In This Issue:
- Measuring-Cup Band Spotter
- Mobile Rig for 3.8 and 7 Me.
- R.F. Voltmeters
- 40-Meter DX Beam
- Exciter for 50, 28 and 21 Me.
### MINIATURE AUDIO UNITS...RCOF CASE

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Application</th>
<th>MIL Type</th>
<th>Pri. Imp., Ohms</th>
<th>Sec. Imp., Ohms</th>
<th>DC In Pri., MA ± 2% (Cyc.)</th>
<th>Response</th>
<th>Max, level dBm</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-1</td>
<td>Mike, pickup, line to grid</td>
<td>TF1A11YY</td>
<td>50,200 CT, 500 CT</td>
<td>50,000</td>
<td>0</td>
<td>50,10,000</td>
<td>+ 5</td>
<td>$14.50</td>
</tr>
<tr>
<td>H-2</td>
<td>Mike to grid</td>
<td>TF1A11YY</td>
<td>R7</td>
<td>135,000</td>
<td>50</td>
<td>250-6,000</td>
<td>+21</td>
<td>1.00</td>
</tr>
<tr>
<td>H-3</td>
<td>Single plate to single grid</td>
<td>TF1A11FFY</td>
<td>15,000</td>
<td>60,000</td>
<td>0</td>
<td>50-10,000</td>
<td>+ 6</td>
<td>13.50</td>
</tr>
<tr>
<td>H-4</td>
<td>Single plate to single grid, DC in Pri.</td>
<td>TF1A11FFY</td>
<td>15,000</td>
<td>60,000</td>
<td>4</td>
<td>200-10,000</td>
<td>+ 14</td>
<td>13.50</td>
</tr>
<tr>
<td>H-5</td>
<td>Single plate to P.P. grids</td>
<td>TF1A11FFY</td>
<td>15,000</td>
<td>95,000 CT</td>
<td>0</td>
<td>50,10,000</td>
<td>+ 5</td>
<td>15.50</td>
</tr>
<tr>
<td>H-6</td>
<td>Single plate to P.P. grids, DC in Pri.</td>
<td>TF1A11FFY</td>
<td>15,000</td>
<td>95,000 split</td>
<td>4</td>
<td>200,10,000</td>
<td>+11</td>
<td>16.00</td>
</tr>
<tr>
<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>
<td>16.50</td>
</tr>
<tr>
<td>H-8</td>
<td>Mixing and matching</td>
<td>TF1A13YY</td>
<td>150-600</td>
<td>600 CT</td>
<td>0</td>
<td>50,10,000</td>
<td>+ 6</td>
<td>15.50</td>
</tr>
<tr>
<td>H-9</td>
<td>R2/60,1 input to grid</td>
<td>TF1A12YY</td>
<td>150,600</td>
<td>1 meg.</td>
<td>0</td>
<td>200,3,000 (4dB)</td>
<td>+1</td>
<td>16.50</td>
</tr>
<tr>
<td>H-10</td>
<td>10:1 single plate to single grid</td>
<td>TF1A10YY</td>
<td>10,000</td>
<td>1 meg.</td>
<td>0</td>
<td>200,3,000 (4dB)</td>
<td>+10</td>
<td>15.00</td>
</tr>
<tr>
<td>H-11</td>
<td>Reactor</td>
<td>TF1A20YY</td>
<td>300 Henrys-0 DC, 50 Henrys-3 Ma. DC, 6,000 Ohms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12.00</td>
</tr>
</tbody>
</table>

### COMPACT AUDIO UNITS...RC-50 CASE

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Application</th>
<th>MIL Type</th>
<th>Pri. Imp., Ohms</th>
<th>Sec. Imp., Ohms</th>
<th>DC In Pri., MA ± 2% (Cyc.)</th>
<th>Response</th>
<th>Max, level dBm</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-20</td>
<td>Single plate to grid, can also be used for P.P. plates</td>
<td>TF1A15YY</td>
<td>15,000 split</td>
<td>80,000 split</td>
<td>0</td>
<td>30,20,000</td>
<td>+12</td>
<td>20.00</td>
</tr>
<tr>
<td>H-21</td>
<td>Single plate to P.P. grids, DC in Pri.</td>
<td>TF1A15FFY</td>
<td>15,000</td>
<td>80,000</td>
<td>8</td>
<td>100,20,000</td>
<td>+23</td>
<td>23.00</td>
</tr>
<tr>
<td>H-22</td>
<td>Single plate to multiple line</td>
<td>TF1A13YY</td>
<td>15,000</td>
<td>50,200, 125/500**</td>
<td>8</td>
<td>50,20,000</td>
<td>+23</td>
<td>21.00</td>
</tr>
<tr>
<td>H-23</td>
<td>P.P. plates to multiple line</td>
<td>TF1A13YY</td>
<td>30,000 split</td>
<td>80,000</td>
<td>200,20,000</td>
<td>+19</td>
<td>20.00</td>
<td></td>
</tr>
<tr>
<td>H-24</td>
<td>Reactor</td>
<td>TF1A30YY</td>
<td>450 Hys.-0 DC, 250 Hys.-5 Ma. DC, 6000 ohms...</td>
<td>65 Hys.-10 Ma. DC, 1500 ohms</td>
<td></td>
<td></td>
<td></td>
<td>15.00</td>
</tr>
</tbody>
</table>

### SUBMINIATURE AUDIO UNITS...SM CASE

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Application</th>
<th>MIL Type</th>
<th>Pri. Imp., Ohms</th>
<th>Sec. Imp., Ohms</th>
<th>DC In Pri., MA ± 2% (Cyc.)</th>
<th>Response</th>
<th>Max, level dBm</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-30</td>
<td>Input to grid</td>
<td>TF1A16YY</td>
<td>50***</td>
<td>62,500</td>
<td>0</td>
<td>150,10,000</td>
<td>+13</td>
<td>13.00</td>
</tr>
<tr>
<td>H-31</td>
<td>Single plate to single grid, 3:1</td>
<td>TF1A15FFY</td>
<td>10,000</td>
<td>90,000</td>
<td>0</td>
<td>300,10,000</td>
<td>+13</td>
<td>13.00</td>
</tr>
<tr>
<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>
<td>13.00</td>
</tr>
<tr>
<td>H-33</td>
<td>Single plate to low impedance</td>
<td>TF1A13YY</td>
<td>30,000</td>
<td>50</td>
<td>1</td>
<td>300,10,000</td>
<td>+15</td>
<td>13.00</td>
</tr>
<tr>
<td>H-34</td>
<td>Single plate to low impedance</td>
<td>TF1A13YY</td>
<td>100,000</td>
<td>60</td>
<td>.5</td>
<td>300,10,000</td>
<td>+ 6</td>
<td>3.50</td>
</tr>
<tr>
<td>H-35</td>
<td>Reactor</td>
<td>TF1A30YY</td>
<td>100 Henrys-0 DC, 50 Henrys-1 Ma. DC, 4,000 Ohms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11.00</td>
</tr>
</tbody>
</table>

---

* 200 ohm termination can be used for 150 ohms or 250 ohms. 500 ohm termination can be used for 600 ohms.
** 200 ohm termination can be used for 150 ohms or 250 ohms. 125/500 ohm termination can be used for 150/800 ohms.
*** can be used with higher source impedances, with corresponding reduction in frequency range. With 200 ohm source, secondary impedance becomes 250,000 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.

---

The impedance ratings are listed in standard manner. Obviously, a transformer with a 15,000 ohm primary impedance can operate from a tube representing a source impedance of 7700 ohms, etc. In addition, transformers can be used for applications differing considerably from these shown, keeping in mind that impedance ratio is constant. Lower source impedance will improve response and level ratings... higher source impedance will reduce frequency range and level rating.
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General Electric Co., Schenectady 5, N. Y.

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Heater current 0.225 amp
Max plate voltage 150 v
Max plate dissipation 2 w
Transconductance 9,000 micromhos

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420, 455 mc

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constant. The "superhet" circuit is almost univer-
sally used in today's receivers. G-E re-
search that helped develop it, continues to
create new products for better application
of the superheterodyne principle. Examples
are the v-h-f, u-h-f front-end triodes—in debt
for their advanced design to G.E.'s long ex-
perience in radio electronics!

---

**ELECTRONIC TUBES OF ALL TYPES FOR THE RADIO AMATEUR**

**GENERAL ELECTRIC**

---

166-109
Mr. R. Bellew
Collins Radio Co.
Cedar Rapids, Ia.

Dear Dick:

I received my 32V-3 on 4 April, 1952 and connected it through my 35C-2 filter with RG8/U coax to the Harrison Antenna coupler bought for use with my old 32V-1 in Turkey. This gives me good loading to my 100' inverted "L" Marconi Antenna, 30' high, on all bands 10 through 80 meters. Grounding is accomplished by means of 3/8" copper braid to the house copper water pipe system. On Sunday, 6 April, with the assistance of W4EUZ, W4HRR, and W4RVE, all also members of the Augusta Radio Club's TVI Committee, tests were performed on my neighbor's TV installation, which is a 4-stack bi-conical rotary beam, 50' from my antenna, feeding thence into the Dumont T.V. Receiver. On no band, including 10 X phone, could my signals be detected while tuning for WSB-TV on Channel 2, or for WBT-TV on Channel 3. Each of these stations is located approximately 150 airline miles from here, in Atlanta and Charlotte, respectively. A Drake 300 ohm "Hi-pass" filter was placed in the TV antenna lead-in, but was really not necessary. I might mention that while testing on Channel 2, with full gain on the TV receiver and preamp, the WSB-TV signal was so weak that the set would not "lock" on it. A strong TV signal in this locality will only run about 50 UV.

As you know, I had complete success with your 32V-1/75A-1 combination in Turkey, and on being ordered to this location knew my 2 Kilowatt rigs (homemade) would never be satisfactory under prevailing TV conditions here. Your 32V-3 (with 35C-2 filter) and 75A2 allow me to continue my 35 years as an active ham.

Thankfully,
/s/ Fred

For excellence in amateur communications, it's . . .

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OFFICES
38 La Salle Road
West Hartford 7, Connecticut
Tel.: 3-6268	TWX: HP 88
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“A Gibraltar of Stability”

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Image rejection: Not less than 80 db at any frequency.
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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.

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AMATEUR COMMUNICATIONS — A PROPOSED FORMULA

In 1936 and 1937 the amateur body reached some high points of operation in the public interest, convenience and necessity by performing herculean tasks in providing emergency communications during major floods which covered northeastern states. Not content to rest on its laurels, organized amateur radio took a critical look at its own performance, found some phases where increased efficiency appeared possible, and through the League asked FCC for additions to our rules to facilitate emergency communications procedures. In 1938, the Commission adopted the requested modifications. Basically, it was provided that when FCC declared a state of emergency existed in a particular area, within 1000 miles of that area the then 160- and 80-meter bands would be reserved for disaster contacts; small segments of those bands would be available only for initial emergency calls; a 5-minute listening period in those bands was to be observed; certain key stations might be appointed to spread the news of any such FCC declaration and help patrol the bands. These general provisions have remained in our rules ever since, substantially as originally set up.

For some time now it has been apparent that some revision is in order; for example, the present paragraphs in § 12.156 speak of frequencies no longer available to amateurs. After studies of its own, FCC has just issued notice of proposed amendment to that rule; the basic concepts are retained, but the general procedure is extended to additional bands. Segments of all our bands (except 21 Mc.) up through 225 Mc. are earmarked to be reserved exclusively for emergency communications if and when FCC declares emergency status. The segments range from 25 or 50 kc. in the lower bands to the entire bands at 220 Mc. (All of the civil defense band for RACES are encompassed in the segments so earmarked.) Additional frequencies might be so reserved, at the Commission's discretion. The text of the proposal appears in this issue beginning on page 37. Comment date is September 19th.

That, however, is not all.

FCC has come up with another idea: a sweeping new concept of how amateurs would conduct their routine communications procedures is also contained in the same document. Without primary relation to emergency operations, the Commission now proposes to specify other and smaller segments of our bands, also up through 225 Mc., which would not be available for normal, day-to-day operation, except for calling and answering purposes. The size of the segments range from 7 kc. in the 1800-ke. bands to 500 kc. in the 220-Mc. band. Refer to the text of the proposal for specific figures on other bands.

How you would make a contact in these restricted segments is all spelled out. For example, you would call CQ not more than four times, and sign your call letters not more than four times; on voice, it would be permissible to use phonetics. In CQs, directional indicators might be employed — e.g., "CQ west." That's all. If you don't get an answer to that CQ, you may not call CQ again for five minutes. If you do get an answer, which similarly is restricted to the sending of your call four times, the "de" (or voice equivalent) and signing of his call four times or less, the only thing you may say in acknowledgment is a specification of a channel in an unrestricted part of the band where both of you are going to shift to continue the contact. No signal report, nor anything else, except agreement to a working frequency. (The proposed procedure is almost identical to that used in the commercial maritime mobile service.)

If you choose to listen for a CQ in one of the calling bands, your answering call in that band is limited to the specific four-by-four. If you don't get him on that first blast, you may not call him again for five minutes. Of course, you can always move the rig down into the unrestricted parts of the band and make your contacts in the good, old-fashioned way. In time of disaster, the restricted segments can be used for emergency communications in addition to their primary function as calling channels.

The Commission's proposal is a completely new concept of how regular amateur communications might be conducted. It affects all major amateur bands. It is not merely a suggested procedure; it is a notice of FCC intent to enact provisions into law. It therefore behooves every amateur and club group to give the proposal careful study. Here, too, the comment date to FCC is September 19th.

The League will, of course, submit comment on these proposals; as of this writing studies are in progress, at the direction of the President, to serve as the basis for ARRL comment.
COMING A.R.R.L. CONVENTIONS

See page 50 of this issue for detailed announcements of coming ARRL conventions. Also, don’t forget the Roanoke Division Convention at Richmond, Va., on October 11th.

Strays

Paul Reinhardt, first-prize winner in the Mechanix Illustrated Old Automobile Contest, is WN2NME. We wonder if Paul contemplates installation of mobile gear in that 1952 Nash Rambler station wagon!

W5UTF, confined in Veterans Administration Hospital, McKinney, Texas, licked a ban on antenna construction by taking advantage of the grounds sprinkler-system network as suggested by W5ICB. Will this result in “hot” cold water?

Use of Tools, Basic Navy Training Courses text, has 258 pages of profusely illustrated information on workshop practices. It is highly recommended to amateurs and should be of great value as a reference work. There are fourteen chapters, each dealing with a specific tool category, plus appended tables and index. It may be procured for 75 cents from the Superintendent of Documents, U. S. Govt. Printing Office, Washington 25, D. C. (Catalog No. N17.25: T61/2/-945.)

HAMFEST CALENDAR

INDIANA — Sunday, September 14th, at the Serval Picnic Grounds, southeast of Evansville—the Annual Hamfest of the Tri-State Amateur Radio Society. Refreshments will be available, but each person attending is asked to provide his own lunch. Numerous contests are scheduled, with the c.w.-phone ball game being the main event. Many valuable awards will be distributed. There will be a transmitter on 20.0 Mc. to guide mobiles to the area, and signs will be posted at highway junctions. The registration fee is $1.00 at the grounds. Further information may be obtained from Fred Sawyer, W9FJL, 627 East Virginia Street, Evansville, Ind.

KANSAS — Sunday, September 7th, at the North Kansas Fair Grounds and National Guard Armory at Belleville, Kansas—the Second Annual Hamfest of the Kansas-Nebraska Radio Club. There will be a full day of activities for everyone, and base stations on 160-, 75-, 10- and 2-meters will be operating to guide mobiles to the park. A communications receiver will be the main award. For further information contact the Kansas 5CM.

NEW MEXICO — Sunday, October 5th, at Los Alamos—the New Mexico State Hamfest sponsored by the Los Alamos Amateur Radio Club. John Reinitz, K6IJM, of El Paso, will be the principal speaker. There will be three classes of mobile contests, a QSL contest, an elementary construction contest, a QSL display, a contest for the best gadget, and a code speed contest open to anyone who has ever held a Novice license. All registrations ($2.00) and lists of guests must be sent to Bob Fryman, W3NXE, 2235 40th Street, Los Alamos, not later than Sept. 27th, in order to obtain passes into Los Alamos.

NEW YORK — Saturday, September 27th, at Oneida—the Seventh Annual Hamfest and Ladies Night for Oneida and Central New York hams and friends. Registration will be at 5 p.m., with the banquet-dinner at 7 p.m. Admittance is by advance registration only, $2.50, from Walter L. Babcock, W2RXW, 405 Sayles St., Oneida, N. Y.

NEW YORK — Friday, September 12th, at Lost Battalion Hall, Elmhurst, Queens, Long Island—the Sixteenth Annual Hamfest and Dance sponsored by the Federation of Long Island Radio Clubs, Inc. Special award for the ham attending from the greatest distance, plus favors for the ladies. All the best features of a regular hamfest and dancing. Tickets purchased in advance are $3.00 for hams, $1.25 for the ladies; $5.00 extra if purchased at the door. Tickets and further information may be obtained from Julian N. Jabin, W2QFQ, FLIRC Secretary, 147-14 Charter Road, Jamaica 35, N. Y.

OHIO — Sunday, September 14th, at Ash Grove, Cincinnati—the annual hamfest sponsored by the Greater Cincinnati Amateur Radio Association. Eats and drinks are included in the price of $2.00. For further information write to John Wiscull, WS8WG, 3527 Belmont Avenue, Mariemont, Ohio.

Quist Quiz

After helping A to install his new antenna system, B is now helping to adjust the tuning and coupling of the transmitter and antenna coupler. A is not satisfied with the final result obtained by B because the “pencil test” shows a substantial r.f. arc at the end of the plate tank coil. A claims that this indicates there is still quite a bit of “r.f. left in the tank,” while B says it means nothing. Is A right, and will he be smart to tighten the coupling as soon as B leaves?

(Please turn to page 155 for the answer)
A Two-Band Miniature Mobile Transmitter

10 Watts in 120 Cubic Inches for 3.8 and 7 Mc.

BY C. VERNON CHAMBERS,* W1JEQ

- Provision for operation on the proposed 7-Mc. 'phone band is one feature that will appeal to anyone interested in a new mobile rig. This transmitter includes that capability along with such attractions as low cost, compactness, simplicity, and low power requirements.

Those who favor mobile operation as a secondary use of enjoying ham radio are apt to be extremely cost-conscious while the transmitter selection is being made. It is understandable that these operators do not wish to see a great deal of cash tied up in gear that will be used during the smaller percentage of the total available operating time. This same group is also interested in compactness combined with simplicity because they do not care to devote a great deal of space and constructional time to the in-motion phase of hamming. These three factors — cost, compactness and simplicity — were foremost in mind during the planning of the transmitter to be described.

The cost of the rig is maintained at a reasonable level by designing for low power. A 300-volt 100-ma. power supply, from which the unit is normally operated, is just about the least-expensive job that can be purchased. Keeping the input down also allows a double saving — money and space — at the audio side of the unit where transformers that are compact and inexpensive are used.

Compactness of the transmitter is obtained by employing a carefully planned layout, extremely simple circuits, and small components. Incidentally, the employment of miniature components was not carried to the extreme. We could have cut down on the size of the unit a bit more by using the tiniest variable capacitors made. However, these were the items in the parts list that were not available from our local dealers and we figured that they might be difficult to procure elsewhere.

Simplicity, obtained principally by selecting uncomplicated circuits, shows up in both the constructional chores and the operation of the transmitter. So far as construction goes, the big job, wiring, took less than 7 hours. And as for operation, there is nothing to it. One control allows selection of the crystal frequency and, at the same time, sets up the built-in antenna coupler for either 3.5- or 7-Mc. operation. Variable capacitors for the antenna coupler and the final amplifier are the only other controls. The amplifier covers both bands with a single sweep of the tank capacitor, thus eliminating the need for plug-in coils or switches in this circuit.

Circuit

The circuit of the transmitter, as shown in Fig. 1, utilizes a Type 5763 tube in a grid-plate crystal-controlled oscillator. A switch, $S_{1A}$, permits selection of any one of the five crystals that the circuit will accommodate. When 7-Mc. A3 operation is made legal, we intend to equip the circuit with two 7-Mc. rocks, and three cut for the 3.8-Mc. band. In the meantime, five for the lower of the two frequencies are being used. The plate inductor, $L_1$, for the oscillator is self-resonant at approximately 5.5 Mc., a frequency that was determined to be optimum during the adjustments made to balance the oscillator output at 3.5 and 7 Mc.

The Type 5763 in the final amplifier employs grid-leak bias and is capacity-coupled to the oscillator. The amplifier works straight through at both 3.8 and 7 Mc. and is resonated at either of these frequencies by $C_7$ and $L_5$. Resistors $R_4$ and $R_3$ are inserted in the grid and the plate leads so an external milliammeter may be connected to circuit.

Panel view of the 10-watt mobile transmitter. Control knobs for the crystal switch, antenna tuner and the final amplifier are in line from left to right across the panel. Metering jacks for the grid and plate circuits are to the left and the right of the microphone jack, respectively. The ventilation cut-out at the top of the cabinet is covered with window screen that is held in place by a chart frame.

September 1952
The transmitter is housed in an ICA No. 20812 utility box. This box has a gray hammer-tone finish and measures 4 by 5 by 6 inches. The homemade aluminum chassis which supports most of the components for the rig is made of 1/8-inch stock, measures 4 3/8 inches square, has 1 1/2-inch fold-over at the rear and a 5/8-inch lip at the front. The top surface of the chassis is located 1 1/2 inches up from the bottom of the front panel and these two units are fastened together by means of the jacks for the meter leads and the microphone. Naturally, meter jacks J5, J6 and J7 must be insulated from the metal.

The interior view of the transmitter shows two mica capacitors (connected in parallel) mounted between S16 and ground. This parallel combination was used as C10 only because a single 330-muf. unit was not available. The interior view also shows that the crystals are closely grouped at the rear of the crystal switch. In order to duplicate the compactness at this point it will be necessary to employ crystal sockets similar to the Cinch-Jones type 2KM.

Under the chassis, the amplifier plate coil is fastened in place by the machine screw which passes through the base to the rear mounting bracket of the amplifier tuning capacitor. The form on which the inductor is wound is a Millen type 45000 which has been cut down to a length of 13 1/4 inches. The B&W Miniductor used as the output link, L3, fits inside of the Millen form and may be cemented in place upon completion of the tuning adjustments.

Three tie-point strips are used on the underside of the chassis. A two-terminal job, mounted on the rear wall, supports R6 and the B+ ends of R5 and RFC2. The single-terminal strip, centered in between the oscillator and the amplifier-tube sockets, holds the grid end of C4, RFC2 and

(Continued on page 118)
C1 — 25-µfd, ceramic.
C2, C4 — 120-µfd, ceramic.
C3, C5, C6 — 0.001-µfd, disc-type ceramic.
C7, C8 — 140-µfd, variable (Millen 19140).
C9, C11 — 0.01-µfd, disc-type ceramic.
C10 — 330-µfd, silvered mica.
C12 — 10-µfd, 50-volt electrolytic.
R1 — 68,000 ohms, 1/2 watt.
R2, R3, R5 — 22,000 ohms, 1/2 watt.
R4, R6 — 100 ohms, 1/2 watt.
R7 — 47,000 ohms, 1/2 watt.
R8 — 470 ohms, 1/2 watt.
R9 — 0.47 megohm, 1/2 watt.
L1 — 39 mh; 50-mh, r.f. choke with 1/2 turns removed (National R-33).

La — 11.3 µh; 22 turns No. 22 enam. wire, close-wound, 1-inch diam.
La — 4.1 µh; 15 turns No. 24 wire, 1/8-inch long, 1/4-inch diam. (B&W 3012).
J1 — Coaxial cable connector.
J3 — Microphone jack, double-button type.
J2 — 4-prong connector (Cinch-Jones P-304-AB).
J4, J5, J6, J7 — 'Phone-tip jack (R1, R3 meter shunts).
RFC1, RFC2, RFC3 — 2.5-mh, r.f. choke.
S1 — 2-pole 1-section 5-position selector switch (Centralab 2505).
T1 — Driver transformer, s.p. to p.p. grids, 2.66:1, prim. to 1/4 sec. (Triad A-61X).
T2 — 5-watt modulation transformer, variable ratio, secondary rating 50 ma. (Triad M-1X).

Bottom view of the transmitter. Leads between the crystal holders and S1A pass through a slot at the lower right hand side of the chassis. Bushings to the right of the final tank coil accommodate the through-the-chaiss leads to the amplifier and antenna-coupler capacitors.
Ham-Band Transmitting Loops

BY RICHARD R. HAY, W4LW

Practical-minded cliff-dwellers as well as hams with an experimental urge will find a welcome suggestion in this short story by W4LW. With a 3-foot loop and an output of 10 watts, he has covered up to 2500 miles on 10 c.w.

The antenna system to be described in this article probably won’t interest proponents of the “long wire — strong signal” theory. However, it should have a definite appeal for apartment dwellers and home owners with small lots. Inspiration for this system came from a description of a similar antenna in GE Ham News, July-August, 1950. The idea apparently failed to impress the average ham. However, it seems to have definite advantages where space is at a premium.

Most of the work at W4LW was done in the 40-meter band, and the following data are based on operation in that band. The essential elements for 40-meter operation are shown in Fig. 1. Coil L1 is provided with two taps — one for varying the total inductance, and one for selecting an input impedance equal to that of the coax line. The coil L1, condenser, C1, and the loop, all form a circuit which is resonant at the desired frequency. L1 and C1 are mounted in a protective box provided with a coax fitting for the transmission line and two feed-through connections for the loop. The loop is mounted in a horizontal plane in order to avoid the null which occurs at right angles to the plane of the loop.

Adjustment is as follows:

a) Substitute a 52-ohm dummy load for the antenna system and adjust transmitter for proper loading.

b) Remove dummy load and replace the loop antenna assembly.

c) Set the tap for the coax connection at about 3 turns and tune C1 to resonance at the transmitter frequency. (If necessary, reduce inductance of L1 by shorting turns with the second tap.)

d) Vary the position of the coax tap (retuning C1 each time) until proper loading is indicated.

Fig. 1 — The loop is connected in series with a conventional tank circuit. For a 3-foot loop at 7 Mc., L1 should have an inductance of 2.5 mh. and C1 a maximum capacitance of about 150 µfd.

The position of the coax tap is a fairly critical adjustment and must be set to the nearest 1/4 turn for best results. An s.w.r. indicator would be very helpful, although it can be done by “cut and try.”

Once the correct position of the taps on L1 are determined, it will be desirable to solder the connections. Poor connections will drastically reduce the effectiveness of the antenna. For the same reason, the connections to the loop from L1 and C1 should be of low resistance.

Engineers who have been consulted about this antenna system say that its effectiveness will depend upon the ratio between ohmic losses and the radiation resistance. The installation at W4LW uses No. 12 wire for both the loop and for winding L1. An improvement could probably be effected by the use of heavier wire or even copper tubing.

While specific values for the W4LW installation have been given, these are not necessarily the optimum values. Considerable variation can be made provided that the circuit composed at C1, L1, plus the loop, is tuned to resonance with transmitted frequency and that an impedance match is provided for the transmission line.

It would be desirable to make the loop as large as possible, with corresponding reduction in the inductance, L1. The ultimate would be to reduce L1 to just enough to match the coax line impedance. The larger the loop is made, the greater the radiation resistance. Also, a wider band of frequencies can be covered.

(Continued on page 118)
Controlled Carrier with a Cathode Follower

Another Screen-Grid "Constant Modulation" System

BY JOSE A. VIVARES,* LUIEP

The controlled-carrier system to be described has been in use here for over a year, with excellent results. The idea was born after reading several articles in QST that pointed out the advantages of such systems. The ever-prevalent shortage of radio parts here meant dispensing with a crystal rectifier, and the use of a rectifier tube in the more complex Lippert system was not too appealing. I began thinking about using a triode cathode-follower connected in series with the screen supply, with its grid as the rectifying element, and the circuit shown in Fig. 1 was developed. It performed well from the first time it was put to work, and has now been tested long enough to merit passing along to anyone else who might like to try it.

The Circuit

With the constants shown in Fig. 1, the circuit is used to modulate a single 807 amplifier, but other combinations can undoubtedly be worked out for other tubes and power levels. The 6F6 modulator is conventional and transformer-coupled to the 807 screen. The d.c. voltage across $C_4$ will determine the carrier level of the 807 amplifier — the higher this voltage is, the higher the carrier level will be. The carrier-control 6F6 is a cathode-follower power source for $C_4$ — driving the grid of this 6F6 in a positive direction will charge $C_4$. However, $C_4$ can discharge only through the screen circuit of the 807 stage being modulated.

When no audio voltage appears across $T_1$, the grid of the carrier-control 6F6 is at ground potential, and the voltage across $C_4$ will be low. Thus the screen voltage on the 807 is low, and only a weak carrier is radiated. When an audio voltage appears across $T_1$, it is coupled through $C_4$ to the grid of the 6F6 carrier-control tube, and each positive peak results in a surge of current into $C_4$ and a consequent voltage increase. When the audio voltage is removed, $C_4$ discharges and the carrier level is again reduced.

The magnitude of the voltage across $C_4$ will be determined by the audio voltage, and thus the circuit gives a "constant-modulation" or controlled-carrier system.

There is a highly-distorted audio component in the current passing through the 6F6 carrier-control tube, but it is filtered out by the large capacity at $C_4$. This capacity, $C_4$, also serves as a low-impedance return path for the modulating voltage that is applied to the 807 screen by the secondary of $T_1$.

Operation

In operation, the idling current of the carrier-control tube is practically zero, and the plate current of the 807 is in the neighborhood of 15 ma. Under full modulation by a steady tone, the 807 plate current rises to about 60 ma. Although the carrier increases about 12 db between no and full modulation, listeners who have no S-meters never seem to notice any difference between this signal and normal a.m. signals, and the quality is always reported to be very good.

The transmitter is coupled to the antenna with switch $S_1$ in the "C.W." position (600 volts on the plate) and loaded to 100 ma. plate current. Then $S_1$ is thrown to "P.T." and that's all there is to it. The percentage of modulation can be checked by inspection of the envelope pattern displayed on an oscilloscope when some of the r.f. output is coupled to the vertical deflection plates.

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* Calle 33 No. 1083, La Plata, Buenos Aires, Argentina.

The Measuring-Cup Band Spotter

A Wide-Range Absorption Wavemeter for the Novice

BY RICHARD M. SMITH,* W1FTX

*Technical Assistant, QST.

Just because the crystal in your rig is marked 3725 kc, there is no reason to assume the output is at that frequency. Some frequency-measuring means is necessary. Here is a simple, inexpensive gadget that will enable you to tell when output is in the right band.

It is not necessary to build or buy an elaborate frequency meter for most amateur purposes, especially when the transmitter is crystal-controlled. Much simpler means can serve the purpose just as well. For example, you could hardly want a simpler circuit than that shown in Fig. 1. And as the photographs show, the construction is equally simple. Assembled in a 15-cent measuring cup, this gadget will go a long way toward filling the initial frequency-measuring needs of the Novice licensee. It will also serve the old-timer in many ways when he builds or adjusts transmitters in any ham band from 3.5 to 14 Mc. The cost of the entire unit is less than five dollars, and this figure can be reduced by over fifty per cent if you happen to have a suitable tuning condenser in your junk box.

The measuring-cup wavemeter is nothing more than a tuned circuit covering 3.4 to 15 Mc. with a flashlight bulb in series with it to serve as a resonance indicator. When the coil in the wavemeter is coupled to a transmitter delivering anything from a few watts of r.f. up to a kilowatt and the condenser is tuned so that the wavemeter is resonant at the frequency of operation, the lamp will light. The unit is calibrated so that the frequency at which the power is being generated is read directly from the dial.

Construction of the wavemeter is extremely easy. The measuring cup is used to provide support for the tuning condenser and the calibrated dial, incidentally providing a mounting for the indicator lamp and a handle for the entire unit. The lamp is insulated from the cup by mounting it in a grommet-lined ½-inch hole drilled at the top where it will not interfere with the rotation of the plates of the tuning condenser. The calibration scale is pasted to the face of an aluminum bracket measuring ½ inches wide and 2½ inches high, with a ½-inch lip bent under the cup to form a mounting "foot." This prevents the gadget from rolling off the shelf when stored.

The coil is cemented inside a Quartz-Q coil form 1½ inches in diameter and 1½ inches deep (Millen 46100). Thus the coil is protected from damage and the operator is protected from the high-voltage in the transmitter. The form is mounted ½ inch behind the rear rotor bracket of the tuning condenser by a machine screw and a spacer. The 0-32 screw fits one of the tapped holes that bolt the ceramic spacer bar to the bracket. An insulated tie point is slipped under one of the rear stator connectors of the condenser to serve as the junction point between the tuned circuit and the indicator lamp. One wire from the bracket measuring 3½ inches wide and 2½ inches high, with a ½-inch lip bent under the cup to form a mounting "foot." This prevents the gadget from rolling off the shelf when stored.

The coil is cemented inside a Quartz-Q coil form 1½ inches in diameter and 1½ inches deep (Millen 46100). Thus the coil is protected from damage and the operator is protected from the high-voltage in the transmitter. The form is mounted ½ inch behind the rear rotor bracket of the tuning condenser by a machine screw and a spacer. The 0-32 screw fits one of the tapped holes that bolt the ceramic spacer bar to the bracket. An insulated tie point is slipped under one of the rear stator connectors of the condenser to serve as the junction point between the tuned circuit and the indicator lamp. One wire from the bracket measuring 3½ inches wide and 2½ inches high, with a ½-inch lip bent under the cup to form a mounting "foot." This prevents the gadget from rolling off the shelf when stored.

One of the handiest "tools" in ham radio is the absorption wavemeter. This unit, built around an aluminum measuring cup, is designed to fit the requirements of the Novice licensee. Construction is simple — the entire assembly is held together with one nut.
lamp goes directly to the rotor terminal on the rear of the condenser, the other to the insulated tie point. The coil is connected from the stator terminal of the condenser to the lamp at the insulated tie point.

If you use the same parts we specify below Fig. 1, and wire the unit with approximately the same lead lengths shown in the photographs, you will be able to use the calibrated dial scale reproduced in Fig. 2. It can be cut out and pasted on the aluminum bracket, or traced onto another sheet of paper. If other parts are used, the wavemeter can be calibrated by using a grid-dip meter in conjunction with a calibrated receiver.

