"S" SERIES
PIONEERS IN MINIATURIZATION

AUDIO & POWER
TRANSFORMERS & REACTORS
For Complete Ham Systems

UTC TRANSFORMER CO.
167 EAST 42ND STREET, NEW YORK, N.Y.

Regular Edison
Magnet Components

Power Transformers
Magnet Welding Transformers

MAGNETIC COMPONENTS

MINIATURE POWER EQUIPMENT

REACTORS & FILTERS

TUNING FORCES

100% APPROVED

CIRCUIT BREAKERS

POWER SUPPLIES

FUSES

CABLES

CABLES
SR-2000 transceiver specifications in brief:

Maximum legal input in a 26-lb. box no bigger than an overnight bag! **Special features:** Receiver Offset Control (RIT) permits ±2 kc adjustment of receiver frequency, independent of transmitter, for round-table, net or CW operation. Amplified Automatic Level Control. **Frequency Coverage:** 80, 40, 20, 15 and 10 meters. Upper, lower sideband, CW. All crystals provided for 28.0 to 30.0 mcs. **General:** Dial cal., 1 kc. Linear gear drive with less than 1 kc readout. Adjustable IF noise blanker. Provision for plug-in external VFO/DX adapter. Built-in VOX, break-in CW and PTT. Built-in CW sidetone. Hi-Lo power switch for SSB.* 2.1 kc 6-pole crystal lattice filter. S-meter-RFO-AALC and final screen metering.* Two-speed blower.

100 kc crystal cal. VFO covers 500 kc. **Transmitter Section:** Two 8122 output tubes. Variable Pi network. Power input, 2000 watts P.E.P. SSB; 1000 watts CW. Carrier and unwanted SB suppression, 50 db; distortion products, 30 db. Audio: 500-2600 cps @ 6 db. **Receiver Section:** Sensitivity less than 1 µV for 20 db S/N. Audio output, 2 W.; overall gain, 1 µV for 1/2 W. output. **Price:** $995. amateur net. P-2000AC Power supply, $395.

*Meters for final plate current and voltage built into P-2000AC power supply. Also Hi-Lo power switch, and loud speaker. **Export:** International Division; Canada, Gould Sales Co. A Subsidiary of Northrop Corporation

5th & Kostner Aves., Chicago, Illinois 60624
Very Selective

In fact, the Collins 75S-3B Receiver now has the sharpest selectivity available in a ham receiver. Improved cross-modulation characteristics immunize it to nearby transmitters. CW DXers using the 75S-3B easily dig that one signal from a pileup. Mechanical filter options provide just the right degree of selectivity for operating conditions in SSB, CW, or RTTY. Have you tried the 75S-3B lately? See your Collins distributor.
PUBLISHED MONTHLY, AS ITS OFFICIAL ORGAN, BY THE
AMERICAN RADIO RELAY LEAGUE INC., NEWINGTON, CONN., U. S. A.
OFFICIAL ORGAN OF THE INTERNATIONAL AMATEUR RADIO UNION

CONTENTS

TECHNICAL

Solid-State Receiver Design with the MOS Transistor
George T. Daughters, W8EAG, Wes Hayward, W70J, and Will Alexander, WA6RDZ

A 90-Watt Amplifier For 2 Meters
Doug DeMaw, WlCER

An Antenna for the Traveling Man
J. Santangelo, WINXY

Antenna Rotators and Indicators
E. Laird Campbell, WlCUT

Gimmicks and Gadgets:
The Torso — a QRM Reducer for the Phone Man...
The "Monofil" Noise Generator

Simple "Tattoo" Control for the HT-37
Fred M. Ruzick, W8GQQ

Increased Flexibility With the S-Line
Independent Frequency Control with the 325-1 and
75S-3 ............ Peter Gianas, W8BPE
Cross-Band Operation with the 75S-3 and 325-3
Roger A. Newlander, WB6AYN

Recent Equipment:
The IIT Mackay Marine 3010-B Receiver
Squires Sanders 50-er 50-Mc. Transceiver
Technical Correspondence

BEGINNER AND NOVICE

How To Handle TVI .............. Lewis G. McCoy, WlICP

OPERATING

Take Me to Your Leader .............. 64

GENERAL

TVI Prevention — a New Method
Ralph A. Marino, W1MRW

20,000 QSLs .......................... 58
FCC’s Chairman Looks at Amateur Radio
Football Score Network ......... Harry T. Flasher, W8KKF
How To Stop Traffic At The County Fair
Peruvian Adventure .............. Bill J. Payet, S.J., OA4BO
"But . . . But . . . But, Man!"
William R. Clark, W8AUB

Good Old Neighbor .............. George W. Stevens, W0DZZ

Electronic Crossword .............. S. M. Dunnam, Jr., KSKEI

ARPSG .......................... 64 "It Seems To Us" .......................... 9
Coming Conferences .............. 86 IARU News ......................... 78
Correspondence From Members .... 76 League Lines .......................... 10
Feedback ........................ 91 Operating News ................. 92
Hamfest Calendar ............... 54 Silent Keys ........................ 144
Happenings of the Month .......... 72 Stations Activities ............... 98
Hints & Kinks .................. 56 World Above 50 Mc. ............... 86
How's DX? .................. 79 YL News and Views ................ 84
Index to Advertisers .......... 168 25 Years Ago in QST ................. 89

OUR COVER

An all semiconductor receiver with FETs in the front end? Interested? See page 11 for the full story.
mobile... roughest... or the smoothest... the answer... BIG-K

Business executive—sportsman—radio amateur, Roe Golsch is one of the many discerning BIG-K users who insist upon the finest equipment and who are satisfied only with an ultimate result that is outstanding. Whether spinning along the highway in his handsome Jaguar XKE—or bouncing over Northern California's rugged terrain on a hunting excursion in his fully equipped International Harvester SCOUT, WA6YDW places his reliance on BIG-K for his mobile sky link.

The same BIG-K capable of handling a full 1 kw p.e.p. is available to you with interchangeable inductors for 80-40-20-15-11(C-B) and 10 meters (and add a 300 watt p.e.p. model for 160). Two column lengths are available, long 93" (shown on the XKE) and short, 77" (shown on the SCOUT), each with sturdy, machined-yoke hinged joint for fast lay-down, rapid lockup feature. The adjustable top section is part of the BIG-K assembly.

Sky link! Go BIG-K!

RAYTHEON COMPANY
213 East Grand Ave. South San Francisco, Calif. 94080
CONVERTERS

HF & VHF • UHF • HAM • POLICE
FIRE • MARINE • ETC., ETC.

WE HAVE THEM ALL
TUBES • NUVISTORS • TRANSISTORS

THE LEADER IN THE FIELD

AVAILABLE AT LEADING DISTRIBUTORS WRITE FOR FREE CATALOG

AMECO EQUIPMENT CORPORATION
A SUBSIDIARY OF AEROTRON, INC.
P. O. BOX 6527
RALEIGH, NORTH CAROLINA 27608

MANUFACTURER OF FM AND AM TWO-WAY RADIO, SSB AND ISB COMMUNICATIONS, CONTROLLER FUEL CONTROL & DATA EQUIPMENT, AMECO* HAM, CB AND SHORT WAVE LISTENING EQUIPMENT.
### Section Communications Managers of the ARRL Communications Department

**Atlantic Division**

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delaware</td>
<td></td>
<td>John Thompson</td>
<td>1016 Peckford Drive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allen R. Breiner</td>
<td>219 Race St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cary M. Anderson</td>
<td>1401 Classic Lane</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Edward G. Riner</td>
<td>19 Blackwood Drive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Charles T. Hanson</td>
<td>Warner Gulf Rd.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Robert E. Lawry</td>
<td>1463 N. Allen St.</td>
</tr>
</tbody>
</table>

**Central Division**

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illinois</td>
<td></td>
<td>Edmond A. McVicker</td>
<td>159 South 4th</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mrs. M. Roberta Smith</td>
<td>401 Portal Drive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clifford A. Rhoder</td>
<td>322 Wabash Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Clear Lake 57222</td>
</tr>
</tbody>
</table>

**Dakota Division**

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minnesota</td>
<td></td>
<td>Herman K. Koppenhefer, Jr.</td>
<td>21 Eudora Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Harold L. Schmitt</td>
<td>170 S. 116th St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Seward F. Holt</td>
<td>Clear Lake 57222</td>
</tr>
</tbody>
</table>

**Great Lakes Division**

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michigan</td>
<td></td>
<td>Jon W. Whitman</td>
<td>1117 North Avenue</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bill Swanson, Jr.</td>
<td>633 L. Box 8345-E</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S. H. Haire</td>
<td>2221-27th Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>William A. Boothe</td>
<td>116 East Pole Avenue</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Greenhills 70621</td>
</tr>
</tbody>
</table>

**Kentucky**

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kentucky</td>
<td></td>
<td>Lawrence E. Jeffrey</td>
<td>1605 Auster Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ralph E. Theil</td>
<td>75709 W. Six Mile Road</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W. L. Wulfe</td>
<td>1617 Lebanon Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Lexington 40508</td>
</tr>
</tbody>
</table>

**Midwest Division**

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iowa</td>
<td></td>
<td>Owen G. Hill</td>
<td>14/0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Robert M. Summers</td>
<td>3043 North 72nd</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alfred E. Scheweberg</td>
<td>Edgar Star Rd.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Frank Allen</td>
<td>Sportsgrove 272</td>
</tr>
</tbody>
</table>

**New England Division**

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maine</td>
<td></td>
<td>John J. McNamara</td>
<td>218 Birch Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>John J. Bakie, Jr.</td>
<td>608 Fairview Rd.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Herbert A. Moss</td>
<td>44/1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Walter Mitchell</td>
<td>43 Box 187-A, RFD</td>
</tr>
<tr>
<td></td>
<td></td>
<td>John E. Rehob</td>
<td>399 Frink St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B. Antinak Murray</td>
<td>8 Hillcrest Drive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>уст. James B. Noble</td>
<td>8 St. Dennis Ave.</td>
</tr>
</tbody>
</table>

**Northwestern Division**

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska</td>
<td></td>
<td>John F. Tracy</td>
<td>7700 West 12th Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Donald A. Cripp</td>
<td>2471 SE 11th St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Everett E. Young</td>
<td>1727 NE 11th St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Portland 97217</td>
</tr>
</tbody>
</table>

**Paciific Division**

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td></td>
<td>Stephen D. Smith</td>
<td>420 South Franklin St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mike Hubbard</td>
<td>1240 East 9th St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H. J. Hopkins</td>
<td>8900 Hampton Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Donald D. Morris</td>
<td>1805 Willamette Way</td>
</tr>
</tbody>
</table>

**Rocky Mountain Division**

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorado</td>
<td></td>
<td>Richard Hope</td>
<td>3080 Spruce Dr.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gerald R. Warner</td>
<td>4776 South 275 West</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wayne M. Mount</td>
<td>142 South Montana Ave.</td>
</tr>
</tbody>
</table>

**Southeastern Division**

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td></td>
<td>Richard L. Stone</td>
<td>1200 Spring Ave., S.W.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lee A. Wood</td>
<td>P.O. Box 191</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Edward M. Norman</td>
<td>Red Roof 902, 27th</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Joni R. Minke</td>
<td>6230 500 Holly Drive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>John E. Castle</td>
<td>77 Coleman Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ralph Sarpy</td>
<td>6004 E. Townsend Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>John C. Gieselman</td>
<td>1805 Willowack Way</td>
</tr>
</tbody>
</table>

**Southwestern Division**

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona</td>
<td></td>
<td>Richard Hope</td>
<td>4141 West Palm St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gerald R. Warner</td>
<td>2732 Churro Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wayne M. Mount</td>
<td>1424 South Olive Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Donald D. Morris</td>
<td>1427 Pendleton</td>
</tr>
</tbody>
</table>

**Western Division**

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nevada</td>
<td></td>
<td>Richard Hope</td>
<td>4141 West Palm St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gerald R. Warner</td>
<td>2732 Churro Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wayne M. Mount</td>
<td>1424 South Olive Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Donald D. Morris</td>
<td>1427 Pendleton</td>
</tr>
</tbody>
</table>

**Weld Gulf Division**

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oregon</td>
<td></td>
<td>Richard Hope</td>
<td>4141 West Palm St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gerald R. Warner</td>
<td>2732 Churro Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wayne M. Mount</td>
<td>1424 South Olive Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Donald D. Morris</td>
<td>1427 Pendleton</td>
</tr>
</tbody>
</table>

**Northern Texas**

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas</td>
<td></td>
<td>Richard Hope</td>
<td>4141 West Palm St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gerald R. Warner</td>
<td>2732 Churro Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wayne M. Mount</td>
<td>1424 South Olive Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Donald D. Morris</td>
<td>1427 Pendleton</td>
</tr>
</tbody>
</table>

**Canadian Division**

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alberta</td>
<td></td>
<td>Richard Hope</td>
<td>4141 West Palm St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gerald R. Warner</td>
<td>2732 Churro Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wayne M. Mount</td>
<td>1424 South Olive Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Donald D. Morris</td>
<td>1427 Pendleton</td>
</tr>
</tbody>
</table>

---

*Official appointed to act temporarily in the absence of a regular officer*
NEW from International

SINGLE SIDEBAND
9mc EXCITER-DRIVER
50-54mc MIXER-AMPLIFIER

The SBX-9 Exciter-Driver and the SBA-50 Mixer-Amplifier provide the perfect combination for 50-54mc SSB operation. Performance, versatility and reliability are incorporated into this new SSB pair. A tremendous value at a low price!

Model SBX-9

SPECIFICATIONS:
Exciter-Driver 9mc
Tubes: 6BH6 Oscillator
12AX7 Audio
7360 Bal Modulator
6BA6 RF Amplifier
Filter: Four crystal half lattice
Carrier Suppression 45db min.
Unwanted SB Atten. 40db min.
Output: Provides voltage drive for mixer such as SBA-50
Controls: Carrier Balance
Microphone Gain
Test Switch
USB-LSB Switch
Metering: RF output for balance adjust. Two sensitivity ranges available with front panel switch.
Misc: Relay included for push-to-talk operation. Crystals for upper and lower sideband included. Requires high impedance microphone. For operation on 117 vac 60 cycle power.
$125.00

Order direct from International Crystal Mfg. Co.

Model SBA-50

SPECIFICATIONS:
Mixer-Amplifier 50-54mc
Tubes: 6GUA Oscillator-Mixer
12BY7A Amplifier
6360 Linear power amplifier
Drive: Requires 9mc sideband signal from SBX-9
Output: SSB single tone 10 watts
Controls: On-Off Power
PA Grid Tune
PA Plate Tune
PA Load Tune
Metering Switch
Metering: Oscillator
9mc Drive
Buffer Grid
PA Grid
RF Out
Crystals: Three positions, uses 3rd overtone 41-45mc range.
Crystal frequency = final frequency — 9mc
Misc: Accessory socket provided for connecting keying circuit to SBX-9. Comes with three crystals, specify frequency when ordering. For operation on 117 vac 60 cycle power.
$145.00

INTERNATIONAL

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

Past Presidents

Hiram Percy Maxim, W1AW, 1914-1926
Eugene C. Woodrup, W6CE, 1926-1940
George W. Bailey, W2K, 1940-1952
Goodwin L. Doslant, W8JBL, 1952-1962
Herbert Hoover, Jr., W6ZJ, 1962-1966

Officers

President: ROBERT W. DENNISTON, W6NWX
Box 73, Newton, Iowa 52080
First Vice-President: WAYLAND M. GROVES, W5NW
1406 West 12th Street, Odessa, Texas 79762
Vice-Presidents: CHARLES G. COMPTON, W8BUO
GILBERT L. CROSSLEY, W3YA
Secretary: JOHN HUNTOON, W1LVQ
Treasurer: DAVID H. HOUGHTON
225 Main St., Newington, Connecticut 06111

Honorary Vice-President: FRANCIS E. HANDY, W1BDI

General Manager: JOHN HUNTOON, W1LVQ
Communications Manager: GEORGE HART, W1UJM
Technical Director: GEORGE GRAMMER, W1DFD
Assistant General Manager: RICHARD L. BALDWIN, W1KKE
Assistant Secretaries: PERRY F. WILLIAMS, W1UED
WILLIAM SMITH, W1DVE - WILLIAM I. DUNKERLEY, JR., W2ZRD
225 Main St., Newington, Connecticut 06111

General Counsel: ROBERT M. BOOTH, JR., W3PS
1100 Vermont Avenue, N. W., Washington, D. C. 20005
Associate Counsel: ARTHUR K. MEEN, Q.C., VE3RX
Suite 2212, 44 King St. West, Toronto 1, Ont.

DIRECTORS

Canada
NOEL B. EATON, VE3CJ
R.R. 3 Burlington, Ontario
Vice-President: Colin C. Dunbar, VE2BK
116 Oak Ridge Drive, Blue d'Urbe, Quebec

Atlantic Division
GILBERT L. CROSSLEY, W3YA
734 West Perth Avenue, State College, Pa., 16801
Vice-President: Jesse Holton, W3CT
911 Valley HIll Road, Malvern, Pa., 19355

Central Division
PHILLIP E. HALLER, W8QFG
600 W. Tripp Ave., Chicago, Ill., 60629
Vice-President: Edmond A. Metzger, W8WPM
1320 South Fourth St., Springfield, Illinois 62703

Dakota Division
CHARLES G. COMPTON, W8BUO
1011 Fairmount Ave, St. Paul, Minn., 55105
Vice-President: KEN F. SPENCER, W5DH/W5LXX
29 Alpine St., Lake Vista, New Orleans, La., 70124
Vice-President: Alex Arnold, W7PP
1204 Huntington Road, Bridgeport, Conn., 06605

Delta Division
PHILIP P. SPENCER, W5DH/W5LXX
29 Alpine St., Lake Vista, New Orleans, La., 70124
Vice-President: Edmond A. Metzger, W8WPM
1320 South Fourth St., Springfield, Illinois 62703

Great Lakes Division
DANA E. CARTWRIGHT, W6UPB
570 Trowbridge Rd., Southfield, Michigan 48075
Vice-President: Charles G. Miller, W6RHA
1872 Calvin Drive, Columbus, Ohio 43227

Hudson Division
HARRY J. DAMNALS, W2TEK
REI 1, Auburn, N.Y., Auburn, N.Y., 13021
Vice-President: Stan Sak, W9EB
1256 Old Rt. 20, Sharon, Conn., 06069

Midwest Division
SUMNER E. FOSTER, W9QG
2110 Gold's Gully Road, Cedar Rapids, Iowa 52403
Vice-President:

New England Division
ROBERT YORK CHAPMAN, W1QV
36 Smith Road, Groton, Conn., 06340
Vice-President: Riegolf Green, W1EE
11 Law's Brook Rd., South Acton, Mass., 01775

Northwestern Division
ROBERT B. THURSTON, W7TPOY
7700 31st Ave., N.E., Seattle, Wash., 98115
Vice-President: R. Rex Roberts, W7CPU
137 Park Hill Drive, Bellingham, Wash., 98225

Pacific Division
HARRY E. ENGWIGHT, W6ECO
770 Chisman, San Jose, Calif., 95112
Vice-President: Ronald G. Martin, W6XEP
1673 Baywood Lane, Napa, Calif., 94558

Roanoke Division
VICTOR C. CLARK, W4KFC
12227 Popes Head Road, Chester, Va., 23234
Vice-President: L. Phil Wecker, W4ACY
4821 Hilltop Road, Greenboro, N. C., 27407

Rocky Mountain Division
CARL L. SMITH, W9WBJ
1070 Locust St., Denver, Colo., 80202
Vice-President: John H. Sampson, Jr., W3OCX
3615 Mount Odgen Drive, Denver, Colo., 80202

Southeastern Division
CHARLES J. HOLTIN, W4LWV
2110 S.W. 27th Lane, Miami, Fla., 33126
Vice-President: Albert L. Humel, W4HER
1255 N.E. 26th Street, Portland, Ore., 97214

Southwestern Division
JOHN R. CHIRES, W6KWH
11492 Zehl Ave., Granada Hills, Calif., 91344
Vice-President: Thomas C. Cunningham, W6WPP
1105 East Avenue, Arcadia, Calif., 91004

West Gulf Division
ROEMER H. MARTIN, W5KUF
P.O. Box 1666, Corpus Christi, Texas 78401
Vice-President: Roy K. Brannan, W5WGM
2117 S.W. 64th Terrace Oklahoma City, Okla., 73107
"It Seems to Us..."

BOARD MEETING

It's getting close to that time again — when (in early May) the Board of Directors will meet to chart the course of the League for another year. Many subjects will be discussed, and decisions taken. For the information of members we mention here a few which likely will come up for consideration.

One subject certainly due for attention is the matter of dues. The most recent rise was in 1959 — eight years ago. No one needs to be told what has happened to the economy, and thus the cost of operating an organization, in that time. Letters in the Correspondence Section of previous issues have offered pros and cons of a dues rise. What is your view?

A Life Membership, at a suggested figure of $100, has been proposed, similar to the arrangement existing in a number of other organizations. What think?

And the subject of "freeloaders" will be discussed. Here again the Correspondence Section has shown a considerable difference of opinion. Should the League Hq. additionally limit any of its services to non-members? If so, how far should we go?

An FCC action in docket 15928 should, if the Chairman's expectations are realized, be announced prior to the meeting. W1AW and other OBS will bulletin the information as soon as available. Even though time may be short, give adequate consideration and study to whatever is decided, and then let the division director have the benefit of your thinking.

At copy time two proposals have been offered by individual directors for amendment of the Articles and By-Laws. One would change the terms of directors from two to four years, in line with a trend which seems to exist in our national and state governments to free officials from the handicap of frequent elections. Another would set age 21 as the minimum for a director candidate.

The Citizens Radio Service will also get attention in two basic areas — the feasibility of setting up cooperative amateur CB arrangements for joint efforts in emergency communications planning and operation, and the desirability of a concerted program to interest more CB licensees in moving up to the higher standards and wider horizons available as licensed amateurs.

Will you now express your views on these and other subjects? We hope so.

The president of an ARRL affiliated club said in a recent bulletin to its members: "Our director made a mailing in late December to about 200 radio clubs in the division asking for comments on three questions which will be considered at the annual Board Meeting in May... a simple little questionnaire, not time consuming or demanding too much thinking. But, would you believe it, out of almost 200 letters sent out, he received to date only 2 — yes, TWO — answers to his letter. That's only about a one percent return. Are we so dead, lazy and complacent that we don't give a four-cent hoot to make a comment?"

Though perhaps an extreme case, it is far too typical of the problems directors face in representing their membership — despite correspondence, and club and individual visits to discuss amateur radio's and the League's current problems. Perhaps some amateurs feel that it isn't worth the trouble, that nothing will happen anyway. Perhaps some amateurs feel that the division director is best qualified to make decisions concerning our future in the common interest, and thus speak out only when they are dissatisfied. In any event, let us again solicit — both from individual members and affiliated clubs — comments to their respective division directors on subjects already under discussion plus any new suggestions or ideas they may wish to initiate. Director addresses are on the facing page.

ARE YOU LICENSED?

- When joining the League or renewing your membership, it is important that you show if you have an amateur operator license. Please state your call and/or the class of operator license held, that we may verify your classification.
League Lines...

See page 60 for the latest (at press time) on incentive licensing. In an aside to his QCWA audience, FCC Chairman Hyde admitted that a prediction of action "in the near future" sounded like governmantese, but said he expected it actually to be a matter of only weeks.

An extensive study and appraisal of the amateur radio service, embodied in Stanford Research Institute report M-5436 under contract with ARRL, has now been distributed to many telecommunications officials in Canada and the U.S., and in foreign nations through IARU societies. A few extra copies are available from Hq. to members and affiliated clubs at the approximate cost of production and mailing—$2. We expect to publish a brief summary of the report in a future QST.

Largely because of abuses and interference, FCC's staff is considering abolishing its 27-Mc. 100-mw. license-free walkie-talkie authorization and transferring such activities to the 49-Mc. region.

Our February article on 10-meter conversion of CB gear struck fertile ground—so much so that 29.6 Mc. has now been formally recommended by the League's Executive Committee as a primary gathering spot on the band, particularly for low-powered rigs. See page 93 for details, then give "Channel 60" a whirl. Let's face it—channelization has been a major asset to CB operation, and expansion of the concept could well be a basis for more efficient use of such portions of our bands as the top end of 28 Mc. What are your ideas?

Mobile? Aeronautical Mobile? Maritime Mobile? If you're mobile in, on or over U.S. territory, you're just plain "mobile" regardless of your vehicle—boat, biplane, bike or Bonneville. The terms "aeronautical mobile" and "maritime mobile" are reserved for operation on or over the high seas, outside areas claimed by the U.S.

Running correspondence in the past several issues of our Correspondence Section on "free-loaders" triggered an interesting reaction: a great many requests for info from Hq. now carry the notation "By the way, I'm a League member, not a freeloader." FB!

In the spring a ham's fancy turns to thoughts... well, maybe of conventions and hamfests and such. Mark the National at Montreal as #1 for this year. Divisional conventions and local hamfests also offer lots of technical and operating info—and fraternalism, too. Watch QST announcements of coming affairs and convince the XYL you should schedule your vacation accordingly.

Sneak preview—The World Scout Jamboree is being held in Farragut State Park, Idaho and there will be an exhibition station under the call K7WSJ August 1-9 and especially for the "Jamboree-on-the-Air" August 5-6. More details later.
Solid-State Receiver Design with the MOS Transistor

In Two Parts — Part I

BY GEORGE T. DAUGHTERS,* WB6AIG, ex-K9KDE, WES HAYWARD,** W7OJ, ex-WASUVR, and WILL ALEXANDER,*** WA6RDZ

In the past decade, there has been considerable evolution in the trends affecting the design of communication receivers. Prior to 1956, the better amateur-band receivers were multiple-conversion affairs with a first intermediate frequency of a few megacycles and a second in the range of 50 to 500 kc. The relatively-high first i.f. was used to insure good image rejection while the lower second i.f. easily yielded good adjacent-channel selectivity. In 1957, a paper by Goodman¹ emphasized the drawbacks of such a design. Goodman stated that in the typical multiple-conversion receiver, signals are significantly amplified before being subjected to the high selectivity of the second i.f. amplifier. Due to these high signal levels, severe cross modulation and receiver desensitization often occurred when a strong signal out of the i.f. passband was applied to the receiver. Goodman then suggested that the optimum design would be one wherein the selectivity in the receiver was obtained at a low signal level as possible. This is easily achieved by using a high-frequency crystal lattice filter at the first intermediate frequency. Indeed, modern crystal lattice filters are selective enough that a second conversion is usually redundant.

Following Goodman’s paper, several receivers were built applying these ideas. It soon became apparent that the cross-modulation performance of these receivers, although improved, was still lacking due to nonlinearities in the r.f. amplifier and mixer stages used ahead of the crystal lattice filter. Front-end design was finally optimized by Squires² through the use of a beam deflection tetrode mixer coupled directly to the antenna with no r.f. stage. The result was a receiver which was essentially free of spurious responses.

Concurrent with the developments described above was the introduction of good solid-state active devices. Hence, the all-transistor receiver became quite popular among amateur experimenters. Most of the more extensive solid-state ham receivers have been multiple conversion affairs such as those described by Priebe³ and Harris⁴. A notable exception is the single-conversion transceiver of Vester⁵. Typically, severe cross modulation was encountered. With transistors, the problems are, in general, even more severe than with tubes. This cross-modulation problem has been the only fundamental limita

The field-effect transistor has provided the solution to one outstanding difficulty with transistors in communications receivers — susceptibility to cross modulation. This article discusses the application of modern design principles to solid-state receivers, with Part I covering the front end. Written primarily for the experimenter having some experience in receiver building, it is an “idea” article rather than a "nuts-and-bolts" construction piece.

* Palo Alto Medical Research Foundation, Palo Alto, Calif.
*** Fairchild Semiconductor, Mountain View, Calif.
¹ Goodman, “What’s Wrong with our Present Receivers?” QST, January, 1957.
C1 — Silver mica; see Table I for values.
C2 — Midget variable, 150 pf. or more maximum capacitance.
C3 — Compression trimmer, 50-380 pf. (Arco 465 or equivalent).
C4, C5, C6 — Disk ceramic.
J1, J2, J3 — Miniature coax fitting, chassis mounting.
L1 — See Table I.
L2 — 20 turns No. 24 enam. on toroid ferrite core, i.d. \( \frac{1}{4}" \), o.d. \( \frac{3}{8}" \) (Arnold A4-310-125-EF or equivalent).
L3 — 3 turns No. 24 enam. wound over L2.
L4 — 40 turns No. 32 enam. on same type core as L3.
L5 — 10 turns No. 32 enam. wound over L4.
Q1 — Field-effect transistor (Fairchild FT57).
R1, R2 — ½-watt composition.
S1 — Ceramic rotary, 4 poles, 5 positions (for 5 bands), number of sections and assembly hardware required depends on mixer-oscillator layout.

The Front End

As implied before, several different front-end configurations were tried. The circuit finally chosen is shown in Fig. 1. Signals from the antenna are introduced to the mixer front end through a high-Q tuned circuit. The mixer itself uses a new metal oxide silicon transistor (MOST) that was recently introduced by Fairchild Semiconductor and sells for $9.00 in unit quantities. For those unfamiliar with the newer MOST and field-effect transistor (FET) devices, they have circuit characteristics very similar to a...
Fig. 3—High-frequency oscillator and buffer circuit. Although not shown in this diagram, an output coupling capacitor (0.05-μf, disk ceramic) must be inserted in the lead from the top of R11 to J4 to avoid short-circuiting R11 by the mixer-injection link of Fig. 1.

C1—Silver mica; see Table I.
C2—Silver mica; value to be selected to give desired tuning range with C3.
C4—80-pf. variable; oscillator tuning (Johnson 149-4 or equivalent).
C5, C10, C12—Silver mica.
C11, C12, C14, C15—Disk ceramic.

pentode vacuum tube. In the mixer shown, the local-oscillator voltage is injected on the substrate electrode (in normal amplifier applications, the substrate is connected directly to the source). The local-oscillator injection level is somewhat critical in this circuit. An injection voltage of 4 to 8 volts peak-to-peak should appear on the substrate as measured by an r.f. probe and v.t.v.m. or a high-frequency oscilloscope. If the injection drops below 4 volts peak-to-peak, the conversion gain drops drastically. With approximately 5 volts peak-to-peak injection on the substrate, the measured conversion gain was 17 db. Proper injection level in the HBR-TR is provided by a simple broad-band r.f. transformer wound on a small toroid core.7

When using a mixer front end it is imperative that the mixer noise figure be minimized. The MOST mixer used in the HBR-TR exhibited an adequate noise figure on the bands below 11 Mc. The input signal level for a 6-db. ratio of signal-plus-noise to noise was only 0.14 microvolt. This compares favorably with many commercial receivers having an r.f. amplifier stage. However, since mixer gain is low in comparison to the normal r.f.-amplifier-mixer combination, some consideration should be given to minimizing noise in the first i.f. amplifier, and to minimizing loss in the crystal filter. This will be discussed further in the section describing the

7 A kit of 5 small suitable toroid coil forms is available for $1.50 postpaid from Aleom Electronics, 2025 Middlefield Road, Mountain View, California 94040. Fairchild transistors are available through any Fairchild distributor.

Fig. 4—Etched circuit board for local oscillator and buffer. Components to left of dashed line are not on the board. Board may be any size adequate to accommodate the layout shown inside dashed lines.
The mixer coil assembly in a receiver constructed by one of the authors. The small circuit-board at the right contains the 3.5-Mc. crystal calibrator shown in Fig. 5.

Voltage of several hundred volts—enough to destroy the device. It is thus imperative that special care be taken when soldering an MOST into a circuit. A technique used by the authors is the following: A 5-inch piece of stranded hook-up wire is stripped of its insulation, and a single strand is then separated. This very small wire is wrapped around all of the MOST leads, directly adjacent to the metal can. The device is then soldered into the circuit. After this, the small wire is removed.

Another consequence of the very high input impedance of the MOST mixer is the fact that there is negligible loading of the input tuned circuit due to the mixer. Very high input Qs are thus easily obtained. The Airdux coils used in the front end should be mounted a diameter away from metal walls to maintain optimum Q.

The single profound advantage of the MOST mixer is its immunity to cross modulation. A 10-mv, "desired" c.w. signal was injected into the receiver through the 50-ohm antenna input, and a variable-amplitude 30-percent-modulated "undesired" signal was also introduced, inside the r.f. passband but outside the i.f. passband. Ten percent modulation of the desired signal occurred at a level of 100 millivolts of undesired signal. The desired signal decreased by 1 db, for an undesired-signal level of 20 millivolts. With the step-up in the input tuned circuit, it is easily seen that these are large voltages at the MOST gate. Work is presently being done in the expectation of further improving the performance.

It would be worthwhile to mention briefly the general results obtained with a more conventional front end. One of the initial experimental receivers used a conventional common-emitter r.f. amplifier followed by a standard mixer with the local oscillator injection being applied to the emitter. It was found that if the r.f. and mixer were biased to larger-than-normal collector currents, the cross-modulation characteristics were significantly improved. However, transistors must be chosen carefully so that a low noise figure can be maintained at the higher current levels. In this case, a 2N3564 was used in the r.f. and in the mixer, with a collector current of 10 ma. in each. The result was a receiver with much better cross-modulation characteristics than an earlier transistor receiver built by one of the authors. The performance did not, however, approach that obtained with the MOST mixer front end.

The Local Oscillator

The band-switched local oscillator used is shown schematically in Fig. 3. The criteria used in its design were simplicity, ease of band-switching, and a reasonable degree of stability. The circuit is essentially a simple Colpitts oscillator that is followed by an untuned buffer and

---


Fig. 5—Crystal calibrator circuit.

C5—Compression trimmer 50-380 pf. (Arco 465 or equivalent); may be omitted if exact adjustment of frequency not essential.
C15, C26, C36—Disk ceramic.
Q6—2N3643 (Fairchild) or equivalent r.f. amp. type.
R16, R17—1/2-watt composition.
S7—S.p.d.t. toggle or slide switch.
V1—Marker crystal, 500, 1000, 3500 kc., etc.
direct-coupled emitter follower. As is typical of emitter followers at high frequencies, the output impedance is a function of frequency. However, over the frequency range employed the output impedance is less than 50 ohms, and a voltage of 1.5 volts peak-to-peak is available. The isolation between the oscillator and mixer is excellent and there is no tendency toward “pulling.” No temperature compensation is used in this oscillator, and as a result there is some drift with variations in ambient temperature. Under normal conditions this is not severe, and the stability is sufficient for 10-meter S.B. work. The more critical experimenter may wish to consider temperature compensation.

In the coil data given in Table I for 80 and 40 meters the local-oscillator frequency is higher than the frequency being received, and on 10, 15 and 20 meters, the local-oscillator frequency is lower than the frequency being received. This is done so that whenever the b.f.o. is adjusted for the sidetone in common use on any given band the same b.f.o. setting may be maintained for all bands.

The usual practices of oscillator construction should be followed when building the oscillator. Fig. 4 is the layout for a printed-circuit board for the oscillator. Alternately, Vector board and flea clips may be used. In either case, the board should be mounted firmly to the chassis.

**Crystal Calibrator**

Shown in Fig. 5 is a schematic of a simple crystal oscillator which is used to provide band-edge markers up through 10 meters. Clearly, the prospective constructor could use any one of several calibrator circuits.

The second part of this article will describe the 9-Mc. i.f. amplifier, product detector, audio amplifier and Q-multiplier, audio-derived hang a.g.e. system, and power supply.

---

**Attention radio amateurs who were former wireless operators and all other members of the communications branch of the Royal Canadian Navy and Royal Canadian Naval Volunteer Reserve who trained at H.M.C.S. St. Hyacinthe (Naval Signal School) in St. Hyacinthe, Quebec, Canada. The city of St. Hyacinthe, as their Centennial project, and to commemorate Canada’s 100th birthday, is sponsoring a reunion of personnel who were stationed at the naval signal school during World War II. The program is planned from mid-June to mid-July 1967, with a reception to be held during the weekend of the National Convention. July 1. St. Hyacinthe is about 30 miles from the convention in Montreal. Priority of accommodation will be given to former naval personnel and their families wishing to attend. For further information and reservations write to Tourist Promotion Committee of St. Hyacinthe, 1555 rue des Cassades, St. Hyacinthe, P. Q. or to VE3BD or VE3MF.**

---

The Post Office Department promises faster mail service with the new Zip codes. Use yours when you write League Headquarters. Use ours, 06111.

April 1967 15
A 90-Watt Amplifier For 2 Meters

A.M., C.W., and S.S.B.

with an 829-B

There are those who would look scornfully at tubes as archaic as the 829-B, but economics and availability can be as monumental to some as building the rig and getting it to work properly. This article describes a low-cost amplifier assembly that is easy to get operating and can be powered by an old TV transformer.

BY DOUG DEMAW,* W1CEW

The desire to build a low-budget, mediumpower amplifier for 2 meters is often frustrated by modern-day trends that seem to dictate the need for up-to-date tubes with their expensive hardware. Although such members of the v.h.f. component family are desirable for the generation of very high power levels at reasonable efficiency, the cost of the tube, or tubes, the sockets, and the cooling fan places the total price beyond the reach of many hams with modest incomes. Admittedly, tubes such as the 4CX250 can be garnered from time to time at reasonable prices. Similarly, the sockets and blower fans can be gleaned from bargain-house bins. But once the initial price barrier is hurdled by such judicious shopping, there is still the matter of financing a 1500-to 2500-volt plate supply for the rig. Doubtless, after all of the figures are totaled up, the prospective builder is ready to go back to another year or two of operating his “Communicator,” or similar low-power rig, while he thinks the situation over. This article, then, is slanted toward those constructors who are necessarily frugal in the hobby-expense department, and who feel that a rig in the 90-watt class is ample for their needs.

This amplifier could rightfully be called an updated version of the 829-B assembly that appeared in QST a number of years ago. More recently, the same circuit was published in The Radio Amateur’s V.H.F. Manual. Improvements over the original amplifier include a linear tank circuit for better circuit Q, a broad-tuned grid circuit, unbalanced input and output circuitry for matching into coax lines, an output loading control, and a shield box over the top of the amplifier to lessen shock hazard and to confine the r.f. energy. The 829-B tube was selected because of its bargain-house availability and because many a v.h.f. ham has then in his private “goodie” cache. These tubes are often bartered at swap-and-shop sessions, too. Since 90 watts is a practical power level for general operating and moderate DXing, the 829-B is a “natural.” It can be used without a cooling fan, or with one if a few extra watts of power are desired. The tube socket is readily available and is quite inexpensive. All in all, the unit described here is a practical, low-cost approach to moderate-power operation.

The Circuit

The linear tank inductor, $L_2$, of Fig. 1 provides better circuit Q, contributing to better efficiency than is possible with lumped-inductance circuits of the type used in the earlier model. The inclusion of $C_3$ in the return side of $L_1$ gives some control over the loading of the amplifier. Output from the amplifier is taken at $J_2$ and is coupled into either a 50- or 75-ohm unbalanced load.

Drive to the 829-B is applied at $J_1$, also from a 50- or 75-ohm unbalanced line, and fed to $L_2$ through coupling link $L_4$. A fixed capacitor, $C_1$, is connected between the return side of $L_1$ and

*Assistant Technical Editor.
Looking into the bottom of the chassis, the feed-through bushings for plate power and r.f. output are at the left. Coax cable is used for the high-voltage d.c. lead. Wide copper straps are used to ground the filament and cathode pins of the tube socket. A hood is used over the back side of L2, lower right, to help isolate the input from the output.

ground, tuning out much of the reactance of L1. A 3-to 30-pf. trimmer can be substituted if more precise adjustment is desired. No tuning capacitor is used with L2 because the input capacitance of an 829-B is rather high. L2 is resonant with the tube capacitance and is adjusted by squeezing or spreading the coil until the circuit is resonant at about 145 Mc. It is possible to QSY from 141 to 145.5 Mc, with no noticeable decrease in 829-B grid current.

Neutralization was not required in the model shown. Should the builder desire to include a neutralization circuit, information is available concerning this simple technique.²

Construction Notes

The amplifier is constructed on a 3 × 5 × 10-inch aluminum chassis. The top deck of the assembly is boxed in by an aluminum cage which


---

<table>
<thead>
<tr>
<th>Diagram of the 2-meter amplifier.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C₁ — 27-pf. silver mica.</td>
</tr>
<tr>
<td>C₂ — 18 pf. per section, butterfly variable (E. F. Johnson 167-22 with 3 stator plates removed from each side. Also, two rotor plates are removed).</td>
</tr>
<tr>
<td>C₃ — 50-pf. variable (Millet 20050).</td>
</tr>
<tr>
<td>C₄ — 0.001-pf. transmitting ceramic (Centrelab 858S).</td>
</tr>
<tr>
<td>C₅ — L₁ — 1000-volt disk.</td>
</tr>
<tr>
<td>L₁ — SO-239 connector.</td>
</tr>
<tr>
<td>L₂ — 2 turns No. 22 insulated hookup wire in center of L₂.</td>
</tr>
<tr>
<td>L₃ — 5 turns No. 20 solid, tinned wire, 1/4-inch diameter by 1/2 inch long (see text).</td>
</tr>
<tr>
<td>L₄ — Plate inductor. See Fig. 2 for dimensions.</td>
</tr>
<tr>
<td>L₅ — 6-inch length of No. 12 enam, wire bent into a U with 1/4-inch spacing between sides (cover with spaghetti tubing).</td>
</tr>
<tr>
<td>RFC₁, RFC₂ — 1.72 mH choke (Millet RFC-144).</td>
</tr>
<tr>
<td>TB₁ — 5-terminal barrier strip (Millet 37305).</td>
</tr>
</tbody>
</table>

---

April 1967
to be stable. The 0.001-m. capacitors at pins 3 and 5 should be returned to pin 4, using the shortest leads possible.

The grid coil, L3, is suspended between the grid lugs on the tube socket. Link L1 is inserted into the center of L3 and is later adjusted for optimum coupling. A 3-lug terminal strip is attached to the rear inner wall of the chassis and is used to support C1 and L1. A 5-terminal barrier strip, J3, mounted on the rear of the chassis is used for connecting the amplifier to its power supply.

The r.f. input and output connectors, J1 and J2, are located opposite one another on the rear of the chassis. A UC-106/U shield hood is used to cover the back side of J3. This helps to isolate J1 and J2, reducing the possibility of stray coupling between the input and output terminals of the unit. To reduce further the chance for stray coupling, coaxial cable is used to connect J3 to L3. A second piece of coaxial line is used to carry the B-plus from J3 to the feedthrough bushing at the front of the chassis.

Details for building the plate tank assembly are given in Fig. 2 at B and C. It is important that the stator posts of C3 be soldered to L3 along their entire length. This helps to keep lead inductance at a minimum—an important consideration in v.h.f. circuits. The narrow slots in the plexiglass mounting block can be cut with a keyhole-type hack saw after first making a pilot hole at the start of each slot. The pilot hole can be made by drilling three or four small holes in a row, so that they touch one another, then routing out the plastic between them until there is room to insert the tip of the saw in the plexiglass. L3 should be slipped into place in the slots prior to soldering C3 to L3.

C3 is mounted just above L3 on the plexiglass block. A shaft coupling and a length of insulated be no metal in the immediate field of L3, and so the rotor of C3 will not be grounded. The low-impedance end of L3 is supported above the chassis by a 1-inch long steatite insulator. A No. 6 spade bolt is attached to the exact center of the bend in L3, and is then threaded into the steatite insulator. The link, L4, is supported between one stator post of C3 and the feedthrough bushing to which J3 is connected. C4 is mounted on the front panel of the shield cage. Its rotor should be grounded, also, to the main part of the chassis, using a large bus wire and a solder lug.

In this model, L3 is made of brass and is silver plated. Although the plating wasn’t necessary, it resulted in a neater-looking job. Plain brass or copper would have worked just as well. The important thing to remember is that the plate lines should be polished until very clean. All edges should be filed until smooth. After the plate tank is completely assembled on the chassis, a coating of clear lacquer can be placed on L3 to prevent it from tarnishing.

Fahnstock clips are used for plate connectors on the 829-B. L3 and the Fahnstock clips are joined by 1/2-inch-wide connecting strips. The strips can be made from brass or copper, but should be fashioned from thin material so as to be a bit flexible. This will prevent undue stress from being exerted on the plate pins of the tube. To contribute further to this end, the links are drilled, as shown in Fig. 2C, to accommodate No. 6 screws: when assembling the tank, 4-40 hardware is used in those No. 6 holes, allowing sufficient play at the joints to permit tightening the connections without exerting pressure on the 829-B plate pins. The tube should be seated squarely in its socket before the joints are tightened. Lock washers should be used to assure long-term tightness of each connection.

14-inch diameter shaft material are used to make C3 tunable from the front panel. Wooden dowel rod can be used for the tuning shaft if phenolic or plastic rod is not available. The insulated shaft is necessary so that there will be no metal in the immediate field of L3, and so the rotor of C3 will not be grounded. The low-impedance end of L3 is supported above the chassis by a 1-inch long steatite insulator. A No. 6 spade bolt is attached to the exact center of the bend in L3, and is then threaded into the steatite insulator. The link, L4, is supported between one stator post of C3 and the feedthrough bushing to which J3 is connected. C4 is mounted on the front panel of the shield cage. Its rotor should be grounded, also, to the main part of the chassis, using a large bus wire and a solder lug.

In this model, L3 is made of brass and is silver plated. Although the plating wasn’t necessary, it resulted in a neater-looking job. Plain brass or copper would have worked just as well. The important thing to remember is that the plate lines should be polished until very clean. All edges should be filed until smooth. After the plate tank is completely assembled on the chassis, a coating of clear lacquer can be placed on L3 to prevent it from tarnishing.

Fahnstock clips are used for plate connectors on the 829-B. L3 and the Fahnstock clips are joined by 1/2-inch-wide connecting strips. The strips can be made from brass or copper, but should be fashioned from thin material so as to be a bit flexible. This will prevent undue stress from being exerted on the plate pins of the tube. To contribute further to this end, the links are drilled, as shown in Fig. 2C, to accommodate No. 6 screws: when assembling the tank, 4-40 hardware is used in those No. 6 holes, allowing sufficient play at the joints to permit tightening the connections without exerting pressure on the 829-B plate pins. The tube should be seated squarely in its socket before the joints are tightened. Lock washers should be used to assure long-term tightness of each connection.
<table>
<thead>
<tr>
<th>Operation</th>
<th>$E_p$</th>
<th>$I_D$</th>
<th>$E_{x2}$</th>
<th>$I_{x2}$</th>
<th>$E_{x1}$</th>
<th>$I_{x1}$</th>
<th>$Drive$</th>
<th>$P_{out}$ (Approximate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class C.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.M.</td>
<td>600 v</td>
<td>150 ma</td>
<td>200 v</td>
<td>16 ma</td>
<td>-60 v</td>
<td>7 ma</td>
<td>0.5 w</td>
<td>70 w</td>
</tr>
<tr>
<td>C.W.</td>
<td>750 v</td>
<td>160 ma</td>
<td>200 v</td>
<td>17 ma</td>
<td>-50 v</td>
<td>7 ma</td>
<td>0.9 w</td>
<td>90 w</td>
</tr>
<tr>
<td>Forced-Air</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.M.</td>
<td>600 v</td>
<td>200 ma</td>
<td>200 v</td>
<td>20 ma</td>
<td>-70 v</td>
<td>13 ma</td>
<td>1.1 w</td>
<td>90 w</td>
</tr>
<tr>
<td>C.W.</td>
<td>750 v</td>
<td>200 ma</td>
<td>200 v</td>
<td>20 ma</td>
<td>-50 v</td>
<td>12 ma</td>
<td>0.8 w</td>
<td>115 w</td>
</tr>
<tr>
<td>Class A/B1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Convection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S.S.B.</td>
<td>600 v</td>
<td>110 ma</td>
<td>200 v</td>
<td>26 ma</td>
<td>-18 v</td>
<td>0</td>
<td>0</td>
<td>44 w</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(max.)</td>
<td>(max.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(reg.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum ratings for ICAS use with natural or forced-air cooling, as specified by the manufacturer, RCA.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Operating Data**

Table I gives operating voltages and currents for Class C and A/B1 use. Although these are the voltages preferred by the author, other values can be used if the operator desires. Data for several different ranges of voltage, current, and power are given in the manufacturers' tube tables. If a 450-volt supply is desired, a trans-

*(Continued on page 149)*
An Antenna for the Traveling Man

Compact System for

Multiband Operation

This portable multiband antenna collapses into a package only 19 inches long.

BY J. SANTANGELO, * WINXY

For the past several years I have been traveling throughout the country on business trips. About three years ago I decided it would be desirable to bring an h.f. rig along with me on these trips. I purchased a transistor transceiver that required only the microphone and a 50-ohm antenna system to be operational. The transceiver also has provided me with mobile operation, a feature that has proved very enjoyable and is a significant bonus.

For portable operation, the item that is least standard, yet the most cumbersome for operating on 80 through 15 meters, is the antenna system. Requirements of an antenna for my purposes meant, basically, light weight and portability. The antenna system that evolved over the past three years is functioning exceptionally well. It includes a surplus part, a few standard parts, and some ingenuity! Primarily, the antenna consists of a 127-inch collapsible whip (AN-131A, surplus), a multiband loading coil, approximately 30 μH maximum (Master Mobile type 333), a homemade bracket, 12 feet of coaxial cable (RG-58C/U), and an inexpensive adjustable C clamp (Stanley No. H-157).

The AN-131A collapsible whip is available from some surplus supply houses in various parts of the country. It weighs about a pound,

*194 Barbara Road, Waltham, Mass. 02154.

and consists of eight sections of thin-wall tubing with a cable through the center. The cable is spring-loaded to the base section, the spring holding the pieces in place when the sections are assembled. The antenna folds into a package about 17 inches long and 1 1/2 inches in diameter. When extended, it is 127 inches long, and can be used on 15 meters, with the loading coil completely shorted out.

The Master Mobile coil has been popular as a center-loading coil for mobile operation, and was designed to cover 40 through 10 meters with an 8-foot whip. The 10 1/2-foot length of the AN-131A makes it possible to operate on 80 meters as well. With the longer antenna, 10-meter operation requires that the top section or two be folded back. However, my use did not require anything below 15 meters; therefore I simply moved the adjustable tap to short out the coil completely for 15-meter operation.

The coil has a female 3/8 × 24 thread at both ends, which accommodates the AN-131A whip antenna directly. The lower end of the coil is fastened to the window bracket with a bolt of suitable length, and insulating material, as shown in Fig. 1A. The bolt must be insulated from the metal bracket. This can be accomplished with a shoulder washer (or flat washers) and insulating tubing over the bolt, or a machined piece may be

![Fig. 1](image-url) — Sketches showing dimensions of the mounting bracket and details of the coil-mounting insulation.
made of nylon or Teflon. An effective shoulder washer can be made by stacking different-size flat washers. It is also possible to use phenolinsulating washers. Don’t overlook faucet washers, available in most hardware stores. Since the antenna is not exposed to the elements for any great length of time, almost any good insulating material should be satisfactory. If sufficient attention is given to insulating, connectors, and cable, the only limiting factor for power capability is the loading coil.

The bracket is aluminum, although it could be fabricated from other metal. It is bent so that the coil and whip are at a 45-degree angle when clamped to a window sill. The length of the whip is such that the tip is virtually horizontal. About 12 feet of RG-58C/U cable is used, although the length is not critical. The shield is fastened to the bracket, and the center conductor is connected to the lower end of the coil. In addition, about a foot of flexible wire with a large battery clamp is joined directly to the metal bracket, as shown in the photographs. The bracket in use for this antenna is made of a piece of aluminum 3/16 inch thick and about 14 inches long, with three bends in it as shown in Fig. 13.

With all parts assembled, a trial run was performed, using a v.s.w.r. bridge to check out the matching capability of the combination. The antenna was initially set up for tests by running it out through the shack window, and utilizing the aluminum storm/screen window as the ground plane or counterpoise. Tests were made on each of the amateur bands. The sliding bar on the coil was adjusted for minimum v.s.w.r. on each band, and the position scribed on the bar for future reference. The v.s.w.r. was found to be less than 2 to 1 on all bands, varying from approximately 1.2:1 to about 1.8:1. This was considered adequate.

The antenna system has been used for over two years on all bands, at different hotels and motels. The only requirement is to be able to open the window! The first few times out I carried all kinds of extra paraphernalia, such as several 35-foot lengths of wire (emergency counterpoise), small portable v.s.w.r. bridge, extra lengths of coaxial cable, small tools, a.c. extension cord, and several kinds of coaxial adapters. After much use of this truly portable antenna, the “excess baggage” has been cut down to a small screwdriver. This has been used primarily to show visitors the inards of the transceiver, and improve the vertical height and linearity of the TV set which is on during ham activities! So far, I’ve had no TVI at any of the various operating locations.

The cost of this portable antenna depends on the ingenuity of the user. As a matter of fact, it is quite probable that exact duplicates of the coil and/or the collapsible antenna may not be available in some localities. However, equivalents can be home-brewed, or other available mobile-antenna components adopted for use, depending on the band or bands of operation desired. Stainless steel hardware is nice, if available, but is not functionally necessary.

The total weight of the antenna, including feed line, C clamp, and bracket, is about three pounds. The antenna breaks down into three separate parts, the longest being the coil and bracket assembly which is about 19 inches long. The whip is 17 inches long, when collapsed, and the C clamp has a length of 9 inches. All of these pieces will fit easily into an attaché case, or can be distributed among the clothing in a one- or two-suit. The total weight for my portable ham station is less than 25 pounds.
Antenna Rotators and Indicators

In Two Parts

Part I—Rotators

BY E. LAIRD CAMPBELL,* WICUT

It is a distinct advantage to be able to shift the direction of a beam antenna at will, thus securing the benefits of power gain and directivity in any desired compass direction.” So says the ARRL Handbook introduction to the section on rotary-beam construction. But how do you rotate your antenna? Do you use electric motors, systems of pulleys and ropes, or do you rotate by hand? All are perfectly good schemes. However, before going into some of the details on the different mechanical methods of changing the direction of a beam antenna (and a system for indicating the beam direction), here is a short discussion of some important rotator factors.

Wind-Loading Requirements

Bending moment. Loads acting on the antenna, rotator, and tower are essentially the same as those acting on buildings and other structures. Wind loading is by far the most critical. The design wind load is usually set up from reference to U.S. Weather Bureau reports and maps for each locality, and it varies from a recorded 132 m.p.h. in Miami to 40 m.p.h. in Los Angeles.

When considering the loads experienced by the rotator, it will be necessary to know the wind pressure developed against the antenna surfaces. This means that the total antenna area must be known, a figure that is rarely seen in advertising or catalogs. However, if the antenna area is known or can be calculated, the pressure developed against an antenna surface runs approximately in accordance with the formula:

\[ P = eV^2 \]

where \( P \) is the pressure in pounds per square foot of projected area, \( e \) is a constant (0.0025 for cylindrical surfaces), and \( V \) is the wind velocity in miles per hour. The EIA (Electronic Industries Assn.) has recommended a wind-loading standard of 30 lbs. per square foot of projected surface, which corresponds to a velocity of 110 m.p.h. when calculated in accordance with the above formula, although 40 and 50 pound areas do exist along the Gulf and Atlantic seaboards. However, the use of the above data in design procedures should lead to an antenna system able to withstand average wind conditions. The areas and wind loading of some amateur beam antennas are shown in Table I.

Once the projected area has been found or estimated and dropped into the formula, and the pressure (which in the case of wind is in a horizontal direction) in pounds per square foot is known, what will be the force (bending moments) on the rotator? A look at Fig. 1 shows the bending moment on a rotator resulting from a 110 m.p.h. wind against an antenna with a 10-square foot area, which is mounted 1 foot above the rotator. The bending moment is found simply by multiplying the resulting pressure \( P \) (from the above formula) — 30 pounds per square foot, by the antenna area — 10 square feet, by the distance between the antenna and the rotator — 1 foot. The resulting bending moment of 300 pound feet would jump to 600 pound feet if the antenna were 2 feet above the rotator, or 1200 pound feet at four feet! Thus an important rule: To keep bending moments low, place the antenna as close as is practical to the rotator. Of course, the use of a bearing between the rotator and antenna will reduce the bending moment applied to the rotator.

Now that you know the bending moment for your particular antenna/rotator system, how do you know if the rotator is capable of withstanding

---

Fig. 1—The bending moment on the rotator is found by multiplying the wind pressure, \( P \), by the antenna area and by the distance between the antenna and rotator.

* Managing Editor, QST

QST for
these forces? Unfortunately you probably don’t, since there are no published ratings given for most amateur antenna or TV-antenna rotators.

The writer has observed informal tests made on various TV and ham rotators. The photograph in Fig. 2 shows one such test to determine bending moment capability. The rotator under test is clamped to a table, but with the rotating drive shaft in a horizontal position. A mast is attached to the shaft and a bucket of sand of known weight is hung on the mast. As the bucket is moved down the mast away from the rotator, greater and greater bending-moment forces are applied to the rotator. Finally, a point is reached where the forces are too much for the rotator and it fails. In these tests, a series of rotators made by one manufacturer failed first in the area of the ball bearings and bearing races. As bending moments built up, the forces were concentrated on the ball bearings which circle the outer center rim of the rotator housing. When the forces reached the breaking point, the ball bearings actually started pushing through the aluminum casting. Even before the failure occurred, the bearings would indent the bearing race, causing the rotator to grind to a halt. Finally, the rotator mounting hardware sheared off.

