say that Beth had to promise to get a license in radio before ARRL Honorary Vice-President Groves, W5NW, would agree to a marriage license, and in October 1933 she received the call, W5DUR. As a new member she didn't care for phone and remained active on cw for a long time.

Her main interest now is working W5NW when he is traveling away from home, and talking to some of their close friends in DX countries. She enjoys conventions and hamfests. On their recent trip to Asia and Australia they both met many people they had known on the air, and are now looking forward to returning the hospitality they received during the coming year.



Eila Russell, WA8EBS, and Louise Gambill, K8CEN, co-chairmen for 1971 Mid-west YL

#### Pat McKee, WB6UAH-TV

When Pat goes through her inventory transmission she could use words that would make most of us sit up and stare, but she just aims the camera and her contact looks at all the gear. She uses such words as camera, video amplifier, audio sub-carrier transmitters, and she knows what she is talking about because she builds her own equipment.

Pat, like so many of us, got her license because it was the only way she could keep up with the OM, Jim, WA6ROP's conversation, and from there the challenge of new worlds to conquer got them interested in amateur TV. "I'll never forget the first picture we saw on our own equipment," she said. "Even the snow was beautiful."

A member of Southern California TV Club, Cubic Amateur Radio Club, San Diego FM Repeater Association, Pat is also affiliated with Navy MARS with the call NØHDT. She holds the ATV DX record on the West Coast, and possibly in this country, for putting a picture and voice from San Diego to W6LNW in Santa Barbara, a distance of 178 miles, on July 1, 1970. According to Pat, W6LNW probably could have heard her without a receiver; she was so excited over the distance covered with 8 watts!

Pat has advice for any gals wanting to work ATV. "Always check before you throw that last switch to transmit to be sure you have the rollers out of your hair so you won't look like the women in the TV commercials." One advantage of this type of operation is trouble shooting. Just fire up the rig and find someone and then SHOW them the problem. It is also a beautiful way to show the shack, or goodies found in a surplus store. No need to waste words.

What next? Pat has no intention of coming out of the clouds. She is now dreaming of working moon-bounce.

QST



# Strays



## Feedback

Field Day Results K2DIQ/2 should read K2DTQ/2 under the Class-C Call-Area Leaders.

KSORD advises that the schematic of Spakey (*QST* for December, 1970) should show the lead from pin 7 of gate G4B connected to the Q output of FF6, not to the Q terminal as shown. Also, a 220-ohm resistor connected between J2 and K2B (Fig. 5) will improve the life of the relay contacts.

The tuning capacitor specified on page 13 of December, 1970, *QST* (C3) is from a Command Transmitter, not a Command Receiver, as stated in the article.



Robert E. Anderson, K4UMK, of Roanoke, Virginia is shown being presented the Army Commanders Cup at Ft. Meade, Maryland on January 8, 1970 by Lt. Gen. Seaman, K4UMK, of Army MARS was designated the outstanding MARS member of the 14-State First Army for 1969. His citation was for RTTY, fm repeater development, net control, instruction, and public service.

## QST congratulates . . .

John Fite, W4PFP, for his efforts which resulted in Tennessee call-letter license plates becoming available without additional charges.

Travis Pederson, WSZSK, on winning first prize in the *Electronic Engineer* design contest.

Bill Sweet, W6CSG who received the "Realtor of the Year" award from the Downey Board of Realtors.

Joan Ehlis, WB0ALK, chosen to appear in the 1970 edition of "Outstanding Young Women of America."

Jim Sojka, WB2YJO, on winning a prize in the Pro-Am bowling tournament in Buffalo, NY.

H.K. Bourne, G2AH/W3, on the award of O.B.E. from HRH Queen Elizabeth II.

Leland W. Smith, W3AGI, awarded the Legion of Merit upon retirement from the Marine Corps.

Gerry Baldauf, W3WX, elected president of the Central Penn Soccer League of Pennsylvania.

Taylor S. Shreve, W0CXW, former chairman of the ARRL Vhf Repeater Advisory Committee, on receiving an award and letter of congratulation for an engineering development from the U.S. Bureau of Land Management.

Harry V. Williams, WIMBK, on his election to the Board of Directors of International Telephone and Telegraph.

H. L. Pat Parrish, K4HXF, who was presented (at the ARRL Roanoke Division Convention) an ARRL Life Membership, paid for by anonymous but obviously satisfied users of the W4-K4 QSL Bureau, of which he is manager.

Al Hix, WA2HIU, named a Fellow in the Instrument Society of America.

Ed Kowalchuck, VE4CZ, appointed to his second term as president of the Manitoba Teacher's Society.

T.C. Wherry, W5MMD, elected president of the Kiwanis Club of Bartlesville, Oklahoma.

Gunnar Paulsen Knapp, WA3GZU, on graduation from the Phillips Exeter Academy (N.H.) with highest honors and for receiving the Cox Medal and Faculty Prize for Academic Excellence, and for winning the 1970 High School Contest of the American Association of Teachers of German.

**A lot of people think hams just fool around with radios.**

Suddenly, your "fooling around" is frequently the only way of transmitting messages of help and hope. Of course, you didn't become a ham just to help out in a disaster. You became a ham because you just wanted to be a ham. But you've made your hobby an invaluable public service. And FPL is grateful. We remember. A lot of people thought Edison was just fooling around with electricity, too.



(Reprinted from Florida Skip, November 1970)





CONDUCTED BY ROD NEWKIRK,\* W9BRD

## Who?

Hamdom's DX facet is made to order for kooks and sickies, one big continuous contest in which any goof can easily cheat and hoax his buddies. We're fortunate that such a low percentage of the world's burgeoning nut population can make the ascent into amateur radio. We do have a small share of weirdies, though. Until these few misfits wash out to other fertile fields of misconduct they may achieve coveted notoriety by running ten-kW linears, signing make-believe calls, jamming QSOs, faking DXpeditions and indulging in other nonsense dear to the heart of a jerk.

Most of these way-outs are just low-grade morons gleefully propagating anonymous spitballs from the hidden safety of their hamshacks. If they persist diligently enough they do become known, pitied, scorned, etc., but some couldn't care less. They march, you see, to a different drummer and they make their own rules. Got one or two funnies in your club you're hoping to rehabilitate? Well, lots of luck but your noble endeavor could backfire. Kookism is contagious, especially among the immature.

Kids often will be kids but they can grow out of it. Adult clowns are the really sad ones. They become surprisingly stable in their instabilities. That is, they ritually perform their special vulgarities, little more and little less, with dependable consistency. If they were afflicted with their quirk years ago you can bet they'll be flaunting it years hence, a permanent part of warped but fairly rigid personalities.

On the other hand, symptoms displayed by these unfortunates are also present in progressive paranoia. They conceivably are slipping over the sometimes obscure line that divides the harmless from the dangerous. You know a candidate? It would take psychiatric consultation and a flock of fancy tests to confirm it, perhaps, but you may be witnessing the gradual disintegration of a mind.

The horrifying story of one such mental deterioration, laced with DXish electronics flavor, is strikingly told in *The Strange Last Voyage of Donald Crowhurst*, a recent 317-pager by Tomalin and Hall (Stein & Day, \$7.95). Imagine, if you can, an unseasoned mariner furtively sailing the Atlantic single-handed for 243 days in a deadly serious

attempt to pretend a voyage around the world - faking sun and star sights, sea and weather conditions in a detailed ship's log for far-off places he never saw!

In his soul-wrenching solitude the brilliant but erratic Crowhurst evidently bit off more than even his wildly imaginative brain could chew. Instead of returning triumphantly to England and a hero's welcome the authors deduce he completely flipped and stepped over the side. His *Teignmouth Electron* was found abandoned at sea still sailing in circles.

That next impostor you run into on 20 very possibly won't only be calling CQ or just harrassing your net. In his own inarticulate way he may be pleading piteously for help. For his sake and ours let's hope he finds it in time.

\* \* \*

## What?

No phase of hamming has a livelier selection of weekly and monthly newsletters than those issued by DX devotees. Some are club or society organs like *QST* itself. Others are personally or group inspired. All make up the remarkable DX grapevine so promotionally valuable to amateur radio world wide. This month we'll let them wield Tom Sawyer's well-traveled brush on our DX fence. Aunt Polly won't mind. Auntie Murphy already has had her say, and there's plenty of paint in the big DX bucket. DXcerpting briefly or at length, then, in paraphrase.

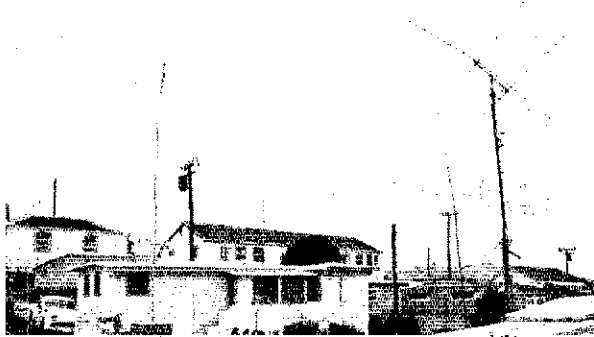
*DX News-Sheet* - A late '70 poll of top DXers showed these regions most desired in order of expressed need: Clipperton, Laccadives, Bouvet, Maria Theresa, Cambodia; South Sandwich, China, Spratlys, Iraq, Tibet, Sao Felix, Tokelau, Minerva, Sikkim, Niue, Mali, Manihiki, Bhutan, Bajo Nuevo, Campbells, Equatorial Guinea, Yemen, Juan de Nova, Guinea, Burma, East Pakistan, Andamans, Juan Fernandez, Fanning, Volta, Revilla Gigedo, Cocos (I19), Geyser Bank, Heard, Serrana Bank, Malpelo, Kure, Navassa, Spanish Sahara, Amsterdam, Timor, Vietnam, Aves, Willis, Blenheim Reef and Glorieuses. Albania, Palmyra and the Arabian neutral zones are still well up there, too.

*Long Island DX Association Bulletin* - Countries most needed among our subscribers as compiled by W2NUT are CE0X-Z, CR3 CT3 CR9 EA9 Ifni, EA0 FB8X-Z, FR7/e/g/t, KC6 Western, KH6 Kure, KP6 MP4M-T, PY0 ST, Paul, SV0 Rhodes, ST2 TT8 TZ, UA1-FJ.L., VK4 Wilis, VR1 Phoenix, VS5 VU5 XF4 XT2 YK1 ZD9

\* 7862-B West Lawrence Ave., Chicago, Ill. 60656.

CT2AT ran off nearly four thousand QSOs from these Azores diggings during the 1970 ARRL DX Contest. Say, this year's version of your League's annual DX superclassic comes up next month already!

January 1971





9Y4s VU and VV, left and right, respectively sewed up Trinidad's code and voice divisions in the '70 ARRL DX Test.

ZL/a/k, ZM7 ZK1-2, 7P8 4S7 4W1 8Z4 and 9K2 — also VU4 YI ZA and 9K3 in spades . . . Much of this "lists" operation has degraded DXing to the point where no real credit should be given to some stations claiming credit for such QSOs. This refers to operators who clearly show by their replies that they did not actually receive RST(R) reports. If the net control would transmit his list to the DX station and let the latter call those stations then creditable QSOs would more often result. Some DX stations use this procedure and it is a pleasure to hear them operate . . . Deliberate QRM, besides being impolite, is illegal. Law and order is supposed to prevail. If you don't believe it, try signing your call after a deliberate attempt to interfere, and an FCC contact confirmation shouldn't surprise you. Every man has rights but when he imposes on the rights of others he overextends himself. If one does not agree with a net, or a DX list, or other activity on the air, that is okay *but* that does not give one any right to QRM such activity.

*Nigerian Amateur Radio Society News* — England has been heard on 160 around 2100-2200 GMT and again at 0430 with 5N2s AAF and KPT active at our end. Eighty meters is very good for Europe and the U.S.A. in the hour or so either side of sunrise. Forty is surprisingly noisy but 5N2AAF works W/Ks on the key around 0500 GMT. Twenty is the band with the signals, of course, but one needs a thick skin, a good antenna and plenty of power to make a real impression. Fifteen meters tends to open a little later than it used to with midday signals weak though consistent; evenings are still quite good, especially to the States. Pacific stations can come through to us on 21 MHz at any hour in daylight but are best in the early evenings and late afternoons. Ten has not been nearly so reliable as it was this time last year but when 28 MHz is open it is very, very good.

*Didi-dumdum-didi* (borrowing from WB6UHF's *WVARC Random Wire*) — Boy, the bands are sure crowded these days! Don't you ever listen to 15 in the late afternoon or 40 in the early evening and yearn for wider-opener spaces? Well, such a band is ten meters. "Ten meters? You can't work anything on ten." Quite the contrary, there is plenty to work on ten. Oh, sure, not as much as on the other bands, but when you consider that ten is so clear that the competition is very thin, too, it doesn't seem like such a bad proposition. You see, what appears dead is not always dead. This is as true to the amateur as it is to modern medical science. Just listening on ten for a while will invariably turn up

something, quite often DX (although during summer months the DX is almost always in the southern hemisphere). And don't forget to call CQ if nobody turns up on your first listen. Ten is strange in that it responds to activity. Give ten a try. You'll probably enjoy it if you're not in too much of a hurry. Getting on ten helps keep up activity on the band, helps keep CBers out, and gives you a chance at a QRM-free QSO or pile-up-free DX contact.

*Florida DX Club DX Report* — It would be one thing if "lists" were compiled for just those who really need assistance. Fine thing on a limited scale. Say the hand stays open to a particular area for an hour and a half. OK, spend a half hour running a list for the QRPers who would never be heard otherwise. Then pull the chocks and let the thoroughbreds run, no holds barred. Joe Schmoe will get his contact if he's lucky and the big boys will have their chance to play with their expensive toys. But to show up on a frequency time after time with a list five yards long full of calls that aren't even in the signal path is ludicrous. . . . FDXC phone-cw DXCCers rank K4KQ, W4BJ, K4PDV, W4s DQS IC, WA4PXP, W4s CKB EEO FRO HOS and K4YYL. Voice-only standings: W4FPS, WA4PXP, W4s IC CWV, KV4FZ, K4YYL, W4PJG, K4CAH, W4s FRO HKJ EEO DRK and HOS.

*Southern California DX Club Bulletin* — K6YRA broke down one of QST's recent DXCC Honor Roll listings by call areas and found Iwoland leading with 19.5 per cent of the free-style group, 22.2 per cent of the phone-only bunch. Sixland is second, Eightland third, in both categories. The rest of the call areas rank 4591037 cw/phone, 9314507 on cw with 4 and 5 really tied for No. 6 code spot. SCDXC holds 35.4 per cent of Sixland's mixed Honor Roll membership, half the phone slots. K6KA, W6s NJU ANN AM JKR, WA6GLD, W6EJJ and WB6PKA lead the club's Five-Band DX Century Club jousting in that order.

*Ten-Meter QUAX* (G3DME & Co.) — Some of our 28-MHz subscribers are CE7DW, DJS 2RE 3LE, DK3PJ, DLs 1FL 1PJ 3IP 6XV 8UW, F5JA, Gs 2BVN 3FKM 3PQF 3TXZ 3TZU 3VIE, G12DZG, GW3NNE, HB9AJU, HP1AC, 11RBA, K6UZZB, OZs 1LO 3PG 6GH, SMs 4BW 4DXL 6PU 7ANL 7COS, UA9BZ, Ws 5JTA 6LRY 0JHY, WA9QJW and WB6IUH . . . The QUAX Net, held daily except Sunday at 1800 GMT on 28,150 kHz, may be augmented by another frequency higher in the band so that more non-Europeans can participate.

**West Coast DX Bulletin** - The mid-September Bulletin was weekly issue No. 124, an unbroken string by WA6AUD and associates . . . It's possible that the International Red Cross may soon be operating MARS-like just outside amateur hands . . . Subs and scuba gear may now be needed to activate Maria Theresa. A Navy Oceanographic Office inquiry indicates the place sank out of sight in '59 and is kilofathoms deep . . . There's a Caribbean DX net on 7203 kHz with KV4FZ involved, also an African net on 14,290 at 0600 GMT, Saturdays . . . Ten meters is intermittently spectacular out west . . . Intruder Watch pins down some of those scratchy 20-meter broadcast signals as 41-meter harmonics and identifies most of the 7- and 14-MHz RTTY noise as Russia-based.

**Far East Auxiliary Radio League News** - The current FEARL brass lineup has KA2s QW pres., SF v.p., RJ sec., SB treas., EB gen. mgr., UR QSL mgr., WM awards mgr., ZD operating activities mgr. and LL News editor . . . New or renewed memberships are held by KAs 2AA (WA4HIG), 2AC (K6OOW), 2AI (K4KAD), 2AX (W6UUX), 2BD (W2OJC), 2CF (WB9DXZ), 2IJ (KH6IJ), 2JM (W9GMN), 200 (K9YZA), 2QW (WA4AQW), 2SB (WA6RBI), 2UR (K3FUR), 5AF (W6EIF), 7GH (W7GH), 8HW (WA6LHU), 9PP (K4QDC), WA6LIL and W3TQ . . . A club net on 40 is under feasibility study. Meanwhile the 0900 and 1900 GMT net Sundays on 14,203 kHz rolls on. FEARL meets on the second Friday of each month at Sagami . . . KA2QW won a Work the States contest with 82 fast W/Ks.

**Northern California DX Club DXer** - Our W6TI issues DX bulletins Sundays at 1800 GMT, Mondays at 0200, on 14,002 kHz . . . The club's 2-meter liaison spots are 146.54 and 147.1 MHz with an fm repeater in prospect . . . Recent recipients of NCDXC's popular California Award, Nos. 163 through 175, are YU1BCD, UAs 4HC 3HI, JA2CZS, HB9AHA, OE1MEW, JA1NDO, HK0BKX, DL4QQ, VU2KV, JA1KRU, VK4FH and JA1SJV. Custodian K6AO reports increasing interest in this time-tested certification . . . DXCC standings among NCDXCers find W6s AM CVV HOC WX, K6AN, WB6OOP, W6s BSY and VUM racing in that order free style, while W6s AM WX VUW, K6ERV, W6s BSY RGG KNG and DZZ do likewise voice-only.

**Columbus Amateur Radio Association CARA-scope** - Repopulating 160 meters would take much phone pressure off the higher bands . . . Wrangle island, long deleted from the ARRL DX Century Club Countries List, now has UW0KAA active almost daily at 0200 GMT around 14,008 kHz . . . Jumping on a frequency and yelling QRZ makes no procedural sense at all if one hasn't been transmitting thereon. Ask the next clod you hear doing this if he knows the definition of QRZ . . . Working new countries "by appointment" reduces DXing from an art of skill to the general level of shooting fish in a barrel . . . It greatly expedites ARRL Hq. DXCC processing if you submit your QSLs in Countries List order . . . ST2SA's cw action on 14,203 kHz indicates that some sidebanders may not be able to copy their own calls . . . There was a vast background of Asians in the '70 All-Asia Test but conditions were such that only high-power beam types got through to our side.

More press cuttings anon - we'd better cover QSL matters now while space is available.

\* \* \*

#### Where:

**ASIA** - As QSL manager for Cyprus Amateur Radio Society may I point out that ZC4 licenses are issued to members of military organizations in the sovereign base areas who refrain from giving exact addresses over the air for security reasons. Since they may be shipped off to other parts of the globe at short notice QSL heart-aches can occur. Cards

for QSOs over three years old may never reach destination and, as our bureau has no outgoing facilities, may end up in the dead-letter office unless International Reply Coupons are enclosed so that senders can be informed of the situation by return mail. This sad story results from lack of funds. - ZC4IN . . . G3LQP is MP4MBB's QSL manager as of November 1, 1970. - DXNS . . . So far AP2KS has sent me logs only for March-April, 1970, so I am unable to confirm all activity by Khalid. While I am in Europe my QSLing arrangements are handled promptly by remote control. - K6TWT . . . TAIIB's log shipments are much too infrequent. Effective this month I'll no longer handle his cards. - W4GHV . . . As of this writing I have no QSLing agreements with 4W1 stations. - W2GHK . . . 9C9s are EP2s with unchanged suffixes. E.g., QSL 9C9s BQ DX TW and WB to EP2s BQ DX TW and WB. - DXNS . . . Use of oversized cards, improper addressing and mistakes in call signs frequently cause delays in handling QSLs at the Far East Auxiliary Radio League bureau. Even such a comparatively small operation may find it necessary to set some standards in these areas. A QSL manager's lot is not a happy one, and one could get emotionally upset by the tear-stained pleas passing through. Files bulge with unclaimed cards but it is a fact of amateur life that not all hams want QSLs. The average tenure of a KA station is two or three years, so in some cases it is important to QSL direct using the latest correct address. Then if the KA has folded his tent and slipped away the card will at least be returned by the post office. U.S. amateurs should keep in mind that IRCs are unnecessary where APO addresses are concerned; U.S. - stamped self-addressed envelopes are sufficient. - KA2BD, FEARL News.



WP4DKA, doing a Puerto Rico stint for the Navy, gave many a mainland Novice his first tempting taste of DX. Nils expects to be a WB8 by the time this photo gets around.

**AFRICA** - Logs for TJ1AK operation in October A '69 and TJ1QQ activity for the period after June 26, 1970, have not been received. QSL requests cannot be answered until they arrive. Herman is reported to be back in Colombia and I'm trying to obtain these missing records. By the way, ZD8J's last log entry is April 8, 1969, so QSLs recently received indicate phony activity. WADQS . . . CR3KD's code QSOs are confirmed through W2CTN, ssb contacts via WA4PXP. Similarly, cw QSOs with TZ2AB may be QSLd to

DJ1QP, voice contacts via DJ6QT. The same holds for their other African stops. - *DXNS*. . . . W9FN is my QSL manager dating from September 25, 1970. - *FLSHM*. . . . WA1JHQ disclaims FB8 QSLing arrangements. - *K6ARB*. . . . EL2AW should be QSLd via the Monrovia bureau, not via the U.S. Embassy, because the call was recently reissued. The new EL2AW is fast with cards. - *VE7BAF*. . . . As of October '70 I'm QSL manager for ZS1CS. - *WB8BTU*. . . . Unfortunately we couldn't announce in advance that we were going to have the 5N5 prefix because we didn't know it ourselves. This breakthrough with P&T, our licensing authority, represents the first real contact with them since the state of emergency was declared four years ago. 5N2AAN has designed special 5N5 QSLs for our use. - *5N2ABC, NARS*.

**E**UROPE - Reminder: All those "R" stations on 28 MHz are Russians. Substitute "U" and you have their normal calls. RO5OAU and R3JHR have been very active of late. - *NARS*. . . . I have no QSL connection with HV stations. - *KL7MF*. . . . GDSATG may be QSLd via my G5ATG address but use of my home QTH is preferable for W/K/VEs. - *K6TWT*. . . . Amateur calls at Russia's antarctic bases include UA1s KAE at Mirny, KAE/1 Dengrosky; KAE/2 Oaza, KAE/3 Pionierskaja, KAE/4 Komsomolskaja, KAE/6 Vostok and KAE/7 Sovietskaja. It is reported that visiting U.S. personnel sometimes sign KC4VOS. - *WCDXB*.

**H**EREABOUTS - I am finally overwhelmed by the QSLing task here and would like to have a manager located in Kansas City. During my visits to the States I would confer with him there and deliver cards and logs. - *YNIMG (K0VVR)*. . . . I'm assuming the job of QSL manager for October 25-26, 1970, operation by VP9DX although the announced route was via W3KT. Consult only the latest *Callbook* for my correct address. - *WA3HGV*. . . . Contesting CWs 3BH 4AR 4CR 8CZ, etc., are ordinarily CXs with the same suffixes. - *DXNS*. . . . 4T4LM, OA4LM's call in November-December, may be QSLd via our DXpedition of the Month bureau. QSLing for YV0AI, the only YV0 whose cards are handled through DoTM, is caught up except for a few stragglers. - *W2GHK*. . . . When I send my QSL to a DX station I enclose a small ballpoint pen with my call, name and address on it. This little item must really be appreciated out in DX land. It's amazing how the results roll in, very nearly 100-percent returns here. - *WA9MZZ*. . . . KITFS is *not* managing DX QSLs despite mail indications to the contrary. - *WICUT*. . . . I began ssb operation in earnest early in 1970 and

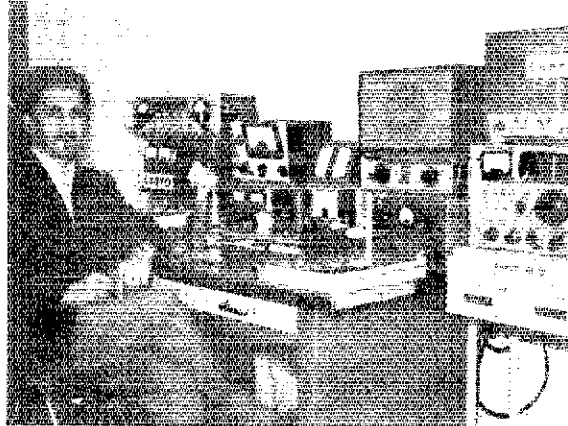
for nearly six months now I've kept fairly close QSL records. I almost wish I had not. My over-all returns on QSLs runs one out of five, these for new countries worked. In contests it's even worse, one out of six. I assume some went astray and a few will be answered belatedly. Discounting these I'm compelled to realize that the majority of DXers no longer QSL. - *W9UTQ*. . . . ARRL SWL Bureau receipts for September included 270 QSLs via League Bureau call area branches. All expectant s.w.l.s are urged to keep self-addressed stamped envelopes on file with me. - *L. Waite, NNRC*. . . . "QSLers of the Month" AF2AD, CRs SSP 7EY, CT1UD, FB8YY, FK8s AC KAA, FL8MB, FR7ZG, GM3TRI, HI7JMP, JH1CXQ, PY2ALR, SV0W11, VP8LK, VQ9TF, YB9AAJ, YJ8WP, ZM1AAT/K, 3V8AL, 7X2MD, 9H1CG and 9X5AA, plus QSL tenders Ws 1YRC 2UTN 4WHF 7VRO, K3EST, WBs 4LWX 9BUV, G2MI and ZL2AFZ, are commended for reliable and rapid confirmational comebacks. Any laudables in *your* log? - *Ks 4BYK 8RYB, Was 2GMD 2HIU 4DWR, VE7BAF*. . . . WA1JKZ requests tips on QSLing FP8CS, KG4CS and any of 23 reluctant Venezuelans; WA2FOS likewise re VP2EE; and W4RM will settle for dope on KP6AR. QSL managerial assistance is offered by K8KRK and WB4QNP. Incidentally, whenever soliciting the service of QSL aides don't omit those s.a.s.e. (s.a.e. plus IRCs if outside your country's postal system) and precise Greenwich Mean Time QSO reference. And now for the mailbag's specific mailing suggestions, being mindful that each item is necessarily neither "official", complete nor accurate . . .

- AX7GC, via A. Blair, 71 Surrey St., San Francisco, Calif.
- C21AA, Radio Station, Nauru Island
- CE9s AG AGE (via CE3RR)
- CM3s CG DG, Box 6, San Antonio de los Banos, Cuba
- CO7CD, Box 452, Camaguey, Cuba
- CO7GC, Box 64, Camaguey, Cuba
- DL4DR, Lt. R. Drew (K1BGT), Box 36, USNSGA, FPO, New York, N.Y., 09514
- DL4WJ, J. Wilson, c/o IDSA, APO, New York, N.Y., 09058
- EL1B-5L1B (via DJ8XZ)
- ET3USA-9E3USA-9F3USA (via VE3IG)
- FR7AE/e, R. Augughero, Météo Chaudron, P.O. Box 4, St. Clothilde, Reunion Island
- FR7AI/t, P.O. Box 4, St. Clothilde, Reunion Island
- FR7ZU/t, J. Guillet, P.O. Box 52, St. Andre, Reunion Island
- GC2LU, H. Chater, 106 Rouge Bouillon, St. Helier, Jersey, C.I., U.K.
- GD3YBH (via RSGB attn. G3YBH)
- GDSATG-G5ATG (to K6TWT)
- GM3WRN, C. McRae, Sgts. Mess, RAF, Kinross, Forres, Morayshire, Scotland
- HI3XAM, Box 700, Santiago, D.R.
- KG4CS, Box 34, FPO, New York, N.Y. 09593
- KH6GLU/KH6, E. DeYoung, 95-213 Waimeli pl., Wahiawa, Hawaii, 96786
- LZ1NJ, Box 70, Haskovo, Bulgaria
- MIAP, Box 23, San Marino
- PA9LX, F. Mulder, 78 Merelthoven, Capelle AD, Yssel, Netherlands
- PJ7LC, Box 160, St. Maarten, Netherlands Antilles
- PZ1DX, P.O. Box 902, Paramaribo, Surinam
- PZ5RK, Box 1439, Paramaribo, Surinam
- TA1s MT TT (via DJ9ZB)
- TJ1s AK QQ (see text)
- TR8VV, B.P. 5050, Libreville, Gabon
- UR2RJ, T. Kull, Majakowsky str. 15a-12, Tallinn 3, Estonian S.S.R., U.S.S.R.
- VQ9TF, T. Fonseka, P.O. Box 4, Mahe, Seychelles



VK9VM of Rabaul has a solid signal at our end of the Pacific path. In fact Ian recently hung up one of ARRL's widely sought Worked All States diplomas.

EABFO's 771 contacts with Yanks and Canadians in last year's ARRL DX Competition easily clinched the Canary Islands code championship. Back again next month, Rafael?



\* \* \*

**Where:**

The dawn of 1971 sees DXpeditionary busting in preparation for the impending ARRL DX Test. K6TWT and friend GD3YBH are determined to fling GDSATG and GD3YBH into the fray, concentrating on key and mike respectively, 20 through 10 meters. Another early declaration comes from W2s BBK and IVP who intend to sign PJ8s AA and PM on Sint Maarten over February 17th-24th mostly around thirty kHz inside low band and subband edges. Larry and Paul may include Anguilla radiations if the ball bounces right.

Other straws in the overseas wind include additional DXcursions by W3DWG, G3PLM and colleagues to the Arabian neutral zones. Ron likes 21,270 and 21,350 kHz around 1300-1800 GMT as a rule. Then JA1KSO of the Tokyo-Yokohama 3KM DX Gang gads about to such spots as Taiwan, the Sudan and Iraq with hopes of getting something going.

On the immediate DX agenda we have the second annual single-sideband Pacific DX Net QSO Party as announced by KH6GLU and associates for 0400-1000 GMT January 3rd. Nonmembers may work net members in this one on suggested frequencies 14,165 (for non-FCC-licensed types), 14,215 and 14,244-14,300 kHz. Shoot s.a.s.e. to KH6GLU or WB6IXC for complete details in order to file your results for possible award eligibility with the latter before the February 3rd deadline . . . Then January 30th-31st will see the joint Northern and Southern California DX Clubs convention at Fresno, a yearly social DXplosion where all sorts of buddies, goodies and juices abound. K6KQN urges swift s.a.s.e. to K6RQ for registration and program details.

Conditions-wise it looks as though '71 should roar in like a lion from 10 through 160 meters. By mid-November W1HGT had quickly collected such 1.8-MHz nifties as DL9KRA, EI9J, GW3YGH, KV4EZ, OKIATP, VPs 1ST 2EE 8DX and thirty-seven Englishmen. Ten meters? Fabulous, OM, at least into November. WA2HZR reports bagging hundreds of cats in sixty countries on all continents in October alone. *Happy New Year!*

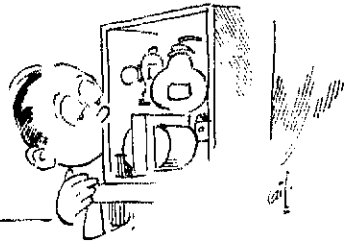


- W4MDN/VP7, AUTEF, Box 55, FPO, New York, N.Y., 09559
- W7UXP/KH6 (via KH6HCM)
- WA1EHO/KJ6, R. Jolly, USCG Loran stn., APO, San Francisco, Calif., 96305
- WA2HNA/TF (via WA5RTB)
- WB8DNH/HR1, Box 270, Tegucigalpa, Honduras
- YB3AAI, Box 59, Surabaya, Java, Indonesia
- YB0AAG, Box 2280, Djakarta, Java, Indonesia
- YB0CJ, P.O. Box 2761, Djakarta, Java, Indonesia
- YJ8JS, c/o Aeradio, Vila, New Hebrides
- YU2RBO, M. Avramovic, 8 Masarykova St., Varazdin, Yugoslavia
- ZK2AF, W Christie, c/o Dept. of Education, Niue Island
- 3V8AL, via L. Loper, W4WHF, 205 Carib St., Merritt, Fla., 32529
- ex-5N2ABD (to MP4BHR)
- 5Z4MR, D. Cox, U. of Nairobi, P.O. Box 30197, Nairobi, Kenya
- 5Z4SB, Box 5324, Nairobi, Kenya
- 9G1BY, Box 2949, Accra, Ghana
- 9H1CG, J. Vella Brincat, Lany/9, St. Louis St., Msida, Malta
- 9M6AD, Box 1370, Sandakan, Sabah
- 9Y4VV, via C. Littlefield, WA7PQE, 1664 E. 8850 S., Sandy, Utah, 84070

- AP2KS (see text)
- AX2ABW/lh (via K2YLM)
- AX2APX/lh (to W6DF)
- AX2BKM/lh (via W2CTN)
- AX9YR (via VK6RU)
- A X0KW (via VK7KJ)
- CW8CZ (see text)
- DA1RAF (via G3XIN)
- DK0WA (via DK2BF)
- EL2AW (see text)
- EP2HL/JY (to EP2HL)
- F0ZF/FC (via DL0LA)
- F0ZN (via DJ9ZB)
- FL8HM (via F9FN)
- EP8CAD (via K7ADL)
- FR7ZE/e (via PY2PA)
- FY7ZO (via DK4MD)
- G3YBH/VP9 (via RSGB)
- GB3PSC (via G3RWQ)
- HB9XSB (to DJ8KB)
- HB0XJV (via DJ9ZB)
- HB0XSF (to DL4WJ)
- JD1YAA (via JA1WU)
- JW5NM (to LA5NM)
- KC6RK (to WA5BON)
- KC6RM (via W6DOR)
- EG6JAC (via DJ9ZB)
- KZ5RP (to WA3BNF)
- LA8YB/4W (via LA3BH)
- MP4MBB (via G3LQP)
- OA3X (via SM6CSB)
- OI3NS (to OH3NS)
- ON8WX (to W8FXP)
- OR5AA (via ON5TO)
- PJ8AR (via W3HNK)
- PI0CF (via W1FJJ)
- TA1IB (see text)
- TA3HC (via LA3UF)
- TZ2AB (see text)
- UM8FM (via W3HNK)
- VP2EE (via W9ZRX)
- VP9DX (to WA3HGV)
- ex-VORCC (to GM3MBS)
- VQ9SM (to JA0CUV/1)
- VR5DK (via WB6GFJ)
- VS9MB/JY (via G3KDB)
- W6LWA/XV5 (via W6DOR)
- YP2HA (via YU2HA)
- ZA1ZA (to YU2RBO)
- ZD8J (see text)
- ZD9BR (via ZS2RM)
- ZF1AN (via W2HAQ)
- BK1CD (via ZL2FA)
- ZS1CS (via WB8BTU)
- 4B1AE (to XE1AE)
- 4M4CDK (via RCV)
- 4M5AXT (to YV5AXT)
- 4T4LM (via W2GHK)
- 5Z4KSA (via 5Z4MD)
- 7X2MD (via 11U)
- 8Z4A (via WB4BLK)
- 9C9BQ (see text)
- 9I6XZ (via WA0ZZT)
- 9V1PD (via GM6MD)
- ex-9V1PM (to G3WRM)
- 9U5VK (via ON5GK)

Thanks for the preceding go to Ws 1CUT 2DY 3HNK 4DQS 4RM 4YOK 4ZYT 6GSV 8FXP 8JTD 9LNQ, Ks 1MAR 1OME 2BK 4BYK 6TWT, Was 1JKZ 1KQM 2FOS 2HZR 4DWR 5UCT, VE7BAE, International Short Wave League Monitor (A. Miller, 62 Wardway In., Selly Oak, Birmingham 20, England), Japan DX Radio Club Bulletin (JA3UT), Newark News Radio Club Bulletin (J. Heien, 3822 Marshall ct., Bellwood, Ill., 60104), North Eastern DX Association DX Bulletin (KIIMP), UBA's *On the Air* (GRs 4AH 5VA), VERON's *DXpress* (PA0s FX 1OU to VDV WWP) and other literature aforementioned.

DON'T SHOOT TROUBLE IN A TRANSMITTER WHEN TIRED OR SLEEPY



# Operating Events

de W1YYM

## JANUARY

**7** W6OWP Qualifying Run (W6ZRI, alternate); at 0500 GMT on 3590/7129 kHz, 10-35 a.m. Remember this is 2100 PST the night of January 6. Copies to ARRL for grading.

**10** VHF SS, the Jan. counterpart to the Nov. SS for those on 6 and above. Work a station once regardless of band, use sections as multipliers. The exchange is a modified message preamble. Check page 58 December for full rules.

**13** WIAW Qualifying Run; 10-35 a.m. at 0230 GMT on 4805 3532 707 14,02 21 02 38 02 50 02 and 145.6 MHz. This is 2130 EST the night of January 12. Underline one minute of top speed copy, state to aids used in copying typewriters OK, sign and mail to ARRL.

**16** Hunting Lions in the Air; worldwide roundup for Lions' Club members, starting at 1200 GMT Jan. 17 all hands phone and cw (phone classified as both au and ssb). Stations can be worked/cont'd for QSO points on each band/mode. La. stations score 1 point for each contact (including other La. stations). All others score 1 point for each La. QSO. Multipliers: La. stations multiply QSO points by number of different states/provinces/countries worked. Outside-La. stations use number of La. parishes as multi. Exchange QSO nr., RST(1) and parish (or La. stations) or state/province/country. Suggested freqs.: 3600 7075 14075 21075 28100 3910 7260 14300 21400 and 28700. Suitable certificates plus the WSPM trophy to first-place La. scorer. There will be a separate category with certificates for portables operating in rare parishes for the contest. Logs must show dates, times, stations, exchanges, bands, modes and claimed score. Send to Lafayette ARRL c/o Danny Griffith K5ARH, 123 Normandy Rd., Lafayette, La. 70501. Enclose an addressed stamped envelope for a copy of the contest results.

**16-17** Louisiana QSO Party, sponsor Lafayette ARC. Starts 1800 GMT Jan. 16 and ends 2500 GMT Jan. 17 all hands phone and cw (phone classified as both au and ssb). Stations can be worked/cont'd for QSO points on each band/mode. La. stations score 1 point for each contact (including other La. stations). All others score 1 point for each La. QSO. Multipliers: La. stations multiply QSO points by number of different states/provinces/countries worked. Outside-La. stations use number of La. parishes as multi. Exchange QSO nr., RST(1) and parish (or La. stations) or state/province/country. Suggested freqs.: 3600 7075 14075 21075 28100 3910 7260 14300 21400 and 28700. Suitable certificates plus the WSPM trophy to first-place La. scorer. There will be a separate category with certificates for portables operating in rare parishes for the contest. Logs must show dates, times, stations, exchanges, bands, modes and claimed score. Send to Lafayette ARRL c/o Danny Griffith K5ARH, 123 Normandy Rd., Lafayette, La. 70501. Enclose an addressed stamped envelope for a copy of the contest results.

**16-18** CD Party, cw. This is a quarterly event for League appointees and officials (notified separately by bulletin). Check with your NIM, page 6, to see if you can qualify for an appointment.

**24-25** CD Party, phone version.

**24-25** Arkansas QSO Party, 2200 GMT Jan. 23 to 0400 GMT Jan. 25. All exchange QSO nr., RST(1) and county for Ark. stations, state/province or country for others. Suggested freqs.: 3560 7060 14060 21060 28060, 3960 7260 14300 21360 28560, Novice 3735 7135 21110. Full rules p. 118 Dec. issue. Logs to W5WEL by Feb. 9.

**30-31** Simulated Emergency Test rules p. 77 Dec., a test of emergency preparedness on a community-to-community basis as well as a test of our long-haul traffic facilities. Participate by coordinating with your local officials. Full list of Section Emergency Coordinators appears in the December issue, p. 77, QRV.

**30-31** French Contest cw; 1400 Jan. 30 to 2200 Jan. 31. Phone session next month, exchange RST and QSO number, 3 points per QSO (with F or DUE countries, only). Multiplier per band, one point for each different "department" (2 figures sent) and each different DUE country (using as additional multipliers 11B cantons,

ON provinces, 4UJ, LX, 9C, 9U and 9X). Scoring based on total QSO points times band multipliers. Logs to the RFD, Blvd. de Berry 60, 75, Paris-12, France.

## FEBRUARY

**3** W6OWP Qualifying Run (W6ZRI, alternate); at 0500 GMT, 3590/7129 kHz, 10-35 a.m.

**6-7** DX Competition phone, first session, full 48 hours GMT. This is the big one pitting WVE against the world. WVEs send report and state/province. DX stations send report plus input power. Full rules page 72, December.

**6-21** Novice Roundup, full rules upfront this issue.

**11** WIAW Qualifying Run at 0230 GMT. See Jan. listing for details.

**13-14** OCWA QSO Party, full 48-hour period GMT. Check page 53 Nov. for info on the event.

**14** Frequency Measuring Test, now open to all, starts with a callup at 0230/0530 GMT (Feb. 14). The periods for measurement start at 0237 (80 meters), 0245 (140 meters) and 0253 (20 meters); for the "late" run 0537, 0545 and 0553 respectively. Each measuring period lasts 5 minutes. Submit your average for each 5-minute period which will be compared with the umpire's average during the same period. The umpire is a professional measuring laboratory. Tell how many readings you took to form your average reading. We must have your report by Feb. 25 to qualify for the competition, to be reported in an early issue. WIAW will transmit the official readings starting Feb. 26. Next IMT scheduled for May 15.

**20-21** DX Competition cw, first session, full 48 hours GMT. Check page 72, December issue.

**27** Colonne Central H. S. Annual "Operations Day," 8:00 am EST until 8:00 pm EST on 75-40-30-15 meter phone bands as well as 40/15-meter Novice bands. QSL WA2DNR via the school radio club, Herb Insley W1KZN, trustee, 100 Hackett Avenue, Albany, N. Y. 12205.

**27-28** French Contest phone, same rules as for cw Jan. 30-31.

**27-28** Vermont QSO Party, details next month.

**27-28** YL/OM Contest phone, starts/ends 1800 GMT. All licensed OM, YL and XYI ops. throughout the world invited to participate, exchanging QSO number, report and section/country. Full details page 101 of the Dec. issue. Cw session slated for March 13-14.

## MARCH

**4** W6OWP Qualifying Run (W6ZRI, alternate) at 0500 GMT on 3590/7129 kHz, 10-35 a.m.

**6-7** DX competition phone, rules p. 72 December.

**12** WIAW Qualifying Run at 0230 GMT

**13-14** YL/OM Contest cw, see the Feb. 27-28 listing and check page 101 of the December issue.

**13-15** Virginia QSO Party, rules next issue.

**13-15** BARRIG Spring RFLY Contest, full info, February.

**20-21** DX Competition cw, rules p. 72 December.

**22** CWA High-Speed Code Test.

**27-28** New Mexico QSO Party.


**29** WIAW Morning Qualifying Run at 1400 GMT. 

## PEP, Average Power and Related Matters

(Continued from page 28)

qualification this term means little or nothing. When one talks into a microphone connected to a ssb transmitter with a typical linear amplifier, the amplifier plate-current meter fluctuates from its resting value to peak values which are much higher. How high these peaks actually go depends on the voice waveform; what we read on the plate meter depends on the meter characteristics. It is often assumed that the highest meter reading is one-half of the actual peak

value, but this could be in error by a large factor. Actually an oscilloscope in the transmitter output circuit is the only accurate method of measuring peak power. A well set up two-tone measuring system as described in the ARRL Handbook is another method.

To summarize, both PEP and average power values of input should be measured and understood in order to assure that the station transmitter is operating properly and within legal limits. Normally the ssb peak power rating is the largest, with the cw rating close behind, and the a-m carrier rating only about 25% of the ssb PEP rating. 

# Operating News

GEORGE HART, WINJM  
Communications Manager

ELLEN WHITE, W1YYM,  
Deputy Comms. Mgr.

**DXCC:** ROBERT L. WHITE, W1CW  
**Contests:** ALBERT M. NOONE, W1KQM

**Training Aids:** GERALD PINARD  
**Public Service:** WILLIAM O. REICHERT, W9HHH

**Q Signal Changes.** In rewriting and revising our booklet *Operating an Amateur Radio Station*, our attention has been brought to some Q-signal changes since the last printing. These changes were made some time ago and were "picked up" in the 1969 *Handbook*. Meanwhile, most amateurs go merrily along using the old meanings, now incorrect, along with some of the Q signals which never were used correctly. Take QRU, for example. Most traffic men seem to take this to mean "Are you clear of traffic?" or "You have nothing for me, right?" But it means "Have you anything for me?" and the answer is "I have nothing for you." It is perhaps our only Q signal that asks a positive question and has a negative answer.

Another Q signal which is consistently used wrong is QRX. It no longer means "stand by," although it is used almost universally for that meaning. On the phone bands you hear "QRX one," probably meaning stand by for a minute. But

QRX now means "When will you call me again? I will call you again at . . . . hours." So "QRX one" could be all right — that is, "I will call you again in one minute." But telling a station to QRX is no longer telling him simply to "stand by" and hasn't been since 1947.

But about those changes. We think they should be called to your attention, because Q signals are used universally by amateurs on all modes. Some of the changes are seemingly slight, but when you look at them closely you find that the slight shift in words changes the meaning in various degrees. Suppose we take a look at changes in Q signals that affect amateur operation.

QRJ no longer has anything to do with reception of signals. It now refers to radio-telephone calls and has a very limited amateur meaning, so will not appear in the "amateur" list.

QRM's meaning has changed from "you" to "I." That is, it no longer means "Are you being

## Tentative dates for major **1971** ARRL operating activities.

January	February	March
7 Qualifying Run, W6OWP 9-10 VHF SS 13 Qualifying Run, W1AW 16-17 CD Party, cw 23-24 CD Party, phone 30-31 Simulated Emergency Test	3 Qualifying Run, W6OWP 6-7 DX Competition, phone 6-21 Novice Roundup 11 Qualifying Run, W1AW 14 Frequency Measuring Test 20-21 DX Competition, cw	4 Qualifying Run, W6OWP 6-7 DX Competition, phone 12 Qualifying Run, W1AW 20-21 DX Competition, cw 29 Morning Qual. Run, W1AW
April	May	June
7 Qualifying Run, W6OWP 13 Qualifying Run, W1AW 17-18 CD Party, cw 24-25 CD Party, phone	6 Qualifying Run, W6OWP 12 Qualifying Run, W1AW 15 Frequency Measuring Test	2 Qualifying Run, W6OWP 10 Qualifying Run, W1AW 12-13 VHF QSO Party 26-27 Field Day 30 Morning Qual. Run, W1AW
July	August	September
8 Qualifying Run, W6OWP 10-11 "Open" CD Party, cw 16 Qualifying Run, W1AW 17-18 "Open" CD Party, phone	4 Qualifying Run, W6OWP 10 Qualifying Run, W1AW	2 Qualifying Run, W6OWP 11-12 VHF QSO Party 12 Frequency Measuring Test 15 Qualifying Run, W1AW 28 Morning Qual. Run, W1AW
October	November	December
6 Qualifying Run, W6OWP 9-10 CD Party, phone 14 Qualifying Run, W1AW 16-17 CD Party, cw	4 Qualifying Run, W6OWP 12 Qualifying Run, W1AW 13 Frequency Measuring Test 13-14 SS, phone 20-21 SS, cw	8 Qualifying Run, W6OWP 11-12 160-Meter Contest 14 Qualifying Run, W1AW 30 Morning Qual. Run, W1AW

The July CD Party is "open" to all. The Jan.-Apr.-Oct. CD Parties (Communications Department) are limited to ARRL Officials and Appointees.

interfered with?" It now means "Is my transmission being interfered with?" Pretty close, but not quite the same thing.

Quite a few of the Q signals have been just slightly changed in wording, but the effect remains the same. For example, QRK now refers to "intelligibility" rather than "readability." QRO and QRP now both specify "transmitter power" rather than just "power." QSD refers to signals being "mutilated" rather than to defective keying as before. QSK now makes definite reference to "break-in" operation. QTA now omits the "as if it had not been sent" clause.

Why keep changing them, you ask? Well, conditions and circumstances and terminology frequently change, so the definitions of abbreviations have to change with them. Considering the extent and rapidity of change in our modern technology, the Q signals have gotten off easy. Many of them are unchanged since they were first devised. Such being the case, let's not date ourselves by using them in obsolete meanings.

**Can't Copy WIAW?** Letter from our friend Sam Henley, WB4HVV/Ø, now residing at Devils Lake, North Dakota, tells us that WIAW's code practice resulted in his passing his General Class cw test. Sam says WIAW's signal is FB out there. What is he using to receive? A small blooper receiver and a 15-foot piece of wire draped over the window, about five feet above ground.

Of course North Dakota isn't the west coast, and WIAW isn't always in the clear QRM-wise, but we'll wager that 90% of the time WIAW can be copied on *some* band at just about any location in the U.S. or Canada (except we won't make too many brags about Alaska and Hawaii), provided adequate receiving equipment is being used. If WB4HVV/Ø can copy with a wet string antenna and a one-lung receiver, the signal should really stand out using a highly-selective communications receiver hooked onto a tuned transmitting antenna.

But one of the more distressing aspects of the WIAW code practice situation is the many letters we get from beginners trying to copy WIAW but finding it difficult or impossible because of the QRM generated by other amateurs on or near the same frequency. It is natural enough to assume that something is deliberate when it annoys you, but even taking this into account it seems pretty obvious that some of the QRM actually *is* deliberate. Of course it is one thing to be convinced of this and something else to prove it, and that's another story. But just on the outside chance that some of the "WIAW-jammers" read this column, let us point out that you are not hurting WIAW or ARRL so much as you are preventing newcomers from obtaining the code practice they need to join our ranks. If your aim is to hurt the present image of amateur radio and its future, then go to it, and may FCC's monitoring stations lend an attentive ear.

And to those who frequent the band in the area in which WIAW transmits its code practice, how about giving the beginners a break during the code practice sessions?

**A-1 Operators Club.** In July 1933 QST there was announced the A-1 Operator's Club, with a listing of initial A-1 operators. (No indication was given as to just how this initial list was evolved.) The idea was to form a club of top-notch operators who would set the example for excellence in operating in the amateur bands. New A-1 operators could be added to the list by nomination of any two already-elected A-1 operators.

Throughout the years new calls and names have been added to this list, until now it numbers several thousand. However, there has been no way to keep track of call changes as members move to other call areas or change calls within the same call area. The list is somewhat out of date, although quite complete.

There is still a lot of interest in the A-1 Operator Club in the field, so we would like to bring our list up to date. Consequently, all calls are being looked up in the current callbook, and those no longer listed are being deleted at least temporarily from the A-1 list. So, if you at one time were an A-1 Operator under a different call from the one which you now hold, please let us know so the list can continue to reflect your status. The new list will be alphabetical by name, instead of call, so there will be less likelihood of "losing" anybody. Not many amateurs change names, but calls are changing all over the place.

The qualifications for A-1 Operator are detailed in the booklet *Operating an Amateur Radio Station*. The club is not heavily publicized, because it is not one for which you apply — in fact, soliciting membership for yourself can result in tacit disqualification, and most members are inclined to be rather strict about this. (Nominations from two members are required to make a new member.) To make A-1 Operator, all you can do is toe the line, make every effort to *be* an A-1 Operator. Eventually your efforts, if successful, will be recognized — maybe! — WINJM.

**Third-Party DXing.** The cast: one m.e., one rare DX station and a "list" of hungry DXers. Often the m.e. is the rare DX station's QSL manager. Conditions are usually poor — QSB, QRN, you name it. QRM? Unbelievable! This doesn't daunt the m.e., however. He assures just about everyone he can hear that they are in the log, whether or not the rudiments of a QSO have taken place.

But what about the QSLs obtained in this fashion? Do they *really* confirm a two-way contact? A QSO consists of an exchange of information between two stations in contact with each other. When some intermediary is used to effect the exchange of information (even including call letters!), this is not really a QSO at all, nor does it qualify as an acceptable alternative for one. It reduces DXing from an art, or skill, to the general level of shooting fish in a barrel.

In all justice, "lists" are often useful, particularly to a low-powered and perhaps inexperienced rare DX station who might hesitate to venture a signal on the air until he learns how to handle the pace.

As an aid to getting him on his operating feet, perhaps the list idea has merit. Whatever the system in use, however, there is no substitute for the *unaided* exchange of information between the two parties in QSO. The station on the "list" who



## W1AW FALL-WINTER SCHEDULE (Oct. 25, 1970—April 25, 1971)

The ARRL Maxima Memorial Station welcomes visitors. Operating-visiting hours are Monday through Friday 1 P.M.—1 A.M. EST, Saturday 7 P.M.—1:00 A.M. EST and Sunday 3 P.M.—11:00 P.M. EST. The station address is 225 Main Street, Newington, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request. If you wish to operate, you must have your *original* operator's license with you. The station will be closed Nov. 26, Dec. 25, 1970; Jan. 1, Feb. 15, Apr. 9, 1971.

