# Typical Audio Components

## Class A Input Transformers

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Application</th>
<th>Ratio</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-2</td>
<td>1 plate to 2 grids</td>
<td>2:1</td>
<td>$3.90</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4:1</td>
<td></td>
</tr>
<tr>
<td>S-5</td>
<td>Single or double button mike or line to 1</td>
<td>16:1</td>
<td>4.25</td>
</tr>
<tr>
<td></td>
<td>grid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-6</td>
<td>Single or double button mike or line to 1</td>
<td>16:1</td>
<td>3.10</td>
</tr>
<tr>
<td></td>
<td>grid</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Universal Driver Transformers

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Application</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-1</td>
<td>Pushpull</td>
<td>$5.20</td>
</tr>
<tr>
<td>S-3</td>
<td>Pushpull, 600 type, 1/4&quot;, or similar plates</td>
<td>4.70</td>
</tr>
<tr>
<td></td>
<td>to 45&quot;, 53&quot;, or 63&quot;, self of fixed bias.</td>
<td></td>
</tr>
</tbody>
</table>

## Universal Modulation Transformers

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Audio Power</th>
<th>Net Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$3.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$4.25</td>
</tr>
<tr>
<td>S-5</td>
<td>Single or double button mike or line to 1</td>
<td>3.60</td>
</tr>
<tr>
<td></td>
<td>grid</td>
<td></td>
</tr>
<tr>
<td>S-6</td>
<td>Single or double button mike or line to 1</td>
<td>3.10</td>
</tr>
<tr>
<td></td>
<td>grid</td>
<td></td>
</tr>
</tbody>
</table>

## Universal Output Transformers

### To Line and Voice Coil

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Volts</th>
<th>Current</th>
<th>Insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-11</td>
<td>120</td>
<td>5 A</td>
<td>3000 V</td>
</tr>
<tr>
<td>S-12</td>
<td>200</td>
<td>5 A</td>
<td>3000 V</td>
</tr>
<tr>
<td>S-13</td>
<td>300</td>
<td>5 A</td>
<td>3000 V</td>
</tr>
</tbody>
</table>

### Filament Transformers

#### Primary Tapped 105, 115 Volts

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Volts</th>
<th>Current</th>
<th>Insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-15</td>
<td>105</td>
<td>5 A</td>
<td>3000 V</td>
</tr>
<tr>
<td>S-16</td>
<td>115</td>
<td>5 A</td>
<td>3000 V</td>
</tr>
</tbody>
</table>

## Typical Power Components

### Plate and Filament Transformers

#### Primary 115 V. — 50/60 Cycles

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Voltage</th>
<th>D.C. Rectifier</th>
<th>Fil. No. 1</th>
<th>Fil. No. 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-40</td>
<td>350-425-0</td>
<td>350-325</td>
<td>400-310</td>
<td>6.3 V.C.T.</td>
</tr>
<tr>
<td>S-41</td>
<td>600-600</td>
<td>475</td>
<td>5 V-3A</td>
<td>8.3 V.C.T.</td>
</tr>
</tbody>
</table>

### Plate Transformers

#### Primary 115 V. — 50/60 Cycles

<table>
<thead>
<tr>
<th>Type No.</th>
<th>High Voltage</th>
<th>DC Voltage*</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-47</td>
<td>1200-1500-1800-0</td>
<td>1275/1850</td>
<td>300 Ma.</td>
</tr>
<tr>
<td>S-48</td>
<td>1800-2100-2500-0</td>
<td>1800/2500</td>
<td>300 Ma.</td>
</tr>
<tr>
<td>S-49</td>
<td>2100-2400-3000-0</td>
<td>2100/3000</td>
<td>300 Ma.</td>
</tr>
</tbody>
</table>

## Filter and Swinging Chokes

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Service</th>
<th>Inductance</th>
<th>Current</th>
<th>Resistance</th>
<th>Insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-26</td>
<td>Filter</td>
<td>15 Hz</td>
<td>60 Ma.</td>
<td>250 ohms</td>
<td>1500 V.</td>
</tr>
<tr>
<td>S-27</td>
<td>Filter</td>
<td>30 Hz</td>
<td>75 Ma.</td>
<td>350 ohms</td>
<td>1500 V.</td>
</tr>
<tr>
<td>S-28</td>
<td>Filter</td>
<td>60 Hz</td>
<td>100 Ma.</td>
<td>350 ohms</td>
<td>1500 V.</td>
</tr>
<tr>
<td>S-29</td>
<td>Filter</td>
<td>120 Hz</td>
<td>150 Ma.</td>
<td>450 ohms</td>
<td>1500 V.</td>
</tr>
<tr>
<td>S-30</td>
<td>Filter</td>
<td>240 Hz</td>
<td>225 Ma.</td>
<td>600 ohms</td>
<td>2200 V.</td>
</tr>
<tr>
<td>S-31</td>
<td>Swinging</td>
<td>47 Hz</td>
<td>225 Ma.</td>
<td>600 ohms</td>
<td>2200 V.</td>
</tr>
<tr>
<td>S-32</td>
<td>Swinging</td>
<td>94 Hz</td>
<td>450 Ma.</td>
<td>1000 ohms</td>
<td>4000 V.</td>
</tr>
<tr>
<td>S-33</td>
<td>Swinging</td>
<td>188 Hz</td>
<td>600 Ma.</td>
<td>1000 ohms</td>
<td>4000 V.</td>
</tr>
<tr>
<td>S-35</td>
<td>Filter</td>
<td>15 Hz</td>
<td>60 Ma.</td>
<td>250 ohms</td>
<td>1500 V.</td>
</tr>
<tr>
<td>S-36</td>
<td>Swinging</td>
<td>47 Hz</td>
<td>300 Ma.</td>
<td>600 ohms</td>
<td>4000 V.</td>
</tr>
<tr>
<td>S-37</td>
<td>Filter</td>
<td>15 Hz</td>
<td>60 Ma.</td>
<td>250 ohms</td>
<td>1500 V.</td>
</tr>
<tr>
<td>S-38</td>
<td>Swinging</td>
<td>47 Hz</td>
<td>600 Ma.</td>
<td>1000 ohms</td>
<td>4000 V.</td>
</tr>
</tbody>
</table>
A GRAND tube, the GL-810, with performance that's ideal for the ham using medium to high power! One tube will take 750 w maximum input CW, or 500 w phone. Double these figures for push-pull.

Coverage? All the DX bands from 80 down to 10 meters, at top input. At reduced input add the 6-meter band. Specifically, the tube will operate up to 30 mc at full ratings, or 100 mc at lower ratings.

To well-rounded performance, to compact modern design with short internal leads, add a bulldog ability to "take it". The tube’s heavy-duty filament—shielded at both ends to conserve power—has reserve capacity in case of overloading. From cap-terminal down to base, the GL-810 is strongly built, G-E-built, for service you can bank on. Put a pair of these stalwarts in your final, and you’re "set" for long hours of steady activity with key or mike.

Best of all . . . the tube is economical to buy! Type GL-810 is a watts-per-dollar bargain ranking high among values offered the ham. Check the low price today with your nearby G-E tube distributor. Electronics Department, General Electric Company, Schenectady 5, New York.

---

GL-810 POWER TRIODE

RATINGS, 2 TUBES
Typical Class C Operation (ICAS)

<table>
<thead>
<tr>
<th></th>
<th>CW</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate voltage</td>
<td>2,500 v</td>
<td>2,000 v</td>
</tr>
<tr>
<td>current</td>
<td>600 ma</td>
<td>500 ma</td>
</tr>
<tr>
<td>Grid current (approx)</td>
<td>120 ma</td>
<td>140 ma</td>
</tr>
<tr>
<td>Driving power (approx)</td>
<td>38 w</td>
<td>70 w</td>
</tr>
<tr>
<td>Power output (approx)</td>
<td>1,150 w</td>
<td>760 w</td>
</tr>
</tbody>
</table>

---

Electronics Department, General Electric Company, Schenectady 5, New York.

See your G-E tube distributor for a copy of each bi-monthly issue of "Ham News". Stay posted on what's new, practical, and helpful in amateur work!
The New DB22A Preselector

Coverage .54 to 44 Mc. — Average Gain 30 DB

Here's the new DB22A completely redesigned for greater efficiency and higher signal to noise ratio. It uses new 6BA6 miniatures. Image ratio is better than 50 DB with a communications receiver having a single stage of RF. It's calibrated, has smooth planetary tuning, self contained power supply, antenna bypass switch, gain control and many other features. Connect the DB22A to your receiver just like an antenna — no wiring — no plug in coils. It's entirely self-contained — entirely in a class by itself!

The RME 84

For Home, Portable or Mobile Operation

A quality receiver in the lower price field that will give you the most for your money. Operates from 115 volts AC, batteries or from the VP-2, a six volt power pack, optional with the RME 84. Also optional, and illustrated, is the CM-1—Carrier Level "S" Meter.

The VHF-152 Converter

For Two, Six, Ten and Eleven Meters

At a cost that an amateur can afford — the new VHF-152 used with a communications receiver will give you peak performance on the very high frequency bands, utilizing an efficient double conversion system. Unit has built in power supply, voltage regulator and temperature stabilized oscillator circuits. Provision is made for connection of 4 separate antennas.
CONTENTS

"It Seems to Us . . . ." .................................................. 9
Silent Keys ............................................................. 10
In QST 25 Years Ago This Month .................................. 10
Selective Single-Sideband Reception Simplified ............... 11
J. L. A. McLaughlin
An Oscillator for the 1215-Mc. Band
Peter G. Sulzer, W3HFW, and Charles R. Ammerman, W3MLN 16
Selectivity in S.S.S.C. Reception
Oswald G. Villard, jr., W6QYI ........................................ 19
Better Reception for 2-Meter Mobile
C. Vernon Chambers, W1JEQ ........................................ 23
An Automatic Keying Monitor
Ian O. Ebert, W3QED .................................................. 27
Our Cover ............................................................. 29
Technical Topics:
S.S.S.C. and S.S.S.R. .................................................. 29
Happenings of the Month ............................................. 30
A Balanced-Modulator N.F.M. Exciter
Paul D. Rockwell, W1PDP ............................................ 33
Self-Filtered Peak Clipping
Howard W. Johnson, W7NU ......................................... 36
United States Naval Reserve ....................................... 38
How's DX? ............................................................ 39
Compact 20-Watt Rig for 50 Mc.
Stephen T. Van Esen, W20XD ..................................... 44
L.A.R.U. News ....................................................... 47
Surplus Corner
F.M. Reception with the Wilcox F-3
John A. Dinter, W8OAP .............................................. 48
The World Above 50 Mc. ........................................... 50
Notes on Push-Pull Triodes ......................................... 58
I. H. Nixon, VE3ACL .................................................. 58
'Phone-Band Phunnies ............................................... 57
John T. Frye, W9EGV ................................................. 57
Hints and Kinks ...................................................... 58
Correspondence from Members .................................... 60
Operating News ..................................................... 62
Station Activities ..................................................... 70
ARRL QSL Bureau ..................................................... 124
Feed-Back ............................................................ 126
Hamfest Calendar ..................................................... 126
RECEIVER
S-38

Hallicrafters famous Model S-38. Recognized by hams, beginning hams and all who know the unending fascination of world wide communications, as one of the greatest receiver values on the market today. Overall frequency range from 540 kc to 32 Mc in four bands. Main tuning dial calibrated with precision accuracy. Separate electrical bandspread dial. CW pitch control adjustable from front panel, automatic noise limiter, self-contained PM dynamic speaker. 105-125 volt AC/DC.

TRANSMITTER
HT-17

The Model HT-17 is a low power, high quality transmitter now available at a new low price. Reaf Hallicrafters performance with maximum convenience and economy. Provides an honest 10 to 20 watts of crystal-controlled CW output on the amateur 3.5, 7, 14, 21 and 28 megacycle bands. A pi-section matching network is an integral part of the plate circuit and, together with an adjustable link, provides coupling to any type of antenna or permits the HT-17 to be used as an exciter for a high power final amplifier. Take advantage of this money saving offer...now! 40-meter coils included.

YOU SAVE $20.00

BE ON THE AIR FOR LESS THAN $100.00

Build yourself a ham shack with the best equipment available at these low prices. Here's your chance to save money. You save exactly $20.00 at these prices. Your nearest Hallicrafters distributor will tell you what tremendous values these pieces of Hallicrafters represent. See him for demonstration and further details.

Copyright 1948, The Hallicrafters Co.
EVERYTHING YOU WANT ...... in a high quality low cost receiver Model **Hallicrafters NEW S-53**

Hallicrafters Model S-53 takes an important position in the Hallicrafters line of high quality communications receivers. Completely modern. Superbly engineered for top flight performance at remarkably low price. All the Hallicrafters' built-in quality features amateurs expect and demand in a good receiver. Extended frequency range from 540 kc to 54.5 Mc in five bands. Uses two Mc IF which positively eliminates all amateur station images or repeat points within the ham bands. The strikingly designed, edge lighted dial is precisely calibrated. A separate bandspread control provides full electrical bandspread on all frequency bands. Latest series type noise limiter circuit; voltage stabilized oscillator; iron core IF's; built-in PM dynamic speaker. Rich satin-black steel cabinet with satin chrome trim. Complete with seven tubes and rectifier. 105-125 volts, 50-60 cycles AC $79.50

Overall tuning range: 540 kc to 54.5 Mc. Band 1: 540-1630 Kc; Band 2: 2.5-6.3 Mc; Band 3: 6.3-16 Mc; Band 4: 14-31 Mc; Band 5: 48-54.5 Mc.

**Controls:** main tuning, bandspread, band-switch, RF gain, audio volume, tone control, noise limiter, standby-receive, phone-code switch, speaker-headphone switch and phone jack on rear panel. Input jack for record player pickup connection.

New superhet circuit uses: 1-6C4 oscillator; 1-6BA6 mixer; 2-6BA6 IF's; 6H6 detector-AVC-noise limiter; 6SC7 BFO-1st audio; 6K6GT audio output and SY3 rectifier.

Size: 12⅛" x 6⅝" x 7¾".

**LISTEN FOR THE GATTI HALLICRAFTERS EXPEDITION**

Hallicrafters mobile, radio-equipped expedition now operating via short wave from the Mountains of the Moon, Africa. Listen for these call letters:

VQ5-HGE VQ3-HGE VQ4-HHE VQ5-HHE

Visit your distributor for maps, itinerary, schedules, other details.

---

**The Hallicrafters Co.**

4401 W. Fifth Ave., Chicago 24, Illinois

MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT
### Section Communications Managers of the ARRL Communications Department

**Reports Invited.** All amateurs, especially League members, are invited to report station activities on the first of each month (for the preceding month) direct to the SCM, the administrative ARRL official elected by members in each Section. Radio Club reports are also desired by SCMs for inclusion in QST. All ARRL Field Organization appointment forms are now available to League members. These include ORS, OES, OPS, OP, and OBS. Also, where vacancies exist SCMs desire appointments for SEC, EC, RM, and PAM. In addition to station and leadership appointments for Members, all amateurs are invited to join the ARRL Emergency Corps (ask for Form 7).

**ATLANTIC DIVISION**

<table>
<thead>
<tr>
<th>State</th>
<th>SCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delaware</td>
<td>W3HES 2641 Larcam Ave.</td>
</tr>
<tr>
<td>New Jersey</td>
<td>WP3ZT G. W. (Bil) Tonnell</td>
</tr>
<tr>
<td>New York</td>
<td>WP3PT Harding A. Clark</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>WP3KT Ernest J. Hinsky</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>WP3KL</td>
</tr>
</tbody>
</table>

**CENTRAL DIVISION**

<table>
<thead>
<tr>
<th>State</th>
<th>SCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illinois</td>
<td>W9ND Wesley E. Marriner</td>
</tr>
<tr>
<td>Indiana</td>
<td>W9KM Ted K. Killion</td>
</tr>
<tr>
<td>Iowa</td>
<td>W9QM Keno W. Gaetacht</td>
</tr>
<tr>
<td>Kansas</td>
<td>W9AR Paul M. Bossolletti</td>
</tr>
<tr>
<td>Michigan</td>
<td>W9TM J. S. Forsberg</td>
</tr>
<tr>
<td>Minnesota</td>
<td>W9CM Walter G. Hanusko</td>
</tr>
<tr>
<td>Missouri</td>
<td>W9QG William L. Montgomery</td>
</tr>
<tr>
<td>Nebraska</td>
<td>W9RK</td>
</tr>
</tbody>
</table>

**PACIFIC DIVISION**

<table>
<thead>
<tr>
<th>State</th>
<th>SCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>W5IIC Marshall Riggs</td>
</tr>
<tr>
<td>California</td>
<td>W5CW W. J. Wilkinson, Jr.</td>
</tr>
<tr>
<td>Colorado</td>
<td>W5MAW Harold Day</td>
</tr>
<tr>
<td>Hawaii</td>
<td>W6DAW James W. Watkins</td>
</tr>
<tr>
<td>Idaho</td>
<td>W6DJ William J. Dambaze</td>
</tr>
<tr>
<td>Oregon</td>
<td>W6JN 1290 Folsom Drive</td>
</tr>
<tr>
<td>Washington</td>
<td>W6LA</td>
</tr>
</tbody>
</table>

**MIDWEST DIVISION**

<table>
<thead>
<tr>
<th>State</th>
<th>SCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indiana</td>
<td>W2GE George Charles Ham, Jr.</td>
</tr>
<tr>
<td>Iowa</td>
<td>W2IP William G. Davis</td>
</tr>
<tr>
<td>Kansas</td>
<td>W2IPD Alvina R. Urrutia</td>
</tr>
<tr>
<td>Missouri</td>
<td>W2IQD Mrs. Letha A. Dangarfield</td>
</tr>
<tr>
<td>Nebraska</td>
<td>W2OR William T. Gemmer</td>
</tr>
<tr>
<td>North Dakota</td>
<td>W2PZ Portland Avenue</td>
</tr>
<tr>
<td>South Dakota</td>
<td>W2GCM John A. L. Kittler</td>
</tr>
</tbody>
</table>

**NEW ENGLAND DIVISION**

<table>
<thead>
<tr>
<th>State</th>
<th>SCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecticut</td>
<td>W1YB Walter L. Glover</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>W1KX F. N. Norman</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>W1ZJ Frank L. Baker, Jr.</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>W1RQ D. A. Hunter, Jr.</td>
</tr>
<tr>
<td>Vermont</td>
<td>W1QG John W. Kliney</td>
</tr>
<tr>
<td>New York</td>
<td>W1RD Craig B. Greenfield</td>
</tr>
<tr>
<td>New Jersey</td>
<td>W1RH</td>
</tr>
</tbody>
</table>

**NORTHEASTERN DIVISION**

<table>
<thead>
<tr>
<th>State</th>
<th>SCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York</td>
<td>W4ZL Joseph G. Heiber</td>
</tr>
<tr>
<td>New Jersey</td>
<td>W4AIP Alan R. Ross</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>W4JH Ralph A. Mynatt</td>
</tr>
<tr>
<td>Virginia</td>
<td>W4CC Clifford Cavanaugh</td>
</tr>
<tr>
<td>West Virginia</td>
<td>W4CF</td>
</tr>
</tbody>
</table>

**PACIFIC DIVISION**

<table>
<thead>
<tr>
<th>State</th>
<th>SCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>W6KO John Sonza</td>
</tr>
<tr>
<td>Colorado</td>
<td>W6OJ N. Arthur Powle</td>
</tr>
<tr>
<td>Idaho</td>
<td>W6PT Roy E. Pinchak</td>
</tr>
<tr>
<td>Nevada</td>
<td>W6TT Horace R. Gerey</td>
</tr>
<tr>
<td>Oregon</td>
<td>W6VL Samuel T. L. Lewis</td>
</tr>
<tr>
<td>Utah</td>
<td>W6MC John R. Kliney</td>
</tr>
<tr>
<td>Wyoming</td>
<td>W6RC Craig B. Greenfield</td>
</tr>
<tr>
<td>Idaho</td>
<td>W6PSQ James F. Wakefield</td>
</tr>
</tbody>
</table>

**SOUTHEASTERN DIVISION**

<table>
<thead>
<tr>
<th>State</th>
<th>SCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>W4CJW Dr. Arthur W. Woods</td>
</tr>
<tr>
<td>Florida</td>
<td>W4FZJ John W. Hollister</td>
</tr>
<tr>
<td>Georgia</td>
<td>W4HJ Thomas M. Moss</td>
</tr>
<tr>
<td>Mississippi</td>
<td>W4GJ Everett R. Mayer</td>
</tr>
<tr>
<td>South Carolina</td>
<td>W4CH Walter R. Bullington</td>
</tr>
<tr>
<td>West Virginia</td>
<td>W4JK Nebraska</td>
</tr>
</tbody>
</table>

**SOUTHWESTERN DIVISION**

<table>
<thead>
<tr>
<th>State</th>
<th>SCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona</td>
<td>W6OX Vincent J. Haggerty</td>
</tr>
<tr>
<td>California</td>
<td>W6MML Gladden C. Elliott</td>
</tr>
<tr>
<td>Colorado</td>
<td>W6QV Irvin L. EMC</td>
</tr>
<tr>
<td>Idaho</td>
<td>W6Q10 1617 Indio Miesto St.</td>
</tr>
<tr>
<td>New Mexico</td>
<td>W6QM 39 North Melwood</td>
</tr>
<tr>
<td>New Mexico</td>
<td>W6VX 4852 Marborough Drive</td>
</tr>
</tbody>
</table>

**SOUTHWESTERN DIVISION**

<table>
<thead>
<tr>
<th>State</th>
<th>SCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texas</td>
<td>W5DAS/MNL</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>W5DKZ N. C. Settle</td>
</tr>
<tr>
<td>New Mexico</td>
<td>W5ADF/BTL</td>
</tr>
<tr>
<td>Nevada</td>
<td>W5OJ Bert Wolford</td>
</tr>
<tr>
<td>California</td>
<td>W6CMB Dev. Chas.</td>
</tr>
<tr>
<td>Oregon</td>
<td>W6CH Lawrence R. Walsh</td>
</tr>
<tr>
<td>Utah</td>
<td>W6DQ P. O. Box 1001</td>
</tr>
<tr>
<td>Idaho</td>
<td>W6EJ P. O. Box 1603</td>
</tr>
</tbody>
</table>

**MARITIME DIVISION**

<table>
<thead>
<tr>
<th>State</th>
<th>SCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maine</td>
<td>VE1DQ A. M. Crowell</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>VE2UQ David S. Hutchinson</td>
</tr>
<tr>
<td>New York</td>
<td>VE2YQ Gordon A. Lyon</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>VE2ZL c/o Radio Division,</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>VE3AQ 3427 Power Drive</td>
</tr>
<tr>
<td>Vermont</td>
<td>VE3QL W. W. Buckhart</td>
</tr>
<tr>
<td>Connecticut</td>
<td>VE3MV 3915 W. W. Storyy</td>
</tr>
<tr>
<td>New York</td>
<td>VE3MM W. R. Williamson</td>
</tr>
<tr>
<td>New Haven</td>
<td>VE3NN 1017-1017 St.</td>
</tr>
<tr>
<td>New Jersey</td>
<td>VE3PE Radio Range St., D.O.T.</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>VE3V 7901 W. 33rd Ave.</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>VE3W 312 W. 33rd Ave.</td>
</tr>
<tr>
<td>New Mexico</td>
<td>V60X 929 S. 7th Ave.</td>
</tr>
<tr>
<td>New York</td>
<td>V60Z 929 S. 7th Ave.</td>
</tr>
<tr>
<td>New York</td>
<td>V61N 929 S. 7th Ave.</td>
</tr>
</tbody>
</table>

**QUEBEC DIVISION**

<table>
<thead>
<tr>
<th>State</th>
<th>SCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quebec</td>
<td>VE2GL Gordon A. Lyon</td>
</tr>
<tr>
<td>New Brunswick</td>
<td>VE6LQ 3915 W. 33rd Ave.</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>VE6OQ W. W. Buckhart</td>
</tr>
<tr>
<td>New York</td>
<td>VE6W 312 W. 33rd Ave.</td>
</tr>
<tr>
<td>New Jersey</td>
<td>VE6X W. R. Williamson</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>VE7AO 3915 W. 33rd Ave.</td>
</tr>
<tr>
<td>New York</td>
<td>VE7SS Radio Range St., D.O.T.</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>VE7US 3915 W. 33rd Ave.</td>
</tr>
<tr>
<td>New York</td>
<td>VE7W 3915 W. 33rd Ave.</td>
</tr>
<tr>
<td>New Jersey</td>
<td>VE7X 3915 W. 33rd Ave.</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>VE7Y 3915 W. 33rd Ave.</td>
</tr>
</tbody>
</table>

**MARITIME DIVISION**

<table>
<thead>
<tr>
<th>State</th>
<th>SCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska</td>
<td>VE3AM A. W. Morley</td>
</tr>
<tr>
<td>British Columbia</td>
<td>VE3AQ A. W. Morley</td>
</tr>
<tr>
<td>California</td>
<td>VE3AO 1102 Wilshire Ave.</td>
</tr>
<tr>
<td>Colorado</td>
<td>VE3AR 1102 Wilshire Ave.</td>
</tr>
<tr>
<td>Idaho</td>
<td>VE3AT 1102 Wilshire Ave.</td>
</tr>
<tr>
<td>Montana</td>
<td>VE3AU 1102 Wilshire Ave.</td>
</tr>
<tr>
<td>North Dakota</td>
<td>VE3AV 1102 Wilshire Ave.</td>
</tr>
<tr>
<td>Oregon</td>
<td>VE3AW 1102 Wilshire Ave.</td>
</tr>
<tr>
<td>Utah</td>
<td>VE3AX 1102 Wilshire Ave.</td>
</tr>
</tbody>
</table>

**MARITIME DIVISION**

<table>
<thead>
<tr>
<th>State</th>
<th>SCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska</td>
<td>VE3AM A. W. Morley</td>
</tr>
<tr>
<td>California</td>
<td>VE3AO 1102 Wilshire Ave.</td>
</tr>
<tr>
<td>Colorado</td>
<td>VE3AR 1102 Wilshire Ave.</td>
</tr>
<tr>
<td>Idaho</td>
<td>VE3AT 1102 Wilshire Ave.</td>
</tr>
<tr>
<td>Montana</td>
<td>VE3AU 1102 Wilshire Ave.</td>
</tr>
<tr>
<td>North Dakota</td>
<td>VE3AV 1102 Wilshire Ave.</td>
</tr>
<tr>
<td>Oregon</td>
<td>VE3AW 1102 Wilshire Ave.</td>
</tr>
<tr>
<td>Utah</td>
<td>VE3AX 1102 Wilshire Ave.</td>
</tr>
</tbody>
</table>

- Officials appointed to act temporarily in the absence of a regular official.
Now, for the first time, you can select a plate choke for a particular frequency and know that it will give excellent performance at this frequency. The Ohmite line of plate chokes are “frequency-rated” — their frequency characteristics have been accurately predetermined. The chart below gives the operating frequency range for each of the seven sizes.

Ohmite single-layer wound, r.f. plate chokes cover the entire frequency range of 3 to 520 megacycles. These chokes are wound on low power factor plastic or steatite cores, and are insulated and protected by a moistureproof coating. All chokes are rated 1000 ma except the Z-14 and Z-28, which are rated at 600 ma. Further information will be supplied upon request.

WRITE FOR BULLETIN 133 • OHMITE MANUFACTURING CO.
4863 Flournoy St., Chicago 44, Ill.

Be Right with... OHMITE
RHEOSTATS • RESISTORS • TAP SWITCHES • CHOKES
is a noncommercial association of radio amateurs, banded 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 Secretary at the administrative headquarters at West Hartford, Connecticut.
YOUR ONE LIFE

The average amateur shack is a potential electrocution chamber. Every year a significant number of amateurs experience narrow escapes from instant death. Others, less fortunate, spend months in a hospital. Some — too many — have paid with their lives for their carelessness. The situation is more dangerous now than it ever was, both because inexpensive war-surplus components make lethal power supplies cheap and because many of us are still using prewar transmitters of now-venerable components. We want to move you to think about this situation as it concerns you and your own station — and your health and your life. You'll have to think it out yourself, because it is something no one can or will do for you. Do you value your one life that much?

Bravery is a virtue but contempt for manifest electrical hazard is folly. Our rigs are full of such hazards and it is probable that most active amateurs have had one or more bare escapes. Such a fellow is fortunate in that he has a chance to find out what bit him and fix it. Others of us have not had that fortune. In some of the fatalities it has been possible to determine the precise cause of death and even to publish a diagram of the fatal circuit as it accidentally existed. How about you? Do you get any satisfaction out of thinking that an investigating committee of your brother amateurs will probably be able to ascertain the cause of your death? That's one circuit diagram in which you're definitely not interested. But do something about it!

The chief requirements in this matter are intelligent thought by each individual amateur, the following of safe construction practices and the development of safe tuning and trouble-shooting habits. It is a very personal matter with you but there is some help we can give you. Shortly before the war the League developed an extensive safety code, dealing both with construction and with safety habits, which was widely publicized at the time. We are dusting it off now to see what revisions it may need in the light of postwar techniques and it will shortly be republished in QST. It may give you needed help in the treatment of grounds, shafts, terminals, jacks, meters, bleeder and so on. Such "safetyizing" of apparatus is sometimes difficult and expensive, although it is always worth while because you have only one life. If you can't accomplish it thoroughly, at least dope out and memorize the particular hazards of your own set and be on guard against them. But no construction code can protect you adequately, since components can fail and cause death-dealing voltages to appear at unexpected places. The best reliance you can put anywhere is on the development of personal safety habits. And if you're unwilling either to make your apparatus safe or to train yourself to safe habits, it seems to us that the least you can do for your family is to run a piece of rope out into the clear from your main switch and show them how to operate it. Then when they find you sizzling on your power supply they can at least pull you out without killing themselves too.

Don't say it can't happen to you. If modesty ever becomes a man it is in this matter. It has happened — too often — to our best people, in our best-appointed stations. These things are always accidents; remember that. Maybe the operator was careless — but you could be, too. Maybe the circuit was normally safe but just then a filament transformer's insulation broke down or a blocking condenser let go — but do you think your parts are sacred against breakdown just because they belong to you? We must also remember that we amateurs do the craziest things. In a station we visited recently the power-control relay was mounted on the transmitter rack. When the operator changed balky plate coils without killing the rig he had to wrestle the whole rack so violently that that relay was in constant danger of closing and putting 2500 volts on his hands. Making some alterations at our own control position the other night we discovered an old prewar push-to-talk cord rolled up and tucked behind the desk panel, still connected in parallel to the control switch. It was so old that its insulation was flaking off and at the first touch it shorted and put the transmitter on
the air. Out of sight, we had missed it completely in our postwar overhauling and there it lurked, an unexpected mantrap. Our "heaps" are full of such things.

After all, when all the construction codes and all the conduct codes in the world are complied with, you still aren't safe, simply because the unexpected can happen. Our history records all too tragically that it does happen. The ABCs of safety are summarized in the words Always Be Careful and there is only one really safe rule for accomplishing it: always kill the transmitter completely and test the filter bleeders before touching anything behind the panel. The only safe transmitter is a dead transmitter. Even if it does take a few seconds more, a little time isn't worth anything to you if you're stretched out in a box. Dead rig, live ham — and you don't want to be a baked one. When there is no power on the rig and no energy in the filter condensers, it can't hurt you. Under all other circumstances, it should be regarded as dangerous and treated accordingly.

Hence that warning picture of a switch, and its accompanying slogan, that you see so often in QST. They represent the fundamentals of this matter. We urge you to switch your thinking and your tinkering habits. Make it a rule to switch off the power — all the power — every time. "Switch to Safety!"

25 Years Ago

"TIME for action, 10 P.M." . . . but perfect quiet on the air nightly from 7 until this hour! Thus we learn from April 1923 QST of the ARRL Board's request for voluntary observance of quiet hours. This, it is planned, is to be amateur radio's contribution to "Unscrambling the Eggs" laid by the failure in Congress of the White-Kellogg radio bill, which had been counted on strongly to bring order to the ether and peace between radiophone listeners and amateurs.

The Board had a busy session at its annual get-together, which was held in Chicago this year. Meeting the needs of our rapidly-growing number in the Dominion, a new office was created, to be known as Canadian General Manager. Director W. C. Duncan, 9AW, Toronto, was elected to fill the post. Also taken up at this time was the awarding of the second Department of Commerce Hoover Cup for the best all-around American amateur station of 1922. The Board's committee of judges named as winner Spark 2OM, station of F. B. Ostman, Ridgewood, N. J.; runners-up were 2FZ and last year's winner, 5ZA. Especially revealing is the report to the Board of Traffic Manager Schnell, which shows League field-organization personnel up 400% and c.w. stations handling 72% of all traffic.

Professor L. A. Hazeltine's neutrodyne circuit, described in the leading technical article this issue, is acclaimed by the Editor. Great promise is held for this arrangement which features tuned r.f. coils and neutralization of the stray capacitance existing between stages, the latter condition previously causing troublesome oscillation. In another receiver article, O. A. Kimball, 9RY, tells of his experiences in "Building a Super-

Silent Keys

IT is with deep regret that we record the passing of these amateurs:
W2PXP, ex-W8OCY, Ralph Jennings, Elmira, N. Y.
W2RJI, ex-W8HQR, Harold A. Smith, Cortland, N. Y.
Ex-W3FZD, James Newby, Bryn Mawr, Penna.
W3GXX, D4APU, First Lt. Alvin C. Manious, USAF, Hagerstown, Md., Munich, Germany
W3KX, Dr. J. F. Kelley, Scranton, Penna.
W5AMZ, John M. Shaver, Sr., Opelousas, La.
W6FAM, Thurston W. Berger, Santa Ana, Calif.
W6NDD, Oscar W. Ericson, San Diego, Calif.
W6SET, Alvin A. Beal, Fontana, Calif.
W7BUF, Merwin Moller, Myrtle Point, Ore.
W8CLC, Frank M. Tarbox, Dunmore, Penna.
Ex-W8DLM, E. Johnson, Rochester, Mich.
W8GLJ, James J. Quinlan, New Philadelphia, Ohio
W8UAZ, Lt. John J. Gerrity, Scranton, Penna.
W9DQA, Burton Robertson, Adams, Wis.
W9FCN, Elmer D. Sweeney, La Grange, Ill.
W9MXG, Lester L. Varner, Seward, Nebraska
PK3JK, J. G. Koerstz, Soarabaya
VE3ALZ, Edward Rendall, Toronto, Ont.
VE8WC, William H. Collins, Medicine Hat, Alta.
VP9R, Alfred Redman, St. George

(Continued on page 180)
Selectable Single-Sideband Reception Simplified

The "Simple Simon" Adapter Unit

BY J. L. A. McLAUGHLIN

This, says the author, is the ultimate simplification of selectable single-sideband reception. It would be hard to disagree, inasmuch as it is a gadget with only three tubes. But it can do an outstanding job in making life in a 'phone band more livable.

We were certainly not prepared for the deluge of letters from amateurs asking for more dope on the selectable single-sideband adapter unit described in our article in the October, 1947, issue of QST.¹ No constructional information was given in that article because the special i.f. transformers and rejector parts were not available. Even if they had been, very few amateurs would have had the necessary laboratory equipment to adjust the 50-ke. bandpass amplifier. The correct adjustment of overcoupled transformers such as these is a ticklish job at best. The fact that this war equipment happened to be more complicated than conventional i.f. systems has led many to the belief that selectable single-sideband reception requires a laboratory-type instrument. Such is not the case, however, as the following will show.

This sudden interest in increased selectivity, brought about by the ever-increasing congestion of the amateur bands, is a very healthy sign and very gratifying to me. I've been preaching this very thing for over ten years with no takers. There is no trick to getting high selectivity.

However, brute-force selectivity (cascade amplifiers) in itself is not going to solve the problem, particularly in 'phone reception. What is required is the type of selectivity characteristic outlined in an article written by Carl Miles and myself in the November, 1937, issue of QST,² which stated in part:

"Our present method of obtaining extreme high i.f. selectivity with transformer coupling consists fundamentally of cascading resonant circuits using high-Q coils in sufficient number to achieve reduction of unwanted signals at some predetermined number of kilocycles either side of the resonance frequency. The resultant selectivity curve is roughly triangular in shape, the apex occurring at resonance frequency."

"It is obvious, then, that if we are going to achieve noteworthy improvement in the elimination of unwanted interference by means of extreme selectivity and yet retain a bandwidth at the nose adequate for intelligible 'phone reception, we must attack the problem of providing a selectivity characteristic radically different from the ones we are now using. The ideal shape, of course, would be rectangular rather than triangular. To achieve this desired rectangular shape, we will have to go to some other method than the one of cascading resonant circuits using high-Q coils with present conventional couplers."

Keep this in mind — it's important! The result of this thinking led me to the development of selectable single-sideband reception (for brevity, hereafter referred to as "s.s.s.r." for improved freedom from interference. What we need is a fairly rectangular-shaped response curve with a flattened nose just wide enough for intelligible speech. The required bandwidth for s.s.s.r. will be only half as great as for ordinary double-sideband reception.
reception, for the same received intelligibility. Just how narrow this speech bandwidth can be made while still retaining intelligibility will vary with the individual, but it seems to me that a couple of kilocycles of audio is needed to carry on telephone communication—for example, the range from about 300 to a little above 2000 cycles. This does not mean that the nose of the curve must be 2 kc. wide. We have found that if the carrier is now down over 70 db. As we get closer to the carrier frequency we naturally experience less attenuation. Low-frequency heterodynes that are but slightly attenuated in the bandpass (below, say, 300 cycles) can be eliminated in the audio circuit; this can be done by using a high-pass filter having high attenuation to frequencies below 300 cycles. A simple way to achieve this is to use a 0.001-µfd. coupling condenser between audio stages (for example C11, Fig. 2). This low-frequency filter not only removes undesired low-frequency beat notes, but makes speech sound more natural by attenuating the "lows" in proportion to the "highs." It will also take out a great deal of noise, together with 60-cycle hum.

Fig. 1 - Comparison of double- and single-sideband curves, using passbands that give the same intelligibility in both cases. A - double sideband; B - single sideband; C - effective selectivity to off-frequency heterodynes obtainable with curve B when the heterodyne appears in only one sideband.

set from 2 to 5 db. down on the cut-off side of the bandpass, a width (at this level) of but 1 kc. will give the desired audio response.

The advantages of single-sideband response over double-sideband response are illustrated in Fig. 1. Fig. 1-A represents a double-sideband response curve with a 2- kc. bandwidth at 5 db. down. This represents roughly the maximum selectivity we can use for decent speech reception. At the edge of this necessary intelligence band, off-frequency carriers will be highly attenuated because of the long narrow skirts of this curve. Such a curve will free the receiver of all high-frequency heterodynes down to, let us say, 2000 cycles. Attenuation of lower-frequency heterodynes will require greater selectivity. As we have stated before, this just cannot be done without loss of intelligibility.

To get rid of heterodynes lower in frequency than 2000 cycles, s.s.s.r. must be employed.

Fig. 1-B shows an s.s.s.r. curve capable of the same intelligibility as Fig. 1-A although the selectivity at the nose has been cut in half to but 1 kc. On this theoretical curve, 2000 cycles on the suppressed-sideband side (the low-frequency side) about 75 per cent of the time. But even when heterodyne interference is present on both sides of the desired carrier 50 per cent of this effective selectivity is still retained.

Basic Circuit Requirements for S.S.S.R.

Three things are necessary for achieving s.s.s.r.:

1) A bandpass amplifier having a bandwidth just sufficient for one sideband.

2) A carrier locator—a tuning system suitable for locating the carrier at the correct point in the bandpass.

3) A sideband selector (double-oscillator sideband inverter).

The first two can be achieved in a number of circuit combinations. In my earlier system the bandpass was made quite broad (4 kc.) at the nose because the equipment was used for intercepting Japanese speech transmissions. Since the Japanese language contains many words with hissing sounds (high audio frequencies) this broad band was necessary. A sharply-tuned 50-kc. amplifier with a tuning meter at its output was used to meet the second requirement. The third was, of course, the tuning system...
Fig. 2 — Circuit diagram of the “Simple Simon” adapter unit for selectable single-sideband reception.

C1, C2, C3, C4, C5, C6, C10, C12 - 0.01-pf'd paper, 400 volts.
C5 - 0.1-pf'd paper, 400 volts.
C7, C8 - 0.001-pf'd mica.
C11, C14 - 25-µf'd mica (10-per-cent tolerance).
C13, C15 - 20-µf'd electrolytic, 450 volts.
R1, R2 - 0.47 megohm, ½ watt.
R3 - 470 ohms, ½ watt.
R4, R14 - 22,000 ohms, ½ watt.
R5 - 1000 ohms, ½ watt.
R6 - 10,000-ohm potentiometer.

R1, R13 - 47,000 ohms, 1 watt.
R6, R15, R18 - 0.1 megohm, ½ watt.
R9 - 47,000 ohms, ½ watt.
R11 - 0.5-megohm potentiometer.
R13 - 2200 ohms, 1 watt.
L1 - 1 millihenry.
L2, L3 - 100 millihenries.
L4 - 8.5 henrys, 50 ma. (Merit A-2981).
S1 - 4-pole 3-position anticaepacity switch.
S2 - S.p.s.t. toggle.
T1, T2 - 50-kc. i.f. transformer. (Type 1898-A or 1898-AX. See note.)
T3 - Power transformer, 240 v. at 40 ma., with 5- and 6.3-volt windings (Merit P-2949).
XTALs - 405 to 406 kc., and 505 to 506 kc.
Exact frequency is not important, but the difference between the two frequencies chosen should be 100 kc. plus or minus about 100 cycles.
The crystals shown in the photograph are Bliley SR-10 units.

Note: The i.f. transformers are not yet directly available from coil manufacturers, but can be obtained in limited quantities from the author.
course, met by our double-oscillator sideband inverter. 3

The second requirement can be satisfied in many ways, either by tuning meters (amplitude or frequency discriminators) or by aural means. In our last article we used a combination aural system which consisted of first making the bandpass quite narrow and peaked to the carrier, and then beating the two oscillators together to produce zero beat at 50 kc. A third method which has been built into several experimental models has automatic sideband switching. This system 4 automatically switches the sideband as the tuning knob is rocked over the correct carrier position, and results in a very sharp "feel" to the tuning—something like the curve of Fig. 1-C.

Simplified S.S.S.R.

Now to get to the meat of this article. How simple can a s.s.s.r. equipment be and still meet the three basic requirements? Fig. 2 shows the circuit diagram of a small adapter unit that will do the trick. The circuit is quite simple. There are no complicated parts and any amateur should be able to build the unit and get it working in a couple of evenings. It can be connected to any receiver with 455/6 i.f. without any changes in the receiver. It is only necessary to run a wire from the input of the adapter to the plate of the detector diode in the receiver (or to the "hot" side of the last i.f. transformer secondary circuit). You do not have to get into the bottom of the receiver to do this. Just pull out the second-detector tube, wrap an insulated wire once or twice around the diode plate pin, and put the tube back in the socket as suggested by Byron Goodman in his "Lazy Man's Q5'er" in January, 1948, QST. The audio output of the adapter can be fed back to the final audio output tube through the phone jack on most receivers. This gadget is so simple it has been nicknamed "Simple Simon" (for "single sideband").

Two problems, in the past, prevented us from reducing s.s.s.r. to amateur needs. One was obtaining suitable crystals for the sideband inverter at a decent price. The only suitable units we could get, up to a year ago, cost $37.50 each. Since two were required, $75 for two crystals surely would have discouraged most hams. This situation no longer exists; suitable crystals at

\[ \text{New to get to the meat of this article.} \]

\[ \text{How simple can a s.s.s.r. equipment be and still meet the three basic requirements?Fig. 2 shows the circuit diagram of a small adapter unit that will do the trick.} \]

\[ \text{The circuit is quite simple. There are no complicated parts and any amateur should be able to build the unit and get it working in a couple of evenings. It can be connected to any receiver with 455/6 i.f. without any changes in the receiver.} \]

\[ \text{It is only necessary to run a wire from the input of the adapter to the plate of the detector diode in the receiver (or to the "hot" side of the last i.f. transformer secondary circuit).} \]

\[ \text{You do not have to get into the bottom of the receiver to do this. Just pull out the second-detector tube, wrap an insulated wire once or twice around the diode plate pin, and put the tube back in the socket as suggested by Byron Goodman in his "Lazy Man's Q5'er" in January, 1948, QST.} \]

\[ \text{The audio output of the adapter can be fed back to the final audio output tube through the phone jack on most receivers. This gadget is so simple it has been nicknamed "Simple Simon" (for "single sideband").} \]

\[ \text{Two problems, in the past, prevented us from reducing s.s.s.r. to amateur needs. One was obtaining suitable crystals for the sideband inverter at a decent price.} \]

\[ \text{The only suitable units we could get, up to a year ago, cost $37.50 each. Since two were required, $75 for two crystals surely would have discouraged most hams.} \]

\[ \text{This situation no longer exists; suitable crystals at} \]

\[ \text{these frequencies can be obtained from most crystal manufacturers for a fraction of this price. And, if you are lucky, you can get surplus Signal Corps tank-set crystals for a total of less than} \]

\[ \text{two dollars for the pair. Another headache we had to overcome was to find a manufacturer to make up 50-kc. i.f. transformers suitable for a ham job. That problem has also been licked.} \]

\[ \text{T1 and T2 are compact 50-kc. i.f. transformers critically coupled. This means that alignment is straightforward. You just tune them on the nose.} \]

\[ \text{The business of satisfying the second basic requirement (aural tuning) has been met by a simple juggling of circuit values and requires no additional transformers or tubes.} \]

Alignment & Operation

In setting up the adapter circuit shown in Fig. 2, the first thing to do is to align T1 and T2 to 50.5 kc. This is done with the switch in the center position ("upper sideband"). The response curve should then look like B in Fig. 3; the response at 50 kc. should be about 5 db. down. 5

After this is done, throw the switch to the left ("tuning") and you should then automatically get curve A. What has taken place is that T2 has been retuned to 49.5 kc. and this (plus T1, which
is still tuned to 50.5 kc.) results in a sharp-nosed curve ideally shaped for aural carrier tuning peaked at 50 kc. This double-sideband tuning position can be used for normal operation. Its selectivity is high enough to attenuate most high-frequency heterodynes lying above 2000 cycles.

When the going gets tough and the off-frequency carrier gets in closer so that the beat note drops to 1000 or even 500 cycles, then is the time to switch to one of the single-sideband positions. One of the positions should knock out the heterodyne. When in one of the single-sideband positions, rock the tuning control very slightly. If the heterodyne persists, switch to the other sideband and again rock the tuning control slightly. If nothing happens, go back to the tuning position again and try tuning a little more carefully. It may take a little time to get used to this high-selectivity “edge” tuning as compared with tuning your regular receiver. Keep in mind that for maximum rejection we have to climb up slightly on the low-frequency side of curve B, Fig. 3, to a point about 5 db. below the peak. That is why we need the sharply-peaked tuning position to locate this point accurately.

This aural tuning and switch system is the fastest and best-operating system used so far. However, it will not tune itself. To make it effective and usable one must learn to tune carefully and accurately to within a hundred cycles. The hand that turns the knob must be connected to something brighter than a Mortimer Snerd!

A final — and important — operating note: Be careful not to overload the “Simple Simon.” With the audio gain control full on, adjust the receiver coupling to the minimum required to produce an audio output a little less than the normal gain of your receiver. Unless this is done it will be impossible to realize the full benefits of single-sideband selectivity.

**Circuit Notes**

One of the problems encountered in low-frequency i.f., not experienced at 455 kc. and higher frequencies, is that of filtering out the r.f. at the output of the last detector. Some sort of low-pass filter is needed because the ratio of carrier frequency to audio frequency is very low, and the condenser-resistor tricks used at 455 kc. do not work. That is the reason for the somewhat elaborate-looking filter between the detector and audio stage in Fig. 2.

In s.s.s.r. the fact that we set the carrier down 5 db. from the peak of the curve results in an emphasis of the higher audio frequencies. To correct this response a 0.01-µfd. by-pass condenser, C10, is shunted across the audio output of the detector (see Fig. 2).

This adapter can be used with receivers with an intermediate frequency other than 455/6 kc. All that is required is to obtain crystals of frequencies equal to your i.f. plus and minus 50 kc. We have found that some of the lower-frequency crystals (405.5 kc.) do not oscillate as readily as the higher (505.5 kc.). In such cases it will be necessary to use the spare contacts on the sideband switch to throw in a separate oscillator plate tuning circuit to replace the 1-mh. coil used. This may be done by switching in a suitable condenser across the 1-mh. coil, or by using a separate coil with a small trimmer across it.

The output jack of the adapter should be connected through a short cable to the grid of the power audio stage. This was easy to do with the receiver we used, a Hallicrafters S-40, as the grid comes out to the tip side of the 'phone jack and all we needed to do was to push the plug in far enough to touch this contact without opening the jack circuit. However, if this is not possible on your receiver, pull out the power-amplifier tube and wrap the bare end of the wire around the grid pin and push the tube back into its socket. If higher audio gain is needed, it can be obtained by using a high-µ triode, with appropriate circuit constants, instead of the 6SN7GT section shown in the circuit diagram. In that event the spare 6SN7GT section could be used as a b.f.o.

The audio control of your receiver must naturally be turned to minimum when the s.s.s.r. adapter is in use. In some receivers strong heterodynes may still leak through when the gain is at minimum. In such cases it will be necessary to disable the first audio tube in some manner. One simple way would be to open the plate voltage to this tube by a switch on the front panel.

The “Simple Simon” represents the ultimate simplification for s.s.s.r. Its sideband suppression is about the same as that of our original 1941 model.\(^6\)

---


April 1948
An inspection of amateur two-way records above 50 Mc. indicated that the 1215-Mc. band had not been fully exploited. The lack of operation on this band probably results from the fact that little if any of the surplus material available can be converted to this frequency range. With this situation in mind, it was thought desirable to investigate the possibility of building a suitable transmitter.

The complete 1215-Mc. oscillator built by W3HFW and W3MLN has a high-gain antenna system built in. The tube and tank circuit are completely shielded, the antenna projecting below the ground-plane base.

There are four types of oscillators usable in the 1215-Mc. band: the klystron, the magnetron, the lighthouse tube with a coaxial resonator, and the doorknob or acorn tube with a linear tank circuit. The first two were not available, and the third appeared difficult to construct, so the fourth was left for consideration. A review of tube characteristics indicated that the 368A, 703A and 6F4 should all be satisfactory in this band. The 6F4 acorn tube was ruled out because of low rated output (45 milliwatts) and very few 368As were seen on the surplus lists. A few 703As were obtained, and after some experimenting, a successful oscillator was constructed. An output of about 1 watt was obtained with an input of 80 milliamperes at 350 volts. Admittedly this is low efficiency, but the output is sufficient to provide good results with the high antenna gain readily obtainable at such high frequencies. The oscillator and antenna are built as one unit, which has the great advantage of being easy to construct; no machining is required.

**Construction**

The oscillator consists of a single 703A triode connected to an open-ended transmission line whose electrical length is a half-wave. The schematic diagram is shown in Fig. 1. The antenna, which may be considered part of the oscillator circuit, is a folded quarter-wave with ground plane and corner reflector. The antenna is mounted directly on the bottom surface of the ground plane, as shown in the photograph of the complete assembly. Capacitive coupling is provided by a probe extending through the ground plane and into the transmission-line shield can near the plate rod. The probe and the open end of the transmission line appear in another photo which shows the oscillator assembly de-

---

Fig. 1 — Schematic diagram of the 1215-Mc. oscillator.

---

* Department of Electrical Engineering, Pennsylvania State College, State College, Penna.
attached from the ground plane. The extra holes in the ground plane near the probe are for ventilation. The upper end of the transmission-line shield can and the tube ends of the plate and grid rods are shown in detail in a third photo. The plate and grid pins of the tube plug into the holes in the ends of these rods, a fourth photo showing the 703A oscillator in position but with its shield removed.

It should be emphasized that complete shielding of the oscillating circuit (which includes the tube elements themselves) is essential at these frequencies. The circuit will not oscillate at all if the plate and grid rods are removed from their can. Without the tube shield very little grid current is obtained.

The detail drawing, Fig. 2, gives all of the necessary dimensions. The transmission lines are made of brass rod; they should be cut to the exact size shown. The holes in the ends of the rods are drilled somewhat off-center so that a slight rotation of the rods will permit adjustment to allow easy entry of the tube pins. The holes in the bakelite support are cut small so that a tight force-fit is obtained. It is not advisable to substitute polystyrene or Lucite for the bakelite because of the high temperature attained by the rods. The 47-ohm grid and plate resistors are soldered to the rods on the tube side of the bakelite. The feed-through Ceramicons, C1, C2 and C3, are helpful in preventing radiation, but are not absolutely necessary. If they are not available, the plate, grid and filament leads can be run through the transmission-line shield can by means of small feed-through insulators.

One filament lead is returned to ground through the choke L1 which must be trimmed as explained later. The other filament lead passes through the top of the transmission-line shield can and connects directly to the inside terminal of C3. The filament-pin connectors were made from the contacts of a female A-N connector.

Adjustment

After the oscillator is finished the tube can be plugged in with the tube shield omitted. The filament circuit is connected, and R4 is adjusted for 4.5 amperes of filament current, or 1.15 volts a.c. at the tube pins. If a meter is not available, adjust R4 until the filament is a bright yellow, or nearly white. Next connect a milliammeter in series with R3 and apply 350 volts to the plate circuit. Some grid current should be indicated, while the plate current should be between 60 and 90 ma. If the plate current is low, try increasing the filament current.

The next step is to ground different turns on L1 until the maximum grid current is obtained. When the proper turn has been found, as indicated by a grid current of 10 milliamperes or so, a permanent ground can be made directly to the shield can under L1. The adjustment of L1 is critical, since it controls the magnitude and phase of the feedback.

When the tube shield is mounted a substantial increase in grid current should be obtained. If so, the oscillator is ready for connection to the antenna. A convenient output indicator can be constructed by connecting a 2-volt 60-milliampere pilot light in the center of a half-wave antenna (5 inches long). Place the antenna assembly on a flat surface with the probe pointing up. Put the transmission-line shield can over the probe, resting on the ground plane, so that the probe is between the plate rod and the transmission-line shield. With the output indicator placed about one foot in front of the antenna move the oscillator so that the plate rod approaches the probe. When maximum output is obtained, mark the position of the oscillator and fasten it to the ground plane by

### April 1948

![Image of oscillator and ground plane separated. Capacitive coupling between the antenna and tank circuit is provided by the probe which projects above the ground plane.](image-url)
means of spade lugs. The oscillator with its antenna is then ready to go.

**Operation**

Two oscillators of this type were constructed, and power supplies and modulators from small low-frequency rigs were used. For portable operation, 300-watt 115-volt 60-cycle gasoline-driven generators were used. The receivers were superhets acquired as war surplus, one Type APR-4 and one Type APR-5. The antenna system used for receiving was a folded quarter-wave radiator and ground plane built on a coaxial-cable connector. The height of the antenna is 2½ inches and the ground plate is a piece of aluminum 6½ inches square. Any conveniently-sized plate with its smallest dimension greater than a half-wave should be satisfactory.

In the initial tests, one transmitter was located on the roof of a building and put into operation with a constant tone modulation. A receiver was then carried to several locations and reception was attempted. At five miles good signal strength was still found, and consequently it was decided to try for a record at a much greater range.

For the second test, one set of equipment was located on the side of a mountain, at an elevation of about 1900 feet. The other set was located 12½ miles down the valley at an elevation of about 1000 feet. At this distance the signals were still Readability 5, Strength 9, with slight ignition noise. It is felt that a much greater distance could have been covered had the proper location been available, but the topography was such as to prevent further tests without prohibitive intervening obstructions. Arthur Benner, W3MEM, provided valuable assistance during these tests.

It is interesting to note that over short distances good signals were heard regardless of intervening obstacles. The 1215-Mc. band is definitely not out of reach of the average v.h.f. enthusiast, nor is it limited to next-door contacts.

**About the Authors**

* Peter G. Sulzer, W3HFW, and Charles R. Ammerman, W3MLN, are both graduates (B.S. in E.E.) of Pennsylvania State College, in 1947 and 1943 respectively. Both are at present connected with this institution, W3HFW working on ionospheric measuring equipment and W3MLN teaching in the Department of Electrical Engineering. Both are interested in v.h.f. experimental work in connection with their hamming, and W3MLN handles quite a bit of traffic at W3YA, the famous station at Penn State.
Selectivity in S.S.S.C. Reception

A Balanced Frequency-Converter Circuit for Communications Receivers

BY OSWALD G. VILLARD, JR.,* W6QYT

The advantages of single sideband over normal amplitude modulation from the standpoint of transmission — i.e., the savings in power, tube capacity, bandwidth, etc. — have been known and understood for many years. However, the fact that single sideband has equally important advantages from the standpoint of reception, at least in amateur work, seems so far to have been overlooked, for it turns out that a shift to single-sideband transmission and reception makes possible a remarkable increase in the effective selectivity of existing receiving equipment — an improvement difficult to achieve in the case of double-sideband transmission without an undesirable increase in cost and complexity. With relatively little difficulty, the amateur can convert his existing receiver for single-sideband reception, and obtain performance rivaling that of the finest commercial installations.

It is the purpose of this article to review the mechanism of detection both in the case of double- and single-sideband reception. The way in which the shortcomings of double-sideband detection can be circumvented by single sideband will then be outlined. It is pointed out that while some of the advantages of single-sideband detection can be realized with unmodified standard communications receivers, a great improvement can be obtained through addition of a simple external single-sideband detector and low-pass audio filter.1

The fact that single-sideband transmission makes possible a 50-per-cent saving in transmitted bandwidth is almost academic when considered in the light of the effective selectivity of present-day receivers. It is all very well to halve the spectrum occupied by the transmitter, but if the receiver doesn't show the difference nothing has been gained.