Using the meter is also easy. Assume for a minute that you have tuned up your transmitter, but are not sure that its output frequency is in the desired band. With the transmitter turned on, hold the wavemeter so that the coil is within a few inches of the plate tank coil of your output stage. Turn the dial until the indicator lamp lights, showing that the wavemeter circuit is tuned to the same frequency as the transmitter output. Don’t get too close to the tank circuit or you may burn out the indicator lamp.

The same procedure may be followed for any tuned circuit in which power is flowing. Whenever the wavemeter is tuned to the same frequency as the power in the tuned circuit, it will absorb some of that power and then dissipate it in the form of light in the indicator. If the stage you are checking has a plate meter, you can observe the effect of the wavemeter on the tuned circuit to which it is coupled. As the wavemeter is resonated, the plate-meter reading will rise slightly as the wavemeter loads the circuit and takes power from it to light the lamp.

This little gadget cannot be expected to be without its limitations. There are some things that it cannot tell you. For example, its calibration is not accurate enough to permit its use as a frequency meter for close-tolerance reading. It will tell you, however, whether your output is in the 3.5-Mc. range, in the 7-Mc. range (as it would be if you happened to tune up on your second harmonic), or somewhere in between (as it might be if the amplifier was unstable and oscillating by itself). It is for this reason that we call it a band spotter, rather than a frequency meter. In the case of a crystal-controlled transmitter, you can be reasonably certain of avoiding off-frequency notices if your crystal is actually in the band, provided that you are sure the output is in the band you think it is. This gadget enables you to be sure.

Rear view of the measuring-cup wavemeter. The coil is mounted on the rear of the tuning condenser inside a protective Quartz-Q form. Also shown is the method of mounting the resonance-indicating lamp in a grommet-lined hole through the side of the cup.

September 1952
Matching Coax Line to the Ground-Plane Antenna

Design Data and Application

BY ROBERT T. DECAMP,* W2AFG

A ground-plane antenna is a vertical quarter-wave antenna using an artificial metallic ground, usually consisting of three or more rods perpendicular to the antenna and extending radially from its base. When used on v.h.f., this type of antenna usually is mounted on a mast high enough to clear surrounding objects, and in practice the low-loss metallic ground and low vertical angle of radiation combine to give the ground-plane antenna an actual advantage of the order of 3 db. over a dipole at the same height.

One reason why the ground plane has not had extensive use in amateur circles is that its low driving-point impedance is not a good match for the characteristic impedance of standard coaxial cables. This paper describes a method of adjusting the termination, as viewed by the transmission line, to any desired value higher than the radiation resistance, without appreciably altering the actual radiation resistance of the antenna.

In this method the antenna is first made slightly shorter than the resonant length so it "looks like" a resistance in series with a capacitance. If the length is chosen to make the capacitive reactance the proper value, and the antenna terminals are then shunted by an inductive reactance of proper value, then the impedance at the driving point as viewed by the transmission line will be resistive and of a value that will match the line impedance.

The inductive reactance required can be supplied conveniently in the form of a stub shorted at its far end. It is also convenient to make the stub out of the same type of cable used for the transmission line to the transmitter. The system is indicated in Fig. 1, which shows a typical installation using four radial rods.

The various values required for proper matching will depend on the particular type of line used, as well as on the radiation resistance, resonant length, and reactance per unit length of the antenna. These antenna characteristics are dependent on the length/diameter ratio — that is, the ratio of a half wavelength in free space to the diameter of the antenna element — and allowance must be made for this factor. The necessary information for design purposes is given in Figs. 2, 3 and 4.

**Procedure**

Determining the antenna dimensions can be reduced to a series of steps, as follows:

First determine \( M \), the ratio of a free-space half wavelength to the conductor diameter. The following formula may be used:

\[
M = \frac{5006}{kD}
\]

where \( k \) = frequency in megacycles,

\( D \) = conductor diameter in inches.

*Fig. 1 — The ground-plane antenna in typical form. The number of radials in the ground plane should not be less than three, but a larger number can be used if desired.

The antenna length, \( L_a \), matching stub length, \( L_s \), and radial length, \( L_r \), are determined as described in the text, for matching a transmission line of given characteristic impedance. As shown in the insert, the radials and the outside conductors of the stub and line are all connected together.*
Fig. 2 — The antenna-length factor as a function of the ratio of a free-space half wavelength to the conductor diameter. The length factor multiplied by a free-space quarter wavelength is the length of a quarter-wave radiator resonant at the selected frequency.

Using the value of $M$ so found, read the length factor ($K_a$) from Fig. 2, the reactance change per 1 per cent change in length ($K_x$) from Fig. 3, and the radiation resistance ($R_r$) from Fig. 4.

Since the antenna is to be shortened, these values must be modified appropriately. The actual radiation resistance, after the antenna is properly shortened, will be

$$R_a = R_r - \frac{Z_1}{4R_r} \text{ ohms,}$$

(2)

where $R_a$ = radiation resistance after shortening,

$Z_1$ = characteristic impedance of transmission line to be matched.

The proper value of capacitive reactance in the shortened antenna is given by

$$X_a = SR_a \text{ ohms,}$$

(3)

where $X_a$ = capacitive reactance of antenna, and

$$S = \sqrt{\frac{Z_1}{R_a} - 1}. \quad (4)$$

The antenna length that gives the proper capacitive reactance is

$$L_a = \frac{2953K_xK_b}{f} \text{ inches,}$$

(5)

where $L_a$ = required antenna length, and

$$K_b = 1 - \frac{X_a}{100K_x}. \quad (6)$$

The only remaining steps are to find the dimensions of the inductive stub and the length (Continued on page 180)

Fig. 3 — Reactance change with antenna length as a function of $M$, for quarter-wave ground-plane (or grounded) antennas. If the antenna is longer than the resonant length the reactance is inductive; if shorter, the reactance is capacitive. The curve is accurate for lengths within 10 per cent of the resonant length. Multiply reactance values by 2 for half-wave antennas.

Fig. 4 — Radiation resistance of a quarter-wave antenna (with ground plane or grounded) as a function of $M$. The values apply only when the antenna is of the resonant length. Multiply resistance values by 2 for half-wave antennas.

September 1952
A Bandswitching Exciter for 50, 28 and 21 Mc.

35 Watts Output on Three Bands in 3 1/2 Inches of Panel Space

BY EDWARD P. TILTON,* WIHDQ

For years many 6-meter enthusiasts have also worked on 10. The lower frequency has made a good medium for comparing notes on the higher, and the two bands combine readily in a transmitter design. The 21-Mc. band now looms as a likely substitute for 28 Mc. for DX work, for the next few years at least, and it can be added to a bandswitching exciter without appreciable complication. Crystals or VFO can be in the same general frequency range for all three bands, making the combination a natural for the v.f.f. man who likes a shot of DX now and then.

The primary factor in mind when this exciter was laid out was reduction of TVI potentialities, so provision was made for complete shielding, and all power leads were by-passed where they come out of the chassis. A common cause of TVI in rigs for 50 Mc. and higher is the radiation of unwanted harmonics of the starting frequency in the exciter. Much of this can be eliminated by using a high starting frequency, but such an approach is not practical for multiband applications. Fortunately, the shielding and filtering methods needed to reduce harmonic radiation from 21- and 28-Mc. stages also take care of the high-order harmonics of the oscillator frequency, so no special TVI precautions were required here for the v.f.f. portion of the exciter.

If a multiband exciter is to be completely shielded, plug-in coils are out—unless you like to take lots of time shifting bands. Building inside the chassis provides the shielding and makes for a neat compact design. The 6146 output stage delivers enough drive for almost any final stage you'll ever want to use on 6, 10 or 15 meters. Output on 48 Mc. is available, too, for tripling to 144.

If we are to have 50-Mc. output we also have, inherently, the means of frequency control for 144 Mc. as well, as customary practice in 2-meter transmitter design involves a stage that triples from 48 to 144 Mc. Bandswitching is easily handled at 21, 28 or 50 Mc., but switched circuits are almost out of the question at 144 Mc., so this band is taken care of at WIHDQ by a tripler stage that is part of the 2-meter portion of the station, described recently in QST.†

Circuit Details

The exciter circuit follows standard practice throughout. The oscillator is a 5763 Tri-tet with provision for 10 crystals and VFO input. Crystals may be in the 3.5-, 6-, 7-, 8-, 14- or 24-Mc. ranges. VFO output should be 7 to 9 Mc. On 21 Mc. the oscillator output is on the signal frequency, and best results are obtained with 7-Mc. crystals, tripling in the plate circuit. For 28 Mc. the oscillator doubles to 14 Mc. with

* V. H. F. Editor, QST.

The 4-band exciter occupies less than the full height of a 3 1/2-inch rack panel.
7-Mc. crystals, quadruples from 3.5 Mc., or works straight through with 14-Mc. overtone crystals. For operation on 50 or 144 Mc., the oscillator output is on 24 to 27 Mc., quadrupling or working straight through, for 6-, 8-, or 24-Mc. crystals, respectively. The 100-µfd. tuning capacitor at C6 tunes the oscillator plate circuit from 14 to 27 Mc., so no bandswitching is needed in this stage.

Another 5763 follows the oscillator, working straight through on 21 Mc., or doubling to 28 or 48 to 54 Mc. Two coils, L2 and L3, and a 50-µfd. condenser, C10, cover 21 to 30 Mc., and 48 to 54 Mc., respectively. In case trouble is encountered in making the 5763 run stably as a 21-Mc. amplifier, a third switch position is available for connecting a damping resistor, R8, in series with L2.

The output stage uses a 6146, with a tapped coil for 21 and 28 Mc., and a second coil for 48 to 54 Mc. Output coupling links in these two coils are also switched. Up to about 40 watts output is available, though for the purpose intended nothing like that amount of power is required. The characteristics of the 6146 are such that it works nicely over a wide range of plate voltages, so this rig may be used in exciter service with as little as 300 volts on the final, or it may be used as a complete transmitter at up to 500 volts. A 2526 may be used in the final stage (the two tubes are interchangeable as to socket connections) where its power output is adequate for the job at hand.

**Construction**

If TVI preventive measures are to be effective in a transmitter operating on frequencies lower than 50 Mc. the r.f. section must be completely shielded. This requirement will be important to v.h.f. men, too, when u.h.f. TV stations come on the air, so now is none too soon to get the habit of shielding and filtering rigs designed for use on 50 Mc. and higher. Shielding, in this case, is taken care of by building the rig inside a standard 3 × 4 × 17-inch aluminum chassis. You will note only the crystals, the

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**Fig. 1 — Schematic diagram and parts list for the bandswitching exciter.** Dashed lines show the separation of components by the shield partitions.

C1 — 5-µfd. ceramic or mica — see text.
C2, C3, C4, C6, C8, C9, C11, C12, C14, C16, C18, C19, C20, C21, C22, C23, C24 — 0.001 µfd. disk ceramic.
C6 — 150-µfd. mica or ceramic — see text.
C5 — 100-µfd. midget variable, shaft-mounting type.
C10 — 50-µfd. midget variable, shaft-mounting type.
C9 — 15-µfd. mica or ceramic.
C17 — 20-µfd. double-spaced midget variable, shaft-mounting type.
C25 — 50-µfd. ceramic or mica.
R4, R5 — 0.1 megohm, 1/2 watt.
R2 — 120 ohms, 1/2 watt.
R3, R6 — 22,000 ohms, 1 watt.
R8, R9 — 1000 ohms, 1/2 watt.
R7 — 100 ohms, 1/2 watt.
R10 — 7.5 ohms, 1 watt (two 15-ohm 1/2-watt resistors in parallel).
R0 — 33,000 ohms, 1 watt.
R1 — 20,000 ohms, 1 watt.
R11 — 68 ohms, 1/2 watt.
L1 — 8½ turns No. 20 tinned, 3/8-inch diam., 1/2 inch long (B & W Miniductor No. 3011).
L2 — 7 turns like L1, 3/16 inch long.
L3 — 5 turns No. 20 tinned, 1/2-inch diam., 1/2 inch long (B & W No. 3006).
L4 — 2 turns No. 18 push-back, 3/4-inch diam., coupled to cold end of L5.
L5 — 4 turns No. 20 tinned, 3/4-inch diam., 1/2 inch long (B & W No. 3010).
L6 — 4½ turns No. 20 tinned, 1/2-inch diam., 1/2 inch long, mounted inside cold end of L5. (B & W Miniductor No. 3003.)
L7 — 11 turns like L1, tapped at 7 turns, 3/4 inch long.
L8 — 9 turns B & W No. 3004, 1/2-inch diam., 3/8 inch long, mounted inside cold end of L7.
J1, J2, J3 — Coaxial fitting. J1 is for VFO input.
J4 — Closed-circuit jack.
J5, J6 — Tap jack.
F7 — 8-pin male chassis fitting.
RFC1 — 100-mh. r.f. choke (National R-100-S).
RFC2 — Parasitic choke, 6 turns No. 20 enameled, 3/4-inch diam., 3/8 inch long.
S1A, S1B — 11-position 2-section ceramic wafer switch. (Made from centralab P-122 index assembly and 2 centralab type Y switch sections. Complete assembly CRL 2513.)
S4 — Similar to above, but single section (CRL 2501 on 2503, wafer Type X or Y).
S3A, S3B — Same but 2-pole 3-position single section (CRL 2505, wafer type RR).

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Looking into the bandswitching exciter-transmitter from the top front. Oscillator components are in the left compartment, the doubler and power connector in the center, and the output stage at the right. Note that the 6146 socket is mounted inside the output stage compartment.

first two tubes and the filament transformer are outside, these being mounted on the rear wall. This not only provides for the shielding, but it makes possible a very neat and compact unit, the whole affair taking up only 3 1/2 inches of rack space vertically.

Despite the small size, it is not difficult to assemble or wire. Arrangement of parts in the first two stages is not particularly critical, the principal consideration being to mount the second 5763 in such position that the coupling lead from the previous stage is short. The grid circuit should be isolated from the rest of the second-stage components, to reduce the tendency to self-oscillation when the stage is operated straight through on 21 Mc. The tube socket is near the partition that separates the two stages, and the lead from $C_{2s}$ to the tube grid is made from a short section of RG-59/U coax, run through a slot filed in the top of the partition.

All power wiring is done with shielded wire, and the inner conductor of each lead is bypassed with a miniature 0.001-μfd disk ceramic where it comes out to the power plug. Leads from the tube plate to the bandswitch, $S_2$, and thence to the tuning condenser, $C_{10}$, are made with 1/4-inch wide copper strap, to hold down lead inductance. A piece of flashing copper 3/4 by 1/4 inches is soldered across the tube socket separating Pins 1 and 9, to isolate the grid and plate leads.

The arrangement of parts in the output stage is important. Note that, contrary to common practice, the 6146 socket is mounted on pillars on the tube side of the partition. Cathode, heater and screen pins (1, 3, 4, 6 and 7) are bypassed individually to separate points on the partition, with the shortest possible leads; in fact, with virtually no leads at all. Heater voltage and cathode keying leads are brought through the partition with shielded wire, and the grid-control and screen connections are run through on short lengths of stiff wire covered with spaghetti sleeving for insulation.

Two other layouts were tried, both with the 6146 socket mounted in a hole in the partition in the conventional way. No amount of screen and cathode by-passing could stabilize the stage in either case. When the parts arrangement shown was tried the 6146 showed no instability, other than a weak 250-Mc. parasitic that was cured by the insertion of $RFC_2$ in the plate lead. The value of this mounting arrangement is that it provides a direct plate-to-cathode return, whereas the return circuit with the conventional below-chassis mounting of the socket passes around the edge of the hole to the opposite side of the partition or chassis. This revised approach has proved its worth in previous tetrode amplifiers, and is well worth a try in extremely tricky stages.

Another important point in the mechanical design of this unit is the use of tuning condensers that are shaft mounted. The rotors of $C_6$, $C_{10}$ and $C_{17}$ must be grounded directly to the chassis with their mounting nuts. Running the shaft through a clearance hole and then making the ground connection by means of the extension of the rotor star spring leaves the rotor shafts hot for r.f. at harmonic frequencies. They and their knobs (particularly if the latter have metal rings) then act as miniature antennas for radiation of harmonic energy. Two more such "antennas" were provided by the tip jacks, $J_5$ and $J_6$, used for metering the multiplier- and final-stage grid currents. Despite the isolation afforded by resistors $R_4$ and $R_9$, these jacks were hot with harmonics until by-passed individually.

The output coupling links, $L_6$ and $L_8$, are the smallest diameter B & W Miniconductor, which makes a close fit inside the larger size used for $L_5$ and $L_7$. They are held in place with household cement. A coupling link is also provided for $L_9$, so that a small amount of power can be taken off at 48 Mc. if desired. This is made of self-supporting stiff insulated wire, coupled closely to the cold end of $L_9$.

Note that the front-panel appearance is com-

pletely symmetrical, the controls being spaced at regular intervals horizontally, and in the center of the panel vertically. In addition to providing a pleasing appearance, this has the practical advantage of permitting operation of the unit either side up — at least until the dial index marks and decals are applied. In our case the chassis is bottom up, with the “bottom” cover at the top. This allows ready access to the inside when the unit is in its normal operating position, but nothing prevents its being used the other side up, if the builder so desires. Ventilation of the 6146 is afforded by twenty 1/2-inch holes drilled in the top and bottom surfaces over and under the tube.

Testing and Use

For initial tests a power supply delivering 200 to 250 volts is adequate. Each stage has its plate-screen power lead brought out to the plug separately, so that individual metering is possible. Applying voltage through Pin 3, we note that the stage draws low current until oscillation is obtained, because of the cathode bias. Plug a low-range meter into \( J_5 \) to read the grid current of the following stage, and tune \( C_9 \) for maximum indication, which will be about 0.5 to 1 ma. at normal operating voltage. The oscillator plate-screen current will be around 20 ma.

Should the oscillator refuse to start, try other crystals, and then experiment with the values of \( C_1 \) and \( C_3 \). The grid-to-cathode capacitor, \( C_1 \), may not be necessary, particularly if crystals no lower than 6 Mc. are used. Use the lowest value that will permit oscillation with all crystals. The value of \( C_3 \) may be critical when overtone-type crystals are used. Improper values at either of these positions may result in intermittent oscillation, or none at all.

Check the output frequency with a calibrated wavemeter, or by listening with a receiver whose calibration can be relied upon, and proceed to the following stage. Plug the grid meter into \( J_6 \), apply power through Pin 4, and check the output frequency when \( C_{16} \) is tuned for maximum grid current. At least 2 ma. should be available. Check for self-oscillation by removing excitation. Should self-oscillation occur on the 21-Mc. range, switch in the damping resistor, \( R_5 \). This should be the lowest value permissible, as the output from the stage drops rapidly as the series resistance is increased above a few ohms.

When around 2 ma. of grid current is obtained the output stage may be checked. This may be done initially with 250 to 300 volts applied through Pins 5 and 6, using a 25-watt lamp plugged into \( J_5 \) for a dummy load. Cutting the excitation (do it only briefly — these 6146s draw a tremendous amount of plate current!) should result in zero grid current. If the stage is operating correctly the output should be around 15 watts with 300 volts on the plate.

Increasing to 400 to 450 volts it should be possible to get at least 35 watts output on all frequencies. In an enclosed layout of such small dimensions it is not advisable to go much beyond this level, as the heat dissipation may be high enough to damage the small coils used. Where the exciter is used to drive a high-powered tetrode final stage, as is the case on 21, 28 and 50 Mc. at the writer’s station, 300 volts on the 6146 and 200 to 250 volts on the 5763s is plenty. The rig is also used occasionally as a complete transmitter, modulating the output stage on 28 or 50 Mc., at 30 to 50 watts input. The operating conditions in all stages can be adjusted to suit the builder’s own requirements by varying the screen resistor values. The exciter is keyed in the 6146 cathode lead for c.w. operation.

Some results of TVI tests may be of interest. Let it be said here that the shielding and bypassing are not, in themselves, TVI “cures” — but they do give us a good start. You can’t just hang an antenna on such a rig and blaze away on any frequency, however. The precautions taken in the design of the rig keep the harmonic energy inside the case, except at the

(Continued on page 188)

Rear view of the exciter. On the rear wall at the right are 10 crystal sockets of various types. Then come the two 5763s, the power plug, the filament transformer, and the output coaxial fitting. Components on the inside front wall are, in the same order, the crystal switch, oscillator tuning, doubler bands switch, doubler tuning, and final hampswitch.

September 1952
Identifying Frequency-Meter Harmonics

A Simple Method of Checking Multiples of the Fundamental

BY N. K. CHAMBERLIN *

- When using the harmonics of the fundamental range of a heterodyne type frequency meter, identification of the number of the harmonic that is beating with the unknown frequency is often puzzling unless the approximate value of the frequency being checked is known beforehand. Here is a simple method that removes most of the guesswork.

In using the harmonics of a frequency generator, or heterodyne frequency meter, to check an unknown frequency, it is necessary, of course, to identify the number of the harmonic beating with the unknown, as well as the fundamental frequency of the oscillator in the generator. With the number of the harmonic determined, the unknown frequency is then obtained simply by multiplying the fundamental frequency read on the calibration by the number of the harmonic. For instance, if the fundamental calibration of the generator or frequency meter is 3500 kc., and we know that it is the third harmonic that is beating with the unknown frequency, then the unknown frequency is 3500 \times 3 = 10,500 kc.

This would be a simple process were it not for the difficulty often experienced in identifying the number of the harmonic. A little thought, however, will show that there is a simple way of determining the harmonic number (or determining the frequency without actually knowing the harmonic number) provided that the checks are carefully made.

As a start, let us plot on graph paper, as in Fig. 1, the frequency curves for a fundamental of 2000 to 4000 kc. (this is one of the ranges covered by the BC-221 frequency meter) and several of its harmonics. Now suppose we have an oscillator running at some unknown frequency and we listen on a receiver tuned to the oscillator frequency, or listen on the monitoring portion of the BC-221. We start tuning the frequency meter from the high-frequency end, listening for beats between the frequency meter and the oscillator being checked. Suppose we hear the first beat with the meter tuned to 3600 kc., and the next beat we hear comes at 2400 kc. Since the signal was heard at more than one point on the dial, it is obvious that the unknown frequency does not lie in the fundamental range of the meter. It is obvious, too, therefore, that the unknown frequency must be a harmonic of 3000 kc. and also a harmonic of 2400 kc. In addition, since no other beats were found between 3600 and 2400 kc., we know, regardless of what the actual numbers of these harmonics may turn out to be, the number of the harmonic in respect to 2400 kc. is one greater than the harmonic number in respect to 3000 kc. (If the unknown is the fourth harmonic of 3600 kc., it must also be the fifth harmonic of 2400 kc., etc.)

Referring to Fig. 1, we draw vertical lines from 3600 and 2400 kc., crossing the harmonic lines. If we have plotted the lines for a sufficient number of harmonics, we will find that there is one harmonic frequency, and only one, where the 2400- and 3000-kc. lines cross adjacent harmonic lines at the same frequency. In Fig. 1, we find that the 2400-kc. line and the third-harmonic line intersect at 7200 kc. Also, the 3000-kc. line and the second-harmonic line intersect at 7200 kc. Therefore the unknown frequency must be 7200 kc.

Any unknown frequency within the usable harmonic range of the frequency meter could be determined graphically in the same manner were it not for the fact that the graph becomes impractically cumbersome and difficult to read with

(Continued on page 184)

Fig. 1—Frequency-meter curves showing the calibrated fundamental range and its harmonics.

* 5810 Greene St., Philadelphia 44, Penna.

QST for
7-Mc. Beam for the Small Yard

A 3-Element Parasitic Array with Quarter-Wave Vertical Elements

BY A. D. MAYO,* W5DF

When the first 20-meter beams came into use, hams using dipoles immediately recognized that they were outclassed by more punch, and today it is futile to compete seriously for 20-meter DX without a good beam. However, on the 7-Mc. band, beams are extremely rare, the reason being that the common types become too large when a half wavelength is about 66 feet. In terms of developing beams that are practical for small city lots, DX operation on 40 is years behind its counterpart on 20 meters.

The 7-Mc. 3-element beam in use at W5DF will fit into almost any back yard and provides high gain — presumably 7 to 8 db. over a single vertical element, but much more compared with a horizontal dipole at the usual height of thirty to forty feet. This is a DX antenna; at moderate distances of 300 miles or so it may not be as good as a low horizontal dipole since it concentrates the radiation at the low angles desirable for DX work. The writer has proved to his own satisfaction, at least, that it will put a signal into Europe that competes with the East Coast, or into VK and ZL that competes with West Coast stations on practically an equal basis. Almost all of the other stations are using antennas that spray the radiation all over the place instead of in the desired direction and at the desired angle.

The 3-element antenna offers many choices of pattern, and the pattern can be varied by the tuning of the two parasitic elements. Instead of describing all of the possible patterns, perhaps it is best to describe the one which will be obtained when the tuning instructions furnished here are followed. This adjustment can be obtained without a field-strength meter and the only instrument needed is a flashlight bulb with loop. This adjustment will provide slightly less than absolute maximum gain directly forward in the desired direction, but it will provide 60 degrees coverage before the output drops to the half-power points and it will cover 90 degrees in the horizontal plane before the power drops to that provided by a single element. Over the remainder of the 300-degree horizontal plane the radiation drops off rapidly after 45 degrees off the central ray is passed, and in the rear 180 degrees it is generally down 10 to 15 db. A pair of nulls appears in the rear and can be rotated with tuning of the parasitic elements. These measurements were taken on the ground.

Antenna Arrangement

Fig. 1 shows a generalized version of the antenna. It may be visualized as a 20-meter 3-element horizontal beam which has been lengthened to 66 feet, sliced through the center, rotated to bring the elements vertical, and with the ground replacing the missing half of the antenna. To eliminate the necessity for making the elements some exact physical length, tuned circuits are inserted in each one of the antennas. The antenna is therefore very tolerant of physical lengths and spacings. No harm results if the lower ends of the two parasitic elements are folded back and brought into the shack along with the lead-in from the center element. This permits having all

*209 Conti St., Jackson, Miss.
three tuning units in the shack for experimental tuning. Ground leads are brought in with these lead-ins, so the current flow will tend to cancel out radiation in the horizontal plane.

$L_1$, $L_2$, $L_3$, and $L_4$ may have any inductance that will tune to 40 meters with condensers $C_1$, $C_2$, $C_4$ and $C_5$, respectively. The writer used surplus components and the condensers have about 150 or 200 $\mu$fd. full capacity. The condenser should hit resonance at about half capacity to give some leeway in tuning off resonance with various antenna-element lengths. $L_2$ and $L_3$ should have ample power rating because they will carry 5 to 10 amperes with high power and close spacing of the elements. Coils wound with No. 12 wire are satisfactory for a kilowatt input. $L_2$ and $L_4$ can be smaller — 50- or 100-watt size. All of these variables carry high r.f. voltage, but 3000-volt condensers have been used at $C_2$ and $C_4$ without breakdown. If the elements are about 33 feet long, from the top to the ground wires, series tuning will resonate the elements. If either the element or its lead-in is lengthened, a point will be reached where parallel tuning is necessary.

The transmission line does not have to be coaxial cable; any type of line can be used to feed the center element. High-impedance lines may require $L_3$ and $C_4$ to be connected in parallel. The center element may be driven by tapping the line on $L_3$ and eliminating $L_2$ and $C_6$, or with coax it may be driven by connecting the coax in series with $L_2$ at the ground end. However, these simplified methods of driving this element do not permit much flexibility in matching impedances. All of these methods of feed have been used at W5DF on various antennas.

**Impedance Characteristics**

The antenna has low radiation resistance and it tunes sharply. It is not for broad-band use, at least in the form shown here. At 7000 kc. it will cover 50 kc. with no noticeable change in tuning, and it will cover 100 kc. if some decrease in loading can be tolerated at the extremes. The radiation resistance is at its lowest value when the two parasitic elements are tuned to resonance, and when closest spacing between elements is used. If broad-band tuning is desired the spacing between elements may be increased to perhaps 20 feet, but the gain of the antenna is reduced. If the spacing is increased to 35 feet there will be practically no gain.

If the antenna is to be used for 20-meter as well as 40-meter operation, which is quite practical, the spacing probably should be kept down to 8 or 10 feet. The spacing should be between 0.1 and 0.15 wavelength for maximum gain. If the spacing exceeds 0.15 wavelength the front-to-back ratio will be reduced. At spacings less than 0.1 wavelength the gain is preserved very well until a spacing of 0.05 wavelength is reached, but the tuning is more critical and the radiation resistance is reduced.

**Ground System**

Low radiation resistance must be recognized as a hazard that can lead to serious losses unless adequate steps are taken to provide a low-resistance ground system. Ground resistance can be kept at a minimum by having a ground made
of a material with two desirable characteristics, large surface area and high conductivity. The ground itself falls down on the second; its conductivity is low at 7000 kc. One desirable ground might be a metal roof, if the antenna is mounted on it. Another desirable ground plane would be a set of 4 radials, at 90 degrees in the horizontal plane, 1/4 wavelength long, with the ends insulated.

At W5DFE, located on a small city lot, it was convenient to erect a two-wire clothesline for a ground system, thereby killing two birds with one stone and gaining back a wee bit of good-will from the XYL about this entire yard full of antennas, not to mention the house. It has often been said that we moved out here to obtain some room, yet you cannot walk in the yard without tripping over an old wire and breaking a leg, or getting a wire under the chin and breaking the neck.

The clothesline is about 30 feet long and extends in one direction from the center antenna. More wire extends in the other direction. These wires are No. 10 zinc-coated steel. Ground rods are used at each pole and at the end of the clothesline. Connections to these parts are adequately soldered. Various other metallic objects such as the plumbing pipes in the house and the buried coax that runs around the yard are all securely grounded to the place where the clothesline ends. All of these materials act as conductors and effectively lower the ground resistance; however, the clothesline itself is sufficient and may be used alone if other objects do not exist. In the absence of plumbing or buried cables, it might be well to run the ground out in two or more directions, or use a wire fence in the connection if one is available. Long ground wires should not be permitted to float above ground, electrically. The ground wires should be grounded to stakes driven in the ground at intervals. Resonant operation is undesirable because it may cause the ground system to radiate and disturb the beam pattern or it may cause a burn on some passer-by if hot with r.f.

**Tuning**

Referring to Fig. 1, the simplified tuning procedure is as follows:

1) Decouple or remove $L_6$ and tune $C_5$ for resonance in the final tank, as indicated by minimum plate current. Mark this dial point, as the final adjustment should return $C_5$ to it.

2) Couple $L_2$ loosely to the final tank. Couple $L_3$ closely to $L_2$. Alternately adjust $C_2$ for maximum plate current and $C_4$ for minimum plate current. Do not attempt to tune for maximum antenna current in the center element. Ignore this antenna current, as it can be increased by too many misadjustments in the entire system, some components of which must operate off resonance for proper phasing of the parasitic elements. Several misadjustments can increase the antenna current by lowering the antenna resistance, not by increasing the radiated power.

Fig. 3 — Circuit for remote reversal of direction. The two auxiliary condensers add just enough capacitance to the tuned circuit to reverse the direction of fire. To adjust, first adjust $C_1$ or $C_2$ with relay contacts open; then bring into tune by adjusting $C_6$ and $C_7$ with the corresponding relay closed.

3) Tune $C_1$ for maximum brilliance of $I_1$, coupled to $L_1$. Decrease the capacity of $C_1$ until the bulb is slightly dimmer. (Maximum brilliance is desired, but it is well to go a little on the low-capacity side for safety since if this adjustment gets a little on the high-capacity side it will cause a sharp null to appear in the forward direction.)

4) For maximum radiation in direction "A," tune $C_2$ for maximum brilliance of $I_2$, coupled to $L_2$, then increase the capacity of $C_3$ until $I_2$ almost goes out. This will increase the brilliance of $I_1$ slightly. The correct adjustment will result in maximum brilliance of the bulb in the parasitic element toward the direction in which maximum radiation is desired. An antenna-current meter may be used in the parasitic element to find this adjustment, or an indicating-type absorption wavemeter may be coupled to the antenna lead on this parasitic element and used as an indicator. At night the flashlight bulb can be seen plainly.

5) For maximum radiation in direction "B," tune $C_3$, then $C_1$, for maximum brilliance of $I_2$ coupled to $L_4$.

6) To complete the tuning, retune $C_2$ for maximum plate current and retune $C_4$ for minimum plate current, alternately, until no further tuning of $C_5$ will increase $I_2$ and no further tuning of $C_4$ will reduce $I_2$. Adjust the coupling of $L_5$ to give the desired plate loading.

As with any antenna coupler, it will be found that the coupling between $L_2$ and $L_3$ may be loosened and $L_5$ coupled more closely to the final tank to get the desired loading. There is a best combination. Adjustment of the coupling between $L_2$ and $L_3$ reflects various resistances to the termination of the coaxial feeder and affects the standing-wave ratio on the coax. An s.w.r. bridge will permit exact adjustment. $L_2$ and $C_4$ permit tuning the system to exact resonance, removing reactances added by other elements in the coax circuit, and assist in harmonic reduction. Final adjustment of $C_5$ for minimum $I_2$ should leave it at the same point as in Step 1.
Reversing the direction of radiation should not require any readjustment of $C_3$, $C_4$ or $C_5$. If reversal of direction by adjustment of $C_1$ and $C_2$ does disturb resonance or loading to any extent, it indicates that it is not symmetrical from an electrical standpoint, and under some conditions the whole thing can appear so snarled up and hopeless as to be beyond possible aid. The tuning procedure outlined above should always lead the adjustments to the correct point if done step by step.

Receiving

For DX work this antenna should by all means be used for receiving. Many hams will say that vertical antennas for receiving will pick up more noise than horizontal antennas, or that vertical antennas increase $BCI$. This is just another way of saying that vertical antennas will have more low-angle radiation, and that is what we are after. Reject low-angle transmission or reception and you reject DX, because DX signals are not bouncing down from something overhead.

In order to take advantage of the directional effects of this antenna for receiving it is essential that the input to the receiver be matched to the transmission line. The HRO receiver in use at W5DF has an input impedance of several hundred ohms, and it was found that a relay in the coaxial line to the antenna tuner did not work out well. A relay was installed to throw the actual antenna lead to a coil and condenser connected in series, and 300-ohm Twin-Lead was used to the HRO, as shown in Fig. 2. The Twin-Lead was tapped on the coil about four turns from the ground end. With the condenser tuned for maximum signal on the HRO the system is in tune.