Another unit tested showed failure in a different area. When the bending moments finally reached the limit for this unit, the nuts that thread onto the studs that attach the rotator to the mast where literally pulled off. Or, if the nuts held, the studs themselves were pulled out of the rotator housing. However, after this failure, the rotator was still functioning.

The bending moments at time of failure were in the 800 to 1000 pound feet range for one make of rotator which was higher than any of the other units tested.

Running Torque and Windmilling. Another important feature of the rotator is that it should not windmill (rotate as a result of wind pressure). If the rotator does not have an effective braking system, the wind can cause the antenna to rotate, or will in some cases actually strip the drive and motor gears. If a torque wrench is available, you can determine the “windmill rating” of your rotator. Simply attach the wrench as shown in Fig. 3 and try to turn the drive shaft, with the rotator held fast, of course. At the point where the shaft begins to turn, read the torque, which is usually in pound feet. The torque imposed by a given antenna is difficult to estimate since the value will depend on the nonuniform wind distribution on the antenna. Under certain wind conditions, the antenna will want to “weather vane,” so if strong winds are forecast for your area it’s a good idea to turn your beam “into the wind.” In the case of horizontal beams, this is usually with the wind looking into the ends of the elements.

The running torque rating of your rotator can be found by holding the wrench fast (and thus the shaft) and turning on the rotator. The rotator

![Table I](image)

<table>
<thead>
<tr>
<th>Name</th>
<th>Wind Load</th>
<th>Velocity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Wind Load</td>
<td>Velocity</td>
</tr>
<tr>
<td>Mosley TA36</td>
<td>69</td>
<td>210.1</td>
</tr>
<tr>
<td>Mosley TA33</td>
<td>40</td>
<td>144.0</td>
</tr>
<tr>
<td>Hy-Gain TII-2</td>
<td>19</td>
<td>85.9</td>
</tr>
<tr>
<td>Hy-Gain TII-3</td>
<td>29</td>
<td>144.0</td>
</tr>
<tr>
<td>Telrex 3-el 20 M.</td>
<td>48</td>
<td>184.0</td>
</tr>
<tr>
<td>Telrex 4-el 20 M.</td>
<td>108</td>
<td>382.0</td>
</tr>
<tr>
<td>Telrex 6-el 20 M.</td>
<td>176</td>
<td>533.0</td>
</tr>
</tbody>
</table>

Fig. 3—A torque wrench is attached to a rotator for a running-torque and “windmilling” test.
will run for a moment until it can no longer overcome the force of the fixed wrench. The running torque is then read from the wrench.

One factor that has not been treated is the importance of the antenna weight. Except for small rotators, antenna weight may not be significant, but it does place a limitation on the length and material of a drive shaft between the rotator and antenna or tower thrust bearing.

Some conclusions. Keep the antenna as close as possible to the rotator; keep the area of the antenna as small as possible; do not use large-area plates which would act as sails in the wind; choose a rotator with a high bending-moment capability and good braking.

Rotating The Antenna

Most rotatable installations use electric-motor drive to turn the antenna, although the “Jack Armstrong” method is practical. If hand rotation is used, the antenna must be within easy reach of the operator and the system usually requires some sort of brake or locking scheme, so that the drive shaft will not windmill when unattended. Other mechanical systems involving belts or chains can be devised, and even direct-drive is possible when the operating position is on a floor directly beneath the roof of the house so that a pipe can project through the roof of the shack.

When it comes to motor drive of the antenna, there are several possible choices: TV-antenna rotators, amateur antenna rotators, prop-pitch motors, and home-devised drives made from converted motors and gear boxes from washing machines.

Home-Devised Drives

In assembling a motor-drive system from available parts, the principal difficulty is likely to be the acquisition of a suitable gear train. Gear trains can be assembled from gears purchased now for the purpose, but it is also possible to find suitable ones in discarded appliances such as washing machines. The bearing for the rotating shaft that supports the antenna should be good but, since the system involves a speed-reduction system, enough torque will usually be developed to overcome minor bearing frictions. A motor capable of delivering \( \frac{1}{2} \) horsepower is usually sufficient. The reduction gears will act as a brake for the system so that it does not coast too far past the position at which the power was shut off. The builder usually has to exercise some ingenuity in devising a mechanical system that permits adapting materials that may be useful in a rotator.

Prop-Pitch Motors

World War II surplus provided the popular prop-pitch motor (an aircraft propeller-pitch feathering motor) and although somewhat scarce today on the surplus market, it seldom fails to appear at ham auctions or swap fests. The motor and gear train have a tremendous amount of torque since the gear reduction ratio is something approaching 10,000 to 1! The motor was originally designed to operate from 28 volts d.c. but it will operate on 10 to 30 volts a.c. or d.c. and is reversible. There are two models, a “large” and a “small.” However, both models are enough alike that conversion information will apply to both.

At 24 volts, the outside gear on the assembly will run at about \( \frac{3}{4} \) r.p.m. This can be speeded up by following the scheme shown below, suggested by W2YLL.

1. Remove the bevel gear;
2. Remove its thrust-bearing plate;
3. Remove the upper case of the speed-reduction unit housing;
4. Remove the large ring gear with the spline on it. The last item is the first thing you will see upon removing item 3;
5. Grind the teeth off the hardened, splined ring gear (not off the splined portion, but off the inside of the ring);
6. Next drill and tap four holes in the gear carrier over which the ring gear was placed. Line the holes up with the holes that already exist in the face of the ring gear, and bolt the two together;
7. Reassemble the whole thing and refill it with oil.

W2YLL points out that the beam will now turn at 4 or 5 r.p.m. but that a more comfortable 1 or 2 r.p.m. can be attained by simply reducing the voltage applied to the motor.

If the prop-pitch motor has not already been converted for “continuous amateur operation,” W6AIQ has a conversion 2 consisting of several steps that can be done in an hour or two.

1. Remove the load balance weight located under the small plate on the outside of the motor;
2. The motor cover is held on by three machine screws which in turn are safety-wired. Remove the safety wire, the three machine screws, and the motor cover;
3. Remove the small rectangular locking lug by removing the safety wire and machine screws which secure it;
4. With an iron bar and hammer, remove the back half of the exposed brake plate by tapping it in a counter-clockwise direction, and lift out the brake shoe from the gear;
5. Remove the cotter key and nut from the motor shaft. Use patience for it may not come off easily;
6. Remove the small gear from the shaft by tapping on the end of the shaft with a soft-nose hammer while applying pressure under the gear with a lever;
7. Lift out all of the remaining brake assembly by removing the three nuts from the inside of the brake plate;
8. To prevent chattering, short out the two contacts that lead to the solenoid coil, with a piece of heavy wire. These are the two nuts that are close together on the edge of the assembly into which the brake unit was formerly seated;
9. Replace motor cover and secure it with the three machine screws;
10. By using the two terminals that are closest together on the outside of the case, and the case

---

itself for the common connector (ground), the motor can now be operated. Using one of the terminals and ground (motor case) the motor will turn in one direction. Using ground with the remaining terminal, the motor will rotate in the opposite direction. Do not remove these terminal wires from their channels in the case casting: this helps to act as a shield. Leads to the motor can be connected by digging the wax out of the terminal points. This will bare a brass screw head which can be used to hold a solder lug for the proper connection. Forget about the two wires on opposite sides of the motor as they are connected to internal switches and have no use for this application.

11) The motor should be treated for r.f.i. A pair of .002 µf. capacitors from the "hot" terminals to the motor case should do the trick. If the electrical "noise" is really bad, coaxial capacitors should be used;

12) The large beveled gear on top outside of the motor should be carefully removed and kept as it affords an opportunity to make use of the radial thrust bearing built inside the gear housing and which can be seen when the gear is lifted off. To the top of this gear, weld a pipe flange which will take a 3-inch pipe nipple 6-inches long. The nipple and flange are also welded together for strength and to prevent loosening. The antenna drive shaft can be a piece of thick-walled aluminum pipe, 2½ inches O.D. One end of this pipe fits nicely over the pipe nipple and rests on the flange. The nipple and aluminum pipe are fastened together with two 10/32 bolts which pass completely through the two pipes at right angles.

Amateur Rotators

At this time, the number of available commercial antenna rotators designed specifically for amateur radio use is small. There have been many different units on the market in years past, and these may still be available at ham auctions or from individuals. At the moment, there are only two rotators that are sold as "amateur antenna rotators." Of course, there are commercial or military models that could be well adapted for amateur applications.

Fig. 4—Telrex rotator.

Telrex. Probably the most rugged amateur antenna rotator is the Telrex series of rotators and indicators (see Fig. 4). All models use a 2-stage worm and worm wheel reducer, which drives a chain-driven mast clamp. The antenna mast goes through the clamp and can then rest on a thrust bearing. Five models in weights from 52 to 110 pounds are available with rotating torques from 1400 to 8500 inch pounds, brake torques from 1500 to 10,000 inch pounds, and drive motors from ½ to 3/4 horsepower. You can see from these figures that these are heavy-duty rotators! They are fitted with selsyn generators, and a standard control console (or rack-mounted control panel) is available that houses the readout indicator and control switches. The system is designed for 360-degree rotation and has limit switches to confine rotation to this amount. The prices of these rotators range from $250 to $600.

Twelve-conductor cable is required. They are manufactured by Telrex Labs, Asbury Park, New Jersey 07712.

Ham-M. One of the most popular amateur rotators is the Ham-M rotator manufactured by CDE (Cornell-Dubilier Electronics), Fuquay Varina, North Carolina. According to the manufacturer, the Ham-M is designed to support "exceptionally heavy antenna arrangements used by amateur radio operators." Fig. 5 shows the Ham-M. Because of its in-line construction, the weight of the antenna and upper mast is carried directly in line with the supporting mast. The rotor, radial and thrust bearings, electrically operated brake, gear train and indicator components are all contained in the elongated bell-shaped housing which is made of aluminum. Here are some of the specifications of the Ham-M as listed by the manufacturer. Input voltage — 115 v.a.c. 60 cycles; motor — 24 v.a.c. 2.25 amps, split phase 10-percent duty; meter — d.c. 5000 ohms/voltmeter calibrated directly in degrees from north (3 or 5 degree increments). The indicating meter circuit is a rotating potentiometer and voltmeter, which will be discussed in Part
If this article. Indicating accuracy — within 5 degrees when calibrated; 360 degree rotation time — approximately 50 seconds. Mechanical stops, along with electrical limit switches, are built into the rotator mechanism. Brake mechanism — positive lock into one of 96 segments which are spaced every 3° 45'. The brake assembly is released by a 21-volt solenoid. A wedge is attached to the solenoid plunger and, when it is positioned for braking, a cam latch locks the wedge in the teeth of one of the drive gears. Rotator dimensions — 8 inches maximum diameter, 20-inches high; weight — 13½ pounds; permissible mast size — 3½ to 21½ inches diameter; cable — 8-conductor required.

If you wish to mount the Ham-M inside a tower, a space 8½ inches in diameter and 15 inches high will accommodate the rotator bolted to a flat plate (without the lower mast clamp attached). To facilitate this kind of mounting, a steel plate, cut to fit against the bottom of the rotator housing, is available from the manufacturer (Kit No. AK-121). This plate carries four heavy bushings drilled to match the screw holes, and will hold the rotator ½ inch above the tower plate. Instructions are included with the kit together with suggestions for thrust bearing for the top mast.

Specifications for allowable bending moment forces for this rotator are not published. Price class: $120.

**TV Rotators**

If proper attention is paid to the wind loading placed upon the rotator, any of the popular TV rotators can be used to turn amateur radio beam antennas. Here is a list of some of the more popular TV rotators available at the moment.

**CDB Model TR-44.** This rotator looks from the outside almost exactly like the Ham-M just described. However, the dimensions show that it is slightly shorter (17½ inches) and weighs less (8¾ pounds). This is probably because the TR-44 does not have the electrically retracted brake mechanism or as many ball bearings as the Ham-M. The indicator is exactly like that of the Ham-M although only 7-conductor cable is needed. Except for the above-mentioned differences, the specifications are about the same as those listed for the Ham-M. This rotator could possibly handle a single small tri-band beam. Price class is $60.

**CDE Model AR-221R.** A light-duty model which might operate safely with a small light-weight 6- or 10-meter beam. The rotator clamps will take masts from 1½ inch through 2 inches. The control box/indicator is marked in points of the compass and the control unit pointer is set to point at the desired position of the antenna. The antenna will then automatically rotate to this position and stop. A manual rotator system (TR-2C) that operates by depressing a touch bar switch is also available. The rotator stops when the switch is released. The antenna position is indicated by back-lighted windows that indicate points on the compass. The automatic system requires 4-conductor cable; the manual system requires 8-wire cable. Price class: $35 automatic, $30 manual.

**CDE Model TR-10.** This inexpensive rotator would probably work with a small v.h.f. or u.h.f. antenna. A steel antenna mast is an integral part of the rotator and the antenna is mounted directly to it. The rotator can be attached to masts up to 1½ inches in diameter. As in the model described above, there are two different control/indicator models available, an automatic and manual. Price class: $25 automatic, $20 manual.

![Fig. 6—Alliance Tenna-Rotor.](image1)

**Alliance Tenna-Rotor Model C-225.** Although advertised primarily as a TV rotator, this unit definitely is a TV or amateur antenna rotator. This husky little rotator, shown in Fig. 6, has tremendous wind-loading properties because of its unique patented construction, and can therefore safely support and rotate rather large amateur beams (see Fig. 7). The secret of the Tenna-Rotor's

![Fig. 7—Typical installation showing a TV rotator (Alliance Tenna-Rotor) and a tri-band beam.](image2)
Stolen Equipment

On January 4, the following equipment was stolen from the home of Donald Yee, WA1ARJ, 549 Middle Road, Haverhill, Mass. 01830: HQ-110C, serial No. 7501; Knight V-44 V.F.O., serial No. 3TW-225; Heathkit Twoer; Knight T-60; Knight V-107 6-meter V.F.O.; 6146 6-meter trans. (National r.f. meter on front) and Pentone and Argone mic.

Lt. Commander R. E. Mickley, USNR reports the following equipment, property of KRBDF, was stolen: Henry 2K linear amplifier, serial No. 411; Collins 3283 transmitters, serial Nos. 13701 and 13046; Collins 7583B receivers, serial Nos. 16537 and 16290; Collins 516F2 power supply, serial No. 2476 and other number not available; Collins station controls, serial Nos. 1695 and 535; Hallcrafters receiver SR-42, serial No. 503333; Zenith transistor all-band receiver, serial No. 3007321; and Collins 312B-3 speaker, serial No. 1324.

This New Year's day marked the successful inauguration of Canada's first amateur radioprinter net 3C3RTT, in regular operation. ARRL President, W8NWX, had filed messages with W1AW addressed to Canada's Prime Minister and Hon. J. W. Pickersgill, DOT's Minister of Transport. All messages were filed to be released at 0000 GMT to start the New Year. A full net session was observed. Six messages were sent to VE3KOL by W1AW on 3624 kc. RTTY. Then VE3KOL sent for USA ARRL officials in return; VE3GK and VE2EII additionally worked W1AW. The Canadian Amateur Radio Teletype Group did itself proud. Since the head of the DOT was in Newfoundland the CARTG relayed on radioteleprinter to 381AT, the Newfoundland Radio Club's station at Gander. The photograph shows Fred L. Biggs 381AT (left) who saw the traffic through, presenting the message to Hon. J. Pickersgill, DOT's Minister of Transport.

April 1967
The Torofil—a QRM Reducer for the Phone Man

Some forms of phone-band QRM can be minimized by the addition of an audio filter at the receiver's output. This is particularly true of receiving equipment that does not have a high degree of i.f. selectivity. By using a filter that attenuates the audio frequencies above 2000 and below 500 c.p.s., much can be done to improve the readability of weak a.m. and s.s.b. signals. Such a filter can, if suitably designed, remove the annoying low-frequency rumble from adjacent-frequency phone signals, and can attenuate high- and low-frequency heterodyne notes that impair readability. Similarly, high-pitched audio components from nearby signals can be greatly attenuated by the use of an audio bandpass filter. A worthwhile reduction in the level of some forms of noise is also a benefit to be realized when using audio selectivity.

When used with receivers that have broad i.f. response the Torofil shown here can make a tremendous difference in the operator's ability to pick the weak ones out of the QRM. With some transceivers, this filter will provide a marked improvement in copying phone signals; the degree of improvement will depend upon the sharpness and skirt selectivity of the i.f. bandpass.

The Sharper the receiver's passband, the less effective the filter will be. When used with the author's s.s.b. transceiver, which has a 2.1-ke. 3-Mc. i.f. filter, there was a very significant improvement when the Torofil was added. The improvement was really startling when the filter was used with a general-coverage communications receiver having only conventional i.f. selectivity.

The Circuit

The Torofil has a narrower passband than most audio filters. It is down 3 db. from peak output at 600 c.p.s. and again at 1900 c.p.s., and is reasonably flat in response from 700 to 1500 c.p.s. The low-frequency rolloff is very pronounced, being down some 10 db. at 500 c.p.s. This characteristic does not affect the intelligibility of a phone signal, but it does impart a somewhat unnatural quality to it.

A significant difference between the Torofil and other audio filters that have been described is that it is designed for use in 4-ohm speaker leads. The insertion loss is in the order of only 3 db., so no additional audio amplification is needed; most receivers have ample reserve gain to make up for the slight loss through the filter.

Telephone-type toroid inductors are used for parts arrangement inside the filter cabinet. The toroids are held in place by a long 6-32 screw, a washer, and a 6-32 hex nut. There is nothing critical about the layout.

[Image of the Torofil ready for use. The switch on the top of the case cuts the filter into and out of the circuit.]
$L_1$ and $L_2$, Fig. 1. Transformers are used at the input and output of the filter to effect an impedance match between the filter and the 4-ohm terminations. The impedance of the filter at 1000 c.p.s. is approximately 500 ohms. This is a handy figure because it enables the builder to use standard 500-ohms-to-voice-coil transformers at $T_1$ and $T_2$.

$S_1$ has been included so the Torofil can be taken out of the circuit at the operator's discretion. When it is switched to off, the filter elements are bypassed and normal operation is restored.

**Construction**

The circuit is built in a home-made box that measures $3 \times 5 \times 2$ inches. (A standard $3 \times 4 \times 5$ Minibox would allow ample room for all of the parts.) Rubber feet on the bottom cover of the box prevent damage to any equipment the filter is placed on.

The toroids are bolted to the chassis with $2^{1/2}$-inch 6-32 machine screws. Plastic washers are used between the inductors, between the chassis and the inductor nearest the chassis, and between the remaining toroid and the metal washer that holds the assembly in place. All of this hardware, except the 6-32 bolt, came with the five-toroid assembly that the author bought. The 6-32 bolt should have spaghetti tubing over it to prevent the bolt threads from damaging the insulation on the coil's windings. Use only enough tension to hold the inductors snugly in place.

**Using the Filter**

To install the Torofil disconnect the speaker from the receiver's voice-coil terminals then connect the filter in series with the speaker line.

For headphone operation a jack that matches the headphone plug can be wired in parallel with $J_2$. Some headphones have restricted frequency response, making it unnecessary to use an audio filter, but others — hi-fi types in particular — will reproduce everything that comes through the receiver's audio line. The Torofil will be a useful accessory when used with the latter.

— WICER

---

Fig. 1 — Schematic of the audio filter. Capacitors are paper. The 560-ohm resistor is a 1/2-watt composition unit, and need not be included in the circuit. It was added originally to prevent possible “ringing,” a condition that will not occur under normal circumstances.

$J_1, J_2$ — Phono connector.

$L_1, L_2$ — Telephone-style toroid inductor, 88 mh. If coil has 4 leads (2 windings), connect the windings in series.

$S_1, S_2$ — D.p.d.t. slide switch.

$T_1, T_2$ — 500-ohm to 3.2-ohm matching transformer (Stancor A-8101 or equivalent).
The "Monode" Noise Generator

Hot-Resistor Noise-Figure Measurement

BY RONALD E. GUENTZLER,* W8BBB

This article describes a noise generator that should find use in amateur work either as a noise source for noise-figure measurements or as a reference source for comparison with the output from some other noise source. It is inexpensive and simple to construct. The "Monode" noise generator is essentially a hot resistor whose noise output is known when the temperature and resistance are known.1 The hot resistor is the tungsten filament of a No. 12 radio pilot lamp heated from a d.c. source. The term "Monode" is derived from vacuum-tube terminology, a monode being a one-element vacuum tube.

The Monode noise generator was constructed to obtain a known source of random noise to check the performance at 147 Mc. of a 5722 temperature-limited diode generator similar to the one in the Handbook.2 The reason for desiring a means of checking the 5722 generator arose from comments by J. A. Huie3 and A. van der Ziel4 regarding the effects of stray capacitance and inductance on the noise output of the 5722 generator at high frequencies. (The output of a 5722 generator was found to be 12 per cent or 0.5 db. high at 147 Mc. before compensation.)

Two other Monode noise generators were built to prove that the principle of the Monode noise generator was indeed practical at lower frequencies. These generators are for use in the 6- and 40-meter bands.

The Resistor as a Noise Generator

A resistor at any temperature above absolute zero generates a noise power

\[ P = KTB \]

where

\[ K = 1.38 \times 10^{-23} \text{ Joules/Kelvin degree}, \]

\( T \) is the temperature of the resistor in degrees Kelvin, and

\( B \) is the bandwidth in cycles per second.

When the temperature of a resistor is other than some reference temperature, \( T_0 \) (usually taken as 290°K), it may be convenient to use the terms "excess noise temperature" or "excess temperature," which are defined as the temperature of the resistor minus reference temperature; i.e.,

\[ T_{E,N} = T - T_0. \]

The term "excess noise" is commonly used: the excess noise is the excess noise temperature divided by the reference temperature; i.e.,

\[ E_{N, E} = (T - T_0) / T_0. \]

The excess noise may be given in db, where

\[ E_{N, db} = 10 \log_{10} \left( T - T_0 / T_0 \right). \]

In order to obtain enough noise for convenience of measurement, the resistor may be raised to many times room temperature. The filament of an incandescent lamp makes a good hot resistor because tungsten is a well-behaved material and has a high melting point. The temperature can be raised by passing a direct current through it.

The Monode Generator

The Monode has the advantages of simplicity, low cost, and being an absolute standard. The disadvantages are fixed output and the necessity for tuning each amateur band (but not within the band). The complete generator is composed of three basic parts: a regulated variable-voltage power supply, a room-temperature "quiet" termination (\( R_t \)), and the noise generator with its r.f. filtering and coupling network (Fig. 1). The variable d.c. voltage from the power supply is used to heat the filament of the lamp. The d.c. is filtered by means of \( RPC_1 \) and a 0.001-μF capacitor, \( C_3 \), to eliminate any r.f. noise component that might be present in the power supply. \( RPC_2 \) is used to conduct into the lamp the d.c. required to heat the filament while preventing the thermal noise generated in the hot lamp filament from being lost in the supply. The noise generated in the filament is

---

A resistor is about as basic a noise generator as you can get. The filament temperature of a No. 12 dial lamp can be adjusted to the desired resistance with sufficiently-high noise output, and the corresponding noise temperature is available from the calibration curve given in this article. With these data, measurement of receiver noise figure becomes simple.

---

* Chelton Road, South Euclid, Ohio 44121
coupled to the output connector, J2, by means of C1; this capacitor also serves the function of resonating the lead and lamp-filament inductances so that the output impedance is purely resistive.

Construction

The major portion of the noise generator can be built using any mechanical construction desired. The one described was built on a 3½ x 19-inch relay-rack panel. The power supply is mounted in a 3 x 4 x 6-inch aluminum chassis fastened to the rear of the panel. The r.f. filter network and the quiet termination, R1, and its connector, J1, are mounted in a small Minibox. The No. 12 lamp, C1, RFC2, and J2 are mounted in an identical Minibox. The two Miniboxes are fastened together and to the panel; the connectors J1 and J2 protrude through holes in the panel.

One obvious innovation would be to have the Minibox containing the lamp physically separate from the power supply and connected to it by means of a flexible cord. In this event, the coaxial socket J2 would be replaced by a plug and R1 would be mounted in a separate plug.

The power supply is a conventional bridge-rectified, RC-filtered supply with a shunt Zener regulator. The supply was made electrically larger than necessary because it was not known at the time of construction what lamp type would be used in the final version. The ½-ampere, 18-volt capability gives a range of voltages and currents large enough for experimental purposes. The actual maximum output required for the No. 12 lamp is 10 volts at 200 mA. The regulation is probably not necessary.

The noise-generator portion of the unit requires more than usual care, considering the frequency for which the unit is designed. Stray inductance and capacitance are not particularly important, although they should be kept low; this is the opposite of the 5722 generator where stray inductance and capacitance result in improper amounts of noise output. However, losses cannot be tolerated; i.e., any resistance appearing in the noise-generating circuit other than the hot lamp filament must be eliminated. This is again the opposite situation from the 5722 generator where losses will, in general, have no deleterious effects and can be beneficial.

Fig. 2 is a photograph of the noise-generating portion of the unit. The components are mounted in such a way that the lead lengths are as short as possible in order to keep their losses low. The lamp is mounted in a "socket" constructed from two of the metal inserts taken from a miniature-tube socket. An entire tube socket cannot be used because the pin spacing is improper. Also, sockets introduce the possibility of losses.

The Monode described here is usable at frequencies below 144 Mc. with slight modification. Two separate noise-generating portions were built, one for use on 6 meters and one for use on 40 meters. For 6 meters, C4 is a 50-380-pf. mica trimmer, RFC1 and RFC2 are Ohmite Z-50

April 1967
inductors, and 

For 40 meters, 

For the other high-frequency bands, use the appropriate Ohmite inductor for RFC, omitting RFC: use a 0.1-μf. disk ceramic for C3, C4 should be the size required to resonate the lamp filament and lead inductance in order to present a pure 50 ohms at the output connector.

Adjustment

Although the temperature of the lamp filament can be varied by varying the applied d.c. voltage, only one temperature of operation is usable because the resistance of the filament is also a function of the applied voltage, and this resistance must be set to give the proper output impedance. Some means of impedance measurement in the band in which the unit is to be used should be available; this can be either an impedance bridge or meter or an s.w.r. bridge known to be properly calibrated. The impedance-measuring device must be sensitive enough to operate on small amounts of r.f. This is necessary to insure that the r.f. getting into the lamp does not heat the filament to a temperature greater than that resulting from the applied d.c. A good check can be made by applying the r.f. while the d.c. is off. The lamp should not glow.

With the impedance-measuring device connected and operating, the d.c. lamp voltage is applied and the voltage and C1 are adjusted until the output impedance at connector J2 is 50 ohms, purely resistive. The value of the lamp voltage is noted, and whenever the unit is to be used the voltage is set at this value. If the Monode noise generator is to be used as a reference for comparison with other noise generators, it is important that the output impedances of all the generators be the same. The best way to make sure that they are the same is to measure all of them at the same time, with the same measuring device, and at the same frequency.

The operating temperature of the filament can be found from Fig. 3. This curve applies to General Electric No. 12 lamps, and may not be applicable to lamps of other than G.E. manufacture. The excess temperature or excess noise can be calculated by means of previously given formulas. For example, assume that as a result of the impedance adjustment step it was found that the lamp must operate at 8.4 volts in order to give an output impedance of 50 + j0. With the aid of Fig. 3 the lamp temperature is found to be 2430°K when operated at 8.4 volts. This is the noise temperature. If room, or reference, temperature is 290°K, then the excess temperature is 2430 - 290 = 2140°K, and the excess noise in db. is 10 log10 (2140/290) = 8.7 db.

K should be adjusted to give an impedance of 50 + j0 when viewed through J2. This resistor should be an inherently nonreactive composition type such as the Ohmite “Little Devil.”

Using the Monode Generator

In using the Monode as a source of noise for noise-figure measurements of a receiver, the quiet termination of the Monode is first connected to the input of the receiver under test by means of a coaxial cable having x db. loss. If the separate noise-head construction is used, x is taken as zero. The output noise power from the receiver is noted; call this reading A. The Monode is then set to its operating voltage, its output is connected to the input of the receiver through the same cable, and the output power of the receiver is noted; call this reading B. The noise figure of the receiver in db. is then found from the formula

\[ N.F.\text{db.} = E.N.\text{db.} - x - 10 \log_{10} \left( \frac{A}{B} - 1 \right) \]

where E.N.db. is the excess noise of the Monode noise generator in db. Note that B and A must be in units of power and not in db.

For example, assume that a coaxial cable with 0.9 db. loss is being used between the Monode noise generator and the receiver; this makes x = 0.9 db. Assume that the excess noise of the Monode is 8.7 db. (from the previous example). Further, assume that the receiver noise output was 1 milliwatt with the quiet termination and 4 milliwatts with the Monode connected; this makes \( \frac{B}{A} = 4 \). Therefore, the receiver noise figure is

\[ 8.7 - 0.9 - 4.8 = 3.0 \text{ db} \]


Fig. 2—The noise-generating head of the Monode. Leads between the lamp, C1, and the coax connector are kept to the shortest possible length. The quiet termination and r.f. filter are in a similar box bolted to the bottom of the one shown.
Concluding Remarks
The following comments are intended to provide a basis for further experimentation, especially at frequencies above 150 Mc.

Skin effect does not significantly increase the d.c. resistance of the lamp filament from the d.c. value, at frequencies up to 150 Mc., because the filament diameter is small (approximately 0.001 inch) and the resistivity of tungsten is relatively high. Therefore, it would be expected that the resistive component of the output impedance as seen from $J_2$ would be the same as the d.c. filament resistance as calculated by taking the ratio of the lamp voltage and current. However, there is about 1 pf. shunt capacitance across the lamp resulting from the lamp leads, and there is a significant amount of inductance effectively in series with the filament resistance. This inductance is principally a result of the coiled filament and the filament support leads; the total inductance is approximately 0.04 microhenry. As a result of the inductance and capacitance, the resistive portion of the filament impedance, as viewed from $J_2$, is increased in magnitude. This increase is significant only at 50 Mc. and above. For the unit pictured in Fig. 2, the d.c. lamp resistance is 45.6 ohms when the output impedance is 50 + j0 at 147 Mc.

The impedance step-up effect was not observed in an earlier version of this unit. The d.c. filament resistance and the output impedance were both 50 ohms. This was considered a bit of good luck until the noise output was found to be too low. It was discovered that the inductor RFC was lossy and, since it was effectively in parallel with the lamp, its associated losses lowered the apparent filament resistance, the output impedance, and the noise temperature. This is why the Ohmite inductors are specified.

A different lamp type might eliminate the impedance transformation problem and the necessity for retuning or rebuilding the Monode noise generator for each different amateur band. An ideal lamp type for noise generation would be one with a straight (not coiled) filament mounted in a small-diameter tubular bulb having the lead-in wires appearing at the opposite ends of the lamp. If the leads are brought out from opposite ends of the bulb, the lamp could be coaxially mounted. This mounting scheme offers the possibility of low stray inductance and capacitance.

I wish to express my appreciation to Mr. Don R. Hobbs of the Miniature Lamp Department, General Electric Company, Nela Park for many pieces of information regarding miniature lamps.

The second annual "Amateur of the Year in Illinois" award will be presented at the 33rd Hamfest of the Hamfester Radio Club in August. Nominations with complete facts, figures and details may be submitted prior to June 1, to the club at 6000 S. Tripp Ave., Chicago, Illinois 60629.

The Federal Register shows that of the 76 treaties and other international agreements relating to radio, 41 concern amateur radio exclusively. Additionally, even some of the remaining 35 included amateur radio. (via W9NWX and W11XO)

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.

Back Copies and Photographs
Back copies of QST referred to in QST issues are available when in print from our Circulation Department. Please send cash, money order or check — 60c 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.

April 1967
Simple "Tattoo" Control for the HT-37

BY FRED M. RUZICK, WASGQQ

I have been operating an HT-37 for a year now, and upon reading an article by W6EVX in an earlier issue of QST, describing how he modified his HT-32 for automatic change-over in c.w. operation, 1 I decided to try something similar in my rig. Operating c.w. becomes a real joy because you don't have to throw any switches—just start sending. Upon stopping, the relay will open and switch your antenna from transmitter to receiver. 2 The addition of push-to-talk control adds the last refinement.

The diagram of the control circuit is shown in Fig. 1. With the controls in the MOX and c.w. positions, and the added potentiometer, R1, with its series-connected switch S1 turned to the MOX position, the operation is unaltered from the original, the operating being controlled by manual standby-to-MOX switching. With R1 turned to close the switch, R1 provides a control of the length of relay hold-in. With the first light contact of the key or bug, the blocking bias on the grid of the relay tube V14A (stored in the 0.22-µf. capacitor C64) is discharged through the low forward resistance of diode V14A, and the VOX relay immediately closes. When the key is opened, however, the 0.22-µf. capacitor must charge slowly through the high resistance of R1 and R2 until a blocking voltage for the relay tube V14A is reached. The adjustment of the potentiometer provides proper "hold" so that the relay remains closed during average sending, but opens promptly when the operator stops sending. This hold adjustment is made after setting the VOX control, which has a unilateral interaction with it. The added hold control is disconnected in all but the c.w. position, however, and does not affect the VOX hold adjustment.

With this modification, closing the key, or the bug-shorting switch, grounds the VOX diode plate and disables the VOX circuit. This can be very useful when you may have a sudden outburst of noise, say, from your harmonics. Closing the key contacts disables the VOX circuit quickly, and push-to-talk can be used.

Modification Procedure

Mount a 5-megohm potentiometer, R1, with switch, S1, in the unused hole of the correct size in the rear of the chassis, between SO7 and the coax output connector.

The main modification is done inside the side-band-generator subassembly shield. Remove this shield to gain access to the function switch.

I used the portion of F5R1 that connects Contacts 11 and 12 in c.w. only, without modification. This switch seems to be superfluous, since the key connected through it in c.w. only is connected through OS5R in MOX only, and the key line to which it is connected is grounded through the VOX relay contacts, which are closed in MOX in all positions except c.w. anyway.

Remove the two wires on Contacts 11 and 12 of F5R1 and connect the wires together. This will free the contacts needed to connect the —49 volts. Run a wire from SO5, Terminal 6, to one of the open switch contacts, 11 or 12. Now run a wire from the other open switch contact through the hole in the sideband shield to the 10-megohm fixed and the 5-megohm variable resistors. From the resistors, run a wire to Pin 2 of the relay tube, V14B. The wiring is completed by making a connection between Pin 7 of the VOX diode, V14A, and the ungrounded side of the key jack.

To add push-to-talk operation, all that is necessary is to substitute a two-prong microphone connector for the original one-prong unit. The second terminal of the two-prong unit is connected to Terminal 6 of P3, the grounding of which will provide the push-to-talk operation.

After making the modifications, I have found c.w. operation much more enjoyable, and a high-quality push-to-talk microphone is used to its fullest extent.

* 221 North Garland Ave., Dayton, Ohio 45403.

Fig. 1 — Circuit modifications in the HT-37 for "Tattoo" operation. The heavy lines indicate added wiring. Dashed lines indicate connections to original wiring which is not disturbed. Original connections to FS5R. Contacts 11 and 12, are removed and tied together before the new connections shown here are made. R1 is a linear control with s.p.s.t. switch S1 attached.
INCREASED FLEXIBILITY WITH THE S/LINE

Provision for either transceive or independent operation is built into the Collins S/Line transmitters and receivers, but the changeover between the two types of operation takes time. With some relatively-simple modifications of the equipment the shift can be made effortless. And in the process, an entirely new feature—control of the receiver by the transmitter v.f.o.—can be added. Here are two articles outlining different methods of attacking the problem. Take your choice!

Independent Frequency Control with the 32S-1 and 75S-3

BY PETER GIANAS,* WSBPE

The purpose of the S/Line modification to be described is twofold:

1) It eliminates the need to remove and reinstall cables to go from transceive to separate-equipment operation.

2) It enables the operator to use the 32S-1 tuning knob to control the frequency of the receiver. As an example, the 75S-3 can be tuned in the 14-Mc. range while operating the 32S-1 in the U. S. portion of the phone band. (So far, this is a normal function of the S/Line.) However, the U. S. portion can be monitored without touching the receiver. The 32S-1 can then be likened to a KWM-2, since it can be used as the transmitter and “receiver.” This is the prime purpose of these modifications, i.e., to be able to monitor one’s own transmitting frequency for DX operation or “tail-ending” a DX-U. S. QSO, without the necessity for using a second receiver.

The modification consists merely of routing the frequency-determining circuits through relays so the operator can control the receiver either with its own v.f.o. or that of the transmitter. Relays also perform the function of essentially removing the cables for separate-equipment operation. The relays are installed in close proximity to the circuits that are switched. When all relays are de-energized, all circuits are normal.

The operation of the modification, Fig. 1, is as follows: When $S_{501}$ in the control unit is closed, relay $K_{501}$ in the 32S-1 is operated, effectively separating the external cables and thus providing the “separate-equipment” feature originally accomplished by removing these cables. Opening $S_{501}$ de-energizes $K_{501}$ and restores the equipment to normal transceive operation. When $S_{503}$ is closed, $K_{502}$ in the 32S-1 and relays $K_{503}$ and $K_{504}$ in the 75S-3 are actuated, provided $S_{501}$ also is closed ($S_{503}$ is disconnected from the 115-volt line if $S_{501}$ is open). This puts the 32S-1 in the trans-control position. Contacts $K_{502A}$ restore B-plus to the 32S-1 v.f.o. to be available when receiving in this new mode, since normally the plate supply to the v.f.o. is disconnected by section 89A in the 32S-1 when receiving. Contacts $K_{502A}$ switch the 32S-1 v.f.o. output through the new cable to the receiver at $K_{503B}$. $K_{503A}$ grounds the output of the 75S-3 v.f.o. in the new mode while $K_{503A}$ picks up the output of the 32S-1 v.f.o.

To prevent out-of-band operation when the 312B5 external v.f.o. is used with the KWM-2, it is necessary for both band-selector switches to be in the same band segment at all times. To eliminate this necessity with the S/Line, $K_{504}$ is wired as shown. When the 75S-3 is in the 14-Mc. portion for foreign reception $K_{504}$ automatically switches to the 14.2-Mc. segment crystal for transmitting. This relay can be omitted, but manual operation of the band-selector switch will then become necessary.

$K_{505}$ in the control unit prevents accidental transmission outside the U. S. phone band if the equipment is not restored to the “separate-equipment” mode before keying the transmitter (normally this would be done, to enable listening

* 2849 Northview Road, Rocky River, Ohio 44116.
70K-2 OSC.

32S-1

*S No connection *

75S-3

Fig. 1 — Circuit changes and control system for selection of transceiver or separate operation of 32S-1 and 75S-3. Added components are identified by numbers beginning with 501; components originally in the equipment bear the manufacturer's designations.


S501, S502 — S.p.s.t. toggle.
Bottom view of the 75S-3 with relays installed, \( K_{505} \) is at the left, mounted on a bracket cemented to the chassis. \( K_{504} \), at upper right, is fastened to the chassis with a machine screw.

in the foreign portion). \( K_{505} \) can be energized by any available pair of relay contacts in the 32S-1 that can be diverted to this purpose: for example, the contacts on \( K_2 \) that are connected to \( J_1 \) for operating an external antenna relay. The ground must be removed from the movable contact of \( K_2 \) since \( K_{505} \) works off the a.c. line.

The relays in the receiver and transmitter were placed as close as possible to the circuits in question. One additional cable was required, the necessary jacks being placed at the rear of the 32S-1 and 75S-3 in any available space. Existing unused jacks can be used if the leads already on them are moved; in the writer's case, the 6.3, PTT, CONV. OUTPUT and P.A. DISABLE jacks were used.

In working out these changes originally, the use of a cathode follower after the v.f.o. was considered because it might appear to be necessary in view of Collins' use of it when the receiver v.f.o. is the controlling one in transceive. However, there was no indication of any loss of receiver sensitivity on switching back and forth.

Fig. 2—Alternative control circuit using push buttons.

115V A.C. Push-button control unit
to 75S-3

115V A.C.

control

S

PUSH-BUTTON CONTROL UNIT

TO J-17 AND P4 IN 32S-1

(See Text)

No connection

\( K_{505} \), \( K_{504} \) and \( K_{507} \)—D.p.d.t. relay, same as in Fig. 1.

S504, S505—Push button, normally open.

S501, S506—Push button, normally closed.

Side view of the 32S-1, showing location of relays designated \( K_{501} \) and \( K_{503} \) in Fig. 1. Both are mounted on metal brackets cemented to the shield cans.
Cross-Band Operation with the 75S-3 and 32S-3

BY ROGER A. NEWLANDER,* WB6AYN

Up to several months ago, I operated a 75S-3 and 32S-3 combination according to Collins' recommended cabling for transceive operation. Anyone who enjoys the luxury of not having to set the transmitter to the other ham's frequency soon leaves his equipment in this configuration all the time.

With the system so connected, the receiver v.f.o., which tunes from 2.5 to 2.7 Mc., also is sent to the transmitter to vary its frequency over a 200-kc. range. The receiver uses a crystal oscillator to establish the 200-kc. band to be used, and this crystal frequency also is sent over to the transmitter so the two units will track. An additional feature is the ability to switch from transceive operation to separate control of the transmitter and receiver within the same 200-kc. range; this is done by switching in the transmitter v.f.o. by means of the frequency control switch on the front panel of the transmitter. While this allows the operator to run his transmitter and receiver at different frequencies within the same 200-kc. range, the transmitting frequency cannot be monitored without retuning the receiver on each transmission. Thus it is almost impossible to operate "cross band" effectively. Up to the time I modified the equipment, I used a separate receiver for listening in the "foreign" part of the phone band while retaining transceive capability in the U.S. phone band. This, of course, ties up an extra receiver.

The second receiver can be eliminated altogether and the capability of monitoring the transmitting frequency can be achieved if the transmitter v.f.o., on occasion, can be made to control the receiver instead of the other way around. This gives the operator the ability to leave the transmitter frequency control in the transmitter v.f.o. position and control the receiver

*3410 Forbes Ave., Santa Clara, California.
(1) with its own v.f.o. to listen in on the foreign DX, or (2) control it with the transmitter v.f.o. to listen on one's own frequency. Essentially, this amounts to having two independent v.f.o.s in operation. The modification to achieve this consists of piping the transmitter v.f.o. to the receiver and, in the latter piece of equipment, giving the operator the choice of using whichever v.f.o. he wants at any particular time.

It is, of course, desirable to make a modification which will not destroy the looks of the equipment or impair its operation. The following modification does essentially that, with the exception of the switch on the front panel of the receiver. If the extra hole in the receiver panel is not desired, a little ingenuity will find another place for such a switch.

**Receiver Changes**

The instruction book for the 755-3 shows that the receiver v.f.o. injects its 2.5- to 2.7-Mc. signal into the cathode of V4A through C52. The signal level for proper conversion should be approximately 2.5 volts r.f., as measured by a v.t.v.m. probe. It is necessary that the transmitter v.f.o., when used, supply this same voltage to the mixer cathode for optimum conversion; if it does not, there will be a noticeable difference in audio output or S-meter reading when switching between the v.f.o.s on the same frequency. If a v.t.v.m. is not available a check for equal S-meter readings may be used instead.

The modification that is necessary in the receiver consists of installing a single-pole double-throw switch, S1, which connects the cathode of V4A either to C52 or to the new v.f.o. input from the transmitter (Fig. 1). If a wafer switch is used it may be mounted on the front panel as shown in Fig. 2. Any other suitable location may be used. However, it is important to use coaxial cable to and from the switch and to keep the leads as short as possible so as not to reduce the sensitivity of the receiver. RG-174 cable is recommended for wiring inside the receiver and transmitter because of its small diameter. An RCA phono jack may be mounted on the crossbar on the top of the receiver for the transmitter v.f.o. input connection, as is also

---

**Fig. 3—Amplifier and cathode follower installed in transmitter. C307, R17 and V13 are original components; others are new. Capacitances are in μf; fixed capacitors are disk ceramic. Resistors are 1/8-watt; resistances are in ohms (K = 1000).**

J1—Phono jack.
L1—Slug-tuned, 9–18 μh.

---

**Fig. 2—The new switch in the 75S-3 is mounted below the FUNCTION and PRESELECTOR controls, as shown at the left.** The phono jack for transmitter-v.f.o. input mounts on a small bracket fastened to the crossbar in the receiver. It is visible at the lower right.
shown in Fig. 2. The chosen v.f.o. frequency is applied through $S_1$ to the cathode of V1A, using a coaxial lead. That is all there is to the receiver modification.

**Transmitter Modification**

A modification is necessary in the transmitter as its v.f.o. should not be used as is to drive the receiver. The cathode follower/line driver used in the receiver does not exist in the transmitter, and some means must be used to drive the low-impedance line. At first I experimented with a breadboard cathode follower, but soon found that there was not enough drive to give the 2.5 volts necessary in the receiver. I tried using a 12AT7 with one section as an amplifier and the other as a cathode follower, with good results, but the final circuit, Fig. 3, used a 6EAS for two reasons: (1) the circuit had proved successful in the receiver as a cathode follower and (2) the triode stage would make a good cathode follower as well as allowing me to use the pentode as an amplifier.

The output circuit (as in the receiver) is a pi network using two padder capacitors and a slug-tuned coil. Although fixed values of $L$ and $C$ could be used, I found the adjustable network handy for establishing the proper values and for setting the output level of the transmitter v.f.o. equal to that of the receiver v.f.o. at the cathode of V4A.

Normally, the v.f.o. in the transmitter operates off the regulated voltage from V13 (0A2) only while transmitting. It is therefore necessary to lift the side of R17 normally attached to the VOX-actuated 275-volt line and connect it to the main 275-volt line so that V13 operates all the time. The transmitter v.f.o. is now switched in to control the transmitter whenever the frequency control switch is set in the transmitter v.f.o. position. It will also control the receiver whenever the new receiver v.f.o. control switch is in the transmitter v.f.o. position. The same 275 volts may also be used for the 6EAS, and the 6.3-volt supply may be tapped for the filament connection.

The amplifier/cathode follower circuitry was mounted on a Vector turret socket, and by fashioning an L-shaped bracket from my hardware box I fastened the assembly to the flat bar which is already in the transmitter, as shown in Fig. 4. The two padder capacitors and the variable inductor are mounted on a perforated board and held to the mounting plate by the same screw that holds the turret socket. Final adjustment is made by adjusting the padder capacitors and coil slug to get a 2.5-volt signal on the cathode of V4A when using the transmitting v.f.o. or by the 8-meter test of switching back and forth between the receiver and the transmitter v.f.o.s with both tuned to the same frequency.

Typical operation is as follows, using the 40-meter band as an example: With the receiver set to tune between 7.000 and 7.200 Mc, when using its own v.f.o., the transmitter is tuned within the U.S. phone band, using the transmitting v.f.o. When $S_1$ is in the transmitter v.f.o. position the transmitter v.f.o. also controls both the receiver and transmitter so that the operator is listening on his transmitting frequency. When the operator wishes to listen on the foreign band, he throws $S_1$ to the v.f.o. and immediately is in the proper portion of the DX band. He need not throw the switch back to the v.f.o. unless he wishes to tune to his own frequency. The modification also is excellent for checking out a new frequency before actually moving to it, and is well worth the small amount of time and money.

---

**Fifty Years of ARRL**

A bound 152-page reprint of the gold-edged historical articles which appeared in the 1964 issues of QST is available from the ARRL for one dollar postpaid. Titled Fifty Years of ARRL, the book covers the highlights of ARRL and amateur radio history during the fifty years from 1914 to 1964, and will make a companion piece to the classic 200 Meters and Down, a reprint of which is also available from the ARRL for one dollar. 
Beginner and Novice

How To Handle TVI

Useful Information On What To Look For

BY LEWIS G. McCOY,* W1ICP

If you are one of those hams that have come into amateur radio in the last year or two, you are going to be pleasantly surprised with conditions on the 20-, 15-, and 10-meter bands. Radio propagation on these bands depends to a great extent on the number of spots on the sun. Sunspots go through cycles, from a large number of spots to just a few, taking approximately 11 years to go from peak to peak or from low to low. When the sunspot number is high, world-wide communication becomes common on the abovementioned bands. At the present time we are on the upswing of sunspots, with the peak predicted in a few years. This in turn will mean increased amateur activity on the higher-frequency bands.

Unfortunately, along with the sweet we have to face the bitter. The bitter in this case is the danger of causing television interference, popularity referred to by hams as TVI. When operating on 20, 15 or 10, the possibility of creating TVI is a great deal more likely than when operating on the lower bands, 100, 80, or 40. It isn’t a problem an amateur can duck, and in this article we’ll treat the whys and wherefore so you’ll be better equipped to face the problem if it affects you.

The Enemy

In this case the “enemy” is simply the television receiver. Some comparisons between your communications receiver and a television set may help show you the problem. In your ham receiver the bandwidth—that portion of the radio spectrum you are hearing—is on the average about five kilocycles. On the other hand, a single television channel is 6000 kilocycles wide. In other words, a single television channel is more than twice as wide as all the amateur bands from 160 through 10 meters! Any radio signal that happens to fall in a television channel can cause TVI. Because a television receiver must be a broad-band device to receive television pictures, it is also easily susceptible to interference from other signals.

There are ways of protecting the set from some of its own failings, and we’ll discuss these in a moment. But first let’s see where the amateur fits into the picture (no pun intended).

Harmonics

The big problem in TVI is keeping undesired signals from falling in a TV channel. It is one of the characteristics of radio equipment that when we generate a desired radio signal, additional signals also are produced, although not wanted. Such signals are usually referred to as “spurious.” Harmonics of our desired signal are classed as spurious signals. Also, parasitic oscillations fall in this same category. A parasitic signal is one that usually bears no direct frequency relationship to the fundamental signal. Harmonics, on the other hand, are always exact multiples of the fundamental signal. For example, if we are transmitting on 21,200 kc. in the 15-meter band, we will find that there will be a harmonic at 42,400 kc., twice the fundamental frequency, another at 63,600 kc., three times the fundamental, and so on. Incidentally, so you won’t be confused, the “second” harmonic is the one that is twice the fundamental: there is no “first” harmonic.

Usually, as we go higher and higher in the harmonic order, the harmonics get weaker and weaker. Unfortunately, however, it doesn’t take a very strong harmonic to cause interference to a television picture. To give you a rough idea and to visualize the problem, refer to Fig. 1. This shows the low-band TV channels, 2 through 6, and the harmonics from three amateur bands, 20, 15 and 10 meters, that fall in this region. Parasitics are not shown but they could appear anywhere in the region.

Spurious signals are the amateur’s responsibility. He must get rid of them or attenuate them to the points where they don’t cause interference, by F.C.C. rules.

* Novice Editor

April 1967
Fundamental Overloading

There is one other important problem which the amateur should be aware of, although it is not directly his fault or responsibility.

When a TV set is operated in the proximity of an amateur station, the fundamental signal of the amateur transmitter can be picked up by the TV set. Even though the amateur signal is far removed in frequency from any TV channel, the TV set can still have interference.

When the strong fundamental signal of the amateur station reaches the r.f. amplifier in the television set (the first stage in the set) the r.f. tube often is not capable of handling the signal. The r.f. stage becomes a harmonic generator, and the harmonics thus generated are fed through the set, causing TVI. Keep in mind that although your station is perfectly clean of spurious output, what the TV set shows is the same as if you were radiating spurious signals. In this case, though, the fault is strictly in the television set: it just doesn’t have the ability to handle the strong fundamental signal from your rig. It would be simple to shrug your shoulders and say “So what, it isn’t my fault.” Unfortunately, we have to get along with television viewers, so we do have obligations.

The cure for fundamental overloading is a more selective front end on the TV set, or a more selective circuit. One device that will solve this problem is called a high-pass filter. A high-pass filter is a combination of capacitors and coils that will permit certain frequencies to pass through but will attenuate others. A high-pass filter for a TV set is usually designed to pass all signals in the TV channels while attenuating any signals below Channel 2. Such a device will prevent your fundamental signal from reaching the front end of the set. The high-pass filter is installed between the antenna terminals on the set and the first stage, usually as close to the TV tuner (front end) as possible.

Cleaning Up Your Spurious Signals

We just described how a high-pass filter works on a TV set to stop fundamental signals, but a high-pass filter will not prevent a harmonic from your rig from getting into the set. Keep in mind that the harmonic will be in the same channel as the TV signal, so we must stop the harmonic at the transmitter.

The opposite of a high-pass filter is a low-pass filter. This is a combination of coils and capacitors that will permit any signals lower than its “cut-off” frequency to pass through to the transmitting antenna but will prevent any higher-frequency signals from getting by. Low-pass filters for the 80- through 10-meter bands are usually designed with a cut-off frequency slightly higher than 30 Mc. This permits any ham signal to reach the antenna but stops the harmonics.

However — and this is most important — in order for a low-pass filter to work, the transmitter itself must be tightly shielded so there is no other “escape” route for the harmonics. This means that all circuits that carry any appreciable amounts of r.f. must be shielded up to the antenna terminal. Otherwise, the harmonics can escape by flowing around the filter and up to the antenna to be radiated. Fig. 2 shows an example of this.

Shielding

If you live in an area where TVI is likely to be a problem — you can check this by studying Fig. 1 — on the bands you plan to use, you will want a shielded transmitter to prevent harmonic radiation. If you plan on buying a transmitter there are certain points that should be checked.

Nearly all commercially built rigs come in metal cabinets, but a metal cabinet doesn’t necessarily mean the rig is well shielded. If the cabinet has any cracks or large openings, such

<table>
<thead>
<tr>
<th>MHz</th>
<th>54</th>
<th>60</th>
<th>66</th>
<th>72</th>
<th>76</th>
<th>80</th>
<th>85</th>
<th>90</th>
<th>94</th>
<th>98</th>
<th>102</th>
<th>106</th>
<th>110</th>
<th>114</th>
<th>118</th>
<th>122</th>
<th>126</th>
</tr>
</thead>
<tbody>
<tr>
<td>CH</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>14 MHz</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 MHz</td>
<td>3</td>
<td>4</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28 MHz</td>
<td>2</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fig. 1 — This chart shows the v.h.f. TV channels and their relation to harmonics from the 20-, 15-, and 10-meter bands.
as meter or dial holes, harmonics can escape and get around a filter. It is possible to get away with large openings for meters if the meter itself is shielded and its leads are bypassed. Areas in a transmitter where r.f. is generated and amplified, particularly the final amplifier, should be tightly shielded. A common method is to use a perforated-metal shield around the amplifier stage. The metal must be free from paint on touching surfaces, otherwise the harmonics can leak out. Clean metal to metal surfaces are a must. Additionally, the chassis should have a bottom plate. These are all points to check if you plan on buying a rig.

When buying a rig, examine it carefully for shielding. Ask to see the instruction manual because this will usually show bottom and top views along with the circuit diagram, and you can check to see if such things as a.c. leads are shielded, or are filtered with chokes and capacitors where the leads leave the transmitter. If you are a newcomer and haven’t had any experience in amateur radio, check with other local hams if possible and see what they are using and how they handle the problem. In many radio stores the clerks have little, if any, knowledge about the subject so you may have to depend on local hams or your nearest radio club to help you.

If you are building your own rig and live in an area that has harmonically-related television channels you’ll have to follow good shielding and filtering techniques. Every rig has its own problems, and we would recommend a study of the complete chapter on interference in *The Radio Amateur’s Handbook*. This chapter treats the entire subject in detail, including construction of both high- and low-pass filters, how to filter leads, and so on.

Some Methods of Testing

The first check to make for harmonics is in your own home. If you have interference on your own set you should, as a first step, install a high-pass filter on the TV set so you’ll be sure that fundamental overloading cannot take place. If the antenna terminals are mounted on the back cover of the set, as they are on most models, remove the cover and install the filter as close to the tuner as possible, making sure that you ground the filter case to the chassis of the set. After the filter is installed run the 300-ohm twin-lead from the filter to the antenna terminals. If you just connect the filter on the antenna terminals it may not do a job for you because the 300-ohm lead between the filter and the tuner may pick up enough fundamental to cause TVI.

Once you have the high-pass filter installed, turn on the rig and check the picture. TVI will run all the way from a complete reversal of the blacks and whites (a negative picture) to a herringbone pattern which may have various degrees of intensity depending on the strength of the harmonic and its relation to the video carrier frequency. The video carrier frequency is 1.25 Mc. above the low edge of the channel; for example, Channel 2 is 54 to 60 Mc. and the video carrier is at 55.25 Mc. The sound carrier is 0.25 Mc. below the high end of the channel. The closer your harmonic is to either of these two frequencies, the more severe the interference is likely to be, and TVI often can be reduced by an appropriate change in transmitting frequency. For example, a third harmonic from your 10-meter rig may cause severe TVI in Channel 6 (82 to 88 Mc.) but if you move your fundamental frequency anywhere above 29.3 Mc. your third harmonic will move completely out of the Channel 6 range. Many amateur 10-meter nets that operate in a Channel 6 area simply move above 29.3 Mc. and forget about TVI. However, the real answer is adequate shielding and filtering.