Selectivity

To clarify the concept of selectivity in the case of conventional detection, it is helpful to consider a specific case. Suppose one is listening to a station that is very weak — perhaps one microvolt across the receiver input terminals. For a given i.f. gain, a certain voltage is delivered to the diode detector. Now what we wish to do is to prevent any station on any other frequency from delivering a signal of approximately equal strength to the detector. It is a characteristic of linear detection — or rectification, as it is sometimes called — that if another signal, no matter how far it may be separated in frequency from the one being listened to, does get through at the same strength, it will also be rectified and the modulation on it, as well as the modulation on the desired signal, will be heard. The two signals may actually be so far apart in frequency that the beat between the carriers is inaudible, yet both modulations will be heard if the two signals are of roughly equal strength at the detector.

Now it is an inherent characteristic of linear diode detectors that if either signal becomes two or three times as strong as the other, the modulation on the weaker tends to be completely suppressed. This is a well-known property.2 It is a desirable one, in point of fact, because it means that the effective selectivity of a receiver with a linear detector — for double-sideband reception — is actually greater than that of the receiver's i.f. circuits alone.

However, suppression of the weaker signal can be very annoying if that signal happens to be a weak DX station, say some five or ten kilocycles away from a strong local. When the local comes on, the DX signal disappears. All that comes out of the loudspeaker is the local's voice. Yet the DX signal is still being received; the suppression effect has simply taken him out.

In order to set up some performance specifications for an "ideal" ham receiver, we might consider what sort of selectivity problem we are actually up against. It is clear that the ideal receiver is one that will receive a barely audible signal without interference on one channel, while the loudest signal we would normally expect to encounter is blasting away on the channel im-

---

1 In a subsequent article a method of improving the performance of this simple arrangement will be described, and complete details of a practical embodiment of the method will be given.

We know that the weakest signal we can receive is approximately one microvolt. To find the strongest signal we are likely to have to reject (locals around the corner excepted) it is necessary to do some estimating, and estimates based on propagation factors as well as actual experience show that the ratio of strongest signal received to weakest signal received may occasionally exceed 1000 to 1.

Now the question is, how much frequency separation is necessary between a 1-microvolt desired signal and a 1000-microvolt undesired signal, in order for the latter to be attenuated down to the 1-microvolt level? The answer will be found in published receiver selectivity curves.

For the Super-Pro receiver, which has four i.f. tuned circuits, the response is down 1000 times at plus or minus 8 kilocycles from the center of the passband for the narrowest setting of the "band-width" control. For the NC-200 receiver, which has three i.f. tuned circuits, the response is down 1000 times at plus 11 or minus 10 kilocycles.

Other communications receivers will, in general, fall in the same range.

This means, then, that if we are listening to a 1-microvolt DX signal, the nearest 1000-microvolt interfering signal must be at least 8 kilocycles away in one case, and 10 to 11 kilocycles away in the other case, in order for both DX and undesired signals to be of equal strength at the second detector. When both signals have equal strength, both stations will be heard; for the undesired signal to be eliminated completely, it must be attenuated still further, until it is less than \( \frac{1}{4} \) or \( \frac{1}{16} \) as strong as the desired signal.

The tendency for a strong adjacent station completely to blot out the one to which we are listening is familiar to everyone, and is the reason for the desirability of extra i.f. selectivity such as is provided by arrangements like the Q5-er. Without such extra selectivity we cannot make full use of the frequency space now available to us.

**Single-Sideband Detection**

The situation is quite different in the case of single-sideband reception, because a fundamentally different process of detection is used. S.s.s.c. or c.w. signals are detected by frequency conversion, rather than by rectification. Here it is helpful to review some theory. A single-sideband voice signal may be thought of as a band of frequencies simply displaced in the frequency spectrum. To each of the frequencies present in the voice wave, a constant frequency is added. Thus a speech sound, which might consist at some instant of three component frequencies — e.g., 500, 1000 and 2500 c.p.s. — can be translated into the radio-frequency spectrum by adding a constant 1,000,000 cycles per second to each component. We then have three new frequencies, namely 1,000,500, 1,001,000 and 1,002,500 cycles per second, forming a voice single sideband which can be transmitted by radio. A single-sideband transmitter, then, is fundamentally a frequency-translating device which shifts the incoming speech frequencies to the desired position in the radio-frequency spectrum.

To receive these signals, it is only necessary to reverse this process: by subtracting the constant frequency of 1,000,000 cycles we can recover the original speech frequencies of 500, 1000 and 2500 cycles.

Note that the reception of code signals is carried out by a very similar process. Assume an incoming keyed c.w. signal of 1,000,000 cycles per second. If we subtract exactly 1,000,000 c.p.s., what we have left is, of course, zero frequency, or keyed d.c. In actual practice, something like 999,000 cycles per second is subtracted. The c.w. signal is thereby translated to a frequency of 1000 c.p.s., which, when amplified and fed to a loudspeaker, is heard as an audible tone.

Now, frequency conversion, in reception, is a process with which everyone is familiar. For code reception in the ordinary receiver, the frequency conversion is actually done in two steps: the local oscillator converts the incoming signal to the i.f. frequency; and the beat oscillator, in conjunction with the second detector, converts the i.f. frequency down to an audio frequency. For either c.w. or single-sideband voice reception, the usual diode second detector could equally well be replaced by a 6L7 or 6AS converter tube. For both types of transmission we are interested in frequency conversion — nothing else. We do not want any normal rectification to take place, particularly in the conversion at the second detector, because this rectification would permit the modulation on undesired amplitude-modulated signals to be heard along with the desired signal resulting from the frequency-translation process.

**Overcoming Rectification Effects**

One way to suppress the spurious signal resulting from rectification is to make the voltage injected by the beat-frequency oscillator very strong in relation to the incoming r.f. signals. In the ordinary communications receiver the amplitude of the b.f.o. voltage is fixed, and the only way to make it strong in relation to the incoming signals is to weaken the latter. This is why it is always recommended that a.f. gain be on full and r.f. gain be kept at a minimum for single-sideband reception. Under these conditions the audio output resulting from rectification of the incoming signals is small compared to the audio output resulting from the beat between the desired single-sideband signals and the b.f.o.

However, even then the rectified audio is unfortunately not negligible. The usual diode second detector is designed as a rectifier rather than as a
pure frequency converter, and its use in the latter service is a compromise. It is generally considered that the audio output attributable to rectification is negligible in comparison with the desired output when the incoming signal voltage is roughly one-tenth as strong as the local-oscillator voltage. When this ratio is achieved by reducing i.f. gain in the ordinary communications receiver, the audio output from the detector is down quite a bit and the reserve audio gain may not be able to compensate for the loss.

Furthermore, it often happens that although the c.w. or single-sideband signal one is listening to is only one-tenth as strong as the local oscillator, an interfering signal on an adjacent channel may be one-half or one-third as strong. It will therefore be rectified, giving rise to interference that will be equally bad no matter how far the carrier frequency of the interfering signal is separated from that of the desired signal.

An objection to running a receiver at reduced r.f. gain is the resulting reduction in signal-to-noise ratio in the first r.f. stage, unless the set happens to be one in which this stage operates at full gain all the time.

Of course, it is possible to use the opposite approach and increase the amplitude of the injected b.f.o. voltage while keeping the r.f. gain normal. This procedure is to be recommended, but it can only be carried to the point at which the second detector overloads.

For these reasons, it is hard to get the full benefits of single-sideband reception in QRM reduction when using a conventional receiver with b.f.o. But it is not difficult to build an external frequency-converter unit (or detector unit), especially designed for single-sideband reception, which can be added to any communications receiver. The method of operation of such a unit is somewhat different from that of ordinary converters, so here we must digress a moment to review some more theory.

**Frequency Conversion vs. Rectification**

There are two basic ways in which frequency conversion may be carried out. In the first, the incoming signal is linearly added to the oscillator voltage, and the combination is rectified in a diode detector. It will be found that the envelope of the combination pulsates at a frequency which is the difference between that of the incoming signal (or signals) and the local oscillator. Since a diode detector follows the envelope variations, the audio output is the desired difference frequency. This is how the b.f.o.-second-detector frequency conversion works. In the second method, the local oscillator modulates the incoming radio-frequency signal, thereby setting up two sidebands whose frequencies are the sum and difference of the incoming and oscillator frequencies. The lower sideband, or difference frequency, is the desired audio signal. The 6L7 converter tube, for example, works on this principle: the local oscillator simply suppressor-grid-modulates the signals being carried from the control grid to plate by the electron stream. The 6L7 is essentially a modulated amplifier.

In a modulated-amplifier converter where we are changing the incoming frequencies down into the audio range — instead of into the i.f. range as in most receivers — we must avoid distortion that would cause partial rectification of the incoming signals and thus produce undesired a.f. output.

As an amplifier, therefore, the 6L7 must be very linear. The best way to keep nonlinear distortion low in any amplifier is to restrict the amplitude of the incoming signal. But where such a restriction is impractical, as is the case if the frequency converter must operate at a fairly-high signal level, it is possible to use the expedient illustrated in Fig. 1 — the push-pull or balanced frequency converter.

![Balanced frequency converter for single-sideband reception. This circuit substitutes for the conventional rectifier (usually a diode) serving as a second detector in a superhet receiver.](image)

*C1, Cs, Cr — 0.0022 µfd.*
*C2, Cs — 50-µfd. electrolytic, 25 volts.*
*C4 — 0.01 µfd.*
*C5 — 0.1 µfd.*
*R1 — 35,000 ohms.*
*R2 — 15,000ohms.*
*R3 — 500-ohm variable.*
*R4, R5 — 10,000 ohms.*
*T1 — l.f. transformer with center-tapped secondary (coupled to beat oscillator).*
*T2 — Audio transformer; push-pull primary capable of carrying about 10 ma.*

In push-pull so far as their outputs are concerned, the tubes are connected carrying about 10 ma.
Actually, the rejection of the unwanted signals cannot be absolutely complete because of the presence of third-order distortion which is not affected by the push-pull connection. However, remote-cutoff tubes such as the 6K7 and 6L7 are especially designed to have low third-order distortion, and their use makes possible a rejection which is quite adequate in practice.

Adjusting for Balance

The correct “balance” of the balanced detector circuit may easily be found. An ordinary modulated signal is applied to the detector, and the beating oscillator is either turned off or, preferably, is detuned so far away from the signal that any beats between it and the signal are above the limit of audibility. Then the amplitude of the signal is increased until the modulation on it just begins to be heard — in other words, the signal just begins to ride through. Disregard any distortion. To balance the detector, the cathode balancing resistor in Fig. 1 is adjusted until the audio output is minimum.

A balanced detector of the type shown in Fig. 1 may easily be added to any standard receiver without disturbing normal operation in any way. A cathode follower will serve to couple energy from the last i.f. stage of the receiver to the external adapter. An external beating oscillator must be provided, however, and likewise a separate audio amplifier, unless the output of the single-sideband detector is fed back into the set’s audio system in some way.

In actual operation, a detector of this sort makes possible an enormous improvement over single-sideband reception by means of either a separate r.f. oscillator (for example a BC-221 or LM-8), or the set’s own b.f.o. It is no longer necessary to keep the i.f. gain control down low in order to keep the b.f.o. voltage large compared with the signal voltage. Strong adjacent modulated signals no longer ride through and cause distraction by adding another voice to the one being copied; they are heard, if at all, only as “monkey chatter,” or scrambled speech.

A Wien bridge or “Hetrofil” may be used with good effect after a detector of this sort to eliminate steady tones caused by the beats between the carriers of interfering double-sideband signals and the conversion oscillator. A sharp-cut-off low-pass filter connected to the output provides an inexpensive way of achieving the ‘phone man’s dream of a virtually square-topped passband. This is possible because the over-all selectivity is largely determined by the audio filter, whose performance can be made very good. To achieve the same square-topped bandpass characteristic through i.f. selectivity alone would probably require conversion to a low i.f. frequency plus use of many cascaded over-coupled tuned circuits, which are awkward to align. Simple selective circuits such as crystal filters, the Q5-er, etc., provide a peaked, rather than a square, response characteristic.

The combination of single-sideband transmission, balanced detector, and low-pass filter has only one drawback, and that is the audio image. Signals on either side of the beating-oscillator frequency can produce an audio output within the passband of the filter. Therefore the combination has twice the effective bandwidth required for single-sideband reception. Nevertheless, even by itself the balanced-detector low-pass filter combination represents a considerable improvement over present-day receiving techniques.

Conclusion

The conclusions reached in this article may be summarized in the following way. With conventional modulation the linear-detection process used, plus finite receiver i.f. selectivity, results in two undesirable features: first, the possibility that the modulation on strong interfering signals quite far from the frequency of the desired signal will ride through; and second, the “suppression” effect which results in complete disappearance of the desired signal when the interfering signal is very strong. These two disadvantages of conventional reception, familiar to all ‘phone men, tend to prevent maximum utilization of existing frequency assignments in the sense that very weak stations cannot be copied immediately adjacent to very strong ones. Single-sideband reception by means of the b.f.o., on standard receivers, reduces the suppression effect but still is vulnerable to the modulation on undesired signals because of the possibility of rectification occurring along with frequency conversion. Finally, single-sideband reception by means of a standard receiver equipped with a balanced detector eliminates both the suppression effect and the possibility of interference due to rectification. In a combination of this sort, audio selectivity becomes the complete equivalent of i.f. selectivity (except for the audio image), provided that the i.f. selectivity of the receiver is sufficient to prevent strong adjacent interfering signals from actually overloading the balanced detector. Should such overloading become a problem because of insufficient i.f. selectivity, it is possible to reduce the i.f. input to the balanced detector and to make up for the loss by increased audio gain.


QST for
Better Reception for 2-Meter Mobile

A Simple Converter for Use as a Companion to the "Mobile Midget"

BY C. VERNON CHAMBERS,* W1JEQ

Though the performance of 144-Mc. receivers for home-station use has been improved greatly in the past year, the sensitivity and selectivity of our mobile jobs have not kept pace. Here is a compact converter for use with a car receiver. It is hardly more difficult to build than the familiar superregen commonly used in mobile work, but its performance is vastly better.

This converter was designed as a companion unit for the mobile transmitter described in a recent issue of QST. It features compactness and single-control tuning and it may be operated from the transmitter power supply. The output frequency of the converter is 1.6 Mc., permitting it to be used with an automobile broadcast receiver, or it may be used at the fixed station by coupling to any receiver or i.f. system capable of tuning to 1600 kc.

Undoubtedly there are many two-meter operators who have not previously built anything more complicated than a superregenerative receiver and they may question the advisability of tackling more complex circuits. Experience has shown, however, that it is hardly more difficult to build and to adjust a simple converter than it is to construct a superregen and to make it behave properly. The converter will outperform the superregen in every way, and the technique required for its construction is well worth learning.

Two 6J6 twin-triodes are used, each as a mixer-oscillator, the first converting the signal frequency to 11.1 Mc., the second working from this frequency to 1600 kc. The high-frequency oscillator is the only circuit that requires tuning during normal operation, inasmuch as the other tuned circuits are preset at fixed frequencies during the testing and alignment of the converter. The 6J6s and some of the other components are sur-

Circuit Details

The first mixer has a self-resonant grid coil which is tuned to the center of the 144-Mc. band by the tube and circuit capacitances. Its plate circuit is tuned to 11.1 Mc. by C1 and L1. The oscillator tunes from 132.9 to 136.9 Mc. to cover the band. It uses the second section of the first 6J6 and, beating with the incoming signal, produces an i.f. of 11.1 Mc. which is then capacitance coupled by means of C6 to the grid of the second mixer. Actually, the oscillator covers a somewhat greater range than that given above, in order that the converter may be tuned outside either end of the band. C4 is the band-set condenser and C5 is the bandspread capacitor. No coupling condenser is used between the oscillator and mixer, since stray coupling between grid pins at the socket gives adequate injection.

The second 6J6 serves as another mixer-oscillator combination, converting the 11.1-Mc. i.f. to 1600 kc. for working into a car radio at the high end of the broadcast band. Note that a trap (C2L4) is connected in series with the coupling condenser between the two mixer circuits. This trap is tuned to 14.3 Mc. and attenuates image response at a frequency removed from the signal plus items which may be purchased at bargain prices. Plate voltage for all circuits is stabilized by an 0B2 regulator tube. The sensitivity of the converter is quite good, and satisfactory image rejection is obtained through the double conversion.

A front view of the mobile converter for 144 Mc. Note how the cabinet, a 3 X 4 X 5-inch utility box, has been modified to allow clearance for the chassis.

April 1948

* Technical Assistant, QST.

1 "A Mobile Midget for 144 Mc.," QST, February, 1948.
Ci, Cs, C8 — 62-µfd. trimmer (Centralab 823-AZ).
C2, C4 — 20-µfd. trimmer (Centralab 820-B).
C6 — 5.27-µfd. "butterfly" variable (Johnson 160-205).
Cj, C5 — 47-µfd. mica.
C3, C6 — 0.01-µfd. paper.
C8 — 100-µfd. mica.
C11 — 150-µfd. mica.
C12, C1 — 15-µfd. mica.
C13 — 470-µfd. mica.
C14 — 0.0047-µfd. mica.
C15 — Injection coupling, made from 75-ohm Twin-Lead — see text.
Ri, Rs — 1.5 megohms, ½ watt.
R2, R3 — 1000 ohms, ½ watt.
R4 — 0.22 megohm, ½ watt.
R6, R7 — 15,000 ohms, ½ watt.
R8 — 3500 ohms, 10 watts.
L1 — 4 turns No. 22 enam., close-wound, 3/16-inch diam.

L2 — 20 turns No. 28 enam., 1/2-inch diam., 5/16 inch long.
L3 — 28 turns No. 28 enam. 3/4-inch diam., 3/4 inch long.
L4 — 75 turns No. 28 enam., 9/16-inch diam., 1 inch long. Coil wound on a National PRC-3 form.
L5 — 10 turns No. 28 enam., close-wound over cold end of La.
L7 — 3 turns No. 14 enam., 5/16-inch diam., approx. 3/16 inch long. See text for adjustment of length.
It — 6.3-volt pilot-lamp assembly.
J2 — Coaxial-cable jack (Amphenol 75-PC1M).
J3 — Three-prong cable jack (Jones S-303-AB).
RFC1 — 1-µh. r.f. choke (National R-33).
RFC2 — 300-µh. r.f. choke (Miller 34300).
Si — S.p.s.t. toggle switch.

This image, which falls within the 2-meter band when the converter is tuned to the low edge, can be reduced by 35 to 40 db. through adjustment of the trap.

The plate circuit of the mixer is tuned to 1600 kc. by the trimmer, Cg, and a fixed capacitor, C11, which supplies the additional capacitance required. A low-impedance output link, La, terminates at J2, and a short length of coaxial cable is used between the jack and the receiver.

Circuit details of the low-frequency oscillator are nearly identical to those of the high-frequency oscillator, except that the low-frequency circuit uses only one capacitor, C0, across the plate coil because the circuit operates at a fixed frequency of 12.7 Mc. Radiation from the oscillator, when the latter was operated with 108 volts applied to the plate of the 6J6, reached the high-frequency mixer and caused numerous spurious responses as the converter was tuned through the band. This condition was eliminated by reducing the oscillator plate voltage (by means of the dropping resistor, Rs) and by placing a copper shield between the two circuits. The reduction in oscillator signal affected the mixer sensitivity and it was necessary to introduce a small amount of capacitive coupling between the oscillator and mixer. A 1 3/4-inch length of 75-ohm Twin-Lead, identi-
fied as $C_X$ on the circuit diagram, provides adequate coupling capacitance.

The 082 regulator tube is adjusted (by means of $R_s$) to pass approximately 12 ma. when the converter is connected to a 300-volt supply. The tube will be badly overloaded if the supply is turned on with the 6J6 tubes removed from their sockets. Otherwise, the tube will operate satisfactorily with a supply output voltage of 250 to 350 volts. The measured output potential of the regulator circuit is 108 volts.

**Construction**

The chassis for the converter measures 1½ by 2⅛ by 4 inches and is made from a 0 ¾ × 3¾-inch sheet of ½-inch aluminum stock. A 1½-inch square is cut from each corner of the aluminum sheet so that the metal can be bent to form a box-like chassis. It is recommended that the marking and drilling of mounting holes for parts be done before the chassis is bent into shape. A top view of the converter shows the location of most of the components and the following dimensions are offered for the convenience of those interested in building the unit: The clearance hole for the oscillator band-set condenser (seen at the top of the chassis) is 1 inch square and is centered between the sides of the chassis. The mounting hole for the bandspread condenser is ½ inch down on the front wall, and a 3½-inch clearance hole for the regulator-tube socket is centered to the left of the square hole. The high-frequency mixer-oscillator tube is centered on the sides of the chassis. The PRE-3 coil form for $L_5$ is 1¾ inches from the rear wall on the right side. The mounting hole for the 14.3-Mc. coil is 3½ inches up from the bottom edge of the chassis and is centered between $C_4$ and $C_5$.

The bottom view of the converter shows how the regulator-tube socket is mounted on a small aluminum bracket which is in turn mounted on the side wall of the chassis. An aluminum strip, ¼ inch wide, should be bent to form a right angle and the position of the socket mounting hole should be marked after the bracket has been placed inside the chassis against the large clearance hole. Excess material may be cut from the bracket after it has been drilled for the socket. A three-terminal tie-point strip is mounted in a vertical position to the rear of the aluminum bracket, the bottom lug serving as a support point for the grid end of $L_2$. The coaxial cable and the antenna coupling loop are connected to the remaining two lugs.

A suitable shield for the low-frequency oscillator circuit can be made from a 1½ by 3¾-inch strip of ½-inch copper. The strip is bent to form a right angle having sides 1½ inches long and covering all of the components located at the top left-hand corner of the chassis. The shield is notched at the bottom corner to allow clearance for the coaxial cable which runs along the left edge of the chassis, and is equipped with a spade lug (the lug is soldered to the copper) for mounting.

The PRE-3 coil form for $L_5$ should be cut to 1½ inches before the coil is wound. This and the other forms should then be marked and drilled to accommodate the windings. Terminal holes are drilled straight through the forms and the ends of the windings are passed through these holes. A coat of cement, or some other suitable compound, may be applied to the windings and allowed to dry while other operations are performed. As shown by the first view of the converter, some work must be done on the metal utility box before it can be used as a cabinet. This modification consists of removing the top and bottom flanges at the right side of the case and then

A top view of the mobile converter, removed from its crackle-finished case.

April 1948
notching the front and rear flanges to provide clearance for the condenser shaft and the jacks which are mounted on the aluminum chassis. A large slot must be cut in the rear of the case to allow access to the input and output jacks when the unit is assembled, and \( \frac{3}{4} \)-inch holes should be cut in the top, bottom, and sides of the box so that the adjustment screws of the trimmer condensers may be reached with an alignment tool. The heater switch and the pilot lamp are mounted as far toward the top of the front panel as possible, and a \( \frac{3}{4} \)-inch hole is drilled up from the bottom of the panel for a distance of 1\( \frac{3}{4} \) inches. This large hole will allow the National AM dial to be positioned correctly with respect to the tuning-condenser shaft after the chassis has been placed inside the cabinet.

The miniature Johnson condenser, \( C_6 \), may have a small-diameter control shaft which does not fit a standard dial coupling, in which case a bushing or shim is required. Fortunately, a \( \frac{3}{4} \)-inch length of easy-to-work \( \frac{1}{4} \)-inch soft-drawn copper tubing can be made to fit the shaft by working the inner surface with a rattail file.

**Wiring**

Needless to say, the converter is more or less of a layer-built job. Its construction is not difficult, however, if the parts are mounted and wired in the following order: First, mount the tube sockets, the three jacks, and the lug strip (the one located on the top of the chassis). Next, complete the heater wiring and mount the grid-leak resistors in place. \( C_4 \) can now be soldered across the terminals of \( C_3 \) and \( L_7 \) can also be mounted on the condenser. This assembly is then mounted on the front wall of the chassis and, in turn, is connected to the tube socket by means of a short length of stiff tinned wire at the plate side and by \( L_9 \) at the grid side. Now, mount the vertically-positioned lug strip on the side wall and connect a short piece of coaxial cable between the top lugs and \( J_1 \). \( C_7 \) can now be connected between the tube socket and the terminal strip and \( L_2 \) (with the small antenna winding slipped inside the cold end of the coil) may be mounted.

Condensers \( C_1 \), \( C_2 \) and \( C_5 \), and coils \( L_8 \), \( L_4 \) and \( L_9 \), are now mounted and wired into their respective circuits and, from here on, the wiring can proceed in any order. The 0.01-µfd. by-pass condensers are mounted in a vertical plane next to \( C_1 \) and \( C_5 \), respectively, and \( RFC_1 \) and \( R_2 \) are supported at the B-plus end by Pin 5 of the regulator-tube socket. The small metal post at the center of the rear tube socket is used as the tie-point for the common connection between \( C_{34} \), \( R_5 \), \( RFC_2 \) and the plate-voltage lead. \( L_4 \) is wired to \( C_5 \) after the padder condenser has been mounted between the coupling condenser, \( C_5 \), and a piece of No. 12 tinned wire which runs down to the stator terminal of \( C_1 \).

If the constructor wishes to use noise as a means of making a rough alignment of the converter, it is suggested that the injection-voltage condenser, \( C_X \), and the dropping resistor, \( R_6 \) be left out of the circuit at this time. Of course, the plate of the 6L6 must be connected directly to \( RFC_2 \) in this case. The converter will have a much higher noise level when wired in this manner and alignment on noise is simplified. Actually, this is a poor method of aligning a double converter and should be used only as a last resort.

**Testing**

Power requirements for the converter are approximately 300 volts at 50 ma. and 6 volts at 0.9 ampere. The first test consists of plugging the three tubes into the sockets and applying these potentials. In the absence of a voltmeter, it is safe to assume that the mixer and oscillator plate voltages are correct as long as the 0B2 glows when high voltage is turned on. A receiver capable of tuning to 1600 kc. should be coupled to the converter by a short length of coaxial cable and the receiver adjusted for normal operation at this frequency. If a signal generator is to be used, it is connected to the input jack, \( J_1 \), and if a generator is not available, the converter should be coupled to a low-impedance antenna system. Remember that \( C_X \) and \( R_6 \) should both be incorporated in the circuit if the converter is to be aligned with the aid of a test signal.

If preliminary testing is to be done with noise, the converter and the receiver are turned on and the converter output tuning condenser, \( C_5 \), ad

(Continued on page 118)

A bottom view of the 144-Mc. converter, showing the small bracket for mounting the regulator-tube socket, located at the lower left-hand corner of the chassis. \( C_5 \) is mounted with the adjustment screw facing the observer. The copper shield to the left of the photograph isolates the low-frequency oscillator and prevents "birdies."

QST for
An Automatic Keying Monitor

BY IAN O. EBERT,* W3QED

Here is a simple little r.f.-actuated keying monitor that can be sandwiched into practically any receiver to give you a constant, accurate check on your fist. The operation is automatic and requires no retuning from band to band.

It is well recognized that monitoring of one's own keying contributes to readability and, for most amateurs, also increases the ease of operation. Some time ago a need was felt at the author's station for a keying monitor. However, most of the common systems appeared to be too complicated, costly or cumbersome, and served only to indicate that the key was down. With these shortcomings in mind the monitor to be described was developed. This monitor can be adapted to occupy a very small space so that it can be built into almost any receiver. It uses almost no power, and serves as a continuous indicator that the transmitter is actually operating. In a trial of several months' duration, this monitor has proven very satisfactory.

The photographs show a possible construction for use with a BC-348. It is by no means the ultimate in compactness, and suggestions will be given on how the size may be further reduced. It is not necessary to incorporate the monitor into a receiver, although this is the most logical place for it if space is available. Since each application is a unique problem, no effort will be made to describe component layout or chassis construction.

Examination of Fig. 1 will show that the portion of the circuit consisting of the neon lamp, $R_3$, $R_4$ and $C_2$ comprises a relaxation oscillator that is coupled to the receiver audio system through $C_3$. The triode section of the 6AQ6 tube acts as a "swamper" and permits operation of the relaxation oscillator only when there is a sufficiently-large negative bias on the grid. If a radio-frequency signal is applied to the diode plates, a negative potential is developed across $R_1$ and appears on the triode grid through $R_2$. Thus, when the pick-up wire is placed close to the output tank or antenna of a transmitter, the relaxation oscillator will operate under key-down conditions and an audio tone will be heard. When the key is up the tone will not be produced. This is the principle of operation of the monitor.

Typical values are shown for the components in Fig. 1, but these values are not critical. Some of the factors governing the choice of component values will be discussed.

The frequency of the audio tone produced by the monitor is determined by the supply voltage, the resistance $R_3$ plus $R_4$, and the condenser $C_2$. With the values shown and a voltage of 250, a tone near 1000 cycles is produced. To raise the tone, increase the voltage or reduce the resistance or capacitance.

The neon lamp used is the 1/25-watt size and may be either a Type NE-51 or NE-2. The NE-51, which has a miniature single-contact bayonet base and a pilot-lamp size bulb, was used in the monitor shown in the photograph. For more compact construction the NE-2 may be used, as it has a smaller envelope and may be soldered directly into the circuit with the leads provided, eliminating the need for a socket.

When in operation, the voltage swing across the neon lamp is of the order of 20 volts which, when applied to the grid of most audio tubes, is more than sufficient to produce a normal receiving level. The output is therefore taken off only a portion of the load resistance. A trimmer condenser is used for the coupling condenser $C_3$.

The simple keying monitor can be built so small that it will fit into any receiver. The Jones fitting below the 6AQ6 tube takes the r.f. pick-up line.

* P.O. Box 4703, Anacostia Station, Washington 20, D. C.
which in turn has some control over the audio level from the monitor. The values shown were satisfactory for headphone reception with a BC-348. The ratio of $R_3$ to $R_4$ will probably have to be changed for use with receivers having a different audio system or for operation with a speaker. A more compact construction would use a fixed condenser of about 150 µfd. for $C_3$ and $R_4$ would then be juggled to give the desired volume level. When changing the resistance ratio the total resistance must remain constant or the tone frequency will be changed.

The condenser $C_3$ is connected directly to the audio grid and not through the audio gain control. This connection permits variation of the audio level of received signals without apparently affecting the level from the monitor.

A 6AQ6 tube was selected because of its small size, low heater current, and comparatively low price. The 150-milliampere heater current required can safely be taken from the 6.3-volt heater circuit of almost any receiver. Other triodes may be substituted for the triode section of this tube. The high-µ type triodes are generally more satisfactory because they require less negative bias for plate-current cut-off.

The value of $R_1$ has to be a compromise. It should be high so that no appreciable power will be taken from the transmitter in developing the required bias, but on the other hand, it should be kept reasonably low because the triode section acts as an amplifier for audio signals on its grid and becomes more susceptible to hum as the grid-circuit impedance is increased. The purpose of $R_4$ is to isolate the grid from r.f., and it may be replaced by an r.f. choke if desired.

The condenser $C_1$ and the r.f. choke serve as a high-pass filter, making the circuit broadly responsive to signals in all amateur bands and relatively insensitive to low-frequency signals such as audio hum. If compact size is an important object, both $C_1$ and the r.f. choke may be eliminated. If this is done, extra care must be taken to insure that the pick-up wire is isolated from all sources of hum.

Any diode may be substituted for the diode sections of the 6AQ6, or one of the readily-available germanium- or silicon-crystal diodes may be used. A suggested circuit utilizing a crystal diode is shown in Fig. 2. This circuit uses a series rectifying circuit, the negative potential being developed across $R_1$. $C_1$ is an r.f. by-pass condenser, the remainder of the circuit being identical to the circuit just described.

The sensitivity of these circuits is such that no difficulty should be experienced in using them in conjunction with even very-low-power transmitters. The author has had very satisfactory results using a six-inch pick-up wire about three inches from the tank coil of a 30-watt transmitter. The pick-up wire should be insulated and should not come in contact with the transmitter.

The monitor may be connected to the power supply of any receiver and works satisfactorily on any plate potential above 100 volts. The current

(Continued on page 89)
When we adopted "s.s.s.c." for "single-sideband suppressed-carrier" there was some criticism of the abbreviation on the part of a few old hands in the single-sideband business. It was pointed out that for years the commercials had been getting along well enough with just plain "single sideband" (occasionally cut down to "s.s.b.") so why couldn't we? Everybody understood that "single sideband" implied carrier suppression, so why take the pains to label it?

We like to keep it simple, too, and it would be nice if we could get along with names that, while not strictly accurate, cause no confusion because everybody understands just what is implied. But in this case it seems we're confronted with a situation that calls for more exactness. True, there may be no such thing as amateur carrier-and-single-sideband transmission at the moment. But there definitely is carrier-with-single-sideband reception: the "selectable single-sideband reception" that is again the subject of an article by J. L. A. McLaughlin in this issue. The difference is the more marked when the McLaughlin article is compared with the "s.s.s.c." converter described by O. G. Villard, jr., also in this issue.

In both systems single sideband is involved. But in s.s.s.c. reception the carrier must be supplied in the receiver, since none is transmitted. On the other hand, s.s.s.r. takes a conventional carrier-and-double-sideband signal, chops off one sideband, and works on the remaining sideband plus carrier. The former is a special kind of receiver for a special kind of transmission; the latter a special kind of receiver for the ordinary kind of transmission. The plain term "single sideband" covers both — but it does not tell you which is under discussion. So we have to distinguish between single sideband with and without carrier. At the moment, what with Q5-ers and BC-453s, there is far more single-sideband-with-carrier reception than there is s.s.s.c. But even this, without the practically-automatic sideband-selection feature, is not "s.s.s.r."

There is another little problem, too: what to call conventional 'phone transmission, with its carrier and two sidebands. "A.m." does not strike us as being good enough; s.s.s.c. is a.m. too, although not the ordinary kind. We hate the thought of contributing further to the alphabet soup, but something probably will have to be adopted in the interests of avoiding confusion. The best we can think of at the moment is to use the FCC designation, A3, which defines the ordinary system of modulation well enough.

Problems of nomenclature are not really serious; they have a habit of solving themselves after a while. The significant thing is that the mere existence of such "problems" indicates that a lot of new ideas are coming into amateur radio. From what has been published in QST in the past several months and what we know is coming up, it is obvious that we are only just beginning to scratch the surface of the possibilities of QRM reduction in 'phone work. It may not be too much of an exaggeration to say that our present-day 'phone methods will be just as obsolete, a few years from now, as spark was a few years after c.w. got its start. "Old-fashioned 'phone" will eventually be something that can be tolerated only where there is plenty of room for it. — G. G.

---

OUR COVER

This month's cover shows an artist's drawing of the design for K2UN, new super amateur station of the United Nations, which is scheduled to be dedicated and formally opened in April.

---

Keying Monitor

(Continued from page 88)

A plate-voltage switch is shown incorporated in the circuit so that the monitor may be turned off when it is desired to use the receiver to check the transmitter frequency or stability.

It should be pointed out that since the monitor circuit is insensitive to frequency variations the steady tone heard on the monitor is no indication that the signal transmitted is even steady enough in frequency to be readable. Other means should be used to check the true condition of the signal as heard by other operators.

This monitor, used in conjunction with a system of clickless break-in such as was described in recent issues of QST, will greatly increase the pleasure and accuracy of code operation.

---

SWITCH TO SAFETY!
NATIONAL CONVENTION

We have good news! Dig out your calendar and put some big red marks around September 4th, 5th and 6th, Labor Day week-end, for those are the dates of the ARRL National Convention in Milwaukee, first in ten years. Start planning now to attend!

Authorized by the ARRL Board of Directors, the "national" is being staged by and held under the auspices of the famous Milwaukee Radio Amateurs' Club, Inc., oldest amateur club in continuous existence in the country. The scene will be the monumental block-square Milwaukee Auditorium, convenient to everything downtown. For some months numerous committees of skilled and ardent amateurs in MRAC have been quietly at work organizing, making arrangements and blocking out a program, and now it is time to begin to tell about it. Program details of course are not yet worked out but we can give you enough of an outline to show you that it will be the biggest and most interesting and best-attended convention in amateur history. Numerous specialized committees of unpaid Milwaukee amateurs, operating under the general chairmanship of Jack Doyle, W9GPI, are busily licking plans into shape.

The convention begins on Saturday, September 4th, with registration in the morning and a general assembly at 2:30 P.M., at which there will be addresses of welcome by the Governor of Wisconsin and the Mayor of Milwaukee, the Division Director and the MRAC president, responded to by officers of the League and representatives of the armed forces. This affair will probably be unique in amateur conventions in having no formal banquet; Milwaukee too much appreciates good food to believe in the high costs, slow service and poor rations that always accompany a huge banquet. In its stead, Saturday night will be Black Forest Evening at which will be staged one of Milwaukee's famous Gemütlichkeit parties, with the things to eat and drink for which Milwaukee is justly famed.

A very special feature of the convention will be a V.H.F. Section which, under the direction of W9TPT, opens at 8:30 P.M. on Saturday and will operate throughout the remainder of the convention with a special program and its own meeting halls. Numerous valuable technical talks are being scheduled for Sunday and Monday forenoons, with facilities for running four lectures simultaneously. There are to be sightseeing tours, including features of technical interest, hidden-transmitter hunts with prizes for the winners, a competition for mobile installations attending the convention, Army and Navy demonstrations, visits to local ham shacks, and special features for the ladies including high tea and a style show. Judging by reports of the activity of a committee on prizes, there is certainly something doing in that direction, too. In 40,000 square feet of floor space in the main hall of the Auditorium, with 192 booths available, there will be a continuously-open exhibit in which manufacturers will display their latest and best products for the ham—everything that you can think of.

One of the main items of the program planned is a general assembly of the convention in the chief hall of the Auditorium on Sunday evening to hear a major address by ARRL President Bailey. Following this will be entertainment which the Milwaukee gang promises will be the biggest floor show in hamdom's history, with both professional and licensed-amateur entertainment, and dancing to a name band. All in all, you can see, the "national" will encompass about everything your heart could desire, everything you would expect at an ARRL national convention.

Joe T. Collins, W9PYM, is chairman for registration and attendance. The registration charge is $7.50 per person, with no extra for children accompanying parents. There are some special inducements for advance registration. Hotel accommodations will be arranged upon request. The Auditorium will maintain a dining room capable of seating a thousand persons, right in the building, where moderately-priced food will be served at all times.

We think there will be at least 4000 hams in Milwaukee come Labor Day, including practically everybody you ever heard of. We know that you'll want to be there and that you'll have the time of your life. Start saving some dough and begin your plans now—let's make it a date for September!

BOARD MEETING

The ARRL Board of Directors will have its annual meeting in West Hartford beginning May 7th. The individual directors desire to hear from the members of their divisions constructive suggestions for the good of the order. Your director's name and address will be found listed in the front of this issue. It is the Board's custom to make as much advance announcement as is possible of the specific proposals that will be pending before it, to aid in obtaining the reaction of members, but
at this early date no notices of proposals have been filed and the annual reports of the officers have not yet been written. The review of the operating assignments for 'phone of course will be a major matter, as extensively reported in our last two issues and on which the poll of advisory amateur opinion has been conducted. Announcement will be made in our next issue of any other known items of Board business.

POSTAL DELAYS

At Hq. we're getting all sorts of squawks from the fellows about delays in the delivery of QST, particularly in comparison with chaps in the next city or the next state. Sometimes these complaints come from a member who has only himself to blame because he delayed his renewal and his copy of QST is lagging behind the regular mailing. But there are many weird happenings; such as all of the copies for a state or a city coming along a week or more behind their neighbors, or the same individual experiencing such a delay several months in a row. There have been enough of these cases to cause us to examine our methods carefully and this is our report to you:

Although we're not perfect, in none of the reported cases have we found ourselves at fault. QST is mailed quite methodically, the same way every month. It takes several days for the whole issue of QST to go through the bindery, generally three days, beginning about the 20th of the month preceding the date of issue and generally so arranged as to not involve the break of a week-end. We mail the copies for the West Coast from the first production, progressing east across the country and ending with New England. There is never more than three days between the mailing of the first and last copies of an edition, and the great bulk of them go out in two consecutive days. Mailing is done in postal sacks, according to postal regulations, and all the copies for a given area go out simultaneously.

Thereafter the matter is in the laps of the gods. The postal system of the country is very sadly overloaded and is creaking in every wheel as a result. Strange things happen. When post offices are behind in the delivery of letter mail they frequently let magazine mail pile up. Mail cars terminate at major cities and the contents must be broken down and redistributed, frequently with delay and often with more delay on some of the contents than on others. There is nothing whatever that ARRL can do to control these abnormalities and accidents. We can assure you that we are doing our part faithfully and methodically and without any of the crazy scheduling that you would expect from the way magazine mail sometimes gets delivered. There is nothing for us to do but grin and bear it until the postal service becomes better able to cope with its task with a less jerky style of transmission. We hope for early improvement but if your QST is delayed, may we beg you to be patient in the confidence that your organization is not at fault and that it will probably show up in a few days more?

CODES & CIPHERS PROHIBITED

International regulations specify that communications between amateur stations, internationally, must be carried on in plain language. Recognizing this principle in a somewhat different approach, FCC has added to our regulations, effective March 8th, a new section prohibiting transmission between amateur stations, either internationally or domestically, in codes or ciphers. The Commission clearly indicates its intention that this shall not interfere with the use of such things as recognized net signals and ham abbreviations "or any other abbreviations or signals where the intent is not to obscure the meaning but only to facilitate communications."

The text:

§12.105 Codes and ciphers prohibited. — The transmission by radio of messages in codes or ciphers in domestic and international communications to or between amateur stations is prohibited. All communications regardless of type of emission employed shall be in plain language except that generally recognized abbreviations established by regulation or custom and usage are permissible as are any other abbreviations or signals where the intent is not to obscure the meaning but only to facilitate communications.

VIOLATION NOTICES

In the past, the unhappy recipients of "notices" from the FCC that they have violated some provision of the amateur rules have had the task of sending their replies of explanation to the FCC at Washington, with a copy to the office originating the notice. That procedure is now simplified by an action of the Commission, effective February 12th, so that the reply goes right back to the office from which the notice was received; no copies elsewhere are required. (It is still a good idea to keep a copy for your own files, though!) The change is accomplished by an amendment of the first sentence of §12.155 of the amateur rules, so that it now reads:

§12.155 Answers to notices of violations. Any licensee receiving official notice of a violation of the terms of the Communications Act of 1934, as amended, any legislative act, Executive order, treaty to which the United States is a party, or the rules and regulations of the Federal Communications Commission, shall, within 3 days from such receipt, send a written answer direct to the office of the Commission originating the official notice.
7-MC. 'PHONE

From comments added to postcards returned in the current poll of amateur opinion about 'phone-c.w. divisions of our major bands, we gather there is widespread misconception about what League policy toward 'phone in the 7-Mc. band was before the war. A typical remark is, "Why are you asking us again about 40-meter 'phone? We decided this conclusively before Pearl Harbor."

Sorry, but we didn’t, OMs. Actually, there were two developments in this matter during that period; they took place several years apart, were entirely separate and distinct, and didn’t decide the 40-meter ‘phone question. Let us explain briefly.

First, the 1939 poll: At the time of the Board meeting in 1939, the Cairo allocation table had not yet come into effect but the directors were concerned over the possible effects on amateurs if and when broadcasting stations opened up in the European assignment of 7200–7300, which was to become effective in September of that year. It seemed to the Board that if interference from foreign broadcasters became so intense that c.w. stations could not work through it, a desirable course might be to open that portion of the band to ‘phone, solely to protect amateur communications. The language of the poll itself reflects all this: "Should A-3 emission be authorized in the 7200–7300 kc. range, if authority can be obtained, for the purpose only of protecting the regularity of amateur communication in the presence of broadcast interference?"

The answer to this poll was overwhelmingly "yes." But observe that it was not a simple question of 40-meter ‘phone, yes or no, but was predicated solely on the possibility of what might happen. Actually, the situation the Board feared did not arise. By mail vote, after the poll results were given it, the Board decided the situation did not warrant action, and decided to take none. At the subsequent Board meeting in 1940, the Board still saw no reason for taking action; the condition they had feared had not developed, so the proposed possible remedy was not invoked. The matter was dropped.

The second development was in 1941. As part of a plan under which, in that year, the military were to take over the portion 3650–3950 kc. of our 80-meter band for training purposes, it was arranged to provide temporary accommodation for 'phone in 50 kc. of the 7-Mc. band for the stations displaced on “80.” In the words of the Commission at that time, “... This is made necessary purely by a situation arising out of the national emergency and does not necessarily represent a continuing or permanent situation.” Although the League worked out with FCC and the military the program under which the frequencies were to be loaned and adjustments made in our other bands, the establishment of 'phone on 40 did not thus become part of the ARRL’s philosophy as a peacetime arrangement. Actually, the plan just mentioned was never put into effect — the war hit us before it could be put into operation, and all amateur radio was closed down as of December 7th of that year. That washed out the plan.

The question of 40-meter 'phone now, so far as League policy is concerned, will be settled by the men you fellows have elected to the Board of Directors. The current poll of amateur opinion is for the purpose of determining how you feel about the matter.

A.F.C.A. SEEKS AMATEURS

The Armed Forces Communications Association will hold its second annual convention at Wright Field, Dayton, Ohio, May 10th and 11th. The Air Force will exhibit and demonstrate the very latest developments in communications, especially radio. The show at Wright Field will be open only to members of the association, an organization formed to assist the Army, Navy and Air Force in their military planning for better communications. Amateurs interested in joining may obtain further information from and make applications to the national headquarters at 1624 Eye Street, N.W., Washington, D. C.

INTERNATIONAL TRAFFIC HANDLING

While amateurs licensed by the United States may handle, within the United States, messages of any type, either on behalf of themselves or on behalf of third parties, provided that compensation does not enter (and with profanity and obscenity of course prohibited), that is not generally true as concerns messages to or from other countries. Some amateurs have been "called" for a violation of regulations. Let us examine what the situation seems to be, strictly as concerns messages between different countries.

This subject has long been treated in the international radio regulations, binding upon all U. S. licensees. Although the Cairo language is effective until the end of this year, slight changes in wording were made at Atlantic City and so it is that language — to endure for five years — that we should examine. It provides that when amateur stations of different countries are in contact, the transmissions "must be made in plain language and must be limited to remarks of a technical nature relating to tests and to remarks of a personal character for which, by reason of their unimportance, recourse to the public telecommunication service is not justified. It is absolutely forbidden for amateur stations to be used for transmitting international communications on behalf of third parties."

In most foreign countries the communications system is a government monopoly. In the inter-

(Continued on page 110)
A Balanced-Modulator N.F.M. Exciter

BY PAUL D. ROCKWELL,* W1PDP, EX-W4AUE, EX-CE3EC

A type of f.m. modulator unit in which special care has been taken to preserve the audio quality. It also includes a means for checking one's deviation, an item of interest to every n.f.m. user.

Neither the general increase in average power in amateur transmitters nor the large numbers of a.c.-d.c. broadcast receivers now in use has done much to help the old crowded-area amateur bugaboo, BCI. The buyer of a cheap receiver (or an inferior not-so-cheap one) doesn't realize that his receiver is at fault, and he naturally resents any interference to his reception. More often than not this resentment is accompanied by tangible manifestations such as name-calling, damage to property, threats of lawsuits and, in rare cases, assault and battery. In turn the amateur is forced to adopt such defenses as quiet hours, wavetraps, line filters, shielding and perhaps a new antenna, all at his own expense. Many retreat to higher and higher frequencies, but even on 28 Mc. they are eventually discovered and molested by inopportune telephone calls, door rapping, radiator pounding, and the like. It's no fun for the amateur.

Narrow-band f.m. has been a godsend to the ham troubled by BCI. Many stations use reactance modulators to swing a VFO, while others are using various types of phase modulators. The phase-modulation systems have the advantage of working with crystal control or VFOs, and are less likely to introduce a shift of average carrier frequency with modulation. Several novel features are incorporated in the new unit developed by Temco, and it was thought that they might be of interest to the many users of n.f.m. techniques.

* 308 Westfield Ave., Bridgeport 6, Conn.

The Circuit

The wiring diagram of the unit is shown in Fig. 1. A 6AC7 is used in a grid-screen Pierce-oscillator circuit, and the plate-circuit values permit tuning over the range 3.3 to 4 Mc. Provision for VFO input is included. The plate tank is center-tapped, so that the excitation to the 6SA7 grids would normally be 180° out of phase. But the plates of the two 6SA7 tubes are in parallel, and there would be no output on the excitation frequency if the grid drive were 180° out of phase. To correct this, the excitation to one grid is fed through a 10,000-ohm series resistor which, in conjunction with the 6SA7 input capacitance, causes a lag in voltage to that grid. The excitation to the other grid is fed through small (10 µfd.) series condensers and a low shunting resistance (15,000 ohms), to give a net advance in phase of the voltage on the grid. There is attenuation in both circuits, and it is proportioned to give practically equal drive at the grids of the 6SA7s, with a phase difference of approximately 120°. Since the grid voltages are not exactly out of phase, a resultant appears in the plate circuit, and this represents the normal unmodulated output. The effect is illustrated in Fig. 2.

Push-pull audio from a phase-inverter stage in the audio section is applied to the No. 3 grids of

A top view of the n.f.m. exciter unit. The Plexiglas panel was for display purposes only.

April 1948
the 6SA7 balanced modulators. Thus when an audio signal is going positive on the No. 3 grid of one 6SA7 (and thus increasing the conductance of that tube), it will be going negative on the other. The r.f. output of the tube receiving the positive audio signal will be predominant and the resultant phase of the r.f. will be shifted. Just how close the resultant output approaches the output vector of the 6SA7 receiving the positive audio signal depends upon the magnitude of the audio signal.

In the audio circuit, a 6SJ7 is used for the first stage of audio amplification, with a resistance-capacitance network in the input to reduce any r.f. picked up in the microphone leads. A 6SL7, with the two triode units in cascade, was first tried but it was found to be unsatisfactory, tending to oscillate at supersonic frequencies unless the gain was reduced. When the oscillations were eliminated by using two 6SL7s in split functions, the distortion was quite noticeable compared with the final arrangement. Lastly, the 6SL7 is a glass-envelope tube and is not too suitable for low-level work in which exposure to hum and other fields through the glass envelope can be troublesome. Accordingly, a 6SJ7 followed by one section of a 6SN7 was selected as the final arrangement. The gain control is placed after the 6SJ7 stage, to reduce the possibility of noise with adjustment of volume.

The other half of the 6SN7 is used as a phase-inverter stage to give the necessary push-pull output for the modulator. However, this output is fed through a 0.1-megohm series resistor and a 0.0015-µfd. shunt condenser, to give an attenuation approaching 6 db. per octave in the middle voice-frequency range, so that the inherent phase-modulation characteristic of the modulator will be converted to that of f.m. In other words, this filter changes the transmitter output to an essentially frequency-modulation characteristic, in which deviation is proportional to audio amplitude at any frequency, rather than allowing the deviation to increase with audio frequency as would otherwise be the case (with any true phase modulator).

It will be seen that no coupling condenser is used between the first 6SN7 half and the phase-inverter section. This is possible because the static plate voltage on the first half is about 60 and the drop across the 47,000-ohm plate and cathode resistors is about 70 volts. Hence a bias of about 10 volts is placed on the phase-inverter grid.

In the modulation-metering circuit, a cathode-follower stage taps on the audio channel — the follower stage doesn’t load the circuit it is connected to — and the output of the follower drives a diode-connected 6SN7 half for the meter rectifier.
**Adjustment**

Tuning of both r.f. coils is of the permeability type, each coil having two slugs. The assembly is arranged so that the lower slug can be tuned through a hole in the upper slug, permitting all tuning adjustments to be made without turning over the chassis. A special tuning rod is provided having a small cross-pin at one end (for upper-slug tuning) and a screwdriver taper (for a slot in lower slug) at the other end. The oscillator coil is tuned for maximum current (0.3 to 0.7 ma., depending upon the activity of the crystal) with the meter switch set to “modulator grids.” Usually the upper slug alone will provide sufficient range of adjustment. When several crystals are used, a compromise adjustment must be used, but this is not difficult because the tuning is quite broad, as a result of damping from the phase-shift networks. Once the oscillator coil is tuned, the switch may be thrown to “deviation” and left there. Control by additional crystals or a VFO may be had by moving the crystal selector switch.

Whatever type transmitter is excited by the n.f.m. unit, it must be free from parasitics. The old-time telephone term of “singing” applied to oscillations takes a clear meaning when parasitics are present in the multipliers or power amplifier, as all sorts of singing and frying noises are likely to come through with voice modulation. Such parasitics, incidentally, are frequently responsible for those puzzling cases of carrier hum or ripple which do not respond to additional power-supply filtering. One good test is to reduce fixed bias on the various multipliers until they dissipate rated wattage without excitation. If under these conditions a change of tuning or touching various parts of the circuit with a screwdriver produces a change in plate current, parasitics are present. Neon bulbs and wave-meters will tell the rest of the story.

**Deviation-Meter Calibration**

The deviation meter was calibrated by using a 30-Mc. f.m. receiver with a calibrated discriminator. The receiver i.f. was 4.4 Mc., and a cascade limiter was used. The discriminator is calibrated first in terms of d.c. volts developed per kilocycle of deviation, by measuring the d.c. voltage developed across the discriminator load resistor. Then a sine-wave audio signal is applied to the unit under test, and the measured deviation as indicated by the peak a.c. voltage developed at the discriminator is plotted against the readings of the “deviation” meter for various input levels. A practical peak-reading a.c. voltmeter might be simply a high-impedance (relative to the discriminator load) diode rectifier circuit used in conjunction with a Volt-Ohmyst — in our case the r.m.s. readings of a Hewlett-Packard 400A v.t.v.m. were converted to peak values.

A meter in the first-limiter grid return assures that sufficient input is present to saturate the cascade limiter. Accuracy of calibration can easily be made twenty per cent by this method; but actually the absolute deviation is not so important as maintaining the deviation at a level found to be most suitable for receiving-end conditions. The deviation meter will rest at a division or two above zero in operation with no speech input because of contact-potential in the rectifier, but this is not important since it is rarely, if ever, desirable to operate at less than 1/2-kc. deviation. A 3.3-ohm resistor in series with the cathode-follower/meter-rectifier 6SN7 heater holds the residual reading to a reasonable value. Some judgment is necessary in the use of the meter, since it is calibrated with constant sine-wave input. On complex waves such as voice, it is likely to read less than peak deviation. However, a good idea of what is going on at voice frequen-

(Continued on page 180)
Self-Filtered Peak Clipping
An Improved Circuit for Preventing Negative-Peak Splatter
BY HOWARD W. JOHNSON,* W7NU

Much has been said and written about splatter suppression and wide sidebands. Much has also been said and written about the weather. Spinning the dial over one of the amateur 'phone bands sometimes makes one wonder if anyone ever does anything about either! It may come as a surprise to some amateurs that the weather and broad signals do not necessarily fall in the same category. Although it is generally conceded that the weather holds the upper hand as far as any control by mankind is concerned, broad signals can be controlled very nicely without too much effort.

Let’s forget transmitters for the moment and discuss receivers. I wonder how many fellows realize that no commercial or military service requires a receiver of such exacting performance as an amateur does. It is doubtful if the crystal filter would ever have been developed to the degree it has been if it weren’t for the demand by the amateur fraternity for sharper and sharper receivers. For what? — to listen to Joe Grobenschneider with his high-fidelity kilowatt? Commercial and military stations work on assigned channels, and to my knowledge no crystal filter has ever been used on a circuit.

Why does the amateur demand narrower and narrower bandwidth in the receiver? Surely it is not so that he can enjoy the beautiful burping sidebands of W-MUT. Perhaps he is starting at the wrong end to correct a bad condition.

Are you lucky enough to own a Super-Pro or some other fine communications receiver? If it happens to be a Pro, why do you pinch the bandwidth control down to three kilocycles? Don’t say it’s because you want to gather in all of the bell-like tones (plus the tommy-gun negative peaks) of W-SAP with his 200-watt carrier modulated by a pair of 810s.

The receiver manufacturers have done an excellent job and the present-day receiver is about as selective as the state of the art permits, but unfortunately full exploitation of the amateur-band capabilities requires sharp transmitters as well as sharp receivers.

Sharp Transmitter Signals

One excellent way to help control bandwidth is to use a compression amplifier, but if you want to enjoy the maximum modulation capabilities of your transmitter, compression alone is not enough. First, the compression amplifier is not a positive guard against splatter. If the compression ratio is six to one, it means that a 6-db. increase in input signal will produce a 1-db. increase in output signal. Even this ratio is not assured all times, because proper operation requires that the compression bias have a time constant that is somewhat slower than the syllabic rate of speech. This means that each word spoken after any appreciable pause starts with the amplifier at the full-gain condition, and this can generate some very annoying splatter.

Clipping is the only method that allows full modulation of the carrier at all times without common practice in military receivers to load and overcouple the i.f. stages to broaden the response. The communication system with which the author is associated has about three hundred Super-Pro receivers in constant 24-hour service, and to my knowledge no crystal filter has ever been used on a circuit.

Fig. 1 — The usual type of high-level negative-peak clipper is shown at A. On negative peaks, the peak rectifier does not conduct, and the circuit is opened as though by S in B. With no plate voltage, the output tube is disconnected from the circuit, as though by S. The net effect is that the final tank circuit is hit by a negative square wave, and damped waves are generated as in a spark transmitter.

* The negative-peak clipper has many advantages in 'phone work. The advantages are reviewed in this article, and an improved circuit is presented.

2501 Beach Drive, Seattle 6, Washington.

* This isn’t strictly true. Present receivers are not as selective as the state of the art permits, but manufacturers don’t make them that sharp, in some cases, because the demand is for fidelity, not selectivity. — Ed.
negative-peak splatter. Only high-level clipping will be discussed, because it is the only method of clipping that is a sure preventative of negative-peak splatter. No maladjustment is possible because the operation is entirely automatic.

Any increase in gain after the low-level clipper, or any decrease in input to the modulated stage, can result in overmodulation. Most low-level clippers limit both the positive and negative peaks, but since the negative peak is the only troublemaker, some extension of the positive peaks is desirable, provided the modulator is capable of supplying the necessary undistorted power.