When the receiver is matched as described above, the beam may be tuned and nulls brought to bear on any signal. Adjustment of both $C_1$ and $C_3$ are required for maximum rejection. The nulls will usually occur at some adjustment other than the two desired ones for transmitting, but this operation suggests interesting possibilities for receiving when the condensers $C_1$ and $C_3$ are adjustable from the operating position. When the null is adjusted on a station during reception in a QSO and this adjustment is used for transmitting, on the next transmission the station will usually comment on a 2 or 3 S-point reduction in signal strength. The nulls are sharp and very noticeable in reception, while the maxima are very broad and may not be determined accurately with the receiver.

Changing Direction

Although no drawings are shown for antennas with more than three elements we have used 5-element beams on 20 meters with sharp directivity and high gain. A 33-foot element on 20 meters does not require an extensive ground since practically no current flows in it, this being a half-wave antenna. Likewise it is not necessary to insulate the metal conduit from the pole if it is attached about 16 feet off ground, since the antenna is at ground potential at this point. A beam tuned to 23 meters in close proximity to the 3-element 40-meter beam did not seem to affect it in any way, and perhaps is comparable to the proximity of a set of 10-meter elements mounted on the same boom with 20-meter elements in a rotary beam. This led us to a short cut in devising a second beam for other directions.

The present beam is directed along a bearing of 60 degrees, toward North Africa from here. Europe is covered easily, and in the reverse direction, 210 degrees, ZL is covered well along with most of VK. South Africa is about 40 degrees off the beam and it was found we did not sock into ZS like Europe. Two additional elements were erected along a line 40 degrees south of the European line to bring 100 degrees and 280 degrees along the line of this beam. These elements are also 14 feet from the center element. By means of a d.p.d.t. switch the tuning units can be switched from one set of two parasitic elements to the other set and the beam directed at ZS or the North Pacific. The two elements not in use have no r.f. on them and do not seem to affect the original set in any way. This suggests the possibility of a 7-element arrangement for complete coverage.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

W2VBW, Clayton E. Ebersberger, Romulus, N. Y.
W3CIZ, Herrmann E. Hobbs, Silver Spring, Md.
W4RLF, William P. Scott, Fayetteville, Tenn.
W51PT, John A. Stipich, Temple, Texas
W6SVG, Maurice G. Barwick, Burbank, Calif.
W8DOJ, Samuel D. Fraile, Chubuagaan, Mich.
W9BQQ, Frank L. Root, St. Louis, Mo.
G3HP, Capt. W. R. Dainty, Brighton, Sussex
V53MB, Miles Whitaker, Morrisburg, Ont.
V92PT, W. G. Ryan, Sydney
V86AJ, Kenneth Cook, Hong Kong

28 QST for
R.F. Voltmeters

A Lower-Cost Alternative to the Thermocouple Ammeter

BY GEORGE GRAMMER,* W1DF

There is no really satisfactory substitute for an r.f. output indicator in a transmitter. Adjusting by plate loading only approximates the proper tuning conditions for maximum output and sometimes, especially with tetrodes, the approximation is not as close as could be desired.

With all the applications that have been thought up for the germanium crystal, it seems to have had little or no use as a rectifier in an r.f. voltmeter for transmitter tuning. Of course, it has been used extensively in s.w.r. bridges, and a very early bridge, the Micro-match, used such a voltmeter for measuring the power delivered to a load. However, it does not seem to be generally realized that a crystal voltmeter is not only an entirely acceptable alternative to an r.f. ammeter for the purposes for which the ammeter is customarily used, but also has a great deal more flexibility and in some cases is more reliable as an indicator. Add to this the fact that the cost is less and you have something worth thinking about.

Representative circuits are given in Fig. 1. Crystals of the general class of the 1N34 have an inverse peak voltage rating in the vicinity of 50 volts, so it is necessary to reduce the actual voltage to a safe value before applying it to the crystal. In the unbalanced (one side grounded) circuit shown at A, this is done by the voltage divider $R_1R_2$. The sum of these two resistances should be at least 100 times the impedance of the circuit at the point where the voltmeter is connected, in which case the power consumed by the voltmeter will not exceed 1 per cent of the power level at that point. Small carbon resistors are desirable because they are noninductive and have good r.f. characteristics. The ratio of $R_2$ to $R_1$ should be chosen so that when $R_2$ is of the order of 10,000 ohms a 0–1 milliammeter will register full scale on the highest r.f. voltage likely to appear across the circuit.

Grounded Circuits

The grounded type of circuit is particularly useful for measuring the voltage into and out of coaxial lines. For flat lines it is sufficient if the sum of $R_1$ and $R_2$ is about 7500 ohms, but to take care of standing-wave ratios as high as 4 to 1 this value may be doubled. The d.c. voltage developed across $R_2$ tends to approach the peak r.f. voltage applied to the rectifier, and since this will be about 10 volts at full scale when $R_2$ is 10,000 ohms, the ratio of $R_2$ to $R_1$ can be based on 10 volts and the probable voltage across the line. With 100 watts of r.f. in a 75 ohm line the peak line voltage is about 120 volts, so $R_2$ should be about one-twelfth of the total. Near enough, $R_1$ could be 6800 ohms and $R_2$ 650 ohms, using standard values. The ratios are not critical so long as the inverse peak voltage is well below the maximum rating.

When $R_2$ is approximately 10,000 ohms (or any higher value) the voltmeter is substantially linear. If it is adjusted for full-scale reading with 100 watts in the line, as in the example above, a linear voltmeter will read 10 per cent of full scale with only 1 watt in the line. In contrast, a thermometer that reads full scale with 100 watts will move only 1 per cent of the scale with 1 watt in the line — a hardly perceptible movement.

Changing the Range

It is obvious that the voltmeter range easily can be changed to fit the voltage level on the line.

*Technical Editor, QST.

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other words, the voltmeter is also a carrier-shift indicator. (This assumes, of course, that ordinary constant-carrier modulation is being used; the meter will kick upward with a controlled-carrier system.)

**Balanced Circuits**

The lower circuit in Fig. 1 is used with balanced transmission lines. The voltmeter has a definite advantage over ammeters here. For one thing, only one instrument is required. More important, the circuit shown will prevent parallel voltages on the line from operating the meter, a condition that cannot easily be overcome when ammeters are used. The only r.f. voltage acting on the crystal is that developed across \( R_2 \), which is proportional to the voltage difference across the line. Parallel components, assuming the line to be reasonably well balanced to ground, are in phase in the line wires and cannot develop a voltage across \( R_2 \). They could act between each wire and ground through the crystal, but are prevented from doing so by the r.f. chokes. Thus the meter reads only the actual voltage applied to the line by the transmitter.

The same considerations hold in this circuit with respect to the values of \( R_1, R_3 \) and \( R_4 \). \( R_1 \) and \( R_2 \) should be equal, and the total should be at least 100 times the impedance at that point on the line. A matched 300-ohm line calls for about 15,000 ohms each at \( R_1 \) and \( R_3 \). Again using 100 watts as a reference, the peak r.f. voltage is nearly 250, so \( R_2 \) should be about \( \frac{250}{250} \) of the total if \( R_4 \) is 10,000 ohms. A 560-ohm resistor would be close enough. \( R_4 \) can be increased to extend the range, as described. For 600-ohm lines \( R_1 \) and \( R_3 \) should be doubled, leaving the other values the same.

With tuned lines operating at a high s.w.r., some difficulties may arise when "voltage feed" or parallel tuning is required. The line impedance at the feed point may be several thousand ohms in such a case, meaning that \( R_1 \) and \( R_3 \) must be very high in value. The shunt capacitances of \( R_1 \) and \( R_3 \), rather than the resistances, tend to take over the voltage-divider function in such a case, so the method of estimating the required resistance values does not work out too well. Also, for a given resistor combination, the meter reading at a fixed value of voltage will increase as the frequency is raised. It is possible that a capacity divider would be a better solution if the voltmeter is to be used across an impedance of more than a few hundred ohms.

However, there is an even simpler solution for tuned lines. Since there has to be tuning apparatus, the best plan is to use a coax-coupled antenna tuner and measure the voltage across the coax line where it goes into the tuner. When the coax line is properly matched, voltmeter indications at this point mean every bit as much as across the open-wire line itself. The photograph shows such an antenna coupler.

**Resistor Ratings**

In the grounded circuit, Fig. 1A, substantially all the r.f. power used by the voltmeter is dissi-
pated in $R_1$. Assuming that the resistance is 100 times the impedance of the line at the point where the voltmeter is connected, $R_2$ should have a rating of 1 watt for each 100 watts of r.f. in the line. The necessary dissipation rating can be built up by using identical 1- or 2-watt carbon resistors in series or parallel to make up the required resistance. Although the power output of the transmitter increases with modulation it is probably not too important to make provision for this increase since modulation is intermittent. In any event, increasing the dissipation capacity by 50 per cent will take care of 100 per cent modulation with an adequate safety factor.

In the balanced circuit, Fig. 1B, $R_1$ and $R_3$ dissipate the power equally. If the resistors are of identical dissipation rating, the total power that can be handled is 100 times the sum of their ratings. The voltmeter shown in the photograph, for example, is good for 200 watts of r.f., with a matched line, since $R_1$ and $R_3$ are 1-watt units.

**TVI**

Any rectifier will generate harmonics, and it could happen that a voltmeter of the type discussed will be responsible for TVI. The large resistors in series with the r.f. path to the transmission line will help suppress harmonics generated in the rectifier circuit, but on a few occasions, using the antenna coupler shown in the photograph with a dummy load, we have been able to observe faint interference (with a weak TV signal) that disappeared when the d.c. circuit of the voltmeter was opened. So far no effect has been noticed with the same coupler on an actual antenna system, but in a different installation it is possible that TVI might occur.

It is well to keep the possibility in mind. A switch in series with the milliammeter, to break the d.c. path, is all that is necessary to take the rectifier out of operation.

**Calibration**

Calibration of an r.f. voltmeter is entirely feasible if an r.f. ammeter is available and the power output of the transmitter can be varied over a fairly wide range. Calibration is not needed for the ordinary run of transmitter adjustments since comparative readings are entirely adequate. The principal purpose of calibration is for measuring power output, but it is hardly worth attempting this unless the impedance of the point of measurement is known definitely. For practical purposes, this limits the measurement of power to coaxial systems in which the s.w.r. has been reduced to 1 to 1 by means of a bridge.

To calibrate, the line must first be made flat. Then the r.f. ammeter is inserted in the input lead to the line and voltmeter, taking care to keep the leads short and to keep the ammeter capacitance to ground low. The transmitter power output is then varied, noting the voltmeter readings corresponding to a number of current readings. Knowing the impedance and the current, the power and the r.m.s. voltage can be calculated from Ohm's Law. This also serves as a check on the linearity of the voltmeter. It is convenient to adjust $R_4$, Fig. 1A, so that 1 milliamperc d.c. represents, say, 100 volts r.m.s. Then the meter reading at any level is simply multiplied by 100 to give the r.m.s. voltage across the line. The scale can be increased by switching in additional resistance to give any multiplying factor desired, within the voltage limitations mentioned earlier. Beyond determining one point, recalibration on such additional scales is not necessary if the voltmeter is reasonably linear.

The accuracy of measurement with an r.f. voltmeter depends principally on the accuracy of calibration, which in turn depends on the accuracy of the r.f. ammeter used as a standard and the precise value of the load resistance used in calibrating. There is also a frequency error which, in the case of a voltmeter for coaxial circuits using the values suggested earlier, is negligible up to 30 Mc. providing the resistors in the r.f. voltage divider are mounted with very short leads and are kept clear of the chassis and other components. Care also should be taken to prevent r.f. pick-up in the loop formed by $R_3$, the crystal, and $C_1$, Fig. 1A. This can be checked by disconnecting $R_1$, when the meter should show no indication with full power going through the transmission line.

![Voltmeter assembly for a balanced circuit. Except for $R_4$ and the milliammeter, all the parts shown in the lower circuit of Fig. 1 are mounted on a piece of thin bakelite, and arranged so that when the bakelite base is mounted with its flat side at right angles to the direction of the transmission line the coupling between the line and voltmeter circuit will be minimum. The leads to $R_4$ and the meter may be any length since they carry only a very small direct current.](image-url)
Are You U.L. Approved?

A Review of Underwriters’ Rules Applying to Amateur Installations

BY I. F. WOLK.* W6HPV

The National Electrical Safety Code, Pamphlet 70, Standard of the National Board of Fire Underwriters, deals with electric wiring and apparatus. The Code was set up to protect persons and buildings from the electrical hazards arising from the use of electricity, radio, etc. Article 810 is entitled “Radio Equipment.” The scope of this article, section 8101, says, “The article applies to radio and television receiving equipment and to amateur radio transmitting equipment, but not to the equipment used in carrier-current operation.” Without reading further, most amateur stations comply with these safety rules, not because they are required to do so, but because of the inherent nature of the ham to provide great safety factors in most of his equipment. It is to the one in a hundred, where the safety factor is doubtful, that these articles will be helpful. It will be seen later that not only do these articles satisfy the Underwriters’ Code but, when fulfilled, some are measures that one would take to TVI-proof his rig. So it’s a matter of killing two birds with one stone.

The Board of Fire Underwriters sets up the code as a minimum standard for good practice. Most cities adopt the code, or parts of it, either entirely or with certain amendments which may apply to that particular city. It is up to the city to enforce these rules. When a violation is reported, periodic checks are made by an inspector until a correction is made and to insure against future recurrence.

Antenna Systems

Sections 8111-8115

“Antenna, counter-poise and lead-in conductors shall be of hard copper, bronze, aluminum alloy, copper-clad steel, or other high-strength, corrosion-resistant material. Soft-drawn or medium-drawn copper may be used for lead-in conductors where the maximum span between points of support is less than 35 feet. Outdoor antenna, counter-poise and lead-in shall not be attached to poles or similar structures carrying electric light or power wires or trolley wires of more than 250 volts. Insulators shall have sufficient mechanical strength to safely support the conductors.

“Outdoor antenna, counter-poise and lead-in shall not cross over electric light or power circuits and shall be kept away from all such circuits so as to avoid the possibility of accidental contact.

“Where the proximity to electric light and power service conductors of less than 250 volts cannot be avoided, the installation shall be such as to provide a clearance of at least two feet. It is recommended that antenna and counter-poise conductors be so installed as not to pass under electric-light or power conductors.

“Splices and joints in antenna and counter-poise spans shall be made with approved splicing devices or by other means as will not appreciably weaken the conductors. Soldering may ordinarily be expected to weaken the conductor; therefore, soldering should be independent of the mechanical support.

“Metal structures supporting antennas shall be permanently and effectively grounded.”

Antenna Systems—Receiving Stations

Sections 8121-8124

“Outdoor antenna and counter-poise conductors for receiving stations shall be of a size not less than in the following table:

<table>
<thead>
<tr>
<th>Material</th>
<th>Minimum Size of Conductor (in. )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum alloy, hard-drawn copper</td>
<td>Less than 35 feet</td>
</tr>
<tr>
<td>Copper-clad steel, bronze or other high-strength material</td>
<td>19</td>
</tr>
</tbody>
</table>

“Lead-in conductors from outside antenna . . . shall be of such size as to have a tensile strength at least as great as that of the antenna conductors (as in the table).

“Lead-in conductors attached to buildings shall be so installed that they cannot swing closer than two feet to the conductors of circuits of over 250 volts, or less; or ten feet to the conductors of circuits of more than 250 volts . . .

* 2233 Vastal Ave., Los Angeles, Calif.
"If an electric supply circuit is used in lieu of an antenna, the device by which the radio receiving set is connected to the supply circuit shall be specially approved for the purpose."

**Antenna Systems — Transmitting Stations**

*Section 8131—8135*

"Antenna and counter-poise conductors for transmitting stations shall be of a size not less than given in the following table:

<table>
<thead>
<tr>
<th>Material</th>
<th>Less than 150 feet</th>
<th>Over 150 feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard-drawn copper</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>Copper clad steel, bronze or other high-strength material</td>
<td>14</td>
<td>12</td>
</tr>
</tbody>
</table>

Lead-in conductors shall be of a size as specified in the table, for maximum span lengths.

"Antenna and counter-poise conductors for transmitting stations attached to buildings shall be firmly mounted at least three inches clear of the surface of the building on non-absorptive insulating supports such as treated pins or brackets, equipped with insulators having not less than three-inch creepage and air gap distances. . . .

"Entry to buildings . . . except where protected with a continuous metallic shield which is permanently and effectively grounded, lead-in conductors for transmitting stations shall enter buildings by one of the following methods:

"a. Through a rigid, non-combustible, non-absorptive tube or bushing.

"b. Through an opening provided for the purpose in which the entrance conductors are firmly secured so as to provide a clearance of at least two inches.

"c. Through a drilled windowpane."

**Transmitting Stations**

*Section 8192*

"Transmitters shall comply with the following:

"a. Enclosing. The transmitter shall be enclosed in a metal frame or grille, or separated from the operating space by a barrier or other equivalent means, all metallic parts of which are effectively connected to ground.

"b. All external metallic handles and controls accessible to the operating personnel shall be effectively grounded. No circuit in excess of 150 volts should have any parts exposed to direct contact. A complete dead-front type of switchboard is preferred.

"c. Interlocks on doors. All access doors shall be provided with interlocks which will disconnect all voltages in excess of 350 volts when any access door is opened.

"d. Audio Amplifiers. Audio amplifiers which are located outside the transmitter housing shall be suitably housed and shall be so located as to be readily accessible and adequately ventilated."

How many hams have transmitters unenclosed or without interlocks or both?

The author has purposely visited over a dozen ham shacks in the last few weeks and there are some who do not comply with various provisions. Of course, no particular station will be shut down because the antenna lead-in is No. 16 instead of No. 14, or because the speech amplifier is not totally enclosed. The National Electric Code is only a minimum standard, and compliance with its rules will assure less operating failures and hazards, and greater safety.

A copy of the pamphlet is available by writing the National Board of Fire Underwriters in your city, or at 85 John Street, New York 38, New York. Ask for pamphlet No. 70.

Other parts of the Underwriters' Code deal with power wiring and, in addition to the requirement of the use of U.L. approved materials and fittings, have the following to say of direct interest to amateurs:

"All switches shall indicate clearly whether they are open or closed.

"All (switch) handles throughout a system . . . shall have uniform open and closed positions.

". . . supply circuits shall not be designed to use the grounds normally as the sole conductor for any part of the circuit."

The latter means that wire conductor should be used for all parts of the power circuit. Dependence should not be placed on water pipes, etc., as one side of a circuit.

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*September 1952*
ELECTION NOTICE

To All Full Members of the American Radio Relay League Residing in the Central, Hudson, New England, Northwestern, Roanoke, Rocky Mountain, Southwestern and West Gulf Divisions.

An election is about to be held in each of the above-mentioned divisions to choose both a director and a vice-director for the 1953-1954 term. These elections constitute an important part of the machinery of self-government of ARRL. They provide the constitutional opportunity for members to put the direction of their association in the hands of representatives of their own choosing. The election procedures are specified in the By-Laws. A copy of the Charter and By-Laws will be mailed to any member upon request. (The By-Laws will also be found on page 56 of July, 1952, QST.)

Nomination is by petition, which must reach the Headquarters by noon of September 20th. Nominating petitions are hereby solicited. Ten or more Full Members of the League residing in any one of the above-named divisions may join in nominating any eligible Full Member residing in that division as a candidate for director thereof, or as a candidate for vice-director therefrom. No person may simultaneously be a candidate for both offices; if petitions are received naming the same candidate for both offices, his nomination will be deemed for director only and his nomination for vice-director will be void. Inasmuch as all the powers of the director are transferred to the vice-director in the event of the director's resignation or death or inability to perform his duties, it is of great importance to name a candidate for vice-director as it is for director. The following form for nomination is suggested:

Executive Committee

The American Radio Relay League
West Hartford 7, Conn.

We, the undersigned Full Members of the ARRL residing in the.................. Division, hereby nominate..........

of...................., as a candidate for director; and
we also nominate............, as a candidate for vice-director; from this division for the 1953-1954 term.

(Signatures and addresses)

The signatures must be Full Members in good standing. The nominee must be a Full Member and the holder of an amateur license, and must have been a member of the League for a continuous term of at least four years immediately preceding receipt by the Secretary of his petition of nomination. No person is eligible who is commercially engaged in the manufacture, sale or rental of radio apparatus capable of being used in radio communication, or is commercially engaged in the publication of radio literature intended in whole or in part for consumption by radio amateurs.

All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon EDT of the 20th day of September, 1952. There is no limit to the number of petitions that may be filed on behalf of a given candidate but no member shall append his signature to more than one petition for the office of director and one petition for the office of vice-director. To be valid, each petition must have the signature of at least ten Full Members in good standing; that is to say, ten or more Full Members must join in executing a single document; a candidate is not nominated by one petition bearing six valid signatures and another bearing four. Petitioners are urged to have an ample number of signatures, since nominees are occasionally found not to be Full Members in good standing. It is not necessary that a petition name candidates both for director and for vice-director but members are urged to interest themselves equally in the two offices.

League members are classified as Full Members and Associate Members. Only those possessing Full Membership may nominate candidates or stand as candidates; members holding Associate Membership are not eligible to either function. Voting by ballots mailed to each Full Member will take place between October 1st and November 20th, except that if on September 20th only one eligible candidate has been nominated, he will be declared elected. Present directors and vice-directors for these divisions are as follows: Central: Wesley E. Marriner, W9AND, and Charles F. Reberg, W9MVZ, Hudson: Joseph M. Johnston, W2SOX, and George V. Cooke, jr., W2OBU. New England: Percy C. Noble, W1BV, and Frank L. Baker, W1ALP. Northwestern: E. Rex Roberts, W7CPU, and Earl W. Weingarten, W7BG, Roanoke: William H. Jacobs, W4CVQ, and Gus M. Browning, W4BPD. Southwestern: John R. Griggs, W6KW, and Walter R. Jones, W6KRM, West Gulf: A. David Mitchell, W5CA, and Frank L. Fuller, W5HP. Full Members are urged to take the initiative and to file nomination petitions immediately.

For the Board of Directors:

July 1, 1952

A. L. BURDLOM
Secretary

CHANGES IN CANADIAN REGS

In mid-July the Canadian government assigned to its amateurs the privilege of operating 'phone on the frequencies 21.2-21.45 Mc. As you will see elsewhere in this month's "Happenings," this is 50 kc. more than the request which ARRL has made to FCC for U. S. amateurs, thus following the usual pattern of Canadian 'phone suballocations extending a few kilocycles lower than U. S. assignments on each 'phone band. This suballocation is available to Canadians with "unrestricted radiotelephone privileges," a license similar to our Advanced Class.

Canada has also removed some of its mobile restrictions, dropping the requirement that mobile operation for more than one month's duration be reported to the district radio officer and doing away with the restriction that Canadian amateurs could not operate mobile in more than four months during any year.
CHANGES IN U. S. REGS

In mid-July the FCC changed its rules so as to delegate authority to Regional Managers, to the Chief of the Field Operating Division, and to the Chief of the Field Engineering and Monitoring Bureau to declare that a state of general communications emergency exists and to act on behalf of the Commission in accordance with the provisions of Section 12.156 with respect to the operation of amateur stations.

FCC has also amended section 12.21(b) to provide relief for a situation in which amateurs in military service may find themselves as a result of the contemplated discontinuance of Advanced Class licenses after the end of this year. The amended rule provides that any amateur on active duty who normally would be eligible for the Advanced Class exam by December 31, 1952, but who wouldn’t be able to take the exam because of the nature of his military assignment, may take the exam prior to the date he would ordinarily become eligible. The results of his examination, however, would be held by FCC until such date as he would normally become eligible. For example, this takes care of the fellow who is going to be eligible for the Advanced Class examination in November but is being shipped off to parts unknown in September. He would be allowed to take the exam in September but FCC would not notify him until November.

A.R.R.L. FILES ON 21-MC. PROPOSAL

For the information of members, we publish herewith the text of filing by the American Radio Relay League of comment on FCC proposals in Docket 10188.

FEDERAL COMMUNICATIONS COMMISSION

In the Matter of
Amendment of Section 12.111
of Part 12, “Rules Governing Amateur Radio Service” to specify emissions and other particulars of operation in the amateur frequency band 21,000–21,450 kilocycles, and for other reasons.

DOCKET 10188

COMMENTS OF THE AMERICAN RADIO RELAY LEAGUE, INC.

These comments are filed pursuant to Paragraph 4 of the Notice of Proposed Rule Making in Docket 10188, dated May 1, 1952.

The comments are made pursuant to the instructions of the Board of Directors of the American Radio Relay League, Inc. As the Commission is aware, the A.R.R.L. Board of Directors is composed of sixteen amateurs nominated and elected by approximately 35,000 licensed amateurs in the United States and possessions, to represent them in the formation of League policy.

As concerns the proposal affecting the amateur band 880–885 Mc. and the alternate band 886–890 Mc.:

As this is merely bringing the amateur rules into line with previous commitments under Part 2 of the Commission’s rules, the League offers no comment.

WHAT BANDS AVAILABLE?

Below is a summary of the U. S. amateur bands on which operation is permitted as of August 1st. Readers are cautioned that a number of proposals are now pending before the FCC and that action on those proposals may change this compilation considerably. Changes will, as usual, be announced by W1AW bulletins. Figures are megacycles. A6 means an unmodulated carrier; A1 means c.w. telegraphy; A2 is m.c.w.; A3 is a.m. ‘phone; A4 is facsimile; A5 is television; n.f.m. designates narrow-band frequency- or phase-modulated radiotelephony; and f.m. means frequency modulation, ‘phone (including n.f.m.) or telegraphy.

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,500–4,000</td>
<td>A1</td>
</tr>
<tr>
<td>3,800–4,000</td>
<td>A3</td>
</tr>
<tr>
<td>6,700–7,300</td>
<td>A1</td>
</tr>
<tr>
<td>14,000–14,350</td>
<td>A1</td>
</tr>
<tr>
<td>14,200–14,350</td>
<td>A3</td>
</tr>
<tr>
<td>21,000–21,450</td>
<td>A1</td>
</tr>
<tr>
<td>26,000–27,220</td>
<td>A4, A1, A2, A3, A4, f.m.</td>
</tr>
<tr>
<td>28,000–29,700</td>
<td>A1</td>
</tr>
<tr>
<td>28,500–29,700</td>
<td>A3</td>
</tr>
<tr>
<td>29,000–29,700</td>
<td>f.m.</td>
</tr>
<tr>
<td>50–54</td>
<td>A1, A2, A3, A4, n.f.m.</td>
</tr>
<tr>
<td>52–54</td>
<td>f.m.</td>
</tr>
<tr>
<td>220–225</td>
<td>A9, A1, A2, A3, A4, f.m.</td>
</tr>
<tr>
<td>420–450</td>
<td>A9, A1, A2, A3, A4, A5, f.m.</td>
</tr>
<tr>
<td>1215–1300</td>
<td>A9, A1, A2, A3, A4, A5, f.m.</td>
</tr>
<tr>
<td>2,300–2,450</td>
<td>A9, A1, A2, A3, A4, A5, f.m.</td>
</tr>
<tr>
<td>3,300–3,500</td>
<td>A9, A1, A2, A3, A4, A5, f.m.</td>
</tr>
<tr>
<td>5,650–5,925</td>
<td>A9, A1, A2, A3, A4, A5, f.m.</td>
</tr>
<tr>
<td>10,000–10,500</td>
<td>A9, A1, A2, A3, A4, A5, f.m.</td>
</tr>
<tr>
<td>21,000–22,000</td>
<td>A9, A1, A2, A3, A4, A5, f.m.</td>
</tr>
</tbody>
</table>

* Peak antenna power must not exceed 50 watts.

In addition, A1 and A3 on portions of 1,800–2,000, as follows:

<table>
<thead>
<tr>
<th>Area</th>
<th>Band, kc.</th>
<th>Power (watts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mississippi River</td>
<td>1890–1925</td>
<td>500 200</td>
</tr>
<tr>
<td>Coast U.S. (except Florida and states bordering Gulf of Mexico)</td>
<td>1875–1900</td>
<td>500 200</td>
</tr>
<tr>
<td>Mississippi River</td>
<td>1900–1925</td>
<td>500 200</td>
</tr>
<tr>
<td>Coast U.S. (except states bordering Gulf of Mexico)</td>
<td>1900–1925</td>
<td>500 200</td>
</tr>
<tr>
<td>Florida and states bordering Gulf of Mexico</td>
<td>1900–1925</td>
<td>500 200</td>
</tr>
<tr>
<td>Puerto Rico and Virgin Islands</td>
<td>1900–1925</td>
<td>500 200</td>
</tr>
<tr>
<td>1975–2000</td>
<td>500 200</td>
<td></td>
</tr>
<tr>
<td>Hawaiian Islands</td>
<td>1900–1925</td>
<td>500 200</td>
</tr>
<tr>
<td>1975–2000</td>
<td>500 200</td>
<td></td>
</tr>
</tbody>
</table>

* Except in State of Washington where daytime power limited to 200 watts and nighttime power to 50 watts.

Novice licensees may use the following frequencies, transmitters to be crystal-controlled and have a maximum power input of 75 watts:

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>Power (watts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3,700–3,750</td>
<td>A1</td>
</tr>
<tr>
<td>26,960–27,230</td>
<td>A1</td>
</tr>
<tr>
<td>145–147</td>
<td>A1, A3</td>
</tr>
</tbody>
</table>

Technician licenses are permitted all amateur privileges in the bands 220 Mc. and above.

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II
As concerns the proposal to open a portion or portions of the 21,000-21,450 kc. amateur band for voice operation, A-S emission and narrow-band frequency or phase modulation:

The League concurs with the principle of authorizing such privileges in this band, and in the proportion suggested by the Commission, but requests that specific subbands for voice operation be, instead, 21,250-21,450 kc.

A. The League’s request for 21,250-21,450 kc. is derived from the premise that this band will be used by amateurs primarily for long-distance communication. Propagation conditions over most of the normal sun-spot cycle dictate that this band will have international effect. An appraisal of suballocations questions must therefore take into account international operating aspects of long-distance communications.

In this connection it is pertinent to note that 21-Mc. amateur suballocations in a number of other countries are in prospect, based on the expectation that American voice suballocations will, following tradition, be at the high-frequency end of the band. The International Amateur Radio Union, an affiliation of some 45 national amateur societies throughout the world, in May of 1950 held in Paris a Twenty-Fifth Anniversary Congress. Among other problems, suballocations in the 21-Mc. band were discussed at length. Because of the dominance of U.S. voice stations in any subbands to which they are assigned, amateurs throughout the rest of the world have customarily been obliged to accommodate their suballocations and practical activities to the extent laid down by U.S. regulations. The recommendation of the IARU meeting in Paris, subsequently concurred in by vote of the Union membership, was based on the assumption that the U.S.A. would traditionally make voice assignments in the high-frequency portion of the band. It also took into account the established practice of amateurs in nations other than the U.S.A. conducting their voice operations in that portion of the amateur band immediately adjacent to whatever frequencies are made available in the U.S.A. for voice operation. The recommendation was that the practical use of the band be as follows:

21,000-21,150 kc. — world-wide c.w.
21,150-21,350 kc. — world-wide voice, except U.S.A.
21,350-21,450 kc. — voice, U.S.A.

The League is informed that the Canadian Government in mid-July, 1952, presumably upon the basis of the recommendation of the IARU and in consideration of the practical use of the band, proceeded to suballocate for voice operation of 21,250 kc. to 21,450 kc.

The maximum effective use of the band by the amateur service requires reasonable uniformity on a world-wide basis. It is largely for this reason that the League requests the U.S.A. make available for voice operation by U.S. amateurs.

B. On frequencies in the order of 21-Mc. amateurs customarily use multielement parasitic antenna arrays for maximum efficiency in point-to-point communication. It is well established that such directional antenna arrays, properly tuned and adjusted, work effectively over only a very narrow band of frequencies. It would be very difficult to obtain peak performance over the entire 450 kc. amateur band with such a directive antenna array. Therefore the amateur use of this band, under the sub-allocation proposed by the Commission, would face the choice of tuning his directional antenna to the center of the 450-ke. band and then operating it with considerably reduced efficiency in the off-bands, or of tuning his directional antenna to one of the segments proposed for voice and in effect denying himself the practical use of the other segment. On the other hand, a continuous band of 200 kc. as proposed by the League permits reasonably effective employment of a single directional parasitic array to cover the entire subband.

C. It may be argued in behalf of the proposal of the Commission that placing voice assignments at each end of the 21-Mc. amateur band will lessen the potentiality of interference to television receivers utilizing an intermediate-frequency in the 21-Mc. region. In the League’s view, this argument has little validity. Although it is true that several prominent manufacturers chose 21.25 Mc. as the sound channel for their receivers, the format industry standard and permitted a choice anywhere in the range of 21.25 to 21.9 Mc., and a considerable number of models employ intermediate frequency channels higher than 21.25 Mc. Furthermore, in practice the actual operating intermediate frequencies in a television receiver may be varied to suit requirements of the local signal. Particularly after installation and a settling-down period, would certainly vary over a considerable number of kilocycles, so that it is improbable any substantial portion of interference would be avoided by shifting the voice subbands anywhere within the 21,000-21,450 kc. range. Moreover, the potential interference to television receivers in this band is primarily the result of inadequacies in receiver design and construction, and the amateur service should not be penalized by suballocations predicated on a condition for which the amateur service is not responsible and for which remedies are easily available from commercial agencies over which the amateur service has no control.

D. It may be argued on behalf of the Commission that placing voice assignments at each end of the 21-Mc. amateur band will permit a more equitable distribution of the utility of voice and c.w. amateur assignments at times when the vagaries of the sunspot cycle place the maximum usable frequency in the 21-Mc. range. This reasoning is invalid. Considering the marginal frequencies of the order of 28 Mc., has comparatively little application at 21 Mc. In practice, for the most part the 21-Mc. band throughout its width would either be "open" for voice or "closed" for frequencies other than voice frequencies. The maximum usable frequency does not settle down for long periods in the middle of the 21,000-21,450 kc. range, as it does often in the larger and more marginal range 29,000-29,700 kc.

III
As concerns the proposal to authorize Novice operation in the subband 21.18-21.3 Mc.:

The League does not believe it wise to take such action and requests that no assignment for Novices be made in this band.