Getting back to cleaning up your own TVI, the next step is to test the transmitter with a dummy load, one of the shielded variety. Tune up the rig, using the dummy load, and check the harmonically-related channels on the TV set. If there is even the slightest trace of interference you’ll have to install a low-pass filter and possibly improve the shielding in the rig. If the picture is clean you can make a further check on harmonic leakage from the transmitter. Take a length of 300-ohm Twin Lead long enough to reach from the rig to the TV set, and solder a one-turn loop of insulated wire, about an inch or so in diameter, between the wires at one end of the Twin Lead. Connect the other end to the TV set’s antenna terminals, along with the regular TV antenna. (While it isn’t likely, you may find that TV picture is considerably weaker or disappears when the Twin-Lead is connected. So, the Twin-Lead should be slightly shortened or lengthened. What has happened is the pick-up loop and Twin-Lead happens to be a half wave long, or multiple thereof, at the TV channel frequency and is acting as a trap for the signal. Lengthening or shortening the twin-lead by 12 inches will eliminate this problem.)

With the transmitter running into the dummy load, move the loop around the rig, checking all openings, knob shafts, and leads coming out. You can quickly see on the TV screen where the bad spots are in the transmitter. And, as outlined in the *Handbook*, install shielding or correct the leakage as needed. Once you get the rig clean you can put on your transmitting antenna and you should have a clean setup in your own house.

The Neighbors

We would never suggest that you canvas the neighborhood to see if you are causing TVI because this would be looking for trouble! Most TV set owners have no idea of the workings of a TV set. All they know is that they paid good money for the set and it shouldn’t “need” anything to get a good picture. Past experience has shown that TV viewers are inclined to blame “that ham down the street” when anything goes wrong, and we do mean anything — ignition noise and any of the host of things that can cause poor TV reception.
This doesn’t mean that you should ignore the neighbors. If you have a TVI complaint — and we cannot stress this strongly enough — be polite, courteous, and civil. Many areas have TVI committees formed by local radio clubs. If your area has such a committee by all means contact the group and ask their help. It is better if a disinterested party, one who is not emotionally involved, handles the complaint.

However, in many instances you’ll have to handle it yourself. Some amateurs have invited the complainant to visit their stations and then showed that they had no interference when the transmitter was operated. Usually the set owner will ask how come his set has problems, and this is your chance to explain that possibly his set doesn’t have adequate rejection of undesired signals. And by undesired, you mean all types of signals, not just amateur. You won’t be lying. If his set is subject to fundamental overload from your signal it may not be able to reject other undesired signals. You can tell him that a high-pass filter only costs a few dollars but should be installed by a reliable TV serviceman. If you can possibly help it, don’t put the filter in his set yourself — or, for that matter, make any adjustments on the TV sets. If anything goes wrong in the future you are liable to be blamed for it. However, talk to the serviceman and impress on him what is happening, and where the filter should be installed.

Dealing with TV viewers is never easy, so use all the tact you can. Above all, don’t lose your temper even though you know you are right!

Other Useful Information

Color TV is becoming more and more popular and all of the cues for black and white TV hold true for color reception. The only real difference between the two is that TVI with color is prettier! As to color, there are a couple of frequencies worth mentioning that could cause a problem.

The color subcarrier in a color transmission is approximately 3580 kc. above the video carrier. For example, in Channel 2 the video carrier is 55.25 Mc., which puts the color subcarrier frequency at 58.83 Mc. The second harmonic of a 10-meter signal at 29,415 kc. would fall on the same frequency as the color subcarrier. Such a harmonic, if strong enough, would degrade the color picture. So, this 10-meter frequency should be avoided if necessary. Also in Channel 6, avoid the third harmonic of 28,943, and in Channel 4 the fifth harmonic of 14,165 kc. The following harmonics fall on the color subcarrier frequency in the higher channels: Channel 9, the ninth harmonic of 21,233; Channel 10, the ninth harmonic of 21,314; Channel 7, the seventh harmonic of 28,123, and Channel 11, the seventh of 28,973. These are the only ones that need be watched out for.

In some of the more elaborate consoles that combine TV and stereo, audio interference to both TV and stereo might occur due to fundamental-signal pick-up on speaker or a.c. leads. A recent article treated this subject in detail, and if you run into the problem it would be worthwhile to apply the techniques of bypassing described there. Many amateurs feel that because they are 30 to 40 miles from the nearest TV station that they are in a fringe area. This isn’t necessarily true. It probably can be safely assumed that if a TV viewer receives a “snow”-free picture on a regular basis he can’t be considered to be in a fringe area. Snow in a TV picture is simply noise which becomes visible in the picture due to the lack of sufficient TV signal strength to override it. If the signal is so weak that only a snowy picture is possible, a very weak harmonic is likely to cause TVI. Under such conditions, the very best of shielding and filtering is a real must. Either that, or operation on bands or frequencies that could cause harmonic TVI should be avoided if possible. We have plenty of bands and frequencies that we can use to avoid TVI problems if it becomes necessary. Just choose a band or frequency where interference cannot occur.

When setting up your station be sure that all connections in the antenna system are good. When tuning up your transmitter do not use more than required grid drive or current to any stage, particularly the final amplifier; overdriving a stage can cause excessive harmonic generation. Your instruction manual should give you the information on how to tune up. If you are using a t.r. switch install the low-pass filter after the t.r. switch — transmitter, t.r. switch, and then filter, in that order. Some t.r. switches can actually generate harmonics, so the low-pass filter should be installed so as to suppress these harmonics.

In many areas, ultra-high-frequency television (u.h.f.) is used. As far as amateurs are concerned, there have been few, if any, harmonic problems with this type of television. In some rare instances, amateurs operating on the v.h.f. bands have run into u.h.f. TVI, but such cases are unusual. We haven’t treated amateur v.h.f. operation, here, and there are some TVI problems particularly related to such operation. It is recommended that the Handbook or The Radio Amateur’s V.H.F. Manual be studied if v.h.f. operation is contemplated.

\( 1 \)McCoy, “Hi Fi and Organ Interference,” June 1966 QST.

Strays

The 1967 International Mobile Rally will be held June 18 at RAF Alconbury, Huntingdonshire, England. This rally is jointly sponsored by the U. S. Air Force and the Amateur Radio Mobile Society of England. Every effort is made to provide truly international representation. Advance notice is required for booking accommodations in local hotels. Correspondence concerning the event may be sent to the Project Officer, MARS Director AJ1AA, International Rally, Box 3234, APO New York, 09238.
The ITT Mackay Marine 3010-B Receiver

The odds are good that most amateurs think their commercial receivers represent the last word in sophisticated communications equipment. After all, the prices are high, the competition is keen, and obviously the communications problems of ham radio can only be solved by the finest gear available. It may come as a slight (non-electrical) shock to learn that such is not the case. Our ham-bands-only receivers are compromises between quality and manufacturing expediency, like just about everything else. If in the course of a day's operation we get jammed by a few loud signals, so what? It isn't a matter of life and death.

On the other hand, the shipboard operator is paid to get the message through. Receivers are built to help him do this, even though he's tied up near a coastal or broadcast station. He can't afford to have a receiver that can't handle strong signals or that is subject to cross modulation.

The 3010-B Marine Receiver is being offered to the amateur market. It isn't likely that many hams will buy it, because the price tag is a bit steep. Not for what you get, but for the limited amateur-bands use it might receive. On the other hand, anyone wanting a superb "all-wave" receiver (its range is 70 kc. to 30 Mc.) might well consider it. Any receiver buff should at least learn something about it. If you get a chance to listen to one, take it, even if it means crawling a few miles through snowdrifts or over a hot desert!

Electrical Details

Referring to the block diagram in Fig. 1, the first thing you notice is the numerous filters throughout the receiver. They aren't there for an ad man's sales pitch: they are there to eliminate the "cruddies" one is likely to find in a less-refined multiple-conversion receiver. The first filter is in the antenna circuit, to reject the broadcast band (unless you want to listen to it). This is followed by an input attenuator, a panel-controlled resistance ladder that can introduce as much as 40-db. loss. The input tuning is a single circuit, switched and capacitortuned. If the r.f. amplifier tube type number is unfamiliar to you, look up its price and you'll know why you haven't seen it in many ham receivers. The 7788 is an extremely high-$q$ tube, run at less than maximum gain in this application.

The r.f. amplifier is followed by a low-pass filter (cutoff frequency of 30 Mc.) and a cathode follower. The mixer is a four-diode ring balanced-mixer configuration, driven by a crystal-controlled local-oscillator signal. Since the basic tuning range of the receiver is 2.0 Mc., the local-oscillator crystals are switched in at 2-Mc. intervals. Note that the only gain between antenna and the first i.f. is in the r.f. amplifier, presumably to reduce chances for cross modulation.

The first i.f. is a 2-Mc. bandpass above the signal frequency, to permit the continuous cover-
Fig. 1—Block diagram of the Mackay 3010-B Marine Receiver. This multiple-conversion wide-range receiver is unusual in its i.f. sequence and its widespread use of filters.

Fig. 2—"Series" mixer injection used at second mixer stage.
age of the receiver without changing intermediate frequencies somewhere along the line. Its amplifier tube, the 6ES8, is also an uncommon one. It has a high price tag and is a high-reliability type designed for broad-band amplifier use.

The broad-band first i.f. is followed by a 6-kc. wide second i.f. To get there, the second mixer is driven by a local-oscillator signal obtained by frequency conversion of a basic 3- to 5-Mc. tunable oscillator. Note the low-pass filter following the tunable oscillator and the two bandpass filters following the v.f.o. mixer. The apparently peculiar routing of the signal from 6BLS cathode follower through the second 43- to 45-Mc. band-pass filter is to show that series injection of the local oscillator signal is used (see Fig. 2).

The third mixer brings us into more familiar territory; it is a crystal-controlled 6BE6. The third i.f. amplifier has two degrees of selectivity, obtained from mechanical filters. The sample receiver had bandwidths of 3.1 and 0.5 kc. When the filters are switched out, the 6-kc. bandwidth of the 5.91-Mc. crystal-lattice filter sets the bandwidth. Amplification at the 455-kc. third i.f. is obtained from two 6BA6 stages. C.w. and sideband detection is obtained in a 12AT7 product detector, and the two diodes of a 6AV6 serve as envelope detector and a.c. rectifier. When switched in, the full a.c. voltage is applied to the two 6BA6 i.f. amplifiers and a fraction of it is used on the 7788 r.f. amplifier. Manual gain control is obtained by changing the cathode voltage of the first i.f. amplifier.

Removing bottom plate reveals heavy die-cast construction of chassis. Lower-right section houses input attic filter and tuning capacitor. Note shield (cover removed) within left-hand compartment; it houses the b.f.o. components. Lower center compartment houses 455-kc. i.f., where a shield is used between the two sections of the selectivity switch. Upper center section houses two 43-45-Mc. band-pass filters.

The automatic noise limiter consists of two self-biased silicon diodes (see Fig. 3) just ahead of the audio gain control. This limiter reduces the amplitudes of pulse-type noises to approximated that of the signal.

In the audio section, the 6AV6 triode and a 6BFX tetrode round out the receiver.

**Physical**

The tuning drive is a large knob giving approximately 100 kc. per revolution. Its scale is a moving tape marked every 2 kc., and 100 kc. averages about 4½ to 5 inches along the tape. Since the 2-Mc. range requires a tape almost 90 inches long, it is not surprising that it is stored on two reels rather than run around the interior of the receiver. A window to the left of the window for the tape reveals the two megacycle segments in use. To read the scale, the operator matches the color of the tape (yellow or green) to the colors in the Mc. window. For example, with the bandswitch set to the 14 and 15 Mc. range, yellow tape indicates the 14-Mc. segment and green tape the 15-Mc. section.

Band changing is sometimes a double-switching action, since the main tuning range (14-15 Mc., 20-21 Mc., etc.) and the input tuning range (8-16 Mc., 16-30 Mc., etc.) may both have to be switched. A knob marked "R.F. Tune" serves as an input peaking control; it turns a 365-pf. capacitor on the 1-octave ranges starting at 2 Mc. This peaking capacitor has an additional 365-pf. section switched in at lower frequencies to cover the 3-to-1 frequency ranges below 2 Mc. The tuning meter serves a dual purpose: it can be switched to give an "r.f." reading (a.c.)

---

**April 1967** 47
Squires Sanders 66-er  
50-Mc. Transceiver

Though the SS 66-er is a successor to the well-known 99-er, a self-contained 50-Mc. a.m. transceiver, it is more like a 22-er. If this ‘er business leaves you confused, you’re just not familiar with the Squires Sanders line of v.h.f. gear. We were tempted to refer to the QST report on the 22-er (144-Mc. transceiver)1 and say that the 66-er is “the same thing, except —,” because the manufacturer did the main engineering job when he produced that moderately-priced a.m. transceiver for the 2-meter man. The 66-er looks almost identical, but it is an interesting example of how a design for the higher band can be adapted for the lower, with a minimum of effort.

There may be things in the 66-er that would not have been there if it had been the first design project, but the fact that the circuit and layout were originally for 144 makes them all the better for 50. Comparison of the pictures with those of the 22-er in April 1965 QST will show no clearly-visible difference, but the block diagrams show that the tube complements vary considerably. Our 66-er diagram is presented in a slightly different manner from that given for the 22-er in order to point out salient features of the 66-er, and also show some points common to both that were not brought out in the report on the other unit.

The transmitter r.f. lineups are similar, except that one less 12BY7 stage is needed for the lower band. The oscillators are identical, except for the slightly higher crystal frequencies required, 8.334 to 8.666 Mc. for the lower half of the 50-Mc. band. Crystals for 12.5 to 13 and 25 to 26 Mc. may also be used. The oscillator is the triode portion of a 6KQ8, V\text{GIA}, with output on 25 to 26 Mc. The pentode section, V\text{HEB}, doubles to 50 to

1 "Recent Equipment," QST, April 1965.

Interior view of the SS 66-er. The tunable oscillator for the receiver is connected to the slide-rule dial, upper right. Transmitter circuits are at the upper left. Receiver tuning range is 50 to 52 Mc.
52 Mc. A 12BY7 amplifier, $V_{12}$, drives a 2E26 output stage to about 13 watts output. Straight-through operation of the driver helps to keep down radiation of unwanted frequencies, and permits all stages to be operated at a conservative level.

In the receiver, a high-transconductance 6EH7 pentode amplifier, $V_1$, gives more than adequate gain and noise figure, and is relatively free from overloading compared to the usual triode stages. Its a.g.c. voltage is controlled by a Zener diode (not shown in Fig. 1) which delays application until a comparatively large signal is tuned in. The stage thus operates “wide-open” on weak signals, giving optimum gain and noise figure when these characteristics are needed.

Oscillator injection at 39.3 to 41.3 Mc. is generated in the triode portion of a 6K58, $V_{10}$. Its pentode half, a buffer-amplifier, feeds one grid of a 6DJ8 double-triode cathode-coupled mixer, $V_8$. The signal from the r.f. stage is impressed on the grid of the other triode of $V_8$.

Output from this first mixer, on 10.7 Mc., is amplified by a 6BA6, $V_8$, and passed on to a 6BE6 mixer-oscillator, $V_4$. The oscillator portion is crystal controlled on 11.156 Mc., resulting in 456-ke. output, which is amplified by another 6BA6, $V_6$. Next comes diode detection, a.g.c. and noise limiter action in a 12AL5, $V_6$.

Audio circuits of mult of this kind seldom call for much discussion, but trust Squires Sanders to come up with interesting ideas, even in the audio. Detector output goes to the pentode of a 6AN8, $V_{7A}$. The triode, $V_{7B}$, is a speech amplifier, and its output also goes through the pentode section. The separate gain controls for receiving audio and speech amplification are isolated from one another by diode switches, $CR_4$ and $CR_5$ in Fig. 1. Bias voltages on these diodes are switched by the send-receive circuitry. The receiver squelch circuit is essentially the same as that described in the 22-er report.

A novel power-saving feature is found in the power audio stage. Two 6AQ5s, $V_5$ and $V_6$, are connected in parallel, but $V_6$ is disabled during receiving by removing its screen voltage. There is plenty of audio output from $V_5$ for receiving purposes.

Bottom of the 66-er, S-meter and speech gain controls are on the rear chassis wall, along with two fuse holders, coaxial fitting for antenna connection, and jacks for speaker, accessory control and external transmitter control.
Squires Sanders 66-er 50-Mc.
A.M. Transceiver

Height: 6½ inches.
Width: 12 inches.
Depth: 12 inches
Weight: 19 lb.
Power Requirements: 115 volts a.c. or 13 volts d.c.; 50 watts receive, 85 watts transmit.
Price Class: $250.
Manufacturer: Squires-Sanders, Inc., Millington, N. J. 07946.

The all-solid-state power supply works on either 115 volts a.c. or 13 volts d.c., depending on which cable plug is used. The cable and plug for a.c. service are supplied. A.d.c. plug is also included, but you hook up your own cable, wiring it according to whether your car is positive or negative ground. Negative is now standard in this country, but some foreign and older U. S. cars may be the other way around.

The 66-er is remarkably free from spurious responses in receiving and from unwanted-frequency output in transmitting. The 456-kc. image (912 kc. above the desired signal) was about 50 db. down on the unit tested. Several other and weaker responses were found by searching with a tunable signal generator, but they were very far down. No in-band spurious signals have been heard at the writer's high location, where the strong signals of nearby f.m. and TV stations cause havoc in some v.h.f. receivers.

The transmitter employs band-pass coupling between the oscillator and doubler stages, and link coupling between the doubler and driver. An impedance-matching circuit between the driver and final grid circuits offers increased selectivity at the desired transmitter output frequency. With these precautions, the 66-er should be about as free of transmitter-caused TVI as it is possible for a 50-Mc. a.m. rig to be.

The speaker is mounted on the rear wall of the case, with its cone facing the left side. No baffle is provided and weak-signal readability suffers from the lack of lows resulting from this. As an experiment, we attached a small baffle to the speaker, and noted an appreciable improvement. This cannot be carried too far, however, as a large baffle area would restrict the flow of air through the case perforations. The speaker is connected to a phone jack on the case, and a patch cord is used to connect to the output transformer, via another jack on the back of the chassis. This makes use of a better-quality external speaker a simple matter, and this is highly recommended for either mobile or home-station use.

The 66-er has provision for use with the maker's Apollo Linear, without modification of either unit.

— W1HDQ

Next Month

Hallicrafters SR-2000 Transceiver

Strays

"A Complete Two-Band Station for the V.H.F. Beginner" — a reprint of four articles that appeared in July, August, September, and October, 1961 QSTs — is still available for 50¢ (no stamps, please) from the ARRL, 225 Main Street, Newington, Connecticut 06111.

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.

W1MCG (right) is presented the Individual Naval Reserve Radio Station "Sweepstakes '66 Trophy" by Rear Adm. Means Johnston, Jr., Commandant, First Naval District. The trophy was awarded for Ed's valuable communications assistance, skill and professional competence.

(Official U.S. Navy Photograph by PHI T.A. Jeffries, USN.)

50 QST for
**TVI PREVENTION — a New Method**

BY RALPH A. MARINO.* W1MRW

O
t all the problems that face the radio ama-
teur, the one that is most feared because
of its bad effect on public relations is the
interference of amateur signals to television
signals. This situation, known as TVI, may be
the result of a number of different conditions.
Three of the most common causes of this diffi-
culty are inadequacies in the TV circuitry, mis-
adjustment of the amateur transmitter, and
rectification in poorly bonded joints. There are
other causes of this problem but they all tend
to have the same result of giving the whole of
amateur radio a bad name. Until now there has
been almost nothing done to solve this problem
on a massive scale; that is, each source of inter-
ference has been successfully dealt with but to
deal with them all at once has been thought to
be an impossibility. Recently, however, I have
developed a new method of TVI prevention
that successfully eliminates even the possibilities
of interference. The new method of TVI preven-
tion should solve everyone's problems.

This method called Synchronization Control
(SC) gets right to the heart of TVI prevention
by taking advantage of a well known but little
utilized fact about TV picture transmission.
Rather than first generating a signal that may
cause TVI, a well adjusted SC unit will give
complete protection before the signal even leaves
the transmitter. So well does this unit work that
even with transmitter mistuning, overloading or
what-have-you, near-by TV sets will never
show that you are on the air!

To understand how the unit works, a simple
review of the action of a picture tube is in order
here. As is well known, the inside face of the tube
is coated with a substance that glows when the
electron stream from the cathode strikes it.
While this stream or beam is flashing across the
screen its intensity is varied by the incoming
video signal. If an unwanted signal appears at
the same time (such as from an amateur trans-
mitter) then the unwanted signal will vary the
beam along with the desired one. This may pro-
duce a herringbone pattern, a crawling line, or
any of a number of other of undesirable effects
on the screen.

The circuits that move the beam across the
face of the tube are generally of no concern or
interest to the amateur (unless he happens to
be watching TV himself at the time). There is
one factor, however, that is of great significance
in the prevention of TVI. As the beam returns

---

* 63 Seventh St, Turners Falls, Mass. 01376

---

from the left to the right hand side of the screen
it is blanked out. In other words it leaves no
trace as it returns to the starting point. This
means that no signal, of any amplitude or phase,
can have any effect on the picture during the
portion of time that the beam spends in returning.
An amateur signal present in the TV at this
time will go unnoticed, undetected and will pro-
duce no interference.

The beam's return is set by the incoming TV
signal itself. They are "locked" together or
are in synchronization. The stability of the
sync signal is set by the TV transmitter and is
the same for all channels 2 through 53. The SC
unit is a further adaptation of the principle of
synchronization to amateur radio. This means
that if SC is used and properly adjusted there
will be no interference on any channel, on any
set, from any transmitter that may be used.

The first step in the adjustment of the SC
system is to sample the output of the sync gen-
erator of any TV set that is "locked" onto a trans-
mitted picture signal. When this is done it will
be found that one has a sawtooth wave with a
frequency equal to the number of return trips
the electron beam makes across the tube — that
is, about 15 kc. Fig. 1 shows the connections
to be made to the sync generator and the recom-
ended cathode-follower amplifier to keep from
overloading the TV circuits. This amplifier also
provides a modest boost in power to bring the
signal through the shielded cable and to the SC
unit proper.

**The SC Unit**

As should be clear from the name of the unit
itself, the SC works by synchronizing the output

---

April 1967
of the transmitter to those times when the picture tube beam is blanked. By restricting output to those times no interference will result. Even a full kilowatt running right next to the TV will not produce even a shadow of a flicker with a properly adjusted SC unit. The transmitter output is always zero except for some fifteen thousand times per second when the beam is cut off.

There are a number of suitable ways to synchronize the output of the transmitter and each amateur will have to find the method that best suits his pocketbook and his junk box:

1) Relays — After the sync level has been amplified to a sufficient amount of power a relay may be operated by the output of the SC unit. Naturally, care must be taken to insure that the relay is closed during the proper intervals of the sync cycle or the transmitter will be on when it should be off and vice-versa. Some provision for phase reversal to deal with this difficulty should be included in each SC unit. A serious problem may be in finding a relay that will key at the proper speed but those who are familiar with the surplus market assure me that suitable relays may occasionally be found, and at a reasonable price.

2) Synchronous motors — An old electric clock can provide the heart of an excellent SC unit. A rotating contact is attached to the shaft of the motor, the motor is run by the power pulses from the SC and when it is up to the sync frequency it will turn the transmitter on during the proper time intervals. Probably a stroboscope of the type used in automobile-ignition timing will be useful in the final adjustment of this unit. One disadvantage of this particular system is the wait for the motor speed to equal the sync frequency. Once this is achieved the motor will hold its timing quite well, however.

3) All-electronic SC — Even though most amateurs have the skill to make the above mechanical constructions, they will probably be even more interested in an all-electronic SC unit. There are many possible varieties and variations of this unit but the simplicity of the model described below makes it a good one for those who have no previous experience with SC units.

In Fig. 2 we have a block diagram showing the general location of the unit in a typical rig. In my case the SC unit was built right into the power supply for the final but for commercial or already constructed equipment it may go "outboard" just as well.

**An Electronic SC**

The unit is simple from an electrical point of view, consisting of a phase adjusting network and a 6C4 connected as a shorting switch. As can be quickly seen from Fig. 3 the plate goes to the B+ plus, the cathode to ground, and the grid is transformer-coupled to the sync-phase adjusting network.

![Diagram](Fig. 3)

There are some features of this unit that deserve a little consideration. First, no filtering is needed for the plate supply because the sync-power pulses are so short that hum or shifting voltage levels are no problem. As it turns out, the plate bypass provides plenty of filtering for this circuit anyway. The transformer is able to handle the extra load of the switch tube because of the short duty cycle. One further point is that no filament supply is needed for the 6C4 in this configuration. Naturally such a small tube could not, under ordinary circumstances, be operated with a plate voltage of 3000 volts. By not heating the filament the current is held to safe level. In a way we have gas tube performance here because the very small number of gas molecules remaining in the tube are ionized by the plate supply and this provides the electron stream that is controlled by the grid. The very short duty cycle allows the published ratings to be exceeded without harm.

During operation, the 6C4 draws no current during the time the TV picture tube electron beam is blanked. As soon as it starts across the screen again, the tube conducts and short-circuits the final plate power supply, reducing the transmitter output to zero. When the far edge of the screen is reached the 6C4 stops conducting and full power is restored. This cycle continues then at the TV picture tube-sync rate, eliminating even the possibility of interference as there is no output at any time the picture may be disturbed.

At first it might be thought that cutting the output to zero at the sync frequency (about 15,000 cps) might produce a strong high-pitched whistle which would overload the ham receiver

(Continued on page 148)
TM 11-4000

Technical Editor, QST:

Any serious amateur must have a certain minimum amount of theoretical knowledge as well as practical experience in his hobby. Amateurs with limited budgets should acquaint themselves with the publications of the Department of Defense in the radio and kindred fields; fortunately, in many respects military communications gear and amateur communications equipment are similar. Government Printing Office Price Lists Nos. 19, 63 and 82, free for the asking, list available technical books.

In particular, TM 11-4000, Trouble Shooting and Repair of Radio Equipment, is highly recommended to the newcomers and the old timers alike.

The book consists of thirteen chapters and an index. The chapter headings, descriptive of their contents, are Introduction; Cautions; Test Equipment; General Troubleshooting; Troubleshooting Vehicular Installations; Troubleshooting Receivers; Troubleshooting A.M. Transmitters; Receiver Alignment; Repairs and Adjustment; Final Check-up; Radio Procedures, and Troubleshooting Transistorized Equipment. At two bucks for a copy, this is a value hard to beat! — Mark D. Bedrossian, W2FJS, 1007 Holly Blvd., Manasquan Park, N.J. 08736.

FREQUENCY CHECK

Technical Editor, QST:

You might be interested in the method we use at K6JZK/WA6DOO to set and monitor a transmitter frequency; we find it especially satisfactory for MARS work.

Using an LM-13 as an "additive" meter, we zero the oscillator on the auxiliary crystal check point nearest the desired operating frequency, and keep it there. Then we adjust a reliable audio oscillator to the difference between the desired operating frequency and the crystal check-point frequency. Applying the LM's output and the audio oscillator's output to the horizontal and vertical amplifiers, respectively, of a cheap scope, we get a straight horizontal line pattern so long as the LM stays in zero beat at the check point; this is, of course, a check on any drift in the LM, since crystal drift is checked separately by a receiver tuned to WWV and also picking up the LM's crystal.

When the transmitter is keyed on, we adjust its v.f.o. so the beat from the LM produces an elliptical pattern on the scope. Any subsequent change in the scope pattern can readily be traced to its source. The direction of the deviation of the transmitter from the auxiliary check point is determined by normal use of the LM-13. — Kenneth M. Durkin, K9JZR/AF6JRZ, 113 Sunora Ave., Danville, Calif. 94526.

RELAYLESS IAMBIMATIC ADAPTER FOR THE KEYER

Technical Editor, QST:

The article written by K80CO in January QST describing his Iambimatic keyer was long awaited here. I have heard several c.w. operators say they were using double paddles, and the idea always sounded good to me.

I immediately built an adapter for my Heathkit HD-10 keyer, but in the process I eliminated the relay. Positive 10 volts appears at the paddle of this keyer, and so I used Fig. 1. This Iambimatic adapter will work perfectly at any speed, since there is no time lag from a relay. The voltages are taken directly from the keyer.

Here is the way the circuit works. If the dash lever is pressed, Q1 will conduct, putting a negative signal on the base of Q3. This allows Q3 to conduct and ground the dash contact, thus making dashes. It does not matter if the trigger signal is applied, as the circuit is not yet a flip-flop. If the dot lever is closed, Q2 will conduct, the dot contact will be grounded through C.R.2, and dots will be generated. The conduction of Q2 at this time has no effect on the operation of Q3.

Now, if both levers are pressed, Q1 and Q2 will act as a flip-flop and Q4 will feed the negative triggering spike at the end of each dot or dash. So, if a dash is made first, Q1 and Q2 will be conducting and, at the end of the dash, Q4 will feed the negative trigger through R1 and C1, which causes the flip-flop to change its state. Now Q4 conducts and Q1 and Q2 are cut off, so the dash contact is opened. But

Fig. 1—Circuit of the Iambimatic adapter for the HD-10. Resistances are in ohms (K = 1000), and capacitances are in microfarads. Diodes are 100-p.i.v. silicon. P-n-p transistors are G.E. GE-2, or Motorola HEP-51, N-p-n transistors are G.E. GE-10, or Motorola HEP-53.

April 1967
since the dot lever is still closed, the next character will be a dot. At the end of the dot, the negative spike trigger will cause the flip-flop to change again, and Q4 will be cut off. Q1 and Q2 will conduct, and a dash will be made. So the lambrmatic circuit will produce alternate dots and dashes in the keyer output, as long as both paddles are held closed.

This circuit should work with any of the currently-popular solid-state keyers. If your keyer uses an N-p-n transistor, you'll have to change Q2 to a p-n-p, and ground the collector instead of the emitter, and also reverse CR4.

For those of you who have negative voltage at your paddle terminals, I believe the circuit in Fig. 2 which, although it hasn't been tried here, should work just as well. Again, if you are using an n-p-n output transistor in your keyer, you will have to change Q2 to a p-n-p, around the collector, and reverse CR4. You can troubleshoot this circuit easily with a VOM, since you're looking only for highs and lows.

We have K8OCO to thank for this excellent addition to our keyers. If you have never tried a squeeze paddle, I guarantee you'll wonder how you ever got along without it. If you work the paddle correctly, you'll get perfectly-spaced letters that sound just like a W1AW tape.

The total cost of all new parts was less than $10.00, and the adapter took about two hours to build. The n-p-n transistors that I used are Motorola HEP-53, and the p-n-p are HEP-51. The silicon diodes are 100-pi-v. at four for a dollar. If you really care about how your flat sounds, this circuit is worth every cent. — Robert Heydt, WB3WX, 8 Trianna St., Belmont, N. Y.

STILL MORE ON THE I-177

Technical Editor, QST:

I refer to the latest series of Technical Correspondence items concerning the I-177 tube tester (February 1967 issue). First, a little "Feedback" on Mr. DeMeis's correspondence. I note one omission. The socket referenced in his Fig. 2 is the "E" socket. Further, I found that his steps (7) and above required the use of Pins 8 and 3, rather than 3 and 5.

Second, a further series of questions now is raised on calibration, since Mr. Schleicher indicates that a different a.o. grid voltage is used on the Hickok 6005. Added to this, I find that the I-177 diagram shows a 4.7-volt winding, whereas the I-177B shows 5.0 volts. Mr. DeMeis indicates that, with the R pot at 0, the voltage should read 5 ±0.3. Hence it is possible that the circuit diagram is in error.

An additional note on Mr. DeMeis' article concerns the modification circuit shown for increasing the Gm range. This is apparently for the TV-7 tester, since the I-177 circuit includes a 15,000-ohm range, and the range resistors are connected as shunts across the series-connected dual sections of the L pot (which is in parallel with the meter). For 30,000 ohms, a third shunt of low resistance value would be required (no shunt is used for the 3000-ohm range). I have not yet attempted to calculate the value of the additional shunt. — Irving Mayer, IT5ZEB, 578 Wayne Drive, Fairborn, Ohio 45324.

Hamfest Calendar

Alabama — The Birmingham Hamfest will be held this year on April 29 and 30. Further details can be obtained from the Birmingham Club, P.O. Box 698, Birmingham, Alabama.

Arkansas — The Eureka Springs Hamfest will be held again this year on May 6 and 7.

Illinois — The Rock River Radio Club will hold their first annual spring Hamfest April 23 at the Lee County 4-H Center, located one mile east of junction U. S. 30 and 52 near Amboy, Illinois. A cordial invitation is extended to all hams, CBers, electronic hobbyists, and commercial exhibitors. Hours: 9:00 A.M. to 5:00 P.M., Lunch refreshments, and unlimited parking. Advance ticket donation $1.00, $1.50 at the door. For additional information and advance tickets, contact Charles Rawdall, W9LDU, Dixon, Ill. 61021.

Illinois — The Sterling-Rock Falls ARS is sponsoring a Hamfest at the Sterling Coliseum in Sterling, Ill., on Sunday April 2.

Illinois — The Kishwaukee Radio Club will hold its annual Ham and Equipment Swapfest in the Hopkins Park Shelter House in DeKalb, Ill., on Sunday, May 7. Come one come all and buy, sell, or swap equipment or just eyeball QSO with fellow hams.

Indiana — Don't forget the NEIRC banquet April 1 at Waterloo, Ind.

Indiana — The IRCC meeting will be held in Indianapolis at Butler University on April 2.
Kansas — The Jayhawk Amateur Radio Society announces a Hamfest and joint AARL Section meeting to be held April 23 at Wyandotte County Park, just East of Atchison, home of Fame, Bonner Springs, Kansas. Free hot dogs, chips, and drinks. Gifs for ladies and amateurs. Registration $1.50. Auction, swap table, 11 ct. tour, cooking demonstration, fashion show, DX, attic sale, displays, dusk-dawn barbecued steak and chicken dinner. 504 North 712nd, Kansas City, Kansas 66109, tel. 299-1128.

Kansas — The Fourteenth Hamfest of Hi Plains ARC will be Sunday, May 21 at the senior public school in Hi Plain.

Louisiana — The Baton Rouge ARC Hamfest will be held May 6 and 7. There will be a banquet Saturday night, and an all-day picnic Sunday.

Maryland — The 8 & O/C & O RailsRoad ARC will have its 6th Annual Banquet at Gunson's Restaurant, 3111 Frederick Ave., Baltimore, Md. on April 29. Registration at 1:30 p.m. and dinner at 6:30 p.m. Tickets are $4.00 each and may be purchased from W. T. Heiser. W3BVL, 7388 8 & O Central Blvd., Baltimore, Md. 21201.

New Jersey — East Coast VHF Society Dinner and dance at Freeholders, April 8. For details write W3WEB.

New York — The American Red Cross Emergency Radio Club is holding a hamfest on Sunday, April 30 between the hours of 12 noon and 6:00 p.m. at the club headquarters at the Central area Chapter of the American Red Cross at 62-40 108th St., Jamaica, Long Island.

New York — The Radio Amateurs of Greater Syracuse presents its annual Central New York Hamfest on Saturday, April 8, 1:00 to 9:00 p.m. at the crossroads of N. Y. State, Northway Inn, intersection of Interstate Rte. 81 and N.Y.S. Thruway Exit 36, Stuart Meyer, W2GQH, will present his latest DXpedition show that all are sure to enjoy. On the air ATV demonstration, c.w. and technical contests, movies, ham gear displays and swap shop, special activities for the YLs and XYLs. Full course roast beef banquet complements the day's activities. Capacity is limited so please pre-register. $2.75 covers registration and banquet. Mail checks payable to Radio Amateurs of Greater Syracuse, P.O. Box 88, Liverpool, N. Y. 13088 or contact W2YRL.

New York — The Rockaway ARC Spring Auction will take place Friday evening April 14 at 8:00 p.m. at the American Irish Hall on Beach Channel Drive (at Beach 81St St.) in Rockaway Beach. Doors open at 5:00 p.m. for items to be sold. One dollar admission, dinner-circuit TV, novice attractions, and more. Talk-in on 3920 kc., 50.11 Mc, and 146.84 Mc. For more information contact K2XBF, 3045 North 72nd, Kansas City, Kansas 66101, tel. 299-1128.

New York — The Southern Tier Radio Clubs will be holding their eighth Annual Dinner and Hamfest on Saturday, April 23, at St. John's Memorial Center in Johnson City. Tickets and reservations are available from John Bull, 221 Oscar Terrace, West Corners, Endicott, N. Y., or Joe Kutz, 3802 Marshall Drive, Endwell, N. Y. Tickets are $4.00 for adults and $2.00 for children under 12. All reservations for tickets must be in by April 12. No tickets will be sold at the door. The doors will open at 5:00 p.m. and dinner will be served at 7:00 p.m. We will have a speaker and displays.

Ohio — All day Saturday, April 29, the Indian Hills Radio Club will host greater Cleveland area hams and friends at the Alliance of Poles Hall, 6948 Broadway Ave., (near Fleet and Rt. 21, Willow Freeway.) This large hall will allow an all indoor affair with ample space to sit and renew contacts with Cleveland area hams. Old fashioned goodwill and socialability is the theme of the day. Donations at the door are $1.00 and tickets to an inexpensive buffet dinner at 7:00 p.m. are $2.50. Contact KS6V, 2312 Shaw Ave., Cleveland, Ohio 44112.

Ohio — The big 1967 Dayton Hamvention, sponsored by the Dayton ARA, will be held Saturday, April 15, at the Wampler Arena Center at Dayton. Speakers, exhibits, forums, ham radio transmitter bunks, banquet, festivities for the YLs and Ys, flea market and more. For additional information and map write Dayton Hamvention, P.O. Box 44, Dayton, Ohio 45401.

Pennsylvania — On April 15, the Mobile Sixers Radio Club will hold their 9th Annual Banquet. This will be at Walker's on the Delaware at 7:00 p.m. For more information write Bill Sargent, K3ZLL, 15 Cobblestone Dr., Paoli, Pa. 19361.

ARRL NEW ENGLAND DIVISION CONVENTION

Swampsott, Mass. April 22 & 23

The New England Division Convention will be held in the New Ocean House Hotel at Swampscott, Massachusetts, April 22 and 23. Among the key speakers is FCC official William Grenfell, W4GF. Also scheduled to speak are Stu Meyer, W2GHH; Father Daniel Liehan, W1HWC; NASA representative Dr. Fred Neiman, W1JDB, with the latest on the Apollo program, and Bruce Kelley, W2ICE with the Antique Wireless Association presentation. Technical talks and meetings are scheduled for v.h.f., DX, QSO, and numerous other phases of amateur radio. Other activities will be similar to those which have been so popular in past years. A complete and separate program has been planned for the ladies. The banquet is on Saturday night this year and will be combined with an evening of professional entertainment and dancing.

League President Robert Denniston, W6QWX, and New England Division Director Robert York Chapman, WQY, will be hosts at the Sunday morning ARLF Forum. FCC exams are also scheduled for Sunday morning.

Talk-in station W1JE/1 will operate both days on 75, 40 and 20 meter s.s.b., and on 10 and 6 meter a.m.

Early-bird discount tickets may be obtained until April 7 from John McCormick, W1KCO, Berkley St., Taunton, Maine. Banquet and dance tickets are $6.50 per person; registrations are $3 each, $4 at the door. Please make checks payable to: Federation of Eastern Massachusetts Amateur Radio Associates (FEMARA). Room reservations at the New Ocean House Hotel are: Single, $10; Double, $15; Triple, $18. Requests should be made directly to the hotel.

COMING A.R.R.L. CONVENTIONS

April 22-23, 1967 — New England Division, Swampscott, Massachusetts

May 27-28, 1967 — Dakota Division, Minneapolis, Minnesota

June 2-4, 1967 — Oregon State, Portland

June 21-23, 1967 — Midwest Division, North Platte, Nebraska

June 30, July 1-2, 1967 — A.R.R.L. National, Montreal, Quebec

July 1-2, 1967 — West Virginia State, Jackson's Mill

July 7-8, 1967 — Central Division, Milwaukee, Wisconsin

July 14-16, 1967 — Alaska State, Anchorage

September 9, 1967 — Louisville Ham肯vention, Louisville, Kentucky

October 27-29, 1967 — Ontario Province, Ottawa, Ontario

April 1967

55
EMERGENCY COAX CONNECTOR

Many times a ham wishes to connect two lengths of coax together but doesn’t have the proper type connector. On the other hand, coax chassis fittings can be joined together to make a connector. In order to weatherproof the unit shown in Fig. 1, the two inner pins were first soldered together; then a piece of copper flashing was formed around the chassis fittings and soldered at all open points. When used outdoors, the entire connection can be taped to seal off the joints from moisture. — W7TCP

Fig. 1 — Emergency coax connector made from two SO-239 chassis fittings and a scrap of copper flashing.

DETERMINING TRANSISTOR BETA

An ohmmeter can be used to determine a transistor’s amplification factor, beta, replacing methods for this purpose in which a microammeter is normally used. As shown in Fig. 3, the voltage is taken from the battery in the ohmmeter. The measurement is done as follows. After the ohmmeter is zeroed, its positive lead is connected to the emitter and its negative lead to the collector of the transistor being tested. One at a time, resistors $R_1$ and $R_2$ are switched in series with the base and the collector. As the resistance in series with the base changes, the resistance of the collector-to-emitter path also changes. The value of the collector-to-emitter resistance is read on the ohmmeter for each position of switch $S_1$. The amplification factor of the transistor is then found from the formula:

$$B = \frac{\Delta R_b}{\Delta R_e} = \frac{R_2 - R_1}{R_{e2} - R_{e1}}$$

where $B$ is the amplification factor of the transistor, and $R_{e1}$ and $R_{e2}$ are the resistances of the collector-to-emitter path when, respectively, $R_1$ and $R_2$ are switched in series with the base and collector. Resistance of the transistor’s base-to-emitter junction is not accounted for since its influence is negligible for practical purposes.

The circuit shown in Fig. 3 is for p-n-p transistors. For determining the beta of n-p-n types, you must shift the polarity of the ohmmeter. The polarity of the test leads can be found if you connect them to any diode as shown in Fig. 2. If the instrument indicates a resistance of less than 2000 ohms, the polarity of the test leads is the same as in Fig. 2.

To find the beta of transistors, the method described has been used with ohmmeters switched to the “X 100” and “X 1000” ranges. Other measuring ranges give different variations in collector current, and the beta is changed accordingly. On lower measuring ranges, $I_e$ and beta tend to grow bigger. Therefore, depending on whether the collector current in the intended circuit will be large or small, you can choose the most suitable measuring range of the ohmmeter.

When the beta of a low-power transistor is measured, the ohmmeter should not be switched to the very lowest ranges, since in this case the

Fig. 2 — Circuit for determining the polarity of ohmmeter leads. If the ohmmeter, $M_1$, reads 2000 ohms or less, the polarity of the leads is as shown. $CR_1$ is any diode whose cathode end is known.

Fig. 3 — Beta checker for p-n-p transistors. N-p-n types can be tested by reversing the polarity of the ohmmeter. $M_1$ — Ohmmeter. $Q_1$ — P-n-p transistor. Reverse ohmmeter polarity for n-p-n types. $R_1$ — 10,000 ohms, $\frac{1}{2}$-watt composition. $R_2$ — 110,000 ohms, $\frac{1}{2}$-watt composition. $S_1$ — S.p.d.t. toggle or slide switch.

56 QST for
collector current can grow very quickly and destroy the transistor.

Also it should be mentioned that, if nothing happens to the ohmmeter when you switch the resistors, $R_1$ and $R_2$, in series with the base and collector, the transistor is defective. — From a translation by Gunner Lind, SM7DZV, of an article by V. Babcov that appeared in the June 1966 issue of the U.S.S.R. publication Radio.

**M.C.W. WITH A CODE-PRACTICE OSCILLATOR AND A THROAT MIKE**

One convenient device that can be used with a phone rig to obtain m.c.w., provided the transmitter uses a carbon-button mike, consists of a transistorized code-practice oscillator with a throat microphone wrapped around it. I use two such gadgets with a pair of 420-Ma. modulated-oscillator transmitters. Each transmitter is combined with a superregenerative receiver in a hand-held transceiver.

The m.c.w. apparatus is shown in Fig. 4. The code-practice oscillator has a speaker and is battery powered. Two suitable oscillators are the Eico 706 and the Calrad CO-5. The throat microphone is a war surplus T-30-Q with two carbon elements that are designed to rest on the user’s neck near the Adam’s apple. Since the microphone cable was rather short, I extended it by adding a three-foot length of audio cable. I soldered one end of the audio cable to a Switchcraft JJ-048 extension jack to accommodate the PL-291 plug on the microphone cable. I connected the other end of the audio cable to a Cine-Jones P-304-CCT plug to match the microphone input fitting on my transceiver.

To make the m.c.w. apparatus, tighten the microphone belt so that the throat mike will fit snugly when attached to the code-practice oscillator. Then slip the T-30-Q over the oscillator, letting the carbon elements rest on the speaker grille or the edge of the grille and the case, whichever location permits a louder tone to reach the throat microphone. The installation is completed by attaching the microphone connector to the transmitter, and a telegraph key to the oscillator.

If by chance, the device described above overmodulates your transmitter, the carbon elements may be placed elsewhere on the code-practice oscillator case, so that the tone reaching them will not be quite so intense. A layer or two of cloth, placed between the oscillator case and the carbon elements, may be helpful. — William C. Babcock, WB6GHH/6

**METAL SPACERS**

An excellent source of chrome-plated spacers of various diameters is an old or broken auto-radio antenna. The needed diameter spacers may be cut from the appropriate telescoping section, and one antenna will provide many, many spacers. — William T. Hole, K9HWM/-W1ANZ

**ADDING CONTROLS WITHOUT ADDING HOLES**

If you desire to add controls, such as varnir tuning or sidetone gain, to your commercial transceiver, you can usually do so, without drilling any new holes, by using potentiometers from Clarostat’s Uni-Tie series of concentric controls. These controls come in all the standard values from 200 ohms up. Either a push-pull or turn type switch can be added to a set of these potentiometers. If desired, you can stack a wire-wound and a carbon control plus a switch. By using concentric potentiometers, it is possible in many cases to double the number of controls on the front panel without ever touching a drill. A source of appropriate knobs for concentric controls can be found in Raytheon’s 400 series.

— Dave Ingram, K4TWJ

**TIE TABS**

The plastic-coated wire tie tabs that are now being used to seal bread wrappers make excellent material for tying up cable assemblies, small rolls of wire and a multitude of other items around the ham shack. Don’t throw the tie tabs out. You’ll be surprised at the many uses that can be found for them. — Robert A. Manning, K1YSD

**WIRE SOURCE**

A handy source for No. 14 through No. 6 solid copper wire is the wire sold for house wiring. Most hardware and Sears stores stock two-conductor plastic-covered wire and it can be purchased in any length required. — W1TCP

**TVI TIP**

When using a transceiver with an external speaker, possible TVI can be prevented by inserting at the set an r.f. choke in series with each of the speaker leads. Otherwise the speaker leads might become radiating antennas. — Richard Mollentine, WA9KKG

---

**Fig. 4**—WB6GHH’s system for m.c.w. operation of his modulated-oscillator transmitter.
20,000 QSLs

Nothing, no nothing, can elate the DXer more than coming home after a hard day at the office to find QSL cards from his DX contacts in the mail box. And nothing can defate him more than not finding the particular card he needs for a certain award.

Tens of thousands of hams around the globe are DXers, sending hundreds of thousands of QSLs each year. Because of the heavy burden of supplying QSLs, many foreign stations simply can not afford, in terms of time and finances, to QSL direct each QSO. In the United States and Canada under League sponsorship, and many other countries through their own national societies, QSL bureaus have been established to aid in the orderly, economical flow of cards between DXers.

All ARRL QSL Bureaus are volunteer operated. The amateurs working the bureaus do so for no salary or fee, giving up their time they themselves could use for operating. Only the cooperation of each DXer can keep the system operating economically and effectively.

The ARRL W2-K2 QSL Bureau, operated by the North Jersey DX Association, is one of the busiest in the U.S. Bureau chairman Vic Ulrich, WA2DJS, says the bureau handles 20,000 cards a month, but that a system has been developed keeping the chore to a minimum while assuring fast, accurate delivery. The NJDXA has 40 members, 28 of whom have volunteered to work in the bureau and divide the work by suffix letters of the alphabet.

Once a week the incoming cards are collected from the Ridgewood, New Jersey, post office and taken to the bureau located in the basement of a professional building. The bureau quarters are not elaborate: in fact the room is only about ten feet square, but it is well-equipped to handle a heavy flow of QSL cards. Along the walls are four sorting racks, each having pigeon holes for each letter of the alphabet. Thus four club members can sort at the same time, separating two thousand cards per hour according to the first letter of the suffix. Universal use of block printing in the filling-out of QSL cards by amateurs would reduce sorting errors and shorten the time bureau personnel have to spend on the job.

After the preliminary sorting, cards are wrapped in individual packets and taken to the next club meeting for distribution. The member assigned to each suffix letter then takes his share of the cards home for final processing — sorting by second letter, then by third, and then mailing the cards to the amateurs.

The Amateur-User's Part

As standard ARRL QSL bureau procedure, amateurs are requested to submit stamped, self-addressed envelopes (4½ x 9¼ inch "business" or 5 by 8 inch manila envelopes) with the call printed in block letters in the upper left hand corner. Unfortunately, many amateurs send non-standard envelopes which are hard to handle; varying amounts of postage are used on the envelopes, too.

To help solve these problems, the W2 Bureau encourages the use of the envelope-credit system. Instead of an s.a.s.e., the "customer" sends a dollar for which he receives 12 credits. The bureau manager records the sums taken in, and at club meetings he hands the letter-men lists of the credits which each enters on a card file for the individual amateur. Envelopes measuring 4½ by 6¾ inches are furnished by the club, already printed with the bureau's return address and space for indicating the remaining credits the user has on file. The special envelope has been found to accept most QSL cards without folding, and a standard size makes for higher efficiency.

The letter-man addresses the envelopes, affixing a five-cent stamp for an ounce of QSLs (eight or ten cards), records the credits used and places the filled envelope in the mail. No envelope is mailed with fewer than four cards; all others are sent each month.

Amateurs preferring the standard system may send in their own stamped envelopes, but most
now use the credit system. In the case of cards arriving for amateurs having neither envelopes nor credits on file, the bureau mails a notice stating that cards for him are on hand and asking for his a.s.a.p. or participation in the credit system.

Simple arithmetic reveals that 12 credits amount to 50 cents in postage: what happens to the other 40 cents? It goes for purchasing and printing the envelopes, for file cabinets and sorting racks, for mailing of notices to non-cooperating hams, and for other miscellaneous expenses of the bureau. Only certain basic items, such as forwarding of missent QSL cards and post office box rent, are presently being paid out of League funds.

The central question for the myriad grateful users of the QSL bureau system seems to be: “I sure appreciate the bureau, but why does someone take on such headaches?” In the case of the North Jersey DX Assn., the answer lies partly in the avid interest they have on anything connected with DX. Of the 46 members, 17 are currently on the DXCC Honor Roll! Many of the members enjoy seeing cards come in for the friendly competitors they meet in pile-ups. Sorting-time gives members a chance to be sociable and swap late information and tall tales as they work.

Whatever the reason, the rest of us are certainly glad we have them on the job: the DX game would not be the same without the ARRL QSL Bureaus! — W1DVE

25 years ago

April 1942

The cover this month shows an amateur doing his stint at watching for aircraft, mike, earphones, portable rig and binoculars. It’s quite inspirational.

. . . The editor points out the need for radio amateurs and technicians in the enormously expanding program of electronics relating to the war effort. We now know, of course, that electronic technology expanded at a fantastic rate and ultimately led to our present space effort. Elsewhere is noted the needs of the various services. George Bailey, president of ARRL is the man to contact. He’s in the middle of things in Washington.

. . . The FCC has started issuing amateur licenses again, the government and Army and Navy recognizing that an FCC ticket attests to useful proficiency. The civil defense program is still somewhat bogged down but some progress is being reported.

. . . In the interest of listening between the ham bands, Don Mix, WITS describes a converter for the ham who has only a communications receiver limited to our bands. Many hams were to make good use of such tuners for the services later on.

. . . The story of the Providence, R.I., mobile radio patrol is well told by the Rev. Charles J. Mahoney, W1BBB, and Perry O. Briggs, W1BCF. It was, at first, a very frustrating experience but soon ways were found to legally get the system going. Twenty-six Providence radio amateurs were sworn in as policemen. The network, using u.h.f., was highly successful, even though the control station had a power of 15 watts.

. . . The versatile Vernon Chambers, W1JEQ, now comes up with a pack set on 112 Me, for defense work. This is the one shown on the cover. It is not a transceiver but does use a super-super receive receiver. Doesn’t seem too difficult to build, either.

. . . Clint DeSoto, Asst. Editor takes a look at the communication possibilities of the induction field, “the field that stays at home.” He remarks that Dr. Mahlon Loomis used the induction field in his heat experiments over a distance of eighteen miles. Personally, this writer believes that Loomis employed true electromagnetic radiation. You should read up on Loomis. Very interesting.

. . . Fred Parsons, W2EXM writes about old WCC. He has made a scale model of the station, complete with a miniature spark coil in transmitter house! Visitors to Cape Cod should go to South Wellfleet and see what is left of the famous station together with the scale model presently displayed. We have a couple of relics here in the Museum.— W1ANA

From the Museum of Amateur Radio

This month we have another exciting piece of old gear to describe. Without reading further, we wonder how many old timers will recognize it. Not many; relatively few people ever saw it. The picture shows Major Edwin H. Armstrong’s original broadboard 12th-up of a low-frequency oscillator for his superregenerative receiver. The circuit resembles that shown in Fig. 11 of the Proc. I.R.E. for August 1922. The inductance is a toroid with two windings and the tuning capacitor is a British Marconi solid-dielectric variable. The vertical tube contains a doped and the fixed capacitor is for blocking. The frequency is about 12 kc. We are indebted to Mr. Richard S. Perkin, Chairman of the Board, The Perkin Elmer Corporation, for this unique gift. It was given to him by Mrs. Armstrong after the death of the inventor. — W1ANA, Curator

April 1967 59
FCC's Chairman Looks at Amateur Radio

Guest of Honor at the 11th annual dinner of the Washington Chapter, QCWA, FCC Chairman Rosel H. Hyde spoke briefly to the assembly with a message we believe of deep interest to every amateur.

President Robinson (W3RE), members of the Quarter Century Wireless Association, distinguished guests:

It is indeed a great pleasure to meet once again with the QCWA. This Association certainly qualifies as one of the most distinguished and most unique. To be eligible for the status of membership one must have been an active amateur for at least 25 years. One could be born, grow up, produce offspring and acquire various degrees, such as Doctor of Philosophy, in less time. But I understand that the elite of the elite are the "older members" — those with 50 or more years as amateurs.

Somehow the word "amateur" as applied to you and particularly to this latter group strikes me as anomalous or as evidence of exceeding modesty. While I am equally sure you would not want to be called "professionals," certainly that term would much better describe your level of competence. Perhaps this dichotomy also accounts for the absence of the term "hams" and the choice of "wireless" in your title as best descriptive of your group.

Whatever the case, it is a real honor to be with you. Although I am not myself a "ham," or even an honorary "ham," I have had a long and pleasant official association with the amateur service. I am proud of this association and of the remarkable record of responsibility and dedication which characterizes amateur radio.

In accepting your kind invitation I was assured that I would not be expected to present an address. In keeping with this admonition, what I shall have to say for the next few minutes will be most informal and in the nature of sharing a few thoughts.

I am aware that the Commission's deliberations in the "incentive licensing proceeding" are of paramount interest these days. Since it is a pending matter I must of course restrict my comments. But there are some aspects which I believe I may discuss which ought to be mentioned at this time.

First, the Commission has not, since issuing the proposal, taken a single step itself toward official consideration of this matter, in spite of rumors to the contrary. The Commission's staff has examined all of the comments and counter-proposals, is engaged in drafting its recommendations, and the matter is shaping up for early consideration.

Second, since there seems to have been some misunderstanding, it might be helpful to discuss some of the basic reasoning behind the Commission's action in initiating the proceedings.

You can best characterize this proceeding as an indication that the Commission believes in encouraging improvement in the quality of the amateur service — on a voluntary basis! This objective is not only desirable from the personal viewpoint of many amateurs but it may also be extremely beneficial to our national commitment to this service in the light of international developments.

New and emerging countries have new and emerging communications requirements that must be met sometime in the spectrum. Therefore, every existing service needs clearly to justify the spectrum space allocated to it. Without adequate justification, someone may lose at least some of what they now have.

As of now, I don't think there is any question about the amateur service having justified every single kilocycle of spectrum space allocated to it. And I know you share this view.

Let's look briefly at the service record.

Almost every major natural disaster in the last thirty-five years or more has seen the amateur at his best. I need only refer to the recent Alaskan earthquake to illustrate this point. It is the amateur who time and again has served as the backbone of essential emergency communications which are so important in the first few hours or days of such a disaster.

It was the amateur who pioneered the use of the high frequency spectrum. In fact, he was forced to go into this once-called "useless" part of the spectrum — only to end up proving its usefulness and practicability for long-distance international communications.

Amateurs developed many of the essential circuit techniques used in the past and in modern-day communications. In many cases, where they may not have invented the circuits amateurs put them to practical and universal use. Super-regeneration,
In this connection, I would note the somewhat disturbing trend of a lessening of interest in the amateur service, at least numerically. Any decrease in the number of amateurs could tend to undermine the importance of this service to the nation and the necessity for these frequencies internationally. Statistics seem to suggest for reasons not fully understood some lack of interest in the amateur service by our youngsters who, as you know better than I, must be attracted if the QCA concept is to be maintained. While the rate of fall-off is not alarming it does require our earnest attention.