Fig. 1-A shows the typical high-level clipper. To understand its operation consider first what causes negative-peak splatter. Under normal modulation conditions, the final tube may be considered as a stable generator and the plate tank circuit and antenna as a resonant load. At all modulation percentages below 100, the final tube as the stable generator retains control of the tank circuit and the resulting signal is sharp. When overmodulation occurs, and the plate voltage drops to zero or goes negative, the final tube loses control of the tank and load circuits, just as though it were disconnected by switch S1 in Fig. 1-B. At this instant we have, for all practical purposes, an old-fashioned spark transmitter consisting of an antenna, a tank circuit, and a voltage source (which in this case is the modulator). The voltage applied to the tank circuit during these periods produces damped waves, the duration of which will be proportional to the circuit Q. The spectrum occupied by these waves will be determined by the L and C of the circuit.

In operation, the clipper tube behaves the same as the final tube when the plate voltage reaches zero. It is represented by switch S in Fig. 1-B. Thus, for all practical purposes, the tank and antenna circuits are completely disconnected from the rest of the transmitter during negative overmodulation peaks.

High-level negative-peak clipping has the following disadvantages:

1) Because of the square-wave trigger characteristics of the rectifier tube (especially the mercury-vapor type) high frequencies are generated which produce broad sidebands, unless the clipper is followed by a low-pass filter.

2) The filament transformer for the clipper tube must be capable of withstanding the peak modulation voltage without insulation breakdown to core or primary.

3) Capacitance of the filament-transformer secondary across the audio results in excessive by-passing.

**Improved High-Level Clipping**

These three disadvantages were overcome by connecting the clipper tube as in Fig. 2-A. The effect is as shown in Fig. 2-B. Switch S will still disable the modulator, as in Fig. 1-B, but with the following advantages:

1) The capacitance of the filament transformer is no longer a part of the plate by-pass circuit.

2) The voltage insulation of the filament transformer needs only to withstand the plate voltage.

3) Since the clipper tube is the generator of the undesirable high frequencies, the combination of the filament-transformer secondary capacitance, the inductance of the modulation-transformer secondary, and the final plate by-pass condenser forms a low-pass filter (Fig. 3-A).

This combination forms a constant-K &-section low-pass filter, as in Fig. 3-B. The cut-off frequency of this filter is unimportant, so long as it is below the highest speech frequency it is desired to pass, because it attenuates only the high-order frequencies produced by the clipper tube. Similarly, the insertion loss because of the impedance (Continued on page 120)

(A) Fig. 2 -- The new type of high-level negative-peak clipper moves the clipper tube to the other side of the modulation-transformer secondary, as shown at A. This has the action of a switch at S in B. In combination with the clipper-tube filament transformer, the inductance of the modulation-transformer secondary and the plate by-pass condenser, a low-pass filter is formed, and no sharp negative square waves reach the modulated stage. (See Fig. 3.)

April 1948 37
After the January sleet storm broke down all normal communication with the city of Camden, Arkansas, Naval Reserve radio stations provided that point with contact with the outside world.

The NR radio, N8ABL, Camden, under charge of Lt. (jg) H. S. Steele, jr., got on the air using emergency power and stayed on until Western Union and the local telephone company recovered enough wires (44 hours later) to declare the emergency terminated.

Naval Reserve Radio Station N8NAA, at Little Rock, Arkansas, manned by CRM Franklin Burt, USNR, W5EGX, rendered invaluable service, relaying traffic from Little Rock and Hot Springs through NDF/W5USN at New Orleans. Several hundred messages were handled for Southern Bell Telephone, Arkansas Light & Power Co., Camden News, Western Union, REA, Red Cross, U. S. Weather Bureau, Arkansas Gazette, and others.

A partial list of the amateur Reservists operating these stations includes W5s EGX, LRA, NSW and GRG.

Naval Reserve Battalion 3-18, composed exclusively of electronics and communications personnel, meets Tuesdays and Thursdays at 7:30 p.m., Building 558, New York Naval Shipyard, Brooklyn, N. Y. All amateurs and friends are invited to visit the radio shack by dropping a line or QSL card requesting a pass to Lieutenant A. Stangel, USNR, W2JZH. The commanding officer of this battalion is Cmdr. T. H. Neely, USNR, of Bell Telephone Toll System’s development division.

The following Naval Reserve amateur calls have been issued since the list appearing on this page last month:

KINRN Newport, R. I. K4NRU Northington, Ala.
KINRO Manchester, N. H. K4NRX Nashville, Tenn.
K4NAJ Daytona Beach, Fla. K5NAP Pawhuska, Okla.
K0MHT St. Cloud, Minn.

W4OL, Cmdr. McCoy, USNR, on active duty as Reserve communications officer of the Eighth Naval District, recently surrendered his well-known call after twenty years and was issued W5OM by the FCC. Nice going, OM!

Eighth Naval District Reserve amateurs have mailed out over 20,000 QSLs in the past 18 months, necessitating a reprinting in some instances.

Individual Naval Reservists who qualify for the station certificate announced in January 1948 QST are now eligible to receive a crystal and some instructional material. District Reserve communications officers can supply more detailed information.

ARRL Atlantic Division Director Martin, W3QV, Atlantic Division Alternate Director Wickenhiser, W3KWA, and Dakota Division Director Dosland, W0TSN, are all active as officers in Naval Reserve activities.

Naval Reserve amateurs are invited to send items suitable for this page via official channels to Cmdr. D. S. Wicks, USN, Room 3052, Arlington Annex, Navy Dept., Washington, D. C.
How's DX?

How:
Unpack those bags under your eyes — it's all over! And the only guy who didn't enjoy the Contest in these parts was W1ODY. He's the bird that has to check the incoming logs and every time he heard someone raise something he QRT'd and sulked. Man, those c.w. periods sounded not unlike an atomic bomb wheezing through a whistle factory. And the 'phone week-ends! Jeeves declares they reminded him of an old argument between his Aunt Harriet and a tobacco auctioneer.

Fryhart as it may, we have been urged to comment on a particular species of the DX Hog ilk this month. He's the type that, after he messes up a few of your QSOs, guffaws loudly and says, "Nertz, you take your DX too darn seriously." This looks like a spot for a simple analogy.

Suppose one has invested in a few hundred bucks of Izaak Walton gear, and has emerged from the sack in a chilly dawn just to esconce oneself hipdeep in the waters of the Little Muddy near where she rounds Rufus Ridge. And then, just as a silvery four-pounder hits the line, a couple of yeggs show up to poke you with poles, throw rocks in the water, snarl your line and finally swipe your fish.

Should you be inclined to laugh uproariously at this great fun?

Any shmo who doesn't take his DX seriously enough to treat his competition on the square ought to well, he just ought to.

And so to DX...

What:
Eighty. This "Old Faithful" of our spectrum family was certainly given an enthusiastic workout during the first Contest week-end. W4BRB still appears to lead the 3.5-Mc. marathon at 35 countries this season. Gene's latest: YU7KX (3535), GW8CT (3540), GW3AZQ (3558), GM5AHQ (3520) and KS4AI (3675). J3AAD is in the heard column — here's a chance for WAC. No WACs have yet been reported post-war on eighty...

A little tougher from W9AND's QTH, but Wes managed G2JT, G6RB, PA6BG, ZL1HM, ZL1DI, ZL4GM and heard UA8KAA. He hears that W7KUH scared up UA6KAA for Asia and now only needs Africa and South America. Ev of KP4KD sandwiched an F8, PA8DC and G6CJ in between W skirmishes... Thirty-five watts at...
DX band. KP4KD rolled up over 30 countries during January. W1GKU got three nifties in EK1AA, MD5KW and EA1IR. He’d like to know how to get pasteboards to the latter and also to OElAX. Seventy-five watts at VE3A we knocked loose VE7A, CM2SW (note that, Jeeves), VO8EP and KI6JL. Crawling forth from the sack at ungodly hours, W1IN is making out cards for VK2ARE (7050), VK3FC (7040), VK3BC (7009), VK2AHB (7050), KV4AA (7001) and VR5R (7025). MB9AA (7033), EA300 (7032), VO3Z (7021), PY7WI (7040) and UB5BG (7049) provided an interesting interlude for W2EQS. W1QVF unwound an r.f. choke, flung it out the window over a tree, and conversed with OK2MA, OK1LM, G2WC and others across the pond, with 50 watts. “Nothing to it!” Down where the first Italian postwar DXCC member, IIIR, of Milan, runs a maximum of 50 watts input to the two-stage rig shown at right, c.w. only. Receiver is a converted 8-tube superhet. Antennae: long wire on 7 Mc and vertical ground-plane job on 14 Mc. Bob writes up DX for Il Radiogiorne when not grabbing new countries or keeping the W gang happy.

Balmy breezes blow, W4LXA latched onto GM5JX, SM3EP, VRI5JE, HB5CR, CN8M2Z and VK7AL. Mike wants to know how can a guy complete a WAS with all this tempting DX around? Don at W2GP soft-soaped people such as KS4AF, UB5KBI, G16HU, LA5U, EQ7AIH, PY7WI, ZS2A, SM7JM and a jugful of Gs and Fs. It’s not too easy from his spot, but W5HBR’s 809 rapped out HB9EI, OL4JW, KG6CP, ZL3FF, ZL2MM, PY1CH, PY2AFS, PY4IE, PY6DZ and many Gs, Fs, KF3s and KL7s. W2KR hung around for D4ABC, D4AEH, UA3BD, UP2U, UB2KAA, UA3KAA, UA6IA, SM5BX, SM4XM and a ship signing SK7A. And this with a final tube costing 38 cents! [Now if you only hadn’t gone and robbed my piggy bank, boss. — Jeeves] Over 30 countries have succumbed to the shouts of W2GVP. Among them, EA3ZT, D4AZR, KS4AI, V580W, ZS1M, UA3BD/UC2, SM5D2, PY2AJT, GD8UB, ZD8B, LA7Y, KP6AB and OK1JR. W1KE tripped over HRIAT. Gad, an honest man! A W3, too, W9XYX piggybacked in an attempt to nab J2SCS and got a report of RST 349 but couldn’t quite pull him through the mire. Shei still needs Asia for 7 Mc. and recently worked KE6OC, KP4CP, ZL1HJQ, VK3FTX, ZS1Y, HP1FYF, HH2CW, OK1RW and ‘leben-‘leben Gs, KL7s and whatnot. G3CDR/MM, at Singapore, heard W2LVN, W4MOC, W8HIU and W8WXU but was not on the air himself. W5CVU misses the competition of 20 as he had too easy a time raising many ZSs, UA3AF and HK1AM. The attic antenna at W2BRC screened some r.f. through the caves for ZC6BK (7050) to complete Nick’s indoor-antenna 7-Mc. WAC. Also contacted were UB5KBA (7052), D4AIF (7045), SM5NU (7031), HB0CS (7055), etc. Another Jersey man, W2VJN, gobbled up HB0EU (7004), KH6GP (7016), PA0PN (7040), GM2BUD (7010) and a PY for continent No. 5. FM8AD showed up in time to enrapure W1RY who was vacationing from 20. A 6L6 c.o.o. popped the buttons off W3G1W’s chest by raising G8PT (7150). Hoosier W0BRN works ZLs and VVs with ease and also snaffled VS6AG for a rare Asian with his 40 watts. A try at this band resulted in PY1AHF, P8FK and ZS5FP down at W5ACL. W1JYH assembled a logful of many Europeans plus GM3BST, UA1YF and some South Americans with his long wire.

Twenty: Spotty conditions or not, there are still a few people on 20. And we ain’t just kiddin’! We see that VK4DO beat his recent 41-minute WAC with one within 28 minutes to the tune of HI2X, CN8BA, D4AVL, VK42BZ, CB5BH and C1LM. Ninety watts and a rotary did the trick. Giving traffic a rest for a moment, W1IN cavorted with UA1AR (14,002), UA3KAA (14,095), OX3GF (14,104), D4ATC (14,015), VO6Y (14,090), VP4T (14,015), YV4AI (14,100) and ZSSBZ (14,002). W6ZZ is still in there pitching with CE3DG, TI1WR, UA0KKB, VQ2GW, KMB6A, K66AD, ZS5HT, ZS6G, ZS6LW, CR7AF and CX1NE. W4I1WI whipped his folded dipole around VQ3HIJ, OX3GR, Y12FDE, UA1KEA, M1625, VU26X, YVIAL and ZD4AO. W1JYH is very prosperous with YA2AB, UA1KEK, UA1EC, CPAIS, ZB2A, CRA2C, EA1A, VQ2GW, VUCG, ZE2JN, C2AS0, MD1D, KAS6A, MD5PA, CR8AN, EP1AL, VP8AI, HJ8X and others.

Down by the Alamo, W5ACL had to be satisfied with ZC6CHI, VU2SJ, VU2ZZ, PZ10Y, VR5PL and V08A. Took Mel 24 years to raise a VU and of course now they’re lining up for him. PX2A has W1RY agog;
also FQ3AT/FE, VQ4EHG, MD1I, VP1AA, G3HH, EKlAA, CR7AF, CR6AN and MD3AB. W1KE was away a few moments with YV1AZ, CR6AI and EK3HM. Nifties such as CT2AB (14,150), W3LYK/KC4 (14,095), CT1SX (14,140), P2IAL (14,120), OAABG (14,060), HK1PU (14,050), OX3U, OX3UE kept W8KPL hopping. An indoor dipole amassed UD6AC, UAIU, UA3BG, VQ3ALT, VQ5JTW, ZD1AM, GC4LI and many ZSes for W1GDY. W1MRQ also got the ZD4 and adds UD6AG and VK7LZ. W9KOK is presently beamless but pilfered XZ2KM, XZ2DN, PK2RK, VU2PK, VU2SI (Pakistan), VU7BR, VS1BJ, VQ8AD, GC2RS, GD6AI, UH8AA, UH8AF, ST2JF and ETIIR. YN5AV, YN1AA, HP4Q, UA9CC, HS1SS and UA6UC are accounted for by W5GLEL. Up to 104 is W5CEW with seizures such as W2WMV/C9, CR4AX, J8AAM, GD3BBS, ZB1AB, Z860L, Z84P, HZ1AB and C1MCC. TF3AB, UH8AE, PZ10Y, CN88C, UAI3VH and UH8AE were prevailed upon at W8EHHI. W6MX tried out a new Q5'er on EA7AV, W6CTV/VRI and VR2AU. W9CYU turned the beam north and collected many Russians plus U05VV and UB5BD. G3BQ, VK5FL, ZL2FA, LU4DQ, CR7AY, VS2CB and W2 helped John to a fast WAC one afternoon. WSDEN has dawdled with YU7KX, Z81AI, OX3RD, OX5JJ, ZM6AF, Z81JI and ZD4AB. A haywire (?) semivertical at W1ZL rattled the cans of VK7RK, F9L1, CX4CZ, Z81KO, a VS2 and a W4 for another 2½-hour WAC and now the total is 127. Pickings in January were mighty slim for W5ASQ - only 106 countries that month! Among them: EA300, VU2HS, W90ZW/KS6, UAI9EAA, VS4VR, VP7NK, UAI8AE and SV1RX. Bill varied the amplitude thereon at ZD2KC, KG6AW/VK9, Y81AC, ZP5AC, AR8AB, MB9AI and OQ8BR. W6BIL rejoices in UAI9EKA, PY4F1, KB6AD, Z86IX, OH6NR, LB9BA and OZ4M. W6RBQ whittled away on VQ2IC, PK4VD, VP2AA, RV2, VQ4RAW, W8TXX/VK9, FT4AB, HC1ES, Z86NU and umpteen others. Some new 810s brought W2TXB up to 98 with CX1PB and OA4BG. It must be tough to have just about worked 'em all, but W1PF was interested in KH1LX/VRI on Makin Atoll. Another member of the never-miss-'em clan, W6S1A, mentions CP5EA, MD7DA, VR3A, ZD1RR, VQ1HUP, plus oodles of Russians. OI2N/3 refused to take W2HAZ's advice and got shipwrecked on Barbados, past which he was steaming. Bill needs VP6 badly. An exceptional synopsis from W1AB offers EK1TF (14,005), SV2AF (14,050), ZG6SM (14,100), GD2DF (14,090), C3LT (14,070), W1PX/KG6 (14,080), UN1AA (14,045), UB5KAB (14,120) and MI6AB (14,000) to give Horace 115. He and the rest of us would like to see more LM, MH, etc. procedure used by DX. A recent visit to W6 has prompted W4DHZ to engage in a rebuilding spree. Meanwhile Nap did business with EK1AZ, EL3A, ET8AF, EP3D, GC4LI, GD2DF/A, J3AAD, KAIAC, KM6AB, KP6AB, MD5DA, UD6BM, VQ2JC, Z81AH, Z81BD and others, for 101. VE1OM met up with VP4TAU, CE3DZ, GD2FRV, G8N0, FA3JY and ZC6WL. XE1AC has been sticking to A3 postwar and quibbled with ZM6AF, VR2AP, EK1AD, EA30S, EA7BA, EB7EDZ, EA9AI, ZD3B, VP1AP, FA8WH, XK6AF, Z81IJC and VR3A. W6VFR has hit 185, helped by W2FHZ/V4 (14,290) and VP2GB (14,330), both on the vocal. People who schedule rare DX for hours night after night are the pet peeves of W2ITD. Steve has been consortin with MD2C, OH3NA, KA1JD, UAI1KEB, KL7MH and Z6G6J on c.w. and crooning to ZS2CL, HK3FAP, ST2CH, VQ4NSH, Z84P, YN1AJS, VP2GE, VK6DD, CN8SB, H10EC and C8NAU.

Ten: If you can afford to lounge about in the daytime, here's the band for you. Otherwise, put on a suit of armor and try it week-ends. Or, if you have a call such as XE1AC, you could maybe work ZD4AH, ZD2KC, QO5BA, C17QA, LX1JW, VQ4ERG, VQ4HRP, VQ4GWB, ZK1AA, ZP2AC, CP5EA, PZ1A, PZ1M, VP3TR, JA2MA and KZ5AY on 'phone. But a call like W4MQV and 50 watts can work VP0P, VK3MC, CE3BA, KP6AA and piles of Europeans. W2GMM yakked with CR7AD, Z81L, EL5A, ZL2BN, and W3NKS/MM (off CR7) and then di-dahed for UA3BM, SP5AB, D6AC, DA7AC, VQ3ALT and CE7AAA. A half-wave and 20 watts were sufficient to enable W1KXW to be palsy-walsy with GI2AFW, GW8NP, 0258.

This looks like a little gathering in some ham shack down the street, but look again- there is rare DX assembled here. The man with the mike is AR11RJ and this is his station, quite newly-active. Guests, left to right: AR1OM/W2BFS, AR1YL/W4CQL, AR1PC/W1KAV, and W1FPD who also operates AR1PC.
We mentioned this young gentleman last month and figured you'd like a look at him. This is W2UFT at his operating position. Don completed his first year of hamming with some 140 countries worked and 90 confirmed. And January 22nd was his fourteenth birthday! He won't talk much but his OM is W2ANX, a 7-Mc. man and quite proud of his offspring. A kw. (3100 p.p.) helped a lot while the antenna was an unspectacular 14-Mc. half-wave vertical. Don is an outstanding scholar at Brooklyn Tech when not pursuing prefixes.

Place

There's one or two here you may take with tongue in cheek; lots to pick from, anyway:

C3LT

David Liu, Box 163, Canton, South China

C57AA

E A X, Box 464, Punta Arena, Chile

CF1ASJ

Castro 888, La Paz, Bolivia

CB5AM

P.O. Box 64, Macao

DA1AD

darc, Box 385, Stuttgart, Germany

DA7AC

darc, Box 385, Stuttgart, Germany

D5AA

(via RF"

DLX

(via Box 80, Moscow)

D6AC, DARC

Box 385, Stuttgart, Germany

EA1A

(via W1AWZ)

EA300

Box 12354, Madrid, Spain

EASEEDZ

Aparato 11, Villa Caceres, Rio de Oro, Spanish West Africa

EK1DI

J. E. Terry, P.O. Box 179, British Post Office, Tangier Zone

KT3AF

Harry Dent, Box 858, Addis Ababa, Ethiopia

HC1KW

Francis A. Croley, Pan-American Grace Airways, Quito, Ecuador

HC2CC

P.O. Box 1233, Guayaquil, Ecuador

H11HB

Bert Trimble, P.O. Box 204, Port-au-Prince, Haiti

HK3LP

Box 1462, Bogota, Colombia

J5LQK

APO 929, % PM, San Francisco

KH8KQ/KP9

C.A.A. Administration, Palmera Island

KH6LX/VR1

(via ARRL)

KX2AF

David Fugman, AACS Det., 775-11, Navy 824, San Francisco

LB9BA

(via ARRL)

MB9AA

(via RSGB)

MD2A

Peter Joubert, % BOAC, Tripoli

MD2B

Chips Carpenter, Tripoli Signals Sqdn., North Africa, M.E.F. 7

MD2D

Ken Williams, % BOAC, Tripoli

MD2E

Butch Orr, % Cable & Wireless, Tripoli

MD2F

Arthur Gover, % BOAC, Tripoli

MD2G

Chalky White, Signals Officer, RAF Stn., Castel Benito, M.E.F. 1

MD2H

Thom Brown, Signals Section, RAF Stn., Castel Benito, M.E.F. 1

MD5GW

Officers Mess, "I," Camp No. 2, Bass Workshop, REME, Tel El Kobir, Egypt

OX3MG

Hans Danielson, APO 888, % PM, New York

OX8FS

(via EDR)

PK5TO

Col. Stoop, Box 73, Macassar, Celebes, N.E.I.

PX1B

% Radio Andorra, Andorra, or via REF

ST2JE

R.A.F. Station, Khartoum, Anglo-Egyptian Sudan

SV1RX

(via RSGB)

V02AX

Lt. J. F. Maloy, USN, Navy 103, Argentina, Newfound% PM, N.Y.C.

Ex-VP2AT

Arthur Tibbits, "Braemar," Britton's Hill, St. Michael, Barbados

VP3TR

Ted Rast, Atkinson Field, British Guiana, via APO 987, % PM, Miami, Fla.

VP3TY

Tony Clavier, 25 Norton St., Georgetown, B. G.

VQ1HGB

H. G. Baker, % Barclay's Bank, Nairobi, Kenya

VQ8AZ

P. O. Small, R.N., 15, The Camp, Phoenix, Mauritius

VS4OR

(via VS2AL)

V85A

Box 541, Hong Kong

W1PXB/KG6

Box 100, Guam


W2EJV/PK3

Box 229, Soerabaya, Java

W2LGZ/KL7

APO 729, % PM, San Francisco, Calif.

W6FMZ/C6

(to home QTH)

XAEQ

Major L. Hill, 13 CTS TPS WSKP, C. M. F. Trieste, or via RSGB

Y42AA

(via ARRL)

Y81AC

Arcadio Chavez, Villa Delgado, San Salvador, El Salvador

ZC6CN

(via 11LT)

ZC6WL

Bert Ward, Signals Officer, RAF Stn., Castel Benito, M.E.F. 1

ZD4AO

(via W3QPV)

For this directory we are indebted to W2s AB, BDJ, HDQ, IN, JYH, PEK, QVF, VG and ZL; W2s EQS, HAZ, ITD and W2; W4DIZ;
Tidbits:

The Gatti-Hallicrafters Expedition is giving the gang plenty of chances for Kenya (VQ4EHG) and should be popping up in VQ3 and VQ5 in the near future. W4ESP relays information that the Kenya set-up has a rhombic centered on good old Chicago. (Did you pick up those train tickets yet, Jeeves?) !To where, boss — Kenya or Chicago?— Jeeves

W6VFR has tracked FK8VB back to ZL and is trying to coax a card from same. Marv also learned that ZS6OL went back home to GM3AFG. When KH6KL first reported to us concerning RV2 some months ago we took the tip with a smattering of sodium chloride. The call and the QTH seemed just a trifle bizarre. But we cheerfully bite our lower lip while presenting the following details from an RV2 letter donated by W6VFR. RV2, operated by Roland D’Assignies, has been quite active on 7 and 14 Mc., using a 6L6 Hartley at 15 watts and an S-38 receiver. The label is strictly temporary and an FO call is pending. Roland has been having a tough time pushing through with his improvised transmitter but W6SAI and W6VFR are fixing him up with a neat 50-watt VFO job. Watch for VR2 using A3 soon.

Despite February QST, W3MWV hastens to state that he has nothing to do with C9. People shouldn’t have calls like W2WMV/O9, anyway! W2ZJ and W2TXB warn that EP1AL is very close to hbt water because of some QSL Hogs trying an RSGB short-cut. QSL EP1AL only via W2ZJ. Along this same tack, W2ZJ advises all to be careful about VS9KA, ET1IR and HZ2TG — no direct mail. Ed quotes KX6AF as desiring self-addressed envelopes for return cards. He’s 1200 behind but trying hard. An interesting VR5PL letter via W6RBQ reads in lovely fashion. To wit: “We kept a Pig Pen list but that was too tough as we soon had hundreds of W calls between us and this idea had to be canceled.” “We” means VR5PL, too. Great stuff. Some critter messed up a VR5PL-G2PL QSO for 53 minutes; Noel finally gave the W3 a break. The latter generously gave VR5PL a report and then tried to line up a few more buddies for QSOs! But though you can lead DX to water you can’t make ’em drink all of it — so there’s one boy who’ll never get a card from VR5PL.

This classical outfit represents G2BB, a well-known Bignal on 28 Mc. The station is operated as completely automatic as possible and possesses some unique switching arrangements. Transmitter winds up with d.p. HK5As and a 4-element rotary beam. An elaborate speech amplifier makes overmodulation impossible at G2BB.

April 1948
Compact 20-Watt Rig for 50 Mc.

A Complete 'Phone-C.W. Transmitter on Two 5 x 10-Inch Chassis

BY STEPHEN T. VAN ESEN,* W20XD

ONE Sunday morning the QRM on 10 meters was even worse than usual. Our converter covers six and two as well as ten, so we flipped the switch to six and tuned the band — what a difference! Four beautiful megacycles — a couple of W2s talking to W6s and a W1 chatting away with a W7. No QRM, no heterodynes — just three signals on an otherwise quiet band. "This," we said, "is for us!"

The available space was small and we weren’t sure just how we were going to like six, so the rig is compact and the power input less than twenty watts. The first stage is a straight crystal oscillator using a 6AQ5 miniature tube and a 12.7-Mc. crystal. This is followed by a 6AQ5 quadrupler which furnishes sufficient drive (2 to 3 ma.) for the 2E26 final. The full supply voltage (300 volts) is applied to the plate of the 2E26 but is dropped through resistors to hold down the voltage on the 6AQ5s to less than 250 volts.

The R.F. Section

The tuning condensers of the oscillator and quadrupler are mounted underneath the chassis and their respective coils are soldered directly to each condenser. The condensers have mounting holes in their ceramic end-pieces enabling them to be mounted by means of small angle brackets, thus keeping the rotors off ground. A small piece of ¼-inch diameter polystyrene rod is coupled to the shaft of each condenser for easy insulation and to prevent grounding the rotors. The oscillator and quadrupler coils are ¾-inch diameter and are self-supporting. The oscillator coil has 13 turns and is 1¾ inches long. The quadrupler coil has 3 turns and is ¾ inch long. Four closed-circuit jacks allow for metering the cathode circuits of each of the three stages and the grid circuit of the 2E26. The transmitter may be keyed for c.w. work by inserting a key in the 2E26 cathode jack, J4.

The final tuning condenser is mounted above the chassis. Two 1½-inch steatite stand-off insulators, one horizontal and one vertical, hold the condenser rigid and bring it high enough so that the lead to the plate of the 2E26 is less than ¼ inch long. The final coil is soldered to the condenser and consists of four turns (½ inch long) wound on a ¾-inch polystyrene rod. The polystyrene rod is supported by two pieces of aluminum mounted on the front and rear of the chassis. The rear aluminum bracket also serves as a place to mount two coaxial connectors, one for the antenna, the other for the line going to the receiver antenna post.

*A 20-watter such as the rig herewith described by W20XD would be pretty well outclassed most of the time on any of our lower-frequency 'phone bands, but on 50 Mc. it is quite capable of giving a good account of itself. A complete 'phone-c.w. rig in less than a cubic foot of space, this transmitter should be popular with the fellows who are looking for an economical way to get started on six meters.

The 6-meter transmitter described by W20XD is constructed on two small aluminum chassis. At the left is the r.f. section, complete with antenna change-over relay. The other unit contains the power supply and modulator.
Fig. 1 — Schematic diagram of the r.f. section of the 50-Mc. transmitter.

A double-pole double-throw relay is mounted just back of and underneath the final condenser. One pole of the relay grounds the transmitter power-supply center-tap in one position and the receiver power-supply center-tap in the other. The other pole of the relay connects the antenna to the transmitter in one position and to the receiver in the other. The outer conductor of the coaxial cable is grounded in all cases and only the inner conductor is switched by the relay.

Mounting the antenna change-over relay within the transmitter itself does away with the necessity for using the scarce and expensive coaxial relay, which would be required if the relay were to be inserted in the line at a point remote from the transmitter. While a coaxial relay might be slightly more efficient, the system used here takes up less space, is cheaper, and seems to work out very well. The output coupling link consists of two turns of No. 20 push-back wire which can be slid back and forth on the polystyrene rod to vary the coupling.

Power Supply & Modulator

The power supply and modulator are built on a 5 X 10-inch aluminum chassis similar to the chassis used for the r.f. section. These aluminum chassis are now available as stock items and once you use one you will never go back to those black-wrinkled steel jobs. The power supply delivers plate and filament voltages to both the r.f. section and the modulator. The modulator consists of a pair of 6AQ5s in push-pull driven by a carbon microphone. The full 300 volts is applied...
to the plates and screens of the 6AQ5s in the modulator. This is perhaps more than their maximum rating, but it does not seem to harm them. Microphone voltage is taken from the cathode bias resistors and the gain of the system can be adjusted by a potentiometer across the primary of the microphone transformer. In actual practice we set the gain at maximum and leave it there. Even then we have to keep fairly close to the microphone mouthpiece in order to keep the modulation up.

A seven-conductor cable runs from the modulator/power-supply unit to the r.f. unit. The conductors carry the following: common ground, high side of 6.3-volt filament voltage, B+ to oscillator and quadrupler, modulated B+ to 2E26, a.c. for relay coil (2), and B—lead from power-supply center-tap to relay contact. A two-conductor cable runs from the r.f. unit to the receiver, carrying B— and ground from the receiver to the relay. The on-off switch, pilot light, fuse, and send-receive switch (S4) are on the front of the modulator chassis. A switch (S3) on the front of the r.f.-unit chassis allows for breaking the B+ line to the 2E26 so that the plate and screen current of this tube can be cut off while the oscillator and quadrupler are tuned.

There is no difficulty in adjusting the rig. After tuning the oscillator it should be backed away a bit from the sharp side of minimum dip for maximum stability. Very little dip can be ob-

(Continued on page 188)

Bottom view of the power-supply-and-modulator unit.
The left-hand toggle switch applies a.c. to the filaments and heaters of all tubes, while the other serves as a send-receive switch.

QST for
NORWAY

The Norsk Radio Relae Liga reports that the expected postwar increase in amateur radio interest is continuing, total membership having risen from about 900 to approximately 1300. The number of licensed amateurs in Norway has increased correspondingly from 300 to 430. Activities of the N.R.R.L. were formerly performed by the officers and members entirely upon a voluntary, unpaid basis but clerical details in connection with general correspondence, QSL handling and the like now require the services of a full-time paid secretary.

N.R.R.L. has been authorized by the Norwegian authorities to examine applicants for amateur radio licenses and to regulate the amateur radio service. The general power limit is still 50 watts but inputs of up to 150 watts are permitted holders of special licenses who qualify by outstanding amateur achievements and whose applications are approved by the society.

In spite of the difficulties encountered in obtaining components for v.h.f. gear, interest in that portion of the radio-frequency spectrum runs high. Norwegian amateurs have been given temporary permission to operate in the 47.0–47.3 Mc. band. N.R.R.L. will submit a request to the authorities for an additional band beginning at 50 Mc.

The Norsk Radio Relae Liga has formed, with cooperation of the Norwegian Red Cross, an emergency corps to furnish radio communications whenever needed, principally to relief expeditions for victims of air accidents.

About twenty young members of N.R.R.L. are now being given additional training to fit them for their part in the emergency set-up. This additional training is to increase their proficiency in high-speed operating, traffic handling and portable work.

A construction program has been inaugurated to build equipment for the emergency corps. The transmitters for portable work are to be small and light. The rigs, powered by dry batteries, have been designed to operate with about 2 watts input and will be adjusted to operate on one net frequency, either 3505 or 3795 kc.

The necessary permission for this type of operation has been granted by the Norwegian authorities. N.R.R.L. has not yet decided what will be used as a distress signal. QRR, the A.R.R.L. traditional signal of distress, was considered but temporarily rejected because of its having been adopted, with another meaning, at the Atlantic City conference as an addition to the international list of Q signals.

PHILIPPINE ISLANDS

The Philippine Amateur Radio Association reports that Philippine amateurs are not presently permitted to communicate with foreign amateurs other than those in the United States. The P.A.R.A. was advised that this prohibition by the Philippine government is for security reasons.

Philippine amateurs ardently hope that the ban on their working DX will soon be lifted so that amateur radio progress in the Islands may be encouraged.

Benjamin Kroger, XE1KE, as official emissary of the Liga Mexicana de Radio Experimentadores, presented fraternal greetings of the L.M.R.E. and expressions of esteem to A.R.R.L. Secretary Warner, W1EH, in the League's West Hartford office. The mutual esteem and friendships between the two American societies and their members is exemplified by the "hands-across-the-border" scene depicted here.

C.A.R.L. SHOW

The Chinese Amateur Radio League will hold an amateur radio exhibition in Nanking sometime in May of this year. This will be the first such exhibition since 1942. C.A.R.L. has requested amateurs all over the world to send photographs of stations, QSL cards, club emblems or banners and similar items to provide a truly international flavor. If you hurry, there is (Continued on page 188)
F.M. Reception with the Wilcox F-3

BY JOHN A. DINTER, WSOAP

One of the current "good buys" is the Wilcox F-3 receiver, a fixed-frequency crystal-controlled receiver commonly used for monitoring aircraft frequencies. It is a.c. operated, has very good sensitivity, and fairly good selectivity for amateur phone work. The unit is self-contained in a chassis built back of a 3½-inch standard rack panel. The one used by the author cost the great sum of $13.50 complete with tubes and coils.

Very little modification is required to use the receiver as the i.f. amplifier following a converter for a.m. reception. However, it is not especially difficult to go one step further and adapt it for narrow-band f.m. reception as well. Much of the current criticism of n.f.m. can be traced directly to the fact that it is being received on a.m. receivers that do not do justice to the system. The "conversion" described here will allow either true n.f.m. or a.m. reception.

The first step is to remove the protective shield box that covers the tubes and coils. The top and bottom of the chassis follow and then the front panel itself. This leaves the inside of the receiver nicely exposed so that any work to be done can be completed easily. The power transformer must be set back to provide a little depth behind the panel at one side, so two new holes should be drilled one inch to the rear of the present ones that hold the unit in place. This leaves ample space to mount a switch behind the panel on the right-hand side. This switch, mounted on the spot formerly occupied by the frequency nameplate, is a s.p.s.t. unit used to break the high-voltage center-tap lead from the transformer for send-receive control. The center control, marked "Noise Control," should be removed from the circuit and from the panel and the hole enlarged to take a d.p.d.t. switch for a.m.-f.m. change-over. In the f.m. position, the switch also shorts out the a.v.c. bus to give a little extra gain.

The next step is to change the crystal socket from the three-pronged aircraft type to an octal of the wafer variety. This requires drilling two holes, but in replacing the crystal shield can it will be found that two bolts will be enough. While the oscillator can be made self-excited, crystal control seemed a good idea because it provides an i.f. channel that is not going to wander in frequency when the set is jarred or the line voltage fluctuates. The crystal used in this unit was 3845 kc., with the oscillator below the signal frequency. This gives an i.f. of 4.3 Mc. (This frequency was used here because the existing converter had been built for use with a 4.3-Mc. wide-band i.f. for f.m. broadcast reception.) This i.f. is high enough to provide good image rejection but still low enough to have good gain. The converter was placed on 235 Mc. and its oscillator did not pull, so it was a natural conclusion that the unit would be just as satisfactory on the 28-, 50- and 144-Mc. amateur bands. It works beautifully on the forestry stations in the 74.5-Mc. region!

F.M. Reception

To make the unit function as an n.f.m. receiver, the 6C8 tube is removed and with it all of the socket wiring with the exception of the heater leads. This tube, formerly used for squelch and audio, is replaced by a 6SJ7, used as an f.m. limiter. Fig. 1 shows the revised circuit. Do not remove resistors $R_{14}$ and $R_{15}$ of the original circuit diagram shown in the book of

A view of the modified receiver with the cover off the chassis. The 615 audio tube is just to the right of the 80 rectifier. To the right of the 615 is the 6S17 limiter, and behind the 6S17 is the discriminator assembly.
Fig. 1 — Circuit revisions to adapt the Wilcox F-3 to a.m.-n.f.m. reception. Components not marked are in the original receiver. The discriminator uses crystal diodes mounted in the same can with a modified diode transformer of the push-pull type.

Directions furnished with the receiver. These resistors are necessary for the correct operation of the a.v.c. amplifier.

Next, remove the small coverplate beside the ex-6C8 socket. This will expose two knockouts, one for a tube and the other for an i.f. can. The tube cut-out should be fitted with an octal socket and wired for the 6J5 audio stage shown in Fig. 1. The i.f. cut-out may be used for the discriminator transformer, a modified full-wave diode i.f. transformer. The modification is simple: take the transformer out of the can, then remove the two diode plate leads and mount a three-lug tie-point at the bottom of the wood dowel by a small wood screw. Then solder a 1N34 to each end of the secondary winding where the ends are attached to the trimmer lugs, with the negative terminal of the 1N34 at the coil. The other terminals of the 1N34s are soldered to two of the lugs at the tie-point. As shown in Fig. 1, two 0.1-megohm resistors are connected in series between the same lugs, and a 50-µfd. condenser is also connected between the same two points. One lug is grounded and the other lug is the connection for the audio output. A 0.1-megohm resistor and a 50-µfd. condenser are connected to the center-tap of the secondary winding, as shown in the diagram. The other terminal of the resistor goes to the common connection between the two 0.1-megohm resistors while the other terminal of the condenser goes to the plate end of the primary winding. This gives a well-shielded and compact discriminator assembly.

The 6J5 audio stage shown in Fig. 1 is resistance coupled for working into an external audio stage to drive a speaker.

Alignment of the i.f. is easy using a signal generator and output meter for the a.m. section. The f.m. discriminator may be lined up by using a high-resistance meter or a vacuum-tube voltmeter connected across the discriminator output. The bandwidth with the f.m. section in use very nicely handles the 30-ke. swing used commercially in the 50- to 42-Mc. band. On a.m. the bandwidth is narrow enough for good selectivity, but wide enough to take care of signal drift when using the receiver on 2 meters.

One word of caution: Be careful not to mess up the a.v.c. circuit; it uses an a.v.c. amplifier operating from negative voltages developed across the lower end of the voltage-divider string. Also, when taking the limiter input from the i.f. amplifier-stage output transformer, connect to the primary rather than secondary. This avoids loading the secondary and gives a better peak on a.m. reception, but does not affect the f.m. performance.

After using the unit on n.f.m. on 10 meters, especially on a signal that really saturates the limiter, you will definitely come to the conclusion that n.f.m. is not just something to read about — or to cuss about!

1 Alignment procedure for f.m. receivers is described in the Handbook.
CONDUCTED BY E. P. TILTON,* WIHDQ

As is usually the case, February was a quiet month for the v.h.f. gang; quiet, that is, from the standpoint of activity heard on the air in most localities. Unlike some previous years, however, this seeming quiet did not mean that interest in v.h.f. matters was low. The correspondence received by this department in the past month refutes that! "Not many contacts to report, but —" and follows a recital of beam building in the basement, of conversion of surplus gear underway, of adding r.f. stages, of tending to the thousand-and-one items of fence mending that the up-and-coming v.h.f. man finds to do at this time of year, in preparation for the big season coming up.

And spring, 1948, is going to be a big season. If our V.H.F. Sweepstakes could bring out literally thousands of stations in January, when conditions were at rock bottom, what may be expected when the coming of spring stretches out our operating ranges? One thing is in immediate prospect for the 50-Mc. gang — the culmination of the race for 50-Mc. WAS. Activity is now ready and waiting in practically all the hard-to-get states, and the bronze trophy may well be won this year. If you've not worked too much heretofore, don't feel that you have no chance, as the first 40 or so can be worked within a month or two, once the spring sporadic-E season gets underway. Starting from scratch, right now, you'll be up with the leaders before they are able to knock off their last few hard ones.

On 144 Mc. we find more stations than ever before on any v.h.f. band, in many places where no v.h.f. activity formerly existed. The 522 and similar rigs, available at low cost on the surplus market, have encouraged hams in many areas to give 2 meters a try, triggering off a boom in 144-Mc. activity that cannot help but produce interesting results this spring. With thousands of stations active on the right places, and with ever-increasing interest in high-gain antennas, the 144-Mc. record is almost certain to be broken before long. And whether you get into any record-breaking DX or not, one thing is certain: you're in for plenty of fun and excitement this year.

The next two higher bands appear headed for greater things also. The anticipated change to 220 from 235 Mc. has held that band back, but the interest is there, and when the change is announced (it may be before this appears in print) an appreciable amount of activity is expected to develop. The 420-Mc. band is already getting quite a bit of attention. In only a few places has it yet reached the point where contacts are made other than by prearrangement, but the flood of surplus gear that is capable of being used there is expected to help in populating this band this summer. By concentrating activity on certain agreed-upon nights, various local groups have succeeded in developing interest within a community area, and tests conducted in connection with an established channel on 2 or 6 meters have shown up interesting results.

Whatever may be your particular field of interest in connection with v.h.f., now is certainly the time to be polishing off the details. Those new beams should be put up without delay, for instance, for the sporadic-E skip and the tropospheric bending will be upon us before we know it. And don't forget the big week-end, May 22nd and 23rd, the occasion of the Spring V.H.F. Party, details of which will be announced in May QST. This contest will follow the principles which made the V.H.F. SS so popular, and will include incentives for multiband operation and a worthwhile multiplier for use of the frequencies higher than 148 Mc. As before, standard reporting forms will be sent without charge to anyone requesting them. Plan now to be on deck!

50-Mc. DX News

Though the 50-Mc. DX picture faded for most of the United States in January, and February activity seemed to be running in direct proportion to the m.u.f., there was an appreciable amount of DX worked in other countries during the month. The South American summer season was producing its quota of sporadic-E skip. PY2QK, Santos, Brazil, worked Argentine stations almost nightly, and on Feb. 17th he had his first contact with OA4AE, Lima, Peru. CE1AH, Chiquimula, Chile, has been working PY2QK and the LUs in the Buenos Aires area quite frequently. On the 22nd the band was open over this path until after midnight, and LUs were working XE1KE at the time, but the latter was not audible at CE1AH. Ida reports that Uruguay is now represented on 50 Mc. by CX1AA, CX1AQ and CX1AY.

* V.H.F. Editor, QST

QST for
The Mexico City 50-Mc. group now comprises five stations, including XElA, XElFE, XElGE, XElKE and XElQE. From the time of his return, on Jan. 28th, from a visit to this country, XElKE had heard nothing on 6 until Feb. 18th, when he worked LU9MA, Mendoza, Argentina, at 8:25 p.m. CST. At 7:50 that same evening he heard W7K7D (possibly W7KAD?) calling CQ six. LU9MA was first heard at 7:58, and LU1AM was heard shortly after, both while the array at XElKE was still pointed northwest. LU9MA was heard later calling OA4AE. LUOMA has not been heard at CElAH when other Argentine stations are coming through, a point of interest, since Mendoza is directly south of Chuquicamata, and only about 750 miles distant, as compared to about 1500 miles for Buenos Aires, to the southeast.

Though the predictions indicate that corresponding paths to those in Africa should be open, there is no news of 50-Mc. DX from the Dark Continent this month. The ZS stations now have permanent permission for 50-Mc. operation, and ZElJM, Southern Rhodesia, is reported by VQ4EHG to be active on 6. While not licensed presently for 50-Mc. work the Gatti-Hallicrafters Expedition, now operating in Tanganyika as VQ3HGE, is willing to listen on 50 Mc. for possible crossband contacts. Both operators, W6PBV and W0LHS, were active on 50 Mc. before signing up with the expedition. Via W2BIA we learn that FASBG is on daily on 50.2 Mc., between 1330 and 1500 GCT. He and MD5KW should be in a position to make contacts with stations in southern and central Africa during March, and possibly April. The path across the South Atlantic looks fairly good on the March predictions, the indicated m.u.f. being above that shown on the North Atlantic charts for some of the times that path has been open for 50-Mc. work.

A Broad-Band Antenna for 50 Mc.

Last month we were propagandizing for use of more of the 50-Mc. band, the region above 51 Mc. going almost unused at present. One reason for this concentration of activity at the low end is the sharpness of the frequency response of most antenna systems having any appreciable gain. Even a wide-spaced 4-element array such as the one described in these pages last year cannot be expected to cover more than half of the band, and at the high end of its coverage (where the directors start to act as reflectors) the performance drops suddenly to well below that of a simple dipole.

Because he wanted to operate in the high half of the band, and still be able to do a creditable job of receiving at the low end, WlEYM, Fairfield, Conn., developed the array pictured here. It consists of four similar folded dipoles, each cut for the center of the band (108 inches long) except for the reflector unit which has 1-inch extensions at each end. The dipoles are mounted a quarter wavelength apart, and fed as shown in the drawing. Though work with the antenna system is still in the experimental phase, WlEYM has established the following facts regarding its performance:

1) It provides a reasonably flat match to a 470-ohm line over the entire 50-54 Mc. band.

2) It has an average gain over the whole band of 8 db, over a half-wave antenna cut for 52 Mc.

3) The front-to-back ratio varies from approximately 3 db. at the low end to about 12 to 15 db. at the high end, this fairly-high front-to-back continuing on up to 60 Mc.

The dipoles are each 108 inches long. If they were cut for the low-frequency end of the band the impedance at the feed-point being approximately 470 ohms. The dipoles are 108 inches long, except for the reflector element, which has 1-inch extensions at each end. Interconnecting sections of 300-ohm line are approximately 108 inches long. The section of 300-ohm line inserted between the 470-ohm transmission line and the second dipole is a half-wave long (minus propagation-factor shortening) and is used to provide a flexible section rather than for matching purposes. The sections of each dipole are 2.94 inches apart, center to center. Performance characteristics are given in the text.

"Directivity"

Detail drawing of the broad-band 50-Mc. antenna system worked out by WlEYM. Four folded dipoles, 54 inches apart, are driven as shown, the impedance at the feed-point being approximately 470 ohms. The dipoles are 108 inches long, except for the reflector element, which has 1-inch extensions at each end. Interconnecting sections of 300-ohm line are approximately 108 inches long. The section of 300-ohm line inserted between the 470-ohm transmission line and the second dipole is a half-wave long (minus propagation-factor shortening) and is used to provide a flexible section rather than for matching purposes. The sections of each dipole are 2.94 inches apart, center to center. Performance characteristics are given in the text.

144-Mc. News

Things are picking up, and we have a goodly supply of reports from the 2-meter contingent.

April 1948
you take the trouble to write in and let us know this month. Many thanks, gang, and keep the representation it deserves in these pages only if news coming. The 144-Mc. band can have the 52 stations who have agreed to go horizontal on out far and wide, in a mimeographed notice which is being mailed in 1948 on 50, 144, and 235 Mc. and higher, for in 1948 on 50 and 28 Mc. On the lower bands almost everyone uses a communications receiver, with resulting standardization of the passband. You can set up your deviation for the average and not be too far off. On 2 it's a different matter. With receivers differing in passband all the way from about one megacycle for some superregens to as little as 5 kc. for the converter-communications-receiver combinations, it is impossible to strike a happy medium for all. Even a swing that is suitable for a 522 receiver will sound like so much hash on a communications receiver with a 455-kc. i.f.

In some areas, where the 2-meter population is fairly limited, there is a considerable standardization in receiver techniques, and thus the life of the n.f.m. enthusiast is made easier. Such conditions are found in the Minneapolis-Champlin-St. Cloud circuit, according to W0SV, who is running controlled phase modulation, as described in QST. Originally he had been using reactance-modulated f.m., but the signal was not stable enough to suit him. For some time was next, followed by W0BHY and W1JTOZ in without help from favorable conditions, the 65-mile hop between St. Cloud and the Twin Cities is spanned regularly, and with many of the receivers in the area now equipped for f.m. detec-

<table>
<thead>
<tr>
<th>Standings as of February 29th</th>
</tr>
</thead>
<tbody>
<tr>
<td>W1CLS 44 W6WH 45 39 W0ZHL 43</td>
</tr>
<tr>
<td>W3CDJ 42 W6ML 39 W0JCM 36</td>
</tr>
<tr>
<td>WILL 40 W6AJG 38 W9QKM 33</td>
</tr>
<tr>
<td>W1HDS 39 W6JLY 38 W9ALU 32</td>
</tr>
<tr>
<td>W1GQY 38 W6FED 38 W9UA 30</td>
</tr>
<tr>
<td>W1HMS 36 W6FSC 34 W9AB 29</td>
</tr>
<tr>
<td>W1JK 35 W9LJU 24</td>
</tr>
<tr>
<td>W1LSN 33 W9USI 45</td>
</tr>
<tr>
<td>W1CLH 32 W6XN 46 W9QIN 43</td>
</tr>
<tr>
<td>W1Q5 30 W6VY 39 W9Z 43</td>
</tr>
<tr>
<td>W1AF 27 W6ANN 38 W9DZM 42</td>
</tr>
<tr>
<td>W1NF 25 W6BPT 34 W9TQK 42</td>
</tr>
<tr>
<td>W9EIO 24 W6FV 31 W9SV 42</td>
</tr>
<tr>
<td>W1IL 21 W6WNN 24 W9DU 22</td>
</tr>
<tr>
<td>W9RLV 37 W7BQX 43 W9PDK 36</td>
</tr>
<tr>
<td>W9OR 35 W7HCA 40 W9IYQ 29</td>
</tr>
<tr>
<td>W1KMY 33 W7DYD 37 W9SANY 27</td>
</tr>
<tr>
<td>W9MCL 33 W7FDJ 36 W9EQZ 24</td>
</tr>
<tr>
<td>W9UTE 31 W7FFE 35 W9BY 24</td>
</tr>
<tr>
<td>W9MQ 15 W7KAD 35 W9E2 17</td>
</tr>
<tr>
<td>W9KEP 12 W7JCA 34 W9E2T 14</td>
</tr>
<tr>
<td>W9JG 48 W7QAP 30</td>
</tr>
<tr>
<td>W9QN 40 W7ACD 27</td>
</tr>
<tr>
<td>W9GY 40 W7JFN 19</td>
</tr>
<tr>
<td>W9ID 38 W7OWX 15</td>
</tr>
<tr>
<td>W9M 33</td>
</tr>
<tr>
<td>W9FHE 31 W8QY 38</td>
</tr>
<tr>
<td>W9HVV 29 W9RFW 25</td>
</tr>
<tr>
<td>W9FJ 26 W9TDJ 22</td>
</tr>
<tr>
<td>W9FRN 25</td>
</tr>
<tr>
<td>W9EMM 25 W9DWB 46</td>
</tr>
<tr>
<td>W9JML 20 W9PK 43</td>
</tr>
</tbody>
</table>

Note: This list covers states worked since March 1, 1946. Send in monthly reports of states worked in 1948 on 50, 144, and 235 Mc. and higher, for entry in the 1948 Most-States-Worked Contest. See January QST, page 150, for details.

52 QST for
tion, everybody (including the BCLs) is happy. Of course, things may be different when tropospheric propagation improves, and the signals start getting out to the 522 territories, when it will be a matter of “very low modulation, OM!” again. Other stations in this territory, using a.m., are W9UYU, Ogilvie, W0QHC and W0QIN, Minneapolis, W0ZNE, Waite Park, and W00BDL, St. Paul.

The receiving system at W00V is really something: two-stage lighthouse preamplifier (surplus), 954 r.f. (with concentric line), 6AK5 triode-connected mixer, Cardwell oscillator unit, Wilcox F-3 crystal-controlled receiver on 5.5 Mc., and an RME NBF-4 ratio-detector adapter unit. This gang in the upper Mississippi Valley region look like good prospects for a new DX record from the Erie area, come the hot summer nights.

One word of warning in connection with 2-meter DX: never take it for granted that all the activity is in any particular direction. In this day of 522s everywhere there is apt to be a group of 2-meter enthusiasts in any direction. With sharp beams, we are inclined to listen only in the directions from which we have been accustomed to hear activity. Worried on this score is a growing group of 2-meter men in Winnipeg, Manitoba. Several crystal-controlled stations are now active and some high-gain beams will be in service before the DX season begins. VE4FU passes along the information that this group, the High-Frequency Club of Winnipeg, is active nightly at 9 P.M. A mere 400 miles from Minneapolis, these fellows hope to be the first VE4s to work 2-meter DX. The Twin Cities, and even the Chicago area, would not seem impossible, in view of last year’s phenomenal results.

The development of reliable relay routes is always a worthwhile endeavor, and it is particularly helpful during the off-season, when the lure of DX is missing, and many of the gang tend to abandon regular operating on the band unless some incentive to get on is provided. One such network which has gotten well underway during the winter season is the Atlantic Coast 2-Meter Trunk Line. In its first message-handling session, February 1st, a message originated by W1JFF, Newport, R. I., reached W2VQR, Asbury Park, N. J., in 15 minutes. The routing was W1JFF, W1PEA, E. Norwalk, Conn., W2RH, Port Chester, N. Y., W2QUT, W. Orange, N. J., W2DFV, Fords, N. J., and W2VQR. A round trip over the same route was completed on Feb. 22nd in 40 minutes.

The objectives of this group include the establishment of a reliable chain that will function regardless of conditions. Stations at each end are looking for additional reliable outlets to the north and south, with a view to extending the range of operation. Candidates should be able to work at least the last two stations in the network, so that reliable communication can be carried on if one of the terminal stations is missing. The principle of maintaining at least one alternate station is carried out throughout the chain. The network operates each Sunday between 7 and 8 P.M., and trunk-line stations are asked to devote this entire period to trunk-line activity, regardless of band openings and other distractions. Anyone interested in joining this trunk-line activity is asked to get in touch with W2RH, R.P.D. 1, Port Chester, N. Y.

A 2-meter emergency net in operation with 18 units is reported by W0AFT, Milwaukee, Wis. This group operates each Monday night at 8 P.M., CST. Another emergency group is that conducted in the Memphis, Tenn., area each Sunday night by W4DI. Reporting stations include W4s JTT, BOR, BAQ, GZT and VT. Attempts to work W4FWX at Somerville have not yet succeeded, according to W4VT, who included the above information in his current OES report.

And here’s a batch of local groups in various parts of the country, to conclude this month’s 2-meter news, which has shown a heartening turn upward:

Emsworth, Penna. — W3NMJ, W3MEP and W5GLH/3 are talking to themselves nightly, and wondering if there may be other groups in the north-central Pennsylvania hills who might be doing likewise.
Shepherdsville, Kentucky — W4FBJ has been hearing weak unidentifiable signals from the north. He is on each night from 7 P.M. on, working stations in the Louisville area, some 27 miles distant. Most of the stations thereabouts are vertical at present, but will change if necessary.
W4FBJ also has 100 watts on 50.02 Mc., and a 4-element array for that band.

_Auburn, Ala._ — W4LRE reports W4DBG, W4JFF, and W4MMK active nearly every night on 144.126 Mc. The first three have 522 rigs. All are using stacked vertical antennas at present, but will change to horizontal shortly. Auburn is close to the Georgia border, just below the middle of the state, and should be within the range of the gang up around Atlanta. Florida stations should be workable from there under good conditions also.

_Steubenville, Ohio_ — WSZEI lists WSCHF, W8TW, W8ZRI, and W8SFSF as active on 144 Mc., cooperating with EC nets on lower frequencies. Distances up to 10 blocks are covered solidly with walkie-talkie gear, tying in with 10-meter mobile units, which in turn work the Fort Steubenville Radio Club station, which is in the statewide net on 80.

_Los Angeles, Calif._ — Does anyone know about the station signing XE2KA heard in the Los Angeles area on several occasions and reported by W9BZKN/6? In connection with XEs on 144 Mc., XE1KE says that he got all set for 2-meter operation before finding out that his license did not include 2-meter work, a condition he hopes to have rectified soon.

_Ogden, Iowa_ — W9AEH reports that 3920 kc. is used throughout the Middle West to report the condition of the 2-meter band. Interested parties check in on this frequency at 9 P.M. CST.

_Maritime-Mobile_— W4AYE/MM works on 144 Mc. while making a coastal run from the Gulf to Fall River, Mass., and return. He makes a special effort to be on hourly, on the hour, starting at 7 P.M. The 2-meter band should provide some mighty interesting contacts for the fellows who work maritime mobile on similar coastal runs, particularly if they have facilities for good 2-meter antenna systems.

_Doings on the Higher Bands_

Having found things pretty quiet on 6 and 2 this winter, VE1OQZ, Halifax, N. S., has been working on gear for 235 (or 220) Mc. He has converted an aircraft radar receiver that uses two stages of r.f. (9568), and has removed the loading resistors on the 30-Mc. i.f. unit, reducing the bandwidth materially. The mixer output can also be run into his EQ-129, for reception of crystal-controlled signals. He will have crystal control on whichever band is to be used this summer.

Several of those radar receivers which were originally converted for use on 144 Mc. can be made to work on 235 or 220 very nicely. W1HDF, Elmwood, Conn., has done a job on a BC-406, and it performs beautifully on 220 Mc. Since it originally tuned up to about 200 Mc., anyway, it is no trick at all to get it to go higher, and those two r.f. stages do no harm at all!

W8PYY, Jackson, Mich., takes us to task for our lack of dope on gear for 1¼-meter use. It's coming, OM, and soon. He has 100 watts on 144 and 235 Mc., and worked 7 states and 4 call areas last year on 144 Mc.