In the present sunspot minimum, propagation conditions in the 21-Mc. band provide only limited usefulness for long-distance communication, the use of these frequencies otherwise being limited to immediately local contacts. With such restrictions on the range of communication, there is no useful opportunity to begin anyone in radio operating training, as there is on the lower frequency bands of medium distance range.

Moreover, and of greater importance, with the progressiveness of the sunspot cycle there are of such order that they will shortly become primary useful for international work over a considerable portion of the day. It is to be expected that as a result, occupancy will be extremely heavy, worldwide. Because of the nature of medium-distance communication procedures, this can only result in considerable competitive congestion. Under such conditions the Novice would find it difficult, if not impossible, to establish contacts and accomplish the training objectives inherent in his class of license.

There is also the factor of harmonic interference to television reception. As apprentices, Novices are admittedly not so capable as the permanent amateur in technical matters. As the 3rd and 4th harmonics of 21 Mc. fall in the center of v.h.f. TV channels, there is a potential interference problem.

The same reasoning which prompted the Commission in 1931 to omit 14 and 28 Mc. from consideration for Novice privileges seems still applicable. It should also be noted that in Docket 10073 additional Novice privileges in a more logical band, 7 Mc., are under consideration by the Commission, and have League endorsement. The League therefore requests the deletion of proposed privileges for Novices in the 21-Mc. amateur band. At the same time the League requests the continuation of present privileges in 26.30-27.25 Mc., a band of medium occupancy where Novices can and do engage in successful communication. It should here be noted, also, that the television interference factor is by no means identical to that at 21 Mc., inasmuch as harmonics of 26.06-27.25 Mc. fall — or can be made to fall — at the edge of v.h.f. TV channels rather than near their centers.
IV
As concerns the proposal to open 21.10-21.55 Mc. for F-emission:
For the reasons enumerated in our contemporary filing in Docket 10073, and which to save space will not be re-
peated here, the League does not believe it wise to take such
action, and therefore requests withdrawal of the proposal.

THE AMERICAN RADIO RELAY LEAGUE, INC.
By:
PAUL M. SEGAL
Its General Counsel

A. L. BUDLONG, Secretary
July 24, 1952

F.C.C. PROPOSALS

The following release from FCC is discussed on our editorial page.

FEDERAL COMMUNICATIONS COMMISSION
Washington 25, D. C.

FCC 52-753

DOCKET NO. 10387

In the Matter of
Amendment of Part 12 of the Commission's Rules and Regulations to designate specific ama-
teur calling, answering and emergency communications fre-
quency bands.

NOTICE OF PROPOSED RULE MAKING

1. Notice is hereby given of proposed rule making in the above-entitled matter.

2. The Commission proposes to amend Part 12, Rules Governing Amateur Radio Service, to provide:
   (a) Specific frequency bands, within the regularly allo-
cated amateur frequency bands, to be used only for calling and answering by amateur stations, except in the case of a communications emergency when they may be used for actual emergency traffic.
   (b) Specific frequency bands, within the regularly allocated amateur frequency bands, to be cleared of all normal amateur operation in any given area whenever the Commission determines that a state of communications emergency exists in that area.
   (c) Procedure for the expeditious declaration of a state of communications emergency in any area, whenever the Commission has determined that a state of communications emergency actually exists in that area, and the clearing of normal amateur operation in that area from the designated amateur emergency communications bands as well as any other amateur frequency bands of segments of such bands which appear to be essential for emergency communications purposes.

3. The proposed amendments, which are set forth in full in an appendix hereto, are issued under the authority of Sections 4(i) and 309(o) and (r) of the Communications Act of 1934, as amended.

4. Any interested party who is of the opinion that the proposed amendments should not be adopted or should not be adopted in the manner proposed herein may file with the Commission on or before September 19, 1952, a statement or brief setting forth his comments. At the same time per-
sions favoring the amendment as proposed may file state-
ments in support thereof. Comments or briefs in reply to

ARE YOU LICENSED?

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

September 1952

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The "Ultimate" C.W. Receiver  
Super-Selectivity with Simplified Construction and Surplus Components

BY ROBERT R. PITTMAN AND GERALD SUMMERS,* WSFKQ

During the past few years several articles have been published that describe "super-selective" devices for c.w. use. The selective devices described previously have varied considerably in design, but have fallen into two general classes: audio filters tacked on at the tail end of a standard communications receiver, and i.f. amplifiers of high selectivity usually tacked on at the end of the standard i.f. channel of a communications receiver. Such devices are invaluable aids when a single station is to be picked out of a number of equally strong signals near the same frequency. If, however, a weak DX signal is to be extracted from a mass of W QRM, the situation will be different. Let's be more specific — suppose we have located a 5-microvolt DX signal (S8 on the DX scale) and just as he comes back to us, W9 so-and-so calls "CQ DX" 300 cycles up the band. It so happens that the W9 has a signal of 5 millivolts (S8 local scale). If our i.f. gain is set to read the DX signal, we will have approximately 1 volt at the detector. In ordinary receivers the signal level of the W9 would then be 1000 volts at the detector unless our amplifiers overloaded. Overloading would certainly occur, and we would have our receiver turned off, or blocked, every time the W9 pressed his key. A situation of this type is most distressing, and no degree of filtering at the end of the receiver gain path will do the least bit of good. The solution is to reject the unwanted signal before it is large enough to overdrive any stage (a level of about 1 volt r.m.s. with most pentode amplifiers).

To do this job satisfactorily calls for a complete receiver design that performs the following essential functions: (1) Channels the signals through very narrow filters with the best possible skirt selectivity consistent with reasonable design considerations. (2) Maintains the signals at a low level until they are operated upon by the above-mentioned filters. This has been done in the receiver to be described, with most gratifying results. From the standpoint of eliminating QRM, it is by far the best receiver we have ever seen or heard.

Before proceeding to the technical details of the receiver, let us clarify one point. Though we believe our receiver to be the best yet built with regard to performance, we do not believe we have yet approached the simplest or the most economical design. By way of illustration, we realize that other coupling schemes would eliminate several of the i.f. tubes. A limited time was available for reducing the number of parts used. We'll leave such worries to hams with smaller junk boxes.

Now that a little groundwork has been laid, let us consider the details from r.f. through to audio.

**The R.F. Stage**

Many hams of today avoid receiver construction because they are afraid of the r.f. tracking problems. Since our ham bands are so narrow, it is possible, by using a high i.f. for image rejection, to make all tuned circuits in the r.f. stages broad enough to require no tuning over a band, thus averting tracking difficulties and their attendant complications of construction. Remembering that we want to keep the gain as low as possible until we get into the highly selective circuits, we conclude that the r.f. stage will serve only to raise antenna noise level above mixer noise level, so that the weakest possible signals may be received.

*1447 Fleming Ave., Dallas 16, Texas.

QST for
Fig. 1 — Circuit diagram of the receiver “front end.”

C1, C2, C3 — 25-µfd. variable.
C4, C5, C6, C7, C8 — 0.01-µfd. mica or ceramic.
C9 — 470-µfd. mica or ceramic.
C10 — 100-µfd. silver mica, padded with smaller capacitance to hit proper frequency.
C11 — Precision 100-µfd. variable (surplus).
C12, C13, C16 — 0.1-µfd. paper.
C14, C15 — Part of 1600-ke. i.f. transformer.
C17, C18, C19 — 0.01-µfd. mica.
C20 — 100-µfd. silver mica.
C21 — Part of 1600-ke. b.f.o. transformer.
C22 — 5-µfd. ceramic.
R1 — 150 ohms.
R2, R3, R5 — 270 ohms.
R4 — 2.2 megohms.
R6, R7, R8 — 47,000 ohms.
R9 — 4700 ohms.
R10, R11 — 1000 ohms.
R12 — 5600 ohms.
R13 — 18,000 ohms. (NOTE: All resistors ½ watt.)
L1, L2 — 6 turns No. 20 enam. close-wound.
L3, L4 — 8 turns No. 20 enam. on 1¼-inch plug-in form (Amphenol 24-4P), spaced to occupy 1¼ inches.
L5 — 7 turns No. 20 enam., tapped at third turn, wound on 1¼-inch plug-in form (Amphenol 24-5P).
L6, L7 — Coils of good 1600-ke. i.f. transformer (Millen 64163 or equivalent).
L8, L9 — Coils of 37-ke. i.f. transformer. (See text.)
L10 — 1600-ke. b.f.o. (Millen 63163 or equivalent).

The practical way to design the r.f. coils is to wind them to resonate at the desired ham band with as low C as is practical. Make the r.f. and mixer coils identical and as high-Q as feasible. Then, when the receiver is completed, load the r.f. and mixer tuned circuits with identical resistors until the receiver gain is down not more than 30 per cent at the high and low ends of the band, with the tuned circuits resonated at the center of the band. If a more scientific approach is desired, a little research in the literature will reveal much on broadband amplifier design.

First and Second Mixer Stages

The diagram of the front end of the receiver is shown in Fig. 1. The first mixer following the 6AK5 r.f. stage is a low-noise triode stage. It also is a low-gain stage, so the r.f. stage gain is actually used to override the noise of the second mixer instead of the first. A 1-µv. signal at the antenna is amplified to about 50 µv. at 1700 kc. by the time it reaches the grid of the 6BE6 second mixer, and is only about 200 µv. at the plate of the 6BE6. The i.f. out of the 6BE6 is 37.4 kc, so there are two image frequencies to be considered in this receiver: one 3400 kc. (2 x 1700) removed from the signal frequency, and one 74.8 kc. (2 x 37.4) from the signal frequency. The rejection of the first image is determined by the selectivity of the r.f. and mixer tuned circuits, and is of the order of 50 db. with the high first i.f. that is used. The rejection of the second image is determined by the selectivity of the 1700-ke. i.f. transformer and is of the order of 50 db. This is a little low and should be improved by using at least one more tuned circuit at 1.7 Mc.

The h.f. oscillator is the only critical part of the receiver — it must be stable. Use of the same circuit principles as in your VFO will give best results. A high quality tuning condenser is required as well as a good reduction drive and dial, since the 20-meter c.w. band, for example, is to be divided into 1000 channels. To be sure, just covering the band will require some time, but your coverage will be complete for the first time in your DX career.

It is well to explain here why a separate oscillator tube is used with the second mixer — it

![Graph](image-url)

**Fig. 2** — Selectivity characteristic of the 37-ke. i.f. amplifier.
was found that using the 6BE6 as a converter with the 37.4-kc. difference frequency caused the signal grid to be overdriven. This lowered the Q of the 1.7-Mc. i.f. transformer and gave extremely low conversion gain. More lengthy research effort might well have allowed use of one tube instead of two.

The 37-Kc. I.F. Amplifier

Much thought went into the design of the i.f. amplifier around circuit components that were available. It was reasoned that a receiver of 40-cycle bandwidth would receive the fastest c.w. encountered in ham operating. It was further concluded that with the questionable frequency stability of ham signals and with the poor notes frequently heard, it would be wise to allow a little safety margin and design a receiver of about 100 cycles bandwidth. This has proven to be a wise decision for, though the receiver is very much easier to tune than a crystal filter receiver, we feel that we have “gone about as far as they can go.”

Any receiver of this type must be built around available parts for, unfortunately, the manufacturers of core materials do not deal with individuals. Hams with fortunate company connections may get the “cup cores” from Stackpole, Lenkurt, General Aniline and Film Corp., and others in the business. It so happens, however, that the AN/ARN-7 radio compasses, once available by the thousands on the surplus market and still offered at a price of $17.50, include all the coil forms you need. These coil forms are actually better than factory-purchased core materials, since the twenty-odd included in a single receiver are mounted in convenient bakelite holders. A breakdown of one of the forms is shown in the photograph, along with a simple winding jig (mounted in chuck of coil winder) we made from Micarta to hold the little cardboard form from which the old coil was removed and on which the new one is scramble-wound. With 720 turns of No. 35 enameled wire, a Q of 95 was obtained at the i.f. Melt a little cerein wax on each layer or so in order that the wire will not “birdcage” when the jig is removed. The jig ends should be counterbored slightly so that the wire does not go clear to the edge of the form. The coils can be wound with a “egg beater” drill, but a counter is a virtual necessity. There is no magic about the frequency — 37.4 kc. happens to be the only frequency at which all fourteen i.f. circuits would peak with 0.01-mf condensers of standard tolerance. It is desirable to use a low-frequency second i.f. in order to obtain narrow bandwidth, while a large number of tuned circuits are necessary to give a steep skirt characteristic. At 37 kc, the Q of 95 is so low as not to give an audible ringing effect on signals and just a trace on thermal noise. A slight amount of unintentional regeneration will, however, lengthen the ringing time considerably.

The coils are mounted at opposite ends of Millen No. 80004 shield cans, the grid coils being tuned from the bottom and the plate coils from the top of the chassis. Each coil should be checked

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\( \text{QST for} \)
before installation by paralleling it with a 0.01-
μfd. condenser and measuring the drop across it
with a 1-megohm resistor between the circuit
and an oscillator of proper frequency. (You must
have a reasonable amount of test equipment to
canstuct this receiver — a crude r.f. voltmeter
and fair test oscillators are essential.)

Very loose coupling is used between the coils
to maintain selectivity and to reduce gain. The
gain loss per transformer is about 50, for the
stray inductive field of the cup cores is relatively
low. Maximum stage gain is about 8 or 9 after
taking the transformer loss.

Figure 2 is a plot of the selectivity curve.
This curve was obtained by the use of a beat-
frequency oscillator with a cycles-increment dial.

A good view of the i.f. transformers can be
had in the photograph of the receiver. They are
the seven cans in line at the rear of the chassis.
Fig. 3 is the wiring diagram of the selective i.f.
minus its audio amplifier.

The beat-frequency oscillator was wound on a
cup core for the sake of uniformity, though Q is
not important here. It uses the same number of
turns as the other coils (720), although a tap was
made at about 20 per cent from one end.

The b.f.o. should be set for a desirable tone
and that tone is about all you'll hear. You won't
hear two sidebands or a zero beat, for the band
is not wide enough for that. The simplicity of the
tuning is beautiful — even a lid can find DX!

You may want to keep your old receiver around
for quick surveys of the band (we do, since we al-
so operate 'phone), but you'll use it less and less.

**Audio**

The audio is conventional but need not pass
frequencies below those of the beat note you
choose. If you misjudge the gain of the i.f. strip,
you can make up for it in the audio. Don't worry
about missing anything this way — the b.f.o.
action makes the third detector linear. Quiet
high-gain audio is easy with poor 60- and 120-
cycle response.

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**Conclusions**

After several months' use of the above receiver
we conclude that 100-cycle bandwidths with
steep skirts are practical in ham radio. The slight
amount of tracking necessary on occasional drift-
ning signals we accept as a bargain price for the
pleasure of relatively QRM-free operation. The
low noise accepted by so small a bandwidth allows
considerably better than 1-μv. sensitivity. Having
only gain and tuning controls on a communications
receiver is a trend reversal, but this re-
ciever so outperforms $400 commercial receivers
for c.w. operation that there is just no comparison
— it was built for less than one-tenth that
amount, although hams buying all of the parts
may spend up to $100. We believe ours to be the
best DX-man's c.w. receiver ever built and have
found the narrow bandwidth a limitation in so
few cases that no effort at incorporating variable
bandwidth is contemplated. Coil data for only
the 20-meter band are given since these are the
only coils wound to date. Plug-in coils are used.

Here one tuned circuit is shown disassembled. From
left to right: bakelite case, half shell, tuning slug, coil
form, half shell, top of bakelite case. The home made
coil winders was built from an old Dictaphone tran-
scriber.
What Price Precision?

The Economics of Frequency Standards
In Two Parts—Part I

BY GEORGE X. M. COLLIER,* W6EG

As the title indicates, this article deals with the cost of generating precise radio frequencies. It also describes the results of experiments conducted on three types of frequency standards, and gives general details of the construction of a 100-kc, unit capable of holding frequency to better than one part in ten million.

As a starter, let's philosophize a bit and look at Webster's definition of the word "precise." It is "sharply or exactly limited, or defined as to meaning; exact, definite, not loose, vague, or equivocal." Now, while the definition standardizes the word, it does not do so with respect to any natural or man-made value, and precise, therefore, may mean most anything. That such is actually the case can be illustrated as follows:

a) In the early days of steam power, a machinist advertised the possession of a boring mill "capable of turning the cylinders of steam engines, accurate to plus or minus the thickness of a shilling"—approximately \( \frac{3}{8} \) inch—which at that time was really something. However, when we consider that today's machines easily hold tolerance on the same item to a very few thousandths of an inch, it becomes apparent that what was good precision in the early 1800s is very poor precision in 1952. Precision is, to a large extent, a matter of date.

b) As a second illustration, let's assume one is building a highway. Now, while it would be entirely possible to maintain the straightness of the grade to plus or minus a foot per mile, this would probably be unnecessary because plus or minus a yard or more would, most likely, be entirely adequate. On the other hand, if one were surveying an international boundary, it is probable that a foot per mile would be relatively poor accuracy. We see, therefore, that precision is also a matter of use, and what is precise in one field is course in another.

c) As a third and final example, let's consider the stability of the medium composing any standard. When the English system was set up a foot, it is said, was the length of such an extremity attached to a British king, and since said king could easily lose his big toe, thus altering the length of the standard, we see that the foot was really a highly variable item. The example is of course a bit ludicrous, since the length of the good king's foot was no doubt transferred to something more stable than human flesh. It does show, however, that beyond a certain point, the medium determines the stability attained.

* 1816 Third Ave., South, Anoka, Minn.

Accuracy from WWV

To show how the above examples work, let's examine WWV's transmissions.

Not too many years ago, the WWV transmissions were stated to be accurate to one part in ten million. Today, they publish an accuracy of two parts in one hundred million, a fivefold improvement. While one part in ten million was, and still is, accurate enough for most measurements, recent physical techniques demand time measurements of much greater accuracy.

Although two parts in 100 million is the published accuracy of WWV transmissions, the generated frequency is accurate to a few parts per billion, with received accuracy being reduced by instability of the ionosphere. Further, going another step back, the Naval Observatory and other observatories throughout the world now find that the speed of the earth's rotation, the primary standard, is not constant. So here we have a case where the medium through which the signal passes limits the received accuracy, and where the standard of time itself is becoming inadequate.

From the foregoing, it will be seen that WWV, the best frequency standard generally available, is capable of no better than two parts per one hundred million as received, and this only when propagation is normal and it is high noon midway between the receiving station and WWV.

Requisites for a Good Standard

When one considers that one part per hundred million is one second in over three years, it becomes apparent that holding such tolerance day in and day out develops into quite a job. Attempting to do so has provided the author with a very interesting twenty years or so of entertainment, from which the following conclusions have been reached:

1) That the circuit is as important as the crystal.

2) That, unless special components are used, temperature control of the frequency-correcting...
components is as important as temperature control for the crystal.

3) That the oscillator should be operated very conservatively, and be well isolated from its load.

4) That operating voltages must be held within small limits.

5) That crystals since World War II are much better than they were before, cost less, are held much closer to frequency, and are much more readily available.

6) That the design of a standard should be approached from one or the other of two angles: use a circuit composed of as few high-quality parts as possible, and temperature control the whole thing; or, if an elaborate circuit is used, develop it in such a manner that a minimum of components affect the output frequency.

7) That any standard, to be worth its salt, should be temperature-stabilized and operated continuously.

**Crystal Characteristics**

Now to get at the meat of this article. As stated above, the results of experiments with several different standards will be reported. First, however, it will be well to indulge in a short discussion of the various crystal cuts used for frequency standards. The most common are the AT, BT, CT, DT, and GT, with variations of the X cut being used by some manufacturers.

Fig. 1 shows typical temperature-frequency curves for AT, DT, and GT cut plates, these being the only ones used in the experiments. AT cut crystals, it will be observed, may have either a positive or negative coefficient. If an AT cut were removed from the mother quartz on the exact zero-temperature axis, it might possibly have a zero temperature coefficient. Practically, however, reasonable manufacturing tolerances must be set up plus or minus the zero-temperature axis, and two temperature coefficients result. AT cuts are seldom used for frequency standards below one megacycle.

DT cuts are the most common in the 100-ke. range, and Fig. 1 shows the temperature coefficient of a typical unit. Note that the crest of the parabolic curve is the point of lowest frequency-temperature change. Since it is possible to orient the DT cut, as taken from the mother quartz, to put the crest of the parabola at most any reasonable temperature, crystals for operation at say 60 degrees C. are oriented so the crest falls at this temperature, and ground to oscillate at 100 ke. at the same time.

GT cut crystals are the only units possessed of almost true zero-temperature coefficients. However, good ones are pretty expensive, and cheap ones are no better than good DTs—at least that has been the experience here. Fig. 1 shows a typical GT temperature curve.

Regardless of cut, all crystals age and change frequency in so doing. They never stop completely, but experience shows most of the drift to be gone after the first six months of continuous operation.

**The FS135C Standard**

Most of you will remember the Hammarlund type FS135C frequency standard, using a 6AU6 or 6AK5 tube in the electron-coupled Pierce circuit, shown in Fig. 2. The crystal furnished with this unit is a B比利 type KV3, 100 ke., DT cut, oriented to put the crest of the parabola at about plus ten degrees C. These standards were advertised as precision units, suitable for mounting in a receiver cabinet. Now, let's see what happens.

Two FS135Cs were purchased, and the crystals and oscillator units labeled Nos. 1 and 2. No. 2 crystal, in No. 2 oscillator, was operated for six months and produced the aging curve labeled A in Fig. 3. No. 2 crystal was then put in No. 1 oscillator, and No. 1 crystal into No. 2 oscillator. Both units were then fired up and operated for about 90 days. No. 1 crystal in No. 2 circuit gave curve B in Fig. 3. No. 2 crystal in No. 1 circuit changed very little, indicating that the crystal, not the circuit, was doing the most aging.

Two more KV3 units were then borrowed from ham friends. These were put to work in oscillators 1 and 2, and both of them drifted low so far that they could no longer be zeroed to 100 ke. Crystals Nos. 1 and 2 were then put back to work, after a 3-week layoff, and low and behold,
they had lost all their aging. No. 1 could not be set to 100 kc. (too low) and No. 2 just barely made it.

In view of the above, a half dozen FS135Cs were rounded up and all of them started off on 24-hour-per-day operation. All of these units drifted low, and beyond control of the zero setter.

A couple of brand-new Billie KV3 units were then purchased and put to work. These were beautiful, had very low temperature coefficient and aged very little.

Correspondence with Billie indicated that some of the KV3s furnished with the FS135Cs were of very early vintage, and unproven when Hammarlund got them. So, it’s not too hard to see why the FS135Cs were declared surplus, and sold at $6.95 each. To get a good standard, one has to buy a new rock at $6.95 again. Those who don’t are lucky. However, $13.90 still isn’t too bad for the basic unit of a pretty good standard.

With a good crystal, the frequency of the FS135C was found to vary as follows:
1) Short circuit output terminal to case: plus or minus 0.5 part per million.
2) Vary plate voltage plus or minus 20 volts: plus or minus 0.5 part per million.
3) Temperature rise from 20 to 40 degrees C: minus 20 parts per million but correctable with the zero setter.
4) Harmonic output was usable through 10 Mc., and open-circuit output was about 45 volts r.m.s.

To stabilize these units, one should:
1) Isolate it by installing a cathode follower between oscillator and load. A 6J5 does very well.
2) Operate the unit from a well-regulated power supply of 200 volts or so. The current drain is only 2 to 3 ma. for the oscillator and about 10 ma. for the 6J5.
3) Last, but far from least, stabilize the ambient temperature. This means get the unit out of a receiver cabinet, if that’s where you now have it. Normal room temperature variations are much less than those in a receiver cabinet, and considerable gain in stability will be realized. To stabilize the temperature further, build the whole unit, oscillator only, into a wood box about 6 inches on a side. Stand the oscillator on edge and extend the shaft for the zero setter to the front of the box. This, with no heaters or thermostats, will further increase the stability of the unit, provided it is in continuous operation, 24 hours per day, seven days per week, etc., and stability on the order of plus or minus 5 to 10 parts per million, day in and day out, is readily attainable, with short-term stability of one part in 10 million being perfectly practical.

Increased stability may be realized by temperature-controlling the inside of the box. The more stable the temperature, the better the frequency. Temperatures in excess of 40 degrees C, (104 degrees F,) should not be attempted, as it is possible to run off the end of the zero setter, and thus not be able to bring the frequency to a flat 100 kc. Stability of about plus or minus two parts per million can be realized if the temperature is held constant to plus or minus 0.1 degree C., with stability of one part per hundred million being attainable for a few minutes.

Those using the FS135C units have no doubt had difficulty with the relative coarseness of the zero setter. This can be eliminated by paralleling the zero-setting condenser with a small air variable, say 5 μf.d. maximum, driving it with a vernier dial of some sort. Then, coarse settings can be made with the regular zero setter and fine adjustments accomplished with the trimmer. This procedure is almost a necessity if close settings are to be accomplished at 15 Mc.

The FS135C, while not presently available, can be duplicated from the circuit shown in Fig. 2. Billie type KV3 rocks are a standard item and readily available. These rigs, in my opinion, give the most precision for the least money, and can be completed, including a cathode follower, for about $25.

**The Type 90501 Standard**

Standard No. 3 was Millen type 90501 consisting of the following:
1) An oscillator using a Billie type MS433, 1 Mc., AT-cut crystal.
2) Two multivibrators, one on 100 kc. and the second arranged for operation on either 25 kc. or 10 kc.
3) A harmonic amplifier and tuned circuits, for utilizing the standard frequencies through 54 Mc.
4) A mixer-detector, to permit comparison of a transmitter directly with the standard.
5) A regulated power supply.
6) A 1000-cycle audio modulator.

This unit was used as a station standard from 1947 to 1952, at which time it was superseded by the standard described later. It was in operation for approximately 40,000 hours, and blew nothing but tubes and an electrolytic filter condenser or two. It was advertised as a precision unit, cost **(Continued on page 130)**
Keeping Up with the Girls

The stock prevented W1RTE from completing the July issue of the YLRL Horizons, Nell's last as editor. But OM W1IPQ took over, and his reward for finishing the issue was little Laura Waterman, born June 14th. . .
Two 75-meter phone YL notes functioning regularly, invite additional participation. Girls east of the Mississippi meet Wednesday on 3.9 Mc. at 8:30 A.M. EST; girls west of the Rockies on 3.9 Mc. at 3:30 P.M. PST on Monday. . .
W3QPQ, W3QPJ and W3NNB enjoyed the recent visit of EZ3AC and EZ3CQ, Canal Zone mother-and-daughter duo. The girls had previously QSOd many times. . .
Recently licensed after studying code and theory at school two nights a week for six months, W1VBT, Cecile, is enjoying 40 c.w. . .
Fifteen-year-old Jane Hunt of South Carolina has had the "N" removed from her call — she is now W4UNO. Another 15-year-old, W2RAB, Lynne, works 20 and 40 c.w. regularly. . .
W8JOK, Helen, of Delton, Michigan, and W7W3CR, Louie, of Findlay, Ohio, are two new YLs in the Eighth district. . .
W8JOY has her "MM" certificate. . . VE2HI, VE3DGT and VE3DEX attended a four-day hamfest in North Bay. VE3DGT operated mobile and portable from her trailer while journeying to and from the affair. . .
Canadian YLRL District Chairman VE3BTE is confined to the Hamilton Mountain Sanatorium, but Rose hopes to be seen out and about. . .
YLOS noted at the ARRL Pacific Division Convention at San Francisco were W7s AL 58, BFA 89K, FKY 20Q, LAD 896, MFW 59V, PCN 7ZT, WNO 39FM, WNO 89PL, and WVQYA. The code-speed contest was won by WVQYA (354 w.p.m. with a stick!) . . . W7s MJE QOJ 543, SCS and UQA reported a fine time at the Deep Sea Drag Net picnic held at the home of the NOS, W1PU. . .
In May, seventeen YLS met in Chicago for their second annual get-together. Between discussions of YL affairs, the girls enjoyed a luncheon and banquet, a radio quiz program, the 1952 Audio Fair, a visit to the stacks of W9GME, Grace, and W0DXX, Allen, plus a tour of an amateur equipment manufacturer's plant. W8s AXY BGB PZQ OME KF2X LOY LRT MYC, WNOs QMA QYG BWV SEZ SSL and SYX declared the entire program a big success. (Continued on page 185)

Conducted by ELEANOR WILSON, W1QON

Wiring the finish of the Sixth Annual Women's Transcontinental Air Race, held July 3rd-11th, it was recognized by the women who flew the race (all members of the famed Ninety-Nines) and by the amateurs who aided them on the ground, that something new would be recorded in both the histories of aviation and amateur radio.

Last December, Marjorie Davis, East Coast chairman of the Air Race, foresaw the possibility and value of aid from amateur stations along the flight route. ARRL turned the project over to Viola Grossman, W2JZX, who organized the amateurs and made the possibility a reality.

Sixteen stops from Santa Ana, California, to Teterboro, New Jersey, were scheduled. At each stop amateurs stood by to check-off planes as they landed, to report arrivals to CAA, to advise of weather conditions for the next "hop" of the flight, and to relay the departure time of each plane to amateurs at the next "sit-down" point. Most of these contacts were made on 75 'phone. The entire project was a mutual success.

Fifty-six amateurs participated, and they all did a praiseworthy job, but here we are primarily concerned with the role played by YLs. Bouquets to W2BTB, W2EEO, W3NXU, W8ZGT, W9LRT, the XYL of W2YBT, and an especially nice one to W2JZX. Again YLS have proved their capabilities and resourcefulness.

Next year we'll look for participation by more YLS. It's something to think about — an outstanding group of women on the ground operating in an organized network to safeguard and aid an outstanding group of women in the air!

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

Carolyn (Carlie) Hull, W2YCX, of Boonton, New Jersey, is the first YL of whom we have heard who has passed the Extra Class exam! Carlie obtained her first amateur radio license four years ago when she was a college senior. Now a high school science teacher, her interest in science and teaching stimulates her desire to learn all she can about radio theory and to train others to become amateurs. She built her first receiver and transmitter but now uses a 32V-1 and 73A-1, mainly on 10 'phone and 10, 20 and 40 c.w. Particularly interested in circuitry, she has built various pieces of test gear. One of her several other hobbies is the collecting of cats — but she confesses she has never built a receiver using a "cat's whisker!"
The Series Balanced Modulator

A New Circuit for Transmitters and Receivers

BY FRED M. BERRY,* WØMNN

A balanced modulator is used in single-sideband work (or in any other application) where it is desirable to prevent one of the modulating or heterodyning frequencies from appearing in the output and obtain only the sidebands or products of heterodyning. The "series" balanced modulator is presented because of its simplicity, good linearity, and excellent carrier suppression. In converting from audio to r.f., no iron-cored transformer is required in the audio portion, which makes it possible to keep the hum down without expensive components.

Fig. 1 — The basic series balanced-modulator circuit. \(L_1C_1\) and \(L_2C_2\) resonate at the output frequency, and \(R_i\) is the carrier balance control.

The basic circuit of the series balanced modulator is shown in Fig. 1. The action of the carrier is to switch point B to ground at the carrier rate. A basic requirement of the circuit is that \(Z_1\) (the impedance across which the modulating voltage is developed) have low impedance for the carrier frequency, and that \(Z_2\) (the impedance across which the output is developed) have low impedance for the modulating frequency. In practice, this requirement will be met automatically by using parallel-tuned circuits at \(Z_1\) and \(Z_2\).

\(Z_1\) and \(Z_2\) should be approximately the same impedance, but exact equality is not necessary unless a very minimum of loss is demanded. Impedance ranges between 500 and 50,000 ohms have been used — the optimum impedance depends upon the carrier power and the bias built up across \(R_i\) and \(C_2\) and \(C_3\).

Since the diode resistances appear in series as the carrier keys the diodes, the diode resistance must be low for low-loss operation and to prevent mismatch in filter input and output impedances.

Practical Circuits

The series balanced-modulator circuit has been used in a number of different applications throughout a s.s.b. transmitter. Its use in the audio modulator ahead of the sideband filter is shown in Fig. 2. The 6C4 cathode follower eliminates the need for any step-down transformer, and \(C_2\) offers a low-impedance return to ground for the carrier. The coupling coil, \(L_1\) or \(L_2\), should be sufficient to develop about 6 volts across \(R_3\). The alternative connection for the coupling coil eliminates \(R_3\), \(C_3\), and \(C_4\) and uses \(R_4\) for the balance control. Some improvement in linearity is obtained with this connection, but it requires more oscillator power to develop the proper voltage at the diodes.

Fig. 2 — The series balanced-modulator circuit for generating double sidebands and suppressed carrier. An alternative oscillator connection is shown at the lower left.

- Readers of the Proceedings of the I.R.E. will notice a similarity between the series modulator of WØMNN and that described by Mr. A. E. Kerwin in the July, 1952, Proceedings. Before any reader accuses WØMNN of larceny, we hasten to point out that he first showed us the circuit in March, 1952, and had been using it for some two years before that.

* 1200 East 49th Street, Kansas City, Mo.
Fig. 3 — The series balanced modulator for heterodyning a 450-kc. s.s.b. signal to the 75-meter band with VFO control.

$C_1, C_4, C_5 = 120 \mu$fd.
$C_2 = 200 \mu$fd.
$C_3 = 300 \mu$fd.
$C_6 = 15 \mu$fd.
$C_6, C_7 = 0.001 \mu$fd.
$C_8 = 45-\mu$fd. variable trimmer.
$C_{10}, C_{11}, C_{12} = 0.01 \mu$fd.
$R_1 = 30,000$-ohm potentiometer.
$R_2, R_5 = 0.1$ megohm.
$R_3, R_4 = 10,000$ ohms.
$L_1, L_2, L_3, L_4$ — Slug-tuned coils to resonate as shown.

An example of the series circuit used in a 0.5- to 4-Mc. converter is shown in Fig. 3. Here a 6AL5 is shown as the modulator diode, and a 6H6 phase splitter is used to get push-pull excitation from the VFO. The VFO should deliver enough voltage to furnish approximately 6 volts across $R_3$, $R_4$, and $C_8$ are adjusted for best carrier balance, as indicated by the absence of VFO-frequency signal in the output of the 3.9-Mc. amplifier. The inductive coupling between $L_3$ and $L_4$ is adjusted to give best band-pass characteristics over the 200-kc. phone band. This circuit also illustrates the fact that the diodes can be connected between ground and point $A$ or point $B$ of Fig. 1.

