In This Issue—
AMATEURS TEAM UP TO BUILD C.D. GEAR
### MINIATURE AUDIO UNITS...RCOF CASE

<table>
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<tr>
<th>Type No.</th>
<th>Application</th>
<th>MIL Type</th>
<th>Pri. Imp.</th>
<th>DC in</th>
<th>Response</th>
<th>Max. level</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-1</td>
<td>Mike, pickup, line to grid</td>
<td>TF1A10DY</td>
<td>50,000 CT, 500 CT*</td>
<td>50,000</td>
<td>0</td>
<td>50-10,000</td>
<td>5</td>
</tr>
<tr>
<td>H-2</td>
<td>Mike to grid</td>
<td>TF1A21TY</td>
<td>42</td>
<td>135,000</td>
<td>50</td>
<td>200-4,000</td>
<td>21</td>
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<tr>
<td>H-3</td>
<td>Single plate to single grid</td>
<td>TF1A51XY</td>
<td>15,000</td>
<td>60,000</td>
<td>0</td>
<td>50-10,000</td>
<td>6</td>
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<tr>
<td>H-4</td>
<td>Single plate to single grid, DC in Pri.</td>
<td>TF1A15YS</td>
<td>15,000</td>
<td>60,000</td>
<td>0</td>
<td>200-10,000</td>
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<td>H-5</td>
<td>Single plate to P.P. grids, DC in Pri.</td>
<td>TF1A15YS</td>
<td>15,000</td>
<td>95,000 CT</td>
<td>0</td>
<td>50-10,000</td>
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<td>H-6</td>
<td>Single plate to P.P. grids, DC in Pri.</td>
<td>TF1A53YS</td>
<td>15,000</td>
<td>95,000 split</td>
<td>4</td>
<td>200-10,000</td>
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<td>H-7</td>
<td>Single or P.P. plates to line</td>
<td>TF1A13YY</td>
<td>20,000 CT</td>
<td>150/600</td>
<td>4</td>
<td>200-10,000</td>
<td>21</td>
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<tr>
<td>H-8</td>
<td>Mixing and matching</td>
<td>TF1A55YY</td>
<td>150/600</td>
<td>600 CT</td>
<td>0</td>
<td>50-10,000</td>
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<tr>
<td>H-9</td>
<td>R2/41.1 Input to grid</td>
<td>TF1A10YY</td>
<td>150/600</td>
<td>600 CT</td>
<td>0</td>
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<td>H-10</td>
<td>10:1 single plate to single grid</td>
<td>TF1A15YY</td>
<td>10,000</td>
<td>1 meg.</td>
<td>0</td>
<td>200-3,000 (42b.)</td>
<td>10</td>
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<td>H-11</td>
<td>Reactor</td>
<td>TF1A20YY</td>
<td>300 Henriels-0 DC, 50 Henriels-3 Ma. DC, 6,000 Ohms.</td>
<td>12.50</td>
<td></td>
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### SUBMINIATURE AUDIO UNITS...SM CASE

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<th>Pri. Imp.</th>
<th>DC in</th>
<th>Response</th>
<th>Max. level</th>
<th>List Price</th>
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<tbody>
<tr>
<td>H-30</td>
<td>Input to grid</td>
<td>TF1A10YY</td>
<td>50**</td>
<td>62,500</td>
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<td>150-10,000</td>
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<td>H-31</td>
<td>Single plate to single grid, 3t.</td>
<td>TF1A51YY</td>
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<td>90,000</td>
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<td>13</td>
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<td>H-32</td>
<td>Single plate to line</td>
<td>TF1A13YY</td>
<td>10,000***</td>
<td>200</td>
<td>3</td>
<td>300-10,000</td>
<td>13</td>
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<tr>
<td>H-33</td>
<td>Single plate to low impedance</td>
<td>TF1A31YY</td>
<td>30,000</td>
<td>50</td>
<td>1</td>
<td>300-10,000</td>
<td>13</td>
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<tr>
<td>H-34</td>
<td>Single plate to low impedance</td>
<td>TF1A31YY</td>
<td>100,000</td>
<td>0</td>
<td>.5</td>
<td>300-10,000</td>
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<tr>
<td>H-35</td>
<td>Reactor</td>
<td>TF1A20YY</td>
<td>100 Henriels-0 DC, 50 Henriels-1 Ma. DC, 4,400 ohms.</td>
<td>11.00</td>
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### ULTRA-MINIATURE UNITS TO SPECIFICATIONS ONLY

UTC ultra-miniature units are uncased types of extremely small size. They are made to customers' specifications only, and represent the smallest transformers in the world. The overall dimensions are 1/2 x 1/2 x 1/4"...Weight approximately .2 ounces. Typical special units of this size are noted below:

- **Type K-16949** 100,000 ohms to 100 ohms...6 MW...100 to 5,000 cycles.
- **Type M-14878** 20,000 ohms (1 Ma. DC) to 25 ohms...6 MW...300 to 5,000 cycles.
- **Type M-14870** 6 ohms to 10,000 ohms...6 MW...300 to 5,000 cycles.
- **Type M-14888** 30,000 ohms (1 Ma. DC) to 30,000 ohms...6 MW...300 to 5,000 cycles.

* 200 ohm termination can be used for 150 ohms or 250 ohms, 500 ohm termination can be used for 600 ohms.

** Can be used with higher source impedances, with corresponding reduction in frequency range. With 200 ohm source, secondary impedance becomes 200,000 ohms...loaded response is ~4 dB at 300 cycles.

***Can be used for 500 ohm load...25,000 ohm primary impedance...1.5 Ma. DC.
Specially designed and built, G-E 5-Star Tubes will help keep you on the air unfailingly. They’re shock-proof ... extra-dependable ... long-lived ... with far fewer shorts and heater failures than standard receiving tubes.

Miami, Fla., Police, in a two-year test of G-E 5-Star Tubes for emergency communications, needed to replace only 1 percent —proof of superior tube reliability!

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See your G-E Tube Distributor for complete facts! Every socket where you plug in a 5-Star Tube, is one more step toward assured operation of your C.D. system in the event disaster should occur. Tube Department, General Electric Company, Schenectady 5, New York.

<table>
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<tr>
<th>STANDARD TYPES</th>
<th>REPLACE WITH THESE 5-STAR TYPES</th>
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<td>*GL-5670—h-f medium-mu twin triode.</td>
</tr>
<tr>
<td>2D21</td>
<td>GL-5727—thyratron.</td>
</tr>
<tr>
<td>5Y3-GT</td>
<td>GL-6087—full-wave rectifier.</td>
</tr>
<tr>
<td>6AK5</td>
<td>GL-5654—sharp-cutoff r-f pentode.</td>
</tr>
<tr>
<td>6AL5</td>
<td>GL-5726—twin diode.</td>
</tr>
<tr>
<td>6AQ5</td>
<td>GL-6005—beam power amplifier.</td>
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<tr>
<td>6AS6</td>
<td>GL-5725—dual-control sharp-cutoff r-f pentode.</td>
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<tr>
<td>6AU6</td>
<td>GL-6136—sharp-cutoff pentode.</td>
</tr>
<tr>
<td>6BA6</td>
<td>GL-5749—remote-cutoff r-f pentode.</td>
</tr>
<tr>
<td>6BE6</td>
<td>GL-5750—pentagrid converter.</td>
</tr>
<tr>
<td>6C4</td>
<td>*GL-6135—medium-mu triode.</td>
</tr>
<tr>
<td>6SK7</td>
<td>GL-6137—remote-cutoff r-f pentode.</td>
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<tr>
<td>12AT7</td>
<td>GL-6201—high-Gm medium-mu twin triode.</td>
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<tr>
<td>12AU7</td>
<td>*GL-5814—medium-mu twin triode.</td>
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<tr>
<td>12AX7</td>
<td>*GL-5751—high-mu twin triode.</td>
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<tr>
<td>12AY7</td>
<td>*GL-6072—low-noise medium-mu twin triode.</td>
</tr>
<tr>
<td></td>
<td>GL-5656—beam power amplifier.</td>
</tr>
</tbody>
</table>

*Slid electrical difference

Sub-miniature G-E 5-Star Tubes, as well as regular 5-Star types, are listed in new Booklet ETD-348-A, which contains a reference table of ratings and characteristics. Ask your G-E tube distributor for a copy, or write direct to General Electric at the address given at the left.

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- 100 watts carrier power with high level (Class AB2) modulation on any band.
- Continuous coverage, with overlapping bands, from 1.7 to 30 mc.
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* T.V.I. PROOFED—means that this transmitter has circuitry specifically designed to eliminate spurious and harmonic energies that result in television interference.

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**Reports Invited.** All amateurs, especially League members, are invited to report station activities on the first of each month (for preceding month) direct to the 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 appointments are non-transferable to League members, where vacancies may be elsewhere. SCMs desire applications for SEC, EC, RM, and FAM. In addition to station and leadership appointments for Members, all amateurs in the United States and Canada are invited to join the Amateur Radio Emergency Corps (see Form 7).

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<th>Phone</th>
<th>City, State/Province</th>
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<td></td>
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<td>Eastern Pennsylvania</td>
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<td>Springfield</td>
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<td>1321 South Governor St.</td>
<td>Evansville 13</td>
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<td>Reno W. Goetsch</td>
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<tr>
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<td>John A. Ross</td>
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<td>MONTANA</td>
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<td>J. R. Rodin</td>
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<td>Everett</td>
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<td>Laurence Sobrin</td>
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<td>John R. Sanders</td>
<td>c/o Mackay Radio Telegraph Co., Inc., Box 904</td>
<td>Honolulu</td>
</tr>
<tr>
<td>NEVADA</td>
<td>W7U</td>
<td>Ray T. Warner</td>
<td>539 Birch St.</td>
<td>Boulder City</td>
</tr>
<tr>
<td>San Diego</td>
<td>W9GL</td>
<td>Roy J. Gould</td>
<td>11615 Eagleswood Ave.</td>
<td>La Jolla</td>
</tr>
<tr>
<td>San Francisco</td>
<td>W9Z</td>
<td>Ray H. Cornell</td>
<td>909 St.</td>
<td>Berkeley 51</td>
</tr>
<tr>
<td>SACRAMENTO VALLEY</td>
<td>W9A</td>
<td>R. P. C. Marlow</td>
<td>141 Colson Ave</td>
<td>San Jose 12</td>
</tr>
<tr>
<td>SACRAMENTO VALLEY</td>
<td>W9VCY</td>
<td>Willie van den Kamp</td>
<td>RD 1, Box 102</td>
<td>Chico 16</td>
</tr>
<tr>
<td>SOUTHERN CALIFORNIA</td>
<td>W4DLX</td>
<td>J. C. Geaden</td>
<td>1942 Logle Ave.</td>
<td>Turlock</td>
</tr>
<tr>
<td>SOUTH CAROLINA</td>
<td>W4DN</td>
<td>T. H. Peck</td>
<td>1708 North 10th Ave.</td>
<td>Charlotte</td>
</tr>
<tr>
<td>SOUTH CAROLINA</td>
<td>W4S</td>
<td>H. E. Lindauer</td>
<td>Route 1, Box 41</td>
<td>North Charleston</td>
</tr>
<tr>
<td>SOUTHERN CALIFORNIA</td>
<td>W4DZ</td>
<td>James P. Born, Jr.</td>
<td>41945 Keowee St.</td>
<td>Irvine 14</td>
</tr>
<tr>
<td>WEST INDIA (CUBA-P.R.-V.L.)</td>
<td>KP4DJ</td>
<td>William Werner</td>
<td>1655 East 4th, North</td>
<td>La Puente 7</td>
</tr>
<tr>
<td>COLORADO</td>
<td>W9DZ</td>
<td>Karl Bruggeman</td>
<td>103 S. 72nd St.</td>
<td>Miami Beach</td>
</tr>
<tr>
<td>UTAH</td>
<td>W7UTM</td>
<td>Floyd L. Hines</td>
<td>3150 Crescent</td>
<td>San Diego 9</td>
</tr>
<tr>
<td>W7HNI</td>
<td>Albert S. Steiner</td>
<td>1701 Sepulveda Ave.</td>
<td>Manhattan Beach</td>
<td></td>
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<tr>
<td>SOUTHERN CALIFORNIA</td>
<td>W8E</td>
<td>William L. Good</td>
<td>300 W. Okalona Dr.</td>
<td>Los Angeles 321</td>
</tr>
<tr>
<td>OKLAHOMA</td>
<td>W8F</td>
<td>Dr. Charles Evertson</td>
<td>2605 W. Oklahoma Blvd.</td>
<td>Pauls Valley</td>
</tr>
<tr>
<td>WESTERN OKLAHOMA</td>
<td>W8DR</td>
<td>Charles F. McMillan</td>
<td>619 Mission Ave.</td>
<td>Oklahoma City 348</td>
</tr>
<tr>
<td>NEW MEXICO</td>
<td>W8DW</td>
<td>Dick Mattia</td>
<td>P. O. Box 348</td>
<td>Santa Fe 348</td>
</tr>
<tr>
<td>MARITIME</td>
<td>VE1DQ</td>
<td>A. M. Bond</td>
<td>300 Dublin St.</td>
<td>Halifax, N. S.</td>
</tr>
<tr>
<td>ONTARIO</td>
<td>VE3HA</td>
<td>G. Eric Forghu</td>
<td>16 Emerald Crescent</td>
<td>Burlington, Ont.</td>
</tr>
<tr>
<td>QUEBEC</td>
<td>VE2GL</td>
<td>Gordon A. Lynn</td>
<td>R. R. No. 1</td>
<td>Ste. Genevieve delemetry</td>
</tr>
<tr>
<td>ALBERTA</td>
<td>VE6MU</td>
<td>Sydney L. Jones</td>
<td>10706-21 Ave.</td>
<td>Edmonton, Alta.</td>
</tr>
<tr>
<td>B.C.</td>
<td>VERTUS</td>
<td>Wild Moorhouse</td>
<td>321 Regina Ave.</td>
<td>Lethbridge</td>
</tr>
<tr>
<td>SASKATCHEWAN</td>
<td>VE4AM</td>
<td>A. W. Morley</td>
<td>20 Lennox Ave.</td>
<td>VAC \</td>
</tr>
<tr>
<td>SASKATCHEWAN</td>
<td>VE4HR</td>
<td>Harold R. Iona</td>
<td>1044 King St.</td>
<td>\</td>
</tr>
</tbody>
</table>

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THE AMERICAN RADIO RELAY LEAGUE, INC.,

is a noncommercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternialism 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.

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"It Seems to Us..."

THE YEAR IN REVIEW

Each year we wonder if the events of the previous twelve months were sufficient in importance or number to warrant recounting of the highlights on this page; but when we start jotting them down, each year seems even busier than those gone before.

Nineteen Fifty-Two saw additional heartening progress in TVI. The Commission announced its own policy, centering on formation of local interference committees but coupled with the very encouraging announcement that many manufacturers had agreed to custom-remedy situations when receivers were at fault. League warnings to industry about potential interference problems at 21 Mc. stirred up a beautiful hornet’s nest, for the first time really reaching the big brass of many companies with the over-all seriousness of the amateur plight. Phil Rand, becoming formally associated with our staff, lectured at industry and service meetings as part of an educational campaign. Net result of these and similar activities: excellent!

The ARRL adopted new instruments of government, and got a new president: Goodwin L. Dosland, W0TSN, replacing George W. Bailey, W2KH, who had held the post for 12 years. Membership again showed a pleasing increase. Interest in contests and awards continued high; another new record was set for Field Day participation. Some DX records on v.h.f. and up were broken. Civil defense plans took more definite shape, and mobile activity reached new highs. The new Amateur Extra Class license exam was tackled by hundreds of more-aspiring amateurs, in addition to those who qualified under the “grandfather” clause proposed by FCC. Novices continued rolling in in considerable numbers, although it is too early to determine whether this license is actually increasing the permanent growth of amateur radio or is simply a means of newcomers being able to start earlier. The League prepared and distributed hundreds of thousands of a new-amateur promotional booklet, the results of which are just beginning to be felt.

But it was in the regulatory field, as seems to be the custom in recent years, that most 1952 developments occurred. We got operating privileges in our Atlantic City 21-Mc. band (and our VE’s got voice privileges therein); we also had our last contacts in 14,350–14,400 kc. We got n.f.m. on all amateur voice sub-bands above 3.8 Mc.; the Radio Amateur Civil Emergency Service; reciprocal operating privileges with Canada; a third-party message traffic agreement with Cuba; Lebanon, Japan and Netherlands West Indies stricken from the forbidden list; and nighttime operating privileges in 1800–2000 kc. shared bands for the boys along the Gulf Coast. Practically without exception, these matters originated with, or at least were actively promoted by, ARRL.

The Commission had pending (in early December, as we write) numerous additional ideas: opening 75- and 20-meter voice bands to General and Conditional Class amateur (opposed by ARRL); opening 7200–7300 kc. to phone (favored by ARRL); opening 7175–7200 to Novices (suggested by ARRL, with the subsequent request that the band be enlarged to 7150–7200); opening most c.w. bands to radioteleprinter (opposed, with request that RTTY be limited to a small segment of 30 meters as originally proposed a year earlier by the League); opening 100 kc. at each end of 21 Mc. to voice (the League’s view is a proposal to permit phone in 21,250–21,450 kc.); opening part of 21 Mc. to Novices (opposed); elimination of special call signs for amateurs (opposed); and the one which caused in amateur ranks the biggest uproar in years — establishment of exclusive calling and answering channels in our bands (opposed!).

On its own, the League requested a band for mobiles 3775–3800 kc.; expansion of the 20- and 10-meter voice bands; opening part of 50 Mc. to duplex and (temporarily) to Novices; and retention of the Advanced Class as a permanent part of the amateur licensing structure. All this unfinished business as the year drew to a close foretold a 1953 similarly occupied with regulatory developments and an already-bulging License Manual perhaps even further fattened.

But let’s not spend time in armchair predictions; let’s tackle each event or problem that 1953 may bring us and give it the best we have. In that way we can be sure that it will be an exciting and rewarding one for amateur radio.
A HELPING HAND

The Boy Scout organization is currently engaged in a program to stimulate greater youth interest in radio, a project which has had full ARRL cooperation inasmuch as the natural channel is of course amateur radio and particularly the Novice Class license. To attract more newcomers to the hobby, BSA during the months of January and February is conducting a listening contest, urging Scouts to use their or friends' short-wave receivers (or build or buy one) to eavesdrop on the ether and familiarize themselves with high-frequency communications procedures. Accent will naturally fall on the amateur bands (though intercepts of other services count for the boys, too). What we're working up to saying is that undoubtedly many amateurs, particularly those on voice, will be receiving SWL cards from Scouts eagerly pursuing their new-found interest. The extent of amateur QSO response may well make or break that interest. So, knowing the typical lack of enthusiasm exhibited by the average amateur upon receipt of a short-wave listener's heard report, we'd like to ask that, particularly for this laudable promotional effort, you take special pains to mail a QSL (assuming the report checks with your log). Remember, you were once a beginner. And the card you may mail may just be the helping hand the Scout needs to spur his interest.

DOCKET 10237 SETTLED

Calling and Answering Frequencies Abandoned

Just at press time the FCC announced final action in Docket 10237. The idea of permanent calling and answering frequencies for normal operation has been completely dropped, which accords with the request of ARRL. The proposed new text for $12.156 on emergency operation has been modified to eliminate specific bands designated in advance, and to eliminate a compulsory listening period, which also accord with ARRL requests; in fact, the final text, which will become effective February 2nd next, is with only slight editorial changes, the same as proposed by the League in its comment (page 32, October QST). Details next month.

Strays

"Why fight it? It's bigger than all of us." So contends W2KDB in recommending that germanium crystals be forthwith officially dubbed germanium.

Glenn (W4BFQ), James (W4EPJ), Bynum (W4NMB), George (W4SLG), Larry (W4WZT) and Tom (W6ZTG) are the brothers Diggs — one real ham family!

"Woodpecker Attacks Television Aerials," reads a headline in a recent Cleveland paper. This undoubtedly lends support to those who maintain that TV is strictly for the birds.

New Zealander Dr. Thomas R. A. Davis, accompanied only by his wife, his two sons and a crew of two, sailed 10,000 miles from Wellington to Boston in his 48-foot ketch *Miri* while placing considerable reliance on contacts with amateurs. A 30-watt transmitter and Eddystone receiver, operated under the call ZKIAN/MM,

Quizz Quiz

During the past several days, our friend A has been hearing an American short-wave b.c. station in the middle of the 20-meter band. Should he sit still and gripe, or should he report it to ARRL?

(please turn to page 150 for the answer)

The *Miri* enters Boston harbor after her five-month voyage from "down under." (Photo by W1BB)

were squeezed aboard — the Doctor has been a radio enthusiast for many years.

"Doctor Tom" undertook the perilous voyage to take advantage of a $5000 fellowship awarded him at Harvard's School of Public Health. Among the stations who contacted and assisted the *Miri* during its five-month passage were:

W6A AVV BB BDM BNS CPI DBE JAK LIB LMB MB ME SIB TOP. W2A DZH H8Q IAW I1K1 KW PFL RWJ VFM YEF ZDB ZL ZM, W3A B7T CPl CRM CH KFO NMQ QEP QHS. W4A JAM BBG CQG/3 FY MPH MVP NV GOX QFS RHC RSF RWW UB VRK W8.

Dr. Davis was "guided in" to dock at the Science Museum, Charles River Basin, where a gala Boston welcome for the *Miri* polished off an extraordinary achievement in seamanship.

— W1BB

QST for
The old filter-builder, Ralph, W2CVF, had been passing comments during many sessions of the Gloster's Club. Most of the boys on the 20-Me. net were right in there pitching with him: "How can a guy spend two or three years out there in West Orange chasing microvolts with a butterfly net?" Or, "All you have to do down here in Englewood is put the rig and filter in a couple of dishpans back-to-back, and you're on the air! Why fiddle with the plumbing in the kitchen sink?"

Ralph would agree that there was a remote possibility that sinks might be involved in TVI. We all would agree that some sinks might be above suspicion, but, of course, there are different kinds of sinks — big ones and little ones, clean ones and rusty ones, city sinks and country sinks.

It finally took Santa Claus to get Ralph to believe in kitchen sinks. On Christmas Day, in 1951, W2CVF went on the air to pass along his season's greetings and to find out who had been able to cash in on the softened-up holiday atmosphere for double-conversion superhet. The atmosphere didn't stay soft for long in West Englewood that day, however. Channel 2 was taking a beating from the most filtered transmitter east of the Hackensack.

How could a horrible thing like this happen to an ardent disciple of Phil Rand, Russ Valentine, and George Grammer? How could it happen to the chief bather of K2CR and W2RYI for bigger and better filter designs?

Ralph admits that he remembered the kitchen sink as soon as the unusual occurred. Actually, the plumbing wasn't involved, but it was the same proposition in a more refined category. Santa Claus had seen to that! The most recent change in the household was a Christmas present to the up-and-coming junior operator, a crystal set for the pleasure of a Christmas toy, and possibly the beginning of a devous road to scientific achievement or fun and fortune on the amateur bands.

No better demonstration of nonlinear systems could have been prepared on the laboratory work bench: a 20-Me. harmonic-free transmitter, an efficient crystal rectifier on an isolated receiving antenna, and a television set tuned to a holiday show. Ralph suspected the crystal and, sure enough, when the cat's-whisker was lifted from the galena, TVI ceased entirely.

* c/o Tube Dept., RCA Victor Div., RCA, Harrison, N. J.

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Case Histories

Not all amateurs have had the dubious pleasure of encountering harmonics radiated from external nonlinear systems. Many in the TV areas have found the phenomenon at work in the first r.f. stage of TV receivers, where a strong amateur signal can swing the grid beyond linearity and produce multiple harmonics of an original pure signal. A few amateurs have isolated other devices that proved to be the cause of harmonics seemingly radiated from carefully shielded transmitters, but the complexity of the problem has baffled careful workers, and many sources of spurious radiation are yet to be discovered.

Table I lists some of the many sources from which harmonics produced in external nonlinear devices were strong enough to interfere with television reception. There are probably hundreds of locations where harmonics are produced at a level too low to develop visible cross-hatching, but are strong enough to measure with simple equipment. From the evidence at hand, it is somewhat perplexing that more of the interfering variety have not been reported. Perhaps, in time, some of the low-level producers will develop into efficient rectifiers, and stronger harmonics will be radiated. This development may be particularly noticeable in cases similar to the one listed in the table wherein corroded TV antenna fittings were found to be at fault. Corrosion conditions are accelerated in humid regions, especially where salt spray is in the atmosphere. Some industrial centers have a slightly acidic atmosphere, which also enhances corrosion.

January 1953
Signal Strength for Interference

As usual with TVI problems, a harmonic entering a receiver at a frequency near that of the picture carrier will not produce cross-hatching unless it is at least 1/100 as strong as the TV carrier. A harmonic measuring 100 microvolts at TV-antenna terminals might never be seen on a kinescope located within walking distance of a TV transmitter. The same level of harmonic measured at a fringe-area receiver, however, could very well be equal in strength to the picture carrier, and could produce cross-hatching as black and white as the picture elements. If all amateur transmitters were completely single-signal radiators, the fringe-area boys would still have more TVI problems than the amateurs in the primary coverage areas, because harmonics from external rectifiers are produced with equal facility in both areas.

Basically, any rectifier can produce harmonics if a signal is fed to the cathode-anode circuit. The low-order harmonics are the strongest, and the high-order harmonics become progressively weaker unless some common resonant circuit accentuates a specific multiple of the fundamental frequency. A good rectifier is one which has the largest ratio of forward-to-reverse-direction current flow. A device having a low rectification ratio will be less efficient as a harmonic producer, the ultimate being a pure conductor which passes current equally well in both directions, producing no harmonics, or a nonconductor which will not pass current in either direction.

Rectifiers are called nonlinear devices because of the marked discontinuity in the graphic presentation of their conduction characteristics. Triodes and pentodes are also nonlinear devices because the output is not exactly proportional to the input, and a graph illustrating the operating characteristics discloses a curved line. The range in which an amplifier is normally used is represented by such a limited portion of the curve that it is almost a straight line, and the harmonic output is extremely low. If the range is increased by applying a large input signal, the portion of the curve used no longer approximates a straight line, and the output signal, therefore, is not an exact reproduction of the input signal. The resultant wave-shape is a composite of strong harmonics.

Natural-Born Rectifiers

Nature is a prolific producer of rectifiers. Oxides and other corrosion products of metals will frequently pass current better in one direction than in the reverse. The efficiency of most of these compounds is low, but some of nature’s products are excellent rectifiers. Lead sulphide is the galena crystal of early radio fame. Silicon and germanium diodes are employed in many modern applications. Copper oxide and selenium, produced under controlled conditions, are utilized extensively for power rectification.

Because corrosion of such metals as iron, copper, and aluminum proceeds uncontrolled in nature, the rectification ability of the corrosion by-products from these metals varies immensely. If the material can pass current slightly better in one direction, however, and if it is part of a circuit arrangement in which r.f. signals can be admitted and released, harmonics will be produced. The strength of the harmonic is a function

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**TABLE 1**

<table>
<thead>
<tr>
<th>Year</th>
<th>Amateur Station</th>
<th>TVI-Producing System</th>
</tr>
</thead>
<tbody>
<tr>
<td>1947</td>
<td>W1DBM, W1DF, W2LV, W2MY1, W2RY1, etc.</td>
<td>1) Harmonics produced in TV-receiver front end, in addition to heterodyning, blocking, etc.</td>
</tr>
<tr>
<td>1948</td>
<td>W2RY1</td>
<td>2) 1st r.f. stage of communications receiver</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3) Modulator plate-filament circuit</td>
</tr>
<tr>
<td>1949</td>
<td>W1DF</td>
<td>4) Evidence from aluminum mast and guy wires</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5) BX sheath touching another BX cable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6) Clean-out poker hanging from pipe</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7) Rectifier in a.c.-d.c. broadcast receiver</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8) Germanium r.f. probe on TV antenna</td>
</tr>
<tr>
<td>1950</td>
<td>W2HP</td>
<td>9) BX sheath touching hot-air duct</td>
</tr>
<tr>
<td></td>
<td>W2PEX</td>
<td>10) Corroded joint on aluminum window frame</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11) (W2RID) Rider editorial on corroded TV antenna</td>
</tr>
<tr>
<td></td>
<td>W2RY1</td>
<td>12) Faulty link joint</td>
</tr>
<tr>
<td></td>
<td>Not given</td>
<td>13) W2UGL’s story about a hearing aid</td>
</tr>
<tr>
<td>1951</td>
<td>W2RY1</td>
<td>14) Bathtub drain-link mechanism</td>
</tr>
<tr>
<td></td>
<td>W2CVF</td>
<td>15) Son’s crystal detector</td>
</tr>
</tbody>
</table>

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QST for
of the r.f. voltage applied, the efficiency of the rectifier, and the resonant frequency of the system.

All of the elements required to produce a harmonic-generating system are present in the houses and structures in the vicinity of amateur stations. If a house could be observed with Superman’s X-ray eyes, the metallic structure standing there would be identical to the conductors that a radio wave would recognize as it passes through the maze of pipes, wires, ducts, and fixtures. An r.f. signal produces standing waves on the various elements of this complex receiving antenna, and wherever a rusty or corroded joint has formed between pipes or lines crossing each other, rectification takes place. The harmonics produced are reradiated by the same metallic maze.

If a joint is an efficient rectifier, if the r.f. voltage applied is high enough, and if the resonant frequency of the metallic structure is appropriate, a nearby TV antenna may receive a harmonic signal sufficiently strong to interfere with the picture. The poker joint listed in Table I produced a 1000-microvolt 57-Mc. signal on the feeder of a TV antenna located 30 feet from the joint and 30 feet from the 23.5-Mc. transmitting antenna.

Because manufactured rectifiers are usually the most efficient, any equipment containing them may be suspected of producing harmonics. The access of r.f. signal to equipment rectifiers is the limiting factor in TVPI production. Other tubes, vacuum and gas, triodes and pentodes, can also produce harmonics if sufficient r.f. reaches them in the equipment suspected.

**Locating Nonlinear Devices**

Table II lists some of the places where trouble may be encountered. Locating natural nonlinear joints is sometimes difficult. Watching the interference pattern on a TV receiver while pushing exposed pipes, air ducts, BX cables, etc., may disclose the location of a joint. The intensity of the interference changes rapidly as the joint is jarred by pushing the pipe or pounding the floor or wall behind it.

When brute-force methods fail, more exacting techniques are required, especially when the system is located between floor and ceiling, or sealed behind plaster walls. Fig. 1 shows a 6-inch pick-up loop fed into a TV tuner. Readings are taken on the S-meter of the communications receiver tuned to the output of the tuner. As a joint is approached with the loop, the S-meter on this double-conversion equipment will indicate an increase in signal strength. The loop will not always pin-point the source, however, because the harmonic signal may be radiating from a considerable length of metal, such as pipe or BX, comprising the joint circuit.

As a matter of fact, the complexity of the circuits involved led to the experiments at W2RYI to learn more about the behavior of harmonic-producing joints. If a nonlinear system cannot be located by direct methods, knowledge of its characteristics is helpful in the
detector work necessary to isolate and eliminate the source of the trouble.

The groundwork for these experiments had been laid in 1947, '48, and '49; completely shielded transmitters and conservatively designed low-pass filters were used, and the worst of the natural nonlinear systems were eliminated. All vacuum and gas tubes in exposed power supplies and control circuits had been by-passed, as shown in Fig. 2 and Table III. Some of the preliminary search for nonlinear joints had been conducted with a portable broadcast receiver. Inasmuch as these external rectifiers will mix signals as well as produce harmonics, the sum and difference frequencies of two signals transmitted from antennas in the back yard are produced in the nonlinear house circuits. Simultaneous transmissions on 27.0 and 28.4 Mc. produced a 1400-ke. signal which could be picked up on the battery portable. In this instance, too, the general location of the rectifying joint could be determined.

Another phenomenon proved helpful early in the proceedings. A small 60-cycle voltage normally present on the BX sheath modulated the harmonics produced in joints common to the BX cable, and the hum could be heard in the double-conversion set-up or could be seen as

<table>
<thead>
<tr>
<th>TABLE II</th>
<th>Nonlinear Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manufactured:</strong></td>
<td><strong>Nonlinear Systems</strong></td>
</tr>
<tr>
<td>Amplifiers</td>
<td>Fluorescent lamps</td>
</tr>
<tr>
<td>Battery chargers</td>
<td>Hearing aids</td>
</tr>
<tr>
<td>Diode probes</td>
<td>Intercoms</td>
</tr>
<tr>
<td>Electronic control devices</td>
<td>Modulation TV receivers</td>
</tr>
<tr>
<td>Field-strength indicators</td>
<td>Neon bulbs</td>
</tr>
<tr>
<td>Corroded joints in conjunction with:</td>
<td>Toy trains (d.c.)</td>
</tr>
<tr>
<td>Air ducts</td>
<td>Furnace and hot-water installation</td>
</tr>
<tr>
<td>Bathroom, kitchen, and laundry fixtures and equipment</td>
<td>Ground clamps</td>
</tr>
<tr>
<td>BX cable</td>
<td>Power line, telephone, radio, TV</td>
</tr>
<tr>
<td>BX boxes, switches</td>
<td>Gutters and roof drains</td>
</tr>
<tr>
<td>Ceiling and wall fixtures, chandeliers</td>
<td>Guy wires and lanyards</td>
</tr>
<tr>
<td>Chains</td>
<td>Lightning arrestors and lightning rods</td>
</tr>
<tr>
<td>Conduits</td>
<td>Metal fences</td>
</tr>
<tr>
<td>Furnace and hot-water installation</td>
<td>Metal-mesh lath for plaster and stucco</td>
</tr>
<tr>
<td>Ground clamps; power line, telephone, radio, TV</td>
<td>Metal towers and masts</td>
</tr>
<tr>
<td>Outside power and telephone lines and equipment</td>
<td>Outside power and telephone lines and equipment</td>
</tr>
<tr>
<td>Pipes; gas, steam, water, sewer, and vents</td>
<td>Radiators and registers</td>
</tr>
<tr>
<td>Receiving antennas — radio and TV</td>
<td>Re-enforcement rods in concrete</td>
</tr>
<tr>
<td>Telephone installation</td>
<td>Thermostat system</td>
</tr>
<tr>
<td>Thermocouple system</td>
<td>Transmitting antennas</td>
</tr>
<tr>
<td>Transmitting antennas</td>
<td>Sheet metal roofs and structures</td>
</tr>
<tr>
<td>Sheet metal roofs and structures</td>
<td>Stove pipes</td>
</tr>
<tr>
<td>Stove pipes</td>
<td>Structural steel beams and framework</td>
</tr>
<tr>
<td>Structural steel beams and framework</td>
<td>Wiring: bell, intercom, power and light</td>
</tr>
</tbody>
</table>

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horizontal bands having variable intensity in the interference pattern. Joints common to water and gas pipes did not exhibit the modulation, so one more bit of information was available to aid in isolating rectifiers.

**Eliminating Joints**

Several techniques were used at W2RYI to eliminate nonlinear joints after they had been located. When possible, the junction was insulated or separated mechanically. Several BXbox connectors had to be scraped and soldered. The water connections to the kitchen sink were inaccessible, and neither insulating nor soldering could be accomplished without ripping up the wall, so a third method was required. Where the pipes emerged under the sink, short copper straps were connected to by-pass the iron-enamel-rust pipe junction.

How long can an effective shorting strap be? How far away from the transmitter can difficulties be expected from harmonics produced by nonlinear systems? What effect does pipe length have on production and radiation of harmonics? Does a joint produce harmonics in direct proportion to transmitter-power input? These were some of the questions that needed answers in the form of specific data, and the experiments were performed to obtain those data.

**Tests with Artificial Joints**

A 1N34 crystal diode was utilized to simulate a relatively efficient rectifying joint. The measurements were taken on the double-conversion setup after it was calibrated with a borrowed signal generator; a well-filtered TV receiver was used to reveal the interference effects. The receiving antenna used for the measurements was of the high-band, low-band type, with folded dipoles and reflectors. This antenna was located 15 feet off the ground and 50 feet from the discone transmit-

Fig. 2 — By-pass filters for exposed tube circuits where rectification can occur. L = 30 µh.; C = 1000 µfd.

Fig. 3 shows the effect of transmitter power input upon harmonic output of the 1N34 system. The dotted lines represent exact proportionality between transmitter power input and harmonic signal output. The deviation exhibited is small enough to indicate that the measurements were reasonably accurate and that the voltages applied to the crystal were not causing breakdown or saturation. Extrapolation of the data for these curves shows that the power input to the final amplifier would have to be reduced to 0.003 watt to stay below the threshold of interference with an isolated nonlinear system of this efficiency.

Fig. 4 shows the effect of various lengths of wire connected to the crystal diode. Here, as in Fig. 3, the rectifier was placed at the end of a half-wave conductor, but the wire appendage connected to the other diode terminal was shortened progressively as the readings were taken. It is possible that there were changing lobes in the radiation pattern, but the major effect of appendage length is clearly shown. That second harmonic comes whompin’ out at a wide variety of appendage lengths, and the third harmonic is not far behind!

The optimum conditions for harmonic production occur when the rectifier and appendage are connected at a point of maximum voltage at the fundamental frequency and the appendage is one-half wavelength at the harmonic frequency. It is reasonable to expect the optimum level of the second harmonic to be 6 db. above the opti-

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TABLE III

<table>
<thead>
<tr>
<th>Procedure for Analysis of Harmonic Radiation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Shield transmitter</td>
</tr>
<tr>
<td>2) Filter all supply and control leads</td>
</tr>
<tr>
<td>3) Use low-pass filter on transmission line</td>
</tr>
<tr>
<td>4) Check harmonics with shielded dummy load</td>
</tr>
<tr>
<td>(lamp in a sealed tin can)</td>
</tr>
<tr>
<td>a) Load inside transmitter</td>
</tr>
<tr>
<td>b) Load at output of low-pass filter</td>
</tr>
<tr>
<td>c) Load at end of coax transmission line</td>
</tr>
<tr>
<td>5) If harmonics are produced only when antenna is connected, attenuate the fundamental and check</td>
</tr>
<tr>
<td>harmonic-to-fundamental ratio</td>
</tr>
<tr>
<td>a) Reduce coupling to final tank</td>
</tr>
<tr>
<td>b) Try a high-pass filter in series with the</td>
</tr>
<tr>
<td>low-pass filter</td>
</tr>
<tr>
<td>c) Run the final at 60 to 70 megacycles if</td>
</tr>
<tr>
<td>possible</td>
</tr>
<tr>
<td>d) Couple a 50- to 80-Mc. self-excited 807 to</td>
</tr>
<tr>
<td>the final tank</td>
</tr>
<tr>
<td>6) If signals at TV frequencies are not coming out of</td>
</tr>
<tr>
<td>the transmitter and antenna, and if radiation</td>
</tr>
<tr>
<td>at the amateur fundamental frequency is required to produce harmonics, look for external nonlinear systems.</td>
</tr>
</tbody>
</table>
Fig. 3 — Effect of power input on harmonics produced by artificial joint.

The maximum 3rd harmonic. It is interesting, however, to note that a strong 2nd harmonic is radiated at a wide range of appendage lengths, whereas a strong 3rd is produced in a restricted range.

A set of conditions in which a strong 3rd harmonic exceeded the 2nd is shown in Fig. 5. A 3rd-harmonic appendage was moved along a fundamental 1/4-wavelength conductor. A reasonably strong 2nd harmonic was available at a number of positions, but in a region between two and three feet from each end of the conductor the 3rd harmonic radiation exceeded the 2nd by a voltage ratio of 4 to 1. Knowledge of the conditions under which higher-order harmonics can exceed the strength of lower-order radiation is valuable in sifting evidence of nonlinear systems, especially when the systems concerned are concealed in walls or ceilings.

Fig. 6 is similar to Fig. 5, except that a 2nd-harmonic appendage was employed in taking the radiation data. Naturally, the 2nd harmonic was easily produced, but it was somewhat surprising to find that the relatively low-level end-point radiation of the 3rd harmonic was not exceeded at other positions along the conductor.

Other combinations of conductor and appendage were tested, but the three described above give the basic characteristics of the systems. Various-sized loops with a crystal inserted were tried. Reasonably strong signals were produced, but loop circumfer-

ences varying from 16 feet down to a few inches produced no extreme resonances. The largest of the loops produced harmonic output in the 1000-microvolt range.

**Interference Tests**

A feeder signal of 4000 microvolts collected on an antenna 20 feet from the radiating system can be expected to produce about 2000 microvolts at 40 feet, and 1000 microvolts at 80 feet. Interference to the TV receiver at W2RYI was, of course, appreciable during the tests of artificial nonlinear systems, and occasional complaints came in from around the neighborhood when the signals were kept on for more than a few seconds during the major-program hours. No attempt was made to determine the exact sphere of influence, but some interesting tests were run with Paul Schneider, W2CYZ, to estimate the range of interference.

Paul's house is located 900 feet from W2RYI. At that distance, the signal from the artificial nonlinear system should have been able to produce about 100 microvolts on his TV feeder. We had planned to take the equipment over to check the level, but after looking at the interference pattern on his receiver, we decided the measurements were unnecessary. When W2RYI was operating on 28 megacycles, with the artificial nonlinear system 50 feet from the discone, and Paul's TV receiver 900 feet away tuned to Channel 2, the cross-hatching in the picture was objectionable.

In the reverse direction, when W2CYZ was transmitting and the nonlinear system was 20 feet from the TV antenna at W2RYI, no visible interference was produced — but that was easy to fix! A 1N34 crystal clipped in series with an 8-foot wire loop across the TV feeder at W2RYI was all that was needed to generate enough harmonic output from Paul's harmonic-free signal to massacre Channel 2. Numerous other combinations of crystal and TV feeder were tried using the signal from 900 feet, and most of them...
produced objectionable interference. Two combinations that were particularly bad were set up to simulate conditions that could actually occur in standard TV installations. One represented a rusty lightning arrestor; the other, a corroded TV antenna.

The "lightning-arrestor" joint consisted of a 1N34 diode clipped to one side of the 300-ohm line about 10 feet from the receiver. An 8-foot appendage from the diode was strapped to the water main where it emerged from the ground.

The "corroded antenna" had an artificial joint that represented one of the many that can develop from weathering. The joint selected was located between the feeder terminal on the low-band folded dipole and the adjacent bolt from the steel support arm. A 1N34 diode clipped between these two points produced heavy Channel 2 interference in the tests with the signal from W2CYZ, and demonstrated the effectiveness of nonlinear joints that can develop on TV antennas.

The artificially corroded TV antenna was also utilized to make measurements of the intensity of high-order harmonics produced by an efficient rectifier. These measurements, shown in Table IV, indicate that the high-order harmonics are comparatively weak. Analysis of the data also indicated that the 35-foot TV feeder was not sufficiently long at 3.5 and 7 Mc. to develop optimum fundamental voltage on the rectifier. The optimum transfer of amateur fundamental signal to harmonics available at the receiver terminals occurs with a length of TV feeder that is resonant at the amateur fundamental, placing a voltage maximum at a rectification point common to both the feeder and a harmonic-resonant element in the TV antenna.

Another optimum condition for nonlinear production of harmonics occurs when an amateur transmitting antenna has a rectifying joint. An "ideal" system would be available if a rectifier were substituted for the insulator at the end of a half-wave doublet, with a wire lanyard ½ wavelength for the second harmonic. Some day, someone is going to experience an exact duplicate of this condition — an old insulator with soot and rust and corroded copper wire — but almost any antenna or supporting structure is capable of developing a corroded joint at a point close enough to the optimum to produce potent harmonic signals.

If an artificial joint 50 feet from a transmitting

<table>
<thead>
<tr>
<th>Harmonic Frequency Mc.</th>
<th>28 Mc.</th>
<th>14 Mc.</th>
<th>7 Mc.</th>
<th>3.5 Mc.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>µS. Sig.</td>
<td>Harmonic</td>
<td>µS. Sig.</td>
<td>Harmonic</td>
</tr>
<tr>
<td>56</td>
<td>5000</td>
<td>2nd</td>
<td>2500</td>
<td>4th</td>
</tr>
<tr>
<td>59.5</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>63</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>70</td>
<td>—</td>
<td>—</td>
<td>900</td>
<td>5th</td>
</tr>
<tr>
<td>77</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>84</td>
<td>1000</td>
<td>3rd</td>
<td>1000</td>
<td>6th</td>
</tr>
<tr>
<td>102</td>
<td>—</td>
<td>—</td>
<td>20</td>
<td>15th</td>
</tr>
<tr>
<td>190</td>
<td>20</td>
<td>7th</td>
<td>3</td>
<td>14th</td>
</tr>
<tr>
<td>210</td>
<td>—</td>
<td>—</td>
<td>5</td>
<td>16th</td>
</tr>
</tbody>
</table>

**Fig. 5** — Harmonic intensity as a function of the position of the third-harmonic appendage along a half-wave conductor. Frequency, 27 Mc.; power input, 320 watts; transmitting antenna 50 feet from harmonic-generating system; receiving antenna 20 feet from system.

**Fig. 6** — Harmonic intensity as a function of the position of the second-harmonic appendage along a half-wave conductor. Same conditions as Fig. 5, except that appendage length is 102 inches.
antenna can produce TVI at 900 feet, less efficient joints common to the antenna should certainly be suspected when TVI at close range is developed.

**Experiments with Joints as Mixers**

Getting back to the TV antenna, the diode connected to the support arm was utilized in examining the behavior of joints as mixers. Natural joints had been investigated with two signals transmitted simultaneously at W2RYI on several occasions, but data from controlled tests were needed for a better understanding of the results.

At times, two separate transmitting antennas were used, but results were identical when the two signals were fed through a coax T-fitting to the discone transmission line, so the measurements made to produce the data for Figs. 7 and 8 were taken with a single source of radiation. One transmitter and a grid-dip oscillator had been used while tracking down the high-level sink joint. The signal from the grid-dip meter was fed into the BX, water, sewer, gas, and steam lines at various points along the lines while the regular transmitter was on 27 Mc. The water and sewer lines in the vicinity of the kitchen developed the strongest sum and difference signals, the grid-dip oscillator being run at 28.4 and 3.0 Mc. to develop signals at 1400 kc. for detection with the battery portable, and at 30 Mc. for checks in the communication receiver.

Stronger and steadier mixed signals, of course, are developed when a second transmitter is run instead of the dipper, and, if work such as searching the neighborhood areas for joints is found necessary, a husky signal is advantageous. In any detecting operation, whether at broadcast frequencies or in the amateur or television bands, the receiver must reject the amateur fundamental. Traps or high-pass or low-pass filters may be required to prevent the production of harmonics or mixed signals in the receiving device.