_W9BAY, Chicago Heights, Ill._, would like to see stabilization of gear for 144 Mc. made mandatory, forcing those who wish to use the simplest form of gear to move on to higher bands. Well, the present condition of activity on 144 Mc. has almost produced the result without legal action, the modulated oscillator having almost been forced out of business on 2 meters, a condition which was not prevalent when stabilization of 5-meter rigs was made mandatory back in 1938. The problem would seem to be well on the way toward taking care of itself.

At what frequency does ignition noise peak? There seems to be a difference of opinion — W4VT says there is no ignition noise when using a superregen on 420, and W6Ptv says that ignition noise is worse than on lower bands! Certainly receiver noise goes up with frequency, and signal strength tends to go down, so the signal-to-noise ratio is due to drop as we go higher. The ease of erection of high-gain antennas, and possibly improved tropospheric bending, will help to counteract this, however. W6Ptv reports the first two-way 420-Mc. QSO between Sacramento (W6PTV) and Berkeley Hills (W6VSV) during the SS contest, a distance of 65 miles. The next shot is the crystal-controlled signal of W60VK at Redwood City. The Redwood City-Sacramento path has been solid on 144 Mc. for two years, so it is expected that the right antennas will turn the trick on 420 before long.

From Memphis, Tenn., W4VT reports that there is more interest in the possibilities of the 420-Mc. band, now that he and W4GPV have heard each other.

Since last summer's vacation on Martha's Vineyard Island, your conductor has held the Cape Cod DX record for 420 Mc. — 7 miles, from Vineyard Haven to Woods Hole, but we've got to do better another time, for W1JLK is now working W1HMS, Fairhaven, Mass., a distance of 15 miles across Buzzards Bay. The rigs are converted APS-13s, and the antennas are 16-element horizontal arrays. Horizontal, did you say, Deke? Shades of the Minutemen!

More than a year ago we asked if there was anyone in the New York area interested in 2100 Mc. W2VQA has gear for 2400 and 1215 Mc., and would like to get in touch with others who are similarly equipped.

The Official Experimental Station idea, slow at first in getting started, is now taking hold. Much of the information contained in this month's department was gleaned from OES station reports, and there is more, some of which will be reproduced in the special bulletins sent regularly to OES appointees.
Notes on Push-Pull Triodes

Avoiding Trouble in Balanced Class C Amplifiers

By I. H. Nixon, VE3ACL

This article treats three of the most common troubles in push-pull Class C amplifiers — parasitics, neutralization and uneven load distribution. The remedies suggested are simple and effective.

Judging from the popularity of push-pull Class C stages as final amplifiers in amateur transmitters, many an unsuspecting ham has looked at the schematic diagram of such a stage, shown in Fig. 1, and has been impressed by the advantages which its symmetry seems to offer. At first glance there are indeed many desirable features. The possibility of unbalance as a result of stray capacitances and inductances is minimized; neutralization, in the case of triodes, is simplified, and the push-pull circuit tends to reduce the generation of even-multiple harmonics. For these reasons it is not uncommon to find two tubes in the final amplifier when one would be capable of handling the desired input without exceeding ratings.

It is not intended here to attempt a comparison of the merits of single-ended versus push-pull circuits, but merely to point out, for the guidance of those who favor the latter type, some of the major troubles that may be expected to develop in a push-pull Class C stage, especially when triodes are used. Contrary to popular opinion, modern high-perveance three-element tubes can cause almost as much grief as tetrodes or pentodes. Accordingly they form the subject of this article, although some of the remarks which follow can be applied to all types.

Unfortunately, it is necessary to dampen the prospective builder's initial enthusiasm. The chances are excellent that his newlv-constructed amplifier, far from being trouble-free in operation, will have at least three undesirable tendencies. It may develop parasitic oscillations. If the transmitter is to be operated on three or more bands, one neutralization adjustment may not be correct for all of them. The circuit may not be balanced, i.e., one tube may dissipate more power than the other. The aggregate result can be spurious signals, key clicks, little or no attenuation of harmonics, and band changing hampered by the need to reneutralize — all of which are not calculated to lower the blood pressure. The average ham would do well to anticipate such bugs so that he may make allowances for such preventive measures as are possible during construction.

Parasitic Oscillation

In the course of initial testing of the amplifier, trouble-shooting should follow a definite pattern, with the elimination of parasitic oscillation receiving first attention because remedial action taken in this direction may have an effect upon neutralization and balance. Oscillation, whether at the operating frequency or at frequencies remote from the operating frequency, can best be detected by removing excitation from the amplifier, applying plate voltage with the grid bias adjusted to the point where the plate current drawn does not result in a plate dissipation in excess of the rating for the two tubes. When the grid and plate tank condensers are rotated under these conditions, the plate current should remain constant and there should be no sign of grid current with the amplifier neutralized. If this is not the case, parasitic oscillation is taking place.

The next step is to determine the frequency of oscillation. For this an absorption wavemeter is ideal. The tuning range of the meter must be very wide — something like 200 kc. to 200 Mc. In the absence of such an instrument, a neon bulb will give a rough approximation when brought near a part of the circuit carrying r.f. The neon bulb
will glow with a predominantly orange color if the parasitic is of low frequency, or violet if it is of very-high frequency.

Low-frequency parasitics are almost always the result of resonance in plate and grid r.f. chokes. The obvious remedy is to eliminate one of the chokes.

V.h.f. oscillations sometimes present more of a problem, since the leads which serve to make up the tank circuits are not always easily determined. But regardless of how the circuit is formed, a trap circuit tuned to the frequency of the parasitic, connected in series with either grid lead at the socket terminal, usually will suffice to suppress the oscillation. A trap, simply constructed by winding a 10-turn coil of No. 14 wire on a ½-inch diameter form (such as a pencil), tuned by a ceramic or compression mica trimmer of about 30 µfd. maximum capacitance, usually will hit the parasitic frequency somewhere within its tuning range. If it does not, the tuning range may have to be shifted by altering the coil by a turn or two. Depending upon which leads are forming the oscillatory circuit, it may be preferable to feed the lead to the neutralizing condenser through the trap or alternatively directly to the grid terminal. Under other conditions placing the trap in the plate lead, rather than in the grid lead, may be most effective. In general, however, a trap should be used in one tube only, since the object is to unbalance the parasitic circuit.

Neutralization

So much for parasitics. Making certain that they cannot exist in your final amplifier is good insurance toward a clean signal, whether you key the amplifier or the oscillator, or operate only on 'phone. Turning now to the neutralization of the amplifier, you may find that the adjustment varies from band to band, especially if it has been found necessary to bring one of the neutralizing leads through a parasitic trap. The amplifier should first be neutralized for the lowest-frequency band to be used and the settings of the neutralizing condensers noted. All subsequent experimenting should now be done at the highest-frequency band. When an adjustment has been found where neutralization at the highest frequency prevails with the neutralizing condensers set as they were for the lowest frequency, the adjustment should hold for intermediate frequencies. The recommended method of accomplishing this is to tap both neutralizing-condenser leads along various points on the grid leads, as indicated in Fig. 2, starting as close to the tube sockets as possible and working back toward the grid tank condenser. In extreme cases, it may be necessary to try lengthening or shortening all leads; a little work usually will reveal the steps necessary to bring about the desired result.

Circuit Balance

The measures outlined above to discourage parasitics and to achieve stable neutralization can be counted upon to upset the balance in a push-pull amplifier. This is characterized by the condition where one bottle carries far more than its share of the load. If you are running close to the maximum rated input, this condition can shorten tube life considerably. It is definitely good practice to use separate filament transformers so that individual cathode currents can be checked. It is often easier to mount two small units as compared to a single large one, and they may even cost less. Meters inserted between filament center-tap and ground will read the sum of grid and plate currents, but the balance in grid current can be determined by removing plate voltage and reading grid current alone.

Balanced grid current doesn't always mean balanced plate current, however, especially at the higher frequencies. Proper balance is most easily obtained by adjusting — not necessarily equalizing — the grid drive to each tube so that the cathode currents are balanced.

The adjustment procedure to be followed will depend upon the arrangement of the grid tank circuit. In the circuit of Fig. 3A, the nodal point or electrical center is established by grounding the center of the tank condenser. If the r.f. choke is effective, its point of connection to the coil has...
Fig. 3 Methods of adjusting for balance. If the tank-condenser rotor is grounded as in A, a compensating condenser should be used across one side of the circuit; if the center of the coil is grounded, as in B, the center-tap may be adjusted. Grounding of both condenser rotor and coil center-tap, as shown in C, is not recommended.

negligible effect on the balance of the circuit. Such a circuit can be balanced by connecting a small variable condenser across the section of the tank condenser connected to the tube drawing more current and adjusting its capacitance until cathode currents balance. The circuit should be kept at resonance, of course, by readjusting the tank condenser as found necessary. If the balance does not remain constant with frequency, it will be found that the neutralizing condensers provide the answer. With the compensating condenser adjusted for balance with the tank circuit tuned to resonance on the lowest-frequency band, any unbalance at the highest frequency can be compensated for by increasing the capacitance of one neutralizing condenser and correspondingly decreasing the capacitance of the other to maintain neutralization. This will have only a minor effect on the low-frequency adjustment. Needless to say, the balance should be checked whenever a tube is replaced.

If the electrical center is located at the center of the coil, as shown in Fig. 3B, the procedure will be the same, except that the tap on the coil should be moved one way or the other until balance is obtained. This connection may be used when it becomes necessary to eliminate the r.f. choke.

The arrangement shown in Fig. 3C is sometimes used, but in general is not to be recommended since it may serve to set up a parasitic close to the operating frequency.

An amplifier which has been tested and adjusted as described should reward the builder by performing as it is supposed to do, regardless of how you key or modulate the rig. But if you neglect these fundamental considerations, you're not giving your push-pull stage a chance. Remember, your final generates the signal that goes into the antenna — don’t take it for granted.

Phone-Band Phunnies

The Busy Bee

This bird tries to outdo Teddy Roosevelt, who is said to have been able to read a book, dictate a letter, and carry on an interview all at the same time. While he is in QSO with you, he is invariably doing several other things as well, things such as drilling a chassis, repairing a broadcast set, or papering the shack. He runs the gain wide open so he can talk to you from any place in the house, and his conversation, liberally salted with grunts and pauses, goes something like this:

"Sorry I was so slow in coming back, Old Man. When you turned it over to me, I was out in the yard taking up a little slack in the feeders. I did not get much of what you said, for I had the drill going most of the time you were talking. Wait a minute now while I punch out this socket hole. [There is an ear-shattering crash.]" "Did you hear that? I'll bet you did. When I smacked the punch with the sledge, it really made the old Class B meter jump. "Wups! I dropped a screw. [The voice becomes muffled.] I'm down here on my hands and knees under the bench now. Where the heck did the cursed thing roll to? Oh well, I may as well go upstairs and get a jar of them I have up there. I'll turn it over to you, Old Man, and you can be transmitting while I am gone. Take her away!"

It is a great inspiration to you to know that you have his undivided attention.

— John T. Frye, W9EGV
PROTECTING SCREEN-GRID TUBES

A simple method of protecting the large screen-grid tube against failure has been described in the past for the case where the screen current is supplied to the tube through a series dropping resistor from the plate supply. A different and more serious problem is introduced when the screen current is supplied from a low-voltage source of comparatively good regulation such as the exciter power supply. In this instance, loss of plate or bias voltage is almost always fatal to the amplifier tube if the full screen potential is still applied.

The circuit shown in Fig. 1 offers a simple method for protecting the tube against failure of the plate supply, and at the same time eliminates the need for fixed bias. First consider the circuit with the amplifier tube $V_2$ operating under normal conditions. The negative grid bias developed across $R_1$ is applied to the grid of $V_1$, thereby cutting off its plate current, so for the moment this tube may be disregarded. $R_3$ and $R_4$ act as a voltage divider across the plate supply of the amplifier tube. Their values are such that the voltage at their junction point is approximately equal to the desired operating voltage for the screen of the amplifier tube.

If a sufficiently-high voltage is applied to the plate of $V_2$, it will conduct, and the potential applied to the plate of $V_2$ (less tube drop) will appear at its cathode, serving as the screen voltage of $V_2$. This in turn is controlled by the grid voltage of $V_2$, which is determined by $R_3R_4$. If, however, the plate voltage of $V_3$ is removed, the grid of $V_2$ falls to ground potential, approximately, tending to reduce sharply the conductivity of $V_2$, thus reducing the screen potential on the amplifier tube. Thus $V_2$ serves to protect the tube against failure of the plate supply while excitation and screen voltage are applied.

The function of $V_1$ is to protect the amplifier tube against failure of excitation while plate and screen voltages are still applied. If the excitation is removed from the grid of the amplifier tube, $V_2$, the grid of $V_1$ returns to zero, and plate current is drawn through $R_4$. This reduces the voltage on the grid of $V_2$, causing its conductivity to be decreased, thus lowering the screen voltage on the amplifier tube to a point where plate and screen dissipation are not excessive.

For a practical case, assume that the desired amplifier screen voltage is of the order of 300 to 400 volts. A 6J5 tube may be used for $V_1$, and a 6L6G, with the screen and plate tied together, may be used for $V_2$. If the screen current in the amplifier tube is about 30 or 40 ma., the drop across $V_2$ will be 75 to 100 volts. Thus the screen supply will have to furnish this extra voltage. $R_3$ and $R_4$ should be about 500 ohms per volt. Since the current through them is small, they may be made up of a number of 2-watt carbon resistors in series, the value of each resistor being 0.25 megohm or less. This allows a reasonable factor of safety in the matter of allowable dissipation and voltage drop across each resistor. A separate filament transformer is required for $V_2$. If the screen current supplied to $V_2$ is modulated, $C_3$ and $C_4$ must be large enough to pass the modulation frequencies.

BUILT-IN OSCILLOSCOPE FOR MODULATION MONITORING

The availability of 3-inch cathode-ray tubes (3AP1, 3BP1, etc.) and 8016 high-voltage rectifier tubes on the surplus market makes it possible for every amateur who operates 'phone to equip his transmitter with a built-in 'scope for modulation monitoring.

The circuit shown in Fig. 2 has two novel features. Accelerating voltage for the cathode-ray tube is obtained from one of the high-voltage supplies in the transmitter, eliminating the need for a separate supply. The filament voltage for

the 8016 rectifier is obtained by link coupling it to the tank coil of a low-power r.f. stage. Thus during stand-by periods the 'scope tube is inoperative, eliminating the danger of burning the screen.

Since the 8016 operates at only 1.25 volts and is easily damaged by overloads, it is suggested that the initial adjustment of the link be made using a No. 112 flashlight lamp across the link in place of the 8016 filament. Use a one-turn link and start with very loose coupling. Increase the coupling until the lamp reaches full brilliance. Caution! The lead from the high-voltage transformer to the link must be opened during this adjustment, because otherwise the link would be at the full plate potential! All wiring associated with the 8016 filament should be insulated for several thousand volts.

Should a more conventional filament circuit be desired, any of a number of the high-voltage rectifiers (2X2, 2V3-G, etc.) may be used with a well-insulated filament transformer. A modification of this type is shown in Fig. 3.

In operation, this modulation indicator produces the familiar trapezoidal pattern (in many ways superior to any other for this purpose). Should a "leaning" pattern appear, it is probable that some r.f. voltage is appearing at the horizontal-deflection plates of the tube. This effect can be minimized by insertion of a 2.5-mh. r.f. choke in the lead to the rotor arm of R1.

General information on the adjustment and operation of cathode-ray tubes, and on the interpretation of the trapezoidal patterns obtained, may be found in The Radio Amateur's Handbook.

FIELD-STRENGTH MEASUREMENTS WITH A VOLT-OHM METER

After pondering some length of time in an effort to avoid having to build a permanent field-strength meter to tune a beam antenna, the following brain child resulted.

Using your volt-ohmmeter, or a 0-1 ma. meter, tie a 1N34 crystal diode across the ends of the test leads where they enter the meter box. Place the ohmmeter, with the leads attached, a half-wavelength or more from the antenna that is to be adjusted. Spread the test leads out on the ground to resemble a dipole with the ohmmeter at the center. Set the ohmmeter to the 0-1 ma. scale, aim the beam at the meter, and turn the transmitter on. The position of the meter may

(Continued on page 150)
Correspondence
From Members

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

PHONE FREQUENCIES

1544 Johnson St., Klamath Falls, Oregon

Editor, QST:

Our friend W4JGH is guilty of overlooking one important fact: lots of us prefer c.w. to ‘phone. Why wouldn’t it be just as reasonable for me to argue for “the Utopia where ‘phone signals are a federal offense except for emergency purposes”? I suppose Mr. Cook would demand the right-of-way to the entire highway if he should choose to buy a car three or four times as wide as the normal vehicle.

I’ve been a c.w. man since I received my license in 1933, but I certainly feel that the ‘phone boys are entitled to a fair portion of available ham frequencies. Why not a 50-50 split? If the ‘phone men insist on using a means of transmission which requires a much broader channel, thus, in effect narrowing their split of the frequencies, that’s their hard luck.

— GB Walters, W7HDU

Rt. 3, Box 900, Portland 2, Oregon

Editor, QST:

I understand that the Planning Committee has already made its recommendations to the Board of Directors, which makes this poll seem superfluous, the probability being that, as is its custom, the Board will act according to the recommendations of this Planning Committee.

[Upon’s Note: Not necessarily, OM. In numerous instances the Board, after extensive examination and discussion, has declined to act in accordance with Planning Committee recommendations.]

14 Kingsland Rd., No. Tarrytown, N. Y.

Editor, QST:

... At the present time, the top 100 kilocycles of the 7-megacycle band is so afflicted by QRM from foreign broadcast transmitters that it is practically abandoned so far as c.w. operation is concerned. It is my sincere suggestion that these 100 kilocycles be assigned to American ‘phones with the suggestion to our Canadian friends that they make a similar assignment. There is some justification to the assertion that foreign ‘phone operation would probably increase in the remainder of the 7-megacycle band as a result of such an allocation in these countries; however, I believe that such interference as is thus caused to c.w. operation will be tolerable and that it is not sufficient reason for denying Canadian and American amateur ‘phone operators an opportunity to show what they can do with even a small and inadequate 7-megacycle assignment.

— George M. Brown, W6CVY

21 Rochester St., Scovettle, N. Y.

Editor, QST:

... I do not feel that a ‘phone allotment from 7250 to 7300 kc. would have the dire effects outlined by the Board. Forty meters is not primarily a DX band in my estimation (others will probably violently disagree with this) and while the ‘phone QRM situation does exist and will probably be made worse by the increase in foreign ‘phone stations desiring to communicate with the U. S. and Canadian stations, they, by the Board’s own admission, will occupy only a small portion of the band and only during a limited time of the year and day as governed by propagation conditions.

I am strongly against the change in the 14-Mc. ‘phone allotment for several reasons. Anyone who works 14-Mc. ‘phone for the purpose of attempting to work DX is well aware of the fact that the 100 kc. from 14,500 to 14,400 is quite well populated by foreign ‘phones. At times the QRM situation becomes objectionable at least, because there are quite a large number of foreign ‘phones on the air today. If this portion of the band is opened to U. S. and Canada, the foreign ‘phones will move to the low-frequency side of 14,290 and will probably have to spread out to at least 14,100. This will mean that both ‘phone and c.w. operators will suffer — the c.w. fellows will be working through ‘phone QRM from foreign ‘phones, while the ‘phone operators will be trying to pull the foreign ‘phones through the heavy domestic c.w. QRM.

— R. B. Haner, jr., W2PHA

4024 N. Pioneer, Chicago, Illinois

Editor, QST:

... The approach being made by Headquarters to the problem of channel space saving through fostering narrower bandwidths for ‘phone is commendable because, like time which can’t be reallocated, kilocycles are unalterable. Since there are no more, better use must be made of the available ones for greater occupancy. Like TV, present-day ‘phone appears to be wasteful of frequencies.

— Bro Bricken, W0BPI

213 Davis Hall, University of Va., University, Va.

Editor, QST:

The League has just been pleading in our behalf for maximum spectrum space to ease our interference problem. Shall we follow this up by an expansion of a service less economical in spectrum space? Such a move will certainly make our over-all interference problem more severe. Radiotelegraph training is an amateur activity of great benefit to the public interest and should be encouraged. This operator training does much to justify our continued existence. A solution to present ‘phone-band congestion should be sought in modes of ‘phone communication more economical in spectrum requirements, rather than by expanding the present bands.

— Leonard O. Hayden, W4IWS

2851-43rd Ave., West, Seattle 99, Wash.

Editor, QST:

At first it seemed okay extending 14,300 to 14,400, but no — that would bring even more foreign ‘phones on our little remaining c.w. 14,000-14,150. It is now impractical to use 14,300-14,400 c.w. due to foreign ‘phone interference.

— R. E. Eubankbreck, W7TY

738 Garland, Palo Alto, California

Editor, QST:

I would like to suggest that ‘phone operation be restricted to 10 meters and above, with the possible exception of 75 ‘phone.

— F. A. Streb, W6QPM

3501 Central Avenue, Tampa 3, Florida

Editor, QST:

... Why should 7000 to 7300 kc. be the only band where ‘phone operation is not permitted? The old argument about crowding the band doesn’t hold water. The same argument should then apply to all bands. Give the ‘phone enthusiasts

60 QST for
equal opportunities on all frequencies. C.w. operation is fast
losing popularity. Modern trends tend toward 'phone. Fifty
years from this date, c.w. operation will be a thing of the
past. — Victor Strinch, W4IRP

Editor, QST:
There is something the matter with our licensing system
when so many of today's young squirts are solidly on 'phone
and talk about c.w. being an outmoded form of communica­tion.
They obviously haven't any experience in the delights
of real and solid communication. They don't know what
they're missing, and that's a pity.

Now it's one of the inconsistencies of human nature that
nothing makes a man so want and appreciate something as to
deny it to him. I therefore propose that all new licensees be
obliged to spend a probationary year on 'phone—preferably
in the 14-Mo. band on Sunday mornings—before being
permitted to use c.w.

— F. H. Schnell, W5UZ

305 North Washington, Falls Church, Va.

Editor, QST:
In my opinion there has been only one major change in
c.w. and 'phone ranks within the past 15 years. C.w. was
required by FCC to use d.c. and no modulation, to narrow
carrier space, and 'phone was denied the use of loop modula­
tion in order to narrow carrier and sideband space.

The true nature of an amateur station is for experimental
purposes, true, and crystal selectivity in receivers has allowed a maximum of c.w. in any allotted space. This can­
ot be very well be applied to 'phone, granted, but widening
the 'phone bands isn't the question or solution. N.f.m. or
single sideband will probably be the answer, though that
situation. Consequently, many DX contacts are broken up by
Canadian QRMs. I would propose that if additional 'phone frequencies are to be sought in the 20-meter band
that they be on the low-frequency end, such as 14,150 to
14,300 kc.

— D. S. Bennett, W1SPH

34 Pine Grove, London, N. 20, England

Editor, QST:
I understand there is talk of increasing the 14-Mo. U. S. A.
'phone band to include 14,300-14,400. This will inevitably
have the effect of shifting all foreign 'phones back to the
low-frequency end and our already too-narrow and abused
c.w. band will just increase its already too-narrow and abused
activity all over the world. I myself view 'phone on 7 and 14
Mo. as an extremely selfish form of communication—every average 'phone station occupies enough space
for a couple of dozen or more c.w. stations. Surely 28 Mc.
is the natural place for 'phone where areas of space exist in comparison? Presumably, although I personally
hate the idea, 21 Mc. would perforce be open to 'phone
and therefore the present proposal to ruin 14 Mo. is quite
unnecessary.

— J. M. Kirk, GB2O

Cumberland, Maryland

Editor, QST:
When you have a super saturation, as exists between
14,200 and 14,300 kc., doubling the spectrum space still
leaves saturation. The channels 14,300 to 14,400, soon to
be lopped in half by international agreement, offer almost
the only opportunity for a W station to have satisfactory
contacts with overseas stations. I have tried to work foreign­
ers in the W band. This works out fine at times when
an almost complete W skip is on the band. Unfortunately, this
condition is rare. The rest of the time a nice little S7 foreign
station hasn't a chance when some 1-kw. American single­
hop into my receiver with a fairly strong over-S9 signal. This
always happens, you may be sure.

True, the foreigners can shift to 14,150-14,200. But the
Canadian activity is very intense, too, and the possibility
of 100 % foreign QSOs would be greatly lessened if they had
plow through the many 14-kw. Canadians. Please give
this angle of a rope-torn path for the foreigners every
call — and don't use the 14-Mo. band. They aren't going any
better on 100-ko. band, but I can't hear foreigners through
it.

— David W. Jeffries, WSPA

26 Spring Dell, Rutherford, N. J.

Editor, QST:
The proposition for giving 'phone stations more frequen­
cies is shamful. Are you fellows at Headquarters really
interested in reducing interference as indicated by all your
late schemes such as single-sideband transmission? If you
are, the answer is c.w. Why do you try, year after year and
year, to plow through the many-half-kw. Canadians. Please give
this angle of a rope-torn path for the foreigners everyone
consideration before you decide to make the W QRM not
half as think, but twice as wide. I can get out okay on the
present 100-ko. band, but I can't hear foreigners through its
QRM.

— J. J. W. Jeffries, WSPA

26 Spring Dell, Rutherford, N. J.

Editor, QST:
... The 14-Mo. band is our best band for DX, as every­
one will agree, and must therefore be considered on a world­
wide basis, and not only from the viewpoint of the American
'phone man. The picture now stands as follows:

14,120 kc. to 14,200 kc. — American 'phones
14,200 to 14,300 kc. — American 'phones
14,300 to 14,400 kc. — foreign 'phones

Thus it can be readily seen that the 'phones are using
14,150 to 14,400 kc. True, the American portion is only
100 kc., but it is to their advantage that the bands are
separated as they are at present. If they weren't, the 'phone
man would never work any DX. Remember — 14 Mo. must,

(Continued on page 158)

April 1948
Some amateurs look on amateur radio only as a hobby, though it has become a great deal more than that. Our appreciation of our responsibilities is reflected by the way we use our bands. The frequencies we use have a public-service value. This does not permit indulgence without real justification.

—— Dade Radio Club (W4BYF)

Rules for Annual Field Day, June 12th-13th. Are you ready for the ARRL FD? The detailed rules for this year will focus some additional attention on battery work. They were detailed in the Affiliated-Club Bulletin issued in early February, in order to give full time for advance equipment building and preparation. As always, the ARRL Field Day will be dedicated to giving equipment and operators a real workout, to make us better able to serve in communications emergencies.

This year’s FD is scheduled to start as usual at 4 p.m. local standard time, Saturday, June 12th. However, the test period will be shortened to end at 4 p.m. local standard time, Sunday, to facilitate earlier return from afield, instead of continuing until 6 p.m. as last year. In this year’s affair “one point per completed contact for all different stations” assures just as much credit for working fixed or home stations as for working other portables. Portable, not mobile work, is entered in the FD. A v.h.f.-only listing will give separate credit to those submitting FD scores in such a category. Car rigs should be FCC-reported (§12.92) as to their FD location as portables. The originated-message credit (25) before multiplier remains the same as well as the multipliers for below 30 watts (3), and for 30-100 watts (2), crediting low-power effort. All power must be independent of commercial mains to rate the 3 multiplier allowed for that factor. Score points this year will be subject to an additional multiplier of 1.5 for use of batteries on all equipment. If batteries are connected to a transmitter or receiver while they are charged from commercial mains, that voids the independence-from-mains multiplier.

Club plans will, we hope, encourage the testing of as many individual emergency equipments as possible during the FD opportunity. Last year some clubs gave loving cups to their high men. At least one club arranged operating tours of two hours each, with two operators to a transmitter to give everyone his operating chance! Some operators had had their tickets only two weeks! A power-checking-and-frequency-monitoring committee constantly supervised operations, insuring good signals and an honest accounting.

We suggest one for each big club group. The ARTS “shoe-box-size” transmitter group turned in their highest score! The trend to try out more than one transmitter is a good one. How many simultaneously-working units are available is a measure of the ability of that group to cover different points, if deployed with as many separate power supplies in actual major emergency.

Individual Participation Welcomed! In addition to club and group FD work, which will be compared in the usual ways and which we believe will again prove fascinating, we hope that the increased emphasis on small-rig-with-battery-supply will encourage many licensees to try out on an individual basis (one or two operators) at the numerous points where there is no formal club or organized group activity. Our full geographical coverage as amateurs will not be available in public emergencies until many more units, workable from automobile batteries and other sources, are ready to go in ham shacks. Complete equipments with standardized plug connections and handles will be found ideal for summertime mountaine and seashore vacation enjoyment, in addition to providing emergency utility and FD availability! “Surplus” dynamotors and vibrator supplies that can run from any car battery are cheaper for individual-unit outfitting than the gasoline power plants.

For the big community station or message center the gas-electric power plant, most easily maintained by a club or wealthier individual, is ideal. For the hundreds of cities and towns that have smaller groups of amateurs, and sometimes no club at all, the battery-driven rigs with versatile more-portable transmitters might well be the main reliance for any emergency. Something less than a truck is required to move stations really designed for portable use, too. Among other things we wonder who, this year, will run up most points with the lightest-weight transmitter. Individual entries in the HB (Swiss) FD usually have a “pound” limitation and we believe that some of our receivers and transmitters are as light as anyone’s. “Points per pound” (exclusive of batteries) may have some general interest in connection with the building programs that go for-
ward in different live club groups. We invite you to give us weight statistics on transmitters and receivers with reports, so we can note performance of the lightest reported.

Emergency Corps Note. This year the messages originating with different portable stations under test will not be directed to ARRL Headquarters. Each message will be directed to one's Section Emergency Coordinator or SCM whose address is given on page 6 of QST. Each message will give the number of licensed operators afield, the location (QTH) of the portable, and the number of AEC members at the FD station. All ECs, where possible, are urged to get out in the field with operating groups and to take with them any necessary Form 7A registration blanks, records and member cards, so that new licensees with equipment can be signed up, and AEC cards previously issued endorsed as is necessary on an annual basis. This FD should be a fine opportunity to lay the groundwork (equipment readiness) for full organization under proper community plans, and for designation of just where future and present rigs tried out in the ARRL FD will fit in any real emergency that may require amateur communications between Field Days. Adventuring afield with communications brings fresh experiences and discloses new qualities and possibilities in operating organization and fraternalism.

About 29-Mc. Harmonics. An Army officer who is a good friend of the amateur writes: "A new type of interference believed caused by 29-Mc. amateur stations has been observed repeatedly while listening to Channel A (116.10 Mc.) while flying aircraft in different parts of the country. This channel is used jointly by the military services, the airlines, CAA communications stations and private pilots as an airways communications facility. It is used for reporting fixes while on instrument-flying rules."

It is imperative that the channel be kept as free from interference as possible. The fourth harmonic of 29.025 Mc. falls in this channel. The obvious first solution is the reduction of fourth-harmonic radiation from amateur 10-meter transmitters. Faraday-screened couplings (page 47, January QST) will reduce harmonic output, and copper screening and grounding, as in the Table-Top Kilowatt (May '47 QST), may prevent direct radiation, often the difficulty where tank coils have the identical conductor length of a 116-Mc. radiator. An immediate remedy is to avoid using 29.025 Mc. or to shift frequency. But if there are strong transmitter harmonics they will hinder legitimate use of other channels and invite FCC citation! No 10-meter amateur should be satisfied until he has made honest checks himself or has been checked by a near-by operator whose receiving equipment can cover this frequency. FCC §12.133 is applicable!  

-F. E. H.

WANTED — EXPEDITION RADIO OPERATOR

Once again, in June, Commander Donald B. MacMillan will journey to the Arctic region on another of the expeditions whose history goes back to the early days of amateur radio when W1TS, W1QP and other amateurs went along as radio operator of WNP. The 1948 plans for a three months expedition include the taking along of a radio operator to perform the function of keeping the Boudoin in radio contact with the U. S. via schedules with amateur stations. The operator will share with other crew members the expenses of the expedition. In view of the importance of communications, however, the operator's share will be assessed at five hundred dollars instead of the customary one thousand. If you're interested in the opportunity for adventure in the North as a member of the '48 MacMillan Expedition, address your application for the post of radio operator to Commander Donald B. MacMillan, 48 Beacon St., Boston, Mass. Applicants must hold a commercial radiotelegraph license.

Y.L.R.L. NOTES

Climax of the three-month membership drive was the February 26th-29th YLRL On-the-Air QSO Party. Scores gained in this competition were to be added to the points derived in the membership drive, with substantial prizes going to the winning district chairman and high c.w. and 'phone scorers.

Winners of the YLRL Christmas Party On-the-Air, held early last December, were: 1st prize, Annette Thompson, WALKM (operating the OM's station, W4CWV, Miami, Fla., on 28-Mc. 'phone); 2nd prize, Lou Littlefield, W1MCW, Cape Elizabeth, Me.; 3rd prize, Lily Mae Hester, W7KAE, Douglas, Ariz.

Howy, W2QHH, has presented his 47 YL QSLs to the custodian of WAS/YL Certificates, W1MCW, for scrutiny. He is now frantically looking for a YL op in West Virginia so that he will be the first to obtain the club's new certificate.

Fourteen-year-old Jane Hodgson, W4MKP of Miami, is YLRL's youngest member. The gals would like to know if she is the youngest licensed YL op in the United States or perhaps the world.

New address of the YLRL secretary is Louise Willomitzer, W6VWR, 515 South 3rd Ave., Arcadia, Calif.

BRIEF

College amateurs are invited to join a net for students in Midwestern colleges and universities. Listen for "CQ college net" every Saturday at 1:00 P.M. CST on 7106 kc.
The Tennessee C.W. Net is now in operation on 3737 kc. at 7:30 P.M. EST, Monday, Thursday and Friday.

Operation has been resumed on another ARRL trunk line. TL “G” is now operating on 3600 kc., Monday through Friday, 8:00 P.M. EST. This line provides a route between Massachusetts and Oregon. The trunk manager is W1CCF.

Atlantic-Pacific Trunk Line is maintaining a monitoring station on tap nightly for anyone wishing to place traffic on this net. The monitor guards the frequency for a period of one-half hour before net time each evening. If you have traffic for TLAP, call CQ TLAP on 2630 kc. between 9:00 and 9:30 P.M. EST and a member station will clear you.

The Washington State Net on 3695 kc. is looking for stations in the Grays Harbor area. Any amateur in this area wishing to join the WSN is requested to check into the net or to contact W7ACF.

The Buckeye Net (Ohio) is looking for stations in the Springfield area. This net operates on 3750 kc. at 7:30 P.M. EST, Monday through Friday. Those interested should check into the net or contact W8BFP.

The Western Mass. Net is now operating on a full five-day-per-week schedule, Monday through Friday, on 3760 kc. at 7:00 P.M. EST.

The Slow-Speed Trunk Line is receiving quite a number of applications for membership. Those interested in getting started in traffic work or handling traffic at 15 w.p.m. are cordially invited to contact Dale F. Brock, WSUKV, 4213 Western, Detroit, Mich.

OLZ, the Oklahoma Traffic Net bulletin, has made some rules for net membership. It is thought these rules will give other nets an idea for their net membership requirements. They are as follows:

1. Each member is to report to his NCS by radio on assigned frequency at least once each week.
2. If for any reason whatsoever a net member is unable to make roll call, he may report in by radio at any time during the prescribed time limit and maintain his activity status.
3. Members who find it impossible to maintain activity on the basis outlined will be dropped from roll call and placed on inactive status until again qualified for active-status rating.
4. A report by radio in message form may be given any net member for relay to the NCS and will fulfill membership requirements.
5. Reports by mail are acceptable for leave-of-absence periods or where activity may be temporarily discontinued for other reasons beyond a one-week period.

<table>
<thead>
<tr>
<th>Call</th>
<th>Orig.</th>
<th>Del.</th>
<th>Rel.</th>
<th>Credit</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>W2OEC*</td>
<td>59</td>
<td>15</td>
<td>1479</td>
<td>12</td>
<td>1565</td>
</tr>
<tr>
<td>WFT5T</td>
<td>73</td>
<td>90</td>
<td>835</td>
<td>37</td>
<td>1061</td>
</tr>
<tr>
<td>W6REB</td>
<td>5</td>
<td>18</td>
<td>928</td>
<td>10</td>
<td>961</td>
</tr>
<tr>
<td>W4KDE*</td>
<td>63</td>
<td>44</td>
<td>422</td>
<td>37</td>
<td>566</td>
</tr>
<tr>
<td>W2LFR*</td>
<td>48</td>
<td>39</td>
<td>472</td>
<td>24</td>
<td>583</td>
</tr>
<tr>
<td>W2TYU</td>
<td>18</td>
<td>29</td>
<td>450</td>
<td>9</td>
<td>508</td>
</tr>
</tbody>
</table>

The following make the BPL with over 1000 “deliveries plus extra delivery credits”:

- W1INF 141 W9FP 126 W1IN* 102
- W1N5M 136 W9SYZ 112 W2RTZ 100
- W2TX 123 W5KTE 109 W4CFL 100
- W3SCP 103

A message total of 500 or more, or 100 “deliveries plus extra delivery credits,” will put you in line for a place in the BPL. The Brass Pounders League listing is open to all operators who qualify for this monthly “honor roll.”

*December Traffic.
A.R.R.L. MEMBER PARTY
HIGH CLAIMED SCORES

The Sixth Annual ARRL-Member Party, in keeping with the pattern set by similar operating competitions since the war, produced an abundant crop of record-breaking scores and station-worked records. W4KFC, who has made quite a name for himself as a star performer in postwar contests, submitted the highest claimed score in that order. His message of greeting was clearly received and acknowledged in turn by several Frankford members, after which the participants engaged in a discussion concerning their respective cities and amateur radio activities. Contact was maintained successfully over a two-hour period.

TRAINING AIDS

Four new film strips have been added to the ARRL Film Library. They are available to affiliated clubs only upon request in accordance with the rules. Reviews are also available upon request. The listing below gives code numbers, title, number of frames, title of lecture outline (if different), and approximate presentation time, in that order. These film strips are all U.S. Navy surplus.

FS15. “Maintenance of Storage Batteries.” 51. 30 minutes.

The slide collection, “The ARRL Headquarters Station” (SC2), has been receiving widespread use by affiliated clubs. We’d like to see it used even more. The slides can be shown on any projector that will project 2 x 2 slides. A lecture outline is provided with each set. We recommend that clubs who want a good meeting program of general-interest value lasting about an hour try SC2. We have three copies of it and it is usually available.

A.R.R.L. ACTIVITIES CALENDAR

Apr. 13th: CP Qualifying Run
Apr. 21st-25th: CD QSO Party
May 14th: CP Qualifying Run
May 22nd: V.H.F. Contest
June 12th-13th: ARRL Field Day
June 21st: CP Qualifying Run
July 1st: CP Qualifying Run
July 24th-25th: CD QSO Party
Aug. 19th: CP Qualifying Run
Sept. 11th: CP Qualifying Run
Sept. 25th: V.H.F. Contest

---

Jan. 1st-Dec. 31st: Most-States V.H.F. Contest
First Saturday night each month: ARRL Officials Nite (Get-together for SCMs, RMs, SECs, ECs, PAMs, HQ Staff, Directors, Alt. and Asst.Dirs.)

April 1948

65
Disaster Strikes — AEC Strikes Back!

Two occasions in which amateurs assisted their communities by the supplying of emergency communications during and after the long New Year’s holiday illustrate, as no amount of indoctrination could, the fact that there are two general classes of emergency in which we may be called upon to serve the public interest. In a disaster emergency, as exemplified by the tornado which struck Cotton Valley, Louisiana, on December 31st, considerable public suffering and personal hardship accompanied the disruption of regular communications services. In the blizzard-ice storm, a communications emergency, which struck parts of Iowa and Illinois on the following day, the loss of life and property was slight even though virtually all communications and transportation were paralyzed. In both instances amateur radio functioned in the public interest, and in each case the operators involved quickly aligned themselves in the most efficient manner for the type of situation in which they found themselves.

The Louisiana Tornado

Until the war, Cotton Valley, Louisiana, was a sleepy village of seven or eight hundred people. During the war two oil refineries and recycling plants were built, increasing the town’s population to about 2000. Cotton Valley had never tasted real disaster until the closing hours of 1947, when a tornado roared out of the West. Robert Barr, W5GHF, ARRL emergency coordinator of Springhill, Louisiana, visited Cotton Valley after the tornado had passed, and reports, “I have personally viewed the wreckage there, and cannot conceive of how a living being could survive such destruction.”

Shortly after the tornado hit, at 4:30 P.M., W5IIIHT, New Orleans, NCS of the Pelican Net, contacted W5GHF at Springhill, 15 miles north of Cotton Valley, to determine whether assistance could be rendered by amateur radio, and shortly thereafter W5AXU, W5CEW, W5EB, W5FDC, W5GMR, W5HEJ and W5KTE, all of the Pelican Net frequency in the 75-meter band, had communications circuits established into the devastated area. W5BIQ, W5CNG, W5KIIP and W5KUZ rushed a portable emergency-powered transmitter to the offices of the power company at Haynesville which had been cut off by the storm and began the long vigil during which countless messages directed toward restoration of power to the stricken area were handled.

The Rebel Net, including W4PL, W5IGW, W5KTE, W5L5N and W5VT, worked closely with W5CNG/5, Haynesville, and the valuable link to Shreveport was supplied by W5VT, SCM of Louisiana, who was responsible for the prompt handling of requests for relief supplies to be sent from Barksdale Field, near Shreveport, into Cotton Valley and Haynesville.

In the meantime a 28-Mc. group, including W5ADM, Cotton Valley, W5GCS/5, operating mobile in Cotton Valley, and W5CMQ, W5HGZ, W5JPQ, W5KCI and W5NPG, handled a considerable quantity of urgent traffic for the Louisiana State Police, the Red Cross, and local civic officials. W5ADM was located 2 miles from the devastated area, and had emergency power supplied by the generators of the petroleum refining plant there. This group remained at their posts until 2:30 A.M. on January 1st, at which time it was felt that the immediate emergency had ended.

The Associated Press, having heard that Gillham, Arkansas, had also been struck by the tornado, received reassuring information from W5JAP, near Gillham, via W0JRJ.

W5CEW, with W5QH assisting as second operator, together with W5LN, provided a valuable communications circuit for both the Red Cross and the Louisiana State Police.

When it became apparent that the few stations in and near Cotton Valley were being overloaded by the pressing requirements for communications circuits, a group from Shreveport, including W5BFX, W5BQD, W5LQV and W5MEJ, traveled into the Cotton Valley area with an emergency-powered station and provided another invaluable link with the outside world.

Emergency Coördinator
Robert Barr, W5GHF, of Springhill, Louisiana, who provided some of the first factual information to leave the tornado-stricken area on New Year’s Eve.
Emergency Coordinator  
R. N. Lyons, W9AWA, who, operating on both 'phone and c.w., was a part of the vital ham link which dispatched all trains on the Chicago & Northwestern Railway's Galena Division.

Many stations, in addition to those mentioned above, assisted, either by keeping interference from casual operators to a minimum or by acting as relay stations when conditions made contact between the key stations difficult. Among these were W1AW, W1FOP, W1INF, W4BOL, W4DTV, W5ANP, W5BFA, W5BSR, W5DHE, W5DLA, W5FNY, W5FRL, W5FSS, W5HAV, W5HOT, W5IC, W5IU, W5JAX, W5JBZ, W5JPM, W5LTY, W5MAW, W5QI, W5WA, W9QJR, W8RFJ and W0VMP.

Illinois-Iowa Blizzard

The storm that struck parts of Iowa and Illinois on January 1st turned out to be no ordinary winter blow. The high winds combined with a mixture of sleet and freezing rain to knock out virtually all power, communication and transportation facilities. In Chicago some of the tallest radio towers in the country, b.c., that is, were bent double by the force of the wind. In northern Illinois and Iowa hundreds of miles of telephone and telegraph wires were snapped as their ice coating grew heavier by the hour. The electrical circuits operating the block signals on many of the railroads running through the area were similarly cut, and all train-dispatching lines were either severely overloaded or entirely useless.

Into this breach stepped one of the largest forces of radio amateurs ever to render public service in an emergency. Since there was little immediate danger to the population, and little need, save in isolated instances, for relief or medical supplies, the hams of the Middle West offered their services to a myriad of communications and transportation companies to facilitate their continued operations during their time of need, and to speed the restoration of normal operations. Countless amateurs operated with emergency power — literally dozens of groups traveled many miles with portables and mobiles to render communications to isolated key spots, and hundreds of others, many of whom must go unheralded, operated for hours on end at their home locations assisting the fellows in the portion of the area which had been isolated.

Many organized groups participated in this superb demonstration of the amateur's ability to serve, among which were: Iowa 75 Net, Iowa C.W. Net, Illinois Emergency Net, and the Illinois Traffic Net. Several club groups operated under emergency conditions for several hours, and the performance of the Starved Rock Radio Club has been especially praised by many services.

The following is a partial list of the amateurs who took part in this undertaking: W9s AEQ, AEZ, AIV, AND, AOV, ARD, ARN, ATA, AUU, AWA, BCQ, BLK, BIN, BJF, BJK, BOQ, BRY, CDG, CJO, CFV, CVM, DBQ, DTB, DTL, EAP, EBY, ECJ, ECZ, EEM, ENQ, EOP, ERT, EQX, ERE, EVJ, FCX, FGN, FID, FIF, FXX, GBT, HBG, HVZ, IAW, IBS, IWE, IYK, JAH, JGC, JMG, JTY, KAC, KPT, KQL, KSF, KXY, LIH, LIP, LJP, LQU, LXD, MAG, MKS, MXD, NCJ, NGG, NIK, NIU, NQO, NTF, NRT, OER, PEK, PJ, PL, PNV, QHE, QJR, QKL, QLZ, QMQ, QML, RCJ, RMN, RNW, RPL, RWC, SBT, SUV, SW, SYZ, TFY, TIC, TMM, TMW, UAZ, UBS, UHL, UQT, UXC, VPD, YBY, YPS, YYE, ZEN, ZMV, ZSN; W0s ACL, AFQ, ALC, ANR, ANR, AUL, BHY, CII, CPU, DSV, DTV, ETJ, ETQ, FF, FSH, GEA, HBG, HMM, IGL, JRE, KVX, KZI, LAC, LLN, NYU, PJE, PP, PRP, QVA, SFJ, SWL, TMY, TWX, VMP, WMP, WNL and ZXR.

Also W9s SCA, WMT, TX, QFJ, OM, LIF, ETT and WML.

DX CENTURY CLUB

Presented on this page is a listing, complete as of February 15th, of those who have qualified for the postwar DXCC Award. Figures in parentheses following each call indicate certificate numbers or the order in which awards were issued.

The next complete DXCC listing is scheduled for August QST. Award holders who wish their countries-confirmed totals as up-to-date as possible in that issue should submit additional confirmations for credit no later than June 10th.

MEET THE SCM's

Our Iowa SCM, William G. Davis, W0PP, is a real old-time radio man. In January, 1917, he became a licensed ham, since 1922 has held commercial licenses, for the past fifteen years has worked in broadcast radio, and for a time ran his own radio repair shop. Since receipt of his first license he has held the calls W9PP, W0AEP and W0PP.

The current transmitting line-up in W0PP's shack is 6V6-813-p. 327As, 600 watts input. A BC-654 is on hand for emergency work. Receiver is an SX-28 and antennas in regular use are a 3.85-Mc. doublet and a three-element beam for 28 Mc. Most of W0PP's operating time at present is spent on 3.85-Mc. phone, but plans are being made for future use of 28 Mc.

SCM Davis is the proud possessor of Old Timeers Club and Rag Chevvers Club certificates, and of a prewar ORS certificate; he now holds appointment as OPS and EC. His station is at present Net Control of the Iowa 75 Net. At the time of the 1947 spring emergencies he engaged in organizing communications facilities. He has been awarded a Public Service Certificate for his work in the early-1948 Midwest blizzard storm, as recounted elsewhere in this issue.

A graduate of Harvard Radio School (Navy) and Ground School Naval Aviation School, M.I.T., Davis presently is transmitter engineer for Central Broadcasting Company.

Photography and traveling claim some of his leisure time and his favorite sport is football. However, Bill's first and chief interest since 1912 has been radio, and although he says he has made no outstanding contribution to the art, he is one of the pluggers who keep things going in spite of all difficulties.
BRIEFS

Our DX Editor takes us to task for omitting the score of W9BRD/9 from the final results of the Eleventh Field Day. We hasten to credit the excellent performance of his FD group. Operators W9BUD, W9BRD and W9MFY worked 105 stations for a score of 2025 to place twelfth in the one-transmitter nonclub class. Our apologies for the inadvertent omission, OMs.

The Mount Baker Radio Club of Bellingham, Wash., did a bang-up job demonstrating amateur radio at a hobby show held at the YMCA in their city. Traffic was handled through the Washington State Net.

CODE PROFICIENCY AWARDS

Special transmissions are made once each month to enable you to qualify for a Code Proficiency Certificate at a speed of 15, 20, 25, 30 or 35 w.p.m. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers indicating progress above the first certified speeds. The next qualifying transmissions will be made on April 13th at 10:00 P.M. EST. Identical texts will be sent simultaneously from W1AW and W0CO. W1AW will transmit on 3555, 7215, 14,150, 28,000, 52,000 and 146,000 kc., W0CO on 3554, 7053 and 14,040 kc. Either station may be copied.

Code-practice material is transmitted from W1AW each evening, Monday through Friday, at 10:00 P.M. EST, on the frequencies listed above. Tuesday and Thursday transmissions are made once each month to enable you to qualify for a Code Proficiency Certificate at speeds of 15 through 35 w.p.m. Refer to texts used on several of these practice transmissions appear below. These make it possible to check your copy.

Date: Subject of Practice Text from February QST:
Apr. 1st: Simplified Oscillators for 8500 Mc., p. 11
Apr. 7th: Windmill Towers, p. 15
Apr. 9th: Field Testing 75-Meter Reams, p. 18
Apr. 12th: A Mobile Midget for 144 Mc., p. 21
Apr. 13th: Qualifying Run, 10:00 p.m. EST
Apr. 15th: An Answer to N.F.M. Reception, p. 28
Apr. 20th: An Early-Constructed Buffer and Final Amplifier, p. 30
Apr. 23rd: A Small Reactance Modulator for N.F.M., p. 34
Apr. 26th: Grounded-Grid Technique at 50 Mc., p. 44
Apr. 28th: *A Scope for the Ham Shack, p. 51

ELECTION NOTICE

(To all ARRL Members residing 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 full member of the League for at least one continuous year immediately prior to his nomination.

Petitions must be in West Hartford, Conn., on or before noon on the closing dates specified. In cases where no valid nominating petitions were received in response to previous notices, the closing dates are set ahead to the dates given herewith. The complete name, address, and station call of the candidate 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, with no time to return invalid petitions for additions, a petition may be found invalid by reason of expiring memberships, individual signatures uncertain or ignorant of their membership status, etc.

The following nomination form is suggested:

Communications Manager, ARRL
38 La Salle Road, West Hartford, Conn.
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.

Elections will take place immediately after the closing dates specified for receipt of nominating petitions. The ballots mailed from Headquarters will be full of all names on the list in alphabetical sequence the names of all eligible candidates. 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.

F. E. Handy, Communications Manager

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed in a number of Sections, as provided in our Constitution and By-Laws, electing the following officials, the term of office starting on the date given:

New Hampshire Gilman K. Crowell, W1AQO
Dec. 15, 1947
West Indies Everett Mayer, KPMXK
Dec. 15, 1947
Los Angeles Vincent J. Basset, W6IOX
Jan. 15, 1948
South Dakota J. S. Fossberg, WBNMG
Jan. 15, 1948
Connecticut Walter L. Glover, W1VB
Feb. 15, 1948
San Francisco Samuel C. Van Liew, W6NL
Feb. 15, 1948
West Virginia Donald B. Morris, W52M
Feb. 15, 1948
Washington Clifford C. Cavanaugh, W7AOF
Feb. 16, 1948

April 1948 69
• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BES — High scores in the ARRL Party were made by BXE, FUP, and BES. HDF has four rotary beams stacked one over the other for 144, .50, 28., and 14 Mc. BES added a 532-ft. long wire by BXE, FUF, and BES. RFD has four rotary beams.

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BES — High scores in the ARRL Party were made by BXE, FUP, and BES. HDF has four rotary beams stacked one over the other for 144, .50, 28., and 14 Mc. BES added a 532-ft. long wire by BXE, FUF, and BES. RFD has four rotary beams.

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BES — High scores in the ARRL Party were made by BXE, FUP, and BES. HDF has four rotary beams stacked one over the other for 144, .50, 28., and 14 Mc. BES added a 532-ft. long wire by BXE, FUF, and BES. RFD has four rotary beams.

EASTERN PENNSYLVANIA — SCM, Jerry Mathis, W3BES — High scores in the ARRL Party were made by BXE, FUP, and BES. HDF has four rotary beams stacked one over the other for 144, .50, 28., and 14 Mc. BES added a 532-ft. long wire by BXE, FUF, and BES. RFD has four rotary beams.
been-assigned to duty at Great Lakes where he is on the air with Neilsen 150-B rig and HRO (Navy Kas-2) and 8X-92 receivers. HON is a new net member of Niagara Falls Club, WOE keeps two rigs on the air, one at home and the other at Princeton University. VQG now is Class A and is giving 3.85 Mc. a whirl with low power. ABV is back on the 143-0.5 Mc. net. W9HCT has new VFOA and personal QSO. VIP and XQK have new VFOs. TEP visited the Oneida gang. RXW has SCR-522 going on 144 Mc. OVY is heard regularly on 3.85 and 28 Mc. VMS, TTU, QBF, QJT, TOZ, PW, TZU, UZL and VZL keep things humming in the Ithaca area on 144 Mc. VEN is working 7-Mc. c.w. emergency broadcasts over WHCB. All has drawn many favor-...
Press of Evansville, et al. Wayne RC held a stag on Jan. 29th at the Candle-Lite Restaurant. ANT made the Century Club. The Magnavox boys presented UUN with a beam rotator. BHI has a single section 8JK on 14 Mc. with 65 watts to an 8088. The New Iberia League Album Sheet 21. MBL is running 20 watts to crystal oscillator on 14 Mc. and is getting EC-654A ready for emergency use.

Traffic: WUN 128, TT 44, RJ 33, BKJ 32, EGO 30, HNF 28, DFR 23, WWV 20, NYN 18, WMN 15, DOK 9, EF 8, UKT 9, ESS 6, QLW 4.

WISCONSIN — SCM, Rene W. Grotech, W9RQM — QHR is knocking them cold on 28 and 50 MC. BCV sent in nice report for his area. New officers of Rock River Radio Club in Rockford with Bob W9FV, vice-president, H.H. Luhman, secretary, and Hubert, curling chairman. JFELS schedules BCV on 29,300 kc. and is looking for Green Bay schedule. VLG is operating portable W6 in California. VMC is active on 7 Mc. WRO has his RMEF 23-300 with 60 feet on 14 Mc. with 60F. ByF has new Hammarlund 4-20. IBY has new 28 Mc. beam at Fox Lake. RSH is servicing radio in berlin. BDW and EWC get BC-65 rig results on WTMJ-t.v. APU is rebuilding surplus gear for emergency use. OOV is converting propeller pitch motor for 28-Mc. beam. IZG has n.f.m. on 28 Mc. NJT has three-element beam on 50 Mc. DGH is looking for new receiver. DK5H is getting set for 50-Mc. operation. JAW is building new exciter. HKB has new BC-499A. LBC is looking for QSO on 50 Mc. OVE has radio contact with daughter in Madison. QFO is rebuilding. KRT is on 7 Mc. TVQ has mobile on 38 Mc. TVA works 3.5 Mc. using converted SCR-2742N. BZG has rig on 14 Mc. and 50 is on 3.5 Mc. (phone) and 28 Mc. ESY has been Acting NCS of Badger Emergency Net on 3950 kc. UFZ has completed new 28- to 14-Mc. beam. FTHU has 829-B with 100 watts and 24-element beam on 14 Mc. DJ Roeskin Valley Radio Club has a 58 Mc. E1 0015 beam at 9 p.m. each Thursday and wants to extend ground wave coverage from Waukes. VEA is NCS, CFT, W9 QSL Manager, has been deluged with DX cards. OUT is building a s.a. for 14 Mc. KWE has 40, 20, and EC AH is building 3.5-Mc. VFO. Milwaukee EC Net on 144 Mc. has 18 units enrolled and meets Mondays at 8 p.m. We regret to report DQA as a Silent Key. Traffic: WDRKH 174, LFK 130, DQF 47, KUB 37, TVQ 32, TGM 28, K6LW 23, KEP 16, WKA 15, DND 11, FHT 4, VEA 4, FZC 2, HEZ 2.

DAKOTA DIVISION

NORTH DAKOTA — SCM, Paul M. Rossettelli, W5ZGZ — EOU has new n.f.m. with 600 watts on 14 Mc. and 150 watts on 28 Mc. The Jamestown club is going strong. ZCM, in Beltrum, is treating the net to his ARC-5 signals and reports 300 watts are the norm for the operating traffic band. CQG is working on new 500-watt, YSS and EOG and SCR-522 rig working in Fargo, BCH, new net members, sends time for 'phone on all bands. FCA won both the W9DKH 174, LFK 130, DQF 47, KUB 37, TVQ 32, TGM 28, K6LW 23, KEP 16, WKA 15, DND 11, FHT 4, VEA 4, FZC 2, HEZ 2.

ARRL DIVISIONS

ARIZONA-SCM, Marshall Rigs, WSJIC — Thanks, boys, for the nice work in getting in reports. FMF wants to swap for 3005 kc. crystal so he can get in the middle of the DX. Danger is on the air and needs BCT, BFD, SEC, and BHF for sure. Members of the Mississippi section of the Tri-State Emergency Corp. Please give him your fullest support and answer any and all inquiries at once. Promotions and cooperation are essential on your part in aiding the Emergency Corps. Traffic: W9QG 87, VET 86, CWW 52, KFT 51, YBM 45, DFR 38, JDO 30, JTE 28, HEU 10, EPJ 13, GKC 12, FAH 2, ORJ 10, BMX 9, PSN 8, NDF 8, BSL 7, HEU 7, QXJ 4.
The truly modern amateur receiver could be quite a monstrosity if it had provisions for all the various modes of operation available to the amateur of today.