Other applications and versions of the circuit will undoubtedly occur to the s.s.b. gang. The modulator circuit of Fig. 2 can, of course, be used at 450 kc. (ahead of a crystal filter) with germanium diodes or a 6AL5 for the modulator and with a 450-kc. tuned circuit at $T_1$.

A double-balanced series-modulator circuit can be built for frequency conversion in which neither the signal nor the oscillator frequency appears in the output. In such a circuit, the signal is fed to the center tap of the primary. One side of the push-pull oscillator is fed through resistors and diodes (of opposite polarity) to the ends of the primary, and the other side of the push-pull oscillator is also fed through resistors and reversed diodes to the ends of the primary. A diode anode and a diode cathode connect to each end of the primary. Two of the resistors that run to one end of the primary should be made variable, for adjusting the carrier (oscillator) balance.

General

Referring again to Fig. 1, care should be taken to keep the capacity to ground low at point $B$ (or $A$, if the modulator is connected on that side). The primary-to-secondary capacity of $Z_8$ should also be held as low as possible.

The circuit also works well as a demodulator for receiver work where a locally-injected carrier is used (s.s.b. or o.w.). Its main advantage is that no critical balancing or special components are required. In a receiver, the push-pull carrier and its suppression permits the use of high carrier level for maximum linearity without introducing oscillator noise.

Intermodulation products are better than 60 db. down, using a carrier level of 3 volts and a maximum signal level of 0.1 volt.

Strays

Running consecutively in the Call Book you'll find W1s UPE, UPP and UPG—son, dad and mom respectively. Grandpop is W7THD.

— W2POC

The latest print-order for those multicolored American Airlines QSLs provided cards for 125 amateurs affiliated with the company.

— W2FXH and W2VQ

Bill Savage, VE6EO, ARRL QSL Bureau Manager for Alberta and widely known on the air, was elected president of the International Municipal Signal Association at its recent Walla Walla, Wash., meeting.
A very nice letter from Mr. E. Maurice Walker, ZL1AU, of Auckland, traces the history of s.s.b. in ZL. Apparently, the first on down there was ZL3FV, with a phasing rig and about 10 watts to an 807 on 80. This was about two years ago, and he wasn’t on the air too long. Then ZL1AU came on in November, 1951, with no one to work until he finally made it on 7 Mc. with VK3YW a few days before the end of 1951. In February he was joined by ZL1QS and then ZL4AE, and ZL1ATD is the latest arrival. ZL4AE uses a crystal-filter rig at 500 kc., 1ATD uses a phasing rig, and 1AU and 1QS use crystal filters at 5 Mc. Present activity by all hands is on 3.8 Mc., but there are hopes for some 20-meter activity later on.

W9UIT in Milwaukee worked ZL1AU on 80 on July 16th, and he wonders if it is the first s.s.b. ZL/W or only the first ZL/W9. UIT uses a modified Edmunds followed by a 1625 and a 304-TH running about 700-watt peaks.

Army of W2JJC does a lot of DXing on 20 s.s.b., and the latest one he scared up is VR2CG in the Hijos. No dope on the rig there, however. Other two-way s.s.b. DX includes JA2MB, DL4WC and KP4HF, with G2ALN heard.

Bob of W4INL is another DXer on 20, and recent two-way s.s.b. ones are DL4KA and OB13CC, with new countries EA9AB and EA9DC added with the s.s.b. rig. Bob wonders if an April 8, 1950, two-way s.s.b. with VK7DH qualifies as the first W/VK.

This column can make no pretense of keeping up with all of the new arrivals on s.s.b., but we can note a few for you. In the East, George Littlefield, W1CRU, at Cape Elizabeth, Maine, has a modified Edmunds exciter with a band-switching 807s-805s driver-amplifier on 15, 20 and 75, with most of the work to date on 20. No need for carrier reinforcement so far, since many of the gang are eager and patient to learn about tuning it. DX includes ZS6KD, OE13CC, CN8FR and Gs. ... Edgar Seeler, W1BDF, at Cambridge, Mass., is on 75 with an Edmunds driving AB2 807s to 75 watts, with best DX the West Coast. ... Two in Kentucky: Fred Lewis, W4LQX in Paducah, on 75 with a phasing job and 800 watts to a pair of Class B 5D2Is, and Jack Fulmer, W4HAV, at Fort Thomas, on 75 with a double-lattice voice-controlled exciter ending in a 6AG7 driving a 4-65A, with a "Signal Slicer" (GE Ham News, July, 1951) on the HRO. ... Berg Crawford, W6FMJ, at La Mesa, Calif., has the Handbook phasing rig (W2UNJ) and 811-As linear on 75. He doesn’t like the way the linear backs down when he reinserts carrier for traffic-net work, and we don’t blame him — that’s why lines are never popular before the s.s.b. boys started leaving out the carrier. ... Andy Burton, W5BDX, at Enid, Okla., says he gets more kick out of working s.s.b. with voice break-in than anything else he has done in 20 years of hamming. The rig is an Edmunds with a Good crystal filter (QST, October, 1951) to a Class A 807 driving AB1 813s. Only 200 watts peak so far, but it gets out better on 75 than the old 600-watt a.m. rig, and no TVI.

Dodging the Linear-Amplifier Problem

The July, 1952, Proceedings of the I.R.E. carries an interesting article by Leonard R. Kahn, entitled "Single-Sideband Transmission by Envelope Elimination and Restoration," that is well worth your study. Essentially it is a method for getting around the need for linear amplifiers in a s.s.b. system, which any single-sider will confirm is a worthy objective. This is accomplished by taking a low-level s.s.b. signal and breaking it into two parts, the envelope of the s.s.b. signal and a phase-modulated component with no a.m. present. The p.m. component is then used to excite a Class C amplifier, and the envelope is used to modulate the amplifier. Thus the original s.s.b. signal is duplicated at a higher level without requiring linear amplifiers.

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Fort Worth, Texas, is solidly established on the s.s.b. map through the efforts of "Doc" Stamphill, W5OHY. The rig is an Edmunds crystal-filter exciter, modified slightly by adding a grounded-grid 6AG7 following the regular 6AG7, into a Class A 807 that drives a pair of 4-65As to about 400 watts on peaks. The W1FAJ circuit is used to permit voice-controlled break-ins with a loudspeaker. Other useful adjuncts in the shack are a "Signal Slicer," Panadaptor, and grid-dip meter. A mobile s.s.b. rig is in the works, using a miniaturized Edmunds exciter to drive a single 4-65A.

"Doc" often checks into the CAA-employees s.s.b. net on 3965 Mondays at 2100 CST, where W4MCL acts as NC and W3BOL, W5QCM, and W2DCF work on plans for making it a transcontinental affair.
As briefly described above, the resultant signal would not be of the suppressed-carrier type, but would have a strong carrier when you weren’t talking and a minimum carrier on voice peaks. This might be advantageous in amateur work where automatic frequency control is used in the receiver for reinserting the carrier (as is possible with the YRS-1 adapter). It is possible, the article states, to use an “output level control” that will automatically increase and decrease the amplitude of the p.m. component and thus give an output with a suppressed carrier.

In any event, the system bears looking into, because it opens the possibility of a unit that can be applied to a normal a.m. rig to give a s.s.b. signal, without changing the a.m. rig.

S.S.B. Hints and Kinks

John Grubb, W2FGV, thinks many of the fellows with Edmunds exciters may stay off 20 because there have been no descriptions of suitable frequency converters, so he sends along the circuit of the unit he has been using successfully for some time. Shown in Fig. 1, it should require no further details or explanations, since the techniques involved are standard receiver and low-level transmitter practices.

And while we’re talking about the very popular Edmunds exciter, Harold Klaiss, W4QN, thinks it would be well to point out that you don’t need the double-channel filter originally described to get a choice of upper or lower sideband. If, for example, your suppressed-carrier frequency starts out at 450 kc., using an oscillator at either 3450 or 4350 kc. will put your (suppressed) carrier at 3900 kc., with upper sideband in one case and lower sideband in the other. It is probably most useful with crystal-controlled oscillators, but worth remembering at any time.

— B. G.
VE-W Reciprocal Operation Authorized

Details of Regulations and Procedures

Just in time to catch the end of the vacation season, in mid-July the Governments of Canada and the United States worked out registration procedures for amateurs of one country wishing to operate in the territory of the other, pursuant to treaty brought into effect May 15, 1952. The way is now open for such operation. W1AW carried the essential facts in bulletin immediately the announcement was made. This article will spell out the procedures in detail.

The authority for reciprocal operating privileges comes from a treaty with the extensive title, “Convention Between the United States of America and Canada, Relating to the Operating by Citizens of Either Country of Certain Radio Equipment or Stations in the Other Country.” It provides that civilian pilots, properly qualified as radio operators, may work the radio gear in aircraft of the other country’s registry. It provides that radiotelephone mobile units (commercial and public—not amateur) in border areas may use their equipment on both sides of the boundary. And it provides that “Amateur wireless operators will be permitted, subject to certain conditions, to use their wireless sets while visiting the other country.”

Don’t let that “wireless” scare you. It still means amateur radio!

Since Article III of the convention treats the amateur angles, we quote it herewith:

It is agreed that persons holding appropriate amateur licenses issued by either country may operate their amateur stations in the territory of the other country under the following conditions:

(a) Each visiting amateur may be required to register and receive a permit before operating any amateur station licensed by his government.

(b) The visiting amateur will identify his station by:

1. Radiotelegraph operation—The amateur call sign issued to him by the licensing country followed by a slant (/) sign and the amateur call sign prefix and call area number of the country he is visiting.

2. Radiotelephone operation—The amateur call sign in English issued to him by the licensing country followed by the words “fixed,” “portable” or “mobile,” as appropriate, and the amateur call sign prefix and call area number of the country he is visiting.

(c) Each amateur station shall indicate at least once during each contact with another station its geographical location as nearly as possible by city and state or city and province.

(d) In other respects the amateur station shall be operated in accordance with the laws and regulations of the country in which the station is temporarily located.

We shall now take up these conditions in order.

Each country has already decided that it wishes amateurs of the other to register and get authorization before engaging in such operation. U. S. amateurs should write:

Telecommunications Division
Department of Transport
Ottawa, Ontario, Canada

stating their desire to operate in that country, giving their complete name and call letters, and outlining very briefly the nature of the trip and approximate dates. Write several weeks in advance of your contemplated trip. In reply you will receive two copies of an application form. These are to be filled out carefully—preferably with a typewriter—and mailed back to Ottawa. The duplicate is authenticated, if found satisfactory, and returned to you; it becomes, with your FCC ticket, your instrument of authorization to get your gear intact through customs, and for your operation in Canada. Without the signed authority, your transmitter will be sealed at the border and may not be used while you are in Canada.

In addition to name and address, the form calls for a “license number.” This refers to other services; amateurs leave this space blank, since we have no such number. It calls for the expiration date—not issuance date—of your ticket. It asks for “authorized communication service and area in Canada where station will be operated.” Here you must be brief, as space is limited; you should indicate dates of your trip and area covered, and of course that your service is amateur. A sample entry might be “mobile amateur communications during trip from Niagara Falls, Ont., to Windsor, Ont., September 15-17, 1952.” For a summer camp you might say, “portable amateur communications during vacation at Moose Jaw, Sask., September 15–October 20, 1952.”

When authenticated and returned to you, the duplicate should be kept with your FCC ticket; the form alone is not your authorization, but only an “endorsement” of your regular license. VEs headed south should write:

Authorization Analysis Division
Federal Communications Commission
Washington 25, D.C.

in reply receiving similar application forms. The procedure is substantially the same, except that Canadians might allow a little more advance notice.

Items (b) and (c) of the section of the treaty quoted earlier are pretty much self-explanatory. Identification on c.w. includes the usual slant bar (/) after the station call followed by the prefix and the call district numeral. If you are a W operating in Alberta, you’ll add /VE6 after your call sign; if a VE operating in Pennsylvania, you’ll add /W3. Once during a contact approximate location must be given. On voice, sign your regular call plus “fixed,” “portable,” or “mobile” as the case may be, and the prefix and call district number. A typical voice signature might be therefore, “This is W1LVQ, Double-You One Lewis Victor Queen, operating mobile VE3, on the Queen Elizabeth Highway north of Hamil-

50 QST for
ton, Ontario." Note that the latter geographical identification need be given only once during a contact, but it must be done on c.w. as well as voice.

The map on this page shows call area boundaries in both countries.

FCC licensees are reminded of the present requirement that an amateur operating outside the continental U.S. limits must notify his home district FCC engineer if he is to operate in another country for more than 48 hours; one notification is sufficient for one trip, no matter what the length.

Canadians are reminded of the requirement that monthly notification must be given the U.S. Engineer in Charge of the district in which temporary operation is contemplated. The notice should state the call, name, dates of proposed operation, and portable location or mobile itinerary; it should also make reference to the authorization issued by FCC in Washington. District boundaries and engineer addresses are in the License Manual; or see page 43, June, 1951, QST.

We come now to the last item, (d), which in effect restates the maxim, "When in Rome, do as the Romans do." In other words, you observe the regulations of the country in which you are temporarily operating. An important point to watch is the voice suballocations. As Canadians have generally wider voice bands than Ws, Americans don't have too much of a problem; but VEs crossing the border with a 75-meter mobile rig, for example, ought to remove any crystals lower than 3800 kc.

Canadians may refer to the item "What Bands Available" in the "Happenings" column of this issue for a list, accurate as of August 1st, of frequency privileges in the United States. But keep an ear on WIAW or write Eq. for the latest dope before making your trip, as there are a number of proposals pending before the FCC on changes in U.S. bands.

Americans headed for Canada should note the following comparison of frequency privileges, VE and W. In 1800-2000 kc., Ontario and east have 1800-1825 and 1875-1900 kc., 250 watts day and 100 watts night; Manitoba and west, 1900-1925 and 1975-2000 kc., same power limits. Other overall band limits (but not voice suballocations, which we'll mention in a moment) are identical except 11 meters, which is 26,958-27,282 kc.

Phone suballocations in Canada, in addition to the 1800-2000 kc. segments, are:

- 3725-4000 kc.
- 14,150-14,360 kc.
- 28,200-29,700 kc.

To operate voice in their 1800-2000, 3725-4000, 14,150-14,360, and 28,200-29,700 kc. bands, Canadians must have "unrestricted radiotelephone" authorizations; therefore Ws going into Canada intending to operate 'phone in such bands should possess the counterpart Advanced Class (or higher) license. VEs are warned that they should be holders of such unrestricted tickets before operating in U.S. territory in the 3800-4000 and 14,200-14,360 kc. bands.

In Canada, the power limit (except for 1800-2000 kc., specified above) is 500 watts in the antenna, based on a final amplifier efficiency of

(Continued on page 118)
As noted by W4PN in the Manila Evening News, the first b.c. station in northern Mindanao, Philippines, has been installed at Cagayan de Oro City. Its call letters — DXCC!

Lt. Col. Fred J. Elser, W4GVU, has almost enough WAC-diploma footage to paper his shack. He has earned eight under these calls: pi3AA, W2GVU, W1KOM, W3HQQ, TA3GVU ('phone and c.w.), W6GVU and W4GVU.

An advertising flyer for a new model of a popular tape recorder states the mechanism will rewind at the rate of 1800 feet of tape per second. W9LQE figures they really have something — that's a tape speed of over 1227 m.p.h.!

“The trend today is to accept any modern practice as having been just newly thought of by some bright spark. Actually, in many cases, the ideas have been common in the earliest days of amateur radio, although they may have been rather neglected in the intervening years. The recently publicized grid-dip meter is no exception as the following extract from the third edition of the ARRL Handbook, which was published on October, 1927, will show:

The best thing to do is to build a good antenna and measure its period by closing the circuit (tying antenna lead to counterpoise lead) and bringing a sensitive oscillator near the lead with a milliammeter in the grid circuit. Varying the oscillator frequency, the reading on the 0-1 or 0-5 meter will drop sharply as the antenna 'tune' is found. The wavelength of the oscillator at this adjustment can now be measured.

“Well! Would you believe it? To think that it was described by Handy in the ARRL Handbook just 25 years ago! Why — it's eligible for the Old Timers Club and not such a derided newfangled gadget after all!”

— ZL2IQ in NZART’s “Break-in”

FEED-BACK

The author of the Sling-Pack portable points out that Fig. 1 on page 34 of the June issue shows the LN34 noise-limiter diode connected backward — the cathode should connect to the junction of R9 and R9 when S1 is closed. Also, it has been found that a 10-μfd. 150-volt electrolytic condenser connected from “4-90” to chassis will prevent audio regeneration when the B batteries are approaching the end of their life.

In the circuit of the Bandbox frequency-multiplier unit on page 12 of the April issue, the second (40-meter) contact of S1B should not be connected to succeeding contacts on the switch. In other words, there should be no connection between the second and third contacts of this switch.

In the article on the flea-power portable, page 24 of the August issue, it seems that the type-setter ran out of space and cut the caption of Fig. 1 short. The following should be added:

L4 — 50 turns No. 30, 3¼ inch diam.
J1 — Open-circuit jack.
M1A — 0 to 50 ma.
RF1, RF2 — 2-μh. r.f. choke.
S1, S2, S3, S4, S5 — S.p.s.t. toggle.

[Error’s Note: “A Grid-Meter Driver,” by W. A. Hoffman, appeared in August, 1926, QST. One of the earlier grid-dip meters, the unit described in that article is shown above. A model has been "on file" at ARRL headquarters for over a quarter of a century.]
TVI QUIZ AVAILABLE TO CLUBS

As part of the League’s Training Aids program, a timely quiz has been prepared on the subject of TVI. Consisting of 20 selective-answer type questions, the quiz is designed to liven any club meeting and at the same time impart information on this pertinent topic to the membership. Clubs desiring to make use of this quiz should write ARRL, requesting Training Aid No. 6.

SERVICEMEN ENLIGHTENED ON TVI PROBLEM

Progressive TV receiver manufacturers are leaving no stones unturned in their effort to educate their service agencies in the many causes of TVI and the reasons why. A recent Hallicrafters service bulletin, No. 1952-19, which has been distributed to all members of the Hallicrafters nation-wide service organization along with a copy of Phil Rand’s book, Television Interference, treats the subject comprehensively. We quote from the bulletin, released by N. J. Cooper, general service manager of Hallicrafters:

... TVI is all too frequently blamed on an amateur radio station — while it is quite possible for the amateur transmitter to be radiating harmonics or for its fundamental frequency to be causing TVI (due to close proximity to a television receiver), actually there is far less to be concerned with in that respect than the average serviceman usually believes. The following are other causes of TVI, some of which are sufficiently prevalent to warrant at least equal if not prior attention to interference that might originate with an amateur station:

1. Automobile ignition — spark-plug interference.
2. Diathermy radiation.
4. Airplane flutters.
5. Oscillator radiation from a near-by f.m. receiver.
6. Oscillator radiation from a near-by TV receiver.
7. Oscillator radiation from other near-by short-wave receivers.
8. Co-channel interference — two TV stations operating on the same channel and overlapping reception occurs in the deep fringe area of both transmitters.
9. Image reception of f.m., police, taxi cab, radiotelegraph and industrial radio service transmitters.
10. Superregenerative receivers operating radio-controlled garage doors.
11. Harmonics of a TV f.m. amplifier falling in a TV channel.
12. Adjacent TV channel being received in part causing sound-bar interference.

13. Cross modulation of high- and low-frequency station signals to produce a beat signal in the TV band.
14. Rectification of signals and radiation of harmonics (of signals from stations below the TV band) caused by corroded antenna connections or any nonlinear (rectifying) element in proximity to the TV receiving antenna.
15. Overloading of the r.f. stage of the TV receiver due to a very strong signal from a station whose frequency adjoins or is in general proximity to the television channels.
16. Electric motors in household appliances such as vacuum cleaners, fans, sewing machines, shavers, etc.
17. High-frequency heating equipment used for industrial applications.
18. Old-type tungsten-filament lamps.
19. Cracked insulators and defective lightning arrestors on high-voltage power lines.
20. Oscillation of one or more stages of the TV receiver.
22. Oil burners.
23. Belt static.
24. Oscillation in the amplifier stages of a TV booster.
25. Arc welders.
26. Blinker lights or traffic lights.
27. Fluorescent lights.
29. Poor or unfiltered contact action in devices such as door-bell rings, dial telephones, demand meters, etc.

The Hallicrafters service bulletin continues with a listing of ten ways in which interference can enter the circuits of a TV receiver:

1. Direct signal pick-up or direct feed-thru to the i.f. stages (applies to interfering signals in the I.F. frequency range).
2. Combination of the receiver’s local-oscillator signal with interfering station signals whose frequencies are below or above the TV band.
3. Combination of the second or third harmonic of a TV receiver’s oscillator with an interfering station signal.
4. Direct reception of oscillator signal radiated by a near-by TV receiver.
5. Direct video pick-up of horizontal sweep frequency signal from a near-by TV receiver or the same receiver.
6. Direct video pick-up of an interfering signal.
7. Harmonics of interfering signal beating with local oscillator in the TV set.
8. Rectification of interfering signals in antenna or r.f. stage.
9. Overloading or blocking of the r.f. stage in the TV receiver due to strength of interfering signal.
10. Rectification of interfering signal in 1st audio stage of the TV receiver.

REMINDER . . .

In case you overlooked it, a bibliography of 72 QST titles bearing on TVI was published on page 67 of December, 1951, QST.

At a recent TVI clinic in Washington, D. C., Phil Rand, WIDBM, demonstrates a TVI pattern in one set and compares it to other sets of different circuitry. Co-operating in staging the clinic were the Electric Institute of Washington, the Radio-Television Manufacturers Association, the Washington TVI Committee, and organized ham groups.

September 1952
The Commandant, Eighth Naval District, has announced the following units as winners of their respective type of units in the Eighth Naval District Naval Reserve Program: Organized Electronics Company 8-3, Waco, Texas (K5NNAU); Volunteer Electronics Company 8-52, Belleville, Texas (K5NBPF); and Volunteer Electronics Platoon 8-8, Minnole, Texas. These units will compete in similar activities with other naval districts, to determine the winning units in the national competition.

Armed Forces Day

During the week preceding Armed Forces Day, K5NRE, Naval Reserve Training Center, El Paso, Texas, set up an SCR-299 communication van at San Jacinto Plaza in downtown El Paso. The unit operated daily from 1000 to 1830 local time and messages to and from armed forces personnel were handled. K5NRE originated 877 messages. W5GCJ, Jesse F. Lee, ETRC, and W5BYE, Mario E. Alarcon, RM1, (stationkeepers at the training center), were the operators.

The following Naval Reserve Training Centers in the Ninth Naval District were active during Armed Forces Day: K0NAT, Ft. Wayne; K0NR, Indianapolis; and W9USN, Evansville, Indiana. During open house at the Training Center, Indianapolis, the mobile communication unit was operated in the 7-Mc. band for four hours. Numerous contacts were made on c.w., highlighted by a contact with W9BIL/R who was operating his car while under way. K0NR also reported into the Indiana amateur radio net to handle traffic.

K8NKT, Naval Reserve Training Center, Toledo, Ohio, operated by R. G. Groh, RM2, USNR, stationkeeper, acted as net control for the Toledo area emergency communications net during their field day held on Armed Forces Day. Between 0900 and 1630 local time, K8NKT worked fifty amateur stations, on 1895 and 29,200 kc. Thirty-one of these were mobile units. Thirty hams from the Toledo area visited the Naval Reserve Training Center's open house.

Here and There...

On June 14th and 15th, at Eastern States Exposition Grounds at Springfield, Mass., the Naval Reserve Training Center (att. Boston and Springfield) Mass., provided a mobile communications truck and radio jemp to add to the display of Naval Reserve radio equipment at the New England Division Convention. Amateurs were invited to operate the equipment which was on the air during the Saturday morning session.

W9USN, Eighth Naval District Reserve Master Control Station, New Orleans, La., recently received a W48 certificate. Operators are W9E, K5X, H5P, H5V, L5Q, L5R, S5L, SPX, TMF, T2Y, UNP, W9Ms, UEO, UEP, UIY and UTX.

The multiplier grows by one if you rework this same section on another band. (Scoring differs in this respect from other ARRL competitions to encourage everyone to make use of as many v.h.f. bands as possible.) A simple tabulation with points and section list is all that is required. A card to Headquarters will bring the simple form on which to report; or your own similar tabulation will be accepted.

Rules

1) Name-of-section exchanges must be acknowledged by both operators before either may claim the point(s).
2) All claimed contacts must fall in the contest period and must be on authorized amateur frequencies above 50 Mc., using permitted modes of operation.
3) Fixed-, portable- or mobile-station operation under one call, from one location only, is permitted.
4) The band your transmitter is on determines whether a QSO counts 1 or 5 points. Cross-band work shall not count.
5) A "contestant" is a single operator working without the help of any other person. Results may be presented with names of all participating persons, for listing, but only single-operator scores will be considered for certificates.

(Continued on page 158)
WELL, here we are, just about through another summer. To date it has not been up to the last few years in a number of respects. Sporadic-E skip, particularly, has been down compared to the early-summer periods of 1949, '50 and '51. A natural conclusion to draw is that this is the result of hitting the bottom of the sunspot cycle, but an examination of the record back to 1945 does not bear this out. The summer of 1948, right at the top of the cycle, was very similar to the season now just coming to a close, yet 1947 (on the up side of the cycle) and 1949, '50 and '51 (on the downward slope) were extremely good.

Setting a character figure for sporadic-E from amateur observations is difficult, at best. By "good" do we mean frequent openings, long openings, widespread openings, high-density ionization (short skip), or high incidence of multiple hop effects? One thing is sure, however; by almost any of these standards, the summer of 1952 has been no ball of fire. Particularly as to evening openings and double-hop, the season has been disappointing. If you were on 6 in 1948 you can see the similarity between the two years, but if your 6-meter activity dates back only to 1949 you'll be hailing 1952 as the worst ever.

Tropospheric propagation, too, has been less exciting than in recent years. It would take more of a meteorologist than the writer to explain this, but the fact remains that stable and widespread inversions, usually in evidence from May on, have been almost totally lacking thus far this summer. When signals on 144 Mc. and higher bands have been up, it has been largely from stations at distances under 250 miles, and there have been very few indications of duct effects that might make possible communication over distance up to 1000 miles or more. Of course, late summer and early fall are the peak period for that sort of thing, and the best of the year is still ahead as we write.

*V.H.F. Editor, QST.*

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The omnidirectional array used by VE2RA, Halifax, N. S. This station is operated 24 hours a day on 49.99 Mc. by the Defence Research Board of Canada as an aid to those interested in studying v.h.f. propagation phenomena. The slanting supports are half-wave transmission lines to each dipole. Design by VE1IQZ.

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September 1952
more than a couple of miles on 144 Mc. Someone must have changed all that in the last few years, however, and now the W6s rank high in v.h.f. enthusiasm. This was well demonstrated at the West Gulf Division Convention in Corpus Christi, June 28th and 29th, where the v.h.f. meeting brought out an attendance of 135. A feature was the presentation of v.h.f. achievement awards to W2PEK, W5FAG, and W6DFT, as planned by Texas, New Mexico and Oklahoma in the 1951 competition sponsored by West Gulf Director Middleton, WSCA. The competition is being continued in 1952. Big things are more likely means for the ARRL, National Convention, to be held next year in Houston. W6FEK is in charge of the v.h.f. program.

The early morning hours are generally the best of the day for v.h.f. propagation, but too little attention has been paid to this well-known fact. Late afternoon and late-evening hours are also often good, and not many of us can burn the candle at both ends and get away with it very long. One thing in favor of the early morning is that it is good the year around, whereas favorable nights are more a warm-weather proposition. For a year now, W2QED, Seabrook, N. J., and your conductor have been maintaining schedules on 144 Mc., daily except Sunday, at 7:30 to 7:30 A.M. and it is seldom that we are unable to make some sort of contact on this 210-mile path, yet tests in the evening hours have been largely unproductive, except during the summer.

Earlier starting times than this would be desirable for those who have the fortitude to roll out for them. VE1Q2, Holm, N. B., has been testing from 5:30 to 6:30 A.M., and is in ESTD recently on 144.65, and has now begun trying the same times in the early evening, W2UK, W2LNY, W2EH, and W2FO, join the morning parade, and others are invited to do so, at their convenience, and John Ve1Q2, Pa., is looking for activity on 2 daily between 6:30 and 7:45 A.M. ESTD. There is daily activity in Eastern Texas, starting around 6:30 A.M. Anyone who is keeping regular morning skeds is invited to send information to the writer, so that the times and frequencies can be given publicity.

Been wondering what happened to that Pike's Peak 6- and 2-meter expedition scheduled for the ARRL Field Day? We got the notes from W9KBM just too late for inclusion in August 817, so here it is. In W9KAX and W9KBY went through with their plans, but unfortunately were not aided by any unusual conditions. They worked several stations in Pueblo on 146 Mc., and in Denver on 50 Mc., but no real DX on either band. Just a few days previously there had been DX all over the place, showing even as high as TV Channels 7 and 9, and on the commercial v.h.f. assignments and the f.m. band, but it was not in the cards for the Field Day week end. The field force, who may be planning high-altitude work with emergency power-supplies their 750-watt a.c. unit would not quite light a 200-watt lamp, when operated at 14,100 feet above sea level.

The low-powered 50-Mc. portable described by the writer in May, 1951, QST, has proved a popular item. Results obtained with such gear have been a source of wonder to many. We are so accustomed to thinking of hammering in terms of hundreds of watts input that we tend to forget that even 90 volts of "B" battery on the final stage can do OK in a good location.

There were four of these little rigs at the recent New England Division Convention in Springfield, Mass., built by W1AXA, WISUZ, W1RO and the writer. W1AXA modified the design by mounting another chasse similar to the one used in the original along with it, to carry larger batteries and more of them. His 156 volts of "B" give him husky modulation and he has room for an "A" battery that will allow some rag-chewing. W1AXA is often heard working mobile with this set-up, using the regular ear whip antenna. One of the best hops he's made with it was working W1HDQ from M. Wachusett, a distance of 70 miles. Even with the little center-loaded whip, W1AXA/1 was a solidly-readable 84 at W1HDQ. Not bad for less than 1/2 watt input to a doubler! Red inserts a dropping resistor between the modulator choke and the final tank, to increase the modulation percentage.

Nebraska has not been well represented on 6 recently, a condition that W9EET tried his best to remedy by spending two weeks in Lincoln during early July, and operating at TV by every opportunity. He didn't see much DX on the evening hours, but frequent daytime openings gave him a chance to work 41 different stations in 14 states, several 56 QST for
being the first Nebraska contact for the fellows at the other end. Gordon was responsible for station No. 43 at WSSFW, and No. 46 for WSMJD, but ground-wave skids made with Kansas and Minnesota stations failed to produce the desired result. If things work out well, another attempt will be made next year, with an improved antenna system.

Some Hints on High-Powered 2-Meter Amplifiers
From W2LZD, Scranton, Pa., come some ideas that will be of interest to anyone contemplating high power on 144 Mc. Fred has revamped his 4-125A rig five times in four years, in the interest of increased efficiency and TVI reduction.

His latest.version of the coax line fed, found it desirable to time out the reactance of the coupling loop at the tank. This resulted in an increase of about 50 watts antenna power at the 600-watt level. Forced-air cooling raised the permissible input to 750 watts on "phone" and a full kilowatt on c.w. Improved tank-circuit efficiency was developed by going to 14"-diameter silver-plated tubing. With this tank the coupling loop required is made of only three inches of wire loosely coupled to the tank. The variable capacitor for tuning out the reactance is set at about 5 μfd. capacitance.

In his first exciter, Fred started at 8 Mc., with the result that multiples of this frequency appeared all through the spectrum, causing TVI wherever they landed in a TV channel. Replacing capacity-coupled stages with inductive coupling helped some, but was not a complete cure. The early stages ran too much power, too, a 252G doubler to 48 Mc. driving an 829A tripler to 144 was very "loud." Going to a 24-Mc. starting frequency was a big help, but one of the 24-Mc. multiples still fell in a TV channel used locally, and since many TV sets in the Scranton area run on a signal level around 100 μv, there was still trouble.

Fred's present rig starts out on 48 Mc., using a crystal marked for 28,815 kc., working on its fifth overtone instead of the third (9605 kc. fundamental). Two 829C triplers to 144 and this stage and the crystal oscillator are in a separate shielded compartment, with power leads decoupled and the output coming out on coax. Next is an 832 amplifier with shielded parallel-line tank, driving an 832 amplifier similarly coupled. These two stages are in another shielded and filtered assembly, with coax feeding the 4-125As in a third shielded unit.

Even these precautions left some radiation at 96 and 192 Mc., so three-quarter-wave stubs were placed on the outputs of each of the stages. These have no effect at 144 Mc., but they are effectively shorted at the frequencies 48 Mc. on either side. Attenuation of 96 and 192 Mc. is thus too high that they are barely audible in the immediate vicinity of the transmitter, and inaudible at any distance. The end result is no TVI that can be traced to transmitter faults. There is some audio trouble of the midget-receiver variety, but Fred can run a full kilowatt on 144-Mc. c.w. (you hear him doing it regularly during tropospheric and aurora openings) with complete peace of mind.

Doings on 220 and 420
Activity on 220 Mc. has been more increasing in the Cleveland area, largely through the efforts of W8JG, and the following calls are heard quite regularly: W8FQ, W8FQ-WFC WJC U8S J8S I8P F8O and W8M. To provide some DX, W8WM installed 220-Mc. gear aboard the cabin cruiser Mary Margaret IV, and has been working the gang from around islands of Lake Erie, about 20 miles off shore. Saturday, the home port. From this point, W8JC-BFQ, 70 miles distant, is worked regularly, and with a freedom from all forms of noise that is a revelation after fixed-station operation in a noisy location. The cruiser's set-up has an 827C doubler driven by an 832 and a string of 066s as oscillator and multipliers. The receiver is a crystal-controlled converter. A 4-section "City Slicker" array is used, with a servo reflector that can be added if weather and wind conditions warrant.

W8BM points out that most pleasure craft of 45 feet or larger carry gasoline or Diesel-engine driven generators that are a source of emergency power. This points up the desirability of lumping them together on some ham club and yacht clubs, for emergency purposes, where the two kinds of organizations exist in one locality.