Two-signal transmissions produced some interesting data. Fig. 7 shows the major harmonic and sum-frequency signals between 50 and 100 Mc. that were developed in the TV antenna with the artificial joint. The power input to each transmitter was 50 watts; the transmitters were run individually at 27 and 29 Mc. and then simultaneously at the two frequencies. Readings taken for the individual transmitters showed that mixed signals developed between two and three times as much voltage as harmonics in the same frequency ranges. The harmonics had less amplitude when both transmitters were operating than when each transmitter was on by itself; the ratio of mixed-to-harmonic signal when both transmitters are operating runs between 5 and 29 to 1. No set pattern for the occurrence of various ratios is evident in the limited data represented by this graph, but the general observation holds that the mixed signals are stronger than the harmonics.

The two-signal method can be utilized to advantage if the existence of detrimental nonlinear systems is questioned in a given location. If mixed signals are produced, the evidence helps confirm the presence of rectifying joints, and the general ratio of harmonic-to-mixed signal can be employed to approximate how much of the harmonic radiation is due to the transmitting equipment and how much is caused by the external systems.

Another clue to the presence of rectifiers

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is available in locations where there is a strong local broadcast station. Mixed signals from the amateur and broadcast transmitters are sometimes available. With the artificially corroded antenna, modulated signals in the 10-to-20-microvolt range can be found 930 and 770 kilocycles from the 2nd and 3rd harmonics of 27 Mc. These signals are W2RYI mixture products of WPAT and WJZ, which are located, respectively, 5 and 10 miles away.

On rare occasions, an audible arc may form at a corroded joint. Some of the “old timers,” especially ‘phone men, have had experience with talking bathtubs and hot-air ducts that called CQ. This type of modulated arc can produce r.f. harmonics as well as sound waves, but the sound may be easier to follow than the r.f. path when tracking down the source of the disturbance. There is one more example of sound indicating r.f. trouble: If the telephone picks up modulation from a transmitter, rectification is taking place, and r.f. harmonics are probably being produced.

**A New Phenomenon**

An unusual phenomenon was immediately apparent when the readings were being taken on the mixed signals. Fig. 7 shows the effect as a differential between the radiation levels of a given harmonic when first one and then two fundamental signals are introduced to the diode. The 3rd harmonic of 27 Mc was recorded as 1500 microvolts when the 27-Mc transmitter was on the air alone. As soon as a 20-Mc. signal was added, however, the 81-Mc. signal dropped from 1500 microvolts down to 50. This was not a case of poor regulation! The power output of the 27-Mc. transmitter remained constant. It was a weird experience to raise the 20-Mc. power slowly from zero to maximum and watch the 81-Mc. signal drop inversely from maximum to minimum. Other harmonics shown on the graph behaved similarly, but the 3rd of 27 happened to be the most striking.

The mechanism of this phenomenon may be cancellation by phase displacement or shift in the operating range of the crystal, or some other derangement that obeys the law of energy conservation. Whatever the cause, some day some application will come along that can utilize this screw-ball effect. In the meantime, it can be used as part of the evidence to convict kitchen sinks.

**Two Signals on Natural Joints**

Fig. 8 shows the normal two-signal radiation field at W2RYI. When this graph was made, the artificial joints had been tucked away in boxes on the shelf, and specific “bad” natural joints had been eliminated. The general trends in the graph pattern are similar to those in the artificial joint pattern of Fig. 7, adding to the evidence that the residual harmonic level is predominantly from external nonlinear systems.

Occasionally, the natural joints at W2RYI produce signals at a lower level than that shown in Fig. 8, and at other times the intensity increases. Joints that produce heavy interference appear on an average of about once a year. As mentioned previously, some of the bad joints are difficult to eliminate, so shunting them with a conductor is an alternative. The accessibility of the junction determines the length of the shunt that can be employed, but shunts that are long have too much inductance.

Shunt lengths are evaluated in Fig. 9. The data plotted represent the radiation characteristics of the optimum 2nd-harmonic system with various lengths of No. 14 copper wire connected across the diode. The actual shunt path includes the distance along the conductors on both sides of the crystal. If attenuation of more than 10 to 1 is desired, it is apparent that a total shorting path of less than 15 inches is necessary. Readings were also taken with an optimum 3rd-harmonic system. The curves for the 2nd and 3rd harmonics were identical in shape, but were 6 db. apart.

No obvious resonances were found during the shorting tests. The shunt evidently does a straightforward job of reducing the fundamental r.f. voltage across the crystal. There may be some resonance tricks that can be performed on the lines common to an inaccessible joint, but the possibilities seem remote. There are, however, other tricks to try that are based on known procedures. For instance, a beam antenna could be so situated that the heading toward the house would be the one most seldom used. Improvement in the order of 10 to 20 db. could be derived. If the shack is on a farm, putting the antenna far away — and high — will reduce the fundamental field. Sometimes changing the polarization from horizontal to vertical, or vice versa, will reduce the strength of the signal reaching a specific, troublesome conductor.

Perhaps a ground-plane antenna placed on top of the house would reduce the r.f. field below sufficiently to eliminate TVI from inaccessible joints; this is an opportunity for the antenna boys.
A Good Four-Tube Superhet

Stability and Selectivity in a Small Double-Conversion Receiver

BY BYRON GOODMAN,* WIDX

There are just three reasons that come to mind why any amateur would want to build a receiver these days. One is a matter of curiosity—he would like to find out for himself what makes them tick. The second is the matter of performance—he can still build a better receiver than the manufacturers make. (Notice that we didn’t say “better than the manufacturers can make,” because that probably isn’t true, but it is true that commercial designs must be based on a series of compromises that will sell the most sets.) And the third reason is simply the matter of pride—he enjoys operating with something he built himself.

Hey! What about price? Can’t you build a receiver cheaper than you can buy it? Sorry, but we doubt it. If you want an all-band receiver, it is rather unlikely that you can build a copy of any of the commercial receivers for what you pay for the factory product. And if you think you can redesign any particular job so that it can be built at lower cost and still look and perform the same, the manufacturer has a job waiting for you as his design engineer.

We aren’t offering a design to compete with the manufactured product. But for $50 (plus $15 for a power supply) you get a 4-tube receiver (with 8-tube performance) that is not difficult to build and that has selectivity and stability not surpassed by factory-built receivers costing much more. On the debit side, it covers only the 3.5- and 7-Mc. bands—if you want 14- and 21-Mc. coverage we suggest crystal-controlled converters ahead of it. It will snap out 75-meter ‘phone signals in a manner seemingly inconsistent with its small size, although it lacks a.v.c. and you have to handle the r.f. gain manually. There is no audio power tube for running a loudspeaker, but the audio volume is enough to rattle the diaphragms of the most rugged pair of headphones. Now that you have our biased appraisal of the set, and if you think you might be interested in a good two-band receiver, let’s take a look at the circuit.

The Circuit

The receiver is a double-conversion affair, with intermediate frequencies of 1700 and 100 kc. The 1700-ke. first i.f. reduces the image problem considerably, and also permits using an oscillator that tunes only one range for the two bands. Tuning the oscillator from 5.2 to 5.7 Mc. gives an i.f. of 1700 kc. for the 3.5- to 4.0-Mc. range and the same i.f. for the 6.9- to 7.4-Mc. range. Thus the oscillator components can be soldered in place (no switching or plug-in coils) and the dial calibration made once and not worried about after that. To change bands, it is only necessary to swing the input condenser to the 80- or 40-meter band. The 1700-ke. i.f. eliminates any pulling on the oscillator, on either the 40- or 80-meter range.

The 6SB7-Y is a considerably better tube than the 6SA7, from the standpoint of gain, and was a “must” choice for the first converter, since no r.f. stage was to be used. To minimize spurious responses, two tuned circuits were used. In the original version the stray capacity coupling between stator plates of a dual condenser was used. From a signal standpoint the coupling was quite adequate, but on 40 meters the set was plagued with strong commercials around 9 Mc. riding through, since the strong second harmonic

*Assistant Technical Editor, QST.
of the oscillator (around 10.7 Mc.) made this almost inevitable. Attempts at reducing the magnitude of the second harmonic were fruitless, so the two stator sections were shielded from each other, and a shield was added between the coils. Coupling was then controlled by a large capacitor common to both circuits, and this did the trick beautifully. The reasoning followed, of course, was that the original capacity-coupled circuit increased the coupling at the higher frequencies, while the common-capacity coupling now used decreases at the higher frequencies. Suffice to say it was well worth the effort, since it boosted the 9-Mc. rejection from 30 to around 50 db. Fig. 1 shows the principles involved in the two circuits.

Referring to the circuit diagram, Fig. 2, the 1700-kc. signal from the first converter is then converted in the 6K8 second converter to 100 kc. The use of a 1600-kc. crystal for the oscillator at this point may seem like an elaboration, but it permits using a gain control (R10) that has no effect on the frequency. This is a desirable characteristic of any receiver (no frequency change with gain-control setting), and so the 1600-kc. crystal at $2.70 was not considered to be a luxury. While this oscillator could be made self-controlled, it would be almost certain to "pull" with gain-control changes.

The 1700-kc. transformer, T1, between the first and second converters may also appear to be a luxury, since the one specified is a relatively expensive job. However, there can be no compromise at this point, because a poor transformer will not have enough rejection to avoid the secondary images (200-kc. away) that might otherwise ride through. This is no idle speculation on our part — we originally used cheaper components here and made the 6K8 regenerative, but it was too clumsy. The present arrangement is much more satisfactory.

The 100-kc. output from the 6K8 is filtered through several tuned circuits and feeds a triode plate detector (½ 6SN7). This detector is regenerative, but the regeneration is fixed and doesn’t have to be bothered with by the operator unless he changes tubes and the replacement has considerably different characteristics. The regeneration in this 100-kc. detector is what gives the receiver its single-signal a.w. reception characteristic, since there aren’t enough tuned circuits to give it otherwise. The b.f.o. uses the other triode in the 6SN7 envelope, and stray coupling is used for the b.f.o. injection. Using a 100-kc. coil similar to those used in the amplifier, the Clapp circuit is a logical one for the b.f.o., because of the high L-to-C ratio involved. No panel control of b.f.o. pitch was made available — it was deemed unnecessary because the selectivity is not adjustable.

Up to this point the gain of the receiver is

\[\text{QST for}\]
Fig. 2 — Wiring diagram of the four-tube receiver.

- C1 — 10-mfd. ceramic or mica.
- C2 — 140-mfd. per-section dual variable (Hammarlund MCD-140-M).
- C3, C22 — 0.001-mfd. ceramic or mica.
- C4, C23 — 220-mfd. silver mica.
- C5, C24 — 47-mfd. silver mica.
- C6 — 35-mfd. midget variable (Bud LC-1643 or Hammarlund HF-35).
- C7 — 100-mfd. midget variable (National PSR-100).
- C8, C9, C10 — 0.01-mfd. ceramic.
- C11, C12, C13, C14, C15 — 0.1-mfd. 400-volt plastic cased (Sangamo or Sprague).
- C16 — 390-mfd. mica.
- C17, C18, C19 — 100-mfd. mica.
- C20 — 4.7-mfd. mica.
- C21 — 0.0015-mfd. mica.
- R1 — 47 ohms.
- R2 — 22,000 ohms.
- R3 — 4700 ohms.
- R4, R5, R60 — 1000 ohms.
- R6 — 0.15 megohm.
- R7 — 220 ohms.
- R8 — 2000 ohms.
- R9 — 10,000 ohms, 2 watts (or two 22,000 ohms, 1 watt in parallel).
- R10 — 1000-ohm wire-wound potentiometer (Malloy M1MP).
- R11 — 1800 ohms.
- R12 — 33,000 ohms.
- R13 — 6800 ohms.
- R14 — 0.1 megohm.
- R15 — 10,000 ohms, 1 watt.
- R16 — 0.25-megohm volume control.
- R17 — 2200 ohms.
- R18 — 0.22 megohm.

All resistors 1/2 watt unless specified otherwise.

- L1, L2 — 35 turns No. 30 d.c. close-wound on National XR-50 slug-tuned form. Primary on L1 is 8 turns No. 30 d.c. close-wound at ground end.
- L3 — 23 turns No. 24 bare space-wound 32 turns per inch, 1/4-inch diam. Hickok is 1 3/4 turns spaced 1 turn from L3. See text. (Made from B&W 3008 Miniductor).
- L4 — 20-mh. (approx.) slug-tuned 'coil. See text. (RCA 205R1).
- L5 — 20-henry 15-ma. choke (Stancor C-1515).
- RFC1 — 750 ohms. (National R-33).
- S1 — S.p.s.t. rotary or toggle.
- T1 — 1700-ko. i.f. transformer, modified. (Milenk 62161) See text.
- T2, T3 — 100-ko. transformers made from TV components (RCA 205R1). See text.
- T4 — Small 3:1 audio transformer (Stancor A-63C). The 1600-ko. crystal is a Peterson Radio type Z-2.
not too high, and two stages of audio amplification are used. Omitting the cathode by-pass condensers still leaves more than enough audio for any pair of high-impedance headphones.

There is good reason for keeping the gain low up to the audio amplifier. By keeping the level as low as possible up to and through the selective stages, there is a minimum opportunity for overloading and cross-modulation, and the gain must be kept only high enough to prevent degrading the signal-to-noise ratio. Further, it is well known that a regenerative stage has a tendency to "flatten out" with strong signals, so the regenerative detector is somewhat protected by keeping the gain down. But don't for one minute get the idea that this receiver doesn't have plenty of sensitivity, because it does. In any normal location, and with a halfway decent antenna, you will hear all the signals any large receiver can pull in, unless the large receiver has more selectivity than this one. This wouldn't be true on 20 and 10 meters, of course, because there is hard or impossible to get away without using an r.f. stage for best signal-to-noise ratio, but on 40 and 80 the "outside" noise is almost always the limiting factor.

**Construction**

One's first reaction to a glance at the photographs is probably "Why build a receiver like that?" An aluminum chassis is stacked on top of a steel one — why? Well, we think we have some pretty good reasons, and the results have backed us up. One of the primary objectives in this little receiver was to build something that was stable, where a signal wouldn't disappear if you leaned on the dial or dropped a pin on the table. Our choice of dial was the National ACN, because it can be calibrated. To put the knob of the ACN dial where it would be comfortable meant raising it on the 8 X 12-inch panel, and with a chassis mounted at the bottom of the panel this would mean adding braces between panel and chassis for maximum rigidity. So we used the side of the 7 X 11 X 2-inch chassis to back up the part of the panel where the dial was mounted, fastening the two together with 6-32 screws, 1/2-inch long brass collars and a few necessary washers. The ACN drive mechanism is more than 2 inches in diameter, and it would have weakened the chassis to cut out a hole for this drive, as well as making a nasty workshop problem. So we have an aluminum chassis mounted above the bottom of the panel, and the whole thing sits on an inverted steel chassis that has rubber feet (grommets) in the corners. We could have used another aluminum chassis at the bottom, of course, but we wanted all the weight we could get. If you have ever operated with a small receiver that can easily be pushed around on the table top, you'll know why. In any event, the receiver is stable — pushing on the dial doesn't vary the beat note at all, and pounding the table alongside the receiver results in only the slightest of short warbles. (We've never met anyone who operates his receiver while pounding with his other hand on the table, but we know it is one of the universal tests for receiver stability.)

In the oscillator circuit, the 35-µfd. tuning condenser is supported by a small aluminum bracket, and the 100-µfd. trimmer is mounted on the chassis so that it is adjustable from the top. Neither condenser is grounded to the chassis through its mounting — leads from the rotors are grounded to the chassis at one point near the 6SB7-Y tube socket. The oscillator coil is mounted by its leads on a small multiple tap point. This may seem ridiculous in an oscillator that we want to be stable, but the B&K Mini-Ductor is solid, and has so little mass that it is hard to make it vibrate on its short leads.

The shield between the input coils, L1 and L2, is made of thin aluminum. It has a notch in the edge that goes against the chassis side, to clear the antenna-coil leads, and it has a hole through it for the lead between the bottoms of L1 and L2. The dual condenser, C2, is fastened to the chassis by a single 6-32 screw, and the head of this screw has a copper shield soldered to it for minimizing coupling between C2A and C2B. The shield is easily cut out from copper flashing and soldered to the screw head. The rotor assembly of C2 must be removed to put the shield in place, but this is just a matter of loosening four screws. Don't touch the stator plates. The screw with the shield on it, which holds C2 to the chassis, also holds the coil shield in place underneath the chassis.

The 1700-ke. i.f. transformer is mounted on its side because the chassis and panel sizes are such that the receiver can be mounted in a small cabinet, and mounting the transformer upright would prevent any such installation. To lay the
transformer on its side, two 3/8-inch diameter holes were drilled in the side of the i.f. can, opposite the coils. The leads from the i.f. transformer are brought out these holes and through corresponding holes in the chassis. An end plate on the transformer has a clearance hole for the grid lead. Fig. 3 shows these modifications and how the leads are connected and brought out. The 1700-ke. transformer was fastened to the chassis with two clamps using spade bolts, in much the manner that some filter condensers are clamped. Another method might be to make a bracket of the end plate and another bracket at the adjusting-screw end of the transformer.

The 100-ke. circuits use a TV component, the RCA 205R1 Horizontal Oscillator coil. As purchased, they have the soldering lugs and tuning screw out of the top of the can, but they are easily reversed by unmerming the can and reversing the assembly. Before reassembly, however, there are a few things to be done. These coils are actually two coils, a large one connected to Pins A and F (with a center-tap at C) and a smaller coil connected between C and D. The large coil is used for the 100-ke. tuned circuit by connecting a 100-mfd. mica condenser between A and F and lifting the center-tap from Pin C. Don’t break the center-tap — the easiest way is to scrape the two wires first to remove the insulation, flow a drop of solder on the scraped portion, and then cut the two wires away at the pin. The other winding is used as the primary in T2 and the tickler in T3. The primary in T2 can be tuned from the top, because there is also an iron slug in this smaller coil.

While all of these modifications may sound complicated, they are actually harder to describe than to do, and with the components in hand there should be no trouble in making the changes.

In wiring the set, tie points were used liberally so that no components would be floppy. The only shielded wires are the one running from the volume control R15 to Pin 1 of the audio amplifier and the leads from T3 to Pins 4 and 5 of the detector. The shields are grounded to the chassis at the ends and any other convenient points.

The oscillator coil, L5, is made from B&W Miniductor. To separate the two coils of L5, push the 3rd or 4th turn from one end of the piece of Miniductor through toward the center of the coil. Snip this wire with a pair of cutters and push the two ends back out. Each end is then poled around for 3/8 turn. The two coils are then adjusted to the right number of turns by working in from the outside ends.

The rotor of C5 is grounded underneath the chassis by running a wire from the front support of the rotor through a hole in the top.

This view underneath the chassis shows how the parts are arranged around the various tube sockets. Note the baffle shield between the two input coils (left). Not clearly visible in the photograph, but an important part of the construction, is the tie point that supports the oscillator coil (between tuning condenser and coil baffle shield).
of the chassis to the lug under L1. Grounding the rotor to the top of the chassis is undesirable because the r.f. must then flow over and under the chassis.

The aluminum chassis is bolted to the steel chassis by two 4½-inch lengths of ½-inch diameter brass rod, threaded 6-32 at each end. These rods pass through holes in the top and lip of each chassis. The only holes that are required in the steel chassis are those for the two tie rods, the four holes for the rubber feet, and a 1¾-inch diameter hole to clear the headphone jack.

**Adjustment**

There are two types of adjustment that must be made to get the receiver working: adjusting the circuits to the proper frequencies and adjusting the oscillators and the regenerative detector to the proper amplitudes. To this latter end, leave the grounded end of R5 disconnected in your original wiring, and lightly solder (so that it can be changed later) the lead from Pin 5 of the detector to Terminal C of T5. Resistors that may require changing are R2, R7, and R15, so don’t solder them too well the first time around.

Connect a power supply to the receiver and see that the tubes light and that the powersupply voltages are approximately correct. The 250 volts can be anything 25 volts either side of 250, and the 105 volts, coming from a VR tube preferably, will be nothing to worry about if the VR tube lights.

Having proved the wiring this far, connect a low range milliammeter between R9 and ground (+ lead to ground) and apply power again. The grid current should read about 0.05 ma. (50 μa.). If it reads much more than this, try a slightly larger resistor at R7, or a smaller one if the grid current is too low. Make these adjustments with the rotor arm of R19 at the grounded end (maximum gain).

Next check the oscillation of the oscillator portion of the 6SB7-Y. To do this, connect the + side of your 0–10 high-resistance voltmeter to the chassis and connect the − terminal to a 10-mh. r.f. choke. Touch the other side of the choke to the junction of R1 and R2. Lacking a high-resistance voltmeter (20,000 ohms per volt or a v.t.v.m.), lift the end of R3 that connects to the tuning condenser and insert a 0–1 milliammeter between resistor and ground. With C7 set at about ¾ maximum capacity, your voltmeter should read about 3½ volts (or the milliammeter about 0.2 ma.). If it reads much more, increase the value of R3 — if much less, the value of R2 should be decreased. If you get no reading, it means the oscillator isn’t working, and you probably have a mistake in the wiring. With both coils of L4 wound in the same direction (as with the Miniductor), the stator of the tuning condenser should be connected to the outer end of the larger coil, and Pin 6 of the 6SB7-Y should be connected to the inside turn of the smaller coil.

If you can borrow a serviceman’s test oscillator that will give a modulated signal at 1700 kc., this signal can be introduced at the grid of the 6K8 and the 100-kc. i.f. circuits can be peaked (b.f.o. turned off), listening in the headphones for maximum response. The 1700-kc. signal can then be transferred to the grid of the 6SB7-Y and the trimmers peaked on T1. Lacking the signal generator, the next best bet is to provide a modulated signal in the 80- or 40-meter band and couple it to the stator of C28. Let’s assume the signal you have is from a crystal oscillator or VFO at 3750 kc., running from an unfiltered power supply to furnish the modulation. Set the tuning dial vertical. If the signal were at 3500 kc., you would set the tuning condenser C5 at almost full capacity. Rock C7 slowly until the signal is heard. Then peak the 100-kc. transformers T2 and T3, reducing the signal input as necessary to avoid overloading. Then turn on the b.f.o. and adjust the slug in L4 until a beat note is heard. Then peak the trimmers in T1.

With the initial tuning of the 100-kc. channel done, the slugs of L1 and L2 can be adjusted for maximum signal, with no antenna connected. Set C9 at almost full capacity, your signal near 3.5 Mc., and adjust the iron slugs for maximum in the headphones. If you are using a VFO or crystal oscillator, there will probably be enough pick-up without any apparent coupling, but a short 6-inch wire connected to the antenna terminal may be required to pick up the output from a low-powered signal source.

Unless you are very lucky, indeed, the 100-kc. circuits will not be tuned to the exact frequency that makes the calibrations coincide on 80 and 40 meters. While it isn’t necessary, of course, it does make the dial look cleaner. To bring the calibrations into line, beg or borrow a crystal frequency standard that will give signals at 100-kc. intervals. First locate the 4.0- and 7.0-Mc. points on the dial, by referring the harmonics from the 100-kc. standard to the original signal you used for alignment. If, for example, the 80-meter sig-

(Continued on page 108)
Voltage-Multiplying Circuits

A Brief Review of Transformerless Power Systems

BY GABRIEL P. RUMBLE,* EX-W5BBB

Voltage-Multiplying circuits, that is, powersupply circuits in which an a.c. voltage is changed to a higher d.c. voltage, have their widest application at the present time in television receiver circuits. However, frequent use is made of such circuits in ham gear where simplicity and light weight are prime considerations.

Voltage Doublers

In Fig. 1, a condenser and rectifier in series are connected across a source of alternating voltage.

\[\begin{align*}
\text{A.C. Source} & \quad + \quad D_1 \quad + \quad x \\
\text{C}_1 & \quad + \quad D_1 \quad - \quad Y \\
\text{A.C.} & \quad + \quad \text{Source} \\
\end{align*}\]

\(\text{Fig. 1} \quad \text{In A the condenser is being charged. In B the voltage between points X and Y is essentially twice the peak value of the applied a.c. voltage.} \)

When the polarity of the source is as shown in Fig. 1A, the rectifier will conduct and the condenser will become charged to the peak value of the a.c. voltage. When the source voltage reverses polarity, the rectifier will not conduct, but the polarities of the condenser charge and the source voltage will be such as to be additive. Therefore, when the source voltage reaches its peak value on this second half of the cycle, the voltage between points X and Y will be twice the peak value of the source voltage. This doubled voltage can be conducted through an additional rectifier, as shown in Fig. 2, to charge a second condenser to

\[\begin{align*}
\text{A.C. Source} & \quad + \\
\text{Load} & \quad - \\
\end{align*}\]

\(\text{Fig. 2} \quad \text{A practical half-wave voltage-doubling circuit.} \)

delivered twice the peak value of the source voltage to the load. Thus we have a circuit by which a voltage higher than the source voltage can be obtained without the use of a transformer. The circuit of Fig. 2 is called a voltage-doubling circuit. It should be noted that no current flows from the input circuit to the load during that portion of the cycle when the first condenser, \(C_1\), is being charged, because the polarity existing at that time is such as to make the rectifier, \(D_2\), nonconducting. Therefore, the circuit is a half-wave rectifier. However, the discharging of the condensers has a filtering action that smooths out the pulsations before reaching the load. The ripple voltage appearing across the load will depend on the capacitance of the condensers and the value of the load resistance, becoming smaller with an increase in each. For many applications, the further filtering is necessary. Capacitances of 40 \(\mu\text{F}d\). are commonly used throughout voltage-multiplying circuits. \(C_1\) should have a voltage rating at least equal to the peak value of the source voltage; \(C_2\) twice this value.

When more than a light load is placed across the output terminals of the circuit of Fig. 2, the output voltage sags sadly. Regulation is a function of condenser capacitance and rectifier resistance, improving with an increase in capacitance and a decrease in resistance. An advantage of this circuit is that one side of the load circuit may be grounded directly.

\[\begin{align*}
\text{A.C. Source} & \quad + \\
\text{Load} & \quad - \\
\end{align*}\]

\(\text{Fig. 3} \quad \text{A full-wave voltage-doubling circuit.} \)

Improvement in regulation and a reduction in the output ripple can be obtained by using a voltage-doubling circuit in which full-wave rectification takes place. Such a circuit is shown in Fig. 3. On one alternation (half cycle) one condenser is charged, while on the other alternation the other condenser is charged; hence full-wave rectification. The two charged condensers are in series across the load; hence voltage doubling. A disadvantage of this circuit in some applications is that neither side of the load circuit may be grounded. Both \(C_1\) and \(C_2\) should have a voltage rating at least equal to the peak value of the a.c. input voltage.

Voltage Multipliers

The principle of voltage multiplication, that is, the charging up of a condenser through a rectifier during one alternation and the addition of the condenser charge to the line voltage on the other alternation can be extended beyond doubling to tripling, quadrupling and, indeed, to any number of stages. Fig. 4 shows a multiplier cir-
circuit having five sections. You will notice that the first two sections of this circuit are similar to the doubling circuit of Fig. 2. The condenser, $C_5$, will be charged up to five times the peak voltage of the a.c. input voltage. To obtain the desired output voltage, it is necessary merely to employ the appropriate number of sections. $E$ is the peak value of the applied input voltage. The condensers should have a voltage rating at least equal to this peak voltage times the number indicated in each section. The voltage regulation of such an arrangement gets worse as stages are added. For this reason, the condenser capacitances should be as large as practicable. At first glance, one might suspect that the inverse peak voltage across the rectifier increases with each stage, but such is not the case. Under no load, the peak inverse voltage across each rectifier is the same, i.e., twice the peak value of the a.c. input voltage. No matter how many stages, this type of circuit always gives half-wave rectification. As indicated, one side of the load circuit may be grounded.

When tripling or quadrupling, better voltage regulation will be obtained with the circuits of Fig. 5. As with the full-wave doubler circuit, however, neither side of the load circuit can be grounded directly. In the tripler circuit of A, $C_1$ and $C_5$ should have a voltage rating at least equal to the peak value of the a.c. source voltage, while the minimum voltage rating for $C_3$ should be twice that value. In the quadrupler circuit of B, $C_1$ and $C_6$ should be rated for the peak of the source voltage and $C_2$ and $C_4$ for double this value.

From an examination of these circuits, it will become evident that they are most practical for use with selenium or other types of rectifiers requiring no heated filament. The number of filament transformers will usually prohibit the use of vacuum-tube rectifiers. Since the capacitances required are large, such circuits are normally considered economically attractive when the output voltage is limited within the voltage ratings of electrolytic condensers.

![25 Years Ago](image)

**January 1928**

... Results of the International Radiotelegraph Conference were not as unfavorable to amateurs as was anticipated, thanks to the staunch support of the United States and other friendly delegations.

... ARRL Secretary Warner tells a full story of the Conference, pointing out the fears and prejudices toward amateur held by European governmental and commercial interests attending the meeting.

... The Conference designated these amateur band allocations, anticipated effective by 1929: 1715–2900, 3300–4000, 7300–7330, 14,000–14,400, 23,000–30,000 and 56,000–60,000 kilocycles.

... In "Municipal Ordinances on Radio Transmission Unlawful," ARRL Assistant Secretary A. L. Budlong tells of League Director Paul Sagal’s successful precedent-setting case for 9ALM against the town of Wilmore, Ky.

... "Rotten Funk," by The Old Man, gives a hide-tanning to amateurs who hold the view that ham radio is now on the skids as a result of International Radiotelegraph Conference decisions.

... P. C. Lackey, 5AJ, and Dean Spencer, 5JU, stress some important factors to be considered before the average c.w. transmitter may be properly modulated for work in the phone bands.

... "The Grinding of Quartz Plates," by E. G. Watte, jr., 4FM, gives thorough attention to a subject of great interest to crystal-control enthusiasts faced with the prohibitive costs of commercially-ground plates.

... Glenn H. Browning discusses "Radio Frequency Chokes for Receivers" and Rudolph Sturm, 3EQY, furnishes many valuable pointers for emergency and portable operation in "A Portable Power Supply."

... "Matching the Transmission Line to the Antenna," by Walter Van B. Roberts, gives a somewhat mathematical slant on the problem of coupling transmitter output to antenna for maximum efficiency.

... There appears a complete description of nuSCAB, the de luxe Washington, D.C., installation of C. A. Briggs, which has probably handled more messages without schedules than any other ham station of the day.
Simple Remote Tuning for the VFO
An Easily-Made Unit with Minimum Drift

BY DONALD H. MIX, W3ASW

As pointed out previously, the series-tuned Colpitts (Clapp) VFO circuit lends itself especially well to remote tuning control.\(^1\) This refers to the currently popular scheme in which the VFO is placed on the operating table where it can be tuned conveniently, while the rest of the rig may be several feet away. Such an arrangement often involves complications, such as the need for an additional tuned circuit at the output end of the cable coupling the VFO to the transmitter. This is particularly inconvenient if the transmitter stage being fed is normally a crystal oscillator.

The Clapp circuit has the advantage that the tuned circuit can be separated from the VFO tube through a cable several feet long not only with negligible loss, but also without reaction on the frequency by movement of the cable. However, perhaps the greatest advantage in this arrangement is that separation of the tube and tuned circuit reduces temperature effects (drift) to a minimum. It also permits mounting the coil in its enclosure without regard to other components. The coil can be placed at the center of the box with maximum spacing from the sides and, as a consequence, minimum sacrifice in Q.

In this instance, the VFO consists of the two


\(^{2}\) Mix, "The 'Bandbox' -- a Single-Control Frequency-Multiplier Unit," QST, April, 1952, p. 11

\* In the August issue of QST, W3ASW pointed out the possibilities that the Clapp VFO circuit offered in the way of remote tuning and the advantages to be gained by such a system. This article describes the practical construction of a unit incorporating the principles set forth in that article. It not only affords a simple means of feeding a VFO to an existing transmitter but also results in reduced frequency drift.

The remotely-tuned VFO. The large box contains the tuned circuit, the smaller one the oscillator and voltage-regulator tubes. The two terminals on the smaller box are for output and key connections. The power connector is at the end opposite the cable connection.

The oscillator operates in the 3.5-Mc. region and the bandspread tuning system, consisting of shielded units shown in the photographs, one containing the tuned circuit (Fig. 1B) and the other the 5763 oscillator tube and a pair of 0B2 voltage regulators (Fig. 1A), because the VFO was designed primarily as a driver for the "Bandbox" frequency multiplier described in the April, 1952, issue of QST. However, in many cases, the crystal-oscillator tube of a rig can be substituted for the second unit mentioned, if the tube is a 6AG7 or 5763. If the popular grid-plate crystal-oscillator circuit is in use, it should be possible to feed the tuned circuit directly through the 2-conductor cable to the crystal terminals without modifying the crystal circuit in any way. The cable may be of any length up to 10 feet or so. RG-22/U is recommended.

January 1953
$C_1$, $C_2$ and $C_3$, is designed to cover the desired frequency ranges in three steps, when $C_1$ and $C_2$ are altered as described under Fig. 1. With one setting of $C_2$, the tuning condenser, $C_1$, spreads the range of 3500 to 3750 kc. out over 95 per cent of the National ACN dial. Since this fundamental range covers the most-used 80-meter c.w. frequencies, and harmonics of this range cover all of the higher-frequency bands, excepting only the 11-meter band, this range will usually suffice for 90 per cent of all operating. By shifting $C_3$, the range of 3750 to 4000 kc. is spread out over about 75 per cent of the dial. The 27-Mc. band is provided for by a third setting of $C_2$.

**Construction**

The tuned circuit is housed in a $5 \times 6 \times 9$-inch aluminum box. An enclosure of this size is needed not only to provide mounting for an adequate dial, but also to permit spacing the coil well away from the sides of the box so that its Q will not be drastically reduced by the shielding in its field. Incidentally, tests showed that although larger coils had a higher Q before they were placed in a box of this size, the Q of the B&W "J" coil was only negligibly less when the coil was enclosed. Some increase in Q can be obtained by using a larger coil, such as the "T" series B&W unit, provided that a much larger enclosure is used.

The dial is first mounted centrally on one of the $5 \times 9$-inch sides of the box. The tuning condenser, $C_1$, is then coupled to the dial and the mounting step at the rear of the condenser is supported against the bottom of the box with a heavy metal spacer cut to fit. The handset condenser, $C_2$, is shaft-hole mounted 1 inch in from the left side and bottom of the box. This necessitates drilling the shaft hole through the edge of the dial frame. $C_3$ is soldered directly across the terminals of $C_2$. The knob is a National HRS-5.

The B&W coil is removed from its mounting by first drilling out the rivets in the plug-in base, leaving the metal angle pieces at each end attached to the coil, and unsoldering the leads from the pins. The link winding is carefully removed by snipping the turns and prying the spacing blocks loose with a knife. One turn is removed from the coil itself. The coil is then mounted on National GS-1 pillar insulators so that it will be centrally located in the box in both directions. The three-contact jack for the remote-tuning cable is set in the back of the box, and $C_4$ and $C_5$ are soldered to its terminals.

The photographs show the essential details of the assembly of the tube unit. The enclosure is a standard $2 \times 2 \times 4$-inch aluminum box. The three tubes are mounted on a shelf spaced 1 3/4 inches from the top of the box. This dimension is critical if the tubes are to be removed without difficulty. The keying and output jacks are mounted in one of the covers, below the shelf level, and the power connector is mounted at one end and the jack for the coax cable at the other. The resistor, $R_5$, is mounted on top of the shelf, alongside the tubes, on the same side of the box.

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*Interior of the tuned-circuit box. $C_4$ and $C_5$ are to the rear. $C_5$ is soldered across $C_4$ to the left in front.*

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*Fig. 1—Circuit of the remotely-tuned VFO.*

$C_1$ — Approx. 12-μfd. variable (Hammarlund HIF-15, rear rotor plate removed, rear rotor plate bent; see text).

$C_2$ — Approx. 23-μfd. variable (Hammarlund HIF-35, last stator and last two rotor plates removed).

$C_3$ — 39-μfd. silvered mica.

$C_4$, $C_5$ — 0.001-μfd. silvered mica.

$C_6$, $C_7$, $C_8$, $C_9$ — 0.001-μfd. disk ceramic.

$R_1$ — 47,000 ohms, 1/2 watt.

$R_2$ — 10,000 ohms, 10 watts, with slider.

$L_1$ — See text.

$J_1$ — 3-contact female jack (78-PCG3F).

$J_2$ — Key jack — phono input jack.

$J_3$ — Insulated 'phone-tip jack.

$J_4$ — 4-contact male connector (CJ-2-301-AB).

RFG1, RFG2 — 1-mh. r.f. choke (National R-59).

Note: RG-22/U remote cable is terminated at each end with American 91-MPM3L male connector to fit $J_1$ and $J_2$. QST for
Bottom view of the tube unit shell. RFC1 is above RFC2 below. C6 is soldered to J3 on the cover plate. The two leads going to the left solder to the cable connector. The one to the left above goes to J4, the lead to the right to J5.

as the keying and output jacks. This makes it possible to remove the tubes and adjust the slider by removing the blank cover of the box. The resistor is supported between two small angle pieces joined with a piece of threaded rod (or a long 6-32 screw) through the resistor form.

All wiring, with the exception of the connections to the keying and output jacks and the cable connector, can be done before the shelf is placed in the box. This includes connections to the power connector which mounts from the inside. Leads of proper length are made for the jacks and cable connector, and these connections can be made after the shelf has been put in place, and just before the cover is put on. Care should be used in placing the tubes in their sockets, since there is little height to spare. If necessary, the tips of the tubes can be run up through the ventilating holes in the top of the box to allow the pins to clear the sockets.

Adjustment

Any power supply delivering between 250 and 400 volts at 50 ma. or more may be used to operate this VFO. If a 120-ma. transformer, instead of the 70-ma. unit specified for the “Band-Box” in April QST is provided, the VFO and the multiplier unit may be operated from the single supply.

Adjustment of the frequency range for maximum bandspread is quite simple. Set C1 to a dial reading of 5. Then adjust C2 until the oscillator signal is heard on the receiver at 3500 kc. Set the receiver to 3750 kc. and adjust C1 until the signal is heard. If this occurs with the dial set at less than 100, carefully bend the rearmost rotor plate of C1 away from the adjacent stator plate, making sure that the plates do not touch and short the condenser in any position of the rotor. Turn C1 again to a dial reading of 5, reset C2 for 3500 kc., and check again for the point where C1 tunes to 3750 kc. By proper adjustment of the rotor plate on C1, the 3500-3750 kc. range can be made to cover the entire dial, or as much of it as desired.

After this initial range has been set, tune the receiver to 3875 kc. Set C1 to midscale and adjust C2 until the VFO signal is heard. Then the range of 3750 to 4000 kc. should be approximately centered on the dial with a coverage of about 75 divisions. The range can be shifted one way or the other by simply shifting C5 slightly.

If it is desired to center the 11-meter band on the dial, set C1 to midscale, set the receiver to 3387 kc. and adjust C2. until the VFO is heard. All three settings of C2 should be plainly marked so that they can be returned to when desired.

The cathode current (measured in series with the key) may vary over the tuning range from about 25 ma. with both C1 and C2 set at maximum capacitance to 37 ma. with both at minimum.

In using the VFO, the tube unit should be placed close to the stage to be driven and fastened securely to the chassis. A short lead should be used to connect the output terminal to the grid of the stage to be driven. If the driven stage has no grid condenser, a 100-muf. mica condenser should be connected between the output terminal and the grid of the driven stage. If more than adequate drive is obtained, the screen of the oscillator tube can be connected to the junction between the two VR tubes, rather than to the end of R3 (Fig. 1). This unit is not a power device, and adequate gain in the way of a crystal-oscillator tube or other buffer amplifier should be provided.

The completed tube section with the tubes in place. Ventilation holes are drilled in the top of the box and in the plate covering the free side.
Happenings of the Month

ELECTION RESULTS

Autumn balloting in ARRL director elections has resulted in the selection of one new director and the re-election of three others, while in the vice-director field three new faces appear plus one returned to office.

Wesley E. Marriner, W9AND, has been re-elected for another two-year term as Director of the Central Division, in a close decision over his opponent, John G. Doyle, W9GPI, 1144 votes to 1110. Harry M. Mathews, W9UQT, becomes the new vice-director effective January 1st, winning handily over the incumbent, Charles F. Beberg, W9MVZ, 1431 votes to 802. OM Mathews, senior radio operator and technician for the Illinois State Police, has served as an assistant director the past two years, as officer of the Central Illinois Radio Club and Sangamon Valley Radio Club, was one of the organizers and is currently manager of the 75-meter Illinois Emergency Net, and is also Chairman of the Illinois Amateur Radio Club Council.

With incumbent Joseph M. Johnston, W2SOX, not a candidate, the Hudson Division has a new director in the person of George V. Cooke, jr., W2OB, who received a thumping majority of 1405 votes to 352 for Stephen J. Neason, W2ILI, and 256 for William A. Tuthill, W2JFP. A test technician for the Sperry Gyroscope Co., OM Cooke has considerable background in League organizational matters — SCM of the N.Y.C.-LI. section for two terms, former president of the Lake Success Radio Club, service on the committee for the 1949 Hudson Division convention, and the post of vice-director during the past term.

Thomas J. Ryan, W2NKD, received 1196 votes of Hudson Division members to become their new vice-director, while William H. Hannah, W2US, tallied 811. Tom is an enrollment representative of the Blue Cross in Elizabeth, N. J., and is also a former SCM, in this case of Northern New Jersey; he is a radio officer in the N. J. National Guard and is deputy chairman for the amateur division of N. J. civil defense.

Frank L. Baker, jr., W1ALP, has been re-elected as vice-director of the New England Division, with 915 votes to 585 for Clayton C. Gordon, W1HRC. In this column of our November issue we failed to report that Percy C. Noble, W1BVY, is again the director choice of New England members, being returned without opposition. "Percy," incidentally, has the longest service of any U. S. director, having represented the N. E. Division continuously since 1938.

Northwestern returned to the Board for a third term R. Rex Roberts, W7CPY, who won handily over Harold W. Johnston, W7DXP, 889 to 396.

A. David Middleton, W5CA, has been returned as West Gulf Division director by a healthy majority, 1023 votes to 374 for David H. Calk, W5BHO, and 189 for William M. Mead, W5APW. The division's new vice-director is Carl C. Drumler, W5EHC, whose 890 votes put him well ahead of Barnard H. Huif, W5AID, with 156, and John D. Martin, jr., W5PA, with 587. A radio engineer-instructor with CAA, OM Drumler started in 1932 as W9EHC in Colorado, becoming active in the Pikes Peak Amateur Radio Assn., and later serving two terms as the state's SCM; more recently, he has been treasurer of the Oklahoma City Amateur Radio Club and currently holds that post in the Aeronautical Center Amateur Radio Club.

Although not the highest on record, the percentage of eligible voters actually using their ballots was substantial in each of their divisions, except one where only the vice-director post was at stake. The average figure for director balloting: 57.1%. By divisions:

<table>
<thead>
<tr>
<th>Division</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>61.7%</td>
</tr>
<tr>
<td>Hudson</td>
<td>47.6%</td>
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<tr>
<td>New England</td>
<td>40.6%</td>
</tr>
<tr>
<td>Northwestern</td>
<td>60.1%</td>
</tr>
<tr>
<td>West Gulf</td>
<td>84.1%</td>
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</tbody>
</table>

BRAILLE TRANSCRIPTIONS

For some recent years now the HQ has been engaged in a very considerable amount of correspondence with various agencies for the blind to get transcribed into Braille suitable material to enable sightless persons to follow up an interest in radio, via amateur channels. It is with considerable pleasure, therefore, that we report the American Printing House for the Blind, under contract with the Library of Congress, is in the process of producing ARRL's How to Become a Radio Amateur and Radio Amateur's License Manual in grade 2 Braille. A supply will be distributed, for free loan, to about 30 regional libraries around the country. Individual copies may be purchased at cost of production, plus postage and insurance. How to Become is in two Braille volumes, at a price of $4.20 plus 45¢; the LAM is in three volumes, priced at $6.30 plus 75¢. Charge or C.O.D. orders are not accepted. All orders should be sent to:

American Printing House for the Blind
1839 Frankfort Avenue
Louisville 6, Kentucky

Libraries which will shortly have copies available for free loan are:

Service for the Blind, Texas State Library, Austin, Texas
Books for the Blind, Chicago Public Library, Chicago, Ill.
Cincinnati Library Society for the Blind, Cincinnati, Ohio.
Cleveland Public Library, Cleveland, Ohio.
Florida Council for the Blind, Talking Book Library, Daytona Beach, Fla.
Books for the Blind, Denver Public Library, Denver 2, Colorado.
Wayne County Library, Dept. for the Blind, Detroit 8, Michigan.
Minnesota Braille & Eight-Saving School, Faribault, Minnesota.
Library of Hawaii, Honolulu, Hawaii.
Service for the Blind, Indiana State Library, Indianapolis 4, Indiana.
Ill. School for the Blind, Free Circulating Library, Jacksonville, Ill.
Braille Institute of America, Los Angeles 29, Calif.
Librarian for the Blind, Nebraska Public Library Commission, Lincoln 9, Neb.
New Orleans Public Library, New Orleans, La.
Library for the Blind, New York Public Library, New York 1, N. Y.
Oklahoma Library Commission, Oklahoma City 5, Okla.
Work with the Blind, Library Assoc. of Portland, Portland 5, Ore.
Books for the Blind Section, California State Library, Sacramento 9, Calif.
State Library for the Blind, Saginaw, Michigan.
Books for the Blind, Salt Lake City Public Library, Salt Lake City 1, Utah.
Work with the Blind, Henry L. Wolfner Memorial Library, St. Louis 8, Missouri.
Perrins Institution for the Blind, Watertown 2, Mass.

EXAMINATION SCHEDULE

The Federal Communications Commission will give amateur examinations during the first half of 1953 on the following schedule. Remember this list when you need to know when and where examinations will occur. Where exact dates or places are not shown below, information may be obtained, as the date approaches, from the Engineer-in-Charge of the district. Even stated dates are tentative and should be verified from the Engineer as the date approaches. No examinations are given on legal holidays. All examinations begin promptly at 9 a.m. except as noted.