The receiver would have to be able to receive the conventional AM phone, on-off keyed CW, narrow band FM and PM, single side-band suppressed carrier, and frequency shift telegraphy signals and cover the broadcast and short-wave bands up to 30 or 55 mc. and also FM broadcast on both the 43 mc. and new 100 mc. bands. The reader might also add, "What, no television?"

It is obvious that a receiver for all these types of reception could be quite large and very expensive. The average amateur probably is not interested in all of these modes of reception and as a result such a piece of equipment would not be too popular because of its relatively high price. Obviously, if the price is kept down and a variety of these modes of reception is offered in a single unit, either quality or performance (or both) must have suffered.

The techniques of most of these various methods of reception center around the final detector. Receivers like the NC-173, NC-183, HRO-7, etc. which have an accessory connector with IF and other circuits available at this connector are truly basic pieces of equipment whose IF output can be connected to the appropriate type of demodulator that is of interest at the moment. For example, NFM adaptors which plug into this output connector are available for the NC-173, NC-183 and HRO-7 to provide for narrow band FM or PM reception.

The frequency range of these basic receivers is continuous from the low frequency end of the broadcast band up through 30 or 55 mc. With the growing interest in the VHF bands (30 to 300 mc.) National has brought out the HFS Receiver-Converter.

The HFS is a complete VHF Receiver for AM phone and relatively wide FM phone reception and provides continuous coverage from 27 to 250 mc. A noteworthy feature of the HFS is that it can also be used as a converter with 10.7 mc. output to extend the frequency range of a basic receiver. Used in this manner on the 6 and 10 meter bands the HFS will considerably improve the image rejection of typical communication receivers which cover these bands. The IF selectivity of the HFS by itself is broader than that of the usual communications receiver but when used as a converter the adjacent channel selectivity becomes that of the receiver used with it. Thus, the operator has a choice of two degrees of selectivity in the VHF range.

National advertisements will keep you posted on the basic equipments and accessories available.

— W. A. Ready

TEENNESSEE — SCM, James W. Watkins, W4FLS — The NARC had a very interesting program at its regular meeting. "The Lazy Mice" of the North Carolina Hamfoot Club put on an amateur radio program. DIY, BCA, and TBF have new projects under way. FLW has two projects under way, an 829 rig for 144, 50, and 28 Mc. and a new modulator for his 7-Mc. phone. FLA is working out a new folded dipole on 7 Mc. JEH now is with CAA.

A frequency wanted. GQQ is on 7 and 14 Mc. with a new rig that dials up the frequency wanted. JEQ is with the QND 265A. The new call of Rev. C. Lynn White, Harrisburg, TN is NBY.

Operation from Kentucky radio amateurs in submitting monthly reports is excellent. Keep them coming in. Newstorm in North Mississippi. VT and GHP have rigs on 400 for 144, 50, and 28 Mc. and a new modulator for his new rig. BAC reports the reconnaisance around the area is being done by members. NBY is new call of Rev. C. Lynn White, Harrisburg, TN.

Traffic: W5LAK 144, TCF 54, QTN 12, HAN 3, and W5HYC 27, PVB 93, SCW 88, SXY 87, ARJ 82, NOH 81, UKY 70, ABT 70, CYE 68, TRN 48, QBO 42, RJQ 39, AQA 35, DFE 29, 2W 28, YNG 19, IV 19, DN1 15, BBJ 14, SH 13, UVE 13, AGH 12, FN 11, DEB 8, IHB 7, SFW 7, VPE 7, DXY 4, EFC 3, KOS 3, RYJ 3.

OHIO — SCM, William D. Montgomery, WSPNQ — The total traffic for January was 1421. Nice going, gang. keep it up. APF recently was appointed OBS. From the CAFRONC news, we learn that AAW is on 28 Mc. in the Spring. AEC has a new shipboard transmitter on air. Memphis AEC has a new set for 28 Mc. and a new modulator. Details are as follows on 7 Mc. as mentioned in the last issue with CAA. KH has been working 112 Mc., since Thanksgiving. MOV is trying 50 Mc., with an 828 running about 30 watts. NEF is a new call in Chattanooga. A1 will be heard on 7-Mc. e.w. and 28-Mc. phone. FLW has two projects under way: an 829 rig for 144, 50, and 28 Mc. and a new modulator for his 7-Mc. rig.
Oh me! Oh me! What will my frequency be? Do you have spots before your eyes and kilocycles on the brain? The best cure for instability—sometimes known as "where-am-I-hope-it's-in-the-band"—is positive CRYSTAL CONTROL WITH PRs!

Yes, PR Precision CRYSTALS give you peace of mind, because when you have a PR in your rig you KNOW WHERE YOU ARE... and your friends do, too! You can get PRs at your jobber's for the exact frequency you want (integral kilocycle) within amateur bands at no extra cost! Tens of thousands of amateurs all over the world use and boost PR Precision CRYSTALS for accuracy, stability, low cost, dependability and activity. They're unconditionally guaranteed.

—Petersen Radio Company, Inc., 2800 W. Broadway, Council Bluffs, Iowa. (Telephone 2760)

Petersen
COUNCIL BLUFFS
IOWA
MADE IN U.S.A.

PR
Precision CRYSTALS

Harmonic oscillator. Ideal for "straight through" mobile operation. High activity. Heavy drive without damage in our special circuit $5.00

Harmonic oscillator. Low drift. High activity. Can be keyed in most circuits. High power output. Just as stable as fundamental oscillators $3.75

Rugged, low drift fundamental oscillators. High activity and power output with maximum crystal currents. Accurate calibration $2.75

PR QUARTZ CRYSTAL FREQ-KC
14,283

10 METERS
PR Type Z-5.

20 METERS
PR Type Z-3.

40 & 80 METERS
PR Type Z-2.

75
They use Vibrapack* Power Supplies!

Always dependable—always ready, those police radio installations really have to take it—sometimes operating on a twenty-four hour schedule, under extreme heat and stress conditions. Vibrapack Power units have proven their dependability in the many thousands of police car installations, radio transmitters, receivers and P. A. systems, where they have given unfailing service with a noticeably lower current drain from the storage battery.

Important, too, is the size factor—on rigs where space is limited, such as airplane installations.

Use Vibrapack Power Supplies and be sure of long life dependability. Ask your distributor for technical data on Vibrapack Power Supplies or write for Form R-555.

You can rely on Mallory Precision manufacturing to supply you with the most dependable of: resistors, ham band switches, push button switches, controls—roheostats—potentiometers—pads, tubular capacitors, transmitting capacitors, dry electrolytics, dry disc rectifiers, practically every component you need to keep your rig in A-1 condition.

*Vibrapack is the registered trademark of P. R. Mallory & Co., Inc., for Vibrator Power Supplies.

P. R. MALLORY & CO., Inc. INDIANAPOLIS 6 INDIANA

NEW YORK CITY—LONG ISLAND—SCM, Charles Wam, Jr., W2KDC—Brooklyn: The hidden mobile hunt was successful as a 144-Mc. problem in W2PC's test is now a few of the most active. W2PQF was heard 410 Mc. from Newington on 3.5 Mc. with difficulty but EQD camf

UX has been appointed NCS for Group One, following the resignation of EQD. UXR is an addition to 3.5-Mc. c.w. net regular drills are held every week on 3600 kc. with WBN, ANN, WOL, ORZ, RZ, and CH, with FI as Net Control.

803 points in the VHF SS. PRE has a 35-w.p.m. certificate and now uses a folded dipole, US needs professional advice on how to get his 24-element beam up in the sky

This section is continued on page 78.
NOW . . . VARIABLE VACUUM CAPACITORS . . . by EIMAC

Here at last is a dependable variable vacuum capacitor that is physically designed for practical application. Every detail of construction makes the Eimac VVC series the standout variable vacuum capacitor component for your equipment. Here is supreme performance and dependability as only Eimac research and engineering can provide.

CHECK THESE FEATURES

PRACTICAL MOUNTING . . . designed for wide application, the base plate on the single units mounts on panel for direct control, or vertically on chassis for control from a flexible shaft or angular control. Multiple units are conveniently bracketed for chassis and panel installation.

COMPACT SIZE . . . the single unit VVC-60 is but 3 inches in diameter and 5 inches in length. Multiple units are proportionally larger.

COPPER COMPONENTS . . . for increased R.F conductivity and minimum internal losses. All contact surfaces are silver plated.

MECHANICALLY RUGGED . . . bellows, bearings and adjusting mechanism designed to withstand excessive use and provide long life.

SIMPLE CONTROL . . . single and multiple units vary capacitance by rotation of a single knob. Return to previously indexed settings is positive.

For further information see your Eimac dealer or write direct.

EITEL-McCULLOUGH, INC.
194 San Mateo Avenue, San Bruno, California

EXPORT AGENTS: Fraser & Hansen—301 Clay St., San Francisco, Calif.

Follow the Leaders to Eimac TUBES
The Power for R-F

---

GENERAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Type</th>
<th>Capacity</th>
<th>R.F Peak Voltage</th>
<th>Maximum RMS Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>VVC 60-20</td>
<td>10-60 mmf.</td>
<td>20-KV</td>
<td>40 amp.</td>
</tr>
<tr>
<td>VVC2-60-20</td>
<td>20-120 mmf.</td>
<td>20-KV</td>
<td>80 amp.</td>
</tr>
<tr>
<td>Parallel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Split-stator</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VVC4-60-20</td>
<td>40-240 mmf.</td>
<td>20-KV</td>
<td>160 amp.</td>
</tr>
<tr>
<td>Parallel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Split-stator</td>
<td>10-60 mmf.</td>
<td>40-KV</td>
<td>80 amp.</td>
</tr>
</tbody>
</table>
Two good reasons for the superiority of Amphenol Twin-Lead are clearly shown on the graph above.

- Note that Amphenol brown polyethylene shows no surface crazing and almost no change in power factor after twelve months' exposure to strong sunlight, wind and rain. Ordinary clear or natural polyethylene insulation crazed and cracked after nine months.

- Note that Amphenol brown polyethylene shows no surface crazing and almost no change in power factor after twelve months' exposure to strong sunlight, wind and rain. Ordinary clear or natural polyethylene insulation crazed and cracked after nine months.

Two good reasons for the superiority of Amphenol Twin-Lead are clearly shown on the graph above.

- Note that Amphenol brown polyethylene shows no surface crazing and almost no change in power factor after twelve months' exposure to strong sunlight, wind and rain. Ordinary clear or natural polyethylene insulation crazed and cracked after nine months.

- Note that Amphenol brown polyethylene shows no surface crazing and almost no change in power factor after twelve months' exposure to strong sunlight, wind and rain. Ordinary clear or natural polyethylene insulation crazed and cracked after nine months.

Available in 75, 150 and 300 ohm impedances for receiving and 75 ohm impedance for transmitting.

AMERICAN PHENOLIC CORPORATION
1380 SOUTH 54TH AVENUE, CHICAGO 30, ILLINOIS
COAXIAL CABLES AND CONNECTORS • INDUSTRIAL CONNECTORS, SITES AND CONDUIT • ANTENNAS • RADIO COMPONENTS • PLASTICS FOR ELECTRONICS

MIDWEST DIVISION

IOWA — SCM, William C. Davis, WBBP — LAC. Burlington, AFO, Kookuk, and FZL, Ft. Madison, started the new year with a bang by handling emergency traffic from within the storm area. PD did a fine job in his capacity as SEC during this emergency. HMN, of Davenport, was on the air without rest for 64 hours handling c.w. traffic out of the storm area and as a result contracted pneumonia. AFO is new EC for Kookuk and vicinity. BJL is trying out original idea for s.s.b. AFO has hot converter on 144 Mc. ABL reports he is WAS. KMK is on 7 Mc. with an ARC-5, has contacted 147 countries. UWK is on 28-Mc., 'phone, Stations active in the N.J. Emergency 'Phone Net on Sunday mornings are QEM, as ACS, EGM as Alternate ACS, FLE, NEN, FLE, NEN. BZE, KGE, KGE, KGE, KGE. BZE is on 146 Mc, has WAC. OCC has finished remote-tuned, band-switching 504T, 3.5- to 14-Mc. c.w. MO, FPQ, IRF, WFT, and UWN. of Livingston, are on 144 Mc. When ANW and BZJ radioed down, Tom worked the nets and trunk lines from BLS's rig. BLS is now a regular operator on the nets and TO, BZJ has new VFO and is now Class A. BRC, on 75, 150 and 300 ohm impedances for transmitting.

Available in 75, 150 and 300 ohm impedances for receiving and 75 ohm impedance for transmitting.

AMERICAN PHENOLIC CORPORATION
1380 SOUTH 54TH AVENUE, CHICAGO 30, ILLINOIS
COAXIAL CABLES AND CONNECTORS • INDUSTRIAL CONNECTORS, SITES AND CONDUIT • ANTENNAS • RADIO COMPONENTS • PLASTICS FOR ELECTRONICS
**Type 71 Capacitors**

*Longer Life • Smaller Size • Lighter Weight*

Sangamo Type 71 Capacitors are compact units, designed for use in broadcast and aircraft transmitters, and in many varied high-voltage circuits. They give highly satisfactory performance even under the most severe conditions.

These Diaclor impregnated capacitors have the advantage of longer life, smaller size, and lighter weight. Diaclor, a specially compounded chlorinated dielectric, permits greater uniformity of production because of its controllable characteristics. The use of this synthetic impregnant assures high volume resistivity, low power factor, and high dielectric strength. Fire hazard due to accidental leakage is eliminated because Diaclor is non-inflammable and non-explosive.

Type 71 capacitors are available within a range of 600 to 6000 Volts Working, or higher. They can be supplied with either composition rivet, screw type, pyrex glass or stand-off porcelain terminals, and with any one of three types of mounting brackets.

Old-time hams recognize Sangamo Quality. Get acquainted with the Sangamo line today. Your jobber can supply you.
THE NEW NC-108

FM TUNER-RECEIVER

Now...National offers an 88-108 Mc. band FM tuner-receiver designed to meet the most exacting demands of high-fidelity enthusiasts! Flat from 50 to 18,000 cps. ± 2 db, the new NC-108 may be connected to your amplifier or the phono input of your radio. Built-in speaker, audio output stage and tone control also permit use as separate monitor connected to your amplifier or the receiver. Built to National's famous standards of quality, the NC-108 is worthy of the new NC-108 may be con- FM TUNER-RECEIVER to 18,000 cps, ± 2 db, the new NC-108 is worthy of the finest in amplifiers and speakers. Nine tubes plus rectifier and tuning eye. $99.50 Amateur Net

For complete specifications see the National dealer listed in the classified section of your 'phone book, or write direct to

KANSAS — SCM, Alvin B. Unruh, W6AWP — The State Emergency Net meets monthly on 3920-ke. 'phone and 3610-ke. c.w. NCV, Topeka EC, will coordinate 'phone-c.w. activities. YOS is for Zone 2. VBQ says NSB will be Ass't EC, Zone 6. CUTL, Zone 30 EC, has 150-watt ham switching rig on emergency power plant and 35-watt rig on battery power. FEE has 28-Mc. portable-mobile. RHEQ has four-element beam on 64-ft. tower. OAJ has a new VFO. ZAT has new NC-108. New beam owners are VDI, DAC, and DMN. Topeka club officers: NCV, pres.; ICV, vice-pres.; AEG, secy. KZJ has a new HF-18-5AZZ/b has a VFX-680; WIT has an H-129X; UPJ has wide-spaced three-element beam; KBY has three-element beam; ZMC has a Premax beam; WCH has horizontal RVM, pres.; UUS, vice-pres.; CCL, secy.; LTJ, treas.; GTO, pub. dir. ZKF is active on 235 Mc. UNQ has dual 50-28-Mc. beam on 65-ft. tower. CLN has five-element ro- and 28 Mc. OGN replaced 810 with a p.n. 64a. CQC has HT-9 and dual 28-14-Mc. beam. MAO organized 28-Mc. code class. CCL has p.p. 190THF. IFR uses BC-606 for 3.5-Mc. c.w. NXX is on 7 Mc., with G16G. GOV and MAE work in phono net. FNN works in c.w. net. YOS is working on new e.c.o. with n.f.m. We need more towns in QKS. Drop in Mon.-Wed.-Fri. at 6:45 p.m. on 3610 ke. Traffic: (Dec.) W8WKA 29, (Jan.) W8WKA 60, GOV 45, NJS 45, OZK 41, OAQ 39, MAE 34, AWP 39, ICV 32, FZP 27, IFK 22, FRE 19, HDD 18, AWB 12, EQG 12, ABM 6, VBQ 6, FRR 5, ZMC 4, LPL 1.

MISSOURI — SCM, Dr. Letha A. Dangerfield, W8OUD — COQ, who operated with a W5 call for some time, has his original call back and will be on 3.5 Mc. in Springfield. AQB, across the street, paralyses his receiver on 7 Mc. CRM didn't have such a good month in January — he worked 2246 stations in '47. GHD has moved to Memphis. KIK has transmitter worries trying to put the Meltonian down on 14 Mc. and keep the Stancor up. MON. CCL worked 4 in QSO Party and the 813 went purple. Miss broke T-Can on AHJ's 28-Mc. beam. TGN worked 291 in 66 sections in CD Party. DEA worked 225 stations in 51 sections in CD Party and bought crystals for all Midwest nets. He is very busy as new Director. CMIH received new H10 as Christmas gift. MBE is on 7 Mc. and is not a YL as stated in last month's column. That note should have read "BEM is from YL to join AEC." Very sorry for mista- take and apologies to both, VMI recommends KSR as OPS and QMF as EC for Perryville and sends list of members of the 3902 Net. OUP/4 took rig to his Florida winter home and has new 2LMH as guest. With the 75-t, towns as masts they are knocking off much DX and working all bands and all types of transmissions, even f.m. SKA went to Topeka to meet DEA and got a lot of ideas on traffic operation from other traffic men, including the virtue of checking message count and being prompt for net. DPO operation from other traffic men, including the virtue of checking message count and being prompt for net. DPO is back on 3.5 and 7 Mc. in Kansas City and is working on a rig with 818s in final. ZAO is all set up now as SEC and has plans for AEC bulletin. OUD and QSO have scheduled T-290 A.M. on State Net, 3755 kc., and invite others to join. MON meets on 3755 kc. each night at 7 P.M. CST. Traffic: W6QXO 115, YSM 89, ARH 93, OUD 49, SKA 21, CRM 16, VMO 14, VMI 3.

NEBRASKA — SCM, William T. Geenmel, W5RQM — Nebraska C.W. Net needs more outlets around the State. How about you AARS operators? TQD is NOS on 3745 kc. Mon., Wed., and Fri. at 7 P.M. CST. Traffic: W5QXO 29, LYM 29, HRI 29, OUD 29, VMO 29, VMI 29. (Continued on page 82)
FM is actually coming into its own this year ... more than 1000 with permits and grants now on the air, or soon to be. Over 1500 standard broadcast stations now in operation ... 2250 on the air by the end of the year. Television receivers are on mass production lines. New TV stations are going on the air throughout the country.

Radio-electronics is not only expanding in job opportunities but it is also growing in technical complexity. Rapid developments in every branch of the field are leaving many radio technicians and engineers far behind the parade of progress. These are the men who fail to realize that their technical knowledge must grow with the expansion of the industry.

What does this mean to you? It means you must study not only to hold the job you now occupy ... but study to qualify for the better job you want. CREI modern technical training can (within a comparatively short time) qualify you for the better jobs and help enable you to step ahead of those who have failed to improve their ability through technical training.

Beginning right now CREI can provide the on-the-job training that equips you with the technical ability to go after — and GET — the important, high-salaried jobs. Get all the facts today about the unprecedented opportunities that await you. Learn how CREI spare time training can help you as it has helped thousands of other professional radio men advance to better jobs during the past twenty years.

Mail Coupon for FREE BOOKLET

If you have had professional or amateur radio experience and want to make more money, let us prove to you we have the training you need to qualify for a radio job. To help us intelligently assure your inquiry — in writing, PLEASE STATE BRIEFLY YOUR BACKGROUND OF EXPERIENCE, EDUCATION AND PRESENT POSITION.

Veterans! CREI Training Available under the “G.I.” Bill

Capitol Radio Engineering Institute

An Accredited Technical Institute

DEPT. Q-4 16TH AND PARK ROAD, N. W., WASHINGTON 10, D. C.


CAPITOL RADIO ENGINEERING INSTITUTE
16th & Park Rd., N. W., Dept. Q-4, Washington 10, D. C.

Gentlemen: Please send me your free booklet, "CREI Training for Your Better Job in RADIO-ELECTRONICS," together with full details of your home study training. I am attaching a brief resume of my experience, education and present position.

Check ☐ Practical Radio-Electronics
Course ☐ Practical Television

Name ......................................................
Street ..................................................
City ..................................................... Zone ... State ....
☐ I am entitled to training under the G.I. Bill.
NEW ENGLAND DIVISION

CONNECTICUT — SCM, Walter L. Glover, 1V1BV —
New appointments: KUO as ORS and LKF as EC for Hartford and East Hartford. PLI, confined to New Haven Hospital, is improving. JRK bought a new house. AFA is too busy for much hamming.

Traffic: W0SAI 12, CM04.

NEW ENGLAND DIVISION

CONTRACTICUT — SOM, Walter L. Glover, Wl VB —

First Choice of Hams Everywhere

BURGESS BATTERIES

Recognized by their Stripes • Remembered by their Service

(Continued on page 84)
Model VH-15 Speech Master, a new completely weatherproof 15-inch Hypex, is the latest addition to the JENSEN Hypex family, thus expanding this line of projectors to cover a wide range of sizes and prices. Designed only for speech reproduction, without compromise to music requirements, it affords greater naturalness in the low frequencies than do other Speech Masters. Model VH-15 is recommended for sound reinforcement, indoors and out, where distinct natural speech reproduction is required to carry through high noise levels.

Developed acoustic length, 36 inches. Useful response, 180 to 6,000 cps. Voice coil impedance, 8 ohms. Polar coverage angle, 90 degrees. Power rating 15 watts maximum speech signal input. Mouth diameter 15½”; overall length 15”.

NOTE THESE FEATURES

- Horn designed to JENSEN Hypex formula (Pat. 2,372,262) for improved acoustical performance.
- Alnico V driver unit completely enclosed, yet replaceable without special tools.
- Trunnions adjustable through 180 degrees, lock projector in position simply by tightening two nuts with small wrench.
- Non-ferrous and stainless steel rust-proof fittings. Phenolic diaphragm.
- Rustproof, weatherproof terminal box; no exposed terminals. No soldering needed to connect.
- Improved weatherproof finish on all metal parts. Horn finished in two-tone baked enamel.
- Power rating 15 watts maximum speech signal input.

JENSEN MANUFACTURING COMPANY
6611 S. LARAMIE AVE., CHICAGO 38
In Canada: Copper Wire Products, Ltd., 11 King St. W., Toronto

Designers and Manufacturers of Fine Acoustic Equipment
Give your instrument panel that professional look with Drake Jewel Light Assemblies! These highly finished glass jewels and bull’s-eyes, attractively mounted in polished chrome-plated holders, are exactly the same as those used by leading commercial manufacturers throughout the country.

Efficient, good-looking, well made - Drake Pilot Light Assemblies will give you the best in performance and, at the same time, real pride in the appearance of your panel.

Ask your local jobber to show you the big Drake line. If he doesn’t have a complete stock, write us for Catalog Q — just off the press.

Socket and Jewel LIGHT ASSEMBLIES

DRAKE MANUFACTURING CO.
DEPT. 0, 1705 W. HUBBARD ST., CHICAGO 22

LJB is on 3.9 Mc. with a new Collins rig. BWH, EC, held a meeting for Attleboro hams. Newton Emergency Net was on Jan. 26th with BL, BK, LM, MLU, and ONU. LMU had 40 QSOs in UHF SS. AGX will be on with 1-kw. on 3.9 Mc. BR has a 522 and a Workshop beam on 144 Mc. KXV is rebuilding for 144 Mc. with an 829. At Eastern Mass. Club meeting BUD, from ARRL, gave a talk on Atlantic City Conferences and MQ spoke on "Eavesdropping and Interference Problems." New officers of Brockton Amateur Radio Club are: LJT, pre.; EYY, vice-pre.; OEG, secy.; LVI, treas.; OBI, Sgt. at arms. South Shore Club had open forum on RCL. Last week had 21 states on 50 Mc. The Tooele Radio Club held a meeting at Kennewick’s QTH in Danvers. AVY is working lots of DX on 3.5 Mc. DJ has 25 states and eight districts on 50 Mc. NFG has new gear on 144 Mc. QGO is on 7 Mc. and has Mark II and BC-375E. QXM is on 28 Mc. MRQ has new countries. QGO is on 7 Mc. QFM is operating portable at Newton High. LMB worked his 100th country on "phone. QME put up a "V" beam for contest. OBE has new antennas. QTY is on 28 Mc. and has HT-9 and NC-173 receivers. HNC is on 7 Mc. HHC is working on f.m. for 28 Mc. J8S is on 144 and 3.5 Mc. PQZ worked 30 new countries. AAR has new beam on 28 Mc. LAO has new scopes. QGO has new final on 14-Mc. c.w. BWN has new beam on 28 Mc. RD is on 27 Mc. GA, DDI, and HBC are on 28 Mc. MBK is running mobile on 28, 50, and 144 Mc. The Eastern Mass. Net. on 3745 kc. is very active, both the new section at 6:15 P.M. and the old section at 7 P.M. CCF is doing a swell job in keeping things going. Traffic: (Dec.) WAAL, 20; FIO 3; BMW 2; JOJ 4; (Jan.) WILCK, 10; LML 104; PYM 77; BDU 53; DWO 48; BMG 44; TY 34; AAI 32; UB 27; NBS 28; BD 28; KXJ 20; PLQ 19; ALP 12; MDY 12; AAR 8; LAO 7; QMJ 6; JOJ 5; HAJ 5; AOX 3; MRQ 3; RCQ 3; LMB 2; MDU 2; QHC 2; QGO L.

WESTERN MASSACHUSETTS — SCM, Prentiss M. Bailey, WIAZW — BM; BVR, SEC; UD. AMI is new OBS. OMJ is OBS and sends official bulletins Mon. and Wed. on 3920 kc. from Tues. and Fri. on 3922 kc. at 7 P.M. IRB, another OBS, sends bulletins on 25,576 kc. Mon., Wed., and Fri. at 10 P.M. George now has VFO and a.m. and f.m. COI renewed OBS appointment. BVR wants to form a 2-Mc. traffic and emergency net. An E. Mass.-W. Mass. emergency drill failed because of inability to get access to the State on 3.5 Mc. during the day. KIRU is active and VQ is looking for recruits in Naval Reserve around Springfield area. JE reports KO3BY/71 soon will be on from Rockdale. BDV is operating remote control from downtown room. Transmitter is "refrigerated" in attic. Jim is a member of Sen Gull Net. OGI has new six-element 144-Mc. beam for SOR-2502. QXS is a new ham in Westboro on 145 Mc. and is looking for schedules with Worcester and Springfield. QQV is at So. Lancaster and reports forming a club at a college with a Temco transmitter on the air. UD threatens to report on 5760 kc. with c.w. A new net on 29 Mc. is operating including Worcester and Springfield stations. In the first test 33 stations took part. QCC is Aat. EC for 144 Mc. in Hampshire County. PQN is new engineer at WBEC in Pittsfield. QNI and FXR are new hams in Pittsfield. The Pittsfield Radio Club lost its meeting place and all its equipment, including a 234-kw. gas-driven generator, in a fire which raged through the building they occupied. PHZ, in Adams, has VFO and 807 final. BDV is leaving West. Mass. to take a fine position at his company’s Tennessee plant. BEG, LUD, KVN, QJA, BZT, IZN, OBA, COI, and 8SRP took part in timing Eastern Amateur Title Ski Races on Mt. Greylock. Traffic: WIB9R VS, NY 39, JE 28, AZW 28, BDV 28, ED 17, JGC 4; KINRU 3; WEBO 2; LU 1; NEW HAMPSHIRE — SCM, Gilman E. Crowell, WIAQ — The New Hampshire ‘Phone Net (3980 kc.) is on every Sunday at 9:30 A.M. The C.W. Net now operates on 3986 kc. 7-9 P.M., Mon. through Fri., with CRW as Net Control. The following clubs announce new officers: Concord Brannsponders; APK, pres.; JNC, vice-pres.; AJY, secy.-treas. Manchester Radio Club: GDE, pres.; GME, vice-pres.; RFO, secy.-treas.; WQH, treas.; AUY, member at large. Nashua Radio Club and Key: HTO, pres.; DUB, vice-pres.; PKQ, treas. JNC has a new 28-Mc. beam with rotator, also an e.o.o. The Nashua boys converted HTO to ‘phone. MJQ and OFR have nightly schedules on 50 Mc. MRN has a new 25-Mc. beam. MJQ, OFR, and HQ assisted greatly on 50 Mc. during the Wakefield fire. LMB and AYU are red hot on 14 Mc. CRW is doing a fine job on the C.W. Net. Those who want evening activity and do not hold an A (Continued on page 88)
PLASTICON
Plastic Film Oil-Filled
CAPACITORS

1. More Economical
2. Smaller—Lighter
3. Better Electrical Characteristics

1. More Economical

<table>
<thead>
<tr>
<th>MFD.</th>
<th>Volts DC</th>
<th>Paper Capacitor</th>
<th>Plasticon AOC</th>
<th>Saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1000</td>
<td>$15.18</td>
<td>$19.67</td>
<td>$4.51</td>
</tr>
<tr>
<td>4</td>
<td>2000</td>
<td>13.67</td>
<td>9.34</td>
<td>4.33</td>
</tr>
<tr>
<td>2</td>
<td>3000</td>
<td>22.78</td>
<td>15.40</td>
<td>7.38</td>
</tr>
<tr>
<td>1</td>
<td>4000</td>
<td>33.54</td>
<td>27.50</td>
<td>6.04</td>
</tr>
<tr>
<td>2</td>
<td>5000</td>
<td>46.73</td>
<td>41.25</td>
<td>5.48</td>
</tr>
</tbody>
</table>

Above are typical examples.

PLASTICONS are the result of technological advances... cost less to manufacture, give better performance

2. Smaller—Lighter

<table>
<thead>
<tr>
<th>MFD.</th>
<th>Volts DC</th>
<th>Approx. Weight</th>
<th>Approx. Cubic Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Paper Capacitors</td>
<td>Plasticon AOC</td>
</tr>
<tr>
<td>10</td>
<td>1000</td>
<td>1.95 lbs.</td>
<td>31 cu. in.</td>
</tr>
<tr>
<td>4</td>
<td>2000</td>
<td>2.0</td>
<td>31</td>
</tr>
<tr>
<td>2</td>
<td>3000</td>
<td>2.0</td>
<td>31</td>
</tr>
<tr>
<td>1</td>
<td>4000</td>
<td>1.77</td>
<td>28</td>
</tr>
<tr>
<td>2</td>
<td>5000</td>
<td>5.2</td>
<td>70</td>
</tr>
</tbody>
</table>

3. Better Electrical Characteristics

<table>
<thead>
<tr>
<th>Paper Capacitors</th>
<th>Plasticon AOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Factor at 85°C 60 cycles</td>
<td>0.7%</td>
</tr>
<tr>
<td>Resistance at 85°C megohms per Mfd.</td>
<td>40</td>
</tr>
<tr>
<td>Capacitance Temp. Coefficient 100% at 25°C</td>
<td>-40°C = 73%</td>
</tr>
<tr>
<td></td>
<td>+85°C = 97%</td>
</tr>
</tbody>
</table>

PLASTICON CAPACITORS given are Type AOC, mineral oil-filled.
PLASTICON ASC silicone-filled have better characteristics.
Paper Capacitors given are chlorinated diphenyl impregnated.

Condenser Products Company
1375 NORTH BRANCH STREET • CHICAGO 22, ILLINOIS
MANUFACTURERS of GLASSMIKE CAPACITORS and HIGH VOLTAGE POWER SUPPLIES
SAVE UP TO 2/3 ON HAMMARLUND GEAR

SEE THESE VALUES IN POPULAR XMTG EQUIPMENT. Kits include all parts, punched chassis, cabinet, tubes, sockets, resistors, capacitors, wire, insulation, switches, knobs, and detailed illustrated instructions for wiring and adjustment.

FOUR-20 XMTR WAS $120.00

Radio Shack Kit Price $39.50

Gives you all this: all-band operation—80-40-20-11-10 meters; crystal control; CW or phone operation with four-20 transmitter; four-gang condenser tunes crystal and three doublers; variable output matches 50-600 ohms; 150-mil meter switches to meter each r.f. tube; power input 35 watts at 105-120 volts 50/60 cycles; tubes include 7C5L T (4) ocs., 1st, 2nd, and 3rd mult., 807 final amp., 5U4G rect. Coils for 11-20•40•80 meters ...................................... each 8.50

Four-20 mike with push-to-talk switch, cord, and plug. This is a carbon mike.

FOUR-11 MODULATOR WAS $72.50

RADIO SHACK KIT PRICE $29.50

Use it with your present rig or your new Four-20. Gives you eleven watts of audio with less than 50% distortion; substantially flat response. Complete with tubes and instruction book. Made for HalliCrafteiis, Whitney, AAF, and others. Full trade discount at more than double our bar1a ba price. Made for RCA, Corp.; supplied complete with cord, wedge plug, and switch.

FACTORY-WIRED KITS

We have a limited number of factory-wired Four-20's and Four-11's. While they last, they're yours for Four-20 .............. $59.50 Four-11 .............. $49.50

BC-221 FREQUENCY STANDARD $36.95

Fundamental ranges 125-250 and 2000-4000 kc; stability better than 0.001%; works on 110 vac. batteries, or vibrapack. Use it for a signal generator or to make a wonderful VFO. Complete with tubes, crystal, and calibration equipment. Used but excellent working condition.

BC-221-AK with built-in modulation $79.50

BRAND NEW! BC-625

Temperature-stabilized 15 watt XMTG delivers 75 watts. Uses two 632, three 12A6a, one 6CG7, one 807G, 28 volt d-c dynamotor powers entire rig. Complete with tubes, plug, instructions for conversion to 110 volt a-c operation.

Speed delivery and save C. O. D. charges—send full amount with order. 50% deposit required on a C. O. D. order.
SUPER VALUES—Brand New
Westinghouse 807 .......... $0.90 each
4 for $3.10
820 ................... .50 each; 3 for 1.45
822 .................... .50 each; 6 for 4.10
822/722A ............. 1.13 each; 3 for 3.22
832A .................. 1.50 each
866/866A .......... .75 each; 6 for 4.10
872/872A .......... 1.13 each; 3 for 3.22
3C24/G ............. .49 each; 6 for 2.25
316A .......... .45 each
805 ...... $3.75 each
814 ...... 2.95 each
815 .......... 1.49 each
6C4 ............ 10 for $1.50

NEW LOW PRICES ON POPULAR TUBES

<table>
<thead>
<tr>
<th>Type</th>
<th>Net Type</th>
<th>Net Type</th>
<th>Net Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>2C34</td>
<td>0.45</td>
<td>813</td>
<td>6.00</td>
</tr>
<tr>
<td>2C40</td>
<td>1.95</td>
<td>831</td>
<td>1.38</td>
</tr>
<tr>
<td>2C41</td>
<td>1.50</td>
<td>832A</td>
<td>1.50</td>
</tr>
<tr>
<td>2E1</td>
<td>1.50</td>
<td>836</td>
<td>1.50</td>
</tr>
<tr>
<td>2E29/829B</td>
<td>1.50</td>
<td>876</td>
<td>1.50</td>
</tr>
<tr>
<td>8A4</td>
<td>1.37</td>
<td>826</td>
<td>1.75</td>
</tr>
<tr>
<td>8A5</td>
<td>1.59</td>
<td>827</td>
<td>1.59</td>
</tr>
<tr>
<td>8A6</td>
<td>1.75</td>
<td>828</td>
<td>1.75</td>
</tr>
<tr>
<td>8A11</td>
<td>1.95</td>
<td>829</td>
<td>1.95</td>
</tr>
</tbody>
</table>

EIMAC TUBES
BRAND NEW
304-TI $3.95 each 6 for $23.20
plus a limited number of
450-TL $3.72 each 2 for $7.00

RADIO PHONE HANDSETS

Carbon mike, push-to-talk switch, rubber cord, plugs.
TS-11 or TS-13
$3.50
H-23-U .......... $4.95

BRAND NEW GE SELS YNS $4.95 PER PAIR
Ideal for beam position indicators and many other uses. You can
use theseandid selsyn control transformers at
35 volts 60 cycles and
they'll give you permanent, efficient per-
formance.

DYNAMOTOR SPECIAL—BRAND NEW! $9.00
An amazing value. Type PE-55, complete with filters, relays, etc.
500 volt 400 ma. d.c. output. 12 volt d.c. input. Quantity is limited
ORDER NOW.

R-5/ARN-7 RADIO COMPASS UNIT $11.95
Complete with tubes and instruction book. For 100-
1750 Kc service. 28-volt operation. Good used con-
dition.

XMTG CAPACITORS
Nationally known, high-voltage, oil xmtg capacitors all in rectangular cases, with stand-off insulators.

<table>
<thead>
<tr>
<th>Mfd. Volts</th>
<th>Net</th>
<th>Mfd. Volts</th>
<th>Net</th>
</tr>
</thead>
<tbody>
<tr>
<td>1500</td>
<td>2.00</td>
<td>1500</td>
<td>2.00</td>
</tr>
<tr>
<td>1500</td>
<td>1.50</td>
<td>1500</td>
<td>2.50</td>
</tr>
<tr>
<td>1500</td>
<td>1.00</td>
<td>1500</td>
<td>3.00</td>
</tr>
<tr>
<td>1500</td>
<td>0.50</td>
<td>1500</td>
<td>4.00</td>
</tr>
</tbody>
</table>

SELENIUM FULL-WAVE RECTIFIER $3.95
A-c input 35 volts; d-c output 28 volts, 3.5 amperes.

BRAND NEW G.E. BC-645A $9.95
Get going on 420 with this "hot" xmtg-recv for phone and low. Originally
-priced over $2000, they cost you less
than the price of the 15 tubes you get
with the outfit. Full conversion instruc-
tions furnished.

The RADIO SHACK Corp.
CABLE ADDRESS: RADIO SHACK
167 Washington St., Boston, Mass., U.S.A.
single rotation

TUNES 80 TO 10 METERS
WITHOUT CHANGING COILS

Designed to meet hams' demands for greater transmitting ease, the revolutionary National MB-150 Multi-Band Tank Circuit tunes all amateur bands from 80 to 10 meters with a single 180° rotation of the capacitor! No coils to change! 150-watt input for push-pull or balanced single-ended operation.

Link coil matches impedances up to 600 ohms. Rugged split-stator capacitor rated at 1500 volts peak.

$18.75
Amateur Net

For complete details see the National dealer listed in the classified section of your 'phone book or write direct to—

National COMPANY, Inc.

MALDEN, MASSACHUSETTS

(Continued from page 86)

ticket, should tune in on 29-Mc. 'phone after 7 P.M. BFT worked WAC in four hours. CNX just cleared his WAS and WAC. The Concord Brassounders made a tape recording of the club's activities to be sent to the Norwalk Radio Club. The Blackwater ARC meets at the local YMCA. Traffic: W1CRW 112, A0Q 8, AP7 4, C0X 7, AUY 4, QEU 4.

RHODE ISLAND — SCM, Clayton C. Gordon, WHRC — LCH, now D4ABC in Nuremberg, Germany, is on every Sunday at 11 a.m. near 28,200-ke. BGM operates Joe's home rig on this schedule while Joe talks to the folks. LQ1 is on 25-Mc. mobile with Sonar rig and Gon-Set converter. KY0 is on late nights on 14 and 7 Mc. AJQ is now in Texas. ODJ is a new ORS. HRC's HRO has had a face-lift and he took out the 254-volt tubes and installed 250-volt tubes per the HRO-5T circuit with good results, but it is time-consuming and you had better have plenty of test equipment if you plan to do it. Also I finally got a BC-221-Q. In order to keep the heat down in it I am using a selenium rectifier, and to keep the shock hazard down I am using a low-ratio audio-output transformer as an isolation unit between the light-line supply and the power supply. A nice job and five 70-watter 150-watt rig. Ex-7ESO, now LNYG, write.

NORTHWESTERN DIVISION

ALASKA — SCM, Gerald Benedit, WINLD — KRV, on 7 and 3.6 Mc, reports 33 countries confirmed. HRO is building new YFO. PSO also is on ORN. Bus expects to have much more activity on the VT Net. KP4FN, ex-W1BHR, reports he now is in San Juan and had 32 contacts with OKH from Oct. 15th to Jan. 16th on 38 Mc. EKE reports into Green Mountain Net, 28-Mc. 'phone, as well as OKH, MCQ, MMV, QMN, and NDL. OKH reports hearing some 6s and 7s on 28 Mc. during January, and will have rig on 28 Mc. NXE from Massachusetts is now in New Hampshire and will have rig on 7 and 3.5 Mc. MCQ has Command-type receivers and transmitters to use as emergency rigs, and OKH uses one as a.c.c. OQB is stationed at Guam. Traffic: W1PSD 24, ERU 11.

IDAHO — SCM, Alan K. Ross, W7IWU — American Falls: DMZ is new OPS and permanent NCS of the FARM (Friendly Amateur Radio Mission) Net on 3935 kc. Jerome: GZW is Alternate NC Number 3 for the FARM Net. Twin Falls: New EC is KEX, and with IJA as Assistant EC, is after ABC members. KEX also is on 50 Mc. with an 832A final. JMX participated in the ARRRL PFT. He is putting an SCR-223 on 146 Mc. now. Mountain Home: IV is working 28 Mc. c.w. Boise: FOI moved to California. GTN meets with the FARM Net. EPH has new 14-Mc. beam. Ex-F5GSO, now 1NYG, writes from KP4 and is on 14 and 28 Mc. with a BC-300 and three rhombics. Let's have some Idaho participation in the June Field Day this year. Drop me a line of your plans and we will arrange to work each other during the contest. Traffic: W7CIN 30, DMZ 22, EMT 14, JWE 14, GZW 8, BAA 4, HP0 6.

MONTANA — SCM, Albert Beck, W7EQM — SEC: TEMF, GFA is building a small portable rig. BOZ has new frequency meter. CFY reports four portable outfits in the next few months. HRO is remodeling his station. The Billings gang is attempting to organize an emergency net. J3S has 250 watts input. AMK is building a kw. DPK is organizing CART radio net. CVQ deserted tetraode and went back to triode. CFY visited his son, CBY, during the holidays. BSU has bandswitching.
Make your RADIO a WIRE RECORDER COMBINATION

LIST
$75.00

Designed for Amateurs... Experimenters... Professionals!
Complete with new, improved Webster-Chicago circuit for easy connection to existing amplifier circuits. Supplied with oscillator coil, 15-minute spool of recording wire and construction manual. Hook it up yourself to record radio programs... shortwave broadcasts... messages... speed checks. Records and plays up to a full hour. Small, compact size: 10½ x 8½ x 5½ inches. Net weight 10 lbs.

See Your Ham Supply House
Made by the Makers of WEBSTER-CHICAGO
Record Changers and Nylon Phonograph Needles

WEBSTER-CHICAGO
5610 BLOOMINGDALE AVENUE • CHICAGO 39, ILLINOIS
the SHURE "VERSATEX"

1. Fits snugly in your hand—is its own desk stand—sits on the table top by itself—threaded to mount on standard floor stand.
3. Has high output level. 53db below 1 volt measured at end of a 7-foot cable.
4. Has special moisture-proofed crystal.
5. Contains R-F filter to prevent crystal burnout.
6. Has heavy, rich maroon-colored plastic case—prevents shock.

Model 718A
$115.00

SHURE BROTHERS, Inc.
Microphones and Acoustic Devices
225 West Huron Street    Chicago 10, Illinois
Cable Address: SHUREMICRO

SHURE BROTHERS, Inc.
Microphones and Acoustic Devices
225 West Huron Street    Chicago 10, Illinois
Cable Address: SHUREMICRO

807 with VFO exciter. KJX visited EQM in Butte. COH has a 45K27 on the air. FLJ is a.n.o.m. New officers of BARO are: BLX, vice-pres.; GIN, vice-pres.; and LFA, secretary-treas. Quiet and annual installation of officers was held at Casino in Butte. QB arrived from Spokane to work for CAA in Lewistown. HBM is working on a pair of 813s. LVJ is with KXJ. JHJ is having modulation trouble on 28 Mc. DTO is planning a BPL modulation scope to keep check on the 28-Mc. line. JPS visited Capital City Radio Club. Officers of the club are: IVY, pres.; EIZ, vice-pres.; BIJ, secretary-treas. FKO reported working 40 states on 51 Mc. with a converted $22. FGB blew up Class B transformer. Traffic: W7CT 30, FGB 14.

OREGON — SCM, Raleigh A. Munkres, W7HAZ — Portland: JRS ran up an imposing score in VHF SS. JMZ is active on Oregon Net. JL1 is getting BC-450 on the air from Portland University. Astoria: CO2 reports EBD has forsaken o.w. for 28-Mc. phone. QKN had contact with Korea at first QSO with new beam. Pendleton: The club has passed two new resolutions. First, members to return to the QST poll 100 per cent. Second, the correspondent to send a report each month to the SCM. DQX works Europeans on 14 Mc. with a vertical when he can't hear them on a horizontal. BUS increased his local signal on 28 Mc. by using a vertical. FLS is getting a BC-55d ready to go with a.c. power supply. Salem: New officers of the Salem Amateur Radio Club: ARZ, pres.; ASG, vice-pres.; DZT, secy.-treas. LaGrange Park: QP says Medford can hear him on 28 Mc. but he can't hear Medford. HMO schedules OML, a professor at the University of Wyoming. JWM, our blind ham, is studying for his Class A license and building a 28-Mc. converter. Medford: HLF, EC, reports a very active emergency set-up with some fine drills. Oregon has been lacking in emergency organization and it is very gratifying to see the Medford gang turning out. Cutler City: RM APF has agreed to handle the Western terminus of Trunk Line "G." This Trunk should become our best outlet for Eastern and Midwest traffic. Don advises that the Oregon Net, on 3540 kc. nightly, has several new members. Traffic: WATF 12A, JPS 18, FMB 17, LSV 7.

WASHINGTON — SCM, Clifford Cavanaugh, W7ACP — JFB is hard at work with the "WART's," 6955 kc. LIL sends in his last report before heading South for school. HAD is busy putting up three-element beam for that pair of VT1278s of his. He reports that Bremerton has a net on 14-Mc. 'phone called Squawky Gate. It is rumored that a real old-timer, GF, is going to take over the SEC job for the State. Red is a hard worker who knows his stuff and will be a real help to you ECs. FWD is back from the sunny South and going great guns on WSNET. JFX, the PAN, is busy on Mission Trail Net and building three-element 14-Mc. beam. We hear that a BCL cut down ETK's pole. DRT has moved to a new alternate in Ellensburg—AAR, who has helped out on WSNET handling a lot of "WART" traffic besides conducting AEC drills. FRU, our RM, states that Trunk Line "A" will be ready to go any day now as membership is nearly complete. George, manager of this line, has really worked hard to get Trunk Line going and deserves a good hand from all of us. CZY, in sanitarium at Snohomish, is on the air every night with receiver only and would like to hear from some of his old pals. Larry was the first station on WSNET and he deserves all the credit for building it up to its present state-wide coverage. KHL is busy on all bands and WSNET with 7 Japanese meters reading everything except parasitic voltages. DGN has moved to a new QRA where BOLs don't know him. APS wonders what's happened to Trunk Line traffic. JFB keeps M. Vernon on the map. JC made a big score in the ARRL CD Party. DXS sent in a big volume of QSO reports. BTW is having beam trouble. FXD is out on a new VFO and 500 watts. LFA is living for the day when he can get on 3.85-Mc. 'phone. KGY bought a new Supreme AF-100. Hope they get it on WSNET. LAN wonders why broadcast style works better than a nice rack job. BTO reports his 50-Mc. antennas blown down so he is back on 14 and 28. EBO is having trouble hitting all frequencies on 7 and 3.5 Mc. with his new Millen e.o.o. RAO now is the call of JYQ, who is Alternate NOS of WSNET, BG, a real old-timer, is back on 3.5-Mc. o.w. after an absence of six years from this band. We're glad to see him back again. Karl. Traffic: W7CT 328, FRU 230, KK1 66, ACF 54, KHL 49, FWD 41, LFA 27, JFB 34, LIL 19, JFY 18, EBS 18, JC 15, DGN 13, LSV 11, ETO 8, DRT 5, APS 2, HAD 1.
The splatter suppressor circuit using Thordarson components as sketched here, greatly improves phone transmission on the crowded amateur bands. The circuit limits transmission to the important voice frequencies, effectively reduces splatter interference caused by high levels of modulation and permits a higher average modulation level.

Sharper signals result by attenuation of audio modulating frequencies over 3000 CPS and elimination of harmonics generated in the speech amplifier.

The half wave rectifier is an efficient negative peak clipper which prevents plate voltage on the Class C amplifier from going below zero when the 100% modulation level is exceeded.

The circuit is ideal for use in original transmitter design and is readily adaptable to existing installations, either as part of the modulator or assembled on a separate chassis.

Complete instructions and charts furnished with each transformer.

Export — Scheel International Inc. 4237-39 Lincoln Ave. Chicago 18, Ill. Cable — (Herschel)

Thordarson Splatter Chokes and Negative Peak Clipper Components are the Amateur's Perfect Co-operators

Ever mindful of the needs of the amateur operator, Thordarson engineers are constantly developing new applications for improved operations. With Thordarson equipment, the amateur is assured of the greatest thrills in radio... and Thordarson skill makes this superb quality equipment at popular prices.

The Above Chart Indicates Graphically The Frequency Response of the "Splatter" Filter!

Thordarson Manufacturing Quality Electrical Equipment Since 1895

500 West Huron CHICAGO 10, ILLINOIS A Division of Maguire Industries
I can train you to pass your FCC License Exams in a few short weeks if you've had any practical radio experience. My time-proven plan can help put you, too, on the road to success. I'll send you the entire story free of charge. Just fill out the coupon below—Edw. H. Guilford, Vice-President.

OU, too, may EARN $3,000 to $7,500 a year

GET YOUR COMMERCIAL RADIO OPERATORS' LICENSE!

Add the FCC licenses to your base experience and you can fill broadcast jobs that pay from $5000 to $12,000. You can get your FCC ticket in a few short weeks by using CIRE simplified training and coaching methods at home in your spare time. Get the full story now. Fill out the coupon below.

Look what Broadcast Men Earn
(Average Pay Reported by FCC Nationwide Survey)

<table>
<thead>
<tr>
<th>Position</th>
<th>Big Stations</th>
<th>Little Stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmitter Engineer</td>
<td>$4500</td>
<td>$3000</td>
</tr>
<tr>
<td>Studio Engineer</td>
<td>6000</td>
<td>3850</td>
</tr>
<tr>
<td>Chief Engineer</td>
<td>7700</td>
<td>4300</td>
</tr>
</tbody>
</table>

Get these 3 FREE SAMPLE FCC TYPE EXAMS

MAIL COUPON TO GET THESE FREE BOOKLETS

CLEVELAND INSTITUTE OF RADIO ELECTRONICS

I want my FCC commercial ticket. Send me your FREE booklet. "How to Pass FCC License Examinations" (does not cover exams for Amateur License) as well as sample FCC-type exam and Catalog A showing opportunity in growing field of radio electronics.

Name...........................................
Address.........................................
City..............................................State..............................................

☑ Veterans check for enrollment information under G.I. Bill. NO OBLIGATION — NO SALESMAEN

PACIFIC DIVISION

HAWAII—SCM, John Sours, K6EIIL—New officers of Honolulu Radio Club are: DU, pres.; KW, vice-pres.; GH, secy.; AN, treas.; BX, RS, and KA, directors. The Oahu Emergency Net meets Thursday at 144 Mc. Net Control Station is AS, with present members BI, CM, FC, IB, LD, JB, KW, MI, NP, and W6NDC. Operations at DF are picking up with operators returning from Christmas leaves. K6GZ1 (doing TCS on 7 Mc. and GS-232AX on 3.5-Mc. e.w. into horns antennas. Active stations on the Pineapple Net are BW, Net Control, LK, HW, K6GZ1, and W6VWX/RKO. This net meets on 3725 kc. Monday through Friday. LF is rebuilding to higher power. DK is using a pair of 4-KWs on all bands. EM is having fun with p.p. 807s. SX has new 28-Mc. beam with rotor to radiate his n.f.m. MG is trying out new antennas called "Quable Quad" and having good results on 28 Mc. Traffic: K6GZ1 23, K6HEL 22, 6BW 21, 6DF 5.

SANTA CLARA VALLEY—SCM. Roy E. Pinkham, W6BPT—Asst. SCM, Geoffrey Almy, 6TBK. RM: GJ5. PAM: Q1P. EC: CFK. The Palo Alto Amateur Radio Association members have purchased 25 SCR-522s and they plan to convert them to 144 Mc. to be used in an emergency net. At the club's February meeting, QYT gave a very interesting talk on n.r.e., transmission with a demonstration of receiving from station YX. There were 86 present at the meeting. WNI rolled up a total of 48,972 points in last ARRL Party. He is using a BC-453 as a lazy man's Q-5er. QPM has a new Jr. operator at his QTH. YHL assisted GD in putting up sixteen-element beams. K6HVL has new harmonic at his shack. BXM is a new call in San Jose. BUM, in Salinas, slipped and fell while on a ladder adjusting his beam. He now has his right arm in a sling. YPC had his hand and face burned from a flash fire in his garage. ADG is using a pair of 507s to get on 7 Mc. and in the high bands. NUG installed filter on 77.5 Mc. beam-rotating motor and has eliminated the brush flash to some extent. AVJ now is running 120 watts to a 2-BB on 28-Mc. 'phone. CFK was in attendance on the radio program and gave emergency net for the Red Cross a good plug. TAN has raised his beam up to a height of 35 feet. Traffic: W6WMJ 199, BO 198, WNI 28, ZS 8, DZS 5.

BAY AREA—SCM, Horace R. Green, W6RZ. RM: EHS, NNS, TD, IDY, QDE, WGN. V.h.f. and u.h.f. news by WAB. 144-Mc. is 90 per cent crystal-control. VSB has 50 watts and sixteen-element beam. UOV has 24-element beam with 200 watts. UHM has 150 watts and 24-element beam. WAB uses an extended double Zepp with 28 watts. VEN is building new crystal rig. VSB, UHM, YNA, W2H, UOV, and WAB have made various field trips to Mt. Lassen and Mt. Saint Helena with good results. Active on 144 Mc. is a popular band for the following, all using AP913s: VSB, UOV, ZDI, QT, and JLE. The gang around San Leandro has formed a new radio club known as the San Leandro Amateur Radio Club with MRM, pres.; GJZ, kera; KT, secy.; CH, chief op.; YRQ and Q6L, directors. The North Bay Amateur Radio Assn. in Vallejo is very active. RRG, WGM, WBC, WXU, ZHU, CHA, EUL, AFO, and Seth Hodson enjoyed a windy week end atop Mt. Saint Helena on Jan. 17-18 with 50-, 144-, and 420-Mc. gear. CAN reports that a new club is being formed in Napa and will meet the 2nd Tuesday of each month at 7th and Burnett Sts., Napa. VTF, in Guam, writes he is using a portable 60-watt job using a 6AG7 oscillator, 602s, and a pair of 0.5 Mc. crystal transmitters. SOR-522s and they have a 6SQ7, 6SC7 with a pair of 6146s as modulator. OJU is new president of the Richmond Radio Club. On Jan. 20th the Mission Trail 11th Birthday was celebrated on 3.85-Mc. phone. The SARO gang cooperated by adding its mobile 28-Mc. f.m. circuit to the 3.85-Mc. 'phone net through the Net Control, NTU, and SARO Net Control, LCG. AKB and OBJ have been making some good tests with their mobile equipment on week ends. TB finally has his 28-Mc. beam up with beam. PB finally has his 14-Mc. beam turning. TI holds certificate Nr. 14 for all some worked. QXN is active once again on the Pioneer Net. EJA has new p.p. 2507Ts in final. SU7 has gone his h.f. rig and QPM has a new harmonic at his shack. YHC is using a pair of 507s to get on 77.5 Mc. beam-rotating motor and has eliminated the brush flash to some extent. AVJ now is running 120 watts to a 2-BB on 28-Mc. 'phone. CFK was in attendance on the radio program and gave emergency net for the Red Cross a good plug. TAN has raised his beam up to a height of 35 feet. Traffic: W6WMJ 199, BO 198, WNI 28, ZS 8, DZS 5.

(Continued on page 64)
PRICE ECONOMY with MERIT QUALITY

In transformers the greatest economy is found in the highest quality. It is quality throughout that insures dependable performance, freedom from service. But MERIT Quality can also be had at a first saving.

CHECK THESE VALUES WITH YOUR LOCAL JOBBER

MERIT PLATE TRANSFORMERS

<table>
<thead>
<tr>
<th>Type No.</th>
<th>List Price</th>
<th>Sec. Rms. Volts</th>
<th>Sec. DC Volts</th>
<th>DC Sec. M.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-3157</td>
<td>$9.25</td>
<td>(660-660)*</td>
<td>(500)</td>
<td>250</td>
</tr>
<tr>
<td>P-3159</td>
<td>10.00</td>
<td>(550-550)</td>
<td>(400)</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(900-900)*</td>
<td>(750)</td>
<td>225</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(800-800)</td>
<td>(600)</td>
<td></td>
</tr>
</tbody>
</table>

*Has 40 volt bias tap

DIMENSIONS

<table>
<thead>
<tr>
<th>Type No.</th>
<th>H.</th>
<th>W.</th>
<th>D.</th>
<th>Mtg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-3157</td>
<td>4¾</td>
<td>3½</td>
<td>4½</td>
<td>D</td>
</tr>
<tr>
<td>P-3159</td>
<td>4¾</td>
<td>3½</td>
<td>5½</td>
<td>D</td>
</tr>
</tbody>
</table>

MERIT COIL & TRANSFORMER CORP.