GMT*	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
0000	CODE PRACTICE DAILY <sup>1</sup> 10-13-15 wpm						
0130	CW OBS <sup>2</sup>						
0100	RTTY OBS <sup>3,7</sup>						
0120-0130 <sup>4</sup>		3,700 <sup>6</sup>	7,020	3,320	7,150 <sup>6</sup>	7,020	
0130		3,700 <sup>6</sup>	7,080	3,555	7,150 <sup>6</sup>	7,080	
0200	PHONE OBS <sup>4</sup>						
0205-0230 <sup>4</sup>		3,320	50,120	145,600	1,820	3,820	
0230	CODE PRACTICE DAILY <sup>1</sup> (35-15 wpm TThSat), (5-25 wpm MWFSn)						
0330-0400 <sup>4</sup>		3,555		1,405			3,555
0400	RTTY OBS <sup>3</sup>						
0410-0430 <sup>4</sup>		3,625	14,095	7,095	14,095	3,625	
0430	PHONE OBS <sup>4</sup>						
0435-0500 <sup>4</sup>		7,220	3,280	7,220	3,820	7,220	
0500	CW OBS <sup>2</sup>						
0520-0530 <sup>4</sup>		3,700 <sup>6</sup>	7,020	3,845	7,150 <sup>6</sup>	3,820	
0530-0600		3,700 <sup>6</sup>	7,080	3,945	7,150 <sup>6</sup>	3,555	
1400	CODE PRACTICE <sup>1</sup> (5-25 wpm MWF), (35-15 wpm TTh)						
1800-1900	21,28 <sup>5</sup>	21,28 <sup>5</sup>	21,28 <sup>5</sup>	21,28 <sup>5</sup>	21,28 <sup>5</sup>	21,28 <sup>5</sup>	
1900-2000	14,280	7,255	14,280	7,255	14,280		
2000-2100	14,280	21,28 <sup>5</sup>	14,095	21,28 <sup>5</sup>	7,080		
2130-2230	14,100	CW OBS <sup>2</sup>	14,100	CW OBS <sup>2</sup>	14,100		
2230-2330	7,255	RTTY OBS <sup>3</sup>	21,1 <sup>6</sup>	RTTY OBS <sup>3</sup>	7,255		

<sup>1</sup> CW OBS (bulletins, 18 wpm) and the code practice on 1,805, 3,52, 7,02, 14,02, 21,02, 28,02, 50,02, and 145.6 MHz.

<sup>2</sup> Phone OBS (bulletins) 1,82, 3,82, 7,22, 14,22, 21,27, 28,52, 50,12, and 145.6 MHz.

<sup>3</sup> RTTY OBS (bulletins) 3,625, 7,095, 14,095, 21,095 and 28,095 MHz.

<sup>4</sup> Starting time approximate. Operating period follows conclusion of bulletin or code practice.

<sup>5</sup> Operation will be on one of the following frequencies: 21.02, 21.08, 21.27, 21.41, 28.02 or 28.52 MHz.

<sup>6</sup> W1AW will listen in the Novice segments for Novices, on the band indicated, transmitting on the frequency shown.

<sup>7</sup> Bulletins sent with 170-Hertz shift, repeated with 850-Hertz shift.

Maintenance Staff; W1s QIS WPR. \*Times-days in GMT. Operating frequencies are approximate.

### W1AW CODE PRACTICE

W1AW transmits daily code practice according to the following schedule showing speeds, local times/days and GMT times/days. Frequencies are: 1,805 3.52 7.02 14.02 21.02 28.02 50.02 and 145.6 MHz. For practice purposes, the order of words in each line may be reversed during the 5-13 wpm transmissions. Each tape carries checking references.

10-13-15	7:30 P.M. EST dy	0030 dy
	4:30 P.M. PST	
5-7½-10-	9:30 P.M. EST SntThS	0230 MWFSn
13-20-25	6:30 P.M., PST	
5-7½-10-	9:00 A.M. EST MWF	1400 MWF
13-20-25	6:00 A.M. PST	
35-30-25-	9:30 P.M. EST MWF	0230 TThS
20-15	6:30 P.M. PST	
35-30-25-	9:00 A.M. EST TTh	1400 TTh
20-15	6:00 A.M. PST	

The 0230 GMT practice is omitted four times a year on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fist by sending in step with W1AW (but not over the air!), and to allow checking the accuracy of your copy on certain tapes, note the GMT dates and November QST practice text to be sent in the 0230 GMT practice on the following dates.

Jan. 13:	It Seems to Us
Jan. 19:	Correspondence
Jan. 29:	League Lines
Feb. 4:	ARPS

The subject of practice text for the following sessions is *Understanding Amateur Radio*, First Edition.

Feb. 7:	6 and 2 Reception, p. 150
Feb. 10:	General Remarks, p. 155

cannot make the contact unaided should not be given or take credit for the QSO; specifically, if the DX station cannot hear him well enough to copy, no two-way contact really took place.

Meanwhile, many DXers prefer hunting and finding the DX themselves. They prefer taking chances "in the pack" unaided. They look with disdain at those who feel they must use the "crutch" of an m.c. to complete their contacts, garner new "countries."

This column takes no sides on the matter, but deplores the behavior of a few who, not liking the system in use, show their feelings by deliberately QRming the operation. Whether you work your

DX by getting on "lists" or by hunting it down independently, have some regard for the other fellow's views on DXing. If you don't like the system in use, don't use it, but give the other fellow the opportunity to complete his own two-way exchanges under his preferred system.

-W1YYA

### OCTOBER CD PARTIES

The following are high claimed scores; they read, from left to right: appointee, total score, number of QSOs, number of sections and number

of hours of operation. Final adjusted scores will appear in the January CD Bulletin. — WAIKQM.

	CW	K3HZI	89,700-299-60-9
WA6DKF	279,105-802-69-20	K7LPZ/VU 7	
WA7HSP	225,455-668-67-17		88,500-288-60-10
W2LZK	222,625-678-65-20	WSOG7	85,095-272-61-12
VE7BDJ	212,390-627-67-20	WRDQI	84,790-273-61-9
W4DQS	204,350-603-67-17	W4DDO	80,040-253-58-14
54POL	204,100-623-65-19	WSQNY	76,560-264-58-12
K0AZJ	193,280-608-64-7	K91XJ	72,895-232-61-19
W3IN	192,820-616-62-19	W2DSC (WB2DZZ, opt.)	71,806-247-58-10
W8SH (WA3GBU, opt.)	192,640-598-64-18	W4KFC	70,200-277-60-7
W1FTU/4	184,600-562-65-15	S4RAI	66,375-218-59-9
W5QZG	182,000-553-65-17	W6DGH	63,840-217-57-4
W8VBV	180,900-540-67-20	WASVWH	57,000-200-57-9
W4UQ	176,800-537-65-16	W4UDS/0	56,100-199-55-7
WSQNY	173,250-550-63-14	W8VBV	54,900-183-60-5
W5RL	168,840-529-63-13	W5RF	52,920-182-56-6
W11BY	162,130-517-62-14	WA6CP	52,920-193-54-14
WB6ZYV	161,700-485-65-19	K1T2D	51,300-190-54-8
W8VRR	147,620-481-61-14	K4FU	51,240-176-56-7
W6NKR	143,040-440-64-15	W4WSW/4	45,900-180-51-14
W1MX (WA8OCG, opt.)	139,500-459-60-14	WB9DP	43,990-160-53-3
W7HUI	131,400-415-60-17	W4TYI	43,420-160-52-6
E-CAX	128,915-430-59-12	W4IKZF	42,065-176-47-19
WA2BC 1/1		W4LZC	41,250-160-50-12
	127,200-418-60-12	W4BLRQ	40,820-157-52-11
W6DQX	127,200-418-60-10	W2ZQ (K3CPI, opt.)	40,554-153-53-10
W0LRW	126,880-412-61-13	VE6IK	40,250-156-50-15
W6ASH	126,170-397-62-11	W6DUQ	40,000-154-50-4
W8DOL	125,100-412-60-11	WB4DOY	39,780-152-51-7
W4ILE	123,690-392-62-15	WR4J5K	39,600-176-45-8
K11ZD (WA10J, opt.)	123,600-407-60-12	W9LGO	36,720-137-51-10
K4FU	120,475-388-61-11	W1FTU/4	35,520-142-48-5
W0INH	119,255-384-61-7	VF3AYR	34,560-140-48-11
W6JPH	119,100-392-60-7	W5P2B	33,750-145-45-6
W5QB	118,800-389-60-14	W4IMFB	31,775-152-41-14
W9PJ1	118,500-391-60-13	W5NCC	29,835-117-51-9
W1AX	117,000-353-65-	WA7WV	28,060-120-46-17
K2KR	114,575-368-61-7	E11EV	27,520-125-43-
W3UT	114,000-380-60-14	W4PYN	26,840-122-44-4
K4BAI	113,150-358-62-8	WB2VUH	26,660-117-43-6
WB4KVE	112,280-401-56-13	WA2FAH	26,500-100-50-3
W4KFC	110,400-361-60-5	WA3HPS/9	
W3CFJ	107,880-341-62-6		25,920-108-48-8
W3GN	105,315-350-59-8	W7TYN	25,740-117-44-9
WA4UAZ	102,785-332-61-9	W1MRW	25,080-110-44-8
W4OOG	102,660-350-58-15	K3ORW	24,805-118-41-11
K3HFL	101,871-334-61-9	W3GN	23,540-100-44-4
W4TYU	101,700-332-60-12	W40SFV	23,005-104-43-5
WA9AUM	100,595-335-59-10	W6BNX	22,790-100-43-4
WB4LA (WB41 DT)	157,385-494-63-17	VE6AJ	22,500-100-45-4
		W3P1U	22,345-109-41-15
		W47ZR	21,930-102-43-8
		W1YNE	21,015-99-41-6
		W6JPH	20,280-99-39-2
		VE1FK/1	20,240-87-44-9
		K0ELQ	20,000-100-40-7
		WA9BWY (WA9MXG)	158,400-491-64-17

PHONF

W8SH (WA8VRR, opt.)	171,600-525-65-18
WA6UK1	157,450-463-67-19
WA2BCT/1	
	102,480-331-61-14
K0YVU	100,650-301-66-10

NOVEMBER 7 FMT RESULTS

This "last" FMT limited to ARRL Official Observers took place at 0230/0530 GMT November 7. Entries were received from 77 Official Observers, submitting a total of 318 measurements.

The umpire measured the early run at 3505.524 and 7056.334 kilohertz. With 20 meters being difficult copy in many parts of the country, the 14 MHz reading was not used in computing the standings. Readings for the late run were 3531.206 7092.103 and 14,168.976 kilohertz. Using these figures, you can determine the accuracy of your individual measurements. If you're interested in error percentage, move the parts per million decimal point (the figure shown in parentheses) 4 places to the left.

Class I ARRL Official Observers must demonstrate an average accuracy of less than 71.4 parts per million. Class II Observers must show 357.2 parts per million, or better. Interested in an OQ appointment? Check with your SCM see page 6, this issue. Plan to participate in the February 13 FMT, detailed in the Operating Events section of this issue.

HONOR ROLL

This top listing is the standing of the FMT leaders. In consideration of the minimum possible error due to doppler and other unavoidable factors, we accredit as of equal merit all those reports computing 4/10ths parts per million or higher accuracy. A participant must submit a minimum of two measurements to qualify for this listing.

WA2KSB W3BFF K3LPP  
W4NTO K4HDX WA6CPM W8NWU

- (.8) K6MZN, (.9) W1BGW, (1) W6CBX W6RQ, (1.1) W1JB W3FU, (1.7) W2AIQ, (1.9) W4ZEQ, (2.1) W9HSD, (2.5) K0AZJ, (5.8) WA5SKI, (6.2) K6FC, (6.6) KH6BZF, (7.7) W6BAM, (7.8) W5KYD, (9.4) K6GG W9DY, (9.6) W4HU, (10.8) W6AUC, (10.9) W6WOC, (12.6) W7FIS, (12.7) W8BU, (13.1) K6KUQ, (13.2) W9HPG, (13.4) W7LBK VE6MJ, (13.8) W3RDZ, (14.3) WA8DUL, (15.5) W1FFF K9WMP, (16.4) K5SBR/5, (17.1) W3YQ, (19.3) W0DAD/KH6, (20.6) K5EJL, (22.8) W8FMG, (23.9) K9DQU, (26.2) K3STU WB4CBI, (26.8) W9WYB, (28.0) W5QNY, (28.2) W1EBQ, (29.1) W3GN, (29.4) WB2NLM, (30.9) WA0EFN, (32.5) W4MKCB, (34.3) K0TCG, (34.8) K9RAS, (35.9) WA2UCE, (37.2) K0JFN, (39.9) W9UC, (41.9) W51VW, (43.9) W3IN, (46.0) W6CBI, (50.6) K0AYO, (55.7) W4WBK, (57.8) W0DIT, (61.0) W1SWX, (70.3) W9QXO, (82.3) K7ZJS, (84.5) W6AEE, (101.3) VE3GEQ, (110.5) W0WAS, (112.4) W6CPB, (125.4) VE7GG, (156.2) W7CHL, (201.6) VE3AFA, (260.6) W8SUI, (318.5) WA5APQ, (355.1) W8GRG.



Our French isn't good enough to review critically "Comment Devenir Radio Amateur," but we can tell you that this is a soft-cover 64-page booklet in the French language on how to become a radio amateur. It includes both a course in Morse code and in basic electronics (vacuum-tube theory only — no solid state), and is published by Guy Cadiereux, VE2BTG. It is on sale in Canada from VE2BTG (924 20ie Ave. Sud, Ville De St-Antoine, Que.) at \$2.50 for single copies, with special prices for clubs and dealers. Additionally, a magnetic tape, for code practice, is available from VE2BTG for \$20.00.

Feedback

1970 DX Test Results: WA2BCT was inadvertently omitted from the Phone Band Box. It should read WA2BCT 6-32-24-36-21. June VHF QSO Party Results: WA3EQJ/7, Wash. section incorrectly listed as having 36 operators, should have been 3. Field Day Results: The FD score of VO1FN/VO1 should read 303-BC-9-2950, 1 9 7 0 DX Test Results: The Four Lakes ARC aggregate score was inadvertently omitted from the Club Aggregate box. It should have read: Four Lakes ARC (Wisc.) 1,263,347 11 W9BG W9BG.

# DX CENTURY CLUB

The following list contains the call letters and country totals of holders of the DX Century Club Award who have submitted confirmations to ARRL Headquarters for the period from October 1, 1968 through October 31, 1970. New members for the period of October 1 through October 30, 1970 also appear in this list. Since the necessary space to run the complete DXCC roster is not available (the total number of DXCC certificates issued as of October 31, 1970 was 16,725), this list contains only the calls and totals of those who have shown an active interest in their DXCC rating over the indicated 25-month period.

349 W6AM W9BG	W5POA W6CYV W8MPW W8SYK	W1GYE W1JNV W2CR W2UE W5UX W6CHV W6FOZ W6RKP W8KLP W8ONA W8ZCQ W9GIL W9JUV	W1NU W2WMG W5GO W5UKK W5WZQ W6HOC W7CMO W8LWG W8NVZ	W2EXH W2ADIG W6REH W6GOOP W8KIT W9RKP W8CJZ YSIO ZL3IS	W8CT W9GB W9KXK ZS6YQ	311 DL7AB JA1AG JA6AD K1YZW K2TQC K4ID PY7YS VE3AAZ W5VA	W9CH W9FD 304 ZL4BO 303 JA8AA K2ISF F9RM W2QKJ W9LJK W9ZTD	SM6AEK VESJV W1EOB WB2UKP W6KYJ WA9KDI 286 JA4CNS WASREU D34TZ F9RM W5OBS W8IBX 295 I1PP K4HJE W9WNB 294 G3JEC W0CPM 293 W3FAT W8JO W0GNX 292 K4YFQ K5OHS UA3CT W5LZT W6BYB ZL3AB	JA1MIN JA7AD SM5FC WA4LXX 279 OZ6MI W4SYL W8VLK 285 DL8NU JA8ADQ K9WEH OE1HGW WA2IDM W4BRE W5HTY 284 W1EJJ WA4MUB W4BRCR K9AWK W0LBB 283 EP3AM JA1HBX K4GXO OH2BR W3NB W6SJSI WA5NUO	W0CAW W0YTO ZL1ARY 271 OZ6MI W4SYL W8VLK 278 I1EVK I1LAG W42HSX W4BHG K9COS SM1CXE VE3TB 277 K1OZR W3ALB W6EHV WA6DUG W0CY 276 OZ2EGL OZ1LO PA0VO W1BFA W3KA W4NBV 268 F8SK LA1KI OK1ZL VE3DLC W2UI W7RVM 267 DL1QT WA1CR W84BD WA8FH W0TDR 266 K01FL I1A9CE PY2DSE W41UO W9LNQ 265 K4GSS K6LAE W6ANB WB6UDC 272 DL8CH K1LWI PY1DH WB6GMN WB8DCH ZL1HW W1AA W1AW W1FPH W2ACBB W4REZ W9PU K4CIA K4IEP K4IEK K4IEZ K6GLC OZ8SS PY2BGL SP7HX VE3VJ W1ECH W3EFTX W4IKK W4WD WB2VAE W5KGJ W5MCO W6DOD W7FS W7BK W7WLL W9IVL	K5KBH SM5AM SM6CKS VE3GCO W1EW WIKE W1PYM W1RLV W1UUK W2LWI W2RA W42HSX W4BHG W5DL W5LJT W5LRY W5RU WA6AUD W7MVC W8FE W9MZP W0CY 269 DJ5LA W4AOU W6LYC 267 DL1QT WA1CR W84BD WA8FH W0TDR 266 K01FL I1A9CE PY2DSE W41UO W9LNQ 265 K4GSS K6LAE W6ANB WB6UDC 272 DL8CH K1LWI PY1DH WB6GMN WB8DCH ZL1HW W1AA W1AW W1FPH W2ACBB W4REZ W9PU K4CIA K4IEP K4IEK K4IEZ K6GLC OZ8SS PY2BGL SP7HX VE3VJ W1ECH W3EFTX W4IKK W4WD WB2VAE W5KGJ W5MCO W6DOD W7FS W7BK W7WLL W9IVL
---------------------	----------------------------------	--	---	--	--------------------------------	---	--	---	---	---	---







F08BS	W1HRI	W6CDJ	VK2WD	PY2QT	W8JXM	189	W0BA	W8OAR	K1UHY	W1DHL	WA5CST
SMSBPJ	W2IOO	W9XXK	WA3BYS	W3SS	W8WRP	K2EUR	6Y5AH	K3EUR	K3EUR	W2HXF	W6QMA
VE2YU	WB6UO	W9WKU	W7MVC		W9JJV	KH6GLU	179	WA2CA	WA2CA	W4IQO	W6GWHM
VE3RE	W7LL		W8CFG	211	W0YYS		DL4QG	WA8DE	WA8DE	W8IHD	W7FF
W4SPX	W8GHN	239	W9GXH	F3KE	F9GL	188	OZ3KE	TF2WLN	TF2WLN	W0YTO	W7LR
W6ABA	W8JTD	DJ4TZ		F9GL	K1INO	11ZBS	W7MSI	VE4SD	VE4SD		W8YEK
W6KJ	W8NFX	I1ZPB	222	K1INO	200	W6HPS	WA9SLD	W2WNW	W2WNW	157	W9FPM
WB6UDC	W0IJM	PY3BAD	CT1UE	WA9UGI	GW3NWV	W6DAD		W6DDO	W6DDO	K4TSJ	DJ5GI
WA8HFN	W0YDB	W3BSJ	EP3RO	WA9UMH	I1BRN	YA5RG		W7ELU	K5BXG	K5BXG	DJ8YU
W9DH		VE3CQ	JA1OCA	ZL2OW	I1ZRW		178	W7GSP	WA8WMH	WA8WMH	11ECF
W0BK	249		OE1MEW		K2RAP		G3WGS				K3YBN
W0BL	DJ5DA	238	EG9UZ	210	K8CMO	187	I1AUM	163	156		K5MYM
260	K2POA	JA3CWV	W2VBJ	DL3OH	K0GSV	DJ3OS	WA3IUV	VE5DGX	CP1HW		CP1HW
F9MD	OHSVY	VE2DCY	WB2IE	F9IE	K0YIP	G3SVH		VE6MJ	DJ3LS		K8BGZ
HK3WO	WB2VEG	WA4LSK	W4REZ	I1RC	KP4BBK	K8PVD		W0ZOZN	F2QQ		K0RNZ
I1YK	W4EAL			K2SHU	LUR8D	K8PYD	177	W4QAW	I1YU		KP4CRD
VE3EVU	W6TGB	237	221	OH2ZD	SP7HB		K2ANT	W4WR	K2JKJ		W4TXQ
VE3NE	W0LBB	K9JJR	K4BKF	VE4FU	W1COA	186	K6OW	W5IN	K9GZS		W5NOO
VE7SE	248	SM7BHF	K8VCB	W1COA	WA1HFN	WB2RSW	W3BK	WB6FCR	W7QON		WB2OUZ
W2OT	K6TXR		K0IFL	WA1HFN	WA8ZDF		WA8QBQ	W9EB	5Z4KN		W4BCH
W2YYL	OH2BAD	236	OE1PC	VE5QK		185	K7YDO	176	155		WA4RQD
W3GE	OH2BR	W1FJF	W1PCD	VE6PL		K7YDO	WA2JYA	HA5FE	K1UOV		W6ZGO
W3PN	OY7ML	235	W1PCD	VK4QM		WA2JYA	W4TXE	I1VS	W6ZGO		DL6XV
WA3HUP	W4NBV	GW3AHN	W2SSC	W1EJE		W1EJE	W9WNG	JA1EZL	W4WPM		DL6XV
W4ELB		W4BA	W4UF	W5RDA		W1FDL	ZL3GQ		WB4EWU		OK2DB
W4HOS	247	W4JYU	WB6DXU	W2OEH		W2OEH		175	JA1CYV		T12KZ
W6GRV	DL3BK		W7FKM	W2ACC		W2ACC		I1ZPM	K7HFQ		K7UXS
W7DQM	I1CWN	234	W8GGE	W3AB1		K2DDK		K1NIE	OZ5OF		OZ5OF
W7EPA	I1LCK	K1KNO	K1KNO	W3CRE		K4OCE		K4OCE	W3ATO		W3ATO
W7MK1	K1ZSI	W5EDX	9G1DY	W3HKN		OH2XA		W1BGD	W4FOD		W6BGRK
YV5BPU	PY1JR			W3MDJ		W1MDO		WA0PVW	W4SD		W5IOU
	PY2AQQ	233	AP2MR	W4GXB		WB2MWW		174	WB6WV		WB6WV
259	W9MWO	VE6ABP	I1SGZ	K1CMI		W4JDR		DL1UR	WB8PWF		WB8PWF
CX9CO	W9WYB	W4GVE	K4KQ	W5HAK		WA4FDR		DL1UR	WA9OTE		WA9OTE
7P8AR	246	WA1IHN	K4VWK	206		WB4GTC		DL1UR	WA9OTE		WA9OTE
	WA1IHN		K4YFQ	W89ADE		WB4JCV		PY2DLIC			PY2DLIC
258	DJ4PT	245	W6BTT	W5EGS		W5EGS		183	W4OT		W4OT
I1SCA	K1OZR	K1OZR	K6RNR	OE1VK		W9CCK		DL9HC	W81PA		W81PA
K9WTS	W8YGR	XE3EB	K9WEH	VE5KG		W9ICF		JA2APA	YV5CMQ		YV5CMQ
W3MP	W8X8A	DL8NU	O48V	W1JXM		WA91YQ		W7CRT	ZS2PD		ZS2PD
257	VE5JV	244	PY4AP	205		199		182	173		173
XE1YG	JA8ADQ	OE7UD	VE3DNR	JA7JH		CN8BB		K4BMS	DL1RA		DL1RA
	OE7UD	W3JOD	VE3AH	W1BAL		EA2EL		K4EJK	OH3NY		OH3NY
256	K4IEP	PY2DSQ	W2CCGW	W9HJ		I1RZ		K3TGT	K9NBS		W3NKT
W0MYN	W1BFA	W6VCM	WB2FMK	W9ZWH		JA6MS		K8RTH	W9YGN		W9YGN
	W6VCM		W3AES	204		K9PPY		VE3GHL			VE3GHL
255	DL6NX	243	W4BAP	DJ2UJ		5M7XSN		W4RKN	DL1AR		DL1AR
W4SYL	K9COS	SMSYV	WB3WQ	DJ2UJ		V4XSN		W4RKS	HLKAZA		HLKAZA
W5PWW	SM6CKU	W9	W6A0I	DK2BI		W4EUD		W4WFS	HLKAZA		HLKAZA
YV5ANQ	W7NNH	229	W6A0I	DK3PO		W4WVF		W5TBN	HLKAZA		HLKAZA
	W1DO	W4FUM	W6GMR	I1WL		W5LLB		W6HUR	W7YQI		W7YQI
254	K6JR	W8EKV	W8GMR	203		DJ2MM		198	181		181
WB2UZU	YV5CIL	228	CT1LF	DJ2MM		DJ2MM		W8APYL	CR4AJ		CR4AJ
W6ZC	9M2NF	242	G5AFA	DL8OA		DL7OD		DJ3VW	DJ3VW		DJ3VW
		G5AFA	DJ3CN	DL8OA		DL7OD		DL3OM	DL3OM		DL3OM
253	DJ3CP	K2GPL	W2AEB	K3RPY		CE6GS		6A4HV	F5SJ		F5SJ
F8CW	SM5RY	UA3CT	VE3RO	DJ91X		DJ91X		W8TWA	W9GBI		W9GBI
JA1IBX	W2MS		WB2BEE	DL5SV		W5MUG		W8TWA	ZP5CE		ZP5CE
OE3SAA	WA20JD	227	W6FET	K7RLS		W4NLP		195	169		169
PY2DSQ	WB2HZC	CR6CA	ZL1AV	ON4PL		PA0XPQ		JALAA	W2DTK		W2DTK
W6VNH	W3DRD	CT1UA	WA2VEG	PA0XPQ		PY1HX		W3YN	WB2KTO		WB2KTO
W81LC	W2GHK/	4	WA2VEG	PY1HX		VE3ZN		180	DL2KM		DL2KM
	W9RKJ	226	K3QTY	W44DD		W44DD		DL3VX	W6BD1		W6BD1
252	G6LK	241	SM01OU	W44DD		DL6KG		K1PVB	WA0HMP		WA0HMP
K2DJD	DJ0PN	PA01OU	SM0MC	F5RV		W5KJG		K6YUJ	XE1EEI		XE1EEI
K6MHD	DL9CQ	W2EYB	JA3RQ	W5ASLB		W7YBX		PA0UC			PA0UC
ZL3QH	W3UJ	WB4CCY	W2EYB	W6QJW		W6QJW		VR1L			VR1L
	W4PGZ	W9EXE	W2EYB	W8CCCV		W9DDL		W1AW	DL7LV		DL7LV
251	K3PDC	W5RYT	W5R5T	W9DDL		K1S1Z		W1DWQ	K1RAW		K1RAW
YV1KB	ZL3AB	225	K6CWS	CT4DJC		5H3KJ		W1VRK	LA8LG		LA8LG
		225	PA0DEC	W44DD		190		W1LHQ	W5JTA		W5JTA
250	DL1MD	240	W4XLX	W44DD		190		W2GA	W8JA		W8JA
EA71R	W1BAB	CX2CN	WA4GUZ	W44DD		190		W2NRQ			W2NRQ
JA1BN	W1HR	I1ANE	OE3WWB	W44DD		191		W2RIR	DL4QG		DL4QG
K2QOU	W2PDB	Y1NRTS	K1BDP	W44DD		191		W3CM	ET3USA		ET3USA
OZ5JT	WB2PWU	YV1KZ	K1DRN	W44DD		191		W3HGV	W4GHN		W4GHN
PY2DSE	WB2VZW	ZL3AB	K4TTA	W44DD		191		W4BHG			W4BHG
W1HOO	WA4WTG	223	W2IOZ	W44DD		191		W4CZS			W4CZS
		K3GKU	W2IOZ	W44DD		191		W4ORT			W4ORT
			W2IOZ	W44DD		190		W5LDH			W5LDH
			W2IOZ	W44DD		190		W6ISJ			W6ISJ
			W2IOZ	W44DD		190		W7JWE			W7JWE
			W2IOZ	W44DD		190		W8KRS			W8KRS
			W2IOZ	W44DD		190		W8PDD			W8PDD
			W2IOZ	W44DD		190		W9DRL			W9DRL
			W2IOZ	W44DD		190		W9PWQ			W9PWQ
			W2IOZ	W44DD		190					

(Continued on page 138)

SCM — AREC — ORS — CP — SEE — OBS — TCC — OO — NTS — WAG

# Station Activities

OVS — AIOPR — EC — DXCC — CLUBS — RM — OPS — RCC

• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

### ATLANTIC DIVISION

**DELAWARE** SCM, John I. Pentud, K3NYG — SEC/PAM: W3DKX. RM: W3EEB, W3URR, K3JXR, W3TRC, K3CEW, K3EWE, K3LCK, K3VWP, K3NCL and the first State ARC operated a station in demonstration for the Bethel Methodist Church. W3EEB is back handling traffic after a very busy summer. WA3LTA activity has picked up with a new SR-15U. W3DKX is practicing with his new keyer. WA3JCV is building a summer home in Sussex county. W3HKS is active in the CD parties. W3CZS has a new HW-17 and is active on the 2-meter band. Happy New Year to all Delaware amateurs. Traffic: (Oct.) W3EEB 29, W3TRC 28, W3DKX 25, WA3LTA 7, K3Q8D 5, K3NYG 3, WA3KGV 2, W3WR 2, (July) W3EEB 8.

**EASTERN PENNSYLVANIA** — SCM, George S. Van Dyke, Jr., W3HK — SEC: W3ICU. RMs: W3EML, W3MPX, K3MVO, WA3AFI. PAMs: WA3GLI, K3PSO. VHF PAM: W3FGO. OO reports were received from W3KFK, K3RDT, K3HNP. OVS reports from WA3KFT, W3ZRR, K3WEU, WA3IAZ, WA3FMI, WA3BJQ. OBS reports from WA3AEI, W3CBH, WA3JKO, WA3FMI. PSHR: W3MPX, WA3FMI, WA3IYC. BPLs: W3CUL, W3VR, K3NSN, W3MPX, WA3FMI.

Net	Freq.	Operates	QNT	QTC	RM/PAM
EPA	3610	6:45 P Dy	316	354	W3MPX
PTTN	3610	6:00 P Dy	235	172	WA3AFI
PFN	3960	5:30 P.M.-F	599	561	K3PSO
EPAEP&TN	3917	6:00 P Dy	233	113	WA3GLI
WPPW	28.8	5:15 P Th	12	0	WA3FMI

W3CUL reports the RTTY traffic nets are getting organized. W3EML says TCC still is lagging a bit on traffic. WA3ATQ was active in the 1L anniversary party. W3CDB is getting back into the swing of things. W3HNK made over 3000 contacts from VP2VY and PRAR during the OCT. CQ World-Wide Contest. WA4TMY/3 hopes to get his old call back. WA3MHB has his General Class license. Shift work keeps W3BNR off the nets. W3FU works cw on 160-meters. The PJYL have put together a nifty newspaper. WA3NLE is organizing the Abington High North Campus Communications Club. Gear is needed on a loan basis and also instructors for classes. WA3PDN has his General Class license. York Amateur Radio Club's new officers are K3FOB, pres.; K3JFE, vice-pres.; K3BWB, secy.; W3EDO, treas.; W3HYH, trustee. New officers for Penn Wireless Assn. are WA3KTK, pres.; K3JOH, vice-pres.; K3ZQN, corr. secy.; K3WKG, 1st. secy.; K3VRP, treas. New officers at the Drexel U. Radio Club are WA3GNL, pres.; K3WNT, vice-pres. The Central Penn ARC officers are K3JEW, pres.; WN3ONG, vice-pres.; WA3CTP, secy.; W3AVL, treas.; K3MQE, WA3HIK, K3FTS, trustees. K3ETS is now Advanced Class. The Penn Wireless Assn. won first place in the 6 transitter class again this year. WA3KTK got the "Buck Award" as the most outstanding ham in Bucks County. The Penn Wireless used 2-meter fm, 7 mobiles, for the Halloween Parade in Bristol. K3WEU says Inglis House is doing nicely but he still needs volunteers. W3MPX still is trying to do most of the liaison work between phone and cw nets. Traffic: W3CUL 6638, W3VR 1436, K3NSN 526, W3MPX 426, W3EML 396, WA3FMI 146, K3MVO 122, WA3LMO 117, WA3AFI 112, W3HK 73, WA3ATQ 66, W3CDB 65, K3PIE 62, WA3LVE 57, W3HNK 50, WA3JZB 42, K3PSO 39, W3VAP 38, K3OIO 34, W3ADE 22, W3CBH 22, WA3IYC 20, WA3KA 17, W3PFC 17, WA4TMY/3 16, W3VA 11, W3OY 9, W3JSX 9, K3KTH 6, WA3MEH 5, WA3FPM 4, WA3LUV 4, WA3JKO 4, WA3BJQ 2, WA3IAZ 2, W3AIZ 1, W3BNR 1, W3EU 1, W3KEK 1, W3MGF 1.

**MARYLAND-DISTRICT OF COLUMBIA** SCM, John Munnholland, K3LFD — SEC: W3LQY.

### Quarterly Net Report

Net	Freq.	Schedules/EST	Tfc./Mo.	QNT/ Sess.	Manager
MDD	3,643	Dy, 7:00 pm	160	7	W3E7T/RM
MDDN	3,643	Dy, 9:45 pm	35	3	WA3LWT/RM
MDCTN	3,920	STTS, 6:00 pm	45	14	W3FCS/PAM
MFPN	3,920	MWF, 6:00 pm	55	23	K3IAG
		SSu, 1:00 pm			
MTMTN	145,206	T-Sa, 9:00 pm	10	9	W3LW

PSHR (Oct.): W3E7T 64, W3TN 25. BPL: W3TN. New appointments: W3ABC as OO, W3OKN as ORS, W3FZV as ORS. W3FZV chalked up some 50,000 points with an indoor antenna in the Oct. CD Party. W3TN had a big month on the traffic key. W3FA got off on a building kick, modified his 75A-4, W3LQY and WA3HEN, two very FB YLs, have received special citations from the Commanding General, First United States Army, for outstanding work as volunteers in the MARS (Army) program. K3NCC and WN3OYP chorused "nothing new here" in Dickerson for their Oct. reports. WA3NPD, Maryland School for the Blind ARC, favored K3LFD with one of its new QSL cards complete with arial inscription to confirm a recent 2-meter contact. W3CDQ had fun in the 1L Party and worked many former D.C. stations. The entire Atlantic Division was saddened by the passing of W3YA. Honorary Vice-President of the ARRL and former Director of the Atlantic Division for many years, MDD observed a moment of silence in several sessions to honor his memory and long service to his fellow amateurs. The Termite Log reports that K3QMD presented a series of lectures to club members on the history and fundamentals of electronics. A fine crowd at the 1970 Annual Gaithersburg Hamfest of the Foundation for Amateur Radio enjoyed the ARRL exhibit presented by the MDC section. WA3IY, WA3LWT, WA3MJE and K3JOM helped K3LFD set up and operate the booth. Among the visitors were W3EPC, Atlantic Division Director; former MDX SCMs W3JZY and K3JYZ; W3HWZ, W3QOH, W3ECP (SMD for MARS (Army)), W3EOV, K3LB, WA3HEN, K3TBD, W3FA, W3CBG, K3KCC, K3IAG, WA3IY, K3LFN, W3EAS, W3LDD and W3ADQ. W3BHK, MARS (Army) member, displayed a copy of War Broadcast No. 41, printer W3EU, 73 Magazine and the ARRL for providing the 49 Army MARS stations in Vietnam with monthly issues of 73 and QST. W3ABC got a lot of amateur signatures on a petition for liberalizing the Maryland DMV requirements for call-letter license plate. Traffic: W3TN 415, W3E7T 144, K3GZK 83, WA3LWT 82, W3OKN 82, W3FA 79, W3EOV 75, W3PCS 61, WA3LJK 52, WA3MJE 49, K3ORW 38, WA3IY 30, W3FZV 20, W3LQY 18, W3ECP 10, WA3IIV 7.

**SOUTHERN NEW JERSEY** — SCM, Charles E. Travers, W2YF — SEC: W2LVW. RM: WA2BLV. PAM: WB2FJE.

Net	kHz	Time(pm)	Days	Sess.	QNT	Tfc.	Mgr
NJPN	3930	6:00	Sa	4	30	25	WB2FJ
NJLPTN	3950	6:00	M-Sa				W2PE

A new appointee is WB2HMU, as OPS. Endorsement: K2ARY. OBS. WB2JSS is enrolled at Northeastern U. in Boston and is active in the U. Radio Club, W1KBN. W2JL is back in the swing again with a very fine report of activities. WA2YLR, our Florida based member is coming along very well after a slight set back. OO W2ORS is back again now that the summer baseball schedules are over. It is with regret that K2PQD of Gloucester Co., finds it necessary to resign. W2PEV also has resigned as NJEPTN Mgr. Our many thanks to you, Bob and hope to see you on the Sun, Morning Net as NC. The incoming manager, WA2TAF was W2PEV's asst. Net Mgr. Traffic: WB2VEJ 199, W2ORS 29, W2IU 26, WB2FJE 23, W2YF 22, W2JL 17, WB2SFX 16.

**WESTERN NEW YORK** — SCM, Richard M. Pitzeruse, K2KT — Asst. SCM: Rudy M. Ehrhardt, W2PVL. SEC: W2RUE. RM: K2KJR, W2FR, W2MTA, W2RUF. PAMs: WB2RHJ, WA2CA. Section nets appear in July QST. Appointment renewals: WA2HF as OPS; K2DNN, WB2FPG and W2MTA as ORS; W2CKM as WA3HRV/2 as OBS; W2MZA as KM. Very sorry to hear of the passing of former Atlantic Division Director, W3YA. K2DNN recuperating after a stay at the hospital. Officers for the Chemu County AREC Assn. are WA2TCZ, pres.; WA2FJJ, vice-pres.



WA2ZBD, secy.-treas.; K2DNN, trustee. WB2WGI promises more activity with new G146s in the HW-100. Your SCM got his tri-band beam up at the new QTH. W2RQI has a new 50-foot pole up. W2RTC now is teaching Novice classes in Buffalo taking over from W2QLK and W2KZ. K2PPK has a new KW-101 and final. W2QCE is on 75 with a new antenna, courtesy W2TAX and W2QZR. K2BUI now is C7WAE on Easter Island and looks for his WNY friends on 3530 kHz at 0530Z and on 21.360 MHz at 2230Z. W2CFP and the W2CXM gang attended the Hudson Division Convention as did your SCM. NYS reports clearing 316 messages with 715 check-ins in Oct. WA3HRV/2 operated from some DXotic spots this past summer, like HV3SJ and 3A0FH. W2CXM, the Cornell Club, has a new 40-meter beam ready to launch. The Clarkson College ARC, K2CC elected WB2ERK, pres.; WB2ZYV, vice-pres.; WB2SIT, treas.; WA1JQA, secy. WB2JCE has been elected pres. If YLRL and invites all non-member hams to join. ESS handled 236 pieces of traffic in Oct. BPLs for Oct. go to WA2ICU, W2OF and K2KQC. Traffic for Oct. with the asterisk indicating PSHR: WA2ICU 502\*, W2OE 457\*, K2KQC 301, W2PR 224\*, W2QC 214\*, W2MTA 114\*, K2KTK 88\*, W2RUI 86\*, WA2BEX 74\*, WB2LQP 70\*, W2HYM 55, W2RQI 46, W2DBU 44, K2CC 41, W2MSB 39, WA2ANE 30, K2OPV 30, WA2JNW 29, W2EAF 26, W2EAF 23, W2WGF 21, WB2SMD 18, W2FBE 17, K2IMI 14, W2PVI 13, W2PZL 12, W2QAP 11, WA2LCC 9\*, K2BRE 8, WA2LE 8, WB2VBK 7, W2WS 7, K2BWK 6, K2KIR 6, W2RUT 6, WB2YEE 5, W2CTP 3, W2FZK 3. (Sept.) WB2NNA 27, K2DNN 18.

**WESTERN PENNSYLVANIA** - SCM, Robert E. Gawryla, W3NEM - SEC: W3KPI. PAM: K3ZNP. RMs: W3LOS, W3KUN. WPA CW Traffic Net meets daily on 3585 kHz at 7:00 P.M. local time; WPPN meets daily on 3955 kHz sbs at 10:00 P.M. local time; KSSN meets on 3585 kHz at 6:30 P.M. local time. It is with great sorrow that we record the passing of Gil Crossley, W3YA, past Atlantic Director for many years, who became a Silent Key on Nov. 5, 1970. H. Vandegriff, MATCON-DSO, APO N.Y. 09052 would like skeds with hams in Vandegriff, Pa. It seems the town was settled by Hugh's ancestors. The Etna RC via "Oscillator" reports K3CHD, WA3MWM and K3HSE went on a boat trip to the Allegheny River and made 33 contacts during the voyage; WA3JHJ in his News and Views column commented on the conflict of the Pa. QSO Party, VF contest and SAC contest falling on the same week end. The NARC has advised they have been sponsoring the Pa. Party the third full week end in Sept. for the last six years and plan to do so next year. Indiana County ARC says WN3PM1 is a new Novice and the Western Area CD has new facilities in a self-sustaining underground emergency operations center located at the Indiana U. of Pa. Steel City ARC via "Kitowat Harmonics" announces the slate of new officers for the coming year as W3ZPZ, pres.; W3HI, vice-pres.; WA3LJE, secy.; W3ZDW, treas.; W3SDV, corr. secy. Two Rivers ARC also has new officers as WA3AZY, pres.; WA3HHU, vice-pres.; WA3MWM, secy.; WA3OGS, treas.; WA3IZH, act. mgr. New Novices are WN3PGL, WN3PGM, WN3PGN and WN3PIR. Presque Isle ARC was host to W8XZ who developed the Window antenna and which bears his name. W3BRB and K3AFO worked JY1, King Hussein in a three way recently. WPA Tfc. Net: 31 sessions, 193 messages, 425 QNI. WPPN: 26 sessions, 51 messages, 144 QNI. Traffic: K3HKK 262, K3ZNP 218, W3LOS 114, W3KUN 103, W3ATQ 86, W3NEM 52, W3UT 48, WA3JPI 30, K3HCT 20, WA3LDA 10, K3VQV 8, W3YA 8, K3ZOB 8, W3UHN 4, W3SN 2.

### CENTRAL DIVISION

**ILLINOIS** - SCM, Edmond A. Metzger, W9PRN - SEC: W9RYU. RM: WA9ZUE. PAMs: WA9CCP and WA9PFI (vht). Cook County EC: W9HPG.

Net	Freq.	Times(Z)/Days	Tfc.
IEN	3940	1400 Su	
ILN	3760	2330 Dy	198
NCPN	3915	1300/1800 M-Sa	92
III PON	3915	14/20/2245 M-F	630
III PON	145.5	0200 MWF	15
III PON	50.28	0200 M	3

W9HRY, 9RN Mgr. reports a traffic total of 480 for Oct. New officers of the Synton Amateur Radio Club are WA9UOQ, WA9UPD, WA9QFL and WA9VGX. Carl Mosley was the featured speaker at the Oct. meeting of the Wheaton Community Radio Amateurs. WN9ELT is a new Novice in the Galva area. WA9ZAK has joined the ranks of the Illinois State Troopers. WB9EKC would like to hear from hams that are interested in storm interferences and aurora. W9LUDU advises that the Illinois Weather Net meets 7 nights a week on 3940 at 2400 GMT. WN9DVV of Palatine has passed his Advanced Class exam. K9LKA has gone "eye-balling" in JA-Land.

According to reports received, several of the Illinois section Amateur Radio clubs participated in "Halloween Watches" with the cooperation of the local police and were highly praised by the officials. WA9UNR is the proud owner of the Drake-4 line and a collinear on a 64-Ft. tower and says results are E.E. VE4FA is operating portable in Skokie where he is a freshman in college and operating on 75-meter cw with his QTH as the Jewish Theological College. "TXT" the club publication of the Chicago Suburban Radio Assn. has a brand new look. WA9QTE is now a citizen of Villa Park and awaiting his 9 call. W9EUN is a new OBS appointee. K9ZWL, K9YJQ, K9ZLV, WA9BWB, WA9NTA, WA9RIJ and B. Thuma were elected officers of the Six Meter Club of Chicago, Inc. WA9ZLN and WB9CGP are operating on 2-meters. WB9BXX is the only BPL recipient for Oct. Traffic: WB9BXX 604, WA9ZUE 162, WB9DPU 154, W9NXC 133, W9HOT 56, W9DOO 53, W9FHI 40, WB9CXZ 35, W9BCX 34, W9YH 34, W9LDC 30, W9LNQ 29, WA9ZLN 25, WA9BRQ 16, W9PRN 16, WA9NZE 13, WA9ATB/9 12, K9HSK 7, W9HJM 5, WA9RTB 3, WA9SDC/9 2.

**INDIANA** - SCM, William C. Johnson, W9BUQ - SEC: W9FC. RMs: W9FC, W9HRY, WA9WMT, WA9ZKX. PAMs: K9CRS, WA9OHX, W9PMT (vht).

Net	Freq.	Time(Days)	Tfc.	Mgr.
Ind. Tfc	3910	1330 Dy	490	WA9OHX
		2130 M-S		
		2300 Dy		
QIN	3656	0100-0400 Dy	267	WA9WMT
ITN	3740	0000 Dy		WA9ZKX
PON	3910	1245 Su	52	WA9UWJ
PON VHF	50.7	0200 M-Tu	146	WA9TJS
Hoosier VHF			23	W9PMT

With deep regret I report the passing of Osa B. Magruder, W9AVO of Floyd Knob, Ind. WB9BAP, harmonic of K9HIS, grandson of K9RWQ, passed his General Class exam on his 11th birthday. WN9FKX, WN9FJT, WB9FHE and WB9FHF are new hams in Indiana. WA9YJV, call of the Allen County Amateur Society Repeater station, has been changed to W9INX in memory of a deceased member. WA9RNT is back on the air with the help of local hams. W9GX of Princeton received a certificate award from QCWA for distinguished service for 50 years. The Hoosier Hill Hamfest and Picnic at Spring Mill State Park was one of the best. Your SCM was at the Columbus ARC in Oct., talked on amateur radio and had a very nice dinner with WA9OLM and WA9PUM. The Tri-State Amateur Radio Society new officers for 1971 are WA9QCF, pres.; WA9WCE, vice-pres.; W9FHI, treas.; WA9ZZJ, secy.; K9ISK, WA9SFP, K9LAU, W9CGW, WA9HGA, W9VZX, dir. 1971-1972. Don't forget the Lake County Annual Dinner at Schererville in Feb. For more details contact Herb Brier, W9EGQ, 385 Johnson St., Gary, Ind. 46402. QIN Honor Roll: W9HS 26, W9BIP 19, W9EI 17, W9QLW 15. Amateur radio exists because of the service it renders. The Clark County AREC participated in the Boy Scout Jamboree held Oct. 17, 18 with over 100 spots participating. BPL certificates went to W9JBO, W9JYO, W9EQO and WA9QOO for Oct., WA9QOO for Sept. Traffic: (Oct.) W9IBQ 782, W9JYO 723, W9EQO 395, WA9WNH 392, K9FZX 369, WA9WMT 278, W9HRY 259, W9ICU 225, WA9QOO 208, W9FWH 177, W9QLW 158, WA9OHX 126, WA9WJA 54, K9CBY 49, W9HUQ 44, K9RWQ 37, W9PMT 24, K9YBM 24, W9MZV 21, K9ILK 20, WA9NYU 20, WA9TJS 18, W9LG 16, K9RPZ 14, WB9DLH 14, W9DZC 12, W9FJL 12, WA9AUM 10, WA9CHY 10, W9MXG 10, W9YYX 10, K9QVT 8, WA9BHG 7, W9CMT 7, K9JQY 7, W9FC 6, W9HWR 6, K9VHY 5, W9IOH 4, WB9BAP 3, WN9BAQ 3, K9DIY 3, W9IDG 2, W9AQW 1. (Sept.) WA9QOO 313, WN9BAQ 3.

**WISCONSIN** - SCM, S.M. Pokorny, W9NRP - SEC: W9NGT. PAMs: WB9CKE, WA9IZK, WA9OAY, WA9QKP, WA9QNI. RMs: WB9FFY, K9KSA.

Net	Freq.	Time(Z)/Days	QNI	QTC	Mgr.
WSSN	3662	0030 T1Sa	69	4	K9KSA
WTN	3662	0115 Dy	389	141	WB9FFY
WRN	3620	0130 Su (RTTY)			K9GSC
SW2RN	145.35	0230 Dy	252	13	WA9IZK
SW6RN	50.4	0300 Mon-Sa	199	2	WA9E2T
BWN	3985	1245 Mon-Sa	478	252	WA9OAY
BEN	3985	1800 Dy	683	69	WA9QKP
Wi-Pon	3925	1801 Mon-Fri	311	101	W9EMC
WSBN	3985	2300 Dy	1318	129	WA9QNI

WA9E2T has asked to be relieved as PAM for the 2-meter net and WB9CKE has consented to act as Mgr. for the 2-meter net. The West Allis RAC elected the following officers for '70-71 term: K9ILV, pres.; WA9AKV, vice-pres.; WB9BTR, secy.; W9KYZ, treas.; WA9KRF, trustee. Meetings are held at 8 P.M. the 2nd and 4th Tue.

# EIMAC's new 8873 family of grounded grid, zero bias triodes offers you top-man-on-the-frequency performance to 432 MHz.

*(Imagine how these tubes will work at 14 MHz).*

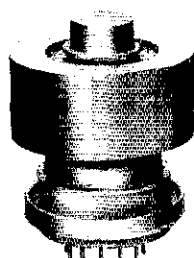
EIMAC's many contributions to grounded grid triode design and production have now been combined with the advantage of rugged, low-profile ceramic/metal assembly to bring you this new family of impressive high- $\mu$  triodes. They're inexpensive, and work up to 1000 watts PEP input at frequencies up through 432 MHz. Quickly, here are the outstanding features of these state-of-the-art tubes:

## 88 and 73

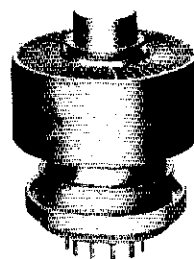
The numerals 88 and 73 have been a tradition in communications language for almost 120 years. The older of the two, 73, appeared in 1853, meaning "My love to you." In 1857, the first official definition made it a "fraternal greeting between operators." Two years later, 1859, Western Union made "73" a part of their "92 Code" to indicate "Accept my compliments." The final change came in 1895, when "73" meant "Best Regards" for the telegraph, and later for radio operators.

"88" never received the formality of an official listing until it was adopted as one of the "Ham Abbreviations." It had been one of the telegraph operators' traditional terms since well before the turn of the Century. During the First World War, "88" was used by the U. S. Army Signal Corps, again strictly as an operator's abbreviation in unofficial communications. At the close of WWI, "88" achieved official status as a part of amateur radio terminology: "love and kisses."

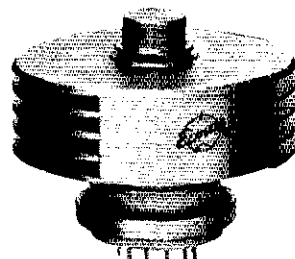
Louise Ramsey Moreau,  
WB6BBO/W3WRE



8873  
CONDUCTION COOLED  
ANODE

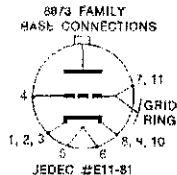


8874  
AXIAL COOLED  
ANODE



8875  
TRANSVERSE COOLED  
ANODE

1. Up to 1000 watts PEP input per tube to 432 MHz. Typically, 2000 volts at peak dc plate current of 500 milliamperes.
2. Indirectly heated cathode. No expensive filament choke needed for grounded grid HF operation as filament is electrically isolated from cathode.
3. Easy to drive. Extremely low grid interception plus EIMAC's exclusive self-focusing cathode combine to provide high power gain, high overall efficiency and low, low intermodulation distortion.
4. May be driven to full rated input with solid state driver in many cases.
5. Inexpensive (\$1.25) socket. No air ducting required. No expensive glass chimney. 11-pin low inductance base and VHF grid ring provide excellent intra-stage isolation.
6. Heat sink cooling available to full anode dissipation.
7. Tubes may be mounted in any position, greatly aiding circuit layout.
8. And, of course, no bulky screen or bias supply needed!



Another example of EIMAC's ability to provide tomorrow's tubes today!

Here are the numbers to prove it:

**The EIMAC 8873** is a grounded grid triode designed for conduction cooling to a heat sink. See this 1971 design in tomorrow's ham gear.

**The EIMAC 8874** is electrically equivalent to the 8873 but has a 400 watt anode designed for axial-flow, forced air cooling.

**The EIMAC 8875** is also similar to the 8873 with a 300 watt anode designed for transverse air cooling with a quiet and inexpensive "phono motor" fan.

A pair of any of these exceptional triodes will fit in the palm of your hand. And will provide you a full 2000 watts PEP input for voice. They're rated for continuous RTTY service, too. We've built a single tube kilowatt 432 MHz stripline amplifier. It'll run 50% overall efficiency with 25 watts drive. More than adequate for successful moonbounce operation!

14 MHz DX operation . . . RTTY . . . moonbounce at 432 MHz . . . widely separated goals, but all met by one family of rugged, ceramic/metal grounded grid triodes, by EIMAC.

**TYPICAL OPERATION,  
INTERMITTENT VOICE SERVICE TO 30 MHz**

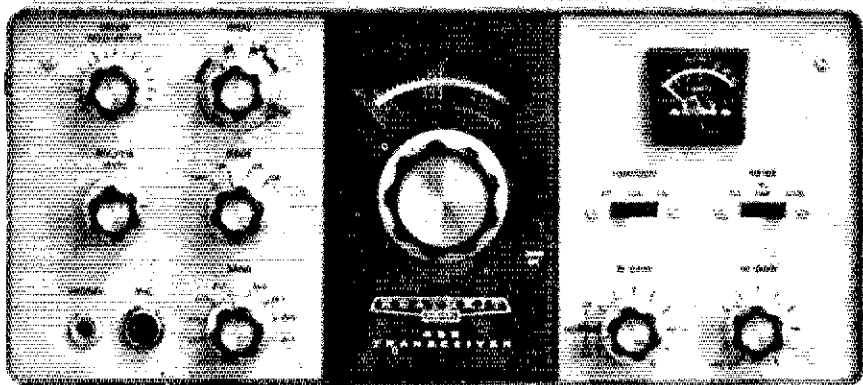
Plate Voltage	Zero-Signal Plate Current	Single-Tone IVS Plate Current	Useful Power Output
2000 V	22 mA	500 mA	587 W
Peak Drive Power	Cathode Voltage	Resonant Load Impedance	Intermodulation Distortion Products
25 W	+8.2 V	2140Ω	3rd order: -35dB 5th order: -36dB

Write to EIMAC for full details and suggested circuitry for this new family of tubes. The 8873, 8874 and 8875. And 8873 to you. EIMAC, 301 Industrial Way, San Carlos, California 94070. Phone: (415) 592-1221.



division  
**varian**

# better than the "Hot-Water 100" ...and a nickel cheaper



**NEW Heathkit® HW-101... \$249.95\***

World's best low cost rig is now even better. The Hams at Heath have done it again... by adding important new performance features to the famous HW-100... without adding to the price. That's Heathkit value... and this is the rig...