May I, therefore, suggest that the Quarter Century Wireless Association seek to stimulate interest in this service, particularly in our youth. Many youngsters today are intrigued by the use of communications equipment which is reasonably inexpensive, readily available and requires either no license or examination. By channeling their interests into the amateur service, youngsters can develop a lifetime hobby — can enlarge their educational horizons and often can make use of their talent in developing a career in engineering or other related fields.

The government relies on its amateur "network" in times of emergency and otherwise. Unique among all of our licensees, yours is almost entirely a self-policing, self-regulated group. You have that admirable quality known as esprit de corps. You have a real opportunity to develop in the youth of America the ideals of pioneers such as are represented here tonight.

In closing let me assure you that whatever the docket number may be, the objective of the Federal Communications Commission in relation to amateur radio is to improve the status of the amateur service in the public interest.

I appreciate your "CQ." Thank you for "seeking me" so that we might chat informally.

When ground was broken in mid-January for the new half-million dollar Corpus Christi (Texas) Museum, one of the major exhibits to be featured at the opening next fall was well into the planning stage. It will be an exhibit of the development of radio communications from primitive stages in the late 1890s, the introduction of the vacuum tube, and into the late 1930s.

The exhibit is part of the personal collection of T. Frank Smith, Sr., W5VA. The collection includes 16 complete stations. The woodwork of the units has been carefully restored and, where necessary, the apparatus has been rewired. Each is in perfect working order. Some pieces bear the magical names of the pioneers of radio: Marconi, De Forrest, Armstrong, Jenkins and Fleming.

One of Smith's most prized possessions is a duplicate of the Westinghouse type T.F. transmitter and receiver with which he worked his first major DX with an Australian amateur.

Museum Director Heine said that Smith's collection is particularly important in today's "throw-away generation" where the national tendency is to discard valuable pieces of history in favor of the latest model.

— Fred Bonavita, W7JLX/6

April 1967
A very unique public service function has been provided in the Dayton, Ohio area by amateur radio. Each Friday evening during football season, portable stations are set up at various high school games for immediate distribution of scores through what we call the "Football Score Network." This article explains the operation, discusses problems encountered, describes the equipment used, and attempts to give an overall insight of the function.

The network, which is on two meters, is controlled from a fixed location which acts as a clearing station. As each quarter ends, stations located at the games report the scores in a predetermined manner. The net control then announces the score for all other stations. In many instances, the stations at a given location can copy scores directly from other games due to the excellent range which we experienced. At the games, the operator lists all scores and periodically passes them to the public address announcer and any b.c. station giving coverage to the game. The press box personnel are always interested in many games and quite often request up-dated information. Generally we give the information at quarter ends as confusion exists with rapidly changing scores and since on peak nights we approach saturation on the frequency. As many as 15 games have been covered in one evening. In addition, we provide major league baseball scores earlier in the season.

A typical exchange between the games stations, WSSJT/S, and the Net Control station, WSIPT, follows:

WSIPT, this is WSSJT/S at game 2.
WSSJT/S, this is WSIPT, go ahead.

Game number 2, Fairmont East 7, Fairmont West 7 at the end of the first quarter.
WSIPT, WSSJT/S is clear.

Attention all stations. Game number 2, Fairmont East 7, Fairmont West 7 at the end of the first quarter. WSSJT/S this is WSIPT in the football net clear.

Each game is numbered for the benefit of recording scores. The visitor score is given first. If net control should repeat a score incorrectly, the game station comes back in with the correction. Each operator maintains a log sheet.

The net control sometimes experiences trouble maintaining communications with all stations as we serve an area having a radius of approximately 30 miles. We found that, although the net control station can reach all locations by using a rotary beam, it misses stations attempting to call in and some of the game stations are unable to copy all announced scores, thus causing unnecessary delays in distributing scores. This led to the use of an alternate control station. However, this did not solve the problem sufficiently because, while in communication with game stations, the alternate control might miss picking up some scores from the regular net control. Also, each handling of a score increases the chance for error. There is the added difficulty in frequency selection for the alternate. Sharing the same frequency adds confusion and delays the regular control station from taking and announcing scores. We finally settled on a plan by which the control station uses two beam antennas pointing in different directions. Two transmitters are used, and are on different frequencies. Receiving is on one frequency with a receiver on each antenna.

To provide additional scores, we have other fixed stations monitoring games not covered in person but which are announced on the commercial b.c. radio frequencies. These stations call in scores in a manner similar to those actually at the football stadiums. We have several operators with mobile equipment who do not have sufficient time to go to a game for its duration, but who mobile in at half time or toward the end of a game, reporting the current score and carrying all available scores to the press box. A mobile can sometimes cover two or more games as the half time break provides time to drive to another game. Low-band equipment is used into more distant locations for away-game scores. All of this helps us achieve our goal of providing as many scores to the game locations as possible.

A MOBILE CAN SOMETIMES COVER TWO OR MORE GAMES.

* RR #2, Box 167H, Piqua, Ohio 45356.
The Fire Department Graciously Assisted With Their Ladders.

We use two meters for the net. Generally, a halo antenna on top of the press box provides more than adequate range; however, at many locations we have installed antennas high up on the floodlight pole nearest the press box. In one instance we called on the fire department and they graciously assisted with their ladders. About the only real technical problem at the games involved interference with the public address systems. These problems were cleared up by the usual methods.\textsuperscript{1} Many of the rigs used at the games are Gonset Communicators. These units are part of the local RACES operation and this also provides us with a basic frequency in general use. "Twoers" and other transceiver types of equipment are used at the balance of game locations.

We found that approaching the athletic director of each school with a good sound sales pitch won us the opportunity to provide the service. After the net had been in operation for several weeks, we received requests for the service from locations which had not been contacted. However the director may not know whom to contact, so it is best to go to him. We request space in the press box, even standing in a corner. After we have been in several times a permanent seat is generally provided, along with a free pass to gain admittance and permission for the public address announcer to give amateur radio recognition when he announces the scores for the crowd.

Several local b.c. radio stations have given us excellent publicity and have had our operator explain our function for their listening audience during pre-game and half-time shows. We have also had newspaper coverage.

In addition to the game scores, the net has provided some special services. At one game, the officials didn’t show up, so using our network the athletic director made an appeal to other nearby locations and immediately found substitutes. The starting of that game was delayed only a few minutes. At another location the public address system failed and our amateur promptly procured needed parts from his home nearby, and made the repair before game time.

Future local plans include expansion of nets in surrounding areas and net-control interchange of scores of interest. We also hope to place a unit at the local newspaper office to provide a Dial-A-Score Service.

A similar operation could be used to cover basketball games — even college football and basketball games by low-band operation.

\textsuperscript{1} McCoy, "HI-FI and Electronic Organ Interference," \textit{QST}, June 1966.

\section*{Strays}

Henry S. Shaw, \texttt{W1JK}, whose name regrettably is among those in Silent Keys in this issue, will be recalled as the author of the very first article on crystal control of transmitters — an article which appeared in July 1924 \textit{QST}, and which was reprinted in our "QST Classics" series in the April 1966 issue. A pioneer "ham," his pre-WWI interest in amateur radio led him to join the General Radio Company early in its existence, and for many years he was Chairman of its Board of Directors.

While in Japan, W8KDS received the traditional amateur radio hospitality from members of the Hokkaido Radio Club in Kushiro. On departure, Paul was presented with a picture autographed by club members. Shown standing (l. to r.) are JA8ABT, JA8BOL, JA8GY, and JA8AAP. Kneeling is Paul, W8KDS.

\textbf{April 1967}
Take Me to Your Leader

Since the inclusion of RACES as a part of ARPS, we have received many questions from the rank and file amateur regarding which is which and who does what. "Who appoints the radio officer?" asks one. "Now that AREC is a part of RACES (or the other way around), do I report to the EC or the RO?" asks another. "Our EC says we can't do anything without the radio officer's permission, is this right?" is another typical question.

Let's see if we can't get such matters straightened out. There are three divisions of ARPSC. In order of seniority they are the Amateur Radio Emergency Corps (AREC), the National Traffic System (NTS) and the Radio Amateur Civil Emergency Service (RACES). If you have a copy of the Operating Manual, the diagram on page 81 tells you much. The same diagram is on page 2 of the recently-revised Public Service Manual. Let's take one division at a time and talk about its leadership and who selects them.

The AREC is the oldest, and the emergency coordinators who head it up are appointed by the elected section communications managers of the League, whose names and addresses are found on page 6 of this and every issue of QST. The SCMs usually appoint section emergency coordinators to take charge of this phase of section activity. When a section amateur applies for EC appointment, he usually submits his application first to the SEC who then, if he approves, forwards it to the SCM. The SCM then notifies headquarters of the appointment on a standard card form. This is usually the way it's done. The exact procedure can vary from section to section.

ECs usually have areas of jurisdiction encompassing cities or counties, and they are undoubtedly the most important appointee in the AREC. Note that the EC is not the leader of any specialty group. He heads up all emergency preparedness activities within his area of jurisdiction, whether it be h.f. or v.h.f., phone, e.w. or RTTY. In the larger organizations he designates assistants for specialized phases of the work, such as band groups, v.h.f. groups, served agency groups, etc. The bigger the organization he has, naturally, the more assistants he needs. The EC is the supervisor, through his assistants if any, of local emergency nets. In small organizations there will probably be only one net; in larger groups there may be as many as half a dozen, in which case coordination between and among them becomes a problem. The idea is somewhere along the line to make liaison with a section net of the National Traffic System.

And this leads us to the next division. NTS is a system of nets designed to handle recorded message traffic in standard form from place to place outside the local areas of EC jurisdiction. Unlike the AREC, it is not just an emergency preparedness system; it operates every day, on a routine basis. The local emergency net supervised by the EC is the common link between these two divisions of ARPSC. At section level, the SCM appoints route managers (c.w. and RTTY) and phone activities managers (all voice modes) to organize and operate section nets and in general coordinate routine traffic-handling matters within the section. Usually the RM or PAM serves as net manager at section level, but sometimes they designate someone to serve in this capacity instead. A mandatory function of NTS section nets is to provide liaison to NTS region nets, operating over an area of greater coverage, such as a call district. Operating over an even greater area are the NTS area nets. And binding the area nets together is the Transcontinental Corps, with three directors, one for each NTS area. All managers of region and area nets and directors of the TCC are appointed by the ARRL Communications Manager. So much for NTS.

That leaves RACES. Unlike the other two divisions, RACES is not implemented by the League. All the League can do is recognize it as a division of ARPSC and coordinate with its government-directed officials — national, regional, state and local — to the maximum extent possible. Just as the SCMs of ARRL head up...
On Dec. 15 this station was set up in the Mayor's Reception Room at the City Hall in Philadelphia, Pa., to originate messages to service men overseas. Shown operating the transceiver is WA3AYQ. Others, left to right, are SEC W3EUI, Commissioner Wise, RO/EC W3PST, Councilman Giordano, Registrar of Wills Walsh, and K3WEU.

City of Philadelphia photo.

activity at section level, c.d. directors head up c.d. activity at state and local level, and the c.d. directors appoint the RACES radio officers. The League has nothing to do with its internal organization, nor directly with the supervision or implementation of RACES. However, the RO and his alternate are invariably amateurs, and RACES is an amateur service, so we think of RACES as one of "our" services to the public.

Quite often, RACES and AREC exist in the same community or county, or in overlapping jurisdictions, and sometimes this causes what can best be described as a "conflict of interest" among local amateurs. The headquarters has no panacea for the resolution of difficulties that might arise from such a situation (wish we did), but usually they can be worked out locally by a proper understanding between officials. For example, RACES might confine itself to c.d. matters and AREC to non-c.d. matters such as working for the Red Cross, for example. Or, the two may combine to form a RACES-AREC group with the EC/RO the same man, or two different persons acting as each others' assistants, depending on the type of activity involved in any specific activation. Or, they may partially overlap and work together; often, the c.d. people are willing enough to have c.d. equipment used by bona fide AREC groups, given the required degree of maturity and responsibility. There is no conflict between AREC and RACES and none should be allowed to develop. If we fight with RACES, we are fighting with ourselves.

— WINJM.

Diary of the AREC

At 10:45 p.m. on Oct. 13, VE2BWS was advised of an explosion as a chemical plant in Ville LaSalle, Que. Firing up on two meters, he found VE2RS BXW and DCF on the air, the former acting as NCS and the latter on his way to the disaster scene. Upon arrival as close as he could get, he advised that conditions were bad and that spectators were in danger. VE2BWS thereupon loaded two walkie-talkies and a portable base station in his mobile unit and took off for the disaster site.

After talking his way through three police barricades, using his AREC card, he finally arrived at a final stop beyond which only police, fire and medical vehicles were allowed to pass. He took the portable base station and proceeded on foot.

At the fire site, he found telephone and power lines down and set up his base station about 300 yards from the fire. Time was midnight. With an 18-inch whip, the rig triggered and fully operated repeater station VE2QMT. Reporting to VE2BXX, it was disclosed that VE2BXX was on his way to the site, VE2ANH was taking up his station at the hospital where the injured were being taken, and there were many other stations standing by. VE2BXX started to handle traffic. Some of the communications conducted were: (1) A call to Canadian Pacific Railroad headquarters (via VE2SH) to dispatch an engine to remove some tank cars in danger of blowing up. (2) A news dispatch (via VE2SH) to relieve a "hold press" situation. (3) Some information supplied to radio station CFMB (via VE2XO) from their reporter at the scene. (4) Casualty lists (via VE2ANH) (5) Welfare traffic for relatives of employees (6) News dispatches for the Montreal Star (7) Traffic for Civil Protection headquarters (via VE2KMK) who had only walkie-talkies at the scene.

The base station was closed down at 1:30 A.M. and activity continued from VE2BXX/mobile, which operated until 4:00 A.M. An outstanding bit of public service by Canadian AREC members.

Two more reports have been received regarding amateur participation in the Belmont, Iowa, tornado, Oct. 14 — unfortunately too late to be included in the March QST writeup.

From Story County Acting EC W6JIG comes an excellent report indicating participation by 29 members of the AREC from 0600 GMT Oct. 15 to approximately 0000 GMT Oct. 18. As soon as it became known that a communications emergency existed, the Iowa 75 Meter Phone Net was activated on 3970. The Story County organization was mobilized as soon as the situation had been assessed by W6JIG, WABEYG and W6BFF. All Story County AREC members with six-meter capability were alerted, as were local law enforcement agencies and the Red Cross. Unable to get any specific request for assistance, it was then decided to send six amateurs operating four mobile units to Belmont. The amateurs thus dispatched were W6BFF, W6KAX, K7EPG, K9YLO, WABEYG and W6JJG. Upon arrival at Belmont, they were immediately put to work handling health and welfare traffic on six meter i.m. The following morning, however, a local six-meter a.m. net was established and the functions were split into health and welfare traffic handling and handling some necessary communication for the National Guard, whose own equipment appeared inadequate for the purpose.

W6BFF reports separately on the operation, and adds that cooperation to avoid QRM on 3970 was excellent. He also quotes one official as saying "you people get more results out of a $50 radio than we get out of our $5,000 ones." Equipment isn't everything; a lot of know-how has to go into any efficient operation.

During the period Nov. 6 to Nov. 12, 1966, the small logging town of Johnsondale, Calif., was smashed and flooded for several days by continuous rain. All communications and power were out and the population was left without food, water and other necessities — and having to deal with a raging flood situation at the same time. K6KCL, in the disaster area, succeeded in making contact with WB6DJV, and K6KCL commenced fixed contact portable operation for 49 solid hours. Communications with the disaster area were maintained for Kern and Inyo County sheriff's department, Red Cross, Civil Defense, and Johnsondale Lumber Company offices in Bakersfield, Los Angeles and Kernville. K6KCL was on emergency power, using car batteries, and operated for two days and nights without sleep. WB6DJV took the traffic on 2 meters and relayed it on 40 c.w. WTPCY offered to stand by for as long as needed to handle any of the traffic. K6KCL and WB6KOH kept portable equipment represented. WB6DUX and WB6KOH relayed some traffic on s.a.b. when it piled up too high. K6APE and W6ORTI also assisted. Kern County was really an emergency.

— WB6DJV.

The blizzard of Nov. 27 in upper Michigan left many highways blocked and impassable and telephone lines
down between all cities. Intermittent power failures throughout the peninsula further complicated the situation. Messages of inquiry after the hundreds of stranded motorists and travelers were handled by amateur radio, mostly through the facilities of the Upper Peninsula Net, with WASSLP as net control. Amateur stations active were W81HHC at Manistique, W8ACQR at Houghton, KSTNZ and W8TQG at Marquette, KIDEU/8 at Sault Ste. Marie, W8LZS in Escanaba and W8OQH of Cedarville for St. Ignace and Straits area. W8PIPI did an outstanding job of handling traffic between the Detroit area and the Upper Peninsula.

A flood in the Ovens Valley area of Inyo County, Calif., isolated Olancha and other Southern Inyo County communities on Dec. 4-6. On Dec. 6, W4GQI contacted W6ZEF on 7255 ke, and received traffic for Cartago and alerted 3005 ke. Fish Net frequency, W6CCQP, W6DDW, W6ZKP and W6DUF. W6HII, Big Creek, received traffic from W6PWE to Kernville and passed same by microwave. All stations stood by until phone lines were repaired and communications restored. The "Kneecleheads" consisting of K8MKW, W6DL, W6PWE, W6DD, W6WAST and W4GQI were also a valuable link during the emergency. Damage was done to the Los Angeles Aqueduct, roads, and the Southern Pacific Railroad, all of whom were served by the amateurs. — W4GQI.

Amateurs were called out in North Vancouver, B. C., on Dec. 17 to serve civil defense, which was active in flood operations. New EC V7EFP alerted his AREC group on the way to c.d. headquarters, and after he arrived there was no time lost in instructing them where to go and what to do. After issuing instructions, he established a base station and was in operation on 144.3 Mc. by the time the first mobile arrived on station. The primary need for communication was in dispatching and directing pump crews, for many basements were flooded. V7EFP "rode shotgun" with the truck carrying pumps and crews, providing them with communication. There were four crews and five mobiles in operation. The operation started at 2030, ended at 0600. City and fire department crews were also active, but a head engineer opined that the c.d. group had by far the best system. — V7EFP.

Amateur radio functioned after an airplane crashed in Bogota, Colombia, on Dec. 20. When no other communication was possible, W8JMY was able to obtain information on their daughter's condition for worried parents in his town. Stations at the other end of the circuit were W6BIMF/HK, HK3LZ and HK3BFZ. — W8JMY.

On Jan. 23, the Southeastern Conn. AREC unit and the Ledyard, Conn., RACES combined on an emergency communications exercise concerning a lost child. Ledyard RO K1MR was alerted by the c.d. director and called his alter ego, K1SBR. EC W1GEC and W1DXX were also called, and operation on the ARES was monitored by K1SBR. K1SBR served as the personal station of the resident state trooper in Ledyard, while K1MR went on patrol. W1LJC heard the call for mobiles and reported in, as did K1GL, and both were assigned to the scene to relay progress of the search party. The two missing 3-year-old boys were found at about midnight and returned to their homes, unharrassed but tired. — K1SBR.

Shortly after the noon hour on Jan. 24, a tornado struck Orrick, Mo., ripping through the high school. The PIED Net in neighboring Clay County was activated and provided emergency communications. K8QBS and K8SFH took the c.d. mobile van to Orrick with the Clay County c.d. director. W3AIKOH operated the c.d. station at Liberty. Emergency traffic consisted of requests for emergency equipment needed in Orrick. Five additional members of the PIED Net, AREC and RACES took part. — W3AIKOH, EC Clay County, Mo.

A snowstorm of almost unprecedented severity hit Illinois and Michigan and other midwestern areas in late January, isolating many areas in which amateur radio was able to come to the rescue. We have a number of reports.

One report comes from W8YAN in Michigan. The Michigan Post Office Net, one of the few regularly-scheduled daytime sessions of communication for the operation according to PAM W8YAN, operated from 1545Z to 1822Z. Immediate liaisons were set up with the Calhoun County Severe Weather Net on six meters. Net controls were W8LAQ on the 75-meter net and W8COZ on the six-meter net. Between the two of them, they covered the entire state. The 2-meter operation dealt primarily with reassurances of safety and notices of inability to get home. The six-meter operation, with the NCS at Battle Creek in the approximate center of the heaviest storm area, met on 50.7 Mc, which is normally used for calling and emergency work in the area. Many stations were QN1 both nets, "Snowos" were dispatched between Battle Creek and the Marshall sheriff's office to rescue persons stranded on the I-94 freeway, to get food and drugs to emergency locations, etc. Local BC stations were furnished with phone numbers of local amateurs to contact with emergency needs, which were then coordinated by radio, freeing overloaded telephone facilities. Traffic was both recorded and "command" type, but all traffic between 75 and 0 meters was on a "formal" basis. Much of the operation's success was attributed to strict net procedures imposed and enforced by both NCS's. PAM W8YAN says there was 28.6 inches of snow with drifts as high as 7 feet.

The Calhoun County, Mich., Emergency Weather Net went into operation at 1400 GMT on Jan. 27 and was cleared at 2100 GMT, according to EC W8ASLRB. The NCS was W8COZ. K8UCQ notified the sheriff's department that the amateurs had activated the net. Messages were handled for and about stranded motorists on I-94. WA8ORY notified local BC stations that amateurs would send and receive messages and also dispatched snowmobiles for food, medicine and other necessities. Contact was also maintained with traffic nets in Illinois, Indiana and long-haul Michigan facilities. A total of 29 stations were in the six-meter weather net.

W8DYN, EC Headed RO for Chicago County, Ill., reports 19 stations active on 160 and 18 on 2 meters during the storm, with many more who reported in and then remained silent because they were not needed. Good contact was established in 10 or 12 towns in the immediate area and much traffic was handled, some of it in the form of telephone calls to let people know their folks were held up and safe from the elements. WA9RBS was the means by which the only news for a local paper got out of Clinton. The local broadcast station at Bloomington did regular programming and handled similar calls for the area, coordinating their operation with the amateurs. Nice work by the McLean County AREC/RACES gang.

These distinguished gentlemen are all members of the Amateur Services Sub-Committee of the Texas State Industry Advisory Committee. Left to right, they are W5DVC (commns. inspector), W5SCV, (Houston commns. officer), W5YW (KTRK-TV engineer), W5LSS (MARS director), W5OWD (comms. center supervisor), W5STQN (c.d. commns. officer), Mr Layne (state c.d. coordinator), KSTRY (chairman).
Another group of amateurs carried on communications for the Illinois Central Railroad. W9XNN started things off in Clinton when the storm started, maintaining contact with the dispatcher office in Chicago through WASCNV. WABLU took over the following day and continued operations right up to a late hour Saturday, Jan. 28. Overseas the operation was W9PEK, c/o. radio officer. At least 40 sets of orders were relayed, keeping control of trains going to Freeport, and in addition many messages were handled for individuals.

W9HJD, EC/RO for Douglas County, reports the county was virtually blacked out in both phone and telephone service. RACES was in action from Thursday, Jan. 26, until Saturday, Jan. 28, operating continuously on emergency power. Serving communications to the entire county and through the mutual aid system at Champaign-Urbana civil defense. When the sheriff’s office lost their entire system, RACES was there to assist, and they stood by to handle long distance emergency calls when the telephone company lost its microwave system. About ten amateurs were in action.

W9RHJ reports that the Chicago FM Amateur Repeater of the Society Radio Operators (SRO/CFAW) was active on Feb. 1 feeding radio stations with reports on road conditions via W9KTB and W9KUJ. Mobiles on their way home covered Chicago north side, north suburbs and northwest suburbs.

Sonoma County, Calif., amateurs operated emergency circuits from Guerneville, Calif., during the Jan. 21-22 flood emergency on the Russian River. The circuits were opened at 3 a.m. on Jan. 21 from Guerneville and Monte Rio to the Santa Rosa c/o. headquarters, and continued in operation until 6 a.m. Jan. 22. About 20 amateurs participated.

On Jan. 25, amateurs of Tula County, Okla., provided emergency communication when a tornado struck Owasso, just north of Tulsa. Mobile units were actually on the way to the area, at the request of the weather bureau, when the funnel cloud formed. Communications for c/o. and Red Cross were maintained most of the night and the following day as many trained mobile unit operators were sent to the area. Fifteen amateurs participated. — K3SCJ, SEC Okla.

On Feb. 12, W8AKU/mobile came upon an auto accident in Canton, Ohio. Police were on the scene, but W8AKU was asked to inform the son of the injured couple of the accident and advise him that his parents were on their way to the hospital. A call on 2-meter f.m. on the calling frequency was answered by WA8NDB and the son duly informed of the unfortunate incident. — K8DBJ, EC Stark County, Ohio.


We received 57 SEC reports from 60 different sections in 1966, a good increase over previous years. We were also pleasantly surprised to count 277 wire sections with a 100% reporting record for 1966, six more than in 1965. Several sections missed only one report, which is 100% for practical, but not statistical purposes. In accordance with usual practice, we list hereafter the 100% sections, with number of consecutive 100% years in parenthesis: E. Fla. (15); NYC-LI (13); Mich. (8); S. Tex. (8); S. Dak. (7); Wash. (7); Nevada (6); Alberta (6); Ala. (4); N.C. (4); N.J. (4); Mo. (3); E. Pa. (3); Ohio (2); N.J. (2); E. Fla. (2); Ga. (2); Mont., B.C. Upriron Colo. W. Pa., Ala., Del., San F. Missing only one report were Ore., Sac., V., Conn., Utah, Ky., Manitoba, Kans. Sections submitting no SEC reports for 1966 are Val., West Mass., Alaska, Idaho, S.C., C.Z., Ariz. and W.I.

National Traffic System

On Feb. 4, the Eastern Area Staff of the National Traffic System met at ARRL headquarters (which happened to be convenient) for a total in-session time of about ten hours. EAS is a group consisting of managers of the six NTS region nets in the NTS Eastern Area, the area net manager, the TCC director and three members-at-large elected by the foregoing. Their function is to discuss operational policy matters having general application to all NTS nets and make recommendations regarding them to the ARRL Communications Manager. There is also a Pacific Area Staff, and a Central Area Staff is in the process of formation, but neither of these has had a formal meeting as yet.

Many NTS topics were discussed during the conference. We cannot here give you anything approaching a complete rundown, but let's try to cover some of the highlights.

One subject raised was the overall feeling of loyalty to the system on the part of NTSers. It was observed that many NTS participants, at whatever level, are primarily concerned with the welfare of their own nets and only secondarily with the overall system aspect. There was some question whether or not this is desirable, or should be the other way around? If the latter, what methods can be used to insist in all NTSers a greater feeling of concern for the system aspect as against the common feeling of adherence to a particular net? Or is this indeed desirable? Do you have an opinion?

The debate became quite heated at times on the subject of the setting up of liaisons between NTS at various levels. As you know, NTS is a system instead of a hodge podge only because of the liaison among the nets at various levels — local, section, region and area, and the inter-area function performed by the Transcontinental Corps: so the liaison function has a most important one. The principal topic of discussion revolved around who (i.e., what net official and at what level) is responsible for designating the liaison stations, how many should be sent and what their functions should be.

There was some extended debate on the subject of NTS statistics, particularly as concerns their significance and usefulness are now presented.

Various aspects of the Simulated Emergency Test as it applies to NTS were discussed in detail, especially how realistic it can be made and the usefulness inherent in extensive planning for it. There was also talk about changing the date to get away from the World Series, football games, the hurricane season and Canadian Thanksgiving. How would a date late in January grab you?

Those who have felt that the goals of NTS are a bunch of c.w. diehards would have been surprised at the Sunday morning session, during which it was generally agreed that there is great need for more phone operators.
and phone nets in NTS. The system has never been a strictly c.w. system and was never intended to be, but it has been true through the years that because most of the medium and long-haul echelons of necessity operate on c.w., there has been a tendency to favor c.w. at the section level. The fact is that at this level c.w. cannot effect anywhere near the coverage that can be afforded on phone. Since liaison from section to region is required, and since most phone operators cannot provide such liaison, it is up to the c.w. operators to do so, by reporting into and being a part of section NTS phone nets for this purpose. How about that?

These are just a few of the 20-odd topics raised for discussion at the January conference. Others will be covered in this column in the future. We want the ideas to keep coming, to make NTS the tightest and most efficient operation in ham radio — so let's have yours. — W7NJV.

January reports:

<table>
<thead>
<tr>
<th>Session</th>
<th>EAN</th>
<th>CAN</th>
<th>PAN</th>
<th>IKN</th>
<th>2RN</th>
<th>3RN</th>
<th>5RN</th>
<th>5RN</th>
<th>6RN</th>
<th>6RN</th>
<th>7RN</th>
<th>7RN</th>
<th>8RN</th>
<th>9RN</th>
<th>TEN</th>
<th>ECN</th>
<th>TYN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net</td>
<td>31</td>
<td>31</td>
<td>31</td>
<td>62</td>
<td>59</td>
<td>62</td>
<td>59</td>
<td>69</td>
<td>66</td>
<td>69</td>
<td>62</td>
<td>55</td>
<td>54</td>
<td>29</td>
<td>62</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>Earnings</td>
<td>1067</td>
<td>1273</td>
<td>1214</td>
<td>459</td>
<td>568</td>
<td>641</td>
<td>581</td>
<td>658</td>
<td>587</td>
<td>571</td>
<td>561</td>
<td>577</td>
<td>551</td>
<td>566</td>
<td>527</td>
<td>535</td>
<td>422</td>
</tr>
<tr>
<td>Traffic</td>
<td>1158</td>
<td>1109</td>
<td>1169</td>
<td>303</td>
<td>679</td>
<td>167</td>
<td>281</td>
<td>371</td>
<td>825</td>
<td>757</td>
<td>581</td>
<td>577</td>
<td>708</td>
<td>708</td>
<td>750</td>
<td>529</td>
<td>415</td>
</tr>
<tr>
<td>Rate</td>
<td>51.7</td>
<td>41.0</td>
<td>40.0</td>
<td>7.4</td>
<td>9.2</td>
<td>10.1</td>
<td>9.8</td>
<td>11.3</td>
<td>17.3</td>
<td>16.6</td>
<td>16.6</td>
<td>9.8</td>
<td>18.4</td>
<td>14.1</td>
<td>4.9</td>
<td>3.3</td>
<td></td>
</tr>
<tr>
<td>Acre-</td>
<td>96.2</td>
<td>100.0</td>
<td>97.8</td>
<td>88.0</td>
<td>93.7</td>
<td>94.5</td>
<td>94.2</td>
<td>80.8</td>
<td>100.0</td>
<td>70.2</td>
<td>96.0</td>
<td>90.0</td>
<td>70.2</td>
<td>75.6</td>
<td>80.0</td>
<td>90.0</td>
<td></td>
</tr>
<tr>
<td>Representations</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Summary: 23,192 EAN 7.5 70.7

Region reports:

<table>
<thead>
<tr>
<th>Region</th>
<th>Summary</th>
<th>Memorandum</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAN</td>
<td>23,192</td>
<td>7.5 13.5</td>
</tr>
</tbody>
</table>

1 Region net representation based on one session per day.
2 Session nets reporting (87): Kans. CW; OZK (Ark.).
3 TCC-Eastern (122): 738
4 TCC-Central (98): 698
5 TCC-Pacific (139): 935

of-the-Year" went to W9DYG (see cut). Runner-up was W9CXY. W7DZX says that the month on TCC-Pacific would have been a real good one, if it wasn't for W7DZX.

January reports:

<table>
<thead>
<tr>
<th>Area</th>
<th>Function</th>
<th>Percent Success</th>
<th>Traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>98.5</td>
<td>1986</td>
<td>738</td>
</tr>
<tr>
<td>Pacific</td>
<td>93.9</td>
<td>1409</td>
<td>688</td>
</tr>
</tbody>
</table>

Summary: 383 93.2 5411 2061

TCC rosters: Eastern W7DIZ; W7ZDM (Dir.) — W7EGF EFW NWM KIJD 7H8Z HSY S9A S9A S8A BLY UFI/4 EPC WBA/5, W8OHIK, W8S EML NEM WMO, W38EEQ, W7Z DST IIJS 7H2, W7Z CHT RYP K78 KMQ IGA WAACF, Central Area (W7DYG, W7DZ, W8G5K, W7DZM, W7DZP, W7AA, W7DZM, W7AA, W7DZM, W7AA, W7DZM, net settlements, TCC-Pacific — all five of them interesting and full of information. KIJD looks salky in all of our statistics and thinks we ought to include liaison representatives both from lower and to higher echelons in our percentage representation figures. Any comment from the rest of you on this? W9DYG promises a new C7N Bulletin soon.

W6NQ announces a 13-week QNI requirement to earn a PAN certificate. WSGQ designation that division of traffic around 2RN seems to have dropped off, because there has been a sharp rise in activity. Traffic fell off on 3RN after the holidays, as usual. W5DTR reports K5K for K5IBZ, while the latter had a two-week checkup in the hospital. W56150 issued net certificates to W9EMS, W86KIL and W86FCQ. Alaska is being represented on RN7 via out-of-net skeds between K8AIW and W7KZ-WTU on 20 meters. Now if only they had Montreal WASCIT has issued RN certificates to W7J H2X OKZ DAE ELW EU HQL HZA IWF NAL RYF, A8A K7Q LTPF, W7J8S XQG OGQ PIM PNM, W9QWL started a second session of 9RN in March, bringing 9RN into full conformity with NTS procedures, TEN's January report is the best in over three years, we proud Net Manager W9LGC. Certificates were earned by K9MRY and W8HHD. K7NHL is having his troubles on RN7, but, he says, it's all fun.

Transcontinental Corps, W3EML has issued TCC certificates to W7J BGD EFW NJM, KIJD, W8G V11 SEI, K2S RYH SSK, W7A3 SBY UFI/4 UPC WBA/5, W820HK, W3S EML NEM, K38M4O, W4V DST IIJS 7ZM, W7Z CHT RYP, K8KMQ, W82CF. W7ZHY announces the 1965 award for the "TCC-Central-Operator-
How To Stop Traffic At The County Fair

BY HARVEY KIJAR, WASFUE

WHEN The Lima Area Amateur Radio Club was preparing its exhibition station for the Allen County Fair, one of the members asked if I could make some large photos for the booth. Feeling that the prints would be difficult to display effectively, I decided to prepare a slide program to be shown by rear projection for continuous showing.

After considering the type of slides that were available from the other members and my own collection it appeared that they would require a lot of explaining to mean anything to the non-ham viewer. In a last minute panic, a letter was sent to League Headquarters requesting a suitable slide show. A prompt reply advised that their slide shows were all booked up but recommended the motion picture “Hams Wide World.” So the film was ordered, a sound projector promoted, and a few details of the original plan changed.

Rear projection is not used much but is just the thing for showing film or slides in the limited depth of a fair booth or similar area. The screen is placed at the front of the booth with the projector adjacent or below it and aimed at a mirror in the back of the booth. The mirror is aimed to reflect the image to the back of the screen. This setup doubles the available lens-to-screen distance and gives four times the picture area. It also puts the picture up close to the audience where it will get better attention.

A fine rear-projection screen can be made from a 1 x 2-inch wood frame work covered with craftsman’s tracing cloth or tracing film. Paint the frame flat black and attach the covering with a stapler with the dull side facing the audience. Finish it off by binding the edges with black plastic electrical tape.

The motion picture format has an aspect ratio of 2:3 for slides it is 3 to 2. A standard size for

* 100614 W. Market St.
Lima, Ohio 45805

The Lima Area A.R.C. booth at the county fair. The projection system described in the text can be seen at the left. The mirror is just above the left end of the console. Space for the display was provided by the Metropolitan Bank of Lima, Ohio.
Peruvian Adventure

Ham Radio To The Rescue

BY BILL J. PAYET, S. J.,* OA4BQ

O
n July 28, 1966, another priest and I left Lima by bus with 32 high school seniors for a graduation trip. Our destination was Iquitos, Peru, some 1000 miles away to the north and east, an outpost of civilization not far from the very heart of the Amazon jungle. The trip involves climbing the snow-covered Andes Mountain Range and descending to the jungle plateau to the east. From there we planned to travel by water the rest of the way.

It took us three days to climb 15,000 feet up over the Andes snowfields and down to the jungle plateau city of Pucallpa on the Ucayali River. It was 600 miles from Lima and we traveled over rough dirt roads, spotted with potholes.

Once in Pucallpa we set up the ham rig, a Raytheon SBE SB-34 transistorized transceiver we had borrowed from a local ham, OA4OS. We hooked it up to a 12-volt truck battery, and tied the 20- and 10-meter dipoles to two neighboring trees. We worked several hams all over Peru — some more than 1,000 miles away — getting excellent signal reports.

After a five-day stay in town, we boarded the ship Yurimaguas. She was a 300-foot ship and was carrying 150 tons of cargo. She also carried 180 passengers, one hundred of them minors and all were packed in like sardines. We left port at 10 a.m. and headed downriver for a five-day voyage. Looking back, I can sometimes tempt to call the shipboard diet simple; this is an understatement, however, and doesn’t do justice to such fare. The food was rough; a hot-water dish the crew called soup, plus beans and rice. This was followed by green bananas boiled in water.

The author, OA4BQ (r.) aboard the ship Yurimaguas. Antennas were strung from the main mast to a water pipe on the stern. The SB-34 transceiver is sitting atop its suitcase in operating position.

Boiling was too good for these bananas, we decided — they had no flavor whatsoever. There were only 40 beds on board. This made it impossible to walk on either of the two decks at night. They were a solid hodgepodge of suitcases, cargo, and people asleep.

I do not believe there has ever been a mobile rig sailing down the jungle rivers of the OAS area, nor will there be another for a long time. We recognized that this was a unique expedition in the annals of ham radio. Accordingly, we raised our dipoles on the main mast in the bow and tied the other end on a water pipe on the stern, forming a 45-degree vertical angle. We used the vessel’s own power, which was generated by a diesel engine.

The rest of the passengers seemed to regard the rig as something of a madman’s toy. Their attitude changed rapidly, however, as the week’s events unfolded. The morning of Monday, August 8, our ship quietly slid over a sand bar and broke its rudder. Being under way, the ship veered, turning on its axis — and promptly got stranded on another sand bar. The captain ordered the engine reversed at full speed, but it was no use. We had broached and were stuck in the middle of the river, 200 yards away from either shore.

What now? The captain informed us that the only way out would be to send his small outboard boat down river all the way to our destination, Iquitos, a 30-hour trip. In Iquitos, they would try to get a tug to come to our rescue. It would be a four-day up-river trip for the tug, which would then take three more days to tow us to our destination. This meant more than a week in all, and the loss of our airline tickets.

Our main concern, however, was food. The captain said we would be fed during the first 21 hours, but that after that we would be on our own. We had beans for an additional day, and rice for a couple more. There were plenty of bananas, all as green as a golf course in spring. One of the passengers was a doctor, and for this we were grateful. Nevertheless, the prospect of so

*P.O. Box 5111, Lima, Peru.

The ordeal over, the author and some of the rescued students enjoy the flight back home aboard the PBY Catalina aircraft.

(Continued on page 129)
"But... But... But, Ma'am!"

BY WILLIAM R. CLARK, WA5AUB

QRX, George, the landline is ringing...
Hello... Yes Ma'am, I am an amateur radio operator... No Ma'am, I didn't know that I was interfering with your television set, but... but... Ma'am, would you please excuse me for just a moment, I'll be right back...

George, some nut just called with another TVI complaint so I'd better say 73... Yeah, see you tomorrow night, WA5AUB clear and QRT...

Hello, Ma'am, I'm back... What's that, Ma'am?... Did I say that?... Yes Ma'am, I'm very sorry that I said that. If I had known that your telephone was right by your TV set I wouldn't have said it... No Ma'am, I'm not trying to be a smart alec, I'm sort of a dumb alec... You're right Ma'am, that's not very funny... Yes Ma'am, I apologize... Ma'am... Could we?... Yes Ma'am, could we?... You're right, Ma'am, my mother would be very ashamed if she knew that I was talking disrespectful to an old lady... but Ma'am, I didn't mean it that way... but... but... but... Please Ma'am, could we just talk about your problem?... Yes Ma'am, could we call it our problem?... If it will make you feel any better we will call it my problem... Yes, Ma'am... No Ma'am... Yes, Ma'am, sometimes an improperly turned transmitter will transmit a signal into the television band but sometimes... Yes, but sometimes... Please Ma'am, did you realize that an old TV set can tune in a signal in the amateur bands... brand new... $750.00... Yes Ma'am, that should be just about as good as money can buy... but... but... but... Yes Ma'am, I know you have the right to report me to the FCC... Well Ma'am, would you believe that I have been reported to the FCC six times and everytime I was cleared?... Would you believe three times?... once?... Yes Ma'am, you're right. My mother would be ashamed of me... No Ma'am, I won't make any more bad jokes... Your son, John Smith, No Ma'am, I don't know him... With the FCC in Kingsville... You don't say?... Is that what he told you to do... Ma'am... but... Please... Please Ma'am, may I say something?... No Ma'am it won't be another smart remark... Yes, Ma'am... Just this, I am very sorry but through my rudeness and poor taste I have gotten this conversation off to a very bad start, would you mind hanging up and calling again...

Hello... Yes Ma'am, I am an amateur radio operator... No Ma'am, I didn't know that I was interfering with your television set but I am certainly glad you called it to my attention... Yes Ma'am, it is possible, but a young lady with such a nice voice probably has a brand-new $750.00 set... You do, well it's probably in my old broken-down transmitter... Yes, Ma'am, I will check it out very carefully and try my best to correct my trouble... Yes Ma'am, thank you for calling... It was a pleasure to talk to you, too... Give my regards to John... If it happens again you just let me know... Goodnight, Ma'am.

*3261 Austin St., Corpus Christi, Texas 78404
1 From Vol. III, No. 2 (March 1966) W5MS Bulletin

April 1967 71
Alex Reid, VE2BE

With the greatest regret we record the passing on January 27, 1967, of Alex Reid, VE2BE, Honorary Vice President of ARRL and a member of its Board of Directors from January 1, 1930 until his election as a vice president on May 13, 1960.

Alex was first licensed in 1919 with the call BE, later changed to 2BE and then VE2BE. His first rig, a rotary spark gap, was followed by a quenched gap transmitter. In the early twenties he switched to a tube rig using 20CS, and contested honors for the first Canada/England amateur work with 2TA. In 1925 Alex relayed news of a Jack Dempsey prize fight from Australia.

After serving as president of the Montreal & District Radio Club, Alex was elected ARRL Section Communications Manager for Quebec Province in 1927. In 1930, he was elected as Canadian General Manager of ARRL under which title he continued to serve until the name was changed in 1951 under the League’s present Articles of Association, carrying on thereafter as director from the Canadian Division. Some small indication of the esteem in which amateurs held him were the 25th, 30th and 35th Anniversary testimonials held in his honor. On the first occasion the Canadian amateurs presented their director with a 20-A sideband transmitter and on the last an NCX-3.

In government circles, too, Alex was highly respected. In the late twenties, he was appointed as a part-time radio inspector. He was a member of the prestigious Canadian Radio Technical Planning Board since its inception at the start of World War II, and he was a member of Canada’s delegation to the International Telecommunications Union conferences at Atlantic City, 1947 and Geneva, 1959.

In the business world, Alex joined the Hartt and Adair Coal Co. as a clerk and worked his way up to president. Since his retirement he had been quite active on the air, as for instance in the “Professional Loafers Net” on 3790 kc. Indeed, it has been reported that Alex was on the air only hours before he died.

To Alex’s widow Jackie, the former Lora Jackson, and to the amateurs of Montreal and of Canada we extend the sincere condolences of League officers and members everywhere. Perhaps our feelings are best summed up by Past President Herbert Hoover, Jr., W6ZII:

“This was with the deepest possible regret that I heard the news of Alex Reid’s death.

“He was kind, friendly and sincere; and he earned the affectionate respect of all who came in contact with him.

“The contributions he made during his lifetime to amateur radio and the League were legion. Yet he did things in such a quiet, modest way he seldom got the credit for his accomplishments — except among a very few who had the privilege of working with him.

“He will be greatly missed, and I trust the League will act appropriately to see that his name will be always honored as one of its staunchest and most effective supporters.”

CYCLES PER SECOND IN CANADA

The Department of Transport in Canada has released the following statement concerning Canada’s use of Hertz for cycles per second:

“The CCIR at the Xth Plenary Assembly, Oslo 1966, adopted the Hertz and multiplicative prefixes as now apply to cycles per second. Following this trend, the Department of Transport is adopting the term Hertz in place of cycles per second as a frequency unit for use in general correspondence. For the time being however, in all correspondence relating to Canadian legislation such as, for instance, the Radio Act, cycles per second will be retained to designate frequency because under General Radio Regulations, Part I, Section 7 and Part II, Section 11, only definitions adopted by ITU are recognized. The Department expects that this exception will continue only until the ITU adopts the term Hertz at a World Radio Conference.”

Our appreciation to the Canadian Radio Technical Planning Board and ARRL, Director Eaton for this information.
FCC ANNUAL REPORT

The Annual Report of FCC for fiscal 1966 and a December 30 statement by Chairman Rosel II. Hyde contain much information of interest. The year-end paper, for instance, mentions the amateur moonbounce record set on November 28 when K2MWA/2 in New Jersey and VK2ATN in Birchip, Australia were in contact on 144 Mc. for six minutes.

The Annual Report, while not providing any previews of FCC decisions on incentive licensing, indicated that Docket 15928 and the 1959 Extra Class Inquiry, Docket 12912, would be dealt with in a single Commission document. The report says in part:

“...the major problems concern the contemplated qualifications for the advanced grades of Licences: what additional privileges, if any, should be afforded the holders of the present Advanced grade licenses, and the privileges to be granted the holders of the preferential grade licenses."

The reports show that FCC issued 17,000 official notices for on-the-air violations of its rules in all radio services, an increase of 20%. The monitors also detected some 1500 unlicensed stations, furnished 600 emergency radio bearings to ships and aircraft and solved about 2800 major interference cases.

The Commission-sponsored National Industry Advisory Committee (NIAC) adopted interim emergency plans in a number of services and confirmed the Radio Amateur Civil Emergency Service (RACES) in this role. Separately, RACES was made a permanent part of the amateur service.

BRITISH COLUMBIA LICENSE PLATES

From the Victoria Short Wave Club comes the welcome news that the Province of British Columbia will no longer require payment of a five-dollar service charge for amateur call-letter license plates. Jim Smith, 3C7FO, is now license plate coordinator, and applications for 1968 plates are being accepted now.

NATIONAL CONVENTION ACCOMMODATIONS

The National Convention Committee has secured some additional accommodations, in moderate and low-priced brackets, for the convention in Montreal June 30, July 1 and 2.

Convention headquarters is the Hotel Bonaventure, where rates are $21 for a single and $26 for a double. Children under 18, sharing a room with parents, are free.

The Kennedy Apartment Hotel features 2½ room suites accommodating four persons; minimum rate is $30.

The Motel Lafayette is $22 per day, single or double, with extra cots at $1.

Rooms in inspected and approved private homes range from $8 to $10, double occupancy, depending upon location, comfort and parking facilities.

A trailer park and camp is located 8 miles from Expo '67 on Route 9. Rates are $3 for tents, $4 for trailer tents and $5 for trailers. Running water, baby sitters, restaurant; telephones and bus service every half hour to the Expo grounds are features of “Camping Valle Air.” For reservations at this facility only, write or call Mr. O. Godbout, 742 Colonel Jones St., Ste. Foy, Quebec (phone 653-7360).

Marina facilities are also available. Write to the address below for further information.

All reservation requests except the trailer park go to Mr. Doug Shaw, VE2BSX, 7401 Mount Avenue, Montreal 16, P. O., Canada — before June 1, 1967, please.

Jean Shepherd, K2ORS, whose wit sparkles forth nightly on WOR-New York, and who did an uproariously funny stand-up bit on an amateur radio at the 1966 Hudson Convention, celebrated the latter occasion with the release of a book of amusing, sometimes acid, reminiscences, In God We Trust—All Others Pay Cash. The book, published by Doubleday & Co. totals 264 pages and sells for $4.50

April 1967
Godley Receives VWOA Award

At its Forty-Second Annual Memorial Awards Banquet held in New York City on February 25, 1967, the Veteran Wireless Operators Association presented Paul F. Godley with its De Forest Audition Award for outstanding achievement in the field of research and development. Prominent in the list of citations was his development of early amateur equipment (is there an old-time-timer who doesn't fondly recall the Paragon receiver?) and that never-to-be-forgotten Transatlantic Test expedition in 1921, sponsored by ARRL. W69UX was the first transatlantic reception of U.S. amateur signals. In the photograph above, taken after the presentation, "Paragon Paul" is the fourth from the left. Others, left to right, are Clarence D. Tuska, co-founder of ARRL, Arthur Batcheller, retired chief of the FCC New York office, Hatton C. Wilks (W2BC-W1BC), VWOA President, George Grammer (W1DP), representing ARRL on this occasion, Frank T. King, VWOA Assistant Secretary, Patrick O'Keefe, Editor of the VWOA publications, and Richard S. Egolf (W2WX).

EXECUTIVE COMMITTEE MEETING

Minutes of Executive Committee Meeting
No. 314
February 11, 1967

Pursuant to due notice, the Executive Committee of The American Radio Relay League, Inc. met at the Headquarters office of the League in Newton, Connecticut, at 9:38 A.M. on February 11, 1967. Present: President Robert W. Denniston, W8NWX, in the Chair; First Vice President W. M. Groves, W5NW; Directors Charles G. Compton, W9DJU, Gilbert L. Crossley, W5YA, Noel B. Eaton, W30J, and Carl L. Smith, W9BHJ; and General Manager John Huntoon, W1LVQ. Also present were Director Robert York Chapman, W1QV; Director Harry J. Dukas, W2TUK; General Counsel Robert M. Booth, Jr., W38F; and Assistant General Manager Richard L. Baldwin, W1IKE.

The General Manager reported on a preliminary financial statement of the operations of the League in 1966, and the matter received extended discussion. A tentative budget submitted by Project Oscar, Inc. for its 1967 operations was examined and appeared satisfactory as concerns proposed League monetary support. At the request of New England Division Vice Director W. N. Grow, W1EAE, the Committee examined his recent change of employment as against the eligibility requirements for his office; the Committee found no conflict. At the request of the Committee, Communications Manager George Hart, W3JMJ, joined the meeting. Extensive discussion ensued concerning the possibility of designating a common channel in the 28-Mc. amateur band to facilitate low-power a.m. operations such as converted CB equipment. On motion of Mr. Smith, the following resolution was unanimously ADOPTED:

WHEREAS, the initial response to the February 1967 QST article concerning conversion of CB equip-

ment for use on the amateur 10-meter band has produced considerable interest with the membership; and
WHEREAS, the use of a common frequency above 29.0 Mc. by low-power transmitters using the a.m. mode will greatly facilitate amateur operation in the 10-meter band; and
WHEREAS, the selection of a recommended frequency will encourage monitoring and usage both locally and on a League-wide basis; now, therefore, BE IT RESOLVED, that ARRL encourages amateurs generally to employ 29.0 Mc. as a common frequency, particularly for low-powered a.m. communication.

The Committee recessed for luncheon at 12:45 p.m., reconvening at 1:45 p.m. with all persons beforehand mentioned in attendance except Messrs. Chapman and Hart.

On motion of Mr. Eaton, after discussion, unanimously VOTED that the League make available to individual members and clubs, at the approximate cost of production and mailing, extra copies of the Stanford Research Institute study of the Amateur Radio Service.

The General Counsel reported on the status of various Washington and legal matters.

On motion of Mr. Groves, unanimously VOTED that the League enter the affirmative position in the matter of IARU Proposals 119 and 120, concerning applications for membership from the Faroeese Amateur Radio Society and the Malta Amateur Radio Society.

On motion of Mr. Crossley, unanimously VOTED to approve the holding of an Oregon State Convention in Portland on June 2-4, 1967; a West Virginia State Convention in Jackson's Mill on July 1-2, 1967; and an Ontario Province Convention in Ottawa on October 27-29, 1967.

On motion of Mr. Crossley, affiliation was unanimously GRANTED to the following societies:

The Amateur Radio Club of McGill University
Montreal, Que., Can.

Amateur Radio Club of St. John's College
High School
Washington, D. C.

Amateur Radio Club of Cleveland, Ohio
Boulder High School Amateur Radio Club
Boulder, Colo.

Central Kentucky Amateur Radio Club
Campbellsville, Ky.

Conestoga High School Amateur Radio Club
Bermey, Pa.

Golden Triangle DX Club
Seminole, Fla.

Hastings High School Amateur Radio Club
Hastings-on-Hudson, N. Y.

Kaiser Employees Amateur Radio Club
Phoenix, Ariz.

Lamesa Amateur Radio Club
Lamesa, Texas

Lewiston-Clarkston Amateur Radio Club, Inc.
Lewiston, Idaho

Metuchen YMCA Radio Club
Metuchen, N. J.

Minneapolis High School Amateur Radio Club
Excelsior, Minn.

Moneton Area Amateur Radio Club
Moneton, N.B., Can.

North Alabama DX Club
Huntsville, Ala.

North Arkansas Amateur Radio Society
Harrison, Ark.

Opposum Amateur Radio Club
Wantagh, N. Y.

Overlook Radio Society
Kingston, N. Y.

Ozone Amateur Radio Club
Pearl River, La.

Penn Jersey Young Ladies Radio Club
King of Prussia, Pa.

The Phillips Exeter Academy Radio Club
Exeter, N. H.

Red River Valley Amateur Radio Club
Gainesville, Texas

Shorefront YM-YWHA Amateur Radio Club
Brooklyn, N. Y.

Strongsville High School Amateur Radio Club
Strongsville, Ohio

Viking Amateur Radio Society
Waseca, Minn.

Virginia Amateur Radio Association
Richmond, Va.

Wisconsin Rapids Amateur Radio Club
Wisconsin Rapids, Wis.

Young Amateurs of Quebec (YAQ)
Montreal, Que., Can.

In the course of its meeting the Committee discussed, without formal action, the 1967 National Convention, DXpeditions, group life insurance, RACES operations, and membership development.

There being no further business, the Committee adjourned, at 6:50 p.m.

JOHN HUNTOON
Secretary
ISRAELI OPERATING CHANGES

The October, 1966 IARU column carried news about amateur radio in Israel. Since the article by Philip M. Kane, 4XIUQ, appeared there have been several changes in procedures.

OM Kane says U.S. amateurs are now receiving reciprocal operating permits on the same basis as their Israeli counterparts in the U.S.—one year (renewable) or to the end of the license term, whichever occurs first. The grading remains the same: Novice Class and Technician Class licensees receive Grade "C" privileges here, General Class and Conditional Class holders receive Grade "B" privileges, and Extra Class and Advanced Class licensees get Class "A" privileges. Operation under such a permit is with the "home call" with the addition of /4X.

Amateurs who are intending to settle in the country can receive an Israeli license and call sign by passing the appropriate technical examination for the grades outlined above (except for Grade "C" which will be granted without further examination) credit being granted for the FCC code examination. In addition, a license of one grade lower than indicated may be granted without further examination. For further information, the applicant should contact the Ministry of Posts directly.

The Frequency, License, and Legislation Section of the Engineering Services, Ministry of Posts, is located in the Shalom Tower Building, Tel Aviv. However, the mail address for all correspondence with the Section is Ministry of Posts, Engineering Services-Frequency, License, and Legislation Section, General Post Office, Jerusalem. The former Tel Aviv post office box address is no longer valid.

In general, the Customs on completed instruments for amateur stations (or for kits to build them) is 15% of the total value (this is true for transmitters, receivers, antennas, etc. but there are many "small print" sections of the Customs Regulations which are applied in each individual case). In all instances of clearance of radio equipment (including receivers and walkie-talkies not subject to licensing in the U.S.) the Customs authorities require a specific approval-release from the Ministry of Posts (the same section that deals with licensing) before the goods may be cleared into the country. For the purposes of this approval, the recipient is required to supply to the Ministry of Posts the following: date and port of arrival; name of ship or airline; manifest, bill-of-lading, or import license numbers (as applicable), and a complete description of the goods to be released.

For a tourist coming to the country, equipment accompanying the amateur will be held at Customs until the approval-release is obtained. When the equipment is released, a notation will be made in the amateur's passport that upon leaving the country he is responsible for removing the equipment or paying the required duties and fees.

For an amateur coming to Israel for a stay exceeding three months, (in Temporary Resident, Permanent Resident, or Immigrant status) the procedure is a bit more complicated. The individual concerned will file a Customs Declaration within one month of his arrival or change from Tourist status, and if he intends to clear radio equipment duty-free he must list it on his declaration. Then, when the equipment arrives, he must obtain the approval-release as mentioned, and in addition, may be required by the Customs to post a guarantee bond for the amount of the customs and fees. Additional information as to the procedure and the mechanics may be obtained from the Association of Americans and Canadians in Israel (AACCI), 53a Hayarkon Street, Tel Aviv or from AACCI branches in the U.S. and Canada.

An agreement has been signed between Israel and Canada permitting third-party traffic between amateur stations of these countries. It should be emphasized that a U.S. station operating in Israel under the reciprocity agreement is bound by the third-party restrictions of an Israeli station (i.e., with U.S. or Canadian stations only).