4427 North Clark St.  Long Beach 6311  CHICAGO 40 ILL.

TELEPHONE
Introduced Only 4 Months Ago
IT HAS ALREADY WON A TOP PLACE AMONG FAMOUS NAMES!

TBS-50 TRANSMITTER
50 WATTS — 8 BANDS — PHONE OR CW
BAND SWITCHED — NO PLUG-IN COILS
80, 40, 20, 15, 11, 10, 6 AND 2 METERS

Crystal controlled on all bands, yet requires no oscillator or multiplier tuning. Will operate from A.C. power packs up to 450 volts at 275 ma. or direct current 12 volts, requires no tuning. Will operate from A.C. or D.C. 12 volts, Watt Class C amplifier.

Price — Complete with tubes ......................... $99.50
Wired and Tested ... Not a Kit

POWER SUPPLY FOR TBS-50, Now AVAILABLE
Delivers 425 volts at 275 ma. and 6.3 volts POWER SUPPLY FOR TBS-50, Now AVAILABLE

PLACE AMONG FAMOUS NAMES!

Introduced Only 4 Months Ago
I
TBS-IA with TBS-50 ..................
Delivers 425 volts at 275 ma. and 6.3 volts POWER SUPPLY FOR TBS-50, Now AVAILABLE

PLACE AMONG FAMOUS NAMES!

HARVEY-WELLS ELECTRONICS, INC.
Southbridge, Massachusetts

Send today for Catalogue No. 114

(Continued on page 98)
In your home or wherever you roam, there's no thrill in radio like this New Zenith Trans-Oceanic Portable! Take it anywhere—it plays in remotest areas, below-zero cold, jungle heat. And it's "tropic-treated" against humidity, radio's greatest enemy. GUARANTEED to give perfect performance even under the worst of humid conditions!

With its exclusive Zenith Wavemagnets (U.S. Patents 2164251 ... 2200674) this Trans-Oceanic Portable pulls in standard broadcast coast to coast, plus world-wide short wave on 5 international bands—just press a button and tune 'em in! Works on battery (up to a year's normal use) and on AC or DC current. Tops in performance, tone, smart luggage styling. No wonder a list of Zenith Trans-Oceanic owners reads like "Who's Who in the Sportsman's World!" Get a thrilling demonstration at your radio dealer's today. Model 8G005Y $114.40*

*Battery Extra. West Coast Price slightly higher.

NEW ZENITH TRANS-OCEANIC PORTABLE

Zenith Radio Corp., Chicago 39, Illinois

Copr. 1947, Zenith Radio Corp.
Radio Transmitter
& Receiver Aps 13
Tunes 410/420 megacycles; light weight, airborne Radar, 17 tubes, including 5/6J6; 9/6AG5; 2/2D2l1/VR105 and 30 megacycle I.F. strip. With schematic. All for $11.95.

APC-25 Air Trimmers 12 plates, Screw Driver Adjusted. Silver Plated 15¢ each. 10 for $1.25

De Jur W.W. 20000 ohm pots 12 watt........49¢
Arc-5 Silver Plated Banana Plugs per doz....10¢
Meissner 2.5 M.A. RF chokes shielded.......19¢

150 WATT H. H. Rheostat 5 OHMS
Wire Wound toroidally, around Refractory core and embedded in vitreous enamel. Copper-graphite contact brush in porcelain holder travels on inside circumference of winding. Maximum amps. 5.48 Diam. 4" Depth behind panel 1¾".
An exceptional Value.................$1.95

OIL FILLED CAPACITORS

<table>
<thead>
<tr>
<th>Size</th>
<th>Steel</th>
<th>Aluminum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 mfd</td>
<td>750 VDC Sprague</td>
<td>25¢</td>
</tr>
<tr>
<td>7 mfd</td>
<td>330 VAC G.E.</td>
<td>98¢</td>
</tr>
<tr>
<td>10 mfd</td>
<td>330 VAC G.E.</td>
<td>$1.25</td>
</tr>
<tr>
<td>10 mfd</td>
<td>600V capacitor</td>
<td>98¢</td>
</tr>
<tr>
<td>16 mfd</td>
<td>400 VDC W.E.</td>
<td>98¢</td>
</tr>
<tr>
<td>2 mfd</td>
<td>1000 VDC Aerovox</td>
<td>69¢</td>
</tr>
<tr>
<td>0.1 mfd</td>
<td>7500 VDC G.E.</td>
<td>$1.50</td>
</tr>
<tr>
<td>2 x 0.1 mfd</td>
<td>7000 VDC G.E.</td>
<td>$2.00</td>
</tr>
<tr>
<td>1 mfd</td>
<td>5000 VDC Solar</td>
<td>$2.95</td>
</tr>
</tbody>
</table>

WIRE WOUND POTENTIOMETER
100,000 ohm, precision made. G.R. type 25 watt, 6" diameter. Brand new........$1.95

FULL WAVE BRIDGE RECTIFIER
Type 9D06125-Up to 144VAC in, 96VDC. Out 2.12 ampps..............$2.50

If not noted 25%, with order, balance C. O. D. All prices F. O. B. our warehouse New York. No order under $2.00.
We ship to any part of the globe
26TH YEAR

ANNIVERSARY

BC-645A 450MC X-Mitter-Receiver

BRAND NEW Complete with Tubes and Dynamotor includes 4-7F7, 4-7H7, 2-7E6, 2-6F6, 2-955 and 1-WE 316A door knob. Can be easily converted for Phone or CW on 420-450Mc Bands.

Our Anniversary Special: $7.95 each

<table>
<thead>
<tr>
<th>METERS</th>
<th>5-0-5 amps, D.C., Discharge &amp; Charge Scale 2&quot; Round</th>
<th>69¢</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0-1 amp, R.F., G.E. 2&quot; Round</td>
<td>$2.45</td>
</tr>
<tr>
<td>100 amp-6 volt D.C. 3&quot; Scale, 4½&quot; Square</td>
<td>Gray Finish, with shunt. A Swell Buy</td>
<td>$2.95</td>
</tr>
</tbody>
</table>

| TUBES | 5 BP-1 CR Tubes 5" Green Screen Brand New | $1.45 |
|       | 5 BP-4 " " " " " White " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " " 
A Sensational Value!

Munger ELECTRO-BEAM ROTATOR

ORDER ONE NOW!

$69.50 COMPLETE

- Price Includes Reversible Electro-Beam Rotator and Accurate Direction Indicator.
- Foolproof Potentiometer and Meter Circuit. Calibrations in Both Degrees and Directions.

Inquire About Our Time Payment Plan

Don't Lose Those Good QSO's While Turning Your Beam by Hand

There's no longer any need to run down stairs, out in the back yard to turn your beam. The Munger Electro-Beam Rotator's positive-action drive saves you those trips in any weather, any time of the day or night. A reversing switch mounted on the calibrated direction indicator permits you to peak up your own and received signals in a few seconds. Enjoy the thrill of holding those rare DX contacts right through heavy QRMI. Don't lose those good QSO's.

FREE Inspection Offer — No Risk

Send your check for $59.50 for one Electron-Beam Rotator complete with Direction Indicator and instruction sheet. Pay small shipping charge upon arrival. If you are not completely satisfied, return the units in ten days and your money will instantly be refunded in full. You can't go wrong! Order your Munger Electro-Beam Rotator today!

Illustrated Bulletin on Request

MANUFACTURED AND SOLD EXCLUSIVELY BY

Rex L. Munger Company
4701 Sheridan Rd., Chicago 40, Illinois

(Continued from page 64)

ROANOKE DIVISION

NORTH CAROLINA — SCM, W. J. Wortman, W4CYB

— Thanks to the Key and Mike gang for the well hamfest. MFE has advised of the formation of the 1330 Club, which meets daily at 1330 on 3900 kc. Those active are MFE, W McC, CYN, HEP, HEP, WCC, and W. L. IMM, a new-comer to Durham. New officers of the Asheville club are: WL, pres.; MUV, vice-pres.; George Netherton, secy.; DFF, asst. secy.; KTB, treas.; and M1Q, custodian. MDE, the club station, operates Monday and Thursday nights on 3930 kc. How about putting that rock crusher on 3905 kc, a couple of nights a week for Asheville traffic? Thanks to OG for a report on the WSARC. New club transmitters are underway for everything down through 28 Mc. ABT is active on 3.6 Mc. AFI is burning up 14-Mc. 'phone and boasting an all-time total of 118 countries. CTP keeps to 3.85-Mc. 'phone. BOBT did recent emergency work during the ice storm. LZE has 99 countries posted, and OG has 80. The Greensboro boys have a new line-up with AJT, pres.; BML, vice-pres.; HEE, secy.; GG, treas., and CS, director. AGD is EC for the Greensboro area. JFY submitted VLY, DXY, OBD, HIP, JIG, J2P, LCV, MDG, NBR, BVM, LLQ, KLZEI, and 51QI/4 have formed a club in Elizabeth City known as the Northeast Carolina Amateur Radio Club. New officers of the Charlotte Club are HUJ, pres.; ETY, vice-pres.; J. L. Land, secy-treas., and HGC, custodian. You are all invited to join the North Carolina Net on 3905 kc nightly. Traffic: W4CFL 495, TXU 527, IMH 203, KJ5 115, CYB 37.

SOUTH CAROLINA — SCM, Ted Ferguson, W4BQE/ANG—JGW is active on 20-Mc. 'phone, working mobile on 3.5 Mc. KZG works mountain top on 28 Mc. MFP receives 7-Mc. c.w. MAQ is to be heard on 28-Mc. 'phone. MAO spends his time on 7 Mc. HEY is busy with the club equipment. KIM has his Bendix TA-15 on the air. GRD's shack was destroyed by fire and all equipment was lost. OG reports little activity on 3.6, 7, and 14 Mc. IZD is interested in short skip on 28 Mc. AVG has changed his QTH to North Charleston. The Charleston 28-Mc. 'phone net consists of the following: CNE, KOD, KLD, CMA, ANK, DPC. IZD, LMB, FCK, CE, DBK, BWV, and PG. MJ is back in Columbia. EDQ says n.f.m. is FB on 14 Mc. KLD has low wattage on 38-44, and 38-38-Mc. 'phone. CE is active on 3.5 Mc. KVEZ has a new e.c.o. and 400 watts on 14-Mc. c.w. DX hounds in the Greensboro area. JFY submits his JFY-1200, and 3-element beam. LMB now has a brand-new Class A ticket, beam builder in Charleston. ANK now is on 3605 kc. nightly. Traffic: W4CFL 495, TXU 527, IMH 203, KJ5 115, CYB 37.

VIRGINIA — SCM, Walter R. Bullington, W4JHK — JW is putting up a 60-ft. steel tower for a 144-Mc. rotator. He plans running 800 watts. DIZQ is running 800 watts on 14-Mc. c.w. KLS and has 1000 watts on 7 Mc. LNC was active on 28-Mc. 'phone. W4KDE in Richmond was active on 3680 kc. during the December contest. LCF is to be heard on 144 Mc. c.w. He has a 150 foot tower and b.c. in use. WVO is active on 3.5 Mc. c.w. and 3.85 Mc. 'phone. KLC has made the W4-SEP for December. KLJ has been qaing the DXCC. Congrats to WVO. KLD reports work during the ice storm. LZF has 1000 watts on 14-Mc. c.w. KLS has 99 countries postwar, and WG has 80. The Greensboro boys have a new line-up with AJT, pres.; BML, vice-pres.; HEE, secy.; GG, treas., and CS, director. AGD is EC for the Greensboro area. JFY submitted VLY, DXY, OBD, HIP, JIG, J2P, LCV, MDG, NBR, BVM, LLQ, KLZEI, and 51QI/4 have formed a club in Elizabeth City known as the Northeast Carolina Amateur Radio Club. New officers of the Charlotte Club are HUJ, pres.; ETY, vice-pres.; J. L. Land, secy-treas., and HGC, custodian. You are all invited to join the North Carolina Net on 3905 kc nightly. Traffic: W4CFL 495, TXU 527, IMH 203, KJ5 115, CYB 37.
NEW AND STANDARD GUIDES TO RADIO

Wave Guides
By L. G. H. Huxley
This is the first of a new series of books on radio techniques developed largely during the war and here-tofore not fully divulged. The authors are all men who were personally responsible for important advances in the various aspects of radio on which they write. In this book the Principal Scientific Officer in the British Ministry of Aircraft Production explains the theory, practical construction and operation of wave guides in high-frequency equipment. Both the British and American experience is described. Full explanation of the mathematics and formulas involved is included. $4.75

Fundamental Electronics and Vacuum Tubes
By Arthur L. Albert
A new revised edition of a book which has been highly praised for its clarity and for the thorough grounding it gives in basic theory, the principles of electronic tubes and tube circuits, and their use for both power and communications. Explanation of theory includes recent atomic considerations and other new developments; and material on vacuum tube voltage and power amplifiers, modulators, photoelectric and measuring devices, and other applications are similarly up to date. The latest standards of the AIEE and IRE are used throughout. The book is a valuable reference for anyone wishing to learn or brush up on electronic fundamentals. $6.

Introduction to Electronics
By Ralph G. Hudson
This masterly summary of electronics gives to those who want a practical, non-technical knowledge of this science and its potentialities an accurate idea of the basic theories of modern nuclear physics and electricity, the construction and operating principles of the vacuum tube, cathode-ray tube, phototube and other fundamental electronic devices, and the important functions of these devices in radio, radar, television, telephony, the production of power and many other fields. Illustrated with 37 full-page plates. $3.30

Introduction to Practical Radio
By Durward J. Tucker
Written by the chief engineer of a commercial, a police and an experimental broadcasting station (WRR, KVP, and KVPA, Dallas, Texas), a man who is also owner and operator of one of the oldest amateur stations (WSVU), this book gives a very clear, practical and thorough foundation in the principles of radio required for all radio work. It includes full explanations of the necessary mathematics at the points where mathematics is used. It is very clearly written and constantly shows through examples how each basic principle is used in the construction and operation of radio apparatus. Those who are studying radio on their own will find this book complete, clear and easy to follow, and those now working in radio will find it a helpful refresher. 160 illus. $5.

Ultra-High-Frequency Radio Engineering
By Willis L. Emery
The basic principles are explained as simply as possible, with no mathematics beyond differential equations. Solved problems illustrate applications, and there is much practical how-to-do-it information. The treatment of cathode-ray tubes and related circuits, transmission lines, the Fourier integral and transient responses, and radiation, propagation and wave guides has been noted as outstanding by radio engineering teachers. $3.75

Principles of Radio for Operators
By Ralph Atherton
A basic book on electrical fundamentals and operating principles of each part of radio including antennas. Techniques of teaching found so successful in the intensive training of personnel for the armed services during the war have been used to good effect in this book. There are 470 illustrations which help the learner to visualize every piece of equipment, its construction and use in radio circuits. An appendix includes full reference tables and a step-by-step example of trouble-shooting the modern receiver. $4.

SEE COPIES ON APPROVAL

This coupon gives you the privilege of ordering copies of any of these books for FREE EXAMINATION. If you are not entirely satisfied with their worth to you, you may return them without charge. Send for your copies today.

THE MACMILLAN COMPANY, 60 FIFTH AVENUE, NEW YORK 11, N.Y.

☐ Wave Guides
☐ Fundamental Electronics & Vacuum Tubes
☐ Introduction to Electronics
☐ Practical Radio
☐ Ultra-High-Frequency Radio Engineering
☐ Radio for Operators

Please send me copies of the books checked on 10 days' approval.

Signed

Address

(Please prepaid on cash orders, otherwise a few cents postage will be added to the price of each book)
 Model 703 short-cuts all usual intervening doubler stages - replaces them with a compact, quick means of getting...

Model 703 Pre-Tuned...a Jnounc~ that Mod...

two knobs, gives you 40 watts output 80 thru 10 meters, you need is an 80 meter v.f.o. or xtal oscillator putting out about 1 watt to drive 703-which, at the flip of...frequency Multiplier...

300 volt, 250 ma. and 400 to 600 volt, 100 ma. power supply is only $49.90 net, ready to go.

POWER SUPPLY MODEL 301
450 volts, 100 MA. D.C. 350 volts, 200 MA.

On one-piece drawn aluminum chassis 5" x 4" x 5" high, here's 70 watts of filtered plate power in the smallest "package" ever. Four new 200 MA Selenium rectifiers in a transformer less voltage-quad-

rplet circuit give you more power per "$./. The ideal answer to that $64 question of power for exciters, frequency multipliers, small transmitters, modulators, receivers. Model 301 simultaneously furnishes 6.3 volt filament power at 3.5 amperes, too. You can't match it at only $26.50.

THANKS TO YOU, MODEL 701 watt CW, 30 watt AM phone, transmitter continues to be answering that $64 question of power for exciters, small transmitters, modulators, receivers. Model 301 simultaneously furnishes 6.3 volt filament power at 3.5 amperes, too.

Model 301 short-cuts all usual intervening doubler stages - replaces them with a compact, quick means of getting anywhere in any band thru 6 meters in a jiffy. Net price, less 2-6AG7, 2-616 and 1-807 tubes, 300 volt, 250 ma. and 400 to 600 volt, 100 ma. power supply is only $49.90 net, ready to go.

POWER SUPPLY MODEL 301

450 volts, 100 MA. D.C. 350 volts, 200 MA.

On one-piece drawn aluminum chassis 5" x 4" x 5" high, here's 70 watts of filtered plate power in the smallest "package" ever. Four new 200 MA Selenium rectifiers in a transformer less voltage-quad-

rplet circuit give you more power per "$./. The ideal answer to that $64 question of power for exciters, frequency multipliers, small transmitters, modulators, receivers. Model 301 simultaneously furnishes 6.3 volt filament power at 3.5 amperes, too. You can't match it at only $26.50.

THANKS TO YOU, MODEL 701 watt CW, 30 watt AM phone, transmitter continues to be the choice of all who want most watts/$. In a honey of a permanent and mobile/ Knitter/driver Over 1000 in amateur use prove it top value at only $36.95.

NEXT MONTH we'll announce a simplified, 'sopped-up" Q.S.T. see Phil Rand in December, 1947 QST, Byron Goodman in January, 1948 Issue. This will add phone and CW selectivity to your present receiver "like nothing you ever heard or saw". This new Model 805 also makes your receiver S.S.S.C. - watch for it! 

SETHOUGH DIVISION

ROCKY MOUNTAIN DIVISION

COLORADO — SCM, Glen Bond, W5QY7 — Short skip is starting to break through on 28 Mc. and should give us a chance to work some of the stations near home. @RM, in Trinidad, has been on 28 Mc. since March with an 807 but is building a new rig. SSG, in Colorado Springs, is building another rig with an 820B in the final, with provision for low-power phone. Otto handled Karas ice-storm traffic in December. GKW, Grand Junction, is getting his AEC Net in line and will be ready to go soon. G8C was able to help in an emergency network as relay station between mobile stations helping the sheriff in small towns near Ft. Wayne, Ind., and relayed traffic back to Ft. Wayne. LZY, in Colorado Springs, is using p.p. 807 final. The San Isabel ARA and the Pueblo Junior College is making interested persons to get a ham ticket. Leon Dudley, a blind fellow, joined the class and did so well he came to Denver Jan. 8th, took the exam, and now is SGBX. You may find Leon on 28-Mc. c.w. or p.p. in Colorado. In City, is planning a better 3.5-Mc. antenna as soon as weather permits. DYS, in Morley, is manager of the Colorado Utility Net. Dick is doing a fine job and the net is getting a good start. The early morning Coffee Cup Club on 3.85-Mc. phone has PFU, MGY, WRS, OWP, 5DVH, and 7FLO as regular customers.

Traffic: W9DRB 412, DYS 95, MOM 72, SSG 37, LZY 17, QHI 4, QYT 4.

UTAH-WYOMING — SCM, Alvin M. Phillips, W7NPU — MQE’s new speech clipper works FB against QRM. JPN participated in VIIF SS and has been working 7-Mc. c.w. and the SLC 28-Mc. round table every Thurs. at 8 p.m. New officers of UARC are ex-6NMK, 7IBM, and OOK. JQJ worked 122 stations in 40 sections during ARRL Party. The UASC Radio Club will have 1-kw. on 14- and 3.55-Mc. phone. LHZ is on 28-Mc. phone. LCB has new antenna and QTH. LBY is new activity manager for USAC Club. Grids are.

1011 — W0QYT - Short skip will be working some of the stations near home. @RM, in Trinidad, has been on 28 Mc. since March with an 807 but is building a new rig. SSG, in Colorado Springs, is building another rig with an 820B in the final, with provision for low-power phone. Otto handled Karas ice-storm traffic in December. GKW, Grand Junction, is getting his AEC Net in line and will be ready to go soon. G8C was able to help in an emergency network as relay station between mobile stations helping the sheriff in small towns near Ft. Wayne, Ind., and relayed traffic back to Ft. Wayne. LZY, in Colorado Springs, is using p.p. 807 final. The San Isabel ARA and the Pueblo Junior College is making interested persons to get a ham ticket. Leon Dudley, a blind fellow, joined the class and did so well he came to Denver Jan. 8th, took the exam, and now is SGBX. You may find Leon on 28-Mc. c.w. or p.p. in Colorado. In City, is planning a better 3.5-Mc. antenna as soon as weather permits. DYS, in Morley, is manager of the Colorado Utility Net. Dick is doing a fine job and the net is getting a good start. The early morning Coffee Cup Club on 3.85-Mc. phone has PFU, MGY, WRS, OWP, 5DVH, and 7FLO as regular customers.

Traffic: W9DRB 412, DYS 95, MOM 72, SSG 37, LZY 17, QHI 4, QYT 4.

UTAH-WYOMING — SCM, Alvin M. Phillips, W7NPU — MQE’s new speech clipper works FB against QRM. JPN participated in VIIF SS and has been working 7-Mc. c.w. and the SLC 28-Mc. round table every Thurs. at 8 p.m. New officers of UARC are ex-6NMK, 7IBM, and OOK. JQJ worked 122 stations in 40 sections during ARRL Party. The UASC Radio Club will have 1-kw. on 14- and 3.55-Mc. phone. LHZ is on 28-Mc. phone. LCB has new antenna and QTH. LBY is new activity manager for USAC Club. Grids are.

SETHOUGH DIVISION

A L A B A M A — SCM, Dr. Arthur W. Woods, W4AGW — SEC: ECQ, PAM: BA, RM: DD. Many appointments still are vacant. If interested, please write for information. At Auburn University the Pre-Clinic is held each Thursday at 10 a.m. by the station engineer. The station is a 250 watt Basic transceiver and 35-35 receiver, MIH with station completed from surplus gear, MNK on 7 and 28 Mc. with low power, KUQ on 3.55-Mc., LHZ and LHW with joint station, MFA on 7 Mc. with 100 watts, PJO ready for 28-Mc. c.w. and DBG on 7 Mc. with 5 watts to a Signal Shifter. The club at Auburn is preparing a 450-watt all-band rig. MUW, in Gadsden, is on 7 and 28 Mc. JYB has nearly converted an AR-AE for mobile use. He schedules 8 daily, PZC is on in Sheffield. GDO writes of increased 50-Mc. activity in Mobile. (Continued on page 108)
TUBES Last Chance!

To get top quality tubes at amazing savings. All new — Guaranteed!

807 $ .95 ea. — 3 for $2.60
866A $ .75 ea. — 6 for $4.10
VT46A $ .75 ea. — 6 for $4.10
VT47A $ .75 ea. — 6 for $4.10
872 $ 1.13 ea. — 4 for $4.06
3C24/G $ .49 ea. — 6 for $2.25
813 $ 6.00 ea. — 4 for $22.95
304TL $ 3.75 ea. — 4 for $13.95
2AQ $ 2.25 829B $ 4.95
2AQ $ 2.25 830B $ 5.25
2C44 $ .75 832A/832 $ 1.50
2E22 $ .75 881A/8801 $ 1.50
2X2/879 $ .30 883/858 $ .75
3AP $ 1.80 HFI30 $ 3.75
4AG5 $ .68 845 $ .75
6AK5 $ .60 845 $ .75
4C4 $ .15 856 $ .75
48 $ .53 931A $ 1.87
10Y $ .25 954 $ .25
12AK $ .15 881A/8801 $ 1.50
VR105/30 $ .75 925/927 $ .20
VR150/30 $ .75 950A $ .38
211 $ .38 959 $ .38
31A $ .45 445 $ 1.50
801/A01 $ .75 819 $ 1.50
803 $ 10.00 162/1627 $ .45
1005/VT143 $ 3.75 162/1627 $ .35
807 $ 12.50 162/1627 $ .25
1005/VT143 $ 3.75 162/1627 $ .25
810 $ 4.95 162/1627 $ .25
811/VT117 $ .95 9003 $ .53
814 $ 4.50 9003/9023 $ .25
815/VT117 $ 2.25 9004 $ .25
826 $ .75 9006 $ .25

Minimum tube orders $2.50. Save more — take 10% discount on 10 or more of any ONE TYPE.

"MAC" KEY Famous Model 200

Our Low Only 69¢ Plus Postage

FILTER CHoke Stock No. S-722

Our Low 99¢ Plus Postage

S-715. 100 ma., 14 Hy., 450 ohms

FAMOUS MAKE CRYSTAL MIKE

A brand new, superior quality crystal microphone. Make by leading mfr. Output 49.7 db below 1 V per bar. Mike can be removed from base. Rubber covered shielded cable .... attractive Hammondite finish. Stock Wgt. 3 lbs. Stock No. S-518 Our Price $5.95

Incl. Postage

NEWARK ELECTRIC COMPANY, INC.

NEW YORK Offices & Warehouse
242 W. 55th St., N.Y. 19

ChICAGO 323 W. Madison St.
Chicago 6, I.I.

Send 20% Deposit with C.O.D. Orders

101
Amateurs!

CHOOSE THE FINEST IN TRANSMITTING EQUIPMENT

1 Set Band 2 Set Dial to 3 Turn Switch Frequency Power on

you're ON THE AIR! WITH THE

El-Tronics INC. AE-30

FIVE BAND SINGLE DIAL GANG-TUNED BAND-SWITCHING 30 WATT AMATEUR TRANSMITTER

Not just another "ECO" BUT a complete transmitter with 30 watts output on five bands PLUS THE FACT that it is single dial tuned and band switching. (Makes excellent exciter for high power amplifier)

CHECK JUST A FEW OF OUTSTANDING FEATURES

1 - Completely band switching
2 - Single dial gang-tuned
3 - 30 Watts output on 5 bands
4 - Covers 80, 40, 20, 15 and 10-11 meter bands
5 - Very low frequency drift
6 - Link coupled output
7 - Oscillator keying for break-in operation
8 - Provision for plate & screen modulation
9 - Blocked grid keying; clean & clatterless signal
10 - All critical voltages are regulated
11 - Three complete power supplies.
12 - Phase-O switch and remote control


PRICE only $220 complete with all tubes - rack mounting

Amory, AUP is going broke trying to save money. In Tuscaloosa, KDP is on 144, 23, and 3.56 Mc. GJW is doctor to RIV, the new jr. operator. ELX is working a re-arranged reception on 7 Mc. while MAB is on 3.56 Mc. ATV works traffic 75 per cent of the time. ECQ needs more applicants for Emergency Corps Net. Traffic: W4ATF 22, GJW 3.

EASTERN FLORIDA — SCM, John W. Hollister, W4Fwz — Time to think of our emergency gear and check over the mobile gear. Brooieville: MNT is on 3075-ke. net. and on 14 Mc. snagged VOZAT and GGB. Cortez: DQW relayed plenty of traffic for State Fair. CCR is on 144 Mc. EEW is running 1-ke., 3.5 to 28 Mc. Dolanda: WSV is revolving to get rid of B.C.I. on 3910 kc. LXA is new member on Gator Net. KOA is active on 3910-ke. net. PET is back on the air with plenty of stuff on 3.56 Mc. but is oiling up the bug for c.w. Daytona: MSP is snagging more QSOs. Q-Ser on receiver and says its fb for crowded band. ASR is back from a spell in the hospital. Jax: KJTX is EC. AEC set-up looks good. JLK is Memphis QTH now. FJC has husky rig on 3.85 Mc. The good programs arranged by EKE are bringing them out for the JARS meetings. Lakeland: DRH is regular on 3075-ke. net. AQV has FB signal on 3910-ke. net. Lake City: IQY, NCS on 3075-ke. net. get credit for bungup organization plus publishing a fine ham bulletin. Miami: The Dave Club WAS Contest is a good example of club activity. BYF has Collins 75A1 and 3102B plus 5514a. MKP is active on 3075- and 7290-ke. nts but finds time to work 14-Mc. DX. BXL, with cold cure in one hand, worked two stations and the operators were Tom and Jerry. BXL got D4ABF. BT sends official bulletins at 11 p.m. on 7170 kc. Orlando: GIP now is OBS. Sanford: IMJ is proud of Collins 75A1 receiver. SCM says "Get on a net. Let's have the emergency crew lined up in advanced! See your EQ, and write JT or DQW. "Phone, 3010 kc., Tues., 6 p.m. c.w.; 2675 kc., 7:30 p.m., Mon.-Fri..; 7290 kc. 7 p.m., Mon.-Fri. They will QRS for your QTC." Traffic: W4IQV 726, AAR 76, BY7V 70, DQW 66, FWZ 67, BT 63, RG 47, MKP 46, IKT 35, LCZ 29, BYF 25, LJM 21, LXX 13, BXL 6, KHY 1.

CANAL ZONE (Special report) — CZARA elected officers for 1943 as follows: KZ5GD, pres.: Capt. Marshall Weller, U S. Army; vice-pres.: F F., Swain, CG, treas. For the first time, seven certificates have been issued to stations working ten KZ5s, the first was snarled by OA4BL. AY rendered valuable assistance with his 28-Mc. phone during an air search following a crash in Peru. Beating gums with AY on 28 Mc. are AO, AP, AW, BA, BD, CG, EL, ES, FB, FW, GD, LN, SW, and WB, with FW alone on 28-Mc. n.f.m. AU unpacked a new NC-138 and is rebuilding his rig. AK, AW, BE, and CG keep busy with traffic but take time out occasionally to poke around for DX. RB is rebuilding. AY is converting a couple of SCR-522s for 50 and 144 Mc. and is cutting the elements for a two-over-six beam. FW has his VHIF-152 and a 5-Mc. rig about ready to go. AQ butchered an SCR-620 for parts to make an amplifier for his HT-6. CZARA’s first hamfest was held February 22 at Howard Field.

WESTERN FLORIDA — SCM, Luther M. Holt, W4DQQ RM: AXP, BEC: ABC. DXQ has now National 175, MlEN moved to 28-Mc. ’phone; EKU schedules FDL. DZX scheduled his brother in Minnesota. JXV burned the midnight oil in DX Contest. AXB is building 14-Mc. rotary beam. New Pensacola calls include NFM and NFN. ASAA is active down there. Officers of the club are: Lawrence Hail!ell, jr., pres.; Geo. W. Miller, secy.; are prospective hams, and the club is conducting classes. A BC-452 and BC-610 transmitter is in use, thanks to the
ARMY SURPLUS HEADPHONES
HS23A
HS23A—Used but in A-1 electrical condition, 8000 ohms impedance. Complete with leather headband and rubber cushions. Shpg. Wt. 3 lbs.

ONLY $98c

ON THESE SURPLUS SPECIALS

SURPLUS KEY
Type J-37 Ruggedly built. 1/2" silver contacts. Bakelite base. Shpg. Wt. 2 lbs.

ONLY $98c

FOR A SURPRISE TRADE-IN ALLOWANCE ON YOUR USED COMMUNICATIONS EQUIPMENT

SURPLUS T-17 HANDMIKES

ONLY $69c

SURPLUS SENSITIVE RELAY

ONLY $98c

SAVE NOW.

Limited Quantity

SURPLUS OCTAL SOCKETS
Similar or equal to the MTP-8. Molded in plate 8 prong socket. Shpg. Wt. 1 lb. 12 for...

ONLY $50c

FILTER CONDENSER
2 MFD. x 400 VAC. Good for about 1600 VDC. Metal can. Shpg. Wt. 3 lbs.

ONLY $98c

FREE!
SEND FOR OUR BIG NEW 1948 CATALOG
WJWD WOTM WOPI WOULH WQRW WOOF WOYD

ATTENTION RADIO AMATEURS
For amazing bargains in top condition, slightly used Communication Equipment, apply to Walter Ashe. A wide selection of good-as-new merchandise available.

Walter Ashe
RADIO CO.
1125 PINE ST. • ST. LOUIS 1, MO.
NEW LOW PRICES

7" and 10" TV "TELEKITS"

Never before have television kits manufactured by one of the country’s leading firms been offered at such a low price! They’re easy to assemble... with guaranteed performance. Each kit complete with instruction books, photos and diagrams.

SEVEN-INCH KIT WITH 13-CHANNEL TUNER 59.50

Number 7 is the perfect set for the television beginner, and brings better picture reception than conventional receivers of its size. The new 13-Channel Tuner is pre-wired and factory aligned for the entire television spectrum of 13 channels. The kit builder merely installs this unit into the Telekit chassis and makes 3 connections. Contains R. F. Stage, Oscillator and Mixer. High voltage transformer insures brilliant, sharply focussed pictures. Sound reception is high quality F.M.

Tube Kit Including 16 Tubes Plus 7" Picture Tube 39.50 . . . . . . . . . . Cabinet 21.00

TEN-INCH KIT WITH 13-CHANNEL TUNER 99.50

- Incorporation of the Telekit Thirteen Channel Tuner
- Uses the modern flyback transformer method of securing the 10,000 volt second anode supply for 108BP4 Picture Tube
- Magnetic deflection and focusing - ion trap electromagnet prevents burning of screen - Uses two complete low voltage power supplies which prevent "weep interaction" between picture and sweep circuits - Features the T.T. sync interlock circuits which insures stability under low signal strength and noisy conditions.

Tube Kit Including 18 Tubes Plus 10" Picture Tube 59.95 . . . . . . . . . . Cabinet 23.50

Radio Electric SERVICE CO. OF PENNA., INC.
7TH AND ARCH STREETS, PHILA. 6, PENNA.
Branches: 930 Market St. & 3145 N. Broad St, Phila.
Also in Wilmington, Del.; Easton, Pa.; Allentown, Pa.; Camden, N.J.

ARMY at Warner Robins. The Albany Amateur Radio Club has recommended as ARRL appointees: HKA, OPS; GLB, OBS; and ATP, ORS. Would like to have the gang in other clubs recommend local appointees. AGI now is at Maxwell Field. MWF is new station at Cochran. LMG has stations and KBH 84 stations on 144 Mc. JWP and LWN are on 144 Mc. Section Net Certificates have been issued to the following stations in Cracker Emergency Net: HEC, GLX, FVT, CTC, QJG, MIA, UL, TO, SK, NAR, JPF, JV, IUC, JNL, IXX, RX, and HZA. The Net held a meeting together at Cochran in October. Various agencies of the government continue to recognize the efficiency of this group. Thanks to the clubs for the dope. Traffic: WKV 120, LRL 11, FKE 10, LMG 8, GGD 10.

WEST INDIES — SCM, Eveready Mayer, KPAKD — AM operated 20.8 hours with HC, G3, and GM for DX. BE also added GM for new country, with G3 and G2 for DX. Both were on 28-Mc. phone. EW installed 28-Mc. phone rig in car with 28 watts. FJ moved to new QTH. HD is trustee for KPUSA, Ft. Brooke, San Juan. EZ’s new beam got him 23 countries with over 45 different G stations worked on 28-Mc. phone. FX’s OE schedule is running perfectly. 7-Mc. c.w. produced 23 countries for KD. On Feb. lst the Puerto Rico Amateur Radio Club held a ham gathering in honor of Dr. Serge Korff, of N.Y.U., and Dr. A. Cobas, of the U. of P.R., who directed the recent expedition in connection with cosmic rays conducted at San Juan, and in which the KP4s cooperated. The club elected the first number of the "Ground Wase; FK9 RH keeps schedule with WIOXRH near his hometown, Burlington, Vt., and worked D4AWC, also a Vermonter.

SOUTHWESTERN DIVISION

LOS ANGELES — SCM, V. J. Haagerty, W8IOX. Asst.
SCM, W. J. Schuch, 6CMN. FYW submitted a fine report from the Paso Robles Radio Club. 7MSG/6 is the club’s newest member. The Popcorn Net operates with low power on 3060 kc. Fridays at 8:30 P.M. for Paso Robles round table. The class attended the first class meeting this year and is going fine. Its slogan is, “A Ham Ticket by March 17th.” FYW works traffic on the Pioneer and Southern California Nets. BJI schedules his brother, EU, on Paso Robles. KFA and 2BK sandwiches call in the middle of the night and makes QSOs between two jobs and operates on six bands. Busy man! ON operates on 50 and 144 Mc. and expects to be on 28 and 3.5 Mc. soon. His 60-54-Mc. DX includes 7 states, all in 4 districts. EP is on 28 Mc. with a four-element beam. UBV is QRL school and YLA. ET1 is a smoke-eater. HE has kw. on 14-Mc. ‘phone, PSX has separate rigs on all bands. PQD set for 144 Mc. RAD, ZMZ, FYW, and FFX are active on Southern California Net and additional traffic outlets in Los Angeles area. CMN reports no traffic this month. The doc said, “Take it easy,” so Bill’s FYF operates by connecting his radio tubes. Bill now has a new folded dipole on 3.5 Mc. feels better, and is back in the saddle again. New officers of Santa Barbara Amateur Radio Club are: AMD, pres.; and PJP, secy. The club meets the last Friday of each month in the Recreation Center at 7:30 P.M. and visitors are welcome. WQV reports from Ventura. He works traffic on the SCM and has made application for ORS appointment. ZEN is working DX on 7 and 14 Mc. Thanks to all whose cooperation helped me to get started on this job. Your continued support is solicited. Traffic: (Dec.) W4KV 127, W4FX 147. (Jan.) WIOX 207, FYW 100, FMG 14, WQV 10, ON 5.

ARIZONA — SCM, Gladden C. Elliott, W7MLL — RNB is running a Russian Tank rig from a 12-volt battery. KAG is operating all bands with p.p. 61.5a at Casa Grande. JIN is running kw. on 3.5 Mc. VTF handles traffic on all bands from Tucson. UPW is handling O.I. person-to-person traffic to Guam. 1MEJ/7 is on 28-Mc. ‘phone at Davis Monthan Field. LIB has a 615 on 7 Mc. KWF gets out on all bands with low power. Indoor whips are his thing. KFD is on 28 Mc. with a Mem. FPA has p.p. 812 on 28 Mc. LBN worked 25 countries in 2 1/4 months with an 807. JNN, using only 8 watts, worked a D4. LDK has a kw. on the air. RU is working 28-Mc. ‘phone as well, 3.5. SJU has a new beam on 28 Mc. GYK has upped his power to 500 watts. NRI is on 3.85 Mc. MLI has 250 watts on 3.5 Mc. c.w. LIFE put 4-65A in his Supreme and is working 7-Mc. c.w. KAD is on 7-Mc. c.w. KAR is running a kw. on 28 Mc. ‘phone. XL/9RH had a 747N on 28 Mc. GBN, Gil Bend, is on 8-Mc. c.w. DPS, Yums, is on 3.5-

(Continued on page 109)
WEBSTER MODEL 79 WIRE RECORDER, chassis only, for building your own portable or permanently installed wire recorder. Extremely useful for recording QSO’s, transmitting telephone conversations, checking your signal speech quality, etc. 15 minute spool of wire included. Hook to your own amplifier....$44.10

Recording wire, 15 min. $2.00; 30 min. $3.00; 1 hour $5.00 per spool.

BRUSH TAPE RECORDING chassis BK-407. Same unit as used in Brush SoundMirror. Complete with built-in pre-amplifiers, erase oscillator, tubes, etc., all that is needed to make this a complete tape recording unit is power supply (furnishing 250 volts at approx. 60 mils and 6.3 volts at approx. 2 amps.), speaker and power amplifier to drive speaker. Net....$131.25

BRUSH TAPE RECORDING chassis BK-407. Same unit as used in Brush SoundMirror. Complete with built-in pre-amplifiers, erase oscillator, tubes, etc., all that is needed to make this a complete tape recording unit is power supply (furnishing 250 volts at approx. 60 mils and 6.3 volts at approx. 2 amps.), speaker and power amplifier to drive speaker. Net....$131.25

HARVEY’S HITS OF THE MONTH
Harvey has 20 meter crystals for a buck! Mounted in holder with ½” pin spacing. Also 40 and 80 meter and 6 and 13 mc. hands at the same low price........... $1.00

Also in stock complete line of Billley AX-2 xtals. Include 10¢ postage with your crystal order.

HARVEY’S HAMFESTIVAL OF VALUES

Type 1616 tube; Half wave, high vacuum rectifier. Filament 2.5 volts, 5 amp; peak inverse 5500 volts; peak current .8 amp; surge current 2.5 amps; average plate current .130 amp. List price $7.50. Harvey special price, while they last...........$7.50

St/I/A

Hammarlund FS-135-C Frequency Standard. Makes your receiver an accurate frequency standard with marker signals every 100 kc. Includes low-drift, silver plated 100 kc. crystal, 6AU6G tube, complete instructions for hook-up. Can be adjusted to zero beat with WWV. Brand New......................... $6.95

Order a spare 6AU6G tube with your F-135-C at 65c


Net price..........................6 for $2.94

Thordarson 7SC49 chokes, 8 H at 120 mls........79c

Cornell-Dubilier T20040 filter condenser, rated 4 mfd. at 2000 volts DC working............. $3.75

RCA Sound Powered Phones, Navy type, self-contained, work up to 2000 feet without batteries. Many uses around transmitter, home, plant or farm. Brand New, in original cartons. Each........................$15.00 per pair..............$24.50

RCA Sound Powered Phones, Navy type, self-contained, work up to 2000 feet without batteries. Many uses around transmitter, home, plant or farm. Brand New, in original cartons. Each........................$15.00 per pair..............$24.50

RCA Sound Powered Phones, Navy type, self-contained, work up to 2000 feet without batteries. Many uses around transmitter, home, plant or farm. Brand New, in original cartons. Each........................$15.00 per pair..............$24.50

Harvey has a very complete line of all makes and types of TV components, tubes and kits in stock such as RCA coils and transformers, Transvision kits, Vision Assembly kits, Teletron coils and transformers, Mallory Inducto tuners, RCA front ends, Essex RF power supply coils and others too numerous to mention. Immediate delivery from stock. Send your order in for same day shipment.

In stock, the new Spencer recording wire, can be used with Webster wire recorders, etc. 15 min. $1.60; 30 min. $2.40; 1 hour $4.00

NOTE: All prices are Net, F.O.B. NYC and are subject to change without notice.

Telephone: LONGacre 3-1800

HARVEY RADIO COMPANY INC.
103 West 43rd St., New York 18, N. Y.

Get Your Order In Early For Immediate Delivery.
STRUTHERS-DUNN RELAY
Control all of your equipment with this one relay. 110 VAC coil, 4-pole, 2 double throw, single throw, 6 Amp contacts, screw terminal; insulated leads 3 x 3/4", a terrific bargain at.

Firthordarson Multi-Transformer
2.5 Volt 10 Amp., 5.5 Volt 5 Amp., 12 Volt 1 Amp, 2000 Volt insulation, hermetically sealed, ceramic feed-thru connections, 110 Volt, 60 cycle primary, 4½" x 3½" x 5½"

100 Kc Frequency Standard

Call Letter Desk Plate
Display your call. Highly embossed letters in beautiful Gold or Silver finish, crackle background in choice of Black, Red, Green, Blue.

Steinbergs
633 Walnut Street • Cincinnati 2, Ohio

Me, c.w. UPF is trying out the Taylor plate modulation system with a pair of 4-12AS. UKE divides his time between 7-Mc. c.w. and 28-Mc. 'phone. If you want to get on c.w. but are scared of the high speed boys, try 3552 at 9 P.M.

SAN DIEGO — SCM, Irvin L. Emig, W6GC — Ass't. SCM, SEC, Gordon Brown, W6AO. W6WU is OBB. W6GB is OCF. BAND's schedule is QM/T Sun. at 4 P.M. Orange County Club is forming a c.w. net on 3550 kc.

Mondays at 7 P.M. FMJ is holding down the southern end of the Mission Trail Net. LKB is getting an SCR-522 operating on 14-Mc. A few 5LPZ/6s is building a 14-Mc. plug, which we feel will be a delight. NF/CFP schedules QP daily at 3820 kc. BCU and score high traffic for an XYL. San Diego Amateur Radio Club thanks its retiring secretary, YYM, for the splendid job she did. BBD, Naval Amphibious Base, Coronado, is operating schedules to the Pacific with WZL, YND, and 8VQZ as operators. 5GAA/6 is active on 28-, 14-, and 3.85-Mc. 'phone from Air Force Detachment at Fort Rosecrans. YTB is building new p.p. 30TL final.

OLY is working 7-Mc. c.w. VCD and YTFE are conducting field tests with mobile rigs for best point-to-point operation. ZV is operating 28-Mc. with a 20-element array. MI gets out better with new elements in his 28-Mc. beam. The Helix 474 Club meets every Sunday at 9 A.M. on 3900 kc. with the following amateurs using BC-474s: WNN, FMJ, QNM, EPW, OQU, NBJ, KSE, BZL, and EOP. The 532 Club is going strong. The Imperial Valley Amateur Radio Association conducts code classes every other night on 3551 kc. TIX, YXL, VM, and 281Y are active on 28-Mc. "We find," write AWE, JQX, TDE, and SCO show up on 7-Mc. Active ARC members under APG are: DUP, DBE, BTP, YRK, ATZ, YLP, AHU, SEZ, YQW, YNZ, BWM, CAB, GRD, LK, YJY, RAN, TPL, TIX, YWN, VRF, WPA, YCP, WEN, WZZ, BW, ADK, FG, PQ, WUU, WWX, GC, XXX, YQJ, YQZ, YTH, VCD, WGS, UWE, VDQ, LGX, YZV, 18, JMJ 11, NF/CFN 7, DEY 4, GO 4, MI 3, BGF 2.

WEST GULF DIVISION
NORTHERN TEXAS — SCM, N. C. Settle, W5DAS/MNI — NWY is a new call in Commerce. Helen, LBY, is OBB and QSM. W6KB and X6 have new Collins 32-V rigs. IRP, M7Y, MUX, and LRP are active from Lufkin. 3NOU is ex-SHCS, and reports S9 signals from the balloon tower. W5LSN is now in the family. Tests is West Columbia, AR, with W5WY, BZL, and 8VQZ. The Ft. Worth Radio Club is active on 14-, and 3.85-Mc. 'phone. NWQ is active on 28-Mc. "We find," report DX, going to town with mobile rigs for best point-to-point operation. LFT and MHS are new on the 'phone net. LFT and MHS are active on 28-Mc. "We find," report DX, going to town with mobile rigs for best point-to-point operation.

(Continued on page 106)
All Regular Lines?—You bet! Receivers?—Every set! Bargain prices?—Lowest yet! Fast service?—JET!

PLATE TRANSFORMER BUY!
A super Surplus Value in a rugged zorchtor to power your entire rig! 1170 Volt CT secondary will deliver up to 500 Volts DC at 750 MA with choke input filter, or 600 Volts DC at 600 MA with condenser input. (One branch or dual rectifiers and filters for added flexibility and reliability). With half-wave or bridge rectifier will give 1200 Volts, 300 MA, TWO, with secondary windings in series, will economically make available 1200 Volts at 600 MA!

Primary is 115 or 230 Volt, 60 cycle, with taps to reduce output 10% and 20%. F B regulation!—plenty of good grade iron and copper. 3½" x 6½" x 12½" overall, including ceramic HV feedthrough insulators. Husky—27¼ lbs. Dependable!—made to Gt's specs. By reputable manufacturer. Sensationally priced!—Less than four—$5.94, plus repacking charge of __. Lots of FOUR in original wood case over-all, including 6 to dozen 5,000 volt 0.5 microfarad paper in oil for output filter. Each ... (Tell your friends or dubf) ... EACH OOUK, 750K, 8UOK 750, 1K, 8K, 1OK, 2OK, 1UOK, 4OK, Finest grade, 10-40~ resistance. Fully shielded. FILTER CHOKE BARGAIN

PRECISION RESISTORS
Finest grade 1% accurate Wire Wound, WWA, WWC, etc. 750, 1K, 5K, 10K, 20K, 100K, 200K, 600K, 1M, 5OK, 2MK $1.98

ARC-5 BC-454A Receiver, 3 to 6 MC. Brand new, complete with tubes. $4.95

FILTER CHOKE BARGAIN
Smooth away your ripple with this 15 Henry, 175 MA reactor, 200 ohm resistance. Fully shielded, 3½" x 3½" x 4½" high. Weighs 5 lbs. You'll recognize the good name:___.

Two or more at $1.69 each

- LONG ISLAND HAMS!
Our JAMAICA BRANCH is mightily convenient to save time—and money.
See W2KYV Hillside Ave, at 172 Street

HAM HEADQUARTERS
Since 1925!

HARRISON R.C. 7
PHONE—BARcley 7-9854  EXPORT DEPT.—CABLE—HARRISONRAD
JAMAICA BRANCH—172-31 Hillside Ave.—Republic 9-4102

If you can't visit either of our well-stocked stores, phone or mail in your orders for really superior SERVICE. All standard lines at lowest prices.

73, Bill Harrison, W2AVA

NEW VHF RECEIVER
A "natural" for hams, labs, utilities, fire buffs, etc. Necessary to the 10-10. National's new HP5 is a 27 to 250 MC superhet with BC-454A IF and the new 107 crystal-controlled second detector. A good AM — FM — CW 7 tube receiver with built-in speaker and phone jack. MAY also be used as a converter for dual-penetration, image free reception. Complete with coils, less power supply... $125

AC pack—$12.45 6V DC Vibrapack—$34.16

SSSC
National's new P-27 Sideband Filter. See page 44, March GST. First delivery scheduled for March. Includes balanced input and output transformer. Price will be around... $50-$60 Mounted 550 KC Crystal. $4.95
465 KC Double slug tuned IP's... $4.49
New developments!—We'll have the very newest things as they come out!

MON-KEY
Why monkey around with an old fashion key when you can go right out and get this new electronic MON-KEY and be a champion operator! Have at nice prices... $9.95

IN NEW YORK—ONLY HARRISON HAS IT!

TV Wanna try? too! if you are keeping quiet hours a/c to TVL you might as well see what's going on. Like to roll your own? Get one of the magnetic deflection Television Assembly Co. kit - complete 40 tubes, 12" speaker, chassis, antenna, wired and pre-tuned RF and IF sections. Even a lid can finish the wiring and get results equal to factory-built jobs costing much more! $127—$229.50

Get ready for summer fun on 2 METERs!

Abbott RM-1, Five element all aluminum beam. List $25.50 Special—$8.83
E- L 1066 Vibrator Pack, 6V DC to 500 Volts 100 MA. Filters... $14.97

NIGHT SHOPPING
For your convenience, and ease of parking
New York — Wednesdays
Jamaica Branch—Fridays
UNTIL 9

(Bring the YF and Kiddies!)
KVG is on 3.5 Mc. LHO is building a new bandswitching rig. KVG and his son, LPL, are always to be found on 7 Mc. LTI is on 28 and 14 Mc. MFZ has a new ham shack and has to rely on his rig to file in. KWE is trying to get back on 7 Mc. and would like to contact others interested. Fly now is 2SIJ. LXX and MNN have new rigs on 28 Mc. NUT is on 7 Mc. GNG operates on 50 Mc. LRZ and KIKG are on 28 Mc. HEV is starting on a.s.s.o. transmitter. HXT has a new antenna. MPW is hot on double conversion. The Battleville Club had a birthday party for GTU at the home of JKS. Traffic: WS1GO 149, AHT 98, MBY 58, RCX 96, JKL 48, QZ 30, KRE 24, KUZ 19, AFRB 11, HXG 11, ITF 10, ACD 9, RDE 9, IOW 8, IWJ 4, WQ 3.

SOUTHERN TEXAS—SCM, Ted Chastain, WSHIF—SEC: B. J. VRC; RE: FAJ; PAM: FYY, EM: reports that the Port Arthur Amateur Radio Club elected the following officers: HER, pres.; LTV, vice-pres.; EQK, secy.-treas. Regular meetings are held the 2nd Wednesday of each month. The club also plans a weekly 144-Mc. test Wednesday evening at 7:30. NNB has Billey SMC-100 crystal. IPE reports all Wharton amateurs are enrolled in AEC. JYQ is on 3.85 Mc. AHH has moved his kw. to 3.85 Mc. DUQ is conducting a bang-up code class and working towards 50 Mc. MFY has p.p. 24S in behind his BC-285. IG is back on, running a BC-459 on 7-Mc. c.w. with an S-40 receiver. In Bay City, CNX is rebuilding his modulators. GLD is building new rig with 813s in final. BZO is on 3.85 Mc. KEM has 14 in final and is attending night school at the U. of Houston. IPE runs 600 watts on all bands. BAJ, EYL, JHW, and KSW, in Brownsville, are looking for 50-Mc. contacts. Congrats to CXX on the new ir. operator. DAA, in Kingsville, is RM for this section, and is organizing a South Texas Traffic Net which meets Mon., Wed., and Fri. at 8 p.m. on 3750 kc. Henry would look outides in every town in this section. How about you traffic-handlers reporting into this Net? NYY has worked Asia and Africa on 7 Mc. KFZ has new 28-Mc. beam. JKQ is back on after breakdown. NXX is new call in Del Rio; he has BC-348 and BC-459A on 7-Mc. c.w. The Kingsville Radio Club's new officers are: LGL, pres.; JKB, vice-pres.; and NQI, secy.-treas. The annual business meeting and convention of the Beaumont Emergency Net will be held in Cibou, May 29th and 30th. Headquarters will be at the American Legion Hall and activities will start promptly at 1 p.m. Everybody come! The c.w. section of STTN is conducting weekly drills, using emergency power. OIX, EYV, and IVU are going seriously for 50 Mc. BVG, one of the old-timers in San Antonio, writes from California that he is alive and kicking and intends to settle down in San Antonio when he retires from the Army. Traffic: W5MN 218, DAA 47, MXV 39, ACL 12, MJN 11, IC 9, KSW 8, MWN 6, CCD 4.

NEW MEXICO—SCM, Lawrence R. Walsh, WSSMA—We extend hearty congratulations and a welcome to RZK on his new ticket. JYQ is still flying high on 3.5 Mc. TMF plans a c.w. or phone reporting session. MFZ has moved to St. Louis to attend Washington University. HJJ, our RM, recommended the following for ORS appointment: GXL, JYW, JNE, KWE, KXX, DWY, ROX, NND, and NXX. Congratulations, gang. Activity in Albuquerque on 144 and 435 Mc. is getting organized by FAG. A State drill on 7266 kc. was held Jan. 11th, MXF, Clovis, is leaving New Mexico for 50 Mc. BVG, one of the old-timers in San Antonio, is organizing a South Texas Traffic Net which meets Mon., Wed., and Fri. at 8 p.m. on 3750 kc. Henry would look outside in every town in this section. How about you traffic-handlers reporting into this Net? NYY has worked Asia and Africa on 7 Mc. KFZ has new 28-Mc. beam. JKQ is back on after breakdown. NXX is new call in Del Rio; he has BC-348 and BC-459A on 7-Mc. c.w. The Kingsville Radio Club's new officers are: LGL, pres.; JKB, vice-pres.; and NQI, secy.-treas. The annual business meeting and convention of the Beaumont Emergency Net will be held in Cibou, May 29th and 30th. Headquarters will be at the American Legion Hall and activities will start promptly at 1 p.m. Everybody come! The c.w. section of STTN is conducting weekly drills, using emergency power. OIX, EYV, and IVU are going seriously for 50 Mc. BVG, one of the old-timers in San Antonio, writes from California that he is alive and kicking and intends to settle down in San Antonio when he retires from the Army. Traffic: W5MN 218, DAA 47, MXV 39, ACL 12, MJN 11, IC 9, KSW 8, MWN 6, CCD 4.

CANADA

MARITIME DIVISION

MARITIME—SCM, A. M. Crowell, VElDQ—High traffic man this month is GTI, with 70 to his credit. HJJ still manages to get on 3.5 Mc. occasionally to handle a few. DB keeps schedules on Sundays with VO2AJ and BT. JK has gone his frequency now, working 28 and 50 Mc. The reports 50 Mc. is, dead so he now is doing some work on the p.p. 813 14-Mc. c.w. rig. He still schedules VO3J and VO2Z. DQ, SQ, and PX have been handling quite a bit of personal (continued on page 110)
A FEW OF THE ITEMS WE STOCK ARE LISTED BELOW

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collins 75A1</td>
<td>$375.00</td>
</tr>
<tr>
<td>Collins 32V1</td>
<td>$475.00</td>
</tr>
<tr>
<td>Hallicrafters S38</td>
<td>$47.50</td>
</tr>
<tr>
<td>Hallicrafters S53</td>
<td>$95.00</td>
</tr>
<tr>
<td>Hallicrafters SA40A</td>
<td>$89.50</td>
</tr>
<tr>
<td>Hallicrafters SX43</td>
<td>$169.50</td>
</tr>
<tr>
<td>Hallicrafters SX42</td>
<td>$275.00</td>
</tr>
<tr>
<td>Hallicrafters HT18</td>
<td>$110.00</td>
</tr>
<tr>
<td>Hallicrafters HT9</td>
<td>$350.00</td>
</tr>
<tr>
<td>Hallicrafters SP44</td>
<td>$49.50</td>
</tr>
<tr>
<td>Hallicrafters S51</td>
<td>$129.50</td>
</tr>
<tr>
<td>National NC33</td>
<td>$65.95</td>
</tr>
<tr>
<td>National NC57</td>
<td>$89.50</td>
</tr>
<tr>
<td>National NC173</td>
<td>$179.50</td>
</tr>
<tr>
<td>National NC183</td>
<td>$269.00</td>
</tr>
<tr>
<td>National NC240D</td>
<td>$225.00</td>
</tr>
<tr>
<td>National HR07</td>
<td>$279.00</td>
</tr>
<tr>
<td>Hammarlund 1212X</td>
<td>$177.30</td>
</tr>
<tr>
<td>Hammarlund SP400X</td>
<td>$398.25</td>
</tr>
<tr>
<td>RME VHF152A</td>
<td>$86.60</td>
</tr>
<tr>
<td>RME HF-10-20</td>
<td>$77.00</td>
</tr>
<tr>
<td>RME DB22A</td>
<td>$77.00</td>
</tr>
<tr>
<td>RME84</td>
<td>$98.70</td>
</tr>
<tr>
<td>RME45</td>
<td>$198.70</td>
</tr>
<tr>
<td>Signal Shifter model EX</td>
<td>$99.50</td>
</tr>
<tr>
<td>Bud VFO-21</td>
<td>$52.50</td>
</tr>
<tr>
<td>Millen 90700 VFO</td>
<td>$65.50</td>
</tr>
<tr>
<td>Millen 90800 exciter</td>
<td>$42.50</td>
</tr>
<tr>
<td>Millen 90281 power supply</td>
<td>$84.50</td>
</tr>
<tr>
<td>Millen 90881 RF amp.</td>
<td>$89.50</td>
</tr>
</tbody>
</table>

Silver, Sonar, Gordon, Amphenol, Premax, Workshop, Gonset; we have everything.