**Improved receiver circuitry** now delivers 0.35  $\mu$ V sensitivity for 10 dB S+N/N.

**Improved dial drive mechanism.** New ball-bearing drive assembly provides a 36 to 1 knob to dial turning ratio... delivers 34 velvet-smooth knob revolutions per 500 kHz band segment.

**Front panel switch selection of SSB or CW filters.** Now choose the built-in 2.1 kHz or optional 400 Hz filter with just a flip of a switch.

Plus all the features that made the "100" the world's most popular transceiver. Add it all up and you've got the new HW-101... a lot more rig for a little less money. From the Hams at Heath, of course.

Kit HW-101, 23 lbs. .... \$249.95\*

Kit HP-23A, AC supply, 19 lbs. .... \$51.95\*

Kit HP-13A, DC supply, 7 lbs. .... \$69.95\*

SBA-301-2, 400 Hz CW filter, 1 lb. .... \$21.95\*

SBA-100-1, mobile mount, 6 lbs. .... \$14.95\*

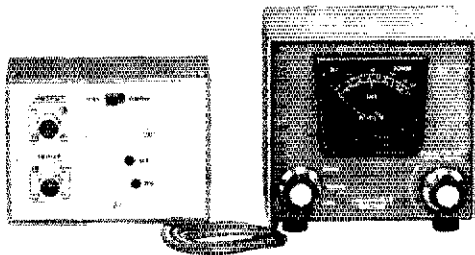
**HW-101 SPECIFICATIONS — RECEIVER:** Sensitivity: Less than 0.35 microvolt for 10 dB signal-plus-noise to noise ratio for SSB operation. SSB selectivity: 2.1 kHz minimum at 6 dB down; 7 kHz maximum at 60 dB down (3.395 MHz filter). CW selectivity: (with optional SBA-301-2 CW crystal filter installed); 400 Hz min. @ 6 dB down; 2.0

kHz max. @ 60 dB down. Input: Low impedance for unbalanced coaxial input. Output impedance: 8 ohm speaker, and high impedance headphone. Power output: 2 watts with less than 10% distortion. Spurious response: Image and IF rejection better than 50 dB. **TRANSMITTER:** DC power input: SSB, (A3J emission) 180 watt PEP (normal voice, continuous duty cycle). CW, (A1 emission) 170 watts (50% duty cycle). RF power output: 100 watts on 80 through 15 meters; 80 watts on 10 meters (50 ohm non-reactive load). Output impedance: 50 ohm to 75 ohm with less than 2:1 SWR. Oscillator feed-through or mixer products: 55 dB below rated output. Harmonic radiation: 45 dB below rated output. Transmit-receive operation: SSB: PTT or VOX. CW: Provided by operating VOX from a keyed tone, using grid-block keying. CW side-tone: Internally switched to speaker or headphone in CW mode. Approximately 1000 Hz tone. Microphone input: High impedance with a rating of -45 to -55 dB. Carrier suppression: 45 dB down from single-tone output. Unwanted sideband suppression: 45 dB down from single-tone output at 1000 Hz reference. Third order distortion: 30 dB down from two-tone output. RF compression (TALC\*): 10 dB or greater at 1 mA final grid current. **GENERAL:** Frequency coverage: 3.5 to 4.0; 7.0 to 7.3; 14.0 to 14.5; 21.0 to 21.5; 28.0 to 28.5; 28.5 to 29.0; 29.0 to 29.5; 29.5 to 30.0 (megahertz). Frequency stability: Less than 100 hertz per hour after 30 minutes warmup from normal ambient conditions. Less than 100 Hz for  $\pm 10\%$  line voltage variations. Modes of operation: Selectable upper or lower sideband (suppressed carrier) and CW. Dial calibration: 5 kHz. Calibration: 100 kHz crystal. Audio frequency response: 350 to 2450 Hz. Transistors: MPF105 FET-VFO; 2N3393-Voltage regulator. Rear apron connections: CW Key jack; 8 ohm output; ALC input; Power and accessory plug; RF output; Spare. Power requirements: 700 to 850 volts at 250 mA with 1% maximum ripple; 300 volts at 150 mA with .05% maximum ripple; -115 volts at 10 mA with .5% maximum ripple; 12 volts AC/DC at 4.76 amps. Cabinet dimensions: 14 1/4" W x 6 1/4" H x 13 3/8" D. \*Triple Action Level Control™

## New Heathkit® Wattmeter... \$29.95\*

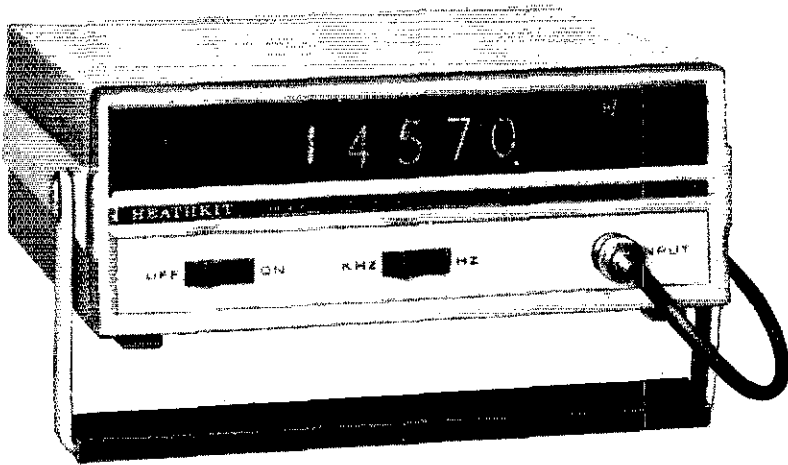
You asked for it... a low cost high quality Heathkit wattmeter. New HM-102 measures RF power output from 10-200 W and 100-2000 W in two switch-selected ranges. Built-in calibrator permits 10% accuracy throughout the 80-10 M bands. Built-in SWR capability. Negligible loss permits permanent insertion in any 50 ohm line. Exclusive remote detector allows placement of meter in any location. Put the new HM-102 in your shack now... it's another powerful value from the Hams at Heath.

Kit HM-102, 3 lbs. .... \$29.95\*



# The only difference between the new Heathkit® Frequency Counter and those costing \$400

...is the price **\$199<sup>95</sup>\***



Compare performance & features of the IB-101 to counters selling for twice the price! Counts from 1 Hz to over 15 MHz; advanced IC design eliminates blinking readout and divider chain adjustment.

**8-digit capability.** Set the range switch to kHz and read to the nearest kHz... push the range switch to Hz and read down to the last Hz. Overrange & Hz/kHz indicators light up to give correct range at all times; do an 8-digit measurement with 5-digit readout.

**Exclusive Heath-designed input circuit.** Dual gate, diode-protected MOSFET design provides proper triggering without adjustment from less than 100 mV to over 200 V. Input Z is 1 megohm shunted by less than 20 pF to minimize circuit loading & error.

**Other features** include sockets for all 26 IC's and 5 display tubes... double-sided, plated-thru fiberglass circuit board... 120/240 VAC operation...

convenient handle/tilt-stand. Compare the new Heathkit IB-101 to the \$400 models... and discover that \$199.95 buys more counter.


Kit IB-101, 7 lbs. .... \$199.95\*

**IB-101 SPECIFICATIONS:** Frequency Range: 1 Hz to greater than 15 MHz. Accuracy:  $\pm 1$  count  $\pm$  time base stability. Gate Times: 1 millisecond or 1 second with automatic reset. **INPUT CHARACTERISTICS—Sensitivity:** 1 Hz to 1 MHz, less than 100 mV rms. 1 MHz to 15 MHz, less than 250 mV rms, after 30 minutes warmup. Trigger Level: Automatic. Impedance: 1 Megohm shunted by less than 20 pF. Maximum Input: 200 V rms. DC—1 kHz. Derate at 48 V per frequency decade. **TIME BASE: Frequency:** 1 MHz, crystal controlled. Aging Rate: Less than 1 PPM/month after 30 days. Temperature: Less than  $\pm 2$  parts in  $10^7$ /degree C. 20 to 35 degrees C after 30 minutes warm-up.  $\pm .002\%$  from 0 to 40 degrees C. **GENERAL: Readout:** 5 digits plus overrange ambient. Temperature Range: Storage; -55 to 80 degrees C. Operating; 0 to 40 degrees C. Power Requirements: 105-125 or 210-250 VAC, 50/60 Hz, 8 watts. Cabinet Dimensions: 8 $\frac{1}{4}$ " W x 3 $\frac{1}{8}$ " H x 9" D not including handle. Net Weight: 4 $\frac{1}{2}$  lbs.



**FREE '71 CATALOG**

Describes these and over 300 other Heathkits. Save up to 50% by building them yourself. Use coupon and send for your FREE copy!



HEATH COMPANY, Dept. 8-1  
Benton Harbor, Michigan 49022  
a Schlumberger company

Enclosed is \$ \_\_\_\_\_, plus shipping.

Please send model (s) \_\_\_\_\_

Please send FREE Heathkit Catalog.

Name \_\_\_\_\_ (Please Print)

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Prices & specifications subject to change without notice.  
\*Mail order prices; F.O.B. factory.

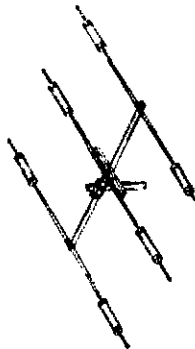
TE-233

# Mosley Electronics Inc.

QUARTER OF A CENTURY OF MANUFACTURING KNOW-HOW, 1946 TO 1971

# CELEBRATING OUR 25th YEAR

## Classic Line Multi-Band Beams



### MODEL CL-33 10, 15, & 20 meters

Designed to provide the extra gain for working hard-to-reach DX. Incorporates the exclusive Mosley patented "Balanced Capacitive Matching". Features include six Trap-Master traps with resonant frequency stability, improved boom for even wider element spacing. Stainless Steel hardware. Fits up to 2" mast. Use with most heavy duty rotors. The CL-33 is designed for 1000 watts AM/CW or 2000 watts P.E.P. SSB.

## TRAP MASTER

## Multi-Band Beams



### MODEL TA-33 10, 15, & 20 meters

The most widely used 3-element beam in the amateur universe. The TA-33 features the Mosley "Trap-Master" traps, known for rugged construction and resonant frequency stability under all weather conditions. Power rated: 2000 watts P.E.P. SSB.

### MODEL TA-33Jr. 10, 15, & 20 meters

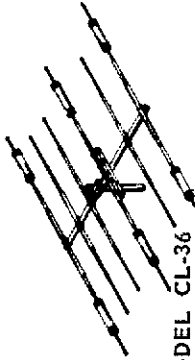
The TA-33Jr incorporates the same famous "Trap-Master" performance found in the TA-33 at a reduced price. Offering a power rating of 1000 watts P.E.P. SSB.

# Anniversary Special

## Free QSO Index

Keep track of over 200,000 contacts. Recall in seconds whether you have contacted a station before, and if so, the operators name. The deluxe Mosley QSO Index will never increase in size or weight and is light enough, only 28 ounces, to carry with you on those field day operations. This unique QSO Index will provide you with hours of pleasure and it is yours free with the purchase of any one of the Mosley Antennas shown here.

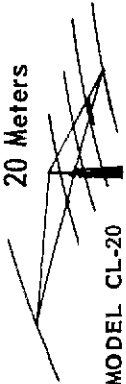
Free offer expires December 31, 1971.



**MODEL CL-36**  
10, 15, & 20 meters

The Classic 36, incorporating the Mosley superior feed system "Balanced Capacitive Matching". This wide-spaced, six-element beam employs 4 operating elements on 10 meters, 3 operating elements on 15 meters and 3 operating elements on 20 meters. Automatic bandswitching is accomplished through Mosley designed high impedance paralleled resonant "Trap-Circuits".

### Single-Band Beams 20 Meters



**MODEL CL-20**

The improved electrical balance, "Balanced Capacitive Matching," combines with optimum spacing to provide maximum gain, increased bandwidth for greater efficiency in performance.

**MODEL CL-203**

Designed for full power, the new Classic 203 will out-perform many four to six element arrays. The Classic Feed System, combined with optimum spacing to provide maximum gain, increased bandwidth and rugged construction, offers the most in 3-element, 20 meter beam performance.

### New Six-Band Mobile Antenna System



A unique mobile antenna system offering the greatest number of money-saving options ever available in the amateur radio market. Your choice of 6, 10, 15, 20, 40, and 75/80 meters. Select from five new interchangeable coils, all of which are especially designed for the thrifty, economy-minded Ham.

Each "Rode-Master" coil is precision wound on phenolic form, housed and sealed in a curable, water-proof phenolic case and power rated for 200 watts AM; 400 watts P.E.P. SSB. VSWR 1.5/1 or better at resonance on each band.

The upper whip section of the "Rode-Master", Support-Mast is a Six-meter antenna, adjustable for the entire 6 meter band and may be purchased separately.

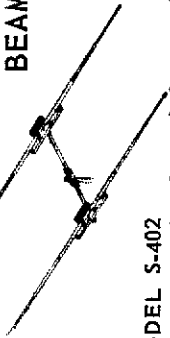
The lower section of the mast has a host of features that include provisions for bumper or deck mounting. A break-over (hinge) to lower and swivel, align and secure antenna to gutter rail.

"RODE-MASTER"

- |                  |             |
|------------------|-------------|
| 6 meter antenna  | Models MD-6 |
| 10 meter coil    | MD-10       |
| 15 meter coil    | MD-15       |
| 20 meter coil    | MD-20       |
| 40 meter coil    | MD-40       |
| 75/80 meter coil | MD-78       |
| Matching Network | MD-48       |

### Signal-Master

40 METERS  
BEAM



**MODEL S-402**

For a top signal needed to push through 40 meter QRM, the Mosley Signal Master S-402 will do the trick! This 100% rust-proof 2-element beam unit constructed of rugged heavy-wall aluminum is designed and engineered to provide the performance you need for both DX hunting and relaxing in a QRM free rag-chewing session. Beam is fed through couplings, resulting in an excellent match over the entire bandwidth.



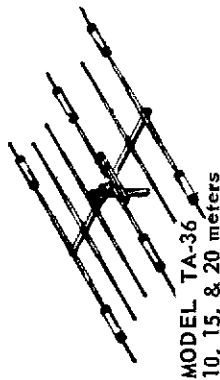
### Multi-Band Verticals

**MODEL RV-3C**

Three band vertical for 10, 15, and 20 meters. RV-3C features automatic bandswitching and low angle radiation. Complete with guy line, "Cyclac" base, coax fitting and all necessary hardware.

**MODEL RV-4C**

Mosley RV-4C, vertical antenna is ideal for installation where space is an important factor. Designed for 10, 15, 20, and 40 meters. With automatic bandswitching. Entirely self-supporting.



**MODEL TA-36**  
10, 15, & 20 meters

The voice of authority! This wide-spaced 6-element configuration employs 4 operating elements on 10 meters, 3 operating elements on 15 meters, and 3 operating elements on 20 meters. Automatic bandswitching is accomplished through the Mosley exclusively designed high impedance paralleled resonant "Trap-Circuits".

For more information see your nearest Mosley Dealer or specify area of interest and write factory direct.

Dept. 205

**Mosley Electronics, Inc.**  
4610 N. LINDBERGH BLVD.  
BRIDGETON, MO. 63044

Mosley, manufacturer of quality TV Antenna Accessories for nearly a Quarter of a Century.

Write Dept. 198-TV for free Booklet!

'How to Improve Your TV Picture'

at McKinley Field House, 1000 So. 72nd St. They also will hold code and theory classes for Novices before the meeting. The former Eye Bank Net nos is called Eye Emergency Net, The Dane County Civil Defense Net meets Mon. nights at 8:30 on 146.94. WA9RYD is back from Alaska and active again. K9KSA has an SB-200. Wis RACES meets Sun. at 1400Z on 3993.5. WN9DWG and WN9EMO are now General Class licensees and will sign WB9. Traffic: W9CXY 433, WB9BJR 347, K9CPM 238, W9DND 122, WB9FFY 112, K9KSA 98, W9ESJ 85, WA9QNI 68, K9FHI 46, W9NRP 43, W9AOW 36, W9AYS 35, W9KRO 33, K9IP3 30, WA9AY9 30, W9IHW 26, WB9ABI 25, W9RPT 22, K9TBY 21, W9OMT 20, W9DXV 18, WA9YEC 15, W9CBC 13, K9VER 12, WA9IHF 10, WB9DXK 6, W9ZBD 6, WA9EDZ 5.

### DAKOTA DIVISION

**MINNESOTA** - SCM, John H. Halstead, K0MVF - Asst. SCM; Edna M. Thorson, WA0RRA. SEC: WA0MZW. RMs: WA0IAW, W0AAU. PAMs: WA0HRM, WA0OEL, WA0DWM, WA0MMV. Competition is fierce in W0LYP's shack with three new hams in the family, W0OCHK, W0OCBP, W0OCJW. Congrats! Happiness for W0UTT is good signal reports he receives on his new T4-XB and R4-B. The Southwest Minnesota Amateur Radio Assn. organizational meeting was held Oct. 27 at Fairmont. WA0IEF reports plans to affiliate with ARRL. W0OCVR, son of the late K0JLV, is reactivating the station at Cutting, Minn. The usual high class gear changed hands at the annual Oct. auction of the Minneapolis Radio Club. WA0UAF, W0TCK, W0CSC, WA0TUU needed a truck to haul home the loot! WA0WDX has a brand new Life Membership. WA0TNG made Extra Class and Uncle Sam's Air Force on almost the same day! K0ZXE has a new two-element 40-meter beam at 70-feet. W0AAU and WA0LUP have started novice cw and theory classes at Fergus Falls. WA0EPX and WA0JPR are sporting new Advanced Class tickets. W0PAN, Dakota Division Director, is on temporary assignment in Phoenix, Ariz. Traffic: (Oct.) WA0VAS 1102, WA0TOT 560, K0CSE 293, WA0WEZ 244, W0ZHN 211, WA0IAW 158, WA0WDX 131, WA0OEL 91, W0BUC 81, K0ZRD 77, WA0RRA 61, W0WFA 55, WA0YMU 50, WA0ONE 49, W0AAU 44, WA0TFC 39, WA0VTZ 39, WA0VYV 37, W0BE 30, WA0RKV 30, W0IYP 16, WA0HRM 24, K0ORR 22, K0ZBI 22, K0MVF 17, WA0YZH 17, WA0DOT 16, WA0JPR 16, K0CJC 15, W0MYB 14, WA0NOH 13, W0HEN 12, WA0IIB 12, WA0UAH 12, W0UMX 12, WA0JXL 11, WA0YJB 11, W0CNCB 9, K0DD 9, K0FTI 8, K0SRK 8, W0BAEM 7, W0BUO 6, W0SZJ 6, W0KNR 5, K0LWK 5, W0NYVT 5, K0ZXE 5, W0KLG 4, WA0MMV 4, WA0MNE 4, W0EQO 3, K0FLT 3, K0IKU 3, W0PET 3, WA0STJ 3, WA0CJZ 2. (Sept.) W0WFA 39, W0NFU 18.

**NORTH DAKOTA** - SCM, Harold L. Sheets, W0DM - SEC: WA0AYL. OBS: K0SPH. PAM: W0CAQ. RM: WA0RSR. OO: W0BF. Five members of the Theodore Roosevelt ARC manned the Mini-Field Day held at the juncture of three states, Montana, North and South Dakota. Both general and novice stations were set up with about 150 contacts made. Antennas were built on the spot. Special QSLs will be sent for this location. WA7GVT, WA0ZPI, W0BAUM, W0BAY, W0CIP and W0NCEP participated. W0BAUM has a new SB-102. The TRARC showed the ARRL film on ssb at its meeting. W0AOX, from Enderlin, joined the ranks of Silent Keys. We are glad to welcome back W0MEA. He is on with a Signet rig on 75-meter so give him a holler. WA0AYL, W0GFE and W0DM recently held an antenna party for W0BHH who now can be heard on 75- and 40-meters especially. Out of the past came a voice of old, W0AZV with a new Signet 270-B. W0BF returned from his western trip mobilizing all the way. WA0JSB also went mobile to the east coast for pleasure and business. WA0REW is back on the WX Net. W0ECX is now in Bradenton, Fla. and will be on 15-meters mostly. W0DM and WA0AYL attended the Directors meeting in Alexandria. W0BUO, ARRL vice-pres, was also there with timely information. W0DM has started radio classes at Valley Jr. High. W0BCZ, the UND station, is back in business again after repairs on the tower and rotator were made.

Net	KHz	CST/Days	Sess.	QNI	Tfc.
Goose River	1990	0900	4	56	-
YL Weather	3994	0730 M-Su	12	224	212
NDPON	3996.5	1830 S-S 0900 Su	12	29	14
NDRACES	3996.5	1730 M-F 1830 M-F	26	855	66
NDCW	3640	2300 M-F	15	29	5

Traffic: K0SPH 37, WA0RSR 33, WA0ZPI 29, W0DM 20, WA0MND 20, W0BIN 17, W0WWL 14, W0CDO 12, WA0JPT 8.

**SOUTH DAKOTA** - SCM, Ed Gray, WA0CPX - WA0LY reports DXCC at 114/79. He has finished the remote vfo for the HW-100. It works fine. WA0THG has completed his staining and will be sailing aboard the USS Mt. Whitney from Newport News, Va. as soon as construction is completed. WA0YFR of Menno has taken over the duties of Net Mgr. for the Early Session Evening Net. All the nets are very active and your check-ins are encouraged. The CW Net on 3.645 would appreciate your check-ins. They meet at 0100Z. The Morning Net reports 653 check-ins and 77 formals, the NJQ Noon Net reports 385 QNI and 12 formals, the Late Evening Net reports 1336 QNI and 75 formals, the CW Net reports 60 QNI and 9 formals. Traffic: WA0FUZ 221, W0HOJ 142, WA0PNB 8, W0IG 37, WA0UFN 32, K0AIE 24, WA0LYO 6, WA0CAS 26.

### DELTA DIVISION

**ARKANSAS** - Acting SCM, Jimmie N. Lowrey, WA5VWH - SEC: W5PBZ. RM: WASTLS. PAM: WA5KJT. Congratulations to W5OYH on passing the Advanced Class exam. WNSBLE, General Class and W5BYV also General Class, WA5VDH had his station struck by lightning and was off the air for a while, he now is back on with his rig but his TA-33 was destroyed. W5NPM, ex-SEC of Arkansas, now is in Biloxi, Miss. W5EFL has a new QTH in Little Rock and has gained a variance on the Little Rock city ordinance maximum of 75-feet. He plans to put up four-elements on each band 10, 15, and 20. WNSBPU/4 has been working good DX from his school QTH. WNSROE operates portable at Arkansas Tech. W5RNG and W5PWP conduct Novice classes at the U. of Arkansas. Nov. 1 through 7, 1970 was proclaimed Amateur Radio Week in Arkansas by Governor Rockefeller.

Net	Time(Z)/Day	Freq.	QNI	Mts.	Tfc.	Mgr.
OZK	0100 Dy	3790	214	574	37	WASTLS
RN	0030 Dy	3995	618	654	13	WASJUP
PON	2130 M-F	3925	185		70	W5MJO
APN	1200 M-F	3937	425	1405	20	W5VEV
DX INFO	0045 M	3860				W5EFL
EC Net	0000 Su	3995				W5PBZ

Traffic: W5NND 164, WASTLS 48.

**LOUISIANA** - SCM, J. Allen Swanson, Jr., W5PM - You indulgence fellows! I just arrived back in Covington two days ago and there is no time before our deadline to go through the volume of reports you have sent in. A good report next month. I spent 10 glorious days in England and had dinner with G2-MI, QSL Mgr. for the RSCB. Then 8 glorious days touring Switzerland in a rented car. The HB9s were scarce. From Montrux near Geneva the XYL and I spent 14 days in Italy visiting Milan, Florence, Rome and Naples. We sailed from Naples on the SS Michelangelo and stopped for a few hours in Algieria and Halifax before New York. Then 10 days in Chappaqua, N.Y. before flying home. I'm still in the clouds but expect to be back on the air shortly. My thanks to our SEC for handling the story here for the last two months! Don't forget our Annual QSO Party Jan. 16, 17, starting at 1800 GMT. The usual frequencies and logs go to K5ARL 123 Normandy Road Lafayette, La. 70501.

**MISSISSIPPI** - SCM, Clifton C. Comfort, WASKEY - This is my last SCM report. W5NCB now is Acting SCM. Only the cooperation of you fellows made the job possible for me. Thanks. Please give your support to Walker. I am happy that a man of his qualification is willing to work with and for Amateur Radio. W1LRW/5 has gone back to New York. WA9QVT/5 has transferred to Fla. and will be missed on the CW Net. The QCWA Mississippi charter has been granted! Those interested contact W5JHS. W5BW is secy. On Oct. 17, W5LEA in Greenwood and W4BOA in Memphis worked an unusual 116 mile QSO on 20-meters with 30 over 9 copy from 9:30 A.M. to 10:30 A.M. WA5YJA made WAS. The Greater Natchez Amateur Radio Club is planning a hantfest in Apr., '71. It will take place the week end following the Annual Natchez Pilgrimage. Watch for it. WA5EIN is active again. W5SBM now is mobile. WA5XC and WA5WJR have the 2-meter repeater almost ready.

Nets	KHz	CST/Days	Mgr.
MTTN	3665	1845 Dy	W5SBM
GC5BN	3928	1830 Dy	W5JHS
MSB	3990	1815 Dy	WA5UYW
CG5HN	3935	1900 Dy	WA5GOH

Traffic: W5SBM 327, WA9QVT/5 251, W5EDT 92, W5WZ 40, WA5SEG 38, W5NCB 22, W5BW 9, WA5EIN 5, K5KIR 2.

**TENNESSEE** - SCM, Harry A. Phillips, K4RCT - SEC: WB4ANX. RM: K4AMC. PAMs: W4FP, K4MQI, WA4EWW.

Net	Freq.	Time(Z)/Days	Sess.	QNI	QTC	Mgr.
TSSB	3980	2330 Tu-Su	26	1617	109	K4MQ



The most powerful antennas under the sun!

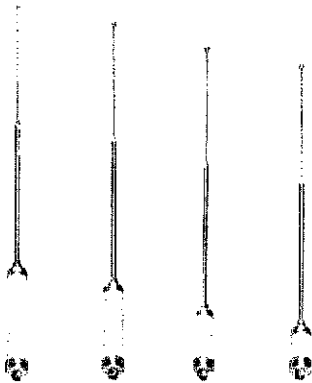
# Hy-Gain's ALL NEW HAMCAT

## Now The Best Is Even Better!

No. 252

- More power capability with lower VSWR
- Higher Q plus broad band performance
- Higher radiation effectiveness
- Lightweight, super strength construction
- Shake-proof sleeve lock folds over for garaging
- Lightweight precision wound coils sealed in an indestructible epoxy-fiberglass sleeve
- Swivel base for quick change from band to band
- Nominal 52 ohm impedance on all bands—no special matching (any length coax will work)
- Coil sleeve is distinctive white with heavy chrome plated brass fittings
- Turn-over mast is hefty 5/8" dia. heavy wall tubing of highly polished heat-treated brite dipped aluminum
- All connections are standard 3/8 x 24 thread
- Mast folds over, swivels, turns over—mount it on bumper or deck
- Swivel lock base is stainless steel
- Coil and tip rods are a one-piece assembly. Coil diameters are constant, only lengths change

Order No. 257 All new design 5' long heavy duty mast of high strength heavy wall tubing	<b>\$16.95</b>
Order No. 252 75 meter mobile coil	<b>\$19.95</b>
Order No. 256 40 meter mobile coil	<b>\$17.95</b>
Order No. 255 20 meter mobile coil	<b>\$15.95</b>
Order No. 254 15 meter mobile coil	<b>\$12.95</b>
Order No. 253 10 meter mobile coil	<b>\$10.95</b>



No. 256    No. 255    No. 254    No. 253

<p>Shake proof SWIVEL LOCK releases fold-over hinge</p>	<p>SWIVEL BASE simplifies quick change from band to band</p>
<p>Order No. 492</p> <p>Price \$2.80</p> <p>Coil and tip rod SPRINGS also available Sling. Wt. 0.2 lbs.</p>	<p>COIL ASSEMBLY (G)-AWAY</p> <p>G. Chrome plated brass fittings. H. Inner fiberglass core I. Precision coil. K. Water fiberglass shield.</p> <p>All permanently assembled and completely impregnated with special moisture-proof compound.</p>

### Hy-Gain Heavy Duty Bumper Mount

- Rugged stainless steel construction • Handles full size heavy whip
- Clamps to most car bumpers

Order No. 415

**\$8.95**

## HY-GAIN ELECTRONICS CORPORATION

P.O. Box 5407-HA, Lincoln, Nebraska 68505

No. 257

LPN	3980	1145 M-1	31	1270	43	W4PFP
EIPN	3980	1300 Sa-Su	22	614	30	WA4EWW
IPON	3980	2330 M	4			4R1A
TN	3635	0000 Dy	30	178	55	K4AMC
E1VHE	145.2		9	46		W4IOB
W4VHV	50.4		13	155	3	W4GGB
E1IM	28.7	0200 W&F				WA4QXC
MTTM	28.8	0200 Tu&F	9	9		WA4GLS

W4HHK and W3G6P have made the world's first 1304 MHz microphone contact. Congratulations! The Farragut High ARC needs an inexpensive transmitter. Contact W4QOM, Ienoir City. We welcome the former Fla. RM, K4UUY4, who is attending graduate school at MTSU. W4HSS, OPS, is trying for DXCC. The W4E4I repeater (Nashville) is now equipped with auto-patch. Efforts are being made to have liaison stations on each section net ready to relay out-of-state traffic through the NTS. I hope everyone will participate in the SET. Traffic: K4UBY4 234, WA4DAZ 179, W4ZJY 172, W4OGG 125, W4SQE 49, W4WBK 37, W4MYZ 21, W4BANX 18, WA4GLS 15, W4PFP 15, WA4CGK 13, W4MXP 12, W4E4I 8, W4GTV 8, W4BMPJ 8, WA4YFM 7, WA4ZZZ 7, W4DYJ 6.

**GREAT LAKES DIVISION**

KENTUCKY - SCM, George S. Wilson, W4OYL - SEC: K4YZU. Appointee: W4NQZ (KNN) as RM. Undorsed: W4BAZ as RM (Ky.), W4C7V as EC, W4C10 as ORS and EC, W4TOY as OO and OVS. BPLs: WA4MKL, W4OYL.

Net	QMI	QTC	Secs	QMI	QTC
KRN	434*	34*	KNTN	131*	72*
MKPN	504*	25*	KYN	305	220
KTN	1051*	197*	FCATN	138*	71*

Note that an asterisk on net report indicates improvement over last year. W4LEZ and WA4WSW are sporting new amplifiers and W4MTT has a new rig. W4PSP and W4MCT are running a Central Area Novice Net on 7150 at 9:30 EST. W4LIL is wall papering with placards from CAN, WAS and WAC. W4BTA and his group had a simulated hospital readiness exercise. It's been swell being your SCM. Y'all support W4CID. Ted is welcome to my support and any help I can give. Thanks for the nice cards and messages. Traffic: (Oct.) WA4MKJ 435, WA4VZZ 385, W4OYL 309, W4KPL 292, W4LIL 234, W4NQZ 138, W4PSP 118, W4MTT 114, W4HOW 105, K4MAN 95, K4UDZ 71, WA4EAF 68, K4TRT 57, W4BGE 54, W4BAZ 49, WA4CHO 48, WA4AGH 41, WA4WSW 38, W4EOR 28, W4AAUN 24, K4DZM 20, W4MRZ 20, W4OYL 20, K4UMN 18, WA4MLX 17, W4GCV 13, W4LKP4 12, K4UNW 12, W4BTA 10, K4HOL 10, W4LOY 8, WA4DYL 7, W4LEZ 7, K4VDZ 7, W4BGG/D4 5, W4LIL 5, W4KER 5, K4YCB 5, W4HTN 4, K4AVX 2. (Sept.) W4HOW 77, W4LIL 24, W4LEZ 10, K4AVX 1. Total traffic 2567\* Reports 44\*.

MICHIGAN - Acting SCM, Jerry C. Ohlmgrove, W8ZTF - SEC: W8MPD. RMs: W8PJM, W8RTN, W8WV, K8KMO, W8D7T. PAMs: W8VXM, W8ASTN, K8PVC. VHF PAMs: W8VQ, K8AFM.

Net	Freq.	Time/Days	QMI	QTC	Secs	Mgr.
QMN	3663	2300 Dy	1113	361	43	W8PJM
WSSB	3435	0000 Dy	864	114	31	W8VXM
BR/MEN	3930	2230 S-F	810	72	26	W8RTN
DFPN	3420	2230 Dy	466	33	31	K8MJK
GLFTN	3932	0130 Dy	812	112	31	K8PVC
PRO-DAY	3453	1600 Dy	868	223	31	K8JNF
PON-GW	3625	0000 M-S	184	13	25	V4JDPO
S&M2M	145.26	0100 M-F	66	0	4	W8VQ
6M 1U		M-F	141	23	22	W8VXF

New officers for GRARA are W8AAT. pres.: W8IKP, vice-pres.: W8SWZ, secy.: W8IGT, treas. GRARA now is planning for the Apr. ARRI Convention at Grand Rapids, Kent Co. Emergency Club, with constitution changes, becomes Kent Co. Repeater Club with W8DNX, pres.; W8SHZL, vice-pres.; K8QJL, secy.-treas. Milford ARC, W8YDK, was on Spook Patrol for the 9th year with 16 hams assisting, using 10 mobiles. The VHF conference at WMU was a big success. Curran Skuff, Vice Dir., was the dinner speaker and explained ARRI operations. K8SSW is now Extra Class. New General Class licenses are W8KAKH, W8RC'KW, W8R'GC, W8R'GD, W8R'CN is new at Grayling. W8A1 X-8 ganged up with G4MY1/W8 at Ann Arbor and are busy chasing DXCC and WAS on 10- and 15-meters. K8GOU is county hunting for the Wolverine Award. W8JUY has a new rotor for his beam and now works JAs. W8RBJY has a new HW-12. FCs W8NOH, W8RVN, W8ASTV, W8E4K reported to the SEC with a total of 15 drils. New EC appointees are W8WZF, W8PJI and W8KBZ. W8LXY is now editor for the QMN bulletin. The S&MARA now have code and theory classes. The Blossomland ARC are making plans for the annual Swap Shop and Auction, Mar. 14, '71. W8YKO, formerly

of Bloomfield Hills, now is VK5QO in Adelaide. W8AP found trouble in the selsyn indicator, detective plug. The Delta Co. ARC was recently formed in Pecos. Traffic: (Oct.) K8JUI 310, WA8WZL 179, WA8PJM 177, K8JNF 152, W8NOH 149, WA8LXY 146, WA8DUI 142, WA8ZAV 100, W8D7T 86, W8IZ 80, W8JY 71, W8RTN 61, W8MOW 57, W8WV 51, W8WON 51, W8E4K 49, W8ZL 47, W8REU 44, W8ARTN 44, W8BVB 33, W8VXM 32, W8ZL 31, K8IED 31, K8PVC 27, W8FX 24, W8MPD 23, W8ENW 20, W8CFV 18, W8B8PY 17, W8FZL 17, K8MEG 17, W8SH 17, W8SCV 16, W8BMDK 15, W8AIAO 14, W8DEN 12, W8LUC 11, W8KBZ 10, W8UES 10, W8BANR 9, W8BLZ 9, W8PJI 9, W8ACW 6, W8AGQ 6, W8TBP 6, K8GOJ 5, K8AJM 4. (Sept.) W8IZ 64, W8JYA 51, W8TBP 31, W8QJL 13.

OHIO - SCM, Richard A. Egbert, W8F1U - SEC: W8OUK. RM: W8IMI. PAM: K8URK. VHF PAM: W8ADU. Oct. section reports:

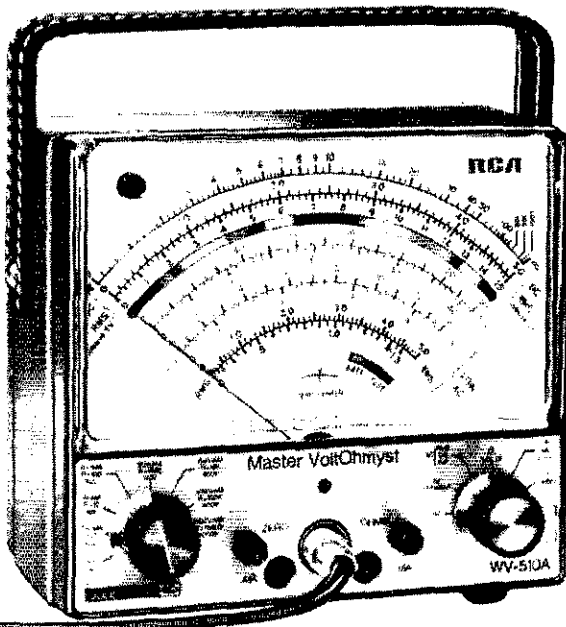
Net	QMI	QTC	Secs	Freq.	Time(Z)	Mgr.
OSSBN	2201	840	62	3972.5	1530	E8LVB
					2345	
BN	675	397	61	3580	0000	W8IM
					0300	
06 MtrN	390	43	61	50.61	0000	WA8AD
					50.16	0200
OSN	203	68	51	3580	2325	WA8WA

BPLs for Oct. went to W8B1X, K8ONA and W8QCU. We regret to report the passing of W8VLL, W8HW and W8EA. New officers of the Lancaster and Fairfield Co. ARC are W8STP, pres.; W8IFR vice-pres., W8SVC, secy.: W8SSJ, treas. Ohio State U. RC officers are W8AVN, pres.; W8ULF, vice-pres.; W8BAIF, secy. W8C'F, treas. Toledo Mobile RA elected W8KW, pres., W8SYV vice-pres.; W8DEO, secy.; K8RZL, treas. K8LH NW Ohio he announces reorganization of his ARFC group. Columbus Area had talk and demonstration on ATV by W8DMR. K8ONA spoke at amateur radio before the Cleveland Lions Club. The Scioto Valley ARC newsletter reports that W8RIQ now is W84RMY in Atlantic Co. The Fourth Annual 8th Region ARPS: Conference held at Columbus had about 35 attending from Mich., W. Va. and Ohio. Parra RC's bulletin remarks that the Oct. Boy Scout On-the-Air Ambrose was a big success. The fall meeting of the Ohio Council of Amateur Radio Clubs was attended by our Director and 2 delegates representing 23 clubs. Top scorers in the Ohio QSO Party were W8Y7D, Wis., 3550, K4CZS, S.C., 4860 and K8GJD, Md. 4025. Ohio leaders were W8UMD, Darke Co., 18136, W8L7/Delaware Co., 15975 and W8R'DZ/R, Morrow Co., 14475. High points scored was 18436 made by W8FRD who, as contest chmr. disqualified himself. RM W8IMI announces that the section level RITTY Net will be known as the RITTY session of the Buckeye Net Operation starts Jan. 10, and will meet nightly at 2300Z on 360 kHz. Net Mgr. is W8YUB, who is interested in hearing from stations who can NCS and liaison to the rest of NTS. New appointees: W8RCL, K8RDX and W8LKY as ORSs; W8KAJ OO; W8LKY as OVS/OPS, OSSBN certificates for continuing activity were earned by W8AJC, W8AVS/R, W8C'B, W8B'W, W8CUT, W8B'DZ, W8EKO, W8FPA, W8ETX, W8F'CO, W8F'CO, W8G'G, W8G'VX, W8H'VK, W8JMD, W8KAL, W8RAY, K8BHH, K8BYR, W8D'HC, W8DWL, W8FMK, W8F'U, W8F'U, W8F'U, W8G'N, W8G'N, W8G'N, W8G'N, W8H'U, Ohio Six Met Net members qualifying for certificates are K8ACD, W8AHI, W8AHR, W8BHP, W8BFZ, K8RNS, W8BNT, W8BWT or W8SKL. Don't forget the 81 T Jan. 31. Best wishes to all for Happy and Prosperous New Year. Traffic: (Oct.) W8E4K 56, W8LAT 377, K8ONA 296, W8FRD 286, W8IMI 205, W8QCU 19, W8R'D 188, W8AVS/R 162, W8DWT 146, W8R'DSV 13, W8AUP 136, W8D 134, W8AKW 126, W8G'V 126, W8AOF 120, W8QZK 118, K8BHH 111, W8PJI 109, W8AUL 10, W8AKW 100, W8MOK 29, K8UBK 86, W8CWD 80, W8OF 8 W8DHY 78, W8JHI 75, W8K'G 69, W8JMD 62, K8GJA 6, W8LJW 50, W8GRR 50, W8R'RH 48, W8C'HT 41, W8ZT 41, K8BYR 35, W8LH 34, K8MCK 32, W8RNO 32, W8S'P 30, W8WPO 30, K8E'F 28, W8G'N 28, W8VWH 28, W8YU 27, W8F'U 25, W8RZG 25, W8BAJ 24, W8E4K 24, K8OY 24, W8V'F 23, W8A'DU 20, W8G'D 20, W8R'D 20, W8R'D 18, W8AYC 17, W8GOE 16, K8DHI 14, W8RMI 14, W8FGD 1 W8KTH 13, W8H 12, W8FPA 12, W8LZ 12, W8NAL 1 W8ASHP 9, W8BZX 7, W8E4K 7, W8L 7, W8OUI 7, K8PBE W8WSO 7, W8CEH 6, K8LJG 6, W8AJZ 5, W8BCKI W8UPD 5, K8C'Y 4, K8E'K 4, K8RDX 4, W8EBS 3, W8BEH W8E'W 2, W8YHN 2, W8ZNC 2, W8COC 1. (Sep. W8YHN 47.

**HUDSON DIVISION**

EASTERN NEW YORK - SCM, Graham G. Berry, K3SJM. SEC: W8KGC. PAM: W8ZVB. RM: W8VYS. VHF PAM:

# Now it costs less to own the best VOM you need.



The New RCA WV-510A Solid-State Master VoltOhmyst®

\*Inexpensive Quality  
†Optional Distributor  
Resale Price

The best you need is the new solid-state RCA WV-510A Master VoltOhmyst®. The most functional VOM we've ever produced, the 510A has all the features you'll ever need no matter what your requirements may be.

And we've added some extra features you won't find in any competitive VOM, at any price...features designed to make your work easier, help you get the job done faster.

For example: RCA WV-510A operates from batteries or AC. Remove the detachable AC line cord while you're taking a measurement and the batteries take over immediately without a flicker of the pointer. And you'll get maximum life from the batteries because they're always on trickle charge during AC operation. Stability? Switch from range to range and watch a whole series of measurements without constantly zero-adjusting the meter.

Some statistics:

Current:

0.01 milliampere to 1.5 amperes in 8 ranges.

Resistance:

0.02 ohm to 1000 megohms in 7 ranges.

DC Volts:

0.01 volt to 500 volts in 8 ranges.

AC Volts:

0.2 to 1500 rms AC volts in 7 ranges plus peak-to-peak voltages of complex waveforms.

21 megohm resistance on all DC ranges.

And it's only \$128,† complete with DC/AC ohms probe and flexible shielded input cable with BNC connector, and removable AC line cord.

Some statistics! For complete details, contact your local RCA Distributor.

RCA|Electronic Components|Harrison, N. J. 07029

WB2YOU. Section nets: See last month's column for listings. Renewals and appointments: WA2VYT as ORS and OPS; WA2BRA as OBS and OVS; WB2FUV as ORS; W2URP as Schenectady Co. EC. On the club circuit: In Oct., the Westchester Co. ARA heard Vice-Directorial candidates K2SJO and WB2TUL; also present was Director-elect W2TUK and ENY SCM, K2SIN. The same team was at New Rochelle the previous week for the CNR meeting. The Harmonic Hills lists WN2KDE and WA2GJT as new dir.; WN2KDE as editor of the club bulletin. The Albany Club heard K2HYD on microwave communications. The Albany HS ARS, W2YPN needs novice crystals desperately - check your junk box for possible donations. The Poughkeepsie ARC held its Annual Auction in Oct. The LERA ARC now has details available on the 1971 NY State QSO Party, 1 or details write WR2OZG. The Spring Valley HS ARC, WB2OOU is planning a Rockland Co. QSO Party; write WA2FBI or WA2FIQ for details. The Schenectady Club held its Annual Auction in Oct. and presented the H.P. Broughton Memorial Award to WB2BDB for service to the club, the hobby and the community. Congratulations. Individual station activities: K2IQB replaces W2DPV as RO. The New Rochelle CD ex-WB2LZJ now is K4FBG in N.C. WB2ISS qualified for net certificates on F.S.S. WN2NAA raised a tower for his TA-32 and 2-meter beams. Welcome to WN2OOZ. It was nice to see so many ENY appointees and members at the HARC Biennial in Tarrytown. Attention all ARFC appointees: check 3925 MHz Wed, at 8:00 P.M. local for reactivated Westchester Co. ARFC Net. Good opportunity for liaison between counties. If your county lacks an FC, get in touch with W2KGC or K2SIN and fill the vacant spot. WB2GMN reports QRP cw is in as far as he's concerned. WB2MYV reports an HB-30-watter contact with WB2AER, Tulsa, proved out his design. Happy 1971 and good hunting to all in ENY section. Traffic: (Oct.) WA2VYT 221, W2MTA 112, WA2FBI 67, WB2VJB 34, WA2VLS 29, W2ANV 21, WA2MGT 20, WB2FUV 19, K2SIN 19, WB2RXL 9, WB2YQU 9, K2HNW 6, W2PKY 6, WA2EJH 3. (Sept.) W2MTA 148.

NEW YORK CITY AND LONG ISLAND - SCM, Fred J. Brunjes, K2DGI - SEC: K2OVN, RM: K2UAT, HF PAM: WA2UWA, VHF PAM: WB2RQF. The following nets are major ARFC Nets. Join one!

Bronx	28.64 MHz	50.35 MHz	146.17 MHz
Brooklyn	28.64 MHz	50.40 MHz	145.28 MHz
Nassau	28.72 MHz		145.32 MHz
Queens	29.50 MHz	50.20 MHz	145.62 MHz
Richmond			147.12 MHz
Suffolk	29.56 MHz	53.51 MHz	146.82 MHz
Huntington	28.73 MHz		145.50 MHz
Brookhaven	28.73 MHz	50.46 MHz	145.50 MHz
New York	28.5	50.48 MHz	

Note: Nets usually open 2000 local Mon. Happy New Year to all! Hope everybody enjoyed their holidays. I would like to thank all of you who have helped out at the various communications hoots that were set up around the section to handle traffic for our servicemen stationed around the world. This sort of Public Service goes a long way in helping Amateur Radio gain the respect and appreciation it justly deserves. Your SCM starts his second year of service. I have enjoyed the past year, and hope to meet some of you this coming year; so how about an invite to the happening! If you need a program "fill" (talk about the bottom of the barrel) or just a meet the gang sessions let me know so I may schedule some. Have some new officers out Suffolk County RC way; WA2FOG, pres; WB2HI M, vice-pres; W2JTP, reg. secy.; W2MGV, corr. secy.; K2JDH, treas. Congratulations! W2ORM found K2RYI looking out of his ATV set up. Had a little snow, but it was better than looking at himself! WA2FQG had an unusual birthday gift; a QSL card confirming his 300th country for DXCC. The gang at W2DSC is off and running for 5RWAS with a late start. They report at least half way through since Sept. '70. W2EW spent the early winter digging out from all the leaves that his 50 oak trees kept throwing down. W2PE cleaned the gear out of the bedroom closet so it could be painted. WB2DZZ is having a great time with QRP 15-watts on top band. New officers at QRP Int'l. WA2JFK, pres.; WA2HYV, vice-pres.; WB2RUI, secy.; WB2KBZ, treas. OI' WB4SMA is in reality ex-WA2HMO who recently moved to the sunny clime. My thanks to all members of the various traffic nets and ARFC/RACES nets for their participation during the last year, and I hope everyone will be in there this coming year. It's a tough job trying to run a net every day and week, and I would like to take this space to thank those "heros" who try to keep things going even when it looks like the check-ins are fading away. Hang in there your efforts are appreciated by all! W2DSC made HPL. Traffic: W2DSC 506, WA2GPT 214, WB2ZGA 147, WB2IEQ 123, W2GKZ 56, WB2ZGG 56, WA2EMP 43, WB2WFJ 41, W2FC 18, W2LKG 16, W2DRQ 14, WA2LJS 13, W2GP 11, W2EW 10, K2AAS 9, W2PF 4, WA2BRF 3, WA2QUJ 2.

NORTHERN NEW JERSEY - SCM, Louis J. Amoroso, W2ZZ - SEC: K2KJQ, RM: WA2BAN and WA2TAF, PAMs: K2KJQ, K2SGX, WA2TAF and WA2TBS.

Net	MHz	Time (PM/Day)	Secs	QNI	T/c	Mgr.
NJN	3695	7:00 Dv	31	401	274	WA2BLV
NJN	3695	10:00 Dv	29	201	80	WA2BLV
NJSN	3740	8:00 Dv	15	32	4	WA2FHH
NJPON	3930	6:00 Su	4	30	25	WB2JFH
NJFPTN	3950	6:00 M-S	31	584	286	W2PEV
NJAN	5042.5	8:00 M-F	22	144	5	K2SGX
FVLEIN	145710	7:30 Dv	21	282	162	K2KJQ
FVFTN	145800	8:30 M-S				WA2TBS
	146700	8:30 Su				

New appointments: W2LC as OO, K2CBG as OPS, WA2FRZ and WA2JNO as OBS. Endorsements: K2KJQ, K2DEL and W2CVW as OVSs, WA2DNU as EC for Glen Rock and vicinity, WA2FRZ as ORS and OPS. The annual NJN meeting at W2CVW's QTH was a big success and the members elected WA2BAN as Net Mgr. for the coming year. We all thank WA2BLV, the outgoing Mgr. for his efforts. The NJFPTN dinner and meeting had a good showing and the group put WA2TAF in as Mgr. for the coming year. Many thanks to W2PEV for his outstanding job during the past two years. The K2OOJ group presented the first annual Operator of the Year award for traffic handling to WB2FHH. W2NCY is chasing 15-meter DX with a new vertical. WA2UOO is back at school in Wash., D.C. WA2MYB will operate portable from Sioux City, Iowa on 15 and 20 looking for his old NNI friends. W2JVI is the 3rd member of NDXA to qualify for the SBDXCC. The K2USA group is now 100% ARRL. W2ZZ spoke at a CSARA meeting in Shrewsbury. W2EJK is back on with the T4XR and R4-B combination. The K2OOJ group have 12 members in their novice class. The following joined Navy MARS: WA2JNL, K2BPP, WA2MIX, WA2MIY, WB2YTA, WN2LJH and WA2JIM. WB2LSQ now is on 2-meter RTTY. WA2CRF put his TH-3 up on a new 50-ft. tower. WA2RZY now is active on 2-meters. WN2OKX passed the General Class exam after 3 months as a Novice. He plans 40 cw when the new ticket arrives. The CD units did a great job in NNI on Mischief Night. WA2JHT is the new RO for South Orange. WA2QKR is on 20 cw with a Valiant and 75A-4 set up. WA2UDT has his HW-32A working. The K2MFF group put up a new 50-ft. tower on top of a four-story building for vhf work. W2CVW and WA2ASM chaired the Traffic and ARFC sessions at the recent Hudson Division Convention. All nets will be active during the SFT. Contact K2KJQ for EC information. We will be on most bands, Traffic: (Oct.) WA2EPI 729, WA2FRZ 539, WA2KJQ 284, WA2BAN 278, K2KJQ 274, WB2VPR 192, W2DRDQ 184, K2DEL 183, WA2IHW 169, WA2TRU 106, WA2IIM 83, W2EWZ 61, WA2DX 45, W2CVW 40, WA2CCE 27, WB2TUL 23, WB2YPO 22, W2ZZ 21, W2CU 20, WA2FVH 20, WA2FUI 19, K2OOJ 12, WA2JNO 11, K2RXQ 11, WA2YXQ 11, K2CBG 10, K2DQT 10, WB2BS 9, K2EQP 9, WB2ITW 8, W2BNC 7, K2MFF 6, WA2DMT 6, WA2JNO 4, WA2UOO 4, WA2FUX 1. (Sept.) K2OOJ 50, K2EOP 10.

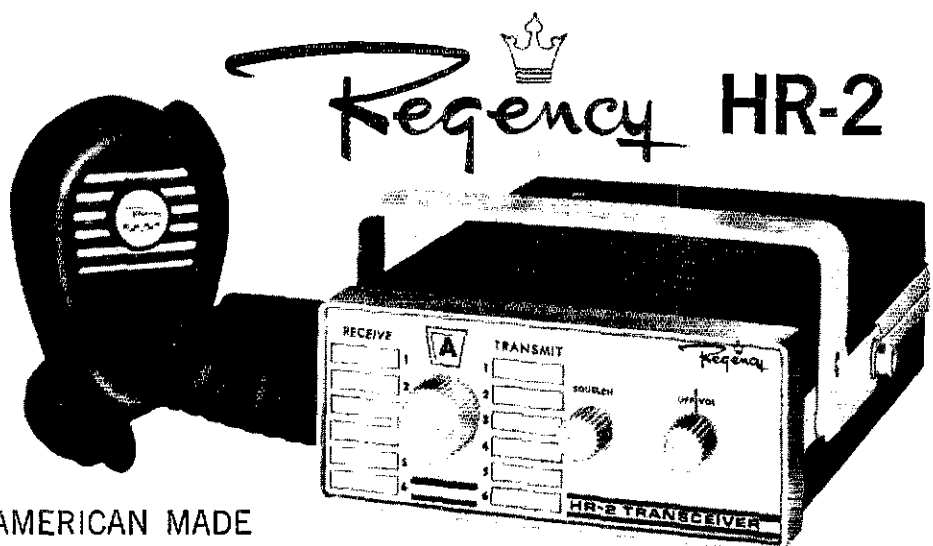
### MIDWEST DIVISION

IOWA - SCM, Al Culbert, K0YVU - SEC: K0LVB, OPS: W0JAO, W0LCK, W0LR, W0SMIT, W0SLF. New appointees: WA0EEN as OO, K0KQD as OPS, WA0EEN as ORS, K0LVB and I journeyed to Storm Lake Oct. 13 to speak on the ARFC in Iowa. We were overwhelmed with a turnout of 73 people from NW Iowa (is there any significance in that number?). W2PTR, ex-K0JZK has moved back to the Clear Lake area and awaiting his 0 call. W0BCK has moved to the Kansas City area. Glad to hear K0SOA back on. K0JMA is back and around after having done battle in the hospital. W0GO has a new Signal One. K0LVB and K0YVP have been out practicing downwind landings on the wrong runways again. W0BRXR operates portable from Luther College, and also has a new 160-meter vertical antenna for those weak ends at home. WA0NYU had the North Iowa ARC over to his QTH for a showing of his KL7 trip pictures. Congratulations to WA0VBM of Clinton on passing the Extra Class exam. K0ELI of Ames is ready for the winter with his antennas on a new 40-foot mast and a six-meter tower in his car.