On 420 Mc., improvements in receivers, transmitters and antennas are helping to make many a hop regularly that was formerly considered phonematic. In the better 420-Mc. installations there is no longer a large difference between the consistent operating range on 420 and 144 Mc. W3QED, Seabrook, N. J., finds that W3BSV, Salisbury, Md., about 90 miles to the south, is no longer in the DX category. Twice-daily checks between W1CLS and W3QED, Marietta, Ga., and your correspondent in Canton, Conn., have shown that this path of close to 100 miles is open for at least an audible signal on 432 Mc., either morning or evening. The minimum signal is just a trace with the b.f.o. on, but most days there is show. peaks about 3 db. above the background noise, and when a pronounced inversion is present the 432-Mc. signal may run 15 to 20 db. above the noise level. These contacts are started on 50 Mc., where there is always a
readable signal. When 144-Mc. communication has been tried, that band shows signals only slightly above the 432-Mc. ones. The 50-Mc. signal is considerably better than either, under most conditions.

W3QBD's first 435-Mc. DX of the summer to the south was worked on the night of July 29th, two-way contacts having been made with W4NIK and W4ODG, Hampton, Va., 150 miles distant. These fellows are both using APT-5 jammers, but are working on crystal-controlled gear.

In Baltimore, W3KFM and W3JF are on each Tuesday, Thursday and Saturday, transmitting for 5 minutes each. A 15-minute interval, starting at 10:15 p.m., beams northeast. They listen after each test transmission, and turn around to the south at 11:15, if nothing has developed in the northeast direction earlier. W3JF has worked W3BBSV, across Chesapeake Bay in Salisbury.

W2UFU, Long Island City, N. Y., is working on amateur TV, and would like to hear from other TV experimenters. He would like to form a club devoted to v.h.f. and TV experimental work, not only for licensed hams, but for others who are experimentally inclined.

WAMS, Pensacola, Fla., is another TV enthusiast. Eddie is working on his camera equipment, and will be in a position to supply prints of the construction to hams who are genuinely interested in this phase of the amateur art.

V.H.F. Net News

To promote interest in year-round v.h.f. operation, we list in these pages at regular intervals the principal details of known active v.h.f. nets. The first such list, published in the QST, resulted in several groups sending additional information on their activities, and they are added below. The table is far from complete, however; please give us the dope on your regularly-scheduled v.h.f. operations so that they can be added the next time the table appears. And how about those question marks in the table below?

<table>
<thead>
<tr>
<th>Name or Area Served</th>
<th>Frequency</th>
<th>Date and Time</th>
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<tbody>
<tr>
<td>Minute Men (E. Mass.)</td>
<td>51</td>
<td>WIIN Sun. a.m.</td>
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<tr>
<td>Homestead (W1, 2)</td>
<td>50-51</td>
<td>W1B7DQ Tues. 1930</td>
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<tr>
<td>Arlington, Mass. CD</td>
<td>53.4</td>
<td>?</td>
</tr>
<tr>
<td>N. Y. — N. J.</td>
<td>50-54</td>
<td>Rotates Nightly 2200</td>
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<tr>
<td>N. Y. State CD, Zone 9</td>
<td>144 (T)</td>
<td>Fri. 2000</td>
</tr>
<tr>
<td>N. Y. State CD, Zone 10</td>
<td>145.26</td>
<td>W2BRD Mon. 2200</td>
</tr>
<tr>
<td>Phila. High Freq. Club</td>
<td>147.3</td>
<td>Thurs. 2000</td>
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<tr>
<td>Interley (Phila.)</td>
<td>147.3</td>
<td>Mon. 2000</td>
</tr>
<tr>
<td>York Road Radio Club</td>
<td>146.6</td>
<td>Wed. 1930</td>
</tr>
<tr>
<td>Oak Ridge Em. Net</td>
<td>50.7</td>
<td>Thu. Fri. 1930</td>
</tr>
<tr>
<td>STTY No. 2 (W3, 3, 4)</td>
<td>146.34</td>
<td>Mon. 2000</td>
</tr>
<tr>
<td>Columbus, Ohio</td>
<td>?</td>
<td>Mon. 2000</td>
</tr>
<tr>
<td>2 Meters &amp; Down Club</td>
<td>144-148</td>
<td>W6HIE Mon. 2000</td>
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<tr>
<td>Jackson, Mich. CD Net</td>
<td>145.6</td>
<td>WSBBY Wed. 1930</td>
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<tr>
<td>Muncie, Ind.</td>
<td>145.86</td>
<td>W9GSSY Mon. 2000</td>
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OES Notes

W2UTII, Rochester, N. Y., reports that the early part of the summer was not too good in the quality or length of openings on 144 Mc. There have been several short periods when signals have been good for distances up to about 150 miles, mostly during the early evening, but few signs of anything beyond.

W2ZWH, in the same city, notes that DX across the Lake is better on the evenings when the air is cool, after hot days. But the weather began to be consistently hot in the evening (70 to 80 average) the signals from the Canadian stations were for the most part below the line even when the evening temperatures ran between 55 and 65. Cheer up, boys, that's what we'll be getting again in September; the best period of the year for 2-meter propagation is just coming up.

WXNY, Colwyn, Pa., needs help with his 2-meter teletype set-up. Any offers?

W5LIU, Ft. Worth, Texas, found the 50-Mc. band open 22 days in June, though the openings were not particularly good, except for June 15th, 18th and 28th.

W7JRG, Mont., was busy during the early summer providing 50-Mc. contacts for Montana-hunry state hunters, not the least of them being a certain Connecticut W1, who now can relax, having been pushed into the 48-worked states bracket by the Rochester University crew from Montana. W7JRG found 22 openings between May 13th and the end of June.

W8UIY, Columbus, Ohio, found 21 days when the band was open in June, and raised his state total to 45 thereby.

WSFKC, Hudson, Ohio, says that not the least of the advantages of the 220-Mc. band is that you can get antennas ready-made at little cost. Only very minor modifications are required to convert a 220-Mc. phone receiver to 220. Ralph's present array is one of those long 5-element jobs. He estimates that it provides around 10 db. gain on 220, and it is noticeably better than a 5-element array of similar design.

WSFKEC is also working on 420, and has been experimenting with crystal and vacuum-tube mixers, using a coaxial line made according to the information in June, 1952, QST. A 6AF4 triode makes a marked improvement when it is installed in place of a crystal in this tank circuit. One of the new 6AJ4s is used in a coaxial-line r.f. stage, with excellent results and no sign of instability. The transmitter is an AX-9903 tripler, delivering about 10 watts output on 432.99 Mc.

W9CFP reports that the success of the Racine Megacycle Club's 2-meter installation for the ARRL Field Day has started a move in AREC circles to replace the 10- and 25-meter mobile gear in Racine County plans with 144-Mc. equipment.

W9FAN describes a junk-box final stage for higher-powered e.o. operation on 144 Mc. Driven by his regular 292B, the new set-up uses a pair of 500-watt junk-box stages; neutralizing and decoupling is furnished by short lengths of coax, the adjustment being made by bunching up the outer conductor.

Final Results, June V.H.F. Party

There are 210 cells in the final tabulation of scores in the June V.H.F. Party below, one of the largest turnouts yet seen in a spring or fall v.h.f. contest. Scores were good, too, and activity was at an all-time high in many quarters, particularly in the areas where extensive 2-meter activity concentrations encourage participation. Generally good tropospheric propagation helped things along, but there was little in the way of sporadic-E skip to bolster the scores of the 50-Mc. men.

As reported last month, the country's high score was posted by Margaret Rogers, W8BFQ, Everett, Ohio, and the NYC-LI Section winner, as often before, was Viola Kapp, W2FJH. One Novice placed first in his section, W7NRAF of Seattle topping the list of entries in the Washington Section. There were more reports from the sections bordering on the Great Lakes than we've had in past v.h.f. contests, pointing up the large increases in 2-meter interest in evidence in that part of the country.

West Coast reports were generally low, making it worse what had happened to the hundreds of 2-meter operators that are using the 2-meter band in California.

Contest highlights were reported in some detail last month. In the final tabulation of scores, listed are ARRL Divisions and Sections. Unless otherwise indicated, the first call in each section is the award winner. Columns give the score, the number of contacts, the section multiplier, and the bands used. A is 50 Mc, B 144, C 220, D 420 and E 2400 Mc. Next contest Sept. 20th-21st. See announcement elsewhere in this issue.

ATLANTIC DIVISION

<table>
<thead>
<tr>
<th>Station</th>
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<tr>
<td>W3WLA</td>
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<td>72-18-4</td>
<td>B</td>
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<tr>
<td>W3AF</td>
<td>1974</td>
<td>69-15-4</td>
<td>AB</td>
</tr>
<tr>
<td>W3GTP</td>
<td>2148</td>
<td>42-13-3</td>
<td>B</td>
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S. New Jersey

<table>
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<th>Station</th>
<th>Score</th>
<th>Contacts</th>
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<tr>
<td>W2QED</td>
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<td>104-44-9</td>
<td>AB</td>
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<tr>
<td>W2UK</td>
<td>2019</td>
<td>158-155-10</td>
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<td>W2NYX</td>
<td>1110</td>
<td>105-118-10</td>
<td>B</td>
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<td>309</td>
<td>37-8-8D</td>
<td>B</td>
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<td>W2MEU</td>
<td>249</td>
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<tr>
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<td>185</td>
<td>156-27-6</td>
<td>B</td>
</tr>
<tr>
<td>W2AD</td>
<td>128</td>
<td>25-1-6</td>
<td>B</td>
</tr>
<tr>
<td>W2DMDU</td>
<td>24</td>
<td>8-3</td>
<td>B</td>
</tr>
</tbody>
</table>

* Md.-Del.-D.C.

W3PPW  | 891  | 81-11-3 | B
| W3REQ  | 100  | 20-5-5BD | B |

W2QFT/2  | 290  | 48-15-15 | B
World, 1972

Hudson, New York

W2PCQ

W2YEE

W3JQB/2

W741

W1Y4F

Central Division

Illinois

W9FIF

W9CGA

W9M5O

W9RN6E

W9NOXK

W9DXO

W9CT

W9QSW

W9WHS

W9WSW

W90RQ

W0DEN

W8ADO

W8PPY

INDIANA

W9WO

W9GMW

W9NOY

W9MTV

W9MFI

W9BOM

W88T

W80T

W9UM

W8QJE

W8NAN

W8XU

W8ZES

W8RNL

W8GSP

GREAT LAKES

KENTUCKY

W4PCT

W4MEJ

W4MIF

MICHIGAN

WSBN

WN8P

W8RMH

WS8YU

W8QGY

WN8SE

W8BD0

OHIO

W8BFQ

W8LDP

W8UW

W8SH0H

W8BLN

W8F1C

W8NS1Q

W8HUX

W8WSE

W8N8I9QK

W8M8Y

W8M8LD

W8MD

W8MRJW

W8YJH

W8M85T

W8T0C

W8NSWJ

WASHINGTON

WASHINGTON

WEST GULF

DIVISION

NORTHWEST DIVISION

PACIFIC DIVISION

SOUTHERN CALIFORNIA

SOUTHERN DIVISION

CANA

ONTAR

IS YOURS ON FILE

WITH YOUR QSL MGR?

See page 60, August QST, for the address of your QSL manager.
Coming ARRL Conventions

HUDSON DIVISION
Albany, N. Y., October 3rd-5th
The ARRL Hudson Division Convention, sponsored by the Albany Amateur Radio Association, will be held at the Ten Eyck Hotel, Albany, on Oct. 3rd-5th. An extensive program is being planned to cover all phases of interest to the amateur fraternity. There will be demonstrations and talks on s.s.b., microwaves, and the transmitter. Also to be featured are discussions of interest to the mobile ham and the novice. An FCC examiner will be on hand to give exams, and there will be the traditional midnight ceremony of the Royal Order of the Wouff Hong. There will be a complete program for the ladies.
Registration prior to September 22nd will be $5.75; after that date $6.00. For tickets write to H. L. Schultz, jr., P. O. Box 6073, Albany, N. Y.

SOUTHWESTERN DIVISION
San Diego, Calif., October 11th-12th
The ARRL Southwestern Division Convention, sponsored by the San Diego Amateur Radio Emergency Corps, will be held in Balboa Park, San Diego, on Saturday and Sunday, October 11th and 12th. Registration is scheduled to start at 9 A.M. on Saturday. The program will include a mobile rig contest, transmitter hunts, exhibits, a code contest, QLF contest, ROWH ceremony, ARRL open forum, technical talks, v.h.f. round-up, YLRL meeting, and special get-togethers for the DX men, SCMs, and others. The banquet will be held on Saturday evening.
Registrations ($5.00 each) and information may be obtained from Chairman R. E. Hopper, W6TXU, 4327 Santa Cruz, San Diego 7, Calif.

VERMONT STATE
Burlington, Vt., September 14th
The annual Vermont State ARRL Convention and Hamfest, sponsored by the Burlington Amateur Radio Club, will be held on Sunday, September 14th, at the Hotel Vermont in Burlington. The program will get underway at 9:30 A.M. with FCC exams, exhibits, 75- and 10-meter hunts, technical talks, ARRL and Civil Defense meetings, and a boat ride on Lake Champlain for YLs and XYLs. There will be a banquet at 2:30, with entertainment and awards.
Registration is $4.50 until September 12th; $5.00 after that date. Secure tickets from Bert Dean, W1NLO, P. O. Box 81, Burlington, Vermont.

NEW HAMPSHIRE STATE
Nashua, N. H., September 27th
The annual New Hampshire State ARRL Convention and Hamfest, sponsored by the Nashua Mike and Key Club, will be held Saturday, September 27th, at Pulaski Park, Nashua. Plenty of mobile activity is anticipated, with hunts on 2, 10, and 75 meters. There will be excursions to the famous Benson's Wild Animal Farm, and a special program for the ladies. Lectures, meetings, FCC exams, plenty of cats and refreshments, dancing and awards will round out a full day of activities. There are plenty of indoor facilities, so the weather will be no problem.
Registration prior to September 17th is $3.00; after that date $3.50. Write to Nashua Mike and Key Club, P. O. Box 94, Nashua, N. H.

25 Years Ago
September 1927

... There is every indication of solid backing by our government for exclusive and sufficient amateur-band allocations at the forthcoming International Radiotelegraph Conference in Washington.

... Paul M. Segal, 0EEA, points out the menacing epidemic of local-government "radio-control" ordinances and demonstrates the illegality of such means to deprive radio enthusiasts of constitutional rights.

... Fred J. Eisler, 0P8A, recounts the saga of xop12A, his "radio flivver," which used UX-201-A tubes to put 0.8 amperes into a vertical rod antenna while the author motored across some 3000 miles of Europe.

... A UX-210 ultradrome oscillator-transmitter, which QSOs conveniently to any one of four bands — 80, 40, 20 and 8 meters — by way of plug-in coils, is detailed by James T. McCormick, 0BHR.

... Important considerations concerning the functions of the condenser following the rectifier tube in plate power-supply units are presented by James Millen and D. E. Repligle in "The First Filter Condenser."

... David Grimes describes "A Harmonic Method of Increasing Selectivity" wherein he employs frequency doubling as a basis for obtaining a greater separation between incoming signals.

... Another 5-Meter CQ Party is announced, scheduled for November, and it is hoped that some of the pursuing reports and phenomena produced by the previous Test will receive clarification.

... John Grinnan, of IBCG transatlantic-tests renown, has his Kingston, Jamaica, station — now a familiar signal on 32 meters — described and illustrated by Clair Foster, 6HM, in an article entitled "nj2FZ."

... Twenty and forty meters are enlivened by the activities of VOQ, Putnam Baffin Island Expedition; WNP, MacMillan Expedition; WOBD, ship Radio off Labrador; KFVM, yacht Idaho in the Pacific; and VYQ, Canada's Beothic.

... Among the many photographs of overseas stations we find ac8GG, Shanghai; amY61AB, Singapore; en8GA, Netherlands; and kflf of the yacht Rippla, now plying the Pacific with 6BUR at the key.

QST for 60
How's DX?

CONDUCTED BY ROD NEWKIRK,* WIVMW

How:

They range from 8 to 80; in education, from those who halted in the grammar grades to the erudite holders of doctor's degrees; in social status... scions of wealthy families and the son of an ex-president of the United States; in occupations, from coal miners and bellhops to major executives in giant corporations."DeSoto

KUC and UCQ, caught up with EAOAM (14.045), FQ8AP (072), KC6DX (114), K5AUA (043), V8AF (040), V50s CG (065), CQ (070), Y1BZ (092), YU8AT (092), ZC2MAC (023) and 4X4BR (068) --- CR7AQ (070), CR9AF (020). DU1PM (087), FABS, F8BZ (049), FASAH, KB3AX (030), KH6MF/KD8, KX6AH, M1SX2, UL7RAA (0), VP7NM, VQ6BM, VQ40D, VS7s LB, WA, Y150 and YU4BN have been working Truk's KC6QL. --- V52CN looks for Wa with crystals on 14.013 and 14.077. --- ZD2DY, M13DD, M15B9 and YU1CB were appropriated by W2NOY, while W2EEY grabbed F8ANM (W8AW) --- CPEBX (092) was raised by W8AIN. Don wants a line on ex-ZC6XY/W8LX. --- W6EAY has K6CQY (030), K66AR (097), VK9GW (062) and VP41Z in the log. --- Up to 125 went K2BU because of TAAAM (010), EAAAC (100), EL2R (032), VP6MD (035) and 5A367A (045). --- Lack of VK2AB and V81DC QSLs plagued K2BU and W2CTO respectively. --- W6NDP landed FORAH, KM6BD, KW6AZ (091), VK2CJ and other Oceanians. --- TZ4s CB (070), TG (080), YV1WQ (070) and LU8AC/MB were welcomed by W600K. --- W8NOH reached 110 worked with F8AN and YU5BN. FY3YE, SV5WB, Y81MS and ZC2HR got away. --- VP8AJ tells W8DIAW that VP8AD now back in US, doesn't know for QSLing. Russ captured ZD9AA (032), LB6BD on Jan Mayen, JA7HJ and LZ1KAB --- a dandy foursome. --- YU1AI (017) and TF3MB (020) worked W4EEZ; W2EEN adds CK5ER (115) and VK8VM of Papua. --- Z2ZAA (096) (7), aboard ship in the Indian Ocean, regularly knocks K1HDFM's ears off. So does VR7AB (001). --- W70EB collected many others in addition to DU1OR, Y1RA, QA1AEL and K6CQY. Buddy W1OHI adds K6GAY and a two VP3s. --- W7H5UZ did well with CPEBX (010), DU5s 1FM (078), 6V (050), EA8BC (055), KX5AI (040), YU1s AD (012), CX (012), VP6UN (020), Y81IV (095), ZP5AZ (020) and 4X4C (065). Van is working hard to solve the rapid-QSY system employed by VP2MD --- W2DKT, an old hand at 14 Mc, recently paid visits to YV5AO. VP5s AK, DX, CO2s WY and YW. Charles got back in time to snag F8ANL (W8FO), a T35 and some CPls. --- MF2AC (025), OX8BV, C83US2, KB3FAB (070) and VP6PV answered W4TVQ; M1B and 3V5AC slipped away. --- W3MFW says he'd like to try RCA's megawatt-output 58S1 in a 20-meter dogfight. Anyway, Russ did well on KM6AH/KB6 (110), SU1GG

AC3PT

Amateur radio never ceases to attract those from every walk of life. Though the late C. B. D. made no reference to Hamdom's royalty in the above excerpt, he was later to chronicle for the pages of QST the activities of two prominent DXers of the Thirties -- Archduke Anton of Hapsburg, O63AH, and Vinh San, PR8VX, exiled Prince of Annam -- who perhaps took greater pride in their amateur activities than they possibly could have derived from dutiful affairs of state.

One of the active members of ham radio's royal devotees at present is P. T. Namgyl, Maharaj Kumar of Sikkim, who operates a modest station in The Palace, Gangtok. While official duties limit AC3PT's on-the-air time he looks forward to many QSOs with W/VEs and has recently undertaken to set as QSL bureau manager for all incoming AC cards.

GL and DX, OM!

What:

If twenty has any of its old form left, the Africans should begin building up this month on both paths. We shall see. W5MPG, who recently entertained visiting firemen W5s

*DX Editor, QST.
A great many readers have asked for a peek at the shack of W1FH. This is it—nothing unessential to the working of new countries clusters up Charlie's installation. On-the-nose rotary beams for 10 and 20 poke high into the Boston sky nearby.

PYa 2CK, 6DJI, ON4UF and VP9GJX... W9NSL worked the band at W9IT/0 on Field Day, coming up with PY2a AØ, HT, K25s KZ, T3, KB9RS and VZ2CC. FABAT was heard... VP9e AB and O hit the band with a will as soon as 15 was made available to Bermudians... ZC6UNJ is on the watch for 15-meter W/VEs and Argentinas was authorized 21-Me operation on August 1st which should hop up the band a bit to view present north-south rotation. The Dominican Republic, Ecuador, Guatemala, Netherlands Antilles, Denmark and Burmas have given 15-meter privileges to their amateurs—the list is growing fast!

The new junior operator's 3 M.W. ham gives W3MFW a shot at some good stuff on forty: KB9AX (1032), K2GQY (1010), VP8AJ (0920), ZK1A1 (017) and F8PAN. W6ORK got 2Z1, a bunch of VK/ZLs and one 2ZG9 (012). Fat prefers a ground-plane for 7-Me. work... YV2AQP, VP9HI, KV4AQ, V99W and 7EB replied to W3DJI... 4X4DH (039) gave W3RLZ a potential WAC on the band and W2AIB/1X6D is hearing all sorts of U.S. DX— U17, U95, et al—working each other, of course... W9ZRB added F9PSA (062), K9B4LA (052), T2C2R (021), VPs SBH (011), 7NT, YV2XAK (012), YV55Q (080) and others of others.

W62AT doesn't let the cold season noises interfere with his DXing on eight. Del chastised with ZLs IC, LHF, 5GC, 4JT, 3OP, VK6s ADT, TC and CX1FY; he still has lost skeds with Z83KX and V87NG... ZL1HIM owes V87NG a bow for the completion of his 3-Me. WAC and ZL1CI told W3ZAT to keep an eye out for YJ1AB near the low edge.

What ten does this year (as compared to last) may be indicative of the trend conditions will take in '33, so this band will bear watching. Unusual working things are still strictly north-south. W9LMC verifies this by reporting phones LUS 2QC (28312), SDZ (150), 6AB (320), oMC (145), 8CA (200), 8DAC (230), H1C0 (415), HK4AT (335) and HP7WP (260) also appear... LUS 38d (400), TDCO (291) and 7DI (360) — W4SCS encountered PJ2CA (400) while W2ZVS bagged PJ5RE, V8s 5AY, 6IR, 6JB, 6NA, 8SD, 7NT, 9A, ZL5s BN and JB... At W4RP we find ZS5 2CY (309), 6EB (770) and W8IWC (550) frequently run into W22XM/MM, who shows off a weighty signal from Flying Enterprises 11.

Where:

There are now over 26 CN2a licensed; cards for them may be
sent via TARC, French P. O. Box 150, Tanger, Tangier Zone.
Legitimate FJ stations are becoming more numerous. We understand that PJ2AA, B. H. Herring, Dakota Airport, Auroa, N. W. I., will handle incoming FJ

cards... Guan's bureau has had a slight change in
address. It's now P. O. Box 145, CAA. Agana, Guam, for
your KGB-bound postcards... FEARL's QSL bureau
is holding a stack of cards ceased to form JAs who
have left Japan. Forwarding addresses and some postage
will ensure immediate dispatch to owners and will help
clear the files. Write FEARL, APO 590, Postmaster,
San Francisco... HBS are Swiss portables—send
your QSLs to the corresponding HB3 calls or Via USRA.
ISPR 70% Post Office, Bialaia, Italian Somaliland

JY1XY Leslie Berkley, RAF Station, Amman, Jordan, MRAF2

KB6AX 70% CAA, Canton Island

K6GSH ex-K6GSH Box 45, Sandwater, Rhode Island

K6MMP/KB6 70% CAA Contractor, Canton Island

K6AW Shell, APO 105, 70% Postmaster, San Francisco, Calif.

K6MRE Box 18, Navy 3980, FPO, San Francisco, Calif.

K6AX Box 3, Navy 8281, FPO, San Francisco, Calif.

P7AD J. M. Kohl, Box 9, Oranjestad, Aruba, N. W. I.

SRG 70% via RSGB

T12CR Instituto Geografico Nacional, San Jose, Costa Rica

V7FNN (QSL via V6JRR)

V7FNT (QSL via V7FNN)

V7FAH B. M. Pitaluza, San Salvador, Falkland Islands

V7EKS Mrs. K. C. Ritchie, 70% PWD Workshops, Lusaka, No. Rhodesia

V6BNU A. Allen, Aroon Station, Talanga, Tanga, Tanganyika

V8SC Faming Coconut Plantation, Fanning Island

V8SCM Lionel, Box 541, Hong Kong

V8GQ John Stetten, Cable & Wireless Ltd., Nogaco, Okinawa

ex-V1A7AH E. S. Vail, V22RA, Post Box 10, Tumkur, India

YU8BN Box 420, Sarajevo, Yugoslavia

Z6JFY W. Milne, 4 Ahorre St., Bulawayo, So. Rhodesia

Z6KXW G. D. Wall, P. O. Box 2020, Salisbury, So. Rhodesia

Z6RA2 Amateur Radio Club, RAF, Thornhill, Gwe, So. Rhodesia

Z6MJQ RSSR, Hq, Station, P. O. Box 1068, Bulawayo, So. Rhodesia

Z6MBA Box 37, Arapa, Western Samoa

Z6AY (QSL via RSGB)

Z6E J. C. du Buisson, P. O. Box 4, Ornemund, S. W. Africa

Z6XX A. G. Sudd, P. O. Box 81, Keetmaaschop, S. W. Africa

Z6TA M. E. Andre, P. O. Box 417, Fietemariaburg, Natal

The above through the efforts of W6S P7X HA IKE RWS VG, W6S EGG NOY ZYS, W5UGF, W4TVT, W5FNA, W7s NDP OKK YY, W7s DAW NOH, W7s CFT HUZ TRD, CN2AJ, ON41B, V8P9D, OY6s OBM, VERONA's News, WGDXC's DX Bulletin and SARRL.

Tiddbits:

According to W6YY, Japanese nationals will be assigned only spot frequencies in the 80- and 40-meter bands but will be able to roam 14,000-14,470, 21,120-21,370 and 28,200-28,500 kHz allocations. Phone or c.w. may be used and there are various power limitations specified for different bands ranging from 50 watt input on 10 meters to 500 on 40. Two classes of licenses are contemplated ... 09T8RZ learns there are now six resident 2A2As licensed. Charlie says each issue of the Call Book requires over 5000 modifications in the DX section alone ... 3A2AII operates only phone on 20 and 10. Hank has been receiving QSLs confirming c.w. QSOs — a neat trick considering he doesn't know the code. Pirates on the prowl ... W5FNA loaned us a copy of VERONA (Netherlands Antilles) News and the PJ boys, as usual, are right on the ball. Technical articles, DX items, certificate-award information and editorials enhance the effort. By the way, PJ2A is ex-PJ5RE, PJ2AC is ex-PJ5BX and PJ2AD, ex-PJ5SN. ... KG6ACZ tells W1NJN of extremely spotty DX conditions although the path to Sistria appears steadily improving. ... 970s MQ and KB were to operate H1BM/QV in Switzerland's canton Wallis during mid-August. That's a rare one toward the H-22 award. W1HA heard they intended 40- and 20-meter c.w. work ... Ex-MP4BAD, Y1X, now G3GPE, writes W8DAD to defend rare-DX stations with QSL difficulties. Ken is restating in RAF for another 12-year hitch and hopes for further rare-DX assignments. G3GPE currently has 15 watts of c.w. on 40 and 80. W8DAD is considering a DX vacation after he raises his 195-confirmed tally to an even 200. ... The Radio Society of Bermuda held field days in June and August. V8P9D reports they bowling success. V6PAX/P, with V7FAH AX, a.c., and DX operating, rolled up the high score and their log showed QSOs with 26 countries. Trophies were awarded to each member of this winning team. W2KMP, honeymooning in Bermuda, found himself and his XYL right in the middle of the affair. The Garrys rolled up their sleeves and pitched in to assist V7P0BC/P, and with the aid of V9P0D, a great time was had by all. V9P0D reports the Society's station, V9P0DA, ready to hit the ether on all bands, "phone and c.w. James will be on the air from G8XL, his British station, during a three-month holiday beginning this month. ... W2QHH was running for HB1MQ/VS. ... Howdy needs a very few more to complete his H-22 effort ... V5SKF mentioned to W4ASG that V4QRF has ideas of putting ZD8RF on the air soon. ... Via W1RWS, G6RHI would like info on the present whereabouts of W90ZW/KS6, worked in '47. ... K8CAG took another extensive trip to the U. S. AI reports 3511 QSOs rumbled up by EA10DC in 11u — that's a Rock of H8TA. ... 09H2NW was looking for visiting amateurs at the Olympic Games ticket office in Helsinki. ... K066Q (ex-W3KVE-K1H06L/KB6/KC6) wants to finish his DXCC (Continued on page 196)

Tents, tsetse flies and hand-cranked generators are a far cry from these snappy console consoles. The layouts of VQ4ERR (right), ZS6Z (right, below) and M1US (below) may show W4JX a trick or two! See page 126 for dimensional data on VQ4ERR's set-up.)
ANY NURSES?

145 W. 88th St.
New York 24, N. Y.

Editor, QST:
I would like to contact radio amateurs who are nurses, male or female, as I want to write an article on the nurses in ham radio.

—Joseph R. Lebo, W80BU

SWITCH TO SAFETY!

20 Wall Street
Norwalk, Conn.

Editor, QST:
For eighteen years I have done maintenance work on broadcast transmitters. And not once have I found a bleeder open-circuited, failing to do its vital job. Until today!

Utilizing a shorting stick for the unprintable thousandth time with nary a display of fireworks over the years, all of a sudden I found my luck had changed. I was startled to find by a loud snap and a flash of fire as the stick shorted out one of WNLK's filter condensers.

All this took place at about six o'clock in the morning. There had been no plate voltage on the transmitter since the night before and, following our usual practice, the filament had been burned for a few minutes after sign-off. One could assume that this would have bled away any current remaining in the power supply. But there it was, a charge of at least two thousand volts and with enough mile behind it to fry "ham" to a turn.

Broadcast men in particular should be careful about those voltages that can't be there, where most with maintenance being done at late hours when the mind may not be normally alert, but all of us should remember that soon or later, somehow or other, there'll be a dangerous voltage when you least expect it. It takes everlasting vigilance to get it before it gets you.

—David W. Jeffries, W1ZA

NOVICE BREAK-IN

14 Elza Street
Valhalla, N. Y.

Editor, QST:
One way to lick the QRM problem on the 80 meter Novice band is with break-in. Few Novices realize what a boon to crowded frequencies it is. And for most low-power rigs it's quite inexpensive, too.

The traffic boys have been using it effectively, so why can't we?

—Peter Scherer, KN8ACH

SINGLE-SIDEBAND MODULATION

195 Broadway
New York, N. Y.

Editor, QST:
Some years ago when discussing with a friend the so-called "phase" system of generating a single-sideband communication signal, my attention was called to the fact that this system of modulation was invented by R. V. L. Hartley, who also originated the well-known Hartley type of oscillator circuit. The single-sideband modulation system in question is described in Patent 1,666,306, which was applied for January 15, 1925, and was issued April 17, 1926.

The various names given to that system of single-sideband modulation are imperfectly descriptive and an accurately descriptive name would require a good many words. Perhaps the simplest way of designating this system without ambiguity and with brevity would be to call it "the Hartley modulation system."

—Wm. R. Woodward, W2ROY

MOTORBIKE RIGS

Kellogg Route
Oakland, Ore.

Editor, QST:
After reading W6QJP's item in a recent QST about motorcycle rigs for civil defense, I'm going ahead on my original plan to put an all-band rig on my cycle. The civil defense chain has a weak link in it down here, but if all of you boys who have motorcycles can contribute a little time and effort we can help a lot. The time is coming when they will need us.

—J. R. Barrett, W7PXS

HE'S ABSOLUTELY RIGHT

23 Chelmsford Road
Rochester 18, N. Y.

Editor, QST:
Who started this "slant two" business on 'phone for portable operation, on 75 that is? It seems to be that FCC specifies that we state whether we are "portable," "fixed portable," "mobile," "marine" or "aero mobile" (and not "portable mobile"). In addition we are supposed to state exact location such as "Dripping Lake, N. Y." rather than "slant 2" or "is second call area." Let's keep it sensible as well as legal and "say it with words."

—E. B. Snow, W2BN

HEY, RAPP!

Box 633
Goodyear, Arizona

Editor, QST:
With regard to the new rules being hashed over at present it looks to me as if someone is forgetting the prime object. I consider this to be "less QRM." Why not allow the boys with Extra Class tickets to operate on any c.w. frequency with +polarized cone, or single sideband, or double sideband reduced carrier?

The polarized cone deal sounded especially good in QST a couple of months ago. If some of the boys could be forced to go + and some -- we would double our useful frequencies for the mutual benefit of everyone.

I believe the old Class A (unlimited) should be done away with completely and special privileges granted only to Extra Class. Reason -- anyone can pass the Extra exam with slight effort and if he doesn't think enough of his hobby to exert that effort Class B privileges are enough for him.

So -- let's do some thing to encourage the latest developments being used and up-grade the whole gang to our mutual gain.

—Arthur E. Luz, W7RTP

"BALLOONTENNA"

Portsmouth, N. H.

Editor, QST:
I live in an area where it is hard to find natural things on which to hang an antenna. . . . I went to the local airport and without too much trouble got two weather balloons filled with helium from the man on duty in the weather room. I tied these together and attached a spool of No. 36 enamelled wire to them. Then the balloons were let up until the end was reached. I tied the end of the No. 36 wire to a fitting on the roof of my shack and ran a No. 18 rubber-covered wire from the fitting to my transmitter. After adjusting the pi network I was able to load the vertical wire very well. During the next few days I worked a number of stations during daylight which were over 500 miles away. At night I was able to do much better. I am using a rather poor

64
receiver at present and I feel that the results would have been better if I had been able to hear better. Possibly I had answers from even farther and was unable to hear them.