Some prices slightly higher on the West Coast.

USE BOB HENRY’S PERSONAL SERVICE

I personally promise that you can find nowhere else lower prices, quicker delivery, easier terms or more generous trade-ins. I give you 10-day free trial and 90-day free service. You can't go wrong in dealing with me because I personally guarantee that you will be completely satisfied on every deal. Write, wire or phone me today.

COMPLETE STOCKS

Henry has everything in the ham field.

QUICK DELIVERY

Shipments 4 hours after receipt of order. Send $5.00 with order and shipment will be made at once C.O.D.

TRADE-INS

You can't beat Bob Henry for trade-ins. Write, wire or phone today about your equipment and Bob Henry will make you a better offer than you can get anywhere else.

TIME PAYMENT

Because Bob Henry finances the terms himself you get a better break. Save time and money, deal with Bob Henry on his personal, profitable time payment plan.

Silver, Sonar, Gordon, Amphenol, Premax, Workshop, Gonset; we have everything.

Orders and inquiries from outside U.S.A. welcome.
MODULATION TRANSFORMER
Stancor A-3871

Fully shielded plate modulation transformer. Primary 4500 ohms, secondary 3550 ohms for single 46.6 Mc. 15693 in class A, or single 64.5, 66.6, 6N6 class A (with sec. used as grid) 50 Audio Watts. DC primary 60 ma, secondary 50 ma, 111/10" x 2 3/10" x 2 3/10". Single. $2.15. List Price $4.00. Our Low Price $1.49

A.T.R. 12-V INVERTER
Model 125SB
12V DC Input, 110V AC Output. 125 Watts intermittent, 100 Watts continuous. BRAND NEW, in original carton. List Price $11.00. Our Low Price $17.60

MATCHING SPEAKER
LS3
6" heavy duty PM speaker. Mounted weather-proof and wind-proof in cost-effectively treated metal cabinet. 4000-ohm transformer mounted on speaker. Two-circuit jack on front panel. Our Low Price $5.95

COAXIAL CABLE
RG-11-U — 75 ohms. Rated 330 watts input. 400 Mc. 11c per ft. RG-59-U — 75 ohms. Rated 130 watts input. 400 Mc. 6c per ft.

SYLVANIA GERMANIUM CRYSTAL DIODES
Type IN-34 Specially developed for H.F. work. Low shunt current. Rated for average and current of 18 Mc. $1.09 each 99c each in lots of 12

CERAMIC SOCKET
for 826 — 829 — 832 Tubes
Spring Grip Contacts 29c each

Write for quotations on steel chassis and panels — IMMEDIATE DELIVERY — MINIMUM ORDER $2.00 All prices F.O.B. Jamaica, N. Y. Please add postage. Write Dept. Q.

ONTOARIO DIVISION

ONTARIO — SCM, David S. Hutchinson, VE3DU — A1U now has 96 countries on 28 Mc. AUB is back on 3.5-Mc. BLC will be on 3559 kc. 'Phone from London on 50-Mc. using a single 807. AWI is handling traffic. OJ may be able to get the following stations on for the VHF ES: BBW, EK, BCM, MX, BDY, FC, and 2WA. OJ is on 144, 50, 28, 14, and 2.5 Mc. At the January meeting of the London Club, P. A. Fields, chief engineer of CFCF, spoke on Wave Propagation on both High and Low Frequencies. The amateurs of Western Ontario held a hamfest at the William Pitt Hotel, Chatham, on Jan. 24th, sponsored by the Kent County Radio Club. St. Windsor, Sarnia, Chatham, Thomas, and London clubs were represented. Alex Reid, our genial CCM, was guest speaker. BMI has new SX-25. BOF is working 3.5- and 7-Mc. c.w. and 50-Mc. 'phone. AWP has new rig on 7 and 3.8 Mc. BAX worked New York and Florida on 50 Mc. with six-element beam. RFH schedules VE1IV on 14 Mc. AVN is building a Q-5er for VC-312. BAY is on 50 Mc. with an 807. The TARC already is discussing Fall Day plans. BBO attended Scarboro Radio Club Hamfest on Jan. 24th. CY is new EC for K-W Club. The following was received from AQB: BDB is working plenty of DX on 28 Mc.; ANS and MJ are doing well on 14-Mc. 'phone; CI is using co-ex line on Parade Shield; Wallingford, Connecticut, has four active hams; BM, BSK, and BSK are getting out on 28 Mc.; LB and AUB both have new beams. The following came from North Shore Club: ADD worked 3.5- through 14-Mc. c.w.; IV, BQW, AZV, AZT, AIY, BAD, and BIE make up the Oshawa 50-Mc. net. BAI has 30 watts on an 807 on 3559 kc. AWJ schedules BGF and 2HY. CI is now ORS. AWE and AUW have new VFOs. Traffic: (Dec.) VESSP 339, ADC 24, (Jan.) VE2TM 70, ATU 74, XO 47, GI 39, DU 36, AWJ 21, DI 21, KM 17, AQB 16, AWJ 14, BMG 12, OF 12, BCP 8, AWJ 6.

QUEBEC DIVISION

QUEBEC — SCM, Gordon A. Lynn, VE2GIL — IQ has 807 on 14 Mc. c.w. and is building VFO. UC is rebuilding using S13 in final. CR is on 28 Mc. with 807, 35 watts. BE and WD are building modulator frequency meter. GK is building a frequency meter. GK has built up on 2.5 Mc. and is working on 4 Mc. OG still is not satisfied with beam but uses it on 28 Mc.: he also has new 6J6 preamplifier and finds it excellent. NM has 807 on 3.5, 7, and 14 Mc. and also is building 'scope. BB has new rig on 7 Mc. and schedules W2OUT and VE3LO. RZ has built new monitor with directly-calibrated dial crystal calibrator and 28-Mc. multivibrator. BB changed antennas to tuned center feeders and is trying to feed new Silley COO-2A into TA12C transmitter for 28 Mc. CA is building over a.e. LO is on 5.5 Mc. c.w. BB is new in Drummondville. XO and AGS are new in Yamachiche. KT has rebuilt using S07a. WR is rebuilding and will have 150 watts on all bands. RJ schedules 3BSA. AC has drifting VFO. TM schedules 1FQ, 2DL, and 3AVF. TN has remote-controlled rig. EC reports continued activity on Quebec 'Phone Net. QL has been transferred to Lachine but goes home week ends to operate rig. BE finds n.f.m. on 14 Mc. excellent. FG has VFO 15 watts on S.5- Mc. c.w. The Montreal Amateur Radio Club collected $135.00 at the last three meetings and sent 30 food parcels to U.K. hams. Traffic: VE2EC 45, GL 32, TM 21, BB 14, CA 7, RJ 2, WR 2, HH 1.

VANALTA DIVISION

ALBERTA — SCM, W. W. Butchart, VE6LQ — CARA requests n.f.m. on all bands. HQ holds out for more social activity. New calls in Calgary are WR, LK, and NW. (Continued on page 118)
YOU’LL FIND ALL THE NEW GEAR IN THIS NEW ALLIED CATALOG—GET IT TODAY
Immediate Delivery on Latest Receivers!

Hallcrafters S-51... $129.50 National NC-57... . . $ 99.50
Hallcrafters S-53... 79.50 National NC-173...189.50
Hallcrafters SX-43... 169.50 National NC-183... 269.00
Hallcrafters SX-42... 275.00 National HRO-7... 311.36

Net FOB Chicago. Prices subject to change without notice.

NEW! Liberal Time Payment Plan
Buy on ALLIED’S new Easy Payment Plan that saves you money! Full refund of carrying charges if you complete payment in 60 days—50% refund on payment in half the required time. Minimum order is only $45.00—take up to 12 months to pay. Carrying charges are only 6% of balance after 20% down payment. Get the equipment you want this easy, economical way. No red tape—no delay—you save on ALLIED’S Easy Payment Plan.

THE ALLIED HAM BULLETIN
Looking for new dope and really useful "buys"? You'll want to be on the mailing list for our lively Ham Bulletin. It's free—ask for it.

ALLIED RADIO
Everything for the Ham

Send for Your NEW ALLIED CATALOG Today!

Depend on the Leading Amateur Buying Guide
Just name your needs! You can depend on ALLIED’S great new catalog, the leading Amateur Buying Guide, to bring you everything that’s newest and best in Ham radio. Here are complete selections of quality receivers, transmitters, instruments, parts and station gear—all at money-saving prices.

Take advantage of our new Time Payment Plan—nothing like it in radio. Get the benefits of our liberal trade-in allowances, 15-day trial on all receivers, full 90-day guarantee, and all the help in the world from ALLIED’S old-time Hams. Follow the lead of thousands of Amateurs who depend on ALLIED for all their station needs. Write today for your FREE copy of the new 172-page ALLIED Catalog, the world’s Leading Amateur Radio Buying Guide.

It Pays to be "Equipped by ALLIED"
Keep This Buying Guide Handy...

ALLIED RADIO CORP., D. L. Warner, W9IBC
833 W. Jackson Blvd., Dept. 27-D-8
Chicago 7, Illinois

☐ Send FREE New ALLIED Catalog
☐ Enter order for ...........
☐ Enclosed $ ......... ☐ Full Payment ☐ Part Payment (Balance C.O.D.)
☐ Put my name on mailing list for the Allied Ham Bulletin.

Name ..........................................................
Address ....................................................

City ...................................... Zone ........ State ............
MOBILE KITS

XM 1 - 10 Meter Transmitters
10 Watt Input

Contains 1-777 Osc. and
darbler, 1-7CS Final,
1-7CS Modulator. Kit
comes complete with
punched chassis ready
for wiring. Weight 5 lbs.

YOUR SPECIAL COST..............$18.50

STANDARD BRAND

Vitreous Enamel Rheostat
7500 OHMS
50 WATTS

YOUR COST, LESS KNOB 49¢

Tube Specials

VR150 New-Boxed................. 79¢
9001 New-Boxed.................. 49
9002 New-Boxed.................. 49
9003 New-Boxed.................. 49
9006 New-Boxed.................. 49
6J5CT New-Boxed............... 44
41 New-Boxed.................... 49

LEACH RELAY

D.P.D.T.—R.F. ¼" Pure Sil-
vier Contacts, 5 to 8 volts
D.C. Special, each............. 95¢

All prices F.O.B. Los Angeles (Californias Purchasers add 2½% sales tax), include 25% with order—balance on delivery.
Foreign orders cash. Minimum order $1.00.

Get YOUR NAME on our mailing list. We'll keep you posted
on merchandise available, new equipment and special bargains.
Address correspondence to Dept. C-4.

When in Los Angeles, drop in for a rag chew

YL is going high power. AW got back on the air after a pro-
longed absence. FB works out on 3.5-Mc. c.w. ET has pair
of 144-Mc. field antennas, and keeps 'phone key on
YU, at Provoant. EW has FB signal on 3.5-Mc. c.w. YJ has
very high noise level with which to contend. FR is working
28, 14, 7, and 3.5 Mc. FM works 7-Mc. c.w. FG starts out
on 7-Mc. c.w. AE finds B.C.I. bad in a so-so-locale. radical WS
is竞争优势. five-element beam on 28 Mc. BN built keying
oscillator to check on his fat new bug. Q8 sports
AR-811P : receiver. He still is working on that VFQ. Both
BN and QS are showing up well on Alberta Net activities.
WQ of Medicine Hat, passed away on January 31 from
injuries received in the line of duty as a fireman. Alberta,
B. C., Saskatchewan, and Manitoba 3.5-Mc. 'phone men
observed a ten-minute silence in his honor on Feb. 2nd, and
SR received a very appropriate poem composed for the occasion.
MJ had a FB time in ARRL Member Party. WQ is doing
yeoman service on T. L. "I" Traffic: VE3WO 119, LQ 12,
BN 10.

PRITISH COLUMBIA — SCM, W. W. Storey, VTETS
— Club Thirteen reports a bang-up social on Jan. 21st.
President AC railroaded ZZ, VC, HC, and AIY into
the newly-formed "dishwashing committee." Secretary TE
finally got on 50 Mc. with a pair of VT-127As. ZZ is design-
ing a new rotary to buck poor location. VC got 7 Mc. SS
from G but is rebuilding to 813s for SS. AIY is on 7 Mc.
with p.p. 813s. LT is heard punching away on 7 Mc. MO
is rebuilding for 14-Mc. 'phone and c.w. while WH and
OJ are working n.f.m. HI is manufacturing new "phone
pickups similar to WE type 9A, also precision pickup arms.
AGC, on 7 Mc., soon will be heard behind a mike on 28 Mc.
SR puts out a nice signal on 14- and 28-Mc. 'phone and
c.w. HC was heard by FASBG and G2PL on 3.5 Mc. while
taking fer VAC. The Vancouver Amateur Radio Club will
hold its annual dance in April. The Collingwood Club year-
end party was a roaring success. BD was guest from West
Vancouver. WH brought wire recorder from C.B.C. UU is
building converters. AZ has 274N receiver. OJ is active
on 14-Mc. c.w. AIY had new four-element beam and 50-wt.
mast crash onto his porch. AKE is rebuilding for more
power. LF is working on 28-Mc. 'phone rig. ADV, AM, and
3F are on 144 Mc. UU has surplus 312 receiver. AIH is
building A.M.C. unit. AKW is building converter for
28-Mc. 'phone. AGP is going VFQ. XT is trying to muscle
in on our 14-Mc. DX men, MJ and OJ. RS is going after
DX on 14 and 28 Mc.

PRAIRIE DIVISION

MANITOBA — SCM, A. W. Morley, VE4AM — CI at
Brandon, is on 3.8 Mc. with lovely quality. GV, new
in Minnedosa, is on 7 Mc. HS, at Miami, got Hydro Power
and turns up on 3.5 Mc. FK and FU have heard WNs on
144 Mc. but none have been worked as yet. EA and 5MW
have settled on 3.5 Mc. First night on 14-Mc. 'phone for
GW he worked 3BON and had 3BON's mother in shack.
IF/GE are again active on 3.8 Mc. AD is recovering from
operation. SS is having trouble with 807s in finals. AM/3M
have new BC-4/57A for exciter. GO is running schedule with
2JA on 28 Mc. In November a message was
addressed to me from Scotland. The message was put direct
via VE3 and address to me from Scotland. The message was put direct
via VE3 and

(Continued on page 114)
TOP QUALITY — AMATEUR TRANSMITTERS — FACTORY BUILT!

Harvey-Wells TBS-50 TRANSMITTER
50 Watts on Phone & CW 80, 40, 20, 15, 11, 10, 6 & 2 meters
Alcnowled as America's most versatile small transmitter, the TBS-50 covers 8 bands on phone and CW without plug-in coils! Crystal controlled on all bands, requires no vacuum or multiplier tubes. Ideal for fixed station or mobile operation. Tubes: 6AQ5 crystal oscillator, 6AQ5 buffer-multiplier, 6DQ5 final amplifier, 2-6L6 class B modulators. Completely wired and tested — not a kit! With tubes, less power supply............... 99.50
Complete with tubes and one set of coils, less crystal........... 203.67

SONAR'S NEW SRT-75 60 Watts
SRT-75 — Sonar's new 60 watt all-band transmitter for NBFM and CW operation, matches any type antenna or load impedance. Actively self-contained are VFX-460 link-coupled to AMP-50 amplifier, powered by PS-50 power supply. Complete with tubes and one set of coils, less crystal.................. 39.50

OWN A LIGHT PLANE? Here's A Bargain!
LEAR TR-18 PXr transmitter-receiver, crystal controlled output on 3105 Kc., receives 195 to 405 Kc. Brand new, (NOT surplus), complete with tubes, crystal, 12 volt power supply, microphone, headphones and accessories. Wt. 15 lbs., total for all light aircraft. Everywhere $129.50, our price ...................................................... 87.45

AMBENPOL TWIN-LEAD Folded Dipole Antennas
Conductors are copper-clad steel high winds, ice-loading, etc. The Band Antenna Length Net
10 meters 18 feet 4.53
20 meters 35 feet 5.64
40 meters 70 feet 7.94
80 meters 135 feet 12.20
NEW! Ambenpol 300 ohm Twin-Lead, 150 feet. Conductors, #14-022. Per foot......... 9¢

MB-611 Mobile Transmitter — compact and rugged narrow-band FM for 10-11 meter mobile operation. Requires 250-650 volts D.C. @ 100 ma, and 6.3 volts @ 2.3 amperes for power supply. Complete with tubes, less crystal........... 72.50

HEADQUARTERS FOR AMATEUR EQUIPMENT

TERMINAL IS YOUR BEST BET FOR BETTER BUYS

NEW YORK'S LEADING SUPPLY HOUSE for RADIO PARTS & ELECTRONIC EQUIPMENT
Terminal has tremendous stocks of Everything in Radio at Lowest Prices! Prompt attention given all orders! IMMEDIATE DELIVERY of ALL ITEMS in this AD!

GUARANTEE — Every item, regardless of its low price, is fully guaranteed by TERMINAL RADIO CORPORATION.

TERMINAL RADIO CORP.
85 Cortlandt Street • New York 7, N.Y.
Phone: WOorth 2-4415
Cable Address: TERMINARAD
The "BUG"
Identifies the NOW Sending is Easy for Anyone Genuine Vibroplex Trade Mark

Par-Metal "BUG" Equipment is preferred by Service Men, Amateurs and Manufacturers because they're adaptable, easy-to-assemble, economical. Beautifully designed, ruggedly constructed by specialists. Famous for quality and economy. Write for Catalog.

PAR-METAL PRODUCTS CORPORATION 32-62-49th St., Long Island City, N. Y.
Export Dept.: Rocke International Corp.
13 East 40 Street, New York 16

NOW Sending is Easy for Anyone GENUINE DELUXE VIBROPLEX Reg. Trade Marks: Vibroplex, Lighting Bug, Bug

"Original" Delux Model Illustrated Polished Chromium Base and Parts. ONLY $19.50

Don't worry if you lack sending skill. Sending is easy for anyone with a Genuine Delux Vibroplex key. No special skill required. No tiresome effort involved. The secret is in the Patented JEWEL Movement feature. Harder than metal, the jewels in Delux Vibroplex keys as the jewels in the finest-made watches reduce friction, maintain smoother, easier operation and lengthen life of key. Try this amazing key! Note its confidence-inspiring feel, superior signals and ease of operation. Your choice of three Delux models. Original, Blue Racer and Lightning Bug. Order yours to-day! Money order or registered mail. FREE catalog.

THE VIBROPLEX CO., Inc. 833 Broadway, New York 3, N. Y.

stra\'s

"New Electronics Terms" Department:
Oakland (Calif.) Post-Enquirer, thanks to W6OFS: "S-40 Helicopter receiver, $70."
Houghton (Mich.) Mining Gazette, spotted by W8YFT: "New kinds of broadcasting-frequency modulation and television—are short in range, ..." (Italics ours.)

The IBM Selective Sequence Electronic Calculator, just announced, contains 12,500 tubes, 21,400 relays, and 40,000 pluggable connections. The mammoth device, which can "remember" as many as 400,000 digits, is expected to work out in a period of days problems whose solving herebefore required a lifetime of work by scientists.

Resourceful people, hams. VE3AWS, stationed in the Canadian army at Ottawa, recently proposed to his YL back home in Winnipeg—and received acceptance—via ham radio. Aiding Dan Cupid in this maneuver were VE3BOG, VE4LC, and VE4LF.

AMATEUR GEAR
Checked Before Delivery

RME 84 and a VHF1525 = 2-6-10-15-20-40-80 meters, a sensitive, selective, image-free receiving set-up, that really works on the high-frequencies. . . . . . . . . . . . . only $185.30

Harvey-Wellis TS550, 50 watt bandswitching Transmitter = 2-6-10-15-20-40-80 meters. . . . . . . . . . . . . only $99.50

RME 45 = $198.70; VHF151A = $26.60; HF10-20 = $77.00; DB22A = $71.00; MB8 Boomerang = $77.50; NBF-4 Radio Detector for NBFM $19.50

Sonar — XE10 NFM Exciter = $75.50; VHF 500 ECO NFM Exciter = $57.50; UTC Exciter = $57.50

Klincor Beam Antenna — 10 meter, 51 ohm feed — $31.20; 10 meter 300 ohm — $27.00; 5 element 2 meter 52 ohm — $84.00.

Heavy Transmission Line, 300 ohm, 75 cent ft.; regular 300 ohm, $2.85 per 100 ft.

Beam Tubing — Tempered Aluminum — 12 ft. lengths. ¼" = $1.64; ½" = $3.48; ¾" = $3.16.

Stainless Steel Clamps — 22c each.

WAR SURPLUS — Ask for List

ART A. JOHNSON SALES
(Art A. Johnson—W9HGQ)
1117 Charles Street
Rockford, Illinois
The Radio Amateur's

HANDBOOK

The twenty-fifth edition of the Handbook is featured by the complete rewriting of the material to give a more understandable discussion of those basic facts that an amateur should know to get the most out of constructing and using his apparatus. Owners of previous editions will recognize immediately that the over-all plan of the book has been changed — achieving, we believe, the object of segregating the material so that it can be most conveniently used. A great deal of new equipment has been constructed especially for this edition. As always, the object has been to show the best of current technique through equipment designs proved by thorough testing. As the art grows, the problem of presenting a representative selection of gear grows with it — a state of affairs that is reflected in an increase of well over a hundred pages in this edition. New chapters on ultrahigh frequencies, station assembly, and the elimination of interference to broadcasting have been added to round out the treatment of all phases of amateur radio. The material on operating has likewise been greatly expanded. Altogether, this revision is the most comprehensive of recent years.

PRICE $2.00 — UNITED STATES, ITS POSSESSIONS AND CANADA

$2.50 ELSEWHERE • BUCKRAM BOUND $3.00

American Radio Relay League, West Hartford, Conn., U.S.A.
Have a "fist like a tape" with...  

Electronic MONITOR and SENDING KEY

Now you can send code like a professional. MON-KEY gives you electro-timed rhythm... with dots and dashes made for you... perfectly spaced and uniform for your sending speed.

Simple...Easy to Use

Press the key to the right and you get dots... evenly spaced. Press left and you get a series of evenly spaced dashes. Just relax and let the code roll out with the most perfectly timed rhythm you ever heard. Send fast or slow... there's a dial setting to regulate speed. It's a monitor, too, producing a clear tone that can be regulated for volume and tone or cut out entirely.

Compact...Precision Built

This compact unit is only 11" x 4 3/8" x 4 1/2" high. Plastic base, rubber feet, cast aluminum housing with black crackle finish, transparent plastic dust cover for key. 2" dynamic speaker. Uses only 3 tubes including rectifier. Fully shielded. 110 volt A.C. or D.C.

Designed by experienced electronic engineers... tested by experts... tried out and enthusiastically approved by amateurs and professionals alike.

MON-KEY is easy to learn, easy to use, easy to read. This combination sending key, monitor, and keying relay costs you only $29.95. Get yours today and go on the air with a near-perfect fist. See your dealer or write for descriptive folder.

ELECTRIC EYE EQUIPMENT CO.
6 West Fairchild St., Danville, Ill.  

Manufacturers of Specialized Electronic Controls and Inspection Devices

2-Meter Mobile  
(Continued from page 86)

adjusted until the noise level is at maximum. The low-frequency oscillator should now be adjusted by means of C4 until a further increase in noise level is heard. C4, the h.f. oscillator padder, should also be adjusted to produce maximum receiver output and this should occur with the padder adjusted to approximately half capacitance.

At this stage of the game, it is necessary to introduce a test signal of known frequency, and it is helpful if the signal can be set at 146 Mc. — the center of the band. With such a signal fed to the converter, and with C5 set at half capacitance, C4 is adjusted until the test signal is heard. It is advisable to check the frequency of the high-frequency oscillator at this point to make sure that it is adjusted to the low-frequency side of the input mixer circuit. Condensers C1, C2 and C3 should now be tuned for maximum converter sensitivity. Incidentally, the frequency of the second oscillator can be checked by tuning the range around 12.7 Mc. with an all-band receiver.

The converter bandspread can be adjusted by changing the L/C ratio of the first oscillator, by altering the spacing between turns of L7. Of course, C4 must be reset each time the inductance of the coil is varied. Because the first mixer has a broad frequency response, it is only necessary to peak the input coil. L2, at the center of the band by varying the length of the coil. The coupling between the antenna link and L2 should be adjusted for maximum response.

When all of the circuits have been aligned, it is time to adjust the 14.3-Mc. trap. This is done by tuning to the high side of the signal frequency until the image is heard, and by then adjusting C2 until the image response is attenuated to the greatest degree.

It is to be expected that the various circuits will need slight readjustment after the chassis has been enclosed in the cabinet. However, this presents no difficulty as all of the tuning controls are accessible. QST for February, 1948, presents control-circuit diagrams that show how a converter of this type may be tied in as part of a complete mobile station.

Happenings  
(Continued from page 84)

ests of revenue and censorship, such foreign gov­
ernments commonly forbid their amateurs to
handle any formal messages or any communica­
tions on behalf of third parties, even friendly
greetings. The international regulations providing
that this arrangement can be modified by special
arrangements between nations, the United States
Government, at the request of ARRL, has ap­
proached the governments of many foreign
countries with a proposal to relax this restriction.
Most of the other countries have refused. There
are a few exceptions, which we report:
(Continued on page 118)
ANNOUNCING
ARROW’S NEW ECONOMY LINE

OF AMATEUR KITS

450 WATTS FOR ONLY $39.95
LESS TUBES

ARROW’S new Economy Line now includes a 450 watt power supply kit designed to fit on a compact 7” x 19” black crackle rack panel. There is nothing else to buy with this kit except the tubes. Hardware, wire, switches, tiepoints, sockets, support brackets and punched and drilled chassis and panel are supplied complete, ready to assemble and wire. A complete set of step-by-step instructions and illustrations are supplied with each kit. The kit uses ARROW’s Economy Line Transformers (March QST ad), Swinging choke input, with a 4 Microfarad oil filled condenser and a 100 watt bleeder resistor. Two Z225 rectifiers are in the above photograph and are recommended but 866A’s or 836’s can be used. ARROW’S Economy Line Kit 450-P is the best buy anywhere. ORDER YOURS NOW. DELIVERS 1500 VDC AT 300MA.

OTHER TERRIFIC BUYS

813) ALL $3.95
HF 100 BRAND NATIONAL
ZB 120 NEW 813 SOCKET
81 NEW 246 $1.95
ONLY 81¢ BRAND
ONLY 70¢ NEW

RCA 866A $1.75

ALL ORDERS F.O.B. N.Y.C. — AND SUBJECT TO PRIOR SALE — ORDER NOW

ARROW ELECTRONICS, INC.
HAM DEPT., 82 CORTLANDT ST., N.Y. 7, N.Y.
Now Available...
S.S.S.C. SIDEBAND FILTER!

S.S.S.C.—the hottest news in the ham world!
Build your own S.S.S.C. exciter around the National F-22 Sideband Filter—another National exclusive! Sharply attenuated filter, with built-in balanced input and output transformers!

ESPEY TELEVISION KIT

Designed around modern circuits, and manufactured of the finest materials, this ESPEY Television Kit offers you the opportunity of building your own personal television set at unbelievably low cost. Kit is supplied complete (less tubes and cabinets) with all parts, punched and welded chassis, instruction book, etc., for only $69.50.*

*Prices 5% higher West of Rockies
For full details, write to Dept. B

ESPEY MANUFACTURING CO., INC.
528 East 72nd St. New York 21, N. Y.

Canada. (1) We may handle messages on behalf of third parties provided that they are of the character that would not normally be sent by any existing means of electrical communication or except for the availability of the amateur stations.

(2) We may handle messages from radio stations in isolated points not connected into the regular electrical communication network, such messages to be handed to the local office of the commercial telegraph company for transmission to final destination.

(3) In cases of emergency, where the regular communication system is interrupted, amateurs may handle messages of any importance, same to be handed to the nearest point on the commercial telegraph system remaining in operation.

Chile. Same as (1) for Canada above.
Peru. Same as (1) for Canada above.

Traffic may be freely handled with the outlying territories and possessions of the United States where amateur stations are licensed by FCC. The same is true of KZ5 stations in the Canal Zone.

G.I. Stations. The amateur stations operated by U. S. military personnel all over the world are to be regarded as located in little parts of the good old U.S.A. By common acquiescence, message traffic to and from military personnel is not only permitted but encouraged. However, the orders of the local military commanders commonly confine such traffic strictly to persons in the United States military service, to the absolute exclusion of traffic to or from the natives, particularly enemy nationals. In some theaters, messages relating to business transactions may not be handled by military-amateur stations and in such a case it is well for the American amateur to make inquiry first whether such a message can be accepted, although there is no bar under our FCC rules to our own handling of such a message to a G.I. station.

Australia. Although traffic is normally prohibited, certain official traffic stations of the Wireless Institute of Australia are authorized to handle messages concerning WIA internal administration, and this is deemed to permit the exchange of messages between WIA Headquarters and ARRL Headquarters concerning relations between the two societies, arrangements for contests, etc. Absolutely no third-party personal traffic is permitted, however.

Philippines. Messages could be handled freely with the Philippines while they were a U.S. possession. The establishment of the Republic of the Philippines made the islands an independent country, and as a technical legal matter the right to handle traffic no longer exists. The League has requested the Department of State to undertake a treaty with the new government to reaffirm the traffic-handling right.

Rest of the World. In general, traffic is prohibited with amateur stations in the rest of the world, not through reluctance on the part of the
OPPORTUNITY TO BUY TUBES at Ridiculously Low Prices

Transmitting - Special Purpose

Every tube is Brand New in original unbroken factory package

<table>
<thead>
<tr>
<th>Magnetrons</th>
<th>Klystrons</th>
<th>Transmitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>2J22</td>
<td>417A</td>
<td>2C22 UHF Triode</td>
</tr>
<tr>
<td>2J38 w/magnet</td>
<td>723A/B</td>
<td>5021 Tetrode</td>
</tr>
<tr>
<td>2J48</td>
<td>726A</td>
<td>16E UHF Triode</td>
</tr>
<tr>
<td>4J26</td>
<td></td>
<td>2J22 UHF Triode</td>
</tr>
<tr>
<td>5J23</td>
<td></td>
<td>5J29 UHF Triode</td>
</tr>
<tr>
<td>5J29</td>
<td></td>
<td>714A Y</td>
</tr>
<tr>
<td>725A</td>
<td>12.50</td>
<td>24G UHF Triode - Plate Diss.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25W - 2000V at 75 ma.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>good up to 300 Mc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rectifiers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2C22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5D21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16E</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cathode Ray</th>
<th>Rectifiers</th>
<th>Transmitting</th>
</tr>
</thead>
<tbody>
<tr>
<td>3CP1/S1</td>
<td>866A/866</td>
<td>24G UHF Triode - Plate Diss.</td>
</tr>
<tr>
<td>5J12</td>
<td></td>
<td>25W - 2000V at 75 ma.</td>
</tr>
<tr>
<td>5J12</td>
<td></td>
<td>good up to 300 Mc.</td>
</tr>
<tr>
<td>12GP7</td>
<td>12.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1641/RK60</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Receiving</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VT-158A UHF Triode with Tuned</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Circuits Built-in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>388A Door Knob Triode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.95</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GL434A Lighthouse</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GL446A Lighthouse(2C40)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.74</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WL530 Water Cooled Triode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>39.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>715B Tetrode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.95</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Receiving</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VT-158A UHF Triode with Tuned</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Circuits Built-in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>388A Door Knob Triode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.95</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GL434A Lighthouse</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GL446A Lighthouse(2C40)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.74</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WL530 Water Cooled Triode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>39.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>715B Tetrode</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9.95</td>
</tr>
</tbody>
</table>

|                     |                 | Special Purpose                      |
|                     |                 | VT-158A UHF Triode with Tuned         |
|                     |                 | Circuits Built-in                     |
|                     |                 | 388A Door Knob Triode                |
|                     |                 | 4.95                                 |
|                     |                 | GL434A Lighthouse                    |
|                     |                 | 7.45                                 |
|                     |                 | GL446A Lighthouse(2C40)              |
|                     |                 | 7.74                                 |
|                     |                 | WL530 Water Cooled Triode            |
|                     |                 | 39.50                                |
|                     |                 | 715B Tetrode                         |
|                     |                 | 9.95                                 |

|                     |                 | Special Purpose                      |
|                     |                 | VT-158A UHF Triode with Tuned         |
|                     |                 | Circuits Built-in                     |
|                     |                 | 388A Door Knob Triode                |
|                     |                 | 4.95                                 |
|                     |                 | GL434A Lighthouse                    |
|                     |                 | 7.45                                 |
|                     |                 | GL446A Lighthouse(2C40)              |
|                     |                 | 7.74                                 |
|                     |                 | WL530 Water Cooled Triode            |
|                     |                 | 39.50                                |
|                     |                 | 715B Tetrode                         |
|                     |                 | 9.95                                 |

|                     |                 | Receiving                             |
|                     |                 | VT-158A UHF Triode with Tuned         |
|                     |                 | Circuits Built-in                     |
|                     |                 | 388A Door Knob Triode                |
|                     |                 | 4.95                                 |
|                     |                 | GL434A Lighthouse                    |
|                     |                 | 7.45                                 |
|                     |                 | GL446A Lighthouse(2C40)              |
|                     |                 | 7.74                                 |
|                     |                 | WL530 Water Cooled Triode            |
|                     |                 | 39.50                                |
|                     |                 | 715B Tetrode                         |
|                     |                 | 9.95                                 |

|                     |                 | Receiving                             |
|                     |                 | VT-158A UHF Triode with Tuned         |
|                     |                 | Circuits Built-in                     |
|                     |                 | 388A Door Knob Triode                |
|                     |                 | 4.95                                 |
|                     |                 | GL434A Lighthouse                    |
|                     |                 | 7.45                                 |
|                     |                 | GL446A Lighthouse(2C40)              |
|                     |                 | 7.74                                 |
|                     |                 | WL530 Water Cooled Triode            |
|                     |                 | 39.50                                |
|                     |                 | 715B Tetrode                         |
|                     |                 | 9.95                                 |

|                     |                 | Special Purpose                      |
|                     |                 | VT-158A UHF Triode with Tuned         |
|                     |                 | Circuits Built-in                     |
|                     |                 | 388A Door Knob Triode                |
|                     |                 | 4.95                                 |
|                     |                 | GL434A Lighthouse                    |
|                     |                 | 7.45                                 |
|                     |                 | GL446A Lighthouse(2C40)              |
|                     |                 | 7.74                                 |
|                     |                 | WL530 Water Cooled Triode            |
|                     |                 | 39.50                                |
|                     |                 | 715B Tetrode                         |
|                     |                 | 9.95                                 |

|                     |                 | Special Purpose                      |
|                     |                 | VT-158A UHF Triode with Tuned         |
|                     |                 | Circuits Built-in                     |
|                     |                 | 388A Door Knob Triode                |
|                     |                 | 4.95                                 |
|                     |                 | GL434A Lighthouse                    |
|                     |                 | 7.45                                 |
|                     |                 | GL446A Lighthouse(2C40)              |
|                     |                 | 7.74                                 |
|                     |                 | WL530 Water Cooled Triode            |
|                     |                 | 39.50                                |
|                     |                 | 715B Tetrode                         |
|                     |                 | 9.95                                 |

|                     |                 | Special Purpose                      |
|                     |                 | VT-158A UHF Triode with Tuned         |
|                     |                 | Circuits Built-in                     |
|                     |                 | 388A Door Knob Triode                |
|                     |                 | 4.95                                 |
|                     |                 | GL434A Lighthouse                    |
|                     |                 | 7.45                                 |
|                     |                 | GL446A Lighthouse(2C40)              |
|                     |                 | 7.74                                 |
|                     |                 | WL530 Water Cooled Triode            |
|                     |                 | 39.50                                |
|                     |                 | 715B Tetrode                         |
|                     |                 | 9.95                                 |

|                     |                 | Special Purpose                      |
|                     |                 | VT-158A UHF Triode with Tuned         |
|                     |                 | Circuits Built-in                     |
|                     |                 | 388A Door Knob Triode                |
|                     |                 | 4.95                                 |
|                     |                 | GL434A Lighthouse                    |
|                     |                 | 7.45                                 |
|                     |                 | GL446A Lighthouse(2C40)              |
|                     |                 | 7.74                                 |
|                     |                 | WL530 Water Cooled Triode            |
|                     |                 | 39.50                                |
|                     |                 | 715B Tetrode                         |
|                     |                 | 9.95                                 |

Don't Delay - Order Today!

TERMS - Orders under $3.00, cash with order; orders over $3.00 require 20% deposit, balance C.O.D.

ALL PRICES ARE NET, F.O.B. DAYTON, O.
This is a crystal oven designed to accommodate the following JK crystals: H7, HlS, HI 7 and others. Operating temperature is adjustable and temperature stability is plus or minus 1/2°C. Heater is 0.3 volt and consumption is approximately 1 amp. Others on special order.

How to repair RADIOS...

This manual shows you how to handle 95% of all service problems.

Here's a highly practical radio repair manual that leads you in easy steps to a complete understanding of 95% of all radio servicing jobs. It covers the modern superheterodyne A.M. receiver, as well as phonograph-combination service problems and auto radio problems. Detailed "how-to-do-it" explanations enable you to put your finger exactly what needs to be done.

ELEMENTS OF RADIO SERVICING

By WILLIAM MARCUS, co-author of "Elements of Radio" and ALEX LEVY, instructor of Radio Mechanics, Manhattan Trade Center for Veterans and Chelsea Vocational High School.

471 pages, 6 x 9, Illustrated, $4.50

This radio servicing handbook is easy-to-read and easy-to-understand. It is designed to show you the best methods of making most modern radio repairs. Analyses of the stages are generalized for easy application to receivers made by most manufacturers.

120

U. S. Government but because of prohibitions by the other governments concerned. The amateur at the other end is commonly forbidden all traffic handling. We advise amateurs to abide by this restriction and to have no participation in the handling of third-party traffic in such cases.

N.F.M. Exciter

(Continued from page 35)

Peak Clipping

(Continued from page 37)

characteristics of the filter is of no consequence, since the pass frequency is zero.

Assuming an inductance of 20 henrys in the modulation-transformer secondary, a capacitance of 0.002 µfd. in the filament transformer and a 0.004-µfd. plate by-pass condenser, the cut-off frequency would be approximately 900 cycles.

It must be remembered that the filter in this case need only pass direct currents and attenuate frequencies below about 3000 cycles, and this allows considerable latitude. Because the cut-off frequency is well below 3000 cycles, the sloping characteristic of the constant-K configuration is of no disadvantage, for the attenuation is ample in the upper voice range and above. This eliminates the necessity for any M-derived sections.
SCR-522 VHF TRANSCEIVER

The finest all purpose equipment on the surplus market. Tuned: 100-156 MC. Don't confuse these with the other complete and used 522's. Sun Radio offers electronically perfect and guaranteed 522's... AND COMPLETE with tubes (one 10 tube superhet receiver, one 7 tube transmitter), remote control box, 28 volt dynamotor (can be converted to 110 V operation), 4 crystals and ALL CABLE CONNECTORS but less cable... $24.95

MAGNETIC HEADPHONES

2000 ohms, 6¢ Cords with Army plug. All unused; show slight handling... $1.98

T513 Handset

Combining a 200 ohm carbon mike and 2500 ohm earphone with butterfly switch for talk-listen. Has 6¢ flexible rubber cord with 1-pl.55 and 1-P208 plugs attached. Brand New... $2.95

DYNAMIC MUTUAL CONDUCTANCE

Brand New 3" round foundation meter for Dynamic Mutual Conductance Tube Checkers. Copy of Army diagram packed with each meter... $9.50

* TERMS: All Items F.O.B., Washington, D. C. All orders $30.00 or less, cash with order. Above $30.00 25 per cent with order, balance C.O.D. Foreign orders cash with orders, plus exchange rate.

SUN RADIO

OF WASHINGTON, D. C.

938 F STREET, N. W., WASH., D. C.

121
Above antenna used for receiving in remote pickup broadcast service by American Broadcasting Company, Inc. offices in R.i.S.C.ni..~ny Broacj Band parasitic array uses a folded dipole driven element with 3 directors and 1 reflector, spaced .1 and .15 wavelength respectively. All elements are 
" aluminum tubing cut for the middle of the 144 to 148 Mc. band. The boom is 1" aluminum tubing with standard Elincor swivel bracket adjustable for either horizontal or vertical polarization. Designed to be fed with Rg8/U 52 ohm coaxial cable or equivalent. Amateur set price: $3.40. We manufacture a complete line of FM, television broadcast and short-wave antennas plus 6 and 10 meter beams. Send for literature.

As Up-to-Date As Tomorrow Morning's Newspaper

COURSES FOR AMATEURS AND PROFESSIONALS

Approved for Veterans, Licensed, N. Y. State Bd. of Ed.

Advocate your hobby or prepare for a career in a radio school run by radio men for almost a decade.

Frank Melville, W2AQK

MELVILLE RADIO INSTITUTE
Melville Bldg., 15 W. 46th St., N. Y. 16, N. Y. Send for Bulletin "B" or call Lunsacre 4-0340

ORDER NOW

NEW

"ELEMENTS OF MAGNETIC TAPE RECORDING and 999 APPLICATIONS"

by A. C. Stanley

AVAILABLE AT ONLY 25c

AMPLIFIER CORP. of AMERICA

398-11 Broadway, New York 15, N. Y.

Reference has been made above to 3000 cycles as a frequency limit for modulation. While this may seem narrow to some of the high-fidelity advocates, it should be remembered that the Bell System has established that limit as adequate for both male and female voices. No intelligibility will be lost with this upper frequency limit if the lows below 200 cycles are also attenuated. Dividing 600,000 by the upper cut-off frequency gives the proper low cut-off for natural speech. It is therefore strongly recommended that even a smoothly-operating clipper circuit be augmented with a 3000-cycle low-pass filter and a compression amplifier. The filter is inexpensive when designed for low-level operation, and the subject has been well covered in various publications recently. When used with a dependable clipper, the time constant of the compression circuit may be made slow enough to adjust the amplifier gain to a good average high level without fear of overmodulation. Slow recovery is desirable for conversational purposes.

After the clipper has been installed, a check with the oscilloscope will prove its value. It is impossible to put a tail on the trapezoid pattern, provided that the audio applied to the horizontal plates is taken from the load side of the clipper. One of the checks used at W7NU with this clipper was to set the gain for 100-per-cent modulation with 600 watts input, and then to drop the input to 300 watts and shout into the microphone! Checks with the oscilloscope and with hams a few blocks away revealed no splatter, even with this severe test.

Let me reiterate that the filter formed by the circuit constants mentioned is not a filter for the modulator, and only attenuates frequencies produced by the clipper tube acting as a generator. It need not have a sharp cut-off, because the pass frequency is zero (direct current). Its attenuation at the highest voice frequency used is the only critical criterion of its value. Also we should bear in mind that using a 3000-cycle low-pass filter gives us a channel-width of 6 kilocycles on the band. Divide the 100 kilocycles of the 20-meter 'phone band by the number of hams operating there and then try to pick your 6-ko. spot! If the amateur were as critical about the frequency-response curve of his transmitter as he is with his receiver, it would prove that he still has some of that "Do Unto Others" spirit in his system.

A final word of caution: the clipper is not a cure-all. Wide sidebands can occur for other reasons than extended negative peaks. Even a low-pass filter does not preclude the possibility of spurious frequencies in subsequent stages because of resonant transformers, etc. It is therefore essential that the speech amplifier and modulator be relatively free from distortion before any type of suppression is attempted.

3 Grammer, "House Cleaning the Low-Frequency 'Phone Bands," QST, May, 1947.
De MAMBRO'S CARTOON CONTEST

WIN A JONES MICRO-MATCH
NO BOX TOPS!! NO BOTTLE CAPS!!

JUST RIP OFF AN OLD PIECE OF PAPER AND TELL US:

1. ALL THE B.C.I. ELIMINATORS IN THE ABOVE CARTOON.
2. A FEW WORDS ON WHY YOU LIKE DE MAMBRO CARTOONS.

CONTEST ENDS MIDNITE APRIL 15, 1948, WINNER TO BE ANNOUNCED IN QST.
SEND ALL ENTRIES TO OUR BOSTON STORE.

DeMAMBRO RADIO SUPPLY CO.

BOSTON
1111 Commonwealth Ave.

PROVIDENCE
90 Broadway

MANCHESTER, N. H.
1308 Elm Street

WORCESTER
729 Main Street
8-ELEMENT 2-METER BEAM

IDEAL FOR 522's!

Weight 4 lbs., power gain 20 over folded dipole, front to back power ratio 625 to one! Average reports on air 5 to 6.5 units front to back. Half wave shortened matching transformer handles feed lines of 100 feet and over. Can be mounted either vertical or horizontal. All Dural construction. Ideal for summer portable use. Amateur net price shipped parcel post prepaid U. S. A. $20. Shipments from stock.

ALSO AVAILABLE IN 16 ELEMENTS!

Weight 9 lbs., same height but ten feet wide, power gain between 30 and 40, front to back ratio over 625 to one. Extremely sharp for cutting thru QRM. Amateur net price shipped express prepaid, $35. Wide maximum spaced, ten meter beams, power gain of 15 over folded dipole. 20 meter beam, gain of 9.9. Send for literature.

U.H.F. RESONATOR CO.
Guion Road, Rye, N. Y.
W. F. Hoisington, W2BAV

-- LEARN CODE -- SPEED UP YOUR RECEIVING with G-C Automatic Sender Type S $20.00 Postpaid


GARDINER & COMPANY • Box 56
STRATFORD, NEW JERSEY

FOR the convenience of American and Canadian amateurs, the League maintains a QSL-card distributing system which operates through volunteer district QSL managers in each call area. To secure such foreign cards as may be received for you, send your district manager a stationer’s-size No. 10 stamped self-addressed envelope. If you have reason to expect a considerable number of cards, put on an extra stamp so that it has a total of six cents postage. Your own name and address go in the customary place on the face, and your station call should be printed prominently in the upper left-hand corner. If you have held other calls in previous years, submit an envelope for each such call to the proper manager — there are many thousands of uncancelled-for cards in the files. All incoming cards are routed by Hq. to the home district of the call shown in the address. Therefore, cards for portable operation in other districts should be obtained from the home-district manager.

W1, K1 — Charles Mellen, W1FH, 320 Cornell St., Boston Mass.
W2, K2 — Henry W. Yahnle, W2SN, Lake Ave., Helmetta, N. J.
W4, K4 — Johnny Dortch, W4DDE, 1611 East Calhoun Ave., Nashville, Tenn.
W5, K5 — L. W. May, jr., W5AJG, 0428 Hobart St., Dallas 14, Texas.
W6, K6 — Horace R. Greer, W6TI, 414 Fairmount Ave., Oakland, Calif.
W7, K7 — Frank E. Pratt, W7DXZ, 5223 S. Ferry St., Tacoma, Wash.
W8, K8 — Fred W. Allen, W8GBR, 1926 Riverside Drive, Dayton 5, Ohio.
W9, K9 — John F. Schneider, W9CFT, 311 W. Roas Ave., Wausau, Wis.
W0, K0 — Alva A. Smith, W0DMA, 238 East Main St., Caledonia, Minn.
VE1 — L. J. Pader, VE1FQ, 122 Henry St., Halifax, N.S.
VE2 — Austin A. W. Smith, VE2UW, 6146 Jeanne Mance, Montreal S. Que.
VE3 — W. Bert Knowles, VE3QB, Lansark, Ont.
VE4 — Len Cuff, VE4LC, 296 Rutland St., St. James, Manitoba.
VE5 — Fred Ward, VE5OP, 899 Connaught Ave., Moose Jaw, Sask.
VE7 — H. R. Hough, VE7HR, 1755 Emerson St., Victoria, R.C.
VE8 — Yukon A. R. C., P. O. Box 268, Whitehorse, Y.T.
KP4 — E. W. Mayer, KP4KD, P. O. Box 1061, San Juan, P.R.
KH6 — Andy H. Fuchikami, KH6BA, 2643 Namau Dr., Honolulu, T.H.
KL7 — J. W. McKinley, KL7CK, Box 1533, Juneau, Alaska.

Strays

Glyptol, bane of those converting war surplus, can be softened temporarily by the application of heat — a heavy-duty soldering iron is a good source. However, fast work is necessary once a setscrew or coupling has been freed in this manner, because the stuff "sets up" rapidly. — W4JWG.
Early Model D-104* ASTATIC MICROPHONE

Still in use after more than 10 Years of Service

Rev. Russell Wm. Baldwin, pastor of The People’s Christian Church, New Bedford, Mass., in a letter to The Astatic Corporation accompanying the photograph reproduced here, says in part: "Many years ago . . . I installed one of your D-104 Microphones in our church for our weekly broadcast. The same microphone, now over 10 years old, is still doing an excellent job. We broadcast over Station WNBH every Sunday morning, and we continually get excellent reports on the reception of our services, both the preaching and the music."

*This Astatic microphone was manufactured between 1913 and 1916 — and is possibly 12 to 14 years old.

THE D-104 MODEL, but little changed, is still in the Astatic line, and because of its ideal speech range characteristics, a great favorite with many leading radio amateurs the world over.
A drafting error in Fig. 2B of L. H. Allen's article, "An Answer to N.F.M. Reception," February QST, grounded the plate of the upper half-section of the 6H6 ratio detector instead of the cathode of the lower half. We regret any inconvenience caused constructors of this unit.

**HAMFEST CALENDAR**

NEW JERSEY — The Northern New Jersey Radio Association announces its Second Annual Dinner Dance, to be held on April 28th at the White Beeches Country Club, Haworth, New Jersey. Music by Bud Page and his orchestra; entertainment and prizes. Amateurs and their friends are cordially invited to attend. Tickets, $4 per person. Instructions for reaching the club are available from Chairman H. P. Nordblom, W2UNL, 26 Grant Ave., Totowa, N. J., or from Secretary K. LeFlore, W2FEA, 30 Surrey Lane, River Edge, N. J.

**HY-LITE STUDIOS**

528 TIFFANY ST., BRONX 59, N. Y.

Mass. Radio School

271 Huntington Ave., Boston 15, Mass.


Send for Catalog

Licensed by Commonwealth of Mass.
Department of Education

**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 typical messages on all subjects. Speed range 5 to 40 WPM. Always ready, no QRM, beats having someone send to you.

ENDORSED BY THOUSANDS!

The Instructograph Code Teacher literally takes the place of an operator-instructor and enables anyone to learn and master code 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**

4709 SHERIDAN ROAD, CHICAGO 41, ILLINOIS

**FEED-BACK**

FCC has waived §12.81 of its Rules Governing Amateur Radio Service to allow Theron W. Wigton to change his call from W9FGN to W9UA, in memory of his father who used the latter combination more than a quarter century ago. In making this grant, the Commission reiterated that it is not relaxing its long policy against transfer of amateur calls or requests for particular calls.

**How's DX?**

(Continued from page 43)

in and may draw KS4AK. Looks as if they're going right on through the alphabet as the replacements come in — wonder if Goodman will show up down there when they get close to 4DX!

VR2AQ took time out to slip us the lowdown on the Fiji fellows. Seems as how VR2s AO, AQ and AX stick pretty close to 28 Mc., AP holds forth on 14 Mc. and AS likes his QRP on 7 Mc. AR went back to New Zealand for a ZL call. W3RDZ would like to catch up with former operators of VP5PU in the South Caicos. For QSL purposes, of course D4ALN is keeping schedules with W2OEC for traffic as well as rolling up a stack of snappy DX contacts. A note from ZC6SM stresses that he's in Palestine all right and will QSL all contacts via the Cairo bureau. W5ALA and JSAAG ran a dead heat in pointing out that Korean stations are now using the HLI prefix. Present stations will drop the first letter after the number, i.e., J8AAG becomes HLIAG. Neat, eh? HA8Z is okay but strictly under cover; QSL via ARRL. And the same goes for any others of our overseas brethren about whom you are in doubt! W6F'MZ/C6 won't answer his cards until he hits Stateside around July, but he intends to do a thorough job at that time. Senor Juan Lobo y Lobo fooled plenty of us again, judging from the mailbag. To all concerned: XFlA is XElA's favorite contest call and is not a new country unless you need Mexico. (Like we do. —

(Continued on page 165)
HANDSOME, CONVENIENT AND LOW PRICED

NEW TURNER FIREBALL
Model 35X

New crystal desk and hand mike
with detachable stand

Here's a mike that's as easy to use as a fountain-pen desk set. It's a desk mike, it's a hand mike. A quarter-turn releases handle from base. Designed for all-around use with high quality crystal circuit. Ideal for amateur communications. Response: 50–7000 c.p.s. Level 52 db below 1 volt/dyne/sq. cm. Lightweight die cast case, handle and stand richly finished. And priced complete with 7 ft. cable at only $13.25 list. Buy a Fireball for your rig.

THE TURNER COMPANY
917 17th STREET, N. E. • • • CEDAR RAPIDS, IOWA

Microphones by Turner


HAM RELAYS

FOR EFFICIENCY, CONVENIENCE, SAFETY

• For SPDT switching 52 to 75 ohm coax cable... handles 880 watts of rf power at 100 mc. (limited only by the rating of the cable connectors), ¼" pure silver internal contacts easily reached by handy inspection port, ⅞" pure silver external contacts (DUVT) for indicator lights or other associated cir wts. Coil voltages up to 440 VAC or up to 220 VDC, Series 7200 (AC) or Series 8200 (DC). Net price to hams $1.25... with aux contacts $1.50

• For filament protection. Prevent application of HV until valuable tubes are warmed up. Easily adjustable from 10 sec. to 1 min. For clean make and break, contacts are ¼" pure silver. Available SPST to DUVT. All single throw models either normally open or closed. Trench those high priced bottlenecks and increase their life. This line 1D relay will pay for itself over and over in the years to come. Series 300... net price to hams $4.95 or $5.10

• For overload protection. Don't let accidental overloads flatten your tubes. Why not eliminate this worry once and for all with a fast acting OL relay. ¼" silver SPST contacts break circuit automatically if current exceeds any predetermined value between 250 & 500 mills (type 700A), or 500 & 1000 Mills (type 700B). Contacts re-set mechanically. Net price to hams... $6.09

See your jobber today. Be fully equipped for maximum efficiency, convenience, and safety. There is an Advance relay for every ham need. Valuable, complete catalog available at your jobber's or sent free.

Advance Relays

ADVANCE ELECTRIC & RELAY CO.
1260 W. Second Street, Los Angeles 26, Calif.
RF STAGES ON ALL BANDS!

NATIONAL NC-183

RANGE ... 0.54 to 31 mcs, plus 48-56 mcs.
TUBES ... 14 plus rectifier
OUTPUT ... push-pull, 8 watts undistorted
NFM-83 ... adapter available

For complete information write:
CENTRAL RADIO PARTS CO.
1723 W. Fond Du Lac Avenue
Milwaukee 5, Wisconsin

WHOLESALE DISTRIBUTORS

ANOTHER New BROWNING DEVICE

FM TUNER
MODEL RV-10

Small, compact, easily mounted high fidelity FM tuner, Armstrong FM circuit. Range: from 88 to 108 MC.

KNOW THE ENTIRE BROWNING LINE • ENGINEERED FOR ENGINEERS
WRITE TO DEPT. D FOR CATALOG

BROWNING LABORATORIES, INC.
WINCHESTER, MASS.

ELECTRICITY FOR RADIO AND ELECTRONIC APPLICATIONS

ONAN ELECTRIC GENERATING PLANTS supply electric service for electronics applications and general use, mobile or stationary. Driven by Onan 4-cycle gasoline engines, they are of single-unit, compact design and sturdy construction. ONAN Electric Plants are available in many sizes and models ALTERNATING CURRENT: 350 to 5,000 watts in all standard voltages and frequencies. DIRECT CURRENT: 600 to 10,000 watts 115 and 220 volts. BATTERY CHARGERS: 300 to 6,000 watts 12, 24, 32 and 115 volts. Write for detailed literature or engineering assistance.

D. W. ONAN & SONS
4670 Royalston Ave.
Minneapolis 5, Minn.

Jeeves] ....... Watch for a flurry of activity in ZDB (Nyasaland). New regulations there should result in a few new juicy calls before long.

We bow to W6TI and the Northern California DX Club for this gem:
Old Ham: "8s OM, and you give me the freq of this choice DX station calling?"
New Ham: "Sir, OM, I am looking for him myself."
Old Ham: "How come?"
New Ham: "I just picked up a call from a friend that I would give the guy a call as soon as all new countries I can get."
Old Ham: "Don't forget to send him QSL so we will send you one."
New Ham: "No, OM, I won't. I have one already made out to send him."

Any resemblance to persons living or dead is purely discomfoobetering.

Rig for 50 Mc.

(Continued from page 40)

tained in the plate circuit of the quadrupler; it can be tuned by watching for maximum grid current in the 2E26. Cathode current in the oscillator and quadrupler runs around 20 to 25 ma. each, and the cathode current of the 2E26 about 60 ma. when loaded. The 6AQ5s in the modulator draw about 35 to 40 ma. each.