Amarillo, Texas: March 31.
Anchorage, Alaska, 52 Federal Bldg.: By appointment.
Atlanta, Georgia, 411 Federal Annex: Tuesday and Friday at 8:30 a.m.
Bakersfield, Calif.: Sometime in May.
Baltimore 2, Md., 508 Old Town Bank Bldg.: Monday through Friday. When code test required, between 8:30 a.m. and 9:30 a.m.
Bangor, Maine: April 16.
Beaumont, Texas, 329 P.O. Bldg.: Monday through Friday except Thursday only when code test required.
Billings, Montana: May 9.
Birmingham, Alabama: March 5 and June 4.
Boise, Idaho: Sometime in April.
Boston, Mass., 1600 Customhouse: Monday through Friday 8:30 a.m. to 2 p.m.
Buffalo, N. Y., 328 P. O. Bldg.: Thursday.
Butte, Montana: May 7.
Charleston, W. Va.: Sometime in March and June.
Chicago, Ill., 1300 U. S. Courthouse: Friday.
Cincinnati, Ohio: Sometime in February and May.
Cleveland, Ohio: Sometime in March and June.
Columbus, Ohio: Sometime in January and April.
Corpus Christi, Tex.: March 11 and June 10.
Cumberland, Md.: Sometime in April.
Dallas, Texas, 500 U. S. Terminal Annex Bldg.: Monday through Friday. Tuesday only when code test required.
Davenport, Iowa: Sometime in January and April.
Denver, Colorado, 521 New Customhouse: 1st and 2nd Thursdays, 8 a.m.
Des Moines, Iowa: Sometime in January and April.
Detroit, Michigan, 1029 Federal Bldg.: Wed. and Fri.
El Paso, Texas: April 7.
Ft. Wayne, Ind.: Sometime in February and May.
Fredericksburg, Va.: March 20 and June 19.
Grand Rapids, Mich.: Sometime in January and April.
Hartford, Conn.: March 10-11.
Hilo, T. H.: April 7.
Honolulu, T. H.: Monday through Friday, 8:15 a.m.
Houston, Texas, 324 U. S. Appraiser's Stores Bldg.: Tuesday and Friday.
Indianapolis, Ind.: Sometime in February and May.
Jackson, Miss.: March 11 and June 10.
Jacksonville, Fla.: April 11.
 Jamestown, N. D.: April 20, 10 a.m.
Juneau, Alaska, 6 Shattuck Bldg.: By appointment.
Kansas City, Mo., 3230 Federal Office Bldg.: Friday, 8:30 a.m.: also by appointment.
Klamath Falls, Ore.: Sometime in May.
Knoxville, Tenn.: March 19 and June 18.
Little Rock, Ark.: January 14 and April 16.
Los Angeles, 539 Federal Bldg.: Wed., 9 a.m. and 1 p.m.
Louisville, Ky.: Sometime in May.
Manchester, N. H.: May 15.
Marquette, Mich.: May 6, 10 a.m.
Memphis, Tenn.: January 18 and April 17.
Miami, Fla., 312 Federal Bldg.: Thursday.
Milwaukee, Wis.: Sometime in January and April.
Mobile, Ala., 419 U. S. Courthouse and Customhouse: Wednesday and by appointment.
Nashville, Tenn.: February 5 and May 7.
New Orleans, La., 360 Audubon Bldg.: Monday through Friday except Monday through Wednesday only at 8:30 a.m. when code test required.
New York, N. Y., 748 Federal Bldg., 941 Washington St.: Monday through Friday.
Norfolk, Va., 402 Federal Bldg.: Monday through Friday except Friday only when code test required.
Oklahoma City, Okla.: January 15-16 and April 16-17.
Omaha, Neb.: Sometime in January and April.
Philadelphia, 1086 U. S. Customhouse: Monday through Friday, 8:30 a.m. to 2 p.m.
Phoenix, Ariz.: Sometime in January and April.
Pittsburgh, Penna.: Sometime in February and May.
Portland, Maine: April 14.
Portland, Ore., 307 Fitzpatrick Bldg.: Friday, 8:30 a.m. for 20 and 13 w.p.m. tests; 9 a.m. for 5 w.p.m. test.
Rapid City, S. D.: May 20.
Roanoke, Va.: April 4.
St. Louis, Mo.: Sometime in February and May.
St. Paul, Minn., 208 Federal Courts Bldg.: Friday.
Salt Lake City, Utah: March 14 and June 13.
San Antonio, Tex.: February 12 and May 14.
San Diego, 15-A U. S. Customhouse: By appointment.
San Francisco, 323-A Customhouse: Mon., Novice and Technician, 8:45 a.m.: Fri., General and Extra, 8:45 a.m.
San Juan, P. R., 325 Federal Bldg.: Thursday, and Monday through Friday at 8 a.m. if no code test required.
Savannah, Ga., 214 P. O. Bldg.: By appointment.
Schenectady, N. Y.: March 18-19 and June 17-18, 9 a.m. and 1 p.m.
Seattle, Wash., 808 Federal Office Bldg.: Friday.
Sioux Falls, S. D.: March 11 and sometime in June. Novice and Technician at 10 a.m.; others at 1 p.m.
Spokane, Wash.: May 5.
Springfield, Mo.: Sometime in June.
Syracuse, N. Y.: Sometime in January and April.
Tallahassee, Fla.: January 10.
Tampa, Fla., 410 P. O. Bldg.: By appointment.
Tucson, Ariz.: Sometime in April.
Waco, Texas: April 9.
Washington, D. C., 415 22nd St., N. W.: Monday through Friday, 8:30 a.m. to 5 p.m.
Wichita, Kan.: Sometime in March.
Williamsport, Penna.: Sometime in March and June.
Wilmington, N. C.: June 12.
A Novice 35-Watter

Simple Construction with TVI Precautions

BY LEWIS G. McCOY,* W11CP

In conversations with many Novices it was found that one of the big problems confronting them was TVI. After considerable study and work it can be very disappointing to receive that coveted ticket, get on the air, and find that one has suddenly become very unpopular with the neighbors. But TVI is not a necessary part of being a ham. Here is a transmitter that is easy to build, has a minimum of shielding, and yet gets a clean bill of health on all TV channels. The TVI-proofing consists of using an aluminum chassis, bottom plate, metal tubes, a shield can on the amplifier coil, and by-passing of the 115-volt line and the key leads where they leave the chassis. If the transmitter had been designed to work on higher frequencies than 3.5 or 7 Mc., there might have been a need for shielded wiring, but it was found that ordinary hook-up wire was adequate for the job on the low frequencies.

The transmitter consists of a 6AG7 crystal oscillator stage driving a 6L6 amplifier. The oscillator uses 80-meter crystals and has no tuning controls, and 80- or 40-meter output is selected by tuning the plate circuit of the 6L6. The wiring diagram is shown in Fig. 1. A small flashlight bulb in the B+ lead to the 6L6 is used instead of a milliammeter for indicating plate current, thereby reducing the cost of the transmitter by several dollars. If the builder has a 100- or 150-ma. milliammeter, it can be used in the plate circuit in place of the flashlight bulb, but additional shielding may be necessary.

The power transformer is a receiver-replacement type, and any transformer that delivers between 300 and 400 volts at 100 to 150 ma. can be used. The 10-μfd. electrolytic condensers are the chassis-mounting metal-enclosed type. Paper-covered electrolytics can be used, but they must be mounted below the chassis to maintain good shielding.

Construction

A 12 × 7 × 3-inch aluminum chassis with bottom plate is used. As can be seen from the photograph, the r.f. components are mounted in a line across the chassis. Although the placement of the parts is not critical, wiring is easier when the components are arranged in line. A line 2 inches in from the front is drawn across the top of the chassis and placement is as follows: crystal socket, 1 inch from left-hand side of chassis; oscillator socket, 2½ inches; amplifier socket, 5 inches; flashlight lamp, 7½ inches; and amplifier coil, 10½ inches from the left side. It should be added that experienced builders cover the chassis with paper and mark the centers and parts placement on and through the paper to keep the chassis clean. The power transformer is mounted in the rear left-hand corner, and the rectifier socket is placed 1½ inches from the transformer edge. The dual 10-μfd. electrolytic condenser is

Top view of the transmitter also showing the ICA shield can and the flashlight-bulb shield. The shield is not for TVI precautions but to give a better view of the bulb for tuning purposes.
Fig. 1 — Circuit diagram of the Novice 35-watt transmitter.

C1, C2, C3, C4, C5, C6, C7 — 0.005-mfd. 500-volt disk-type ceramic (Sprague).
C8, C9 — 100-mfd. mica.
C10 — 235-mfd. variable (Bud Mc-1859).
C11, C12 — 10-mfd. 450-volt electrolytic (see text).
C13, C14, C15 — 0.001-mfd. 500-volt disk-type ceramic (Sprague) (see text).
R1 — 56,000 ohms, 1/2 watt.
R2 — 22,000 ohms, 1 watt.
R3 — 18,000 ohms, 1 watt.
R4 — 18,000 ohms, 1 watt.
R5 — 50,000 ohms, 10 watts.
L1 — 3.5-7.0 Mc. — 15 turns No. 18 enameled, 11/4-inch diam., close-wound (National XR-4 coil form).

placed 4 inches from the transformer.

On a center line drawn across the front of the chassis, the key jack is mounted 21/2 inches from the left-hand edge, the switch 6 inches, and the amplifier condenser knob 9 1/2 inches. The 115-volt plug and the coaxial output connector are mounted on the back of the chassis.

Underneath the chassis, the power-supply choke, L5, is mounted between the rectifier socket and the electrolytic condenser. Three tie points were used in the construction: one between the oscillator and the amplifier, one at the electrolytic condenser, and one between the transformer and oscillator tube. Millen ceramic sockets are used for the tubes and the coil, and the screws that hold the sockets to the chassis also hold soldering lugs, for convenience in making chassis ground connections. There are various types of dial-lamp mountings that can be used for the tuning indicator but, whatever type is used, care should be taken to see that it is insulated from the chassis, to avoid short-circuiting the plate supply to the chassis.

Wiring

Push-back hook-up wire was used in construction, and a neat wiring job can be obtained if the wires are laid out parallel to the sides and ends

of the chassis. If this is the builder's first construction job, it will be time well spent to read the information on soldering given in The Radio Amateur's Handbook and also an article on construction practices in a recent issue of QST.1

The power supply is wired first. The connections to the electrolytic condensers are hidden by the filter choke in the photograph, but the bleeder resistor, R6, is visible just at the edge of the choke. The output of the power supply is brought to the tie point visible alongside the resistor. The heaters of the 6AG7 and the 6L6 are wired next.

Pin 8 of the 6L6 and Pin 5 of the 6AG7 are wired together and C5 and C6 are installed. A lead is then run from Pin 5 of the 6AG7 to the key jack and C14 is installed across the key jack, keeping the leads of C14 as short as possible. This completes the cathode keying circuit.

The square condenser appearing over the 6AG7 socket is C7 and is connected between Pin 6 and ground. In the photograph it hides R5, the screen dropping resistor that is connected from Pin 6 to the tie point between the tubes. The B+ lead is run to this tie point, and both R3 and R4 are tied to it. RFC2 is also obscured in the photograph, but it goes from Pin 8 of the 6AG7 to the tie point of the B+ lead. The condenser below RFC2 is C8 — it is connected from Pin 3 of the 6L6 to a tie point and then to the stator of C9.

1Goodman, "How To Wire a Transmitter," QST, Feb., 1952.
The heavy black lead coming from the base of the coil socket is a piece of coax cable that shields the output of the amplifier from stray harmonics that might be present below the chassis. The inner conductor of the coax goes to the output coax connector, and the shield of the coax is grounded as close as possible at the connector. To prevent harmonics from flowing out of the chassis on the 115-volt line, $C_{12}$ and $C_{13}$ are installed at the outlet plug from each side of the line to ground. Keep the condenser leads as short as possible.

**Operation**

The first step in testing the transmitter is to fix up a dummy antenna for test purposes. A 25-watt electric light bulb will serve. Solder a wire lead to the screw part base of the lamp and another lead to the point on the base. One lead is grounded to the chassis of the transmitter and the other lead is inserted in the coax output connector. A telegraph key is fixed up with leads and a plug, and the plug is inserted in the key jack. Make sure the key is open, and then plug in the 115-volt line. Give the rig a minute to warm up before closing the key.

When the key is closed, the flashlight lamp will light up. When the amplifier condenser, $C_9$, is turned, the flashlight bulb should dim at certain points and the dummy antenna should light up. The flashlight bulb dims when the amplifier is tuned to the crystal frequency or twice the frequency, indicating minimum plate current and the fact that the amplifier circuit is tuned to the crystal frequency or a harmonic. There should be two points where the flashlight bulb dims — one when the condenser, $C_9$, is nearly engaged or near maximum capacity, and one point near minimum capacity. The dimming of the bulb near maximum capacity indicates resonance in the 80-meter band and the minimum tuning point indicates resonance in the 40-meter band. It is very important that the condenser setting for each band be carefully marked on the tuning knob to insure correct setting of the condenser.

In some localities metal 6L6s are not available and if such is the case, a shield will be needed for a glass tube to prevent radiation of harmonics that could cause TVI. An ordinary tin can will suffice but several 1/4-inch holes should be drilled in the top of the can for ventilation, since a 6L6 runs quite warm.

Needless to say, 35 watts of power will produce plenty of contacts. The *Radio Amateur's Handbook* lists several methods of antenna coupling, and there is an article in August, 1952, *QST* on antenna coupling for Novices that describes simple methods of getting the most power into the antenna.

The 35-watter was put on the air at the Headquarters lab and a few CQs produced satisfying results. The transmitter was operated alongside a TV receiver without a trace of interference on all of the 12 TV channels.

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Bottom view showing the completely wired transmitter. The black lead on the right-hand side of the chassis is a piece of RG-59/U coax cable used to shield the output from any stray harmonics.
19th ARRL International DX Competition

Phone: Feb. 6th–8th and Feb. 20th–22nd;
C.W.: March 6th–8th and March 20th–22nd

It’s time again to ready your station for the ARRL International DX Competition, to be held in February and March of this year. This contest, the nineteenth of its kind, gives an opportunity for all Canadian and continental U.S. operators to add new countries to their DX totals, other stations to fill in for their WAS and WAVE awards, and everyone to match DX operating skill with other operators in his country or ARRL section. But, whether you have 9 or 99 hundred watts, whether you work 2 or 2 thousand stations, whether you have a wire out the window or a 7-element antenna, you can have a whale of a lot of fun in this annual event.

As in the past, two week ends are devoted to c.w. operation and two to “phone operation, giving everyone an opportunity to participate in four week ends of hot activity. In order to take advantage of any 28-Mc. openings, both ‘phone periods are scheduled for February. The c.w. periods are in March. In each case periods are separated by “rest up” week ends. To enable stations whose ‘phone operations are limited to 10 and 11 meters to compare their scores with similar stations, a special listing is available.

As usual, special certificate awards are offered to the top single-operator ‘phone and c.w. scorer in each country and ARRL section. A special category recognizes multiple-operator stations in those sections or countries from which three or more valid multiple-operator entries are received. Multiple-operator scores are grouped with single-operator scores in club competition, and a handsome gavel is offered to the club with the highest aggregate score. Within a club, single-operator entries can compete for the “club-certificate” awards given to the highest c.w. and ‘phone scorers.

If you’re new to the DX Contest, it won’t take you long to catch on. During the contest period, stations outside of the U.S. and Canada will call “CQ W/VE” or “CQ TEST” and will exchange numbers as shown in the sample elsewhere on these pages. If the input is 250 watts, your number is 250. If you run only 75 watts, use the number 075. Full kilowatts have a choice — they can use either 000 or 999. If your input is different on different bands, change the number to approximate the input figure, but don’t bother about 0.1 per cent accuracy on any band — the usual approximation is adequate.

You can try a “CQ DX” or “CQ TEST” if you’re a W or VE, but past experience shows that this pays off very seldom. On c.w., Ws and VEs have quotas but this doesn’t apply to ‘phone. Keep your log carefully, and send a copy of it, in the form shown, to ARRL. Free contest forms are available from ARRL Headquarters, West Hartford, Conn., upon request. Get your station working at top efficiency, make no social commitments for the important week ends, read the rules to acquaint yourself with the pattern, and then get set for DX galore in February and March.

Rules

1) Eligibility: Amateurs operating fixed amateur stations in any and all parts of the world are invited to participate.
2) Object: Amateurs in the continental U.S. and Canada will try to work as many amateur stations in other parts of the world as possible under the rules and during the contest periods.
3) Conditions of Entry: Each entrant agrees to be bound by the provisions of this announcement, the regulations of his licensing authority, and the decisions of the ARRL Award Committee.
4) Entry Classifications: Entry may be made in either or both the ‘phone or c.w. sections; c.w. scores are independent of ‘phone scores. Entries will be further classified as single- or multiple-operator stations. Single-operator stations are those at which one person performs all the operating func-

CONTEST TIMETABLE

Phone Section:

<table>
<thead>
<tr>
<th>Time</th>
<th>Start</th>
<th>Ends</th>
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<tr>
<td>GCT</td>
<td>Feb. 6th 2400</td>
<td>Feb. 8th 8:00 p.m.</td>
</tr>
<tr>
<td>EST</td>
<td>Feb. 6th 7:00 p.m.</td>
<td>Feb. 8th 9:00 p.m.</td>
</tr>
<tr>
<td>CST</td>
<td>Feb. 6th 6:00 p.m.</td>
<td>Feb. 8th 10:00 p.m.</td>
</tr>
<tr>
<td>PST</td>
<td>Feb. 6th 4:00 p.m.</td>
<td>Feb. 8th 4:00 p.m.</td>
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</table>

The second period of this contest starts at these same hours Feb. 20th.

The second period of the contest ends at these same hours Feb. 22nd.

C.W. Section:

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>GCT</td>
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<td>PST</td>
<td>Mar. 6th 4:00 p.m.</td>
<td>Mar. 8th 4:00 p.m.</td>
</tr>
</tbody>
</table>

The second period of this contest starts at these same hours Mar. 20th.

The second period of this contest ends at these same hours Mar. 22nd.

January 1953
LOG, 19th A.R.R.L. INTERNATIONAL DX COMPETITION

Sheet of 1 of 1

Date & Time  Station Worked  Country  Serial Numbers  P

<table>
<thead>
<tr>
<th>Date &amp; Time</th>
<th>Station Worked</th>
<th>Country</th>
<th>3 5</th>
<th>14</th>
<th>21</th>
<th>27</th>
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<td></td>
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<td>57090</td>
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<td>58500</td>
<td>58500</td>
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</table>

Sample of report form that must be used by foreign c.w. and all 'phone participants.

8) Scoring: a) Points: 1 point is earned by a W (E) or VE/VO station upon receiving acknowledgment of a number sent, and 2 points upon acknowledging a number received. Two points are earned by any other station upon receiving acknowledgment of a number sent, and 1 point upon acknowledging a number received.
b) Final Score: W (E) and VE/VO stations multiply

LOG, 19th INTERNATIONAL DX COMPETITION

Band 50  ARRL SECTION  5

<table>
<thead>
<tr>
<th>Station Worked</th>
<th>Call</th>
<th>ARRL Section</th>
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<tr>
<td>PA9GN</td>
<td>3/6</td>
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<td>PA9RA</td>
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</tr>
<tr>
<td>PA9LQ</td>
<td>3/21</td>
<td>1421</td>
</tr>
<tr>
<td>G2MI</td>
<td>3/21</td>
<td>1245</td>
</tr>
<tr>
<td>G2MI</td>
<td>3/21</td>
<td>1256</td>
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<tr>
<td>G2MA</td>
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<td>1430</td>
</tr>
<tr>
<td>G2MI</td>
<td>3/21</td>
<td>1380</td>
</tr>
</tbody>
</table>

Sample of report form that must be used by W/VE c.w. participants. When a station is worked for less than the maximum number of points allowed (as for example the contact with G2MI shown at right), the additional contact to make up the points not earned in the first contact should be entered at the bottom of the sheet. Canadian entrants should allow two blocks for each country, but may record no more than six contacts therein. A separate set of sheets should be used for each band.

Sample of report form that must be used by foreign c.w. and all 'phone participants.

Sample of report form that must be used by foreign c.w. and all 'phone participants.

Sample of report form that must be used by foreign c.w. and all 'phone participants.

36 QST for
total points earned under Rule 8(a) by the number of countries worked on one band plus the number of countries worked on each other band. All other stations multiply total points earned under Rule 8(a) by the sum of the number of W (K) and VE/VO licensing areas worked on one band plus the number of W (K) and VE/VO licensing areas worked on each other band.

Countries will be those on the ARRL Countries List. There are 10 licensing areas: 10 in the United States, 9 in Canada (VO, VE1-VE3). 9. Repeat Contacts: The same station may be worked again for additional points if the contact is made on a different frequency band. The same station may be worked again on the same band if the complete exchange for a total of three points was not made during the original contact on that band.

10. Quotas: The maximum number of points per country per band which may be earned by W (K) stations in the c.w. section is 12, and contacts made on the same band with the same country after the quota is filled will not count. Thus complete exchanges with 4 stations in one country on one band fill the band quota for that country. The maximum number of points per country per band which may be earned by VE/VO stations in the c.w. section is 18, and contacts made on the same band with the same country after the quota is filled will not count. Exchanges with 6 stations in one country on one band are thus permitted Canadian participants. There is no quota for stations in the c.w. section outside of the U.S. and Canada. There is no quota for any station in the phone section.

11. Reporting: Contest work must be reported as shown in the sample form. Each entry must include the signed statement as shown in that example. Contest reports must be mailed no later than April 24, 1953, to be eligible for QST listing and awards. All DX Contest reports become the property of the American Radio Relay League. No contest reports can be returned.

12. Awards: To document the performance of participants in the Nineteenth ARRL International DX Competition, a full report will be carried in QST. In addition, special recognition will be made as follows:

a) A certificate will be awarded to the high scoring single-operator 'phone and to the high-scoring single-operator c.w. entrant in each country (as shown in the ARRL Countries List) and in each of the 73 U.S. and Canadian ARRL sections (see page 9 of this issue) from which valid entries are received. In addition, a certificate will be awarded to the high-scoring multiple-operator station in each section on country from which three or more valid multiple-operator entries are received.

b) A suitable certificate will be awarded to the operator making the highest single-operator 'phone score in each ARRL-affiliated club, provided the club secretary submits a listing of a minimum of three 'phone entries by bona fide resident members of such club, and provided further that these scores are confirmed by receipt at ARRL headquarters of the individual contest logs from such members. The highest single-operator c.w. scorer in each club will be awarded a certificate under the same conditions.

c) ARRL will award a gavel to the affiliated club submitting the greatest aggregate 'phone and c.w. score by bona fide resident club members, whether single- or multiple-operator entries, provided such scores are confirmed by receipt at ARRL headquarters of the individual contest logs from such members.

13. Judges: All entries will be passed upon by the ARRL Award Committee, whose decisions will be final. The Committee will void or adjust entries as its interpretation of these rules may require.

14. Disqualifications: Off-frequency operation (as confirmed by a single FCC citation or advisory notice or two ARRL accredited official observer measurements) will disqualify. Low tone reports in logs will also be considered by the ARRL Award Committee as grounds for disqualification.

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**SUMMARY, 19th ARRL INTERNATIONAL DX COMPETITION**

<table>
<thead>
<tr>
<th>Band</th>
<th>3.5 Mc.</th>
<th>7 Mc.</th>
<th>14 Mc.</th>
<th>27 Mc.</th>
<th>28 Mc.</th>
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<td>Number of Contacts</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>

Number of Different Countries Worked: 45

Number of Hours of Station Operation: 500

Assisting Person(s) Name(s) or Call(s): 8

Points: 350

Multiplier: 45

Final Score

Participation for Club Award in the:

(Operator’s Signature)

* Figure in this box is multiplier.

Sample of summary sheet that must accompany all reports.

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January 1953 37
"Here's How!"—Detroit

Some De Luxe Teamwork for Civil Defense

Amateurs throughout the country are rallying to implement the machinery of Civil Defense through the Radio Amateur Civil Emergency Service (RACES). The teamwork and enthusiastic participation necessary in this, one of amateur radio's most ambitious undertakings, is perhaps demonstrated no more clearly than in this pictorial account of a well-coordinated project in Detroit.

For the past two years members and associates of the Inter-County Amateur Radio Club in the Detroit area have been working closely with the Office of Civil Defense and the American Red Cross in maintaining a six-county network of emergency communications. It became apparent as a result of a series of recent drills that an important asset to existing facilities would be the availability of numerous hand-carried portable transmitter-receivers.

The conclusion was reached that ordinary mobile installations might well become inoperable during certain types of disaster, are frequently limited in their approach to scenes of centralized trouble and are rarely adaptable to such uses as transmitting from boats during floods, etc. Thus, despite obvious range limitations, it was decided that compact stations carried by hand have a definite rôle to play in a well-rounded emergency communications program.

Approximately one hundred such small units were needed but the commercial market cost was found to be prohibitive. So Inter-County's amateurs approached representatives of Detroit industry and radio dealers to organize the venture pictured here, an activity quite unique in the history of amateur radio.

With an assist from radio suppliers M. N. Duffy & Co., hams financed the purchase, at cost, of the various materials needed to build their own transmitter-receivers. Using evening workshop space and equipment loaned by the Briggs Manufacturing Co., some forty amateurs took advantage of the arrangements.

Other AREC/RACES groups may well benefit from the successful enterprise recounted and pictured here.

 novice and Old-timers alike pooled their efforts to turn out the work. A total of approximately 20 man-hours per unit was required to complete the job.

The club's technical committee, assisted by W8IFU, furnished the design and schematics of the transmitter-receivers. This group prepared transformers.
Under-chassis wiring was the assignment for this section of the assembly line. Amateurs of six counties surrounding metropolitan Detroit participated.

Work area and equipment volunteered by the Briggs Manufacturing Company were utilized at night on a production-line basis.

_Left: A father (W8CLH) and son combination collaborated to expedite one of the numerous soldering operations required.

_Right: One of the super-portable units as constructed. They are normally crystal-controlled on 29,610 kc., the: Detroit area's general emergency frequency. An early QST will contain detailed circuit and constructional data.

The compact stations were finally tested and adjusted using the facilities of the Radio Electronic Television School in Detroit.

The efficiency of mass production held down cost of the units to $25 each for active workers and $35 for club members who did not take part.
Some ABCs of V.H.F. Receiver Design

Hints for Improving Weak-Signal Performance at 50 Mc. and Higher

BY EDWARD P. TILTON,* W1HDQ

The receiver engineers can pass this one up. It is written for the fellow who, knowing little of the factors that make for good reception, tends to judge a receiver by its price tag or its appearance. He is more likely to choose a receiver that harmonizes with his wife’s interior decorating scheme, or one that sounds best in the broadcast band, rather than the receiver that will deliver optimum performance in the ham bands. And as for building something in the receiving line for himself — well, he shudders at the thought — if, in fact, he has ever gotten around to thinking about it.

Now there are many good reasons why we tend, more and more, to let the receiver manufacturers do the dirty work in designing and construction for us. Unless we have extensive shop facilities, good test equipment, and considerable experience in receiver work it is difficult to build a complete receiver for 3.5, 7 or 14 Mc. that will equal one made by an outfit having these assets. But even if we intend to work only on the lower bands, we should not fall into the habit of letting the engineers do all our thinking for us, too! And if we are going to concentrate on the frequencies from 28 Mc. up, we have little choice but to build our own gear, if we expect to do a first-class receiving job.

What Makes a “Sensitive” Receiver?

We all want to be able to pull in the weak ones. To be able to hear signals that other fellows miss is a universal amateur aim, regardless of the frequency we work on. Before we invest a month’s pay in a new communications receiver, or start in building a v.h.f. converter, therefore, we should know something of the factors that make for superior weak-signal reception.

Up to around 20 Mc. or so there is no very marked difference in the weak-signal capabilities of the better receivers. Below this region nearly all tubes work well, and the limiting factor in receiving weak signals is noise generated outside the receiver. Additional r.f. amplifier stages, no matter how well designed, will serve mainly to increase such noise in direct proportion to the signals we want to hear. Thus, adding r.f. gain is similar to tacking on another stage of audio — it will make the signals louder, but no more readable. In some of the simpler receivers having no r.f. amplifier stages, or an ineffective one, an external r.f. preamplifier may be needed to bring up the level of the weakest signals, but in a majority of cases the only way to hear more DX on 3.5, 7 or 14 Mc. will be to put up a better antenna, or move to a quieter location.

As we approach the v.h.f. region the picture changes, and our noise level comes from a different source. Tube performance falls off as we go higher in frequency, and amplifier stages have to be run “wide open” to produce enough gain to make weak signals audible. There is still some external noise, to be sure, but much of the “shush” that is characteristic of a hot v.h.f. receiver is tube noise, generated within the receiver. At 3.5 Mc., a good receiver with its a.v.c. off and its gain controls set for optimum weak-signal reception makes little or no noise when its antenna is disconnected, or the terminals shorted. A good v.h.f. receiver makes plenty! What, then, are these “low-noise front ends” we talk about in QST and the Handbook?

The point to remember here is that the noise generated within the receiver, not that coming in on the antenna, is the limiting factor in v.h.f. receiver sensitivity. This condition begins to show at 28 Mc. It is much more marked at 50 Mc., and it is all-important at 144 Mc. and higher. Thus, the more gain an r.f. amplifier stage provides for a given amount of noise generated, the better will be its weak-signal performance.

To make the best use of this information, we have to know what makes “tube noise” and what tubes develop the least for a given amount of gain. Most of this noise results from electronic action within the tubes, so other things being equal, the more elements within the tube, the more noise it will make as a v.h.f. amplifier. Thus, a pentode (with a plate, screen, suppressor and control grid, all contributing to the total cathode current) will make more noise than a triode, when the upper limit of its useful frequency range is approached. And these elements add to the input and output capacitance of the tube, resulting in more capacitive loading of the tuned circuits to which it is connected.

The principal advantage of the pentode is that, by isolating the grid and plate circuits it makes possible high gain (over its normal frequency range) without external neutralizing circuits. When the limit of its operating range is approached it gives way to the triode, with some circuit tricks added to achieve stability. Well designed pentode stages work just about as well as triodes at 21 and 8 Mc., but at 50 Mc. and higher the triodes take over almost exclusively. And even at 21 and 28 Mc., the pentodes don’t do so well unless the circuits are designed specifically for these frequencies.

Here, then, is the main reason why the best “all-band” receivers fall down on 28 and 50 Mc., compared to even the simplest converters of the home-built variety. The first stages of any re-

*V.H.F. Editor, QST.
receiver that covers the broadcast band and the lower ham bands are designed to give optimum performance there—in the range where they will be used most. Stability over a wide tuning range, good response to automatic volume control action (needed to work that popular accessory, the S-meter), and freedom from cross-modulation troubles dictate the use of tubes that do not perform well at 28 Mc. and higher. It's a hard fact of receiver design, and no reflection on the ability of the engineers who develop our commercial receivers, that you can spend close to a thousand dollars for a receiver and still not get as good performance on 28 or 50 Mc. as is available with a converter you can build yourself for twenty dollars or less.

Maybe there will be a really good commercial receiver for the v.h.f. bands someday, but it has not appeared on the horizon thus far, except in limited-production converter form.

The Role of Selectivity

Too many v.h.f. men think of selectivity only as an aid to separating stations on crowded lower frequencies, not realizing that it is also directly related to the effective signal-to-noise ratio that can be achieved when the receiver is used with a converter for the v.h.f. bands. All other things being equal, the greater a receiver's bandwidth the more noise it will make for a given amount of over-all gain.

Let's look at Fig. 1 for a moment. Here are Curve B shows the broadest response, used mainly for high-fidelity broadcast reception. From B we see that to drop the signal level 6 db., we have to tune out 7 kc. on either side of the center frequency. To drop it 60 db. we must detune 17 kc. On curve A, we see that the 6-db. points are only about 3 kc. removed from the center frequency, and the 60-db. points are only about 8 kc. from the center.

Now we know that to receive voice modulation with good readability, we need only about 5 or 6 kilocycles bandwidth, and we can get along with even less, if we have to. Thus, there will be little, if any, difference in the sound of a 2-meter signal with the selectivity control in either of these two positions, but the receiver noise that will be present on a weak signal will be vastly greater with the wide bandwidth.

Consider curve C. This was not taken from any particular receiver, but it is about the best that could be expected with a receiver having a high intermediate frequency and a crystal filter. It might be one of those Command sets, with the 2830-ke. i.f. systems, for example. One look at its selectivity curve shows that this is not going to make a hot v.h.f. receiver, no matter how good a converter we put ahead of it. The bandwidth would be fine for 2-meter mobile work, but don't rely on it for home-station use if you want to hear the weak ones.

The bandwidth of the SCR-522 is even broader. That was a fine receiver for non-critical fixed-frequency work, the purpose for which it was intended. It is not a top-flight weak-signal receiver, and no amount of work on the front end will make it so. The way to hop up reception with a 522 or any other broad-tuning receiver, assuming that you've already done a job on the front end, is to take the output of the high-frequency i.f. and feed it into a communications receiver, where the passband can be reduced to the minimum needed for voice intelligibility.

This noise-bandwidth relationship also shows why it is a waste of time to convert radar-type receivers to amateur use. Progress in our 420-Mc. band has been delayed several years because of the availability of the APS-13, the BC-645, the BC-788, the ASB-series receivers and other broadband devices on the surplus market. They're fine for local work, receiving the broad emissions of modulated oscillators, but useless for weak-signal DX reception. Just imagine their bandwidth of four megacycles or more presented in the manner of Fig. 1, and you see why one of these receivers is a millstone around the neck of the ham who has just jumped into the u.h.f. pool!

One last thought on this selectivity business. So far, we've been talking about the minimum bandwidth needed for voice. We can't clip much sharper than 3 kc. and still copy voice modulation. But we can go down to a bandwidth of a few hundred cycles and get along nicely on c.w. There is an obvious point here for the fellow who wants to work real v.h.f. DX — there's no way to do it like using high selectivity and c.w.

(Continued on page 118)

January 1953
Another Coffee-Can Rig

Adding a Doubler Stage

BY EDWARD HAYWARD, W1PH

A YEAR OR SO AGO, THE AUTHOR DESCRIBED AN inexpensive VFO rig using a one-pound coffee can as the shielding enclosure for the oscillator. This was designed primarily for the 3.5- and 7-Mc. bands, but 14-Mc. operation was possible by changing the oscillator coil. Aside from the inconvenience of opening up the can to change VFO coils, there is always the danger that inconsistencies in plug-in-coil contacts may result in intermittent instability in the VFO.

For these reasons, I decided to revamp the original circuit to provide a doubler stage so that the VFO could always be operated at 3.5 Mc. The revised circuit is shown in Fig. 1. A 6V6 series-tuned Colpitts (Clapp) VFO drives an untuned buffer stage using another 6V6. The following stage, using a third 6V6, may be used either as a doubler to 7 Mc. or as a second buffer on 80. In the latter case, a 2.5-mh. r.f. choke, mounted in a plug-in coil form, is substituted at L2. The 6L6 is operated as a straight amplifier at 7 Mc. No trouble has been experienced operating in this manner without neutralization.

Two keying jacks are provided. With the key plugged in at J1, and S1 closed, all stages are keyed simultaneously for break-in. With the key at J2 and S1 open, only the final is keyed. The latter may be found preferable at 14 Mc. Inexpensive meters are provided for measuring doubler and final-amplifier plate currents. Fig. 2 shows the diagram of a suitable power supply. An input of 45 watts can be run to the final stage on all bands.

The cost of parts for this little rig should not exceed $35.00 if all new parts are purchased. However, a good share of the components will be found in the usual junk box. Although metal construction may be used, I made the chassis or base from Preswood. It is much easier to work and I have had no trouble with TVI either on my own receiver or those of my neighbors. The parts are mounted on a piece 12½ inches long and 6½ inches wide. The Preswood is fastened to a ½-inch piece of wood of the same dimensions, using ⅜-inch spacers between to provide clearance for the wiring underneath. I gave the baseboard and coffee can two coats of Steelcoat rubberized enamel in deep maroon and it really dollies it up.

The oscillator components are mounted in the coffee can. The tuning condenser, C2, is shaft-hole mounted on one side of the can, placing it far enough down in the can so that it does not interfere with the cover. The band-set trimmer, C3, and the paddle, C1, are soldered...
Fig. 1 — Circuit of the coffee-can VFO rig.

C1 — 200-µfd. silvered mica.
C2 — 100-µfd. variable (Bud MC-1875).
C3 — 45-µfd, neg. temp. trimmer ( Erie N-500).
C4, C5 — 0.001-µfd. silvered mica.
C6 — 100-µfd. silvered mica.
C7 — 0.0039-µfd. mica.
C8C11, C12, C14, C16, C17, C19 — 0.01-µfd. mica or ceramic.
C18, C18a, C18b — 100-µfd. mica.
C19, C20 — 140-µfd. variable (Bud MC-1876).
R1 — 0.1 megohm, ½ watt.
R2, R3 — 47,000 ohms, ½ watt.
R4 — 150 ohms, ½ watt.
R5 — 24,000 ohms, ½ watt.
R6 — 150 ohms, 1 watt.
L4 — 19 turns No. 16 enam., 1½ inches diam., close-wound.

across the terminals of C5. The tube socket is mounted opposite the condenser on 3½-inch spacers. The socket should be wired up before mounting in the can. The coil, L4, is wound at one end of a coil form 2 inches long and the opposite end of the form is cemented to the bottom of the can, midway between the condenser and tube. The small components — r.f. choke, by-pass condenser — are distributed about in the remaining space, using insulated tie points where necessary. Connecting leads are brought out through holes drilled in the bottom of the can and through the baseboard. The dial is a National type AM.

In the rear-view photograph, the two 6V6s

(Continued on page 114)
An Inexpensive Radioteletype Converter

Simple Unit for Transmitting and Receiving

BY MARVIN BERNSTEIN, W2PAT

The teletypewriter is a machine that can convert an appropriate series of pulses of direct current into a typed message at various speeds, usually up to a maximum of 60 w.p.m. This is accomplished by making use of a five-unit-code pulse system in which various combinations of marking and spacing impulses operate electromagnets which set up code bars in the printer and mechanically convert the pulses into the correct information or functions. In addition to the five code pulses, a starting pulse and a stopping pulse are required. The time interval between the beginning of the starting pulse and ending of the stopping pulse is approximately 163 milliseconds.

The operation of these teleprinters on short telegraph lines using direct-current impulses requires the use of little external equipment other than a source of electrical power to operate the solenoid magnets and motors. In order to operate the printer with signals derived from a radio receiver tuned to a radio station sending printer signals, however, a separate piece of equipment is required. This unit is called a converter and is used to change or convert the radio signals into the proper sequences of impulses of marking and spacing currents required by the printer. In one system commonly used, the radio signals are received and changed to marking or

* As those who operate radioteletype know, a device is required to change the audio tones at the output of the receiver to d.c. pulses that operate the printer and, conversely, to convert the d.c. pulses from the transmitting keyboard to audio tones for modulating the transmitting carrier. This article describes a simplified unit for this purpose.

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**Fig. 1 — Circuit of the radioteletype converter.**

C1 — 0.01-mfd. paper.
C2, C5 — 0.003-mfd. mica.
C3 — 0.05-mfd. paper.
C4, C6, C13 — 0.0047-mfd. mica.
C7 — 0.15-mfd. paper.
C14 — 0.11-mfd. paper.
C15, C16 — 0.001-mfd. mica.
C17 — 0.029-mfd. (approx.).
C18 — 0.03-mfd. paper.
C19, C20 — 10-mfd. 450-volt electrolytic.
R1, R21 — 33,000 ohms, 1/2 watt.
R2 — 150 ohms, 1/2 watt.
R3, R7 — 0.47 megohm, 1/2 watt.
R3 — 6.1 megohm, 1 watt.
R4 — 0.22 megohm, 1/2 watt.
R6, R12, R13, R14, R22, R23 — 47,000 ohms, 1/2 watt.
R8 — 0.1 megohm, 1/2 watt.
R10, R11 — 2.2 megohms, 1/2 watt.
R14 — 50,000-ohm potentiometer.
R15, R20 — 1 megohm, 1/2 watt.
R17 — 270 ohms, 1/2 watt.
R19 — 1000 ohms, 1 watt.
R24 — 51,000 ohms, 1 watt.
R25, R26 — 6800 ohms, 2 watts.
L1 — 30 mh. (GE RLD-019 TV width control).
L2 — 29 mh. (GE RLD-014 TV width control).
L3 — 95 mh. (GE RLC-091 TV loc. osc. coil).
S1 — S.p.s.t. toggle.
T1 — Power transformer: 250-0-250 volts r.m.s., 30 ma.; 6.3 volts, 3 amp.

QST for
spacing audio frequencies of 2125 and 2975 c.p.s., respectively. In the case of v.h.f. operation, these frequencies are the result of amplitude modulation of the transmitter carrier by means of an audio-frequency-shift keyed oscillator. The lower frequencies in the range below 30 Mc. permit the use of carrier-frequency-shift circuits in the transmitter; in this case the receiver output is obtained by making use of the b.f.o. and beating against the carrier so that alternate audio outputs of 2125 and 2975 cycles are obtained.

The converter must have certain characteristics in addition to its function of changing the audio tones into marking and spacing current impulses. It must function properly even though the signals vary in amplitude or have poor signal-to-noise ratio. It must also produce direct-current signals which are free from bias or other forms of distortion. For optimum operation the d.c. impulses should exactly duplicate the original impulses generated at the transmitter end of the RTTY circuit.

The Circuit

The circuit shown in Fig. 1 is a form of converter in which a few refinements have been eliminated to demonstrate

The simplicity of equipment needed for radio use. This unit is, however, adequate for printing information transmitted by commercial frequency-shift stations operating in the h.f. bands at speeds of 60 w.p.m. The converter will operate with signals which are only 6 db. above the noise level. The equipment is specifically designed for use with a transmitter in the v.h.f. bands where amplitude modulation of the transmitter carrier is ordinarily employed; a circuit of a simple audio frequency-shift oscillator is included for use with the transmitter.

A simple functional description of the operation of the various circuit elements follows: In receiving, the audio output from the receiver is fed to two germanium diodes, D1 and D2, that are biased with approximately 0.3 volts. The result is to limit the maximum peak voltage applied to the grid of the 6SL7 limiter tube to values of 0.14 to 0.65 volts with input-signal levels varying from 1 volt to more than 30 volts. The diodes are even more effective in clipping the peak amplitude of narrow noise pulses. The 6SL7 cascaded limiter-amplifier is used primarily to increase the level of the signal voltage, but a secondary function is to obtain additional output-level stabilization. The output signal amplitude is approximately 15 volts and varies ± 1.0 db. with input-voltage changes from 0.45 volts to more than 30 volts.

The output signals from the 6SL7 limiting amplifier are fed into the two parallel-tuned LC circuits, L1C1 and L2C2, which are resonant to 2125 and 2975 cycles, respectively. The potentiometer is used to adjust the ratio of the currents in the two windings of the polar relay, K3, when noise voltage only is applied to the converter input. The second 6SL7 tube is used as a grid-rectifying dual detector, and the plate currents of this tube will depend on the amount of signal applied to each grid. A marking signal

(Continued on page 114)
Harry McCormick, W9HB, at Pekin, Ill., is on 20 in a big way, with an Electronic Engineering Co. exciter and a kilowatt final. . . . Ed Brown, W9ROQ, at Chillicothe, is giving it a whirl with 10 watts and a crystal-filter exciter. . . . Art Collins, W9CXX, at Cedar Rapids, Iowa, is making a lot of the a.m. die-hards think "maybe there's something to this single-sideband stuff after all."

The 20-meter s.s.b. gang should be on the lookout for VR2CG, Wyn McGee in the Fiji Islands. His phasing exciter uses 6AG7s in the balanced modulators, screen-modulated by push-pull 6SN7s, and the final is a pair of 811As driven to about 150 watts peak. "Carrier insertion is used quite a bit with chaps who are not conversant with s.s.b. signals, but it is dropped after the tuning procedure is 'Okayed.'" Wyn has worked two-way s.s.b. with Japan, Canada, KH6 and the U. S. A., and is looking forward to a s.s.b. WAC during the remaining two years of his stay in Fiji. He works the high end around 14,305 and is very interested in making skeds with any of the s.s.b. gang. He reports that VR2CJ should be on 75 s.s.b. within a few months, with 807s and a long wire.

Yoc, of W2EB, worked CN8FR through the Sunday afternoon QRM on 20 and took 14 messages. The CN said he had been trying for two days to establish a decent readable W contact for the QSP, and that the band was such a mess that s.s.b. was the only thing that saved the day. Yoc finds a rapidly-increasing interest in s.s.b. among the foreign phone stations, but they are handicapped in getting on by lack of information and gear.

On the other side of the Atlantic, Jean Lattard, FO9LE, in Paris, is on 20 with a Rust phasing exciter using 6AG7s as balanced modulators, an

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**Diagram:**

![Diagram](image)

**Fig. 1** — The regulated screen supply used with a pair of 811As at W2AZW.

- $C_1 = 0.01 \mu F, 2000$ volts.
- $C_2 = 0.01 \mu F, 400$ volts, if needed to prevent oscillation.
- $R_1$ — Adjustable wire-wound, resistance and wattage as required.
- $R_2 = 22,000$ ohms, 2 watts.
- $R_3, R_4, R_5 = 0.1$ megohm, 2 watts.
- MA — Milliammeter required for original adjustment.
807 driver and an 813 final running about 200 watts peak. It is crystal-controlled on 14,250, 14,280 and 14,300 kc, and active around 2100–2300 GCT.

**A Regulated Screen Supply**

As everyone knows, or soon finds out, tetrode linear amplifiers require "stiff" screen-voltage supplies for lowest distortion. Earl Weaver, W2AZW, uses a pair of 813s in his output amplifier, and devised the circuit in Fig. 1 to stabilize the screen voltage. It is a shunt-type regulator that derives a regulated voltage from the high-voltage supply. Since the high-voltage supply will usually need a bleeder resistance for regulation purposes, the shunt regulator also takes care of that requirement.

A zero-bias tube is used, and the grid is always conducting, unless the source voltage drops so low that the VR tubes extinguish. The output voltage is equal to the sum of the VR drops plus the grid-to-ground voltage of the 811-A. This grid-to-ground voltage is the regulating potential, of course, and varies from 6 to 20 volts between full load and no load.

The initial adjustment is made by placing a milliammeter in the circuit as shown and adjusting R1 for 15 to 20 ma, higher than the normal peak screen current. This adjustment should be made with the amplifier connected but with no excitation, so that the idling plate current will be drawn. After the adjustment is completed, the meter can be removed from the circuit and the filament center-tap wired directly to ground. Since R1 is in a high-voltage circuit, it must be treated with full safety precautions, and all adjustments should be made only after the power is turned off and the high-voltage terminal has been grounded.