There are a couple of items I might mention about weather balloons at this point. If they are not tied very tightly or plugged in some manner they will deflate in a few days. In a high wind, the No. 36 wire will break so it is a good idea to stretch tape a piece of baling line to the wire insuring the wire not being left loose between the taped areas. Also let the balloons up in a high clear area as they, of course, tend to ride down wind and in a high wind flatten the line out considerably. My first "balloontenna" fouled in the TV antenna causing much QRN from the rear of the family as it did weird things to the picture. Lately I have seen some very large balloons made of plastic advertised in various mechanical magazines. If the weather man's sense of humor still holds out, I intend to try again using heavier wire, and one of these larger balloons.

— Thomas M. Dale, WN1TPW

[Editor's Note: Anyone using such an antenna should be careful to keep it away from power lines, to avoid the possibility of bringing unspent thousand volts into the shack if the wind should shift. Also, don't forget the antenna structure limitations imposed by 12.99 of the regs.]

HELPS ON A.M., TOO

Editor, QST:

I have heard the gang on 3990 and others complain about s.a.b. QRN. Is it possible that "Close A," amateurs don't know how to use their receivers effectively? I wonder why they don't try using the method of reception for a.m. as well as s.s.b. They are in for a big surprise.

Operation of receivers for s.s.b. should be in every column published on single-sideband as it is simple — a.v.c. off, b.f.o. on, volume on maximum then adjust r.f. gain for audio level as low as possible.

For the beginner or newcomer to single-sideband, do understand this — with no carrier transmitted you have to reinset the carrier at the receiver. Some strong signals may sound distorted due to overmodulation of your reinserter carrier. This is a modulation percentage problem and calls for stronger injection of the b.f.o., or, if you have a frequency meter, turn off b.f.o., and with frequency meter at fundamental frequency of the received signal couple to receiver and increase coupling until overmodulation distortion stops.

This has a quieting effect on the receiver also, and results are excellent because as injection is increased it increases your selectivity. Fine tuning can then be done on the frequency meter. Try it!

— Moe Kammel, WE8ESP

THAT NOVICE RECEIVER

1012 Fairlady Dr.
Kingsport, Tenn.

Editor, QST:

This is just a note to tell you that I appreciate the help and suggestions that your article in August, 1951, QST, has given me. I built that two-tube receiver and I want you to know that it really has been surprising.

I have worked six sections, 16 states, and have 116 contacts on this receiver.

One thing I can say for a regenerative receiver is that it will receive most any signal that's on the air...

— Larry Guenther, WNAJFT

NEW COUNTRIES

427 Lakeview Way
Redwood City, Calif.

Editor, QST:

I am very curious about those odd signals from out in space, some near ten centimeters, others in all portions of the spectrum. Seems with some fairly good receivers available such as airborne radar surplus we could do more experimental work and open a new field for discussion.

If you had a chance to work an off-the-earth or interplanetary contact, would you know if it were legal? Would the State Department, Army or other agency be on your neck?

— John M. Wood, WE8NV

ECHOES

205 Eighteenth Ave
Sterling, Illinois

Editor, QST:

In over 25 years of being in the ham game, I ran into my most unusual experience last night. Was on 14-Mc., e.w. about 10 p.m. when the band was out completely except for a couple weak V.E.Ss coming through. The weather was very clear and calm. I called CQ several times and after turning on the receiver I could hear 2 of the V.E.Ss at about a 2-second delay. At first I thought it another station signing off right after me. I then made a series of tests. I could send out a series of dots and the like and then listen on my own frequency and in 2 or 3 seconds I would in each case hear my own signal coming back about 80 or 75.

This condition continued for about 5 minutes and then gradually became weaker until I was no longer able to hear the echo signal.

I was running about 750 watts to p.p. 818a. Antenna was a folded dipole with its broadside aimed just slightly west of due north.

Can you offer a possible explanation for these echo signals?

— Robert A. Lundstrom, W6FUR

[Editor's Note: Several possible explanations have been offered — one, for example, is that the signal bounces back and forth for a long time between two layers in the Ionosphere.]

MOBILE INSURANCE

354 Linden Avenue
Buffalo 16, N. Y.

Editor, QST:

After talking to my auto insurance man I learned much about the mobile installation in cars — the way they are covered on actual cash value against fire and theft. I suggest that mobile installations be covered by a rider writing in the policy or the outfit may not be insured. It costs no more and gives added protection over the actual cash value of the vehicle in which it is installed.

— Charles M. Lalor, WEFSB

HOW'S YOUR RECEIVER?

20 Miles Avenue
Fairport, New York

Editor, QST:

I suggest the following test be conducted by anyone who thinks he has a "sharp" receiver before he condemns single-sideband or double-sideband reduced-carrier operation: Tune in an unmodulated commercial or amateur e.w. signal (in a clear channel) with the a.v.c. on, r.f. gain full on, audio gain up and b.f.o. off, and very carefully rock the tuning dial on both sides of the signal. Note how far the dial has to be tuned in order for the carrier noise to disappear. (It's pretty hard to describe the noise made by an unmodulated carrier, but everyone who tunes a receiver a while knows by sense when he is approaching a carrier.) Now repeat this test with the a.v.c. off and reduce the r.f. gain to a point where the receiver just begins to block — this is the maximum gain that would ever be used in com- ping a signal without a.v.c. — and again rock the tuning dial until the keying can no longer be heard. The receiver will appear considerably sharper than before.

An unmodulated keyed carrier occupies a very narrow channel — only a few cycles at moderate keying speeds, yet the average communications receiver with the a.v.c. on will detect the carrier over a bandwidth of at least 15 kc. So far as the receiver is concerned, a s.a.b. signal is nothing more than several e.w. signals of varying amplitudes (and frequencies) all operating in a band of about 3 kc, and the receiver will respond to them exactly the same as it will to a keyed carrier. If the receiver appears to tune broadly on a c.w. station, which occupies a band of only a few cycles, how can it not be expected to tune broadly when receiving a s.a.b. signal? Turn off the a.v.c. and reduce the r.f. gain — clean up your own receiver before condemning the transmitted signal.

— Fran Shertwood, W9QCP

[*Loss if the receiver has decent skirts selectivity but, unfortunately, most receivers leave much to be desired. However, several of the latest ones are featuring improved skirt selectivity — Ed.*]
ADDING AUDIO SELECTIVITY BY MECHANICAL MEANS

The gadgets shown in Fig. 1 attack the selectivity problem from an unusual angle, in the sound reproducer itself.

![Diagram of audio selectivity gadgets](image)

**Fig. 1** — Two methods of adding further audio selectivity are shown here. Both are extensions of the same principles involved in adding selectivity by means of the Q5-er and other sharp i. f. systems, but attack the problem from the mechanical side.

The arrangement shown in sketch A might be termed “A Soft Speaker,” for it utilizes a hearing-aid type receiver found in some varieties of war-surplus headphones. A closed-tube resonator is coupled to the receiver, forming a tiny folded horn. Suitable steps should already be incorporated in the receiver audio circuits to maximize the beat note that is most pleasing to the operator. The length of the tube should then be cut to form a resonant air column at this frequency. The resultant build-up in signal at resonance is sufficient to make copying c.w. possible in a reasonably quiet room. Other signals are attenuated, aiding materially when severe QRM is present.

If you are mathematically inclined, you can compute your own dimensions from simple physical formulæ, but a resonator constructed of 1-inch o.d. brass tubing 1½ inches deep has been found generally satisfactory. A simple refinement would be to install a variable plug in the bottom of the tube so that tuning could be varied at will. If a rather low beat note is chosen it is possible to zero-beat out some adjacent channel signals while still retaining the air-amplification of the desired signal. — William Bruce Cameron

Shown in sketch B of Fig. 1 is a simple resonant speaker system which forms an effective tone filter for the reception of c.w. signals under conditions of severe QRM. It consists of a loudspeaker closely coupled to a sealed resonant tube which acts as an attenuator for all except the frequency at which it is resonant. As a result, the bandwidth of the audio system is greatly reduced.

The construction and method of assembly are shown in the drawing. A 3-inch diameter speaker is mounted as shown in a wooden box in which the only aperture is closed off by the cone of the speaker itself. The interior of the box is packed with cotton to avoid unwanted box resonances. Care should be taken to avoid overpacking or the cone will not vibrate.

A tube, 8 inches long and 4 inches in diameter, is sealed at one end and mounted over the speaker by means of three equally-spaced angle brackets. The open end of the tube should be raised 3½-inch from the face of the box. The tube itself can be made of stiff cardboard or any other material that will not produce unwanted resonance due to its composition. In operation, the “filter” produces a marked reduction in background noise, and has the property of making most signals sound “pure” in tone. The absence of any ringing effect is useful when weak signals are being copied, since their mark-space characteristics are not altered. — R. Young, G3BTP (R.S.G.B. Bulletin, Feb., 1952)

SOURCE OF SHIELD CANS

Let’s not overlook the corner grocery store as a source of good shielding materials. The 6-ounce cans used for frozen orange juice are just the right size for shielding small coils and tubes. Open them with a wall-type can opener so that the end roll will not be destroyed. Both ends may be removed if desired, and copper screening can be soldered inside one end to provide ventilation where needed. The circular clamps used to mount filter condensers serve as an excellent mounting device for cans of this size. — Jack W. L. Kochne, W9PF

PLASTIC SPOOLS AS FEEDER SPREADERS

Discarded plastic spools from photographic roll film make excellent feeder spreaders for those who desire open-wire transmission lines. Several companies are using this type of spool in most of the popular sizes.

One of the best for this purpose is the spool used with the film required by the Polaroid Land Camera. These spools are already slotted at the ends, and result in a transmission line spaced about 3½ inches. Real estate offices use this film for quick photos of houses, etc., and use a lot of it. Ask them to save the empty spools for you. — Don Langbell, VE6EL
Operating News

F. E. HANDY, W1BDI, Communications Mgr.
J. A. MOSKEY, W1UMY, Deputy Comm. Mgr.
GEORGE HART, WINJM, Nat'l Emerg. Coordinator

Expedition. The Blue Dolphin, W2BZD/MM, as of July 17th reported 60 QSOs since sailing. W1CH has handled 99 per cent of this traffic with W1CQR, W1CRW, W1NRZ, W2EHW, W2HUG, W2QYT, W3AS, W3WW, W5HO and K4AF taking the rest. Bruce sends greeting to the gang from Hebron, Labrador.

Signing Up in RACES. Since August 15th the Radio Amateur Civil Emergency Service has been a going concern. Every amateur licensee should meet the challenge and invitation implied. It is hoped that in every community operating fun and prestige and serious purpose can be combined for the success of this amateur service. Already-licensed amateurs must apply for an additional authorization from FCC to operate in RACES. The local civil defense communications plans that call for the use of designated amateurs must be approved at state and federal civil defense levels to get a station its authorization from FCC. RACES is amateur in name, and largely in requirements; short of war it operates on a shared basis with the regular amateur service. It is our stake in making a continued wartime amateur operating contribution. To have it then and make it work properly, we should each get into it now. Before this is in print in QST, your ARRL Emergency Coordinator will receive a full copy of the RACES rules. Through him or directly it is suggested that, if you hold an amateur license, you at once get lined up to participate in RACES for your community, contacting the Civil Defense Radio Officer, if appointed, to get the proper FCC forms, so the RO can certify these and start them up through channels to get your RACES authorization.

Operating Fun. The July or Summer CD Party was a whale of a success. It was fully enjoyable in the time available to us. Are you readers and new hams in on these things? These radio get-togethers of the whole ARRL appointment family are highlights that come along four times a year. One meets fine operators and QSOs from 'round the nation if one's gear permits shifting properly from band to band. Some were fast contacts, but we had long chats with some. Our suggestion to amateurs who would like to engage in station testing like this and the fraternal contact with fellow appointees: Get your SCM to accept your application for appropriate station and leadership appointment along the lines of your natural interest. It is a prime chance for you to belong to groups that count for operating achievement in amateur radio, to do things in a constructive way. Consistent activity and reports of same in appointment status earn you the right to participate in the "day off" when these quarterly radio activities come along.

DX Problem. The '53 ARRL DX Contest will of course utilize the 21-Mc. band. The new list of countries where amateurs can use 21 Mc. looks very promising. Twenty-one different countries are in that list put out in OB No. 356 in July! An informal word now to ask you how you would like the coming DX Test as to band counting and periods. Your frank individual feeling will help our staff committee that examines items or proposals for the next DX Contest rules. Majority sentiment has been closely followed in the past. We need a showing of hands (letter or radio message please) on whether you plan to take part in the '53 DX test would like (a) to have ten and eleven meters count as one band or two, (b) to limit this year's test to one week end instead of the usual two, risking variable conditions more but making it a shorter run to accumulate a decent DX showing. We'll appreciate whatever you have to offer on this one.

On Correct Signing When Mobile. Just the other day a case was reported to us of a chap using 7-Mc. mobile and improperly signing /M. Very likely he shifted from phone on some other band and neglected to examine Section 12.82 for the exact procedure he should follow! A portable or mobile station using radiotelegraphy must transmit immediately after its call sign the fraction-bar character DN followed by the number of the amateur call sign area in which it is operating. It is not however necessary for amateurs answering this station to use the slant designation with that call. When telephony is used, the call sign identifying the transmissions, sent last as always to avoid confusion, should be preceded by the words "this is" or "from" with the call followed by mention of the geographical location in which the portable or mobile is operated. (Example: "...operating portable (or mobile) four miles south of Podunk, Fl., over.") /MM is the approved c.w. way to indicate true maritime mobile operation normally limited by FCC to ten-meter work. It should be noted however that this is not the proper way to sign, except out beyond the continental limit. The usual land-mobile procedure applies when in inland and coastal waters.

By the way, if you hear an amateur call followed by a digit without any slant sign, it will
not necessarily be a violation of FCC regulations. It will probably be one of those newly-authorized RACES stations with several units operating under the same call sign in mobile work. These are distinguished from other amateur operation by the omission of the slant sign when working c.w., as provided in the new FCC rules for Radio Amateur Civil Emergency Service operating.

On Good and Bad Operating Procedures. From time to time members of the fraternity have compiled lists of do's and don'ts; it is valuable to review some of these. The Novice particularly can profit from examining practices considered good and efficient to make his own operating the kind generally admired; he has the advantage of not having to unlearn any habitually poor operating practices! Consideration of the following points is found to contribute to individual operating enjoyment and success in addition to resting on the premise that consideration for others and following of common sense rule-of-thumb will pay dividends in communications results to you and me. Tom, VE3BFK, rates a bouquet for compiling this list for the Kingeston Age, presented, as he says, "with malice toward none":

Heard locally — procedures to avoid:
1. Excessive tuning and loading of antenna.
2. V.f.o. swung over band with i.p. on.
3. Excessive strings of dots and other keying to no real purpose; whirlies and hellos, no call sign.
4. CQ DX, sent on the channel where the DX was calling CQ!
5. Failures to identify station properly.
6. Tuning up on a frequency where others are in QSO; failure to listen adequately.
7. Untruthful reports merely to make distant operator "feel good."
8. Improper procedure signs, both c.w. and "phone, excessive verbiage in sign-offs.
9. C.w. signal in "phone channel ignored with "phone net controller side references to not answering c.w.

Based on such considerations as the above, it is possible to summarize some general points of good operating and public relations.

Cultivating good listening techniques:
1. Learn to recognize open spots, stations you may be interfering with, the stations in QSO, desirable contacts when free.
2. Self-criticize your operating time elements: If you transmit excessively (some regard this as more than 10 per cent of the time you listen) you may kill DX or contacts for someone else. Consider also that at the same time you can't listen to it yourself.
3. Produce higher results by going after the stuff you can satisfactorily copy.

Tuning and loading — high and low power:
1. Every rig should have a dummy load — even if just an electric light bulb; be considerate of others, remove the radiating antenna on all preliminary tune-ups.
2. Using only the necessary amount of grid drive minimizes harmonic generation and TVI; controlling modulation avoids overmodulation and consequent splatter when using a.m.

— F.E.H.

MEET THE SCM

Eastern Pennsylvania's SCM, John H. DuBois, W3BXE, has been a licensed amateur since March 1932. During the summers of 1949-50-51 he operated the first licensed station at St. Pierre under the calls FFPAA and FFSAB. A former Assistant SCM and SEC, he now holds appointment as Official Relay Station and is Assistant Director in the Atlantic Division. SCM DuBois maintains an active interest in many phases of the ham game and is an ardent participant in such ARRL activities as DX Contests, Sweepstakes, Field Days, V.H.F., SS Contests, 160-Meter WAS Contests, LO-Nites, and CD Parties. He is a member of the Frankford Radio Club and has held office as its secretary; in addition he holds membership in the RSGB, DXCC, RCC, ROWE, A-I Operator's Club, Old Timer's Club, AREC; and possesses WA6E, Code Proficiency (15 w.p.m.), and WAS (3 bands) certificates. Before World War II he was a member of the Atlantic-Pacific Trunk, E. Pa. Net, COP Net, and TL "M."

W3BXE is active on 3.5-, 7-, and 14-Mc. c.w. as well as 50-Mc. "phone but his favorite band is 14 Mc. Regular transmitting equipment consists of a 6AG7 VFO-6AG7 doubler-6AG7 doubler-paralleled 807s final running 150 watts on 80, 40, and 20. An 8X-11 and DB22A preselector are used for receiving and the antenna is a 68-ft. center-fed. Two 75-watt portable rigs are handy for emergency use.

Previous to his current employment by the RCA Manufacturing Company as product design engineer, Jack was a draftsman and designer. An expert chess player, his favorite sports are football, baseball, tennis, and swimming.

CODE PROFICIENCY AWARDS

Have you received your 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 September 10th at 2130 EDST. Transmissions will be made simultaneously on 1807, 3805, 7120, 14,100, 28,060, 82,000 and 146,000 kc. The next qualifying run from W2GVP only will be transmitted on September 9th at 2100 FST on 3990 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 five speeds transmitted, 10 through 35 w.p.m., you will receive a certificate. If your initial qualification is for a speed below 35 w.p.m., you may try later for endorsement stickers.

Code-practice transmissions are made from W1AW each evening at 2130 EDST. References to texts used on several of the transmissions are given below. These make it possible to check your copy. 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 July QST
Sept. 2nd A High-Powered Driver-Amplifier . . . p. 11
Sept. 4th The Siamese Paddle, p. 16
Sept. 10th A Phase-Angle Detector . . . p. 17
Sept. 12th Getting the Most Into Your Antenna, p. 21
Sept. 15th A Quadrifilar Mobile Transmitter, p. 24
Sept. 18th Two-Element Driver Arrays, p. 28
Sept. 23rd Antenna-Mast Loading and Guying, p. 42
Sept. 24th A 809-Writer for 100, p. 48
Sept. 29th The World Above 60 Mc., p. 61

W1AW OPERATING SCHEDULE

From September 1st through September 27th W1AW will operate on the same frequencies and at the same times as indicated in the summer schedule announced on page 69 of June QST. The general contact schedule also will remain the same. The fall operating schedule will be announced in October QST.
Traffic of a non-commercial nature may now be handled with the following countries only: Canada, Chile, Cuba, Ecuador, Liberia and Peru. Traffic to and from U. S. citizens may be handled with amateur stations operated by U. S. citizens in other countries only if (1) these stations are licensed by an agency of the U. S. Government (not by the foreign government) and (2) the licensing authority permits the handling of third party traffic.
W7PFX has been inactive due to illness in the family.

Thirteenth Regional Net: VESATR and VESBUT are trying to keep things together until fall.

Eastern Area Net: 2RN missed one session in June, its first miss in 1952. Central Area Net: CAN Manager W4JUJ says “Thanks to TKN and 9RN for 100% liaison.” Pacific Area Net: As of June 30th, no TCC stations had reported in to report east-bound traffic. W7WJ compliments W6EMG for so gallantly trying to handle west-bound traffic under trying conditions. Better representation is needed for this fall.

FREQUENCY MEASUREMENT TESTING SEPTEMBER 10TH

All amateurs are invited to try their hand at frequency measurement. W4JW will transmit a band of signals for the Frequency Measurement Test September 10th. The signals will consist of dashes interspersed with station identification. This will be a general session sent to help amateurs locate the stations before the measurement transmission starts. The approximate frequencies used will be 3657, 7136, and 14,138 kc. About 44 minutes will be allowed for measuring each frequency, with long dashes for measurement starting about 10:35 p.m. It is suggested that these frequencies be measured in the order listed. Transmissions will be found within 5 or 10 kc. of the suggested frequencies.

At 1:30 A.M., EDST, September 11th (9:30 P.M., PST, September 10th), W4JW will transmit a second series of signals for the Frequency Measuring Test. Approximate frequencies used will be 3894, 7001 and 14,138 kc.

Individual reports on results will be sent to all amateurs who take part and submit results. Copies of this report are sent to all interested amateurs, so, in order to obtain reports and make use of them for their own use, it is suggested that they be measured in the order listed. The message will be 5 kc. per million, or falls between limits of 71.43 and 357.15 parts per million, the participants will become eligible for appointment by SM'S as Class I or Class II official observers, respectively.

This ARRL Frequency Measuring Test will be used to aid qualification of SM's for the purpose of appointing present observers. Present observers not demonstrating the requisite average accuracy will be reclassified appropriately until they demonstrate the average minimum required accuracy for these classes of appointment. Class I and Class II SM's must participate in at least two Frequency Measuring Tests each year to hold such appointments. SM'S are to submit reports through ARRL, reporting activity monthly through SCAM'S, to warrant continued holding of official observer appointment. Any amateur may submit frequency measurements on one or all frequencies listed above. No entry consisting of a single measurement will be considered eligible for the QST rating of the top results in this test; at least two readings and preferably more should be submitted to warrant consideration. Order of listing will be based on the overall average accuracy, as compared with readings submitted by an independent professional frequency-measuring organization.

ARRL ACTIVITIES CALENDAR

Sept. 5th: CP Qualifying Run — W6OWP
Sept. 10th: Frequency Measuring Test
Sept. 16th: CP Qualifying Run — W1AW
Sept. 20th-21st: V.H.F. Contest
Oct. 4th: CP Qualifying Run — W6OWP
Oct. 11th-12th: Simulated Emergency Test
Oct. 15th: CP Qualifying Run — W1AW
Oct. 18th-19th: CD QSO Party (e.w.)
Oct. 23rd-26th: CD QSO Party (phone)
Nov. 9th: CP Qualifying Run — W6OWP
Nov. 13th: CP Qualifying Run — W1AW
Nov. 15th-16th, 22nd-23rd: Sweepstakes
Dec. 5th: CP Qualifying Run — W6OWP
Dec. 5th-7th, 12th-14th: 40-Meter WAS Party
Dec. 19th: CP Qualifying Run — W1AW
The new Radio Amateur Civil Emergency Service will go into effect approximately two months prior to the annual ARRL Simulated Emergency Test, which is scheduled this year, as many of you may have noticed, on October 11th-12th. More about the TEST next month, before which time EOCs should have received a copy of the complete RACES regulations as amended and as finalised by FCC, and an accompanying bulletin which contains an attempt by this office to boil down the regulations to their bare bones for simplification and a better understanding than might be available from casual study of the intricate legal language necessary in formal regulations. The annual SET bulletin should be reaching EOCs also about the middle of September, as usual.

The finalised RACES regulations are changed but little in effect, although in a good many places the wording has been rearranged with clarification in mind. The only change made affected the type of emission authorized, and this only to a minor extent. Narrow-band I.F. (6.73) is authorized on 3999-4000 kc. instead of fascinette (6 A4). Also, on RACES frequencies above 50 megacycles, audio frequency-shift keying is now permitted by both s.s.m. and I.M. (6 A2 and 6 F2 respectively), but 6 F2 not permitted in the segment 50.35-50.75 Mc.). Other changes in the wording, although in some cases quite extensive, were for the purpose of clarification only and do not affect the intent.

By the time this appears in print, RACES will have been implemented, and there’s no doubt there will be RACES applications before FCC; at least, we hope so. The forthcoming Simulated Emergency Test need not be a RACES function, but this year we are closer to the necessity for civil defense than we were a year ago, and once again civil defense will play a major role in our Test. Most civil defense officials manage to restrain their enthusiasm concerning an “amateur show,” as such. Be this as it may, the SET is an amateur show. The extent to which RACES figures in the SET will reflect the extent to which we amateurs figure in RACES and that, after all, is up to us.

Less than 24 hours after the close of the 1955 Field Day, the Edmonton AREC was called out to furnish radio communication for the Engineer’s Department of the city. SCM VE6MHJ was alerted by the c.d. authorities and advised the Saskatchewan River was rising rapidly. Information from points upstream indicated the river would reach flood proportions endangering the lives and property of those residing in the low-lying areas. In less than two hours, VE6MJ had his portable rig installed in the City Engineer’s office and was in communication with VE6EA and VE6HM. They were soon joined by VE6EH and VE6WS. Operations were suspended at 2300 June 23rd after six hours, but the AREC net was again called at 1730 on June 24th, with seven mobiles and two fixed stations reporting in. During the night the mobiles patrolled the four areas concerned, assisting the welfare, police and first-aid workers by passing information to flood headquarters where speedy action was taken.

The city officials were prolific in their praise of amateur radio and the cooperation shown by Edmonton’s amateurs in this emergency. The following amateurs participated: VE6EA EA E8 DH HM HI FB GW MJ PE WO W8 and VK.

--- VE6MJ, SCM Alberta ---

At the request of W5DVL, the calls of all amateurs who participated in the Arkansas-Tennessee tornado last March are printed hereon: W1EPE; W3s BIP BPF CVE NRE; W4s AEF AF1 AGC AKJ AJP ATW BAO BAG BP BPK CDA CVY EKD FK FLW FWX FX GCH GHE HCJ HZC HPX HXC IYV JRD JU JW0 KI KNAU KK LC LQJ LUK MGT MPS MVM MXW NNT0 ODR OFX OFW OMM PUP PWX R1O RKN RQI RPO SBF SBE SJ SON SQM STX SUC SUD B5 SAV TM TRQ VBA; W9s AKR APW AQP ARR AUU BBX BCZ BDR BJI DH RM DI DRW DVI EA EB EBJ EET EGY EM FPD FYR FYZ GIH HAA HHT HPL HUF HUS ICS IGH JFT JFL JIC JPR KEE KBB KK KKM KTY LCO LOK MRO MHS MSG MIP MRD MKK MSII NBT NLO NOO OCO OXO OFX ODP OWW PHP PITI PX QIP QKJ RHH RJW RWJ SMU STV SUB TTV THY TIC TID TIE TIE TIZ T33 T3J TNY TOS UAA U1D UTW; W5GQW; W9s ACW DLZ KEDK ELW IV HZG KJ TBP URM WKO XYN; W9s BDP OZ2 DKA EPZ FYM JBQ LZI NTW NWU QCH QLW TG TT ULD WT; W9s ANB AUB AUV CEX CXF DMY EBB ESE GBJ EIN NWP OTQ PTO RMX YQJ.

Part of the Midwestern flood story which appeared in August QST still remains to be told. The amateurs in St. Joseph, Missouri, set up a station at the City Hall under the call of W6AWH. Mobiles were used on 75 and 10 and went as far south as Rushville. Communication was established with W9BMB/B at Jefferson City for official state traffic. Both the Kansas "Phone Net" and QRS were on the job, but no appreciable amount of medium-distance traffic developed. W8RVG, the amateur station permanently set up at the Red Cross building at Kansas City, was active for about a two-week period, mainly on an "alert" basis. There was flooding and damage in the low-lands around Kansas City, but the Missouri's raging lacked

An impressive turnout of some 200 odd amateurs attended a Civil Defense-AREC dinner sponsored by the Briggs Manufacturing Co. and the Econo Motor Co. Each of these amateurs received his credentials as a member of Detroit Area Civil Defense, and with them a Form 7 AREC registration to fill out and submit to his EC. Among those at the speakers’ table were W6GTY, (Astm. EC, Detroit Area), Emery Lee (FCC Regional Manager), W8WFA (Detroit Area EC), W6OXK, John M. Sullivan (Red Cross), W8WA (m.c.), W6BDZT (for Briggs), W8PSF (ARRL director), E. C. Denstaedt (Civil Defense) and W8GJJ (SEC). See anybody you know?
NATIONAL CALLING AND
EMERGENCY FREQUENCIES

C. W.       PHONE
7100 kc. (day)  3875 kc.  3350 kc. (night)
14,225 kc.  14,050 kc.  28,640 kc.
28,100 kc.

During periods of communications emergency those channels will be monitored by stations of the National Emergency Net for personal-inquiry traffic. At other times, these frequencies can be used as general calling frequencies to expedite general traffic movement among amateur stations. Emergency traffic has precedence. After contact has been made the frequency should be vacated immediately to accommodate other callers.

The following are the National Calling and Emergency Frequencies for Canada: c.w. — 3535, 7050, 14,060; phone — 3815, 14,160 kc., 28,250 kc.

the concentrated fury of last year's Kaw flood. The following were known to have been active in one capacity or the other: W6A AT A AZL BGP BIA CBS CJS CXM DNF FJI H8 FIMO IAR ILF JTY JED KSS KSY NDS NR NMD NNU PR PCT POY PQG RDR UBR UFL UQJ VHF WHK WPN ZQK and K8FAY.

We welcome the SECs of Iowa and New York City—Long Island to the list of those who have submitted monthly reports in 1952, making the total 25. For the month of May, 18 SECs reported on behalf of 2718 AREC members. So our reporting progress continues, albeit slowly.

HIGH CLAIMED SCORES—1952 FIELD DAY

Listed below are high claimed scores reported for the Fifteenth ARRL Field Day, June 21st—22nd. These are subject to checking and grouping according to the number of transmitters in simultaneous use at each station. Complete FD results will be published in a later issue.

Class A

(Listings show call used in FD, claimed score, and number of simultaneously operated transmitters.)

- Frankford Radio Club, W3FRY/3, 21,078-10
- Garden State Amateur Radio Assoc., W2OSA/2, 12,789-9
- (non-club group), W6UP/6, 10,588-11
- Lakeland Amateur Radio Assoc., W2YD/2, 10,494-6
- North Suburban Radio Club, W9AP/9, 10,351-6
- North West Amateur Radio Club, W9IT/9, 10,071-9
- Ohio Valley Amateur Radio Assn., W4FU/8, 10,017-8
- Concord Brassounders, W1OC/1, 9909-9
- York Radio Club, W9PCS/9, 9255-6
- Potomac Valley Radio Club, W4KPC/4, 8765-2
- Somerset Hills Radio Club, W3ARL/2, 8228-6
- Beaver Valley Amateur Radio Club, W3YBZ/3, 8046-5
- Hamilton Amateur Radio Club, W3BDC/3, 7863-10
- Northeast Radio Club, W3FPK/7, 7587-7
- West Side Radio Club, W3HJ/3, 7181-7
- Chicago Suburban Radio Assn., W9C/9, 6958-6
- Harrison Valley Radio Club, W2QW/2, 6516-4
- Poor Lakes Amateur Radio Club, W3WSQ/9, 6489-5
- West Seattle Amateur Radio Club, W7AW/7, 6471-7
- Bellingham Amateur Radio Club, W5MG/8, 6483-4
- South Jersey Radio Assn., K2AA/2, 6093-3
- San Diego Amateur Radio Club, W6OEG/6, 6087-5
- Bakersfield Amateur Radio Club, W6OER/6, 6039-7
- Bakersfield Radio Club, W6OBR/6, 6008-8
- Electric City Amateur Radio Club, W3KX/3, 5796-7
- Palo Alto Amateur Radio Assoc., W6OTX/5, 5735-8

Cleveland Brassounders, W6BWA/3, 5679-2
Penn Jersey Amateur Radio Club, W2KFR/2, 5651-4
Norfolk Amateur Radio Club, W6BRR/3, 5599-5
Bridgeport Radio Amateur Club, W1QA/1, 5463-2
Motor City Radio Club, W6MMR/3, 5450-3
Santa Clara County Amateur Radio Assn., W6UW/6, 5397-10
Narragansett Assn. of Amateur Radio Operators, W1SKT/1, 5065-2
El-Ray Radio Club, W1OMI/1, 5058-5
Grand Rapids Amateur Radio Assn., W8DGC/8, 5068-4
Sandia Base Radio Club, W5MPZ/5, 5051-3
Joe Alamos Amateur Radio Club, W6PDO/5, 5031-4
Capital Key and Mike Club, W2DIM/3, 4873-3
Military Amateur Radio System, K4AF/4, 4849-6
Jewish Radio Club, W3WUX/2, 4785-5
Twin City Contest Club, W3TXR/0, 4743-1
Niagara Radio Club, W2QTV/2, 4717-3
Michiana Amateur Radio Club, W6BA/9, 4692-5
Milwaukie Amateur Radio Emergency Corps, W6EJ/9, 4655-5
Delaware Valley Radio Assn., W2ZQ/2, 4609-4
Radio Club of Tacoma, W7DKE/7, 4503-4
Morris Radio Club, W2FUB/3, 4481-4
Ulices Amateur Radio Club, W2MTH/2, 4452-2
Huntington Amateur Radio Club, W2DQF/2, 4313-7
Hamfester Radio Club, W5P/GF/9, 4140-3
Albany Amateur Radio Assn., W3GM/2, 4356-4
Sacramento Amateur Radio Club, W6WQ/6, 4350-6
Concord Amateur Radio Club, W6H/3, 4347-2
Kennefo Buffalo Tonawanda Radio Club, W2EWT/2, 4329-2
Oak Ridge Radio Club, W4SKH/4, 4329-7
Sioux City Amateur Radio Club, W8ERG/9, 4285-4
Connecticut Wireless Assn., W1TX/1, 4269-1
Lake County Amateur Radio Club, W6AN/9, 4193-4
South Lyme Beer, Chowder & Propagation Society, W1EB/1, 4178-3
West Valley Radio Club, W2WRD/2, 4146-7
Mid-Island Radio Club, W2UBW/2, 4023-3

Class B

(Listings show call of operators at each station, call used and score.)