(Continued on page 140)


April 1967 75
DROP DEAD

Q. When I saw the editorial in February QST, I was shocked. I admit when I was a novice some years ago I was in disagreement with the ARRL. But, in time I found that it was the best amateur organization available.

My feeling about incentive licensing is that I do not completely go along with it but I can see its good and bad points. I believe, instead of cutting the phone band, it should be expanded and thus expansion should be for extra class only. As everyone knows the bands are very crowded now and by cutting, they will only become more crowded.

— Lloyd Pennell, WB3GHR, Linden, N. J.

Q. This is the first time incentive licensing was really brought out clear and concise. My compliments on all that was said!

I personally endorse all that was said and I'm sure that some of the unhappy amateurs would too now if they took the time to read it! As we all know misconceptions can get started in a big hurry and take years to clear up.

Again my thanks for a tremendous editorial and I'm glad that I have been an ARRL member for "only" 18 years. — Ernest Blind, W7DDQ, Bremerton, Wash.

Q. I would not worry about the individuals that mail unsigned letters. In the first place they are not desirable people to have in any organization and are to be pitied for being a weak character.


Q. You state that the FCC's proposal is to divide the bands, one half for the upgraded license and the other half for the present general license. This is not true. The FCC's proposal gives the entire band for the upgraded license and half of the band for the present general license. A vast difference. Half the band will be expected to handle all general traffic as well as all general traffic to generals.

Even if the bands were to be divided in two equal parts, much harm will result. It has been a well-known fact in the telephone industry that two trunk groups of equal size cannot handle as many calls as can be handled if the trunks are put in one large group. The same is true for radio frequencies.

I feel that you are ignoring good engineering practices and are distorting facts in your zeal to help a few even if it hurts many.

— James A. Nieder, W3MRI, Bethlehem, Pa.

Q. You're right! I'm talking about your italicized paragraph heads in the Editorial (Feb.). Every one of them comes from a man, or men, of non-think status. We have all met the kind, not only in amateur radio, who love to sound off to make up for their secretly realized lack of knowledge in hopes that noise of anger will impress others.


MORE DB

Q. Periodically one sees, in QST and elsewhere, interesting and illuminating estimates of the effective power ratios among the various modes of transmission — e.g., cw 0 db, a.s.b. —17 db, etc.

Admirable though these pioneering efforts have been, they can now be superseded by a General Law of Transmission Mode Power Ratios. I have developed this Law during 22 years of amateur operation, some of it in contests, during no part of which have I run more than 20 watts input. This Law is to the aforementioned estimates as the Theory of Relativity is to Newtonian mechanics, and furthermore it rhymes, which is an aid to remembering which Relativity can hardly claim. As every scientific law ought, this one is a perfect and infallible predictor of the actual situations which arise; it is:

If they need you,
They can read you.

— Frank Gue, VE3DPC, Burlington, Ont., Canada.

TECHNICAL STUDY GROUPS CONTINUED

Q. As an active amateur interested in advanced communication techniques, I have watched the "Correspondence from Members" with an eye toward seeing views of other amateurs on technical advancement. The letter from OM Kirsh, W3QOT, in February QST, contains a laudable suggestion — technical study groups.

Experience as a member of an active organization has proven to me that a group effort on a large scale project is the best way. I would like to cast my vote in favor of initiating an organized program of technical study groups within the League.

Based on qualification and stated interest, groups throughout the world could work independently in the many areas amateur radio encompasses. One group might work on high speed information transmission for use by the traffic men. Another might work with in-band duplexing which could be of use in several areas. Still another might work on a pre-detection recording system or an automatic tracking system for the satellite enthusiasts.

There are, in fact, somewhat similar groups working presently on their own in such areas as low-scan TV on 14 Mc., moonbounce, and microwave communications.

I believe that League financial aid is by no means a mandatory item. The League through QST would be a clearing house for the ideas and a forum for the results of these study groups. A prerequisite, however, to any technical program the League might undertake would be a determination of what is "state-of-the-art" in amateur radio.

Finally, I am sure such a program, well organized and selectively administered, would become another feather in the League's cap. It would be a clear demonstration of the League's ability to supply the constructive leadership so badly needed if amateurs
ne to extend their horizons in the light of the complexity of today's electronics. — David B. Collins, K8LME, Terre Haute, Ind. J

J With the danger to some of our high-frequency allocations it appears that greater emphasis should be placed on technical activities involving research and experimental work in the h.f., u.h.f. and microwave portions of the spectrum. We seemingly have a relatively high proportion of communicator type operations (hobby categories of activities) which would be extremely difficult to successfully defend as justifiable utilization of facilities in the category of world domain. That we so occupy ourselves when there yet remains much experimental and developmental work in the area of space communications and satellite relay, seems to be a poor utilization of the majority membership of our fraternity.

It appears timely that we initiate a policy of special emphasis on technical development and experimental work to ultimately restore the image of the average amateur as a qualified technician and make him a valuable contributor to development of the state-of-the-art in microwave equipment for space and satellite communications. This is in reality, not a new area of activity for us, but merely a return to the pursuits that sustained for the pioneer amateur an enviable place in the history of radio development.

Briefly, a plan should be implemented to greatly expand our efforts on a group study or experimental basis, somewhat on the order of engineers chapters and special research groups operating at the local level. The nearest approach seen in amateur work is the moonbounce clubs and the Oscar satellite program. These are small beginnings and this type of work should be tremendously accelerated. The ARRL policy should primarily be that of stimulating the efforts of public spirited amateurs with the required technical and administrative background who would staff these study and experimental projects groups. They would also attract interested recruits from the beginner level of technical capability who would ultimately become expert technicians or engineers.

These groups should be organized in every urban area to perform a level of technical training and experimental work on a par with the overall technical and administrative capability of the group. With proper backing, a program of this kind could generate a tremendous surge of design, construction, and experimental activity that could have a very gratifying effect on the prestige and good will of the electronic world for the League.

Ultimately, these groups could assume the responsibility for all amateur communications facilities, with the full load of communications channels transferred from the high-frequency part of the spectrum, to v.h.f., u.h.f. and microwave frequencies. Multiplex carrier, teletype and telemetering modes of operation would tremendously increase the potential capabilities of amateur radio facilities, and these modern installations, utilizing satellite relay, scatter, and line-of-sight communications techniques, with capable technical and administrative supervision, would become a tremendously large potential communications network of priceless value to the government for emergency and disaster communications.

The present loosely knit organization of the League does not provide the necessary control or coordination necessary to make the most effective use of our facilities. The result is that individual effort is directed into many different directions, with duplication and over-saturation both as to function and spectrum space. We end up with a very low rating of efficiency and effectiveness because so much of our activity is at the whim and for the pleasure of the individual amateur. — William W. Adams, Sr., W5WW, Center, Texas.

J The only frontier now for experimenters is in ultra-high frequencies. ARRL may be losing ground because it doesn't capture the imagination of the young experimenter but perpetuates dead and sentiment tradition and attempts to force its ideas rather than make them so appealing through leadership, that the mob follows. — W. R. Moody, K6VQW, Riverside, Md.

(Leopold's note: Policy matters such as formation of League technical study groups are decided by the Board of Directors. The next Board meeting will be May 3, 1967. If you are interested in expressing your views, be sure to write your Director; his name and address appear on page 51)

THANKS!

J I would like to express my appreciation for the outstanding and unselfish services provided by Mr. James W. Knapp to Commander Carrier Division Six (Comcardiv Six) and USS Independence (CVA 62) personnel.

Comcardiv Six was embarked aboard Independence on a Mediterranean deployment from June 1966 to February 1967. During the deployment Mr. Knapp, ham radio station K1AKQ, Brockport, New York, provided outstanding ham radio message relay service for personnel of Comcardiv Six and Independence. The cooperation and assistance rendered by Mr. Knapp was outstanding in every respect. Nearly every day during the last two months of the deployment Mr. Knapp gave freely of his time to serve the men of Independence. Very often his services commenced at 5:30 a.m. and continued for eight to ten hours.

Mr. Knapp's diligence and service provided pleasure to men separated from families for long periods of time and his services are sincerely appreciated.

Please accept my deep gratitude for superior performance and service. — V. G. Lambert, Rear Admiral, U.S. Navy

J I would like to take the liberty of thanking the various individuals having ham radios who have assisted in my obtaining word with respect to my parents after the recent riots in Nicaragua. It seems that this could best be done by writing.

Although I don't know the name of the person involved, station YN1URI apparently exercised a major role in the assistance. The members of my family and I appreciate it. — Edward D. O'Brien, Anaheim, Calif.

RULE OF THUMB FOR VHF/UHF

J Ground everything in sight;
If you can't ground it, bypass it;
If you can't bypass it, shield it;
If you can't shield it, forget it.
If you can't forget it, go back to the low bands.

Dennis McCormack, K1PLX, Winchester, Mass.

CAN YOU VOTE?

J I have talked and written to amateurs who don't agree with many League policies. As a result of the League's backing of Docket 13528, some dropped their membership. What they don't seem to realize is if all (or most, anyway) of the U.S. amateurs...
joined the League, they could easily put enough pressure on League leadership (after all, they vote for it) to change the policies with which they are not in accord. Not only this, but a respected and responsible organization of 270,000 people, whether it be of amateurs or hog callers, can exert a great deal of influence on the government commissions which regulate their practices. For these two reasons alone, the ARRL should be given the amateur's support. — David F. Austin, River Edge, N. J.

DUES

0 I have been watching the debate over an increase in dues with interest. But, I don't think that anybody has touched on the real issue yet. It is simply this: In an age of inflation, you cannot survive on a fixed income. That is essentially what the ARRL is trying to do. Since I first got my license, the cost of living has risen some seven percent, if my estimate is correct. How much have dues risen in the same two years? To have kept pace, they should now be $5.35. But they aren't. Insignificant? Perhaps on an individual basis, but multiplying that thirty-five cents by 100,000 members comes out to the symphony of $35,000.

So, if the ARRL is to continue to operate in any capacity, its income must increase. That means a dues hike. — Frank E. Fisher, Jr., WA4UXQ, Arlington, Va.

I am against raising of dues. Five dollars is quite enough for most hams. It is worth it and I wish I could give more but would think twice on higher dues. Is there any other way you could raise revenue for overhead? — E. F. Gray, K3SQQ, Beaver Falls, N. Y.

Please keep the dues down where they are! — David Langmann, WB2YZC, Plushing, N. Y.

I don’t know how you do it. I'm not rich, but believe in paying my own way. With the cost of ham gear what it is no one should complain about a raise in dues to $15.00 per year. Think of the status an ARRL member would have then! — Scotty Gray, Terrance, Calif.

I have read the recent issue of QST in regards to membership in the ARRL. It is regrettable that some people take great pride in their scandalous attitude towards renewing their membership.

I travel throughout New England for pleasure, and have noticed many country clubs and boat clubs. I often wonder how long would they survive if their dues were only five dollars a year. In other words, would there be any incentive or prestige to be a member? Personally, I doubt it.

I have more than twenty years experience in radio repair and design. I have built many short wave receivers throughout the years and I never realized the enjoyment possible in ham radio. I received my General Class license in Nov., '66. I visited headquarters and became a member. Many thanks to W1AW for the code practice for without it I doubt if I ever could get to 13 w.p.m. I am now near 20 w.p.m.

I would suggest to new hams' who have doubts about joining the ARRL, and to ham's who are not renewing their membership, if at all possible, to visit W1AW and the museum. The collection is priceless. Had it not been for H. P. Maxim and the League this priceless heritage of the early days would not have existed. Speaking with R. B. Bourne, W1ANA, curator for the museum is an education in itself. — Robert B. Flanagan, W1H1AC, Dorchester, Mass.

WWW VISIT

0 The two-part series: "WWW Moves to Colorado" proved to be very interesting reading at our QTH; not only because it was so well written, but because it brought back to mind the pleasant experience we had during a brief visit at the Boulder complex this past Summer.

The articles failed to mention the one factor that impressed us the most about the operation and that is the attitude of the employees. I was a little hesitant about even stopping by the NBS center because I had visions of a typical governmental operation that would be geared to a formal, rigid tour of the facilities. Some of these fears were dispersed when we pulled into the employee's parking lot and saw what looked like the gathering on field day — about every third car had either a whip or a halo.

An hour of our vacation time had been set aside to see what we could see about the NBS but as it turned out this little side trip became one of the highlights of our vacation. Never have I seen such a large group of mass dedication and enthusiasm — everyone acted like they should be paying someone for working there. Yes, the graphs in the article told of many accomplishments but I know that these goals were made not by an employee working on an assignment but complete devotion and mutual helpfulness by all.

Soon April 15 will be here and Uncle Sam will again be taking his big bite out of each of us. This year I found an inhibitor that will remove part of the sting . . . in Boulder. — W. L. Lamb, W3PHD, Warren, Minn.

2 IN 1

0 When I proceeded to remove the wrapper from my February QST, the package felt heavier and thicker than usual and I thought maybe it contained a special edition. Lo and behold when I removed the wrapper I found not only QST but also the February issue of QJ!

Apparently the interloper publication had been tucked in the QST wrapper by a clerk at the P.O. It was really tucked in and from all outward appearances it looked as though the two magazines had been mailed in the QST wrapper. QJ was in its own wrapper however. Nothing like American free enterprise and competitive cooperation. — Fred Thiele, W2EC, Schenect, N. Y.

---

The Albany High School Amateur Radio Society, W2YPN, has formed a New York State High School Net. The purposes are to further each individual club by discussing mutual high school club problems, passing traffic in and out of New York State, exchanging activity reports and eventually organizing a hamfest with all participating clubs invited. The net currently meets once a week on 3860 kc. at 2:30 P.M. local time. Any high school radio club station or individual representing such a group is invited to check in. Further information may be obtained by contacting Jerry Kahn, WB2PZL, Seely.-Treas. Albany High School Amateur Radio Society, 141 Western Avenue, Albany, New York.
How:
The idea suggests itself, of course, but we thought it proper to show up in our mailbag before implementation: the Best of Jeeves. It did; several "How's" correspondents want to see some favorite W1CJD cartoon classics rerun. We intend to do this occasionally. Which Jeeveses of the past particularly tickled you!

-----

While emptying out trash for the Tuesday pick-up (will that January snow ever go away?) we ran across a spraying Slinkys. We've discarded sprung Slinkys before. In fact, with our kids, every spring seems to find at least one sprawling around.

Spring fever has us feeling more quirky than usual this year, so that light bulb twinkled and we sprang for the Slinky, sprung or not. Being between deadlines, we indulged in a little pseudoscientific investigation.

A Slinky, as you well may know if you've ever stepped on one barefoot in the dark, is a 100-turn 2½-inch-diameter coil of ½-inch spring-steel ribbon. Now any old plug-in coil man will tell you that this is a hair too hefty for 160-meter tanks. But any young apartment dweller should recognize inherent hide-away antenna possibilities. After all, Slinkys compress to 2½ inches thick, closewound.

For those inclined to proceed further along such an inviting avenue of research, here's a start: A standard Slinky, extended to room-size length of 12 feet, self-resonates at about 12 Mc. Against ground, naturally, the dip is 6 Mc.

By all means let us know how you do Slinky-wise on 20 and 40, fellows, as well as top-loaded on 80 and 160. For possible v.h.f. helix application you'll have to check with colleague W1DWE. You may not clear DXCC with it, but not every ham has an antenna that can walk downstairs.

What:
A packed program causes us to so lightly with your "How's" Handout for this month. Moreover, a few hours in the 1967 ARRL DX Contest just concluded should have armed you with a substantial stalk list, WAZBAH/1, a mill in his lap and pencil behind each ear, awaits your Test results at the League Contests Desk. Please file your outing, be it extensive or casual, by early post to Newington, . . . . We can't resist just a small peak at 28 Mc., especially since this first hot season in years is drawing to a close. Oh, there will be occasional late summer and fall 10-meter openings, of course, but that vee-dip DX QRM won't stall in again till fall. Or will it? . . .

10 phone DXcelement, described in dispatches from WAs 1ICNU 8YGR, W2OR 515 8GQN 9MQJ, WBA 1JD1 and w.d. W. Klawn, is the fault of CWSRS, CRs 45IC* 1700 GMT, 61X (2899 ke.), 47C 10, 7DS 71Z, GTBGB, CEs 1BPF 21, 1BPS 289 (550) 21, DM2AFO (700) 11, EAB AM CR EX FG, FSZXL (357) 17, FSZGD

10 PHASES-B West Lawrence Ave., Chicago, IL, 60655,
Asia — "I still have K1YF/EVS QSLs for those lucky enough to work him," reminds W4UWC.

"No confirmations will be issued on MF4RBO's activity as MPA4GBA," regrets VE1AJS. "Rock's Bahrein logs were lost." There are, fortunately, several active MF4RBO stations active in the area, and it's clear that Canadian QSL attendants cannot mail self-addressed double-stamped envelopes bearing U.S. postage. International Reply Coupons instead, fellows.

With the arrival of ZE4A/B's QSL manager for all W/K/E/V/O contacts made on and after February 15, 1967, declares W4HEG. — Northern California DX Club's widely read DXer understands that WBAV can assist U.S. stations toward V89FRV's postcards. — "V89AVB sends me log info for U.S. contacts only," concedes W4NFJ. "However, when I work him I can usually check and correct non-W/K/E/V/O log references." The well-edited DXer of DX Club of Puerto Rico is appraised by APSB, enabling Pakistan QSL chasers, that APSB's gear and logs are still sealed and unavailable. This presumably go for other AP QSO records. Very little bona-fide Pakistan hammering since May, 1965, border troubles shut things down.

Africa — CR6GO notifies, "I'm TF72D's QSL manager for QSOs dating January 27, 1967, and thereafter. Direct replies required, s.a.e., and necessary IRCs." "Unclaimed QSLs for WC6CJ/5's UTAR and 3A6DX work last summer have been cleared via bureau as of early February," announces K5CGY. "Those who do not receive their cards after a suitable waiting period can request me to direct, but they should first check their bureau." QSL side W4NFJ reports, "I have an E62A0 log for QSOs earlier than May 11, 1966. To confirm prior contacts, I suggest applications direct to R. Shrirot, K7CGC, 305 Oak Valley Dr., W. Va., 25505. Re yo, attended University of West Virginia. Fresh out of FL6ACs at present but I expect we'll print more to take up the slack. I also maintain E62A0 s.a.e. required." — "ZD9J tells me he confirms all first-line QSOs 100 percent via bureau," states W2HLL. "John wants QSLs via his K1LJV address.

Oceania — "If I can confirm all VK2BKB QSOs," advises WA9ITB, looking at future DXpeditionary endeavors by this gentleman, S.A.E., and Greenwhich Mean Time log references. -- "The well-edited Monitor gives P.O. Box 36, E. Melbourne, Vic., Australia, as a QSL route to anticipate outpost VK6's GS and up to FO. The QSL manager for Macquarie's V89CRR was listed here last month.

Europe — VERON's DXpress says SMU's who are "lockjawed" are busy reviewing a report that enumerates a new prefix and are henceforth authorized to resume "set 500" status. New licensees in the concerned region will be SMU. Wa2HLL's QSL side W4NFJ reports, "the International Short Wave League QSL bureau relays from 800 to 1500 cards daily. Dick welcomes s.a.e.

Ceylon Islands DXpeditioners may come and go but ZF1GC stays on at Bodden town. 14-Mc s.a.e. preferred. (Photo via K6ACI)
Whence:

Europe—Those who are still unfrustrated after the annual ARRL affair will find other DX contests on the docket this month and next. From the 10th on April 22nd to 1700 the 2nd, USLA (Switzerland) holds its annual "Helvetia-22" DX Contest on 10 through 150 meters, e.w. and phone. Participating stations are usually the best of the world, and the contest will be very competitive. Each USLA station can be worked once per band at 3 points per contact; this point total to be multiplied by the number of stations heard by the USLA station, to give the total points won. In the meantime, VENON's DX press (FA D-X LOW) and VE3FZ's DX press (5-A LUC) are available to help you keep up with the contests.


Whence:

Europe—Those who are still unfrustrated after the annual ARRL affair will find other DX contests on the docket this month and next. From the 10th on April 22nd to 1700 the 2nd, USLA (Switzerland) holds its annual "Helvetia-22" DX Contest on 10 through 150 meters, e.w. and phone. Participating stations are usually the best of the world, and the contest will be very competitive. Each USLA station can be worked once per band at 3 points per contact; this point total to be multiplied by the number of stations heard by the USLA station, to give the total points won. In the meantime, VENON's DX press (FA D-X LOW) and VE3FZ's DX press (5-A LUC) are available to help you keep up with the contests.


Whence:

Europe—Those who are still unfrustrated after the annual ARRL affair will find other DX contests on the docket this month and next. From the 10th on April 22nd to 1700 the 2nd, USLA (Switzerland) holds its annual "Helvetia-22" DX Contest on 10 through 150 meters, e.w. and phone. Participating stations are usually the best of the world, and the contest will be very competitive. Each USLA station can be worked once per band at 3 points per contact; this point total to be multiplied by the number of stations heard by the USLA station, to give the total points won. In the meantime, VENON's DX press (FA D-X LOW) and VE3FZ's DX press (5-A LUC) are available to help you keep up with the contests.


Whence:

Europe—Those who are still unfrustrated after the annual ARRL affair will find other DX contests on the docket this month and next. From the 10th on April 22nd to 1700 the 2nd, USLA (Switzerland) holds its annual "Helvetia-22" DX Contest on 10 through 150 meters, e.w. and phone. Participating stations are usually the best of the world, and the contest will be very competitive. Each USLA station can be worked once per band at 3 points per contact; this point total to be multiplied by the number of stations heard by the USLA station, to give the total points won. In the meantime, VENON's DX press (FA D-X LOW) and VE3FZ's DX press (5-A LUC) are available to help you keep up with the contests.


Whence:

Europe—Those who are still unfrustrated after the annual ARRL affair will find other DX contests on the docket this month and next. From the 10th on April 22nd to 1700 the 2nd, USLA (Switzerland) holds its annual "Helvetia-22" DX Contest on 10 through 150 meters, e.w. and phone. Participating stations are usually the best of the world, and the contest will be very competitive. Each USLA station can be worked once per band at 3 points per contact; this point total to be multiplied by the number of stations heard by the USLA station, to give the total points won. In the meantime, VENON's DX press (FA D-X LOW) and VE3FZ's DX press (5-A LUC) are available to help you keep up with the contests.


Whence:

Europe—Those who are still unfrustrated after the annual ARRL affair will find other DX contests on the docket this month and next. From the 10th on April 22nd to 1700 the 2nd, USLA (Switzerland) holds its annual "Helvetia-22" DX Contest on 10 through 150 meters, e.w. and phone. Participating stations are usually the best of the world, and the contest will be very competitive. Each USLA station can be worked once per band at 3 points per contact; this point total to be multiplied by the number of stations heard by the USLA station, to give the total points won. In the meantime, VENON's DX press (FA D-X LOW) and VE3FZ's DX press (5-A LUC) are available to help you keep up with the contests.
AFRICA — TUB2D (ex-XT2HV) hangs around 14,140
A4, at 0745-0815 and 1800 GMT week days but tries
his luck with WAs near 14,250 kc, week ends. —
CRG60 again on Thundr band schedules at 2200 GMT.
Neighbor CR2C6K, according to K8ZT, needs only
Delaware to clinch ARRL's Worked All States 20 c.w.
from 1800 till fadeout — W8SGN says FR7ZL/m transmits
Tromelin's weather station and should be workable
for a year or so, c.w. now and maybe a.m. later. —
W4NIF affirms EL2AT's closedown but his gear
should continue to produce Liberia contacts. Paul
solved out before handover — W2AJH1L (ex-SR4H)
has a d-c band all on 1801 kc, c.w. — ZD6BE repre-
sents Tristan da Cunha reliable-sky, s.s.b. on 20, c.w.
or on 15 meters. Allen hopes between 14,140 and
14,250 kc at 1730-2000 GMT, and usually hits 21,000
kc at 1900-2000. — W209HK hints that W4BP4
does his own DX station near Gpoui, may break
away for more Gus fuss at any time — W4UST looks
forward to TYSATD test courtesy S52AA —
W8C5H for the moment should be easier for more
Pacifica DXing after a U.K. holiday — African addenda
courtesy club data digests: 9L1JIM (PABR) boosts Sten
Leonard for W5, 7, 14 and 28, c.w. at 0000-1300
GMT, Tuesdays at 2000-2400. — W21DB/SV8 is a
late-February briefie on 20 phone and c.w. —
20 c.w. sideswinds of 1410 kc at 1800 GMT or so,
keying on 14,100 around 1130. — On the Cape
Verdes front CR4BC likes 10-meter a.m., C6A
and GB3A on sporadic E may be good — TTSAB
is a pleasant straight-a.m. surprise on 2135
kc at 1600 GMT — FHC5D's phone may show up
between 1600-1730, 2000-1400, 2005-1530, 1530-
1600 GMT. — 57ALAK skeds W2KEY Tuesdays and
Thursdays on 14,350 kc at 1930 GMT, and 50TLA is
catchable after 1700 around 14,280 and 2010
SL is frequent as 2010 and 1800. — D and B for Bolivian
waves, 5V3RQ tantalizes from Togo on 14,150, 1600-
2000 sidetone, 2100-2000 GMT, CR2BI/2 is good
between 1800-2000, 14,300 GMT and 0000-0300
GMT — 583AS of NASA hits 14,120-14,100 kc side-
tone at 1400-1900 when space duty permits. —
W6KG and W4LW are good in the early hours for flat
Hops from Senegal and other desirables over that
way.

OSCEANA — W8PAU scored a Hawaiian DXCC as
W8PAU/XK6H but is proud of his ARRL
A-1 Operator diploma, according to SCMI KHE6ZF.
— Don't forget VK2AYA's/2's multiband, multimode
Lord Heacham, fourth month of crystal.
A useful pictoral derives from literature of aforementioned clubs and
groups: V2KTSM or 8S5BLA may steer you toward VK6CR
of Port of Spain, W6RL on 14,160, W6FJG on
Sundays, W6EAS and CP hold forth at Almawon base,
TC from lonely Wilkes. — Nauru notions are eminently
worth your while. W6WJ-YJ keeps New Hebrides
hunters happy, 0800-1200 GMT near 14,025 kc.
— VK6M81 will add 21 Mc to a DX reperoire with
14,025 and 14,090, but worse luck with VK6R8.
— B55MB on 14,100 is finally able to QRT, tries
sideband on 14,100 or 14,150 kc at 0000-0700 GMT.
— B2SBS pops up on 14,025 after 1230 kHz.
— VR3BP and VR1BP offer Marcus and Salinan
respectively, 14,254-14,290 kc all day.

SOUTH AMERICA — PY2BGL tells W7VFO his switch
from a multiband to monoband rotaries really chops the
QRN crop — Chris of CH48SM informs W4NIF he
will be QRV this year of the year in celebrating
as Byrd station. "He's on s.s.b., almost nightly around 14,250
kc, 0100-0500 GMT. hunting Alaska, Arizona, Hawaii, New
Hampton, Europe, and Argentine QSOs. —
W2HJQ finds KQDIW at the key of near-by KH8TG.
— VP8D1T is one of the better DXers in the biological party on
Stny. South Orkneys," observes W1D1GM. "Stew long
up from his home QTH, London. — KJCAH, WA4NRF and
associates reportedly moll over Halide possibilities
— VY8A AHR ANF BWN BOA and QRPLQOA
produced that February Aires probe by VW6A.

HERRABOTS — W7VCO plants a substantial Wash-
ington antenna farm after returning from E1EA-
DE66 and SK66. — W1NQD, a four-legged Vee with 555-ft. legs, a couple of Stereo curtains and
some verticals. In the works are a full-size 7-Mc.
Stereo, a two-meter invert for 3.6 Mc, and a four-
element quad. Now that I have all the room I want
I find I'm short on time," Ken says the Citizens Band is
a fine source of aid in ham-oriented situations, and
that those cheap CB ground-planes perform wonders on
Convention Time

April, according to the poets from Chaucer to Millay, is a time for getting out and doing. We consult road maps, begin to think about weekend trips, and start to make definite vacation plans. On the air and at club meetings we discuss hamfests and conventions from the type with a single theme, such as v.h.f., sideband, and YL, to the ones covering the full scope of amateur radio such as state, division, and, of course, "the big one," the National ARRL Convention.

Registration, reservations, advance planning for arrival is always the same no matter what organization sponsors a convention, but right there the similarity stops for an amateur radio convention is a very unique gathering. It is more like a kaleidoscope with dozens of completely different patterns making up the picture. We don’t attend as delegates, but as individuals. We attend meetings to learn, and to contribute. And, we are there to meet the persons we have talked to for so long, and put faces on those very familiar voices.

Some of us are there to discuss policy and the new rules and regulations governing the service, while others are there only for the military affiliate activity. There are those who attend to learn more about technical advances, and will hear from some of the best qualified people in the communications field. And, there are those who like to range the field and who will be buring from the technical meetings, to serious discussion groups on public service and on to a QCWA luncheon. For everyone, from beginner to old-timer there are mouth watering displays of the newest equipment.

For the gals it’s a YLRI Forum: a special luncheon and fashion show, with a SWOOP initiation for the suffering unlicensed wives of the OMs. It’s sight seeing tours of the convention town, and it is the same appeal of the technical meetings to the YL as to the OM, and woe betide the speaker who purports to make a layman’s explanation “for the benefit of the ladies who are present.” Those very ladies may well stop him with an extremely specialized question during the Q and A period following the talk.

A convention is a code contest, luncheons, lectures, forums, social gatherings, Woniff Hong. It is banquets, and speakers and a dance. It is a wealth of information clearing away many problems. It is meeting people who have become legends in the field, and it is prizes, and a week-

end of talking on our favorite subject with no static, no fading, no disturbances, but oh, the QRM.

From April until late in the year the convention calendar will be filled with announcements of coming meetings across the country. This month is a good time to add a convention to the list of planned special events on our own “coming attractions” calendar.

YL — SCM

The only elected official in the ARRL board is the Director, is the Section Communications Manager who is the administrator of League affairs at section level. To most amateurs the term constitutes OM, in fact the duties describing the position are always written in the masculine gender. In the history of the ARRL field organization a number of women have been elected to fill the SCM office, and at present two of these very capable jobs are held by YLS. E9IQU. Roberta Kruehlik, of Michigan City, Indiana, became SCM of Indiana Section in October 1964, according to her “after saying yes in a weak moment.” First licensed in 1937, Roberta went through all the usual phases of amateur operation, and then became interested in traffic nets. An OO briefly, then OPS, and PAM of the Indiana Phone Net since 1961. She holds a license Class A Operator received the Hoosier Courtesy Award, and, in 1964 was voted the Outstanding Amateur Radio Operator of Indiana for that year. Operation during Hurricanes Carla, and Ethel, increased her interest in public service.

A member and past president of LARK, of Chicago, and a Director of IIAWQ, IRCC, and a member of the Michigan City Radio Club, Roberta’s other interests are flying, and painting.

From Indiana to the Canal Zone is a “fur piece,” unless it is on the air where we count in seconds rather than miles.

Myrtle Cunningham, WAG6JSY, President LA/YYRC, W5VKH took her picture as she was presiding over the Annual Valentine Banquet of the Los Angeles YLRC. OM, Tom, W6PIT, is vice director, Southwestern Division ARRL.

84
Lillian Smith, KZ5TT, Administrative Assistant to the Director of Communications-Electronics, at Headquarters U.S. Southern Command is SCM in the Canal Zone. Her duties at work include administering examinations for both Canal Zone and FCC, renewing licenses, monitoring the bands for the office station, helping write changes in local regulations. Thus, her SCM position extends a little farther by adding ARRL administration in the section. Lillian is well known on 10 and 15 meters helping service personnel keep in touch with home. She has had all sorts of experiences from relaying proposals of marriage to letting a grandmother hear her grandson cry. She and the OM, KZ5LT have a son, now at school in Texas. Lillian is a member of YLRL and has won the Canal Zone Section Certificate for YLAP for the past four years. Holds WAS and is a member of the U.S. Air Forces Southern Command MARS.

W6QPI, "Angel of the Antarctic."

Betty Gillies, W6QPI, of Rancho Santa Fe, California, who is well known in many YL activities, was named "Angel of the Antarctic" by the service personnel stationed on the ice in recognition of her long time service of keeping them in touch with home. At a meeting of the Rancho Rotary Club last January Betty was presented with a bronze plaque in appreciation of her efforts.

In 1967, Betty answered a "CQ" from a station on McMurdo Sound during "Operation Deepfreeze" of the second national geophysical year, and that began a ten-year period of handling messages for both service personnel and scientists located in the Antarctic.

In August, 1966, the men stationed at the polar bases decided that some recognition should be given her assistance that kept them in contact with their homes. The Navy requested that a presentation be made in their behalf by the Rancho Rotary Club. At the meeting, Rear Admiral John E. Lee, USN, Retired, presented Betty with a bronze plaque bearing the inscription "...by the officers and men of the Antarctic Support Activities Command, with the inscription"... by the officers and men of the Antarctic Support Activities in grateful appreciation for her amateur radio services to the Antarctic, August, 1966." The letter read "So far as can be determined she (Betty) is one of the first to have worked the ice..." Her dedicated service on their behalf has led us to refer to her as "The Angel of the Antarctic."

Coming Events

The 10th Anniversary of the Loaded Clothesline Net will be marked by a special 24 hour QSO Party beginning 1700 GMT, April 8, 1967. Special certificates will be issued to anyone working three net members in good standing.

(Continued on page 148)
FSDO-W6DNG QSO Via The Moon

News of the latest e.m.e. (earth-moon-earth) feat reached ARRL just before deadline for the March issue so we were not able then to give the contact the attention that it rightfully deserves.

This is the 32-element expanded-extended collinear array at W6DNG, Long Beach, California. (W6DNG photo)

Marius Cousin, FSDO, writes that the January 27 contact was the result of more than 2 years hard work for F1BF and himself. They were also assisted by F1HR, F9PT, F9LN and others. Marius built the 72-element Yagi array and the receiving system; the transmitter was built by F1BF. Marius says the array is fed with low-loss M7A coax and is tuned to 144,000 Mc. The receiving system is a TIXMO5 preamp ahead of a Nuvisor/ESSCC/6AK5/6U8 converter into a Drake R4-A receiver. He also uses a post detection system with two cross-correlated audio channels keying an audio oscillator or pen recorder. FSDO is currently conducting other tests with OH1NL and K6MYC as well as continuing the tests with Bill Conkel, W6DNG. OM Bill is no newcomer to the moonbounce game. He was the first American to work Europe on two meters when, on April 11, 1964, he made contact with OH1NL in Finland (see QST page 95, June 1964). At his Long Beach station, W6DNG uses a pair of 4X250 lbs running nearly 800 watts output. Bill's antenna is a 32-element expanded-extended collinear of the type designed by the late Oliver Wright, W6CID, and exploited by Frank Jones, W6AJF. The gain measures 18.3 db. over a dipole. The array is rotatable both in azimuth and elevation.

For receiving, Bill has a transistor preamp ahead of a Parks 144-I converter. The converter output is fed through a noise clamping and blanking system and then into a much-modified Collins 75A-4. He also uses a tracking filter with provisions for audio and pen recording. Bill says the phase-lock receiver is very good on slow-speed c.w. f.s.k. He and OH1NL have tried the system several times with excellent results. Lena, OH1NL, is now experimenting with a seven-channel mechanical integrating recorder system for visual signal copying. Bill says, "visual copying is very popular among weak signal enthusiasts—it's much easier than squinting your eyes!"

W6DNG is continuing his tests with both OH1NL and FSPO. Marius says he is open for schedules with anyone who can hear his own echoes.

More E.m.e. Notes

Dick Turrin, W2IMU, of the K2MWA group, has made available tape recordings of the contacts between the Crawford Hill club and VK3ATN and K8MYC and the Australian. They are interesting listening and reveal some of Ray's future plans.

VK3ATN is going to build a LaPorte—Veldhuis rhombic (undoubtedly similar to the one

F6DO’s 72-element 144-Mc. Yagi array used to work W6DNG via the moon. (FSDO photo)
German OSCAR Package Completed

The prospect of an Oscar flight later this year seems brighter as a result of the following letter from Karl Meinzer, DJ4ZC.

"The Oscar V electronic hardware is completed. We just want to have a test flight on a balloon before it is shipped to Project Oscar. Provided no serious problems turn-out during this flight, the set will be shipped to Project Oscar this month (February)."

DJ4ZC's Oscar package that has been successfully balloon tested over Central Europe. (DJ4ZC photo)

The transponder is designed to put signals between 144.06 and 144.14 Mc. to the frequencies 145.86 and 145.94 Mc. Amplification of the set is 120 db. and p.e.p. output at the moment is 0.7 watt. I will work in the next days to bring this to 1 watt. The power for the transponder is regulated and no significant change of the data is expected during its life. Power consumption is between 1 and 2 watts depending on the loading from the ground; this will give a useful life of about six weeks.

Apart from the transponder the package contains a telemetry beacon on 145.95 Mc. with 25-milliwatts output. It is coded with two "Hi's" followed by a long c.w. The length of the c.w. gives the battery voltage; the length of the "Hi" interval gives the inside temperature of the transponder.

Just a few words about the antenna system. The antenna is designed to give a minimum of fading when linear polarization at the ground is used. Because some doubt was expressed to me in some letters about this question I will tell you why. I use a crossed pair of dipoles that are fed to give right hand polarization on the receiver and left hand polarization from the transmitter, seen from the top. Seen from either side the antenna gives horizontal polarization for transmitter and receiver. Seen from below the antenna gives circular polarization again, but with the sense of rotation reversed to that of the top side. Out of the 16 possible attitudes in space only 4 nulls result from linear polarization at the ground, while circular polarization will result in 8 nulls."

This information from DJ4ZC does not mean the package will be immediately ready to fly once it reaches California. A series of tests will have to be conducted by officials at Project Oscar before flight plans are made.

Reportedly there have been some difficulties in the shipment of the Australian package (another prospect for Oscar V) and it has been delayed in Australia.

Late DJ4ZC Oscar Report

From DJ4ZC at deadline. . . . we have balloon-flown the Oscar equipment to an altitude of nearly 13 miles during a two-hour flight. The package worked 100% satisfactorily. 20 wat\varepsilon; distances were simulated with two 20 db. pads. People were very enthusiastic with the performance. The operator was able to log 63 stations, another had 34 s.s.b. QSOs. It is estimated that during the flight about 250 QSOs were made, all on s.s.b. and c.w.

I think you know that we have a transponder very similar to the Oscar that was flown here with the balloon so far 18 times. These flights gave our European operators a good chance to train themselves in the art of transponder communication. At the same time the set serves as a test of space operating objectives. The training proved to be very valuable. During the first two or three flights a lot of confusion was present, but in later flights skills improved and people in general are now quite capable of making the best of this way of communication.

There is still some time until the launch, so I think it would be nice to give the American hams an opportunity to train themselves, too. Perhaps you or some other ham might be interested in arranging a balloon transponder flight. I would be glad to supply you with the equipment as often as you wish and of course, free of charge. For these flights it takes a balloon that can lift six pounds and two or more mobile stations to hunt for the set. The hunt is great fun and our mobiles like it very much. The maximum distance the set can be worked is about 400 miles so QSOs up to 800 miles are possible and were made in Europe."

That is quite an offer, Karl. Because of the air currents, perhaps some group in the west or midwest would be the most logical to originate a test flight. Who is interested?

144 Mc. Antenna Ideas

K6MYC and W7FS have sent information on 144 Mc. antennas that should be of interest to the 2 meter DX man.

First is a modification of the Cushcraft 16-element collinear from K6MYC to increase the gain of the antenna by placing a director in front of each pair of driven elements. This is the modification he used in the array that worked VK3ATN via 144 Mc. e.m.e.

Mike used a 3/4-inch length of 3/4-inch o.d. aluminum tubing for each boom extension. The tubing is drilled 3/4-inch from one end to tightly accept a 37-inch length of No. 4 a.w.g. aluminum wire which serves as the director element. The wire is strengthened and tempered by holding one end in a vice while pulling and twisting on the other end with an electric drill. The element is fixed in place with epoxy or a set screw.

The new assembly is attached to the original boom by loosening the driven element braces and slipping the assembly over the end until it is under one side of

April 1967
K6MYC's improved collinear. Note the placement of the director assembly D1 on the top set of elements. An identical assembly is added to each of the other sets of elements in the original configuration.

bracket. The spacing between the driven element and the director is 8¼-inches. Now retighten the bracket and the job is finished.

K6MYC says the 4 directors add 1.7 db. to the previously measured 11.7 db. gain of the array before the modification. Mike's gain figures are over a tolerance dipole.

Mike also sent along details on a 144-Mc. rhombic that will fit into the average back yard. The gain is estimated at 27 db. over a dipole! He designed the rhombic for 144.100 Mc. following specifications from the I.C.A. Review, March 1960, page 117 in an article by E.A. LaPort and A.C. Veldhuis entitled “Improved Antennas of the Rhombic Class.”

The original authors say the configuration reduces undesirable side lobes present in conventional rhombic antennas.

The narrow beamwidth obviously reduces the usefulness for general coverage, but for specific scatter or a.m. paths the antenna would seem to lend itself quite well. K6MYC says several European amateurs and W8PT either have built, or are building, the antenna.

300-ohm PARALLEL FEED

A 144-Mc. rhombic with an estimated 27-db. gain over a dipole. The wires are all on the horizontal plane with the crossovers insulated.

L1—29.5 feet
L2—50.67 feet
X—52.2°
Y—37.7°
R1—660 ohms, total wattage should equal half the power output of the transmitter.

Height above ground—12.29 feet

Elevation angle—7.5°

Vertical beamwidth—5.5°

Horizontal beamwidth—8.5°

An interesting adaptation of the WICER/WBHH8 “Quad-Quad Array or 2 Meters” (May 1964, 78 Magazine) is being used by Keith Olsen, W7FS. He increased the number of elements to five per bay; the original design featured four 8-element quads in a box configuration. W7FS noted an approximate increase in overall gain of one 8-unit by adding two more directors to each bay. Each director is stub-tuned for maximum forward gain; the second director is spaced 19-inches ahead of the first director, and the third director is 21-inches ahead of the second director.

In the original design, coaxial transformers and coaxial harnessing was used to feed a 75-ohm transmission line. W7FS uses 450-ohm open-wire line, one-wavelength sections, to connect the bays. A balun transformer is used between the feedpoint and low-loss 75-ohm transmission line. The asymmetrical feed system corrected the 10-degree skew in the lobe pattern of the original WICER design.

Keith reports excellent results in fade reduction over difficult paths since installing the quad array. He points the antenna at 6000 foot Mount Olympus, Washington 30 miles away for many of his contacts, including meteor scatter.

Those who are interested in an easily-built antenna that offers good gain and minimum fading effects through diversity response should not overlook a quad array for v.h.f. or u.h.f. work. Others have experienced results similar to those at W7FS.

The 20-element 144 Mc. quad-quad array at W7FS, Belfair, Washington.

220 Mc. and Up Directory

ARRL is preparing a directory of stations operating on 220 Mc. and higher. If you are actually on one of these bands we would like to know about it. Chances are that many of you have received a questionnaire already, but if you haven’t by the end of April, please write for the form so you can be included in the directory. When completed, a copy of the directory will be mailed to each OVS appointee, or to anyone who sends a stamped self-addressed envelope.

Two Record Boxes

Several of you have asked for separate recognition of moonbounce and tropospheric-ionospheric records. So, beginning this month there will be two record boxes, one for moonbounce and the other for the more conventional modes of propagation. Notice there is no record for either 50 or 220 Mc. moonbounce.

About the “Standing” boxes, postcards have been sent to each 144 Mc. operator who has reported no close hits in his standings for the past two years or more. Please help me keep the standings current so they may reflect not only previous work, but present activity as well.

OVS and Operating News

50 Mc. has been full of DX surprises, W6NLO, W6NZX, W6PZU, W6YDF and KG6D, report working C63GQ in Santiago, Chile at 0220Z February 12 on 50.125 a.m. Several Spanish speaking a.m. stations were copied around 50.005 Mc. and channel 2 from Mexico City was also putting a good signal into Southern California. The operating lasted almost two hours. In Brazil, PY5GRK reports openings since
last October to Argentina, Puerto Rico, Netherlands Antilles, Chile, Uruguay and Paraguay. According to WSNZ, KSWSK and WBSD copied an n.m. station signing W3311X in South Africa for about 30 minutes beginning at 1938 Z on January 18. One contact was made. The frequency was 50,250 Mc. W6NZX reports back-scatter contacts with WS5FW at Amarillo, Texas, WATAAS in Phoenix and K7L7T near Phoenix between 1955 and 2048 Z on January 14. W6NZX says he is interested in scarce schedules. W6H to Bob at 3144 Tuna Avenue, San Diego, Cal., 92117, W6AHLX, near Los Angeles, also reported F-layer DX during January from the military scatter systems on Midway Island and Hawaii. K7CJW at Las Vegas heard no F-layer activity. One contact was made. K7DVK in Portland, Oregon says Australian VK7KZ is active on six meters and will schedule. Numerous reports of E openings during the first two weeks of January were received from most areas of the U. S.

144 Mc. and aurora provided DX excitement during the January ARRL V.h.f. Sweepstakes. Reports of auroral contacts during the January 7 and 15 sessions have been received from Montana to Quebec and South to South Carolina and Texas. Both sessions produced strong signals and the intensity allowed even 5-watt W9JY in Bridgeton, Missouri to work K2HLA on Long Island. Only one contact was reported on 220, but there were several on 432 Mc., which were reported last month. W9HDQ says the schedules are unusual for January and were about the best he has ever heard. The auroral openings directly correlated with marked increases in sun noise as recorded by W6HDK in 432 Mc. Dozens of reports were received from the high activity states, but some "rare" ones put in an appearance also. Among them were K1BIK in Vermont; K1ABR, Rhode Island; W1GKJ, Maine; W8AEC, West Virginia; W8CUC, South Dakota; W8EIK, Illinois; W7JRG, Montana; W7UFB, Wyoming; W8HC, Delaware;

MOONBOUNCE RECORDS

Two-Way Work

144 Mc.: VK3ATN — K2MWA/2 10117 Miles — Nov. 28, 1966
420 Mc.: W1LU — K6IUK 5092 Miles — July 31, 1964
1215 Mc.: W1BU — KH6UK 5092 Miles — August 9, 1962

50 Mc. WAS

1 W6ZB 22 50WFB 43 50WAB 43 67WACD
2 W6JY 22 50VYOR 21 50WYQ 21 67WACD
3 W6QSB 24 W6ALU 24 W6QEP 24 50WOB
4 W6AJQ 21 50WYQ 21 50WOB 21 50WOB
5 W6HL 21 50WOB 21 50WAB 21 50WOB
6 W6QYA 21 50WSN 21 50WOB 21 50WOB
7 W6QI 21 50WOB 21 50WOB 21 50WOB
8 W6HBD 21 50WOB 21 50WOB 21 50WOB
9 W6LL 21 50WOB 21 50WOB 21 50WOB
10 W8MDD 21 50WOB 21 50WOB 21 50WOB
11 W6QIC 21 50WOB 21 50WOB 21 50WOB
12 W6W 21 50WOB 21 50WOB 21 50WOB
13 W6HAY 21 50WOB 21 50WOB 21 50WOB
14 W7WCB 21 50WOB 21 50WOB 21 50WOB
15 W6QFB 21 50WOB 21 50WOB 21 50WOB
16 W7WCB 21 50WOB 21 50WOB 21 50WOB
17 W7WCB 21 50WOB 21 50WOB 21 50WOB
18 W7WCB 21 50WOB 21 50WOB 21 50WOB
19 W6QI 21 50WOB 21 50WOB 21 50WOB
20 W6QI 21 50WOB 21 50WOB 21 50WOB
21 W6QI 21 50WOB 21 50WOB 21 50WOB

* 49 states  50 states

** 50 states

at Holliston, Mass, has 2 watts on 1296 Mc. with a 2CS9 tripler and expects to use helices on 1290 and 2300 Mc. He also is looking for schedules or someone to work with, W6QQV, Hanover, New Jersey, is working on 21 Ge, gear and wants to know of anyone else interested in Northern New Jersey.

420 Mc. activity is increasing in many areas and not those necessarily in the high population centers. K3AJ at Quincy, Illinois now has 10 states on the band. After making the first known 432 aurora QSO on September 9th with W6AAE, Lee has been monitoring 144 and 432 Mc. simultaneously during auroras. From Alexandria, Virginia, K4SUM reports hearing W1QWY over a 350-mile path to Springfield, Mass. three days during last January. K4SUM says 13 stations are now active on 432 Mc. in and around Alexandria. W8UGC at Chester, Pa. schedules K2DZM at Railways, New Jersey on 492,084 each night at 0300Z.
2-METER STATIONS

W2LM ... 33 6 1350 KAYZ ... 30 9 1255
W2MT ... 22 6 1350 WERG ... 25 8 1150
WIAF ... 32 1360 W2GK ... 29 8 1150
X2LZ ... 4 1360 W2KX ... 10 6 960
X2JW ... 7 1360 W2UZ ... 6 6 960
W2BA ... 13 6 1350 K2PQ ... 17 7 1250
W2AR ... 24 7 1360 W2SW ... 20 5 960
W2AE ... 23 1360 W2KF ... 7 3 1350
W2VS ... 20 7 1360 W2JO ... 13 5 1360
W2B ... 22 7 1360 W2SA ... 12 5 1360
W2OE ... 6 6 1360 W2LZ ... 2 5 1360
W2RU ... 8 6 1360 W2JW ... 6 5 1360
W2DS ... 7 6 1360 W2SG ... 5 5 1360
W2DR ... 6 6 1360 W2WJ ... 10 4 1360
W2DP ... 5 6 1360 W2WE ... 10 3 1360
W2DL ... 7 6 1360 W2IB ... 10 3 1360
W2DH ... 5 6 1360 W2IB ... 10 3 1360
W2DK ... 5 6 1360 W2IB ... 10 3 1360
W2DJ ... 4 6 1360 W2IB ... 10 3 1360
W2DK ... 5 6 1360 W2IB ... 10 3 1360
W2DP ... 5 6 1360 W2IB ... 10 3 1360
W2DL ... 7 6 1360 W2IB ... 10 3 1360
W2DH ... 5 6 1360 W2IB ... 10 3 1360
W2DJ ... 4 6 1360 W2IB ... 10 3 1360

At Las Vegas, Al, K7ICW, is looking for information on temperature during 432 Mc. tropo tests. Al says temperature below 1000 ft. is supposed to exceed 100 °F. Al lives 225 miles from Las Vegas, so QSOs from his area may be of interest to those in the area. Al has been active for many years on the 220-Mc. band and is looking for operators interested in the band. Al's call is K7ICW and he is active during daylight hours.

One of the New England states by 432 Mc. is W1QXG, at Spring Hill, Mass. Dick schedules VE2LI at Montreal Wednesday and Sunday nights with constant exchanges. He also runs a key on 432.000 Wednesday nights with constant exchange. East from 2030 to 2035. Northeast from 2035 to 2105. Southwest from 2125 to 2135 and southeast from 2215 and 2230. He is also interested in other stations in the area. Dick's call is VE2LI and he is located at Spring Hill, Mass.

The figures after each call refer to states, call area and mileage of best DX.

(Continued on page 188)

utes following the automatic transmission. Dick will maintain the schedule through May, later if others ask him to. Al is primarily interested in the use of the 220-Mc. band and the use of the 432-Mc. band for propagation studies. He is looking forward to hearing from other stations interested in this frequency and would be happy to exchange information with them. Al's call is VE2LI and he is located at Spring Hill, Mass.

The figures after each call refer to states, call area and mileage of best DX.
Good Old Neighbor

BY GEORGE W. STEVENS, W6DZZ

Living near a small town on a high bluff overlooking lakes on two sides was a ham’s paradise for me until a new neighbor moved in across the road. I take time out from hamming and go over and get acquainted — seem like a fine couple, they are from Chicago.

Couple days go by and then he is out putting up an antenna but it is smaller than ham beams that I have seen. I am hoping that he is another ham. Will have to ask him the next time we talk. That nite my good old SW-3 receiver has a funny whistle so I check it over and find nothing wrong so I give up and hit the bed. Next morning 40 meters is good so I fire up the homebrew 53 cee and push-pull T220s and pout the key a couple of hours. The next couple nites my old faithfull SW-3 has a whistle but only at nites. I don’t seem to find out why. Maybe it is a line noise, so I change my sleeping to after dinner and ham in the morning. I work 11 till 7 shift, Sunday is my afternoon for sked with old ham friend so at 2:30 I get rig warmed up and then this whistle appears, but soon I hear John calling me, his signal is stronger, so we ragchew for 10 minutes and there is a knock at my door, it is the new neighbor. He is mad because I am spoiling his television picture. I sign with friend and go over and take a look at this thing, called television, which looks like a snow storm on a big tube, every now and then I can see people on the round tube. Neighbor says my antenna is sucking all the picture away from his antenna and that is why there is so much snow on the tube, my antenna is bigger than his. I complain about the noise his big tube makes in his receiver and his wife agrees with me because it does the same on her little radio in the kitchen.

They both work in the day time so I agree to stay off the air at nite if they will leave television off on Sunday afternoon so I can keep sked with friend John. Everything goes fine for a couple weeks, I study and evenings sleeping while he watches television.

I study about TV and ham interference. Then comes the evening I am sleeping and good old neighbor comes over and knocks at front door and is storming mad. My XXL tells him that I am sleeping and that I go to work at 11, but he insists that I am using my radio to mess up his TV picture, and if I don’t stop it he will cut my antenna down.

Next nite I take XXL to town for a show and stop at drive-in for a snack before going home, we are just about to leave when my old friend the town marshal drives up along side, I was on my way out to your place, the new neighbor called in awhile ago and wants to file a complaint against you for interfering with his television set all evening.

So we go out and see good old neighbor. I let the marshal do all the talking and after good old neighbor gets done complaining about how I spoiled his evening of watching TV and I was doing it in the dark, so he would think I was not at home when all the time he could see me on the TV. So goes the battle and I go off to work they are still at it.

The next morning when I come home from work I look up for my 40-meter feed top but it is on the ground and wire is cut in small pieces. I am mad enough to eat shoe leather, but if good old neighbor wants to be that way so can I, so I drive back into town and find me one of those old-time light bulbs with carbon filaments and put it up in the attic and wire the light bulb into the hot line and cover the bulb with a big box so it cannot be seen, now let him watch his snow box. I put up a long wire on the other side of house using fine wire so it is almost impossible to see and work 40 meters c.w. in the daytime.

One month goes by and the good old neighbor don’t speak when we meet on the street up town. I come home one morning and am sitting at the table eating breakfast, here comes a big moving van, which stops at good old neighbor’s front door. When I get up at 5 o’clock they are gone. I understand they went back to Chicago where television is good. I hope so. I put my 40-meter flat top back up and the old SW-3 is playing sweet c.w. notes again.

---

Feedback

The long dimension for the side plate of the 50-Mc. transceiver (50-Mc. Transistor Transceiver, Mark II), February and March, 1967, QST, should be 9 inches, instead of 9 1/2 inches, as given in March QST, page 23. The 5 1/2 by 9-inch side plates are bent on the long sides only, resulting in a plate that is 4 3/4 by 9 inches, after bending. Thanks to WA4AWW, who brought this to our attention.

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.

*Blue Earth, Minn. 56013.
The Old and the New. You have all heard the old saw "Ring out the old, ring in the new." The old was rung out, with ruffles, flourishes, honors and even a few tears, during January and early February, a poignant combination of sorrow and cheer which inevitably goes with these affairs. The new has been duly rung in, to the accompaniment of cleaning out of old files, moving of effects, conferences on personnel shuffles and other departmental reorganizational matters. The result is a Communications Department made up of some old and some new faces, and some temporary key vacancies. To start a new regime short-staffed is an appalling prospect, but this is what we have been up against and we hope you will all bear with us until we get firmly established. We'll discuss some personnel details later, space permitting.

Right now, we have to take a look at the immediate future. Your Communications Department will continue to function in the best interest of the operating amateur in accordance with our interpretation of that interest as conveyed by the membership. We hope you will think of it as the same CD which has served you well and faithfully in the past and will continue to do so in the future — as a department staffed by mature amateurs with a combination of many years experience and completely open minds, a mixture of new and old ideas, methods and procedures, casting out the old as they become useless or obsolete, adopting the new when they represent progress and achievement, but neither accepting or rejecting either because they are simply old or simply new. Logic doesn't change with the years, nor do the general trends in the course of amateur radio affairs. History has a way of repeating itself. The past is an inescapable part of the present and the future and is not to be ignored. On the other hand, old methods which were or are "good enough" cannot be allowed to continue if there are new ways which are better. Your CD always has been open to suggestion and change if merited. We want to make it clear that your new CD is not necessarily a continuation of the old, nor necessarily a complete break with the past. We do not intend to abandon tried and true methods, procedures and philosophies just because they are old; we do intend looking ever toward the progressive and will not hesitate to change methods, procedures and philosophies if progress will be achieved thereby.