Any number of VR tubes may be used to provide a regulated voltage near the desired value, VR tubes with various operating voltages can be connected in series, if the current ratings are the same. Two 811-A's can be connected in parallel if higher current capacity is required. The maximum current through the 811-A should be such that the manufacturer's plate-dissipation rating is not exceeded. It may be necessary to adjust R1 for a slightly higher current under minimum load than is first expected, to compensate for full-load voltage drops in the high-voltage supply.

At W2AZW, the 813 screen current varies from about 5 to 60 ma, and the shunt regulator holds the screen voltage constant to within 10 or 15 volts.

**Measuring Sideband Suppression**

Howard Wright, W1PNB, suggests the simple stunt shown in Fig. 2 for measuring sideband suppression of your own or the other fellow's signal. It requires that you have a selectable-sideband receiver of some kind, YRS-1, and an oscilloscope, and the only other requirement is a calibrated volume control.

The volume control is calibrated with an ohmmeter. Assuming a 1-megohm volume control, the -6 db point will be a half resistance, or 0.5 megohm. The -12 db point will be at half of this, or 0.25 megohm. The -18 db point is half of this (0.125 megohm), and so on down the line in 6-db. steps. The scope can be connected at any point in the audio amplifier following the calibrated volume control, and the sweep speed should be set low enough to make noise peaks appear as individual "spikes."

To measure sideband suppression, set the control at 0 db, and advance the r.f. gain control of the receiver to a point where the unwanted sideband gives a definite amount of 'scope deflection on peaks. Reduce the calibrated volume control setting (to save the loudspeaker) and switch to the desired sideband. Adjust the calibrated control until exactly the same amplitude peaks appear, and read the suppression ratio directly from the control.

The accuracy of the system is limited, of course, by the care taken in calibrating the control, errors in reading the 'scope, and by the maximum possible amount of sideband suppression the selectable-sideband receiver is capable of. However, the limit of the receiver rejection can readily be found by occasionally tuning across an unmodulated carrier and measuring the point of receiver failure. Any reports given below this ratio will be accurate.

**807 Grounded-Grid Class B Stage**

A note from G2FEL mentions that he and G3BOO have used a triode-connected 807 as a linear amplifier in the circuit shown in Fig. 3. The grounded-grid stage has a very low input impedance (around 200 ohms), which accounts for the tapping down on the grid coil. Connected this way, the 807 becomes a zero-bias tube, at some plate voltage that wasn't mentioned. Since the subject of grounded-grid amplifiers gets kicked around a lot by the s.s.b. gang, the circuit is passed along for anyone who would like to try it.

**CALLING ALL NOVICE HAMS!**

The Novice Round-up makes its second annual appearance this year January 10th through 25th. Old-timers are invited to join in the fun and give the newcomers contacts.

Full details appeared in December QST, but as a reminder, don't forget that the Round-up starts on Saturday, January 10th, at 6:00 p.m., local time and ends on Sunday, January 25th, 9:00 p.m. local time. A time limit of forty hours is available. This can be used any way you prefer in operation on 80, 11 and 2 meters.

You've still time to get extra scoring credits by qualifying in the Code Proficiency Run from W1AW on January 19th, or from W6OP on January 3rd, if you've time. But, in the meantime, send in to ARRL Headquarters for your free map of the United States, a contest log and reporting forms for the Novice Round-up. The fine outline map can be posted in your shack to keep a visual check on your worked-all-states progress.

Remember to check December QST again for full details on rules.
Inexpensive L and C Standards

One of the well-known uses of the grid-dip meter is as a calibrated source of r.f. in the resonant-circuit method of measuring inductance and capacitance. If the capacitance of a condenser is known accurately, the inductance of a coil connected to it can be determined from the frequency at which the combination resonates. Similarly, if a coil of known inductance is available, the capacitance of a condenser connected to it can be measured. The accuracy of the method depends, among other things, on the accuracy with which the standard L and C values are known.

It is possible to get entirely adequate L and C standards for a matter of pennies, and the ingredients usually can be found in any radio parts store. Silver mica condensers are highly stable and their standard tolerance is plus or minus 5 per cent of the marked value. It is possible to get them with a tolerance of 2 per cent, but this usually will require a special order — which is slow going these days. Furthermore, it is not really necessary, since an inductance standard of the same order of accuracy is readily available in the B & W Miniductors. Being machine wound, these can be held to quite close tolerances in diameter and winding pitch, especially in sizes with the turns fairly well spaced. The 3015 type meets these requirements quite nicely.

By proper choice of values for the standards a range of L and C measurements that will take care of all the usual amateur requirements can be covered, without exceeding the frequency range commonly incorporated in a grid-dip meter. A good selection is 5 microhenrys for the coil and 100 μfd. for the condenser. These will permit measurements of inductance from 0.1 to 100 μh, and capacitances from 5 μfd. to 0.002 μfd., with a grid-dip range of 1500 kc. to 50 Mc.

Seventeen turns of 3015 Miniductor (1-inch diameter, 16 turns per inch) has an inductance of almost exactly 5 microhenrys. To be usable, it has to be mounted in some way that will permit ready connection, and it is convenient to use a binding-post plate as shown in the photograph [p. 120]. The 100-μfd. silver mica can be similarly mounted, one plate of a pair being used for each unit. Ceramic plates are best from the standpoint of good electrical characteristics and mechanical stability, but the material is probably not too important. In cutting the coil to size, be careful not to distort the turns or disturb the spacing, and leave just enough lead length to solder into the lugs under the binding posts.

Fig. 1 can be used with a coil of this size and a run-of-mill 100-μfd. silver mica. Using this chart and the calibration of a commercial grid-dip meter, it was found that over most of the range the maximum discrepancy between values of L and C so measured and the values given by measurement on a Boonton Q-meter was under 6 per cent, and the average deviation was considerably less. The actual capacitance of the condenser assembly was 106 μfd.

(Continued on page 180)

Fig. 1 — Inductance and capacitance as a function of the resonant frequency of an LC circuit, based on an inductance of 5 μh. for capacitance measurements and a capacitance of 100 μfd. for inductance measurements.
BY ELEANOR WILSON, W1QON

Good publicity is something amateurs can always use. In these days of TVI, the more favorable publicity, the better. We YLs have an excellent opportunity to sell our hobby from the human interest standpoint. Newspapers and broadcast stations are continually searching for people with interesting stories to tell. As feminine radio operators, we certainly can fill the bill.

In the Boston area alone, at least three radio programs, one TV program, and innumerable newspaper articles have featured "lady" hams during the past year or two. Similar broadcasts and articles occur throughout the country. Perhaps we should resolve this new year to personally do all we can to help build and maintain a store of good will for amateur radio.

It's surprisingly easy to do once you get started — TV and radio broadcasts and newspaper articles can be a lot of fun. Then, too, ARRL has available for the asking sample scripts for radio interviews and speeches and various other material suitable for presentation to the general public. We can write magazine articles (or more ambitiously, books). We can talk to clubs, school and church groups. Bring the mobile rig along and watch eyes pop when you demonstrate two-way amateur radio in your car!

Keeping Up with the Girls

We are sorry to report the passing on November 2nd of May Smith, W1BDM, of Manchester, N. H. May was a real old-timer, having been licensed in 1920 with the call W1BAE. In 1928 she became W1BDM and held this call for twenty-four years. May was well known on the power five-meter band.... Now Advanced Class, W1UBM has held three licenses — Novice, General, and Advanced Classes — within fourteen months (see Sept. '52 column). Norma is undoubtedly one of few who have accomplished this feat in such a short time. ... Fifteen members were present at this season's first meeting of the Los Angeles

*YL Editor, G8T. Please send all contributions to W1QON's home QTH: 318 Fisher St., Walpole, Mass.

A Jeep, plus a mobile rig, plus a YL operator tend to create a bit of excitement as Lillian Klarfeld, W21QP, has discovered. Lil draws lots of stares as she QSOs while driving about her home town, Newark, N. J., in her own jeep, which is outfitted with a 15-watt rig on ten. Lil's OM, W2EAO, and two sons, W2YC and W2YG, also have individual tickets, and each is equipped with a mobile rig on ten. There's a fifth rig fixed at home. All the Klarfelds hold Advanced Class licenses, too. We guess it's safe to assume that the family enjoys its hobby!

The first YL QSL Bureau Manager — Mary Ann Tatro, W7FWR, of Olympia, Washington. Mary admits that in previous years about 45,000 cards were received annually, but "only" some 25,000 came in during 1952, due in part to poor DX band conditions and TV. When Mary has spare moments between mail deliveries, she operates ten 'phone with an IIT-9 transmitter and HQ-129 receiver. Once each day she skeds her son W7EKW, using her OM's station, W1FWD.

YLRC, FCC Docket 11297 and call-sign license plates were discussed. At a later date W6UHA, Maxine, entertained 25 club members and guests with a lovely luncheon, highlight of which was a large cake decorated with an antenna. The girls' greetings to W6FWR, Lou, who is at the Good Samaritan Hospital in L.A., were recorded by W6NIAZ, Lenore. ... WN1WNE, Sylvia, a new R. I. YL, is running 8 watts on two. ... YLRL Publicity Chairman W1QON reports that a new club photograph album has been purchased, and the book is awaiting photographs to adorn its bare pages — one large hint! W8ATB and OM W8QBO mobiled their way (75 meters) over 8000 miles during their recent trip West. Esther was particularly happy to meet W7s IHH JWC MUP NH, W2AYX, W6s EYD and KOY. ... Unfortunately, VE8BTE is seriously ill and will be unable to continue as YLRL District Chairman for Canada. VE3- AJR, Dell, will relieve Rose of her duties. ... W4 RIG, Bobbe, is doing well with her new 32V-3. ... Two more new young YLs are 14-year-old WN9YJR, Louise Drolet, Kankakee, Illinois, and 16-year-old WN6OBZ, Joan Dobson, No. Hollywood. And 15-year-old WN3UPT, Sylvia Granuma, writes that she became interested in getting her own license because of "dear old Dad, W3CRC, and the way Mom would patiently look on as he got intrigued with

(Continued on page 186)
Unpainted But Adequate
An Idea for the Compact Ham Station

BY J. W. PADDON,* VEIOU/W3

In a better world every amateur would live in his own house set in the middle of ten acres judiciously dotted with tall pine trees and 80-foot towers. As it is, many of us live in cities, in apartments surrounded by TV sets, with no place to work and with neighbors whose reaction to sawing and hammering noises is only equaled by their appreciation of a Harris-tweed pattern appearing on a 20-inch screen.

To any amateur, a communications receiver is a thing of beauty and a joy forever. Oddly, this view is shared by few XYLs and no interior decorators. A good receiver is sure to be heavy and not suited to the creations of Sheraton or Hepplewhite. We get a receiver, and the problem of what to set it on automatically arises. The problem was further complicated by apartment living without access to tools or a working place.

People who own oil wells or have a seat on the stock exchange would probably have gone out and bought a bit of modern furniture or a genuine Grand Rapids antique. As for us, we immediately set forth to the well-known emporium of Mr. Sears and Mr. Roebuck. With a leer at the cost-of-living index, a course was set toward the unpainted furniture department where, after burrowing around among the displays, we came across an unpainted bookcase. This one was unusual because it was a double bookcase, with shelves on both sides. This was it.

In Fig. 1 [p. 122] we see the cross-sectional view. The piece is 27 inches high, 30 inches long, and 16 inches deep. There is a vertical dividing panel halfway between the two open faces, separating the thing into two identical halves. Thus on each side of the partition there is a shelf about 7 3/4 inches deep. The vertical partition is made of 3/8-inch plywood and not removable, and the rest is of ponderosa pine, finished and ready to paint.

We didn't get a matching loudspeaker and case for the receiver. They cost money and space, and anyhow, we had a 7-inch 'speaker already. The next purchase was one of those little hacksaws that look like junior keyhole saws (35¢). Once the bookcase was delivered, it was laid flat on the floor and a 7-inch circle drawn on the vertical partition with a compass. The location shown in the photograph is not important; the 'speaker can be located to fit the OM's taste. A screwdriver was used to chew a starting hole through the plywood partition at a point on the circumference of the circle. The baby hacksaw made light work of the circle and that was it.

The bookcase is just wide enough to accommodate the receiver with a bit to spare. Four wood screws were used to secure the 'speaker to the back of the plywood partition. Connections were made.

(Continued on page 188)

Left: Although this bookcase looks like only enough support for the receiver, 'speaker, and a few books, it is a double affair in which the other half can be used for storing anything from the rig to the family jewels. Below: One of the two additional vertical partitions installed, and the runners for supporting the receiver coils have been installed. (Photos courtesy VE3KR)
6th V.H.F. Sweepstakes, Jan. 10th-11th
ARRL Certificates to Leaders—Gavel for Winning Club

BY F. E. HANDY,* W1BDI

The Sixth Annual V.H.F. Sweepstakes will start at 2:00 P.M. your local time, Saturday, January 10th, ending at midnight Sunday. Phone, m.c.w. or c.w. may be used, with results all contributing to one score. The aim of this contest is to work as many v.h.f. stations as possible in one week end. All points from such work will be multiplied by the number of different ARRL sections worked. "CQ Sweepstakes, this is W...... over" (on c.w. just "CQ SS de ...... K") will identify stations desiring to make contest exchanges.

If an exchange of SS data is completed in both directions, two points may be claimed. To make it easy to record exchanges they should be sent in the order of information shown. Exchanged information is in the form of a message preamble, with the ARRL section substituted for the city and state, and the RST report for "check." Any station you work is good for one point in the score if you get the other operator's acknowledgment of "message," whether he is in the contest for score or not.

Contest reporting forms for your convenience will be sent free on request. Neither advance entry nor form is required. Follow the log arrangement shown. All lists, small or otherwise, are welcomed by ARRL to help support claims and make complete results in QST possible. Report as soon as the test is over.

*Communications Manager, ARRL.

1 See list of sections in the ARRL field organization, page 6. Awards include Puerto Rico, Hawai, Alaska. In operating use section abbreviations such as E, Mass., R. I., W. N. Y., Neb., N.Y.C.-L.I.

2 In phone RST exchanges only two numerals need be used, Say Readability . . . . Strength . . . . On c.w. full 3-number RST reports should be logged.

3 Where only one point is made on a contact you can add a point by working this station again for exchange in the opposite direction later. Leave right or left report column blank so that other pairs of exchanges completed in one contact are side by side in your report.

Certificate awards will go to V.H.F. Sweepstakes winners in each ARRL section and to leading operators of clubs where three or more submissions are received. A club gavel goes to the club with top aggregate score. Get set for a v.h.f. operating week end!

Rules

1) Eligibility: Amateur operators in any field-organization section1 operating fixed, mobile or portable under one call on or above 50 Mc. are invited to take part.

2) Object: Amateurs in U. S. and Canadian sections of the ARRL field organization will attempt to contact as many other stations in as many sections as possible.

3) Contest Periods: The contest starts at 2:00 P.M. your local time Saturday, Jan. 10, 1953, and ends at midnight Sunday, Jan. 11, 1953.

4) Exchanges: Contest exchanges, including all data shown in the sample, must be transmitted and receipted for as a basis for each scored point.

5) Scoring: (a) Contacts count one point when the required exchange information has been received and acknowledged, a second point when exchange has been completed in both directions.

(b) Final score is obtained by multiplying totaled points by the number of different ARRL sections worked (the number in which at least one SS point has been credited).

6) Conditions for Valid Contact Credit: (a) Repeat contacts in other bands confirmed by completed exchanges of up to two points per band may be counted for each different station worked. (Example: WIXXX works W3MQU on 50 and 144 Mc. for complete exchanges, 2 points each on each band. 2 x 2 gives 4 points but only one section multiplier.)

(b) Crossband work shall not count for any points or sections.

(c) Fixed-, portable-, or mobile-station opera-

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EXPLANATION OF V.H.F. SS CONTEST EXCHANGES

<table>
<thead>
<tr>
<th>Purpose (example)</th>
<th>Exchanges</th>
<th>Call</th>
<th>CK</th>
<th>Place</th>
<th>Time</th>
<th>Date</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Contest numbers 1, 2, 3, etc., a new NR for each station worked</td>
<td>Send your own call</td>
<td>CK (Readability . . . . Strength . . . . or RST of station worked)</td>
<td>Your ARRL section1</td>
<td>Send time of transmitting this NR</td>
<td>Send date of QSO</td>
</tr>
<tr>
<td></td>
<td>QSO NR tells how you are doing. (NR 1)</td>
<td>Identification (W1AW)</td>
<td>All exchange reports (S80)</td>
<td>Section1 vital contest data. (Conn.)</td>
<td>Time and date must fall in contest period, 6R55 P.M. Jan. 10</td>
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station under one call, from one location only, is permitted.

7) Awards: Entries will be classified as single- or multioperator, a single-operator station being defined as one manned by an individual amateur who neither receives assistance nor gives assistance to any person in the contest period. Certificates will be granted based on the leading work in the single-operator classification in each ARRL section. Multioperator work will be grouped separately in the QST official report of results.

When three or more individual club members compete and submit logs naming the club with which they are identified, an ARRL certificate will be issued through such club to the leading individual in the local competition. When less than three individual logs are received there will be no club award or club mention.

A gavel with engraved sterling-silver band is offered the club whose secretary submits the greatest aggregate score, such claim successfully confirmed by individual member reports (resident club members only). Claims from federations, radio club councils, or other combinations of radio clubs, will not be accepted. Special memberships granted for contest purposes will not be recognized.

8) Conditions of Entry: Each entrant agrees to be bound by the provisions of this announcement, the regulations of his licensing authority, and the decisions of the Award Committee.

9) Reports from all entrants must be postmarked no later than January 26, 1953, to be considered for awards.

W0RA finds it's tough to coax the r.f. through his coax.

Our Navy's Jim Creek Valley, Wash., megawatt-output long-wave station, begun in 1946 and now nearing completion, will probably be lighting homes in near-by towns whether light switches are on or off. Not only that, wire fences for some 25 miles around will have to be properly grounded to prevent injury to livestock and farm personnel.

"- Seattle Times via WNSSCU"
F

or some time now most of us have been aware that a device called a transistor has been undergoing laboratory development. We knew that it was destined to have far-reaching effects on the science of electronics, but so far it had created no great stir in amateur circles. For one thing, the first transistors to be made available were suitable for use only at very low radio frequencies. Thus it may seem strange that what may be the first amateur use of transistors is reported in this section of QST, but the fact is that it happened on 144 Mc.

One evening not long ago K2AH, Mountain Lakes, N. J., worked W2KNI, Mountainside, W2DPB, East Orange, and W2UK, New Brunswick, with what was unquestionably the first amateur transistor transmitter, and probably the world's record for low transmitter power. Not even W2UK, more than 25 miles away, was at first aware that he had taken part in a history-making event. He knew that the signal was well down from what he had come to expect from K2AH, but it was readable enough.

Now don't rush off to the nearest radio store for a 2-meter transistor and a flashlight cell, to beat K2AH's low-power record; there are a few obstacles in the way. What happened was that George Rose, who is manager of the RCA Tube Department Advanced Development Group, had taken an experimental transistor now being developed for v.h.f. applications and made a 146-Mc. crystal oscillator out of it. The transmitter, complete with power supply, could have been built into cigarette-package size—probably the nearest thing yet to the wrist radio made famous by Dick Tracy.

As may be seen, there are features about this approach that may keep it from becoming routine ham practice for some time, but it does give some inkling of the manifold ends these amazing gadgets may eventually serve. More details of the K2AH rig in February QST.

Here and There on 6 and 2

In the big rush of events in early September there was bound to be some confusion as to who worked whom. Two errors in our reporting of the 2-meter openings have been brought to our attention, both of them in the "firsts" listed. Minnesota and Missouri were linked on 144 Mc. prior to the September sessions. Unless someone can establish prior claim, we install the July 6th contact between W4TJP and W6DDX as the first 2-meter work between these two states, with thanks to W4TJP for bringing it to our attention.

W6AJG says that the September openings created no excitement in Texas, so he was surprised to find a Wisconsin Texas contact listed among the "firsts." He checked up on the Texas end and found that W6JLX has never been on 144 Mc., so it appears that we must scratch that one unless WN9SDH can give us the straight dope. The original report came by way of a third party, so there was plenty of opportunity for error in the call signs involved.

With the sunspot cycle scraping bottom, there is not much DX news in regard to 50 Mc. these days, particularly in the fall months when sporadic-E skip is infrequent at best. Use of the 50-Mc. band for civil defense work has boosted occupancy markedly in some areas, however. Notable in this respect is Massachusetts, where state-wide operation on 6 is being planned. Already several regional nets are in business in the eastern and central parts of the state, and this influx of new stations has resulted in an increase in the routine use of the band as well. This comes at a time when other areas where no c.d. use of 6 is contemplated report activity on the band at a low ebb. At least 5 nights a week see 50-Mc. net operations taking place in Massachusetts, the most recent addition being the 6-meter net in the Worcester area. This group uses 50.56 Mc. each Thursday at 1930 EST, the function of net control rotating among the members.

November's news is not devoid of 6-meter DX reports, either. W6BAG, San Gabriel, Calif., heard W7A HEA and JPA working each other at 10:10 PST on the 16th. At the first opportunity W6A gave them a call and maintenance contact intermittently for the next hour and a half. The W7A also worked W6EPJ at San Bernardino. Their signals were louder on 6, W6BAG reports, than any W7A heard on 10 during this period. W6TA, Inyokern, Calif., caught an opening to the east on the 25th, working W5MTJ at 1947, and hearing W6HJ, H6U, and W5MB. The band remained open for about an hour. W6BAG said he caught this one, too, working W5A KWP, MY1, and MY2 and MJD between 2007 and 2055. Again on the 26th, W6BAG worked the same stations and heard W5A AG, ONS, and BNI. W6BAG, Pleasant Hill, Mo., worked W6ANN, W6IUC and W5MTJ on the 26th. On the 25th he caught W4LAW, W7QAP, W5MTJ and W7LV. Not bad for November!

The WAR certificate award offered some months ago by the Rochester (N. Y.) V.H.F. Group has helped to maintain activity on 144 Mc. in the area around that city. Stations within a 25-mile radius of Rochester must work 25 Rochester stations to qualify for the award, while those more than 25 miles away need work only 15. Special WAR Nights are scheduled from time to time, when operators wishing to work for the award can be assured of a large turnout of Rochester stations. The WAR Night schedule for the next few months is as follows: Dec. 16th, Jan. 22nd, Feb. 16th, March 17th, April 22nd, May 21st, June 15th. Another opportunity for Rochester area activity is the weekly operation of the Finger Lakes Net, working out on 145.35 Mc. each Friday night at 2000.

Two more 2-meter nets are reported by K6AM, Chula Vista, Calif. The gang in the San Diego area gather on the air each Tuesday at 1900. Present net membership numbers about 34, and the function of net control rotates among the group. In addition, there is a net coordinator elected for a 6-month period by the membership. W6BWI serves in this position until the end of 1952, when K6AM takes over. On June 30th, he will turn his duties over to W6IBS. Independently-powered gear is under construction, and will soon be available for simulated or actual emergencies.

Chula Vista also has its own 2-meter net. This group, presently numbering 6 stations, holds forth each Thursday at 1900, with W6MUA as Net Control.

Mobile Antenna for 2 and 10

With both 28 and 144 Mc. being widely used in c.d. planning, a mobile antenna that will work well on both bands should be a useful item. A suggestion to this end is offered by W2FBR, East Orange, N. J. Ralph tried a regular 10-meter whip, which took power on both bands well enough, but the radiation angle on 144 Mc.

* V.H.F. Editor, QST.

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was high and the antenna did not compare in effectiveness with a 2-meter whip or coaxial dipole.

The addition of two coaxial skirts in the manner shown in Fig. 1 corrected this to a large extent. The skirts have no effect on the operation of the antenna on 20 Mc; yet, its performance on 144 is greatly improved. Carrying the utility of the antenna still further, it is close enough to a 50-Mc. half-wave so that it has been used effectively on that band as well.

### New Interest in 220 Mc. and Higher

For a reason that may not have occurred to many of us, there is more interest in the frequencies above 220 Mc. today than ever before. And what's more important, it's growing every day. This is for the reason, of course, that the novice and intermediate classes license. Not a few holders of that ticket are fellows who were well enough grounded technically to pass the General Class exam, but who couldn't make the grade on the 13-w.p.m. code speed. Having passed the technical portion of the exam, they took Technician tickets along with their Novice ones, and were thus assured of permanent licenses.

There has been increasing interest in the higher frequencies for some years, and the advent of the Technician license, limiting the holder to 220 Mc. and 144 Mc., has done a lot in this direction. For the first year, however, almost every Technician also had a Novice ticket, so most of them concentrated their activity on 3.7 or 145 Mc. Now the Novice tickets are running out in considerable numbers, so the Technician license is getting an ever bigger play.

And why not? In the years since the early '30s literally thousands of beginners have made their start in amateur radio on the v.h.f. bands. Today's Technician has open to him bands that offer at least as much of interest as the 3-meter band offered to the beginner in the period of great v.h.f. expansion that began 20 years ago. It was several years before '40 for instance, when worked more than 50 miles away without climbing a mountain to do it, and almost nobody ever dreamed of working over distances that stand as records for 220 and 420 today.

The fellows who are busy on 220 and 420 would be the last to say that they have done all there is to be done on these bands. On the contrary, they are almost unanimous in their feeling that we have done little more than scratch the surface of the possibilities of these and higher bands. If these frequencies are to be developed, the Technicians must certainly play an important part in the future.

As an example of interest building up in 220-Mc. circles, W4HHS, Collierville, Tenn., sends in a list of 42 Mc. stations and equipment he's gathered recently. He has 16 elements with screen reflector, and a crystal oscillator ahead of an SX-43. W5AYU, Houston, also has a 4X150 rig, on 432.15. His array is 5-element jobs stacked, and his converter uses a 6A4 r.f. amplifier ahead of a crystal mixer. W6OIS, Jackson, Miss., has 10 watts on 432.2, feeding a 5-over-8 and a 10-element-with-screen array. W5AXY runs 40 watts input to a 9903 amplifier on 432.0 Mc., feeding a 5-over-5 array. His receiver is an NC-180D with a crystal converter. W4BYN, Memphis, Tenn., runs an 882A amplifier on 434.1 Mc. His array is a 16-element job, and his receiver a 06J mixer-oscillator converter. W4HIH-UDQ will soon have a 9903 tripler on 434.1 Mc. to go with his 32-element array and converters that work into an HEO-6OT. Paul is getting fine results with a 6A4 r.f. amplifier built similar to the 6J4 job described in January, 1952, QST, and in recent editions of the Handbook. This is followed by either a crystal mixer, or a 6AM4 grounded-grid mixer, the latter being as yet inferior to the crystal job. Mixer output is 27 to 30 for tuning 432 to 435 Mc. Other stations in various stages of getting started on 430 are W5RCI, Marks, Miss., W5TOE and W5ERMZ, Little Rock, Ark., and W9UED, Belleville, Ill.

### Plate Lines for the 9903

One of the most widely-used tubes for 430-Mc. work is the Amperex AX-6908. This dual triode is capable of 10 watts output as a tripler from 144 Mc., or up to 30 watts as a 432-Mc. amplifier. It has only one disadvantage: the glass support for the plate pins is fragile, as a number of 430-Mc. experimenters have found to their sorrow. This condition has been corrected by the introduction of an improved version of the tube, but meanwhile, many of us have 9903s we'd like to use without fear of breakage around the plate pins.

In applications where a flexible lead between the plate pin and the grid is called for, a 220-Mc. plate line can be used as shown in the diagram.

#### Fig. 1 — Modification of the 10-meter whip to permit low-angle radiation on 144 Mc., used by W2FBR.
connection and the tank circuit can be used, this presents no problem, as flexible ribbon or braids can handle the job. But on 420 you don’t use “leads” in the conventional sense, and very flexible materials don’t make good tank circuits as a rule. A neat solution offered by W5AYU is shown in Fig. 2. Lee makes the major portion of his halfwave line of stiff brass stock, and provides a short flexible section cut from beryllium copper spring stock only 0.005 inch thick.

Fig. 2 — 420-Mc. tank circuit design for the AX-9903 suggested by W5AYU.

Tabs on the flexible portion fold over the brass strips, and are soldered in place. The plate connection is taken care of by small pieces of brass rod drilled to pass the 9603 plate pins. The flexible portion of the line may be silver soldered to these connectors, if facilities of this type of soldering are available, or the brass may be drilled and tapped for small screws to hold the flexible strips in place. The complete assembly is silver plated.

OES Notes

The new 6A4J tube is attracting attention among the fellows who are looking for ways to improve their receiver performance. This is a new triode especially designed for grounded-grid r.f. service at uh.f. TV frequencies. From results reported by several workers it appears to be capable of anything that the much higher-priced 6J4 would do. A companion tube, for uh.f. TV mixer use, is the 6A4M, also being tried out on 420 by several reportes.

W9FEC, Hudson, Ohio, is rebuilding his crystal-controlled 6E5-Mc. converter for these tubes. Ralph has already made use of the 6A4J in an r.f. preamplifier with excellent results, as has W9HJK. Both say that the tube operates very stably, and makes a worthwhile improvement in the signal-to-noise ratio, as well as gain, of their converters for 432 Mc. Mixed reports have come through so far on the 6A4M as a grounded-grid mixer, and if anyone has achieved really good results with this tube the rest of the gang would be glad to have the details.

W9KQX uses the 6A4J as the second tube in his cascode converter, in place of the 6J6 commonly used with a triode-connected 6A5 in this circuit. This is for 144 Mc.

W9MBI has been trying the 5842, another high-beta triode, as an r.f. amplifier on 432, 220 and 144 Mc. Excellent results have been achieved on all bands, and on 432 Mc. the noise figure of Clare’s crystal-mixer crystal-controlled converter was improved by about 8 db. by the addition of the 5842 preamplifier.

This is in line with results your conductor got with r.f. amplifiers described in January, 1952, QST, and in the 1952 and 1953 editions of the Handbook. From our results, we concluded that use of a crystal mixer with an r.f. amplifier is not so hot; that if no r.f. stage is used, it is better to use a vacuum-tube mixer.

W9LBE reports that the Northern Wisconsin Radio Club is sponsoring informal operation on 144 Mc. nightly at 2000 to extend what is developing into appreciable v.h.f. interest in that area.

A new OES from that region, W9DSE, Chippewa Falls, reports work on 438 Mc. with W9REQ. These two are using an unconverted BC-455a as present, to exchange excellent signals over the 6-mile path. They’d be glad to hear from others within range who are interested in 420-Mc. work.

2-METER STANDINGS

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Other OES are using the winter bull to accomplish such varied ends as shack rebuilding and 420-Mc. TV experimenting. W8WBN and W7JRG are the carpenters. W2UTI is drawing pictures at present, in the hope of transmitting pictures later.

For mention of amateur TV in these pages is sure to bring widespread response. W4MS, Pensacola, Fla., says that four lines in October QST about the camera information he has prepared brought 18 requests from 6 different call areas. The TV enthusiasts have launched the American Amateur Television Society, operated on a nonprofit basis for exchanging ideas. W4MS and W1BHD are prime movers in this project.

January 1953
TETRODE CIRCUIT FOR CLAMPER TUBES

A space-saving and very practical idea was recently suggested by W2SGJ, using a miniature tube (6AK8, 6AQ5, etc.), connected as a tetrode, in the protective circuit for a screen-grid amplifier. After trial, we can safely say that for a given tube the arrangement provides more effective clamper action than does the more commonly used low-µ triode circuit. Referring to the characteristics of a pentode or a tetrode tube, it will be seen that the plate current is more dependent on screen voltage than it is on plate voltage. Therefore, if the screen voltage of a multigrid tube is maintained at some suitable value, the normal plate current of the tube will not be too greatly affected by reduced plate voltage. Naturally, this feature is ideal for clamper-circuit operation because it means that the protective circuit will continue to draw heavily through the screen-dropping resistor even after the plate voltage (screen voltage for the r.f. amplifier) has been reduced to a very low value.

Fig. 1 is the schematic diagram of a clamper circuit which uses a Type 6AQ5 tube. The circuit differs from the standard low-µ triode layout in that the screen of the tube is fed from a fixed voltage source. \( R_1 \), \( R_2 \), and \( RFC_1 \) are all normal r.f. amplifier components. The voltage applied to the screen grid of the 6AQ5 may be obtained from the screen circuit of one of the exciter stages or it may be taken from the low-voltage supply through a dropping resistor. In any event, the applied voltage must be less than the value which will cause the screen-grid dissipation rating to be exceeded. A potential of approximately 130 volts appears to be maximum for the 6AQ5.

It is logical to assume that the screen-grid voltage for the tetrode clamper could be obtained from the amplifier high-voltage supply if the latter is one of the low-power jobs. If this system is employed, it may be necessary to tap the screen onto a voltage divider connected between the h.v. supply and ground. A simple series-dropping resistor may be used between the supply and the screen if the voltage does not rise too high when the clamper tube is cut off.

The above circuit will be of special interest to anyone who wants to clamp a 6146 — a tough tube to hold down. The writer has used both the 6AK8 and the 6AQ5 to clamp a 6146 to 15 ma. when the amplifier was operating with 360 volts on the plate. Under the same conditions, a conventional triode clamper held the current to no less than 100 ma. — R. B. Haner, W3FBA

[Note: QST wishes to thank Joe E. Stuckey, W4HCV, for forwarding data on his independent development of this screen-grid clamper circuit.]

[Entron's Note: Here in the ARRL lab we found that the 6AQ5, operated as a tetrode clamper, will draw approximately 30 ma. plate current under the following conditions: \( E_2 \) = 500 volts; plate-dropping resistor = 15,000 ohms; \( E_{sc} \) = 130 volts; \( I_2 \) = 13 ma.; \( E_{sc} \) = 0 volts.]

REVAMPPING AUTO RADIOS FOR 160-METER MOBILE

Many amateurs who wish to revamp a car radio for 160-meter mobile work are under the impression that an extensive modification is in order. Actually, the task is not nearly so difficult as would be expected and there are several types of receivers that can be done over in less than an hour. The following explains how easily and quickly the job can be done.

After the radio has been removed from the car, it should be opened and inspected. If the front end employs variable-inductance tuning, proceed as follows: First, locate the oscillator trimmer. This capacitor is usually mounted close to a converter tube (6SA7, 6AE, 6BA7, etc.) and is connected in parallel with a padder capacitance of approximately 300 \( \mu F \). Remove the padder and replace it with one having a capacitance of approximately 250 \( \mu F \).

The modified set should now be adjusted to the high-frequency end of the tuning range. Next, feed the output of a modulated signal generator to the antenna jack of the receiver and adjust the r.f. amplifier and the converter circuits for maximum response at 1900 kc. The set may now be reinstalled in the car and connected to the antenna. The antenna trimmer should now be peaked while listening to a weak signal located somewhere around 1800 kc.

Receivers employing variable-inductance tuning that we have converted have ended up with a frequency range of 600 to 1925 kc. Of course, the original calibration is off after the change but this is not objectionable after the push buttons have been set to their respective b.c. stations.

(Continued on page 124)
The operating position of ZD7A, picture taken by the proprietor of the Consulate Hotel, Jamestown, St. Helena. Authorities granted permission for the equipment to be installed atop Ladder Hill, a prominence over 800 feet above sea level (see below).

ZD7A
(Napoleon Was Born 137 Years Too Soon)

Picturesque, volcanic St. Helena, famed as the island exile home of the Emperor Napoleon, is located some 1200 miles off Africa's west coast, has 47 square miles of area and supports an estimated population of 4800 souls. Until Arthur J. S. Hemsley (ZS6GV-ZS7B) came along, it was just another blank space on everybody's DXCC Countries List.

Thanks to OM ZS6GV and his keen perseverance in the face of obstacles so numerous in such an ambitious DXpedition, hundreds of amateurs throughout the world had an opportunity to contact ZD7A-land. This very rare catch was available during most of the month of October, 1982.

ZD7A commenced eagerly-awaited operations October 10th and performed on the 20-, 15- and 10-meter bands steadily for over two weeks. The rig—a 6K5-6AG7-807 layout—was powered by an Onan generator and ran 20 watts input. This was all the soup needed to throw amateur frequencies into a howling uproar! The r.f. section and modulator were constructed as compactly as possible on a 12 × 7-inch chassis which can be seen atop the HRO receiver in the photo above.

Arthur's ambition now is to accomplish his own DXCC at his ZS6GV home station in Germiston, Union of South Africa. Grateful DXers everywhere will wish him the best of luck on it!

Right: Ladder Hill as seen from the floor of the valley in which all of Jamestown is situated. The valley is only 200 yards wide and a half mile in length. At the left is Jacobs Ladder with its precipitous angle. Arthur used this route to reach the gear of ZD7A from his quarters in the hotel below.

Right, below: Looking down the giddy angle of Jacobs Ladder from the small platform at the top. "Upon becoming used to the exhausting task and firmly grasping the rails, I skipped down two at a time and reached the bottom step in five minutes." No soft touch for a 12-year-old!

Below: A view of the bay from the rampart at the summit of Ladder Hill. Ships calling at the island must be anchored in the roadstead and all passengers and cargo conveyed to shore in rowboats. This system was disconcerting to ZS6GV but the islanders are adept small-boat sailors.

---All photos via W1FH
How's DX?

CONDUCTED BY ROD NEWKIRK,* W1VMW

On Facing Page —

UP-TO-DATE COUNTRIES LIST

* For the information of DX-Contesters, DXCC members and aspirants, this QST reproduces in full the official postwar ARRL Countries List, including all modifications and additions made to date.

How:

After last Thursday's club meeting at Bis-
switch O' Riley's, some of us hung around to see
how his new squirter would perform on an almost
dead band. It was while we watched him call
some Pacific stuff that Rhombies Roberts drew
our attention to the "body english" our host was
throwing into each and every call.

When Biswitch sent a dash, his right foot
struck the floor with the impact of a brick; on
every series of dots he yanked at the lobe of his
left ear with enough force to shorten his neck by
an inch or more. The observation touched off an
interesting discussion.

IRC Smith, who has the best QSL percentage
in the club, recalled a W7 friend who had equally
intriguing operating characteristics. "When start-
ing to send," said IRC, "the fellow would trans-
form his breathing into irregular grunts and
wheezes, clamp a cigar upward against the tip
of his nose and narrow his eyes to slits of awe-
some determination. It really got results."

Clippers Clark, our top 'phone DX man,
brought up the ease of a W8 acquaintance.
"While calling the rare ones, Zeke would doodel
all over his log sheets, swing his monitor gain
control continuously and apply vicious scissors-
holds to the right front leg of his operating table.
They usually came back!"

"That's nothing," countered Hi-fi Hanson. "I
knew a W5 who, when monitoring, kept snapping
his right earphone like a pair of two-bit sus-
penders — invariably finished a DX test with a
splitting headache. But he always did roll up
mean scores."

Evidently 'tain't so much what you do to
raise 'em. It's how you do it. What's your system?

What:

Lower-frequency goings-on deserve looking into at this
time of year. W1ATE reports that seventy-five 'phone has
been sounding just like good old twenty on occasions. From
2100 EST well into the wee hours, Chad's ears have been
dented by terrific signals from D1ALL, G2PU, HB9MS
(3792), OX3WX, ZS6Dw, ZS6KD (3790), ZS6OW (3792)
and many others. Conditions have been so hot that even
W6s and W7s are getting good cracks on such stuff.

* DX Editor, QST.

W2WZ was in there slugging, too, and came out with
EA2CQ (3789), HB9MS, OK1MB (3800), HR1BG (3780),
VH2L (3797), G3S (3778), 9AX (3757), 9BA (3800),
9G (3771) and VQ3BU (3784). W1ATE says a
fairly efficient vertical (nothing overly high or fancy) and
a little soup will really bring home the bacon. More sta-
tions, and particularly more DX stations, should give it a
good try.

On eighty c.w. things are hopping, too. W7MQY/K4A2
is hearing our Novices in Japan — W7NQXD was really
boiling in. EA9AF at 0030 AST, E1s 75 (1917),
9j (2043), 9G (2140), CN8A9F (1832), FP8AYP (1900),
D17AU (2040), CT1DIJ (1553), OB13RN (2111), OZ5PA
(1926), PA8XYZ (2045), VP4LZ (2113) and numerous
British Isles fill VE1J's log. K17S was running a mere
two watts and all these stations were found between 3500
and 3515 kc. Lee has been hearing 4X4BX but no QSO so
far. Don't forget that VP4LZ goes for South America and
may be convenient for your 80-meter WAC. W4PWZ was
among those to encounter ZK1AN/MM and he also nailed
VP5BE of the Caymans. EA3s 1AB 1IC, FA0RZ, FO9S,
OKIs HT FM, SP5PF, ZD4AB and 4X4AL are other entries to be heard haunting 80's low
edge — this should be an interesting season. Let the WACs
fall where they may!

Twenty, as a rule, doesn't propagate too well when
the lower freqs are jumping. But we do have a note or two on
the band. W7HEV came through with CP1BX (14,050),
G8s 5AC (940), 6AC (354), 6CC (670), C62 2BG (3190),
3AA (011), 3AB (030), CN8MMZ (060), EA9AP (001),
F8SAG (075), FO8AP (090), HB1IL (001), KA2IMX (060),
MIJUS (020), O4AAX (030), OB13SS (020), OQ5IL (050),
P4AD (025), T34MB (005), TG9aE AC (010), R8400,
T125S (007), ST2GL (007), VPh 2MD (025), SBL (050),
5BE (006), 7NB (025), 8AT (060), VQ4DO (033), YV55ES
(010), EZ (006), Z6EJAN (040), 4X4RE (020) and S4A3TU
(065). Tom is parting with his 813 rig in favor of a Viking 11.
He certainly made a fast rise up to 90 countries.

Getting his Lazy H back up, W9JHN collected CR7LU
(050), F9QY/FC (035) in Corse. FK2SBC (010), MF2AG
(330), OB13RN (065), SP5AB (010), VQ4PCA (045),
YU1AP (105), ZC4IP (055), ZV8AN (075) and S3AT7 (055).
ZC4IP was W8DLZ's first Asian
after many years — W8NOH picked up CR6CZ (040).

Jan., 1953
YU1DJQ (012) ... "TG9GR." .... FQ8AJ, FQ8AG, HC1QW. OQ6RA, VQ2KR and V558H were grabbed by W4TQV. ....... When you're up over 200, new countries come hand. LBE2XD (010) was W2Q4H's first 1952 trophy along this line. .... W6ZGZ installed a new beam across time to work CP's BK BX, DU1DO, E3AEBF, E31DFX, K816A AX AY, KAA 2KW SUB B8B, K6Q6L, KJ6AR, K95AH and V528C. Miles would like to swap his 200- watt for some real gas, but he's doing okay. D1U1MB, D3G5UB, J3A5UF, TFS5V, YU6C5Y and Z55K are among W5AUX's latest successes. An 828 at 200 watts does the job for Walt. .... W1UPO wanted it stressed that the gang at MIT's W1MX continue to keep the bands warm. Their DX log contains stuff like CT3AM, FFS8N, G4LHL, H3R1AT, IS1A9H, MBB0J, OE3H5L, PZ1Q0, SP5TH, TA3AA. TFS5Q, YU1UDA, Z58S U Q, 4X4RE and 966AX4 ... you can't find such on slides rules. .... W3SNY's first crack at 200 produced H9B8. Thereafter he scored with C3E3CD, F6P9A and an OK1 .... ZD7A, Z85Q and LBE2XD brought K2BU up to 144. W6QZJ also caught ZD7A but W4RNP let him get away. .... West Gulf DX Club's D X Inductives tells of AP2E (100), CR3 4AE (090), 4AF (070), 6AB (060), ELZC (044), F5V8B BE (060), BI (050), ZZ (050), F4AD4 (080), FO7GA (019), FMTW (150), FR72A (020), K6MAC (085), L219AX (200-400), MP4s RBD (050), MK (050), P2CF (025), SP2RGA (060), TFSSV (106), V3EJ (090), PN (087), VQ9BM (054), VR3 2BZ (051), 4AE (155), VPS8 AE (102), AN (108), AU (050), V56CG (044), VU2JG (022), YQ2BG (025), Z52A (091), Z88A (080), Z887 (070), 5A2TV (017), 5A3s TA (025), TR (102) and 96AMQ (028) .... Heard but not QSOd by W5AUX were OS6RB, F4YNY, M3C1 J6 SI, UG6KAA, UG19C, V38AW, Z525 IN and JI. .... On twenty 'phone, AP2L (14), CR6s AC (142), AI (138), AT (170), BX (122), F6Bs BA (150), BC (160), BI (200), F60A, FM7s WD (150), WF (132), FOSAD (140), G6DAM (200), EDG (170), IU3 (171), H3YMY (153), K6AT8 (119), Ml3s JY (190), UK (200), MP4s BHI (130), 2B2 (170), P21WIK (107), SU5CC (270), TAZ2EFA (189), TA3AA (195), VPS 1AB (180), 2SE (150), 3LF (140), 3LG (111), VQ4 2DC (140), JBU (160), SGH (180), 4A4, 5AD (150), V6S 1AY (194), 7EA (181), 7FG (197), 7NG (100), 7PW (142), 7WA (181), 9AW (140), VU2ET (224), ZDS 2CDI (180), OR'D (170), ZK2AA (192) and Z85G (118) are active A3ers specified by W5KUC and the West Gulf boys. ... Five times has its good days and WACOC doesn't miss many of them. Bill is up to 59 countries on 21 M. .... E49A, ZK2AA and 4X4RE are his latest. W4COK heard AG3PT trying out the band but no QSO luck. .... Operating only on week ends, K54RD found UDA4 (21060), K1I6YL, KZ5DE, TA3AA (090), V4Q4HP (090), ZD5AA (045) and 954AX (015). Short skip brings EV fill-ins from the Caribbean area and he notes CT3s AB and AV doing a land-olive 21-Mc. trade. .... W9NSL's first affiliation of 15-meteters brought him FYQ4U, VPTNM and Z80CM.

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Colombian ham enthusiasts (front, l. to r.) HKs 6JH, 7BX, 3D1, 481, 6ES, 3A0, 6QS* 2nd opns.: (rear) HKs 5FN, 4DP, 6FU, 6H1, 6GC, visiting Capt. A. Sanchez, 3CZ, 6JI, another visitor, and 3LS hold monthly meetings at Manizales.