Net	MHz	GMT	QTC	QNI	Mgr.
Iowa Phone	1.970	18.30	1416	189	K0LVB
Iowa Phone	3.970	00.00	1209	68	W0YLS
TLCN (cw)	3.560	00.30	150	107	K0AZI

Traffic: W0LCK 1023, K0AZI 95, W0MOO 91, WA0AUX 04, WA0VZH 53, W0GZ 51, WA0ZD 45, W0BW 9, K0LKH 8, WA0RXX 7, WA0AIW 6, W0KB 4, WA0EEN 2.

KANSAS - SCM, Robert M. Summers, K0BXL - SEC: K0LPE, PAM: K0JMF, RM: K0MRI, VHF PAMs: WA0UCW, WA0TRO. The Hiawatha ARC members, using 2-meter fm handy-talkies, 4 portable



AMERICAN MADE

# Mobile 2 Meter FM Transceiver

Here is what the 2 meter, FM Ham World has been asking for.

Specifications: 90 day warranty

<p><b>RECEIVER</b></p> <p>The HR-2 receiver is a double conversion, superhetrodyne with highly selective ceramic filter.</p> <p>Frequency Range...144-148 MHz</p> <p>Sensitivity.....0.35 <math>\mu</math>V (nom.) 20DB Quieting</p> <p>Selectivity.....50DB Down <math>\pm</math> 16KC 50DB Down <math>\pm</math> 32KC</p> <p>Audio Output (3-4 <math>\Omega</math> Speaker)....3 Watts 10% Distortion 5 Watts Maximum</p> <p>Channels.....6 Crystal controlled with provision for adding an additional 6 channels</p> <p>I.F. Frequencies.....10.7 MHz &amp; 455KHz</p>	<p><b>TRANSMITTER</b></p> <p>The HR-2 transmitter uses phase modulation for the ultimate in carrier stability. Built in SWR load mismatch circuitry provides protection against open and shorted antenna conditions.</p> <p>Frequency Range...144-148 MHz</p> <p>Power Output.....10 Watts (min.) @ 13.6 VDC</p> <p>Modulation.....Phase Modulation with automatic deviation limiting</p> <p>Deviation.....Automatic Limiting with internal adjustments from 0-15KC deviation</p> <p>Microphone.....Plug-in, hand held, high Z Ceramic supplied</p> <p>Channels.....6 Crystal controlled with individual trimmer capacitors for Frequency netting</p>
---	---

**GENERAL**

Power Requirements 13.6 Volts (nominal)

Receive (Squelched) 180 MA.

Receive (Max. audio output).....800 MA.

Transmit.....2.5 Amps (max.)

**STANDARD EQUIPMENT**

Built-in 4" Speaker

Mobile Mounting Bracket

SO-239 Antenna Connector Socket

T & R Crystals for 146.94 MHz

PTT Ceramic Mike

only **\$229<sup>00</sup>** Amateur Net



**ELECTRONICS, INC.**

7900 Pendleton Pike, Indianapolis, Indiana 46226

This is actual size and shape of our radio. Cut it out and place it under your dash to see how compactly it fits.

# AHA! YOU THOUGHT GOTHAM

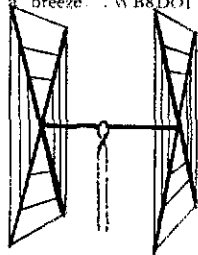
made ordinary, everyday, run-of-the-mill antennas. No, no, no. We make winners through superior materials and design. WA1JFG won the New England Round-Up championship with our 3-element 15-meter beam by a margin of 5,982 points! In QST since '53.

## QUADS

Totally satisfied with quad. Worked DF4VIP, SA7DLH, XE1AB, DM4SEE, FL8SR, F6AUM, 1K7YB in few hours. Instructions a breeze. WR8DD1

### CUBICAL QUAD ANTENNAS—

these two element beams have a full wavelength driven element and a reflector (the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount; uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a fool-proof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!



### 10/15/20 CUBICAL QUAD SPECIFICATIONS

Elements: A full wavelength driven element and reflector for each band.

Frequencies: 14-14.4 Mc.; 21-21.45 Mc., 28-29.7 Mc.

Dimensions: About 16' square

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10' x 1 1/4" OD, 18 gauge steel, double plated, gold color.

Beam Mount: Square aluminum alloy plate, with four steel U-bolt assemblies. Will support 100 lbs.; universal polarization.

Radiating elements: Aluminum wire, tempered and plated, .064" diameter.

X Frameworks: Two 12' x 1" OD aluminum 'hi-strength' alloy tubing, with telescoping 7/8" OD tubing and dowel insulator. Plated hose clamps on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

Now check these startling prices — note that they are much lower than even the bamboo-type:

10-15-20 CUBICAL QUAD. . . . .	\$37.00
10-15 CUBICAL QUAD. . . . .	32.00
15-20 CUBICAL QUAD. . . . .	34.00
TWENTY METER CUBICAL QUAD	27.00
FIFTEEN METER CUBICAL QUAD	26.00
TEN METER CUBICAL QUAD. . . . .	25.00

(all use single coax feedline)

How to order: Send check or money order. We ship immediately upon receipt of order by railway express, shipping charges collect. DEALERS WRITE!

## BEAMS

"Just a note to let you know that as a Novice, your 3-E1, 15 Beam got me RI Section Winner and New England Division Leader in Novice Round-up. See June QST, p. 57 for picture of ant. (below). Tnx for a fine working piece of gear. 73s, Jay, WA1JFG"

Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history! Each beam is brand new! full size (36' of tubing for each 20 meter element for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; 3/8" and 1" aluminum alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 E1 20. . . . .	\$21	4 E1 10. . . . .	\$20
3 E1 20. . . . .	27*	7 E1 10. . . . .	34*
4 E1 20. . . . .	34*	4 E1 6. . . . .	20
2 E1 15. . . . .	17	8 E1 6. . . . .	30*
3 E1 15. . . . .	21	12 E1 2. . . . .	27*
4 E1 15. . . . .	27*		*20-ft. boom
5 E1 15. . . . .	30*		

## ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, TI2FGS, W5KYJ, W1WOZ, W2ODH, WA3DJT, WB2FCB, W2YHH, VE3FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3KT. Moral: It's the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, KZ5OWN, HC1-LC, PY5ASN, FG7XT, XE2L, KP4-AQL, SM5BGK, G2AQB, YV5CLK, OZ4H, and over a thousand other stations!

V40 vertical for 40, 20, 15,	
10, 6 meters. . . . .	\$14.95
V80 vertical for 80, 75, 40,	
20, 15, 10, 6 meters. . . . .	\$16.95
V160 vertical for 160, 80, 75,	
40, 20, 15, 10, 6 meters. . . . .	\$18.95

**GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139**

# ABSOLUTELY NEW

TRI-EX

# W-51

**FREE STANDING  
TOWER.**

**SUPPORTS 9 SQ. FT.  
OF ANTENNA.**

Shown with internal Ham M  
rotator and 2" mast.

**INCLUDES**

- **FREE: RIGID BASE MOUNT**
- **PRE-DRILLED TOP PLATE — For TB-2 thrust bearing.**
- **HIGH STRENGTH STEEL TUBING LEGS. Solid rod, "W" bracing.**
- **EASY MAINTENANCE — No guys or house brackets needed.**
- **RISES TO 51 FT. — Nests down to 21 ft.**
- **HOT DIPPED GALVANIZED AFTER FABRICATION! All welding by certified welders.**

**IMMEDIATE DELIVERY**

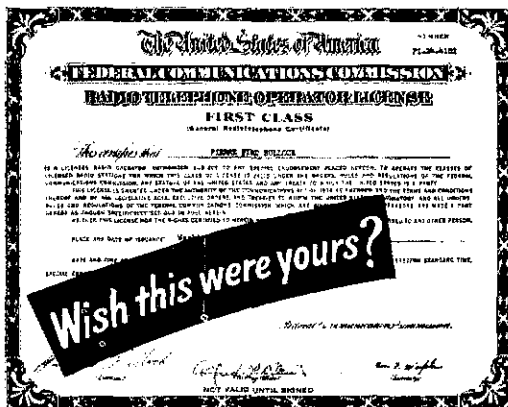
# \$393<sup>40</sup>

FREIGHT PREPAID INSIDE  
CONTINENTAL U.S.A.

**Iri-Ex TOWER CORPORATION**

7182 Rasmussen Ave., Visalia, Calif. 93277

# You earn your FCC First Class License



## or your money back!

**THERE'S A WORLD OF OPPORTUNITY  
FOR THE MAN WITH AN FCC LICENSE**

All it takes is a few spare hours a week and NRI's FCC License Course to open the way to increased opportunities in Communications. With an FCC License, you're ready to operate, service and install transmitting equipment used in aviation, broadcasting, marine, mobile and Citizens-Band communications.

What does it take? Men with absolutely no training or experience in Electronics complete the course in 10 months. A Technician or man with some background can easily cut that time in half. And because NRI has a greater enrollment than any other school of its type, training costs you less than comparable courses offered by other schools. Further, **YOU MUST PASS your FCC exams or NRI refunds your tuition in full.**

Get full details about NRI FCC License Course plus other home-study plans offered by NRI, oldest and largest school of its kind. Mail coupon. No obligation. No salesman will call. NATIONAL RADIO INSTITUTE, Washington, D.C.

**Available Under NEW  
GI BILL.** If you served since  
January 31, 1955, or are in  
service, check GI line in coupon.

### MAIL NOW for FREE CATALOG

**nri** NATIONAL RADIO INSTITUTE 19-011  
Electronics Division, Washington, D.C. 20016

Please send complete data about FCC License training, other NRI courses checked below. (No salesman will call.)

- |  |  |
|--|--|
| <input type="checkbox"/> FCC License             | <input type="checkbox"/> TV-Radio Servicing (with color) |
| <input type="checkbox"/> Complete Communications | <input type="checkbox"/> Advanced Color TV               |
| <input type="checkbox"/> Aviation Communications | <input type="checkbox"/> Industrial Electronics          |
| <input type="checkbox"/> Marine Communications   | <input type="checkbox"/> Basic Electronics               |
| <input type="checkbox"/> Mobile Communications   | <input type="checkbox"/> Electronics for Automation      |
| <input type="checkbox"/> Math for Electronics    | <input type="checkbox"/> Electrical Appliance Repair     |

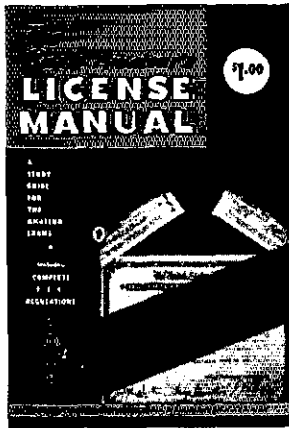
CHECK FOR FACTS ON NEW GI BILL

Name \_\_\_\_\_ Age \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

ACCREDITED MEMBER NATIONAL HOME STUDY COUNCIL



64th EDITION

Regulations change from time to time, and every amateur should be aware of the latest changes. The best source for the latest information is the current *LICENSE MANUAL*.

Complete FCC Regulations - in addition to sample questions for Novice, Technician, General, Advanced and the Extra Class examinations.

**\$1.00**

POSTPAID

*The* AMERICAN RADIO  
RELAY LEAGUE INC.

NEWINGTON, CONN. 06111

bases and 1 mobile planned and organized the Halloween Parade communications for the Chamber of Commerce Parade Committee. The CKARC, Salina Spook Patrol also aided the police in providing communications on Halloween night. WA0LLC came up with some nice DX QSOs while in Hawaii for 10 days in Oct. After meeting with K0LPE and K0BKF, Oct. 24 at the QTH of W0INH the Wheat Belt Radio Club has started working on emergency equipment for use in public demonstrations and the forthcoming SET. The Wichita Amateur Radio Club was also out chasing Spooks and Goblins on their annual Spook Patrol. WARC also proudly announces a club membership of 101. A new radio club is being formed in Lawrence, Kansas. The club elected W0RZF, pres.; K0BTG, vice-pres.; WN0CFU, secy.; WA0SVQ, treas.; WA0SEV, act. mgr.; WB0CQI, program mgr.; K0TLQ, cd mgr.; WN0BIY, information mgr. The club meets the 2nd Wed. of each month. The Kansas EC Net now has officially changed frequency to 7278 kHz each Sun. at 1 P.M. CST, all members are welcome to check in. Net reports: K5BN, 1038 QNI, 74 QYC, 30 sessions; KPN 207 QNI, 14 QYC, 16 sessions; QRK, 128 QNI, 22 QIU; PI Net, 26 QNI; QKS 1, 237 QNI, 82 QTC; QKS 2, 212 QNI, 93 QTC; Ks EC Net, 97 QNI, 6 QTC; KWN, 602 QNI, 44 QIC, 31 sessions. Traffic: W0INH 202, W0IH 172, WA0LBB 170, WA0TZK 110, K0MRI 101, WA0LLC 74, W0MA 66, K0JMF 65, K0BKF 53, W0NEE 50, WN0CGI 37, W0CHJ 28, W0GCI 27, WA0JFC 22, WA0UTT 20, W0ICV 18, W0FCL 15, WN0WXY 14, W0BGX 10, W0GUR 10, WA0ZTW 9, WA0UWH 8, K0UYH 8, WN0WPZ 8, W5DTR/0 6, WA0SEV 6, W0LYC 4, WA0QZP 4, W0PB 4, WA0SXR 3, W0FDJ 2, WA0HOZ 2.

MISSOURI - SCM, Robert J. Peavler, W0BY - SEC: W0ENW. Appointments renewed: WA0LL, as OI, ORS, OPS. PFD Net certificates go to K0SI I and WA0SUE. I am sorry to report K0KYM is a Silent Key.

Net	Freq.	Time/Day	Sess.	QNI	QTC	Mgr.
MoSSB	3963	2400 MS	27	1246	86	W0RTO
HRN	7280		1800	646	109	WA0UPA
MOIN	3585	0100 DY	30	140	15	K0AEM
MOIN 2	3585	0345 DY	26	81	36	WA0SKP
PFD	50.45	0130 T	4	120	4	WA0KUH

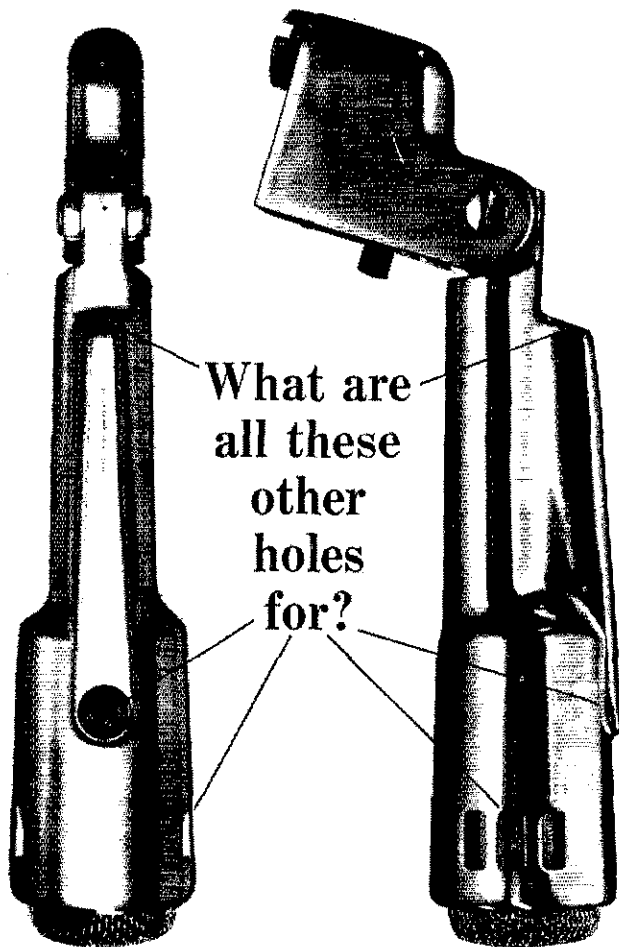
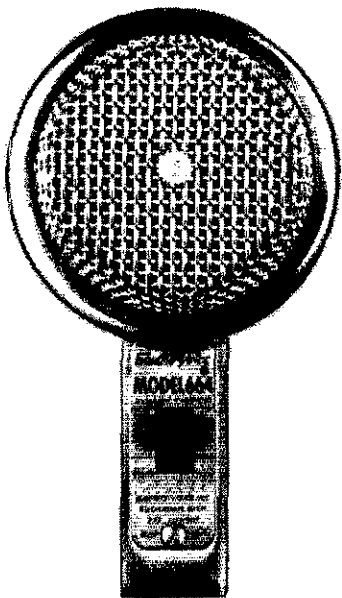
WA0YCN finally got South Dakota for WAS; Mike is working on a linear amplifier and reports more DX with Advanced Class. W0GCL vacated in Arkansas. WA0ZLU reports little activity on Navy MARS in this area; He now is AD0ZLU in Army MARS. WA0ZGP is on the air with an HW-22, and also has a 20-ft. tower which was built for 540 with the help of WN0ZIX and WN0ZGW. Congratulations to: W0GS, who was awarded a plaque at the Zero Beaters Hamfest for his work on radio aids for the blind; to W0QUD, who received a distinguished service certificate for RACES work; to K0HUO, who passed the Advanced Class exam; to WA0ZGP, who passed both General and Advanced; and to new Novice WN0CRF. My thanks to K0DFQ and WA0BV for their excellent mobile work during the Missouri QSO Party, to the St. Louis Amateur Radio Club, who volunteered to check the logs, and to all who participated. WA0SYI is in the Air Force and is at San Antonio. WA0PUL now is attending school at Lindenwood College II at St. Charles. Now is the time to write state legislators to restore call letter license plates. Traffic: K0AEM 286, W0BY 140, WA0HTN 116, WA0UPA 89, W0HVJ 28, W0QUD 25, W0HH 22, WA0KUH 8, W0BVI 6, W0GBJ 4, WA0YCN 2, WA0YST 1.

NEBRASKA - SCM, V.A. Cashon, K0OAL - Asst. SCM: Velma Sayer, WA0GHZ, SEC: K0QBF. All those contributing to the success of KF0NEB operating at the Nebr. State Fair are to be commended for their participation. KF0NEB originated 457 messages qualifying for BPL 2000 QSLs were mailed. Welcome to new Novices WN0CQS, WN0CLH, WN0CVO, WN0CRB, WN0CST and WN0CPD. Congratulations to WA0YCX, Advanced Class licensee, WA0VNE, Technician. With deep regret we report W0LSI, W0BFV and W0ROS as Silent Keys. K0QDF says that some ECs have not reported for quite some time and would like all ECs to forward a current report so an accurate count may be made of AREC membership. Those wishing to join AREC may do so by contacting the EC in your county. If uncertain as to your EC, forward application to K0QDF. The SET is planned for Jan. 30, 31. K0WPF, Box Butte Co. EC reports 2-Meter AREC Net QNI 24. Renewed appointments: WA0LRC and WA0LWK as ECs and WA0LRO as OPS. Oct Net reports:

Net	Freq.	GMT/Day	QNI	QTC	Mgr.
NSN I	3982	0030 DY	1135	29	WA0LOY
I60	1995	0130 DY	91	29	WA0CBI
NER	3590	0500 DY	183	37	WA0HWR
NMN	3982	1230 DY	1108	32	WA0JUF
WNN	3950	1300 M-Sa	545	14	W0NTK
AREC	3982	1330 SU	187	3	W0IKZ
CHN	3980	1730 DY	1020	128	WA0GHZ



If the  
Electro-Voice  
Model 664  
picks up  
sound here...



What are  
all these  
other  
holes  
for?

**(E-V)** The holes in the top, sides and rear of the Electro-Voice Model 664 make it one of the finest dynamic cardioid microphones you can buy. These holes reduce sound pickup at the sides, and practically cancel sound arriving from the rear. Only an Electro-Voice Variable-D® microphone has them.

Behind the slots on each side is a tiny acoustic "window" that leads directly to the back of the 664 Acoustalloy® diaphragm. The route is short, small, and designed to let only highs get through. The path is so arranged that when highs from the back of the 664 arrive, they are cut in loudness by almost 20 db. Highs arriving from the front aren't affected. Why two "windows"? So that sound rejection is uniform and symmetrical regardless of microphone placement.

The hole on top is for the mid-range. It works the same, but with a longer path and added filters to

near the rear is another hole for the lows, with an even longer path and more filtering that delays only the bass sounds, again providing almost 20 db of cancellation of sounds arriving from the rear. This "three-way" system of ports insures that the cancellation of sound from the back is just as uniform as the pickup of sound from the front—without any loss of sensitivity. The result is uniform cardioid effectiveness at every frequency for outstanding noise and feedback control.

Most other cardioid-type microphones have a single cancellation port for all frequencies. At best, this is a compromise, and indeed, many of these "single-hole" cardioids are actually omnidirectional at one frequency or another!

In addition to high sensitivity to shock and wind noises, single-port cardioid microphones also suffer from proximity effect. As you get ultra-close, bass response rises.

this varying bass response—except use a Variable-D microphone with multi-port design\* that eliminates this problem completely.

Because it works better, the E-V 664 Dynamic Cardioid is one of the most popular directional microphones for demanding communications applications. To learn more about Variable-D microphones, write for our free booklet, "The Directional Microphone Story." Then see and try the E-V 664 at your nearby Electro-Voice microphone headquarters. Just \$89.00 in satin chrome or non-reflecting gray.

\*Pat. No. 3,115,207

**ELECTRO-VOICE, INC.**, Dept. 112Q,  
631 Cecil St., Buchanan, Mich. 49107



DEM 3482 2200 Dy 343 18 W0FBY  
 NSN II 3482 2330 Ty 071 24 W0FOY

Traffic: (Oct.) W0LGD 102, WA0SPC 65, K0DCW 48, K0CWA 45, WA0HWR 39, WA0EXE 34, K0JFN 25, W0BIV 24, WA0TMC 24, W0DMY 18, W0KPA 16, K0ODI 15, WA0BOK 12, WA0GJZ 12, WA0HII 12, W0AGK 11, WA0QEI 9, WA0DY 7, K0ERU 6, W0N1K 6, WA0PCC 6, W0WKP 6, WA0EII 5, WA0IRB 4, K0OAL 4, WA0OQX 4, WA0PIF 4, K0UDW 4, WA0VIT 4, W0HTA 3, WA0LOY 3, WA0SPI 3, W0VIA 3, W0JAV 2, W0RAM 2, WA0JUT 1, WA0OKC 1, WA0QMZ 1, K0SIA 1, W0YFR 1, (Sept.) K0NLE 457, WA0SPI 4.

**NEW ENGLAND DIVISION**

**CONNECTICUT** - SCM, John J. McNassor, W1GVT - SEC: W1HHR, RM: K1FIR, PAM: K1YGS, VHF: PAM: K1XSL.

Net	Freq.	Time/Days	Sess.	QNI	QTC
CN	3640	1845 Dy	31	459	393
CPN	3965	1800 M-S	31	492	277
		1000 Su			
VHF 2	145.98	2200 M-S	22	67	9
VHF 6	50.0	2100 M-S	22	107	26

High OM: CN - WA1GPH, K1IIR, WA1HOL and WA1HSN, CPN - W1GVI, WA1JVV, W1MPW, K1SXF and K1YGS. SFC W1HHR still is busy getting new P.C.s. He will visit your club if requested. Clubs - Please send program and report to Director W1QV. He is interested in your club and will help if possible. New club officers - Candlewood ARA: W1NPL, pres.; WA1ACR, vice-pres.; WA1KRG, secy.; W1ZKQ, treas. East Catholic HS ARC: WA1LEP, pres.; WA1LEH, vice-pres.; W1N1MO, secy. Conn. Yankee ARC: WA1KOL, pres.; W1HHR, vice-pres.; K1MVO, secy. Clubs - To exchange bulletins contact Candlewood ARA, W1ADW; Trumbull ARC, W1FTD; Hamden ARA, W1LGO; Murphy's Marauders, WA1HOF; In-City ARC, WA1KMP; Southington ARA, W1EDW. Also WA1HSN, Nutmeg Net News, K1IIR, CN bulletin and K1YGS, CPN bulletin. The New England Novice Net is active Mon., Wed., Fri., 6:30 P.M. on 3733 kHz. All Novice operators are encouraged to join. The CN Annual Fall Meeting at ARRI was very successful. Congratulations to: WA1HOL and W1EUF, Oct. BP; W1WHR, Extra Class; WA1ZL, W1AINRS, General Class; W1N1RX, W1N1RU, W1N1JK, Novice Class! Suggested New Year's resolutions - Upgrade your operating ability and class of license, build at least one piece of ham shack equipment, have your club provide QST each month in your local Public Library! Thanks again for your help and a Very Happy New Year To All! Traffic: (Oct.) WA1HOL 337, K1IIR 324, WA1JVV 252, W1EII 209, WA1SUL 166, W1EJW 127, WA1GH 120, WA1JZC 117, W1EUF 116, K1SXF 90, WA1HSN 87, W1GVT 79, K1IUC 69, K1YGS 63, W1CTI 54, W1MPW 52, WA1YF 33, WA1MO 26, K1SRE 26, WA1JOC 23, WB2ZHC 21 20, W1DQI 16, WA1JGA 15, W1AW 13, W1BDL 12, W1RNB 12, W1HHR 12, W1CUH 9, W1QV 8, W1YBH 6, W1YB 4, (Sept.) W1EJW 216.

**EASTERN MASSACHUSETTS** - SCM, Frank L. Baker, Jr., W1ALP - SFC: W1AOG received reports from W1LE, WA1EM, WA1DKI, K1s DZG, N1W, ZEP and asks that you send SFL messages to me as he is in Florida. W1N1RV is WA1KZE's brother. A nice meeting of the FMN arranged by WA1ESI, was held at Anthony's Steak House in Framingham. BPLs were made by W1QYY, W1PEX, WA1EY, WA1ESI and W1QJM, also for Sept. The 6-Meter Cross Band Net had 11 sessions, 22 QNIs, 1 traffic. The Barnyard Net had 574 QNIs, 7 traffic. Melrose EC K1NFW and the following helped Police and Fire Depts. on Halloween night: W1s QXB, C1G, HYZ, CB, PGM, DFN and JH. W1PH is on 160-80-40 cw. FM2N had 22 sessions, 163 QNIs, 188 traffic. W1AQ is on 2. W1N1MO is a new 5L. W1WSN gave a nice talk and demonstration on fm repeaters at the South Shore Club. Ex-W1GW/ex-W1DXO is a Silent Key. K1EPL is Net Mgr. of the New England Emergency Phone Net on 3945 kHz at 8:30 A.M., Sun. WA1DPX has a new son. The OOTC held a meeting in Salem, Mass. WA1MKP has his Advanced Class license. Ex-WA1FMC has his old call back, W1SDJ. WA1BYM has an electronic keyer. W1UX has a Heathkit transistor and capacitor checker. W1EJN is on 6. N1EPLN had 4 sessions, 79 QNIs, 6 traffic. W1M5B is in the Novice Net. The T-9 Club met at W1KGP's. W1N1PW is K1RAW's son. WA1GWL is in Ft. Monmouth, N.J. WA1EB has a beam for 10. WA1KDL is building a quad. WA1TZ has a mini beam. The Norwood ARC now has a monthly newsletter. Note that the Eastern Massachusetts Novice Net is now the New England Novice Net, open to all novices, on 3733 kHz Mon., Wed., Fri., at 2330 GMT; K1PNB is the RM. FMN had 58 sessions, 316 QNIs, 419 traffic. W1EDN is back on the air. WA1DL worked JY1 in Jordan on 10. WA1FE worked W9s on 6. WA1HL is now WB4SNL in Florida. W1GAN worked VE1AFB on 432 in Nova Scotia, is this a first? W2NSD1 spoke at the Middlesex

ARC. The Southeastern Mass. ARC, W1AFC has a lower with beams for all bands and also are working on a 20-ft. dish for a moonbounce. Sorry to hear that K1AAX, XVI of W1TZ has been ill. New appointees: W1AP, K8J11 as ORSs. Endorsements: K9AQP1 as OVS, W1AOG as SEC, ORS, OBS, K9AQP1 is active on 432 and says he works VE2JT most every night. He also is an Extra Class licensee. The Framingham RC elected W1SQN, vice-pres.; K1BOX gave a talk on antennas and also holds classes for Generals and Technicians. W1QJW was at the FMN meeting. W1CTR has retired and moved to Westbrook, Maine. The Massasoit ARA held their last meeting at the Silver Lake Regional School, Ham's Wide World was shown and the radio class set up a station, W1KVO has a new tower and antenna. K1UW has moved into a new house in E. Bridgewater. The Capeway RC met at K1MAK's, K1NDA is in the hospital. The Quannapowitt RA held an auction, WA1NPO is the call of the Whitman ARC. W1BWC is trustee, WA1RX is on 6. WA1HQ, now in Avon, has an HA-460 and quad. W1DKD has a Polycam and squaw mobile. WA1AGR has her WAC. Traffic: (Oct.) W1QYV 687, W1PEX 613, WA1EY 556, W1D1M 542, W1FAD 249, W1EMG 223, WA1ESI 221, WA1LE 202, W1EJ 79, W1AIC 78, K1PRB 55, WA1BYM 51, WA1JOC 34, W1MNM 30, W1RUF 25, K1LCO 24, W1UX 23, W1DOM 19, W1EJN 19, WA1KZL 17, W1ROL 17, W1AOG 14, K1PSG 8, WA1MEG 8, W1LL 6, W2TFE1 6, WA1RY 3, W1M5B 2, K1UKE 2, WA1N1M 1, (Sept.) W1D1M 521, WA1FAD 421, K1LCO 57, W1DOM 7, WA1MHI 1, W1N1H 1, (Aug.) K1LCO 6.

**MAINE** - SCM, Peter F. Sterling, K1LEV - SEC: K1CLE, PAM: WA1CM RM: W1RIG W1GZS is building a 2-meter repeater in the Sanford area, the transmitter will be on Mt. Hope. Anyone wishing to come in on it please contact him for information. WA1MDA, K1ELO, WA1HJ have been working 2-meters in the Patten Oakfield, Ston Pond areas. The 2 meter band has been exceptionally good this month, hope it keeps up. K4BSB is back in Brunswick. Welcome back to Main, Nick. New hams in Maine are: W1N1PI, W1N1LW. Congratulations! W1OL, ex-W1FAX is stationed in Saigon as an electronics advisor. W1EZZ is now 2-meter fm mobile. I still am looking for news for the column. Any tidbits are welcome. For the benefit of the new novices Maine the New England Novice Net meets on 3733 Mon., Wed., and Fri. from 1830 to 1900 local time. The Portland Amateur Wireless Association is planning an auction sometime next spring. Start cleaning out your cellars so we can have a big time. We still are looking for people to NCS the Pine Tree Net. Anyone willing to devote one night a week on the net please get in touch with W1BG for information. Traffic: W1RIG 251, WA1PCM 238, W1YA 104, W1NND 77, WA1EJ 7, K1TV 6.

**NEW HAMPSHIRE** - SCM, Donald Morgan, K1QES - The CSPN report from the Net Mgr. shows 706 check-ins and 69 traffic. At times it is almost impossible to conduct a net with two other nets on the same frequency, because of skip conditions. We are losing our PAM after these many years and his successor will have his work cut out for him. K1APO has resigned after an excellent job. He will remain as Net Mgr., however. The Net Mgr. of the VTNH Net reports 31 sessions, 191 check-ins, 350 traffic. Also a time change for the net is noted to 0000 GMT on 3685 daily. K1BCS, RM is resigning because of business pressures. To K1APO and K1BCS go my thanks for a job well done. How about checking into the New England Novice Net on 3733 MHz at 6:30 P.M. local time. At this time I wish to thank the many appointees for the help and consideration they have given me. Our section must continue to grow. Remember that courtesy wins respect. Traffic: (Oct.) K1BCS 1281, W1UBG 264, WA1GCT 221, (Sept.) WA1MPP 39.

**RHODE ISLAND** - SCM, John E. Johnson, K1AAV - SFC: W1YNE, RM: W1RIV, PAM: W1TXL, VHF PAM: K1TPK, R1SPN report: 31 sessions, 567 QNI, 108 traffic. The Fidelity ARC, K1NOC, elected the following officers at a recent meeting: WA1HS, pres., W1NLSV vice-pres.; W1M1PU, secy.; W1M1OT, treas. Several members of the club are new. Novice Class licensees: W1N1SM, W1N1OL and W1N1NA. During the week and prior to Christmas the club will have a display at the Midland Mall Shopping Center. W1QLD operates on 160-meters. W1MOT and W1M1PU both have 40-meter inverted "Ys" mounted 35-ft. high. WA1HTF has a 70-foot tower and is working out well with a classic 36 beam. W1N1ME is studying spark coils and how to prevent shock. WA1WS and WA1HOM are both interested in slow-scan TV. K1QFD is waiting for a new function switch for her transceiver. W1YN is working on a tower. Traffic: W1TXL 150, W1YNE 95, WA1HC 89, WA1CXF 19, K1QFD 11, WA1ST 10, WA1HRW 6, K1YVC 5.

**VERMONT** - SCM, L. Reginald Murray, K1MPN -

Net	Freq.	Time/Days	QNI	QTC	Mgr.
Green Mt	3942	2230 M-S	578	41	91JLZ

# The DRAKE 4 LINE



*Neat . . . Compact . . . Versatile !*

Ray Grenier, K9KHW, Mail Order Sales Manager at  
AMATEUR ELECTRONIC SUPPLY, says:

"Operating all bands (160 thru 2 Meters) is a real pleasure with my DRAKE 4 LINE setup. You, too, can eliminate all of that extra gear and mess usually needed for that much frequency coverage. Let me help you go the same route. . . . all the way, as I have done - or just one unit at a time.

Visit our store or write me at AMATEUR ELECTRONIC SUPPLY for the best Trade or No-Trade Deal on new DRAKE equipment. You will be surprised how little per month it would cost you to own new DRAKE equipment when you use our convenient Revolving Charge Plan.

Remember, too! When trading with AMATEUR ELECTRONIC SUPPLY you can use our STAY-ON-THE-AIR PLAN, which means you can keep your trade-ins until your new equipment arrives. - Lose no operating time! CU on the air!"

The BIGGEST - The BEST - In the MIDWEST

## AMATEUR ELECTRONIC SUPPLY

4828 West Fond du Lac Ave. Milwaukee, Wis. 53216

Phone (414) 442-4200

STORE HOURS: Mon & Fri 9-9; Tues, Wed & Thurs 9-5:30; Sat 9-3

Vt. Fone	3955	1400 Sun.	115	6	W1KKM
Carner	3945	1400 M-S	477	27	W1BLC
VTSB	3909	2230 M-S	514	78	W1HSG
		1330 Sun.			

The new pres. of the Burlington ARC is W1ERQ. Congrats to new Technician WA1NQ (Burlington) and new Novice WN1NRA (E. Middlebury currently with USAF in Las Vegas). The Vt. QSO Party will be Feb. 27, 28, 1971 with a special Vermont prize for the outside winner. W1CBW has a new 2-meter fm rig. W1YZ and W1QNM have been in the hospital. WA1JMA is a new station in Essex Co. K1HMO, now W1EMQ, recently married and now in Stratford, Vt. (another Orange Co. contact). W1IGK will operate from Middlebury College until graduation in Spring. Traffic: (Oct.) K1BOB 195, WA1JGK 74, WA1GKS 56, W1MRW 13, K1MPN 12, K1YGI 10, W1KJG 6. (Sept.) WA1GCE 462, W1FRT 22.

**WESTERN MASSACHUSETTS** - SCM, Percy C. Noble, W1BVR - SEC: WA1DNB, CW RM: W1DVV, VHF RM: WA1IGO (Berkshire County 6-Meters). The SEC reports that AREC nets are all going very well (see last month's QST for dates, frequencies and times). The Berkshire County 6-Meter AREC Net now is in operation every Sun. morning at 10:00 (12 check-ins during the second session). The CW RM reports that W1MN had 165 QNLs and handled 131 messages. Top five in attendance were W1ZPB, W1BVR, WA1LNF, WA1LPJ and K1SSH. W1MN liaison with 1RN is holding up very well also. The Eastern Massachusetts Novice Net has now expanded into the New England Novice Net with K1PNB as Mgr., Mon., Wed. and Fri., 6:30 P.M. on 3733. Call NENN. This net is excellent training and is recommended for any novices interested in traffic work. New ORS: W1YK. With deep regret we report the passing of W1NM (formerly W1FWJ). WA1MFB made BPL and is very active in Air Force MARS and DX. W1CSF has a new Galaxy-5 and Hornet J8-500 for 10, 15, and 20. WA1JNW is wintering in St. Petersburg. WA1LPJ now has 65 countries worked. From CMARA: The club now has a list of 14 prospective members. W1JNA is home from the hospital. From HCRA: New members: K1MET, WN1NBR and WA1EJV. The club was represented in the Communications Display Project at the Springfield Museum. From VARC: Speaker of the month was WA6GVC/1 who talked on VHF repeaters. Traffic: (Oct.) K1SSH 147, W1ZPB 139, WA1MFB 117, WA1LPJ 69, W1BVR 61, W1DVV 58, W1LNF 38, W1HI 17, WA1BXO 5, WA1ABW 4, W1EOB 2, W1HRC 1. (Sept.) WA1LNF 48, WA1MFB 6.

#### NORTHWESTERN DIVISION

**IDAHO** - SCM, Donald A. Crisp, W7ZNN - The FARM Net convenes at 0200 GMT each day on 3935 kHz. The Idaho RACES Net meets week days at 1515 GMT on 3991 kHz. The Post Office Net meets Tue., Thurs., and Sat. at 0130 GMT on 3930 kHz. The Idaho SEC is WA7EWW. W7A00 is building a new 813 linear. W7CJ says amateurs in Moscow are forming a new club. The Lewiston Club plans to conduct a novice code and theory course. A new ham in Coeur d'Alene is WN7PUX. K7RDV, a fireman, was burned in a fire. WA7JL has a new SB-200 and a new home-made 15-meter beam on a home-made tower. K7THX is off the air because of a fire in his transmitter. WA7GSM used ham radio for communications from his elk hunting camp. FARM Net report: 31 sessions, 1147 check-ins, 114 traffic handled. Post Office Net: 6 sessions, 52 check-ins, 36 traffic, 1 emergency message handled. Traffic: K7KBX 166, WA7BDD 82, W7IY 54, WA7G00 26, W7ZNN 23, W7YON 18, K7CSL 4, W7FIS 2.

**MONTANA** - SCM, Harry A. Roylance, W7RZY - Asst. SCM: Bertha A. Roylance, K7CHA. SEC: W7TYN. PAM: WA7IZR, VHF PAM: W7IAC. Welcome to new hams in the section, WN7POH and WA7PIQ of Bozeman, WA7IMO of Whitefish and WA7PHQ of Livingston. K7SVR has a new home and will be back on soon. W7YB has new quarters on the top floor of the Engineering building at the University in Bozeman. W7OTJ is using a delta loop on 10 meters. WA7HDD will be in Europe for 2 years on a mission for his church. WA7CAC now has the tig in the kitchen. W7OHO is busy making a new roster of the Butte gang. K7BON, W7JRG and W7RZY worked the path from Billings to Harlowton on 2. Clubs are reminded to send a member to represent them at the Montana Council of Amateur Clubs. Send information to your SCM. WA7JZR reports that the W1MU Hamfest will be held Aug. 6, 7 and 8. Owen needs a lot of help so clubs and individuals are urged to contact him. We still need more AREC members. If there is no EC in your area contact W7TYN. Traffic: WA7JQS 237, W7IBK 51, WA7IZR 39, K7EG 20.

**OREGON** - SCM, Dale T. Justice, K7WWR - SEC: W7HLE, RM: K7GGQ. PAM: K7ROZ. Section nets: K7YQM reports for the AREC Net, sessions 31, check-ins 660, traffic 30, contacts 73, maximum number of counties 16. This is Gene's last report as

WA7GTK is taking over. We thank Gene for his consistent and prompt reporting & leadership of the net. K7ZQU reports for BSN sessions 60, check-ins 1270, traffic 127, contacts 209. WA7KIU reports for OSN, sessions 23, check-ins 108, traffic 34. WA7FTT handled 898 phone patches to S.E. Asia. The Oregon PON met Wed. at 1830 PST on 3920 kHz. The NW Novice Net meets on 7181 at 1730 PST week days and 1500 PST Sat. and Sun. Oct. totals sessions 51, check-ins 181, traffic 24. New Novices in Lincoln City are WN7PRX, WN7PRW, WN7PTO and WN7PTM, all coached by WA7MMD. Traffic: WA7IKX 233, K7RQZ 168, W7BZ 158, WA7IES 102, K7QFG 88, K7OUF 56, WA7KIU 45, K7WWR 26, WN7ONC/7 24, WA7KRH 16, WA7JAW 12, W7HLE 11, K7KPT 11, W7L17 10, W7MLJ 8, WA7MIE 5.

**WASHINGTON** - SCM, Harry W. Lewis, W7JWJ - The King County Department of Public Safety recently issued a Certificate of Merit to the Boeing Employees Amateur Radio Society. It says in part that the BEARS have supplied manpower, equipment and expertise to the emergency operation of the Department of Public Safety. Oct. report for WSN indicates 31 sessions with QNL of 317 and QTC of 188. W7IEU has canceled as OBS because of work schedules and QRM covering W1AW. W7YD at the U. of W. and W7YH at WSU are back on the air for the winter quarters. Don't forget the Dial Twister CW practice net every Mon. night at 7:30 P.M. on 3735 kHz. Starts around 5 wpm and works on up. K7UWT of Lynnwood has been judged to be the top single operator phone scorer in Europe. He operated as CT2AT in the Azores. The BEARS Club committee is as follows: WA7ACQ, training and ARRL; W7RJW, emergency; WA7JBM, programs; WA7FGH, nets; WA7BSQ, certificates. Traffic: W7BA 1091, W7PI 294, W7AXT 182, W7FQE 84, K7UXS 57, W7BUN 42, W7RO 32, W7JLY 31, W7APS 27, WA7LMO 17, K7OKC 16, W7RXH 13, W7IEU 5, W7AIB 2.

#### PACIFIC DIVISION

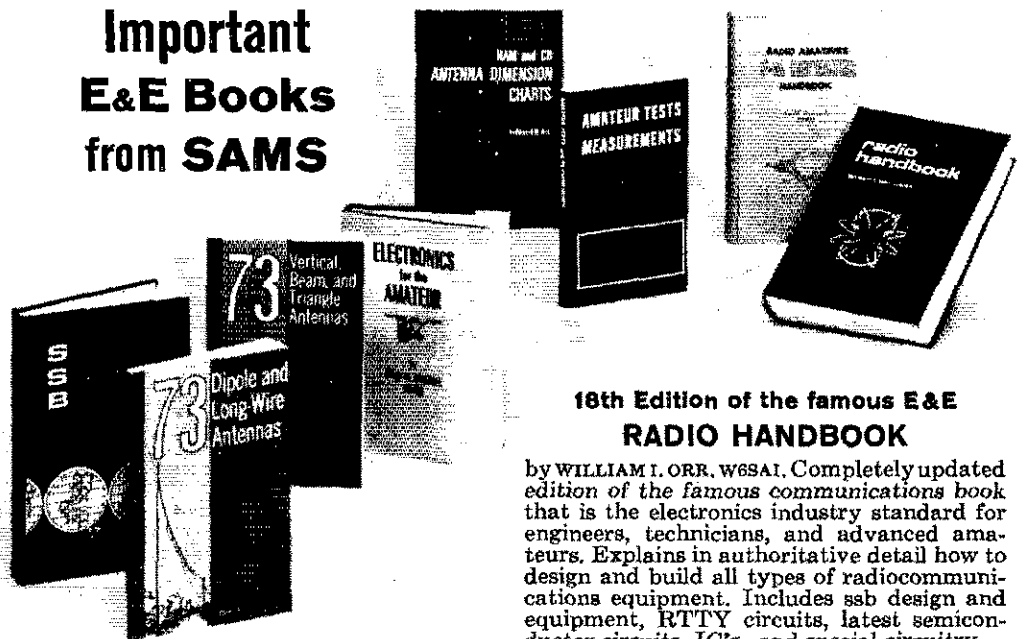
**EAST BAY** - SCM, Paul J. Parker, WB6DHH - KM: WA6DL. W6ZF reports that the work on his frequency standard is coming along well. Ron transmits the Pacific Division bulletin every 1st and 3rd Mon. at 8 P.M. local time on 3540 kHz. WN6DRU still is working on his 4H Net and in first place in the Northern Calif. 4H Electronics program. W6UZX reports that traffic at his OTH has been down some lately. W6TTS has really been burning up 15-meters lately with 115 countries and is going for WAS on that band also. WB6NMT/6 joined the school ranks this fall at Davis. That's all there is for Oct. and if you did not see your station listed in the operating activities it is because you did not forward any activities for Oct. Traffic: W6IPW 249, W6UZX 7, W6ZF 4.

**HAWAII** - SCM, Lee R. Wical, KH6BZF - SEC: KH6GQW. KM: KH6AD. PAM: KH6GJN. QSL Mgr.: KH6DQ. ECs: KH6s GPO, LP, BAS, GUO/KH6. GKD, K1HNO/KH6, KC6EJ and W7UZH/KG6. RACES Nets coordinate with Henry Gamache, Radio Officer.

Net	MHz	Time (ZL) Days
Friendly	7.290	2030 M-F
World-Wide Boy Scout	21.360	1800 Sat
Confusion (Parishes)	21.400	0130 All
Pacific Interisland	14.335	0830 M-W-F
Micronesia	14.335	0800 Tu-Th-Sa-Sun
PACDXNET	14.265	0600 Fri.
S.E. Asia	14.320	1200 All
GECRO	14.290	0730 Tue.
Pacific Typhoon*	14.265	

\*During typhoon alerts. Again I bring your attention to the 1971 ARRL Simulated Emergency Test (SET) Jan. 30 and 31, 1971. Get involved by contacting your local EC, Island Radio Officer or our Section Emergency Coordinator-Hawaii KH6GQW, for further details. His phone is 488-5693. Be prepared. Preparedness is something no emergency should be without. In town was New England Division Director, W1QV, for TAD/TDY. Don't forget the Fresno DX bash in Jan., also the '71 SAROC Convention in Las Vegas, Jan. 7-10. KH6NS and KH6GRU worked 50 MHz DX to the mainland and GRU worked South America and Japan. Details in the World Above 50 MHz column. Last month I reported WB6ZXE/KH6 now is signing KH6HHH. Well, I forgot to add his gracious XYL, WB6ZXE/KH6 now is signing KH6HHH! KH6HRZ now is back in Med school. WB4IOJ, ex-KH6FON, writes from N.C. State U. at Raleigh. W7UZH/KG6 reports that he worked WAS while mobile KG6 using QRP! KH6s SP, RS, BVS, GMP, EOG, BZF and JI were active in the recent CQ World-Wide Contest. KH6GLU/KH6 worked the contest from KH6NR with great results on 40-meters. K6SDR and his XYL checked into town for some "surf and sand" recently. W0DAD/KH6, returned from a lengthy business trip. ARRL Vice-Pres. W0BWW and his XYL vacationed on the big island of Hawaii. KH6HGJ reports he put up a new Mosley

# Important E&E Books from SAMS



## Single Sideband: Theory and Practice

by HARRY D. HOOTON, W6TYH. This one-source guide emphasizes basic principles and circuitry of ssb. Covers the origin of ssb, the derivation of ssb signals, carrier-suppression techniques, sideband selection, and a complete analysis of all types of ssb equipment. Order 24014, only . . . . . \$6.95

## 73 Dipole and Long-Wire Antennas

by EDWARD M. NOLL, W3FQJ. The first compendium of virtually every type of wire antenna used by amateurs. Includes dimensions, configurations, and detailed construction data for 73 different types. Appendices describe construction of noise bridges, line tuners, and data on measuring resonant frequency, velocity factor, and SWR. Order 24006, only . . . . . \$4.50

## 73 Vertical, Beam, and Triangle Antennas

by EDWARD M. NOLL, W3FQJ. Describes the design and construction of 73 different antennas used by amateurs. Each has actually been built and air-tested by the author. Appendices cover construction of noise bridges and antenna line tuners, as well as measurement methods. Order 24021, only . . . . \$4.95

## Electronics for the Amateur

by LOUIS M. DEZETTEL, W6REZ. This is one of the few books on the theory of electronics and radio that programs the material for the amateur. Discusses radio-wave propagation as it applies to amateur band frequencies, reception and transmission pertaining to ham equipment, and the special field of antennas and how to feed them. Contains all the information required to pass the theory section of the General License exam. Order 24022, only . . . . . \$7.95

## 18th Edition of the famous E&E RADIO HANDBOOK

by WILLIAM I. ORR, W6SA1. Completely updated edition of the famous communications book that is the electronics industry standard for engineers, technicians, and advanced amateurs. Explains in authoritative detail how to design and build all types of radiocommunications equipment. Includes ssb design and equipment, RTTY circuits, latest semiconductor circuits, IC's, and special circuitry. Order 24020, only . . . . . \$13.50

## Radio Amateur's F-M Repeater Handbook

by KEN SESSIONS, JR., K6MVH. The definitive work on the vital and virtually undocumented subject of amateur f-m repeaters. Chapters include: Preparing and obtaining sites for repeaters; How to build a repeater; and Repeater applications. Includes an f-m repeater directory. Order 24008, only . . . . . \$6.95

## Amateur Tests and Measurements

by LOUIS M. DEZETTEL, W6REZ. Shows how to accomplish virtually all performance tests on amateur transmitters, receivers, and antennas, and how to make required adjustments. Order 24007, only . . . . . \$5.50

## Ham and CB Antenna Dimension Charts

by EDWARD M. NOLL, W3FQJ. Tabulates dimension data in feet and inches for all the popular antenna configurations. Charts are so subdivided that an antenna can be dimensioned for a specific frequency range according to license class and mode of operation. Order 24023, only . . . . . \$1.95

Order from your electronic parts distributor or send coupon below.

### EDITORS and ENGINEERS

Howard W. Sams & Co., Inc., Dept. QS-011  
4300 W. 62nd St., Indianapolis, Ind. 46268

Send me the following books: Nos. \_\_\_\_\_

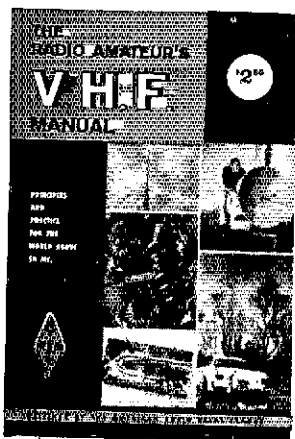
\_\_\_\_\_ \$ \_\_\_\_\_ encl.

Send Free 1970 Sams Book Catalog

Name \_\_\_\_\_  
PLEASE PRINT

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_



# change of Pace

**BAND** conditions are crowded and noisy — except on the higher frequencies. You won't work the world any time you want, but you can sure get away from all those annoyances on the lower bands. No QRM to speak of, no atmospheric noise to make copy difficult. Just enjoyable ragchewing.

**A LITTLE** time and a few ideas from the ARRL VHF MANUAL will put you on the air in this most enjoyable part of the spectrum.

**THINK** about it and look at a copy of the VHF MANUAL the next time you are in your local dealer's "ham shack."

**\$2.50** U.S.A.

**\$3.00** Elsewhere

AMERICAN RADIO RELAY LEAGUE  
Newington, Connecticut 06111

CI-36 at 200-ft. KH6BX has a new Drake transceiver and new 74-foot tower. KH6HDM has a new Swan 350. KH6BAS reports his four-element Quad gets good SSTV pictures from ZL1AOY, ZL1DV, ZS6PP, 1L1CF, SM5DAJ, KL7DRZ and VE6MR. Again best of Season's Greetings. Traffic: (Oct.) W0DAD/KH6 129. KH6BZF 34, KH6HJG 21, K2HBA/KH6 7. KHNO/KH6 1, KH6BAS 1, W7UZH/RG6 1. (Sept.) W0DAD/KH6 20, KH6HJG 15, KH6GPV 6, W7UZH/RG6 1. (Aug.) W0DAD/KH6 141. (July) W0DAD/KH6 25.

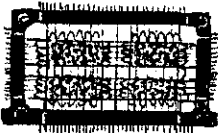
**NEVADA** — SCM, Leonard M. Norman, W7PBV SEC: Lewis L. "Mike" Blain, WA7BEU, 560 Cherry Street, Boulder City, NV. WA7BAV conducts code and theory classes for the Nellis AFB Club. W7RBV and K7TDQ are both home from the hospital and doing fine. K7ZOK and WA7DSP report FB signals on 6-Meters. The NARA and SNARS Radio Clubs are getting ready for their holiday dinners and installation of club officers. The K7UGE fm repeater 34/94 antennas were repositioned for better signal coverage from Red Mountain. The SAROC Convention at the Flamingo Hotel, Las Vegas, Jan. 7, 10, 1971 promises to be an outstanding event with the Convention area filled with exhibitors and technical seminars on the agenda.