Let's get specific. One of the most vital fields in which the development of operating organization is needed is that of the v.h.f.'s. During the past year your communications manager has stressed this, and it is due for continued stressing and emphasis. The Official Experimental Stations have become Official VHF Stations, and their energies being urged into the field of public service. We are not fully satisfied with progress made so far, and want ideas for more. Let's have 'em, fellows. How about development of new v.h.f. nets at local levels? How about using more

Operating News

GEORGE HART, WINIM, Communications Manager
ELLEN WHITE, WITYM, Deputy Comm., Mgr.
Administration: LILLIAN M. SALTER, WIZIE
Contests: STANLEY H. ISRAEL, WA2BAH
Public Service: WILLIAM A. OWEN, W4YAU
Training Aids: GERALD FINARD
DXCC: ROBERT L. WHITE, WIWPO

OPERATING EVENTS
ARRL-IARU Societies-SCM-Affiliated-Club-Operating Events

<table>
<thead>
<tr>
<th>April</th>
<th>May</th>
<th>June</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2 Florida QSO Party, p. 142 March QST</td>
<td>4 Qualifying Run, W6OWP</td>
<td>10-11 V.H.F. QSO Party</td>
</tr>
<tr>
<td>7 Qualifying Run, W6OWP</td>
<td>6-7 Russian Contest, p. 82, this issue</td>
<td>13 Qualifying Run, W1AW</td>
</tr>
<tr>
<td>14 Qualifying Run, W1AW</td>
<td>12 Qualifying Run, W1AW</td>
<td>16 Qualifying Run, W6OWP</td>
</tr>
<tr>
<td>15-17 CD Party (c.w.)</td>
<td>13-14 Hawaii QSO Party, p. 132, March QST, Georgia QSO Party, next issue</td>
<td></td>
</tr>
<tr>
<td>22-23 Helvetia 22, p. 82 this issue, 22-24 CD Party (phone)</td>
<td>24-25 Field Day</td>
<td></td>
</tr>
<tr>
<td>29-30 PACC Contest, p. 82, this issue, Missouri QSO Party, p. 108, this issue, Ohio QSO Party, p. 102, this issue</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

92 QST for
repeaters for communication, as well as experimenting? New developments make the field limitless — satellite, moon bounce, scatter, all these have communications possibilities and potential. But whatever possibilities exist are useless without planned organization, and that's what we are here for.

How about RTTY? This writer has never been able to mention this subject without getting into hot water with someone, because there is no enthusiast so rabid as the RTTY addict. (Oops, there we go again!) Think of the communications potential, as more equipments become available every day, and with lots of literature on the subject! A natural for organized communication if there ever was one. But again, it needs centralized organization, a plan of operation, a way of working into and being a part of the whole amateur package of public service communication.

Phone? Voice is a basic means of communication, so naturally there is more activity in this field than any other, but there are three different modes of radio voice communication and they need consolidating. Let's quit the scrapping about it. A.m. still has its uses, especially on ten meters and v.h.f. (quiet, you sidebanders!). Sideband is the coming thing — in fact, it has already come! On some of the v.h.f. bands, wide-band f.m. is receiving widespread use, what with surplus gear rapidly becoming available at no or small cost — and if you think f.m. has no advantages over a.m. and s.s.b., just ask someone who has used it.

C.w.? It's not dead, and shows no sign of dying. You can say what you please about its obsolescence as a communications mode, c.w. still occupies less spectrum space than any other and in the hands of skilled operators (ah, there's the rub!) can more than hold its own with any other method being used today. Anybody who can learn to talk can learn c.w. Learning to talk is a thousand times more difficult.

Contests? By all means they must be continued, slanted as possible toward training, but dedicated primarily to the "fun" aspect of amateur radio, a phase we can't do without. The "big three" are now the Big Four as the v.h.f. sweepstakes takes its place as a major activity along with the SS, FD and DX Competition.

And speaking of DX, this is by sheer popularity one of our most important operating activities and deserves the exclusive attention of a section of the department. It shall continue to have it.

All the other awards, appointments, field organization activities and rules are continued in effect. There are no precipitant or drastic changes. All the forms previously used will be used up before they are revised or discontinued: but each form, as we run out, will be studied for improvement or possible elimination. The familiar F. E. Handy signature and initials will be around on ARRL forms and certificates for some time. You will see changes, from time to time. We can't consult you on every little detail. Let us know when we do something you don't like (as if you won't anyway!), but just to keep us from shooting ourselves, we would appreciate a pat on the back once in a while, too. We are firm believers in this rule of thumb for success: sheer perseverance, readiness to learn, sincere belief in principles, and a willingness to believe we could be wrong.

"Channel 60." The February QST article on converted Citizens-Band rigs for the ten meter band has started a lot of amateurs thinking along lines of low-power operation on ten during the coming high-sunspot-activity cycle. It is a well-known fact to those of us who have been around that when ten is open to skip, it is open, and the strength of the signal that can be put into a location far distant when the skip is right seems to have little relation to power. No doubt about it, within a few months "ten" will be wide open as it was in the late 50's — absolute bedding on the low end, good occupancy at the high end.

And there will be a lot of converted-CB rigs in action, especially mobiles. The suggestion comes from some of the gang in Colorado that a certain frequency be picked on ten meters for an international calling frequency, primarily for low powered rigs and mobiles and especially for converted CB rigs, but open to anyone. The idea would be to listen on "channel 60" (i.e. 29.60 Mc.) for a QSO, either call a CQ or call someone CQing there, then, when contact is made, shift to channel 61, 62 or 63 (i.e., 29.61, 29.62 or 29.63 Mc.), whichever is free and commonly available on the particular rigs being used. The CB rigs are ideal for this, since they all contain three or more crystal positions. The procedure might be,

Meet Your SCM

Wyoming SCM Wayne M. Moore W7CQL dates his amateur radio interest back to 1935. In addition to the post of SCM, he is currently an OBS, Assistant Director and an active member of the Casper Amateur Radio Club. Past leadership posts have included Section Emergency Coordinator and Vice Director. He holds an ARRL Public Service Award and is active on 80 meters, enjoys hunting, fishing and baseball and is a Past Master of his local Masonic Lodge. Wayne's station includes a Ranger driving an 813, HQ-170 and off-center-fed antenna.

April 1967
typically, to get yourself a CB rig, convert it per the Feb. QST article, get yourself three crystals for 29.60, 29.61 and 29.62 (or 29.63 in place of one of the latter two — or all three if you have enough positions in your rig).

Note that we are getting close to but not sitting on the NCEF at 29.64 Mc. This suggests having nothing specific to do with the NCEFs. However, the proximity of the NCEF to this calling channel (i.e., "channel 60") leaves right into another possibility — put a 29.61 crystal into the rig so that when you are not looking for a QSO you can switch the rig to "channel 61," operate the squele, and your will automatically not only be monitoring the NCEF, but ready immediately to reply to any distress call you might hear there.

Let's try it, eh? If it works on ten, maybe we'll use the idea on other bands too. See you on "Channel 60."

CD Personnel Changes. The masthead above and in March QST give some idea of the set up. Ellen White, W1YYM becomes the "No. 2 man" in the department, with general supervisor functions. Ellen's former post of contest supervisor is taken over by Stan Israel, (WA2BAI/J), with the status of assistant communications manager. The only other change at present is the addition of a new staffer to take over public service functions, also with the status

---

**DX CENTURY CLUB AWARDS**

From January 1 through January 31, 1967 DXCC Certificate based on contacts with 100 or more countries has been issued by the ARRL Communications Department to the amateurs listed below.

### New Members

<table>
<thead>
<tr>
<th>Call</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>K2GVD</td>
<td>W8AMH</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>ZL1HU</td>
<td>W8ADK</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>W4TFL</td>
<td>W8ABO</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>W4BR</td>
<td>W8AVP</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>W8MRR</td>
<td>W8AVZ</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>W8RBA</td>
<td>W8AVL</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>W8FJQ</td>
<td>W8AYL</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>W8FQQ</td>
<td>W8AZC</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
</tbody>
</table>

### Radiotelephone

<table>
<thead>
<tr>
<th>Call</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>W4TFL</td>
<td>W8ZWD</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>W8RBA</td>
<td>W8ZM</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>W8RRA</td>
<td>W8ZK</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>W8FQQ</td>
<td>W8ZY</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
</tbody>
</table>

### Endorsements

Endorsements issued for confirmations submitted from January 1 thru January 31, 1967 are listed below. Endorsements listings through the 300 level are given in increments of 30, above the 300 level they are given in increments of 10. The totals shown do not necessarily represent the exact credits given but only that the participant has reached the endorsement group indicated.

### Radiotelephone

<table>
<thead>
<tr>
<th>Call</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>W8OM</td>
<td>W9TP</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>W8ZBM</td>
<td>W9TP</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>W8FQQ</td>
<td>W9TP</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
</tbody>
</table>

---

94 QST for
ELECTION NOTICE

To all ARRL members in the Sections listed below:

You are hereby notified that an election for Section Communications Manager is about to be held in your respective sections. This notice supersedes previous notices.

Nominating petitions are solicited. The signatures of five or more ARRL full members of the Section concerned, in good standing, are required on each petition. No member shall sign more than one petition.

Each candidate for Section Communications Manager must have been a licensed amateur for at least two years and similarly a member of the same Section continuously for one calendar year immediately prior to his nomination.

Petitions must be received at ARRL on or before 4:30 P.M. the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are extended to the dates given herewith. The complete name, address, zip code and station call of the candidate and signers should be included with the petition. It is advisable that eight or ten full-member signatures be obtained, since on checking names against Headquarters files, no time to return invalid petitions for additions, a petition may be found invalid by reasons of expiring memberships, individual signatures uncertain or ignorant of their membership status, etc.

The following nominating form is suggested. (Signers should be sure to give city, street address and zip code to facilitate checking membership.)

Communications Manager, ARRL 
225 Main St., Hartford, Conn, 06111

We, the undersigned full members of the ....... ARRL Section of the ... Division, hereby nominate ......... as candidate for Section Communications Manager for this Section for the next two-year term of office.

You are urged to take the initiative and file nominating petitions immediately. This is your opportunity to put the man of your choice in office.

—George Hart, W1NJJ, Communications Manager

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed by members in the following Sections, completing their election in accordance with regular League policy, each term of office starting on the date given.

Sponsored Valley John F. Miske, Jr., W5JDT Feb. 25, 1967
North Dakota Harold L. Settle, W9DM Mar. 8, 1967
Missouri Alfred E. Schwantes, W9TEE Mar. 11, 1967
Minnesota German R. Kopolinski, W9TUC Mar. 15, 1967

In the Alaska Section of the North Western Division, Mr. John F. Trent, K7DJG, and Mr. Albert P. Weber, K7TDR, were nominated. Mr. Trent received 60 votes and Mr. Weber received 57 votes. Mr. Trent’s term of office began Jan. 12, 1967.
## BRASS POUNDERS LEAGUE

Winners of BPL Certificate for Jan, Trantex:

<table>
<thead>
<tr>
<th>Call</th>
<th>Orig.</th>
<th>Rec.</th>
<th>Del.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>KCBPT</td>
<td>4002</td>
<td>1902</td>
<td>1719</td>
<td>183</td>
</tr>
<tr>
<td>KCBK</td>
<td>82</td>
<td>2947</td>
<td>3096</td>
<td>36</td>
</tr>
<tr>
<td>KCPP</td>
<td>26</td>
<td>940</td>
<td>387</td>
<td>53</td>
</tr>
<tr>
<td>WC3U1</td>
<td>245</td>
<td>640</td>
<td>699</td>
<td>9</td>
</tr>
<tr>
<td>WBF12</td>
<td>847</td>
<td>542</td>
<td>1349</td>
<td>13</td>
</tr>
<tr>
<td>WBA1</td>
<td>8</td>
<td>657</td>
<td>657</td>
<td>54</td>
</tr>
<tr>
<td>WBF9</td>
<td>45</td>
<td>455</td>
<td>1002</td>
<td>60</td>
</tr>
<tr>
<td>WZJ2W</td>
<td>23</td>
<td>489</td>
<td>483</td>
<td>6</td>
</tr>
<tr>
<td>WBF11</td>
<td>1503</td>
<td>651</td>
<td>975</td>
<td>975</td>
</tr>
</tbody>
</table>

| KCTEY | 17    | 706  | 225  | 9     | 954  |
| KTCY  | 19    | 432  | 432  | 9     | 940  |
| WBF12  | 440  | 440  | 10   | 90    | 555  |
| WBFML  | 29    | 545  | 357  | 0     | 942  |
| WBF11  | 406  | 406  | 1   | 1     | 920  |
| GK1O   | 6     | 491  | 329  | 0     | 826  |
| WBF12  | 43    | 440  | 1   | 7     | 448  |
| WBFML  | 227  | 227  | 4   | 24    | 547  |
| WBF10  | 116  | 116  | 3   | 3     | 122  |
| WBFH8  | 41    | 366  | 373  | 56   | 778  |
| WBFQY  | 20    | 306  | 341  | 2     | 682  |
| WH1O   | 28    | 383  | 48   | 13    | 485  |
| WADNJ  | 26    | 250  | 276  | 8     | 304  |
| WBF11  | 185  | 289  | 517  | 16    | 677  |
| WBF11  | 26    | 294  | 257  | 3     | 548  |
| KBFQD  | 12    | 272  | 325  | 5     | 532  |
| KBFQD  | 21    | 217  | 245  | 2     | 535  |
| KSMY  | 19    | 267  | 225  | 15    | 524  |

**More-Than-One-Operator Station**

**WJO3D** | 7 | 9 | 535  
**WJO3D** | 7 | 9 | 535  

**BPL for 100 or more original plus deliveries**

**WBA1Q** | 106  
**WBFML** | 106  

**Late Report: KCTEY (Dec.)** | 22 | 959 | 396 | 1351  
**WBF1R (Dec.)** | 39 | 241 | 192 | 538  

### CODE PROFICIENCY PROGRAM

Twice each month special transmissions are made to enable you to qualify for the ARRL Code Proficiency Certificate. The next qualifying run from W1AW will be made Apr. 14 at 0230 GMT. Identical tests will be sent simultaneously by transmitters on listed c.w. frequencies. The next qualifying run from W6OPF will only be transmitted Apr. 7 at 0300 Greenwich Mean Time on 3990 and 7129 kHz. CAUTION: Note that the dates are given per Greenwich Mean Time. Code Proficiency Qualifying Runs in the United States and Canada actually fall on the evening previous to the date given. Example: In converting, 0230 GMT Apr. 14 becomes 2130 EST Apr. 13.

Any person can apply. Neither ARRL membership for an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers.

**Code practice is sent daily by W1AW at 0030 and 0230 GMT, simultaneously on all listed c.w. frequencies. At 0030 GMT Tuesday, Thursday and Saturday, speeds are 15, 20, 25, 30 and 35 w.p.m.; on Monday, Wednesday, Friday and Sundays, speeds are 5, 7, 10, 13, 20 and 25 w.p.m. For practice purposes, the order of words in each line may be reversed during the 5 through 13 w.p.m. tests. At 0030 GMT daily, speeds are 10, 13 and 15 w.p.m. The 0230-0320 GMT runs are omitted four times each year, on designated nights when Frequency Measuring Tests are made in this period. To permit improving your fast bind by sending in *deed* with W1AW (but not on the air) and to allow checking strict accuracy of your copy on certain tapes note the GMT dates and tests to be sent in the 0230-0320 GMT practice on those dates:

**Date Subject of Practice Text from Feb. QST**

**Apr. 3: It Seems to Us, p. 9**

**Apr. 6: Matter Conversion of CB Transmitters, p. 20**

**Apr. 11: How to Operate Messages, p. 69**

**Date Subject of Practice Text from Understanding Amateur Radio, First Edition**

**Apr. 19: Some Hints on Operating Your Receiver, p. 64**

**Apr. 28: Setting the B.F.O., p. 69**

### WIAW SCHEDULE, APRIL 1967

The ARRL Maxim Memorial Station welcomes visitors, Operating visiting-hours are Monday through Friday 3 P.M.-5 A.M. EST, Saturday 7 P.M.-230 A.M. EST and Sunday 3 P.M.-10:30 P.M. EST. The station address is 225 Main Street, Newton, Conn., about 7 miles south of Hartford. A map showing local street detail will be sent upon request.

<table>
<thead>
<tr>
<th>GMT*</th>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0900</td>
<td>Code Practice Daily 10-13 15 w.p.m.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0100</td>
<td>C.W. OBS1</td>
<td>C.W. OBS2</td>
<td>C.W. OBS3</td>
<td>C.W. OBS4</td>
<td>C.W. OBS5</td>
<td>C.W. OBS6</td>
<td>C.W. OBS7</td>
</tr>
<tr>
<td>0400</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0700</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1600</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1900</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**More-Than-One-Operator Station**

**KCC2 243** | WRF15 125 | WRF15 (Dec.) 109  

**BPL medals (see Aug. 1964, p. 64) have been awarded to the following amateurs since last month's listing: WB200RE, WBFQO, WBF11W, WB4FZP.**

---

1. C.W. OBS (bulletins, 18 w.p.m.) and code practice on 1,805, 3,555, 7,080, 14,141, 21,075, 50,7 and 115,6 Mc.
2. Phone OBS (bulletins) on 1,821, 3,519, 7,235, 14,283, 21,411, 30,77 and 145,6 Mc.
3. RTTY OBS (bulletins) on 3,026, 7,107 and 14,075 Mc. Other ARRL code practice during this period is also available.
4. Starting time approximate. Operation period follows conclusion of bulletin or code practice.
5. Operation will be on one of the following frequencies: 21,075, 21,211, 28,035 or 28,75 Mc.
6. W1AW will listen in the novice segments for Novices on band indicated before looking for other contacts.
8. Maintenance Staff: W1A QST WPH N6J. 

---

**OST**
Electronics Crossword
BY S. M. DUNNAM, JR., K5KEI

ACROSS
1. Freq. Absorption.
2. Reduce.
4. Grid signal.
5. Freq. measurement.
8. Demodulation.
9. Here.
10. Arrangement.
11. Noise filtering circuit. (ab)
12. Type of amplifier.
13. "King Spark" (Pre-WW-I).
15. Phone part.
16. "Your sig. fades."
17. Intermediate.
18. Unusual.
19. Station leading a net.
22. SSB amplifiers.
23. Iterate (ab.)
25. Electrical degrees.
44. Reduce.
47. Grid signal.
48. Freq. measurement.
49. Modulation checker.
50. Chassis front.
51. Demodulation.
52. Arrangement.

DOWN
1. Field Strength (ab).
2. Small tube type.
3. Type of switch.
4. Henry, easy, easy.
5. Negative coefficient designation.
6. Multiple capacitor.
7. Measuring instrument.
8. "I am closing my station."
9. Chart of values (ab).
10. Instrument covers.
11. "14"
14. "I"
15. Children.
16. To mark a dial.
17. Reduce.
18. Gain potentiometer.
19. Speaker mounts.
20. Radiator.
21. Static troubles.
22. Static troubles.
23. Radiation element.
24. "rr"
25. Test equipment meter (ab).
26. Messages (ab).
27. Power ratio unit (ab).
28. Type of current (ab).
29. Radiation element.
30. "rr"
31. Test equipment meter (ab).
32. Messages (ab).
33. Power ratio unit (ab).
34. Type of current (ab).

Answer on page 148

Strays

THE FRANKLIN INSTITUTE
OF THE STATE OF PENNSYLVANIA

AWARDS THE PRESIDENT'S CITATION TO
PHIL-MONT MOBILE RADIO CLUB
IN RECOGNITION OF
FOURTEEN YEARS OF LOYAL AND DEDICATED SERVICE OF ITS MEMBERS IN HELPING TO ESTABLISH AND MAINTAIN AMUR
RADIO STATION W3QCV IN THE SCIENCE TEACHING MUSEUM, THERE ENABLING THE FRANKLIN INSTITUTE TO ADVANCE THE CAUSE OF AMATEUR RADIO AND OF RADIO EDUCATION.

On January 18, the Phil-Mont Mobile Radio Club received this award from the Franklin Institute. Pictured is W3ADV receiving a similar award from Institute President W3QCV. The President's Citation had been made only seven times prior to this occasion.

April 1967 97
Station Activities

ATLANTIC DIVISION

DELAWARE—SCM, John M. Thompson, W2HRC; SEC: K3NYG, RM; W2EJF. New appointments: W2H- 
RJG as KC NC. County: W3DEO as OPS, W3DPR as NCS, W3F5H as ARS. W3GK as OPS, W3BOQ as 
OO, New ARES stations: K3VHS, K3HJR, W3GKHE. Renewals: W3GKHE, K3KNY, W3KD, 
K3LJF, W3LJS, W3MHR, W3NC, W3NE, W3QW, W3SC, W3WYJ.

PENNSYLVANIA—SCM, Allen B. 
Breiner, W3ZQF; SEC: W3EJL, RM; K3VGC, W3BCH, 
W3EML, K3NIV, PAM; W3FGQ, K3F5SW and K3SUN 
are new OOs. The KPA C.W. Net had QNI 456 and QTC 
of 299. The PTTN Training Net had QTC of 329. The 
KPA Emergency Phone & Traffic Net had QNI 720 with 
QTC 151. W3JUF is looking for Hawaii and Alaska for 
his W3AK. W3EMG joined our training net and uses an 
NC-303 and a DX-100. After 45 years in ham radio, 
W3CAU made DXCC W3FGQ worked WB2ZBG on 402, 
W4DXV on 10, W3EHF and W3QSO on 30. K3TRE 
is active on 8 meters. K3METZ made the Dean's List for the third time 
in a row at Temple U. W3NML located its v.h.f. problems, 
a new code and W3GKHE made QSOs with K3SW's John 
National Guard and will be stationed in Texas. W3CUJ 
closed shop and headed for Florida for the winter. New 
George W3AKF, recent QTC from W1KPH; an 8-meter 
c.w., 5-watt portable built by W3CFTU; a DX-100 for 
K3WV; an 80-meter inverted Vee to W3AXEN; an 
n Other's new "QRM" QTC. W3KDL is a new member in 2nd Army 
MARS, New club officers: Pottsburg 
Ara-K3NMM, pres.; K3NUN, vice-pres.; W3FQ, 
seck.; W3WVD, treas.; Anthracite Chapter QTA W3PVY, 
pres.; W3OML, vice-pres.; W3KJJ, seck., 
Kishingo ABC, Pitcairn ABC: W3ASG as guest speaker on "Pictures 
from Satellites." W3KRR is waiting for warmer weather 
to get his rotor upstart; he also retired Feb. 1. W3ASLJ got his General ticket in Sept. and works 
40, 80 and even 40 meters on CW & phone. W39PQ has acquired employment 
been so activities will be limited during off-rush 
weekends. The new WPA Section Dinner-Meeting will be held 
Apr. 22 at Canonsburg. Details will be forwarded in the 
quarterly WPA Bulletin. If you are not on the 
mailing list you may be put on by dropping a card or radiogram with your name, call and address in your 
exterior to the post office of your section club. The regular 
books are sold at 60 cents each.

MARYLAND-DISTRICT OF COLUMBIA—SCM,

Carl E. Andersen, K3JYV; SEC: W3CYE, RM; K3AOE, 
W3ZWN, PAMS: W3JYJ, K3LFJ.

Net Freq. Time Days Sec. OTC 1st, ONU 
MDS 3443 0045Z Daily 21 15 0.0 
MDDS 3443 0100Z Daily 21 31 0.6 
MEPN 3420 2200Z M-W 9 10 0.0 
MEPN 3420 1700Z Sat. 
NITE OWL 59 250 0400Z Daily 21 31 0.0

New appointees: W3S2CF as K3, W3DPR as ARS, W3ASB as ARS, W3GK as OVS, W3BOY as OO, New 
ARES stations: K3VHS, W3HJR, W3GKHE. Renewals: W3GKHE, K3KNY, W3KD, 
K3LJF, W3LJS, W3MHR, W3NC, W3NE, W3QW, W3SC, W3WYJ.

SOUTHERN NEW JERSEY—SCM, Edward G. Rosser, 
W2ZL—A1st. SCM, Charles B. Travata, W2YZF. SEC: 
W2AZJ, RM: W2JIL, W2JIV. Renewals: W2JIL, W2JIV, W2JSP, K3JW, K3JWJ, K3JY, K3JYK, 
W3JNN Net Mar., NJN reports a QNI of 901 and traffic 737. 
K3JNN reports QNI of 791 and traffic 180. W3B7T is the new 
net controller and the net rolls over to W3B77. W3KQF is the new 
collar work. W2BM0O and W2CKF are now OOs. W3D2- 
TEN was high man with 809 QSOs during the SS for 
SIRH with W3JPH as net controller. W3KQF is an 
important call and is on the air at W3SLO for a 
homebrew 
VHF receiver. He made good MARS and traffic. 
W3BUJ, W3JGJ, W3MYS, W3NC, W3P2, W3Q2J, W3RZ, 
W3JSM, W3WYJ, W3S2CF.

W3JSP is W3BNB. W3D3O is W3DNB. W3ZL is W3DNP. W3ZL is W3DNP. W3ZL is W3DNP. W3ZL is W3DNP.
CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W8PRN—SEC: W8HYU, RM: W8AMQ, PAMS; W8BWX, W8LBK and W8RVA (v.h.f.), Cook County EC: W8QJG, No. 10.

CENTRAL DIVISION

ILLINOIS—SCM, Edmond A. Metzger, W8PRN—SEC: W8HYU, RM: W8AMQ, PAMS; W8BWX, W8LBK and W8RVA (v.h.f.), Cook County EC: W8QJG, No. 10.

CENTRAL DIVISION
ARIZONA—SCM, Don W. Whitney, KEGKN—SEC; WASKX, PUM; WASMCO, RA; WATND, KAM; WASPD, PM; WASKQ, RE; WASKSG, R; WASKTP, R; WASKQV, R; WASKTV, R; WASKTR, R; WASKU, R. New net manager for the 8. Dakota State Sideline Net. Reports of good activity on v.h.f. are received from WASKQ and WASKTP. New net manager for the 8. Dakota State Sideline Net.

ARKANSAS—SCM, Don W. Whitney, KEGKN—SEC; WASKX, PUM; WASMCO, RA; WATND, KAM; WASPD, PM; WASKQ, RE; WASKSG, R; WASKTP, R; WASKQV, R; WASKTV, R; WASKTR, R; WASKU, R. New net manager for the 8. Dakota State Sideline Net. Reports of good activity on v.h.f. are received from WASKQ and WASKTP. New net manager for the 8. Dakota State Sideline Net.
MISSISSIPPI—SCM, S. H. Hairston, W5AM—IQC: WJIB. The Mississippi Blind have an exceptionally fine Semi-Annual Pense at Lake Raymond, W5M0O was elected net mgr. and W5ASO not. Hinds Jr. College presents courses in electronics to the Jackson Ham Club and other amateurs. W5ASO has a new 80-meter beam working fine. Many Mississippi hams worked WWV on their first day of operation. K4DMZ has a 3/5W in a new trans. to add to the 250W he has already and is planning to up his power to 300 W. The Meridiana Net, on 3816 kc, Sun., at 1330 CDT, is growing under the leadership of W5NZO, K5GNC and W5YCS. K5KKN is offering his assistance to WWV as a base station. The fire performers are the middle moving to Olive Branch, W5JWD is having fun converting 40W to 10 meters, courtesy of QST. W5BV built his new 20-meter beam and is having fun with it on 10 meters. W5WX is still at it old Vibroplex. Traffic: W5ASO 39, W5BV 28, W5EM 16, W5JWD 11, W5CAM 2.

TENNESSEE—SCM, William A. Scott, W4UPV—IQC: K4RCRT, RM: KA4WPL, PAMS: W4WCR, W4WVW,

Net
Freq. Data
Date
Time
Joined
QTH

TSSB 320 kc.

1
0902
2
1000

TPN
1345
2
1147
294

ETPN 3550 kc.

1141
2
334
29

TN 3535 kc.

1002
56
325
82

Congrats to W4QG on making the BPL again. The Memphis Hamfest May 20-21 promises to be the best yet with the addition of a new parking lot. The Johnson City RA officers are KA4WPL, pres.; W4UPV, vice-pres.; WH4XMM, treas.; W4WVW, secy.; and KA4EIN, act. mgr. The best wishes of the section goes to W4YAU as he joins the Hq. Staff in Newport, WAHUK reports sun noise of 5.0 db for Jan., high for this area. The Aurora of the 17th was visible from nearly the 18th to 20th. The peak was 1330/1550. The Great Ridge 6-Meter Emergency Nets are considering consolidating. All appointees are reminded that activity reports are due the 15th. AREC in Tennessee is new at 3906 20W, send your applications to your EC. K4KRC or W4WVW.

Traffic:


K4ASO, K4HUB, K4WIY, K4MMX, K4MWP, K4BWS, K4WMS 2.

W4WVW 69, W4D3A 59, W4YAU 34, W4WUX 34, W4WYV 25.

The W4QG has the new 80-meter converter, W4WUX is in the hospital, W4WVW has a new 2-meter converter, W4WYV has a new 10-meter converter. W4WUX is in the hospital, W4WYV has a new 2-meter converter. W4WUX is going back to college, K4HUB's 6 WYL, W4ASO is making plans to move to New York, W4WUX is in the hospital, W4WVW is in the hospital, W4WYV is in the hospital, W4QG is in the hospital, W4WUX is in the hospital, W4ASO is in the hospital, W4WYV is in the hospital, W4QG is in the hospital.

NET
Freq.
Data
Date
Time
Joined
QTH

KEN 2900 kc.

2003
1200
2
29
29

K4MMX 320 kc.

2300
29
29
29

K4WMS 300 kc.

2900
29
29
29

K4HUB 300 kc.

2900
29
29
29

We are sorry to report the death on Feb. 6 of W4TFK, Frankford, Ky. Johnson was one of the best-known amateurs in Kentucky and probably the friendliest, he was probably best known on 3906 kc, with the Comet Clover Net and was a very popular net officer. He was a long-time member of the Franklin County Ham Club and was active in civic and state affairs. And now it’s de W4TFK SK. A traffic net meeting was held in Louisville Jan. 22. All nets were represented with over 200 present. Thanks to all for calling up all the arrangements. WA4WWT has now his 33-w.p.m. certificate, K4GOU is handling the Falls City Area Net and was in a very active net last month. WA4WWT reports that the FCATN had 9 sessions, QN 46 and QTC 43, K4FPP is active in six v.h.f. nets, W4JSH has an active 12-meter net and was in a very active net last month. WA4WWT reports that the FCATN had 9 sessions, QN 46 and QTC 43, K4FPP is active in six v.h.f. nets, W4JSH has an active 12-meter net and was in a very active net last month.

K4MMX 320 kc.

2900
29
29
29

K4WMS 300 kc.

2900
29
29
29

K4HUB 300 kc.

2900
29
29
29

We are sorry to report the death on Feb. 6 of W4TFK, Frankford, Ky. Johnson was one of the best-known amateurs in Kentucky and probably the friendliest, he was probably best known on 3906 kc, with the Comet Clover Net and was a very popular net officer. He was a long-time member of the Franklin County Ham Club and was active in civic and state affairs. And now it’s de W4TFK SK. A traffic net meeting was held in Louisville Jan. 22. All nets were represented with over 200 present. Thanks to all for calling up all the arrangements. WA4WWT has now his 33-w.p.m. certificate, K4GOU is handling the Falls City Area Net and was in a very active net last month. WA4WWT reports that the FCATN had 9 sessions, QN 46 and QTC 43, K4FPP is active in six v.h.f. nets, W4JSH has an active 12-meter net and was in a very active net last month. WA4WWT reports that the FCATN had 9 sessions, QN 46 and QTC 43, K4FPP is active in six v.h.f. nets, W4JSH has an active 12-meter net and was in a very active net last month.
FIFTEENTH OHIO QSO PARTY
April 29-30, 1967

All Ohio amateurs are invited to take part in this QSO party, sponsored by the Ohio Council of Amateur Radio Clubs.

Rules:
1. The party will begin at 2300 GMT on Saturday April 29 and end at 2300 GMT April 30.
2. All types of emission and operations may be used, but a station may be worked only once regardless of mode. A maximum of ten stations may be worked in a single country, and no single call will be "CQ Ohio." 4. Scoring: Multiplying the number of Ohio stations worked by the number of channels used and adding 2 points for each 1000 miles of grid square covered would produce the call of stations worked, time, date and the county in which the station is located. 5. Suggested frequencies are 3560, 3605 and 7250 kc. On the other bands, take your choice.
6. A cup and four appropriate certificates will be awarded to the highest scoring stations.
7. All contest logs must be postmarked not later than May 30, 1967, and should be sent to the contest manager, KDHD, 81 West Main Street, Westerville, Ohio 43081.
What does it take to produce reliable receiving tubes? Tubes you can plug in with complete confidence in their continuously dependable operation. The answer is complex. Partly, reliable receiving tubes are products of years of engineering experience and technical competence with electronic components. More than 40 years of experience—with all types of electronic systems and products—are directly and indirectly involved in manufacturing Raytheon receiving tubes.

The development of the BH rectifier, which helped make radio a reality, was a Raytheon achievement. Raytheon's many engineering and production breakthroughs—with magnetrons, miniature and subminiature tubes—are well known throughout the industry. So, too, is Raytheon's extensive experience with complex electronic systems for the U.S. government—such as the Hawk and Sparrow missiles, and the guidance system for Apollo space vehicles.

Part of the answer lies in continuing adherence to the highest engineering and production standards—which guarantees electronic components having the utmost reliability. In many cases, Raytheon specifications are even more stringent than military requirements. For example: Raytheon frequently requires 1,000-hour live tests whereas military requirements may call only for 500 hours of testing.

Another example: Raytheon is especially concerned with high-and low-line operation. All horizontal amplifiers must provide full scan at 100 volts and extremely long life at 130 volts. Tests of 11 volts heater cycling for 6.3 volt tubes (and similar tests for heater ratings) are conducted by Raytheon even though they are not required by the military.

For more information about Raytheon receiving tubes, write to Raytheon Company, Receiving Tube Operation, Fourth Avenue, Burlington, Massachusetts 01803.
Going Mobile?
Go Heathkit

HW-12A
$99.95

SB-110
$299.00

SB-101
$360.00
Hit The Road With A Solid 200 Watts P.E.P. On The Band Of Your Choice With A New Heathkit SSB Single-Bander

- Now Upper Or Lower sideband operation on all Single Banders • Choose 80, 40, or 20 meter model • Improved styling • More convenient control locations • 200 watts P.E.P. input • Single knob tuning with 2 kHz dial calibration • New ALC input for use with external linear amplifiers • Excellent exciters for operation on the band of your choice with the KW Kompact or SB-200 Linear Amplifiers • Now with improved audio and AVC response • Crystal filter type SSB generation • Built-in S-meter, VOX, PTT, and ALC • Fixed or mobile with the power supply of your choice

Here’s The Low-Cost Way To Get On Your Favorite Band • Fixed Or Mobile • Full Transceiver Operation • and with the kind of performance you expect only in high-priced equipment. Upper or lower sideband, built-in S-meter, VOX, PTT, and ALC. Provisions for plug-in 100 kHz crystal calibrator. Fixed or mobile with appropriate power supply.

Kit HW-12A, 80-meter Model, 15 lbs. .................. $99.95
Kit HW-22A, 40-meter Model, 15 lbs. .................. $104.95
Kit HW-32A, 20-meter Model, 15 lbs. .................. $104.95
Kit HRA-10-1, Plug-in Crystal Calibrator, 1 lb. ........ $48.95
Kit HP-13, Mobile Power Supply, 7 lbs. ............... $64.95
Kit HP-23, Fixed-station Power Supply, 19 lbs. ......... $49.95

Go First Class! ... With The One "No Compromise" Six Meter Transceiver ... The Heathkit SB-110 ... truly high performance on "six"

- Uncompromised engineering — the SB-110 features the same quality crystal filter found on Heathkit 80-10 meter SB-Series rigs • The same Heath LMO (Linear Master Oscillator) found on 80-10 meter SB-Series rigs • Built-in VOX • Built-in crystal calibrator • Upper & lower sideband selection • Full CW provisions, including built-in sidetone

Work Fixed Or Mobile With 180 Watts P.E.P. SSB Input, 150 Watts CW Input ... work six meters with lowband stability, 1 kHz dial calibration, linear tuning, and a backlash-free dial mechanism ... all of the standard "built-in" features found on the Heathkit 80-10 meter SB-Series equipment.

Kit SB-110, Six-meter Transceiver, 23 lbs. .............. $299.00
Kit HP-13, Mobile Power Supply, 7 lbs. ............... $64.95
Kit HP-23, Fixed Station Power Supply, 19 lbs. ......... $49.95
Kit SBA-100-1, Mobile Mounting Bracket, 6 lbs. ....... $14.95

Come Fly With The "Ultimate" In Amateur Band SSB Transceivers ... The New Heathkit SB-101 — 180 Watts P.E.P. Input On 80-10 Meters

- Front panel selection of standard USB/LSB 2.1 kHz SSB filter or optional 400 Hz CW filter • 170 watts input CW • Switch select upper or lower sideband or CW • Built-in CW sidetone • PTT or VOX • Truly linear tuning & 1 kHz calibration through Heath SB-Series LMO (Linear Master Oscillator) • Fixed or mobile operation with the appropriate power supply

Order The SB-101 For The Best Value In SSB Transceivers ... Regardless! The famous Heath pre-built LMO for superior tuning characteristics, USB/LSB selection, TALC, built-in VOX and sstl calibrator, low cost power supplies, and many more features make the SB-101 truly the "ultimate" in SSB transceivers.

Kit SB-101, 80-10 Meter SSB Transceiver, 23 lbs. ....... $360.00
SBA-301-2, Optional 400 Hz CW filter, 1 lb. .............. $20.95
Kit HP-13, Mobile Power Supply, 7 lbs. ............... $64.95
Kit HP-23, Fixed Station Power Supply, 19 lbs. ......... $49.95
the world classic... hallicrafters
SR-2000, P2000 Hurricane

PUTS YOUR SIGNAL

See it, hear it, operate it at Uncle George's! This high performance Hallicrafters Hurricane transceiver gives you the big signal and more. Receiver Offset Control (RIT) permits ±2 Kc adjustment of receiver frequency, independent of transmitter for round table, net or CW operation. Full coverage of 80, 40, 20, 15 and 10 meters. AND maximum legal power in a minimum of space—nearly 5 watts of power per square inch!

SR-2000—$995.00  P-2000 AC power supply/speaker with 115/230V AC inputs—$395.00

Uncle George's has the all new HT-46 transmitter and matching SX-146 amateur band receiver. These operate as separate units or function as a highly stable 5-band transceiver featuring 180 watts PEP on SSB; 150 watts on CW. The advanced design SX-146 receiver assures high order frequency stability and freedom from adjacent channel cross-modulation products. Come in and try it out! SX-146 Receiver, $269.95, HT-46 Transmitter—$369.95.

Service on All Types of Amateur Radio Equipment

Our 12th year of service as Ham Headquarters for the Nation's Capital.

UNCLE GEORGE'S RADIO
a division of ELECTRONIC
Phone 949-2262  •  11324 FERN STREET,
WHERE YOU WANT IT!

Hitch your Hurricane to a Hygain Thunderbird Tribander Beam ... specifically, the ALL-NEW 6-element TH6DX for the ultimate in tribander performance and mechanical reliability on 10, 15 and 20 meters. Superb on DX and other long haul contacts. Separate Hy-Q traps, featuring large diameter coils developing exceptionally favorable L/C ratio and very high Q. Peak performance on each band—phone or CW. Takes maximum legal power. Model TH6DX, $149.90

The new, improved 3-element Model TH3Mk2 Thunderbird delivers outstanding performance. New "Hy-Q" traps for each band. Rugged construction throughout. Takes maximum legal power. $114.95

The fabulous Thunderbird Jr. Model TH3Mk2 3-element beam takes up to 300 watts AM; 600 watts PEP. For roof-top or light weight tower. Rotates with heavy duty TV rotator. Turning radius 14.3 ft. $74.50

The ruggedly constructed 2-element Thunderbird. Model TH2Mk2 installs almost anywhere ... delivers excellent performance. Features the new "Hy-Q" traps. Takes maximum legal power. $74.50

WE STOCK ALMOST EVERY ITEM IN THE HY-GAIN LINE — AVAILABLE FOR IMMEDIATE SHIPMENT

HAM SHACK DISTRIBUTORS, INC.
WHEATON, MARYLAND, U.S.A.
15 kW tetrode offers high power gain for advanced transmitters

Most new high-power 20 kW FM transmitters use the EIMAC 4CX15,000A tetrode for service as a Class-C amplifier. The tube features a new internal mechanical structure which minimizes rf losses, and is capable of operation at full power ratings to 110 MHz. EIMAC also recommends the 4CX15,000A for 220 MHz operation at lower power levels for VHF-TV transmitters. EIMAC's long experience in tube technology and ceramic-to-metal sealing leadership have combined to produce a tetrode of optimum design and structural integrity. That's why the 4CX15,000A is used in more new transmitters than any other ceramic tetrode with similar characteristics. For more information write Product Manager, Power Grid Tubes, or contact your nearest EIMAC distributor.
SUB-MINIATURE SOLID STATE TV CAMERA
FOR CLOSED CIRCUIT OR AMATEUR TV

THE VANGUARD 501 is a completely automatic closed circuit television camera. Its design is such that it can be used on any closed-circuit system with no special requirements. It is designed for the amateur, who wants to enjoy television in the comfort of his home, and for the professional, who needs the finest in performance and reliability.

SPECIFICATIONS:
- Measures 2¾" x 4¾" x 7" (excluding lens and connectors).
- Weighs 3½ lbs.
- Operates on 100-130 volts 50 or 60 cycles, 7 watts.
- Tested at 100 to 125°F.
- Advanced circuitry utilizing 35 semi-conductors most of which are silicon.
- Field effect input circuit for minimum video noise.
- Resolution guaranteed to exceed standards set by 525 line TV receiver.
- RF output 30,000 microvolts adjustable for channels 2 to 6.
- Video output 1.5V p-p composite with standard negative sync (random interface).
- Viewable pictures obtainable with illumination as low as 1 ft. candle.
- Vidicon controlled light compensation; 150/1.
- Adjustable iris on lens enables use in bright sunlight.
- New long life, sub-miniature vidicon with spectral response similar to Type 7735A.
- Electronically regulated power supply and thermally compensated circuits eliminate changes in picture quality when line voltage and temperature fluctuate.
- All parts guaranteed for 1 year (except for open filaments on vidicon or breakage).
- Fast, low-cost service always available from our factory in Hollis, N.Y.

Send your order direct to our factory
VANGUARD LABS
196-23 Jamaica Ave. Dept. S-5
Hollis, N.Y. 11423

$279.95
SHIPPING COLLECT
COMPLETE WITH LENS

of KOQSV, has a TR-2 on 80-40-20. WJUH has a new Galaxy V. QO reports were received from KOQSV, WQOZ, WQTR and KOYTP. QSST reports from WATFUV and WAOHJ. Net reports for Jan.: Net Frex. Time Pmgs Scan. GNI QTO Mag. MBN 3885 23502 M-W-F 14 269 25 WUBUL MON 3835 0800 Daily 31 213 294 WATDDB MNB 3850 1900 Daily 26 92 20 WUBD MSOD 3833 0200 M-Sat. 29 611 133 KFTCB MGPO 3810 2100 M-F 27 278 211 WUBJTV MTTN 3830 0500 M-F 21 326 204 ARISL QMO 3850 23502 Sun. 30 89 201 WABBDA RSN 3713 0500 Daily 31 37 12 KOONK PED 5645 0100 Tues.(152) 4 91 8 WARELL HBN 3850 7250 1800 M-F 22 538 212 WABBIG Traffic: (Jan.) KOONK 491, KOALE 229, WYOOTR 215, WVEE1 192, WAOFYJ 194, KORPH 192, WOZLN 173, WOVH 131, WOOD 120, WAOHJ 66, WOFGL 49, WAOFPF1. WORV 22, KOYTP 22, KFTCB 22, WAOHQR 21, KOBOR 19, WAOEAL 16, WAOFKD 15, KOVYH 14, WOQUR 12, WAOJUG 11, WOQUR 10, WOQUR 8, WAOJUG 8, WOQUR 7, WOQUR 2, WOAQV 2, WOQUR 1, WOQUR 1.

NEBRASKA—SOM., Frank Allen, WOOGP—SEC: KOOAL. Appointments: WAOJW as NC. Net reports: Nebraska, Phone Net. WAOJUF, JNI 229, QTC 40, Nebraska, ARC Net; Phone: WOBOZ, JNI 149, QTC 2, Dead End Net. WOBOZ, JNI 149, QTC 2, Nebraska, ARC Net. WOBOZ, JNI 149, QTC 2, Nebraska, ARC Net. WOBOZ, JNI 149, QTC 2, Nebraska, ARC Net. WOBOZ, JNI 149, QTC 2, Nebraska, ARC Net. WOBOZ, JNI 149, QTC 2, Nebraska, ARC Net. WOBOZ, JNI 149, QTC 2, Nebraska, ARC Net. WOBOZ, JNI 149, QTC 2, Nebraska, ARC Net. WOBOZ, JNI 149, QTC 2, Nebraska, ARC Net. WOBOZ, JNI 149, QTC 2, Nebraska, ARC Net. WOBOZ, JNI 149, QTC 2, Nebraska, ARC Net. WOBOZ, JNI 149, QTC 2, Nebraska, ARC Net. WOBOZ, JNI 149, QTC 2, Nebraska, ARC Net. WOBOZ, JNI 149, QTC 2, Nebraska, ARC Net. WOBOZ, JNI 149, QTC 2, Nebraska, ARC Net. WOBOZ, JNI 149, QTC 2, Nebraska, ARC Net.

NEW ENGLAND DIVISION
CONNECTICUT—SCM, John J. McNassor, WIGVT—SEC: WITRF, WM. WIZEFM, PAM. WITYD. Net reports for Jan.: Net Frex. Days Time Scan. GNI QTO CN 3905 1500 Daily 1808 21 378 302 CPN 3880 M-S 1800 31 190 174 High GNI: CN—WIZEFM, WIKUO, WBZFTP71 and WAIENJ, CPN—WITRF 30, WAIENJ 28, WBZFY 28, WYZH 55, WIMPF 24, KISREP 23, KIWH 22, WIITCV 22, KIDORF 21, WAIENJ 20, WIKUO 20, WIBIF 18, WIKUO 18, WIBIF 17, WIKUO 17, WIBIF 16, WIBIF 16. WIBIF sends the Pi-Conn Bulletin to all ECs. Please respond with activity reports and keep your EC appointment endorsement up to date. The successful search for the lost children was greatly aided by KISREP, KINR, WIGVT, WIBIF, KOIT and KIWH in an emergency operation handled by the New England Division. EDW (Public Safety) and Sea quarter's Staff made Jan. 31 a red-letter day for WIBIT to note his retirement from ARHL. WIBIT is visiting clubs to explain in ARHL's forthcoming Preservation of Amateur Radio Frequencies. WIBTH is handling traffic on 20-meter s.s.b. WBZFTP71 is a new Connecticut resident and is active on CN. KITTRJ suggests the new ARHL Operators Manual as a "must" for all stations. KITTRJ is active with extended range operation on 10 meters from KITTRJ. KOIIT keeps WIKUO, CPN, WAIENJ has been active the past two years as 10-M. Sun. Net Control for the Echo Net (KIMU) on 50.388 Mc. and offers a certificate for 10 check-ins. Congratulations to WAIENJ for BPL. WIKUO for 3rd BPL in a row. WIKUO for a new 50-w.p.m. c.w. check! Also to WBZFY, WIBIF, WIBIF and WIGVT for Dec. participation. IRR certificates were issued to KITYF, WAIENJ, KIAMIS, WIKUO, WIKUO, WIKUO and WIKUO. Be sure to attend the 1967 New England Division Convention in Swampscott, Mass. April 22 and 23. Hope to meet you there! Traffic: (Jan.) WITRF 420, WIAW 298, KIRQO
DELUXE ADDITION TO THE SWAN LINE
5 BANDS—480 WATTS
HOME STATION—PORTABLE—MOBILE

It is with great pride that we announce the development and production of the newest addition to the Swan Line. The Swan 500 is a most fitting deluxe companion to the classic model 350. Improved circuit efficiency provides increased power ratings of 480 Watts P.E.P. on sideband; 360 Watts CW input and 125 Watts AM.

At the top of the Swan Line, the 500 offers many extra features: Selectable upper and lower sideband, 100 kc crystal calibrator, automatic noise limiter, provision for installation of an internal speaker (the best solution for the mobile installation), and a factory installed accessory socket for the addition of the model 410 external VFO.

As a receiver, the new 500 will satisfy the most critical operator. Sensitivity is better than .5 uv and the precision tuning mechanism is easily the smoothest you will find on any piece of amateur gear. Improved production techniques result in even better VFO stability. A new product detector circuit provides you with superior audio quality, and a new AGC system responds more smoothly to wide variations in signal strength.

The new 500 is equipped with the finest sideband filter used in any transceiver today. With a shape factor of 1.7, ultimate rejection better than 100 db, and a carefully selected bandwidth of 2.7 kc, this superior crystal filter combines good channel separation with the excellent audio quality for which Swan transceivers are so well known.

Frequency coverage of the five bands is complete: 3.5-4.0 mc, 7.0-7.5 mc, 13.85-14.35 mc, 21-21.5 mc, 28-29.7 mc. (In addition, the 500 covers Mars frequencies with the 405X accessory crystal oscillator.)

Along with higher power, improved styling and many deluxe features, the new 500 has the same high standards of performance, rugged reliability and craftsmanship that have become the trademark of the Swan Line. Backed up by a full year warranty and a service policy second to none, we feel that the Swan 500 will establish a new standard of value for the industry. Our new “Star” is now in production.

$495 amateur net.

ACCESSORIES:

MATCHING AC SUPPLY
With speaker and phone jack.
Model 117XC ........................................... $ 95

12 VOLT DC SUPPLY
For mobile or portable operation.
Model 14-117 ........................................... $130

MARS CRYSTAL OSCILLATOR
Five crystal-controlled channels with vernier freq. control.
Model 405X (less crystals) ......................... $ 45

FULL COVERAGE EXTERNAL VFO
Model 410 ............................................. $ 95

DUAL VFO ADAPTOR
Provides for separate control of transmit and receive frequencies.
Model 22 .............................................. $ 25

PLUG-IN VOX UNIT Model VX-1 .................. $ 35

See your Swan dealer today.
EASTERN MASSACHUSETTS—SCM, Frank L. Baker, Jr., W1ALP—W1AQG, our SEC, received reports from W1s RFK, LHY, Kfz ERO, PNB, DZG. New appointments: W1QNG as EC for Winchester, W1JEU as ORS, W1AETC as OVS, W1FJS as OPS. New officers of the Norwood RC, KJMR are: W1BQHT, pres.; W1AEO, vice-pres.; W1HERV, secy.; W1AILU, treas. W1AETC has a Ranger 2, HQ-10, four-element beam. W1AOG enjoys his first CD Party. W1AMK has a DX3, SB-200 and WAI receiver on c.w. and s/s. WAI was in the V.I.F. S8 for the 1200 Radio Club, KidZIG. Somerville EC needs help from the hams in town. Call him at 606-627-0791, Ex-W1JK, formerly W1LR, Melrose.

Silent Key. EMNMM had 22 sessions, 232 QNs, 123 twicings. W1RPF and his Avon AREC Net are on 510 MHz, Wed. at 9 PA. W1EX, ex-WIBAL, is on after a 35-year layoff. WAIWGT is building a v.f.o. and modulator for his h.t. (Heard on 75. W1AGHU and W1PFE. W1ILXZ has Al Operator club membership. The South Shore Club held a very good auction with W1AKY as auctioneer, W1AGRP, in the Navy, is on 10/19/20. W1AMJ/A, in Brockton, has a stick with W1CHUR, KJRL has a new DX40, going to 11M. W1ZMO, secy. of the Danvers ARA, says the RACES Net was activated for a bad fire in town. W1HRL/DBLPI is on 10/19/20 in Germany with a KJ1M-1, K1WJ, W1BYA. W1WY and W1BOW took part in the Dec. FM3, W1DJD is busy at school, says W1TWT. The Natick RC will be on again with a Vicma 2. The Framingham RC had a talk on the HRO-500 by W1FSJ. The Carway RC meets at K1IPB’s, K1DJD is moving to W. Hollywood, Fla. W1URB gave a talk on “Intermodulation Matching” at the Wellesley ARS. W1CMW has moved to Danvers, W1DVT-YKTOP, Andover, is on many bands. W1QJU is going into the Army for a month. Don’t forget the convention at Swampscott Apr. 22-23. RBAQP/1 is working on s/s. For 2 and 6, W1APDX has a Telco antenna, six-element 24-1 ft. beam on 50 watts. 6-meter Yagis are also needed.

W1FJS has a Swan 330, W1BOW, Everett EC, reports a successful c.d. meeting. K1BUP joined Navy MARS. W1TZW/1 has a new 1200 IRN card. We went to W1DJD, W1GEE, W1EYFY and W1JFVP from W1EOW, IRN mgr. K1WWM, W1FTP, W1WJK and W1RJ have their 430-Mc. transceivers working. W1EFN gets in on 50. W1CIFE got out well during the aurora on 2. The Yankee RC held a “surprise meeting.” Appointments confirmed: K1PNE, W1QNF as ECs; W1s VMD, TZ, KBN, KIWHM as OVs; K1BUP, KI-QLQ, W1AQA, EMG, KIWH as ORS; W1GT1 as OVS; W1s ZH, TZ as OVs; W1AQS as IRs; W1ZPR as OVS. W1NF has been a ham for 65 years. W1AKXK has applied for the OVS appointment. New stations in our Norcross Net of W1s: W1N4A, GUP, KJSM, GW1, W1UF, W1AEQ on 160-meter c.w. W1JN and KIWH are busy at college in Maine, W1QQZ works on code speed for the Radio Class. W1HBF has W1AC and W1AS. W1WJ2G and W1OEUX are working in Needham. W1AEUX is NCS Mon, for EMN. W1APSH has new HW32 for 20-meter s/s. His YTL-1 is FRT. K1JQH is active in A.P. MARS. W1DVT is out in the air from school. K1CLM is feeling better, K1YUB is mobile on 4. Our sympathy to K1BOK on the death of his wife.

TRAFFIC: W1FJP 371, W1MGC 107, K1OW 149. K1KGA 137, W1JON 120, W1UJR 70, W1AEY 69, K1QJ 63, W1LJ 59, W1DOM 54, W1AEEY 51, W1WQ 48, W1AOG 49, W1DID 38, W1QJ 32, W1DNR 34, W1DSD 24, W1FS1 21, K1RGP 21, W1AH 18, W1AES 9, W1KQ 9, K1QK 8, W1DJ 7, W1DID 6, W1WY 5, W1DST 5, W1N 3. W1AK 2, K1CLM 2, K1YUB 1. (Dec.) K1NH2 30, W1DST 3, W1JQ 3.

MAINE—SCM, Herbert A. Davis, K1DYC—SEC: K1QIQ, PAM’s: K1WQI, K1ZVN, RM: KITZH. Traffic note: See Sec Net meeting Sat. on 30 MHz from 1700 to 1800 and 2000 to 2100. Pine Tree Net meets daily on 3958 ke, at 1100 on c.w. A tribute to two Silent Keys: W1QIQ, of Bowdoinham, who passed away recently, was active on most of the bands and Army MARS. W1DW, of Millinocket, also passed away recently, was active on most of the bands and Army MARS.

They both will be sadly missed by all who knew them along the way. W1EOW, mgr. of the IRN, sent the following news: W1AQR, W1QIQ, K1TZH and K1CSP have received new IRN certificates. There is an amateur station active at Belknap Academy with new operators on the air. W1GRG is getting his antenna up at his new home. Traffic: K1WQI 60, W1QIQ 21.

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
$362.60
FREIGHT PREPAID INSIDE CONTINENTAL U.S.A.

Tri-Ex TOWER CORPORATION
7182 RASMUSSEN AVE., VISALIA, CALIF.

112
The New Galaxy V Mark 2
5 Band Transceiver Mobile or Fixed Station

Now—Even Better than Ever!

NEW 400 Watt Power!

Six Ways Better! Yet Still Only $420.00

These NEW Features...
- New 400 Watt Power
- New Precise Vernier Logging Scale
- New Solid State VFO
- New CW Sidetone Audio
- New CW Break-In Option
- New CW Filter Option

Plus all the great features that put the Galaxy V in a Class by Itself!
- Smallest of the High-Powered Transceivers. (6" x 10¼" x 11¼").
- Great for either Mobile or Fixed Station. No compromise in power.
- 'Hottest' Receiver of any Transceiver—Special New Six-Crystal lattice filter.
  - The personal drift chart of every Galaxy that comes off our line goes with the unit to its new owner!
- Complete 80-10 Meter Coverage. 500 KC on all bands, with 1 Megacycle on 10 Meters.
- Both Upper and Lower Selectable Sideband.
- Highest Stability. Drift less than 100 CY in any 15 minute period after warmup.

Write for free Brochure, complete specs on the Galaxy V Mark 2—

Galaxy Electronics
"Pacesetter in Amateur/Commercial Equipment Design"
10 South 34th Street • Dept. QST-R16 • Council Bluffs, Iowa 51501

WASHINGTON—Assignment to W1SN, Alex V. O'Leary, W1FST, W1GL, W1GLA—SEC: KINQZ. RM: Open.

WASHINGTON—Assignment to W1SN, Alex V. O'Leary, W1FST, W1GL, W1GLA—SEC: KINQZ. RM: Open.