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... Times and frequencies from W8NOH: PY2CK 1025 (060), L64AX 1740 (062), VQ4JHP 1315 (074), ZR2JP 1238 (062), ZS8A 1050 (045) and FY77C (021), all EST. .... W6ZGZ snagged K2ZFE, OA4DI, T12TP and ZE2J V while hearing CN8MI, 086G6, YV58DE and ZSSK. Let's see what's been popping up on forty. Asia eluded W5IH for 25 years until 4X4RE came along on 7 Mc. Gil added E3A8, F88AG, PJ2AD, some 4Ps and YV58DE. 7Es and VKs are also represented on his list. .... HESCR (7093), KME5C (041) and VP3RF (085) were tracked down by W9LMC. .... Look what W7QJV rounded up with only 10 watts to a 6V6: K71APY, VKs 2ACP 5XK, VPs 7ND 9BG and ZL3Q. Business is so good John doesn't bother to list his KI8Es. .... W0ZQ scored with KX6AL while W8NOH tangled with F8PAD (024), T12TP (024) and ZS9A. .... HR2ZEE, VPs 4TR 5BF, Z3A2B, 5A3TR and an FB were captured by W4TQV. .... Six more countries will make it an even 100 40-meter total at W2Q4H. .... A new ground-plane deal at W1MX did the trick for CT5AB, E3A8s AW BF, H3R1AT, U3s 4Z1, OK31A, TA3AA, VK3G, YU5 1AFG 1CY 30J 3AJK 30J DDO, TFSSV, ZC4RX, ZD4AB, ZESUP, ZSS 9 U, 4X4RE and a 3A3. Yugoslavs really hit forty with a lead pencil. .... Other goodies noted on 7 Mc. are HC1FG, VP8AJ, VQ4DO, ZK82A, Z58K, Z58F and MP48AU (011) of Qatar.

One-exzr opened with a large bang last November 9th at WILYV. Larry worked 18-watters (G6BK, GW5FSP, G3HYG and G3GOH in that order beginning at 0530 GCT. .... A letter from G6LB to WILYV warns that A1A calling DX between 1800 and 1030 kc. are often blanked out by local Dutch Navigational phone station, "Schelvanng Radio." Looks as if we'd best do our European calling above 1810 kc. this season during the 160-Meter Transatlantic Tests (see Dec., 1952, QST, pp. 64-65).

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Where:

VERON (Netherlands) emphasizes that its bureau is the only representative one for PA8 QSLs. Send your PA8-bound cards to VERON's listed address. .... May we remind you there's nothing necessarily "official" about the QTHs we gather for these monthly listings—they range from first-hand-vis-mailing authentications down to the scuttlebutt variety, all presented in the hope they may lead you to a fast QSL, here are those we have on hand:

C08EL, QSL via W4C0CH
C086C, Box 210, Lonala, Angola
ex-DX2K, QSL to G6KK or via R6GB
ex-D4AEP, QSL to W0XNK
F88TB, Box 867, Transairive, Madagascar
F88AP, Louis Maule, Box 920, Dakar, F.W.A.

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Louis Fonseca, VP3LF, is British Guiana's senior amateur licensee. Thanks to VP3LF, that country is quite available on 10 and 20 'phone. (Photo via WA24IS and W3SHO)
Amateur radio means a lot to OX3SF of the isolated Greenland outpost at Kangardussuk. Though they may take a year or more to arrive, Grove vows QSLs for all QSOs. He prefers 14-Mc. e.w. work.

quency of 7087.5 kc, and that with power output not to exceed eight watts. There, certainly, is a crying need for some out-of-this-world selectivity! . . . . . . . . V862Q (ex-Z61A1) has been putting a good signal into Europe with a 20-watt while he resides a 120-watt phone rig for the fray. James writes to KH5JL that the U.S. "Island Gang" put terrible signals into Malayia with kilowatt gear.

Africa — OQ8 will be the new prefix for Rundu-Urumdi as soon as administrative powers—that-be get off the dime. OQ5RA, our informant, is limiting his current ham activity to Saturdays only, while he studies in preparation for various technical examinations of a commercial nature . . . . . . . OQ5AV came back from a stay in Belgium to settle himself in Rundu-Urumdi; he should be radiating from there by the time you scan this stuff . . . . . . . OQ5JL returned from his U.S.A. wanderings and is hitting 20 meters hard to make up for lost time . . . . . . . FQ8AP removed from Bras- zaville to Port Arabhambi and is also back at it once again . . . . . . . VQ6CB will minimize his Chago ham activity in favor of more work at his VQ8AB, Mauritius, set-up . . . . . . . In WGDXC's DX Bulletin we learn that FF8E are now permitted 200 watts on 80, 40 and 20 meters, 300 watts on 15 meters and below . . . . FV7TA finds that U. S. East Coast papers have been leaking through to Reunion best between 1100 and 1300 GCT . . . . . . . F88E BA BB BC BE BH and BI are Madagascar calls now assigned.

Jeeves — KH16ARA moved to Hilo after signing up as chief engineer for KH1BC . . . . . . . KC6Ql pulled out of Truk in mid-October after falling seventeen countries short of his intended Carolines DXCC. Bob regrets he was unable to squeeze more W7VE QSOs into his log but ham-band conditions down that way were generally quite spotty during his stay. KC6Ql's shutdown will spill a load of on-the-air Carolines pressure over to KC6QY of Ponape . . . . . . . K6H3X (W6FNE) hopped back to the States almost before his Okinawa QTH appeared in "Where." He and friend W90LU/4 are but recently separated from the service . . . . . . . Rapa Island, QTH of quite-active FOSAD, carries a separate designation for K6FT's OUTF award. There are four other such designations in FOS-land, WINWO offers to fill anyone in on details concerning this award.

South America — Paraguay call signs took a shuffling as of late 1962. The letter following the numeral in a ZP call furtherly indicated geographic location but now that task is up to the numeral itself — ZP3, for instance, holds for Concepción-Amambay and ZP5 for Asunción. There are nine zones in all with ZP0XA-ZP9XZ used for experimental (non-amateur) work and ZP8AA-ZP9BZ for amateur mobile. ZPs 3AC and 9GA have collaborated to publish an anthem for their Radio Club Paraguay of which ZP5AJ is President and ZP5CF, Secretary.

Jeeves urges that we add this important expression to our DX equations in terms of countries: OEt + EQ + F18 + HS1 + PK = 0.

H89GJ is one of Switzerland’s most active amateurs, as his shack walls will verify. You may have worked Fritz as HB3. H89GJ holds DXCC, WAC, WAS, WBE and H-22 awards. Mrs. H89GJ looks on.

January 1953
HAM TEAMWORK

707 Sheridan Rd.
Evanston, Ill.

Editor, QST:

Ham radio as a hobby of real importance suddenly struck me as unique among the personal-ability avocations. It takes more than just the hobbyist to make it work; it takes others to go along with him. It isn’t an introvert sort of thing, as so many “making” or “collecting” games can be, but combines the feature of one’s being able to stay by himself for the building of gear if he wants solo time, and then gives him the whopping crowd of other hams to mingle with whom he operates. No wonder it appeals!

— Temple Nieter, W9LF

RADIO ECHOES

6520 Horrocks Street
Philadelphia 24, Penna.

Editor, QST:

Robert Landstrom might send himself a QSL since the radio path must have approached 186,000 miles. The Editor’s suggestion, however, is not the only answer possible and here is one with far more zip and fancy!

In about 1928 echoes were recorded from a Holland station where delays as great as 20 seconds were noted. This curious event was brought to the attention of Dr. Van der Pol. At this point, I lose track of the story until the final theory of the suspected cause is outlined by Dr. Stromer. All the above data and the following suggestion is mentioned in a book by Harlan T. Stetson called “Earth, Radio and the Stars.”

It seems that the earth is located in the inner diameter of a toroid. This toroid is a current sheet device made of electrons or other charged particles of negative polarity which originates the earth from interstellar space. The polar axis of the earth is along the common axis of the toroid.

The presence of this shell prevents primary charged particles from reaching the earth except at the polar regions. When the received density is high the particles ionize the atmosphere, producing the aurora, both northern and southern. At the same time, the inner surface presents an excellent reflective medium for electromagnetic waves. Echoes based on this reasoning were predicted and actually observed.

Could it be that since you were broadside north that the density was high enough to reflect back an echo, coupled with a Highvizer critical frequency which allowed your signals to pass through?

If, as the Editor suggests, the wave was trapped by multiple reflections the band would have been open. This apparently was not the case and the band was dead, in good agreement with what would be expected for this suggestion.

Further, the toroid density may even be part of the reason for a thin Highvizer condition. It would be interesting to find out if an aurora display were in progress on or about the date when the echoes were noticed.

The ARRL has a chance here to act as a clearance house for such phenomena observed by amateurs when the data is useful to the various scientific groups. It is just possible that one fact gained here may prove valuable to the common good on which we base our existence.

— Benjamin Yener, W3KBD

715 Woodside Way
San Mateo, Calif.

Editor, QST:

A possible explanation for the echo signals referred to by W9RUB in the September QST is that his 14-Mc. signals were being reflected back from the moon.

The mean distance of the moon is 384,400 kilometers; twice that is 768,800 — divided by 300,000 (speed of light in kilometers per second) gives 2.56 seconds delay for the reflected signal.

The dead condition of the band could have been caused by absence of a reflecting layer, which would allow signals to penetrate to outer space. Was the moon above the horizon at that time?

How about some experimental moon QSOs?

— Margaret J. Hartley (age 10), W6JPI

HELP

R.R. 3
Elkhart, Ind.

Editor, QST:

Help! Amateurs are being struck, strangled, harassed, and restricted by the greatest spate of bureaucratic regulations since the war. Every month when I open my QST I find changes in regulations, either enacted or proposed. Now it is Docket 10237. I have been thinking of retaining a lawyer to advise me while I operate.

Somebody must be taking the attitude that amateur radio is a business or profession. I myself do not have unlimited time to spend on amateur radio. I have a duty to my employer, my family, my church, and others. I am also interested in other hobbies: astronomy and dog breeding.

Now in my radio operation I have to keep up with changes in frequency allocations and sub-allocations, docket this, and docket that. I like to do some construction. I have to investigate TVI. When can I get on the air for a rag-chew?

— Rolland Jackson, W9QQT

QRP

17225 Salom
Detroit 19, Mich.

Editor, QST:

Just a line to say that I have experienced very good results with the one-tube (6V6) transmitter that you described in your booklet How to Become a Radio Amateur, on pages 20-21. The whole rig (and I had to buy most components new) cost about $15. I appreciated the fact that I was able to get on the air so inexpensively, thanks to the ARRL. I have made a couple of 100-mile contacts, and can do 20-25 miles without any trouble.

The only change I made was to add a d.e., milliammeter, and I wound my tank and output coils on inverted Alka-Seltzer bottles with the caps bolted to the chassis, dipping the bottles and coils in paraffin after getting proper spacing to make the deal mechanically solid. I use a Marconi antenna with about 33 ft. of flat-top.

— Steve Parker, W9LJO

DISHONEST REPORTS

2097 Norman
Muskegon, Mich.

Editor, QST:

Who are we kidding? The "BST" system adequately fulfills all possibilities and yet broad, chirpy, n.s. notes consistently receive 500x reports. This is unfair.

A good operator — and a true ham — will accurately report the other boy's signal. Let's be honest and clean up our hands of rough, chirpy, wobbly notes. Let's quit "thank- ing" each other for the nice report. The burden lies with the sender. A good report originates with the sender — let's get that monitor working, and put a fire under the set-up, not wait for FCC to do it for us. Who are we kidding?

— Walter A. Peterson, W8IXI

62 QST for
Activity and Progress. The New Year is a good time to take a look at individual operating progress during the past year, and to start going in for participation in the operating opportunities that are here or just ahead. Some are spot or week-end activities that give maximum results for minimum time at your equipment. Others like traffic handling, reporting into your 'phone and c.w. Section Net, or working as many Novices as you can to contribute to their Round-up (Jan. 10th–25th) can be taken a little at a time each day for maximum pleasure and real communications results. All the things that give point to operating are most worth-while and designed to add strength to our institution of amateur radio as well as to furnish enjoyment and a barometer of personal progress, as through our several operating awards.

In the next five weeks you can (1) give the Code Proficiency qualifying runs scheduled from W6OF and WIAW a whirl; (2) give your v.h.f. gear a real workout in one of the annual outstanding v.h.f.-ARRL events, the V.H.F. Sweepstakes, Jan. 10th–11th; (3) accumulate and send to QST your points from Novice QSOs in the 15-day Round-up; (4) become an ARRL SCM appointee, then participating in the CD QSO Party, c.w. section, Jan. 17th–18th, or 'phone section Jan. 24th–25th; (5) get in the ARRL DX Competition for some new countries ('phone sections start Feb. 6th and 23th with c.w. periods to follow); (6) give your frequency-measuring ability a workout Feb. 11th in the Frequency Measuring Test, full announcement next month. What project or band or new proficiency comes next on your list? Operating communications are the final test of your ability as a communicator. Our service record in handling emergency communications, personal traffic for each other and third parties, our membership in AREC, in RACES groups, in Section networks, whether we individually have a mobile, or emergency power in the home station, spell out our ability as a group as well as our position as a good citizen in the community of amateur radio. We help to write the continuing story of amateur radio progress or we drag our feet. It depends on seizing the opportunities around us, in staying an active instead of becoming a dormant sort of amateur sitting on the sidelines as history is written.

May we cordially invite all readers to take part in any or all operating activities scheduled in '53. We spill out all real progress through activity!
and keep themselves above the barracks-room lawyer contest approach. Getting their pleasure from the operating made possible, without over-emphasis on just score tokens of progress, one is less tempted to stoop to inconsiderate-selfish practices. In so operating truly for fun the spirit as well as the rules of the competition are easily met.

**Secrecy of Communication.** The provisions of Sec. 605 of the Communications Act apply to all persons, including licensed operators. Information specifically addressed, whether in record communication (messages) or after a definite sequence of radio call signal identifications (which confine transmissions to individuals or groups) are covered by the all-inclusive wording of this important section of the Act. Amateurs of course are required to know and observe the provisions to the letter, application of the section very often being a part of FCC examinations. Significant extract:

"Except in case of broadcasts or information for the general public or relating to ships in distress, no person receiving or assisting in receiving or sending radio information shall divulge, publish or use such, to any person other than the addressee, his agent, or attorney, or one employed to forward such communication to its destination . . . also, no person not authorized by the sender shall divulge the existence, substance or meaning of such intercepted communication to any person . . . or use the same for his own benefit or the benefit of another not entitled thereto."...

**Helps for the Novice.** We invite any Novice or prospective Novice to request our Reference Guide tabulation of information on code helps which gives articles of reference and information on the availability of code records, etc. The W1AW transmission schedule is probably one of the best helps of all. One of the items ARRL has to assist through clubs is a club-award type of code proficiency certification. Such special certificates are adaptable to code-receiving or code-transmitting (hamfests) contests or club programs for the new man to reward step by step proficiency increases. They are similar but of broader application than the Hq. Code Proficiency certifications based on submission of copy on W1AW or W6OWP, after practicing on W1AW and W6JZ. The only requirement is that a full report of each club's award be reported to ARRL on the proper form. The program has to be supervised properly so the certificates mean just what they say when issued under local auspices. The Camp Gordon Radio Club, among others, is a leading group in issuance of these certificates. ARRL invites inquiries from any clubs that will start programs for the Novice or others this fall which would like some suggestions for this part of the program with information about club certification.

--- F. E. H.---

**ELKHART LAKE, ROAD RACES**

Amateur radio is well on the way to being indispensable to the running of the annual Elkhart Lake Races. For the second year communications at this event were supplied by the Milwaukee Radio Amateurs' Club. These races are an annual amateur racing event sponsored by the Sports Car Club of America. In 1952 they attracted 130,000 spectators! The race course comprises the main street of the town of Elkhart Lake and the winding concrete highway that runs around the lake, a distance of six and one-half miles for each lap. The start-finish line is located in the town and nine additional checkpoints were established at strategic points around the course.

The Elkhart Lake races present a big communications job. They are run on both Saturday and Sunday, this year September 6th and 7th, and it is necessary to maintain the communications system each day from 9:30 A.M. to 5:00 P.M. MRAC's emergency radio truck, W9HRM/M, left Milwaukee at 4:30 A.M. Saturday morning accompanied by several 75- and 10-meter mobiles and was stationed at the start-finish line as control station. A double was erected for operation on 3850 kc., with the 32-V transmitter, an HRO and a ground-plane on 29,650 kc. with the Harvey-Wells transmitter. Reception was provided by an RME converter and NC-57. For convenience in operating both groups of mobiles the control station was arranged to control and modulate both transmitters simultaneously. While the truck was operated from commercial power, its emergency 21-kw. a.c. generator was available as a stand-by.

Some thirty-five mobiles were used, many of them participating on both days. The amateur radio personnel were designated as "Emergency," a top priority rating permitting their free movement anywhere, except on the track, during the races. Mobiles were assigned to each of the nine track check points. When available, two cars operated alternately at a single location to provide absolute reliability.

Assignments of MRAC's mobile units at the track included a press relations man, two photographers, clerks, loggers, stand-by mobile radio crew, control operators, assistants, messengers, and two crews with emergency mobile radio units for use on the track. One of the latter was called into service when a serious accident occurred during the race. A racing driver lost control of his car, went through a snow fence and bailed hay, broke off a telephone pole and plunged into a group of spectators. Fortunately there were no fatalities, but nine persons suffered broken bones. At the first report of the accident, the Chief Track Steward had the control truck transmit instruction for a "yellow" light at all positions. This signal limits speed on the track to fifty miles per hour and all racing cars are required to maintain their relative positions. Next instructions put four ambulances and two "wreckers" on the track accompanied by an amateur mobile unit. With more than fifty racing cars on the track at the same time, this assignment was quite dangerous and certainly exciting!

Mr. R. H. Underwood, Director of Civil Defense Communications in Milwaukee (and Superintendent of Western Union at Milwaukee), was present to observe the operation and made an almost complete report to the Milwaukee Civil Defense and Disaster Committee. Mr. Underwood estimated that

MRAC members record sound effects for a film record made of the Elkhart Road Races. (Photo by W9DTK.)

**QST for**
more than 500 messages were handled at the control station.

In the two days of operation there were no failures in the entire communications set-up. Sports Car Club officials and Elkhart Lake Chamber of Commerce officials were lavish with their praise of the performance by the amateurs. Excellent press notices were received in the Milwaukee Journal and the Chicago Tribune.

All operations were under the supervision of Charles Kastel, W6SNK, Director of Mobile Activities for MRAC. Energetic amateurs contributed materially to the success of the operation: W6AN, AFA, BPR, BTW, QW, DTK, ESE, ESJ, FY, FPA, GLA, GFI, GZT, HWX, IDW, IFS, IZO, KEF, LIP, LSK, MDG, MGT, MOP, NLY, OMT, OON, OPS, ORQ, OVO, PFT, SNE, SIZH, TFX, UH, ULIK, VOG, WIK, YDI, and W5WBB.

— H. Charles Kastel, W6SNK

COURT-OPERATING STATIONS

The following is an up-to-date list of all stations transmitting code practice in the ARRL Code Practice Program: W7MNO, Arthur Zavarelli, 1762 Main Street, Sagamaw, Mass., 29,400 kc., Tues., Thurs., 1300-1500 EST, beginners’ speeds.

W2SBB, Al Vesce, 40 North Main Street, Thompsonville, Conn 29,400 kc., Mon., Wed. and Fri., 1300-1500 EST, beginners’ speeds.

W1VCG, Carl Norris, 128 Medicine Street, Westfield, Mass., 29,400 kc., Tues. and Thurs., 1300-1500 EST, beginners’ speeds.


W4URU, R. E. Blatt, 530 10th Avenue So., St. Petersburg, Fla., 29,050 kc., Mon. and Wed. 1900 EST, beginners’ speeds.

W6GZ, Ray Cornell, 909 Curtis Street, Albany, Calif, 3500 kc., Mon. and Fri., 5, 7, 14, 10 and 13 w.p.m., Wed., 15, 20, 25, 35 and 45 w.p.m. 1815 PST; ten minutes at each end.

W7FDW, O. U. Tato, 513 N. Central, Olympia, Wash., 3646 kc., Mon. through Fri., 1700 PST; 4, 6, 10 and 25 w.p.m. Ten minutes at each end.


W7RKA, Zane Casey, Route 2 Box 73, Hood River, Oregon, 7290 kc., Mon. through Thurs. 1300-2000 PST, 5 and 8 w.p.m.

W7WJ, Hal C. McCracken, 4605 N.E. 28th Ave., Portland, Oregon, 3560 kc., Tues., Thurs. and Sat., 1100-1300 PST, 735 and 15 w.p.m.

W9ODD, Stephen P. Victor, 615 N. 15th St., Milwaukee, Wis. 29,224 kc., Mon., Weds. and Fri., 1900-2000 CST, beginners’ speeds.

W9EGQ, Robert McMillen, Route 1, Lehigh, Neb., 3600 kc., Mon. through Fri., 1700-1745 CST, 5, 7, 14, 10 and 12 w.p.m. with text from the Braille Technical Press.

W9FXH, Quentin Johnson, 125 N. Berry Rd., Glendale 19, Mo. 29,500 kc., Mon. and Weds., 1900-2000 CST, 3, 5 and 7 w.p.m.


W9EYF, Harold Lantow, Persia, Iowa, 3710 kc., Mon. through Fri., 1700-1730 CST, 8 w.p.m.

WIAW OPERATING SCHEDULE

(All Times Given Are Eastern Standard Time)

Operating Visiting hours:

Monday through Friday: 1500-0830 (following day)

Saturday: 1900-0230 (Sunday)

Sunday: 1500-2200

Exceptions: WIAW will be closed from 0300 January 1st to 1500 January 2nd in observance of the New Year’s Day holiday. On February 11th, WIAW will transmit a Frequency-Measuring Test instead of the regular code practice. On January 19th and 21st, WIAW will transmit a Code Proficiency Qualifying Run instead of the regular code practice.

General Operation: Refer to page 65, October, 1953, QST for a chart showing WIAW general operation. This schedule is still in effect and is not reproduced herewith for space considerations. Mimeographed complete master schedules of all WIAW operation in EST, CST or PST are available upon request.

On Saturdays and Sundays during which official ARRL activities are being conducted, WIAW will participate in the activity concerned.

Official ARRL Bulletin Schedule: Bulletins containing latest information on matters of general amateur interest are transmitted on regular schedules:

Frequencies:

C.W. — 1885, 3555, 7310, 14,100, 50,000, 146,000 kc. Telephone — 1885, 2900, 14,280, 50,000, 146,000 kc.

Frequencies may vary slightly from round figures given; they are to assist in finding the WIAW signal, not for exact calculation purposes.

Times:

Sunday through Friday, 2000 by c.w., 2100 by ‘phone. Monday through Saturday, 2330 by ‘phone. 2400 by c.w.

Code/Proficiency Program: Practice transmissions are made on the above-listed c.w. frequencies, starting at 2130 daily. Speeds are 15, 20, 25, 30 and 35 w.p.m. on Monday, Wednesday and Friday, and 5, 7, 14, 10 and 13 w.p.m. on Sunday, Tuesday, Thursday and Saturday. Approximately ten minutes of practice is given at each speed. Next certificate qualifying run from WIAW is scheduled for January 19th; from W6OWP, January 3rd.

DX CENTURY CLUB AWARDS

HONOR ROLL

W1FH... 249 W1XO... 212 W3GBD... 237
W8HHW... 245 W8ENV... 241 W8JFT... 236
W8VYF... 241 W8QPL... 244 W9PBY... 255
W8BES... 218 W8AM... 238 W8KT... 255
W8SN... 235

RADIOTELEPHONE

W1FH... 222 W1NYO... 204 W568B... 195
P2YCR... 218 W8GK... 202 W34APU... 194
V4QRR... 218 W8BR... 200 W5M5P... 194
Z41AC... 213 W7U5X... 196

From October 15 to November 15, 1952, DXCC certificates and endorsements based on postwar contacts with 100 or more countries have been issued to the amateurs listed below.

NEW MEMBERS

W4FC... 154 G8CMT... 106 W6WFS... 101
W2YVS... 130 ZL1AH... 104 W3C6CD... 101
E1A0B... 111 E52BD... 103 W3KCU... 100
V2Jub... 111 W3IL... 101 W4CRK... 100
W1AG... 107 W9A1... 101 W5BHS... 100

RADIOTELEPHONE

1R1IIH... 109 SM6F7... 102
CTFII... 102 E2AGV... 100

ENDORSEMENTS

W3JNN... 221 W6WEB... 163 W6Q6E... 133
W5KIA... 220 W6G0S... 190 W1AZ... 131
PASH... 204 G8FSN... 160 L8X... 131
W9RQO... 200 K8LTH... 160 G8UO... 130
W8HPE... 192 Y9Q8V... 159 G9YS... 125
W2TXY... 191 G8M9D... 159 W8PM... 122
W5LXY... 184 W9ANGA... 151 M83EP... 122
W8DOW... 184 W9WNG... 151 W1VGW... 120
H8BNCX... 182 G8DODG... 150 W5B8B... 120
W8A1AS... 181 SM6F7... 141 HB1MQ... 119
W21MU... 180 W8AIH... 145 F8CW... 112
W9SUV... 180 Y9VAE... 143 G8M3P... 112
W8UAS... 180 ON4GL... 141 W5EEO... 110
O8RFA... 170 W8SMT... 140 W9NN... 110
W5MGB... 171 D9HT... 145 P68OS... 110
W4HA... 170 W2AZS... 133 E9R... 110

RADIOTELEPHONE

Z56Q... 181 G8ZM... 151 ON4AR... 123
CE1AB... 172 W4OM... 145 G8UO... 121
W3JNN... 170 G8ML... 141 W2ZW... 114
Z56QX... 170 W2ZBN... 130 W6B... 112
TRAFFIC TOPICS

There are two ways of building a traffic system. One is to try to tie together existing miscellaneous and spontaneous facilities so that a semblance of nationwide liaison is achieved, changing this liaison freely at the whim of the many small traffic empires which serve by it. The other is to set up a structure, define your goal, and then go to work to achieve it. The first is the easy way, the second the hard way. The first is more realistic, the second more idealistic. The first way is likely to get the immediate support of the majority, the second the initial support only of those who are able to or want to take the trouble to see the whole picture; but these few, after they put the system on its feet, will be joined by the others later.

Both ways were considered before the National Traffic System was established; yet, the second method was chosen when we knew it would get less initial support and was, for that and other reasons, harder to accomplish. Many trafficers have asked why; why pursue an elusive ideal when the same objective can be achieved, even if not as well, in a manner both easier and more popular? Why try to change things, when the old way was "good enough"?

The answer is that the world and amateur radio changes, and we have to change with it; old and young, it's time we all realized this. Old ways of doing things that were "good enough" have to give ground to new ways that are better. The achievement of an organized National Traffic System is an elusive ideal, so was the achievement of a nationwide amateur organisation in the first place, and if we at headquarters are idealistic it is because we are working under the influence and tradition of men like Maxtin, Tucka and Warner—who were also idealistic.

And so we have set out to organize the National Traffic System—a traffic system which has a nationwide structure, a goal, an ideal to achieve. The traffic men fit into NTS; we cannot and do not alter NTS to suit the convenience of individuals. But there is room in the over-all structure for nearly every amateur who can spare one or two evening hours once per week. There is probably room for you.

How to find out? The first thing to do is to drop us a line for the lithographed pamphlet entitled "The ARR National Traffic System." It explains all about NTS. Every amateur at all interested in traffic work should know about NTS—including many who just do not know it.

Then, drop into NTS where you 'fit best—at section, regional, area or inter-area (TCC) level.

Several comments have been received concerning our November offering about "refusing traffic." We mention this because we want to make sure that all and sundry who read this column (both of you) understand that comments, favorable or unfavorable, on the content hereof, are welcome. Sure we're busy, but somehow we can always find time to talk traffic. Let us in on your thoughts.

National Traffic System. Unfavorable propagation conditions have raised havoc with our TCC schedules and the amateurs who are trying to keep them. This was noticeable in October and, if anything, was worse in November. What happens is that a TCC man gets traffic from his area net, calls his schedule at the frequency for the interarea and hears nothing; so naturally, he assumes he is stood up. Meanwhile, the guy at the other end is hearing the same thing (i.e., nothing) and making the same assumption. So they both get away mad and at the first opportunity write us (instead of each other) a nasty letter saying they are through with TCC unless we can get them a schedule that will be kept. And whom does that leave in the middle? You should ask?

However, a recent TCC bulletin outlined some alternative routings for our inter-area traffic, and we hope Mother Nature will turn more kindly toward us. We want to handle our traffic if we can.

October reports:

<table>
<thead>
<tr>
<th>Most</th>
<th>Net Sessions Traffic High Average Consistent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1RN</td>
<td>44* 410 32 9.3 E. Mass.</td>
</tr>
<tr>
<td>2RN</td>
<td>46 313 17 6.8 NJN</td>
</tr>
<tr>
<td>3RN</td>
<td>50 316 21 6.3 MDD</td>
</tr>
<tr>
<td>4RN</td>
<td>48 240 25 5.4 Va.</td>
</tr>
<tr>
<td>RN5</td>
<td>29 11 15 5.7 Twn.</td>
</tr>
<tr>
<td>R5N</td>
<td>50 661 31 11.8 SSN</td>
</tr>
<tr>
<td>RN7</td>
<td>54 318 26 5.0 Wash.</td>
</tr>
<tr>
<td>8RN</td>
<td>35 116 11 3.2 Mich.</td>
</tr>
<tr>
<td>9RN</td>
<td>28 402 58 17.2 All 100%</td>
</tr>
<tr>
<td>TFRN</td>
<td>43 689 39 10.0 La.</td>
</tr>
<tr>
<td>Kans.</td>
<td></td>
</tr>
<tr>
<td>Minn.</td>
<td></td>
</tr>
<tr>
<td>Mo.</td>
<td></td>
</tr>
<tr>
<td>1RN</td>
<td>40 90 10 1.1 Nen.</td>
</tr>
<tr>
<td>EAN</td>
<td>25 806 52 32.2 All</td>
</tr>
<tr>
<td>CAN</td>
<td>25 579 41 23.1 All</td>
</tr>
<tr>
<td>QLN (Ind.)</td>
<td>69 531 34 8.1</td>
</tr>
<tr>
<td>TLCN (La.)</td>
<td>20 297 40 14.8</td>
</tr>
<tr>
<td>QK5 (Kans.)</td>
<td>23 96 14 4.2</td>
</tr>
<tr>
<td>MSN (Minn.)</td>
<td>27 161 16 6.0</td>
</tr>
<tr>
<td>Total</td>
<td>768 637 96 8.2</td>
</tr>
</tbody>
</table>

* Out of 46 sessions held.

With four section nets reporting, in addition to all regional and area nets except TWTN and PAN, we establish a new record in the number of net sessions reported in a month. The highest-number reporting was 678 in December, 1951.

W8RIP put out an excellent 3RN Bulletin going into net policy and operating procedure in some detail. It shows that recent recipients of 3RN certificates include W3a IFRS P2W RCO RJA RJB and W2YVS/3. To date 18 stations from MDD, 9 from E. Pa. and 6 from W. Pa. have earned their certificates. Is 160 meters a possibility when conditions are stinko on 80?

W6MRK doesn't feel he is doing a good job on NTS and wants to resign as manager. We are trying to find someone to replace him.

W6QJB is the new RN5 manager and starts off with a

QST for
SUPPLEMENT TO NETWORK DIRECTORY

The following list of nets will supplement and correct the listing on page 60 of November QST. An asterisk (*) indicates correction from previous listing. This includes all information received up to November 19, 1952.

**Name of Net** Freq. Time Days

*Ala. Emerg. Net B* 3575 1900 CST Daily
All College Net (ACN) 3575 1715 EST Thu.
*Ambrose Net (AN)* 3610 1900 EST Mon.-Fri.
*Bergen Co. C.D.* 29,510 1945 EST Wed.
*Blackhawk Co. (Iowa) Emerg. Net (WOO)*
*Calif. Civil Defense Net (CCDN)* 3501 1900 PST Mon.
*Crawfish Net (CFN)* 7175 0900 CST Sun.
*Eastern Shuttle Net* (ESN) 7120 1030 EST Daily
*Evansville (Ind.) Mobile Emerg. Net* 29,600 1930 CST Last Thu.
*Farm Net* 3935 1900 MST Mon.-Fri.
*Great Lakes Net* 1580 1930 EST Tue., Thu., Sat.
*Iowa 160-Meter Net* 1983 1830 CST Daily
*Kansas 75-Meter Phone Net* 3920 0800 Sun.
*Kans. Slow Speed Net* (QKS-SS) 3610 1845 CST Thu.
*Mennor Net (Minn.)* 1885 1900 CST Mon., Fri.
*Minnesota Phone Net* 3820 1205 CST Mon.-Sat.
*Minnesota Junior Net* 3710 1700 EST Sat.
*Minn. Section Net* 3595 1900 CST Mon.-Fri.
*Missionary Amateur Net* 7050 1915 CST Fri.

Mobile Amateur Radio Corps (Minn.* 29,500 2000 CST Daily
Muskingum Emerg. Net (Ohio) 29,616 2200 EST Fri.
N. B. Civil Defense Net 3728 1000 AST Mon.
N. Y. C.-L. I. Section 3630 1930 EST Mon.-Fri.
Traffic Net (NLI)* 3710 1930 EST Mon.-Fri.
Training Net (NII)* 3595 2000 EST Mon.-Fri.
*N. Y. Slow Speed Net (NYS)*
Northland Net (MINN)* 1910 1900 CST Mon.-Fri.
*Ohio EC Net (OFC)* 3695 2000 EST Mon.
Ont. Forty Meter Net (QON) 7207 1930 EST Daily
Overseas Traffic Net 3695 0700 EST Mon.-Fri.
*Province of Quebec Net (QON)* 3570 1900 EST Mon., Wed., 2200 EST Fri.
Quarter Century Wire- less Assn. Net 3810 1900 EST Wed.
Rhode Island C.D. Net 3900 1000 EST Sun.
*Sea Cruise Net (ME)* 3900 1730 EST Mon.-Fri.
*Skew Ball Net (Minn.)* 3980 0700 CST Mon.-Sat.
So. Dak. P. Phone #* 3870 1830 CST Mon.-Sat.
St. Paul (Minn.)* 29,520 2000 CST Thu.
Mobile Corps 30,200 2000 PST Old Wed.
Tenn. C.W. Net (TN)* 3630 1900 CST Mon.-Sat.
Toronto Ten-Meter Net 28,250 2200 EST Sun.
Transcontinental 'Phone Net (TCPN) 3970 1730 CST Daily
Trunk Line 1 (TLI) 3780 2330 MST Mon.-Fri.
28,820 Net 29,520 2000 CST Tue.
Two-City Ten-Meter Net (Minn.) 29,200 2100 CST Tue.
Virginia C.W. Net (YN) 3690 1900 EST Mon.-Fri.
Wayne Co. (N. Y.) C.D. 3853 0930 EST Sun.
and EC Net 2200 EST Mon.
W. Va. C.W. Net (WNJ) 3570 1900 EST Mon.-Fri.

**TRAINING AIDS**

If you’re a member of an ARRL-affiliated club and have not yet seen the films available to your group, ask your club secretary to write the Communications Department for a list of current training aids. At present, they include 28 motion picture films, 12 film strips, one slide collection, reviews, and ten different quizzes. Several new slide collections are in the works and will be completed just as soon as possible, but the material available now can furnish your club with many a lively and educational evening. Whether you’re interested in the basic theories of capacitance and inductance, or the effect of the ionosphere on radio wave propagation, there’s a film for you! The film strips are an excellent source of basic material and have an advantage over motion picture films in that they can be stopped, discussed, and explained can be held before going on to the next frame. Since the film strips have not been used much, we’re making them available to all clubs, whether or not they are affiliated. This applies to quizzes also. Requests from affiliated clubs will continue to receive priority, however.

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This is Russ and Tina Marquis, Mr. and Mrs. W7BDR. Russ has made BPL twice the "hard" way. He is vice-president of the Iowa Central Amateur Radio Club and a member of the Iowa Tall Corn Net, Iowa 75-Meter 'Phone Net, TLJ/9RN, Tenth Regional Net and TLAP. Both he and Tina are visually handicapped.

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January 1953
With the AREC

We have heard it said by certain irate amateurs that RACES is just a device for opening certain of the amateur bands to non-amateurs, and this is the topic of our discussion this month. We approach it with some trepidation, for it is absolutely true that under RACES it will be possible for non-amateurs under certain conditions to operate in segments of our bands. But those conditions make the difference.

Let's revert to history to develop the background. In World War II we had WERS, thrown at us almost a year after we were already embroiled in war. It was not an amateur service, but it borrowed amateur frequencies and amateurs, in the main, constituted the supervisory personnel. However, there were not nearly enough amateurs to run it, and use had to be made of third class commercial radiotelephone personnel to supplement our then-dwindled ranks. At that time, two thoughts dominated the consciousness of every amateur in WERS: (1) that we should have started preparing for it years ago; (2) that we ought to have more frequencies than the "impractical" four megacycles of the "215-meter" band.

In preparing for a possible third world war, these lessons have been remembered. What some amateurs now feel are "viles" of a new service are actually preventive against evils which were known to have existed in a somewhat similar situation in past years. True, we are not now at war and the kind of amateur radio we have always loved is still in operation; but by RACES we are preparing for the worst, this time before the war starts — and this time we have more frequencies on more amateur bands to work with (although, of course, it is still not enough).

We also know that, come the war, nearly half the amateur body will have military duties to discharge, and about half of the other half will be unavailable for RACES for one reason or another. Optimistically speaking, perhaps 20,000 radio amateurs will be available to implement RACES; yet ARDC's own estimate of the number of communicators needed to implement the RACES program is 200,000. Where are they coming from? The answer is, of course, that they will have to be trained, trained in great numbers, trained the amateurs because we are going to run RACES.

This time it is an amateur service.

But the appearance of these non-amateurs in the RACES picture can hardly be said to be an "invasion" of the amateur bands by non-amateurs. Actually, they will operate under the closest surveillance, and they will operate only when told to do so, and when they do operate it will be in accordance with a pre-set operating procedure. Not for them the joys of casual chatter, of calling and working DX, or of participating in contests. They will have to stick strictly to business.

Make no mistake about it — the use of parts of our bands for RACES is going to be an inconvenience to our daily employment of amateur radio. The whole aspect of World War III is decidedly an inconvenience. It would not be quite correct to say that we share these frequencies with RACES, because we are RACES. It is just that we have temporarily set aside portions of our bands for this work, with official government sanction and blessing. If, by our own QRM, we make operation therein impractical, we have only ourselves to blame for the outcome. There are enough minimal influences at work to take away from the amateur that respect which rightfully belongs to him. Let's not create for our own to detract from the success of this, the first specific service function which has ever been assigned to the amateur — the Radio Amateur Civil Emergency Service.

Just to complete the record on the Midwest Floods last April, we want to mention the work done by amateurs in Sioux City, which has just been reported to us. W6ENS was established as net control, and a station was placed at the police station under the use of W6ERS/0 using the transmitter of W6HMV. Two portable units of the Sioux City Amateur Radio Club were placed in service, one at Dakota City and one at a motel near Crystal Lake. This latter unit was placed in service by the local AFQ. All stations were manned 24 hours per day by members of the club. The call used at Dakota City was W6UKU/0, and that at Crystal Lake, W9VFY/0. On April 12th, W9FQY/3 was set up at W6ENS, the net control station, was secured at 2300 on Tuesday, and W9FQY/0 after 120 hours of continuous operation. The following participated, in addition to those mentioned above: W6 AFOE A88 BGE CQN DJU DTU EEU EQN ERG FNF FQI FVO FOZ GDE HFT HUH HWM JED KUX MWB OSO PSE TYS URB VIF VRU WFB YMY ZTD, and W9OOL.

On Sunday, August 31st, W1HXY/1, W1IYQY/1, and W1SFZ/1 provided communications at the Insurance City Open Golf Tournament held over Labor Day weekend in Hartford, Conn. All three operated Civil defense portable units as described in May 1965, to provide a link between the Club House and the grounds. The maximum distance covered was 2/4 mile over rolling terrain. After operating from 1000 to 1630 the gang produced a band with higher power in a small station. This enabled them to make a much better impression on the officials and public. Signals were 89 both ways, and communication was solid. Newspaper reporters used the information given via the amateur set-up, thus saving themselves considerable leg work. A quite severe rainstorm failed to break up the contest, so of course the hams stuck to it, though tempted to sign MM, due to the high s.w.r. (standing water ratio). W1IYQY

The Detroit area Hams were very "Public Service" minded these past two months. Under the coordination of the Inter-County Amateur Radio Emergency Committee, three services were performed that year. The latter was for organizations who needed communications. The first of these was the 4th International Model Plane Contest August 21st–22nd at Saginaw, and August 23rd–24th on Belle Isle. Communications were provided between their headquarters in the Shelby Hotel, and the contest points. Because of the coordination by mobiles, more flight models were recovered than at any previous contest.

Some of the mobiles even made their own roads across fields to keep the models in sight.

The second event was the 4th International Aviation Exposition held August 28th, 30th, 31st, and September 1st at the Detroit-Wayne Major Airport. Communications was equipped with a 10-kw. gasoline-engine generator, making it completely independent of electrical power if need be. The unit contains an amateur transmitting position by means of which it can maintain contact with members of Detroit's active AREC organization.

QST for
between the two control towers, Security Officer, State Police, Red Cross, motor pool, crash trucks, and the Plane parking area were provided as well as communications to coordinate the expedition and Air Show.

The Silver Cup Speedboat Race was the third event. It was held August 30th and September 1st on the Detroit River. Coordination between the Race Committee, on the judges and the boat pilots was a part of the job. Mobiles were spotted around the course at intervals, and attached to each mobile was a sound car. As the boats proceeded around the course, each mobile transmitted a running description of the race as it passed in front of him. This description was available to the sound cars, and to the Race Committee. In this way, the public watching the race knew just what was happening on parts of the course they were unable to see, and the Committee was able to keep track of the race on all times. Congratulations to all of you on a job well done!

The amateur stations that participated in the New York State Election Return Net on November 4th did a perfect job. Returns moved rapidly and smoothly from about 2200 to 0117, Nov. 5th, when the count was complete. The net was established at the request of WNYC. Ham stations throughout the state in many cases used mobiles stationed at campaign headquarters or at county seats, whence the tabulations were sent to a 75-phone or 80-circuit station on a New York City station, where a two-meter radioteleprint circuit was in operation from 6 P.M. to closing time. The RTTY circuit, maintained by W2BFD and W2QG, functioned without hitch for the entire period, and at no time was there a delay of more than a few seconds.

Late in the evening the 75-meter ‘phone band went out, breaking the net entirely. W41HMQ and K4WDF assisted in relaying information and acting as net controllers.

Reports came in steadily on the c.w. net, with some difficulty. Frequencies used were 3506.5 and 3983 kc. — W2BGO

Seventeen SEC reports on behalf of 3362 ARRL headquarters were submitted for September activities. Two new SECs, those of Nebraska and Iowa, are added to the list of reports in 1952. This makes a total of 29 out of a possible 72 SECs who have submitted one or more reports in 1952. Forty-three report-deficient SECs, please take notice!

CODE-PREFERENCE AWARDS
Have you received an ARRL Code Proficiency Certificate yet? Twice each month special transmissions are made to enable you to qualify for the award. The next qualifying run from W1AW will be held on January 19th at 2130 EST. Transmission signals will be made simultaneously on 1887, 3555, 7120, 14,100, 28,000, 52,000 and 146,000 kc. The next qualifying run from WEDW only will be transmitted on January 3rd at 2100 EST on 3590 and 7248 kc.

Any person may apply; neither ARRL membership nor an amateur license is required. Send copies of all qualifying runs to ARRL for grading, stating the call of the station you copied. If you qualify at one of the six speeds transmitted, 10 through 25 w.p.m., you receive a certificate. If your initial qualification is for a speed below 25 w.p.m., you may try later for endorsement stickers.

Code-practice transmissions are made from W1AW each evening at 2130 EST. References to texts used on several of the transmissions are given below. These make it possible to check your copy. For practice purposes, the order of words in each line of QST text is reversed during certain of the slow-speed transmissions. To get sending practice, hook up your own key and buzzer and attempt to send in step with W1AW.

Date Subject of Practice Text from Nov. QST
Jan. 2nd: Peak-Pull 0116z at 14 1/2 Mc., p. 11
Jan. 6th: Where is Your Mobile Signal Going, p. 15
Jan. 8th: More Effective Utilization of the Small Power Transformer, p. 18
Jan. 12th: "Packaging" 35 Wats for 30 and 40, p. 21
Jan. 14th: The Reception of Single-Sideband Signals, p. 25
Jan. 20th: Bandswitching the Antenna Tuner, p. 28
Jan. 22nd: The Coffee-Can Receiver, p. 38
Jan. 28th: Turret Switching for the Receiver or VFO, p. 32
Jan. 30th: Technical Topics, p. 41

**Phone**

**PHONE**

W4KFC . . . . . . 2130-100-57 W4KMS . . . . . . . . . . 8,890-.52-26
W4FY . . . . . . 14,820-95-56 W4LRS . . . . . . . . . . 6,880-47-28
W2ZYN . . . . . 14,400-83-32 W3MLY . . . . . . . . . . 6,500-50-26
W5FBC . . . . . 13,860-84-33 W1AQE . . . . . . . . . . 6,300-63-20
W2MJE . . . . . 10,020-84-56 W1DF . . . . . . . . . . 5,890-57-10
W2KX . . . . . . 9,240-66-47 W1XZ . . . . . . . . . . 5,790-65-50
W5MYW . . . . . 8,265-84-29 W4HJ . . . . . . . . . . 5,745-49-19
W2SGF . . . . . 6,400-27-48 W1CRW . . . . . . . . . . 5,600-50-20
W5BZ . . . . . . 8,400-26-47 W5EOZ . . . . . . . . . . 5,400-198-81
W2PLF . . . . . 6,095-27-47 W4PFK . . . . . . . . . . 5,200-241-46

**ARRL ACTIVITIES CALENDAR**

Jan. 3rd: CP Qualifying Run — W6WOP
Jan. 10th-11th: V.H.F. Sweepstakes
Jan. 10th-25th: V.H.F. Round-up
Jan. 17th-18th: CD QSO Party (e.w.)
Jan. 19th: CP Qualifying Run — W1AW
Jan. 21th-25th: CD QSO Party (phone)
Feb. 9th-8th: DX Competition (phone)
Feb. 8th: CP Qualifying Run — W6WOP
Feb. 11th: Frequency Measuring Test
Feb. 17th: CP Qualifying Run — W1AW
Feb. 20th-22nd: DX Competition (phone)
Mar. 6th-8th: DX Competition (phone)
Mar. 12th: CP Qualifying Run — W6WOP
Mar. 18th: CP Qualifying Run — W1AW
Mar. 20th-22nd: DX Competition (e.w.)
Apr. 3rd: CP Qualifying Run — W6WOP
Apr. 11th-12th: CD QSO Party (e.w.)
Apr. 16th: CP Qualifying Run — W1AW
Apr. 18th-19th: CD QSO Party (phone)
May 9th: CP Qualifying Run — W6WOP
May 15th: CP Qualifying Run — W1AW

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October CD QSO Parties

The contact totals reported by participants in the October CD QSO Parties indicate that there were plenty of ARRL appointees on the air. Top e.w. score honors, which have been evenly divided between eastern and western stations during the last year, this time go to W0YHM, who nosed out eastern contender W4KFC with a final tally of 146,350, while W4KFC chalked up the tertiary contact total of 481, the highest made in any CD Party for a mighty long time! The only other contestant to go over the 400 mark was old-time CD Party favorite W1EDB, who made 421 contacts to score 129,520. In the 'phone party W4KFC was also outstanding with 103 contacts, 37 sections and 20,350 points. W4FY came through with his usual fine performance for second place, and W2SW, who has been hot after that top position for some time, finished up third. Listeners also had the high claimed scores. The figures following each call indicate the claimed score, number of contacts and number of ARRL sections worked. Final and complete results will appear in the January CD Bulletin.