To those kind readers who have ventured this far, we hasten to impart some highly confidential information. It relates to the small though plainly-visible hole which appears on the chassis just to the right of the crystal. This hole has several important advantages. Aside from its ventilating function, it serves as a newly devised type of parasitic trap and on occasion has been used as a convenient receptacle for unwanted pencil sharpenings. More about this in our forthcoming IRE paper!

We have had good results with the rig since putting it on the air and we are becoming increasingly fond of six. According to reports the signal is reasonably clean. No hurry at all to get back to that 10-meter QRM— we’re enjoying those four beautiful megacycles that suddenly loomed onto our horizon one Sunday morning not so long ago.

I.A.R.U. News

(Continued from page 47)

still time to provide such items, which should be sent immediately to C.A.R.L., 40 May Yuan Villa, Kuo-Fu Road, East, Nanking (2), China. Members of the Chinese society are experiencing considerable economic difficulties, principally because of the devastating effects of the late war. The Chinese Amateur Radio League is very active at present and would welcome the financial help of American amateurs as supporting members. Such members will receive the League’s emblem, membership card and circular. Lifetime membership dues for supporting members of C.A.R.L. are $5.00. Applicants should make remittance in

(Continued on page 120)
Because of their precision construction, Speed-X keys give you the most in smooth operation and ease of adjustment. It's the reason they are used throughout the world as standard equipment in amateur and commercial service.

Speed-X semi-automatic keys possess a feature skilled operators value highly: full adjustment from lowest to highest speeds.

In addition to the units illustrated, the Speed-X line comprises 27 additional manual keys, practice sets and repair parts for all semi-automatic keys.

See Speed-X at your jobber or write JOHNSON for catalog and additional information.

**TAKE YOUR HOBBY OUTDOORS!**

*Try U.H.F. PORTABLE/MOBILE WORK*

- on trips
- at camp
- from airplanes
- from boats
- from hills or mountains

The Sperti Handie-Talkie is a small unit developed by a well-known large company to meet your 2 meter portable/mobile needs. You can drive to a good DX location and operate from there.

- Size 2" x 3" x 10" — Weight only 3½ lbs.
- Self-contained 135 volt B Battery! Long Life!
- No external connections
- Dipole antenna — efficiently coupled
- Covers the whole band, 144-148 mc.
- Can be used with a remote antenna
- Not surplus equipment!

This little set is fine for the newcomer, or for the man who wants to get on the air, doesn't have time to build — and doesn't have much money to spend.

For field days, transmitter hunts, ham fests, emergency work, this compact unit can't be beat. Useful in adjusting your directional antenna and reporting field strength measurements. See your local dealer now or write to the factory. Amateur net price $34.50.

SPERTI, INC. • Dept. WT • CINCINNATI 12, OHIO
EVERYTHING in Radio and Electronics. Write for FREE 52-PAGE BOOK on request.

DID YOU GET IT?

~;~~es!~

6L6 buffer-doubler and 807 amplifier. Kit includes four speedot 5¼" aluminum relay rack panel, socket for plug-in key lack, and miscellaneous parts.

No. 31A28, SPECIAL Per Kit, Each........................ •

PARTS KIT. Everything needed to complete exciter except tubes and power supply. Includes all mica condensers, resistors, tuning units (illustrated at right above with cover removed), No. 31A28A, SPECIAL Per Kit, Each........................ $9.31

WANT RG-58/U? Use RG-29/U—exactly the same except clear plastic cover overall. We Have It!

A BARGAIN—No. 3A105—20 Foot Coils, Each.................... $49c
CONTINUOUS LENGTH 50 ft. and over, No. 2A169, SPECIAL PER FOOT........................ $0.31

DID YOU GET IT? THE BIG NEW B-A Catalog No. 481—EVERYTHING in Radio and Electronics. Write if you did not receive it. FREE on request.

“A MOBILE MIDGET for 144 MC."

(See page 21, February QST)

Can be equally good on 54 and 28 Mc. too. We have manufactured xtal controlled MOBILE transmitters for ten years. Try us on this very latest innovation.

144 Mc. Kit $41.32, wired $60.00
4 tubes and xtal extra

Write us or ask your dealer

RADIO TRANSMITTER LABORATORIES
11623 Jamaica Avenue Richmond Hill 18, N. Y.

HAVE SKILL, ACCURACY

SENDING RECEIVING

CODE

Rapid

Be a "key" man. Learn how to send and receive messages in code by telegraph and radio. Commerce needs thousands of men. Expansion of air commerce and freight traffic should create an even bigger peacetime demand for operators. The famous Candler System, maker of world's champions teaches you the "knack" of sound sense and sound consciousness that I•

this amount payable to "A/C No. 1162 (which is the account number of C.A.R.L.), Bank of China, 40 Wall Street, New York." The Bank of China will issue a receipt to the applicant which should be presented to C.A.R.L. with his membership application.

ITALY

On December 15th last, the call of XADW was changed to IAAAA. Thus ended the last of the XA calls in Italy proper. Amateurs in the status of former holders of XA calls will henceforth be assigned calls with the normal prefix for Italy.

Hints & Kinks

(Continued from page 69)

be changed to provide more, or less, deflection of the meter as required. Beam adjustments can then be made as usual.

If the meter registers backward, reverse the connection of the crystal diode. Variations on this may consist of lengthening the test leads to a total length of a half-wave at the operating frequency to increase the "deflection sensitivity" of the set-up. A remote-indicating device may be made by using Twin-Lead to connect a pick-up dipole at some distance to an ohmmeter located at the beam to make one-man adjustment possible.

— Frederick L. Moore, W4JYB

25 Years Ago

(Continued from page 10)

heterodyne and Making It Work." The author successfully makes use of transformer-coupled i.f. stages, with performance much improved over the common resistance-coupled circuit. For the amateur who wants to wean his receiver from its battery diet, there is S. T. Woodhull’s description in this issue of a "Receiver Plate Supply from A.C.,” which provides practical data on doing the job with 8 tubes and homemade chokes and power transformers.

The Headquarters’ campaign for utilization of shorter waves continues. Technical Editor Kruse discusses “Getting the Transmitter Down to 100 Meters,” and appraises in detail the successful circuits used by 9ZN, 3ALN and 1QP. Mr. Kruse debunks the illusion that tube efficiency falls off at low wavelengths, and cites that pioneers on 100 meters are putting through better signals than they did on 200! There’s sound advice also in L. W. Hatry’s “How To Make a 5-Watt Tube Reach Out.” Circuit voltages, antenna-coupling methods, and the antenna itself, are critical, 5XV states. Revealing too is the discourse by M. G. Goldborg, 9APW, on electrolytic rectifiers and filter circuits. In an article replete with oscillograms, the author discloses that simple low-pass filters are quite suitable for amateur needs.

QST’s new department, International Amateur Radio, is crammed with news of amateur activity

(Continued on page 138)
Elements for Your Beam Arrays

**Designed** to meet the demand for light-weight but dependable elements for use in horizontal arrays and similar applications, Premax Elements are unusually light in weight and their special construction insures exceptional strength and rigidity which is so essential in horizontal arrays. Premax Elements are fully adjustable and possess the electrical conductivity that you have been seeking.

**Coralite Elements** — A tubular element with reeded design which gives extra rigidity. Available in 1, 2, 3 and 4-section designs, giving lengths from 5 to 17 feet.

**Coralite Element Kits** — Contain elements and mountings, together with working drawing for wood frame and support. Available for 3-Element 10 Meter, 4-Element 10 Meter, 3-Element 20 Meter, 4-Element 20 Meter.

**Rotary Beam Kit** — Includes frame and three pairs of Elements with necessary insulators and hardware including T-match accessories but without transmission line. Adjustable for 6, 10, and 11-Meter Bands.

Ask your Radio Jobber for the new Premax Catalog of Antennas and Mountings

**FM-TV Extended “T” Type Antenna** — Gives coverage from 44 to 216 mc. Dipole elements are seamless aluminum with cast aluminum fittings. Comes complete with mounting bracket.

**FM Universal Dipole Antenna** — Another complete dipole Antenna designed for FM reception. Available with or without reflector. The most compact FM antenna on the market.

**Chicago Volt-Ohm-Milliampmeters** — A good volt-ohm-milliammeter is usually the first test instrument purchased by any radio man. Chicago Featherweights offer so great a value in accurate quality, small size, in a wide selection of ranges and sensitivities, that they are the first choice of amateurs everywhere.

Chicago volt-ohm-milliammeters are priced from $5.25 to $26.00 depending on sensitivity, ranges, etc. At our modest prices, no ham shack need be without the benefit of this most useful instrument.

**FM-TV Extended “T” Type Antenna** — Gives coverage from 44 to 216 mc. Dipole elements are seamless aluminum with cast aluminum fittings. Comes complete with mounting bracket.

**FM Universal Dipole Antenna** — Another complete dipole Antenna designed for FM reception. Available with or without reflector. The most compact FM antenna on the market.

**Chicago Volt-Ohm-Milliammeters**

A good volt-ohm-milliammeter is usually the first test instrument purchased by any radio man. Chicago Featherweights offer so great a value in accurate quality, small size, in a wide selection of ranges and sensitivities, that they are the first choice of amateurs everywhere.

Chicago volt-ohm-milliammeters are priced from $5.25 to $26.00 depending on sensitivity, ranges, etc. At our modest prices, no ham shack need be without the benefit of this most useful instrument.

See your Jobber or write us today for Bulletin No. 11

**The Amateur’s First Choice**

**Transformers to Operate War Surplus Equipment**

New small units now available at your favorite distributor. Model F 5069 delivers 24 volts at 3 amperes—$3.90 net. Model F 5075 delivers 24 volts at 1 amperes—$2.40 net. Other models for 12 and 24 volt operation.

Write for your free copy of the new STACO Relay and Transformer Catalog.

**Chicago Industrial Instrument Co.**

536 W. Elm Street  •  •  •  Chicago 10, Ill.

**Staco**

406 Linden Ave., Dayton 3, Ohio
Also send for our Booklet on "Radio Keying and Telegraphy for Beginners" —

This Booklet gives the fundamentals of keying. . . . It contains codes, and how to learn them.

SIGNAL ELECTRIC MFG. CO., Menominee, Mich.

Established 1892

RCA INSTITUTES, INC.
Offer thorough training courses in all technical phases of RADIO and TELEVISION

WEEKLY RATES
DAYS — EVENINGS
VETERANS: RCA Institutes is approved under G. I. Bill of Rights
For Free Catalog write Dept. ST-48

Founded in 1909

RADIO TELEPHONY
RADIO TELEGRAPHY

Courses ranging in length from 7 to 12 months. Dormitory accommodations on campus. The college owns KPAC, 5 KW broadcast station with studios located on campus. New students accepted monthly. If interested in radio training necessary to pass P.C.C. examinations for first-class telephone and second-class telegraph licenses, write for details.

PORT ARTHUR COLLEGE
PORT ARTHUR, TEXAS
Approved for G.I. training

Correspondence

(Continued from page 61)

and can, only be considered on a world-wide basis. For the 'phone man not interested in DX, he has plenty of other frequencies for local QSO's and he shouldn't be occupying the 20-meter band in the first place.

—Jules Obester, W3ALO
Kenendy, Texas

Editor, QST:

I see not a reason in the world why 7200-7300 should not be opened to 'phone on a sunrise-to-sunset basis; seems to me this would be entirely feasible and certainly would fill a dire need for a daylight 'phone band for local and up-to-500-mile work during daylight hours. We have simply got to make every use we can of free time on the bands. This daytime operation would certainly put no hardship on the c.w. in 40 as during daylight there is plenty of room.

—W. O. Porter, W6FAH
Brooklyn, Iowa

Editor, QST:

... You make the statement that 40 carries a high percentage of beginner telegraphy; well, I would like you to know that I am one of those beginners. My 5 watts may not be much, but it provides me with a lot of fun. QRM from foreign 'phones in the band would be a real mess.

—Randall C. Goff, W0NRJ
111 South Emery Ave., Peshtigo, Wisconsin

Editor, QST:

If anything, more than 50 kc. should be added to this 75-meter 'phone band. There isn't anywhere near the amount of c.w. activity in this band as 'phone if one is to judge by the signals I pick up here. Why not live us a break on 'phone unless the c.w. boys show the need for the space by putting it to use.

—Donald MacLaughlin, W9TW

111 South Emery Ave., Peshtigo, Wisconsin

Editor, QST:

— In the Midwest there is scarcely a c.w. signal on the 80-meter band until late afternoon or evening. My suggestion is that the 'phone band be opened a little more in the day than at night. . . .

—Francis J. Phelan, W9AXH
(Continued on page 134)
LOW DIELECTRIC LOSS! HIGHLY EFFICIENT! EXCELLENT APPEARANCE!
and better performance per dollar

B & W Type T coils are available without link, fixed center link with center tap, and variable center link with center tap. The latter arrangement has the link hinged on the jack base which permits use of the same link with coils for all bands. Thus you can provide easy panel adjustment for matching of load impedances up to 72 ohms.

Since B&W pioneered the "air wound" type of coil some 12 years ago, these excellent inductors have proved their unquestioned superiority in Amateur equipment — and in a wide variety of military and commercial devices, too!

The Type T Inductor shown here is widely used with great improvement in efficiency. For the majority of Amateur applications, and for powers up to 500 watts, Type T Air Wound Inductors are ideal. They're rugged, reasonably priced, and will be a credit to your rig.

Write for B&W Catalog.

BARKER & WILLIAMSON, INC.
Dept. Q-48 • 237 FAIRFIELD AVE. • UPPER DARBY, PA.

Valpey Xtalector provides INSTANT QSY with UNEQUALLED STABILITY

The Valpey Xtalector is BETTER than a "rubber" crystal

- Provides 3 exact spot frequencies at your finger tips.
- Eliminates erratic operation.
- Maintains constant activity.
- Actually costs you less!

If your dealer cannot supply you, write to

Valpey CRYSTAL CORP.
Holliston, Mass.

Craftsmanship in Crystals Since 1931

WIATP • WIHWY • W182J • W1PPLX • W1PFX

133
HERE'S A TRYLYON TOWER FOR AMATEURS

Buy only the genuine, lightweight TRYLYON Steel Ladder Tower. Easily adapted as an Amateur use, it employs the same basic design of the famous TRYLYON radars. Look for these features:
- Designed and engineered for 100 mph winds
- All steel parts hot dip galvanized after fabrication to rigid Army and Navy specifications
- Easy-to-climb ladder on all towers
- Prefabricated guys with factory assembled compression sleeves
- "Peanut" supplied with each and every ball
- Easy to install

60'-TYPE TRYLYON STEEL LADDER TOWER

- Base tower: 2 men completely fabricated guy
- 2 guys top: 2 men, top carried 250 lb. per pole, 12" strides, 24" max. guy spacing.
- $10.00 (Minimum Net Price)

Write: TRYLYON Company
West Chester, Pennsylvania

KNOW THE ENTIRE BROWNING LINE • ENGINEERED FOR ENGINEERS
WRITE TO DEPT. D FOR CATALOG

BROWNING LABORATORIES, INC.
WINCHESTER, MASS.

1 A C R E A T I O N W I T H A F U T U R E !

TELEVISION

SHOP WORK • SHOP TECHNIQUES • THEORY • FULL ELECTRONICS LABORATORIES
- RADIO SERVICE & REPAIR
- F. M. & TELEVISION
- TRANSMITTER COURSES Preparing for F.C.C. LICENSES
- RADIO TECHNOLOGY MORNING • AFTERNOON • EVENING CLASSES • MODERATE RATES • INSTALLMENTS AVAILABLE UNDER G. I. BILL

DELEHANTY SCHOOL OF RADIO • ELECTRONICS • TELEVISION
105 EAST 13TH STREET, NEW YORK 3, N. Y. • DEPT. T LICENSED BY STATE OF NEW YORK

134

105 EAST 13TH SHEET, NEW YORK 3, N. Y.

KNOW THE ENTIRE BROWNING LINE • ENGINEERED FOR ENGINEERS
WRITE TO DEPT. D FOR CATALOG

BROWNING LABORATORIES, INC.
WINCHESTER, MASS.

1 A C R E A T I O N W I T H A F U T U R E !

TELEVISION

SHOP WORK • SHOP TECHNIQUES • THEORY • FULL ELECTRONICS LABORATORIES
- RADIO SERVICE & REPAIR
- F. M. & TELEVISION
- TRANSMITTER COURSES Preparing for F.C.C. LICENSES
- RADIO TECHNOLOGY MORNING • AFTERNOON • EVENING CLASSES • MODERATE RATES • INSTALLMENTS AVAILABLE UNDER G. I. BILL

DELEHANTY SCHOOL OF RADIO • ELECTRONICS • TELEVISION
105 EAST 13TH STREET, NEW YORK 3, N. Y. • DEPT. T LICENSED BY STATE OF NEW YORK

134

105 EAST 13TH SHEET, NEW YORK 3, N. Y.

KNOW THE ENTIRE BROWNING LINE • ENGINEERED FOR ENGINEERS
WRITE TO DEPT. D FOR CATALOG

BROWNING LABORATORIES, INC.
WINCHESTER, MASS.

1 A C R E A T I O N W I T H A F U T U R E !

TELEVISION

SHOP WORK • SHOP TECHNIQUES • THEORY • FULL ELECTRONICS LABORATORIES
- RADIO SERVICE & REPAIR
- F. M. & TELEVISION
- TRANSMITTER COURSES Preparing for F.C.C. LICENSES
- RADIO TECHNOLOGY MORNING • AFTERNOON • EVENING CLASSES • MODERATE RATES • INSTALLMENTS AVAILABLE UNDER G. I. BILL

DELEHANTY SCHOOL OF RADIO • ELECTRONICS • TELEVISION
105 EAST 13TH STREET, NEW YORK 3, N. Y. • DEPT. T LICENSED BY STATE OF NEW YORK

134

105 EAST 13TH SHEET, NEW YORK 3, N. Y.

KNOW THE ENTIRE BROWNING LINE • ENGINEERED FOR ENGINEERS
WRITE TO DEPT. D FOR CATALOG

BROWNING LABORATORIES, INC.
WINCHESTER, MASS.

1 A C R E A T I O N W I T H A F U T U R E !

TELEVISION

SHOP WORK • SHOP TECHNIQUES • THEORY • FULL ELECTRONICS LABORATORIES
- RADIO SERVICE & REPAIR
- F. M. & TELEVISION
- TRANSMITTER COURSES Preparing for F.C.C. LICENSES
- RADIO TECHNOLOGY MORNING • AFTERNOON • EVENING CLASSES • MODERATE RATES • INSTALLMENTS AVAILABLE UNDER G. I. BILL

DELEHANTY SCHOOL OF RADIO • ELECTRONICS • TELEVISION
105 EAST 13TH STREET, NEW YORK 3, N. Y. • DEPT. T LICENSED BY STATE OF NEW YORK

134

105 EAST 13TH SHEET, NEW YORK 3, N. Y.

KNOW THE ENTIRE BROWNING LINE • ENGINEERED FOR ENGINEERS
WRITE TO DEPT. D FOR CATALOG

BROWNING LABORATORIES, INC.
WINCHESTER, MASS.

1A C R E A T I O N W I T H A F U T U R E !

TELEVISION

SHOP WORK • SHOP TECHNIQUES • THEORY • FULL ELECTRONICS LABORATORIES
- RADIO SERVICE & REPAIR
- F. M. & TELEVISION
- TRANSMITTER COURSES Preparing for F.C.C. LICENSES
- RADIO TECHNOLOGY MORNING • AFTERNOON • EVENING CLASSES • MODERATE RATES • INSTALLMENTS AVAILABLE UNDER G. I. BILL

DELEHANTY SCHOOL OF RADIO • ELECTRONICS • TELEVISION
105 EAST 13TH STREET, NEW YORK 3, N. Y. • DEPT. T LICENSED BY STATE OF NEW YORK

134

105 EAST 13TH SHEET, NEW YORK 3, N. Y.

KNOW THE ENTIRE BROWNING LINE • ENGINEERED FOR ENGINEERS
WRITE TO DEPT. D FOR CATALOG

BROWNING LABORATORIES, INC.
WINCHESTER, MASS.

1 A C R E A T I O N W I T H A F U T U R E !

TELEVISION

SHOP WORK • SHOP TECHNIQUES • THEORY • FULL ELECTRONICS LABORATORIES
- RADIO SERVICE & REPAIR
- F. M. & TELEVISION
- TRANSMITTER COURSES Preparing for F.C.C. LICENSES
- RADIO TECHNOLOGY MORNING • AFTERNOON • EVENING CLASSES • MODERATE RATES • INSTALLMENTS AVAILABLE UNDER G. I. BILL

DELEHANTY SCHOOL OF RADIO • ELECTRONICS • TELEVISION
105 EAST 13TH STREET, NEW YORK 3, N. Y. • DEPT. T LICENSED BY STATE OF NEW YORK
"Since March, 1947, working on weekends and holidays only, I have worked 21 states and across the Atlantic twice while using your 6-meter beam. Most of my reports have been R-9 or better, and I have been told my signal is very often the loudest on the band. While the transmitter is a very simple affair, only 40 watts input, the Workshop Antenna makes up for lack of power by providing the sock that effectively deals with competition — QRM or QRN. L. R. Mitchell, W1HIL."

Available through your regular dealer. Price $9.00

The WORKSHOP ASSOCIATES, INC.
Specialists in High-Frequency Antennas
63 NEEDHAM STREET, NEWTON HIGHLANDS 61, MASSACHUSETTS

CLIPPER CHOKES & FILTERS
Triple average speech power on your present carrier without modulation, important development. See QST Nov. '46.

SHIELDED CHOKES, 3.75 by. 5%, hi-alloy, airgap type.
HI-Q, with directions and schematic. MODEL C-375 $4.95.
SAME, any inductance 1/4 to 20 by. for any low-level circuit for either low, peaked or high pass filtering, with directions and formula, to order.

COMPLETE FILTER ASSEMBLY, low-pass, including CHOKES C-375, capacitors C3, C4, C5 and R3 (QST Nov. '46), sealed in 11/4" x 11/4" x 2 1/4" shield case, M-Q. $5. With directions and schematic.

MODEL LP-3000, cut-off freq. 3000 cy. $5.95
MODEL LP-3500, cut-off freq. 3500 cy. $5.95
MODEL LP-5000, cut-off freq. 5000 cy. $5.95

OTHER cut-offs to order. IMMEDIATE DELIVERY. Through your jobber or from manufacturer.

Kenneth Richardson Laboratories
254 Vincent Ave.
Lynbrook, L. I., N. Y.

HEADQUARTERS for
hallicrafters

** AMATEUR EQUIPMENT **

RADIO PARTS DISTRIBUTING CO.
128 W. Olney Road
Norfolk, Va.

GET MORE POWER!

USE MicroMatch

MEASURES STANDING WAVE RATIO — RF POWER

Micronitch enables you to get MORE POWER WITH THE SAME TRANSMITTER AND ANTENNA. Investigate the many superb advantages of this power "detective" right away. Ask your distributor or write for complete details.

MM1 for open wire lines ........................................... $29.50
MM2 (shown) for coaxial lines ................................. $37.45

M. C. JONES ELECTRONICS COMPANY
BRISTOL, CONNECTICUT
MODULATION & DRIVER TRANSFORMERS

These transformers are suitable for use with type 811, 809, TZ40, TZ20, etc. to modulate either triode or beam tube RF amplifiers. Two secondaries are provided. Impedance ratio primary to secondary number one, 2 to 1. Primary to secondary number two, 16 to 1. Will modulate up to 300 watts input. Modulation transformer, driver transformer, circuit diagrams and other information all for $5.90. Please include 50 cents for postage and handling. Send full amount to speed delivery and save C.O.D. charges. Shipped only in the U. S., its possessions and Canada.

ELECTRONIC NAVIGATION, INC.
Box 735, Church Street Station
New York 8, New York

ANOTHER New BROWNING DEVICE

CAPACITANCE RELAY MODEL DD-20

Super-sensitive "brain" for alarms, safety, or signal systems. Operates alarm circuit on capacitance changes of 0.25 mmfd.

KNOW THE ENTIRE BROWNING LINE • ENGINEERED FOR ENGINEERS

WRITE TO DEPT. D FOR CATALOG

BROWNING LABORATORIES, INC.
WINCHESTER, MASS.

TRAINING "with-a-purpose" AT WRCI

Your well-equipped laboratories provide the PRACTICAL training essential to a successful career in Radio Communications (R.C. licensed) or in Radio-Television Servicing (Technician). Train under supervision of technical specialists with COMMERCIAL type equipment. Investigate WRCI SPECIALIZED TRAINING methods before selecting a school. Free illustrated booklet upon request. Available for non-veterans - approved for veteran training.

WESTERN RADIO COMMUNICATIONS INSTITUTE
631 West Ninth St. Dept. C Los Angeles 15, California

The greatest number of amateurs, I place them in that order deliberately. If the ideal frequency allocation can do both, wonderful. If it can do only one, then I feel that public good takes precedence. I do not stand on the existing division of the bands. While I do not necessarily agree with one popular solution advanced by some "phone men in N. C.," — that each and every amateur band be divided 50-50 between "phone and c.w.," and let that way for all time — I feel that way for all time — I think the ARRL is exceedingly wise to reexamine amateur frequency allocations at this time, and I can assure you that any decision reached by the directors after due study and contemplation will be accepted by me without criticism, and that I will support the Board's recommendations against any and all challengers...

The average c.w. man feels that the 75-meter "phone men have not cleaned up that band sufficiently that they should be given additional property until the rubbish and undergrowth are cleared away from their present premises. I speak specifically of loud, unmodulated signals; over-modulation; lack of adequate clipping of superfluous voice frequencies; clumsy operating practices, with tedious calling, excessive verbosity, and unneeded repeats; a craze for high power, for the "California Kilowatt" type of signal; unwillingness (especially in North Carolina) to do anything in the public good. The "phone men in North Carolina, by and large, have done nothing and are doing nothing to prepare for their supreme privilege — and duty viz., the establishing and operating of an efficient network of well-qualified traffic experts which could move into action rapidly and operate in the most effective manner in the event of a possible disaster in our state. There have been spasmodic efforts to establish a "phone traffic net in this state in the last several months, but they have failed because there is no interest. That, I think, is one of the cardinal sins of the 75-meter "phone group.

Those who consider "underbrush" in the 75-meter "phone's backyard which should be cleared away before the "phone men demand more of the c.w. frequencies. If it were cleaned up, I am sure that their pleas for more frequencies would fall on more receptive ears. And by that, I do not mean to imply that the c.w. band is without sin. On the contrary, it is woefully full of unnecessary key clicks, broad, raspy and chirpy signals, bad fists, etc., and I would be one of the first to admit, and deplore, our own shortcomings...

... personally I do not think another 50 kilocycles will make any appreciable difference in the QRM on the 75-meter "phone band. Even another 100 kilocycles would still not open up the "phone frequencies sufficiently to make all the "phone men happy. And we must remember that an extra 50 kilocycles for 75 meters in this country will mean an extra 100 kilocycles, for the Canadian "phone will surely move right on down. So, I am against any further increase in 50-meter frequencies for "phone operation at this time. And I think the day is rapidly coming when "phone operation must be limited to 21 megacycles and higher, and I believe that an even more stringent examination should be necessary before any amateur is permitted to put a voice transmitter on the air.

But whatever decision you may reach, be sure that I will stand behind you, and that there will be no criticism and backbiting from me.

— Pete McKnight, W4CFL

Strays

Term an handbook writers, take note! Here is Article II, Section 6, of the constitution of the Farmers' Mutual Telephone System, Shenandoah County, Virginia, as printed in their 1946-47 telephone directory:

Do not whistle, sing or play a musical instrument on the lines when they are in use, neither use sweet talk, lest you soften the wire.

— W4YEJ

Robert D. Smith, pictured on page 10 of February QST, is W0AUV, not W0QJW as we identified him. Sorry!
HALLICRAFTERS
new receiver S-51
for land-sea-air-communications
Frequency coverage from 132 kc. to 13 Mc. in 4 bands... plus three fixed frequency channels which may be pre-set in the range between 200 and 300 kc. and 2 Mc. to 3 Mc. The S-51 can be used practically anywhere. Equipped for 110 volt AC/DC operation, provision is made for the addition of power supply combinations permitting operation from either 6, 12 or 32 volt batteries.

PRE-MAX CORULITE ELEMENTS
108M, 10M •• $5.40 pr.
ELEMENT INSULATORS
fits tubing
9C-20 1/4” $1.95
9C-24 3/8” each
9C-32 1/2”

PRE-MAX CORULITE ELEMENTS
618M, 20M •• $11.40 pr.

ABBOTT BM-2
2 meter beam $14.10
S/C LABS. 702A
3 element 10-meter beam $44.95
S/C LABS. 702B
3 element 6-meter beam $29.95

RECEIVERS IN STOCK
$129.95
National NC57
Hallicrafters SX43
Hammarlund HQ29X
RME 45
RME 84

SPORTING GOODS COMPANY
512 Market St., Philadelphia 6, Pa.

WHOLESALE RADIO PARTS DIVISION

COMPLETE RADIO TRAINING!
Prepare now to accept a responsible position in Commercial Radio. New developments will demand techniques thorough basic training, plus a knowledge of new techniques discovered during the war. Training open to high school graduates or those with high school equivalency. Courses 6 to 12 months duration in RADIO AND ELECTRONICS, Aproved Veterans in Radio. Write for Particulars.

COMMERCIAL RADIO INSTITUTE

FASTER SIGNAL TRACING—STRAIGHTLINED RADIO SERVICING!

MUL-TI-FREQUENCY GENERATOR
Generates R.F., I.F. and AUDIO Frequencies, 2560 cycles to over 10 megacycles, using new electronic multivibrator radar principle. Completely self-contained—fits coat pocket or tool chest. Just plug into A.C. or D.C., line and check receiver sensitivity. Audio gain, R.F. and I.F. touch-up, auto radio aerial peaking or shielding, breaks in wires, stage by stage signal tracing tube testing, by direct comparison, etc., etc. Sanity construction, handsome appearance. See at your distributor, or write for details, Shipping Wt. 1 1/4 ozs.

Signalette
MULTI-FREQUENCY GENERATOR
$995 at distributor or postpaid Cincinnati

FASTER SIGNAL TRACING—STRAIGHTLINED RADIO SERVICING!

CLIPPARD INSTRUMENT LABORATORY, INC.
DEPT. T, 7, 1125 BANK ST., CINCINNATI 14, OHIO
JIM NOLAND W6AWX Omaha, Nebr.
Superintendent Electronic Radio Division Institute

“We have here at the school selected both the Globe King and the Globe Trotter because after very critical inspection we decided that these two transmitters were the best for the money anywhere. Since the installation of this equipment hundreds of our students have been keenly impressed with the construction, appearance and D.X. contacts made.

IT'S A SWEETHEART——
Horace M. Whittlesey, Balderas Num. 32-217, Mexico, D. F. writes:—
I have been testing the GLOBE TROTTER and had the transmitter on the air for a week and have contacted New Zealand, Australia, Peru, Venezuela, Canada, all U. S. districts, and a mobile marine in Venezuela. We contacted Hawaii also all to the credit of the Globe Trotter on 10 meter band.

WRL Globe Trotter XMTR Kit
Amateurs the world over are praising the performance of this high quality, low cost rig. It's a 40 watt input kit including all parts, power supply, chassis, panel and streamlined cabinet. Write for export prices.

Cat. No. 70-312 same as above, wired...
1 set of coils, meters, tubes, extra...

WRL Exciter Kit
From our own labs. Uses 6L6 regenerative Osc. into an 807 driver or final. Similar to unit described in A.R.R.L. Handbook. Output 35 to 40 watts. Comes mounted on standard relay rack panel 31/2 x 10. Cat. No. 70-302 less accessories...

LORTS O!E BARGAINS TOO
BC458A VFO $35.00, BC459A VFO $40.00; and complete BCB 274N XMTR, Brand new with tubes, less dynamo, your cost...

WRL 275 Watt
This WRL WAY MORE THAN KING Transmitter Kit is available as a complete unit, or individual sections may be purchased separately for prices. Components with tubes cost, 1 set of coils...

Kit Form
$66.45 Wired
$386.45

QUICK DELIVERY
It takes about a week to wire this kit.

VALUES, LARGE STOCKS, FAST, DEPENDABLE SERVICE.
Hams all over the world are enjoying our personal service, fast delivery, liberal trade-ins and easy payment plan. We make it easy for you to buy and easy for you to pay. Just write and tell us what you want, the make and models you now have and I will answer your inquiry the same day giving you trade in allowances. Many times it will serve as a down payment on new gear. Dollar for dollar, you will get more at WRL. We have a large store of all national merchandise such as Hallicrafters, National, Hammarland, RME, Millen, Sonar, receivers, transmitters, test equipment, beams, etc. Write me for anything you want. We can fill your order quickly.

20% DOWN—MONTHLY PAYMENTS TO FIT YOUR NEEDS!
It's Easy—We Finance Our Own Paper—No Red Tape

LATEST IN HAM GEAR... WE HAVE IT

| National NC 175 | $189.50 |
| National NC 187 | $269.00 |
| Bud VFO-81 | $32.50 |
| Metamer Signal Shifter | $29.00 |
| Gonset 6-15 Converter | $75.00 |
| Gonset 10-11 meter | $99.50 |
| Harvey Wells TIS-50 | $99.50 |
| Sonar MB 611 | $125.00 |
| Sonar VFX-680 | $75.45 |
| Sonar’s New CFC | $59.75 |
| Hammarland HQ 19X | $177.50 |
| Millen 90810 H. F. XMTR | $97.50 |

LOT S OF BARGAINS TOO

| National NC 311 | $65.95 |
| National NC 33 | $65.95 |
| RME H.F. 10-20 | $77.00 |
| Hallicrafters SX 48 | $189.50 |
| BC458A VFO XMTR | $79.50 |
| BC459A VFO XMTR | $119.50 |

GET THIS 68 PAGE BARGAIN CATALOG

World Radio Laboratories
443 West Broadway
COUNCIL BLUFFS, IOWA

SEND LATEST FREE FLYER WITH BARGAINS
| Send more data on "Globe King" Kit |
| Send more data on "Globe King" Kit |
HAM-ADS

(1) Advertising shall pertain to radio and shall be of interest to radio amateurs or experimenters in their pursuit of the art.

(2) No display of any character will be accepted, nor any special typographical arrangement, such as all or part of any word in upper or lower case, unless it is so marked in the text as to be clearly understood.

(3) The word "advertiser" shall mean any individual or organization using the word "advertiser" in an advertisement.

(4) Reprinting full must accompany copy. No change in price is to be submitted without the prior consent of the editor.

(5) The deadline for ads is the 25th of the month preceding publication date.

(6) Each advertiser shall apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. An advertisement offering for sale an apparatus or a substitute apparatus for exchange or advertising the sale of such apparatus for special equipment, if by a member of the American Radio Relay League, shall be inserted in the classified section of the magazine. An attempt to deal in apparatus in quantity for profit, even if it is a member, is commercial and all advertising by him taken the 30th rate. Provisions of paragraphs (1), (2), (4), and (5), apply to all advertising in this column regardless of which rate may apply.

(7) Because error is more easily avoided, it is requested that signature and address be printed plainly.

(8) No advertiser may use more than 75 words in any one advertisement.

(9) No advertiser may use more than 75 words in any one advertisement.

(10) No display of any character will be accepted, nor any special typographical arrangement, such as all or part of any word in upper or lower case, unless it is so marked in the text as to be clearly understood.

(11) Each advertiser shall apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. An advertisement offering for sale an apparatus or a substitute apparatus for exchange or advertising the sale of such apparatus for special equipment, if by a member of the American Radio Relay League, shall be inserted in the classified section of the magazine. An attempt to deal in apparatus in quantity for profit, even if it is a member, is commercial and all advertising by him taken the 30th rate. Provisions of paragraphs (1), (2), (4), and (5), apply to all advertising in this column regardless of which rate may apply.

(12) Because error is more easily avoided, it is requested that signature and address be printed plainly.

(13) No advertiser may use more than 75 words in any one advertisement.

(14) No display of any character will be accepted, nor any special typographical arrangement, such as all or part of any word in upper or lower case, unless it is so marked in the text as to be clearly understood.

(15) Each advertiser shall apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. An advertisement offering for sale an apparatus or a substitute apparatus for exchange or advertising the sale of such apparatus for special equipment, if by a member of the American Radio Relay League, shall be inserted in the classified section of the magazine. An attempt to deal in apparatus in quantity for profit, even if it is a member, is commercial and all advertising by him taken the 30th rate. Provisions of paragraphs (1), (2), (4), and (5), apply to all advertising in this column regardless of which rate may apply.

(16) Because error is more easily avoided, it is requested that signature and address be printed plainly.

(17) No advertiser may use more than 75 words in any one advertisement.

(18) No display of any character will be accepted, nor any special typographical arrangement, such as all or part of any word in upper or lower case, unless it is so marked in the text as to be clearly understood.

(19) Each advertiser shall apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. An advertisement offering for sale an apparatus or a substitute apparatus for exchange or advertising the sale of such apparatus for special equipment, if by a member of the American Radio Relay League, shall be inserted in the classified section of the magazine. An attempt to deal in apparatus in quantity for profit, even if it is a member, is commercial and all advertising by him taken the 30th rate. Provisions of paragraphs (1), (2), (4), and (5), apply to all advertising in this column regardless of which rate may apply.

(20) Because error is more easily avoided, it is requested that signature and address be printed plainly.

(21) No advertiser may use more than 75 words in any one advertisement.

(22) No display of any character will be accepted, nor any special typographical arrangement, such as all or part of any word in upper or lower case, unless it is so marked in the text as to be clearly understood.

(23) Each advertiser shall apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. An advertisement offering for sale an apparatus or a substitute apparatus for exchange or advertising the sale of such apparatus for special equipment, if by a member of the American Radio Relay League, shall be inserted in the classified section of the magazine. An attempt to deal in apparatus in quantity for profit, even if it is a member, is commercial and all advertising by him taken the 30th rate. Provisions of paragraphs (1), (2), (4), and (5), apply to all advertising in this column regardless of which rate may apply.

(24) Because error is more easily avoided, it is requested that signature and address be printed plainly.

(25) No advertiser may use more than 75 words in any one advertisement.

(26) No display of any character will be accepted, nor any special typographical arrangement, such as all or part of any word in upper or lower case, unless it is so marked in the text as to be clearly understood.

(27) Each advertiser shall apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. An advertisement offering for sale an apparatus or a substitute apparatus for exchange or advertising the sale of such apparatus for special equipment, if by a member of the American Radio Relay League, shall be inserted in the classified section of the magazine. An attempt to deal in apparatus in quantity for profit, even if it is a member, is commercial and all advertising by him taken the 30th rate. Provisions of paragraphs (1), (2), (4), and (5), apply to all advertising in this column regardless of which rate may apply.

(28) Because error is more easily avoided, it is requested that signature and address be printed plainly.

(29) No advertiser may use more than 75 words in any one advertisement.

(30) No display of any character will be accepted, nor any special typographical arrangement, such as all or part of any word in upper or lower case, unless it is so marked in the text as to be clearly understood.

(31) Each advertiser shall apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. An advertisement offering for sale an apparatus or a substitute apparatus for exchange or advertising the sale of such apparatus for special equipment, if by a member of the American Radio Relay League, shall be inserted in the classified section of the magazine. An attempt to deal in apparatus in quantity for profit, even if it is a member, is commercial and all advertising by him taken the 30th rate. Provisions of paragraphs (1), (2), (4), and (5), apply to all advertising in this column regardless of which rate may apply.

(32) Because error is more easily avoided, it is requested that signature and address be printed plainly.

(33) No advertiser may use more than 75 words in any one advertisement.

(34) No display of any character will be accepted, nor any special typographical arrangement, such as all or part of any word in upper or lower case, unless it is so marked in the text as to be clearly understood.

(35) Each advertiser shall apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. An advertisement offering for sale an apparatus or a substitute apparatus for exchange or advertising the sale of such apparatus for special equipment, if by a member of the American Radio Relay League, shall be inserted in the classified section of the magazine. An attempt to deal in apparatus in quantity for profit, even if it is a member, is commercial and all advertising by him taken the 30th rate. Provisions of paragraphs (1), (2), (4), and (5), apply to all advertising in this column regardless of which rate may apply.

(36) Because error is more easily avoided, it is requested that signature and address be printed plainly.

(37) No advertiser may use more than 75 words in any one advertisement.

(38) No display of any character will be accepted, nor any special typographical arrangement, such as all or part of any word in upper or lower case, unless it is so marked in the text as to be clearly understood.

(39) Each advertiser shall apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. An advertisement offering for sale an apparatus or a substitute apparatus for exchange or advertising the sale of such apparatus for special equipment, if by a member of the American Radio Relay League, shall be inserted in the classified section of the magazine. An attempt to deal in apparatus in quantity for profit, even if it is a member, is commercial and all advertising by him taken the 30th rate. Provisions of paragraphs (1), (2), (4), and (5), apply to all advertising in this column regardless of which rate may apply.

(40) Because error is more easily avoided, it is requested that signature and address be printed plainly.

(41) No advertiser may use more than 75 words in any one advertisement.

(42) No display of any character will be accepted, nor any special typographical arrangement, such as all or part of any word in upper or lower case, unless it is so marked in the text as to be clearly understood.

(43) Each advertiser shall apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. An advertisement offering for sale an apparatus or a substitute apparatus for exchange or advertising the sale of such apparatus for special equipment, if by a member of the American Radio Relay League, shall be inserted in the classified section of the magazine. An attempt to deal in apparatus in quantity for profit, even if it is a member, is commercial and all advertising by him taken the 30th rate. Provisions of paragraphs (1), (2), (4), and (5), apply to all advertising in this column regardless of which rate may apply.

(44) Because error is more easily avoided, it is requested that signature and address be printed plainly.

(45) No advertiser may use more than 75 words in any one advertisement.

(46) No display of any character will be accepted, nor any special typographical arrangement, such as all or part of any word in upper or lower case, unless it is so marked in the text as to be clearly understood.

(47) Each advertiser shall apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. An advertisement offering for sale an apparatus or a substitute apparatus for exchange or advertising the sale of such apparatus for special equipment, if by a member of the American Radio Relay League, shall be inserted in the classified section of the magazine. An attempt to deal in apparatus in quantity for profit, even if it is a member, is commercial and all advertising by him taken the 30th rate. Provisions of paragraphs (1), (2), (4), and (5), apply to all advertising in this column regardless of which rate may apply.

(48) Because error is more easily avoided, it is requested that signature and address be printed plainly.

(49) No advertiser may use more than 75 words in any one advertisement.

SELL Stancor lO-P complete, $20. Guthman U-36 xmr, $25; 3 kW S.s. condenser 75 µf, $10. W9IRD, 1338 Barry Ave., Chicago 7, Ill.

SALE Cw xmr 60-87-309 power supply 10M coils, $85. HF-300 tube. $20. W4KQS, 4302 San Juan, Tampa, Fla.

FOR Sale: HRQ-W with power supply and 5 sets gen. coverage coils, $140; HQ-129-X, $130; S-36, $100; RBV-2 Pandapator with power supply. Latest offers. Am going to school. W9BEO, 3351 W. Ohio St., Chicago 24, Ill.

DELUXE 1-kw/2 transmitter, commercial built, 400 w cw 300 w fone. All racks, cabinets, parts chrome-plated. General 10 and 20 per-leaf going with rig. HRQ-STA miscellaneous parts. Move in a hurry. Call local dealer. W9RE, 429 N. Central Ave., Chicago 44, Ill.

SELL: S-22 R Hallcrafters, 110 Kc to 18 Mf. Excellent condition. Best offer. H. Madden, 166 Buena Vista Road, Bridgeport, Conn.


FOR Sale: HR0-7, Complete. Used demonstrator only. Kolp, 2209 38th, N.W., Washington 8, D. C.

FOR Sale: All F.o.b. New York. W2AOM, 1600 West 5th Street, Brooklyn 60, N. Y.

FOR Sale: One BC-610, converted. Best offer over $700.00. One BC-610, converted (HT4B), $350.00. One Super-Pro (1004) SH, 20 Meg, $125.00. One HR0, 2.5 v., B. S. cells, $7.50. One NC-240-D, $149.00. One BC-221, $49.00. One BC-224H, 14V BC348, $199.00; HQ-129-X, $139.00; SPC-400-X, $249.00; HR0 Sr., $119.00; NC-240-D, $149.00; DB-20, $29.00; DB-22-A, $49.00; RME-45, $75.00; RME-69, $115.00; NC-64, NC-100-X, NC-173, S-36-A, RME-69, other receivers, transmitting, etc. Shipped on ten day trial. Write. Henry Radio, Elber, Mo.

FOR SALE: Practically new Collins 30-K transmitter and HRO-7, Complete. Used as demonstrator only. Kolp, 2309 Ave. A, Fort Worth, Texas.

FOR Sale: Latest model RME-45 with Calromatic tuning and matcher. $125. Latest model DB-20 pre-selector. $35. Cash only. Both items absolutely like new in appearance and operating condition. W2SOK, Gerald B. Wright, 912 Parry Road, Elkhart, Ind.

FOR Sale: Latest model RME-45 with Calomatic tuning and matching speaker. $125. Latest model DB-20 pre-selector. $35. Cash only. Both items absolutely like new in appearance and operating condition. W2SOK, Gerald B. Wright, 912 Parry Road, Elkhart, Ind.

SELL: Stancor 60-P, 60 watt fone and c.w. xmtter. Coils for a.c. pwr supplies, ready to go. JOO watts fone/c.w. Reason: need cash only. Both items absolutely like new in appearance and operating condition. W2SOK, Gerald B. Wright, 912 Parry Road, Elkhart, Ind.

FOR Sale: Collins AR-42 Scout VFO, just off the shelf. $35. Write, W2SOK, Gerald B. Wright, 912 Parry Road, Elkhart, Ind.


FOR Sale:最早的1939年版的QST,出售。只提供给出价最高的竞标者。W8BV, P.O. Box 121, Chicago, Ill.


FOR Sale: Rare RCA VHF transmitters, etc. Lowest prices. Term financed by me. Reason: have Super-Pro. Want $145. Write, Wire or call Joseph Skutnik, Pine Island, N. Y. Tel. Warwick 77-288.

FOR Sale: The following books are available: Bound 1932 volume QST and 160 copies 1932-1946. All for first $25 offer. W9KBE, Woodlawn, Ill.

Sell: QST from 1928 through 1939. In good condition. Write W8BV, P. O. Box 121, Chicago, Ill.
QSLS. Design your own, at regular price. Plastics, Bristol, condition. Best offer. Spitzer, 219 Bronx River Road, Yonkers 4, N. Y.

SOL or sell Presto K recorder. Best offer or good receiver. Just answered. WNYD, 802 Georgetown Road, Bethesda, Md.

FOR Sale: NC-100 ASD 110 volt AC 1300 Khz; J3830 Kc used short time. In excellent condition. Complete with loud speaker and extra set of tubes $75.00. Maxian, W2THH, 2412 Enzinger St., New York, N. Y.

FOR Sale: NC-100 ASD 110 volt AC 1300 Khz; J3830 Kc used short time. In excellent condition. Complete with loud speaker and extra set of tubes $75.00. Maxian, W2THH, 2412 Enzinger St., New York, N. Y.

RESISTORS: popular sizes up to 2 watts: $2.00 per kit of 100. Precision (IRC) 1 watt wirewound @ 1% (0.1, 0.15, 0.2, 0.25, 0.3, 0.5, 1.0, 2.0, 5.0, 10.0, 15.0, 22.0, 33.0, 47.0, 56.0, 100.0, 150.0, 220.0, 330.0, 470.0, 560.0, 1K, 2K, 4, 5, 10, 20, 50, 100, 200, 300, 500, 1000, 2000, 3000, 5000 ohms). Price: $2.00 per kit.

SOL or sell Presto K recorder. Best offer or good receiver. Just answered. WNYD, 802 Georgetown Road, Bethesda, Md.

FOR Sale: NC-100 ASD 110 volt AC 1300 Khz; J3830 Kc used short time. In excellent condition. Complete with loud speaker and extra set of tubes $75.00. Maxian, W2THH, 2412 Enzinger St., New York, N. Y.

FOR Sale: NC-100 ASD 110 volt AC 1300 Khz; J3830 Kc used short time. In excellent condition. Complete with loud speaker and extra set of tubes $75.00. Maxian, W2THH, 2412 Enzinger St., New York, N. Y.

FOR Sale: NC-100 ASD 110 volt AC 1300 Khz; J3830 Kc used short time. In excellent condition. Complete with loud speaker and extra set of tubes $75.00. Maxian, W2THH, 2412 Enzinger St., New York, N. Y.

RESISTORS: popular sizes up to 2 watts: $2.00 per kit of 100. Precision (IRC) 1 watt wirewound @ 1% (0.1, 0.15, 0.2, 0.25, 0.3, 0.5, 1.0, 2.0, 5.0, 10.0, 15.0, 22.0, 33.0, 47.0, 56.0, 1K, 2K, 4, 5, 10, 20, 50, 100, 200, 300, 500, 1000, 2000, 3000, 5000 ohms). Price: $2.00 per kit.

SOL or sell Presto K recorder. Best offer or good receiver. Just answered. WNYD, 802 Georgetown Road, Bethesda, Md.

FOR Sale: NC-100 ASD 110 volt AC 1300 Khz; J3830 Kc used short time. In excellent condition. Complete with loud speaker and extra set of tubes $75.00. Maxian, W2THH, 2412 Enzinger St., New York, N. Y.

FOR Sale: NC-100 ASD 110 volt AC 1300 Khz; J3830 Kc used short time. In excellent condition. Complete with loud speaker and extra set of tubes $75.00. Maxian, W2THH, 2412 Enzinger St., New York, N. Y.

FOR Sale: NC-100 ASD 110 volt AC 1300 Khz; J3830 Kc used short time. In excellent condition. Complete with loud speaker and extra set of tubes $75.00. Maxian, W2THH, 2412 Enzinger St., New York, N. Y.

RESISTORS: popular sizes up to 2 watts: $2.00 per kit of 100. Precision (IRC) 1 watt wirewound @ 1% (0.1, 0.15, 0.2, 0.25, 0.3, 0.5, 1.0, 2.0, 5.0, 10.0, 15.0, 22.0, 33.0, 47.0, 56.0, 1K, 2K, 4, 5, 10, 20, 50, 100, 200, 300, 500, 1000, 2000, 3000, 5000 ohms). Price: $2.00 per kit.

SOL or sell Presto K recorder. Best offer or good receiver. Just answered. WNYD, 802 Georgetown Road, Bethesda, Md.

FOR Sale: NC-100 ASD 110 volt AC 1300 Khz; J3830 Kc used short time. In excellent condition. Complete with loud speaker and extra set of tubes $75.00. Maxian, W2THH, 2412 Enzinger St., New York, N. Y.

FOR Sale: NC-100 ASD 110 volt AC 1300 Khz; J3830 Kc used short time. In excellent condition. Complete with loud speaker and extra set of tubes $75.00. Maxian, W2THH, 2412 Enzinger St., New York, N. Y.

RESISTORS: popular sizes up to 2 watts: $2.00 per kit of 100. Precision (IRC) 1 watt wirewound @ 1% (0.1, 0.15, 0.2, 0.25, 0.3, 0.5, 1.0, 2.0, 5.0, 10.0, 15.0, 22.0, 33.0, 47.0, 56.0, 1K, 2K, 4, 5, 10, 20, 50, 100, 200, 300, 500, 1000, 2000, 3000, 5000 ohms). Price: $2.00 per kit.

SOL or sell Presto K recorder. Best offer or good receiver. Just answered. WNYD, 802 Georgetown Road, Bethesda, Md.

FOR Sale: NC-100 ASD 110 volt AC 1300 Khz; J3830 Kc used short time. In excellent condition. Complete with loud speaker and extra set of tubes $75.00. Maxian, W2THH, 2412 Enzinger St., New York, N. Y.

FOR Sale: NC-100 ASD 110 volt AC 1300 Khz; J3830 Kc used short time. In excellent condition. Complete with loud speaker and extra set of tubes $75.00. Maxian, W2THH, 2412 Enzinger St., New York, N. Y.

RESISTORS: popular sizes up to 2 watts: $2.00 per kit of 100. Precision (IRC) 1 watt wirewound @ 1% (0.1, 0.15, 0.2, 0.25, 0.3, 0.5, 1.0, 2.0, 5.0, 10.0, 15.0, 22.0, 33.0, 47.0, 56.0, 1K, 2K, 4, 5, 10, 20, 50, 100, 200, 300, 500, 1000, 2000, 3000, 5000 ohms). Price: $2.00 per kit.

SOL or sell Presto K recorder. Best offer or good receiver. Just answered. WNYD, 802 Georgetown Road, Bethesda, Md.

FOR Sale: NC-100 ASD 110 volt AC 1300 Khz; J3830 Kc used short time. In excellent condition. Complete with loud speaker and extra set of tubes $75.00. Maxian, W2THH, 2412 Enzinger St., New York, N. Y.
The 23000 Series Variable Air Capacitors

"Designed for Application," double bearings, steatite end plates, cadmium or silver plated brass plates. Single or double section, .020" or .060" air gap. End plate size: 1¼ x 1½. Rotor plate radius: 1½". Shaft lock, rear shaft extension, special mounting brackets, etc., to meet your requirements.

JAMES MILLEN MFG. CO., INC.
MAIN OFFICE AND FACTORY
MALDEN
MASSACHUSETTS
A NEW ALL-BAND NBFM-CW TRANSMITTER

Capable of delivering 50 WATTS OUTPUT (ccs rating) 75 WATTS INPUT to any type antenna or load impedance, the SRT 75 employs the famous VFX 680 NBFM-CW-VFO-XTAL exciter (incorporating the exclusive SONAR phase modulated circuit for eliminating BCI). The VFX 680 is link coupled to SONAR's new AMP 50 amplifier, which is powered by the PS 50.

The AMP 50 is an excellently designed low power amplifier using the 2E22 power pentode with the high-efficiency plug-in coil system. The plate tank is a split-stator condenser and a swinging center link coil for balanced loading and harmonic suppression. The meter in the AMP 50 has two scales, one for the grid and one for the plate circuit which is controlled by a switch on the front panel.

The PS 50 supplies the necessary voltages (plate and filament) for maximum ccs rating of the 2E22.

All these attractive units are assembled in a handsome, crackle-finished, rack-size, chrome-trimmed, table cabinet. Plug in the power cord, a key or mike, an antenna and tune for many pleasant QSO's and DX.

$203.67

Amateur Net (less xtal)
The permeability tuned 70E-8A is a frequency generating device around which you can build an excellent r-f exciter with such features as direct dial calibration, excellent keying characteristics, even on 10 meters, practically no frequency drift, and stability that is usually associated with a crystal controlled exciter.

Each 70E-8A is individually calibrated to factory standards which specify that every 100 kilocycle check point from 3.5 to 4 megacycles must be set to within 500 cycles of the dial reading. To assure operation free from humidity effects this oscillator is baked until thoroughly dry, then completely sealed and moisture proofed. As an added protection against leakage a silica-gel capsule is factory inserted.

In order to achieve excellent keying characteristics in a r-f exciter it is desirable for the oscillator to run continuously, and for the keying to take place in a following stage. Due to the fact that the 70E-8A is completely shielded, it is possible to accomplish this without undue back wave interference, even when working break-in on the operating frequency.

The schematic shown here is suggested for a suitable exciter. The output of this exciter is on 80 meters, necessitating the use of the multiplier stages in your present rig to tune the higher frequency bands. The output will be approximately 80 volts across 40,000 ohms—ample to drive a 6L6 oscillator stage or an 807 buffer stage. Write for 70E-8A descriptive bulletin.

Net domestic cash price, complete with slide-rule dial, tube and instruction book, exclusive of state and local taxes, $40.00 F.O.B. Cedar Rapids, Iowa.

COLLINS RADIO COMPANY
Cedar Rapids, Iowa
11 West 42nd Street, New York 18, N. Y.
458 South Spring Street, Los Angeles 13, Calif.
THE NEW
NATIONAL HFS
$125
(Power Supply Extra)

Incorporating the latest in VHF design, the new National HFS is ideal for the amateur, laboratories, fire and police departments, news services, airlines and others interested in compact, dependable VHF equipment modestly-priced. Write for complete information.

THE NEW
NATIONAL HFS
$125
(Power Supply Extra)

Incorporating the latest in VHF design, the new National HFS is ideal for the amateur, laboratories, fire and police departments, news services, airlines and others interested in compact, dependable VHF equipment modestly-priced. Write for complete information.

**Complete Coverage 27 mcs-250 mcs!**

... in 6 bands, including 1¼, 2, 6, 10 and 11 meter amateur bands. Receives CW, AM or FM!

**Mobile, Portable or Stationary!**

Operates from standard National 5886 power supply, National 686S vibrator power supply or batteries! Built-in speaker. Light.

**Receiver or Converter!**

Can be used separately or with any conventional superhet tuning 10.6 mcs. Makes all features of connected receiver usable on VHF!

SEE YOUR NEAREST NATIONAL DEALER LISTED IN THE CLASSIFIED SECTION OF YOUR "PHONE BOOK."
In tubes, high efficiency counts
...and RCA tubes have it

- For instance, take the RCA-8D21 and RCA 829-B VHF power tubes—
  You can hold the RCA-8D21 twin tetrode in one hand... yet this tube takes a full 10 kw input right up to 300 Mc! The answer? Water is piped right into the electrodes... each electrode is cooled close to its active area. What's more, the incorporation of advanced principles of "electron optics" and electrode screening give the RCA-8D21 exceedingly high power sensitivity and unusual stability as a wide-band final amplifier in television and FM transmitters.

The same caliber of engineering ingenuity is incorporated in the tiny RCA 829-B. This tv beam tube for amateur work takes 150 w input at 200 Mc... and can be driven by 2E26 doubler!

To get maximum efficiency from the tubes pay for, buy RCA. For full information on RCA tube, see your local RCA Tube Distributor or write RCA, Commercial Engineering, Sec. DM54, Harrison, New Jersey.

The Fountainhead of Modern Tube Development is 1