VERMONT—Assignment to 6F4Q, Robert J. Godard, W1KZB—SEC: WIVSAA. RM: KITQZ. Jan. net reports:

WESTERN MASSACHUSETTS—SCM, Percy C. Noble, W1HR—SEC: W1ZMQ. RM: KIY0BB. W1M Net Bulletin was sent out by RM W1MDW, and it should show results in increased activity. Those reporting into W1M1N were 20 times during the past month. W1DQ (with 10% attendance), W1DWA, W2BSC/L. KI-

NEXT CLASS FIRST CLASS LICENSE

FCC First Class License

Endorsements: W1BYS as OPS. New Nashua Mike and Key Club officers are W1ARE, pres.; WH1TE, vice-pres.; W1QKA, secy.; KIPPE, treas.; W1DUR act. mer. Welcome to new hams W1NKH, W1HGO, W1WI, W1WAIGE, W1GAHG, W1HIS, W1CHER. KICHT moves to Cantonton. W1UIX/L is going on with the same model. W1KOG is working for DX. W1NB1E, W1KBRT, W1HYC, K1CFZ, K1FCF, and K1FPCY had a visit from son K1JUJ. Yours truly met SCM W1ASPFLG while in Nevada recently. K1HNE is home on leave from the Air Force. W1DYS's new call DX and some NCX-4. K1KIH has new Drake "twins," K1MNX was in the CD Party. The Nashua Mike and Key Club will hold an auction on W1THF for the v.h.f. bands. KIAQG and W1K0C attended W1SEL's funeral in Burlington. V1. KINQZ has been watching the belts in K168- and K168-land. Traffic: W1APX 25, W1-

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. Now, 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 can complete the course in 10 months. A Technician or men 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.

MAIL for FREE CATALOG

NATIONAL RADIO INSTITUTE

Electronic Division

Washington, D. C.

Please send me complete information on FCC License Training and other home-study courses, as checked below. (No salesman will call.)

FCC License

Radio TV Servicing

Complete Communications

Industrial Electronics

Aviation Communications

Electronics for Automation

Marine Communications

Mobile Communications

Check for facts on new GI Bill.

Name

Age

Address

City State Zip

ACREDITED MEMBER NATIONAL HOME STUDY COUNCIL

19-047

Available Under NEW GI BILL. If you served since January 27, 1955, or are in service, check off line in coupon.
features for the future . . .
all present

It would be easy to reel off another dozen SB-34 features, most of them solid-state—like bi-lateral 2-way circuits—many of them exclusive. But when you actually pick up this mighty miniature—heft its 19 pounds—you will realize how much solid-state components have helped to shrink the size and weight of the package. It would be only natural if you marveled a bit about the fact that you have at your fingertips a powerful, full-fledged, 4-band SSB station in a package only 5"x11\(\frac{1}{4}\)"x10".

Not shown in the film clip at the left is the all-important handle for the SB-34 provided to encourage you to take advantage of the utility of this fine transceiver—and to use it at home, in your car—or boat—or plane—or ski resort? Of course you'll also be packing the dual 117V AC and 12V DC power supply. But this time no extra handle—the supply is built right into the SB-34 cabinet. (and is included in the price of $419.00.) Carry on!

SBE, Sideband Engineers, 213 East Grand Ave, South San Francisco, California.

Big name in towers

ROHN TOWERS have become the accepted standard of excellence throughout the world — meeting the needs of the communication, broadcasting, transportation, oil, utilities, manufacturing and other industries, including home TV and amateur needs.

Computer engineered and designed ROHN TOWERS are produced in ROHN’S vast manufacturing complex utilizing the latest equipment and methods. Convenient warehousing facilities at strategic locations plus world-wide representatives and complete turnkey tower erection service ... along with a complete line of tower accessories, lighting systems and microwave reflectors make ROHN the complete tower line — throughout the world.

Representation and Distribution Worldwide

For further information contact

ROHN

Home Office
P.O. Box 2000,
Pearl, Illinois 61601
Ph. 309/637-8416
TWX 309/697-1488

NORTHERN DIVISION

IDAHO — SCM, Donald A. Crip, WZZN—The Farm Net convenes Mon. through Fri. on 3935 kc. at 0200 GMT. The Eagle Rock Club is sponsoring a code and theory class. W7DMP, W7DZI and W7DQO have overhauled the Idaho Falls ed. generator and antenna. WADNB is building a new SB-100, K7OAB is overhauling its station. The Lewiston-Clearwater Club held a goon-away party for W7GMC, who is moving to Yakama. Lewiston area amateurs provided communications for the March of Dimes Telethon that was broadcast from Spokane. F.A.M. Net traffic for Jan.: 21 sessions, 758 check-ins. IHF traffic handled. Traffic: K7HLR 458, K7OQZ 22, K7OAB 9, W7- ZNN 5, WAB6V 4. (Dec.) K7OAB 29.

MONTANA — SCM, Joseph A. D'Arcy, WTYV—Asc. SCM/SEC: Harry Rodolfa, W8RZ, RM: K7- ZIX. New appointment: W7O10 as an OBS. A pioneering and test project is being launched in the Northwest Division. Its aim is to increase the public knowledge of amateur radio. If you are interested in helping please contact George P. Griffin, K7ESJ. Chairman. Northwestern Division ARRL F.R. Committee, 241 S. W. School St. Redmond, Ore. W72ZI, K7EHH has a new Heathkit SB rig on the air from Great Falls. K7DCH is out of the hospital after a bout with the flu. W5EL has a new SB-200 on the air. The Butte Amateur Radio Club held its Annual Installation Dinner in Butte. W7- NFV had an average error of 3.1 parts per million in the recent Frequency Measurement Test. The Beaman/Goldenlight Amateur Radio Club sponsored a booth in the Mid-Winter Fair at Bozeman. The FCC will give amateur exams at Butte, the dates to be announced in QST. W8UBKO is a new ham in the Bozeman area. New officers of the Gallatin Amateur Radio Club are W8ATC, w.n.s.; W8ATT, v.p.; W8NWP, treas.; W8AC, act. mgr. W7OKC, EC. Several Montana stations were active on 2 during the recent auroral openings. W8ATC, at Butte, worked 24 states on W7C3N, at Butte, worked W8EAN at Whitefish. W7C3F worked several stations in various states throughout the West. W7S7Q also worked a new state on 432 Mc. Traffic: K7EGJ 79, K7PWY 41, K7DCH 6, W7WYG 6, W7FL 5, W8AEX 4, K7NTP 4, W8C6D 1.

OREGON — SCM, Everett H. France, W7AJN—SEC: W7AJN, RM: W7ZFH. Oregon section nets, inviting your participation follow:

Net GMT Freq. Dura. Mag.
OSN 0200 3685 7.8 W7ZFH NTS
BRN 2000 3625 Daily K7EGJ NTS
AREC 0000 3675 Daily W7AHF NTS

SCM official appointments for Jan.: K7WWR and W7B- CP1 as OBSs. Appointments are made to those who are active and ARRL members. W7AIW reports for AREC sessions 31, maximum number of counties 14, total attendance 45, QSTs 3, traffic 4, contacts 46. W7Z7FI reports for OSN, sessions 21, total attendance 106, traffic 83. There is a lot of traffic being handled in Oregon and no reports are being received. My 1966 records show that the c.w. traffic men took ten honors again with 96 percent of the traffic handled and reported. The break- down is as follows: Of total reported, origination 79 received 9028, relayed 2842, delivered 463, total 6537. This is far below that of 1965. Seven c.w. operators and 12 phone operators made 1566 reports. No other reports were received this month. Traffic: W7BZ 144, K7WCD 129, W7ATBP 89, W7ZFH 54, WACPI 30, WAFES 30, K7- WWH 8.

WASHINGTON — SCM, Everett E. Young, W7MOM— SEC: W7WUT, RM: W7BEB, PAM: W7LEC. Section nets:

WSN Daily 3535 kc. 0200Z ONI 434 QST 545 Sec. 31
WARTS X-Sun. 3070 kc. 0201Z ONI 1421 QST 147 Sec. 26
NTN Daily 3900 kc. 2130Z ONI 1199 QST 672 Sec. 31

W7ZIJ is the new secy. for ARAB and also made the HPL. W7D2X missed the BPL by 25. Over 40 Washington section nets report a QSL from W7VY. W7ZTB reports K7GAAH on 21.310 Mc. at 2100Z. WACFN handles YMCA traffic for Arab-Land. W7MCW is building solid state transmite and receiver gear. K7JH reports a new
HOW MUCH TRAINING IS NEEDED TO OPERATE RADIO COMMUNICATIONS EQUIPMENT OVER 100 MILE TO 1000 MILE DISTANCES?

It only takes 15 minutes to learn how to use the RF Communications Compact SSB Transceiver!!

These are the steps...
1. TURN ON POWER
2. SELECT CHANNEL
3. ADJUST AUDIO VOLUME
4. PUSH THE BUTTON AND TALK

Designed for extra simplified operation, the RF Communications Compact series SSB Transceiver is a high quality commercial unit using modern circuit design and the best grade of components and construction. The Compact is used in over 50 countries of the world by Police Departments, Oil Companies, Government Agencies, Military Organizations, etc.

With 100 watts power output (p.e.p.) the Compact provides highly dependable SSB communications over long distances.

The Compact is available in 1, 2, 3 or 4 channel versions. The frequency range is 1.6 to 16 Mc, either upperside band, lower sideband or selectable sideband.

The Compact weighs only 35 pounds complete in one cabinet including power supply. The Compact can be used in mobile applications with the RF-1210 mobile power kit.

The modern circuit has many advanced features including AGC, ALC, Collins mechanical filter, military grade crystals in high stability ovens and solid state power supply. All high voltage circuits are protected and the transceiver can be used under conditions of high temperatures and humidity.

A complete line of antenna couplers, linear power amplifiers, and other accessories are available. RF Communications is a leader in SSB communications.

Prices on the Compact start at $695.

Please contact us for further details.

RF COMMUNICATIONS, INC.
1680 UNIVERSITY AVENUE • ROCHESTER, NEW YORK 14610
"BEST BUY" IN RF TERMINATION WATTMETERS

Power ratings of 120, 250, 500, and 1000 watts

Frequencies from 2 to 1000 MHz

500-to-1 dynamic range

Four power ranges (250-, 500-, and 1000-watt models)

Expanded meter scale

"Twist-Off" connectors for fast field changes

Wide dynamic range, coupled with expanded meter scale, facilitates precise measurement of low-level signals.

Sealed cast-aluminum housings (no bells, no air vents) check coolant leakage. Noncarbonylizing silicone outlasts conventional oil dielectric under repeated heat cycling. No external power or water connections needed.

Prices are $195 (120 w), $275 (250 w), $325 ($500 w), and $450 (1000 w), with Type N, C, or UHF connectors. All models accept Sierra "Twist-Off" connectors, available in eight types.

For FREE 1967 Sierra "Power Generation and Measurement Equipment" catalog, mail coupon today.

PHILCO-FORD CORPORATION
Sierra Electronic Operation
Menlo Park, California • 94025

PHILCO
Ford

Sierra, 3885 Bohannon Dr., Menlo Park, California 94025
Please rush complete data on Model 401A Series RF Termination Wattmeters, including prices and ordering information.
Please send FREE 1967 "Power Generation and Measurement Equipment" catalog.

Name
Address
City... State... Zip

tech net starting with Novice; W7OEI nailed W6SBD on 14-Mc., A-1. W7YOJ had the beam down and the dipole on the ground in the big recent blow. The Capitol County Pen (AREC) net operated at 0430Z on 2995 kc. A new call heard in Pasco is W7EQQ, A 10-meter contest is planned between the Twin City ARC and the Rhode Island ARC.
New officers of WSN are W71A5G, mask.; W7HMA, asst. mgr.; W7PTL, net rec., KT7VA becomes an active Taxonomy WSNer. K7VBN is the new net. For June 1967, KTGY is still looking for public relations personnel. If you have had experience in this work, contact K7H.
New officers of the Chilmark County ARC are H7ROZ, pres.; KS7GB, vice-pres.; KT7RAJ, secsy.; W7A1B, treas., W7G7YF has earned a selection net certificate on WSN. W711ABC is the Stockton outlet to NTA, W7HOF, and CBN.
W7AIX is active on WSN and QWCM. KT7YS hooked 9N23A, K7H4C, CX51CO, 2SK1J, W7UF, D7B1H, and K7TQV. W7VUR has a nice new periodic schedule: W7VPN is touring FOB, ZL-4, AY6E, and KT6L and will have an audio-visual recording of his trip for us in May. New officers of the West Seattle ARC are W711EJ, mask.; W7JWJ, vice-pres.; KT7K1N, secsy.; KH5H7B, treas.; W7RFEK, stew., KT7JZ, delegate to Puget Sound Council; KT7GQI, alternate; W7FZV, act. at, tent.; W71UK, W71TUW, W7L7CS, W70DID, and W7FRM, board members.
WATCSE sends Official Bulletins daily on 7,255 Mc. at 0500 and 1600 GMT. WATFDF is a new OBS. The Big Tornado fire on Jan. 30 brought out AREC members and other emergency crews. W71BGD, KTATD, KTATF, and KT7USF spearheaded the public service effort. The Radio Club of Tacoma took in a tour of a P.A. facilities at Auburn. W7MCU can arrange a tour for you group. A newcomer to our area is W7TOU, ex-9D0A, SCM for June 1967; ex-K7AIK in Seward, Alas., Commander ARLR 29-30, Midwest Division Director 29-30. The QWA is setting up a hospital radio fund to furnish communications to hospitalized hosts. Those contributions are being accepted, K7ONE will help you in a worthy project. Traffic: (Jan.) W7BA 1359, W7IMA 1088, W7IVJ 17, W7AB 9, W7DCH 372, W7AAX 114, W7JYE 280, W7PPI 244, W77TB 130, W7DCN 97, W7UW 84, W7MCW 74, K7JHA 62, W7IUU 53, K7YNB 52, W71DB 47, K71TC 34, K71TA 33, W7ATP 29, W7KA 28, W710V 19, W71GYF 14, W7ATK 2, (Dec.) K71DX 17, K7MGA 21, W7VGC 18, W71IE 13. (Nov.) K71YNB 30, (Oct.) W71KCP 84.

PACIFIC DIVISION

HAWAII—SCM, Lee R. Wiel, K7HBFZ—Asst. SEC; KH7BZF, F.TM; WOPAN/K7E5, RM: Vacant. V.I.P; FAM: K7H3EM.

RCSC Net (40, 10, 8 and 2 meters) coordinated with KH7CEG. I'd like to say thanks for all the help we've received from all our former SEC K7HCCCL, who has resigned because of heavy business demands. What's Hawaii QSO Party, Who: All KH6 stations, When: 900 GMT May 13 to 2100 GMT May 14, phone or c.w., Where: All bands, Why: For attractive QSLs, special cachet, awards and generally the greatest fun. For arrangers, QST or send a SASE to KH6 QN, Bureau Box 101, Aiea, Hawaii 96701, Attn.: QSO Party, WOPAN/K7E5 entertained interesting VY4DA, from Queensland, K7HPEV reports he's QRT in Kalua. K7H5FB keeps the v.h.f. news coming in. K7PCC/K7H6 is the C3S for US Army Strategic Comms Command-Pacific. Others out at STRATCOM-PAC are KH7AIU, KH7BCK, KH7CBS, ex-W4WBG, KH7EWZ, ex-K4WBG and KH7E6, new officers. KH7GFF/K7H6 is associated. KH7BE/K7H6 is active.

K7KLE. The Friendly Net elected its third year of operation Dec. 30, 1966, with KH6ATS (ACS) KH7E ELW, K7UVW, K7JH, KH7E6, K7H1F.J, 1000, BHI and KH7BE radio operators on board. KH7BEF/K7H6 is on board for various bands and events. KH7BEF is of the Silver Spoon QN, can be heard on 20 and 15 phone and c.w., with his open swan, Traffic: (Jan.) K7HBFZ 8, WOPAN/K7E5 1, KH7BF 1, K7H5FO 1, K7HGB 1. (Dec.) K7HBFZ 1.
How did Gotham drastically cut antenna prices? Mass purchases, mass production, product specialization, and 15 years of antenna manufacturing experience. The result: The kind of antennas you want, at the right price! In QST since ’53.

QUADS

Worked 42 countries in two weeks with my Gotham Quad and only 75 watts... W3AZR

CUBICAL QUAD ANTENNAS — these two elements 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; 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.


Dimensions: About 16’ square.

Power Rating: 5 KW.

Operation Mode: All.

SWR: 1.05:1 at resonance.

Boom: 10’ x 11/4” 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: Steel 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.

Receiver Terminals: Clinch-Jones two-terminal fittings.

Feedline: (not furnished) Single 52 ohm coaxial cable.

Now check these starting prices — note that they are much lower than even the bamboo-type:

10-15-20 CUBICAL QUAD........... $35.00
10-15 CUBICAL QUAD............. 30.00
15-20 CUBICAL QUAD.............. 32.00
TWENTY METER CUBICAL QUAD.... 25.00
FIFTEEN METER CUBICAL QUAD... 24.00
TEN METER CUBICAL QUAD....... 23.00
(all use same coax feedline)

BEAMS

The first morning I put up my 3 element Gotham beam (20 ft) I worked Y44CT, O5IJWW, SP9ADO, and 4U1ITU. THAT ANTENNA WORKS! WN4DY N

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; 90” 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 EI 20........... $16
3 EI 20........... 22* 7 EI 10........... 32*
4 EI 20........... 32* 4 EI 6........... 15
2 EI 15........... 12 8 EI 6........... 28*
3 EI 15........... 16 12 EI 2........... 25*
4 EI 15........... 25* *20’ boom
5 EI 15........... 28*

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, T12FGS, WSKYJX, W1WOZ, W2ODH, WAD3JT, WB2FPC, W2YYJH, VE3FOB, W7CZG, KI5YB, KA2RDJ, K1MVV, K5HHY, K5ULT, W9OJC, WA2LVE, YS1MAM, WA8ATS, K2PGS, W2QJP, W4WJY, K2PSK, W8CGA, WB2KWY, W21HH, VE3KT. Moral: It’s the antenna that counts!

FLASH! Switched to 15 c.w. and worked KZ5IKN, K75OWN, HCLC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5GBK, G2AOB, 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

HOW TO ORDER: SEND CHECK OR MONEY ORDER. WE SHIP IMMEDIATELY UPON RECEIPT OF ORDER BY RAILWAY EXPRESS, SHIPPING CHARGES COLLECT.

GOTHAM, 1805 Purdy Ave, Miami Beach, Fla. 33139
NEW! IMPROVED! SOLID STATE FREQUENCY CONVERTERS

Priced from only $14.95 to $39.95

OVER 5000 FREQUENCY COMBINATIONS FROM .45 Mc. to 475 Mc. AVAILABLE FROM STOCK.

MANY NEW MODELS TO CHOOSE FROM OFFERING A TOTAL OF THE FOLLOWING:
Crystal control, variable tuning, UHF epitaxial transistors, FET transistors, noise figures as low as 2.0 db, full wave varactor diode transistor protection, sensitivity better than 2/10 microvolt, fully shielded oscillators and band-pass filters to eliminate spurious frequencies, zener diode voltage regulation, 6 to 12 volts positive or negative ground, slug tuned coils, double tuned R.F. stages, tuned mixer stages, wide band I.F. amplifiers. All this plus the highest quality components carefully assembled, tested, and guaranteed.

We have exactly what you want at a lower price and better quality than you can obtain elsewhere. See our new multiple oscillator converters for monitoring two or more frequencies simultaneously!

24-hour special delivery service available on many models. Send for your free 1967 converter catalog.

VANGUARD LABS
196-23 Jamaica Ave., Dept. 5-4 Hollis, N.Y. 11423

ducting hearings that he has not been able to get the 8TH linear he got at "NAROC." W7BF is a new 2-meter beam, The Southern Nevada 2-meter I.M. group still is working on its repeater. W7YV is

SACRAMENTO VALLEY—SCM, John F. Mills, III, W7JDT; N.C., W6HBB; E.C., W6MIXD, K6RWH, W6SMU, W6TQJ, K6JHU; W6LNZ.

The Gold and Silver Net now has a Novice section which meets on 3740 daily at 0100Z. All Sacramento Valley Novices are invited to participate. W7MDV of Oroville became a Silent Key Dec. 31 after a long battle with leukemia. W6DOR is interested in forming a group to operate during the June 15th-Park on the Modesto side of Lake Tulloch. If interested, contact Ev or your SCM. December participants in the P.A.T. were W6CKY, K6LZ, K6RWH, W6JVS, W6MV, W6RMP, W6ZIR, W7OH, K6MW.

SAN FRANCISCO—SCM, Hugh Cassidy, WA8AUD
-W6XKX has his TEB-13 running with a full gallon of power. WA8IP spoke to the Marin Radio Club on maintenance of amateur gear. The San Francisco Radio Club held its Annual Auction in March. Dick de Bolt is now General Class with the call W7FTEK. K6KCLZ is completing the work on an SB-varicap and active again in W6AQC. North Marin is covered by the Novato Club 2-meter Net on 146.03 kc. West of 1220 local time W6BFGV will call in. Navy this fall, W6BDUJ put up a four-element yagi for 20 meters. W6BDYE also has added a tower and a TA-32. Heartiest congratulations to W6LAM, W6OMX and W6QQA. W6BFDP has been appointed News Director for broadcast station KTLF, Flood conditions on the lower Russian River in the

SAN JOAQUIN VALLEY—SCM, Ralph Saroyan, W6IFU—A shop-rescued net has been started on 2850 kc. at OSEOZ. All interested in furthering their ambitions to handle traffic are invited to attend. W6BFQ is NCS. The Tulare County Amateur Radio

120
Our message to the amateurs of the world is simple:

We believe the new 2K-2 is the finest linear amplifier ever made for the amateur service

The new 2K-2, Floor Console, 2KD-2 Desk Model and 2KR-2 RF Deck are destined for greatness. Following the pattern of excellence established by the world famous 2-K, the new 2K-2 reaches previously unattainable levels of achievement. Its exceptional simplicity of design, extraordinary concern for reliability, superb linearity with attendant signal sharpness, remarkable power output and modern design all combine to make the 2K-2 the finest linear available to the amateur today. Wouldn’t you like to own the finest? Write today for full information.

6% FINANCE CHARGE • 10% DOWN OR TRADE-IN DOWN • NO FINANCE CHARGE IF PAID IN 90 DAYS • GOOD RECONDITIONED APPARATUS • Nearly all makes & models.

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. Write for bulletin.

TED HENRY (W6UOU) BOB HENRY (W0ARA) WALT HENRY (W6NRV)

CALL DIRECT . . USE AREA CODE

Henry Radio Stores

Butler 1, Missouri, 64730 816 679-3127
11240 W. Olympic, Los Angeles, Calif., 90064 213 477-6701
931 N. Euclid, Anaheim, Calif., 92801 714 772-9200
6116 N. 27th Ave., Phoenix, Ariz., 85017 602 AM 4-3895

East Coast Rep.: Howard Laughrey, 2 Elizabeth St., Chappaqua, N.Y. 10514. (914) CE 8-3683

“Worlds Largest Distributors of Short Wave Receivers”
WOULD YOU BELIEVE
2 METERS – 6 METERS
BUILT-IN?

ONLY WITH
HAMMARLUND'S
HQ-170A-VHF
HQ-110A-VHF TOO!

CAPTURES ALL POPULAR HAM BANDS
The exciting HQ-170A-VHF is the only Ham Band
receiver that gives you everything you want. Separate
NuVisitor front ends (0.3 uV for 10 db S/N) for both
6 and 2 meters completely eliminates need for add-on
converters or jury-rigged adaptations. Built-in 6 and
2 meter operation employs matched circuitry for
outstanding performance.

Full coverage from 2 to 160 meters, superlative
AM, CW and SSB reception make this Hammarlund
receiver first choice for the amateur fraternity.
Back On The Market
Universal
Beam Antenna Hardware

Yes, by popular demand, this fine product originally designed by WB4YR is available again by mail order. This universal clamp made of light, durable cast aluminum alloy is made in sizes shown below. The U-bolts have been increased in size to 5/16 dia. Any form fitting element holder channel locks with any yoke size. Correct size U-bolts A or B are automatically supplied.

Complete Clamp .............................................. $2.29

SIZES
A or B

3/4" to 1 1/8"

1 1/4" to 3"

When ordering element to boom clamps, furnish us with element and boom size. When ordering boom to mast mounts, furnish us with boom and mast size.

HEAVY DUTY
BOOM TO MAST MOUNTING

Heavy die cast mounting plate uses 4 U-bolts and 4 yokes. Size required. Available as a single or dual plate assembly.

Single Plate Mount ...... $8.95
Dual Plate Mount ...... $11.95

QUAD SPIDER X OR + MOUNTS

These rugged die cast aluminum alloy mounts are proven and unbeatable. V angle channel in and 3 in. size hub will handle quad arms from 1 to 1 1/8 in. 1 1/4 and 1 1/2 hub accepts 1/2 to 3/4 arms. Hub sizes available as shown below.

1-1/4 in. Boom
(VHF) .............. $2.98
1-1/2 in. Boom .... 4.95
2 in. Boom ......... 6.95
3 in. Boom ........ 9.95

Send 10¢ in stamps for complete brochure and technical manuals giving construction methods and designs of monobander, interlaced dual and tri-band full size arrays.

KIRK Electronics

6151 DAYTON-LIBERTY ROAD  DAYTON, OHIO 45418
PHONE: AREA CODE 513 — 835-5028

Visit our booth at the Dayton Ham Vention April 14-15.
If efficient, reliable Communication is Vital to your operation—

demand the very best!

GALAXY COMM-I
SINGLE SIDEBAND
4 Channel Transceiver

Weighs only 13 pounds and measures 10½ x 11¾ x 6 inches. Uses an external power supply.

The New Standard of EXCELLENCE in Two-Way SSB Commercial Communication

Designed for the most exacting requirements of Government, Military, Industrial, Commercial and Business applications.

Some of the present users include: National Guard/Civil Defense, U.S. Corps of Engineers, MARS, Geophysical Research and many foreign commercial systems.

The COMM-I can provide the same communications range, even under poor signal conditions, as a 1500 to 1600 watt AM transmitter—offers four channels over a frequency range of 3.0 to 7.5 megacycles.

Complete systems available including efficient, remote controlled antenna. Available in both Fixed Station and Mobile Packages with optional 2000 Watt Linear Amplifier. Basic Transceiver is interchangeable between services without modification or adjustment of components. Very Competitively Priced!

Domestic Prices begin at $495 (less accessories)
Write for complete Package Prices and Specifications.

GALAXY ELECTRONICS
"Pacesetter in Amateur/Commercial Equipment Design"
10 South 34th St., Dept. QST16T • Council Bluffs, Iowa 51501
Traffic and members reporting are on the increase. Membership is rising. W4OQL, our Asst. SCM, was lined up in the station to turn in the entry and was given a gavel for the Argonaut Radio Club. La Junta has a new club, WA9BBH. Is spearheading the organization. Groups planning hamfests should start and interest is in advance so we can publicize it. Lead time on QST report is six weeks. The Newton Roundup was an unqualified success in the section. There were at least twenty times as many entries as in 1966. Some of the participants were W5O (UNC), O8J, P6L, OX9, PVR, P7U, P8Q, P9I, P4F, PHN, PQH, and OQG in the Denver area. PVU greatly assisted in promoting entries. QRCs are requested to make monthly reports to W2IM. A national membership drive will continue.

Note to QRC News: Please put K0FDR and WAIQ- NQL on the mailing list. Other papers follow suit, please. Traffic: W9JG, K0FDR, W0FED, W0WEP, W9FOF, W4A0T, W4ALCM, W4AOMN, W8SBR, W4KDC, W6WOMN, K8ZAM, W4A0TQ, W4A0AL, W4A0TQ, W4A0AL, W4A0TQ, W4A0AL, W4A0TQ, W4A0AL, W4A0TQ.

NEW MEXICO—SCM, Bill Farley, W5PFLG; SEC: W5ALL; PAM; W5WZK. The Albuquerque Amateur Radio Club now meets the 2nd Wed. of each month at C.D. Hu. The club also holds a breakfast the 1st Sat. at 8 A.M. at the Village Pancake House. Your SCM had a nice visit with W5YWX, the SCM of New Hampshire. Ever had your rig go out and have to rely on a small cell? Poor old W5APJ was faced with it recently. He sent his Swan 350 back to the factory and had to go to a Knight T50 transmitter and his son's Novice receiver. You should know your equipment is around the shop for just such an emergency. Well, guess W5PFLG, the Weed Kid, has been married long enough now to be able to get back into his old equipment handling. Heard him passing some on 75 the other day. Congratulations to W7MCG for hisushman handling of the Rainbow Towne Net. The net operated at 2000 empty night around 0100Z. Traffic has increased and the net is operating very satisfactorily. If you hold an appointment from your SCM be surer of your appointment. Certificates must be signed by the SCM every year to be valid. Traffic: W5R7Y/8 08, W5BRU 42, W5LPX 23, W5ASU 41, W5WZK 14, K9YJX 11, W6PNF 8, W9MCX 7, K9YVJ 3.

UTOH—SCM, Gerald F. Warner, W7YVS—SEC: W7- WKF, R.M.: W7OCTG, Section nets: HUN, daily, 7272 ke., 1000Z. UARN, Sat., Sun., 3057.5 ke., 1600Z. A v.h.f. section net is being operated using the Relay Club’s Lake Mountain repeater. The net will meet daily at 1830 MST, input frequency 146.2 Mc., output on 146.8 Mc. K7S7J, secy. of the UCC group, states that all amateurs in the Utah area are invited to join this traffic-only net. The Ogden ARC held its annual banquet Jan. 27. The Utah ARC has membership contest underway, and is sponsoring amateur-hunter contest in May. WithQT racked up several new states on 2 meters during January, times ranging from 0400Z to 1400Z with time c.w. under W7BFAJ is finally on phone with 2-meter gear. W7ERB is a new ORES Traffic, Jan.) W7COC 105, W8KHT 29, K7AD 6, W7KFB 4, (Dec.) WAT- EB 268, K7RMA 4.


SOUTHEASTERN DIVISION

ALABAMA—SCM, Edward L. Stone, K4III—SEC: W4PPL, PAM: W4ECC, W4ECC, R.M: W4APL. W4USEC is the new SEC for AL. W4WEBI has made the most of W4WEBI and W4WEBI, with his two SE areas filled. Let’s give hi some help. The Birmingham Hamfest will be held Apr. 29 and 30 this year. The Atlanta Hamfest and the Southeastern Division will be held Apr. 29-30 in Florence. Make your plans now. The AENTF plaque for outstanding operator of the quarter was awarded to W4BBD. Jan. net reports (times GMT).

Net Fri. Time Day Date Sel. Am. T.F. Am. ONL AENB 3375 0100 Daily 54 1.8 5.6
WE ANTICIPATED
YOUR E/M* PROBLEMS -
CHECK THE SPECS!

IT'S THE
NEW CPC

Base Station Discone Antenna

Cat. No. 396-509
Frequency Range 150-470 Mc

Cat. No. 396-509 Discone Antenna is a skeletonized discone in which the disc element is fabricated of twelve 1 1/4" diameter solid brass rods. The cone element consists of twelve 3/8" heavy wall brass tubes. Feed point insulator is fabricated of polycarbonate resin. The antenna assembly is mounted on a 4 ft. 1 in. IPS galvanized steel pipe. Cat. No. 396-509 is supplied with RG8A/U internal feed line terminated 18" below the support pipe with a Type N male connector and neoprene weatherproof housing.

**ELECTRICAL**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal Input Impedance</td>
<td>50 OHMS</td>
</tr>
<tr>
<td>Maximum Power Input</td>
<td>500 Watts at 150 Mc</td>
</tr>
<tr>
<td></td>
<td>150 Watts at 470 Mc</td>
</tr>
<tr>
<td>VSWR</td>
<td>2.0:1 Maximum</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>150-470 Mc STARGAP</td>
</tr>
<tr>
<td>Lightning Protection</td>
<td></td>
</tr>
</tbody>
</table>

**MECHANICAL**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Element Material</td>
<td>BRASS</td>
</tr>
<tr>
<td>Disc Diameter</td>
<td>20&quot;</td>
</tr>
<tr>
<td>Cone-Maximum Diameter</td>
<td>23-1/2&quot;</td>
</tr>
<tr>
<td>Support Pipe</td>
<td>1-3/16&quot; Dia. Galvanized Steel</td>
</tr>
<tr>
<td>Rated Wind Velocity</td>
<td>100 MPH</td>
</tr>
<tr>
<td>Lateral Thrust at Rated Wind</td>
<td>24.5 LBS.</td>
</tr>
<tr>
<td>Bend, Moment 6&quot; Below Cone</td>
<td>37.0 FT. LBS.</td>
</tr>
<tr>
<td>Weight</td>
<td>16 LBS.</td>
</tr>
</tbody>
</table>

---

Communication Products Company

PHELPS DODGE ELECTRONIC PRODUCTS CORPORATION

Marlboro, New Jersey 07746—Tel. (201) 462-1880
Los Angeles, California 90065—Tel. (213) 245-1143
POLY tri QUAD ANTENNA KIT

2 element . . . tri band . . . power gain comparable to 3 el yagi . . . lower angle of radiation . . . greater capture area . . . more efficiency.

• 8 Zip-Glas Spreaders (13")
• 2 Universal Starmounts
• 1 Boom/Wast Adapter
• 1 Instruction Manual

$59.95
plus $3.50 shipping in USA

The Spreaders with the Ultra-Violet Shield

created by our exclusive, patented Glasdramatics process . . . greater flexural strength . . . superior to anything on the market . . . more durable . . . each Zip-Glas section is finaled in rich, sky-blue epoxy paint . . . this fine coat resists all types of weather deterioration . . . blocks out even the sun’s destructive rays . . . adds years to spreader life.

Exclusive Universal Starmount

At last, a spreader mount that grows . . . you can start with a 2” boom, later add more elements on a larger boom, or discard your original Starmount . . . die-cast of corrosion resistant aluminum alloy . . . equally rugged aluminum alloy boom/wast adapter complete with hardware.

POLY tri QUAD KITS

You can order 2, 3 or 4 element POLY tri QUAD kits—POLY duo QUAD (15-10) and POLY mono QUAD (10) kits also available. For further specifications plus complete list of kits and individual components, write...

POLYGON PLASTIC CO.
Division of Plas/Steel Products, Inc.
64 Industrial Park, Walkerton, Indiana 46574
Phone 586-3122

AEND 2725 2300 Daily 23 2.69 5.97
AENH 50.7 0200 Sun./Tue. 9 2.1 20.1
AENM 3905 0000 Daily 31 4.83 54.5
AENO 59.3 0115 T/Sat. 27 9.16 175.8
AENT 3970 2200 Daily 34 1.96 7.4
AENT/AENR no report

Better than usual DX activity was noticed. All DXers be sure to send in your contest logs. KKKJ has a new award and is renewing his old membership. W20J is bringing out a fine new 20 meter station to complete his work on 20. A time group is working 2-meter f.m. in the Huntsville area and looking for others. Contact W4WGI for information and help with your 2-meter gear.

CANAL ZONE—SCM, Mrs. Lillian C. Smith, KSZTT


EXCLUSIVE Zip-Glas TELESCOPIC FIBERGLASS SPREADERS


EASTERN FLORIDA—SCM, Albert L. Hamel, KAYSUMSEC: W4YTT, RM C.W.; W4ILE, RM KTTY; W4AWM, PAM S.S.H.; W4QGMI, PAM K; W4ABM, PAM K; W4ABW, PAM K; W4K4B, W4VU, PAM K; W4BMC, PAM K. In case you have forgotten W4ABM, he is the new SCM for Florida. He has taken over the SCM Fund, which is slowly getting into the traffic whirl. See where W4ILM can now show his metal as the new editor of Florida Standard. As a paper editor, he is quite a new idea for us. The third new SCM is W4WGI. He is the new SCM for the Lake Apopka Amateur Radio Association. SCMs are always welcome, and we are eagerly looking forward to the March meeting in Pennsylvania for SCM contact for his hundredth Novice. All with 20 watts and V=0 vertical. By now you all know that W4ILE, RM KTTY, is now the new SCM for the Atlantic Division. SCM, Mrs. C. F. Richardson, KZJ2C, Sec.; KZJ2V, Rec.; KZJ2K, Asst.; KZJ2M, Asst.; KZJ2Z, Asst.

GEORGIA—SCM, Howard L. Schenker, WARZI—Asst., SCM: James W. Parker, Sr., W4KGP, Sec.; W4DDY, RM; W4CZ, PAM; K4PKK, W4WDE, W4MMQ, FPM; W4MMQ in the FPM with an excellent report. K4HIQ reports N4GEV has been discontinued temporarily and is reorganizing. K4HIQ is the proud dadda of a second son, a harmonica. K4SS, (DLATY) was married recently. W4BAEGQ is on 6 with a Thomas-Kokss doing an outstanding job with W4NAM traffic.

The Georgia QSO Party will be held the week end of May 14/16. W4HAYN reports more activity on 8. K4HJI maintains activity on 6 and is adding 2-meter gear. The Columbus Hamfest will be held the first week end in April. QSN is planning increased activity. W4ANMU worked in the Ark, QSO party. W4FQX is mobile again.
WRL gives you a FREE 2-week trial

ON THE
Great NEW
GALAXY V MARK 2
5 BAND TRANSCEIVER NOW—even Better than Ever!

6 NEW Features:
• New 400 Watt Power
• New Precise Vernier Logging Scale
• New Solid State VFO
• New CW Sidetone Audio
• New CW Break-In Option
• New CW Filter Option

6 WAYS BETTER—
Yet Still Only $420.00

Satisfaction Guaranteed! (Serving Amateurs over 31 years!)

We have the great new Galaxy V Mark 2 in stock, and we’re so confident you’ll like it that we’re going to make it easy for you to step up to this powerful 80 through 10 meter transceiver on a “no risk” two-week FREE trial! Just mail the coupon in for details. Remember, we give the highest trade-in on your present equipment...offer an easy monthly payment plan (no finance company—you deal directly with us).

Send in the coupon today, just check off your interests and mail.

"The House the HAMS Built!"

WORLD RADIO LABORATORIES
Dept. QST-165
3415 West Broadway, Council Bluffs, Iowa Zip 51501

Please send me the following: (F.O.B. Council Bluffs, Iowa)

☐ Information on 2-week trial
☐ Galaxy V Mark 2 Brochure ☐ A.C. SUPPLY—$79.95
☐ GALAXY V Mark 2—$420.00 ☐ Quote me a trade
☐ Fixed Station Package—$597.55
☐ Mobile Package—$606.50 ☐ FREE WRL 1967 Catalog
☐ Enclosed is my Money Order ☐ Check ☐ Charge it

Name__________________________________________Call_____________________
Address_________________________________________________________________
City________________________________State___________Zip_________

129
NEW B. T. I. LINEAR STOPS THE SHOW
At Ham Conventions Everywhere

THIS IS HOW [BTI] DID IT...

At least twenty-one important and advanced features built-in the brand new

BTI LINEAR AMPLIFIER
MODEL LK-2000

YOU'RE THE EXPERT—CHECK FOR YOURSELF

1. Designed for maximum legal input all modes, 2000 watts PEP SSB—1000 watts CW-AM-RTTY.
2. Full 1000 watts plate dissipation using Elmac 3-1000Z.
3. New tank circuit design provides greater output on higher frequencies including 10 meters.
5. Instant transmit—to warm up—accomplished by BTI Solid State Supply and use of thoriated tungsten filament in 3-1000Z.
6. Longer tube life because of exclusive after off cooling.
7. A.L.C. output provides higher audio level without flat-topping.
8. Tuned cathode input for minimum distortion and higher efficiency (50 ohm in).
9. Choice of Line Voltages—220V AC @ 10 amps or 115V AC @ 20 amps (Solid State Supply permits efficient 115 VAC operation).
11. Built in metering and switching for Dummy Load accessory which when attached provides dummy load for linear or exciter.
12. Meter overload protection.
13. Changeover relay feeds exciter direct to antenna when linear is off.
14. All relays have D.C. coils for hum free operation.
15. Safety switch and shorting bars for personal safety and component protection.
16. High voltage overload circuit breakers.
17. Fused filament and control supplies using lighted fuse indicators.
18. Distinguished console (TVI preventive) design (29" H x 16" W x 14 1/2" D.)
19. No exposed high voltage in lower console.
20. Precision console casters for easy mobility.

BRAD THOMPSON INDUSTRIES, long recognized for innovation in the electronics field, realized the need for a quality linear amplifier which would offer more features with reliable and rugged construction, at a price within practical limits.

Well-engineered, foolproof, simple operation, reasonably priced, fully guaranteed; the B. T. I Linear Amplifier provides the signal impact you’ve been wanting.

$795 COMPLETE READY TO GO!

B. T. I. (Amateur Division)
83-810 Tamarisk Street—P.O. Box CCCC
Indio, California 92201
Write immediately for free 4 page illustrated specifications brochure or
Contact your local distributor NOW.

131
is getting organized in the new shack and plans to get back on the v.h.f. bands with some on 230 Mc., and a beacon. Further QRV around this time will be W606 in SASK, and John Quinlan W656C is planning to go to the north again in search of DX. W656C is expecting a new s.s.b. transceiver for his birthday, KB6A is now partly active at the home QTH. W656C will be telling CB operators and friends about it and a new QSL card for it is in the works.


Wishing you could afford a New antenna? Molsey antennas just look expensive — and you should! Because they are constructed of heavy duty materials to last you longer. Wouldn’t you pay a few dollars more for an antenna lasting twice as long? For extra gain — improved front-to-back . . . for more DX — select a Quality Molsey antenna!

Molsey Electronics Inc.
4610 N. Lindbergh Blvd.
Bridgeport Missouri 63042

Send for your FREE 1967 Molsey Amateur Radio Antenna Catalog and look over our complete line.
Dept. No. 125

ORANGE—SCM, Roy R. Massey, W6E6T—The 2-4-8 Net, 146.860 Mc., 1455 PST daily reports for Jan., had 543 check-ins, traffic 116; for Nov. 69, and 500 check-ins, traffic 119; for Dec. 66, per K6DLY. The Gold and Silver Novice Net is becoming active on 220.3 Mc. and W6BOLD to meet daily by 1340Z, on 0100 GMT, 8 is for Novices and Generals for training and traffic. Send code and nearest crystal frequency to be placed on roll. W6E6T suggests that W6FQ be the net control of the Desert Rats and that W6DNI and W6TAQ, recently in Mexico and Minnesota respectively, keep in touch with one via transceiver. W6FQ is looking for the air with an EICO 765 on 40 mobile, W6TAQ advises of two new ARDC members, W6VGT, 11 years old, and W6VQ, a retired W6VRL; W6FQ advises that K6QD appointed FC for the Riverside Metropolitan Area. Traffic: W6E6T 385, W6BOLD 116, W6DNI 114, KB6M 112, W6DNI 109, W6TQX 106, W6MRL 45, W6TQX 26, W6QY 21, K6YQY/6 13, W6TAQ 12, W6FB 9.

SAN DIEGO—SCM, Don Stansifer, W6LBU/W6VUL—Officers of the Palomar Club for 1967 are W6LBU, pres.; W6LEC, vice-pres.; W6TVY, secy.; W6AIPY, treas. The new officers are K6ARR, pres.; K6AX, vice-pres.; K6SKK, secy.; W6PV, treas. San Diego Council Officers are W6ATD, chairman; K6TBF, vice-chairman; W6LBU, secretary. Remember the Division Convention here in 1966. The Council is planning now and needs your help. W6FKN is now active on SCN, 3600 kc. c.w., 0200Z daily. A new APEC/ARPS was held primarily for Novices; meets at 8:30 A.M. Sun. on 3770 kc. with W6ATW as NOS. He will tune around the Novice band for check-ins. This is the only c.w. Novice ARDF in the section. Two recent Novices: K6QQ was W6FQ and W6TFP, the latter was C.D. Radio Officer and Red Cross Radio Officer, and was active in emergency communication throughout the section for years. The S.D.S.C. Round Diego Council Panel of the Year Award went to K6ZDB, who organized the Eye Bank in San Diego and kept daily schedules of an emergency basis while this work could be done. Traffic: (Jan.) K6QY/6 7840, W6BOLD 499, W6VQ 493, W6BP 399, W6LBU 44, W6BQ 45, W6MRL 4, W6ATW 3, K6YQY/6 13, W6TAQ 12, W6FB 9.

SANTA BARBARA—SCM, Cecil D. Hanson, W6AOK—SCM, Cecil D. Hanson, W6AOK—SCM, Cecil D. Hanson, W6AOK—SCM, Cecil D. Hanson, W6AOK—SCM, Cecil D. Hanson, W6AOK—SCM, Cecil D. Hanson, W6AOK. Rock and Roll! Now that the vacations have ended, I hope that everyone has his new rig and equipment adjusted and ready to settle down and do some real listening. Now is a good time to get lined up on some good Valentine's Day DX. The new Manual for operators is a good investment for anyone wanting to know the principles of handling tran-
SUDDENLY YOU'RE WORKING MORE STATIONS . . .

Pulling in the Weak Ones
that demand the sensitivity of DAVCO'S exclusive Field-Effect front end . . .

Knifing Through the QRM
by choosing the optimum selectivity for conditions—a razor-sharp CW filter, a near-perfect SSB Mechanical filter, or a fine AM filter . . .

Blanking Out Noise
from power lines and ignition with the no-extra-cost noise-blanker that lets you extract a Q5 signal you couldn't know existed without it . . .

or nulling an offending carrier with the T-notch. The DR-30 communications receiver covers all the ham bands from 80 meters through 50.550 Mc in the 6-meter band. It has a built-in crystal calibrator, full AGC, Teflon wiring and plug-in modules for all active circuitry. It is the most versatile receiver ever produced, and it can be operated from an AC pack or from batteries in fixed, mobile, and portable operations.

Frequency coverage: 10 550 kc segments covering the entire 80, 40, 20, 15, 10 meter ham bands plus 50.0-50.55 in 6 meters and 9.5-10.05 WWV. Provision for two extra ranges.

Sensitivity: Better than .6 microvolts for 10db s/n.

Selectivity: SSB: 2.1 kc Collins mechanical filter
AM: 5 kc ceramic/transformer filter
CW: 200 cycle crystal filter

Stability: Negligible warm-up; less than 100 cps per hour; less than 25 cps for 20% power supply variation. Extreme resistance to shock and vibration.

Detectors: Separate AM and SSB/CW product detectors; crystal-controlled BFO.

Noise Limiter: True blanking action preceding selectivity; has separate ANL amplifiers and detector; front panel threshold control.

RF Stage: Low noise premium Field-Effect RF amplifier and first mixer; tuned circuits employ high-Q toroidal inductors.

Semiconductor Complement:
23 bi-polar transistors
2 Field-Effect transistors
10 signal diodes
1 power diode
2 zener diodes

Size: 4" high, 7/8" wide, 6" deep. Weight: 7 pounds

Power requirements: 12 volts DC @ 300 ma. maximum.

Price: from factory ..............................................$389.50

DR-30-s: Complete regulated power supply for operation of DR-30 from 110/230 volts 50/60 cps, plus battery holder for 9 D-size cells for portable operation; speaker, earphone jack. (Illustrated above) ..............................................$39.50

Send us your card for an information package containing evaluations of the DR-30 by the staffs of CQ (December 1966), QST (January 1967) and 73 (May 1965), an 8 page technical brochure and a complete schematic. DAVCO products are available direct from the factory.

DAVCO ELECTRONICS, INC.
P. O. Box 2677
2024 South Monroe Street
Tallahassee, Florida 32304

DAVCO receivers for telemetry, radio astronomy, WWV, SWL's and other special applications are available from stock or can be provided to your specifications. Your inquiry, detailing your requirements, is invited.
Now...2000 Watts P.E.P. Full Power/Minimum Size
FOR APARTMENTS • SUBURBAN HOMES
Marine and Portable Operation
Packaged for APO 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.

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.

Bands
Power Rating
El. Length
Turn. Radius
Total Weight
Single Feed Line
SWR at Resonance
6-10-15-20 Meters
2000 Watts P.E.P.
11'
7'
11 lbs.
52 ohm
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 -

EMPLOYMENT OPPORTUNITIES
At
HAMMARLUND MANUFACTURING CO.
Continuing expansion at Hammarlund is creating new opportunities for:
• PRODUCT ENGINEERS
• DESIGN ENGINEERS
• ELECTRONIC TECHNICIANS
• MECHANICAL DESIGNERS
• DRAFTSMEN

Send resume in complete confidence to:
Personnel Manager
Hammarlund Manufacturing Company
Mars Hill, North Carolina 28754

An Equal Opportunity Employer

-fe. In it you will find all the information you need to become a good traffic man. Mr. H. I. (Ed) Handy on his retirement, which became effective Feb. 1. I have known Ed for more than ten years and I hate to see him leave the League. He has been appointed to take Ed's place and I believe his experience will be well to the benefit of the League. NTN reports 1407 stations, with 423 pieces of traffic handled in the last 72 hours. KYUV is active on the Lakota Field. The KC Club, Ft. Worth, has offered a permanent meeting place in the Children's Museum and as soon as all arrangements can be worked out will start meetings there. W5QCB has moved to Arizona. KG5CB has OBS 165, KG5DJ 146, WASGEG 135, KG5IU 110, WASIGY 58, W5RAA 20, W5BOO 13, WASJLJ 12.

OKLAHOMA—SCM, Daniel B. Prater, KG5AY—Asst. SCM: Sam Whitley, W5WX; Secy: KG5JZ; RM: W5QAL; PAM-6 meters: W5WVP; PAM-2 meters: W5LBR; Turtles provided emergency communications during the tornado alert Jan. 29. Most of the traffic was through the usual repeater on 2 meters. The Oklahoma Central V.H.F. Amateur Radio Club elected W5YJC, pres.; W5XLS, vice-pres.; W5UW, 1st vice-pres.; W5QAL, 2nd vice-pres.; W5WVR, 3rd vice-pres. The new officers are looking forward to more activity in the new repeater, W5MCK/1, on 143.500 MHz. W5MCK/2, on 62.DX, W5QAL, 3rd vice-pres., has moved to Arizona. KG5CB has OBS 165, KG5DJ 146, WASGEG 135, KG5IU 110, WASIGY 58, W5RAA 20, W5BOO 13, WASJLJ 12.

SOUTHERN TEXAS—SCM, G. D. Jerry Sears, W5AIR—CQ: KG5QG, PAM: W5NLV, RM: W5QDC. Congratulations to another new Southern Texas Ham: WA5C as OPS and QSO, K5HMF as OQ, WA5NH as EC Walker County. New RM W5CQZ was heard on the Tex. Traffic Net during a campaign started for more efficient traffic-handling. Come on, fellows, and join the fun at 1000 and 2200 Central Time on 3770 kc. K5WIC reports that the W5IC is starting out again in a

50-watt, crank-up tower topped with a Ham-Gain TH6DX and eight-element 2-meter beam. OPS KG5QG advises that 614 brings issues of interest to the EyeBank Net operation. EC W5TFW advises a large group participated in the March of Dimes Telethon. W5- HOB has a new Galaxy 300 on the air. EC W5KGR/1 has a new HFI2A and reports W5AUM has a new SB-200 and W5FPX an RFO 783 Tri-Bander. W5URW, former EC is now Administrator for the Houston, Galveston, Brenham, W5KLV advises the STEN Convention will be held June 16-17-18. OPS K5WYN is keeping skeds with several 75-, 60- and 2-meter nets. W5GB, RFD, just on 2 meters, Navy, is now at Texas A & M, U. and with room-mate W5PHB working on v.h.f. keeping skeds daily with Brummel 200. OPS W5GA on 146.3 Mc. W5QAL is back on the air with "Random Wire" and "L" Network. OPS W5KRO, in Nacogdoches, hopes to develop a slow-speed c.w. net on 2 meters for traffic and experimental work on transmission over the Southern Texas section. Watch for his c.w. on 2 meters. A ham demonstration was given to the crops of the University of Victoria by W5WJB/5. Several 2-meter stations KG5DH, along with K5QG and W5JPD, have returned from a trip to Las Vegas. They operated on 146.900 Mc. in ear QSOs and were able to make many contacts on 2-meter KG5DH now has a new SB-200 amplifier so he must have won. We regret the loss of K5QAT, of LaMarque, Tex., who became active Feb. 1. The well known W5QVB, TX. Traffic, handled 248 pieces of traffic in 62 sessions. Traffic: K5GEB 186, KG5DH 197, W5GFX 114, W5QAL/7 71, W5AC 88, KG5WJ 48, W5QAL KG5MF, W5QAL DNR 38, W5AIR 34, W5BY 33, W5KLV 18, W5WY 14, W5TFW 13, W5BAQ 12, W5QAI 11, KG5MG 4, KG5LM 4, W5QCM.

CANADIAN DIVISION

ALBERTA—SCM, Harry Harold, VE7TGC—Sec.: VE7KFX, PAM APN: VE7BED, ASB: VE7ALQ, ECS: VE7SA, VE7SS, VE7XG, VE7AFQ, VE7AT, ORS: VE7RM, VE7ATM, OPS: VE7SH, VE7SS.
better sent... better received
with Belden wire and cable
...easy to use packaged lengths.

Antenna Rotor Cables
Sturdy, flexible, plastic insulated cable for rotor applications. Color coded. Chrome, vinyl plastic jacket resists sun and aging.

Shielded Hook-Up and Grid Wire
Provide most effective TVI suppression. Vinyl insulated with tinned copper braid shield. Available from 24 AWG to 12 AWG.

Power Supply Cables
Excellent mechanical and electrical characteristics for long service life. Special jacket offers maximum resistance to abrasion and ozone. Use as power supply cords and interconnecting cables. Ideal for remote control circuits, special press-to-talk microphone circuits, and other applications.

Coiled Microphone Cable
Provides low impedance for mobile microphone applications. Neoprene jacket remains flexible at low temperatures. Available with or without shielded conductors.

Ham Transmission Lines—Parallel Type

Ham Transmission Lines—RG/U Type
Designed for lowest losses, longer service life, and maximum dependability. Cables are essentially flat with no peaks in attenuation to reduce signal on either high or low frequencies.

FOR FULL INFORMATION CONTACT YOUR BELDEN ELECTRONIC DISTRIBUTOR
The Belden line gives you maximum efficiency with lowest losses under all conditions of operation. There's a Belden wire or cable to meet every ham transmitting and receiving need. Shown here is only a small portion of this complete line.

BELDEN MANUFACTURING COMPANY • P.O. BOX 5070-A, CHICAGO, ILLINOIS 60680

135
$12.95  WZAU  FOUR  PURPOSE  BALUN  $12.95
BALANCE  YOUR  ANTENNA  •  STOP  YOUR
COAX  FROM  RADIATING  •  HELP  ELIMI-
NATE  TVI  •  IMPROVE  YOUR  RADIATION
PATTERN  PLUS  F/B  RATIO
•  Broad-bandet  3-32  mc.  •  Center  hang-up
hook  for  inverted  Vees  •  Handles  full  legal
power,  2KW  PEP  •  Built-in  lightning  arrester
•  SO239  RF  connector  for  coax  transmission  feed
line  eliminates  center  insulator  •  Withstands
up  to  600  lb  antenna  pull  •  For  use  with  all
type  antennas  fed  with  unbalanced  coax  line
•  Weights  only  3/4  lb  or  1/2  diam.  6"  long  •  3
Models:  1:1  matches  50  or  75  ohm  unbalanced
coax  to  50  or  75  antenna  load.  4:1  matches  50
or  25  ohm  unbalanced  coax  to  200  or  300  ohm.
•  W2AU  Super  Vinyl  jacketed  2  element
10-15-20  meter  quad.  Complete  quad  $62.95
•  W2AU  Super-Vbergels,  2  element  10-15-20
meter  quad.  Complete  quad  $99.95

DIRECT/5:1  REVERSE  VERNIER  DRIVE
The  newest  in  the  line  of  fine  tuning  aids  from  Jackson  Bros.  Direct/Slow
Reverse  (5:1)  Vernier  Drive.  Easy
tuning — requires  only  one  1/4"  hole.
High  torque,  low-backlash  smooth  and
permanent  movement,  easily  adjusted.
1/4"  shaft  dia.  Model  4111/RV  $1.95

VERSATILE  MINIATURE
TRANSFORMER
Same  as  used  in  W2EML  SSB  Rig —
March,  1956  QST.  Three  sets  of  DT
windings  for  a  combination  of  imped-
ances:  600  ohms,  5200  ohms,  22000
ohms.  (By  using  center-taps  the  imped-
ances  are  quartered).  The  ideal  trans-
former  for  a  SSB-transmitter.  Other  uses:
interstage,  transistor,  high  impedance
chokes,  line  to  grid  or  plate,  etc.  Sizes
only  2"  h.  x  31/4"  w.  x  31/4"  d.  New  and
fully  shielded.
$1.49  ea.  3  for  $3.95  10  for  $12.50

SQUALO  MOBILE/FIXED
ANTENNAS
2 - 6 - 10 - 15 - 20 - 40  METERS
SQUALO  is  a  full  half  wave,  horizontally  polarized,
omni-directional  antenna.  Outstanding  all
around  performance  is  achieved  through  a  360°
pattern  with  no  deep  nulls.  The  square  shape
allows  full  electrical  length  in  compact  dimen-
sions.  Direct  52  ohm  Reeder  March  feed  provides
ease  of  tuning  and  broad  band  coverage.
ON  A  MAST  ON  YOUR  CAR  OUT  A  WINDOW
ASQ-2  2  Meter,  10"  Square  $9.95
ASQ-6  6  Meter,  30"  Square  13.95
ASQ-10  10  Meter,  50"  Square  19.95
ASQ-15  15  Meter,  65"  Square  23.95
ASQ-20  20  Meter,  100"  Square  32.95
ASQ-40  40  Meter,  192"  Square  66.95

COMING  SOON  — ARROW'S  NEW
NEW  YORK  CITY  STORE  AT
97  CHAMBERS  STREET

ARROW ELECTRONICS  INC
900  Rte.  110,  Farmingdale,  N.Y.
516 — Myrtle  4-6822
565  N.  7,  N.Y.  516 — Pioneer  2-2280
65  Cortlandt  St.,  N.Y.  7,  N.Y.  212 — Digby  9-4730
525  Jericho  Tpke.,  Mineola,  N.Y.
18  Isaac  St.,  Norwalk,  Conn.
225  Rte.  46,  Totowa,  N.J.
203 — 838-6877
201 — 256-8555
Communications IF Transformers from 50 kHz through 45 MHz

Get top performance when you build your receiver. Select the most appropriate tube or transistor type IF transformers for your set from the widest line in the electronic industry.