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January 1953

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**69**
ALL operating amateurs are invited to report to the SCM on the first of each month, at 12:00 noon, for discussions of necessities for the preceding month. Radio Club news is also desired by SCM's for inclusion in these columns. The addresses of all SCM's will be found on page 6.

ATLANTIC DIVISION
L W3BKE — SEC: ISE, RM; AYA, BIP, E, PA, Net: 3010 kc. Communications for a highly successful civil defense demonstration were furnished by N.E. Phila. amateurs on Oct. 18th, 2A2L and 2UK were the principal speakers at a dinner meeting of the Electric City Radio Club. Scopes, sounders, etc. were on display at the meeting. The Lancaster RTS, now conducting weekly code classes for potential hams, participated in the October School Ex. The QRL and the local Naval Reserve Training Center's station, K3NRL, during D.C. demonstrations. They also report a new society, namely, the Lancaster Hamsquadrons, operating under the call QVY. On Oct. 9th, the Philadelphia, Wireless Assn. adopted a new constitution and by-laws. The meeting was attended by the following members: JWC, v-p, RNF, sec. soc'y, QL, cor. soc'y. NHX, treas.; HHR, mem., dir. The York Road BC, held past Class Conclin, held on Oct. 4th, was a big success. The E. PA. Net is rolling along in fine style with NOK and K3USN as new additions, also Orchids to high-scoring OOs in the contest, who, in their work in the Western States, K3USN makes BFL this month. ADE is TVI-proofing his rig. FPC reports that anyone interested in joining the 10-meter MARS net should contact KB7W. KB7H has been working DX with 90 watts to an indoor beam. PKU has new all-band 813 final. QLZ was appointed NCS for 3RN (second session). QV, PKU, and PSH all received commercial 'phone tickets. RGC's 813 rig is taking shape and he also is building 2-meter rig with 4/121 final. SNY has joined the 20-meter gang with his first taste of DX and his state to his credit. WNSTBR is now active on 80 meters using an 807 final and WNSUQ can be found on 144 Mc. F zrobićem de 145 are seven who have worked 44 states, which has a population of about 5000 people, and four Novice's ready for General Class exam. Appointments are now available for the last half of the month. Traffic, Oct.: W3CUL 512, K5SUN 426, W2VW 21, W3KUL 196, AYA 30, QL 75, DE 35, RCG 28, NOR 23, AD 2D, DUN 18, BFF 6, WJF 5, WBY 8, QEW 8, VR 4, EAN 2. (Sept.) W3RCG 13, SNY 2. (Oct.)

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM. James W. John, W3OMN — The Baltimore Polytechnic Institute Radio Club got under way with the following officers: ROU, pres.; SDT, vice-pres.; URRJ, treas.; 8DU, sec'y. On Oct. 22nd the Club visited TV station WCAAM, The Chesapeake Amateur Radio Club held a "Symposium" on amateur radio for the Oct. 31st meeting and on Oct. 27th Steve Allen, of Bendix Radio, described "How One TV Set Works" and discussed what makes it susceptible to ham TV. At the Oct. 30th meeting of the Baltimore Amateur Radio Club GKN's topic was,"Introduction of Public Address Equipment." Two technical meetings and practices were shown at the Oct. 25th meeting of the Washington Radio Club. An equipment demonstration and gabling session on Oct. 10th at the Rennington Court by the Rock Creek Amateur Radio Assn. On Oct. 24th the Club held a successful auction. The Capitol Suburban Radio Club visited SUA, Ray Goode's station, on Oct. 17th. ORK acquired a new Viking from AWS. FQR has 3 watts on a.m. Visitors at AHR's shack find the OM has completed a de luxe new equipment which is in fine shape. K3EY, MD, Control for TCRN, reports net qualifications as follows: 2S to 30 w.m.p., copy traffic with typewriter, at least 95% correct, 100 per cent delivery on all traffic. BWT still is QRT pending completion of a new rig. PKZ has high-power excellent receiver which is being utilized for policed traffic. Reports prop pitch motors should be checked for water in the gears. WD2U is visiting TV WTVN now. The Washington Area was well represented at the Rockville Convention and brought home 1st and 2nd prizes. Traffic: W3PWZ 615, COG 128, QEC 120, CVE 116, ARB 79, NNX 40, MCG 39, MCD 24, COG 22, JE 22, NOE 20, RJA 11, JHW 9, PFC 6, PZT 8, HC 6, PZ 2.

SOUTHERN NEW JERSEY — SCM. Lloyd L. Gainey. W2UCV — EWN has been appointed Section Mobile Emergency Coordinator in an effort to build up our strength in this area and direct large activities on short notice. Calls for the new Mobile Coordinator have been answered. As Mobile Coordinator for Burlington County, UA has been directing the amateur group in the Moorestown Area and making numerous contacts with the Camden County Sheriff's Office. New Section Net Coordinator for Burlington County is T2V. Traffic: K2BG 268, WZRG 160, ZWV 94, ZI 28, ASC 17, HAZ 2.

SOUTHERN NEW YORK — SCM. Edward Graf. W2JSV — SEC: UTH, FM; RUF, COU, PAM, GMS: NYS 3015, 7E, and 10 P.M.; 3080 kc. 6:30 P.M.; NYS 3565 and 3570 kc., 8 A.M. and NYS 3570 kc., 8 A.M. and NYS 3574 kc. QNA reports new officers of the Niagara Radio Club are KFB, pres.; UMS, vice-pres.; KMS, sec'y. W3ZV (former ZI), has been appointed Zone Coordinator by the N. Y. office of c.d. SCZ reports that results are obtained if pi-network antenna tuner is used with a trans. 1200 long fed 45° from end with 300-ohm line. KBT meetings are devoted to auction night and demonstration of pi-networks. Our thanks to W3NP, W3EE, B. A. B., and others for the Hudson Division Convention which afforded an excellent opportunity for your Director, ZEG, and your SCM to meet with members. We also wish to extend our appreciation to those of you who have been and are now active on 20 meters running 500 watts with a well signal. The October meeting of the SJRA featured a very interesting talk on "The Modulation Process in Color TV." The John Westworth of W3VCF is serving in the Field Artillery in the Far East. The Camden Civil Defense Council is negotiating for the purchase of four 2-meter p.g. for Civil Defense emergency work.

TRAFFIC: K2BG 268, WZRG 160, ZWV 94, ZI 28, ASC 17, HAZ 2.

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TRAFFIC: K2BG 268, WZRG 160, ZWV 94, ZI 28, ASC 17, HAZ 2.
Merry Christmas
and
Happy New Year
from NATIONAL COMPANY

C. L. Gagnebin............ W1ATD
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Seth Card............ W1DRO
Frank Bartlett............ W1EU
George Ringland............ W1EY
Dave Smith............ W1HOH
Vincent Pelrine............ W1HOX
John Baxter............ W1HRK
Vincent Messina............ W1HRW
Jack Ivers............ W1HSV
Joe Rossi............ W1HXY
Edmund Harrington............ W1JEL
Gustave Jacobson............ W1JDG
Robert Williams............ W1JOX
John Stanley............ W1LFF
Frank Waden............ W1LNV
Richard Thurston............ W1MFZ
Donald Poulin............ W1MXC
Martin Oxman............ W1NYU
Ralph Hawkins............ W1OEX
John Prusak............ W1OPT
William McNamara............ W1OTK
William Bartell............ W1PIJ
Harry Paul............ W1PMS
Hyman Kana............ W1PSJ
Raymond Jordan............ W1QUI
S. W. Bateman............ W1RX
Redmond Sheets............ W1SYA
Frank Finnegan............ W1TAO
William S. Doyle............ W1TV
Henry Flood............ W1TVY
John Halchak............ W1TOD
Victor Jarvis............ W1KKQ
Thomas Stillwell............ W1WNJ
Richard Moore............ W4MLC

Carl Cutler............ W1WCS
Bob Snowman............ W1VXE
Martin Shapiro............ W9GRO
Herman Bradley............ W1BAQ
James Clarlene............ W1BHW
Harvey Poore............ W1DKM
William Osborne............ W1EXR
Alfred Zerega............ W1JMK
Frank Lopez............ W1KBP
Leo Green............ W1LML
Sam Beverage............ W1MGP
Thomas Benard............ W1MLL
Victor Penney............ W1MTS
Dexter Atkinson............ W1MYH
Charles Coley............ W1PME
Edward Millen............ W1UBB
Harry Mayo............ W1PQ
Stuart Tuma............ W1QXS
Ralph Hemeon............ W1MWX
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W. Bradley Martin............ W3QV
Arthur H. Lynch............ W4DKJ
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Kenny Raymond............ W9NNW
Clyde Schryver............ W9RPE
Dick Gentry............ W2AEK
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Dayton Warner............ W9IBC
Robert Lundeen............ W9VX
Arthur Stangel............ W2JZH
Arle H. Anderson............ W7LPN

* It is a privilege to reproduce the 1952 Christmas Seal of the National Tuberculosis Society as a token of our contribution
SELECTIVITY...
in a Communications

The selectivity curves shown here tell the story of a new concept in receiver performance. The Mechanical Filter recently developed by Collins and incorporated in the 75A-3 receiver represents an entirely new approach to the attainment of selectivity. Using resonant mechanical elements rather than tuned electrical circuits, the Mechanical Filter gives a close approach to the ideal rectangular selectivity curve. Each 75A-3 receiver has plug-in provisions for two Mechanical Filters. A 3 kc Filter is standard factory equipment and when still greater selectivity for CW operation is desired, the 1 kc plug-in unit is available as an optional accessory. With both the 1 kc and 3 kc Filters in the receiver, a switch on the front panel provides instantaneous choice of selectivity characteristics. When required, the crystal filter may also be switched into the circuit to notch out interfering signals and heterodynes.

The nearly flat top and sharp cutoff at the sides of the selectivity curve of the 3 kc Mechanical Filter permit all AM signals to be tuned so as to accept the carrier and either one of the sidebands at will, while the other sideband is rejected. Thus much distortion due to fading is eliminated, and susceptibility to interference is greatly reduced. Alternatively, both AM and SSSC signals may be received with carrier supplied by the BFO; and the ideal selectivity curve of the Mechanical Filter permits full advantage to be taken of the benefits of local carrier reinsertion.

Because of the Mechanical Filter’s straight-sided selectivity curve, the 75A-3 receiver can be tuned near a strong signal without responding to that signal. As the receiver is tuned across the band, signals suddenly appear and disappear. This is because of the absence of broad skirts which “drag out” the tuning of conventional receivers.

All of the proven features of the 75A-2 have been retained in the 75A-3. These features, such as crystal controlled front-end, highly stable variable frequency oscillator, and accurate dial calibration, to name but a few, combine with the new Collins Mechanical Filter to give unequalled performance.

Whether you ragchew, handle traffic, or work dx, here is the receiver for solid contacts. The straight-sided, flat-topped, selectivity curve and the excellent frequency stability of the 75A-3 make it a natural for the single-sideband operator.

The Mechanical Filter is a resonant mechanical device that is coupled into the receiver’s 455 kc IF strip by means of magnetostriction. As shown here, it consists of three general sections: an input transducer, a mechanically resonant section consisting of a number of metal disks, and an output transducer. A 455 kc electrical signal applied to the input terminals is converted to a 455 kc mechanical vibration at the input transducer. This mechanical vibration travels through the resonant mechanical section to the output transducer, and is converted to a 455 kc electrical signal which appears at the output terminals. The Mechanical Filter is enclosed in a hermetically sealed case and requires no adjustment.
never before achieved Receiver

The Collins 75A-3 with Mechanical Filter. A 3 kc Mechanical Filter is installed at the factory. The Filters are plug-in units, and a 1 kc Mechanical Filter may be installed at any time.

The curves above show a comparison between the selectivity curve of a good IF strip using nine tuned circuits, and typical selectivity available in a Collins 75A-3 receiver incorporating a 1 kc and a 3 kc Mechanical Filter. When both Mechanical Filters are installed in the receiver, either one may be selected at the flip of a switch. These curves show performance without the crystal filter. When required, the crystal filter may be called into play to phase out unwanted signals or heterodynes.

ATTENTION 75A-2 OWNERS

75A-2 owners can return their receivers through the Distributor to be modified at the factory to incorporate the new Mechanical Filter arrangement. Modifications can be made, effective immediately, and will consist of the installation of a 3 kc Filter, minor repairs and complete realignment of the equipment. Modification, F.O.B. Cedar Rapids ................................................................. $125.00
Conversion kits are available from your distributor, complete with instructions and a 3 kc Mechanical Filter. Conversion Kit .........................................................$100.00

Net Domestic Prices:

75A-3 receiver including 3 kc Mechanical Filter ......................... $530
1 kc Mechanical Filter plug-in unit, $75
10-inch speaker in matching cabinet, $20
8R-1 plug-in crystal calibrator .......... $25
148C-1 plug-in NBFM adapter .. $22.50

For the best in amateur radio, it's . . .

COLLINS RADIO COMPANY, Cedar Rapids, Iowa
11 W. 42nd St., NEW YORK 36 1930 Hi-Line Drive, DALLAS 2 2700 W. Olive Ave., BURBANK

73
ELDICO TRANSMITTER KIT TR-75TV

Eldico's TR-75TV is a 60 watt all-band cw transmitter sensibly priced, solidly designed. With thousands of these transmitters now on the air—unsolicited letters on actual performance are being received daily. Here are but a few excerpts from typical letters demonstrating the approval of hams everywhere.

I recently purchased an Eldico TR-75TV and am extremely pleased with the quality of the components and the easy to follow detailed instructions.

S.M.S-2542

I have been operating your TR-75TV since last Spring. It does not interfere with the TV sets next door although the TV stations are 125 miles away.

W9RGJ

I have had your TR-75TV transmitter on the air for several months. I have had no complaints of TVI from any of my neighbors. A friend of mine down the street has four notices from the F.C.C. and numerous TVI calls. He is even running less power than I.

W4TMV

I have been operating your TR-75TV since last Spring. It does not interfere with the TV sets next door although the TV stations are 125 miles away.

W9RGJ

Thought I would let you know that I have been on the air about three weeks using an Eldico TR-75TV and the results are fine; good signal reports everywhere.

W2DGZ

Just ordered a TR-75TV, Joe. Your signal (W8EHC) sold me on it right unseen.

W8WVL

(Above taken from QSL Card received by W8EHC)

When my TR-75TV arrived I had it completely assembled and wired on the second day and on the air that evening. I now have the WD4OP with the TR-75TV. On phone worked Argentina, Barbados, Ecuador, Canal Zone, Cuba, Chile, Brazil, Colombia and Guatemala with SP reports.

W4JOU

44-31 DOUGLASTON PARKWAY, DOUGLASTON, L. I., N. Y. • Bayside 8-8686
LOOK AT THESE OUTSTANDING FEATURES OF THE TR-75TV:

- Simple enough for the beginner to assemble, sturdy enough for years of trouble-free operation.
- Uses the time proven crystal oscillator final amplifier combination.
- Circuit permits use of 80-meter or 40-meter crystals to cover all bands.
- Plug-in coils eliminate trick circuits.
- Husky power supply employing a SU4G rectifier delivers 500 volts d.c. to the final.
- Antenna tuner output simplifies loading of transmitter with all types of antennas ideal for multi-band operation.
- All stages are metered using a meter which can be switched to oscillator plate, final grid and final plate.
- A terminal strip is provided to connect a modulator if radiophone operation is desired at a later date. Eldico's MD-40/MD-40P Class B 616 modulator is designed expressly as a companion unit.

Over-all size with cover 17" x 10" x 9 1/2". Complete kit (less crystal) ... not another bolt or wire to purchase, including a smartly styled shielded cabinet to minimize television interference. For 110-120 v, 50-60 cycles.

TR-75TV, complete kit with instructions .................. $64.95
Factory wired and tested ........................................ $94.95

ACK RADIO SUPPLY CO.
Birmingham 3, Alabama

ALLEN & HURLEY
Trenton, New Jersey

ALLIED RADIO CORP.
Chicago 7, Illinois

ALMO RADIO CO.
Philadelphia 6, Penna.

ALMO RADIO CO.
Atlantic City, N. J.

ALMO RADIO CO.
Wilmington, Delaware

ARROW ELECTRONICS INC.
New York 7, New York

WALTER ASHE
RADIO CO.
St. Louis 1, Missouri

GEORGE D. BARBEY CO.
Reading, Penna.

BLUFF CITY DIST. CO.
Memphis 3, Tenn.

CAMERADIO CO.
Pittsburgh 22, Penna.

CONSOLIDATED RADIO CO.
Philadelphia 6, Penna.

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Hamilton, Ont., Canada

CURLE RADIO SUPPLY
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Providence, R. I.

DOW RADIO, INC.
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M. N. DUFFY & CO.
Detroit 26, Michigan

W. H. EDWARDS CO.
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THE ELECTRONIC EQUIPMENT CO.
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HARVEY RADIO CO. INC.
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HUDSON RADIO
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HUDSON RADIO
New York 19, N. Y.

KIERULL & CO.
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RADIO AMATEUR
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RADIO ELECT. SERV. CO.
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Allentown, Penna.

RADIO ELECT. SERV. CO.
OF PENNA. INC.
Easton, Penna.

RADIO ELECT. SERV. CO.
OF PENNA. INC.
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RADIO LABORATORIES
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RADIO PARTS, INC.
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RADIO PARTS CO. INC.
Milwaukee 3, Wisconsin

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RADIO PRODUCTS
SALES CO.
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RADIO PRODUCTS
SALES CO.
Seattle, Washington

RADIO SHACK CORP.
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RADIO WHOLESALE &
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Honolulu 11, Hawaii

RADIO WIRE
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75
“MAPC”—everything reduced but Quality & Performance

The “MAPC”, a miniature “APC”, was engineered for use in equipment where an unusually compact, high-quality air dielectric trimmer is required. Its base size is only 15/16 inches by 25/32 inches.

This capacitor was carefully designed to resist effects of temperature, moisture and vibration. Rotors and stators are fabricated by soldering brass plated to supporting members and then nickel-plated, fastening the assembly. Terminals are tinned to permit easily made solder joints. Two tapped brass mounting studs fastened to the silicone-treated teatite base make it possible to mount the capacitor without grounding the rotor.

The “MAPC” is available in six standard models with capacities ranging from 2.3 mmfd to 100 mmfd. Because of its low minimum capacity and low inductance, it is ideal for VHF applications.

Have you received your copy of the new Capacitor Catalog? It lists Hammarlund’s complete line of standard capacitors sold by responsible dealers from coast to coast.

**SEND TODAY!**

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(Continued from page 70)

for his work in the Ohio River flood of Jan. 1952. NXU, corresponding secretary, West Central Emergency Net, is monitoring the net frequency, 29.425, in continuous consultation with a broad-band receiver employing a squelch circuit. NUU reports that the net is active and that WATC and WAUK have joined the staff at YA, Pennsylvania State College.

The club station at YA is a 1-kw, all-band transmitter. The lone correspondent in the net, an IFT, is operating from a 9-inch, 50-meter antenna, set up to get a well-balanced 50-meter antenna. TVS is heard chasing DX on 80 meters. NUG, RM, for the W. Pa. traffic net, says the new officers of the Amateur Transmitters, Inc. (ATI), are OVM, pres.; UL, treas.; QPQ, secy.; RFX, A-XX, LMM, and NDU, directors. CA has an HIO-20, JSH piled up a score in the recent CID Party, is experimenting with a new type of hermetically-sealed relay. MIV, QCN, and QHLS, along with their families, attended the Western banquet, e.g. meeting at Van Foss, PA. Other officers of the Pennsylvania County Radio Assn. are GEG, pres.; CJF, vice-pres.; NCD, secy.; and STZ, treas. WNSST is now a full-fledged W3. Although handicapped by total blindness, this extremely active on the air and has been club treasurer for several terms. Your SCM’s term of office runs out in March and some special elections for that month, so all of you to seek out the man best suited for that job.

Traffic: (Oct.) W3UHN 79, KUN 19, CA 11, M17 7, LXE 3.


**CENTRAL DIVISION**

**ILLINOIS**—SCM, R. E. Lund, W0KQL—Section Nets: LNN 3515 kHz; IRN 3690 kc; SEC, QLQ, Ass. Sec; HPG; RM, BUK, PAM; TQY. BA had a 5-minute interview over K6GM in connection with the S.E.T. UFM has traveled this old road and will be heard on 80 meters in the Highland Park. Newcomers to LNN are JC, at Columbus, and KOU, in Carthage. SKO took the summer to build a 30-meter (150-foot) tower. K6WTV has been heard.

The indoor antennas don’t work as well there as on 20 meters. BXC, with an XYL and a small apartment, has been voice on 20 meters. VBB has a 150-meter, voice on 80 through 15 meters. Under the direction of HPG the Chicago Area totaled 1002 points with 115 stations active in the S.E.T. There were 74 mobiles and self-powered stations in operation. PQN has been elected secretary of the Egyptian Amateur Radio Society to replace HT2L, who has moved to Iowa. Club membership includes XV, PHUH, PNK, QYJ, TIOV, and ZZ. Graduates from the Novice ranks include LRL, PBB, PND, and QLJ. QPQ has an SC22 with a five-element beam on 144 Mc. Visitors to M1 included HPC, PQN, and W0NRE. LNN has built a 350 vertical. PRN is 144-Mc. mobile in Springfield. WFS made DXCC with 162 confirmations. QPC is a member of the SSCC, director and reflector to make his 30-meter wire a three-element beam. Traffic: (Oct.) W9Y1X 528, CSW 199, HPG U1 1DIA 113, QNZ 199, QEL 199, N6WLD 84, BUX 45, KQL 39, CTZ 38, W4HMX/9 U3, W5STT 26, XYZ 187, WIS 031, N3R 121, LBO 199, BWN 86, DOR 3, BUP 2, PRN 1. (Sept.) W5UH 4.

**INDIANA**—SCM, C. L. T. McIver, W0SDA—DX, JTO, and JOL have mobiles on 9855 kc. PA8 has new 4-65 rig. KLH has moved to Liberia. DRJ is manager of the Calumet Area Emergency Net, AJO worked 80 on 150 meters. U.K.A. IAC, and DJH have vertical antennas for 150 meters.

New officers of the Wabash Valley ARRA are EHT, pres.; QPQ, vice-pres.; W0NSY, secy.-treas. IQO reports they have a duster mobiles on 50.6 Mc, OQO, H5, and JVF have new homes. JQ7 has new all-band TVI-proof transmitter. The hams working for Western Electric Co. in Indianapolis are forming a club to be affiliated with the ARRL. LQB has new exciter with crystal oscillator and VOI both operating in the range of 457.5 to 500 kc. New officers of TARS are NIB, pres.; JQO, secy.; and BSN, treas. OXW now is SCC and has new 80-meter antenna. OUX runs 250 watts to a 304TL. NTA is superintendent of the Crawfords Ferry. JQ7 reports on RFN traffic as 148. The Martinsville ARC was host to the IRCC. New Officers of the council are KDH, chairman; QCD, vice-chairman; JZL, secy.; and H5, treas. JQO, JVE, DUD, VFY, and NTA provided communications for the National Guard while fighting a forest fire. NTA has run the HIO-28, CC is a new call in South Bend. HJX reports the IFN traffic as 223 covering 82 active stations. JT is working on a new rig, CMT has new 78A and Viking II transmitter. QPQ moved to Muncie, IN and has a new rig. KAS has a 55-foot mast. PPT visited HGV. New officers of the IFRC are DEG, KIS, vice-pres., KQY, secy.; ABN, comm., UAT, CEX, and BUK, directors. UQH new blnmac rig. AQX has a new FIO. AIO has a pair of 907A. DPL report nice openings on 15 meters.

(Continued on page 72)
One was in your father's shack—
One should be in yours!

Two generations of satisfied discriminating hams is PROOF of the superiority of Hammarlund's Professional Approach to Receiver Design.

HERE ARE TODAY'S CHAMPIONS

With the "SP-600-JX", the professional receiver now available to hams, you have facilities for six crystal-controlled fixed frequencies. This designates it as the perfect receiver for point-to-point and network operations. Pre-arrange day and night fixed frequencies. With crystal control you can select your desired channels immediately.

Whether you want to operate on a fixed-frequency for contact with an individual station or network, or roam the six bands from 540 kc to 54 mc, you just can't operate a finer receiver.

Professional quality in the "HQ-129-X" is evident in its conveniently placed dials and controls, carefully positioned to provide maximum operating ease. With this receiver you rest your arms on the table for all important control movements—no continuous reaching or other tiring movements during long contest runs.

In addition, the calibrated band-spread dial for 3.5-4 mc, 7-7.3 mc, 14-14.4 mc and 28-30 mc, make it an extremely valuable receiver for operating in today's crowded ham bands.

HAMMARLUND
HAMMARLUND MANUFACTURING COMPANY, INC.
460 WEST 34th STREET • NEW YORK 1, N. Y.
NOW!
a 5 Band
MOBILE CONVERTER
The RME MC-55
For 10-11, 15, 20, 40 and 75 Meters

RME is proud to bring hams a new mobile converter designed for coverage of FIVE bands. With possible opening of 15 and 40 meters to phone operation, the MC-55 is all ready to do a superlative job on those bands as well as 10-11, 20 and 75 meters.

Many of the features so well liked in the RME VHF-152 and HF 10-20 converters, are incorporated in the MC-55. Other brand new features, found only in the MC models, make this small, compact mobile converter an outstanding performer.

Write for illustrated specification sheet.
Address RADIO MFG. ENGINEERS, Peoria 6, Illinois

- HIGH SENSITIVITY. 1.25 micro-volts on all bands.
- THREE GANG TUNING. Individual slug-tuned coils for each band.
- BUILT-IN NOISE CLIPPER. Highly efficient automatic noise-limiter all ready to connect into car radio. Handy IN-OUT switch.
- SEPARATE INPUT CONNECTIONS. An input connector for the regular car antenna, switched from front control knob, does away with loss of "punch" on the broadcast band.
- SMOOTH, SOLID TUNING. 25-to-1 worm gear drive assembly provides smooth, effortless tuning, rock like stability, NO backlash.
- LOW POWER REQUIREMENTS. All miniature low-drain tube line-up. Requires only 25 ma. at 150-180 volts. Uses 6AK5 if. amp. 12AT7 osc. and det. 6BQ6 if. amp. 6AL5 noise limiter.
- FOUR TUNED CIRCUITS in if. output stage. Output frequency 1550 kc.
- TRANSMIT-RECEIVE SWITCH. Transmit position removes converter "b" plus, makes 6v available at rear terminal strip for operating relays.
- LARGE, ATTRACTIVE EDGE-LIGHTED DIAL calibrated for 26.4-30 mc, 21-21.45 mc, 14-14.3 mc, 7-7.3 mc, and 3.5-4 mc.
- SMALL, COMPACT AND RUGGED. Easy to mount in any handy location. Attractive cabinet blends nicely in any car. Complete with tubes, connecting cables and instruction sheets.

Amateur Net $69.50
OTHER RME CONVERTERS

MC-53
For 2, 6 and 10-11 Meters

The many special features of this converter result in outstanding performance and highest stability on these frequencies. Uses 6AK5 rf. amp., 12AT7 osc. and det., 6BJ6 if. amp., 6AL5 noise limiter and OB2 voltage regulator. Amateur Net. $66.60.

MC-57
For 10, 20 and 75 Meters

Plenty of bandspread, accurate calibration and rock-like stability are only a few of the many fine features found in this converter for the most popular fone bands. Uses 6BJ6 rf. amp., 12AT7 osc. and det., 6BJ6 if. amp. and 6AL5 noise limiter. Amateur Net. $64.50.

GOOD NEWS FOR AMATEURS FROM ELECTRO-VOICE AND RME

With the announcement of the new MC-55 five-band mobile converter, RME announces that it has become a division of ELECTRO-VOICE, INC.

As in the past, RME will devote its energies and talents to building quality products for the amateur.

With the additional engineering and manufacturing resources provided by ELECTRO-VOICE, RME will be able to serve you better than ever before.

The new RME MC-55 marks only the first of many new ham products to be offered the discriminating amateur in the months ahead. Many others are now on the drawing boards and in the development lab, receiving careful attention from some of the nation’s most able engineers, all of whom are hams themselves.

Watch for these new products—they’ll be the finest model

RADIO MANUFACTURING ENGINEERS
Peoria 6, Illinois

JRI reports QFN traffic as 561. DHI built new VFO. EIU works 80-meter c.w. with low-powered VFO. DLI and HDB by 2-meter mobile gear. EIN has ECTA X transverter. WDXL is operating KX6AF and AR from Eniwetok. KXZ has new mobile rig. EVR works 80-meter c.w. New members of IRC include FTPW, PD5, GOH, QAG, WMR, NOS, and BRI.

A new Novice in Yorktown is W9NLIR. HKQ and KLR are the only known active hams in Jasper County. New ARRL appointees include OWZ as OBS, NGB as OBS, OPX as OBS, OLX as OBS, KLR as OBS, and KAS as Marion County EC. Traffic: (Oct.) W9JUJ 1380, TT 220, NZZ 186, KDV 181, IUM 104, UMS 153, TQ 154, SKY 161, HSC 197, HSO 190, TQ 155, WBA 57, FYM 74, QJD 65, DGA 69, DJH 45, NTA 98, PFS 38, FZW 36, DOK 33, GUX 27, DRR 22, CMT 20, EBY 17, VWV 16, FYM 16, BDF 6, WNM 006, WNBH 4, YV5 4, UIA 2, (Sept.) W9OWZ 25, KAS 30, AB 19, GUX 6.

VISCIONEON - VINCIONEON Semiconductor, WPQRM - SEC: OVO. PAM: ESJ, RM: IQW, SFL, Phone Net (BEN) 6 p.m. daily, 3950 kc. c.w. Net (WIN) 3825 kc., 7 a.m. daily; slow speed 6:30 p.m. Mon.-Fri. State Mobile, Emergency and C.D. frequency, 29.620 kc. IQW reports as WIN NCS: Mon., Tues., Thurs., Fri. ERW, SFL, SEC: IQW, SFL reports as NSC on WIN slow-speed net: Mon., Tues., Thurs., Wed. NLH, Thurs., SFL, Fri., PVH, CXT handled urgent Guam traffic on 14 Mc, while telephone circuits were out because of the hurricane there. Congrats to MQV, who received A-1 Operator Club certificate, FCF is rebuilding VFO and c.w. UCR, has had over 500 6K6s in stock for operating from Campbellport. 4YCW, ex-9YCW, has completed his tour of duty as chief of MARSH-Army, and soon to be on leave from his station as KL7. DBW is QRL Air Force Reserve duty. RKF has 70 counties confirmed out of 98 worked. SDK is back with a rig on 6 and 7.5 Mc., c.w. and 4- and 5-meter broadcast, with QSL cards. DKL is in error of only .00014 per cent in the September F.M.T. A new Lyco 609 VFO has been added to NUWY, the WYRA control station. OPA reports that the Green Bay Mike & Key Club was on land and in the air for 33 hours and 1 hour 30 minutes, and FWO maritime mobile. NLH put up 10-meter grade plane vertical. SBH is building a new rig, JM built a new mobile converter. LSJ has the rig on 29 Mc, after cleaning up a case of TVI. New appointments: SDK as OBS. Appointment renewals: VNA as EC, LSJ as OBS, OVO as OBS. On 144 Mc., LEE is working on a new p.s.e. final, WN9TTP worked DSP, JBF, NYS, and LEE, and is pouring DX juice into his converter for better response. The now NWSG established an informal 144-Mc net, still working daily. KXK has moved into a new QTH and has rotary on a 55-ft. pole. Traffic: (Oct.) W9CXY 134, MQW 194, DR 72, GQ 67, ECP 51, SFL 51, NUW 006, ECP 51, UC8 29, LSK 28, CFP 29, ERW 26, HDY 16, OVO 13, IFS 9, SDK 3, (Sept.) W9DR 32.

DAKOTA V I O T I O

NORTH DAKOTA - SCM, Everett E. Hill, W9KEP - North Dakota appointments now in effect are RRW as SEC, YEQ as PAM 75 phone net, OEF as PAM 160 phone net, CED as Grand Forks Area EC, GDX as Fargo Area EC, W9DG as 80 c.w. net, KZZ, now in Fargo, has a Viking 2; KZK is in the Bismarck Hospital with a broken leg. All YL operators in the State, please register with KOY for XLRL EC. KXX has been licensed. LWX is a new call in Adams. DQB wants more information in this column, so let's turn in some reports to your automobile SC/M. I appreciate hearing from you with yardstick for this column. RRW and JWW went duck hunting near Westhope. The SARA will enter the Grand Forks Hobby Show. GND is new editor of the SARA Feedstock. ARB, a major in the CAP, is Wing Communications Officer, LHS has the teletype about ready to go. Your SCM has mimeographed copies of the State Emergency Corps Handbook ready for mailing. It includes a map and all information on nets for the State. Contact him for your copy.

SOUTH DAKOTA - SCM, J. W. Elsen, W9RN - SEC: GCP, RM: OLZ, UTV, Pierre, has moved into his new shack. Trot's rebuilt rig is now cabinet-mounted. The South Dakota 1960 show was held 4-10 December 1959, at 1005 kc., with KHE as NCS. The Prairie Dog 160-meter net operates nightly on 1950 kc. WN6QX attends U.S.D. at Vermillion. KUQ, formerly of Parkersburg, now is in USN radio school in San Francisco. EIU, Viborg, has his Advanced Class ticket. New tickets: LTS, Aberdeen; WN65LKN and WN6LXQ; Sioux Falls. FJS now is located in Vermillion, with REA, and is in Lake County EC, SDE, Mitchell, is Davison County EC. GCP added four mail and one supporting AEC members this month. The new net needs help—3615 kc., Mon., Wed., and Fri., 1900 CST, LXD, newly-licensed, is working portable at State College, Brookings. Let's all start spreading activity for c.w. and letter license plates. Director PHR visited Black Hills ARC and Pierre ARC in October. RRW is teaching a weekly ham class to close the amateur men. Traffic: W9SHF 8, PHR 4, GCP 17, W15W/6 16, WD9JTB 16, AEN 12, WU7 8.

handles traffic; URF has a new beam, new rack and cabinet rig and helped out in fire emergency; BGF, with new chief operator, SMW, mucked up a nice traffic total; FRT reports things are making good progress at the new KYN, and BGF deems the overseas traffic. BAZ extends a cordial welcome to all amateurs to sign up with the CAP. FFD works on KYN and makes the ragchews there the best. "Old man" KYN, is doing FB. We have saved the last lines to pay a great big compliment to MWX, our Route Manager. Vy has been missing, individuals are better and KYN has done a wonderful job. He puts in many hours operating and also prepares and mails out his net bulletin. A great big compliment to MGZ, for a wonderful job handled in an outstanding fashion! In the notes: K4BW of Ohio is a W4, BGF 65, WSC 47, CDA 30, PRT 36, UWA 29, FYD 34, KFP 5.

MICHIGAN — SCM. Norman C. MacMillan, W6DLZ — Ass't SCM. R. B. Cooper, SAQA; M. C. Wills, 5C8B; J. R. Beljan, 5CCW; SEC; QJH. RMs: UVE, YKO, ELO, WBF, W6DLZ. New appointments: HIC. RMs: WBF, W6DLZ. (Mich. Area #2). FGF (Barber Co.). NS (Oakland Co.). HRD (Gogebic Co.); OBS to NBO; OH to GBU. ALD is permanent NCS of the GREL. New officers of the Liv. County Club are FBO, pres.; RTN, VIB, and GOL, vice-pres.; GPF, secy.; FOV, tres. The Catalpa Amateur Radio Club, Liv. Co., has its new officers are VJL, pres.; CIC, vice-pres.; GCP, secy.-tresp. This club has a monthly civil defense drill NSC, and has the club station, HLD. GPF reports seven of the members active in 1st net this month. They are: A. W. ROC, RTZ, J. W. 10F, GPF, and WO. DOL sends 73 to the Michigan gang, and says he will be twiddling the bug and reporting next month. The NW, and FGF are NCS on the Great Lakes Emergency Net. BUV reports the Midland AREC gang put up a 100 per cent check with local police. The Tecumseh ARC, who run a Viking I for o.d. work, according to word from CPB. A 150-meter net in the U.P. is in operation Sun. at 1:00 EST (1000) on 1560 kc. Every day an "RRS, codified" was operated in Western Michigan. Working with Methodist ministers LDD, YNG, AVJ, BKL, and KTV handled traffic during a week between church services. The State, FGB reports HAT is now Advanced Class while W6LNM is the newest Novice in Benton Harbor. SWF says there are signs of a major traffic increase. WBF is on 75 and 160 meters. EGI reports 896B (ex-2FBY) is now located in 1st net by T. TLG, and reports that EGI is not an active operator any more. He hopes 813 rig. SFM (SCW's XYL) now is active on QM and SRN. Hay, fellows, do you know where these newcomers have come to get their information? They plan to use the traffic-report form. We sure can use more of 'em. How about taking the time to jot down any local items of interest to the gang? Thanks to the GREL, SCM. New officers of the Liv. County Club are: Nor. NOR 188, DAP 127, RTN 225, SPF 30, CPB 71, QX 61, 1LP 54, GGS 82, DIZ 48, JY 42, JY 37, EEF 19, TOQ 17, FYD 14; HIC 17, WBF 14, and HRD 8. MGZ 8, EF 8, EGI 4, EUG 8/F, TIC 4, WVL 4, ENX 2, ZEE 1, (Gentl.) WRSTN 68, JY 34, IKX 31, AXP 30, WAP 13, EGI 13, HRD 12, and 580, COW 5, LR 3, FUV 8, EFG 6, SOW 6, NQ 1, ZEE 1.

OHIO — SCM. John E. Siringor, W8AJV — Ass't SCM. C. D. Green, ON2X; UVE: J. F. Koenig, 5PB; RAM: PUF; OMs: TCF, KCF, and 5PB. New appointments are RO (ex-AXJ) as OBS. AQ now is living a few blocks from home QTH. IN, and is getting on the air. He is on the new mobile rig on 160 meters. CTZ is in area director for TCPN, 3970 kc., with LMB and GDB serving as his assistants. Ohio traffic may now be heard on 1600 to 1800, prior to starting time. TLAB again is going full blast. DG has received his Extra class license. EKA has worked six counties on 21 Me., with 2 watts. OZ is re-emerging from a broken ankle and wrist via the wheelchair treatment. We don't believe Windy will be held down for long. The Toledo gang held its pot-luck picnic Oct. 17th. Most of those who attended are well on the road to recovery. The BSWARZ held a "CR Party for President" Oct. 8th. U2J and SRF have had their appointments reinstated. They threaten to become very active traffic-wise. S89Z from Canton, Ohio, has been an operator for the last three months on 160 meters. GNF is again calling on the air. He also won the o.w. section and AJW was declared the "phone winner. QB is back on the air after being laid up for three months. GNF won the "best of the week" contest. N8X has deserted the Buckley State and has taken up residence in Hastings, Mich. YQR spent three weeks vacationing in Ohio. The Ohio State Club has been reorganized and will gladly accept free equipment with no questions asked. On Oct. 13th the Canton gang held its final outdoor meeting. The new 80-meter mobile is the big noise in the Queen City with WBG, LOM, AQV, SDD, MOP, 4C8HF, and 4J7YS making most of the traffic. SDD worked traffic from all the major areas during his vacation. The Dayton R. F. Carrier states that GQ, HB, and OHQ finished one-three, respectively, in the mock QSO test at UX7, and the club held a W2H Contest on Oct. 12th; the ZQUs have a new

(Continued on page 82)
For nearly two decades Eimac vacuum power tubes have paced the electronic industry. Through a record of consistently dependable operation, Eimac tubes — whether a triode, tetrode or pentode — are being relied on by leading Amateur Radio Operators. Whatever frequency, power or system your rig is operating on, there is an Eimac tube to do the job with a minimum of driving power, high plate efficiency and simple circuitry. Eimac tubes vary in plate dissipation ratings from 25 watts to 20,000 watts and cover the spectrum from audio frequencies to 9600 mc. No matter what your power transmitting needs, as an amateur or engineer, you'll find time-proven Eimac tubes will perform efficiently, dependably and economically.

* For information and technical data write the Eimac Amateurs' Service Bureau. "Care and Feeding of Power Tetrodes," a handy 28 page booklet, that is all the name implies, is available free upon request.
HUDSON DIVISION

EASTERN NEW YORK — SCiM, Stephen J. Nesson, W2ILL — RMs; TYC, KBT, PAM; JGK, JCSA, IFP has new all-band exciter and will add an S13 filter soon. Dave is working with his K3E, 1017 Rye Rd., Mt. Kisco, NY 10549, and active as OBS and with the traffic nets. MIDE had a fine time in the 1st and the other events.

COMFORTAEX, Zone IV Coordinator, still finds time to answer the nets for Zone IV, and he offers its sincere thanks to LWE for the excellent wiring job on the Viking transmitter, this in connection with the recent Hudson Division meet at Oakwood Park on Saturday and Sunday with DX at 1 pm and at 6 pm each day. Refice TALK Club has been held in the Madison, Wisconsin, and the new Antennas group has held the election results with much success on the 144 and 293 MHz. SEEK is selling the YXL at the idea of having a DX. Five in the side of the mobile antenna and the mobile is used a lot. The new XYL is consulting with the XYL about a new S13-2X or S13-3X if you wish, and they find it quite effective. A couple of YXLs should be in the mail soon and the purchase of the new DX is under way.

CWG and the Alliance County AARC gang handled the election results with much success on the 144 and 293 MHz. SEEK is selling the YXL at the idea of having a DX. Five in the side of the mobile antenna and the mobile is used a lot. The new XYL is consulting with the XYL about a new S13-2X or S13-3X if you wish, and they find it quite effective. A couple of YXLs should be in the mail soon and the purchase of the new DX is under way.

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Office Hours: MARRS and NYS. HIQ again is active on 3.9 Melbourne, S4BO, announces a QSO Contest between ZS1 and ZS5.

GEOFFREY S. D. — SCiM, George V. Cooke, Jr., W2BOU — ASSC, ASM, Harry Danals, 2TUJ; SEC: KTF; RM: VNJ; PAM: YBT; The Amateur Radio Club at SUNY at Buffalo, New York State, has been active at SUNY for several years. Over 200 AREC stations were on the air and a mass of traffic was handled. More than 100 members attended the meeting, and over 100 stations were on the air in the S.E.T., both on 10 and 12 meters, and the SUNY has now 17 stations permanently located at their headquarters. A new Townsvillage, IYX, the ECC, and the NOSSC, provided the drill in which mobiles on 6 meters took part. KFB set up a mobile unit at the police station, and the police officers relaxed election returns to LBJ in Sands Point, who relayed to JVG in Manhattan, from which the returns were telegraphed to WPY, IF monitored 2 meters just to the north. KFB's DX station was noted on 11 000 and 14 000 on Sundays.

In New Jersey, RM for the NYC-NJ (NJL) Traffic Net, which meets Mon. through Fri., at 1400 on 3600 kHz, and the New Jersey 144 MHz has beenactive on the various nets. Nine JVEs called into the nets during the weekend.

The AMC is active on the MIDE, but the new DX is under way.

The AMC is active on the MIDE, but the new DX is under way.

The AMC is active on the MIDE, but the new DX is under way.
WHAT TO LOOK FOR IN A
UHF TV CONVERTER

Dear OM:

Many communities are preparing to welcome UHF television for the first time. As a result it is probable that you will be called upon by friends, neighbors, and relatives for technical advice regarding the possibility of using a VHF television receiver for the reception of UHF channels.

For your information, UHF reception is entirely possible from a conventional VHF TV receiver provided a suitable outboard Converter is employed ahead of the set. In such a combination, the original TV receiver functions as an i.f. amplifier, and UHF tuning is accomplished solely by means of the Converter.

Unfortunately, the effectiveness of this arrangement depends almost entirely on the skill with which the Converter was designed and manufactured. It is true that a well-designed Converter will tend to overcome some of the deficiencies of a mediocre TV set. On the other hand, it is just as true that a poorly designed Converter will always produce inferior results no matter how good the TV set might be. In view of this, a very deliberate study of every angle of UHF Converter design is justified before recommending purchase of this or that UHF Converter.

One of the points which must be considered is the tuning range of the unit. Does it provide reception of all UHF channels? Or does it limit the user to a choice of only a few of the available channels?

Does it have antenna pre-selection? (The answer to this question is exceedingly important to the amateur, because of the ever possible TVI as a direct result of poor input selectivity!)

Can it be employed with any conventional VHF TV set? Can it be installed without special tools and by non-technicians?

Is it stable in operation? Is it easily tuned, so that even a child can enjoy UHF television?

Does it have built-in low-noise i.f. pre-amplification to guarantee the best possible signal-to-noise ratio at all times? Is it complete? Does it have its own power supply?

Strictly from an operating standpoint, the size and appearance of a UHF Converter is of little importance. However, it is a well-known fact that recommendations to wives, mothers, daughters, sisters, and aunts must be made in good taste. So, the question of appearance must be considered!

Your analysis of a UHF Converter suitable for unqualified recommendation to associates should result in clear-cut affirmative answers to each of the above. Anything less, means that you haven’t examined the characteristics of the Mallory TV101, Inductuner® equipped, UHF Converter. The TV101 design definitely includes each of the above . . . plus. Your QSL, letter, or msg. directed to TV101 Bulletin, P. R. Mallory & Co. Inc., Box 1558, Indianapolis 6, Indiana, will get you additional information.