**SACRAMENTO VALLEY** — SCM, John F. Minke, III, W6KYA — The North Hills Radio Club held another get-together dinner, this time at Grouchey's in Rocklin. The RAMS held their annual Dinner Dance Oct. 10, at the Town and Country Inn. K6HTM reports 5 new hams in Chico, WN6ARK, WN6CIZ, WN6COF, WN6RHC and WN6RHD. W6JDN has completed a new SB-220 linear amplifier and will be using it as soon as a new power line is run into the shack. Hal also reports that the Mt. Shasta and Yreka clubs have become somewhat dormant of late. W6VUZ also has a linear amplifier going but has been busy with the walnut harvest up around Red Bluff. Not many Sacramento Valley members were seen at the Bay Area Hamfest, but those of us who were there had a special treat Sun. morning — rain! After a long dry summer that wet weather was good to see. And, it looks like it will be a long wet winter, so be prepared. Make sure your gear is in working order. Hope you all had a joyful Christmas and may you all have a rewarding New Year. Traffic: (Oct.) W6LNZ 19, W6VUZ 3. (Sept.) W6VUZ 4.

**SAN FRANCISCO** — SCM, Kenneth S. McTaggart, K6SRM — Now that the year '71 is upon us, how about some New Year's resolutions? 1) I promise faithfully to send in my Form 1s to the SCM; 2) I will spend at least some of my time devoting myself to public service and building the image of amateur radio in the public eye; 3) I will offer my help to someone who is interested in becoming an amateur; 4) I will be courteous and thoughtful on the air, even to those who may not reciprocate. Well, even two out of four will be a good start, don't you think? Don't forget the SET! Be sure to make the required reports so our section can get the credit. With 600 members in the section, I should be getting more information, via Form 1s, for this column. Some misunderstand the purpose of the Form 1 post card, thinking it is only traffic reporting. The Form 1 card is a means of reporting your activity, whether or not it involves traffic handling, vhf experimentation, social events, etc. WA6LX is spending some time in KK6-Land. WN6CBB is patiently waiting for his General Class license. W6PZE says another repeater is planned for the Petaluma area. W6FCX has been spending some time in Yuma on vacation. Thanks to those who sent in their Form 1s. My best wishes for the New Year to you all. Traffic: (Oct.) WA6BYZ 236, W6WLV 161, W6KVO 148, W6OER 113, W6FAX 38, WB6IQP 11, W6BWV 10, K6UGS 10. (Sept.) W6FAX 38.

**SAN JOAQUIN VALLEY** — SCM, Ralph Satoyan, W6JPU — The Delta Amateur Radio Club hold their meetings on the 3rd Fri. of each month at the Daniel Webster Jr. High School. Their NET is held on 146.0 MHz at 2030 every Wed., all are invited to attend and participate. WB6RZI was kept busy fighting forest fires during the summer. The Tuolumne Radio Club has 3 mobile and 6 160-meter portable rigs ready to go. W6NNG is vacationing in Alaska. The Tulare County ARPS members were on standby to assist the Division of Forestry with radio communications during the summer. WA6ASU is active on 6- and 2-, 220- and 432-MHz. WR6JKO has a new beam and tower. The Lodi Amateur Radio Club hold their meetings in the Lodi Academy. K6OZL worked OH2BH/2A and has 280 countries worked. WA6JDB is working traffic again and has a Ten-Tec Keyer. W6POW is working 6-meter scatter. WB6VOG has an eleven-element beam on 2-meters, horizontally polarized for ssb. W6DPD reports that 2-meter ssb activity is on the increase. W6WME was guest speaker at the Tulare County Amateur Radio Club in Oct. WB6TTP still is pushing the four counties contest. W6WMV is on 160. WB6ERO is the new call for the San Joaquin Memorial Radio Club. Traffic: WA6JDB 166, WA6CPP 4.

4,000 BIT  
MEMORY \$8.50



From IBM Computers,  
Guaranteed W/Spec Sheets

**LINEAR AMPLIFIERS**

Your Choice

**\$1.29**



- 702C DC Amplifier
- 709C Operational Amp
- 710C Differential Comp.
- 711C Sense Amplifier

**FAIRCHILD 741C  
HIGH PERFORMANCE**

**\$2.59**

3 for \$6

Similar to 709 but  
frequency compensated



**\$10 ORDERS  
CHOOSE  
ANY  
\$1 ITEM Free**

**POPULAR "LINE LITERS"**

- 1 Tunnel Diode 1N3716 for amps-osc ..... \$1.19
- 1-Watt Audio "IC amplifier" WC334 ..... 1.49
- 1 Voltage Regulator, 0-40V pos ..... 1.19
- 4 - 2N4409 Mixtr tube drivers ..... 1.00
- 1 - 15Amp 200 PRV Triac stud ..... 1.49
- 2 Unijunction transistors 2N4891 ..... 1.19
- 2 N-Channel plastic Fets 2N819 Texas ..... 1.19
- 5 - 3Amp 600V top hats silicon ..... .99
- 4 - 3Amp 800V top hats silicon ..... .99
- 1 - 2N3632 400MC 8A.20W. npn sil ..... 2.98
- 1 - 5U4 Raytheon silicon tube ..... 1.49
- 3 - ER-900 Trigger diodes, triacs ..... .99
- 2 - 2N2419 Unijunction transistors ..... 1.19
- 25 GE 1Amp silicon rects. to 1000V ..... 1.00
- 1 - 1N2929 Tunnel diode, Centralab TO-18 ..... 1.00
- 4-ft Fiber Optic Lite Pipe w/jacket ..... 1.19
- 10 - 1Amp 800 pIV silicon rectifiers ..... 1.00
- 8 - 1Amp 1000 pIV silicon rectifiers ..... 1.00
- 1 - 2N3055 NPN 100V 15A TO3 trans 1.19

**EPOXY RECTIFIERS**



PIV	1Amp*	2Amp	3Amp
50	\$ .05	\$ .05	\$ .08
100	.06	.06	.12
200	.07	.07	.15
400	.09	.09	.22
600	.12	.12	.28
800	.16	.16	.39
1000	.22	.22	.59

\*microminiature

**HIGH VOLTAGE  
1 AMP EPOXY**

PIV	SALE
<input type="checkbox"/> 2000*	1.00
<input type="checkbox"/> 3000	1.35
<input type="checkbox"/> 4000	1.65
<input type="checkbox"/> 5000	2.25
<input type="checkbox"/> 6000	2.96
<input type="checkbox"/> 8000	3.50
<input type="checkbox"/> 10000	3.95



**SILICON  
RECTIFIERS**

**6-Amp  
SILICON  
FULL WAVE  
BRIDGES**

PIV	Sale
<input type="checkbox"/> 50	\$1.19
<input type="checkbox"/> 100	1.39
<input type="checkbox"/> 200	1.59
<input type="checkbox"/> 400	1.85
<input type="checkbox"/> 600	2.15
<input type="checkbox"/> 800	2.50
<input type="checkbox"/> 1000	2.95



**GIANT SALE ON NEW TTL  
TEXAS & NATIONAL ICs**

Guaranteed! W/Spec Sheets  
Any 3 - 10% Discount!

Type	Description	SALE
<input type="checkbox"/> SN7400N	Quad 2 Input NAND Gate	.88
<input type="checkbox"/> SN7402N	Quad 2 Input NOR Gate	.88
<input type="checkbox"/> SN7404N	Hex Inverter	.99
<input type="checkbox"/> SN7410N	Triple 3 In. NAND Gate	.88
<input type="checkbox"/> SN7420N	Dual 4 In. NAND Gate	.88
<input type="checkbox"/> SN7430N	8 Input NAND Gate	.88
<input type="checkbox"/> SN7440N	Dual 4 In. NAND BUFFER	.88
<input type="checkbox"/> SN7440F	Dual 4 In. NAND BUFFER	.88
<input type="checkbox"/> SN7441N	BCD to Decimal Driver	4.95
<input type="checkbox"/> SN7442N	BCD to Decimal Decoder	4.50
<input type="checkbox"/> SN7470F	J-K Flip Flop	.99
<input type="checkbox"/> SN7472N	J-K Master Slave Flip Flop	1.19
<input type="checkbox"/> SN7473N	Dual J-K Master Slave Flip-Flop	1.49
<input type="checkbox"/> SN7474N	Dual "D" Type Edge Triggered Flip Flop	1.49
<input type="checkbox"/> SN7475N	4 Bit Bistable Latch	2.95
<input type="checkbox"/> SN7476N	Dual J-K Master Slave Flip Flop	1.49
<input type="checkbox"/> SN7483N	4 Bit Binary Full Adder	4.50
<input type="checkbox"/> SN7490N	Decade Counter	3.98
<input type="checkbox"/> SN7492N	Divide-by-twelve Counter	4.50
<input type="checkbox"/> SN7493N	4 Bit Binary (divide by 16)	3.98
<input type="checkbox"/> SN7495N	4 Bit Right & Left Register	4.50

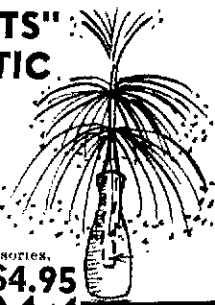
Code: F - Flat Pak, N - Dual Inline

**"CELESTIAL LIGHTS"  
3-LEVEL FIBER OPTIC  
DISPLAY KIT**

- 1400 multi-colored fibers
- 18" high of brite lites
- Cordless light source
- Variable color control
- SAFE! FUN! EDUCATIONAL!

Kit: 1400 glass fibers 2-ft. long, accessories, adhesive, self-powered light source, "Blinky", booklets

**\$4.95**



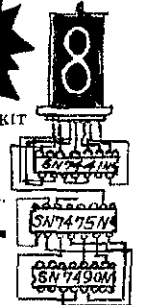
**SPRAGUE- IC's**

- Your Choice
- 3 for \$1
- 908 Full Adder
  - 909 Buffer
  - 912 Half Adder
  - 913 Shift Register
  - 960 Dual Buffer



**COUNTING  
SYSTEM  
\$11 3 PC. KIT**

Includes SN7490 decade counter, SN7441 BCD decoder-driver, SN7475 quad latch with bookups, instructions



**EPOXY SILICON  
TRANSISTORS**

5 for \$1



Type	Sale
<input type="checkbox"/> 2N2222	5 for \$1
<input type="checkbox"/> 2N3565	5 for \$1
<input type="checkbox"/> 2N3638	5 for \$1
<input type="checkbox"/> 2N3641-3	5 for \$1
<input type="checkbox"/> 2N3645	5 for \$1

**NIXIE\* TUBE**

**\$5.95**

(0-9), wide angle  
Similar to Burroughs

**FAIRCHILD'S POPULAR "IC"  
TWINS - RTL914 & RTL923**

With Spec Sheets!

- 914/921 Dual 2 input gate
- 923/940 J-K flip flop

**2 For \$1**

WINTER CATALOG  
**10¢**  
BUY'S  
BARAIN  
CATALOG

**POLY PAKS**

P.O. BOX 942 M  
Lynnfield, Mass.  
01940

Terms: add postage. Rated: net 30, cod's 50%  
Phone Orders: Wakefield, Mass. (617) 245-8829  
Retail: 211 Albion, St., Wakefield, Mass.

**SANTA CLARA VALLEY** - SCM, Albert F. Gaetano, W6VZT - RM: WA6LFA. W6AUC took all his antennas off the roof because the roof had to be replaced. He now is busy putting them back up. W6VBV spent a couple of weeks in Albuquerque, New Mexico. Welcome to VE3FZK/W6 who has moved into Menlo Park. WA6DKF is experimenting with a sloping long wire on 80-meters. It doesn't appear to work any better than a drooping dipole. If you tricklers want to improve your code speed don't forget that K6DYX is sending high speed code practice on Sun, night at 7:30 local time on 3690 kHz. WA6NHD's activity on the traffic nets has slowed down because of school work and too much TVI. W6RFF has a new linear amplifier that is working fine. W6YBV has recovered nicely from his stay in the hospital. W6ZRJ has been helping his students at school set up a model 15 teletype. They now are working on some fax gear to get it going. The Live Oak High School has applied for station license for their school club. Traffic: W6RSY 464, W6YBV 203, WA6LFA 144, W6BVR 131, W6WNW 116, W6DEF 100, W6VZT 59, K6DYX 57, W6AUC 47, W6ZRJ 22, W6BPT 16, W6RFF 14, WA6DKF 12, W6OU 8, WA6NHD 2.

### ROANOKE DIVISION

**NORTH CAROLINA** - SCM, Calvin M. Dempsey, WA4UQC - SEC: W4EYN. PAM: WA4JT. VHF PAM: W4HJZ. RM: W4WXZ. K4FO has completed all counties (100) in N.C. He has worked all counties in 8 states. The Alamance Amateur Radio Club has just been formed in Burlington, N.C. with 15 members. WA4FFW was top scorer in the nation for the Pa. QSO Party. He also was high scorer in the Mid-D.C. QSO Party. The Rowan Amateur Radio Society set up for the week end in the Rowan Mall shopping center to display equipment and take traffic for overseas military personnel. 27 messages were sent and 12 club members participated. K4DSX, WA4FFW, K4MPE, K4CAX and W4OMW participated in the 4-Land QSO Party. K4GHR got his DXCC. He also is on 2-meter fm with 25 watts and a pair of eleven-element beams. W4TYF enjoyed the CD Party. W4IJC gave a real good talk about antennas to the Brightleaf Amateur Radio Club in Greenville, N.C.

Net	Freq.	Time(Z)/Days	QTC	Mgr.
NC SSB	3938	0030 Dy	7	WB4ADE
THEN	3923	0030 Dy	30	WA4UQC

Traffic: (Oct.) W4EYN 207, W4WXZ 112, K4MC 44, WA4VNV 29, W4EXU 27, WB4MTQ 35, K4VBG 23, WA4UQC 8, WR4HGT 7, K4GHR 6, W4TYF 6, WB4JMG 5, WB4HGS 4, WA4KWC 3. (Sept.) W4YTE 8.

**SOUTH CAROLINA** - SCM, Mrs. Elizabeth Y. Miller, WA4EFP - SEC: WA4ECJ. Asst. SEC: W4WQM. PAM: WA4GAW. RM: K4LND. The Rock Hill ARC is building a complete 2-meter station, repeater and all. By the time this is published, K4HJ will be back from Gurnsey Island where he expected to be operating as GC5AGA during mid-Dec. K4HDX had pins and hardware removed from his crushed elbow, injured in the crash of his experimental light plane, and now is home mending. Says he's gonna beat W4NTO on the next EMT. K4NZE is back from Vietnam and expects to be on the air soon from Charlotte. W4SH's new Heath-220 sounds mighty big. He is the new KACLES officer in Spartanburg. WB4MCI, Spartanburg EC, has conducted several historical society wearing demonstrations. WB4KPN is in the control room of WSPA TV. The Roanoke Division Convention was just great! We enjoyed it immensely. Those who weren't there surely missed a gala affair. SCSSBN traffic: 181. SCPN: 3940 kHz Dy Noon; Sun, 1330Z and 2030Z. CN: 3573 kHz Dy 2245Z and 0200Z. SCSSBN: 3915 kHz Dy 0000Z. SC AREC Forum 3915 kHz Tue-Wed 2330Z. Traffic: K4LND 191, WA4EFP 73, WB4SKC 68, W4JSD 38, WB4OVQ 29, K4OCU 21, W4WQM 17, WB4BZA 10, W4ELW 5, W4JA 1.

**VIRGINIA** - SCM, Robert J. Slagle, K4GR - Asst. SCM: A.E. Martin, W4THV. SEC: WA4PBG. Asst. SEC: WB4CVY. PAMS: W4OKN, WA4YXK. RMs: W4EUL, K4MLC, W4SHJ. I deeply regret to announce the passing of W4QGW. W4TE is tops in checking in the miscellaneous nets. Nice show at the Roanoke Division Convention hosted by Raleigh ARC with Director W4KIC presiding. Biggest turnout yet at Gaithersburg. Looking forward to good get together in Greensboro come spring. The mobile of WA4WQG is working better, has 1990 counties, and met a fine group in the CD Party. W4MK was in the CD Party as was WB4ODN where he multi-operated at WB4GTS. WA4HQW reports on line with RTTY; K4GR still is trying. WA4JKR is a new operator at K4CG and a new member of PVRC. W9SZR/4 (ex-H18XAL, HS3AL, HS5ABD) is sojourning in Virginia prior to another overseas assignment. K4AOL received the Advanced Class license and is working on the extra. Albemarle ARC has 146.28/94 repeater playing. W4YZC is subbing as NCS on VN. WB4DRC is on the air at Ohio U. W4KX reports a quiet Oct. W4JHK says business necessitates inactivity. W4ZRJ said everybody told him to report to

his SCM and did so for the first time in 40 years! He operates 5-watts and below, would like to go high power to ten watts but is worried about safety! WB4JKB, trustee, says William and Mary ARC will be on the air by the holidays with WB4JMD, pres.; WB4JCY, secy. WB4FDT reports as pres. and trustee of the Virginia Commonwealth U. ARC with WA4QEL, treas.; WB4IMV, secy.; WB4JLV, act.mgr. will also be on the air by the holidays. VSBN Net Certificates to K4AWV and WB4KIT.

Net	kHz	EST Dy.
VSBN	3938	1800/2200
VSN	3860	1830
VN	3860	1900
VFN	3947	1930

Traffic: (Oct.) WB4NNO 455, W4SQQ 335, W4TE 240, K4KPN 205, W4BKSQ 166, W4ALC 150, W4UQ 138, WA4JJE 110, WB4CVY 79, K4GR 76, W4OKN 50, K4FSS 49, WA4PBG 40, WB4PMB 35, WB4K1P 29, K4LMB 29, WB4JMD 23, W4SHJ 22, WB4KBJ 19, W4ZYT 16, K4RHO 15, K4AWY 14, WA4HOW 14, K4JM 14, W4THV 14, WB4FDT 12, WA4JNG 12, K4TSI 11, WA4WQG 11, K4JYM 9, W4ZM 9, W4MK 7, W4KFC 6, WB4ODN 6, WA3YS/4 4, K4VCY 4, W4OP 3, WB4DRC 2, W4YZC 2, W4KX 1. (Sept.) W4OP 7. (Aug.) WB4ODN 20.

**WEST VIRGINIA** - SCM, Donald B. Morris, W8JM - SEC: WA8NDY. RM: WB8BBG. PAMS: W8DUW, K8LHW, W8YD. Phone Net Mgr.: WA8LFW. CW Net, 0000Z and 0300Z on 3570. Phone Net, 2300Z on 3995. I regret to report the passing of K8HUX, ex-8AAI of Grafton. The Kera ARC hold code and theory classes with WA8ZBX as instructor. WA8WCK and WA8NDY attended the 8RN ARSC meeting in Columbus. W8NYH, W8CWY, W8BT, WA8FLV, WA8NDY, WA8WCK, W8DUV, W8DUW and W8JM attended the Roanoke Division Convention in Raleigh, N.C. W8SSA received DXCC, with many contacts from his mobile. W8DUV will be chmn. of the division's LO meeting in Apr. WB8DXE likes building gear and checking into cw nets. W8LBI spoke at the Wheeling ARC on his trip to Czechoslovakia. QVN CW Net reports 127 stations with 80 messages handled. Phone Net, 462 check-ins, 87 messages handled. W8DUW will represent W. Va. on the Roanoke Division fm repeater committee. WA8FN has moved to Florida. WB8BBG again makes PSHR. Traffic: WB8BBG 133, WA8NDY 111, WB8CYB 65, WB8DXE 40, W8JWX 17, WA8WCK 17, WA8LFW 12, W8JM 9, W8AEC 8, W8DUV 8, W8EQH 8, WA8ZNL 5, WB8AQE 4, WB8DQX 4, W8CKX 1, WA8THX 1, W8W01 1.

### ROCKY MOUNTAIN DIVISION

**COLORADO** - SCM, Charles M. Cotterell, W8SN - CCN Net Mgr. welcomes WB9AOL, K8YAJ, W8YNP and W8WHIE to the net and their help in NCS and liaison. OO W0LLA is back in business and QVS reports were received from W8MOX and W8BAWG. W8MOX worked W0LCN during the aurora opening and several others on 144 MHz. W8WYX reports many new stations using the 2-meter repeater; 450 and 6-meters are in operation also. W8MNL is the new presy of the PPAA and also is asst. Net Mgr. for CCN. K8JSP is now operational on RTTY and W8LRN reports a new RTTY society has been formed. W8YCD, Lamar, will soon be operating from new EOC there. The Silver State Net now is in operation with a total of 6 sessions in Oct. Total QNI 43, QTC 10, 132 mins. SSN provides phone outlets to the NCS and are looking for more check-ins. W8KFH, W8NUZ, W8LCE and W8OMN have taken trips and K8MNP is building a keger. W8UAT is moving to Lakewood. K3TEZ/0 is welcomed to our nets. All stations should check to see if they qualify for PSHR; if so, please turn in the information so you may be listed. Columbine Net total QNI 1019, QTC 78, informals 240, 1400 mins. CCN, 31 sessions, QNI 158, QTC 75, 534 mins. Hi-Noon QNI 962, QTC 100, 1099 mins. Traffic: (Oct.) K8ZSO 1020, W8WYX 238, K8ECR 71, K8JSP 66, W8MNL 65, W8MOH 61, W8YCD 28, K8IGA 22, W8LRW 22, W8PAOL 21, W8UAT 11, W8SN 9, W8LCE 4, W8KFH 3, K3TEZ/0 2. (Sept.) K8ZSO 662, W8MOH 89.

**NEW MEXICO** - SCM, James R. Prine, W5NUI - The NMSU Club, W5GB, now has company with the UNM group of 19 members and the club station, W5SAX is active on 40-meters. On Oct. 31, 20 Alamogordo amateurs got together for reactivation of a local club. Additional members are welcome and should contact W5BUI or W5VBQ in Alamogordo or W5UNO at HAFB. Information on the spring New Mexico QSO Party has been sent to all club secretaries. Circle the week end of March 27 for this event. I was very pleased to receive messages from W5SHYC of Gallup and W5BSR of Deming. W5UH is the new call for ex-W6BN/5. Hope this one will also last for 48 years. The section is now well represented on TWN. Congratulations and keep up the good work.



# THE BIG SIGNAL

"W2AU" BALUN = \$12.95



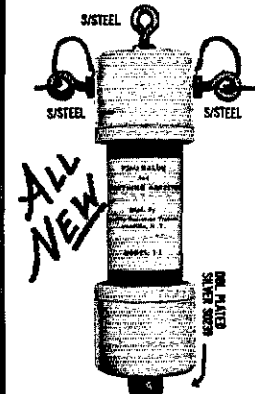
1. HANDLES FULL KW INPUT—THEN SOME. Broad-Banded 3 to 40 Mc.
2. HELPS TVI PROBLEMS By Reducing Coax Line Radiation
3. NOW ALL STAINLESS STEEL HARDWARE. SO239 Double Silver Plated
4. IMPROVES F/B RATIO By Reducing Coax Line Pick-Up
5. REPLACES CENTER INSULATOR. Withstands Antenna Pull of Over 600 Lbs.
6. BUILT-IN LIGHTNING ARRESTER. Protects 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 EXTENSIVELY BY ALL BRANCHES OF THE U.S. ARMED FORCES, FAA, RCA, CIA, CANADIAN DEFENSE DEPT. PLUS THOUSANDS OF HAMS THE WORLD OVER

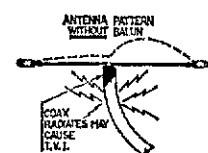
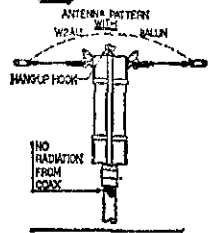
## BIG SIGNALS DON'T JUST HAPPEN—GIVE YOUR ANTENNA A BREAK

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



IT'S WHAT'S INSIDE THAT COUNTS!



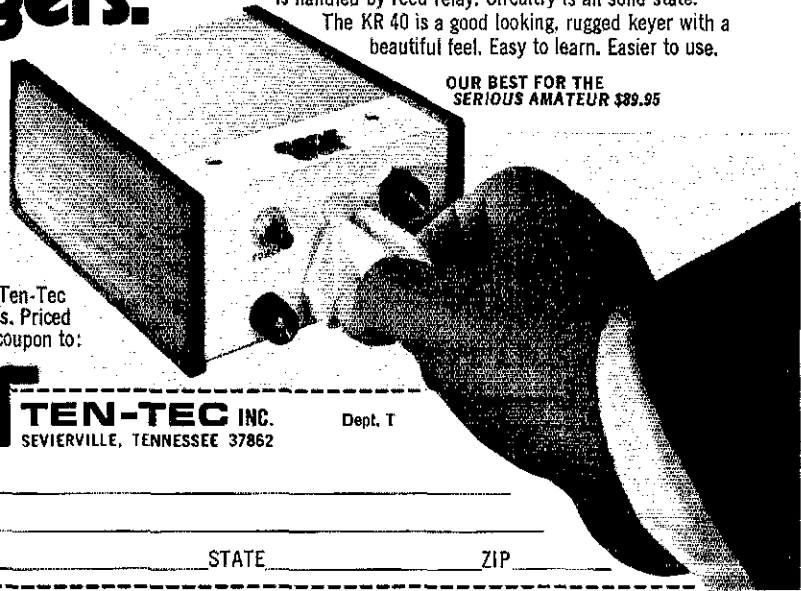
We'll GUARANTEE no other balun, at any price, has all these features  
UNADILLA, N.Y. 13849  
Dept. H

UNADILLA RADIATION PRODUCTS

MFRS. OF BALUNS & QUADS  
Tel: 607-369-2985

## Pro CW from amateur fingers.

Ten-Tec's KR 40 squeeze keyer makes the perfect signal from the imperfect hand. Built-in memories insert characters in correct place and spacing with only a momentary closure of either paddle. Spacing and speed are adjustable to match your sending speed, from 6 to 60 words per minute. Built-in monitor provides side tone for headphones, speaker or off-the-air practice. Output is handled by reed relay. Circuitry is all solid state. The KR 40 is a good looking, rugged keyer with a beautiful feel. Easy to learn. Easier to use.



OUR BEST FOR THE SERIOUS AMATEUR \$89.95

Write for complete information on the Ten-Tec family of five keyers. Priced from \$34.95. Send coupon to:



TEN-TEC INC.  
SEVIERVILLE, TENNESSEE 37862

Dept. T

NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

Traffic: KSMAT 130, KSDAV 95, W5RL 61, WA5LJY 56, W5NUT 52, W5LJ 28, WA5GHI 28, WA5JNC 24, W5MYM 20, W5PDY 19, WA5IXU 16, WA5BLI 15, WA5MIY 13.

UTAH - SCM, Thomas H. Miller, W7QWH - SEC: W7WKF, RM: W7URX. The new location for Utah is Carroll Super, K7SOT, 4422 Emigration Canyon, Salt Lake City, Utah 84108. Much thanks is due Don W7QWH for those amateurs who have supported me during the last two years as SCM. W7FM has renewed acquaintance with W4FFP both on the air and in person after 28 years. WA7LES sent his station activity report in Braille. I'm glad he also wrote it out. The club station at Weber State College is looking for members among faculty staff and students. K7HLR has been appointed ORS. K7ZIS sent out 75 cooperative reports during Oct. WA7MAX and WA7HCQ have earned BUN certificates No. 80 and 81 respectively. Traffic totals are up this month. W7OXC reports 52 points for PSHR and K7ZVT reports 47. K7ZVT's report is the first PSHR report besides W7OXC. Traffic: K7HLR 144, K7ZVT 144, W7OXC 50, W7NZZ 45, WA7HCQ 41, W7EM 40, WA7LES 24, K7CLO 5.

WYOMING - SCM, Wayne M. Moore, W7CQJ - SEC: K7NQK. We have lost W7HYQ to Santa Fe, New Mexico and WA7LWO to Montana. W7HRM has moved into a new house. K7ZFN is a new father - a fine boy. Also found out that W7GTM had a new son in July. K7WUR was in the hospital but is recuperating nicely now. W7VTB now has worked all continental 48 on 6-meter phone. Believe he is the second in Wyoming to do this with W7HL, taking the honors for being first. W7HNL now has a new transceiver which is working very good. Don't forget to set aside the 3rd week end in July for the annual hamfest. The Casper Club is host for 1971 and committees are now working to make it one of the best yet. Traffic: K7NQX 296, K7KSA 234, W7HLA 66, W7TZK 65, W7SDA 36, W7YWW 27, W7BHH 8, K7AHO 6, WA7LE 4, K7WNE 4, K7JFD 3, K7RTE 1.

### SOUTHEASTERN DIVISION

ALABAMA - SCM, Donald W. Bonner, W4WLG - SEC: W4DGH, RM: W4HEH. A new 2-meter fm repeater is in operation in Springville with an input frequency of 146.34 and an output of 146.94. W4DGH is our new SEC. WB4JMH is a new ORS. Congratulations go to the Birmingham ARC again this year for taking top honors in the 1970 Field Day competition. That was a job well done. There were a lot of good scores this year throughout the section. It's time again for everyone to make preparations for the Simulated Emergency Test. Check the rules, see the SEC for the name of the EC in your county and get ready to handle some traffic. One purpose of the SEI is to see if the NIS will bog down under heavy traffic loads and, sure enough, it bogs down. This year talk to your NM ahead of time and make sure that you know the schedules and procedures of your net and, by all means, remember one thing: the NCS and only the NCS has charge of the net at all times. He doesn't need any help unless he specifically asks for it. The best help that we can give is to be reliable, be at the appointed place at the appointed time. Don't forget to report your activity so that the section can get proper credit. Traffic: W4HDU 114, WB4KDI 88, WB4JMH 86, WB4EKJ 81, WB4OKT 76, WA4FYO 44, K4AOF 42, WB4LAL 42, WB4KSL 34, WB4OYR 34, WB4OJD 33, WB4POI 13, W4WLG 12, WB4LNM 11, WB4MLV 7, W4DGH 5, WN4POD 3, WN4RLX 1.

EASTERN FLORIDA - SCM, John L. Porter, W4KGJ - SEC: W4LYT, Asst. SEC: W4SMK, RMs: K4EHY and W4ILE, PAM 75: W4OGX, PAM 40: W4SDR. We are very sorry to hear of the departure of K4SIH for the Ataskaun wild country. Ham has for many years been active in the activities of the Eastern section. Good luck on your new venture. The Tampa Hamfest was a big success. Your SCM attended and enjoyed the many eyeball QSOs. Thanks to WA4RNE, IC for extending the welcome mat. HARS has plans for a four-week course on weather, the first of the year. RTTY systems and codes will be covered. George Wooten, WFLA TV meteorologist will instruct. K4FMA, OO Class 1, sent out 138 notices for Oct. Dade Radio Club, W4NVU/4, operated at the Miami Museum of Science Show Case. This added to our traffic totals this month. Thanks to the following for their club bulletins: Brandon ARC "Slant Bars", Daytona Beach ARA "Ground Wave" and many others that we will name from time to time. Welcome to the newly-affiliated IBM Radio Club of Boca Raton. Be sure and have your say. Keep us posted on your meeting dates. KH6AK has moved into the Tarpon Springs area. Welcome home Art. W4FFP now has joined the faithful in checking in to 4RN as QFN rep. He is also assuming NCS of 4RN one day a week. WBFO moved to Georgia in Nov. Brandon's new Novice class is being taught by WB4MUU, K4NP and WB4OXZ. 18 BARS members attended the LARC Tampa Hamfest. W4LJK, W4DFD and WANVU made BPL in Oct. Keep those cards and letters coming. Traffic: (Oct.) W4LJK

898, W4FPC 372, WB4OMG 345, W4FFP 334, W4SDR 327, WA4LH 246, 8R1Y/W4 213, W4DFU 192, WB4IUW 167, W4NVU/4 159, W4EHW 49, W4DVO 120, K4LEX 67, W4NGR 61, W4YXP 59, WB4AA 55, W4FFY 54, WA4HDH 51, K4GJ 50, W4IA 48, WA4ABY 43, K4HS 41, W4BPFD 41, WB4HGD 39, W4ZAK 35, W4OGX 31, WB4HNL 28, W4PFO 19, W4BNE 18, W4YIT 16, K4JWM 16, K4BLM 14, K4LPS 13, W4AD 12, W4KGG 11, K4FFP 10, W4SMK 10, K4DYW 7, WA4FYU 7, W4LK 7, W4SCY 7, W4LLE 1. (Sept.) WB4AIW 320, W4SDR 118, K4DAX 30, WA4EJA 26, WA4OHO 11.

GFORGIA - SCM, A.J. Garrison, WA4WOU - Asst. SCM: John T. Lane, III, K4BAI, SEC: WA4VWY, PAMS: K4HOL, W4LRR, RMs: K4BAI, WB4JXO.

Net	Freq	Time/2 Days	QNT	QTC	Mgr.
GSN	3595	0000/0300 DV	578	241	K4BAI
GIN	3618	2300 DV	202	43	WB4JXO
Ca. Radio	3975	0100 DV	502	52	WA4VWY
Ca. Cracker	3995	1300 Sun.	139	12	WA4IQU

The Georgia Single Sideband Assn. voted to change the name of the organization to: The Georgia State Amateur Radio Assn. They also voted to change the name of the Georgia Single Sideband Net to: The Georgia Radio Net. At their annual business meeting, held in Atlanta on Oct. 25, new officers of the Assn. elected were WA4VWY, pres.; WB4DMO, vice-pres.; WB4CRH, secy.-treas. New officers of the Augusta Radio Club are WB4DHR, pres.; WA4WHT, vice-pres.; K4OHK, secy.-treas. The Confederate Signal Corps holds a 2-meter net on 146.94 at 0000Z each Sun. with good participation reported. Vice-Director, W4DQD is handling the scheduling of "Hams Wide World" for the Southeastern Division. W4DQD reports that Georgia Southern College Radio Club's special event station KE4GSC made 1400 contacts. Worked 48 states and 73 different countries. Traffic: WA4RAY 205, W4FFP 123, W4AMB 103, WA4WOU 101, K4BAI 98, W4RNL 91, W4PIM 77, W4CZN 47, W4NSO 42, WB4KVE 38, W4IVP 32, WA4VWY 32, K4ELR 21, W4FDN 10, W4RLE 9.

WEST INDIES - SCM, Jose Medina-Hernandez, KP4CO - The Oct. floods over the island of Puerto Rico provided a real test of the effectiveness of organized amateur radio communications. There are no words of praise or commendation adequate to describe the concerted efforts of Puerto Rican amateurs to provide efficient and timely communications contributive to security of life and property. My most heartfelt thanks and congratulations to all participants and especially to KP4CZM, KP4DKZ, KP4AEJ, KP4BSH for their continued efforts and cooperation with American Red Cross, Civil Defense, and the WAPA-TV marathon. Also to KP4COB, KP4WT, KP4ASTm, KP4Ssm, KP4QM, KP4IM, KP4JZ, KP4PW, KP4DFI, KP4AKX, KP4DFY, KP4AYX, KP4CPG, KP4QC, KP4UE, KP4DGI, KP4DPP, KP4RD, KP4WR, KP4WD, KP4QG, KP4CU, KP4DJR, KP4BIW, KP4KE, KP4DGV, KP4BBN, KP4AL, KP4OV, KP4ACX, KP4DPS, KP4AXN, KP4DGK, KP4BBK, KP4JDZ, KP4DDO, KP4ANH, KP4GN, KP4BMW, KP4ABD, KP4VC, W4BZD/4, KP4ADD, KP4AWX, KP4PO, KP4SV, KP4AKS, HNRRL/KP4, H17TG/KP4, KP4GH, KP4GI, KP4CPP, KP4ADY, KP4ANG, KP4CO Traffic: KP4WT 227.

WESTERN FLORIDA - SCM, Frank M. Butler, Jr., W4RRK - Pensacola: WB4DHL has an 80-watt rig and 17-Jb gain antenna on 224.5 MHz and is looking for schedules. K8BAD/4 is active in traffic handling on ssb, cw and RTTY. K4JAN prepared an article on amateur radio for the local newspaper. WA4ECY, USN Cory Field, set up a ham exhibit at the interstate bar. Club meetings are held at 5:00 P.M. each Sun. WB4RBY is mobile on 2 meter fm. WA4WAR is working in the Ft. Walton area and had to give up EC job. WB4BZS passed his General Class exam. Milton: WB4SOK has his Advanced Class license, while his son passed the Novice exam. Fort Walton: Amateur TV was used to provide local TV cable subscribers with live TV coverage of local election results. WB4NHH cured his rig troubles and is a regular on QFN, WN4SLY, WN4SMP and WN4SMQ are new Novices. Chitney: WN4PVG is over halfway toward WAS. W4LKB has plans for another 2-meter repeater. Tallahassee: W4MOQ is conducting classes for upgrading to General. WA4ISJ has a new SR-110 and is working meteor scatter. WB4LJO is assembling an SB-500. He and WB4G1Y are working cross town on 2-meter ssb with URC-40 rigs. WN4RCI has a new all band vertical. WB4HYM is a student at FSU. WA4LCOJ got a dc supply for his Swan and plans to go mobile soon. Traffic: (Oct.) K8BAD/4 226, 8R1Y/W4 213, WA5GTJ/4 40, W4RRK 14, W4FDI 5. (Sept.) 8R1Y/W4 85.

### SOUTHWESTERN DIVISION

ARIZONA - SCM, Gary M. Hamman, W7CAF - SEC: K7GPZ, RM: K7NHL, PAM: W7UXZ. The third Annual Winter Hamfest, sponsored by the Amateur Radio Council of Arizona, will be held

# NCX-1000

# THE 1000 WATT TRANSCEIVER of the

# 70'S

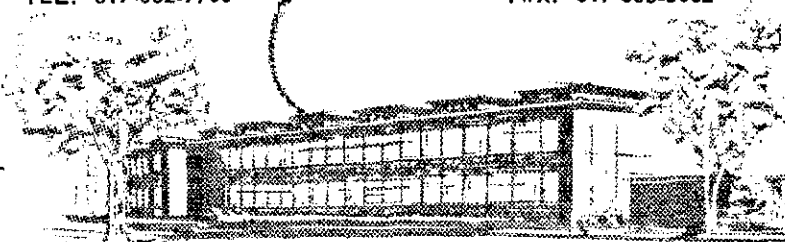


Pleasure value.....\$1,000,000

- 5 BANDS
- 4 MODES
- SOLID STATE DESIGN

NOW AVAILABLE FROM THE  
NEW NRCI AT A  
NEW LOW PRICE **\$839.95**

37 WASHINGTON STREET, MELROSE, MASSACHUSETTS 02176  
TEL: 617-662-7700 TWX: 617-665-5032



Write for Specifications!

*Excellence in Communications Since 1914*

# NATIONAL RADIO CO., INC.

Feb. 7 at Squaw Peak Park in north Phoenix. A pot luck lunch will be held at 1:00 P.M. at Hopi Ramadas 1, 2, 3, and 4. Other activities include 2- and 75-meter transmitter hunts and a swap table. For more information contact your club's ARCA representative or hamfest chairman, W7UXZ, 2519 E. Monterosa, Phoenix. The Ariz. Repeater Assn. has added 2 repeaters to its system. One is atop South Mountain using 449.3 MHz input and 445.3 MHz output. The second one is in the central Phoenix area with 146.16 MHz input and 146.76 MHz output. These two machines as well as the usual 146.34/94 MHz repeater are licensed under WA7CEM. The ARCA also held a 2-meter transmitter hunt one evening in Phoenix. The transmitter was hidden under a week's supply of groceries in a shopping cart in a local supermarket with WA7DSW operating and shopping while wearing a blonde wig and appearing to be pregnant. W7KWB was the first one to find her, but it took him an hour and a half. The annual Simulated Emergency Test is Jan. 30, 31. The traffic nets will hold several extra sessions on each day. Listen on these nets or contact W7CAF for more information. The Scottsdale ARC has moved its station, WA7APE, to the Hoys Club building. WN7NWL passed his General Class exam. Traffic: K7NHL 180, W7PG 58, K7NTG 54, W7DOS 26, WA7GAE 23, W7CAF 16, W7JMQ 4, WA7IXC 3, K7EMM 2, WA7FHG 2, W7UXZ 2.

LOS ANGELES - SCM, Harvey D. Hetland, WA6KZI - Asst. SCM: Dick Norton, W6DGH. WB6JZL is trying to start a radio club at Rio Hondo Jr. College. W6JTT reports that the UCLA Club is off to a good start with WB6VZL, pres.; K6COD, vice-pres. and attempts are being made to budget a new linear amplifier. K6KUO has a new linear and took part in the CQWW DX phone test. W6UOX, W6LJJ, W6WLH and HH9DL operated as HH9DL and made over 4000 QSOs in the CQWW DX test and about 1900 QSOs prior to the test. The Antelope Valley ARC now has the call K6OX. W6TOW now has a GS8-100 for the hf bands. WA6BLK and WB6WFI is busy visiting fellow RTTY fans. K6QPH returned from Florida with plans to be on in time for SS WN6DHH picked up a VE3 on 7 MHz and is working on his General Class exam. W6USY has plans for a new 3.5 MHz antenna. K6OMU and W6JBX participated in a Halloween Patrol with the Altadena Reserve Deputies. WB6WIT claims 800-K in the CQWW DX phone test. WN6GGG worked his first European. K6NA has been DXing with five-watts. New officers of the Palisades Amateur Radio Club are W6ION, pres.; K6ABH, vice-pres.; W6JPH, secy.; WA6LLI, treas. WB6WDS reports pleasure at fast K1WK/TI2 and CH0AE QSL returns. WN6GLT qualified for RCC and picked up KE and CD for new countries. The fall meeting of the So. Cal. CQWA was attended by about 230 people and 50-year awards were issued to W6AGK, E6EO, W6GB, W6GY and W6JY. CQWA chapter officers for 1971 are K6BX, chmn.; W6MAB, vice-chmn.; W6INH, secy.-treas.; W6YY, dir.; W6ADP, historian; W6ATC, curator. WB6USZ now is mobile on 146.94 MHz fm simplex. WB6ASR participated with the Cal Poly RC and the Edgewood AR Society in a Spook Patrol. WA6FCQ is using an HA-750 mobile on 6-meters. W6VIO (JPL ARC) joined WCARS. New officers of the Northrup Inst. ARC are K1MTP, pres.; WA6FOC, vice-pres.; WB6ZLR, secy.; WA6NIA, treas.; WN7PBT, pub. rel.; WA6INW, QSL mgr. W7GAQ reports the Society of Wireless Pioneers now has a membership of 677. WB6ZTI has added another 50-ft. mast to the farm. The Cal. Poly Amateur Radio Assn., WA6GYI, holds 6-Meter transmitter hunts every other Fri. at 6:45 P.M. Contact WA6GYI for information. Two new Novices have started in our section: WN6ABL has a net Sun. 7.176 MHz at 10:00 A.M. and the JPL ARC Mon. 3703 kHz at 8:30 P.M. Net reports for Oct.:

Net	Freq.	Time	QNT	QTC	Mgr.
SCN	3.60 MHz	6:30 P.M.	470	422	W6LYY

Traffic: (BPL/PSHR 1: W6AM 9/0, WB6ASR 2/8, W6BHG 67/0, K6CDW 122/31, K6CL 49/0, W6DGH 2/0, W6DOX 7/0, K6EA 25/0, W6FD 27/0, W6FIT 4/33, WB6GHI 11/0, WN6GLT 2/0, W6INH 382/39, W6IVC 93/16, W6JBX 0/6, WB6JZL 0/3, WB6KKG 20/17, WA6KLA 0/1, K6KUO 0/2, W6LYY 70/5, WA6MCK 0/8, W6OEO 65/10, WB6PAV 0/5, WB6SSZ 2/0, WB6WDS 5/7, WB6WH 0/17, WB6WIT 6/0, W6YRA 4/0, WB6ZTI 32/24.

ORANGE - SCM, Jerry L. Verduft, W6MNY - Asst. SCM: Richard W. Birbeck, K6CLD. SEC: W6BCCQ. We regretfully record the passing of Don Catone, W6KRB, who died of a sudden heart attack. Don was very active as Asst. Director and member of the Anaheim ARA. W6JPK reports the passing of Leo McQuaid, W6FECB, who also died of a heart attack. K6ILB has moved to Modjeska Canyon and is QNI on SCN. New appointees are WB6RAL as QVS and WB6QNU as OO. WB6RAL reports frequent 50 MHz auroral F openings to Hawaii and occasionally Japan. W6FB says his new FR-4U frequency meter works FB. WA6HTT has received his endorsement for DXCC #120. W6DRG and WA6EPX of the So. Cal.

ATV Club gave ATV talks and demonstration at the Newport ARS and Orange County ARC. SCN mgr. W6LYY reports those of you originating traffic and don't have the addressee's phone number should try the nation-wide information operator by dialing 1 - (addressee's area code number) - 5551212. There is no charge for this service and it may speed the delivery of your messages by two or three days time. The Orange Section League Officials Net has moved to 7275 kHz but still meets the 1st Sun. of each month at 1000 local. W6BNX visited Hawaii and was patched to home from KH6SP via WB6TBU. W6KFF reports the Orange County 6-Meter FM ARCA Net has grown to 15 full members. Make plans to attend the 1971 Southwestern Division Convention at Disneyland on Labor Day week end. I plan to host an ARPSC/LO forum and there will be many other interesting activities. Happy New Year to all! PSHR: W6BNX 67, W6MNY 48, WB6ASR 5. Traffic: W6LCP 197, WA6IOQ 184, W6MNY 107, W6BNX 81, WB6TYZ 50, W6WRJ 37, WB6ZC 19, W6HUK 7, W6FB 7, K6GGS 6, WB6RAL 4, WB6ASR 2, K6H/B/6 2.

SAN DIEGO - SCM, Richard E. Leffler, WA6COE - A Happy 1971 to all! At the end of Jan. comes the annual SFT, All 252 ARCA members are requested to put Jan. 30, 31 aside for our section test. Meanwhile, join in on the new ARCA TEN Net, which meets on 29.5 MHz, Sun., at 1000 and on 28.585 MHz on Mon. at 2000 local time. Club activities: Fall meetings for the SD DX Club began at the home of K6EC in Oct. W6KGC spoke at the Palomar Club in Oct. SOBARS met at the home of WA6DDD in Nov. El Cajon and North Shores Club had their nomination night in Nov. It's that time again - clubs should send list of 1971 officers to the SCM. Station activities: We regretfully report the following as Silent Keys: W6JUP, W6LJA, W6RDI. BPL certificate went to W6VNO. W6TAL reports finishing his 2nd AC supply for Field Day use. A new ORS is W6IOU. W6VNO renewed as QRS. WA6HXB, W6GBF, W6INI, WA6COE visited IVARA in Nov. Ten appointees attended the LO breakfast in Oct. at the Chuck Wagon. W6VNO reports a need for TCC operators. W6VVF, chmn. of the SD Radio Council was hospitalized in Oct. K6EC and W6SRS report sending OO notices for out-of-band QSOs mostly. K6BTO continues to build on 3.31 GHz. PSHR: W6LRU 48, W6BGJ 44. Traffic: W6VNO 575, W6LRU 350, W6EOT 311, W6RGE 245, W6JOU 156, K6KDE 66, W6MHMY 57, K6HAV 52, WA6COE 10, W6YKF 8, WA6FXM 6, WB6JOJ 4, W6TAL 1.

SANTA BARBARA - SCM, Cecil D. Hinson, WA6OKN - SEC: W6JTA. RM: W6UJ. The Estero ARC and the City of Morro Bay will issue a Centennial Award certificate to those amateurs who have 8 QSOs with San Luis Obispo County hams. The Santa Barbara ARC is 50 years old and celebrating their golden anniversary. For those wishing to contact the club, write to 333 Old Mill Road, Space 238, Santa Barbara, Ca. 93105. The Santa Barbara ARC Net meets every Mon. night at 1930 local time on 145.8 MHz, and net control is W6WKC/6. Plans are being made to initiate a new VHF Society for Santa Barbara and Ventura Counties. Those interested are urged to contact Rod Jensen in Santa Barbara at 962-9780. W6INW in Santa Barbara has been working San Diego or 435 MHz ATV with good pictures both ways. Traffic: W6JTA 8.

#### WEST GULF DIVISION

NORTHERN TEXAS - SCM, L.E. Gene Harrison, W5LR - Asst. SCM: Gene Pool, W5NFO. SEC: W5JSM. Asst. SEC: W5KHE. PAM: W5BOO. RM: W5QGZ. Brownfield attendance was 482, per W5NFO. WSOPX, OO NoTex, made 35 observations this month. W5LUJ is interested in an OO appointment. Looks like many stations failed to receive Form 1 cards, Irving ARC membership is up. The KSQHD Radio Club reports signal demonstration by Dave Brandenburg, FB. Ex-W3RV/5 is now W5UT, Wichita Falls, has a Valiant with 275 watts. Lubbock RC paper says WA5UNI contacted K0MQS on 2-meters using A-1, total distance 745 miles. W5GWV is working on an EC program for the Waco area. WA5PPE traffic slowed down because of increased OO work. W5LGY submitted EC appointment for renewal. W5OU is nearing century mark on traffic. K5FOG says some people continue to abuse repeaters. K5BDC submits QPS for renewal. WA5VJW is all set. K5RWK, Richardson ARC where all Dallas DXers live, raised dues from \$2.00 to \$4.00 a year. The Dallas ARC has an open repeater 146.28 in and 146.88 out. The new Affiliated Club Bulletin was received. Clubs with 50-years participation include Houston and San Antonio from West Gulf. The annual OBS survey is underway. Let's see what we can do toward restoring the OBS to its original purpose as an on-the-air program. W5JNM's Oct. report shows 277 ARCA members. Congrats. Re: QSI Bureau. Hey you guys, slow down just a bit. I have checked this one carefully. W5QMJ receives 1000 cards a day plus, and he was behind in his work. Not now, he's catching up fast. Send in real big envelopes stapled self addressed and he'll

# 50% off on FET experimenter kits and the Siliconix FET handbook



**The Handbook:** The ink is barely dry on this one. It takes you from basic FET principles and manufacture through characterization and biasing to audio and RF amplifiers, VCRs, current limiters, switches, chopper and analog gates . . . just to mention a few. More than 30 practical circuits are shown. Additional references are included for those who want to go deeper into a given subject.

### KIT #1

2N3368 Amplifier	1.40
2N4223 VHF Amplifier	1.50
E300 VHF Amplifier	1.40
U183 Amplifier	1.40
VCR7N VCR	2.25
CL2210 Current Limiter	3.25
and new FET Handbook	2.50
VALUE	\$13.70

LIMITED-TIME PRICE

Only \$16.50

### KIT #2

2N3368 Amplifier	1.40
2N3437 Amplifier	1.90
E101 Amplifier	2.20
E300 VHF Amplifier	1.40
U202 Switch	2.95
VCR7N VCR	2.25
CL1020 Current Limiter	3.25
U234 Matched Dual FET	5.00
and new FET Handbook	2.50
VALUE	\$22.85

LIMITED-TIME PRICE

Only \$11.50

### KIT #3

2N3370 Amplifier	2.15
2N5398 UHF Amplifier	4.50
E101 Amplifier	2.20
U184 HF Amplifier	2.75
U241 10 Ohm Switch	9.70
CL1020 Current Limiter	3.25
U234 Matched Dual Fet	5.00
LM201H Op. Amplifier	6.50
and new FET Handbook	2.50
VALUE	\$38.55

LIMITED-TIME PRICE

Only \$16.50

Kits may be purchased less handbook as noted on coupon.

This is your half-price chance to really get to know FETs, so send in the coupon today!

**Siliconix**  
incorporated

2201 Laurelwood Rd. • Santa Clara, Calif. 95054  
(408) 246-8000 Ext. 201 • TWX: 910-338-0227

### SILICONIX INCORPORATED

Dept. F — 2201 Laurelwood Rd. — Santa Clara, Calif. 95054

Please send items as checked below, for which payment is enclosed. (Sorry, no Purchase Orders or CODs.)

- |   |   |
|---|---|
| <input type="checkbox"/> Kit #1 \$ 6.50       | <input type="checkbox"/> Kit #1 Less Handbook \$ 5.00 |
| <input type="checkbox"/> Kit #2 \$11.50       | <input type="checkbox"/> Kit #2 Less Handbook \$10.00 |
| <input type="checkbox"/> Kit #3 \$16.50       | <input type="checkbox"/> Kit #3 Less Handbook \$15.00 |
| <input type="checkbox"/> Handbook only \$2.50 |   |

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

(California residents add 5% sales tax)

do the rest. He's got thousands of cards scheduled for file 13 or burn basket if someone don't claim 'em. RM WSQZ reports WSLUJ and WSUF, ex-W3RV/5 as new ORSS. WSLL's son Robert Clinkscapes, Jr., passed away in Dallas. Many hams knew Bob and his Dad WSLL was a former SCM under Frank Corlett Sr., ex-SZC. W5SXO is a new ARRL member NoTex and W5LWA lost his shack to a new washing machine. Traffic: WASVJW 104, W5QU 103, W3RV/5 38, W5FJR 29, W5DQP 18, W5IZU 14, W5PRN 13, W5NFO 12, W5JSM 11, W5LW 7, W5QZ 7.

**OKLAHOMA -** SCM, Cecil C. Cash, W5PML - Asst. SCM: W.L. Smoky Stover, K5DQV. SEC: WASFSN. RM: WASYRO. PAM: W5MFX, WASWHV, K5DLE and WASZRU. QSL Bureau: W5QMJ. Your SCM and SEC met with the Central States vhf fm Repeater Society at Stillwater Oct. 24. There were 55 representatives of the four-state area present. New officers for the society are: W5BPS, Tulsa, pres.; W5RPO, Oklahoma City, 1st vice-pres.; K5CFM, Oklahoma City, 2nd vice-pres.; W5UJG, Enid, secy.; W5AKCL, Stillwater, treas.; K5YZO, Bartlesville, WASATW, Fort Smith, W5ECJ, Ponca City, WBSAQH, Amarillo, W5PIB, Wichita and K5IRC, Ardmore, board of dir. New officers of the Enid ARC are: W5UJF, pres.; K5BYP, vice-pres.; K5CAY, secy.-treas. K5WPP of Muskogee has returned from a trip to Arkansas. Welcome to W5JK/5 now operating from Tulsa and very active in the nets. Congratulations to W5BNM who took the Novice Exam last Feb. and upgraded to General Class in Aug. The Aeronautical Center ARC, W5PAA is now in temporary quarters, room 31 of the Coast Guard Bldg. pending permanent quarters in a new multi-purpose bldg. now under construction. Net reports.