J. W. Miller coils and transformers are available nationally from distributors and mail order houses.

Write for full line catalog.

J. W. MILLER CO.
5917 So. Main St., Los Angeles, Calif. 90003

ONTARIO—SCM, Richard W. Roberts, KE2NG—I regret to advise you of two silent Keys in Jan. Our beloved Alex Reid, VE2BE, Vice-President of the ARRL and former Canadian Director of the Canadian Division, has passed away. Alex will be missed by his many friends and will be remembered with heartfelt condolences to Mrs. Reid and family. Also we regret to record the passing of VE3BQY, of North Bay, who will be missed by his many friends. The Snell’s, Marie Club elected VE3ENY, vice-pres.; VE3EHXH, exec.; VE3CSY, treas.; VE3FVW, sec. ma.

QUEBEC—SCM, J. W. Bier, VE2QJ—SEC: VE3ALE, RM: VE2DR. At a well-attended meeting of the MARC in January the members heard a most interesting and well-executed talk on DX by VE2NNY, a pro at the DX field of amateur radio as the country list he has to his credit shows. VE3ANK now has 4000 QSO’s confirmed. The January issue of Macramom contained a very hard-hitting editorial at those over-zealous people who can’t wait for their license before exercising the privileges of their license. The Quebec ARC Net is on at the usual time, 1600 GMT Sun., but on 7.050 kHz, for a trial period. It is hoped the QRN problem some had at 2755 kHz will be overcome. The Canadian NCC, VE3AUU, has been hard at work getting the groundwork for amateur communication to follow the progress of the race from Western Canada to the Expo 67 site. At this writing, the site atop Signal Mountain has been confirmed and by now the new repeater on 2 meters should be an established thing, giving a new link to the west area of the network and with Ontario. It gets nearer to the time for the biggest ARRL National Convention ever—Montreal—June 30. July 1 and 2. Traffic: VE2ZYB 91, VE2ZDI 72, VE2ZSD 22, VE2ZCS 54, VE2ZDL 21, VE2ZCI 19, VE2ZB 17, VE2ZCP 17, VE2ZCV 13.

World Above 50 Mc.
(Continued from page 90)

Low-Band V.h.f. Nets

At least three low-band v.h.f. nets are now in operation offering a means of information exchange weekly.

One group meets at 2000Z, Sundays, on 28.530 Mc., a.m., and another, which is just getting started, nightly at 2345Z on 3.577 Mc., e.w.

The third net meets at 1330Z, Mondays on about 3.810 Mc., s.a.b. The frequency may vary some week-to-week because of QRN, but not more than 5 kHz. The net begins with the Central States and is then joined by the West Coast group about one hour later. A few East Coast v.h.f. fans check-in. The net members like a “who’s who” of v.h.f. and provides an excellent source of up-to-the-minute news of existing schedules and propagation information.

...notice their improvement in intelligibility and added punch?
Shure Brothers, Inc.,
222 Hartrey Avenue, Evanston, Ill.
EXCLUSIVE 66 FOOT MOR-GAIN 75 THRU 10 METER DIPOLE
NO TRAPS — NO COILS — NO STUBS — NO CAPACITORS
Fully Air Tested — Thousands Already in Use

MULTIRAND SECTIONS
FULLY GUARANTEED
PATENT ALLOWED
40% Copper Clad wire—Under three lbs. Air Weight—Rated for full legal power on AM/CW or 50—80 Coaxial or Balanced 50-75 ohm feed—VSWR under 1.5 to 1 at most heights—Rust resistant hardware—Drop-proof insulators. Completely assembled, ready to put up. Model 75/40 Amateur Net $25.00. Terrific Performance—No coils or traps to break down or change under weather conditions—Fully Guaranteed. MODEL 80/40 SUPER "SHORTY" 10 & 20 METER TRAP BEAM $35.95

NEW SUPER HEAVY DUTY DIPOLES 66' LONG. RATED
4KW PEP-2000 POUND BREAKING STRENGTH—DELrin CENTER & Enameled END INSULATORS—OUT PERFORM
FULL SIZE DIPOLES.
75/40 SHD $30.00; 75-20 SHD $35.00; 75-10 SHD $42.00

ORDER DIRECT OR WRITE FOR
FULL INFORMATION
MOR-GAIN
P.O. Box 6006
Alexandria, Virginia 22306
Phone: 703-768-7766; Nights and holidays 703-768-2171

OR THRU YOUR FAVORITE DISTRIBUTOR

BARRY ELECTRONICS

SX-62 COMMUNICATION and FM RECEIVER. Tunes continuously from 540 KCS thru 108 MGS. Excel. condition. Only $175.00.
NATIONAL NCX-3 TRANSCIEVER. Brand new. $195.00.
GONSET SUPER-6 MOBILE CONVERTER. All Ham Bands and SW BC. $22.00.
P & H MODEL LA-100C 800 Watts PEP SSB Linear Amplifier with built-in power supply. Like new. With book. 7 Bands, 10 thru 80. $125.00.
LETTINE MODEL 242, 6 meter VHF Transmitter. $45.00.
KARG UNIVERSAL FM STEREO MULTI-PLEX ADAPTOR, Model MX-5, for receiving Station FM Broadcasts with ordinary FM Tuner or Receiver. Brand new with instruction sheet. Sale priced at $13.95.
RCA COLOR BAR GENERATOR MODEL WR-61B. Orig. RCA carton. (orig. net $259.50) Sale Price $210.00.
VIDICON TYPE 7038 @ $62.50 — Brand new imported.
VIDICON TYPE 7735 @ $77.50 — Brand new imported.
6 HY. @ 1.2 AMP. CHOKE. Hermetically sealed. Porcelain insulators, 3,000 V. insulation. $17.50 (two for $30.00). shipped via economical motor freight.
HH-PAR 2M6 6 element 2 meter beam only $6.50.

SOMMER-KAMP FR-100B DOUBLE CONVERSION SUPERHET

SO, 40, 20, 15, 10 mtrs. 1 st if. 555-5955 kc; 2nd if. 855 kc; one mech filter 4 kc for a.m.; one mech filter 2.1 kc for s.s.b.; one xtal filter 500 cycle for c.w. 100 kc xtal calls; h.f.o.; noise limits: built-in noise sup 115/210 vac, 60 cps. Sensitivity 0.5 microvolts. Transceive plug, 12 tubes, 10 diodes, dial calls 1 kc, 12 x 13 x 7 inches.

SOMMER-KAMP FL-200B 120 WATTS s.s.b./c.w./a.m.

WHEN IN NEW YORK DROP IN AND SAY HELLO!
BARRY ELECTRONICS DEPT. 0-4
512 BROADWAY, NEW YORK, N. Y. 10012
WALKER 5-7900 (Area Code 212)
O Enclosed is money order or check and my order. Prices FOB, NYC. Shipment over 20 lbs. will be shipped collect for shipping. Prepayment. Less than $25 must be sufficient postage. Any overage will be refunded, fragile tubes shipped via Rail- way Express. Minimum order $5.00.
O Send 10c for 72 page Greensheet Catalog $18.
O Write for your copy.
O Send information.

Name ........................................................................ Title
Company ....................................................................
Address ....................................................................... City .................................... State .......... Zip ...

139
ITU SECRETARY-GENERAL DIES
ITU Secretary-General Dr. Manohar Balaji Sarwate died February 19th in Geneva, Switzerland. He was 56 years old.

Deputy Secretary-General Mohamed Mill will serve as Secretary-General of the ITU until the next plenipotentiary conference, scheduled for 1971.

Dr. Sarwate was engaged in the development and research on aircraft radio and radar equipment in the United Kingdom during the first part of World War II. After returning to India in 1941, he worked mainly with radar, entering government circles in the communication field.

Dr. Sarwate was a founder-member of the Institution of Telecommunication Engineers of India and was active in ITU affairs since 1959. At its plenipotentiary conference that year he was chosen as Deputy Secretary-General. He was elected Secretary-General of ITU in October, 1965.

LMRE CONVENTION
The Mexican IARU society, Liga Mexicana de Radio Experimentadores (LMRE) will hold its National Convention May 27-30 at Tulancingo, Hidalgo, Mexico. Further information on the convention is available from LMRE, P.O. Box 907, Mexico D.F., Mexico.

RAL QSL BUREAU
The address of the OD5 QSL bureau is Association de Radio-Amateurs Libanais (RAL) P.O. Box 1217, Beirut, Lebanon.

DECEMBER IARU CALENDAR
The current issue of the IARU Calendar contains the vote sheet for proposals 119 and 120, the admission of the Faroe Island Amateur Radio Society (FRA) and the Malta Amateur Radio Society (MARS) into the IARU, and the annual questionnaire. Headquarters urges each member-society to complete and return both the vote sheet and the questionnaire.

1967 IARC CONVENTION
The 1967 IARC Convention is scheduled for September 23 and 24 in Geneva, Switzerland. The convention coincides with the meeting of the World Administrative Radio Conference on matters relating to the maritime mobile service.

LIBERIAN FIELD DAY
The Liberian Radio Amateur Association is holding its Third Annual Field Day April 29 and 30. Club station EL2FD will operate s.s.b. on 14.303 and 21.303 Mc. between 1400 and 0100 GMT April 29, and from 0900 to 0100 GMT April 30. C.w. transmissions will be on 14.103; RTTY will be attempted around 14.000 Mc. QSL cards will be sent to each station contacted.
budget-priced walnut communications desk
groups equipment neatly, right in your living room

You can operate your amateur radio equipment right in your living room with this inexpensive, "wife-approved" communications desk from Design Industries.

You'll like its custom features... functionally tilted top surface holds your equipment at just the right operating angle... deep cable trough keeps desk top neat, yet leaves connections accessible... three drawers give you plenty of storage room.

She'll like its rich walnut finish and modern furniture styling.

You'll both like its low price.

The DIPLOMAT communications desk accommodates Collins, R. L. Drake, Galaxy, Hallicrafters, and most other modern equipment.

Sold Only Through Authorized Distributors

DESIGN INDUSTRIES, INC.
P. O. Box 19406 214 528-0150 DALLAS, TEXAS 75219

FREE! HOW TO IMPROVE YOUR TWO-WAY RADIO!

The right communications microphone may double the talk power of even the finest transmitters! Learn how unwanted noise can be eliminated—reliability improved—intelligibility increased by proper microphone selection.

Write for our helpful free booklet today!
Grand Central Radio,
New York midtown headquarters
for famous Hallicrafters.

New! Hurricane SR 2000 Transceiver

Now a 5-band amateur transceiver from Hallicrafters with professional electronic engineering. Exclusive amplified automatic level control. Full coverage provided for 80, 40, 20, 15 and 10 meters. See it at Grand Central Radio.

All Hallicrafters in stock for immediate delivery. Complete Audio Demonstration Department.

Write or see us for the best deal. You know you can depend on us.

Grand Central Radio
124 East 44th Street, MU 2-3869.
One door east of Lexington Ave.

EASY TO LEARN CODE

It is easy and pleasant to learn or increase speed the modern way — with an Instructograph Code Teacher. Excellent for the beginner or advanced student. A quick, practical and dependable method. Available tapes from beginner’s alphabet to typewwriter messages on all subjects, speed range 5 to 40 WPM. Always ready. No QRM. Bests for the teacher, for the learner.

ENDORSED BY THOUSANDS!
The Instructograph Code Teacher literally takes the place of an operator-instructor and enables anyone to learn and master code. This is at a time without further assistance. Thousands of successful operators have “acquired the code” with the Instructograph System. Write today for full particulars and convenient rental plans.

INSTRUCTOGRAPH COMPANY
5071-O NORTH BROADWAY, CHICAGO, ILL. 60040
4700-Q S. Crenshaw Blvd., Los Angeles, Calif. 90043

RADIO TELETYPETE EQUIPMENT

TELETYPETE MODELS 28 ASR, 28 KSR, 28 LPR,
28 LARP, 28 LXD, 28 LBXDI, 14, 15, 19. Page
printers, Perforators, Reperforators, Transmitter-Distributors, Polar Relays, Collins Receivers
511-3, R-388, 511-4, R-390A. Hammarlund SP-600IX. Frequency Shift Converters.

ALLTRONICS-HOWARD CO.
Box 19, Boston, Mass 02101 Tel: 617-742-0048

Electronic Crossword
(Continued from page 87)

TVI Prevention
(Continued from page 88)

on the other end of the QSO. Happily this has not been the case. As nearly as can be determined, the transmitter plate tank circuit (when SC is used) is operating in a superregenerative condition (that is, in and out of oscillation at a high audio rate). This condition so sharpens the signal and narrows the bandwidth of the receiver that this high tone is completely lost.

Others, when first hearing of this method, have felt that because the transmitter is off part of the time there would be gaps in the received speech pattern. While in fact there are such gaps, they are of such short duration that the human ear will blend them over and the interruptions will not be noticed.

Since using this form of TVI prevention the author has not had a single complaint. Reports from all who have built SC units indicate that they too are experiencing complete freedom from TVI. Whatever your TVI problem, the Synchronization Control Unit is the ideal way to solve it permanently.

YL News
(Continued from page 85)

Submit standard log information as proof of contacts. Suggested meeting times and frequencies are:

Time GMT Frequency
1700 7286 kc.
1900 3885 kc.
2100 14.265 kc.
2200 21.350 kc.
0200 lower part of 75-meter band.

Send copies of logs to: Helen Drake, 5065.7, 1717 Virginia Street N.E., Albuquerque, New Mexico.

Plan Ahead!

The 10th annual Mid West YL Convention will be held on May 19, 20, 21, 1967, at Holiday Inn, Lafayette, Indiana. It will be hosted by the Hoosier Amateur Women’s Club, Pre-registration fee of $2.00, should be sent to Mary Alice Kozer, K6BWX, 2116 Hockmeyer Road, Richmond, Indiana 47374. After April 1, 1967 registration will be $2.50.

Telrex “BALUN” FED INVERTED “V” ANTENNA KITS

SIMPLE-TO-INSTALL, HI-PERFORMANCE ANTENNA SYSTEMS:

1.5-2.5 P.E.P., Mono and Duo-Band I.V.’s from . . . . $23.95
NEW! All band, I.V. Conical — 80 thru 10M . . . . . . . . . $49.95
Kits contain “Balun”, copperweld wire, insulators and
Installation and adjustment instructions.

Telrex COMMUNICATION ENGINEERING LABORATORIES
ASBURY PARK, N.J. 07712
this is the new Clegg "66'er"

plenty of power, fixed or mobile operation—all the features you'd want in a top quality, 6-meter transceiver.

Just look at what you get in this compact, high-power, ultra-sensitive successor to the famed 99'er.

SUPERSENSITIVE RECEIVER • Dual conversion design with sharp 8 KC selectivity for freedom from birdies, tweets and spurious signals. • S Meter doubles as tuneup meter for transmitter. • Full 49.9 to 52.1 mc coverage for accurate dial readout—excellent band spread. • Sharp cut-off, adjustable squelch. • Excellent AGC performance. • RF stage provides optimum usable noise figure—freedom from cross modulation and overload. 0.5 uv sensitivity captures weakest signals. • 2 watts audio output with internal speaker. Provision for external speaker. • Effective automatic noise limiter.

POWERFUL TRANSMITTER • High efficiency, 22 watt final amplifier, driven by straight-through amplifier for low-low harmonic output. • Dual self-contained, solid-state power supply for both 115 VAC or 12 VDC operation. • Push-to-talk with provisions to automatically switch Apollo Linear and external VFO. • Broadband, multi-tuned exciter stages for rapid QSY and freedom from spurious outputs—no TVI problems! • High level modulation with speech clipping for top talk power. • Transmitter frequency spotting switch. • Operated with 8.3/12.5/25 mc crystals. Ideal for MARS, CAP. Wide variety of accessories for PD application. See the Clegg "66'er" today. $249.95. Microphone $10.50. Squires-Sanders, Inc., Martinsville Road, Millington, N. J. 07946.

Squires-Sanders

Faster CW—
Better Readability

AUTRONIC 19.95 AUTRONIC KEYER 79.50
Preferred by better operators

ELECTROPHYSICS CORP.
89 W. 18th St., Costa Mesa, Calif.

NOW! in Easy to Build Kit Form!

ONLY $249.95

Less Tubes $249.95

Bandit 2000B Financing Available (Set of Cetron Tubes available for $58)

Grounded grid operation, 2000 watts PEP (twice average DC), 80, 40, 20, 15, 10 meter operation ... 115 or 220 volt operation ... Relay operated with selector controls ... Solid state rectifiers ... Many other features ... size 14¾" x 6¾" x 14" deep ... Weight 65 lbs. Available in color to match Drake or Collins. No extra charge.

Hunter Sales, Inc.

"HOW TO MAKE MONEY in Mobile Radio Maintenance"

AUTHORITATIVE GUIDEBOOK ABOUT THE BUSINESS IN TWO-WAY MOBILE RADIO. GIVES FACTS, FIGURES, PAY RATES, WRITE TODAY! FREE.

LAMPKIN LABORATORIES, INC., Mfg. Div., BRADENTON, FLA.

NEW! 1967 CATALOG OF BARGAINS

FREE

World Radio Labs

World Radio Laboratories
3415 West Broadway
Council Bluffs, Iowa 51501

Gentlemen:
Please rush me your 1967 Catalog.

Name________________________
Address_____________________
City_________________________ State_______ Zip_______
Silent Keys

I t is with deep regret that we report the passing of these amateurs:

W1GZL, F. Leslie Horner, Holyoke, Mass.
W1HL, William G. Milnes, Jr., Johnston, R. I.
ex-W1XL, Arthur L. Page, Sr., Pacifica, Calif.
ex-W1JK, Henry S. Shaw, Westbrook, Me.
K1OKB, Ernest Hill, Biddeford, Me.
W10TD, Stephen Tabor, Hamden, Conn.
K3DJO, John J. MacNamee, Springfield Center, N. Y.
W2EBT, Leroy E. Raynor, E. Moriches, N. Y.
W2KX, William G. Schuster, Frankfort, N. Y.
ex-W2NAX, Erwin Bertscheller, Queens, N. Y.
K2SFY, Douglas B. Cause, Sr., Acura, N. Y.
W12SNT, Sol Schacter, Brooklyn, N. Y.
W3UYD, Howard A. Short, Syracusus, N. Y.
W3Y0B, Raymond D'Italia, White Plains, N. Y.
W3ZLD, I. Fishelberg, Longport, N. J.
W2ZYO, Edward W. Hague, Union, N. J.
W3AJW, Albert P. Frederick, Lemoyne, Pa.
WN3CWWU, Anthony J. Kuznietz, Pittsburgh, Pa.
W3HQ, Leon W. Ashton, Wilmington, Del.
W9B1H, Dana R. Stagg, Miami, Fla.
K4KEI, Thomas N. Mcgown, Roswell, Ga.
K4E0Z, Aubrey B. Cox, Memphis, Tenn.
W4TFK, John Gerard, Frankfort, Kentucky
K4MT, Harry C. Rice, Smyrna, Tenn.
W4TMY, Thomas A. Groves, Franklin, Tenn.
K5BHP, Ray A. Billings, Shilo, Tex.
W5EBX, Robert N. White, San Antonio, Tex.
W9FMI, Don B. King, McAlester, Okla.
W3NWX, Paul H. Gounax, Franklin, La.
W9BGL, Henry C. Jungo, Escandon, Calif.
W8BDEF, John Curtis, Grovelia, Calif.
W5DQY, William E. Cary, Santa Maria, Calif.
W9EPA, Kenneth E. Beckman, Armona, Calif.
W8GFA, Norman G. Mayfield, Sudley City, Calif.
W5BQY, Clifford A. Carlson, Redlands, Calif.
W2AFXJ, Joel M. Whitlock, Salinas, Calif.
ex-W8SO, Louis G. Trolean, La Mesa, Calif.
W6WUU, Michael Macieluk, Soquel, Calif.
W5A7YD, Elma D. Suthers, Seattle, Wash.
W7GE, Hubert L. Hasbrooke, Portland, Ore.
W7ZGW, Job J. Anderson, Kearns, Utah.
W8EEF, Rudolph J. Blaho, Paroli, Ohio.
K5EQK, Donald W. Buckshorn, Cincinnati, Ohio
W8GRT, Claude L. Shakespeare, Lakewood, Ohio
W9CA, Robert L. Wilson, Paris, Ohio
W8RX, George N. Kerck, Cele, Ohio.
W9RRC, Walter M. Witherspoon, Fostoria, Ohio
W9RY, Carl P. Goetz, Sr., Springdale, Ohio
W8BPA, Donald C. Ridge, Anderson, Ind.
W9CEZ, M. J. Stegmaier, Deseret, Ill.
W9GQZ, Frank T. Tatro, Western Springs, Ill.
W9HJQ, Clarence H. Brooks, Stevens Point, Wisc.
W9QO, Robert O. Wible, Kendalville, Ind.
W9OOUR, Lucien R. VanBlairicum, Columbus, Ind.
W9QZK, James H. Wendi, Owen, Wisc.
K9QDD, Robert S. Hammond, Bloomington, Ind.
W9QEC, Richard D. Berkeley, Amboy, Ill.
W9REO, Warren H. Keller, LaPorte, Ind.
W9WJU, Harold E. Minier, Hammond, Ind.
W8D0I, B. R. Loving, Bailwin Pk., Mo.
W6GKN, Floyd D. Moore, Emporia, Kan.
W6RXO, Clarence A. McDermott, St. Paul, Minn.
W9A8LRX, David L. Beasy, Parsons, Kansas
SM7CT, Ingvar Tynnell, Malmo, Sweden
VE2OK, Cameron J. Campbell, Dorval, Que.
VE3CXS, T. J. Sparkman, Riverside, Ont.
VE3BN, Robert H. Hayman, Victoria, B. C.
ZL2AFF, R. B. Robins, Lower Tufts, New Zealand
ZS2NV, Henry Alpers, King Williams Town, Rep. of So. Africa
$1.00 POSTPAID
U.S.A. – $1.25 Elsewhere

THE RADIO AMATEUR’S OPERATING MANUAL is ideal for the newcomer who wishes to learn, and the Old Timer who wishes to brush-up on operating procedures, or who is becoming active in a new phase of amateur radio and needs information regarding this “new” facet.

Its nine comprehensive chapters and appendix provide a guide and ready reference source on good operating practices found most effective over the years.

THE RADIO AMATEUR’S OPERATING MANUAL deserves a place on the bookshelf of every amateur who prides himself on good operating procedures.

LRL-66 ANTENNA
66' LONG. 80 THRU 10M

- Power rating 2 Kw, P.E.P. or over on 80, 40, 15
  On 20 and 10 1 Kw, P.E.P. Transmitter Input

| 1. Loading coils for 80 & 40M doublet operation |
| 2. Adjustable ends to set 80 meter resonance |
| 3. Decoupling stubs for 20 & 10 meters |

5. Center insulator with female coax connector to take PL-259 plug
6. Fittings on insulators to tie on rope

Box 44
Owensboro, Kentucky

NEW HIGH POWER DUMMY ANTENNAS
Gentec Dummy Antennas permit transmitter adjustments under electrical conditions duplicating actual antenna conditions, but eliminating TVI, QRM and associated problems. Transmitters readily peaked for top DX operation.

SPECIFICATIONS—DC to 250 MCS. (50 Ohm Units)

<table>
<thead>
<tr>
<th>Price</th>
<th>$1.95</th>
<th>$11.95</th>
<th>$19.95</th>
<th>$19.95</th>
<th>$20.95</th>
<th>$20.95</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>507</td>
<td>525</td>
<td>526A</td>
<td>510U</td>
<td>510N</td>
<td>510B</td>
</tr>
<tr>
<td>Term's</td>
<td>UHF</td>
<td>UHF</td>
<td>N BNC</td>
<td>UHF</td>
<td>N BNC</td>
<td>N BNC</td>
</tr>
<tr>
<td>VSWR (max)</td>
<td>1.05</td>
<td>1.10</td>
<td>1.05</td>
<td>1.10</td>
<td>1.05</td>
<td>1.05</td>
</tr>
<tr>
<td>Power</td>
<td>2W</td>
<td>125W</td>
<td>250W</td>
<td>500W</td>
<td>500W</td>
<td>500W</td>
</tr>
</tbody>
</table>

Terms: C.O.D. plus postage or ppd in U.S.A. when check included with order.

Write for Free Literature (50 and 70 Ohm Units)
GENTEC INCORPORATED, P.O. Box 233, Raritan, New Jersey

FAIR RADIO SALES
P.O. Box 1105 • LIMA, OHIO • 45802

HAM'S
CARIBBEAN RETREAT!
Go foreign Antigua, W.I.
Hotel Beachcomber
73, Bill Wyer, VP2AZ/EX-VE3BP,
GZ2B-DXCC
Box 10, Antigua, W.I.
Caribbean DXpedition Headquarters
A 90-Watt Amplifier for 2 Meters

(Continued from page 19)

former from an old TV set can be used. With silicon-diode rectifiers and capacitor input filtering, most TV transformers will deliver approximately 450 volts d.c. at 200 milliampere or more. The screen-grid voltage can be taken from a dropping resistor or bleeder tap for Class C operation. The screen voltage should, however, be regulated for Class AB conditions. The control-grid bias can be secured by placing a 6-volt filament transformer back-to-back with the 6.3-volt winding of the TV transformer, then using a half-wave rectifier and voltage divider on the filament transformer’s 115-volt winding to secure the desired negative voltage.

A 5894 tube can be used instead of the 829-B in this circuit. If this is done, the length of L3 will have to be increased approximately 2 inches over the dimensions given. This is necessary because the output capacitance of a 5894 is somewhat lower than that of an 829-B. The operating voltages for a 5894 are different than those used with 829-Bs, so the tube data sheet should be consulted before setting up the amplifier. The tube socket connections, however, are the same.

In Class C, this amplifier produced 55 watts of r.f. output into a 50-ohm dummy load. The driving power was secured from a Hallcrafters SR-42 and measured 3 watts. The input power to the 829-B was 80 watts, using 600 volts on the plates. S.s.b. tests were not run because an exciter was not available at the time. Information on tune up and operation of an 829-B in s.s.b. service was given in a recent issue of QST.3 The best way to adjust a linear amplifier is to observe the waveform on an oscilloscope during tune up.4

A grid-current meter can be placed in the bias line to the amplifier if desired. Compressing or spreading the turns of L2 will produce a peak in grid current when resonance is established. A peak in output power should be noted when C4 is tuned through its range (amplifier connected to a 50- or 75-ohm non-reactive load) and with C6/L4 tuned to resonance. If there is no such peak, change the spacing between L3 and L1 experimentally until the peak is obtained. In the author’s amplifier, a spacing of approximately ¾ inch was required.

Whether this amplifier is to be used as a separate assembly or as an integral part of a 2-meter transmitter, it should satisfy the need for an amplifier stage in the moderate-power class. Archie or not, the 829-B is capable of doing a good job. Better still, this amplifier is easy to build and the cost is within reason for small-budget hams.

---

"Beamed-Power" ANTENNAS, "BALUNS"
I. V. KITS and ROTATOR SYSTEMS!

Most Technically-Perfected, Finest Communication Arrays in the World! Precision-Tuned-Matched and "Balun" Fed for "Balanced-Pattern" to assure "TOP-MAN-ON-THE-FREQUENCY" Results

Enjoy World Renowned TELREX performance, value and durability! Send for PL67 tech. data and pricing catalog, describing professionally engineered communication antenna systems, rotator-selsyn-indicator-systems. "Baluns", I.V. Kits, Towers, "Mono-Pole", "Big-Berthas", accessories, etc. etc.

Communication Engineering Laboratories
ASBURY PARK, NEW JERSEY 07712, U.S.A.

SURPLUS NEEDED
Guaranteed highest prices. Shipping paid. We'll buy, trade or give you new equipment of your choice. Send list or telephone for immediate quote. Payment in 24 hrs.

MILITARY ELECTRONICS CORP.
SPACE ELECTRONICS DIVISION
4178 PARK AVE., N.Y. 10457 - (212) CY 9-0300

HAM HOBBY DIRECTORY
If you would like to be listed in a HAM HOBBY DIRECTORY, please send your Call Sign, Name, Address, and Hobbies that you would like to be listed under to: HAM HOBBY DIRECTORY, P.O. Box 57, Bedford, Massachusetts 01730. Planned publication time is July and price will be $2.00.

YES!

I would like to become a member of ARRL and help support its many services to amateurs and amateur radio. Here's my $5.00 ($5.25 from Canada, $6.00 elsewhere). Sign me up for a year's membership and twelve big issues of QST!

My name ............................................. Call .............

Street ................................................... 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-467
LEARN CODE
the right way—with
Code Sound Language!

"The specialized language of sound" brings you a complete study of the International Morse Code. Satisfied users say—"Complete in every detail"—"Easy to learn!"—"CSL is the best!"—Increase YOUR receiving speed, master the code now!

CSL NR 1 & NR 2 (1 tape) for the prospective Novice, Technician, General or Amateur Extra First. 3 to 23 wpm.

CSL NR 3 & NR 4 (1 tape) for the advanced operator with a sincere desire to copy code sounds at rapid speeds. How to copy behind, etc., 25 to 55 wpm. Both tapes, plenty of copy—plain and scrambled, numerals and punctuation.

Magnetic tape, 7" reel, dual track, 2 hours. Immediate delivery. Send check or money order. (Specify which tape.) $6.95 each.

Both tapes on one order, only $13.50.

SOUND HISTORY RECORDING  Box 16015, Washington, D. C. 20023

ALL-BAND ANTENNA CONNECTOR
HYE-QUE 1 molded connector has
cylinders for securing antenna elements, heavy copper leads, coax FLEX connector for feedline, and tie-point for antenna support. 120°-cap protects connector. Reinforced. At your dealer's, or $2.95 postpaid. Companion insulations. 2 for $9.80 ppd. Instructions included.

BUDWIG MFG. CO., P.O. Box 97A, Ramona, Calif. 92065

EXCELLENT SELECTION—AT EXTREMELY
LOW PRICES—48 HOUR DELIVERY

Thousands of frequencies in stock. Types include HCB/U, HGB/U, FT-241, FT-243, FT-171, etc.

SEND 10¢ for catalog with oscillator circuits. Refunded on first order.

2400G Crystal Drive, Ft. Myers, Fla. 33901

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

STREET

CITY

STATE

ZIP

ARRL HANDBOOK  $4.00

The standard comprehensive manual of amateur radio communication

UNDERSTANDING AMATEUR RADIO  $2.00

Written for the beginner—theory and how-to-build it.

VHF MANUAL  $2.00

A new and thorough treatment of the amateur v.h.f. field

LICENSE MANUAL  50¢

Complete text of amateur regs, plus Q&A for amateur exams

HOW TO BECOME A RADIO AMATEUR  $1.00

All about amateur radio and how to get started

A COURSE IN RADIO FUNDAMENTALS  $1.00

Use this in conjunction with the Handbook

ANTENNA BOOK  $2.00

Theory and construction of antennas

SINGLE SIDEBAND FOR THE RADIO AMATEUR  $2.50

The best s.s.b. articles from QST

THE MOBILE MANUAL  $2.50

The best mobile articles from QST

HINTS AND KINKS  $1.00

300 practical ideas for your ham shack

OPERATING MANUAL  $1.00

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
UP TO DATE...

The 57th edition of the Radio Amateur’s LICENSE MANUAL is complete, up to date and revised to include latest information on amateur licensing. Contains information on questions included in FCC amateur exams, all the dope on frequency privileges for the various classes of amateur licenses, the full text of RACES regs, details of the U.S.-Canada Reciprocal Operating Agreement, code-practice schedules, and the current FCC examination schedule. A useful manual for all, newcomer and oldtimer alike. Always up to date.

Order YOUR copy today

PRICE 50¢ POSTPAID

The American Radio Relay League, Inc.
Newington, Conn. 06111

Kit Of 100 Precision Wirewound and film precision resistors. Includes complete instructions for combining values covering the fabulous range of from 0.25 ohms to 50 megohms. (Accuracy 1%). Extra instructions and values for multipliers and shunts for your D.C. Panel Meters. Sent postpaid for $1.00 if you will give us names (Please include zip code) of those interested in receiving our catalogs.

Alternate offer 1.0000 kc. XTAL

Cortlandt Electronics, Inc.
44 Day St., New York, N.Y. 10009
P.O. Box 353
Church St. Station

Improve Mobile Radio Reception

Filter out annoying ignition noise with SIGNAL SAVERS®

The signal comes through sharper, more clearly, when you ground annoying ignition interference. You extend reception range—even double it. SIGNAL SAVERS place a blanketing shield around the sources of interference: distributor, coil, spark plugs, high tension leads… keep the noise out; let the signal come through. Guaranteed not to interfere with electrical or mechanical performance. SIGNAL SAVERS are approved for original equipment installation by all leading automotive engine manufacturers. Write for information and name of nearby SIGNAL SAVER dealer.

Sight Saver is a Hallett trademark

Hallett

Dept. QST-467, 136 N. Ash St., Inglewood, Calif. 90301

Some Distributor Areas Open!
Peruvian Adventure

(Continued from page 70)

many youngsters living under such conditions for at least a week was frightening. The only thing to do was to ask for help.

At 11 a.m. we sent our first SOS, using the ARRL national calling and emergency frequency, 7,100 Mc. Five minutes later the call was picked up by OA1NAN, a YL in Piura, northern Peru, who relayed it to OA1IFO in Lima, who passed our QTC to the local Jesuit high school. By then the rig had turned into the only hope for the entire ship. People crowded around me as I worked the rig under a burning tropical sun. The temperature was over 100 degrees, the humidity 95 per cent.

Word of our plight spread quickly. The Peruvian Air Force Minister was flooded with telephone calls from local hams, informing him of our desperate situation. To make the story short, he ordered a PBY Catalina aircraft dispatched to our rescue. The aircraft was only 470 miles away and within flying distance. Less than six hours from our first SOS we sighted the first plane. Cheers broke out from all of us as we waved to the aircraft. It was a beautiful sight to see as it touched down on the river. We had been in contact with the capital city all day, so we flashed the news. As a consequence, the Air Command heard it first from the hams rather than from the pilot, who was still busy parking the aircraft at the river bank.

That night we kept Lima hams busy running local and even long-distance message deliveries for the youngsters on board. The papers that evening and the following morning broke the news to the country and the world.

The following morning the first 26 of us were rescued and flown to Iquitos, an hour and 10 minutes away by air. It took more than six flights to evacuate the ship entirely. With the news that we were in Iquitos, there were a lot of families in Peru thanking the hams for their work. Incidentally, we made our air connection back to Lima.

First-Day Covers Still Available

When the Amateur Radio First-Day Covers were processed in Anchorage on December 15, 1961, we gambled and had a few extra unaddressed covers prepared, because orders for the first-day covers were still coming in and we didn’t want anyone to be disappointed. We still have some of these left. They are all singles, unaddressed but carrying the stamp and the official first-day cancellation, and they will be mailed to you in an envelope. Prices are 35c each, three for a dollar. Send your orders to ARRL Hq., 225 Main Street, Newington, Conn., 06111.
Trigger has cut the red tape of time-consuming credit investigations and interminable delays! If you are the holder of any major credit card such as:

- Town & Country
- American Express
- Carte Blanche
- Diner’s Club, Etc.

we will grant you instant credit on Open Account or Time Payments—on either brand new equipment, or like-new equipment. Just pick up the phone and call us (no collect calls, please) or write and your goodies will be on their way the very same day. If you live in the Chicago area, drop in and take the merchandise home with you. What’s more, there is no carrying charge, up to 25 days, on Open Account. Or you can take advantage of Trigger’s easy budget terms at a very low interest rate. Merely give us the name of your credit card, and its number, and tell us what you want. You can also get a substantial trade-in on your present gear.

For a real eye-opener, visit Trigger, located near the junction of Routes 64 and 42A, where there’s plenty of free parking.

No company processes foreign orders and inquiries with greater dispatch than Trigger.

NEW EQUIPMENT ON LOW BUDGET TERMS

<table>
<thead>
<tr>
<th>SWAN</th>
<th>DRAKE</th>
<th>SBE</th>
</tr>
</thead>
<tbody>
<tr>
<td>HALLCRAFTERS</td>
<td>HY-GAIN</td>
<td>NATIONAL</td>
</tr>
<tr>
<td>JOHNSON</td>
<td>REGENCY</td>
<td>WELLER</td>
</tr>
<tr>
<td>AMECO</td>
<td>WATERS</td>
<td>SHURE</td>
</tr>
<tr>
<td>ASTATIC</td>
<td>NUMECRON</td>
<td>DOW KEY</td>
</tr>
<tr>
<td>FINCO</td>
<td>CDR</td>
<td>B &amp; W</td>
</tr>
<tr>
<td>HAMMARLUND</td>
<td>UNGAR</td>
<td>EICO</td>
</tr>
</tbody>
</table>

and other major brands

LIKE-NEW EQUIPMENT ON LOW BUDGET TERMS

- Ten-Day Trial
- 30-Day Guarantee
- Trades Accepted

Tops in performance and appearance, thoroughly reconditioned, clean-as-a-pin; alignment, calibration as good as new. Write for complete listing and prices.

SPECIALS OF THE MONTH FOR APRIL

| DRAKE TR 1 | $359  | SR66 | $129  | RANGER XMTR | $109  |
| DRAKE TR 4 | $319  | H100A | $127  | JOHNSON VFO | $12   |
| DRAKE TR 8 | $349  | H176CA | $279  | INNQ43 | $288  |
| DRAKE TR 12 | $199 | SP600UX | $399  | EICO 753 | $159  |
| HAMMARLUND 500 | $259 | NC105 | $299  | EICO 725 | $37   |
| HAMMARLUND 550 | $259 | NC405 | $299  | EICO 715 | $77   |
| HAMMARLUND 600 | $349 | NC450 | $399  | TRIGGER 600 | $47 |
| HAMMARLUND 350 | $349 | NC350 | $199  | 160 KIT FORM | $39 |
| MBE 350      | $339  | NC4A AC SUPPL | $79  | SRT-BRIDGE | $12 |
| MBE 250      | $209  | NC35 LATE MOD | $499  | 24 HOUR CLOCK | $7 |
| CLEGG 222    | $179  | VX500 VFO | $179  | 100 KG CALIBRAT | $9 |
| SR55         | $67   | NCL2000 | $349  | HEATH STERO ATT | $77 |
| SX100        | $179  | H111    | $17   | FISHER FMX | $39 |
| SX12         | $67   | H121    | $79   | TRIGGER FMX | $199 |
| SX13         | $157  | H352    | $79   | FMX 8000 | $44 |
| SX140        | $129  | HM500 ZERK | $44    | FMX 8000 | $44 |
| SX150        | $77   | HP25    | $77   | FMX 8000 | $44 |
| HT37         | $259  | HP13    | $49   | FMX 8000 | $44 |
| HT46         | $209  | PM1 SUPPLY | $24   | FMX 8000 | $44 |

A SMALL DEPOSIT WILL HOLD ANY UNIT ON LAY-AWAY.

STORE HOURS

Weekdays 11:00 A.M.—8:00 P.M.
Saturdays 9:00 A.M.—3:00 P.M.

TRIGGER Attn: W917VJ
7361 North Avenue
River Forest, Illinois

RUSH THE FOLLOWING: Enclosed

__________________________
NAME_____________________

__________________________
ADDRESS___________________

__________________________
CITY________________STATE___ZIP____

ORDER BLANK TO: trade ur present gear, order equipment, sell ur gear for cash.

TELEPHONE (312) 771-8616

SUNDAY TELEPHONE SERVICE
11 A.M.—3 P.M.
HAM-ADS

(1) Advertising shall pertain to products and services which are used in amateur radio.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all capitals, words which are in all bold, italics, or any other advertisement stand out from the others. No Box references will be accepted.

(3) Mail orders in these columns must be signed and may commercial type copy be signed solely with a mastered signature. Hams who submit these goods must sign the order with name and address impersonated by a character, publisher of QST are unable to vouch for the truthfulness of the material or character of the products or services advertised.

DAYTON Hamvention April 15-16, 1967. Dayton Amateur Radio Association, 3600 East Bonham Center, Dayton, Ohio. Participate in the technical sessions, forums, and social events. Bunk at the HRA dorm! Complete your 10 or 20 at home. For information write Dayton Hamvention, Department B, Box 44, Dayton, Ohio 45401.

ROCKAWAY RSLQ Club Spring Convention is being held this weekend, April 22-24, in the beautiful Western New York Hamfest and East Coast Spring VHF Conference, Saturday, May 13. Top programming plus more. Information from Rockaway Amateur Radio Assn., P.O. Box 1388, Rochester, N.Y. 14603.

INVITATION: New York Radio Club cordially invites New York City area hams and SWLs to its regular, monthly meetings. The 26th meeting will be held Thursday, April 20, at 8:30 P.M. at the New York Club of the Natl. Association of Amateur Radio Inc., 53rd St. and Lexington Ave., promptly at 8 P.M. All are welcome.


DAYTON area Annual Swap Shop: Sunday, April 3, 10 a.m. to 4 p.m., 617 North Main Street, Dayton, Ohio. League dealers: just have fun.

OLD Town Club now over 650 members with verified 2-way contacts since 1962. Life membership $15.00. Bi-monthly Spark Gap Times. $.35, 30 annually. Roster free to members. Write OLDC, 207 S.West Street, Deck, Texas 76239.

MOTOROLA used FM communication equipment brought and sold this week. Write RCA-Kalbh, 815 Fno. Federal Highway, Fort Lauderdale, Florida 33315.

WANT Chatbooks, catalogs, magazines. pre-1920 for historical research. Write Dave Nelson, Concord, N.C. 28027.

WANTED: all type tubes, 6L6G, 618F or 8188, 380, GRC, PCR, 51 JRVX, Collins linear amplifier. The more tubes the better for $100 to $150. Also a large selection of commercial, also large type tubes and test equipment in general. Contact telephone contact Ted Dames W2KJO, 308 Hickory, Arlington, N.J.

SEB, swap and buy ancient radio set and parts magazines.

WANTED: Military and commercial laboratory test equipment. Electrocraft, Box 12, Binghamton, N.Y. 13902.

SAVING for Make of new and used equipment. Write or call Bob Gilbreath, Manager, National Electronics 617-598-2530 for the near you at the prices you want to pay. TEL: 100 SWLs. All types of tubes and capacitors. Write or phone Coco Communications, 20 West Swain St., N.J. 07747.

OSLSI: "America's Finest!!" Samples 254, Delux, 35¢. Sakkers, W8OED, P.O. Box 218, Holland, Michigan 49423 (Religious QSL samples, 25¢).

OSLS: samples, 25¢. QSL Press, Box 281, Oak Park, Ill. 60303.

OSLS: "Brownie" W3CH, 111 Lehigh, Allentown, Penna. Samples 25¢.

FRITZ—QSLs that you're proud to send, bring greater return! Samples 25¢ deductible, Box 1684, Scottsdale, Arizona 85251 (formerly RSLQ, Arizona Field Day).

OSLS: Movers, 946 Rising Sun, Telford, Penna. Samples, stamped envelope.

OSLS-SMS Samples 106. Malojo Press, Box J37, M.O., Toledo 1, Ohio 43606.

DELUXE QSL Petty, W2HAZ, P.O. Box 5237, Trenton, N.J. 08638, Samples, 10¢.

OSLS: QSLs samples 254, Delux, 35¢. Sakkers, W8OED, P.O. Box 218, Holland, Michigan 49423 (Religious QSL samples, 25¢).

OSLS: samples, 25¢. QSL Press, Box 281, Oak Park, Ill. 60303.

OSLS: SWLs, XYL-SMS, 9¢ (sample assortment approximately 9¢) covering design, planning, printing, arranging, mailing, equipment, coats, and fabulous DX-attracting, postcard, unused unaddressed cards (Wow! Roger's KBAB, 961 Avenue St., South Bend, Ind. 46618). Plus Free cards.

RUBBER Stamps, 1-2 line address $1.50. I.F. Marquardt Co., Inc., 483 Porter Avenue, Revere, Massachusetts 02151.

3-QSL cards add prestige with spectacularly different glittering color and design. Samples 25¢ (refundable) J-3 QSL Co., Monson, Mass. 01057.

OSLS, SWLS, WFTQ, Samples 10¢, adv. Nicholas & Son Printers, F.O. Box 867, New York, N.Y.

OSLS, SWLS, WFTQ, Samples 10¢, adv. Nicholas & Son Printers, F.O. Box 867, New York, N.Y.

OSLS, SWLS, WFTQ, Samples 10¢, adv. Nicholas & Son Printers, F.O. Box 867, New York, N.Y.

OSLS 3-color address 100¢. $4.50. Roteck, Vary-Typing Service. Free samples. Thomas St., Riegel Riddle, Milford, N.J.

Blue On white Swl's 100¢. $3.00, Don. WILS, Sce- lla, 2750 S. Fullerton Ave., Chicago, Ill. 60618.

OSLS-100 3-color address $3.00, silver globes out, front, report form on back. Free samples. Rossprint, Box 7575, Kansas City, Mo. 64116.

OSLS stamp and call bring samples. Eddie Scott, W8CSX, Springfield, Ohio.

RUBBER Stamps $1.15 includes tax and postage. Climax's radio W2UDQ, 32 Cumberland Ave., Verde, N.J.

ORIGINAL EZ-IN double holders display 20 cards each in 25¢ for $1.00 or 10 for $4.00 prepaid and guaranteed. Free sample to dealers or clubs. Topco, John KAMNY, Box 9817, Galatant, Ill. 60606.

OSLS-GLASSY: 4 colors, 10¢. $2.00. Samples dime.

OSLS-GLASSY: 4 colors, 10¢. $2.00. Sample dime.

OSLS: quality with service. Samples free. R. A. Larson Press, Box 618, Fairview Park, Nebraska 68023.

OSLS: 30 sharp catalogs. Catalog, 10¢. Filmcrafters, Box 30X4, Martins Ferry, Ohio 43935.

OSLS: Quality. 100% new stock, 100% of yesterday. Zero return cost, 100% of today's prices, 100% of today's deals. 35¢, Ray, K7KHL, Box 1176, Twin Falls, Idaho 83301.


NCX-2 with power supply, $375.00. Excellent condition. VEB3-05, 90 Camelot Street, Welland, Ont., Canada.

CANDIAN Ham wants Johnson Navigator, State condition and price. Stan Dene, 226/8 8th Street West, Apt. 1, To- rin, Ont., Canada.

CANDIAN: Best used gear list in Canada. Free, etc., 35¢. MAV. 262ANN, Box 744, Montreal 3.

CANDIAN-ROAD RADIO QSL. Need speaking, all colors, perfect condition (visually and electrically), $250.00. Globe Scout, 125 Main Street, S.A. 1, 2B-400, Alhambra, Calif., Calif.

CANDIAN: Best used gear list in Canada. Free, etc., 35¢. MAV. 262ANN, Box 744, Montreal 3.

CANDIAN-ROAD RADIO QSL. Need speaking, all colors, perfect condition (visually and electrically), $250.00. Globe Scout, 125 Main Street, S.A. 1, 2B-400, Alhambra, Calif., Calif.

PO Box 17112, San Diego, Calif. 92117.

CATALOG: Filmcrafters, Box 304X, Martins Ferry, Ohio.

OSLS: Fast service. Free samples. Bolles, W50WC, Box 9365, Austin, Texas.


OSLS: World-hive address 2 €, 2 colors, attractive, distinctive, changeful. Choice of colors, 100¢—$3.00 up. Samples 14¢, Agent for Call-157, R2V0BF Press, 21 Apple Terrace, Irvington, New Jersey 07111.

OSLS: Radio Press, Box 17112, San Diego, Calif. 92117.

CATALOG: Filmcrafters, Box 304X, Martins Ferry, Ohio.

CANDIAN: Fast service. Free samples. Bolles, W50WC, Box 9365, Austin, Texas.

SHE: Heath HO-13 Pander wire, good condition with new color. Sells for $25.00 or 2 for $40.00, similar to PS-150-120. All complete with cables and manual. Price includes shipping. KADIJ, 279 Holbrook Road, Rochester, N.Y. 14623.

SELL: Heath HO-13 Pander wire, good condition with new cables. Sells for $25.00 or 2 for $40.00, similar to PS-150-120. All complete with cables and manual. Price includes shipping. KADIJ, 279 Holbrook Road, Rochester, N.Y. 14623.

SELL: Heath HO-13 Pander wire, good condition with new cables. Sells for $25.00 or 2 for $40.00, similar to PS-150-120. All complete with cables and manual. Price includes shipping. KADIJ, 279 Holbrook Road, Rochester, N.Y. 14623.
H-1024 through 1966. 4 issues missing. CQ’s 1948 through airmail issue. No recent issue. Make me an offer. B&W all-band transmitter model Model 380A, $35.00 brand new in original box. $15.00. Like new-pitch model, $12.00. 5-stage preselector for motor, $6.00. E. H. Collins, We3FG/W2ZBL, 711 Fair Oaks Avenue, South Pasadena, CA 91030.


OSL cards. Free sample. Send stamped envelope to George WAGONI, Box 282, Valparaiso, IN 46383.

For Sale: Heathkit H-100, $200.00. Cazmaer, 7277 Astoria Place, Goleta, CA 93117.

For Sale: DX-100 with Heath recommended grid block keying, milliammeter and adjustable sensitivity, $75.00. WAGONI, 11 Lauretian, on Juniata Port Washington, NY 11550, Tel.: (516) 883-9561.

WANTED: By former employee and collector: Atwater Kent model 65 or 49: also any A-K “beachcomber” sets or parts. KZPI, 1011 Elridge, W., Collinswood, N.J. 08107.

CLEG 22, new, $165.00: Mosley vertical 4V-RS, $99.00: Malcom 2 scope HO-4, $50.00. Eico 422 scope, $150.00. Multimeter meter, $8.00. pair Benck DI2 ML, 2 newsters, $12.00: Homebrewed QST wait modulator. Best offer. W2WHK, 310 Ults, Tenawawa, N.Y.


For Sale: Collins 755A transverter, $75.00; or Collins 755 receiver, $75.00. Blue Bird Safety, 1059 Dalebrook, Alexandria, VA. Tel: (703) 763-7096.


For Sale: Elmac 2550B tube. Guaranteed and conox., $6.50 each. $10.00 paid repair in U.S.A. Send check or m.o. Everett Shinn, Box A-104, 3014 North 72nd, Milwaukee, Wis. 53210.

For Sale: SB-200, two months old, Guaranteed, $195.00. W0AUM.


JOE ORHAM put away the box of thumb tacks, leaned back in his chair and gazed at his latest "wall-paper". A brand-new Extra Class license certificate hung next to the A-1 Operator sheepskin that had arrived only the week before. Many others adorned the wall — their brightly colored faces telling the whole of this ham's history.

JF first on the wall was his ARRL Associate Member certificate, later flanked by several marked "Full Member". Then came the ten-word code proficiency award now festooned with silver stickers; RGC; Novel Roundup Section Award; Section Net certificate and then ORS; and finally BPL and the Public Service Award, both earned during the Hurricane, when Joe handled 534 messages in less than a week.

JOE ORHAM has come from the ranks of the newcomers to the status of a crack operator in a very short few years. All along he has helped organized amateur radio — and it has helped him through — full participation in League activities. How about you?
The No. 37001 Safety Terminal

An old favorite in the line of exclusive Millen "Designed for Application" products. Combination high voltage terminal and thru-bushing. Tapered contacts fit firmly into conical socket providing large area, low resistance connection. Pin is swiveled mounted in cap to prevent twisting of lead wire. Easy to use. 1/8" o.d. insulation high voltage cable fits into opening in cap. Bared conductor passes thru pin for easy soldering to pre-tinned tip of contact plug.

- Standard 37001 available in either black or red bakelite. No. 37001 is low loss mica filled yellow bakelite for R.F. applications.

James Millen MFG. CO., INC.
Main Office and Factory
Malden
Massachusetts
1967 EDITION
NOW AVAILABLE

THE STANDARD reference work and text for everyone—radio amateurs, students, experimenters, engineers, lab men, technicians.

Annual revision is a feature of the Handbook, always with the objective of presenting the soundest and best aspects of current practice. The big, 1967 Edition contains new descriptions of equipment. Semiconductor-diode and tube tables are brought up to date. Every important aspect of amateur radio is covered: transmitting, c.w., a.m., sideband, radioteleype; receiving; mobile; v.h.f.; propagation; antennas; construction; theory; charts; diagrams; transistors; vacuum tubes; station assembly and operation. The complete handbook!

$4.00 USA
$4.50 US Possessions and Canada
$5.50 Elsewhere

Clothbound Edition $6.50 USA, Possessions and Canada, $7.00 Elsewhere

The American Radio Relay League, Inc.
Newington, Conn. 06111
Since 1925, your most logical supplier of everything for the Ham shack, including all the top-value equipment by

hallicrafters

"Quality through Craftsmanship"

For more than forty years, Hams all over the world have depended upon Harrison for their every need.

The reasons for their satisfaction, and their recommendations are many:
- Our friendly, helpful advice and service.
- Our larger inventory of factory-fresh, latest production equipment.
- Lowest prices—always.
- Quicker deliveries.
- Highest allowances for traded in gear.
- Easy terms (in 48 USA).

It all adds up to more real value for your money and more complete satisfaction, every time you deal with the one and only

"HAM HEADQUARTERS, USA®"

Come on in and see for yourself! Or, send a postcard telling me what you are interested in, I'll rush literature to you, and our latest list of like-new bargains.

You'll like the way we take good care of you, OM

TNX 73 Bill Harrison W2AVA

HARRISON
222 BARTON STREET
NEW YORK, N.Y. 10007

- Phone: (212) BARclay 7-7922
- Cable: "HARRIORAD"
- International TELEX 12-6789

VISIT OUR NEW STORE AT
8 BARCLAY STREET
Near B'way, 1 1/2 blocks
East of our old location

HAMS IN INDUSTRY! Tell your Purchasing Agent that Harrison Electronics Corp. (our Industrial Division) is a reliable source for his component needs. A call to 212-227-7777 can bring him immediate off-the-shelf deliveries, in depth, at lowest factory OEM prices, TNX
New from National
The most versatile
5-bander on the market
...priced even lower
than a kit rig!

Here's the fastest way to move up from single band or triband operation ... the all-new National 200. It's a fabulous five-bander, an ideal rig for mobile, portable, or home operation ... and it's only $359! For the first time at this amazingly low price, you get top-notch SSB, CW, and AM performance on the 80 through 10 meter bands ... plus National's traditional quality and full One-Year Guarantee.

National gives you these important features: ■ Complete coverage of the 80 through 10 meter bands. ■ 200 Watt PEP input on SSB, plus CW and AM. — Separate product and AM detection plus fast-attack slow-release AGC. ■ Crystal-controlled front end and single VFO for high stability, and identical calibration and tuning rate on all bands. ■ Crystal lattice filter for high sideband suppression on transmit, and rejection of adjacent QRM on receive ... plus solid-state balanced modulator for "set-and-forget" carrier suppression. ■ Operation from new low-cost AC-200 supply or from NCX-A or mobile power supplies. ■ ALC. ■ 45/1 planetary/split gear tuning drive. ■ Automatic carrier insertion in AM and CW modes. ■ Panel meter automatically switched to S-units on receive. ■ Universal mobile mount included.

National Radio Company
37 Washington Street, Melrose, Massachusetts 02176
More power
RCA 6146B/8298A Beam Power Tube
Plus Simple Modification Increases Output Over 10%

TYPICAL OPERATING DATA
as ICAS Class C Telegraphy Amplifier at 60MHz

<table>
<thead>
<tr>
<th></th>
<th>6146A</th>
<th>6146B/8298A</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Plate Voltage</td>
<td>750</td>
<td>750</td>
</tr>
<tr>
<td>DC Grid #2 Voltage</td>
<td>160</td>
<td>200</td>
</tr>
<tr>
<td>DC Plate current</td>
<td>120 ma</td>
<td>160 ma</td>
</tr>
<tr>
<td>Power Output (ICAS Approx.)</td>
<td>70 W</td>
<td>85 W</td>
</tr>
</tbody>
</table>

Here from RCA—developer of the famous 6146—is the information you need to increase your rig's output. For full details on simple modification—or direct replacement—to take full advantage of the added 6146B/8298A capabilities, write RCA Commercial Engineering, Section D37-M, Harrison, New Jersey 07022 for your free copies of Engineering Note IEN-3 and product data sheets on the RCA 6146A and 6146B/8298.