73,
Your Mallory Reporter

P. R. MALLORY & CO. Inc.
P. O. Box 1558 Indiana 6, Indiana
Radio Officer for the State of Maine for all RACES stations. 

The official website of WIFF, hosted by the Maine Electronic Communications Association (MECA), which has most stations on the air, with one exception being KX, which does not operate any radio equipment.

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IT'S NEW!
THE JOHNSON Viking II
TRANSmitter KIT
Greater Power — TVI Suppressed

240-102 VIKING II TRANSMITTER KIT, COMPLETE WITH TUBES, LESS CRYSTALS, KEY AND MIKE
AMATEUR NET
$279.50

The transmitter kit you've waited for! The JOHNSON Viking II, successor to the Viking I, and the most complete transmitter kit on the market. The Viking II is an expertly designed transmitter, furnished unassembled but complete to the last detail. Includes all necessary parts, hardware, tubes, wiring harness, and cabinet. Assembly manual contains detailed photos, drawings, and step-by-step instructions. All amateur bands from 10 to 160 meters, 100 watts phone output, 130 watts CW.

RF section: 6AU6 oscillator, 6AQ5 buffer/doubler, parallel 6146 final amplifier. Modulator: 6AU6 voltage amplifier, 6AU6 driver, pp 807's class AB2, 6ALS bias rectifier. Full excitation delivered to the final amplifier on all frequencies. Continuous tuning pi-network amplifier matches a wide range of antenna impedances. All stages metered, dual power supplies designed for economy and operating convenience.

For novice operation, the final amplifier input may be reduced to 75 watts—no transmitter modification is required.

TVI SUPPRESSION MEASURES...

The Viking II is enclosed in a heavily copper plated, steel cabinet, perforated top and bottom. Lid banded with silver plated, phosphor bronze contact fingers. Special shields for meter, dial window, and VFO power socket. Filters at keying jack, microphone connector, VFO power receptacle, power cord, and antenna relay connector.

The Viking II is also available wired and tested at nominal cost. Write for free booklet 714, describing the Viking II in detail.

ADDITIONAL FEATURES
- Amateur Bands—10 to 160 Meters
- 100% Amplitude Modulation
- VFO Input Provision
- Dual Power Supplies
- Self Contained—No Plug-In Coils
- Pi-Network Coupling Output Amplifier
- 135 Watts Phone Input
- 180 Watts CW Input
- Instant Bandswitching

VIKING VFO KIT
The JOHNSON VFO kit is accurately calibrated for all amateur bands from 10 to 160 meters. Stability is excellent, assured by rigid construction and temperature compensated ceramic paddles. Versatile tuning, clean keying, and perfect "break-in" on all bands. Assembly is simple. Kit complete, less tubes.

AMATEUR NET
$42.75

INCREASED HARMONIC ATTENUATION!
Johnson 250-20 Low Pass Filter
The JOHNSON low pass filter consists of four individually shielded sections. Capable of handling more than 1000 watts amplitude modulated 85, the 250-20 can provide an additional 75 db harmonic attenuation in the antenna circuit. 50-239 coaxial connectors, completely assembled and pre-tuned.

AMATEUR NET
$16.50

E. F. JOHNSON COMPANY
CAPACITORS, INDUCTORS, SOCKETS, INSULATORS, PLUGS, JACKS, DIALS, AND PILOT LIGHTS
210 SECOND AVENUE SOUTHWEST • WASECA, MINNESOTA
A HIGHLY USEFUL INSTRUMENT FOR

The B & W Model 600 Dip Meter provides you with a convenient means of doing the job in a minimum of time with dependable accuracy. It is an extremely sensitive and reliable piece of test equipment having innumerable uses in the Ham Shack, Service Shop, Electronic Laboratory, or Production Plant. Armed with this versatile and indispensable instrument, you eliminate the guess-work during measurement of—tank circuit frequencies, antennas, feed line systems, parasitics, and other pertinent tuned circuit characteristics, with speed and accuracy. The handy instruction manual furnished with each instrument covers full information on how to use the Model 600 as an Absorption Meter, Auxiliary Signal Generator, R.F. Signal Monitor, and several special applications as well. See it at all leading electronic parts distributors throughout the U. S. A. and Canada; or write for descriptive bulletin.

NEW HAMPSHIRE — SCM, Carroll A. Currier, WIGMI — BM: CRW. The Great Bay Radio Club sponsored its fall clam chowder to the members of BM, and what a crowd! GTY, Grafton County EC, is calling for volunteers for the emergency net and asks those interested to contact him. GTC now is rebuilding his mobile rig. The Portsmouth City Radio Club at Portsmouth has moved to new and larger quarters. SCHD worked mobile on his trip to Florida. GMII has VHFing II and likes it. The Manchester Radio Club is working out fine from its new quarters atop Mt. Uncanoonuc. KYG has new all-band rig for mobile. Many thanks to those who are sending in the traffic reports. Don’t forget this is your column, so please also send in some news items. LB and SS gave valuable information at the Hampden gathering about the work of the EC in the new call set-up. There now is a RO in each county. TCPC may use some more outlets in the State. Why not call in JHM, back pounding brass, take this opportunity of wishing one and all a Merry Christmas and a Prosperous New Year. Traffic: W1FQK 68, QGU 45, JNC 31, GHM 28, QX 13, FZ 8, UNY 1.

RHODE ISLAND — SCM, Merrill D. Randall, W1JBB — SEC: MJ, BM: BTV, FM: BBF, R1, R. Net meets Mon. through Fri. at 1000 on 3400 kc. The R. L. net meets Sun. at 1000 on 3993 kc., with OIR and TRX as control stations. With eleven stations and five associates, this net could use some more. Whether the beams or the auction drew them, there was quite a gang at the NAARO supper on Oct. 29th, and all had a good time. NGRC’s business meetings are held the 2nd and 4th Mon. all other Mondays are devoted to code and theory classes. Any plans from anywhere is invited to either. Meetings are held at Stearns’ Institute on Mill Street, Newport, just 100 yards from Jamestown Ferry. Still looking for information from other R.I. clubs! That R.I. contest consists of OIR, TRX, ONZ, OMC, Middletown; BBV, OUI, ULC, Newport; BBN, Portsmouth; QYX, Pawtucket; JZB, Warwick; and QCLD, Cranston; as regulars, with AY, APM, and NNN of New Bedford, Fairhaven, and Swansea, Mass., CFI of Wakefield, R. I., and ZIF of Elizabeth, N. J., serving in appropriate capacity. Traffic: WIBBN 38, QYZ 24, ULG 16, OIR 8.

VERMONT — SCM, Raymond N. Flood, W1FPS — SEC: JEN, FM: AZN, BM: OAR, Asst. BM: TAM. The Vermont slow-speed net has been discontinued because of the terrible QRM, phone and c.w., on 3470 kc. Conditions reached the point where it was decided to break each other to say nothing about trying to copy. Sorry, Novices. VT says he can copy 10 w.p.m. on the mili. Nice going, Gordon. VTP has received his General Class license and is reporting in on VTN on 3520 kc. JLZ is having fun with 40 watts to an ant on 75-meter phone. TXY is not doing so well. Keep trying, Ralph, it will be all the more fun when you do get on 75 meters. Please fill out AARL Form #1 and return to me with your local news. Traffic: W1OAQ 181, RIA 108, FPS 44, TAN 40, PT 24, JLZ 16, ELI 11, JEN 10, TXY 7.

NORTHERN DIVISION

A LASKA — SCM, Glen Jefferson, KL7NT — BK is taking time out for home construction on his country acres. AKL is on a.b. and conditioning Anchorage contacts to see about a reception. AKZ will sign for a long bug e in a.b. job. ZG, at Golovin, is about to sell his kw. job, about setting down from a tour with his family “Outside.” Heavy reports of working SBAIPE, VKP, OIEZ, Q5BH, G3JSN, CT1PK, and E4ATDJ. No wonder why we worry about more power. ABE now is running a “near” kw. but have not mentioned any new DX on it for a year. Communications plans for civil defense are making slow progress with slow response from some areas being the retarding factor.

IDaho—SCM, Alan B. Ross, W7WU — Lewiston: IDZ, the new EC, turns in the following: OWA worked XQI on 29 M., for a new country. POZ is the proud papa of a boy. The Lewiston-Clearwater Amateur Radio Club worked with the police on Halloween. IDZ and OYV were at the Police Station working OOW, OWA, POZ, and HDT mobiles. Burley: New officials of the Magic Valley Radio Club are: HAH, prez.; BST, vice-pres.; and NRZ, secy. K1A represented Burke in the Oct. S.E.T. Blackfoot: LQI is active on MARS, 4065 kc. New hammas are QCU and (Continued on page 88)
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Richard A. Mahler, WIDHQ

President

XYL WNT78MH, Hayden Lake and Couer d’Alene Area: FIS is active as EC in three nets, FARM, QRM, and CARs, and also schedules EHZ on 29 M. The S.E.T. was handled by EHZ, IF, W7GK, BBA, OTD, LJD, ELJ, OBN, RHF, FIS, IPE, W7NHK, and W7FAT. Boxes S.E.T, for control stations on 3935, were MUT, NVO, MBS, APK, and SHM. On 3936, were ZN, TO, and ORF. On 3935 was ORF. Skylark is E.C. Traffic: W7TCL 10, FIS 11, LOU 6, DLA 5, HAH 2.

MONTANA — SCM: Edward G. Brown, W7KQJ — Newly-elected officers of the Billings Club are CHB, OPM, vice-pres.; RIL, secy.; PLN, treas.; GPV, editor; and W7NAT, Sgt. at arms. W7NAT has a new SO8S. KU1 has a couple of new calls pending. The Centennial on the air soon, SBTV just received a Public Service award for his activity in the Ohio River Flood emergency of January, 1952. If the lack of activity and news reports are an indication, ham activity must be at a standstill in Montana, as only a couple of fellows have been active in news reports since last spring. Traffic: W8TVV 7, W7JDS 6.

OREGON — SCM: J. E. Roden, W7MQ — RKL got his new mobile going on the 20-Ma. band and is quite proud of his first attempt at such a project, as he is a new amateur. RKL has given up hanging for the time being until the newness is worn off his TV set. RQN and SCW are new Novices, recently licensed from Astoria. PAO is TVI-proofing his rig, LQG has just installed a 10-meter mobile, and ORG is making a new rig of his own and tuning it up in the form of a line run through the home. The Civil Defense Director for radio amateurs in Oregon. QY is new EC for Morrow County and is much interested in getting things rolling in that area. Oregon has 127 operators, including 23 promoters. Extremely bad skip conditions have kept ham operators somewhat quiet in this State, except for the reports for last spring. Traffic: W7HDD 120, MJL 39, MQ 14, OLU 11, ADX 10, KJ 9, PL 9.

WASHINGTON — SCM: Laurence Sehring, W7CZS — SBC: BTV, BM: FLX, PAM: NRH. CWN built broadband converter to use in the car for 75. MVT is still rebuilding his rig, ETK got a new rig, 5133 is the final key to a new rig, 5732 was to a new rig, and 5132 has his 10-meter mobile going. AWG has more TVI trouble, also Q8H, trouble. The 10-meter mobile boys in Spokane are QRZ on c.d., and connected with the police department. They have a new HT-40. FWD is running slower speed bulletin at about 16 w.p.m. at 1830 and at 25 w.p.m. at 1845. CTP is back on the air after 17 years' layoff. PUL will come on the air soon. Traffic: W7XIR/2, YMI/2, KAC/2. The station K7UP, the Station Radio Ace Club is preparing to go over the air with the call of 8AAH. Q7 is visiting his son-in-law, N7J, had to go to the hospital. WMTDRL is building a portable rig. PHG has built 10-20-meter beam mounted. JFV/6 is back at the close of QRM. JFV/6 is working with the police department and is planning a hunting trip and checked in to their families each night. JMO and JX9 are helping to put the final touches on the ART-3 of V/2. The Northwest Ham Radio Club had 9 members working with the City Police and four mobiles with the Washington State Patrol. The only casualty was KWCW, who was clipped by a city police motorcycle as he stepped from behind his car and suffered a bruised leg. OOF is back from Korea. PUL is Spokane OBS and Official Code Practice Station. RFP is attending Gonzaga University. LQA passed away Nov. 4th. Pfullhers were GAY, OZZ, JEN, MIR, BRI, and PAX. The Spokane Radio Amateur Club was very active during the evening of Halloween. Traffic: W7IQC 1939, BA 586, FST 367, CXX 260, AWG 180, ETK 178, FST 124, PVY 178, OBO 72, FWD 70, ECU 71, EIT 71, EGH 46, PAM 27, GM 46, JRA 18, PAU 15, NCO 18, EVW 17, NRH 17, AIB 14, EKT 13, APS 11, LQO 9, EBU 8, PUL 8, KIN 7, CWN 5, FTX 6, CAF 5, PEC 5, EKL 2.

PACIFIC DIVISION

NEVADA — SCM: Ray T. Warner, W7JUJ — SBC: HJ, W7OB, ROA, OXX, TJL, YO, LQS, and ZT, OPS: JUO, NBU is the new ARS in the 3-meter net. LQO is a new call heard on 75 meters. QXH, in Reno, is active on 40 meters, c.w. with 75 watts. JQW, of Pioche, left for Montana. SLL of Las Vegas, has his 10-meter mobile built up by Vincenzo. His 13-year-old daughter of SEC HJ, is now W7SNF. EC MBQ is still Henderson for Iron Mountain, Calif. JDL's new QTH is Henderson, LAX. WQY is a new emergency power throughout the S.E.T. Boulder City hams believe they have more ham stations in proportion to their site than any other place in the world, one amateur for every 271 persons. All Boulder City hams are active in the AREC.

(Continued on page 66)
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TRAFFIC: W7JJ 2N, LGS 19, BVZ 2, SXD 8, IJZ 2, K6Y 1, JUN 1, IJU 1, DJQ 1, POG 1, PFM 1, QHH 1, WN7RKE 1, W7FV 1.

SANTA CLARA VALLEY — SCM, Roy C. Couzin, W6LXJ — Your SCM wishes to thank the fellows in this section for two swell years as SCM and now that he has been informed that I am to carry on for another two years I would like to ask you to please get your activities reports in the mail the first of the month so I can formulate the intelligence on a monthly form to send to League Headquarters. I would like to thank Ed Handy for the congratulations and the offer of assistance. The last section-wise we did pretty well. The San Mateo group also did very well. An FB d.o. drill was held in Brisbane Mon. evening, Oct. 27th. MERV was control station at 151 Telehouse; QIE, UTM, MMG, and W6N6FES were 144-Mc. mobile. Club activities included a very fine talk by Dr. Chleo Brunetti on Electronic Miniatrization at the SCM annual meeting the 13th meeting of FCCARA. On Oct. 8th the Monterey Bay Radio Club had the pleasure of hearing Mr. John Hunt from League Headquarters. The SCM had a band session at the first meeting plus opening nominations for officers for the coming year. An auction also was held, which went over very well. At the second meeting the SCM was discussed and nominations were still in order. CAZ reports weekly sked with CYX/KP4 so he can talk to his mother in Mountain View. CBS reports for the last time from this section before settling in Sacramento. HC still manages to keep his fingers in the nets despite a very heavy work schedule. This week: W6YIN 2, HX 25.

EAST BAY — SCM, Ray H. Cornell, W6JZ — The AAREC turned out in full force for the S.E.T. Nov. 11 to 12. Falls local held emergency drills and handled the Red Cross messages from CKO. The Oakland Radio Club station, OT, was fully manned and relayed several hundred of the Red Cross messages to stations throughout the country. The drills pointed out several weaknesses in the section AAREC organization. Plans will be made to correct these weaknesses for next year's contest. AAREC will be present at the November meeting of section officers to be held Nov. 25th. The East Bay Radio Club held a 1946 organizational meeting in Berkeley on Oct. 31st. Invitations to join were sent to every ham in the Berkeley Area and the response was not satisfactory. DNX is the EC for the Berkeley Area. He plans to activate an AAREC net in that Area at once. Other new ECs are ATM Valleso, CAN Napa, FLF Lake County. JUJ has made his 00 appointment and HIX has joined the list with authority. The local ranks as ORS, K. W. McKinney, who is not a licensed ham but is very active in amateur circles, has been appointed Section TVI Chairman. Joe is a hard worker and very capable of carrying on in the respect of the public and hams alike. Congratulations and good luck to all you fellows. The Oakland Radio Club entered a talk and demonstration on testing televisions, the S.E.T. was the October meeting. You fellows who do not belong to a club miss half the fun of being a ham. Why not join one in your vicinity. Write to me in the name of your club if you wish. The CCBG held the October meeting at LGW's QTH in Alamo. Refreshments par excellence were the highlight of the evening. Chief topic was support of proposed legislation for distinctive license plates for hams. BAD is more active than ever, thanks to 1P6 and JOH, our hard-working RMA. Be sure to check 99K at 815 P.M. Mon. through Fri. NIG is Field Day chairman for the NBARA. Joe is an expert, so the NBARA can expect to be in the lead again. This year I truly visited the SRO and the CRTA at Chicago during the week of Oct. 19-26. Through arrangements made with the 99K and 99HF a swell time was enjoyed and until my plane left for home. Midwestern hospitality is of the best. Thanks: (Oct.) K6FAL 507, W5W 183, JOH 146, HIX 04, EJA 4, YDI 2, (Sept.) WJOH 163.

SAN FRANCISCO — SCM, R. P. Czeleiwitzki, W6ATO — Phone JU 7-9501, SEC: NL, Phone 5-6457, Aerea 9EC, BLX. The newly-organized Novice net is meeting regularly every Tues. at 2000 PST on 3720 kc. The 10-meter net continues operation on 29.16 kc, at 1600 PST each Tues. W7KTH has been assigned the call W5RBR and is currently operating on 10 and 75 meters. W8RBE and W6TFPW/W6, wife and husband respectively, are moving to Sacramento. Congratulations to TJD and PKJ, who have just eliminated the "N" from their calls. The Humboldt Amateur Radio Club meets the 2nd and 4th Fri. in YMCA rooms, rear of Municipal Auditorium, entrance on "E" St., Eureka. Many thanks to BME, secretary, and to BLX, for the news. SCM. Congratulations to the newly-elected officials of the San Francisco Radio Club. They are UBV, prez.; GGC, vice-pres.; PCN, sec-y.; Harry Farwell, treas.; and the executive body consists of GCV, NAC, URA, AMH, and WXY. NAC has now attained his Advanced Class license, and George Paylas has received his Novice ticket. Speaking for the TVI committee, sincere thanks are expressed to the SFRG for the donation of $150.00 to purchase a badly-needed New VHF camera. Thank you Vic Zuck for your generosity. The new board of directors of the TVI, who feel that membership in ANY group or organization, are urged to telephone the TVI committee if in need of assistance or advice. The

(Continued on page 29)
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(10 years old) are XYL and son of RHC. MDARC is equipped with 4.5-kw. gas generator for emergency power. The Richmond Club entertained 50 Novices. WNAYD is now a familiar name. Danville Novice, SNH and KX were transferred by CAA to Lynchburg. TXH has joined the Richmond Area. VSN and the second session of VN now are going full blast. KNJ finally fired up after a 13-month absence. FZA was heard by SNH. SNH heard complete VN activities with a b. c. receiver on 1190 ke. while in a motor court QTH, SDR and SNH hit BPL again. TXK has departed for Florida. 1173 is getting geared for that big office come January. Traffic: (Oct.) W4SDK890, SUJ737, JOT205, FT84, FY79, K4FCC 27, W4AMW197, UCW 69, KX7M, CPY 48, UXH9, UXG36, UXH14, UXG37, UXH31, UXJ3, UXG13, UXG24, UXG3, JZG 18, GR 14, IYT 14, KNS 11, SNH 8, SPE 6, RXW 4, IY 4, WBC 2, (Am.) W4WTK.

WEST VIRGINIA — SCM, John T. Steele, W8MCR — Members of the West Virginia Emergency Net did a bang-up job in the recent forest fire emergency in the State. Details as to who participated and the fine job they did are not yet available. However, just as soon as all reports are in full credit will be given to the fellows who were really "in the ball" with their gear and their time in this serious emergency. The help of the hams in and around Southern West Virginia certainly was appreciated by the State Police and the Fire Commission. The Stonewall Jackson ARC held its annual freeze-out at Jackson Mills over the weekend of November 1st. The transmitters were installed and a 300-watt phone was had by all. Those operating were PZT, BWD, GIN, GVR, JZO, UKH, and AAZ, with IES working control on the phone net. JZO and BVH are building 50-Mc. receivers, and SEC, reports working on a new emergency control plan for the State. Traffic: W8PAU 310, GEB 25.

ROCKY MOUNTAIN DIVISION

UTAH — SCM, Floyd L. Binance, W7UTM — It is with real regret that we must accept the resignation of our SEO, JOE, but Jack has to give up the post to devote more time to his work. We will miss Jack but wish to extend thanks for a job well done! All League appointments await applicants. We especially need EC applications from each town in Utah, large or small. TVL now is rebuilt and is on 3.5, 7, and 14-Mc. c.w. 21X/8 puts in an FB signal from El. Poso on 3.6 Mc. The Utah net averages 97 per cent attendance every week — that’s getting close to 100 per cent, fellows! WNTQVO has ticked his TVI and clicks and is getting ready to drop the “N” from his call. Traffic: W7TUM 103.

WYOMING — SCM, A. D. Giddis, W7HNI — The Sheridan Radio Amateur Relay League elected as officers WNTQVS, pres.; CRP, vice-pres.; JMM, secy-treas.; NJP, EC ONZ, code instructor. Plans for the ’53 season include Novice class and an interference committee. JEK is working on 807 and ECO stages and has new whip for his mobile rig. JDS, BUD, SIC, RKB, and HRR are catering to their private work benches and enjoy every minute. KKB is operating mobile rig OK. HLA has new Lyco and no complaint so far. QOW and B4RA are new space-time operators at K7FAO. R2 and R3 signal go everyday. The MWS is on the air when TV ain’t! The Intermountain net on 1615 ke. is worth listening in on even though you can’t work 100.

SOUTHEASTERN DIVISION

ALABAMA — SCM, Dr. Arthur W. Woods, W4GWJ — W4GWJ handled 84 messages during October, with a maximum of 14 stations per session. New Birmingham, W4ARJ, is 3575 ke. From Huntsville comes word of interest in 2-meter connections. Please address queries to KTO, P.O. Box 426, active again, handling many messages to out-of-State points. KIX has a complete battery-operated station in the shack for emergency use. PWS was top man in civilian category for the second period in the MARS Contest and will receive his choice of two radio courses. BFM is one of the few versatile stations with "phone and cw" nets, and consistently submits activate reports in addition. Traffic: W4PPB 84, R7X 78, BFM 55, QJW 11.

EASTERN FLORIDA — SCM, John W. Hollier, jr., W4PZW — The big news for October was the fine bit of operating turned in by RWM on the British Ketch Motor mailboat. Working with RWM were WS, DRE, OIL, KAI, MV, PYE, KG2, MBF, LQG, ACH, CYV, JG, ROD, RGF, QDA, YTM, MNP, DLS, KVJ, and SKX. Thanks for showing the Coast Guard and press that ham radio still has its serious side. Gainesville: Gator Club officers are SMK, TAD, SXV, WEG, and CKB. At the University also are RVU, WHY, RVN, OAT, JLR, UXG, UXH, OUG, OMO, NOV, OGR, TGU, WN4WBM, WITPU, and CE3BO. The Club call is 1LFU, KDF, UXW, and OXK are using handy-talkies on the campus. Clewiston: PUK makes HPL again. Garton had a nice 7000-mile tour in the Middle West calling on 56 hams in 15 states. Daytona Beach: TNE has dropped the "N" from his call. RWM now is an OAS. Deland: WS reports seven 144-Mc. stations in Deland. Miami: IYT is working on small emergency units for 3.5 and 7 Mc. St. Petersburg: EYT has a network test along with some good (Continued on page 98)
Harvey

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(Continued on page 98)
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hugged a new battery for the club station (T1)? LVO did a
nice job on the B.E.T.; BRY now is Class A. Thanks, "jca.
NTN says that he, OSC, IZO, and QW now are Class A.
For FYW; WNWZ8B is BRY's jr. operator; OJX (12-year
old) is an FB e.w. man; and EDQ completely "COOz-
ized." T1ZZ reports that the Mission Trail 2-meter traffic net,
QI-NC is going great guns nightly on 145.080 at 1930.
CBO is opening gremtine in the 2-meter all-out network.
COZ gives with: MQU is on 10 meters with new 807 rux;
CIS has a new horn for 10 meters; EFZX now is using
s.a.s.b., and FTH is de-TVLing. According to VICKY, the
new station on 160 meters includes QYB, CWS, RUX, VQI, TPF,
QTY, and YRA. YCP reports he has hand-powered portable
and new Elmac mobile; ORO and ORV have a new jr.
operator; QTC has a hot new horn on 20 meters.
BKOY put in a ROFO for PQS, who has been hospitalized for
too-o-o long. Ursus, MNC, HO is back on 75 meters, as
UQV is sporting a new HRO-80. HK put in 319 hours during
the month handling traffic! ICW is "requesting" a
buffering buffer. LKF reports rebuilding Z0J (club radio). It's
nice to hear HOV on 75 again. That znl, WITL, really
handles traffic on 75. Thanks, m's men, for the rest of
the reports, but how about more NWKS? When the blank
space in the report card isn't filled in (as we were too-thirds
of the reports), the netmaster (and net) has no way of know-
ing what you are doing. AREC Notes: Glen Area (VUCN,
EC) coordinated drills with all city services and is building
control center in Mid-Cities (DCB, EC). This big net has five
active control centers in as many cities. Daylight (ONT,
EC): Check-ins are invited, noon Thurs. on 145.8 Mc., a
two-meter netting the Centinella Valley (QJEC). New all-
net control station is being built at Inglewood City Hall, Whitt-
(ONT, BLY, EC): Took auxiliary policemen in mobiles to
parade on Halloween; officials were surprised when they
starting a code class to get in the ham game! A new member
is KTF, ex-EC for Honolulu, San Luis Obispo (LKF, EC):
Because of terrain all operation is on 75 and 10 meters.
Long Beach (NSX, EC): The accent is on mobiles. The big
net is operated in a very business-like fashion on 10 and 2
meters. San Bernardino (HED, EC): Both 10- and 2-meter
segments are very active with good folk in long-walled
traffic nets. IARC station HGV (CBS, EC): These boys are
always on deck when needed and have put up 10- and 2-
segments. Crescent Bay (ZFA, EC): There are heavy weekly
drill turnouts on 10 and 2 meters. They are setting up for
75 meters and participate in all local hospital, etc., denomina-
tions' activities, and what publicity! Ventura (DUY, EC): Mostly
mobile, control stations are auxiliary powered on 2; outlets on
75 meters. Ojai Valley (WVT, EC): Very active on 75,
they are experimenting with u.h.f.; 50 per cent mobilizes.
Among those reporting were BRK, QLY, CXL, EPL, GEB,
GOS, REX, NCO, WOO, and WHT. VQI: 3123, GYH 1019,
HK 701, VHN 284, FMG 223, ESR 189, JQW 171, JQK 129,
QIU 129, WTV 118, WTV 118, TV 75, HLY 68, YF 62,
FMS 61, FYW 48, FYW 48, HTV 34, NTN 26, CMN 25,
NCA 25, HLCZ 22, COZ 18, HIF 16, COB 13,
COF 9, LDR 9, JQK 6, LVQ 4, GHC 3, ONI 1, QZ 4,
QR 1, QSY 1, QCO 1, QSP 1, QSP 1. Arizona—SCM:
Albert Steinbrocher, W7LVR—Asst. SCM: Kenneth P.
Cole, QZQH; Dr. John A. Stewart, 7Z9, SEC; OIF, RM, JGZ,
Arizona: ARIZONA: SCM: John P. Noonan, W7THU;
Fri., 8 P.M., 33615 ke, Phoenix Net: Tues., Thurs., 7 P.M.,
29 Mc. Tucson Net: Thurs., 8:30 P.M. Arizona: ARIZ.
Wed., 7:30P.M., 3865 ke, Arizona 875; WYQ: Thurs., 7:30P.M.,
August 3, 765 ke, Arizona 367; Nightly, 71. Arizona
MARS: Tues., Thurs., 9 P.M., 4025 ke. Announcing
new Arizona Restricted Special, Wed., 7:30P.M.,
3360 ke, Arizona 91; LAD, LLO, LQB, OIF, PLM, PMD,
QHT, QTO, QZQH, QZ, and RYO. The Red Cross was very
much pleased with the late in which the messages were sup-
patched and sent. Send thanks to all participants. The
Arizona G.W. Party saw 20 active stations, including 12
Novices, WNTST is out of the loop, and is getting ready for
the Early Bird Net, GYK got a free trip to Europe, N22 is
building a thorn, QZQH worked KB8 on 75-meter
phone. PBR is building a tripe of 75's. Month: LZX
worked 80-meter cw and received television on some
antenna simultaneously. NP is in the Army. N22 now is on
80, 20, and 15. The two DXers: LZX, MAIC, New Commercial: PMD. New Arizona Net Stations:
MWD, MLI, MZQ, OIF, QMB, New MARS stations:
PLM, LCY, NMJ, QCO, EQV, TF, W7FQ, W7FQ, W7FQ
110, LAD 41, PZ 24, LVR 22, QFQ 22, PLM 21,
MLJ 8.
San Diego—Acting SCM, Thomas H. Wells,
WG6WU—Asst. SCM: Shelley E. Trotter, KBAM; Rich-
ard F. Hultschen, 6DLN; Rm: IZG, SEC: SK; ECs:
DEY, FOP. Within the month a new QSB arrangement
was made to FJH, who very promptly rewarded us with a fine
report from the Ecsandia gape, the very high School Club,
and the Palomar Club. FJH is an instructor at the
school and as organizer of student home obtained IAC for
them back in 1550. He found rough going until the Novices
swelled the rolls to an even doz. The station runs
50 watts on 80 meters and holds daily skeds. They have
joint meetings with the Palomar Club and the 4th Ward
of our meet. IAC also is headquarters for a new ed. net
during (Continued on page 100)
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184 | .04 | 6SN7GT | .05 | $1.55
184 | .04 | 6SN7GT | .05 | $2.75
354 | .05 | 12AT7 | .15 | $1.75
354T | .05 | 12AT7 | .36 | $1.75
354G | .05 | 12AT7 | .36 | $3.95
316G | .45 | 12AT7 | $4.50

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99
the grape valley on 3702 kc. The net has rocks for all members and KGC has supplied them with QN signal sheets. KGC has 150 watts on 20 meters, 10 meters, 15 meters, and reports hearing IAW every FB on 40 and 20 meters for His OBS material. AKY now is Class A and is making with signals on 75 meters. LBV is drooling over a new receiver, IC is trying his hand on 420 Mc, and will get lots of help from the old masters, BOS and ICF. GDG is back from Michigan with a new car. Legion Net, this note. One of the popular signals on 75 meters is a chess game with 3RNH 6, 5K is on an enviable elk-hunt trip to Montana. What’s this about AKY that makes the writer want to go to San Diego to make a good business connection in L.A.? IZG is in again with BPL, but says he has to give up his 5KI appointment. Very poorly. ICF has a total of 1.5 IAI. LBV has dropped out of BPL in a big way with 5026 for a total. CHV had a total of 4 with activity curtailed because of the big power transformer going West. Traffic: W6LBD 6526, YDK 781, IZG 504, ICF 15, CHV 4.

WEST GULF DIVISION

NORHERN TEXAS — SCM, William J. Grouty, W5GFY- SEC; JQG, RM; QHG, FAM; IQH, FAM. Bill Green has done a nice job as SCM and I am sure the members would like him to extend him a vote of thanks. A job well done. BPL cards have been issued to SCM and TFB. Congratulations! QDF now is on Guam and will be there for several months. On Oct. 18th and 19th the South Florida Amateur Radio Club held its Annual dinner with more than 100 members attended from Oklahoma, New Mexico, and Texas. Mr. Carlos Dadd, NUX, staff photographer of the Civil Defense Administration, Regional Office at Dallas, Tex., gave a most enjoyable talk and pictures on civil defense work. Mr. Dadd outlined the plan of RACES, and pointed out the mistakes made. He was chairman and did a fine job. VYY is only 11 years old and a good operator. I will need your traffic and activity reports on time. Your cooperation will be appreciated.


OKLAHOMA — SCM, Jesse M. Langford, W5GVY — SEC; AGM, RM; QOG, FAMM; G2K and ATJ, October provided the Oklahoma hams with another excellent public service. There was no big news and no traffic taking place at this time, Lawrence City, JQG was chairman and did a fine job. VYY is only 11 years old and a good operator. I will need your traffic and activity reports on time. Your cooperation will be appreciated.

Traffic: W5GZR 159, ROZ 137, MRK 121, BJY 119, SWJ 92, MFJ 82, PA 39, EFB 29, MEV 27, GVR 25, QAC 25, QOD 23, KY 22, PML 19, EHC 8, ADG 6, LG 5, BAR 4, RST 4.

SOUTHERN TEXAS — SCM, Dr. Charles Forlumaghis, W6JFP — EYV has returned from a vacation in Virginia. NTY reports that he has started live prospective hams on regular study for a ticket. SCM, the Communications Officer for TSGRC, your SCM has started a Novice radio school for 30 students, with Capt. Farrel and Lt. Fry as chief instructors. IPO still is busy getting new and flying into Houston, UJN, in Texas City, is vice-president and program director of the new Galveston County ARC, with FV, Pryor, KDG, go to LK, 40 and 80 meters and is TVI-proofing the rig. Hams in Texas City now include W5RNQ V5X, W5V, W5V, WVB, and Y3L. UJN now is 00 class and has 600 contacts with 11 watts. UGQ recently passed away. F3X worked VP706 for 150 countries and worked 142 confirmed. QOY visited him during the week. MN is busy with H&I every A.M. on 7150 kc. UBN is working to get a REC activities going around.

RCA: Reports FMT has his General license. W5YTM now has his Tech. class license. K5WAC, the main station post of the small-aunt-wich and guided missile school, works all ARS. FXTN, every FB, 40 and 150 MHz 14,255 kc; K5 TX-Olden, 3900 kc. At 1630 MSt. QPA reports the South Texas Traffic Net is going good. The Brazoria County Amateur Radio Club is coming along PB. UMY, some of the BCARC reports Novices are W50, WTX, VFS, FVR, and Jimmie Seibert. UEP is operating from Channel 18 near La Marque. U6P is operating portable in Houston from Rice. VDE is on 40-meter c.w. and 10-meter

(Continued on page 108)
"Sideband" is sweeping the country... progressive amateurs are going SSSC by the hundreds... and one night spent in listening to a "sideband" QSO will impress you with the terrific "punch" carried by this method of operation—voice control, fast break-in, no heterodynes, the sharpness of tuning... it really "gets the signal through".

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- ★ Built-in stable VFO, with voltage regulation.
- ★ Carrier injection to receiver antenna terminals... tune in SSSC signals the same as AM, no other gadgets necessary.
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- ★ Carrier injection to transmitter available for working single sideband WITH CARRIER, for tune-up adjustments, or CW.

★ 10 watts output, with additional 807 socket for higher power operation.

★ Handsome grey crackle cabinet, chrome trimmed, 20½" x 12½" x 12". Complete with 12 tubes, including one 807, operating manual............................. $245.00

Frequency conversion mixer for 20 meters, rack mtg. 3½" x 12½".......................... 45.00

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A partial list of enthusiastic SS-75 users includes W13Ba, 18GA, 1NSP, 4AYF, 4CM, 4PAV, 8AV, 8F WT, S5YJ, 8JU, 8JL, 8WHE, 9ARK, 9ELK, 9G5E. (Refer to By Goodman's article on page 42 Dec. 1952 QST)

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500 V. D.C.

Triple 8 mfd. 500 volt D.C. all-filled condenser, common negative, solder terminals, hermetically sealed, 5½" x 3½" x 2¼".................... $1.95

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Standard plug with 6 ft. rubber, 2-wire cord with spade lugs............... 85¢

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101
phone and is finishing a kw. final. EKO works 10-meter phone when neighbors and conditions permit. H. R. Atkinson recently passed his Novice Class exam. ARAI National Convention—Shamrock Hotel—Houston, July 10-11-12, 1953. Registration fee $13.50. Watch for details in local W5FF. General Chairman, FHE is mobile on 75 meters with 35 watts to a 2625, also a twelve-element rotary on 2 meters. PED is the club station at Tex. Southern U. with 260 watts on 75 meters and 300 watts on 10 meters with four-element beam. HUG is on 20 meters with 300 watts to an 855. FEP also is on 70-meter mobile. GWS is operating with both mobile and fixed on 75 meters. HJS has a 50-watt peanut whistle on 40-meter c.w. MXD is operating 10-meter phone mobile. QBE is mobile on 75 meters with 155 watts. Elmaric he is on 20 and 75 meters with a Viking. QLE is on 75 meters with an AT-9. OYP has TVI helped with 300 watts on 80 meters to n.p. Y51T. Traffic: K5IPC, K5WAC 1100, WSMN 387, QFA 68, FJF 35, NY14, OYP 14, FXN 8, ULN 2.

CANADA MARITIME DIVISION

MARITIME—SCM, A. M. Crowell, VE1DQ—SCC; FQ, RM: OM, EC: EK. Several of the local boys handed emergency traffic with Sable Island in October. AWA has moved to Hamilton this month. QG says he is still chasing the DX on 7 and 14 Mc. DGQ acquired a Panadapter. EK has a new 813 final ready for action. FQ is keeping busy with W8VSE and the new car. ECQ is on 37.5-14 Mc. oxo, mostly because of R.C.I. N.S. has been active on 3.8 Mc. with skeds with other boys. L.Y. DC, IC, and LZ have been active in the local net. NN is the new local R.C.N. Club station active on 11.4 Mc. Phone. OM reports some activity on the M.T.N. TA is doing some converting to neod. TA-41, GM has a new Collins 75A-1. Late report from VO via VOID.

ONTARIO DIVISION

ONTARIO—SCM, G. Eric Farquhar, VE3LA—Welcome to the newly-formed ham club in Kapuskasing, with the following officers: DIM, pres.: BAE, vice-pres.: AVS, secy.-treas. VSYF, on a visit to Kapuskasing, spotted on his two-year stretch in the North and showed very fine color slides. AVS enjoyed the UD Party. Sympathy is extended to OJ on the loss of his father and has RYM on the passing of his mother. ADN and CP are members of Detroit Civil Defense. VJ was visited by W5STY. WYF is reported to have knocked off DX and is back on 3.5 Mc. Mr. Toronto 8EC is still in Canada with 14 mobiles in operation. G1's new QTH is in Westboro. BHE is mobile with W2-Land on 2 meters. The Quinte Radio Club held its annual banquet in October with lots of OMs and XYLs in attendance. DSQ is quite active in nets. VD says his operating is confined to weekend. While on a hunting trip, CP spends his time with home via ham radio through DW2J. CU and his XYL are due back. Hamilton Clubs' new officers are DQZ, vice-pres.; ZY, vice-pres.; WE, secy.; BV, treas. During the meeting Brig. P. S. Todd, Director of Civil Defense, delivered a very instructive talk on what Civil Defense means, and outlined the great amount of work involved in making the operation a success. Congrat on the Hamilton Club on its achievement during this year's Field Day. By the time this item is in print, the lovely Field Day trophy of the Canadian Marconi Company will have been presented to MASC, which is the initial winner of this "Annual Competition" cup. On behalf of Canadian hams we may also say thanks for the spirit shown by the donor. Traffic: VE3ATB 230, BUR 172, WY 146, IA 88, KAV 68, BJY 56, GH 24, EAU 20, CP 19, BAF 6, AUU 1.

QUEBEC DIVISION

QUEBEC—SCM, Gordon A. Lynn, VE2GL—BK reports his activity is confined to mobile work. EK55 has gone mobile also with a Gooset transmitter and Sonar receiver on 75 meters. KG has renewed winter skeds for OBS, and now has a complete 90-element rhombic. MK1 is operating transmitter-receiver, dynamotor battery, and gas engine. AIO is still completing his new receiver but occasionally finds time to be on the air. NF's DX finds it very slow and hard to come by. EC, AEM, AGU, AGR, VE, and APE keep daily skeds on 75 and 2 meters. ASK is a newcomer in LaPoupee, with 300 watts on 75-meter c.w., and reports into the St. Maurice Valley Net. WW reported his 540-1 long wire was up again. ZZ has changed QTH and is now operating a wire at new location. BV also has changed QTH and is gradually getting the gear assembled (Continued on page 104)
Elmac 50 Watt Transmitter

NOW IN STOCK!
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For use on amateur or on auto or home broadcast set. Super-imposition tuning and 1 mc output. 12 doubles bandspread, special tuning and avoids intermod. Frequency and audio station outputs 2 meter band. 50 ohm coaxial input, easily adapted for use with open wire line or 300 ohm ribbon. High frequency and audio output C.A.P. Receivers. Receive Directly 100-150 kHz. 40, 47, 50, 60, 66. Gray case measures 8 1/4 x 8 1/4 x 5 1/4". Supplied with tubes, cables and instructions. Ship. wt. 4 lbs.

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VEE-D-X MODEL "ULTRA-Q-TEE"—The world's first all-channel TV antenna covering existing channels 2-13 and all projected channels on UHF. Be ready for UHF TV when it comes to your area! Eliminates need for separate UHF antenna and antenna-switching! Preassembled; requires only a single lead-in line. Includes two (round) filters for VHF channel separation; large (rectangular) 6-section printed circuit filter for UHF channel separation—all filters mount on antenna. Complete, least mast. List price $14.25.

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36-8400 TV-101—Net $31.24

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Harmonic Radiation

(Continued from page 18)

to come up with data on a super signal squirter with a high "front-to-bottom" ratio.

There are probably other tricks that expediency will bring forth. Building a new house with all components designed to obviate metallic contacts might be the ultimate, but that would be the last resort! The number of amateurs that would go to such an extreme is limited. As a matter of fact, the number that will experience nonlinear system difficulties may be very small.

It is difficult to predict, from the meager statistics available, what the trend will be. A few stations have had one or more proven cases. A favorable number have apparently had no difficulties. A group of unknown size having partially TVI-proofed transmitters may or may not know that they are having nonlinear system difficulties. And a happy-go-lucky gang, the boys who start activities after the last local television station lowers its flag for the night and plays the "Star-Spangled Banner," may never know!

4-Tube Superhet

(Continued from page 84)

nal you used was at 3650 kc., you know that the first 100-kc. harmonic you hear on the high-frequency side will be 3700 kc., and the first one on the low side will be 3600 kc. The second harmonic of the 3650-kc. signal will furnish a check point at 7300 kc. (2 × 3650), so swinging C2 to about 1/4 meshed (where it will peak the 7-Mc. signals) will allow you to locate the 7-Mc. points. Thus you will have 100-kc. intervals on the dial from 3.5 to 4.0 Mc. and from 6.9 to 7.4 Mc., but not necessarily coinciding. To make them coincide, some slight retuning of the 100-kc. transformers is required. If, for example, the 7.0-Mc. point occurs to the right of the 3.9-Mc. point, the 100-kc. amplifier is tuned low, and the slugs should be turned out slightly. A few trials will bring the circuits to where you want them.

Now is a good time to check the regeneration of the detector, so connect the lead from Pin 5 of the detector to D on T2. You may hear a steady beat, indicating that the detector is oscillating, so tune both circuits of T2 and see if they will kill the oscillation. Their action is to load the regenerative detector to where it won't oscillate — if the action persists, try a 4700-ohm resistor at R13 as a last resort. These circuits should be peaked on a modulated signal, with the b.f.o. turned off.

If this all sounds tricky, it really isn't, and you will find that the regenerative detector can be made to behave quite nicely. After the detector has been made regenerative, the calibration can again be checked as in the preceding paragraph, and any minor changes in tuning made as are found necessary. Once the 100-kc. circuits have

(Continued on page 110)
UNCLE SAM RELYS UPON . . . HAMS PREFER WRL TRANSMITTERS!

That's right fellows. The U.S. Air Force and Signal Corps are buying WRL Globe King and Globe Champion transmitters because they know they can depend upon their accurate, split-second performance.

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Says Jerry Armstrong, 2738 N. 49th St., Omaha, Nebr. Here are some excerpts from Jerry's letter:

"I have had my Globe King Transmitter for 2½ years. I get out with it every night despite heavy QRK, and have QSL cards from all over the world showing excellent contacts. There are 8 TV sets within a quarter block but no one has trouble with TVI even though I use a ground plane vertical antenna. Dollar for dollar, I feel that the Globe King is the ham's best buy."

—Signed/ Jerry Armstrong

NEW WRL 400-WATTS Phone-CW GLOBE KING XMTR
KIT FORM WIRED-TESTED $475.00 $495.00
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THE WRL GLOBE SCOUT
(50 WATTS PHONE — CW)
The WRL GLOBE SCOUT is the latest triumph of the WRL engineering staff. It is a beautiful, compact XMTR, completely self-contained, including power supply — 8H X 14 1/2W X 8 1/2D. Contains new 6L46 tube in final; covers 160 thru 10M. Metering provided for final grid and final plate circuits. Complete kit includes all parts, chassis, panel, power supply, cabinet tubes, meter and one set of coils. Can be used for mobile work with suitable power supply. (Auxiliary socket provided.) An ideal XMTR for the novice or the experienced ham.

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7064-7095 K.C.
7162-7425 K.C.
79¢
each
while
they
last

5675-6975 K.C.
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8000-8650 (in 25 K.C. Jumps)

All crystals mounted in FT-243 holders and checked for activity before shipment. Crystals will only be furnished within the range of frequencies shown above. Will furnish as close to desired frequency as possible. When these are gone, no more available:

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City __________________ State __________________

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been aligned they can be left alone, and if the 3.5- and 4.0-Mc. points don’t come where you want them on the tuning dial, a slight adjustment of $C_3$ will correct it. You can steal a little more bandspread by using only 22 turns at $L_3$, but we suggest doing this only after you are completely familiar with the receiver.