Net	Az	Local Time	Stm.	QNI	QTC
OPEN	3915	0800 Su	4	167	7
STN	3850	1730 M-S	27	402	47
QWXN	3913	1745 M-S	27	606	47(281)
OIZ	3682.5	1900 M-S	19	88	14
SSZ	3682.5	2145 M-S	13	29	18

Traffic: (Oct.) K5TEY 1012, WASYRO 169, W5EKL 60, W2HIR/5 51, WASZOO 46, W5MFX 40, WASWRC 20, W5JK/5 19, K5WPP 18, W5FSN 17, W5UJ 16, WASZNM 10, W5DRZ 8, W5PML 8, (Sept.) W5UJF 77.

**SOUTHERN TEXAS -** SCM, G.D. Jerry Sears, W5AIR - SEC: K5HXR. PAM: W5KLV. RM: W5EZY. Former SEC K5UQG has resigned because of pressing personal business and K5HXR, former Harris County LC, has been appointed as SEC. EC W5ICL reports new officers for the Orange ARC are: K5ROZ, pres.; K5UAH, vice-pres.; W5ADK, secy.-treas. New officers for the Houston ARC are: W5VCE, pres.; K5HXR, vice-pres.; W5NC, treas.; K5QLJ, secy.; K5VOY, prgm.; W5SSEW, membership. EC K5WYN has been busy with phone patches from the "Texas Clipper", training ship of Texas A&M College. K1PKQ/5 will be operating from K66-Land in Dec. Best of luck, David, K55BR upgraded to OO Class 1, W5RBB is a new OO Class IV, EC W5ICL reports K5UAH has a new tower up after several delays. W5NMW has a new 2 and 6-meter antenna with the help of W5OEY, W5ALUZ, W5APX and several other expert advisors. W55AJG now is on the air with an SB-102. Bridge City in Orange County was hit by a tornado Oct. 11. W5NMV, mobile, reported conditions and damage for the Red Cross. A 5-kw plant was moved in by W5GQY, K5ROZ and K5BBN. Red Cross communications were aided by W5QVB, K5UAH and club station W5ND, activated by W5ICL (on 2 and 6-meters). K5HZR, San Antonio, has been elected as your SCM for the next term. Best of luck, Lee, I wish to express my appreciation to all amateurs in Southern Texas for your cooperation during my past several years as SEC and SCM. Traffic: (Oct.) W5ABQ 54, W5TFW 16, K1PKQ/5 2, (Sept.) W5ABQ 71, W5FZY 63, W5BHO 49, K5RVF 15, W5TFW 15, W5AKO 10, K1PKQ/5 3, W5LKL 1. (Aug.) W5ABQ 126, W5AQW 116, K5HZR 95, W5QJA 85, K5HJF 58, W5EZY 44, K5WYN 26, W5RHO 16, W5TFW 16, K5RVF 13, W5AZBN 11, K55UY 5, K1PKQ/5 3.

#### CANADIAN DIVISION

**ALBERTA -** SCM, Don Sutherland, VE6FK - SEC: VE6XC. 'The CARIB' under EC VE6AZU did a fine job on the Miles for Millions. OVS VE6MX reports many 2-meter simplex contacts throughout Alberta during the month-end temperature inversion. Many of these QSOs were over a 200-mile path. Congratulations to VE6AZU on his appointment as EC and for the fine work he is doing. OO VE6MI is looking forward to the open FMTs. He also reports a confirmed total of 165 countries. VE6AWI needs more support for the A1M on 3690 kHz. I have heard of a few instances of amateur help during and after the snow storm in the northern part of the Province. Please furnish details. In the excitement of the recent DX Contest OPS VE6HN forgot his own call for a few moments. He did pile up a good score that should help the Calgary

DX Club in their competition with the City of Edmonton. In the 1968 World-Wide DX Contest VE6ADX made a score of 1250,000 in the single station, multi-band, multi-operator class. Other operators were VE6SB, VE6HN, VE6AFY, VE6XJ. Congratulations to VE6ABX on getting his amateur ticket. Traffic: VE6FK 14, VE6XO 7, VE6QY 6, VE6OE 5, VE6XC 5, VE6FS 4, VE6KS 4, VE6ARL 3, VE6LV 3, VE6YW 3, VE6UD 2.

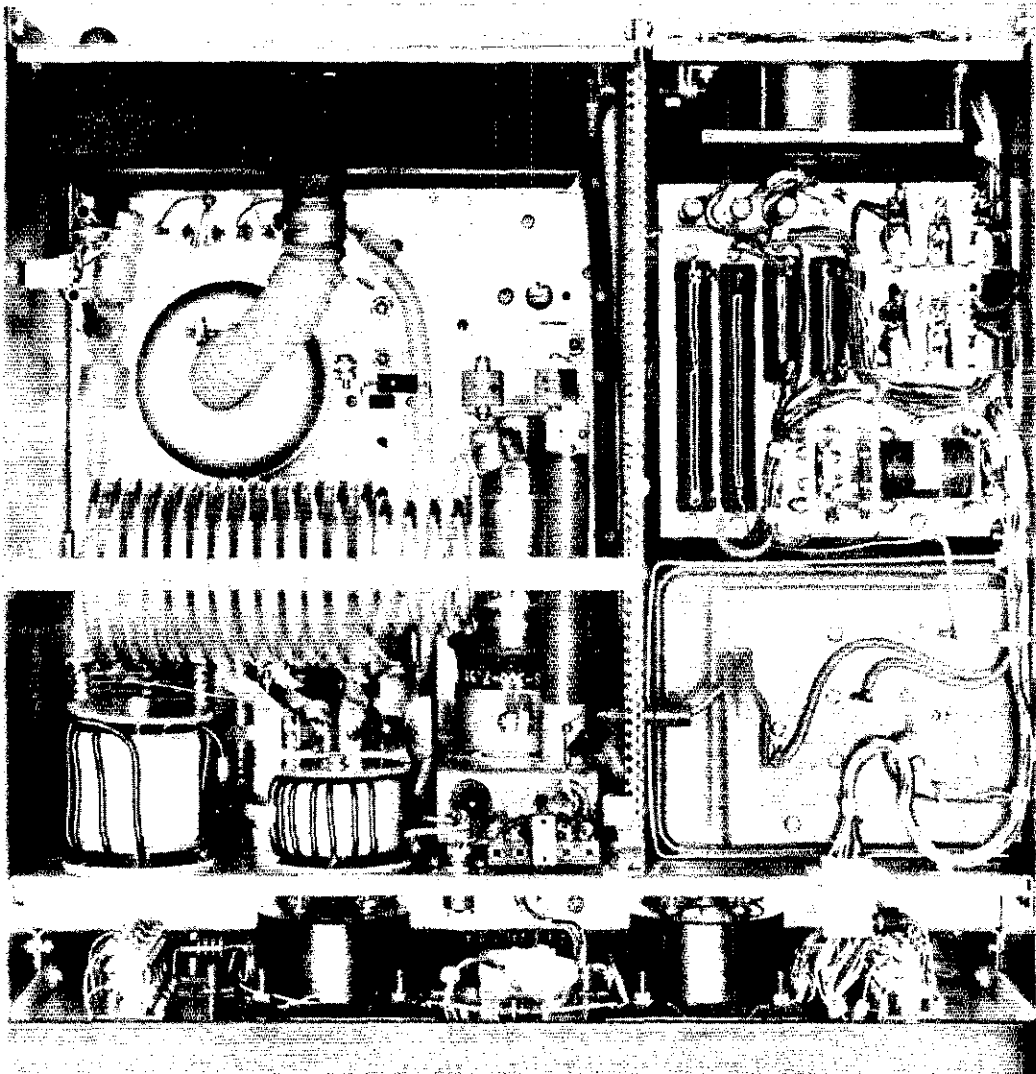
**BRITISH COLUMBIA -** SCM, H.E. Savage, VE7BR - It comes to those that wait. VE7BDJ received his trophy for high score in the VF7W of 1968. VE7SM is doing a fine job as editor of Zero Beat. He also helped on the book, "From Spark to Space". He tells me VE75AA still has some copies. BCARA is chaired by VE7AYI. The Centennial B.C. Award for 1971 is worth waiting for. The Columbia ARC has received their repeater license, VE7CAO. VE7BWD packed an HW-12 on his hunting trip to report his success. From Smuthers, the Friendly Hists Wireless Assn. reports VE7AQL pres.; VE7QQ, secy. treas. The Heaver Valley ARC's news editor is like me, short of news. All news is greatly appreciated. Traffic: (Oct.) WA7NXO/VE7 154, VE7QQ 45, VE7AC 26, VE7BLO 22, VE7DH 13, VE7LL 13, VE7SE 8, VE7GG 5. (Sept.) VE7BLO 18, VE7AC 7, VE7GG 3.

**MANITOBA -** SCM, Keith Witney, VE4EI - We welcome VE4XK to the air. The repeater is operating great guns from its permanent location on top of the Richardson building and has drastically changed the 2-meter picture in Winnipeg. There also has been a brief invasion with VE3UJV, ex-VE4XJ, OY, AE in town for a week in between jobs. VE3DVF was in town on business and W9ZMO arrived to take up a temporary job here. 80-meter conditions are getting better and with them a pick up in net activities. Also back on the air after a long absence is VE4LG, 2-meter mobile of all things. VE4UM might be in its new quarters by the time you read this after 6 years of delays. We welcome VE3ECY as VE4JD. Traffic: VE4FQ 25, VE4RO 18, VE4KE 17, VE4JA 6, VE4IN 6, VE4NE 6, VE4QJ 6, VE4CR 5, VE4XN 5, VE4AP 4, VE4YC 3, VE4D 2, VE4LQ 2, VE4EW 1, VE4PA 2.

**MARITIME -** SCM, William J. Gillis, VE1NR - Asst. SCM: Clarence Mitchell, VO1AW. SEC: VE1HJ. Congrats to VO1AW on placing first in the Maritime section in the ARRL CW DX Contest. Clarence received his certificate in person from W1YYM at the ARRL Convention in Boston. A fine cooperative effort by the NSARA, the Halifax and Dartmouth Clubs, and the CNIB has launched training classes for blind students aspiring to amateur licenses. Assisting in this commendable project are VE1RO, VE1ASN, VE1AKQ, VE1AUF and VE1OM. VO1JH and VO1GL now VE1GO and VE1UR are active from Halifax. VO1CZ is now VE1PN at Saint John. LCARU is considering the possibility of an ARRL convention Labor Day week end. VE8YL Resolute, ex-VO1DE checks in regularly on the Nfld. net. VO1DH has taken over presy of NARA during the illness of VO1GL to whom we wish a speedy recovery. VO1CV in spite of eyesight handicap is active or 75-meters and with assistance of VE1ZO, the Sydney and Glace Bay ARC is participating in establishing a 2-meter link between Nfld and Nova Scotia. New officers of ARCON: VO1DF, pres.; VO1CA 1st vice-pres.; VO1BS, 2nd vice-pres.; VO1FE, secy.; VO1AX, treas. New towers are up at VE1OC and VE1ANT. VE1AQU has succeeded VE1AUF as pres. of NSARA and VE1ASR is filling in for VE1AFN as secy. of HARC. VO1S DB, GI, BE, AK and DF are active through the central Nfld. 2-meter repeater. APN reports sessions 61, QNI 96, QIC 60. Traffic: VE1RO 61, VE1AMR 46, VO1CA 44.

**ONTARIO -** SCM, Holland H. Shepherd, VE3DV - Asst. SCM and SEC: Ed Doyle, VE3EWD. Windsor ARC's VE3EOP and VE3EPM are still receiving congratulations on an excellent run convention held in Oct. Officers of RSO for 1970-1971 are VE3SU, pres. VE3AR, 1st vice-pres.; VE3JK, 2nd vice-pres.; VE3CRL, secy. VE3EPM, treas. It is with regret that I report the passing of VE3EF and VE3GDQ. Again I extend an invitation to all ARCs, and especially ARRL affiliated ARCs, to send me a brief history of your club for future inclusion in this column. The Saskatoon ARC book From Spark to Space is a worthwhile addition to every amateur's library. The CVWA is looking for people interested in Vintage Wireless equipment. For further information contact VE3CD or C1N or OPN. VE3GX is interested in contacting anyone knowing vintage amateur gear available. Ed is prime mover in the OVMRC Inc. project to supply gear to the Curator at Ontario Museum of Science and Technology building located in Ottawa. Now that we are into a new year and starting to look forward to spring and return to our outside activities, let us do a lot of work right now making our stations capable of doing a good job under emergency conditions. Offer your talents and your equipment to your EC VE3ZO, Windsor, is an old Navy colleague of your SCM. We met first time in 30 years at an RSO Convention. It is time club executives did some heavy thinking if we are to have an ARRL

# The *ALPHA SEVENTY*



## BEAUTY IS MORE THAN SKIN DEEP

The *ALPHA SEVENTY* is handsome *on the outside* . . . but to a performance lover - a connoisseur of superb quality - the real *functional beauty* is *inside*.

The *ALPHA SEVENTY* speaks *performance* . . . continuous high power capability cool, quiet operation - versatility and convenience.

The *ALPHA SEVENTY* is *seventy pounds of Silectron<sup>®</sup>* powered, vapor-cooled muscle . . . free of excess bulk, weight, and noise. Write for details of *THE ULTIMATE* in linear amplifiers. Or see your dealer. \$1595.



EHRHORN TECHNOLOGICAL OPERATIONS, INC.  
BROOKSVILLE, FLORIDA 33512  
(904) 796-8400



## VS-II SPEECH INTEGRATOR

Some speech processors work well . . . and some do not. Research at VALTEC determined why . . . and then did something about it.

VALTEC has now released the VS-II Speech Integrator to provide the audio "punch" you need most when conditions get rough. Readability: S+N/N threshold is improved by 4dB nominal.

The VS-II operates like a breeze with PTT, VOX and PTP (press-to-process) control. Laboratory tested, all cable and connectors supplied; guaranteed, the VS-II is only \$35.00\* postpaid USA.

Size—4½w x 2½h x 5d.

Send for Specs or order direct:

**valtec**

\*Mich. residents add  
4% state sales tax.

VALLEY TECHNICS INC.  
2901 SONORA KALAMAZOO, MICHIGAN 49004

## HAL DEVICES

**MAINLINE RTTY EQUIPMENT**  
HAL offers complete parts kits for the Mainline ST-6 TU and other RTTY equipment. Get both the circuit boards and parts from one source and save. Please write for full details and prices.  
HAL DEVICES Box 365 A, Urbana, IL 61801

## HAL DEVICES

Hot Carrier Diodes: HP2800, . . . . . 90¢, 12/\$10.00 Matched by HAL, . . . . . 1/\$4.25  
IC's: 1µL 900, 914 . . . . . 90¢ 1µL 923 . . . . . 90¢  
MATH MC790P, MC880P . . . . . \$2.00, 10/\$19.50  
MC724P, MC789P, MC792P, MC795P . . . . . \$1.15, 10/\$9.50  
Also available: MC723P, MC789P, MC880P, MC767P, MC8760P.  
OP AMP. SN72709N (DIP), SN72709L (TO-5), . . . . . \$1.25  
TOROIDS, Indiana General CF-102-06, CF-102-01, CF-101-02, . . . . . 50¢  
CINCH IC sockets: 14-DIP, 8-ICS, . . . . . 60¢ HAL DEVICES  
Add 50¢ Postage, send for complete list. Box 365A, Urbana, Illinois 61801

## FM SCHEMATIC DIGEST

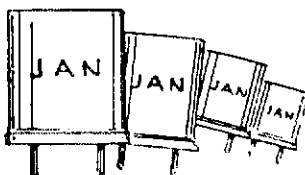
A collection of Motorola Schematics, Alignment, Crystal, and Technical Notes Covering 1947-1960.

136 Pages, 11½ x 17"  
\$6.50 Postpaid

S. WOLF

1100 Tremont Street Boston, Massachusetts 02120

## NEED CRYSTALS?



We can supply crystals from 2KHz to 80MHz in many types of holders.

Color TV Crystal (3579, 645 kHz) wire leads	1 for \$5.00
100 kHz freq. std. crystal (HC12/U)	\$4.50
1000 kHz freq. std. crystal (HC6/U)	\$4.50
Any (CB crystal TR. or REC. (except synthesizer crystals	\$2.50
Any amateur band crystal (except 80 & 160 meters) in FT-243 holders	or 4 for \$5.00
80 meter — FT243 holders	\$2.50

We have in stock over six million crystals including CRIA/AR, FT243, FT241, MC7, HC6/U, HC13/U, HC25/U, HC18/U, etc. Send 10¢ for 1970 catalog with oscillator circuits and stock freq. listing. Add 10¢ per crystal to above prices for shipment 1st class, 15¢ each for air mail.



Special Quantity Prices to Jobbers and Dealers

ORDER DIRECT with check or money order to

2400-C Crystal Drive  
Fort Myers, Florida 33901

## HAM RADIO CENTER

is

USED EQUIPMENT HEADQUARTERS

We sell used  
We buy used  
We trade on used  
We sell your used

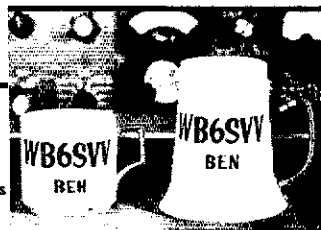
(Write for details & used list)

Also all new major brands in stock

Ham Radio Center Inc.

8342 Olive Bl. St. Louis, Mo. 63132

Phone (314) 993-6060



CUP  
\$2.50  
pp. U.S.  
& Possessions  
only.

STEIN  
\$4.75  
pp. U.S.  
& Possessions  
only.

YOUR PERSONALIZED CUP OR STEIN. CUP IS OF BONE CHINA QUALITY. STEIN IS HIGHEST QUALITY CERAMIC. HANDLES ARE GOLD LEAF AND BLACK LETTERS AND PERMANENT. CAN BE MACHINE WASHED. AN ATTRACTIVE AND USEFUL GIFT FOR ANY HAM. SPECIFY RIGHT OR LEFT HANDED. CALL AND NAME.—Check or M.O. Calif. residents add 5% sales tax. Quote spec. orders.

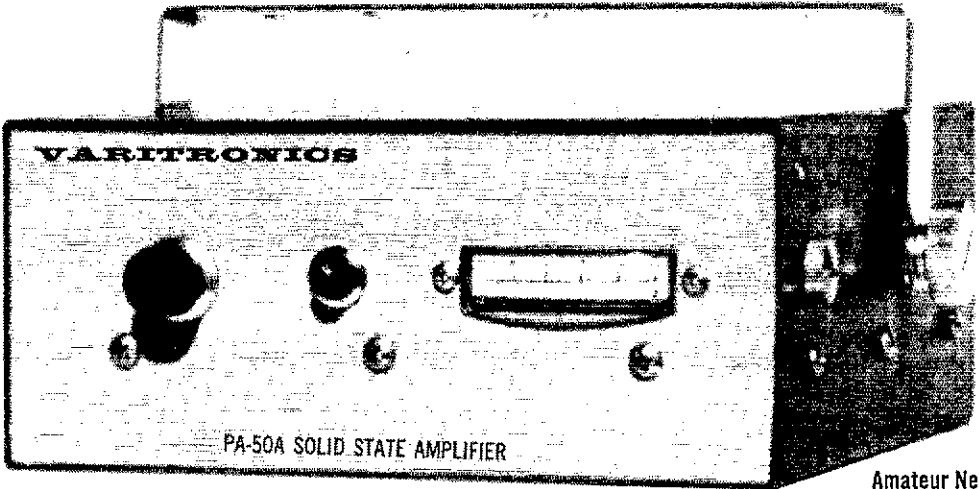
DE PIAZZA ENTERPRISES

P.O. Box 1127

Costa Mesa, CA 92626



# Here's The Mobile FM AFTERBURNER



Amateur Net  
\$129.95

## Delivers 50 Watts of Punch on 2 Meter FM

The Varitronics PA-50A is a completely solid state Class C RF amplifier designed specifically for use in mobile amateur FM applications. Internal RF switching makes the PA-50A useable with any amateur FM transceiver with 10 watts\* output. Balanced emitter devices are employed which are completely insensitive to high VSWR or even no load conditions at its output. This handsome and ruggedly built amplifier is styled like the IC-2F transceiver, features a calibrated output meter and is supplied with mobile mounting bracket and DC cord. For the big signal on FM, try it!

### SPECIFICATIONS

*Drive Requirements . . .	12 Watts Maximum 5 Watts Minimum
RF Output . . . . .	50 Watts - Less with lower drive or input voltage
Power Requirements . . .	13.5 VDC @ 5 Amps
Impedance . . . . .	50 Ohms In/Out
Frequency . . . . .	Any Portion of Amateur 2 Meter Band
Spurious Products . . . .	50DB Down
Dimensions . . . . .	6" X 7" X 2"

*Manufactured by Varitronics . . . still the leaders in quality amateur FM equipment.*

*See it at your dealers.*

## VARITRONICS INCORPORATED

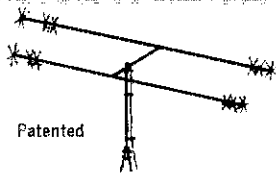
2321 EAST UNIVERSITY DRIVE • PHOENIX, ARIZONA

# Now... 2000 Watts P.E.P.

## Full Power/Minimum Size

### FOR APARTMENTS • SUBURBAN HOMES

Marine and Portable Operation  
Packaged for APQ and FPO Shipping



### 6-10-15-20 METERS

The time proven B-24 4-Band antenna combines maximum efficiency and compact design to provide an excellent antenna where space is a factor. New end loading for maximum radiation efficiency. No center loading.

Bands	6-10-15-20 Meters
Power Rating	2000 Watts P.E.P.
El. Length	11'
Turn. Radius	7'
Total Weight	11 lbs.
Single Feed Line	52 ohm
SWR at Resonance	1.5 to 1.0 max.

**Model B-24**  
**Net \$59.95**

### MULTIBAND COAXIAL ANTENNA for 6-10-15-20 METERS

Needs no ground plane radials. Full electrical 1/2 wave on each band. Excellent quality construction. Mount with inexpensive TV hardware. Patented.

Power Rating	2000 Watts P.E.P.
Total Weight	5 lbs.
Height	11'
Single Feed Line	52 ohm
SWR at Resonance	1.5 to 1.0 max.



**Model C4 Net \$34.95**

Send for Free Brochure

If there is no stocking distributor near you order direct from factory. We pay shipping to your Qth if in Continental U. S. A.

# Mini-Products, Inc.

1001 W. 18th Street • Erie, Pennsylvania 16502

• LEADERS IN COMPACT ANTENNAS •



**FREE Catalog** Of The WORLD'S FINEST GOV'T SURPLUS ELECTRONIC BARGAINS

Now **BIGGER** and **BETTER** Than Ever!

MAIL THIS COUPON NOW

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

CITY: \_\_\_\_\_ STATE: \_\_\_\_\_ ZIP: \_\_\_\_\_

For your FREE copy, fill out coupon and mail. Dept. QST

**FAIR RADIO SALES**  
P.O. Box 1105 • LIMA, OHIO • 45802

and/or RSO convention in Ontario for this year. It is a big job to sponsor a convention but you will get a lot of help. A good way to start any day is to listen to the friendly banter of Hoss and Piper on 75-meters around 0630 EST. Happy New Year gang, see you in SF 771. Traffic: VF3FRU 128, VF3GG 108, VF3DPO 104, VF3BUR 59, VF3DHG 57, VF3GFN 42, VF3CYR 34, VF3EHL 26, VF3UK 23, VF3DD 22, VF3EXI 19, VF3NO 14, VF3AWL 13, VF3BCR, VF3AUU 6.

QUEBEC - SCM, Joe Unsworth, VF2ALE VF2s DM, BWD, AAS, WD, ZA, RGF, RVD, GA, BQN, MS, ROK, AUF completed the EMO course in Oct, Correction Nov QST: WA3FPH to read WA3ORH Merry Christmas and Happy New Year to all. As to banned country list and repeater regulations in question this fall please check with the RI and not word of mouth. DE VF2DLG. Le Congrès 771 RAQI aura lieu les 25, 26, 27 juin prochain a Trois-Rivieres. RAQI organise cette année un concours de nature technique, participation individuelle et clubs bienvenus. Pour renseignements de RAQI appel VF2DLG. Des autobus Réseau marche aux puces de VF2BZL lundis soirs vers 1915 local a 3,780 MHz. Nouveaux 75 metres VF2s DLX, BKH, RRF, RAB, ART, et VF2DIZ maintenant VF2II et VF2ARZ est VF2UR. In Oct, VF2s and VF2s combined to locate ghost transmission and no further information can be given at this time. VF2WM is having a problem with the Mont Blue repeater but enjoys Kay's toffee apples. VF2SS is very sick, get well Pierre. New appointees are needed for RM, OL, PAM. Contact the SCM, Traffic: VF2AJD 37, VF2DR 24, VF2APT 17, VF2BVY 15, VF2QI 14, VF2RIZ 14, VF2ALE 13, VF2FC 12.

SASKATCHEWAN - Acting SCM, Barry Ogden, VF8BO - First term of office. Looking forward to visiting all the clubs and areas in VES-Land! Field Day participation was extensive by all groups who enjoyed lack of sleep and burnt beans! ARAC now is officially recognized as volunteer communications section for SASK/EMO (Emergency Measures Organization). VF5CU, SEC and Southern area ECs are busy setting up an RTTY network which was utilized in joint U.S./Canada exercise the week end of Oct. 31. VF5GA, Uranium City, put up a 904-foot long-wire beam to improve contacts on 75. The Ham's Harvest Ball put on by NSARC was a great success. Participation by the XYLs I hear, was FB. Location of next year's hamfest?

### RULES FOR LIFE MEMBERSHIP

1. The Board of Directors has established a provision for Life Membership in The American Radio Relay League, Inc., effective August 1, 1967.
2. Life Membership is granted only by the Executive Committee, upon proper application from a Full (U. S. or Canadian licensed) Member
3. The Life Membership fee is twenty times the annual dues rate, or currently \$130.
4. An applicant may choose an alternative time-payment plan of 8 quarterly instalments, \$16.25 each. In such instance he will be provided an interim two-year Full Membership certificate. Upon completion of the payments, Life Membership will be granted.
5. Life Memberships are non-transferable, and dues payments are non-refundable. In the event an applicant is unable to complete payments on the instalment plan, he will be given a term of membership, at the annual dues rate, commensurate with payments received.
6. Other licensed amateurs in the same family, and at the same address, of a Life Member may retain or obtain Family Membership upon payment of the annual dues of \$2, but without receipt of QST. The dues of the Family Member may be prepaid for any number of years in advance, but there is no special rate.
7. Applications forms are available upon request from the Secretary, ARRL, Newington, Conn. 06111.



## GREENE

Center Insulator Speaks  
For Itself With or Without  
BALUN

GREENE center insulator is a guaranteed water tight SPALCID assembly. For dipoles, inverted V's ... sagis ... quads ... beams or what have you. Precision milled housing of very high impact high dielectric material. Will take any amount of practical abuse or pull. Corrosion proof ... no nuts ... bolts ... rivets ... rust, or metal eyes to chafe or cut. Smooth joint ring ... rugged antenna connecting eyes, gloss finish. The coaxial fitting is sealed up inside a rain drip boot. No water in lifting or line feeding same. Antenna wire connecting lugs ... solid brass ... sealed in to stay. Unit takes a PL 259 connector.

GREENE center insulator with BALUN \$12.00 post  
GREENE center insulator NO BALUN \$ 9.00 paid  
DRAGON FLY construction drawing \$ 5.00 U.S.A.  
FLIER FREE Patented

O. WATSON GREENE, WAKEFIELD, RI 02880

## QUADS! QUADS! QUADS!

- ★ 2 element, 3 band (10-15-20) \$69.95
- ★ 3 element, 3 band (10-15-20) \$99.95
- ★ 4 element, 3 band (10-15-20) \$129.95

Enjoy all the advantages of a full sized quad at a price that surprises you. Our quads are guaranteed to perform as indicated. Noisy locations our specialty.

SPECIAL DEAL ON A TOWER/QUAD COMBO  
AND THE COMBO IS PREPAID TO YOUR DOOR.

WRITE FOR LITERATURE

**SKYLANE PRODUCTS** 406 Bon Air Ave.  
Temple Terrace, Fla. 33617

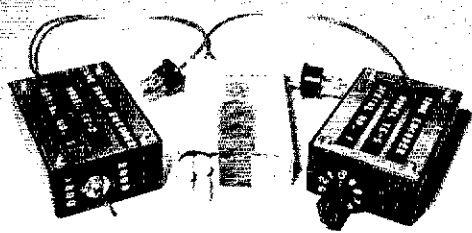
# NOW from

## ROSS AND WHITE COMPANY

Electronics

# SOLID STATE TONE BURST ENCODERS

(to the frequencies of your choice)



**MODEL TE-2**  
2 tone.  
Factory preset,  
only \$29.95  
postage paid.

**MODEL TE-5**  
5 channel model  
Factory preset,  
only \$39.95  
postage paid.

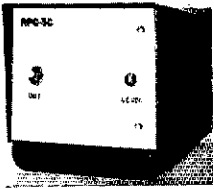
## GUARANTEED FOR ONE YEAR

Use it for 10 days, if not completely  
satisfied return for a full refund.

- Easy to install, 3 wire hookup, attaching bracket included for car or home.
- Operates from a single factory supplied internal 9 volt battery.
- All frequencies factory preset. Can be field adjusted from 1500 to 2500 cycles. Other frequencies on special order.
- Nominal .4 sec. tone burst length.
- American made commercial grade components on glass epoxy PC board for maximum reliability.

## AT LAST -- A SPEECH COMPRESSOR THAT REALLY WORKS!

- LOW DISTORTION CIRCUIT
- 5-10 DB IMPROVEMENT IN TALK POWER
- FULLY WIRED & TESTED NOT A KIT
- SEVERAL MODELS TO CHOOSE FROM
- WORKS WITH PHONE PATCH
- Quality construction includes Silicon transistors, FETS Glass circuit boards
- FULL WARRANTY - ONE YEAR
- Performance second to none
- INTRODUCTORY LOW PRICES



-\$22.50 to \$34.95 (Illinois residents add 5% Sales Tax)

Write for specifications and information sheets (free)

Demonstration Tape available (\$2.00 deposit)

**RW Electronics**  
Box 1201 Q  
CHAMPAIGN, ILL.  
61820

ROSS AND WHITE CO., Electronics Dept. QST-1  
50 West Dundee Rd., Wheeling, Ill. 60090

Gentlemen:  
Send me model \_\_\_\_\_ tone burst encoder.  
Check or money order enclosed. Please set  
frequencies for \_\_\_\_\_  
Send additional information. Check

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_





7 can give you personal service on helping you select better gear per dollar for your operating pleasure. Over 30 years experience. Big trades, easy terms. Used bargains.

**VAN SICKLE RADIO SUPPLY CO.**  
Gene Van Sickle, W9KJF Owner  
4131 N. Keystone Ave.  
On the northeast side of  
Indianapolis, Indiana 46205

## 160 METER ANTENNA



**MODEL 48MV MATCHVERTER WILL RESONATE ANY 40 OR 80 METER DIPOLE/INVERTED VEE ON 160 METERS**

- Handles 250W PEP (140W DC)
- Use coax or open feedline
- Use with any SWR bridge
- Made in USA—Guaranteed

\$39.95 Ppd

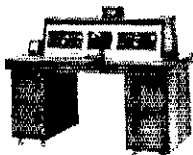
**TOP BAND SYSTEMS**

5349 Abbeyfield, Dept. 4, Long Beach, Calif. 90815

"... IN THE DOG HOUSE?"

### MOVE IN

WITH DESIGN INDUSTRIES  
WIFE-APPROVED  
COMMUNICATIONS DESK  
AND CONSOLES



... would YOU believe ... SOME hams are permitted into the house ... perhaps even the living room when their station includes a Design Industries Communications Desk or Console?

Send Today for Our Special Wife Pacification Kit  
(Descriptive Brochures)

**DESIGN INDUSTRIES, INC.**

P.O. Box 19406  
(214)-528-0150

Dept. T  
Dallas, Texas 75219



**SATURN SIX MOBILEER**  
S-2 6M Ant. only \$12.50  
S-1 w Mast, Mount 17.75  
3L 6M Hilltopper 14.95  
8L 2M Hilltopper 16.95

Also 6&2 Lunenburg Beams, Coronet etc.  
**HI-PAR PROD. Box 88 FITCH, MASS. 01420**



**ELECTRONIC FIST ... THE PROFESSIONAL KEYSER**

Every feature you need for easy, accurate CW

- IAMBIC FOR SQUEEZE KEYERS
- VARIABLE WEIGHTING FOR DXERS
- MESSAGE GENERATOR FOR CONTESTERS
- COLORS TO MATCH YOUR RIG

KIT OR WIRED. PRICES START AT \$69.95  
WRITE FOR SPECIFICATIONS

**CURTIS ELECTRO DEVICES**

Box 4090, Mountain View, California - 94040

## SURPLUS CRYSTAL FILTERS

6 XTAL-11.5 MHZ-36 KHZ 6 DB BW-MOD. MEL-3	\$14
60 DB BW 100 KHZ MAX.-50 OHM TERMINATIONS	
MATCHING XTAL DISCRIMINATOR- MOD. MAL-1	\$10
±10 TO ±15 KHZ DEVIATION-DOPE SHEET INCL.	
10.7 MHZ-13 KHZ 6 DB BW-8 XTAL-MOD. FB-5M	\$19
60 DB BW 25 KHZ MAX-1000 OHMS IN & OUT	
10.7 MHZ-30 KHZ 6 DB BW-6 XTAL-MOD. 10-MA	\$14
60 DB BW 75 KHZ MAX-2000 OHMS IN & OUT	
10.7 MHZ-34 KHZ 6 DB BW-10 XTAL-MOD 6B-79	\$28
60 DB BW 55 KHZ MAX-1000 OHMS IN & OUT	

SEND DIME FOR LIST OF OVER 50 TYPES SURPLUS XTAL FILTERS & NEW & SURPLUS TOROIDAL CORES

**CARBONYL "E" TOROID CORES**  
2" DIA. T-200-2 EACH \$2.75 OR 3 FOR \$7.00  
.69 DIA. T-68-2 EACH \$0.40 OR 7 FOR \$2.75  
MINIMUM POSTPAID ORDER 2.75 TOTAL

J. T. McCULLOUGH, W0BHG



**E. S. Electronic Labs**

301 AUGUSTUS, EXCELSIOR SPRINGS, MO. 64024



# YES!



I would like to become a member of ARRL and help support its many services to amateurs and amateur radio. Here's my \$6.50 (in the U. S. and Canada, \$7.00 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, \$2.00

My name ..... Call .....

Street .....

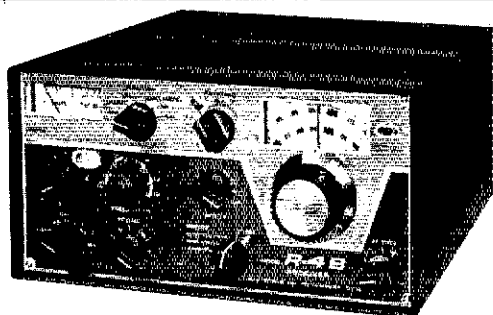
City ..... State ..... Zip .....

(Please see the other side of this page for a list of available League publications.)

**THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111**

QS 1-71

**WANTED: DRAKE 2B  
REWARD: \$225<sup>00</sup>  
ALLOWANCE ON AN R4B RECEIVER**



**R-4B \$475<sup>00</sup>**  
RECEIVER Dependability . . .

**L. A. AMATEUR RADIO SALES**

Div. of L. A. Electronics

23044 Crenshaw Blvd.

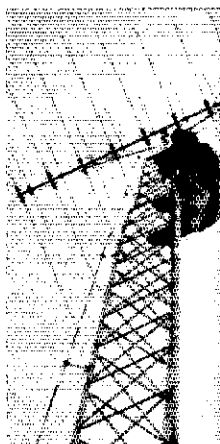
Torrance, CA 90505

PH: 534-4402

# UNIVERSAL TOWERS

## FREE STANDING ALUMINUM TOWER

Consider The  
Tremendous Advantages  
of ALUMINUM  
Over Steel Towers



**Strength** — important to your choice of a tower. Universal towers are tested for 60 m.p.h. winds and are designed to exceed that wind velocity.

**Light Weight** — In addition to its weight advantages aluminum offers maintenance free life time beauty. Eliminates painting and ugly rust inherent in steel towers.

**Easy Assembly** — Child's play to assemble. You can easily assemble a tower on the ground and walk it up, or assemble it erect section by section.

In addition to all of these advantages total cost of a Universal Aluminum Tower is less than similar steel towers extended over the life of the tower.

## Midwest Ham Headquarters

For Over 32 Years

HAMS! Write For Free Catalog and Wholesale Prices!

## ELECTRONIC DISTRIBUTORS, INC.

1960 Peck

Muskegon, MI 49441

Tel: 616-726-3196

I would like the following League publications shipped to me postpaid. I am enclosing payment of \$\_\_\_\_\_ (These prices apply only to the USA.)

Ship to this address:

NAME ..... CALL .....

STREET .....

CITY ..... STATE ..... ZIP .....

- |  |   |
|--|---|
| <input type="checkbox"/> <b>ARRL HANDBOOK</b> \$4.50<br>The standard comprehensive manual of amateur radiocommunication    | <input type="checkbox"/> <b>A COURSE IN RADIO FUNDAMENTALS</b> \$1.00<br>Use this in conjunction with the Handbook  |
| <input type="checkbox"/> <b>UNDERSTANDING AMATEUR RADIO</b> \$2.50<br>Written for the beginner—theory and how-to-build it. | <input type="checkbox"/> <b>ANTENNA BOOK</b> \$2.50<br>Theory and construction of antennas  |
| <input type="checkbox"/> <b>VHF MANUAL</b> \$2.50<br>A new and thorough treatment of the amateur v.h.f. field              | <input type="checkbox"/> <b>SINGLE SIDEBAND FOR THE RADIO AMATEUR</b> \$3.00<br>The best s.s.b. articles from QST   |
| <input type="checkbox"/> <b>LICENSE MANUAL</b> \$1.00<br>Complete text of amateur regs, plus Q&A for amateur exams         | <input type="checkbox"/> <b>THE MOBILE MANUAL</b> \$2.50<br>The best mobile articles from QST   |
| <input type="checkbox"/> <b>HOW TO BECOME A RADIO AMATEUR</b> \$1.00<br>All about amateur radio and how to get started     | <input type="checkbox"/> <b>HINTS AND KINKS</b> \$1.00<br>300 practical ideas for your ham shack  |
|  | <input type="checkbox"/> <b>OPERATING MANUAL</b> \$1.50<br>The techniques of operating your amateur station—DXing, ragchewing, traffic, emergencies, etc. |

(Please see the other side of this page for an application for membership in ARRL and 12 issues of QST)

**THE AMERICAN RADIO RELAY LEAGUE, INC., NEWINGTON, CONN. 06111**

QS 1-71

THESE OM'S  
HAVE RECENTLY  
SWITCHED TO A

**SHURE 444 MIC**

WB2WVF  
WA2AIU  
WB2ADC  
WA3FXQ  
W4ZCR  
WB4EPS  
W5BZO  
W5QCP  
W6EHW  
W6EOG

K7EXT  
WA7HRG  
WA8VUP  
WA8TOW  
W9SZQ  
WA9MIF  
WA0NSD  
W0BNA  
WA9ULU  
WA9WYD

*... notice their improvement  
in intelligibility  
and added punch?*

Shure Brothers, Inc.,  
222 Hartrey Avenue, Evanston, Ill.

**LRL-124 BROADBAND REACTANCE BALANCED ANTENNA for 75/80 meters**

124' 14-2 copperweld polyeth. ins. wire  
with clamping blocks so ends can hang  
down to install in 100' length or less,  
25'-40' center height. 2 KW P.E.P.

Price: \$45.00 ppd Cont. USA

**LATTIN RADIO LABORATORIES**

Box 44

Owensboro, Ky. 42301

"CHOICE OF THE DX KINGS"

the CUBEX

**Skymaster**

**FIBERGLASS  
QUAD KITS**

**2 ELEMENT—3 BAND KIT SPECIAL**

CONTENTS

- 8 Fiberglass Arms—skyblue color
- 2 End Spiders (1 pc. castings)
- 1 Boom/Mast Coupler—h.d. aluminum

ONLY  
**\$69.95**

- 16 Wraplock Spreader Arm Clamps Add \$7.50 for PPD
- 1 CUBEX QUAD Instruction Manual Frt. Cont. U.S.

2-3-4 or more element Quads available  
Write for FREE BROCHURE and Price List

**CUBEX COMPANY**

P.O. Box 732, Altadena, California 91001

Phone: (213) 798-8106

YOU CAN'T SAY "QUAD" BETTER THAN "CUBEX"

**TYMETER®**

"Time At A Glance"

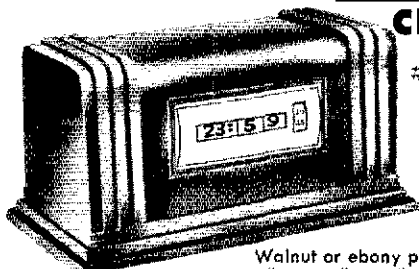


**24  
HOUR  
CLOCK**

#100-24H

**\$16**

Made in  
U.S.A.



Walnut or ebony plastic case.  
4"H, 7 3/4"W, 4"D. 110V 60  
cy. Guaranteed One Year.

At Your Dealer, or  
DIRECT FROM

**PENNWOOD NUMECHRON CO.**

TYMETER ELECTRONICS

7749 FRANKSTOWN AVE.

PITTSBURGH, PA. 15208

Low SWR 3.5-4mc 2:1 or less  
Vertical shorted stub to be  
grounded, also is DC ground for  
ant. Center block has coax  
connector for PL-259 male plug.  
Use RG-8/U or 58/U feeder.

**NEW  
from  
NRI**

**Home  
training in  
AMATEUR  
RADIO**

NRI, leader in Communications, Television, Elec-  
tronics 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 in-  
cludes transmitter, 8-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, Wash-  
ington, D.C. 20016.



..... **MAIL NOW** .....

• NATIONAL RADIO INSTITUTE 50-011  
• Washington, D.C. 20016  
• Please send me information on Amateur Radio  
• training.  
• Name \_\_\_\_\_ Age \_\_\_\_\_  
• Address \_\_\_\_\_  
• City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
• ACCREDITED MEMBER NATIONAL HOME STUDY COUNCIL

# what is an Antenna Noise Bridge?



Antenna Noise Bridge (an-ten-a noiz brij), n. Omega-t System's name for a specialized testing device that checks your antenna system for resonant frequency and coaxial impedance.

An entirely new concept in antenna testing, it not only replaces VSWR bridges with a more economical system, but it is also more reliable, and easier to use.

Obtain maximum efficiency by determining the resonant frequency for any type of antenna, fixed or mobile, with the solid state, self-contained Antenna Noise Bridge . . . and match your system for the best reception ever.

Available in two models . . . the TE7-01 for 1-100 MHz range, priced at \$29.95 . . . the TE7-02 for 1-300 MHz range, priced at \$39.95.

Sold only through authorized dealers of amateur and citizen's band radio supplies. For additional information, write: Omega-t Systems, 300 Terrace Village, Richardson, Texas 75080



omega-t systems incorporated

## DX List

(Continued from page 138)

101	100	K6EIV	VF3DBT	WB4EPI	WAB
WASRVX	DJ7JO	K7VTR	VE3EAC	W5OHF	W9K
W6EF	DJ7KJ	K8BKF	VK5EE	W5CBF	W9Q
W6UWP	DK1NF	K8RRQ	VP9MI	W5DTC	WA9
WA6JKO	DU4GW	K8ZFR	WA1DFL	W5FRN	WA9
WB6FGI	DL7OL	K9EFO	W2EHB	W5VAQ	WA9
WB6WIT	EL2BD	K9ERP	W2FLA	W6CPN	VE3E
WA7GOA	G3IRO	K9UPK	W2GTO	W6EIF	W0
W8AAM	G3TOE	K0BXI	W2HSM	W6JZG	W0J
W8CZW	G5AHX	K0ETV	W2VDE	W6OFU	W0K
W8HJ	HC1MH	K0HUD	W2YTO	W6OVZ	W0L
WA8PRR	HK3LT	K0TWW	WB2IBD	WA6CRJ	WA0
W9ZWO	HP3MC	K0YTM	WB2SH	WA6TAX	WA0
WA9JXT	IJYD	KL7AGJ	WB2TSB	WA6YNT	WA0
WA9OMR	JAIHBC	W1EZFJ	WB2VOG	W7FCD	WA0
WA9ROU	E1DEP	KP4	W3JPT	W7RI	ZL1B
W0IBZ	K1NLQ	KZ5RF	W3UXZ	WA7ISO	ZL3E
WA0YH	K2OYN	LA2BK	W3ZR	W3TBF	9G1K
WA0QIT	K4GHR	OX5AP	W4IME	8	
ZL1AMN	K4PPN	PA0PMC	W4PWB	WRWEJ	
ZL1SZ	K4RSB	PJ2ARI	WA4TP	W8AXQ	
ZS2DC	K5VYT/4	VF3CLX	WA4VWC	W8PWZ	

## Novice Roundup

(Continued from page 56)

3) *QSOs*: Contacts must include certain information sent in the form as shown in the example. QSOs must take place on the 80-, 40-, 15-, or 2-meter bands. Crossband contacts are not permitted. Cw to phone, cw to cw, phone to cw contacts are permitted. Novices work any amateur stations; non-Novices work only Novices. Valid points can be scored by contacting stations not working in the contest, upon acceptance of your number and section and receipt of a number and section. A station may be worked only once, regardless of band.

A Novice may operate in the Novice portion of the competition until he receives his General Class License, then *must* operate as a non-Novice entry.

4) *Scoring*: Each exchange counts one point. Only one point may be earned by contacting any one station, regardless of the frequency band. The total number of ARRL sections (see page 6 of this *QST*) worked during the contest is the "section multiplier". Yukon-N.W.T. (VE8) also counts as a multiplier. A fixed scoring credit may be earned by entrants who hold ARRL Code proficiency certificates. If an entrant does not hold a CP award he can apply for credit by attaching to his Roundup report a copy of the qualifying run from W6OWP, January 7 or February 3, or from W1AW, January 13 or February 11. CP credit equals the wpm speed indicated on the latest certificate or sticker held by the entrant. The final score equals the "total points" plus "Code Proficiency credit" multiplied by the "section multiplier."

5) *Reporting*: Contest work must be reported as shown in the sample form. Reporting forms and a map of the United States will be sent free upon request. Indicate starting and ending times for each period on the air. All Roundup reports become the property of ARRL and must be postmarked *not later than March 5, 1971*.

6) *Awards*: A certificate award will be given to the highest scoring Novice in each ARRL section. Multioperator stations are not eligible for awards.

7) *Disqualifications*: Failure to comply with the contest rules or FCC regulations are grounds for disqualification. ARRL Contest Committee decisions are final.

DEF



**How to build and Tune Ham Antennas**

Work more DX with the right antenna for your location. New book gives step-by-step instructions (117 pages, 200 illustrations) for building every type of antenna: lung wires — dipoles — vees — traps — VHF, etc. Plus many others not described elsewhere. Now 25¢. (Inmate books from converted TV antennas — indoor beams — "invisible" antennas — window sill antennas — 40 meter beams — vertical beams — Novice Band DX — many, many others. Secrets of tune-up of both manufactured and homemade antennas for greater DX. How to use antenna test gear. Buy book "Ham Antenna Construction Projects" from your electronic parts store handling "Gerni" publications, Catalog No. 20624, Only \$3.95. Or order autographed copy direct from author J. A. Stanley 4814 South Williams Street, Denver, Colorado 80209. Add 25 cents for handling. Money-back guarantee.



**ENJOY EASY, RESTFUL KEYING**

With **VIBROPLEX**

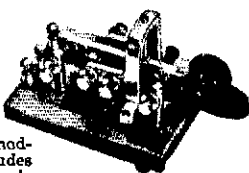
Sending becomes fun instead of work with the SEMI-AUTOMATIC Vibroplex. It actually does all the arm-tiring nerve wrecking work for you. Adjustable to any desired speed. Standard models have polished Chromium top parts and gray base. DeLuxe models also include Chromium Base and red finger and thumb pieces. Five models to choose from. Priced at \$21.95 to the 24K Gold Plated Base "Presentation" at \$43.95.



and thumb pieces. Five models to choose from. Priced at \$21.95 to the 24K Gold Plated Base "Presentation" at \$43.95.

**VIBRO-KEYER**

Works perfectly with any Electronic Transmitting Unit. Weighs 2 3/4 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 \$20.95; DeLuxe model includes Chromium Plated Base at only \$27.50.



Order today at your dealers or direct  
**THE VIBROPLEX CO., INC.**  
833 Broadway New York, N. Y. 10003

**FREE Folder**

**CQ de W2KUW**

The Ted Dames Company, 308 Hickory Street  
Arlington, N.J. 07032 (201) 998-4246

**WINTER SPECIALS IN CLEAN, READY FOR LAB USE**

Tektronix 531 Scope	.....\$150
Tektronix 531A Scope	.....\$350
Tektronix 536 Scope	.....\$395
Tektronix 541A Scope	.....\$350
Tektronix 561 Scope	.....\$250
Tektronix 561A Scope	.....\$350
Tektronix 661 Scope	.....\$500
Tektronix C12 Camera	.....\$200
Tektronix Plugs A, B, C, etc.	
Hewlett-Packard 130A Scope	.....\$150
Hewlett-Packard 185B Scope	.....\$400
Hewlett-Packard 608D Sig. Gen.	.....\$595
Hewlett-Packard 330B Distortion Analyzer	.....\$175
Hewlett-Packard 616A Sig. Gen.	.....\$200
Hewlett-Packard 620A Sig. Gen.	.....\$325
Hewlett-Packard 8002A Pulse Gen.	.....\$250
Hewlett-Packard 650A Aud. Osc.	.....\$150
Measurements 65B Sig. Gen.	.....\$325
Measurements 80B Sig. Gen.	.....\$225
Boonton 202B FM Sig. Gen.	.....\$200
Boonton 310A VTVM	.....\$200
Boonton 320A VM	.....\$125
Bird 46D Thru-line Wattmeter new	.....\$85
Hughes 104 Memoscope	.....\$200
Jennings UCSXE 20-1500 MMFD new	.....\$95
CEC 26-303 Moisture Monitor	.....\$75
CEC 5-114-P4-18 Recording Oscillogram with magazine	.....\$600

We will buy for cash any tube, transceiver, receiver or test gear at 5% over prevailing market price

**FREE!**  
**LAFAYETTE'S 1971 GOLDEN JUBILEE CATALOG 710**



**468 Pages**

- Transmitters • Receivers • Transceivers • Linears • Dipoles • Beams
- Verticals • Rotators • Mobile Antennas
- Filters • Phone Patches • Crystals
- Code Equipment • Clocks • Preamps
- TR Switches • VFO • Speakers • Parts
- Test Equipment

**PLUS . . . Thousands of Additional Stereo, PA, TV, Photography, and other useful items.**

**Serving The Public Since 1921**

**LAFAYETTE Radio ELECTRONICS**  
Dept. 34100 P.O. Box 10  
Syosset, L.I., N.Y. 11791

**MAIL THIS COUPON TODAY FOR YOUR 1971 CATALOG**

Send Me A FREE 1971 Catalog 710

34011

Name .....

Address .....

City .....

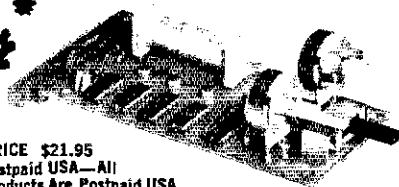
State ..... Zip .....

# New-Ultimate Keyer\*

FEATURING

- Laminic (squeeze-keying) action selectable with P.C. mounted switch
- Dot memory
- Weight control (P.C. Mounted)
- Reed relay output (P.C. Mounted)
- Speed Control (0-50 wpm (P.C. Mounted))
- High Quality construction—3 DTL IC's, 5 transistors, glass epoxy board
- Exclusive edge connector interface permits easy connection to power supply (4.5-8.0 V), paddle, and transmitter
- Use batteries or our power supply
- Wired and Tested—satisfaction guaranteed. Complete instructions included
- Standard Keyer—new design with P.C. mounted reed relay output without dot memory, laminic action, or weight control—\$16.50
- "Splitter" frequency marker—\$19.95
- A.C. power supplies for above 3.6—5 V \$12.00

PRICE \$21.95  
postpaid USA—All  
Products Are Postpaid USA



**DIGI-KEY**  
PO Box 27146  
Minneapolis  
Mn 55427

OTHER DIGI-KEY PRODUCTS

\*Patent Pending

• Write For Free Catalog

## NOW! USE YOUR TAPE RECORDER TO LEARN CODE!

Read code like a Pro! It's easy! PICKERING CODEMASTER tapes give professional instruction on your own tape machine from digital computerized tapes! They can't be matched for timing accuracy! Beginners get course of professional instruction at 5-9 WPM right on the tape! Practice for General and Amateur Extra ranges from 11 to 30 WPM. Nothing else like it! See below for CODEMASTER tapes you need. Get up to speed! Order today!



**CM-1:** For the beginner. A complete course of instruction is on the tape. Practice material at 5, 7, 9 WPM. Prepares you for Novice exam. Includes code groups and punctuation.

**CM-1½:** An intermediate tape, especially for General Class exam study. No instruction; just practice. ½ hr 11 WPM; 1 hr 14 WPM; ½ hr at 17 WPM. Includes coded groups and straight text.

**CM-2:** For Extra-Class license study. Mostly straight text; some code groups. 1 hour at 20 WPM; ½ hour each at 25 and 30 WPM. For real QRQ, play this tape at twice speed!

CODEMASTER tapes are 2-track monaural; available in two styles; 7-inch reel (3¾ IPS) and cassette. Be sure to specify both the program (CM-1, etc) and the style (reel or cassette). Any tape, \$6.95 postpaid USA 4th class. Any two tapes, \$13.00; all three, \$17.00 PPD. For air shipment in USA add 50¢ per cassette or 80¢ per reel. Immediate delivery. Mastercharge and BankAmericard honored; give us your account number. CODEMASTER tapes are made only by Pickering Radio Company, PO Box 29, Portsmouth, RI 02871. Satisfaction guaranteed.

PICKERING RADIO CO  
Post Office Box 29  
Portsmouth RI 02871



### NOVICES

Need Help For Your General?

Recorded Audio-Visual

THEORY INSTRUCTION

EASY - FAST - PROVEN

No Electronics Background Necessary

For Complete Free Information

Write: Amateur License Instruction,

Box 6015 Norfolk, VA 23508

## WORLD QSL BUREAU

5200 PANAMA AVE. RICHMOND CA 94804 USA.

**PLAN 1.** We forward your QSLs (please arrange alphabetically) to any place in World, including all foreign countries, and to or within USA, Canada, and Mexico, for 4¢ each.

**PLAN 2.** You use our special log form and send us a copy. We supply QSL—make out QSL—deliver QSL, all for 8¢ each.

### THE "HI-Q-BALUN"

- For Dipoles—Yagis—Inverted V—Doublet
- Puts Power in Antenna
- Full Legal Power 3-40 MC.
- Small—Light—Weather-proof
- 1:1 Impedance Ratio—Coax Fitting
- Takes Place of Center Insulator
- Built-in Lightning Arrestor
- Helps Eliminate TVI
- Fully guaranteed

\$9.95 PPD  
U.S.A.

VANGORDEN ENGINEERING  
Box 618, Brielle, N.J. 08750

## RADIO TELETYPE EQUIPMENT

Teletype Models 35, 33, 32, 29, 28 ASR, 28 KSR, 28 LPR, 28 LARP, 28 LAD, 28 LBAD1, 14, 15, 19, Page Printers, Perforators, Reperforators, Trans-Dist. polar relays, tape winders, cabinets, Collins Receivers, 5LJ-3, 5LJ-4, R-388, R-390A, SP600JX, Frequency Shift Converters, D.C. Power Supplies.

ALLTRONICS-HOWARD CO.

Box 19, Boston, Mass. 02101 Tel: 617-742-0048

## HAL DEVICES



**HAL  
TOUCHCODER II  
KIT  
\$55.00**

Complete parts kit, excluding keyboard, for the WAUX CW code typer. All circuitry on one 3 x 6" G10 glass PC board. Plug-in IC sockets. Optional FM repeater ID, contest ID, and RTTY features available. Keyboard \$25.00. Shipping extra. Write for full details.

HAL DEVICES, Box 365A, Urbana, IL 61801

## GROTH-Type

**COUNTS & DISPLAYS  
YOUR TURNS**



- 99.99 Turns
- One Hole Panel Mount
- Handy Logging Area
- Spinner Handle Available

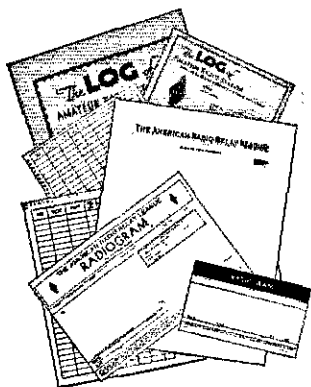
Prices	
TC2	\$6.00
TC3	\$6.60
Spinner (-S)	-\$ .90

Case: 2x4"; shaft ¼"x3"  
Model TC2: Skirt 2¼"; Knob 1½"  
Model TC3: Skirt 3"; Knob 2½"

**R. H. BAUMAN SALES**

P.O. Box 122, Itasca, Ill. 60143

# OPERATING NECESSITIES



Record keeping can often be tedious. But not with the *ARRL Log Book*. Fully ruled with legible headings it helps make compliance with FCC rules a pleasure. Per book..... **50¢**

Mobile and portable operational needs are met by the pocket-size log book, the *Minilog*. Designed for utmost convenience and ease..... **50¢**

First impressions are important. Whether you handle ten or a hundred messages you want to present the addressee with a neat looking radiogram... and you can do this by using the *official radiogram form*. 70 blanks per pad. **35¢**

If you like to correspond with fellow hams you will find the *ARRL membership stationery* ideal. Adds that final touch to your letter. 100 sheets..... **\$1.75**

and they are available postpaid from . . .

**The American Radio Relay League**

NEWINGTON, CONN. 06111

**KNOW AN  
ASPIRING HAM  
WHO IS  
BUFFALOED  
BY THE CODE?**



TELL HIM ABOUT **colutor™**

The simplest instrument ever engineered for generating precision code **SOUNDS** of the alphabet and numbers! Teaches in strict accord with universally recommended techniques. Keyed to *Learning The Radiotelegraph Code* published by The American Radio Relay League.

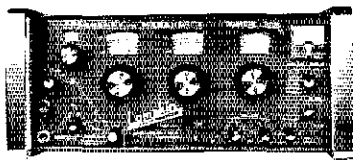
Requires **NO** tape or record player, etc. Non-electrical; use it anywhere, at any speed. Requires no skill, accuracy of code is built-in. Guaranteed quality.

For complete **colutor™** and instructions packaged in attractive instrument case, send \$3.95 (check or money order, no C.O.D.) OR write for free Brochure No. 701.

**ROMNEY ENGINEERING LABORATORIES**

Educational Aids Department T-1  
P.O. Box 15418 (Patent Pending)  
Salt Lake City, Utah 84115

## NEW Signal Generator Capability



The new "A" model of the Lampkin **DIGITAL FREQUENCY METER / SYNTHESIZER / SIGNAL GENERATOR** has FM-modulation capability. Now — AM modulation, or FM modulation, from variable-frequency internal AF generator (50 to 3000 Hz), or from external source, at option.

- ☆ Range 10 KHz to 500 MHz.
- ☆ Frequency Readout on Digital Dials.
- ☆ Accuracy: better than 0.0001%, self contained.
- ☆ Power Supply: 115 V AC or 12 V DC, at option.
- ☆ Weight only 22 pounds.
- ☆ All solid state. Price \$2,390.00
- ☆ Write, wire, or phone — NOW

NAME .....  
ADDRESS .....  
CITY ..... STATE ..... ZIP .....

**LAMPKIN LABORATORIES, INC.**  
MFG. Div., Bradenton, Fla. 33505

# WIRE ELEMENT ANTENNAS

DUAL BAND DIPOLES - DUAL BAND INVERTED VEES - DOUBLE TUNED ANTENNAS

These high quality wire element antennas allow increased frequency coverage yet mount and feed as a dipole or inverted vee. Your present supports and feedline most likely can be used. No traps, no stubs, no gimmicks-just full length half wave elements on each band. Single feedline required-70 ohms dipole, 50 ohms inverted vee. Dual band antennas operate on any two pre-selected bands between 160 and 6 meters. Double tuned antennas resonate at any two widely separated frequencies inside a single ham band allowing low SWR operation in the CW and phone portions (Example-3550 and 3980KHZ). Power rating greater than 2 KW. Low SWR. No. 12 copperweld wire elements used. Three 7 inch ceramic insulators and detailed instructions included.

*DUAL BAND ANTENNAS for*

80-40 M	\$35.00
40-20 M	29.50
20-15 M	17.50
10-6 M	13.75

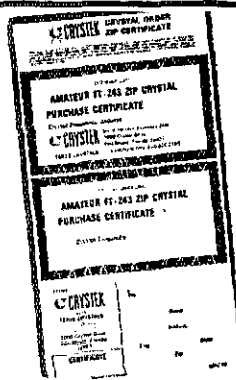
*DOUBLE TUNED ANTENNAS for*

75/80	\$37.50
40 M	31.50
20 M	19.50
6 M	12.50

Combinations other than shown available. Monoband, folded dipoles, and WWV antennas also available-request quotation. Florida residence add 4% sales tax. Shipping charges collect. Order from this ad-send check or money order to:

HOUSE OF DIPOLES

P.O. Box 8484, Orlando, Florida 32806



## NOW... ZIP-ORDER CRYSTEK Amateur FT-243 CRYSTALS

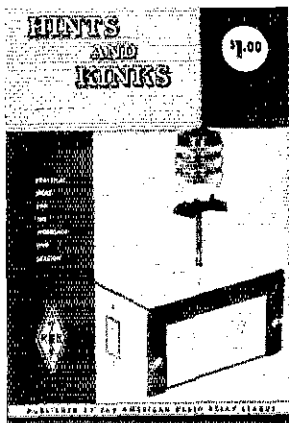
Your dealer has a new, fast, direct-factory ZIP Crystal Purchase Certificate that enables you to get the Amateur Controlled Quality Crystals you want mailed direct to you promptly. Ask about it.



# CRYSTEK

Formerly Texas Crystals  
Div. of Whitehall Electronics Corp.

1000 Crystal Drive      4117 W. Jefferson Blvd.  
Fort Myers, Florida 33901      Los Angeles, California 90015



## Ideas for You!

*H*ints and Kinks, gimmicks and gadgets!

*A*ll those little ideas that can improve your operating, building, experimenting, etc.

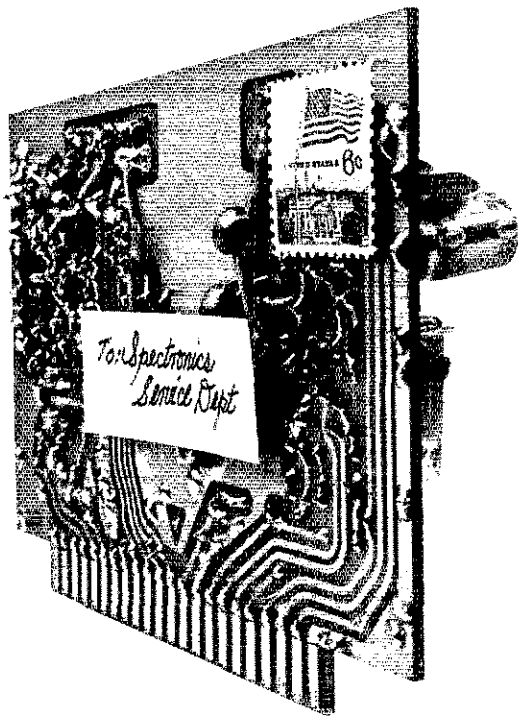
**\$1.00** U.S.A.

\$1.25 Elsewhere

*P*ick up a copy of the latest edition of *HINTS and KINKS* and look over the "gold-mine" of ideas. There is something for you no matter what your "specialty" in Amateur Radio.

The **AMERICAN RADIO RELAY LEAGUE, INC.**  
NEWINGTON, CONNECTICUT 06111

# Repair by mail.



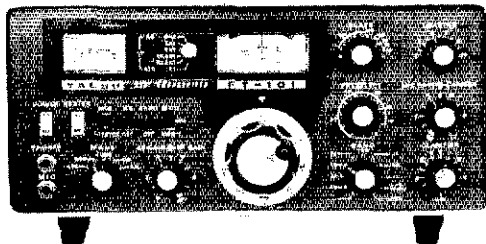
Except for driver and finals, the Yaesu FT-101 is all solid state. Ten FET's, 3 IC's, 31 silicon transistors and 38 silicon diodes do the job—solidly. Most of these components are found on computer-type plug-in modules. Should one of them ever give you trouble, just send us the module. We'll send you a factory-new replacement by return mail.

But with the FT-101, you can expect everything but trouble. Like a built-in VOX, 25 KHz and 100 KHz calibrators, the WWV 10 MHz band,

built-in power supplies right in the package. You supply the 12 or 117 volts plus an antenna and you're air-ready.

For in-motion operation, a noise blanker is essential. We didn't forget to include it in the FT-101. It picks out noise spikes and leaves you with nothing but clean, crisp signal copy.

Though plug-in modules mean quick, convenient repair, we don't really expect to hear from FT-101 owners. Unless it's on the air. Maybe that's why we unconditionally guarantee it for a year. The FT-101 — only \$499.95.



a high Q permeability tuned RF stage and a 5 KHz clarifier. All of that in a portable rig that sounds like it was home base.

The FT-101 is thirty pounds of power. You can work the world on 260 W PEP, 180 W CW or 80 W AM maximum input power. The world between 80 meters and 10 meters. And you'll hear it back with 0.3 microvolts sensitivity—and a 10 db signal-to-noise ratio.

This rig even includes 12 VDC and 117 VAC

## SPECTRONICS WEST

Dept. Q, 1491 E. 28th, Signal Hill, Ca 90806 / (213) 426-2593

## SPECTRONICS EAST

Dept. Q, Box 1457, Stow, Ohio 44224 / (216) 923-4567

Please send new color catalog of all Yaesu products.

Enclosed find \$\_\_\_\_\_

Please send model(s) \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

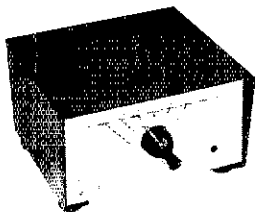
City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

All prices F.O.B. Signal Hill, Ca.

# TBL1

## FREQUENCY MARKER

- SHARP ACCURATE MARKERS AT 100 - 50 - 25 - 10 - 5 KHZ
- KEEPS YOUR RECEIVER CALIBRATED AT ALL TIMES
- SELF CONTAINED UNIT
- BATTERY OPERATED 3 1.5V CELLS
- COMPACT 2.5x4.5x4.5 INCHES
- 2 TONE EQUIPMENT GREY
- FRONT PANEL ADJ TO WWV



IT'S  
WHAT'S  
INSIDE  
THAT  
"COUNTS"

Accuracy and stability has been uppermost in the design of the TBL 1 marker. We feel a marker should be more accurate than the receiver it is going to calibrate—so no compromise has been made in quality

Fairchild—Motorola—JFD—JAN—Mallory—IRC and Keystone components are used throughout

It cost more! But why not calibrate with the best?

Hundreds have been sold to government—amateurs—SWLS—schools and labs all around the world

Try one today. . . . Complete wired & tested. Sold with a money back guarantee

PRICE, less Crystals\* Battery

**\$29.95**

PREPAID USA 50

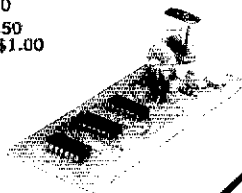
FREQUENCY MARKER IDENTICAL TO ABOVE, LESS CABINET AND SWITCH

SPECIFICATIONS: Glass Epoxy Board, Adjustment to zero beat with WWV. Uses 100 KHz crystal (not supplied), 3 to 4 VDC Compact—1.75 x 3.75 inches. Install anywhere!  
\$16.50 Complete easy-to-assemble kit. \$19.95 Wired & Tested  
Prices Prepaid USA 50  
(\* 100 kHz crystal \$3.50  
Switch for kit models \$1.00

### LAB 1

#### THE RADIO SHOP

48 Elm Street  
New Canaan, CT 06840  
Tel: a.c. (203)-966-3553



Radio Amateurs  
Reference Library  
of Maps and Atlas

**WORLD PREFIX MAP**—Full color, 40" x 28", shows prefixes on each country . . . DX zones, time zones, cities, cross referenced tables . . . postpaid \$1.25

**RADIO AMATEURS GREAT CIRCLE CHART OF THE WORLD**—from the center of the United States! Full color, 30" x 25", listing Great Circle bearings in degrees for six major U.S. cities; Boston, Washington, D.C., Miami, Seattle, San Francisco & Los Angeles. . . . postpaid \$1.25

**RADIO AMATEURS MAP OF NORTH AMERICA!** Full color, 30" x 25"—includes Central America and the Caribbean to the equator, showing call areas, zone boundaries, prefixes and time zones, FCC frequency chart, plus informative information on each of the 50 United States and other Countries. . . . postpaid \$1.25

**WORLD ATLAS**—Only atlas compiled for radio amateurs. Packed with world-wide information—includes 11 maps, in 4 colors with zone boundaries and country prefixes on each map. Also includes a polar projection map of the world plus a map of the Antarctica—a complete set of maps of the world, 20 pages, size 8 3/4" x 12" . . . postpaid \$2.00

Complete reference library of maps—set of 4 as listed above . . . postpaid \$3.50

See your favorite dealer or order direct.

WRITE FOR  
FREE  
BROCHURE!

RADIO AMATEUR  
**callbook** INC.



Dept. A. 925 Sherwood Drive  
Lake Bluff, Ill. 60044

## HAL DEVICES



**HAL 311BC**  
**ELECTRONIC**  
**KEYER**  
**\$53.00**

THE most versatile keyer available.

Send for full details on the HAL 311BC and the complete line of HAL electronic keyers. There is a model to fit your requirement and budget from \$16.50 to \$53.00. Shipping extra.

Now available in kit form for even greater value.

HAL DEVICES, Box 365A, Urbana, Il. 61801

**19.95** NEW AUDIO **CONTROL CENTER**  
FOR SWITCHING SYSTEMS INPUT/OUTPUT



Switch speakers located in every room or use to switch tapes, tape recorders, phones, Black finish; push - push switches, 4-Stereo channel w/ RCA jacks. Other types available. Shipped postpaid.

Order: Box 1348Q  
Lawrence, MA 01842 too. Shipped postpaid.

We probably have the best inventory of good lab test equipment in the country, and an exc. assortment of commun. eqpt., and line-power regulation & freq.-changing eqpt., but please do not ask for catalog! Ask for specific items or kinds of items you need! We also buy! What do you have?

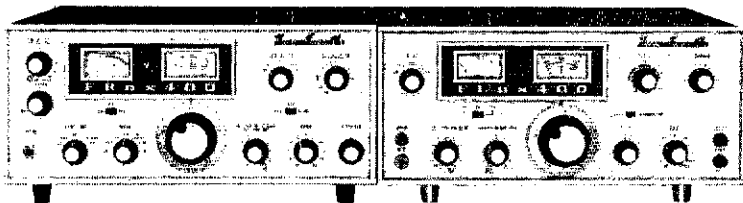
WANTED: GOOD LAB TEST EQPT & MIL COMMUNIC.

**R. E. GOODHEART CO. INC.**

Box 1220-QST, Beverly Hills, Calif. 90213

Phones: Area 213, office 272-5707,

# Now you don't have to pay twice the price to get twice the rig.



Picture this pair in your shack. The Yaesu FLdx 400 transmitter and the FRdx 400 receiver. Loaded with power. Loaded with sensitivity. Loaded with features. Loaded with value. Read on, and discover how you can have the most up-to-date receiver-transmitter rig in the world... and at an unbelievably low price.

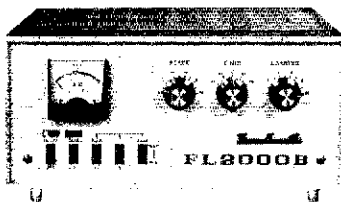
meters—with an optional provision for certain other bands that you can personally specify. For all that, you pay just \$299.95.

## The FRdx 400 Receiver

Get a big ear on the world with complete amateur band coverage from 160 meters through 2 meters, including WWV and CB reception. Four mechanical filters do it—they provide CW, SSB, AM and FM selectivity. Separate AM-SSB-FM detectors are included, along with squelch and transmit monitor controls. Plus a noise limiter and a variable delay AGC. And a built-in notch filter with front panel adjust for notch depth.

The FRdx includes calibration markers at 100 KHz and 25 KHz, with accurate calibrator checks verified by WWV. A solid-state FET VFO for unshakable stability. And a direct-reading 1 KHz dial affords frequency read-out to less than 200 Hertz.

The FRdx 400 sells for \$359.95.



## FL2000 B Linear Amplifier.

Ideal companion to the Series 400, this hand-crafted linear is another example of Yaesu's unbeatable combination of high quality and low cost. Designed to operate at 1500 watts PEP SSB and 1000 watts CW, this unit provides superb regulation—achieved by a filter system with 28 UF effective capacity.

Other features include dual cooling fans (one for each tube), individual tuned input coils on each band for maximum efficiency and low distortion, and a final amplifier of the grounded grid type using two rugged carbon-plate 572 B tubes. Ready to operate at only \$299.95.

## The FLdx 400 Transmitter

Here's how to set yourself up with dual receive, transceive or split VFO operation. The FLdx 400 with its companion receiver brings you the ultimate in operational flexibility. Flexibility like frequency spotting, VOX, break-in CW, SSB, AM and even an optional FSK circuit.

The completely self-contained FLdx 400 features a built-in power supply, fully adjustable VOX, a mechanical SSB filter, metered ALC, IC and PO. A completely solid-state FET VFO provides rock-solid frequency stability.

We rate the FLdx 400 very conservatively. That rating guarantees you 240 W PEP input SSB, 120 W CW and 75 W AM. The FSK option will go all day at a continuous 75 W. And you get full frequency coverage on all amateur bands—80 meters through 10

## SPECTRONICS WEST

Dept. Q, 1491 E. 28th, Signal Hill, Ca. 90806 / (213) 426-2593

## SPECTRONICS EAST

Dept. Q, Box 1457, Stow, Ohio 44224 / (216) 923-4567

Please send new color catalog of all Yaesu products.

Enclosed find \$ \_\_\_\_\_

Please send model(s) \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

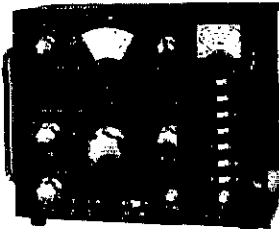
All prices F.O.B. Signal Hill, Ca.



Serving Amateur Radio and The Radio Amateur Continuously and Successfully for 34 years . . .  
We MUST Be Doing Something Right

SEND FOR CURRENT USED EQUIPMENT LIST

**ADIRONDACK Radio Supply, Inc.** (Since 1936)  
185-191 West Main St. Box 88  
Amsterdam NY 12010 Tel: 518-842-8350  
Service & Friendliness to the Radio Amateur



**MODEL SG-83C  
LABORATORY  
STANDARD  
SIGNAL GENERATOR**  
**\$295.00**

Silicon FET osc, silicon em. fol., silicon output amp. produces low distortion RF signal and excellent amplitude modulated envelope with no FM. 80 KHz - 54 Mhz, 1% dial accuracy. 1 Mhz Xtal. Accurately calibrated output, 0.6 to 160,000 microvolts. Battery or AC powered.

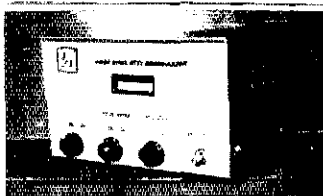
**CLEMENS MANUFACTURING COMPANY**

Write for free copy of instruction book with schematic, etc.

630 S. Berry Road,  
St. Louis, Mo. 63122

**SPEECHEN SIE DEUTSCH? HABLA ESPANOL?**

Speak his language through our simple courses in Spanish or German for amateur radio. Native speakers present over one hour of ham dialogue with 10 QSOs and other aids. English also available for Spanish or German amateurs. New low prices on cassettes and tapes. Write **FOREIGN LANGUAGE QSOs, W1YLV**, Box 53, Acton, Mass. 01720



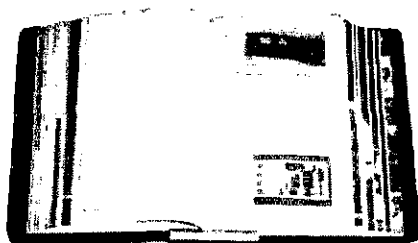
**SPECIALISTS  
In  
BUILDING THE  
FINEST TERMINAL  
UNITS AVAILABLE**

**SOLID STATE RTTY DEMODULATOR**

- All units Hand-built
- A Terminal Unit for Every Need
- J & J Solid State Terminal Unit using the very latest integrated circuitry
- or
- The DeLuxe Mainline TT/L-2 proven the Leader
- Custom-Built
- Write For Brochure

**J & J ELECTRONICS**

Canterbury CT 06331 • Tel: 203-546-9126



**PROTECT  
YOUR  
INVESTMENT!**



You do have an investment in your copies of QST.

Don't endanger your investment by letting QSTs gather dust on a shelf or in a corner.

Protect them with sturdy QST Binders; each holds 12 issues. Gold labels are included for showing what year QST is inside.

At only \$4.00 per binder, (postpaid) it's pretty cheap protection for your valuable QSTs.

Available only in the United States and Possessions

**AMERICAN RADIO RELAY  
LEAGUE**

Newington, Conn. 06111

give to the  
**March  
of Dimes**



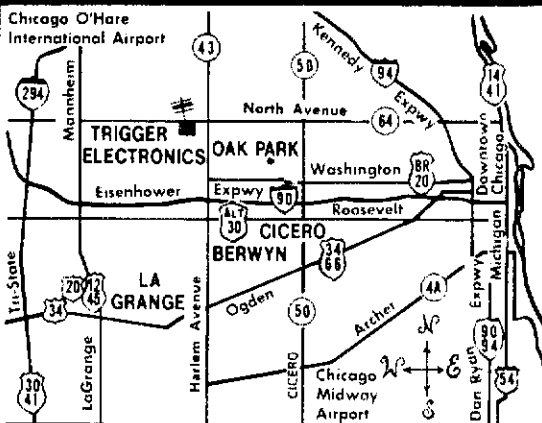


# TRIGGER Electronics



7361 NORTH AVE.  
RIVER FOREST,  
ILLINOIS 60305  
(WEST SUBURBAN CHICAGO)

Where the  
**HAM IS KING!**



ALL PHONES: (AREA 312) 771-8616  
STORE HOURS (CENTRAL TIME)

WEEKDAYS ..... 10:00 A.M.-7:00 P.M.  
SATURDAYS ..... 10:00 A.M.-2:00 P.M.

TRIGGER ELECTRONICS is conveniently located 2 1/2 miles north of the Eisenhower Expressway near the west city limits of Chicago on the main street of North Avenue (State Route #64), 3 blocks west of Harlem Avenue (State Route #43). Just 10 miles due west of downtown Chicago, or 20 minutes southeast of O'Hare Airport. Plenty of free parking. Come in and browse. See the latest in ham gear attractively displayed.

**CLEAN AS A WHISTLE LIKE-NEW BARGAIN SPECIALS FOR JANUARY**

7551.....\$269	5X172.....\$229	HRO500 NEW.....\$1295
7653.....389	5Y196.....189	LF10 NEW.....369
3261 & AC.....375	HT48SAC.....249	NCL2000 LINEAR.....359
3263 & AC.....395	HT96.....249	HEATH GR55.....79
31294.....159	SR150EAC.....349	HW16.....119
30LL.....389	HAI KEYS.....79	SWAN 240AC.....179
ORAKE PC.....179	2004.....249	SWAN 250C.....299
ORAKE 94B.....349	INTERCEPTOR.....199	SWAN 350.....269
ORAKE ZNT.....129	CLEGG 94CR.....89	SWAN 350C.....329
ORAKE 14XB.....379	SUNSET 1V 6 MTR 150	SWAN 50R VFO.....84
ORAKE TR48NB.....549	300A & 90TAC.....249	HQ110AC.....159
MCA CONSOLE.....57	5RE34.....269	HQ110A/VHF NEW.....789
ORAKE TCS.....199	GALAXY D13AN.....399	HQ170C.....169
ORAKE 1CZ.....339	GALAXY R53D.....595	HQ170A/VHF NEW.....389
SP75.....359	INVADER 200.....219	HQ180A.....349
5X115.....259	KNIGHT 150.....34	HQ180AZNB.....389

*Special mail order prices valid to end of month only!*

**OUR 22ND YEAR OF SERVICE TO HAMS**

**WE WANT YOU SATISFIED.** Your satisfaction is our very first goal. That is the way we have done business for years, and that is the way we will continue to do business in the future. We want you to be assured of the very best in merchandise at the very lowest in prices. We feature only nationally advertised brands, so you can be confident in buying.

TRIGGER ELECTRONICS offers you LIKE-NEW ham equipment at money saving prices. The most complete inventory of top-notch, clean as a pin gear at bargain prices.

another important TRIGGER service:  
**WE BUY USED HAM GEAR FOR CASH**  
PROMPT SERVICE...  
PROMPT CASH!

**SAVE TIME!  
SHOP BY MAIL**

Same day shipment on most orders.

*Write today! Send for FREE Catalog!*

**TRIGGER Attn: W9IVJ** Q1-71  
7361 North Avenue  
River Forest, Ill. 60305 Amount Enclosed  
RUSH THE FOLLOWING:

Send free catalog.

NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

## HAM-ADS

(1) Advertising shall pertain to products and services which are related to amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters, be used which would tend to make one advertisement stand out from the others. No Box Reply Service can be maintained in these columns nor may commercial type copy be signed solely with amateur call letters. Ham-ads signed only with a post office box or telephone number without identifying signature cannot be accepted.

(3) The Ham-Ad rate is 50 cents per word, except as noted in paragraph (6) below.

(4) 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.

(5) Closing date for Ham-Ads is the 20th of the second month preceding publication date.

(6) A special rate of 15 cents per word will apply to advertising which, in our judgement, is obviously non-commercial in nature. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, takes the 15-cent rate. Address and signatures are charged for, except there is no charge for zip code, which is essential you furnish. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and all advertising so classified takes the 50-cent rate. Provisions of paragraphs (3), (2) and (5) apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested copy, signature and address be printed plainly on one side of paper only. Typewritten copy preferred but handwritten signature must accompany all authorized insertions. No checking copies can be supplied.

(8) No advertiser may use more than 100 words in any one advertisement, nor more than one ad in one issue.

(9) Due to the tightness of production schedules, cancellation of a Ham-Ad already accepted cannot be guaranteed beyond the deadline noted in paragraph (5) above.

*Having made no investigation of the advertisers in the classified columns except those obviously commercial in character, the publishers of QST are unable to vouch for their integrity or for the grade or character of the products or services advertised.*

Q.C.W.A. 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., Box 394, Manassas, VA 20108.

ROCHESTER NY will again be headquarters for the huge W1NY hamfest, VHF conference and flea market, May 15, 1971.

TOLEDO Mobile Radio Association's 16th annual hamfest and auction will be held February 21, 1971, Lucas County Recreation Center, Maumee, Ohio. \$1 registration, open table sales. Map and info write TMRA W8HHF, Box 273 Toledo OH 43601.

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 Association Bulletin, Latest DX news, business size s.a.s.e. to K2APY, Box 74, Massapequa LI NY 11762.

WANTED: All types of tubes. Top prices paid for Varian and Eimac. Jaro Electronics Corp., 150 Chambers St., New York NY 10007.

WE BUY all types of tubes for cash, especially Eimac, subject to our test. Maritime International Co. Box 516, Hempstead NY 11551.

CASH paid for your unused tubes and good ham and commercial equipment. Send list to Barry W2LNI, Barry Electronics, 512 Broadway NY 10012. Tel. 212-826-7000.

WANTED. For personal collection. The Radio Amateur's License Manual, Edition 12, ARRL "Map of Member Stations," 1914, W1CUT 18 Mohawk Dr. Unionville CT 06085.

NOVICES. Need help for General ticket? Complete recorded audio-visual theory instruction. Easy, no electronic background necessary. Write for free information. Amateur License, Box 6015, Norfolk VA 23508.

WE'RE trying to complete our collection of callbooks at Ho. Anyone have extra copies of Government Callbooks, 1922-1925 and Radio Amateur Callbooks 1928-1934? ARRL, 225 Main St., Newington CT 06111.

DIODES - 1N4007 1000 volt PIV @ 1 amp, silicon diodes, 28c each, \$25 for 100 pgd. M. Weinschenker, Box 353 Irwin PA 15642.

TRANSFORMERS rewound. W4CLJ 411 Gunby Orlando Fla.

QST?? Personalized made-to-order. Samples 25c. Deluxe 35c. Religious 25c. (Deductible). Rus Sakkers W8FDI Box 211 Holland MI 49423.

PICTURE QSL cards of your shack, etc. from your photograph \$50. \$12.50. 1000. \$16.25. Also unusual non-picture designs. Generous sample pack 25c. Half pound of samples 50c. Raum 1154 Fifth St. Philadelphia PA 19140.

NEW! QSLs professionally designed. Every card original, exclusively for you. Free samples. W1FLX QSL Designs, 20 Britton St. Pittsfield MA 01201.

FREE QSL samples. Designs cut catalog 25c. Ace Printing 680 Clark Av. Cleveland OH 44102.

QSLs, samples 10c. Fred Leyden W1NZJ 454 Proctor Av. Rev. MA 02151.

CREATIVE QSL cards. Personal attention. Imaginative new designs. Send 25c. Receive catalog, samples and refund coupon. Wilkins Printing Box 787-1, Atascadero CA 93422.

NEW QSL catalog! Hundreds of cuts, stock and ink samples, nine report forms, plus ten sample QSLs. 25c. Cornelson Quality QSLs 321 Warren St., North Babylon LI NY 11704.

QSLs. All types. Attractive designs, quick return, free sample W7LIZ Press, Box 2387, Eugene OR 97402.

SAMPLES 10c. Harry Sims, 3227 Missouri Ave. St. Louis MO 63118.

QSLs - 100 8-color glossy \$3.50; silver globe or eagle on front - report form on the back. Free samples, Rusprint, Box 7875 Kansas City MO 64116.

QSLs 8-color glossy 100. \$4.50. Rutgers Van-Typing Service. Free samples. Thomas St. Riegel Ridge, Milford, NJ 08848.

QSLs 300 for \$4.50. Samples 10c. W8SKR, George Vesely, RTE#1, 100 Wilson Rd., Ingleside, IL 60041.

HUBBER stamps \$1.25 includes tax and postage. Clint's Radio W2UDO, 32 Cumberland Ave., Verona, NJ 07044.

QST. SWL cards that are different, Quality Card Stock Samples 10c. Home Print, 2416 Elmo Ave., Hamilton, Ohio 45015.

QSLs. Second to none. Same day service. Samples 25c. Ray K7HLR, Box 331, Clearfield UT 84015.

GORGEOUS QSLs. Rainbows, etc. Top quality! Low prices. Samples, 10c. Refundable. Joe Harms, W4BLQ, Box 158 Edgewater Fla. 32032.

QSLs "Brownie." W8CJT, 3111 Lehigh, Allentown PA 18103. Samples 10c. Catalog 25c.

QSL Print. Samples 25c. K1FF, Blaisdell, PO Box 33, Melrose MA 02177.

QSLs. Radio Press, Box 272, Poway CA 92064.

DELUXE QSLs, Petty, W2HAZ, PO Box 5237, Trenton NJ 08638. Samples 10c.

DON'T buy QSL cards until you see my free samples. Fast service, economical prices. Hollex, Little Print Shop, Box 9848 Austin TX 78737.

QSL, SWL, WPE cards. Samples 25c. Log books, file cards, decals. Malgo Press, Box 375 Toledo OH 43601.

QSLs, SWLs, WPE samples 15c. Nicholas & Son Printery, PO Box 11184, Phoenix AZ 85017.

QSLs, stationery, circulars; free samples, estimates. Cohen, Drawer Q, Pittsford, NY 14554.

100 QSLs \$1.50. Samples, dime. Holland, R3, Box 649, Duluth MN 55803.

WE buy electron tubes, diodes, transistors, integrated circuits, semiconductor and resistors. Astral Electronics, 150 Miller St. Elizabeth, NJ 07207. Tel. 201-354-1341.

FRAME Display, and protect your QSLs with 20 pocket plastic holders, 3 for \$1, 10 for \$2. prepaid and guaranteed. Tepaco Box 1987 Gallatin TN 37066.

TELETYPE Mod. LPR 28 receiver-only typing reperforator without cover good operating condx. sync motor 60 wpm. \$125. Tape winder 110vac \$15. +28 LBXD1 trans-dist 60 wpm, sync motor, wired for complete 100vac operation and converted to 112 code \$75. T. Howard Box 252 Boston MA 02101. Tel. 617-742-0916.

SAVE on all makes of new and used ham equipment. Write or call Bob Grimes, 89 Aspen Rd. Swampscott Mass 01907. 617-589-9700

WIRELESS sets, parts, catalogs, bought, traded. Lavery, 118 N. Wrencombe, Lansdowne PA 19050.

REPAIR and calibration service. Write before shipping. Pa. Tronics, Inc. Box 209 Annandale VA 22003.

TELETYPE parts. Fast service. Machine to M.35. Buy, tor S.a.s.e. Typetronics, Box 8873 Ft. Lauderdale FL 33310.

NOVICE crystals: 40-15M \$1.98, 80M \$1.83. Free flyer. Na Smatette Electronics, Umatilla FL 32784.

AMATEUR museum buying old radios, books, magazines, catalogs, parts. Selling QSTs and CQs. Evr Rasmussen 16 Lowell, Redwood City CA 94062.

HALLCRAFTERS equipment discounted at fantastic prices. A brand new factory sealed cartons. Write for low, low prices. P Sales 65 Birchfield Av. North Babylon NY 11702.

POLE pig 3 KV DC 1 KVA 110-220. \$30. WASAKM

VERY In-ter-essing! Next 8 issues \$1. "The Ham Trader," Sycamore Il, 60178.

WANTED: An opportunity to quote your ham needs. 31 years a ham gear dealer. Collins, Signal/One, Drake, Swan and all others. Also \$25,000 inventory used gear. Request list. Chuck Schecter, WSUGC, Electronic Distributors, Inc. 1960 Peck St. Muskegon MI 49441.

DIX Awards log. 150 page book lists contacts for over 100 major worldwide awards. Individual logs for each award for record of contacts and confirmation. Required over two years to prepare. \$3.95 (\$4.95 foreign). McMahon Co. 1055 So. Oak, Knoll, Pasadena CA 91106.

WANTED - Antique receivers and component parts for purpose of restoration. Need all types of antique tubes that are in working condition. Prefer pre-1930 equipment, but will consider later models up to 1935. Items are wanted for personal collection. Please give price with letter. Will swap modern components for your tube or solid-state project if preferred. Write Doug DeMaw WICER c/o ARRL Hq. 60111.

WANTED: Old engineers from model airplanes. Will trade tubes, transistors, transformers, etc. etc. Frank Schwartz W4RFK 2400 W. End Av. Nashville TN 37203.

HAM'S Spanish-English manual \$3 prepaid. Gabriel K4BZY 1329 NE 4th Av. Fort Lauderdale FL

CURRENT amateur license laminated and wood display stand \$1. Schickler, 16-18 163rd St. Whitestone NY 11357.

WANTED: Electronics instructor. General, theory, workshops. Minimum 19. Science Camp Lake Placid NY. Write Eppstein Apt 4B Westend Av. NYC 10024.

HAM ticket - Amateur radio license course for Novice, General, Advanced, Extra Class. Write for information. Clayton Radio Co. 220 Mira Mar Av. Long Beach CA 90803.

WANT Pre-1921 wireless equipment and catalogs. Description, price. Dick Sepic 1945 E. Orangegrove Blvd. Pasadena CA 91104.

DUMMY loads, 1 kw. \$9.95. Phone patch \$8.95. Wired, \$4. Ham-Kits, PO Box 175, Cranford NJ 07016.

HQ-180A excellent general coverage with Ameco nuvistor (new) \$250. Valiant 1 good cord. \$95. Can pack. You can shiping. WA2LOR J105 Towne House Village, Hauppauge NY 11787.

WESTERN hams, new and recon-ditioned equipment. Exciting new Yaesu here. Wireless Shop 1305 Tennessee St. Vallejo CA 707-643-2791.

An Invitation NYC area hams and SWLs are invited to attend NY Radio Club Meetings - 2nd Monday of every month. George Washington Hotel, 23rd St. and Lexington Av. at 8 PM - New members wanted.

WANTED summer 1972, buy home St. Louis area, neighbors receptive to ham and acclimated to tower, three bedrooms. Rathskeller, garage, trees. Vandergrift, MATCOM-DSD, APO NY 09052.

SR-34, \$250. Cheyenne MT1 xmt, a.c. supply, \$35. Hank Magnuski, 17 Westover Ave., No. A15, Caldwell, NJ 07006.

SR-2000 and AC supply, realigned by 1st, will ship purchasers expense, best reasonable offer. J. Richeson, Yolo High School, Rt. 1, Box 1900, West Sacramento, California 95691.

TELETYPEWRITERS - 1 Model 14AE, 2 Models 26A. Good condition, with tables. Clutch pads possibly used replacing on 26As. Approximately 15 rolls paper included with each teletype. - Gonsett Teletype Converter, Model GCY-102. Prototype unit never produced, minor repairs possibly necessary. - Offer. Bob Gonsett, WA6JQQ, 10351 Valley Spring Lane, No. Hollywood, CA 91602.

HAM with general class license, high school graduate minimum. To teach radio to campers at outstanding Coed Camp. Write for application blank to New Jersey YAMA-YWHA Camps, 589 Central Ave., East Orange, NJ 07018. Phone 201-678-7070.

WANTED-KWM-2's, 30L-1's, 312B-4's, 312B-5's, and 516F-2's damaged or in need of repair. Write, fully describing electrical and/or physical damage and lowest price for quick cash payment. Al Sweetman Jr., R9QFR Post office box 2, Pleasant Plains, Illinois 62677.

CYCLONE/SR400 PS-500 AC \$525.00. Ronald M. Nagata, W6RQZ 1330 Curtis 94702 Tel 415-526-7345.

SWAN 350C W/117XK New condition \$395 Hammarlund HQ145X with clock \$160 measurements 84 signal generator 300 to 1000MC \$175 or best offer. John Kakstys 18 Hillcrest Terr., Linden, NJ 07036.

KNOW your frequency. Lampkin set, 105-B frequency meter, 2PM meter, 205-A Modulation, \$300 value for \$600. All or piece. K81UR, RR No. 1, Box 29-A Suttons Bay, Michigan 49682.

FOR SALE - 4BTV Hustler Vertical four band antennae used two months only also 75 meter one KW resonator never used both for \$35, plus shipping. Drake 2B with Xtal Calibrator and 2BQ Multiplier \$150 plus shipping. K4OQ-119 Windward Island Clearwater FL 33515.

WANTED B & W PI-Network Inductor Model 850 or 850A W9NMX, Gene A. Welch, 222 Hawthorne Rd., Algonquin, IL 60102.

"DON AND BOB" New guaranteed goodies. KW all band Mobile Antenna Coil, ICORE 2408T 3/78TP 24.95. Custom coil quotes. Monarch KW SWR relative power dualmeter bridge 15.95; Ham-m 99.00; TR44 59.95; HYGAIN TH6DXX 139.00; TRIEX W-51 Tower Prepaid 329.00; Regency HR2 6CH 20W, 2M. FM (Reg. 229.00) 195.00; Motorola HEP170 2.5A/1000PIV epoxy diode 35cents; We'll beat written cash quotes, prices FOB Houston, GECC Finance, Madison Electronics 1508 McKinney, Houston, TX 77002 713-224-2668.

COLLINS 75A2 receiver, \$170; 310R3 exciter/transmitter, \$85. Excellent condition. W8ACE, 660 Windingway, Dayton, OH 45419.

TRADE HW12A 1970 serial, handspred 3.85-4.05 for HW22A never used mobile. WB8FDP, 6628 Aintree Park Drive, Mayfield Village, OH 44143.

MINI Drake TR-4 station: with MS-4, AC-4 w/warranty card, SWR, bug, matching mike, ham magazines, etc. \$575. WA9YSN: Russell Geoffroy, 2003 N. Tejon, Colorado Springs, CO 80907.

CLEANING out: Telrex 15M317 beam (\$65), transformers, condensers, twenty years' parts cheap. S.A.S.E. for mimeographed price list. Guenther, Apt. M, 13441 Warwick Blvd., Newport News, Virginia 23602.

HALLICRAFTERS SX-117 receiver and HT-46 Transmitter \$190, each General Radio 714-A Voltage Amplifier \$35.00 Sonic Industries Dual Channel Amplifier AM-43C/FRC \$20.00. Wiessn, 18 Wilbur Ave., Newark NJ 07112, 201-923-5322.

R-390/URR Collins Digital read-out receiver, 0.5 - 32MHz. Good working condition, \$475. W8CVF, 1910 Longpoint, Pontiac, MI 48053 Phone: 313-PE5-1021.

4CX250B, \$21 pr. d.p. 4X150, \$11 pr. p.p., New Guaranteed. C. M. Pruett Route 8, Box 399, Fort Myers, FL 33901.

MOSLEY Tribander beam, 40' TRI-EX tower, ODR rotor, \$60. Buyer dismantles. WA7ZF, 1055 So. Oak Knoll, Pasadena, CA 91106. Phone 681-2209.

COLLINS 75A4 ser. No. 5672 Hallcrafters HT32, Best offer. W8BYR 16069 Woodring Ct., Livonia, MI, 48154.

WANTED - Heath HW18-3. No power supply. Paul Donovan 232 Silver Creek Rd., Box-11 Marquette, MI 49855.

CLEANING house, best offer: HW-100, power supply, mike, SB-500, GN2, Telrex 20M-56-265, two relay racks, RCA xfmr 2X1P-2807 pr208 cc7070 3.5kva, SO-1 radar rotor complete, terms. Crossett 84 Sunnyside Pl. Pleasantville, NJ 10570.

KWM2: high serial No. looks and works brand new tubes rejection tuning installed also Collins Co-2 suitcase and P-M-2 power supply 795.00. Drake SPR-4, accessory's calibrator, DC power cord, Transcive adaptor 15 extra crystals \$410.00 Triex space needle 100 ft tower telescoping will hold 30 sq. feet of antenna in 100 mile wind Gonset G50 for 6 meters \$75.00. Porter Barnes W8CKR 2922 Maucartmaw Ave. Evansville, IN 47712 Phone 812-4259857 after 6:00 P.M.

BEAUTIFUL Model two bedroom home - Complete SSB Station mint condition - on the air 200 W. PEP-HX50A-Hq. 150-EZway tower - Ham M-FA338K-40 & 80 Hygan trap - EICO No. 460 Swan-HA225 Receiver - \$500 lot, new lawn, fruit trees- immaculate home near Golf Course- alarm lights, city water & sewers-sound in every room - stereo L4800 - separate well 85ft-60 sprinkler heads & pump - awning windows - awnings - air conditioning - electric heat - Hot Point electric stove and refrigerator - furnished - taxes approximately \$150 year - zoning would permit extra rooms - Ft. Lauderdale also \$46,000 W8CKR Arthur E. Hollands 5030 S. W. 92 Ave., Cooper City, FL 33314.

DRAKE 4A Receiver, Ham Bands Plus 10 Extra Crystals. Sprk. Excellent \$295. HEATH GR54 Gen. Coverage \$55.00 W2BA 22-12-128 St., College Point NY 11366. 212-359-4009.

WANTED! Collins Mechanical-Filior 0.2-0.4, 1.8-2.1KHz. H. Mshima 757 Curtiss Parkway 119, Miami Springs FL 33166.

CAPACITORS: Brand New 275ufd Electrolytics at 500wvdc. 10 for \$19.50 plus shipping. Mehafey K4HP, Atlanta, 30328.

MANUALS - R-390/URR, BC-348J, \$6.50 each. Hundreds more. S. Consalvo, 4906 Roanne Rd., Washington, DC 20021.

SELL: Hy-Power, never assembled, \$130; 14AVQ \$20; Hy-Gain Beam TH2-MK3 with balun \$75; Novice transceiver with 12 xtals \$115; Ameco code oscillator and key \$14; Signal generator Eico 324 \$30; Heath tunnel dipper \$20; Heath 23A power supply \$45. All in excellent condition. W8OAFI, High School, Naut Ansgar, IA 50472.

SELL: Heath Transmitter HX-10, Heath Linear Amplifier HA-10, manuals, extra crystals, Dowkey relay, package sale only, \$330, firm. Mint condition, pre-wired, no modifications, factory-checked. Bill Robinson, 1640 Wandering Drive, Monteter Park, CA 91754.

ANTENNA Insulators Military IN86 10 For \$3.00 100 for \$25.00 W. R. Hemphkins, 100 Main, Denison, TX 75020.

FOR SALE: Collins 75A1 rvy and Heath DX100B wired for \$510.00 \$195 for both. K.J. Todd, W3ISA R.D.4 Meadville, PA 15335.

CLEGG Zeus-Clegg Interceptor. Very nice condition. Manuals-Spare Finals Prepaid \$449.00. Collectors Items. NC81X - NC100. Good. H. Snyder W0NVE Route No. 3 Fremont, NE 68025.

SELL Amateur Radio Station W9HFN, Collins 75A-4 \$325, HT-37 \$180, TR 44 & Tribander Beam \$80, QSP, CQ collection, misc. gear. Ron Phoenix, E. Jackson Rd., Macomb, IL 61455 309-837-1761.

HEATHKUS professionally wired, tested. Send for quote. Parrish, 306 W. Amherst, Melbourne, FL 32801.

FOR SALE: Must sell Thore6 complete with mobile supply, cables ect. Also Hitachi trq-707 stereo tape recorder, 1 year old. Dave Vogel, 1132 Godfrey Lane, Schenectady, NY 12309.

SR-401, SB-301, xtals, CW/SSB/RTTY filters, calibrator, cables, books, both only. \$475. Local interest preferred. K3MNJ, 8361 Langdon St., Phila., PA 19152.

DRAKE R-4 & all 10M&160M Xtals, Drake 21FBCB Converter, Excellent condition \$225. - Joe Hefler, WB2QFR, 2200 Morris, Bronx, 10453.

NEED 500 filter for 7AS-1. Sell Polycorn 62B, H and 2M transceiver; clean, \$225.00. Dick Shongul, W2QFR, 25 Cameron Place, New Rochelle, NY 10804.

WANTED: Coil set "F" for HRO 60, Frank Palan, W5UYG, 10841 Kingston St., Westchester, IL 60153.

HALLICRAFTERS SX-116 receiver, like new, original carton and manual, perfect \$300.00. E6DFZ 5502 Valerie St., Houston, TX 77036 Tel 713-866-7633.

WANT Hammarlund 24 Hour Clock Timer - H, Johnson, Milton WI 53563.

ATTENTION custom builders: Precision dial drives National PW or NPW \$25.00 each. Also have PW or NPW with National capacitors \$40.00. Other scarce transmitting, receiving parts. See for list, Jack Kennedy W5DD/72 72 Clearview Drive, New Shrewsbury, NJ 07724.

HW-32A mike, calib. \$90 Pickup only. Lawrence Stewart WB4NMA 1242 S.W. 9th St. Boca Raton FL, 33432 305-391-6498.

HAMMARLUND HW-110A very good condition with sprk., manual - \$110 - WB4KXZ 114 Berwick, Oak Ridge, TN 37830.

WANTED: Hallcrafters SX-117, or other good ham band receiver. Ray Gimmeson Rt. 2 Box 49, Powell, WY 82435.

WANTED: Manual for Halcrafters SX-110 receiver, Manual for Heathkit DX-35 transmitter, Manual for Gonset G76 transceiver, Manual for G76 power supply. State condition and price. Ben Copeland, 1229 Bellmead, Denton, TX 76201.

LINEAR Builders 30 amp filament choices for GG linears \$5.00 each, ptd USA. Vonn R. Murrell, K4HHA, Rich Rd., Newport TN 37851.

CONTACT us for the best deal on new or reconditioned Collins, Kenwood, Kenwood One, Drake, Swan, Galaxy, Halcrafters, Hy-Gain, Mosley, Henry linear, towers, antennas, rotators, other equipment. We try to beat any deal and to give you the best service, best price, best terms, top trade-in. Write for price lists. Try us. Henry Radio, Butler MO 64730.

COLLINS ARC-58 system \$600. Disposing of large collection of VHF and microwave tubes and parts. S.A.S.E. for list. Will Jenby, W9EQM, RFD, Davenport, IA 62535.

CENTRAL Electronics 100V Serial Number 694 unmarked Unmodified perfect working cond. will custom crate and insure WFTF 432 West 7th Ave., Cheyenne, WY 82001.

HALLICRAFTERS SR-400 Cyclone transceiver with AC supply with spare tubes with warranty card. \$650. K1YYC, 14 Tonetta Circle, Norwalk, CT 06855.

SELL: HQ125 for \$295.00; Sencore FE16 with HV probe, new for \$75.00. M. E. Smith, 614 Bradbury Rd., Monroeville, CA 94016.

SCR 523 transceiver including PTF mike and heavy duty 110 volt power supply presently on 122.8 MC. S45, W9DSV, Box 87, Webbster, WI.

WANT 238 Early wireless magazines for W4AA Historical Library, send for list, Wayne Nelson, Concord NC 28025.

SALE - COLLINS 32V3 transmitter will make excellent CW rig and A.M. Receiver Fine Condition, looks and Performance \$200.00 FOB Felix M. Whitaker, 816 Wilkerson Ave., Durham, NC 27701.

VARIABLE Transformer - 75AMP-115V-50/60C.P.S. \$120 Money Order. E67D/4 John Zukos, 112 Broadhurst Dr., Wilmore, KY 40390. 606-858-4104.

MOTOROLA - 2 meters; U43GGT, 40 watts output, transistor supply, very clean, with cables and control head, less crystals - \$146.00. 80D Transmitter stage - \$15.00. Senson A Receiver - \$20.00. Complete 80D. Transmitter supply with cables and Head - \$40.00. WALINO, Box 587, Manchester, CT 06140.

ENGRAVED Call Letter desk marker. Handsome aluminum plaque, black lettering. 6 1/2 x 1 3/4 walnut wedge base. Satisfaction Guaranteed. \$4.00 postpaid. Kapsian, Box 58823, Houston, TX 77058.

SELL Collins 388 - \$375.00, CV57/URR - \$75.00, CV89A/URA-RA - \$125.00. You pay transportation - Johnny Ortiz-KP4GN P.O. Box 532 Grayana, P.R. 00934.

LAFAYETTE HA 144. All Transistor, battery powered, 2 mtr. evr. Complete with MIC, ANT, carrying case, & heavy duty AC PWR supply. A1 condition - \$120.00 firm, or will trade for 2 mtr. FM equipment. Chet, WB24HK, Brooklyn, NY 11236 212-763-8469.

KNIGHT T-60 and matching V-44 V.F.O. \$45.00 Bob Urbias, WB2DKL, 914-779-7029.

WMAU 4CX300A, new, in sealed package, \$16. Jim Furman, WB2ODA/6, 1812 Parker, Berkeley, CA 94703.

DRAKE R4B, T4XB-AC4, M44MN2000, New condition \$950.00 Van Peterson WB4GQU, 505 Windthrop Place, Fort Walton Beach, FL 32544.

R390 \$475, R890A \$850, URR 388 \$400, #114 (premium condition) \$750, Transcon-3 \$275, Swan 500 \$375, Drake R4T/4 Combo \$650, Halcrafters HT-30 \$150, 5-36 \$50, EA400C \$125, 30L1 \$325, HA-2 \$150, Laboratory and test equipment at half price - Marconi AM-FM Modulation Meter FT2500, Marconi Noise Figure Generator, Kronhit Variable Bandpass Filter Model 330 N, Measurements 80, Measurements 65-B, General Radio #16A, Hewlett Packard 524 B.C.D. Transfer Oscillator 450 B, HP 710 pin, CA Resistance Limit Bridge No. 1652A. Willing trade equal value for Collins gear. W2ADD.