**Antenna Coupling**

You are now on the 1-yard line ready for a touchdown, and all that is left is to familiarize yourself with the handling of the receiver. Since no antenna input circuit has ever been devised that will handle all types of antennas equally well, it is wise to see what yours is doing to the receiver. To this end, we suggest connecting a 140-$\mu$fard. variable in series with the antenna post, to provide for variation in coupling. On 60 meters, peak $C_3$ on noise or a signal and lock the adjustment slug of $L_1$. If it tunes fairly sharp, your antenna coupling is not too tight and you are OK on that band. Swing $C_4$ out until you are listening on 40 (to noise or a signal) and again rock the slug on $L_3$. If it tunes broad, reduce the capacity of the 140-$\mu$fard. antenna condenser until the tuning slug of $L_1$ shows a definite peak. While this 140-$\mu$fard. variable antenna coupling condenser may not be necessary in some cases, it is wise to try its effect if you want to get the most from the receiver. By noting the settings of the condenser for the two bands, it is no trick to swing it to one or the other of these settings as you swing $C_2$.

The input condenser, $C_5$, will tune sharply on either band, and it should always be peaked when listening to a weak signal. Detuning it slightly will attenuate abnormally loud signals, but you should always be able to handle these with $R_{10}$ and $R_{16}$, unless the signal is from a ham next door.

**General**

The single-signal effect on c.w. will depend upon the degree of regeneration you have in the detector and the setting of the b.f.o. Setting the b.f.o. to give a low beat note will not permit as much single-signal effect as will setting it higher, of course. If your headphones have a peak at some frequency (and most of them do), you may want to set the beat note to coincide with this peak.

With no antenna connected to the receiver and with the b.f.o. on, you will run across a few weak signals across the dial. These tune faster than a normal signal and do not peak with the setting of $C_3$. They are caused by the second harmonic of the 5-Mc. oscillator beating with the 7th harmonic of the 1600-ke. crystal, and fall at 3850 and 4000 ke, on the tuning dial (if your 1600-ke. crystal is exactly 1600 ke). They won’t bother you in practical operation, but they are mentioned so that you will recognize them. More selectivity at 1700 ke. would probably reduce them, but it would also result in a more complicated receiver.

The single-signal effect reverses between the two bands, of course. In other words, if the b.f.o. is set up so that tuning toward a higher frequency

(Continued on page 118)
Happy New Year

Megathanks!
... for the FB Ham and Industrial business you have been sending me — It certainly is appreciated!
I hope you had a real Merry Christmas, and that your New Year will be the best ever!
73, Bill Harrison W2AVA

Start the New Year Right with Top Gear from HARRISON’S HAM HEADQUARTERS

(Top Left) LATEST GONSET "SUPER 6" AMATEUR CONVERTER
Covers 10, 11, 15, 20, 40 and 75 meter phone bands with plenty of bandwidth.
Also 49 and 19 meter SW broadcast bands. With tubes $82.50

(Center Top) NEW SONAR BANDSWITCHING TRANSMITTER (SRT-120)
Completely TVI suppressed, 100 watts phone, 120 watts CW, Bandswitching 80, 75, 40, 20, 15, 10 or 11 meters. Provision for VFO or crystals. Requires 6.3V @ 0.44A, 400 V, DC @ 350 mA. With tubes $198.50

(Top Right) LATEST GONSET 2-METER "COMMUNICATOR"
Complete 2-way station for mobile or fixed use. Superhet receiver and built-in noise clipper, 15 watts input. Crystal or carbon mike. Built-in speaker and 10" whip.

(Low) LATEST HALLICRAFTERS HT-20 TRANSMITTER
TVI-suppressed, 115 watts CW or 100 watts AM phone. 1.7 to 30 mc continuous bandswitching coverage. Completely shielded and filtered. For 117V, 60 cycles AC. With tubes $189.50

(Lower Left) FAMOUS HAMMARLUND HQ-129-X RECEIVER
Continuous coverage from 540 to 31 mc in 6 bands. Bandspread on 80, 40, 20 and 10 meter bands. With tubes $449.50

(Lower Right) NEW NATIONAL HRO-60 RECEIVER
Dual conversion above 7 mc. second IF of three 4.56 kc stages with 12 permeability tuned circuits. current regulated heaters in HRO and mixer. PLUS other exclusive features. Less Speaker $239.50

ORDER TODAY!
Literature on any of the above units available on request. No charge. Remember . . . Harrison Has It!

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on 80 meters brings you through the signal and out weakly on the other side of zero beat, tuning toward a higher frequency on 40 will bring you weakly down to zero beat and out loud on the other side.

The power-supply requirements for the receiver are slight: about 15 ma. at 250 volts and 25 ma. at 105. A power supply with 60-ma. rating will take care of this and the additional 10 or 12 ma. for a VR-105. Fig. 4 shows a suggested circuit.

V.H.F. Receiver Design

(Continued from page 41)

Many of the newer crop of double-conversion receivers have selectivity that was impossible heretofore. With them, and a good v.h.f. converter, we can dig down into the noise level in a way that we never could before—if we will take advantage of the possibilities that c.w. operation affords.

You Can't Work 'Em If You Can't Hold 'Em

High selectivity is great stuff—but you don’t get that boost in signal-to-noise ratio for nothing. When you start thinking of bandwidth in cycles, you come up against stability problems. A wandering oscillator doesn’t cause much trouble when the i.f. bandwidth is 50 kc. or so, but to use selectivity effectively the converter oscillator has got to stay put.

This rules out tunable oscillators for the average v.h.f. man, so we turn to crystal-controlled injection sources. A crystal-controlled converter is nice to have, even on 28 Mc. It is more of a pleasure on 50 Mc. At 144, 220 or 420 Mc., it becomes a necessity for narrow-band work. Fortunately, crystal control in the converter is not difficult. Even for 420 Mc., two dual triodes and a low-cost crystal will provide enough energy in the vicinity of 380 Mc. to replace a one-tube oscillator covering the same frequency.

And what a difference!—420-Mc. signals received on a crystal-controlled converter tune in as easily as a signal on 7 Mc., and c.w. is just as practical. No more holding one’s breath, or tuning signals in and out by waving the hands a foot or two away from the receiver. It is no exaggeration to say that the general move to crystal-controlled reception at 144 Mc. and higher in late years has been one of the most potent factors in demonstrating the utility of these bands for amateur communication.

FEED-BACK

In the coil table for the Coffee-Can Receiver on page 40 of the November issue, the form diameter was inadvertently omitted. This should be 7/8 inch.

The “Push-Pull 6146s at 144 Mc.” amplifier chassis specified on page 13, November QST, should measure 5 by 10 by 3 inches rather than 5 by 7 by 3.
Start The New Year RIGHT
..AND START RIGHT IN HAM RADIO THIS EASY WAY!

MY FRIENDS AND I ARE GONNA TAKE THE NOVICE EXAM TOMORROW, OLE TIMER!

WELL, JUNIOR, TO GET STARTED RIGHT YOU SHOULD WRITE TO Walter Ashe FOR HIS FREE LIST OF GOOD USED HAM GEAR, AND LATEST CATALOG!

HALLCRAFTERS Model 5-38C Receiver. Shpg. wt. 14 lbs. Only $49.50

PHILMORE Model 7001-C Broadcast and Shortwave Receiver Kit. 2 tubes plus rect. Complete less tubes. Only $11.75

MEISSNER Model 2-CW Novice Transmitter Kit. Only $24.45

NATIONAL Model SW-54 Receiver. Shpg. wt. 10 lbs. Only $49.95

PHILMORE Model 7001-B Broadcast Receiver Kit. One tube plus rect. Complete less tubes. Only $7.35

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□ Rush "Surprise" Trade-In Allowance on my used (indicate make and model)
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City Zone State

Walter Ashe
RADIO CO.
1125 PINE ST. • ST. LOUIS 1, MO.
Coffee-Can Rig
(Continued from page 53)
are lined up, one behind the other, to the left of the coffee can. To the left of the 6V6 at the rear — the buffer-doubler — is the socket for L2 and then the 6L6. The socket for the output coil, L3, is in front of the 6L6. These sockets are flush-mounted with clearance holes in the base for the prongs. The two tuning condensers, C13 and C18, are mounted from the Predwood base on brackets in front of the two coil sockets. Their shafts, which extend through large clearance holes in the panel, are fitted with well-insulated knobs having recessed set screws, since the shafts are at plate voltage above ground. The two meters are mounted on the panel, above these controls.

With C3 set near maximum capacitance, C5 should be adjusted until the oscillator frequency is set at 3500 kc. Then C2 should cover the band. When the coil is plugged in at L2, C13 should be tuned to resonance as indicated by the usual dip in plate current. This should occur with the condenser at somewhat less than half maximum capacitance.

With the power supply shown, the minimum unloaded plate current to the final amplifier should run about 15 ma, except when doubling. In the latter case, it will run about 30 milliamperes. Using a conventional antenna tuner, the output stage may be loaded until the plate current at resonance is about 100 milliamperes. So long as T2 has a current rating of at least 75 ma., I have not found the use of voltage-regulator tubes necessary.

When the amplifier alone is keyed, a toggle switch connected across a telephone plug inserted in J1 may be used to switch the oscillator off while receiving.

Radioelectype Converter
(Continued from page 40)
present on the grid will result in the flow of grid current and will bias this grid to plate-current cut-off. The plate voltage rises from 15 volts to 50 volts and the series-connected neon lamp fires. This results in the application of about 25 volts of positive bias to one half of the 6SN7 polar-relay-keyer tube. This half of the tube draws 20 ma. of plate current and develops 20 volts of bias across the common 1000-ohm cathode resistor, R13. This voltage results in plate-current cut-off in the second half of the 6SN7 tube. A spacing frequency will cause the second half of the 6SL7 detector to function in the same manner and result in plate-current flow in the second half of the 6SN7 keyer tube.

The 6C5 tube is used in a Hartley oscillator circuit adjusted to oscillate at either the marking frequency of 2125 cycles or the spacing frequency of 2975 cycles, depending upon the action of the printer keyboard contacts. The output of this oscillator is used to drive the amplitude modu-

(Continued on page 116)
to the E.E. or PHYSICS GRADUATE

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RESEARCH AND DEVELOPMENT LABORATORIES
Engineering Personnel Department
CULVER CITY, LOS ANGELES COUNTY, CALIFORNIA

Assurance is required that relocation of the applicant will not cause disruption of an urgent military project.
lator of the transmitter. The power-supply requirements are very nominal and no explanation of the circuit is required.

Fig. 2 shows a plot of the polar-relay keying-tube plate currents, as indicated by the zero-center meter, as a function of the input frequency to the converter. The differential current falls to zero at the frequencies between 2400 and 2660 cycles because of the switching action of the series-connected neon lamps. The converter can be constructed without using neon lamps as switches; however, an increase in the transition time between marking and spacing impulses may result.

Circuit Adjustment

The adjustments required to put this equipment into operating condition are very few. The noise output of the radio receiver, with the antenna disconnected, is fed into the input of the converter and the potentiometer, $R_{14}$, is adjusted until the meter is approximately centered on zero. When a marking signal of 2125 cycles is then applied to the input, the meter should deflect to the left and $L_3$ should be adjusted for maximum deviation. With a spacing signal of 2975 cycles applied, the meter should deflect to the right and $L_4$ should be adjusted for maximum reading of the meter in this direction. The deflections should be approximately equal for either a marking or spacing signal. If the readings differ by a large amount, it indicates that the 6SN7 tube may not have equal cathode-emission capabilities and should be replaced.

The a.f. oscillator can be adjusted to the correct frequencies by first adjusting the core in $L_3$ with the keyboard contacts open. The core is adjusted to give 2975-cycle output from the oscillator circuit. The contacts are closed and $C_1$ is adjusted until the frequency output from the oscillator is 2125 cycles. A recheck can be made of the spacing, and then the marking frequencies, and the adjustments retouched to eliminate the small errors caused by the slight interlocking of the adjustments. $C_1$ should be varied in steps of approximately 500 to 1000 $\mu$F. The frequencies of 2975 and 2125 cycles are nominal and may vary within ±50 cycles without affecting operation. The a.f.s.k.-oscillator output can now be fed into the converter input, and the printer should be capable of a local operational test by printing correctly. If the machine runs open, the indication is that at some point in the circuit a crossover has occurred. A simple cure for this difficulty is a reversal of the connections to the windings of the polar relay.

Single-Selector Printers

This converter is designed for use with a Teletype Corporation Model 12 printer, with which an external power supply is required for the printer selector magnets. Anyone fortunate enough to have a Model 15, or any other printer which has a single selector magnet, can modify the converter described above so as to enable it to be used with these printers directly, thus
BUY TEST EQUIPMENT ON THIS RADICALLY NEW TIME PAYMENT PLAN
NO INTEREST!! - NO CARRYING CHARGES!!

USE CONVENIENT TIME PAYMENT ORDER BLANK BELOW

Superior's New Model TV-11 TUBE TESTER
- Uses the new self-cleaning Lever Action Switches for individual element testing. Because all elements are numbered according to pin number in the RMA base numbering system, the user can instantly identify which element is under test. Tubes having tapped elements and/or with filament terminating in more than one pin are safely tested with the Model TV-11 as any of the pins may be placed in the neutral position when necessary. - Uses no combination type sockets, instead there is a provision for each type of tube. Thus, it is impossible to damage a tube by inserting it in the wrong socket. - Free-moving built-in roll chart provides complete data for all tubes. - Photo Jack on front panel for plugging in either phones or external amplifier detects microphonic tubes or noise due to faulty elements and loose external connections.

Operates on 105-130 Volt 60 Cycle A.C. Hand-rubbed oak cabinet complete with portable cover $47.50

Superior's New Model 670-A SUPER-METER
A COMBINATION VOLT-OHM MILLIAMMETER PLUS CAPACITY REACTANCE AND DECIBEL MEASUREMENTS

SPECIFICATIONS:
D.C. VOLTS: 0 to 7.5/15/75/150/750/5,000 Volts. A.C. VOLTS: 0 to 15/30/150/300/1,500
/3,000 Volts. OUTPUT VOLTS: 0 to 15/30/150/300/1,500/3,000 Volts. D.C. CURRENT: 0 to 1.5/3/15 Ma. 0 to 1.5/15 Amperes. RESISTANCE: 0 to 1,000/100,000 Ohms 0 to 10 Megohms. CAPACITY: 0.01 to 1 Mfd. 0 to 50 Mfd. (Quality test for electrolytic) REACTANCE: 50 to 2,500 Ohms. 2,500 Ohms to 2.5 Megohms. INDUCTANCE: 15 to 1 Henrys 1 to 7,000 Henrys. DECIBLES: +6 to +18 +14 +38 +34 to +58

The Model 670-A comes housed in a rugged, crackle-finished steel cabinet complete with test leads and operating instructions. Size 6 1/4" x 9 1/4" x 4 1/4".

ADDED FEATURE: The Model 670-A includes a special COMPARISON BAD scale for checking the quality of electrolytic condensers at a test potential of 150 Volts.

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Throws an Actual Bar Pattern on Any TV Receiver Screen!!

Two Simple Steps:
1. Connect Bar Generator to Antenna Post of any TV Receiver.
2. Plug Line Cord into A.C. Outlet and Throw Switch.

RESULT: A Stable never-shifting vertical or horizontal pattern projected on the screen of the TV receiver under test.


TV Bar Generator comes complete with shielded leads and detailed operating instructions. Only...

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$11.50 down. Balance $36.00 monthly for 6 months.

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$7.40 down. Balance $3.50 monthly for 6 months.

☐ TELEVISION BAR GENERATOR Total Price $9.95
$2.95 down. Balance $3.50 monthly for 6 months.

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☐ Ship C.O.D. for the down payment.

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eliminating the polar relay and the external power supply. This change is shown in Fig. 3. The 6SN7 polar-relay-keying tube is replaced by two tubes, each capable of passing 60 ma. of cathode current. In this case the printer is connected in series with the marking-tube cathode circuit; the 60 ma. of current, adjusted by \(R_o\), will directly operate the printer selector magnet.

**ARRL Appointments:**

**OFFICIAL RELAY STATION**

Throughout the history of amateur radio, the c.w. traffic-handler has carved for himself an enviable niche. Traffic-handling has brought high credit to all stations engaged. Early ARRL recognition of the public service and dedication to properly systematized procedures created the Official Relay Station post as the first and basic ARRL appointment.

Today ORS appointment is the most popular of all station posts in the field organization. If you enjoy operating c.w. and consistent traffic and net operation, here is something really worth while.

What is it going to cost you? Learning and using standard ARRL operating practices (proper message form, ending signals, abbreviations) . . . keeping a transmitter and receiver in operating condition at all times . . . reporting monthly to your SCM . . . ability to handle the code at 15 w.p.m.

What are you going to get in return? The greatest single benefit is probably the development of operating ability and know-how. You'll find that there's a great deal of satisfaction to be had in being able to efficiently check in on your traffic net and handle your station properly. There's fraternality in net operating with a group of top performers. The opportunity to be a part of the ARRL field organization is yours. We get more fun and accomplishment as part of an operating team, not from going it alone in casual work. Added to enjoyment is the privilege of participation in the quarterly CD Parties. Latest news and operating aids from Headquarters go along with your appointment.

Where can you apply for an Official Relay Station appointment? Your SCM is the one to contact. You'll find his name and address on page 6 of any QST. He'll be glad to help you.
### Receivers

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
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<tbody>
<tr>
<td>Hallicrafters S38C</td>
<td>$49.50</td>
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<tr>
<td>Hallicrafters S40B</td>
<td>$119.95</td>
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<tr>
<td>Hallicrafters S53A</td>
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<td>Hallicrafters SX-62</td>
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<td>Hallicrafters SX-71</td>
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<td>Hallicrafters S-76</td>
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<td>Hallicrafters S72 portable</td>
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<td>Hallicrafters S72 longwave portable</td>
<td>$119.95</td>
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<td>Hallicrafters R46 speaker for Models SX62, SX71, SX73, SX76</td>
<td>$19.95</td>
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<tr>
<td>Hammarlund HQ-129-X with</td>
<td>254.00</td>
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<tr>
<td>Collins 752A with speaker</td>
<td>440.00</td>
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<td>Collins 753A with speaker</td>
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<tr>
<td>National HRO-60T with speaker</td>
<td>499.50</td>
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<tr>
<td>National NC-183D with speaker</td>
<td>385.50</td>
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<tr>
<td>National NC-125 with speaker</td>
<td>160.50</td>
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### Transmitters

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<th>Model</th>
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<tr>
<td>Hallicrafters HT-20 less mike or crystal</td>
<td>$449.50</td>
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<tr>
<td>Eldico TR75 TV wired and tested</td>
<td>$94.95</td>
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<td>Eldico TR1 wired and tested</td>
<td>$379.95</td>
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<td>EF Johnson Viking I kit with tubes and TVI proof</td>
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<td>EF Johnson Viking I wired with tubes and TVI proof</td>
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<td>EF Johnson Viking II wired and tested</td>
<td>$339.50</td>
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<tr>
<td>EF Johnson Viking II kit with tubes</td>
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<tr>
<td>Elmac A54 low impedance carbon with VFO less mike</td>
<td>$139.50</td>
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<tr>
<td>Elmac A54H high impedance crystal with VFO less mike</td>
<td>$149.50</td>
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<tr>
<td>Harvey-Wells TBS550C Bandmaster Sr, less mike</td>
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<tr>
<td>Harvey-Wells TBS550D Bandmaster Deluxe less mike</td>
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### Miscellaneous Equipment—NEW

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<tr>
<td>Premax 3 element rotary beam 10 meter</td>
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<tr>
<td>Hyllite 3 element rotary beam 10 meter</td>
<td>$42.40</td>
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<tr>
<td>Hyllite 3 element rotary beam 20 meter</td>
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<tr>
<td>Cornell-Dubilier rotators new model TR12</td>
<td>$28.77</td>
</tr>
<tr>
<td>Cable for above 4 cond, Per C</td>
<td>$5.00</td>
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<tr>
<td>Gosset tri-band converter</td>
<td>$47.60</td>
</tr>
<tr>
<td>Morrow tri-band converter with noise clipper</td>
<td>$64.95</td>
</tr>
<tr>
<td>Philmore novice transmitter kit</td>
<td>$29.40</td>
</tr>
<tr>
<td>Millen grid dip oscillator</td>
<td>$61.50</td>
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<tr>
<td>Eldico grid dip oscillator kit</td>
<td>$34.95</td>
</tr>
<tr>
<td>Eldico grid dip oscillator wired and tested</td>
<td>$47.95</td>
</tr>
<tr>
<td>Collins 3KC mechanical filter adaptor kit</td>
<td>$100.00</td>
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<tr>
<td>Collins 1KC additional filter adaptor kit</td>
<td>$75.00</td>
</tr>
<tr>
<td>Convert your 75A2 Collins to new model 75A3</td>
<td>$125.00</td>
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</tbody>
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### Used Equipment

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
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<tr>
<td>Sonar tri-band receiver 2, 6 and 10 meter</td>
<td>$58.00</td>
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<tr>
<td>Hallicrafters S72 portable (like new)</td>
<td>$98.00</td>
</tr>
<tr>
<td>Hallicrafters S72L portable (like new)</td>
<td>$107.00</td>
</tr>
<tr>
<td>Sonar 110V AC power supply</td>
<td>$25.00</td>
</tr>
<tr>
<td>Web 10 meter transmitter</td>
<td>$27.50</td>
</tr>
<tr>
<td>Hallicrafters SX25 with speaker</td>
<td>$125.00</td>
</tr>
<tr>
<td>Gosset two meter converter (like new)</td>
<td>$39.00</td>
</tr>
<tr>
<td>Harvey-Wells TBS55A transmitter</td>
<td>$80.00</td>
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<tr>
<td>Telvar 60 Watt transmitter cover 10–160 meters</td>
<td>$75.00</td>
</tr>
<tr>
<td>RME-70 receiver with speaker</td>
<td>$100.00</td>
</tr>
<tr>
<td>HRO-5 with speaker, power supply and 6 calls</td>
<td>$195.00</td>
</tr>
<tr>
<td>Elmac A54</td>
<td>$110.00</td>
</tr>
<tr>
<td>Gosset tri-band</td>
<td>$25.00</td>
</tr>
<tr>
<td>Gosset noise clipper</td>
<td>$5.00</td>
</tr>
</tbody>
</table>

### Bargain Special

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>872A tubes, Each</td>
<td>$2.65</td>
</tr>
<tr>
<td>866A tubes, Each</td>
<td>$1.25</td>
</tr>
<tr>
<td>Morrow 38R (display model)</td>
<td>$54.95</td>
</tr>
<tr>
<td>Micro-Match MM1 (display model)</td>
<td>$50.00</td>
</tr>
<tr>
<td>Morrow 38RLN (display model)</td>
<td>$49.95</td>
</tr>
<tr>
<td>Fabricated plate filter metal cond. 50/450, 10/250, 20/25, Dz. (Each)</td>
<td>$5.75</td>
</tr>
<tr>
<td>Fabricated plate filter metal cond. 30/400, 30/400, Dz.</td>
<td>$5.75</td>
</tr>
<tr>
<td>Oil cond., .25 mfd, 1000V either GE 23F158 or GE 23F472, Each</td>
<td>$.50</td>
</tr>
</tbody>
</table>

### Inventory Close Out

- Fabricated plate filter metal cond. 30/400, 30/400, 30/400, Dz.  | $5.75  
- Each  | $.60  
- Fabricated plate filter metal cond. 30/400, 30/400, 15/400, Dz. (Each)  | $5.75  
- Each  | $.60  
- Oil cond., .25 mfd, 1000V either GE 23F158 or GE 23F472, Each  | $.50  

**Descriptive Catalogue Sheets Sent On Any Items You Request • Send for Our New 1953 Catalogue to Be Out Soon**

**Prices do not include transportation**

**Long Distance Phone 5-1594**
Inexpensive L and C Standards

(Continued from page 48)

Higher Accuracy

Greater accuracy can be attained by making a few corrections. Since the coil is likely to be closer to exactly 5 µh than the condenser is to 100 µfd, the coil can be used as a standard to determine the capacitance of the condenser. The inductance values given by the chart can then be corrected by the factor 100/C, where C is the actual measured capacitance including the mounting.

In measuring very low values of L or C a correction should be made for the residual inductance and capacitance of the standards and their assemblies. The binding-post assembly alone has a capacitance of approximately 1 µfd, which should be subtracted from the measured value of capacitance if it makes a significant change in the result. The residual inductance of the condenser assembly, as determined by shorting the binding posts (at the holes for the wire connections) with a large metal plate and measuring the resonant frequency, is approximately 0.02 µh, which sim-
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Learn It Thoroughly! From America’s Complete Home Training School!

You Get All The Parts—Even Tubes—for this modern Superhetodryne Receiver—and lots of other equipment. And you get to keep it!

Let National Schools—the famous resident-training school founded in 1905—train you as you want to be trained. One of the largest schools of its kind, National is located in Los Angeles—center of Radio-Television world! You learn from lessons prepared by men who are successful Radio and Television technicians.

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Superhetodryne Receiver
T.R.F. Receiver
Signal Generator

With famous National Schools Shop-Method Home Training, you learn by doing—the easy, practical, interesting way. The way you want to learn. We send you many parts—all of modern professional quality. You do lots of practical experiments. You advance day by day, step by step. The free book tells you all about it. Answers all your questions. Use the coupon. And do it now—while you’re thinking of it.

Don’t Put It Off! Get the Big Salary You Have Always Wanted!

Today’s Shortage of Trained Technicians Creates Chance of a Lifetime for You!

Think of it! With guided missiles, radar, and other electronic devices so important to defense! And with over 90,000,000 radios, over 12,000,000 TV sets, with more than 300 radio stations—over 100 TV stations—and more building every day—what an opportunity for you! If you set quickly! Men are wanted in Radio-Television-Electronics—America’s fastest-growing field! Now! Good-paying jobs—the kind you should have—can be yours!

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National Schools graduates—men just like you—are earning good money all over the country. Why not you? National Schools graduates have the personal satisfaction of being highly-skilled technicians. Men who enjoy their work—rather than having to drag along in just any old job. So can you! Mail coupon today—find out how easy it is.

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You get this amazing new testing instrument—complete. It’s specially factory-made and tested. Ready to use Simple to operate. Accurate and dependable. And—it’s light enough to carry around—so you can use it at home or on service calls.

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ADDRESS
CITY
STATE
ZONEDATED

Mail in Envelope
Paid in Full
paid in Full

due

Please Check here if released from service less than 4 years ago.
Unpainted but...

(Continued from page 60)

made, the bookcase pushed against the wall and the signals started to roll in. From an acoustic standpoint, the ‘speaker mounting is adequate for communications quality. Undoubtedly, if an attempt were made to push high fidelity through there would be painful resonances and rattles. A judicious application of Fiberglas or acoustic board on the back of the baffle and on the surrounding surfaces, plus a relief port in the vertical partition, would probably provide a fairly classy loudspeaker system for those who want to hear the highs and lows.

The vertical partition is just a nice thickness to take pilot lamps or switches. There is quite enough depth behind the partition to allow the

Fig. 1 — Cross-sectional view and dimensions of the double bookcase.

installation of a low-power transmitter, preamplifiers, power supplies, or what have you. The vertical space and shelf width available are just right so that the back half of the bookcase makes an excellent place to stash quite a few bottles of root beer or sarsaparilla if it is not occupied with radio equipment. The top of the bookcase is at a convenient height and places the receiver controls in a comfortable working position.

After a week’s operation we got afflicted with the usual amateur disease of not leaving well enough alone. Our particular receiver has plug-in coils sets and the ones not in use cluttered up the

(Continued on page 124)
BUILD YOUR OWN
Heathkit TEST EQUIPMENT

Heathkits are completely engineered instruments supplied unassembled. Every kit goes together smoothly and easily. All drilling, punching, and painting has already been done for you. All parts are furnished and are of highest quality.

Detailed construction manual shows clearly where each wire and part goes and tells exactly how to build the kit. Write for free catalog.

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DOW CO-AX RELAY
FOR 52 OR 72 OHM LINE

FEATURES
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2. Handles power up to 1000 watts.
3. Fills standard connectors for co-ax.
4. No chatter. Specially built for 'Silent operation'.
5. Over-all length 4 5/8”. Over-all width 3”. Note new magnetict cover.
6. Externally mounted SPDT switch operated by relay can be used for opening B+ of receiver when transmitting, or for other control purposes. Add to prices below $1.00.
7. When in transmit position a built-in shorting connector grounds receiver antenna lead. This protects receiver against injury from r.f. and reduces to a minimum the capacity coupling between receiver and relay contacts. Add to prices below $1.00.

AC Types (all voltages), Amateur Net. $10.50
DC Types (all voltages), Amateur Net. 9.50

See your distributor, but if he has not yet stocked Dow Co-ax Relays, order now direct from factory, send check, money order, or will ship C.O.D. Prices are Net, FOB shipping point: Warren, Minn., or Winnipeg and Montreal, Canada.

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place. The uncompromising black circle of the loudspeaker looked businesslike but not beautiful. A most accommodating wood mill never turned a hair but ran off our minute order while we waited. The bill of material amounted to two pieces 1 1/2 by 12 3/4 by 7 3/4 inches, plus eight pieces 1 1/2 by 3 1/4 by 3 7/8 inches, all in pine. The runners are secured in place with brads. The vertical 1 1/4-inch partition is fastened with thin wire nails.

That left the speaker aperture to deal with. Mr. Woolworth supplied a simple 11 by 11-inch wooden picture frame. The glass was removed and a piece of tapestry substituted for it. The picture frame is set in place and secured by placing the second 1 1/2-inch partition in such a position that the picture frame is a push fit. Since the bookcase is never moved and there is no vibration there seemed no point in providing a permanent fastening to the vertical partition. The second 1 1/2-inch partition not only serves to hold the picture frame in place but also gives a better balance to the looks of the thing and, incidentally, storage space on the top shelf for a few books.

The total cost of this rigging left almost five dollars change from a twenty-dollar bill. Exclusive of the time spent shopping, the total expenditure of man-hours was a little less than two. Yes! Someday it will be painted. The ebony OM and XYL on top of the receiver are refugees collected in OQ-land and are not essential to the design.

As it is now used, the bookcase is set flush against the wall. It could also be used, as was the original intent of its design, as a piece of furniture located out in the room away from the walls. In this case, the back of the speaker would need to be hidden by a box or the whole back of the bookcase closed in with a piece of plywood. It is dubious that the arrangement would ever find a place in a “better home” magazine but it does provide an acceptable, inoffensive, and — above all — inexpensive solution of the problem of providing an effective roosting place for the communications receiver.

Hints & Kinks

(Continued from page 60)

If the auto radio uses variable capacitors for tuning purposes it is possible to modify the tuning range merely by inserting a capacitance of approximately 100 μfd., in series with the leads to the variables. This system does not permit complete coverage of the b.c. band and the sets we have worked with tuned 1100 to 2000 kc, after the revamping and the alignment had been completed. — Fred Nazar, W5RNA.

SWITCH TO SAFETY!
HT-20 TVI SUPPRESSED MULTI-BAND TRANSMITTER
A complete new transmitter that incorporates all the Hallcraf-ter's ingenuity and craftsmanship and practically eliminates "TVI" interference. Covers 160-10 meters. Delivers clean signals on both phone and CW. Power output for AM is 100 watts, for CW—115 watts. Uses bandswitching exciters and continuous-tuning final amplifier. All spurious outputs are at least 90 db below rated output. All control leads are filtered thoroughly. Front-panel tuning circuit is followed by 4-section low-pass filter. Dial and meter scales are covered with metal screening. 10-position crystal selector switch has additional positions for external VFO. Single meter with 3-position switch checks all stages and provides output tuning indication. Tube lineup: 6A9H o.e.-buffer, 6L6 buffer-doubler, 4D32 final amp., 6L7GT speech, 6K6GT driver, 2807 modulators, 5U4G L-V rectifier, 2SK84 G-V-H-V rectifiers. 6L7 bistable, 6AL5 RF carrier rectifier, Sizes: 20/5x15x16½". With tubes, cabinet and instructions. For 105-120 volts, 50-60 cycles AC, Wt.: 130 lbs. 98F022. NET. 449.50

MODEL SX-71
DUAL-IF RECEIVER
A top-notch receiver. Has double superhetodyne circuit above 4.6 mc and provide extra selectivity and image rejection. Includes Narrow Band FM reception, as well as AM and CW. Provides continuous AM reception from 338 kc to 35 mc, and 46 to 56 mc. Five-range selector covers: 538-1650 kc, 1600-4000 kc, 4-6-13.5 mc, 12.5-35 mc, and 46-56 mc. Built-in limit and balanced detector stages for hiss-free Narrow Band FM reception. Double conversion (2075 and 455 kc IF channels) gives image rejection of better than 50 db to 1 at 28 mc. One IF, two conversion, and 3 IF stages yield high gain for sensitivity in the order of .7 microvolt. 2½ kc selectivity with 11 tuned circuits. Audio peaked for communications frequenees, with 5 watt output. Has extra-wide dials for Main and Bandspread tuning. Controls: 3-step Crystal Filter with Phasing; RF; AF; Tone: BFO On-Off/Shift; Limiter; Send/Receive Switch; AM/Narrow Band FM Switch. Has universal antenna input, "50" meter, 500-ohm speaker output, phone jack, external power socket and remote send/receive terminals. Circuit uses: 6BA6 RF, 6C4 oscillator, 6A9U mixer, 6E6 2nd conv., 3-56 kI IF, 6H6 AM/delayed AVC; 6S7 BFO/1st audio, 6AL5 detector and 6K6GT audio output. Also has VR105 regulator and 5Y3GT rectifier. Satin black cabinet with chrome trim, hinged top. Size, 18½x8½x12". For 105-125 volts, 60 cycles. With tubes, less speaker. 98F008. Shpg. wt.: 33 lbs. NET. 224.50

THE NEWEST IN HAM EQUIPMENT

MARMAX

MODEL MT-52 TRANSMITTER
Compact multi-band mobile or fixed phone-CW transmitter. Tube complement: 1-6AG7, 1-6Q6GT, 1-12AU7, 1-6J6. Power requirements: 2.9 amperes @ 6 volts DC. Peak power rating of final stage: 50 watts. Size: 14½" high, 8¼" wide, 9½" deep. With tubes and 10 meter coils. Wt.: 2 lbs. 97F190. NET. 79.50

PICALARM

MODEL PR-31
Covers 30-50 mc. For police, fire and emergency calls. Superhet circuit uses ratio detector for quiet operation under low signal conditions. Sensitivity better than 1.0 microvolts. Drift compensated. With 5" speaker. Requires a to 8 ft. vertical wire antenna. Walnut plastic cabinet, 11x6x6", 110-120 v., AC-DC. Shpg. wt.: 8 lbs. 98F101. NET. 44.95

NATIONAL

MODEL SW-54 RECEIVER
Outperforms receivers twice the size and twice the price. Covers entire frequency range from 540 kc to 30 in 4 bands. Police, Foreign, Amateur and Skip bands clearly marked. Unique plastic bandspread dial is adjustable to assure logging accuracy over entire range. Built-in speaker Size: 11x7½". Wt.: 15 lbs. 98F318. NET. 49.95

LYSCO

MODEL 600S TRANSMITTER
Latest from LySCO—a newly designed all-band TVI-suppressed transmitter. Operates on 100, 80, 40, 20, 15 and 10 meter bands. Temperature compensated. Uses 6A7G oscillator, 6A7G buffer, 807 amplifier, 5U4G rectifier. Power input: 35 watts. Black wrinkle-finish steel case, w/17x9x11". Wt.: 50 lbs. 97F040. NET. 189.95

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NEWARK ELECTRIC COMPANY
223 W. MADISON ST. CHICAGO 6, ILL.

Just Out! NEWARKS NEW CATALOG NO. 55

FREE!

125
YL News
(Continued from page 49)

... The Long Island YLRL announced membership in the Federation of L. I. Radio Clubs, Pres. W2JZV. Vi, expects a membership increase as a result of her on-the-air code practice. . . W335X, Kay, has her transmitter checked out and will be on forty again as soon as she finishes work on a new antenna tuner. . . W6HTS, Mildred, reports that the W6 YLRL 75-meter net which meets Wednesdays at 0000 attracts a number of girls, plus an occasional OM.

The first VE2 YL to work the U. S. on Six! Stella Belanger, VE2AOB, sparked interest in the 50-Mc. band among Quebec hams and a growing group is converting transmitters and receivers, proving they can get on with low power. Stella uses a 6F6 VFO, 6V6 buffer, an 807 in the final, and an SX-12 receiver. (We could use more W YLs on Six, too!)

KZ5DG, Sec. of the C.Z. QRMarya reports that eleven KZ5 YL contacts are still necessary for a certificate. KZ5LJ, Jeanne, the twelfth YL in the area, is not yet back on the air. Thus far only OMs have received certificates issued Statewide, so gals who work ten are urged to get busy. . . . Ns have been dropped from the calls of Wns QYG SEZ SJR and SYX. . . . To keep pace with her OM’s numerous hobbies, Wp7Z0, Helen, has taken up flying. . . . Thirteen-year-old WITTE, Carolyna Bradley, of Marblehead, Mass., is on ten regularly. . . . New officers of the LARKS of Chicago are W9LOY, Chris, Pres.; W9MYC, Gladys, V.P.; and W9SJR, Bernice, Sec.-Treas.

Miscellany

We point with pride to the new Assistant Communications Manager. Phone, of ARRL—a YL—Ellen White, W6YJM/1. Ellen’s OM, W6Y3N/1, is Assistant Communications Manager, C. W., and the two are now living in Boston, Conn., where they hope soon to “grow an antenna farm” and work all bands. Ellen, who is also handling the ARRL Training Aids program, reports that she is enjoying her new work very much.

She’s Harriett Sanders, she’s from Texas, and she’s the YLRL Fifth District Chairman, W5BB5. Almost enough said—but we should tell you that she operates ten and seventy-five regularly, and that she’s a faithful member of the South Texas Emergency Net. The OM (also, fellows, there is one) is W5NTR. Harriett echoes the appeal of other District Chairman for more news for Harmonics.
Lick Your TVI!

Most cases of TVI caused by harmonics and spurious radiations can be reduced to a negligible minimum.

In planning a new rig, the best bet, of course, is to use precision-made B&W components—from oscillator to final including antenna coupler. Filtering and shielding recommendations in our "Filter Facts" booklet show what to do, how to do it.

Should your present rig be of fairly good design, a few minor changes as outlined in "Filter Facts" plus installation of B&W low-pass filters and Faraday shielded links will effectively throttle TVI.

Many hams have proved it!

Send 15c today for a copy of "Filter Facts" giving details on how to lick your TVI and get silent rigs back on the air!

B&W Low-pass Filters, Models 52 and 75 Amateur net $27.00.

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COAXSWITCH

50 Ohms—Type N Connectors—Manually Controlled
Low VSWR—4 Models

The COAXSWITCH is an RF switch for use in coaxial circuits where it is important that the 50 OHM impedance of the cables be maintained. In a circuit sense, this switch consists of two pairs of "N" connectors spaced 4 1/2" apart using RG-8/U as the connecting link. The COAXSWITCH itself introduces no VSWR other than that of connectors. Characteristic impedance is maintained thru all switch details. Cut-a-way view shows that shield as well as center conductor is switched. Beryllium copper contacts, on the gooseneck, mate directly with male "N" (Type UG-211B/U) connectors which connect directly to back plate of switch. Since all connectors come out in line with axis of switch, right angle connectors are usually unnecessary.

Literature Gladly Sent

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ARRL Roanoke Convention

The Naval Reserve was well represented during the ARRL Roanoke Division Convention on October 11, 1952, at Richmond, Va. Capt. R. R. Hay, USNR, W4LW, represented the Director, Naval Communications. Cmdr. E. J. Beall, USNR, W6BVY/4, and Cmdr. G. W. Bartlett, USNR, WN4YEV, Reserve Electronics Program officers, represented the Commandant, Fifth Naval District. The Fifth Naval District Reserve Electronics Program office furnished an exhibit consisting of an SCR-399 mobile communications van. This equipment was set up near the convention headquarters and operated on amateur frequencies using the call W4USN/4. Other Reservists attending the convention included: Cmdr. R. E. Coleman, USNR, W1INX; Cmdr. Karl R. Medrow, USNR, W3MCG; Ethel Mae Smith, RM3N, USNR, W3MSU; and C. E. Van Pelt, RM1N, USNR, W4LR1.

ARRL San Diego Convention

The Naval Reserve took an active part in the ARRL Southwestern Division Convention held at Balboa Park, San Diego, Calif., October 11–12, 1952. Cmdr. James C. Picken, Jr., USNR, K0DY, District Reserve Electronics Program officer, represented the Commandant, Eleventh Naval District and the Chief of Naval Operations. Cmdr. Picken was a member of the convention committee as well as a member of the Amateur Radio Emergency Corps of San Diego, which sponsored the convention. Two communications vans were set up and operated on amateur frequencies using the calls K6NCB and K6NRT. A communications jeep furnished mobile directory service on the 75-meter phone band for out-of-town amateurs. A Naval Reserve radioelectricity circuit between San Diego and Long Beach was demonstrated during the convention.

Reading, Pennsylvania, Fair

During the month of September 1952, the Naval Reserve Training Center, Reading, Penna., set up an exhibit at the local fair consisting of an SCR-399 mobile communications van. Messages were accepted for transmission to service personnel throughout the world. K0NRR/3, operating from the Fair, was assisted in handling traffic by W3STJ/3, operating from the training center. Cmdr. S. J. Hopkins, USNR, W3STJ, Inspector Instructor of the training center, was in charge of the exhibit.

Pennsylvania Week

During Pennsylvania Week, October 13–18, 1952, the Naval Reserve Electronics Program office of the Fourth Naval District set up an exhibit on Reymburg Plaza, near the city hall in Philadelphia, Penna. This consisted of an SCR-399 communications van operated by J. B. McGeehgan, RMN, USNR, W2VZM. Messages were sent to service personnel in the U.S. and overseas via amateur radio. The most noteworthy message was one sent by the Mayor of Philadelphia to the Supreme Allied Commander in the Far East, General Mark Clark.

Here and There

---

Arthur W. Louis, W5MMO, a member of Organized Electronics Company 8-32, Bellville, Texas, is one of the operators at K5NBF of the same unit.

---

Lt. Cmdr. John A. Frey, USNR, W1EFQ, recently returned to inactive duty after serving for the past two years as Communication Officer of the USS Block Island.

---

Lt. Cmdr. Norton C. DeWolfe, USNR, W6CBX, is Commanding Officer of Volunteer Electronics Company 12-8, Redwood City, Calif. The call K0NRR is assigned this unit.
Mobile Antennas
For All Regular and Civil Defense Use
Car-top, Whip, Center-Loaded, Marine, Zone and Sector Control Center... a complete line of Mobile Antennas to meet every need.

Special 75, 40, 20, 11, 10, 6 and 2-meter Mobiles for Civil Defense and Amateur installations.

PREMAX PRODUCTS
DIVISION CHISHOLM-RYDER CO., INC.
5302 HIGHLAND AVE., NIAGARA FALLS, N. Y.

Ground Plane Antenna used in Civil Defense Zone and Sector Installations.

At the left, one-hole-mounting car-top, and at the right emergency suction-clamp car-top antenna for 100 to 250 mc.

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ARRL Appointments:
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This is for you if you really take pride in that phone signal you put out on the air! This is for you if you use your mike more than your key. What's for you? . . . appointment as OPS!

That certificate makes a fine-looking addition to the wall of your shack, doesn't it? It represents your desire to learn and to use message and procedure standards recommended by the League. It means you follow circuit precautions to ensure the stability of your signals and the cleanliness of your modulation. It marks you as an amateur interested in the support of your Section Net.

The phone man so appointed has added responsibilities to the general public. Impressions of amateur radio are to a great extent the result of reception of amateur phone conversations. Correct practices create favorable public impressions, and the OPS appointment is in recognition of such intent and practice!

An OPS is entitled to wear the distinctive blue ARRL pin, he receives bulletin directly from Headquarters with late news and operating tips. Along with all station appointments comes the opportunity to take part in the quarterly CD Parties. The obligation to report to the SCM monthly assures that the group organization stays one of actives, one that you can be proud to belong to.

Sound like an appointment you'd like to hold? If so, turn to page 6 now and write the SCM of your section. He'll be happy to send you the necessary application forms, and arrange to get you started on the way to being an OPS.

Answer to QUIST QUIZ on page 10

The Reply Form will be used to ensure that your replies are returned by QST. The form is designed to allow the QST reader to express his opinion on the subject of the quiz.

The form is addressed to the Editor of QST and should be mailed to:

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The No. 90651 MILLEN GRID DIP METER is compact and completely self contained. The AC power supply is of the "transformer" type. The drum dial has seven calibrated uniform length scales from 1.5 MC to 300 MC plus an arbitrary scale for use with the 4 additional inductors available to extend the range to 220 kc. Internal terminal strip permits battery operation for antenna measurement.
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The deck may be awash but there’s fair weather in the radio shack. Despite wind and waves the Captain’s message will reach the home port. In fair weather or foul, you’ll find JK crystals rate a Navy “E” for their part in keeping marine communications “ship shape.”

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CRystals for the Critical

A versatile crystal the JK H-4 is widely used as a replacement crystal in marine and other communications systems. Pressure mounted, dust and water proof, stainless steel electrodes. Frequency range 1800 kc to 15 mc. Military type holder. Another of the many JK Crystals available to serve every need.

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AND GET PAID FOR IT!

Think of the hundreds of hours you spend in your shack, having the time of your life! How would you like to get paid for it? You may IF ... IF you're a top-flight electronic engineer with an excellent communications background. IF you have an electrical engineering degree from an accredited college or university. IF you have an inventive spark — a real urge to create something new and better. IF you meet all of these qualifications, National can offer you an exceptionally good salary, unusual social benefits and a really great gang to work with. Best of all, you'll get paid for doing what you like to do most! IF you can meet the "IF's", write us a letter and tell us about yourself — your education, positions you've held, successes you've had — marital status, present salary, etc. We promise a prompt decision.

President, National Company, Inc.

Write to Industrial Relations Dept., NATIONAL CO., Inc., 61 Sherman St., Malden, Mass.
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Less speaker
DC to 175 Mc!

Specifically designed by RCA for radio amateurs, the RCA-6146 has set a record for circuit versatility matched by few other types. From dc amplifier to VHF services, this remarkable tube has high power sensitivity, regardless of plate voltage or frequency. You have already seen it used in ham gear, described in QST and CQ, and in new commercial transmitters.

Before you freeze the design of that new rig, investigate the RCA-6146. For a free copy of the technical bulletin on this popular tube, see your local RCA Tube Distributor or write RCA, Commercial Engineering, Section 48AM, Harrison, N. J.

**POWERFUL FOR ITS SIZE—**

In CW service (ICAS) it can take
90 watts, up to 60 Mc.
64 watts, at 150 Mc.

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120 watts—class AB;
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