COLLINS 32B3 - \$395, 75B3 with CW Filter - \$395, 312B4 Station Control \$95, 516F2 AC supply - \$95, EV-602 Desk Mike - \$30, Cartons w/ Instructions, Grounded-Grid 4-1000A custom linear - cabinet 36" high - Best components - Plate voltage and current and antenna meters, 4000V DC - Perfect condition - \$500, New Spare 4 - 1000A - \$100, 2-575-A - \$25, EZ Way Tower GPR BX40 - Crank up, tilt over with ground post, CDR Ham Rotor, Antenna-Lab 15 and 20 three element beams on common boom, manual elev. 4 and 80 rod mounted inverted see Good condition - Byron Roudabush W3QPL, 7800 Kachina Lane, Bethesda, MD 20034, 301-365-3000.

HEATH SB-300 CW filter Knight T-60 XMTTR; ten novice XTALs; all manuals etc. Excellent condition, \$300, takes all. Need college money. Call 605-589-3433 write Randy Seizler, Tyndall, S.D. 57066.

WANTED Heathkit SB640 External LMO write WA2JLF 1425 Abbott, Laekawanna NY 14218.

MUST sell little used Drake 2-NT. Perfect. Best offer. Vannewkirk, 654 Freeman, Orange, NJ 07050.

WANTED: Coils EFG for HRO 5TA1. Top Dollar. W0LOV 1354 Madison St., Denver CO 80206.

WANTED: Barker & Williamson No. 3652 rotary inductor, any condition, Steavenson, 13638 Spruole, Sylmar, CA 91342.

SR 301, SR 401, \$275, each or \$525 both. Three 10' sections Robin No. 25, \$19, each. Ken WB6NU, 19400 Soronson No. 131, Cupertino, CA, 95014, 408-253-0256.

WANTED: Verner drive and knob also 2 lke. filter for Collins 75A4, Steve Hose RR No. 1, Box 194X, Rosedale, Indiana, 47874.

SELL: TR-4 W/D-104 Mc. AC-3, MS-4 \$300 Jack Brooks WB4CLU, 3775 Gunston Rd., Alexandria, VA 22302.

WANTED PTO units for 75A4 and R2390 receivers new condition preferred but will consider used units. WA4YFL, Bill Southerman East Bend, NC 27018.

YASEO FLdx 2000 1200 watt linear needs relay first 125.00 takes Fred W4GTU Route 3 Box 477 Theodora, AL 36582.

ULTIMATE 6 MTR. - Clegg THOR 6 - complete with R.F. unit, A.C. supply - modulator, cables, manuals. Brand new. \$275. Mike, WA2TRX, 853 46 St., Brooklyn 11220. 212-871-1886.

SWAN 350 7 Hrs. use Drake 2 B HT, 37 all Mint cond. Orig. owner. Best offer phone 479-0935 R. Downes, Denton, MD 21629.

HEATH SSB SB401-E, SB300, SSB/CW, VOX/PTT, \$440. RW linear, HB-similar to SB200, 4CX250-B's, solid state supply, \$150, \$550 for all. Ray Grimes, WB9CUT, 2146 Maple, Evanston, IL 60201.

TUBES Need to restore old radio, UJ171A, UJ 226, UY 227, W4NSOC, 1390 Yankee Bush Rd., Warren, PA 16365.

2B/2BQ, Calibrator; HT-37 Both with 10 cw XTAL. Both excellent. Bargain Priced \$189 each. WA1ABW 7 Chicomunett, Choupee, MA 01013, 413-592-1586.

WANTED: Halcrafters S-210 Receiver. K4JGX, 121 Maple, Oak Ridge, TN 37830.

HALLICRAFTERS HT-37, H.Q-145 and cond. Now on Air \$250.00. Will sell HT-37 separately. George Finley WA5OWR Drake 3, Box 60, Ashdown AR 71822.

DRAKE TR6, AC4 Supply, \$800, SX42, \$60, John Ashton, E 81SE # 737 Bryson St., Youngstown, Ohio 44502. 216-743-9419.

XC146, extras, \$140 FRO or trade on late 2-Band SSB transceiver and AC supply. Box 215 Ironia, NJ 07845.

SACRIFICE for College: Hammarlund HQ-170-A-VHF, DX-60R with crystals, key. Must have \$250 for all. John MacDonald, Holly Knoll Rd., Hockessin, DE. 19707 Tel: 302-239-7632.

TELETYPE Equipment, electronics, bought, sold. List Telecommunications Services, Box 4117, Alexandria, VA 22303.

EICO 728 60-watt CW xmt. EICO 722 VFO, Clean, \$60. WBRASL, 101 Sigmund St., Beckley, W. Va. 25801 304-252-4558.

DISABLED Need Ham Gear. WA6EBX, General Delivery, Oakland, CA 94604.

NEED HQ120 and super Skydrvr manuals. K4NW, Box 188, Rockledge, FL 32955.

SELLING out, Galaxy III/AC supply exc. cond. \$200.00 Drake 2C/2CQ used 10 hours - \$200.00, partially built 2 KW amp./PWR supply, brand new 4-400A's with sockets and plates caps, much more. Ship COD. D. Smith, Box 351 Thilson, NY 12486, Tel 914-458-8279.

SELL: Complete station, Johnson Ranger with 6 hours use. HQ145C. Unused 18-AVQ and Johnson Matchbox in factory cartons. Unused Johnson T-R switch and Goldline Dummy Load, Plus: Mike, Keys, test equip., oscillograph, code machine, headphones, Gonset CPU, Manuals, handbooks, 3 yrs QST, toys and equipment from 3 leading electronics schools. \$475 or best offer. Joseph P. Campo, WA2ZND 1963 East 12th St., Bklyn NY 11230.

RANGER 1 F/W EX. \$75.00 HW16, HG10 Ex. Both for \$95.00. Air Truck 7 Adrew St., Bayshore, NY 11706.

HQ129X in excellent condition with Ameco Two Meter Converter \$90, W2RLG 42 Union St., Matawan, NJ 07747 201-566-8288.

SELL Drake 2-A evr with Q-multiplier, and Xtal calibrator. \$150. Leon Steinberger, W2EVV, 1, 301 Buckminster, Norwood, MA 02062, Tel 617-762-2853.

HW-100, HP-23, FLDX2000, Stereo, tubes, more. College. WA0KKR, 19 Elmar Court, Vermillion, SD 57059.

RD-92A/UX and TNC-1B facsimile machines. Excellent condition. Consider offers and trades. McGinnis, 43 McFarlin, Dallas, TX 75205.

GREENE - center insulator, with or without Balun - A tough number to beat - free flyer, Box 423 Wakefield, Rhode Island 02880.

TWO Baldwin Type Charlie Headsets, one with headband and cord. Best offer. Ed Ray W1WVN/4 3008 North Arkendale St., Woodbridge, VA 22191.

HEATH HW-16, perfect \$85. WN9ZNH 1515 Brummet, Evanston IL 60202

SELL: Galaxy FM-210 transceiver with p.s., extra xtals, and mike \$180. Ron Perry, Glen Ave., Fishkill, NY 12524.

SX-111 RCVR, 5-meter, Xtal Filter, Manual, Good Clean condition, \$105 ppd, WB9WC 4116 Alicante Ave., Ft Worth TX 76133.

DESIGN Industries communication console, Senator 1 model. New, never used, Blank panel, Cost \$350, Sacrifice \$225, Phone 313-836-8833 — Harry Genster 15335 St. Marys St., Detroit MI 48227.

GALAXY 5 MK 3 with AC supply \$325.00 DC supply \$60.00 3 1/2 lbs New 501JF 4525 Manchester Dr., Omaha, NE 68152, Phone 453-5004.

SERVISSET Model E-C, Commercial counterpart of our Navy Model D-AN. A complete troubleshooting lab that fits in your pocket. \$24.95 P.P. 30-Day Guarantee WA1HKZ, Lee Electronics Labs, 88 Evans St., Watertown, MA 02172.

HEATH TX-1 and SB-10, good condition, \$140 F.O.B. KØWK, Gary Moeller, Milford, IA 51351.

SELL: Hallcrafters SR150 AC PS, \$275.00; HT32 Transmitter \$200.00; National NC 109 Receiver, \$65.00. John Fearon, 3384 Peachtree Rd., N.E. Suite 705, Atlanta, GA 4W4KFP.

AMECO T.X. 6&2, 100, Heath HR-10 \$60. both nice. WAØTXV 5331 Cherryview St. Louis, MO 63128.

SB-101, HP-23, HM-15 SWR Meter, HD-15 phone patch, mint condition \$425 or best offer. Swan 120 plus SW-12DC, excellent condition \$125 or best offer. Will consider trade for receiver, transmitter, or linear. W9LDN 1242 Kennedy Dr., Streamwood, IL 60103.

VIKING Kilowatt amplifier with desk spare 4-400A F.B. FSK \$450 — Pick up or crate and ship F.O.B. Ben Armstrong W9KYE 3143 W. Madison St., Milwaukee, WI 53216.

SELL: 75A4 excellent condition, vernier knob, 800HZ, 3khz filters, noise blanker, speaker, \$325.00, KOEND, Carl Thorsell, 1195 E. 77th, Kansas City, MO 64131.

WANTED; National NC101-X Receiver in good condition. No modifications. Geo. W. Smith, W5HTP, Pottsboro, Texas 75076.

WANTED National NCX5 transmitter prefer Mark 2 W8OAR 3915 Grosvenor, Cleveland, OH 44118.

HALLCRAFTERS SR-160 Transceiver with D.C. Supply. Good condition \$150. W4JPZ P.O. Box 963 Canton NC 28716, 704-848-1901.

COLLINS KWM-2 with Waters Q-Multiplier, 516F-2 immaculate, High S.N., Both for \$700.00 John Mulled P.O. Box 5883 San Francisco, CA 94101, 415-921-6608.

WORLD RADIO'S used gear has trial — terms — guarantee! KWM1 — \$199.95; KWM2 — \$640.00; SB34 — \$249.95; GT560 — \$379.95; 6N2 transmitter — \$79.95; Apache — \$99.95; Valiant — \$129.95; HT46 — \$199.95; HQ140X — \$109.95; 75S1 — \$299.95; SX101 — \$159.95; SX115 — \$249.95; NC155 — \$89.95. Free "blue-book" for many more. WRL 3415 West Broadway, Council Bluffs IA 51501.

FOR SALE: Complete Collins station of estate of W 4 ANT. 30L1, 312B4, 516F2, 32S1, 75N3 and SM2. Complete with original factory cartons and manuals. Good condition — \$1395. Separate almost brand new 75S3B — \$550. Contact Mrs. Vera Engelbert, 2055 Bullard St, Montgomery, AL 36106 after 5:30 p.m., Telephone NO. 205-262-3166

LISTING service — Gear to sell? Need rig? Sellers — \$1. Lists information year. Buyers — Free. SASE brings details. The Listing Service, Box 1111 Benton Harbor, MI 49022

WANTED: Power transformer (Part 681) for Scott HiFidelity all wave receiver 1936 vintage. Fred Belles, 8563 Peables, Pittsburgh PA 15237

HEATH HW22A, HP13 P.S., and Hustler 40 MT, antenna \$120. or trade for 6MT, equipment, Ken Birman, K8YYC RT No. 1 box 216, Dowling MI 49050

NATIONAL HRO-500, excellent condition, \$1100 or best offer. WA4BFP Michael Benetto, 2223 Kenmore Ave., Charlotte, NC 28203 Phone: 704-376-2582.

FOR SALE: Collins 32V2 & B&W Combo—\$145, Separate, 32V2-\$90, 51SB-\$85, Drake 2B and speaker —\$149. All excellent condition. Will ship at your expense. R. Rickett W8BTF 7390 Sawmill Rd., Worthington, OH 43085

SELL station; Hallcrafters HT-37 and SX-101 with mike, balanced speaker, relay, etc complete for \$300. J.G. Lee, 11 Deacons Lane, Wilton, CT 06897 — Home 203-762-8886, Office 212-651-7727

CRYSTALS Airmailed: QST "Novice Special", all frequencies, 40M — 15M, FT-243, active-accurate five or more 99 cents each, 80M \$1.39. Mix OK. Less than five \$1.50. Add postage. Fast service from Mid-America, SSB, MARS — Custom finished, etch stabilized, FT-243 .013, 3500 — 8600 kilocycles \$1.90, (minimum five, same or mixed \$1.75), (crystalize your net, ten same frequency \$1.45) 1700 — 3499 and 8601 — 14,000 fundamentals and 10,000 — 10,000 overtones \$2.95, .0054 add 50 cents/crystal. HC-6/u hermetics above 2000, add 75 cents/crystal. Aiznall 10 cents/crystal, 1st-c-l — 6 cents. Builders crystals. Free order-bulletin. Your crystal shop since 1933. Bob Woods — WØES, C-W Crystals, Marsfield, MO 65706

CLEANING shack; s.a.s.e. for list of goodies. WA7NWJ, 4634 E. Cypress; Phoenix, AZ 85008

GALAXY GT 550, AC & DC supply, Vox, F3, speaker and lencer 1000 antenna. Used only 2-3 hours. Must sell \$07-257-0280, Freedman, 3 Winthrop Pl, Ithaca, NY 14850

RED Hot! 5RK Delta Tr-bandner — sensational break through in Delta Loop design. Proven out-standing DX antenna. Highest quality—also heavy duty high performance quads. Check our low prices. Island Electronics 4103 Ave. S., Galveston, TX 77550

SX101A mint condition with manual \$135. you pay shipping. R.H. Hrusa WA2CP 14 S. White Birch Ter, RD No. 2, Sparta NJ 07871

EICO 753 triband SSB/AM/CW transceiver with 751 AC supply for sale. S.S. VFO, Low Hours, and clean. \$125. Lindsay Colclough 454 Willard St., Quincy, MA 02169

SIGNAL/one CX-7, All new mods, warranty, best offer — Bruce Timpe 1144 Ballena Blvd., Alameda, CA 94501 415-865-4605

SR200 Linear - mint condition. Used 4 hours. \$190. WB2VFR 405 Ave. "L" Brooklyn, NY 11230

MEISSNER Signal Shifter Model EX \$25. Abbot TR-4 \$15. Crystal Case CY-1249/U with 18 HC6U Xtals in 20 to 37 mc range \$10. Wiesen, W2WHB, 18 Wubur, Newark NJ 07112

UPGRADE Your License! You need Post-Check, Original, Expertly devised, multiple-choice questions covering all areas tested in FCC exams. Same form as the FCC exams. Keyed answer, explanations, IBM sheets for self-testing. Over 300 questions and/or diagrams for each class. Each class complete in itself. Basic questions duplicated where they apply. Continuously updated and reprinted since 1964. New prices include first class mailing. General Class \$4.; Advanced Class \$4.25. Extra Class \$4.50. Add 30 cents each copy for air mail. Send check or money order to Post-Check, P.O. Box 3364, Urbandale Station, Des Moines, IA 50322

STUDENT Must Sell; Drake 2B W2QC spkr/Q-mut, \$175.; HT-37 \$160. Both clean, manuals inc. Also D-104 Mike \$14; DK-6H Ant. relay \$14. WA5RXB/5 Raymond Kummer, 702-209 S.W. 16th Ave., Gainesville, FL 32601

HALLCRAFTERS'S SX-99 receiver, mint condition best offer. William Bartko, 6906 Belmère Dr., Parma, OH 44129

NOVICE: Hammarlund HQ-110 and matching speaker, \$76; Heath DX-60, \$35. You pay shipping. Bill Lazzaro, 14 High St., Katoanah, NY 10536

BPI LK2000D heavy duty linear mint condition — \$595. Jack Fleissig W2FHZ 276 Moore Ave., Freeport, NY 11520 516-FR-8681 after 7:00

WE guarantee to beat any legitimate written price quote. All factory-sealed equipment. Full warranty. Drake R-4B (Regularly \$475) \$390. T4XB (\$495) \$415. SPR-4 (\$449) \$379 TR-4 (\$699.95) \$590. Swan 500CX (\$565) \$475. 250C (\$450) \$380. Galaxy GT-550 (\$550) \$459. FM-210 (\$229.50) \$185. SB-35 (\$549.95) \$464. SB-34 (\$449) \$375. National NCX-1000 (\$1095) \$919. Hy-Gain, Th6Pdx (\$74.95) \$140. "th3M3" (\$144.95) \$115. Mosley 6133 (\$145.15) \$115. LC-38 (\$171.92) \$135. A1-33 (\$133.10) \$106. TA-36 (\$167.85) \$134. Ham rotators (\$129.95) \$99.95. TR-44 (\$69.95) \$59.95. Tri-X W-51 prepaid (\$393.40) \$330. MW-65 prepaid (\$359.65) \$301. Package deals. Write today. Discount Radio Sales, Box 6044, Lubbock, TX 79413

SIGNAL/One, new and used. Alpha 70 linear, bargains in 2M FM. Varitronics IC2-F with IC3P AC supply, \$300, for both. HT-2 walkie talkie \$200.; standard SR-C806M, \$255, all above display models fully guaranteed. New regency HK-2, \$229. Hallcrafters SR-400 with AC supply, HA-20 VFO, original cartons, \$675. Drake 2B/2RQ \$150. HT-37 \$130. Knight R-150 \$60. Swan 117XC \$65. 14-17, \$75. 516E2 Collins, \$75. Swan custom bumper mount, \$11. No trades on used gear. Douglas Electronics, 1118 S. Staples, Corpus Christi, TX 78404

PERFECT 75S3 with 2.1 KC & 200 cycle filters \$315. New 516F2 AC supply \$120. New 312B4 station control \$125. Shipped prepaid on receipt your money order. WA2YNS 177 Pains Rd., New Hartford, NY 13413 1-315-732-4936

DRAKE R4A, T4X, M54 speaker and A.C. supply. Mint condx. \$650. WA9QW 1032 Brentwood Rd., Morton, IL 61550 309-265-9528

SALE Swan Mark II linear mint condition. Will ship postpaid cost \$630. \$450. Louis Risik, K7TGA Monroe, UT 84764

SELL: Collins 75S3, 32S3, 312B-4, 516F2, MM-1, CP-1, and National NCL-2000 power amplifier. Complete package for \$1300, or write or call for individual prices. Jim K1VKD 14533 Rosecrans Ave., Apt. 11, LaMirada, CA 90638 Phone: 213-9417483

WANT SSVT; 23 Channel CB. Sell Collins 51J3/R388 SSB/PD, Cabinet, \$325. Mint Hallcrafters receiver S-118 1R6KHz-30MHz \$69. RCA AR-77E SSB/PD 550kHz-30MHz \$75. Motorola 550W 2M Amplifier \$75. Parks 432 \$45. 129W Gridip Meter \$45. Gomet 281 transceiver \$35. pair \$69. 6 tube \$5. each; swap list Sase, WA4PI, Box 4095, Arlington, VA 22204

NCX5 Mark II and NCXA, excellent condition, \$375.; DX60, excellent, \$40.; NC-270 receiver, good, \$85.; AR-22R rotator and indicator, very good, \$18.; Homebrew 8R through 10 meter transmitter, handles full CW with built in Heath SWR meter, for balanced or unbalanced lines, very good, \$40. Vibroplex bug, very good, \$8. DX60-G2C relay DPDT, excellent, \$7. Return any item in ten days for purchase price refund if not delighted. Prices firm. You pay shipping. WB2JEE, Nicholl, 246 Riveredge Rd., New Shrewsbury, NJ 07724 Telephone 201-741-4377

JANUARY Clearance Sale: "Hoss Trader" Ed Moory is reducing inventory on first come first serve basis at ridiculous prices: Used reconditioned equipment: 75A-4, \$275.; 75S-3, \$349. KWM-2, \$549.; Drake 2A, \$129.; 2-B, \$149. TR-3, \$329. SX-111, \$99.; HQ-110C, \$95.; Marauder HX-10, \$125. HX-20 \$75.; National NC-100C, \$99. NC-303, \$149. NCX-3, \$149. Swan 350, \$259. Ham-M \$79. Slightly used Drake SP24, \$325. TR-4, \$339. Drake 833D, \$95. 270B Cygnet, \$375. New WA4P 335 Coaxial switches, \$8.75; New W2AU Quad, \$80. New Mosley classic 33 and Demo Ham-M rotor, \$199. Write for Quotes on other New and Used Equipment: Moory Electronics Co., P. O. Box 506 Phone 601-964-2820 Dewitt, AR 72042

COLLINS 75A4 with matching speaker, Serial number (3279). All factory features, excellent condition, used very little. Will ship to the first cashiers check or money order for \$325, Joseph M. Mazzie 1314 Romine Ave., Port Vue, McKeesport, PA 15133 W3SPN

WORLD QSL Bureau. See display ad elsewhere this issue,

BRAND New fully identified epoxy diodes 1000 PIV @ 2 amps includes disc bypass and bridging resistors 10 for \$4.50. Diodes only 10 for \$3.50. G.E. Line spike suppressors with order 50 cents each. Postpaid USA. East Coast Electronics 123 St. Boniface Rd., Cheektowaga NY 14225

WANTED: Viking 500 WQLOV 1364 Madison, Denver CO 80206

SPIDERS for beamless quads. Hellarc welded aluminum. AP's Antennas, 1339 So. Washington St., Kennewick, WSN 99336

DISPLAY and protect your QSLs in continuous - strip plastic frames. Postpaid send \$1. for 75; \$3. for 250. Cut to your wall space whether only 6" high or from floor-to-ceiling. Includes unprinted cardboard headers for hanging and marking with your own titles. WIKTH, AED Corp., Box 729, New London CT. 06320

The 20th Anniversary Dayton Hamvention will be held on April 24, 1971, at Wampler's Dayton Harra Arena. Technical sessions, exhibits, hidden transmitter hunt and an interesting program for the XYL. For information write Dayton Hamvention, Dept. Q, Box 44, Dayton OH 45401

UTAH Area the size of Delaware and Rhode Island with 80 families served by independent telephone company needs career maintainer. Write SBTEI, Grouse Creek, UT

ELMAC AF-67 with instruction manual, p.t.t. microphone plug; M1070 with instruction manual, interconnecting cable; both \$65. T-60 with instruction manual, four novice crystals; \$40. Terrence E. Wedde, WA9UDW, P.O. Box 103, Wautoma, WI 54982

RECEIVING & Industrial Tubes, Transistors, all brands - Biggest discounts. Technicians, Hobbyists, Experimenters. Request free Giant Catalog and save! Zalytron 469 Jericho Turnpike, Mineola NY 11501

WANTED: Marauder HK-10. Sell Heath GR-54 receiver, \$60. Rich Roy, WA2FEV, 201-9650800.

DRAKE 3-C practically new \$125. Ham-M with indicator mounting plate used 6 months \$80. 10' cable \$5. Wally Waduck 4926 Hawthorne, Hulsde, IL 60162

VIKING II, VFO, HA-600 receiver. All excellent. \$150. WAZNFI, 18 Highland St. W., Massapequa, NY 11758

WEST Coast Hams buy their gear from Amrad Supply, Inc., Send for Byer. 1025 Harrison St., Oakland CA 94607

COLLINS 30S1, New Final, mint \$750. 312B-4 mint \$90. W7MOI P.O. Box 6064 Tucson, AZ 85716

RETIREMENT home in New Smyrna Bch., Fla. 65-ft tower attached. \$11,750 Write: Loyd Metheny K4ZOP/5 115 Felicita Lafayette, LA 70501

SELL: Drake 2NT Novice transmitter mint condition few months old \$130. Dave Sellers WN4PNJ 607 Camelia St., Panama City Beach, FL 32401

DRAKE R4 receiver immaculate \$245. MN2000 \$145. SB220 linear \$350. H.B.3-1000Z R.F. Unit \$300. Wanted T4X ect or 32S1-3 F.E. Coble 251 Collier Ave., Nashville, TN 37211

HEATH SB-301 excellent condition \$225 prepaid. Wanted schematic and manual Hammarlund HK-1B keyer. Will cover expenses. Cline WB6LXI Box 4475, Santa Barbara CA 93103

SELL: QST 1927-1959. QJ 1945-1959, some years of each complete in binders. Old issues Radio Mag., Radio & TV Mag., Pop. Sci., Pop. Mech. Send base for list. F. Kubias, W6JRM, 4655 Lamont, San Diego, CA 92109

TRADE: or sell - HW32A for HW27A. Best offer - Hq170, Hq32, Halh. HA-1 keyer, Heath audio gen and linarty gen. precision E200 Gen, 5BP1 crt. will ship. W2UGM 66 Columbus Ave., Closter, NJ 07624 201-768-1884

APACHE TX1 excellent condition \$75. or trade for 2.1 mechanical filter for Collins 75A4 you pay cash difference. WJDE 13 Senator Rd., Woburn, MA 01801

SK101A Hallcrafters Revr \$175, regency ranger transistor CB \$55. w/ac \$65. No pers ehks pse I pay shipping. M.Bedwell, WB9FV R, 3 Brownsburg, IN 46112 317-852-3057

MITE Teletype - weight 36 pounds, table top unit, 3 speed gears. Uses standard paper and ribbon. Non-overline, copy lights, built in loop supply. Very clean condition. \$175. Ray Gilbert K7VQF, 201-130th Ave. S.E., Bellevue, WA 98005, Phone 206-454-0578

3-D QSLs - The modern concept that makes all others old-fashioned. Samples 25 cents (refundable). 3-D QSL Co., Monson, MA 05017

FOR Sale: Complete YAESU line: FTDX-560 transceiver, FLDX-2000B linear, FVIX-VFO, FTV-650 6mtr transceiver, SP-560 speaker with clock/phone patch used less than 10 hours \$700. plus shipping at buyer's packing. J.K. Reagan Piedmont Airlines, Winston Salem, NC 27102 Phone 919-7575350 day W4KGR

COLLEGE Bound. Sell: Tri-ex THD-471 71 foot crankup tower with extras \$195. California Kilowatt pair of 4-1000A's details SASE. TR-43 rotator with cable \$40. Ham M rotator with cable \$90. 4-element 20 meter beam on a 40 ft. boom \$75. Everything A-1 condition. Al Povol, 3538 Centerview Ave., Wantagh, NY 11793

COLLINS 62S1 \$500. Ameco 2&6 and VFO \$100. TR4 RV4 AC & DC Supplies MN4 \$600. WIUMC 109 Essex Rd., Chestnut Hill, MA 02167 617-277-5180 617-482-4860

HALLCRAFTERS Sideband transceiver, SR150. Complete station; AC and DC power supplies and mobile mounting brackets, push-to-talk microphone, Hustler mobile antenna with resonators, \$225. for complete package like new original cartons. Will sell items separately. Carl Dane, W1FKX, 128 Wadhams Rd., Bloomfield, CT 06002 203-242-5842

WANT: Early Ham or Bc Gear (pre-1928) For Personal Use - K4PT, 92-31St Ave., St. Petersburg Beach, FL 33706

MUST Sell: (Medical school expenses) Ranger II (w) Excelli condition \$145. Mike Lewis, Box 183, D.U.T., 800 Madisc Memphis, TN 38103

HQ215 receiver \$285. HT40 transmitter \$50. 12. Novice cryst \$10. HM15 SWR \$12. Complete station with relay \$345. Gt receiver \$65. Eico 722 VFO \$30. Craig 2403 tape recorder \$11. You ship. Gary Koenig WN2PVC, 2547 West Second., Brooklyn NY 11223

VALUE Unmatched! Where else can you buy 2000 watts P for \$329.95, freight prepaid in the continental USA? Pan 2000C kit full guarantee. Hunter Sales, Inc. Box 1128 I Moines, IA 50311

SB101 WIAC and DC P.S.'s and SB600 \$325. SB301 w/e. filter \$200. Both mint. Free shipping to UPS areas. One own K4SMX Stew Woodward, 1934 Overhill, Charlotte NC 28211

QST's before 1922 and amateur teletype publications want: Orville Magoon 1941 Oakdell Dr., Menlo Park, CA 94025

CYRICAL Quad new Gem 3 EL tribander in original container \$100. Will ship prepaid anywhere in the USA. K3UTH W. Sampar 5903 John Adams Dr., Wash., DC 20031

OSCILLOSCOPE Hewlett-Packard 170B professional instrume DC-20 MHz dual channel probes and accessories complete a brand new \$950. Bob Duke, 13526 Pyramid Dallas TX 75241-2418-888

WANTED: Collins 516F1 or F2 AC Supply for KWM-1. All modern mutual conductance tube tester. W2UOZ D. Whitmore 36 Masterton Rd., Bronxville, NY 10708.

FOR Sale: KWM-2 No. 15668. latest with plugin relays-471 516F2 PS - \$100. 312B5- \$240. Swan 270 - \$375. Techtror port scope 315D- \$150. All in like new cond. K6SNVT, 186 Spaulding, Santa Ana, CA 92705. 714-538-1485

SIDELUXE Collins - Unused KWM-2A and PM-2. Immacul 312B-5 and 90L-1, high serials. \$1500 firm. W6KS San Diego 714-274-7660

NCX 3 Power supply. Perfect condition. Best offer. Arth Lukach, 295 Fifth Ave., New York City 10016

MOSLEY Conversion Kit, TA-40 K, \$27. KRAHN 3117 Jeffr Rd., Baltimore, MD 21207

COLLINS 75S1 receiver, mint cond., \$225. Swan 500, excellent \$375. Heath SB-620 mint, \$85. Lindsey, W5FR, 713-488-055

PASS all FCC amateur, commercial examinations easily via simplified, economical books and code courses. Free catalog. Ameco Publishing 314Q Hillside, Williston Park, NY 11598.

SELL 75A 2 & speaker - central electronics B sideband slicer Q multiplier Q11 - all excellent condition - \$400. W1LQ 174 E. Crescent Ave., Ramsey, NJ 07446

WANTED: Original Hallcrafters Regen TRF Skynder receiver. Sell: Ameco PK-62 and 621 VFO, \$145. Galaxie FM-210 m Power booster, \$225. SB-100 and power supply \$250. W1FMI 603 673 3791. Lord Jeffrey Dr., Amherst, NH 03031

A R T Collins Transmitter, 110 power supply and manual, \$11. Kurt W. Zander, WA6KKB, 2907 N. Baker St., Bakerfield, CA 93305

HEATHKIT HW-16 with speaker, crystals, manual. Excellent condition. \$85. You ship. Mike Bell WA7HNS, 17129 N.E. 5 St., Bellevue, WA 98008

QSOs in Spanish and German. Tapes and cassettes. Foreign language QSOs. Box 53, Acton, MA 01720

WANTED - New England Radio Counselor to teach and operate W1MVM, Main Senior Boys Camp. Minimum age 19, General Class, plus one year college. Write Camp Androscoquin, Wayme ME 04284

FOR SALE: Heathkit SB-101 transceiver with 400 Hz cw filter HP-23A pwr supply, SB-600 speaker, and HDP-21A microphone \$400; SB-101 monitor scope, \$60 Heath HM-15 SWR brnd, \$10; HN-31 Antenna, \$7. Signal Corps ARC-3, \$30; CL TR-44 rotor, \$55; Telrex 20-15-10 meter beam with Hyge balun, \$75; Cushcraft 11 element 2 meter beam, \$10; 7L tower, \$50. W4BVM, 240 Nichols Dr., Saline, MI 49831

JOHNSON Invaider 200, \$150. Drake ZB-2BQ Calibrator \$116. Work perfectly. Will ship FOB. H. R. Kurlmeier, RFD 1, Dur stable MA 01827

GONSET GSB-100 Xmtr, sxb (vox), cw, am, psu, mint cond. Best offer over \$170. You ship. K5DAE/8, J. Duncan, 5 1/2 E. 221, Euclid, OH 44123

COLLINS 75 S1, 500 C.P.S. Filter \$300; 32 S1 & 516 F2 Power supply both \$375. Phone 215-887-1232, Marty Shapiro evenings only.

HALLCRAFTERS HT46 and SX146 both mint \$40. W4BLLX 928 Hillside DR., Fort Smith, AR 72901

CANADIANS for sale my complete rty station, model 28 K5 page printer, mounted in floor consol, excellent \$400. model 43L, complete including page printer, keyboard tape perforator, trans-dist, three speed shift etc, floor console, recently checked and adjusted by Navey technician excellent \$700. 2 model LPR typing repeaters, three speed with covers, like n \$150. each. Collins KWS-1 transmitter and power supply, cov following in 6 bands (80 meters) (4-5 mhz) (3-5 mhz) (2-5 mhz) (1.3-14 mhz) (20 meters) excellent \$275. Coll R-300 VDR receiver mech. filter, digital dial etc like n \$825. Maxwell Powell, Jr., VO1HH, P.O. Box 5000, Carbone Nfld

DRAKE 2C revr with 2AC calibrator, 2CQ Q-multiplier a speaker, excellent condition, \$200. G.S. Morris, RR No. 1 Fe IN 46970

CR-4 transceiver w/pwr sup., brand new, urgent for unsuccessful expedition, \$600, custom fit suitcase available. Reymann, WA4FAG, days 703-525-3556

SELL or Trade: 4-1000A components - Used guaranteed tube-20 - vacuum variable -25 Metal socket-15-filament XFMR-10-Solid state rectifier Bank-10 - Five Section load capacitor-6, Gen radio W30M 110 volt 30A variac-25. Several microscopes-binocular-research. Digital counter-40. Several Bristol model 28XPH571 2K point strip chart recorders with frequency to millivolt converters - A steal, L and N model 4866 lab quality potentiometers-25, Gen. Radio vibration meter and analyzer-75, each, Dumont 185A electronic switch-35, Kintel 204A electronic galvanometer-40, G. R. Trammell 1507 White Oak Ct., Martinsville, VA 24112

WANTED: Collins 32S-3 with P.S. Must be clean and reasonable. C. Galbreath W6BWA 3235 Jaylee Santa Rosa, CA 95404

\$12.50 per thousand QSL's. Black ink on white cards. No extra for photo or drawing submitted. Rush information and check to: Danney Bail Productions - Box 1920 Hemet, CA 92343

NCX3, NCXA \$150. W9OEG RR2 Mokena IL 60448.

NEED HQ120 and Super Skynder Manuals. K4NW, Box 188 Rockledge FL 32955.

DRAFTING Service - For Hams, Engineers - Professionally inked - Ready for publication - 20 years experience - reasonable - For information send SASE - R. Wildman - 8512 Acapulco Way No. 2-Stockton, CA 95207

2-METER FM bargain. Sonobuoy FM transmitter and modulator, solid state, 2 watts output, 10 to 15 volts. Simple conversion for 2-meter FM operation. Complete schematic and conversion details, \$10.95 postpaid, Monks Electronics, 313 Old Farms Rd., Simsbury, CT 06070

DRAKE TR-4, RV-4, AC supply; 1 KW linear (75% efficiency). All excellent condition, \$800. Must pick up. Phil Rubin, 2116 N. Limestone St., Springfield, OH 45503

SB-34, perfect condx, w/mic and mobile bracket. Factory carton. \$299. Will ship. WA7NLR, 1848 Wasatch, S.L.C., UT 84108. 801-484-4671

SALE Complete mobile station. Multi-Elmac AF-67 transmitter. PMR-7 receiver, and James 12 volt vibrator power supply. Excellent condition, \$110. Dick Shotwell W7GDA 371 Dubois Ave., Twin Falls, ID. 83301

WANTED: Swan 420 VFO. Give serial. R. Carl K6DPG, 11128 Claire, Northridge, CA 91324

HEATHKIT SB-301 receiver, 1 microvolt or better sensitivity on all 5 bands, mint condition only \$300. Bob White 314 Tamertaine, Houston, TX 77024

AC Power supply for HW-12 or SB-101 \$35, post paid Con US W9RTP 19 Edward Ave., Edgerton, WI 53534

SELL DX-60, \$35; HG-10 VFO, \$20; HR-10B-new \$65; with calibrator, K4DAR 112 Colonial Dr. Hendersonville, TN 37075

HALLICRAFTERS HT-37 transmitter perfect condition \$175 cash and carry only. W2ABE, 505 Turnpike, Pompton Plains, NJ, 07444, 201-838-4456

SB-401 with crystal pack, beautifully wired and tested, \$225. Local deal only on following: TA32-Jr, \$20.; Sears 180 Amp. AC arc Welder, never used, \$75.; F. S. Eggert, 36042 Schoolcraft, Livonia, MI 48150

SB-101, A-C, speaker, phone patch, mike/PTT clean inside and out - \$395. Jeff Sokol 838 N. Sweetser Ave., No. 6 Los Angeles, CA 90035 213-653-1435

SELL Two meter KW PAs Stripline \$290, 10-80 KW-PA 2-4x250B \$125, Hygain antenna brake \$30, New ARC-5 4-5-3 and 5-3-7 \$10, W6HHN 3467 Rainbow Dr., Palo Alto, CA 94306

PHOTOSTAMPS - 100 High gloss photographs with gummed backs. Us on QSLs, etc. Any photo or part thereof can be reproduced. Original photo returned unharmed. Only \$2.25 postpaid. (Samples for SASE.) Betty Harms, 905 Peralda, Edgewater, FL 32032

WANTED: Old carbon filament light bulbs with seal-tip-on-top (working condition). Write. Bob Ryan, Jr., 445 N. Loara St., Anaheim, CA 92801

SALE Ranger I all new tubes \$50. WB4NMY 4803 Russell St. 23222

NOVICE special DX-20 best offer over \$15, you pay shipping Larry Kaminsky WA8JWR 48449

SELL New Swan 270B with 14A DC converter \$538. Less 20% M.J. Fein, W2AH, 151 Rock Creek Lane, Scarsdale, NY 10583 Phone 914-723-5493

YAESU FL2000B linear, never on the air. Want \$250. K7EPD, 1538 E. Solano Dr., Phoenix, AZ 85014

SALE Antique radios, AK-10, 20, 30, RA-DA, SW-3, SW-5, QSTs. Many more. SASE Joe Horvath, 522-Third St., San Rafael, CA 94901

KWM2, 516F-2, MP-1, 18-HT package \$895. WA9YPL, 8553 Broadway, Indianapolis, IN 46240

HEATH HW12A Xform., TX1 & SB10 \$100., Elco 720 \$50., 730 \$40., U.T.C. S50 Xformer \$20, George Jeck WB2CYU 958 Vail Rd., Parsippany, NJ 07054

SELL: Johnson Valiant II, factory wired, R. Shrago, W9OPL, 9513 N. Karlov, Skokie, IL 60076 Tel. OR 4-5848

EXCELLENT NCL 2000, \$495. Clean TX62 W/Vto \$125. Good HROB0T1. Coils B.C.D.E.F \$150.; Three working BC611 \$50. Charles Jones K9TZJ 26 Spring Valley Dr., Anderson, IN

## THE LEAGUE EMBLEM



● Now available in the form of a rubber stamp for use on QSL cards, correspondence or any other place you want to indicate your League membership. Same size as the illustration above.

● With both gold border and lettering and a black enamel background, the League Emblem is available in either a lapel-type pin (with safety clasp) or screw-back button.

● Special colored emblems in the pin type only, are available to League Appointees: Red for SCM; Green for RM, PAM, EC, SEC; Blue for OO, ORS, OPS, OBS, OVS.

● The Emblem Cut is a logo-type (solid cast metal) 5/8" high for use in printing letterheads, cards, etc.

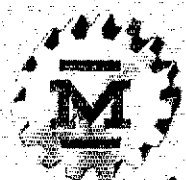
PIN, BUTTON, CUT or RUBBER STAMP

\$1.00 each  
POSTPAID

### THE AMERICAN RADIO RELAY LEAGUE

Newington, Connecticut 06111

Designed for



Application



**NO-STRING DIAL**

No strings; no pulleys; no back lash; no flimsy assembly. The No. 10037 is a sturdy mechanically engineered "Designed for Application" dial assembly which completely eliminates the annoyances of string-driven pointers, eliminates all indicator stutter or wobble and provides positive pointer travel and resetability. The pointer is driven positively by a flexible but non-elastic molded gear driven rack which cannot slip, break or fall off a pulley. The geared flexible rack rides in a multi-slot extruded aluminum channel. This girder-like extruded piece provides mechanical rigidity to the assembly. Furnished complete with panel trim bezel and flexible coupling for output shaft.

**JAMES MILLEN  
MFG. CO., INC.**

MAIN OFFICE AND FACTORY  
**MALDEN  
MASSACHUSETTS**



**Index of Advertisers**

Adirondack Radio Supply, Inc.	150
Aleo Electronic Products, Inc.	148
Alltronics - Howard Co.	144
Amateur Electronic Supply	121
Amateur License Instruction	144
American Radio Relay League	144
<i>Indexes</i>	
Hints & Links	150
League Emblem	146
License Manual	118
Membership	139
Operating Necessities	145
Publications	140
VHF	124
Bauman Sales, Inc.	144
Clomens Mfg. Co.	150
Collins Radio Co.	7
Crystek	146
Cubex Co.	141
Curtis Electro Devices	139
Cush Craft	138
Dames Co., Theodore E.	143
DePlazza Enterprises	134
Design Industries, Inc.	139
DIGI-KEY	144
Drake Co., R. E.	Cov. IV
Ehrhorn Tech. Operations, Inc.	133
EIMAC, A Division of Varian	104,105
Electronic Distributors	140
Electro-Voice, Inc.	119
E. S. Electronic Labs	139
Fair Radio Sales	136
Foreign Language QSOs	150
Goodheart Co., Inc., R.E.	148
Gotham	116
Greene, G. Watson	137
HAL Devices	134,144,148
Ham Radio Center	134
Harrison Radio	160
Heath Co., The	106,107
Henry Radio Stores	5
Hi-Par Products Co.	139
House of Dipoles	146
Hv-Gain Electronics	111
International Crystal Mfg. Co., Inc.	7
JAN Crystals	134
J. J. Electronics	150
L. A. Amateur Radio Supply	140
Lafayette Radio Electronics Corp.	143
Lampkin Laboratories, Inc.	145
Lattin Radio Laboratories	141
Millen Mfg Co., Inc., The James	158
Mini-Products, Inc.	136
Mostly Electronics, Inc.	108,109
National Radio Co.	129
National Radio Institute, Inc.	117,141
Omega-T Systems, Inc.	142
Pennwood Nuncichron	141
Pickering Radio Co.	144
Poly Paks	125
Radio Amateur Callbook, Inc.	148
Radio Shop, Lab J.	148
ROA Electronic Components	113
Regency Electronics, Inc.	115
Robot Research, Inc.	159
Rohn Mfg. Co.	1
Romnev Engineering Labs	145
Ross and White Company	137
RP Electronics, Inc.	137
Sams & Co., Howard M.	123
Savoy Electronics, Inc.	4
Shure Brothers, Inc.	141
Sabcontx, Inc.	131
Skylane Products	137
Spectronics	147,149,Cov. III
Stanley, J. A.	143
Swan Electronics	Cov. II
Tan-Fee, Inc.	127
Top Band Systems	138
Tri-Fx Lower Corp.	117
Trigger Electronics	151
Unadilla Radiation Products	127
Valley Technics, Inc.	134
Vanguard Engineering	144
Van Sickle Radio Supply	139
Varitronics, Inc.	135
Vibroplex Co., Inc.	143
Wolf, S.	134
World QSL Bureau	144



# We are not going to take advantage of our monopoly on SSTV.

Introducing a new factory direct price on the Robot Model 70 SSTV monitor, and Robot Model 80 SSTV camera.....

## \$395 each.

The response to our introduction of the Robot SSTV equipment was completely overwhelming. It was clear to us that you want this exciting new dimension to amateur radio. It was also clear that our Robot SSTV equipment should be priced within the means of every amateur radio operator.

So we are offering our Robot Model 70 SSTV monitor and our Robot Model 80 SSTV camera at a new, direct-to-you price. An incredible \$395 each for camera and monitor.

These are exactly the same units we have been advertising for \$569 each, and they are *all* you need to put your amateur radio station in TV mode.

**Now the new dimension to amateur radio . . . SIGHT**

is easily affordable by practically every amateur radio operator. No additional equipment

is necessary. The SSB or VHF/UHF transmitter and receiver, or transceiver, and antenna you now have are well suited for SSTV. Buy the monitor alone, and receive the many SSTV stations now on the air, or buy both units and transmit and receive pictures around the world.

For complete information on Slow Scan TV, and our camera and monitor, mail the coupon below.

# ROBOT

**ROBOT RESEARCH INC.**  
7591 Convoy Court  
San Diego, California 92111  
Phone 714-279-9430

**ROBOT RESEARCH INC.**  
7591 Convoy Court  
San Diego, California 92111

Gentlemen:

**Please send me your free brochure on SSTV and the Robot camera and monitor.**

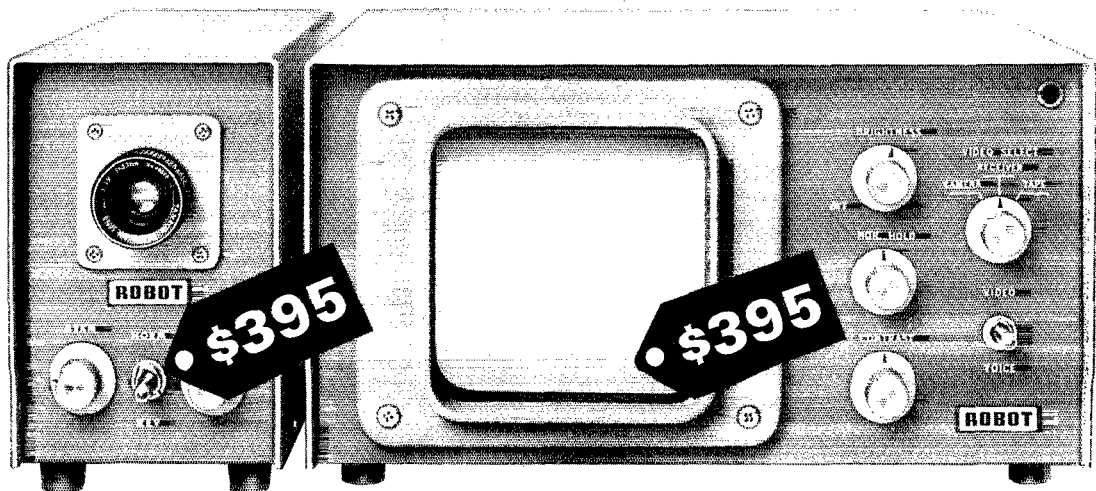
Name \_\_\_\_\_

Street \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

Call \_\_\_\_\_



# WANT *MORE* FOR YOUR MONEY?

Join the gang on 2 meter FM!

With only a few watts power, you can have all the solid, real pleasure QSO's you want — from your car, plane, boat, shack, or as you walk. And, open repeaters extend your range by hundreds of miles!

The new Standard Communications transceiver brings to the Ham field a truly professional piece of equipment, incorporating features of operating convenience and high performance as yet unmatched.

It's a good investment, will give you more for your money — especially when you get it from "Ham Headquarters, USA", where you always get more for your money — all ways! Visit any of our stores, or drop me a line today. TNX.

73

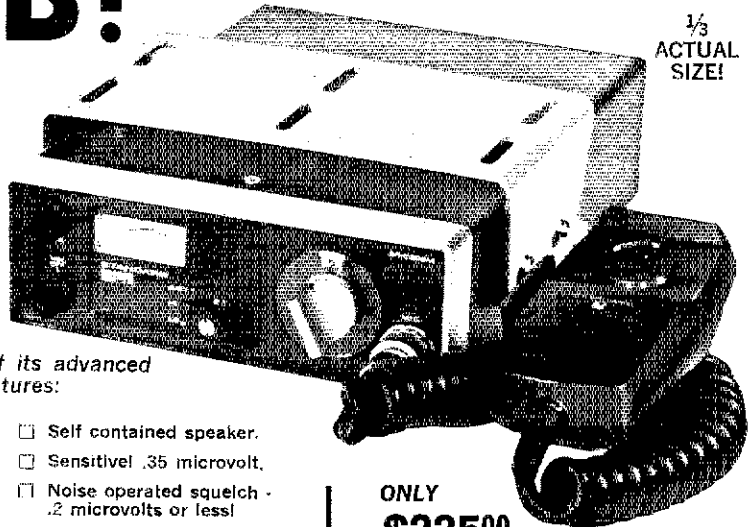
*Bil Harrison*

W2AVA

# FM is FB!

## So is this new SCC Transceiver!

Standard Communications Corp., the world's largest manufacturer of VHF marine equipment, proudly presents their professional quality transceiver specifically designed for superior performance on the 2 meter amateur band.



<sup>1/3</sup>  
ACTUAL  
SIZE!

Here are just a few of its advanced state of the art features:

- All silicon solid state.
- Mosfet mixer.
- 143 to 149 MHz range.
- 12 Channel switching, in 2 MHz spread
- (Comes with 4 sets of crystals installed.)
- .8/10 Watts output, with Hi/Lo switch.
- Runs on 11 to 16 VDC (Or from AC pack, or attachable ten D-cell portable pack.)
- Self contained speaker.
- Sensitivel .35 microvolt.
- Noise operated squelch - .2 microvolts or less!
- Dual conversion super het.
- Draws only 150 ma in receive.
- Compact - Only 2 1/2" x 6 3/8" x 9 3/8" Deep.
- Weighs only 4 1/2 lbs.

ONLY

**\$335<sup>00</sup>**

Complete with dynamic mike!

**ORDER NOW!**

Or, ask for literature.

**CHARGE IT!**

On your Master-Charge, Bank Americard or Uni-Card.

SINCE 1925 . . .



# Harrison

"HAM HEADQUARTERS, USA"™

**FARMINGDALE, L. I.**  
Route 110  
2 miles South of  
L.I.E. exit 49S,  
293-7995

**JAMAICA, L. I.**  
139-20 Hillside  
Near Queens Blvd.  
RE 9-4101

**NEW YORK CITY**  
8 Barclay St.  
Near City Hall  
BArcly 7-7922

**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**

Please include ample postage (plus \$1 handling cost with orders under \$10.) OR, PHONE YOUR ORDERS TO (516) 293-7990 OR (212) BA 7-7922

# For \$450, you just can't beat the Yaesu FTdx 560.

# You can't even beat it for \$800.

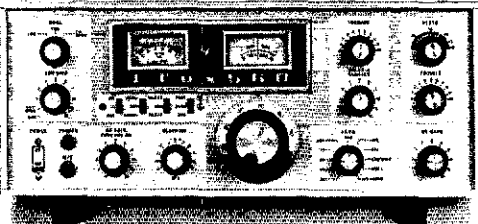
How come the Yaesu is such a good deal?

First of all, it's made in Japan, where people do painstaking electronic assembly work for a lot less money than they do in the U.S. Secondly, it's probably the highest quality transceiver made anywhere in the world, regardless of cost.

Also we import the Yaesu and sell it direct to you, eliminating the usual dealer profit.

The Yaesu FTdx 560 is a fully assembled, fully guaranteed transceiver with 560 watts PEP of SSB power, 500 CW. Included in the selling price are many of the things you usually have to pay extra for. Like power supply, WWV, calibrators, VOX and the one-year warranty. And a lot more.

To see how much more you get with Yaesu, send for our new information packet. It includes things like a chart and photos that compare Yaesu and Yaesu workmanship with other transceivers, plus a complete schematic. Study this packet and you'll see right away how much more value there is in a Yaesu.



- Please send new color catalog of all Yaesu products.
  - Enclosed find \$ \_\_\_\_\_
- Please send model(s) \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

All prices F.O.B. Signal Hill, Ca.

## SPECTRONICS WEST

Dept. Q, 1491 E. 28th, Signal Hill, Ca. 90806 / (213) 426-2593

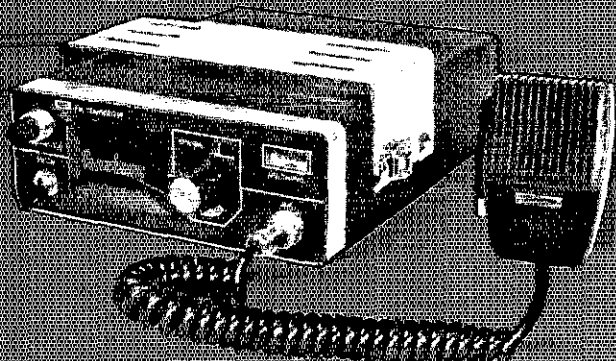
## SPECTRONICS EAST

Dept. Q, Box 1457, Stow, Ohio 44224 / (216) 923-4567

# At last—Drake quality in a VHF FM Transceiver



**Marker  
Luxury**



The best of the Japanese—the Marker-Luxury VHF FM Transceiver—is built, tested and distributed and backed by the B. L. Drake Co.

- Exceptional receiver
- Backed by B. L. Drake
- Complete package for...

**\$329<sup>95</sup>**

includes transceiver—  
dynamic microphone—  
antenna—connector plug—  
AC/DC cord—antenna—

## SPECIFICATIONS

### General

Frequency Coverage	144-148 MHz
Number of Channels	12 Channels, 2 supplied Channel 1 Receive 146.94 MHz Transmit 146.34 MHz Channel 2 Simplex 146.94 MHz
Modulation	Frequency Modulation
Transmitter Control	Push-to-Talk
Power Drain	AC: Receive 6 Watts Transmit 50 Watts DC: Receive 0.5 Amps Transmit 4 Amps
Power Source (Built-in)	AC: 117 Volts Factory Wired 220/240 Volts 50-60 Hz DC: 13.5 Volts $\pm 10\%$ .
Dimensions	7 $\frac{7}{8}$ " W x 2 $\frac{3}{4}$ " H x 10 $\frac{1}{4}$ " D.
Weight	8 $\frac{3}{4}$ lbs.
Standard Accessories	Dynamic Microphone, Antenna, Connector Plug, AC/DC Cord

### Transmitter

RF Output Power	15 Watts
Frequency Deviation	15 KHz maximum
Frequency Stability	$\pm .001\%$ or less
Spurious Radiation	Greater than $-80$ dB below Carrier
Frequency Multiplication	12

### Receiver

Receiver Circuit	Crystal-controlled Double Conversion Superheterodyne
Intermediate Frequencies	1st 10.7 MHz, 2nd 455 kHz
Input Impedance	50 to 75 Ohms
Sensitivity	0.5 $\mu$ V or less for 20 dB S+N/N ratio 1 $\mu$ V or less (30 dB S+N/N ratio at 10 kHz deviation with 1 kHz modulation)
Audio Output	Greater than $-80$ dB 0.5 Watt with 10% or less distortion.

See your distributor or write for details.



**B. L. DRAKE COMPANY**

501 RICHARD ST., MIAMISBURG, OHIO 45342