W6A LDR BW, W6BW/6, 5654-1
W6A EIS W6E, W3EIS/3, 5652-3
W6A FRA DQ, W2RQ/2, 4509-2
W6E EWC YGH, W9WBC/9, 3429-3
W2WZQ, W2WZQ/2, 3096-5
W6A ICN QZQ, W6Q/M/6, 2981-3
W7Q G6 UIT, W7RT/7, 2109-3
W6C ERU HOA, W6ERU/9, 2170-6
W6C COR FTY, W2CCR/2, 2012-9

Class C

(W6MA/6, 3645 W6KCMG/3, 908
W2WX/6, 2097 W6FMH/6, 783
W2IQX/2, 1004 W6ICR/3, 783
W3RO/2, 1007 W6NKX/3, 743
W5DAH/5, 1015 W2LY/3, 581
W3XNX/3, 1175 W3ULG/3, 540
W2FC/3, 1097 W1MGP/1, 257
W2YTH/2, 1096 W6NTU/2, 527

Class D

K7RM, 1037 W6FCT, 89
W7TIA, 240 W2KEL, 29
W8KK, 194

Class E

W3QOR, 170 W2AP/2, 95
W3RES, 124 W6CA, 97
W3QILZ, 123 W6YAG, 97
W1BJP, 120 W4FX, 43
W4TRA, 120 W1UC, 57
W8KX, 113 W8X/7, 57
W8GCA, 118 W8DAE, 52
W8KPH, 104 W8KFXU, 52

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Herewith, another in our series of letters from "Hams" for whom the letters "HRO" have a special meaning.

June 27, 1952

THE NATIONAL COMPANY
Malden, Massachusetts

Gentlemen:

I've been enjoying the recent stories concerning the exploits of ancient vintage National equipment and think the following may be of interest to you.

More years ago than I care to contemplate, when I received my high school diploma, my father gave me $100.00. Approximately 2 hours later I owned an HRO Jr., had fifty cents change, and the Cameradio Co. of Pittsburgh, Pa. (a swell outfit incidentally) had the hundred bucks. The receiver is serial No. 26 or 28 — it's not quite legible now.

The biography of this patriarch among receivers appears below: Prewar, it enabled me to work 126 countries, (no bandspread of course). It was then stored for eighteen months in an old warehouse where no particular precautions were observed, and later shipped to Miami, Florida, where it was kept in a garage and used only intermittently. During the war it made a trip to S. America and back to Miami. My W4 call was issued there and postwar operation began on 28 mc. In 1946 it rattled around in the back of a Plymouth coupe to N. Carolina. Since 1947 it has been in steady service. Between '47 and '49 it made possible QSOs with 189 countries (still no bandspread). Standard HRO coils for 14 mc. were purchased in '49, and the present country total is 209.

The first tube failure occurred around 1941. The 58's and 57's used originally were removed and replaced with 6D6's and 6C6's etc., and no changes were made other than the filament voltage. These tubes are still in use. The receiver now operated in conjunction with a homemade SSSC adapter and Select-O-Ject and a 1 KW SSSC transmitter. There is no indication that this old receiver has any intention of providing anything but excellent service for many more years, a tribute, I think, to its extraordinarily high quality.

Best regards,

R. E. Moran, W4INL
• All operating amateurs are invited to report to the SCM on the first of each month, covering station activities for the preceding month. Radio Club news is also desired by SCMs for inclusion in these columns. The addresses of all SCMs will be found on page 6.

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM: John J. dubois, 1538 South Union Street, Allentown, PA 18104. QTHR: CEC, RAI; AX: BAA, HP; BPA, Net: 3000 kc. During the month of July there was some noticeable activity on 160 meters. Most of the activity was on 160 meters, with a few 80-meter QSOs. During the month of June, there was some 160-meter activity reported by members. The Antennas Committee has been active in planning for the future.

MID-ATLANTIC — SCM: James H. John, 108 Wawanny Avenue, Bladensburg, MD 20710. QTHR: CEC, RAI; AX: BAA, HP; BPA, Net: 3000 kc. During the month of July, there was some noticeable activity on 160 meters. Most of the activity was on 160 meters, with a few 80-meter QSOs. During the month of June, there was some 160-meter activity reported by members. The Antennas Committee has been active in planning for the future.

SOUTHERN NEW JERSEY — SCM: Lloyd L. Gaine, W200G, 1401 Prince Street, Hammonton, NJ 08037. QTHR: CEC, RAI; AX: BAA, HP; BPA, Net: 3000 kc. During the month of July, there was some noticeable activity on 160 meters. Most of the activity was on 160 meters, with a few 80-meter QSOs. During the month of June, there was some 160-meter activity reported by members. The Antennas Committee has been active in planning for the future.

SOUTHERN NEW YORK — SCM: Edward G. Graf, W2JQV, 33 West 42nd Street, New York, NY 10018. QTHR: CEC, RAI; AX: BAA, HP; BPA, Net: 3000 kc. During the month of July, there was some noticeable activity on 160 meters. Most of the activity was on 160 meters, with a few 80-meter QSOs. During the month of June, there was some 160-meter activity reported by members. The Antennas Committee has been active in planning for the future.
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of PENNA. INC.
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RADIO ELECT. SERV. CO.
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RADIO EQUIPMENT CO.
Norfolk 10, Virginia

RADIO PARTS, INC.
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RADIO PARTS CO. INC.
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RADIO PRODUCTS SALES Co.
Seattle, Washington

RADIO PRODUCTS CO.
Denver 2, Colorado

RADIO SHACK CORP.
Boston 8, Mass.

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RADIO WIRE TELEVISION INC.
New York 12, N. Y.

RADIO WIRE TELEVISION INC.
Boston 10, Mass.

RADIO WIRE TELEVISION INC.
Newark 2, New Jersey

RADIO WHOLESALE & SUPPLY CO.
Honolulu 11, Hawaii

THE RADIO CENTRE
Montreal, Quebec, Canada

SPECO INC.
Dayton 2, Ohio

SAN FRANCISCO RADIO & SUPPLY
San Francisco 2, Calif.

SCOTT RADIO SUPPLY
Long Beach 2, Calif.

UNITED RADIO SUPPLY INC.
Portland 9, Oregon

VALLEY ELECTRONIC SUPPLY
Burbank, Calif.

VALLEY RADIO DIST.
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44-31 DOUGLASTON PARKWAY • DOUGLASTON, LONG ISLAND, NEW YORK

75
TR-1 Transmitter

All-Band Amatuer Transmitter Kit. 300 watts CW. 250 watts AM Phone. Covers 80, 40, 20, 15 and 11-10 meters. Band-switching in all stages except final—has broadband, slug-tuned exciter stages. Includes transformers, capacitors, carbon and wire-wound resistors, meter, coils, all tubes, wire, all hardware. Furnished complete with EV-915 crystal microphone and two punched chassis (bases—RF, 17 x 13 x 4"; power supply 17 x 13 x 3""). Uses 6V6 crystal oscillator, 6V6 and 6L6 doublers; 813 final, 100% modulated by Class B 811's; 6SL7GT and 6V6 speech amplifiers. Has 6L6 keyer tube. Rectifiers: SU4G and 2-866A's. With complete instruction manual. For operation from 110-120 volts 50-60 cycles AC.

TR-1: Kit complete with instructions $259.95
TR-1: Factory wired and tested 379.95

TR-1 TV Transmitter

The answer to the "TVI" problem. Eldico's new famous "TR-1" 300 watt CW 250 watt phone all band transmitter, now TVI'd by the experts. Suppression of all harmonics, subharmonics or superluous responses by 60 db or greater. Completely shielded RF chassis (crystal oscillator-doubler-813 final), all leads by-pass and filter, built in brute force AC line filter and low pass transmission line filter (72 ohm output). Complete kit including tubes, chassis, shield, filter, components, coils and etc.

TR-1 TV: Kit complete with instructions $379.95
TR-1 TV: Factory wired and tested 499.95

TR-75TV Transmitter

60 watt CW transmitter. Kit includes anti-TVI features—special shielding and bypassing to reduce harmonics. An easily built beginner's transmitter. Covers all bands 80, 40, 20, 15 and 11-10 meters. Pi-network output permits easy matching to any single-wire antenna. Uses 6AG7 crystal oscillator and 1625 final. Husky power supply with SU4G rectifier delivers 550 volts. Complete with every part, including all tubes, coil forms, coil wire, capacitors, meters, resistors, hardware, chassis, shield cover and TVI-proofing provisions. For operation from 110-120 volts, 50-60 cycles AC, with complete simple instruction manual.

TR-75TV: Kit complete with instructions $64.95
TR-75TV: Factory wired and tested 94.95
Extra coil set for additional bands, $4.50 each set

Single Sideband Transmitter-Exciter

The Eldico SSB Jr., patterned after the revolutionary unit developed by GE engineers is available in either kit form or completely wired and tested. Eldico's SSB Jr. is a complete 7-tube 5-watt single sideband transmitter. Tube complement consists of 12A7/7 combination speech amplifier-oscillator; 12A7 twin-channel amplifier; 6AG7 final, 12A7 speech pre-amplifier; 6N6 pair; 5Y3GT rectifier. Each kit comes with all parts, punched chassis, cabinet, tubes, power supply and full instructions for assembly and operation. No more difficult to construct and adjust than any simple transmitter, because the audio phase-shift network is laboratory assembled and adjusted. Practical SSB at amazingly low cost is now a reality. The Eldico SSB Jr. may be used as a transmitter, as a driver for a high-power linear amplifier, or in conjunction with a v.f.o. The transmitter provides 40 db. sideband suppression by using a simplified phasing method which requires only standard components and no special technical skills.

SSB Jr.: Complete kit with instructions $79.95
SSB Jr.: Wired and tested 129.95
MD-100 MEDIUM POWER MODULATOR
Compact speech amplifier and modulator capable of delivering 100 to 120 watts maximum of A.M. audio for 100% plate modulation of any CW transmitter up to 250 watts input. 6517 resistance coupled to 6SN7 dual-voltage amplifier and phase inverter, driving a 6SN7 transformer coupled to a pair of modulators in class AB2. Modulation transformer is matched to a class C r.f., plate load of 3000 ohms. This complete package includes everything from a carefully punched and drilled chassis to an Electro-Voice 915 crystal microphone. Plate voltage to the low-power speech stages and screen voltage for the modulator is supplied from an integral power supply. The Modulator plate voltage must be obtained from external supply.

MD-100C: Kit complete with Instruction Manual $69.95
MD-100S: Factory wired and tested 99.95

MD-40P LOW POWER MODULATOR/SPEECH AMPLIFIER
40 watts of audio; 6517 drives 2 6SN7 amplifier/phase inverter which in turn drives a 6SN7, driving a pair of 6LG6 modulator tubes in Class AB2. The output transformer is matched from 6LG6's to a Class C r.f. plate load of 6000 ohms. Complete with punched chassis, components parts, and the Electro-Voice 915 High Level Crystal Microphone, less stand. AC Power Supply delivering 350V at 200 ma.

MD-40P: Kit complete with Instruction Manual $59.95
MD-40PS: Factory wired and tested 79.95

MD-40 LOW POWER MODULATOR/SPEECH AMPLIFIER
Same as above with exception that it is less internal power supply.

MD-40: Kit complete with Instruction Manual $49.95
MD-40S: Factory wired and tested 64.95

EE-1 ELECTRONIC KEY
Self-completing type of automatic keying device incorporating all the latest improvements in automatic keying known to the art. Features self-completing characters that automatically insure perfectly formed sending; continuous variable speed control for any rate of sending from 8 to 50 w.p.m.; separate control for weight of characters and ratio of dashes-to-dot length, allowing individual tailoring to your own list; self contained with built-in power supply in an attractive hammer-tone case complete with automatic key.

EE-1: Kit complete with Instruction Manual $29.95
EE-1S: Factory wired and tested 39.95

EE-2 ELECTRONIC KEY
Unit similar to above but with built-in tone oscillator and speaker for monitor keying—pitch and speed control on front panel.

EE-2: Kit complete with Instruction Manual $34.95
EE-2S: Factory wired and tested 49.95

A-300 ALL BAND ANTENNA TUNER
300 watt Universal antenna coupler designed to couple any conventional antenna feedline, regardless of impedance, to any conventional tank circuit. Tuner kit includes split stator capacitor, swinging link, shielded case, 3 round ammeter, coax connector from transmitter, coax and open line connectors and output. Complete with shielded cabinet, R.F. Ammeter, swinging link, dual variable condenser, coaxial plugs, hardware.

ANTENNA TUNER: Kit complete with Instruction Manual $29.95
ANTENNA TUNER: Factory wired and tested 39.95

GDO-GRID DIP OSCILLATOR
Based on the original W2AEF grid-dipper the new model incorporates all the improvements. High-sensitivity regeneration circuit is now standard part of kit. 2" square O-1 ma meter improves readability of instrument. Special straight-line frequency capacitor is fully assembled with all mounting brackets and coil socket. Grid Dipper kit includes everything required, special case designed to facilitate one-hand operation, tube, internal power supply, meter and detailed instruction book covering assembly and operation. Range 3 mc to 250 mc, covered in six steps. Operation from 105-125 volts AC/DC.

GDO: Kit complete with Instructions and Application Manual $34.95
GDO: Factory wired and tested with Application Manual 47.95
**MT-2 2 METER TRANSMITTER**

Crystal controlled transmitter designed for operation in the 144-148 mc band; 6AQ5 crystal, 6AQ doubler; driving 2E26 final up to 22 watts input. 6C4 speech amplifier for carbon microphone input, driving pair 6V6 modulators. A modified pi-network is provided for ease of coupling to any type 2-meter antenna. Low power plate drain is only 300 v., 100 to 200 ma depending upon plate loading. Coax output and integral antenna switching included. All tuning controls are screwdriver adjusted with positive locking to prevent detuning when used in mobile installations. Parts are conservatively rated to provide trouble-free performance. Layout and circuit design insures stable operation equal to standard low-frequency equipment. Cabinet size 5½ x 9½ x 5½" designed for universal mounting and finished in hammertone baked enamel. Jones plug and coax connectors make installation rapid and positive. Any power supply may be used capable of providing 300 volts at 200 ma. May be operated from dual vibrator supply also supplying receiver.

**MT-2 TRANSMITTER: Kit complete with instructions** $59.95

**MT-2 TRANSMITTER: Factory wired and tested** 79.95

**MR-2 2 METER RECEIVER**

Designed for mobile or fixed station operation, this kit is a complete 2-meter superhet tuning 144-148 mc with a sensitivity of better than 1 mv for 6 db signal-to-noise ratio. Using the Walman front end circuit and 9-mc i.f.’s the a.v.c. and a.m.f. contribute to rock-steady stability and unmatched selectivity. The 10 tube circuit has a total battery drain of only 22 watts. 6AK5 r.f. stage; 6C4 cathode followers; 3 stages of 6BA6 i.f.; 6AL5 noise limited; 6V6 audio output of 1 watt into 4 ohms; OA2 voltage regulator. For ease of tuning a geared vernier provides a velvet touch. The local oscillator is designed as an integral assembly. A slight additional cost it can be purchased in a small external box for mounting in confined areas or where the feature of separate receiver tuning is wanted. Cabinet size is 5½ x 9½ x 5½". Designed for universal mounting and finished in handsome hammertone baked enamel. Jones plug and coax connectors make installation rapid and positive. Standard components are used throughout should replacement of parts be necessary.

**MR-2 RECEIVER: Kit with Instruction Manual** $69.95

**MR-2 RECEIVER: Factory wired and tested** 99.95

**MRT-2AC POWER SUPPLY**

AC Power Supply for MR-2 Receiver and MT-2 Transmitter. 115V-50-60 cycles AC input for 300 volts DC at 200 ma. Complete with plugs and cables for direct connection to both units. Built in 6V DC selenium supply for operating control relays. SU4G rectifier furnished.

**Kit complete with Instruction Manual** $29.95

Factory wired and tested... 39.95

**MR-2 REMOTE TUNING KIT**

Local oscillator can be removed from receiver and installed at driver’s position allowing receiver and transmitter to be mounted remotely. Adapter kit consists of special custom housing, new receiver front panel, brackets, hardware, instructions and etc.

**MR-2 REMOTE TUNING KIT: With instructions** $12.95

**ANT-2 ANTENNA**

2-Meter fixed station non-directional "Viker" antenna. The ideal antenna for CAP, Civilian Defense or Amateur Communication. Can be used for vertical or horizontal polarization; perfect match for 72 ohm coax. Complete antenna ready for easy assembly with instructions... $14.50

**ELDICO also custom builds communication equipment for all special purposes—various State, City and Municipal Agencies are now using Eldico mobile and fixed civil defense equipment. See your distributor or write direct to Eldico for your CIVILIAN DEFENSE PLANNING SHEET.**
LOW PASS FILTERS

 Eldico's TVD-62 is a two-section M-serviced low-pass filter completely self-contained in a special case measuring 9 1/2 x 4 7/8 x 2 1/4" supplied with coaxial connectors for the input and output. Attenuation of harmonics radiated by the antenna, the source of most TVI, is in excess of 60 db. Cut-off frequency of 40 mc insures maximum performance to 10 meters. Each filter includes six 50 uf ceramic capacitors; pre-wound and formed coils, shielded case and all necessary fittings. The TVD-62 is installed directly between the link output of the final and the antenna or tuner. For stubborn cases of TVI in high-powered rigs an additional filter should be installed between driver and final grids, Filter will handle up to 1 kw A.M. Insertion loss negligible. For 52 or 72 ohm coaxial feed-lines or coaxial feed to antenna tuner.

TVD-62: Kit complete with Instruction Manual. $15.95
TVD-62: Factory wired and tested. 18.95

DIAxIAL LOW PASS FILTERS

To fill the requirements of amateurs using parallel 52 ohm or 72 ohm coaxial feedlines the Dexceli Low-Pass Filter is a modification of the TVD-62. Consists of two TVD-62 filters paralleled in a single case with a nominal impedance of 100 ohms. All parts and instructions included. Supplied with four standard coaxial connectors for input and output and shielded case.

TVD-104: Kit complete with Instruction Manual. $22.95
TVD-104: Factory wired and tested. 29.95

HARMONIC CHASER

Modified absorption type wave-meter for locating, measuring and identifying transmitter harmonics in any of the 12 television channels. Designed to eliminate swamping by the transmitter fundamental when the unit is tuned to the harmonic. Complete with all parts except indicating meter. Requires a sensitive external current indicator. Can be used with most volt-ohmmeters or with the 500 microampere meter listed below.

TVH: Kit complete with Instruction Manual...$10.95
TVH: Factory wired and tested...16.95
TVH-500: Microampere meter in case to match harmonic chaser...10.95

HIGH PASS FILTERS

For television interference reduction. Essential filters to be installed directly at the antenna coil of the television receiver. Greatly reduces or completely eliminates r.f. interference from amateur or commercial transmitters, industrial equipment, dia- thermy, oscillator radiation and other sources. Negligible insertion loss. Efficient on any television receiver. 40 mc cut-off, no attenuation to signals above 40 mc, consequently does not affect picture strength or quality. Available for coaxial or 300 ohm twin-lead transmission line. Can be assembled from kit in a few minutes.

TVR-300: 300 ohm High Pass Filter
TVR-62: Coaxial High Pass Filter for 52 or 72 ohms—either model...$1.98
Wired and tested. High Pass receiver filter ready to install with complete instructions for connecting.
TVR-300: 300 ohm High Pass Filter
TVR-62: Coaxial High Pass Filter for 52 or 72 ohms—either model...3.98

BRUTE FORCE LINE FILTER

R.F. Feeding back through power lines is a serious source of TVI and BCI. Eldico's two-section Brute Force Line Filter will completely eliminate r.f. feed through in an AC line, required only minimum installation. Patterned after the recommendation model in the 1949 ARRL Handbook each filter consists of two special coils (3/16" Sq. Copper in TVL-2.5KW) pre-formed and wound, 5 oil filled capacitors and 3 mica capacitors all rated at 400 v.d.c. Metal case measures 4 1/4 x 9 1/2 x 2 1/4" TVL-1KW supplied with heavy duty line cord and plug and female AC outlet receptacle. TVL-2.5KW equipped with BX clamps for securing AC lines. Complete with instructions.

TVL-1KW: For total maximum line drain of 1KW Kit complete with Instructions...$11.95
TVL-1KW: Factory wired and tested...15.95
TVL-2.5KW: For total maximum line drain of 2.5KW Kit complete with Instructions...18.95
TVL-2.5KW: Factory wired and tested...24.95
"PRIVATE TUTOR" NOVICE AMATEUR RADIO COURSE

An amateur Radio Course tailor-made for the novice—created by professional educators, engineers and experienced amateurs. All material has been especially selected, profusely illustrated, and arranged in easy step by step sequence to provide individual instruction — literally your own "Private Tutor" every step. The course consists of five Columbia long playing micro-groove recordings for code instructions, six novice theory lessons and examinations, an ARRL License Manual and various supplementary aids. The unbreakable microgroove 12" records give a total course of instructions equal to almost five hours or the equivalent of fifty (50) standard records. Code instructions are accompanied by the voice of the instructor. As the code groups are transmitted the speed is gradually increased. Speed is developed beyond that necessary for the FCC examination requirements and when your license arrives you are ready for your first QSO.

<table>
<thead>
<tr>
<th>Course</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete course (code and theory)</td>
<td>$25.00</td>
</tr>
<tr>
<td>Records only (code course)</td>
<td>17.00</td>
</tr>
<tr>
<td>Theory Course only</td>
<td>10.00</td>
</tr>
</tbody>
</table>

"PRIVATE TUTOR" ADVANCED CODE RECORDS

Another Eldico First. Three code speeds on a single record—five long playing Columbia microgroove recordings are available ranging in speed from eight words a minute, up to and including 30 words a minute. Each recording can be played at three record speeds, giving three different code speeds. Records available for speeds of 8, 9, 10, 12 and 15 words per minute at 33 1/2 r.p.m., giving code speeds of 12, 14, 16, 18 and 21 at 45 r.p.m. and 16, 18, 20, 24 and 30 at the higher 78 r.p.m. Straight text, numbers, coded group and cryptograms are included in the practice. Each record at the slower r.p.m. has approximately 30 minutes of practice time. Available as individual records at $3.95 per record, specify the speed desired.

HIGH VOLTAGE POWER SUPPLY KITS

These kits use all standard brand new components and are conservatively rated to give dependable high voltage under continuous duty service. Because high-voltage supplies generally require little modification upon completion, these units are engineered to give trouble-free performance without attention from the day you solder the last connection. Each kit includes plate transformer, separate filler transformer, smoothing chokes, oil filled condensers, rectifier sockets, HV-1500 also includes line cord, pilot light, fuse, fuse post switch and etc. Each kit is supplied with instructions—less chassis and rectifier tubes. All Eldico High Voltage Power Supply Kits are for 110-120 volt 50 to 60 cycles AC. Total cost of each kit is comparable to what you would expect to pay for the plate transformer alone, 1500 volt supplied uses 866's, all others use 872's.

<table>
<thead>
<tr>
<th>Kit</th>
<th>Weight</th>
<th>Kit</th>
<th>Transformer Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>HV-1500</td>
<td>350 ma</td>
<td>$55.95</td>
<td>$29.95</td>
</tr>
<tr>
<td>HV-2000</td>
<td>500 ma</td>
<td>99.95</td>
<td>65.95</td>
</tr>
<tr>
<td>HV-2000SP</td>
<td>700 ma</td>
<td>129.95</td>
<td>89.95</td>
</tr>
<tr>
<td>HV-2000</td>
<td>500 ma</td>
<td>159.95</td>
<td>119.95</td>
</tr>
</tbody>
</table>

ELDICO has always given first thought to the Ham ... to his well being as an individual, the full enjoyment of his hobby, the advancement of his amateur radio knowledge, and to general good fellowship of one Ham for another all over the world. No little thought has also been given to supplying him with finer, more dependable equipment at prices he can afford. This catalog of the ELDICO line reflects that forethought on behalf of the Ham, as well as the foresight of leading distributors throughout the nation who feature ELDICO.
to the E. E. or PHYSICS GRADUATE

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RADAR OR ELECTRONICS

Hughes Research and Development Laboratories, one of the nation's large electronics organizations, is now creating a number of new openings in an important phase of its operation.

Here is what one of these positions offers you:

1. THE COMPANY
Hughes Research and Development Laboratories is located in Southern California. We are presently engaged in the development of advanced radar devices, electronic computers and guided missiles.

2. NEW OPENINGS
The positions are for men who will serve as technical advisors to the companies and government agencies purchasing Hughes equipment. Your specific job would be to help insure the successful operation of our equipment in the field.

3. THE TRAINING
Upon joining our organization, you will work in our Laboratories for several months until you are thoroughly familiar with the equipment you will later help the Services to understand and properly employ.

4. WHERE YOU WORK
After your period of training (at full pay), you may (1) remain with the company Laboratories in Southern California in an instruction or administrative capacity, (2) become the Hughes representative at a company where our equipment is being installed, or (3) be the Hughes representative at a military base in this country—or overseas (single men only). Compensation is made for traveling and for moving household effects, and married men keep their families with them at all times.

5. YOUR FUTURE
You will gain all-around experience that will increase your value to the company as it further expands in the field of electronics. The next few years are certain to see a large-scale commercial employment of electronic systems—and your training in the most advanced electronic techniques now will qualify you for even more important positions then.

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If you are under thirty-five years of age, and if you have an E. E. or Physics degree, with some experience in radar or electronics,

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Assurance is required that relocation of the applicant will not cause disruption of an urgent military project.
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Picture this
in your shack!

Viking II
TRANSMITTER KIT

- TVI SUPPRESSED
- BANDSWITCHING
- 115 WATTS CW INPUT
- 115 WATTS PHONE INPUT
- 115% AM MODULATION

$279.50

- The JOHNSON 250-50 Low Pass Filter is available as a separate accessory and when used, can provide an additional 15 db harmonic attenuation in the antenna circuit.

AMATEUR NET...

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

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Newark Electric Co.
223 West Madison Street

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INDIANAPOLIS
Graham Electronics Supply, Inc.
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194 West 4th Street
Superb performance on amateur bands 160, 80, 40, 20, 15 and 10-11 meters; 130 watts CW output, 100 watts phone output. 6AU6 oscillator, 6AQ5 buffer/doubler, parallel 6146 output amplifier. Continuous tuning pi-network amplifier matches a wide range of antenna impedances; provides up to 30 db harmonic attenuation before filtering. More than ample excitation at all operating frequencies.

Modulator, pp 807s with 6AU6 speech amplifier, 6AU6 driver. Frequency response limited for effective voice communication.

Power supplies designed for economy, for utmost operating convenience. High vacuum parallel 5R4GY HV rectifiers, 5V-4G low voltage rectifier, 6AL5 fixed bias rectifier.

Crystal selector accommodates 10 crystals. Power and RF input provisions for the Viking VFO. All stages metered, excitation control for output amplifier. CW input may be reduced to 75 watts for novice operation.

E. F. JOHNSON CO., WASECA, MINN.

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Radio Parts Co., Inc. 536-538 West Slate St.
Arkansas — SCM, Fred Ward, WS6LX — The main interest this past week was Field Day, and from the reports it was a very good one. The club at Fort Smith operated 4 transmitters under the call R7/5 and did a fine job. P2C has a pair of 220 MHz transceivers and a new watt job carrying the mail. K5WB has a large antenna and antenna is on one side of the tower and VK1 a box on the other side of the tower. Also new in this area is a new keyer. The new keyer is a good addition to the club and will be used for sending CW on the band.
where the world's toughest transformers are a "must" for the toughest installations . . .

you'll find

CHICAGO

REL specifies and uses CHICAGO
You'll find CHICAGO "Sealed-in-Steel" transformers used throughout REL's FM Transmitting and Relay Equipment. Absolute dependability is a prime requirement in all REL equipment—and CHICAGO transformers contribute significantly to quality, superior performance and long time stability.

COLLINS specifies CHICAGO
This COLLINS MHP Single Frequency Communications Receiver utilizes CHICAGO "Sealed-in-Steel" transformers for trouble-free, continuous service under the most rugged operating conditions.

where the going's tough—specify CHICAGO "Sealed-in-Steel" NEW EQUIPMENT TRANSFORMERS

CHICAGO "New Equipment" transformers (available in 3 mountings) feature one-piece drawn-steel cases—the strongest, toughest, best-looking units you can buy. The one-piece seamless design, enclosing an electronically perfect construction, provides the best possible electrostatic and magnetic shielding, with complete protection against adverse atmospheric conditions. For every application: Power, Bias, Filament, Filter Reactor, Audio, MIL-T-27, Stepdown—ask your electronic parts distributor for CHICAGO "Sealed-in-Steel" transformers.

FREE "New Equipment" Catalog
Get the details on CHICAGO's full New Equipment Line—covering "Sealed-in-Steel" transformers for every modern circuit application. Write for your Free copy of this valuable catalog today, or get it from your distributor.

FREE

CHICAGO TRANSFORMER
DIVISION OF ESSEX WIRE CORPORATION
3501 ADDISON STREET • CHICAGO 18, ILLINOIS

85
WHY ALL THIS JUNK?

(Continued from page 80)

has several graduates from his Novice training class.
DHE operated mobile and portable on a vacation trip through the Smokies. LVO is a consistent Louisiana output
on the Central Gulf Hurricane Net. CQD workers heard
the various Texas traffic nets. ONM and KRC handle CAA
traffic. FY5 and HEL, through their unifying efforts, were
responsible for 100 per cent Louisiana participation in
MARS during the last two months. Traffic: W5NG 213,
M3L 230, CDW 45, AECN, CMX 56, W5JH.

MISSOURI—SCM, Norman B. Feeney, W5HJS—
On Field Day Meridian ARC operated portable 3 miles
outside of Meridian with two transmitted and one
retransmitted. Jackson operated portable with four
transmitters and ten operators.

Keesler ARC operated portable 15 miles northwest of Biloxi, with five transmitters, ten operators, and
seven ARES members. JES, TIV, and LWO, and others of the Mississippi gang report a good
village at the Peninsula. FEB, box 5, has been
have a

Great Lakes Division

KENTUCKY—SCM, I. W. Levy, jr., W4KKG—
W4-KKG says to his friends to be on the lookout for
license holder in Adair County. Since then WIF and
WKB have sprung up! FB and welcome, fellows, RRU of
KBY and TAW of EYN win South their usual trifling,
the old reliable reports. The shack pretty hot this month
but he made the notes sometimes. June set new records all
over the State. The temperature was below 90 only one
day and many days were over 100! All/4 will be on in
August, Va., again for W5E, and will be at Kiawah for CDA
then moves to a new T5H, his son, SHD, gets married, and
the antenna still is on the ground as he says no activity! HL
M1 reports in via Air Mail the other day.

T2IPS's first KCE is publishing the summer building
a de luxe shack. Don't forget the air conditioning, Len! OYO
unicates WAC again the hard way for monthly.

CDA 13, FR 10, KKG 7.

MICHIGAN—SCM, Norman C. MacPhail, W8LZE—
As SCM, W8LZE, R. R. Copeland, W8SSC; M. C. Wills, W8CP; SEC; GJH; RRR; YKC, UKV, ELW,
FAM; LTH. New appointments: ORE to RFI and Zig
W8LZE's reports the following new officers of the Motor
City Radio Club; AJO, pres.; GWA, vice-pres.; WNNJUT,
sec'y.; BYB, trans. TAU is back on 75 meters with a Band
master from Ypsil. RNJ is building a 32-Mc. TV trans-
mitter. YIN now is heard on all bands with a new rig.
DEG is building a new 500-WATT transmitter in his
home town. AVO is on a summer job and will not be
heard until September, when he will be back from college
in Ohio, Hkk7 now is "shotgunning" the bands with a
Miller VFO. Mac has a new "antenna farm" lined up and
will move there soon. ZLK reports the Cherryland Radio
Club has its own call now — W8KTV. THG is experi-
encing with a "TV" antenna 15 ft. long and used on
Eastern Canada with 6 watts on 160-meter phone.
CPB reports FYX is off the air because of licencing his rig
for to UII and the latter could move mobile. Michigan traffic on
either phone and CW, urge more careful censorship of
taxi and radio traffic on the source. The acceptance and
transmission of the 100-watt limit via DX and even two
no bear in our cap. Let's make the small standards
we have established over the years. AXF now is communi-
cating direct for the K50 and K6X from either side
lining off on X1 20 meters with 100 watts. Traffic: (June)
W5ZGT 1200, N7Z 533, FBY 143, JYI 135, R7T 98,
KZ 93, IF 70, IV 75, TFP 44, AXP 40, RKO 35, HXK
(Continued on page 88)
There’s a MALLORY CAPACITOR For Every Need

Did it ever occur to you that more capacitors are used in an amateur transmitter or receiver than any other single component? As a result, the chance of a capacitor failing and putting you off the air, or permitting your transmitter to emit spurious, illegal signals to land in your neighbor’s radio or TV set, is more likely to occur because of a poorly made or defective capacitor, than any other component in your set.

For that reason, every amateur should be especially critical of the capacitors he selects for use in his equipment. Nothing less than top-grade, first line capacitors should ever be tolerated in by-pass, coupling and filter circuits in his equipment.

For a long time Mallory capacitor engineers have recognized the importance of designing and building good capacitors for use in radio and electronic circuits. They have recognized that a truly good capacitor must have low DC leakage and low operating impedance in addition to the usual requirements of full capacity and voltage ratings.

For example, more than 10 years ago Mallory engineers recognized the need for electrolytic capacitors of lower and more uniform impedance. The result: they did something about this need by designing the exclusive Fabricated Plate (FP) anode construction to assure the production of a capacitor with a consistently lower impedance.

Mallory capacitor engineers anticipated the trend toward increased amateur activity in the VHF range above 50 megacycles. The result: ultra small, Mallory tubular and disc type ceramic capacitors were made available for efficient by-passing and coupling at those frequencies.

A number of years ago Mallory vibrator engineers first stressed the importance of proper buffer and timing capacitors to assure long, trouble-free vibrator life in your portable-mobile rigs. But there were no suitable vibrator capacitors available. The result: Mallory capacitor engineers attacked the problem and designed capacitors especially suited for vibrator service.

Mallory engineers have seen it that almost every conceivable size, shape, and type of fixed capacitor the amateur might need, is included in the Mallory list. And they have seen to it that each Mallory capacitor has had individual, painstaking design effort to make it the finest of its type made.

The next time you have need for a capacitor for use in your station, see your Mallory Distributor, and specify Mallory. With the Mallory label on that capacitor, you’ll know without question that you’re getting a top-grade, first line capacitor of excellent operating characteristics.

And see your Mallory Distributor for the other Mallory parts designed for amateur service... including resistors, ham band switches, rheostats, potentiometers, pads, dry disc rectifiers, vibrators and vibrator power supplies.
More Safety...Less Guesswork
When You Use
PRECISION-
TEST EQUIPMENT

Stay On The Air
With “PRECISION”
SERIES 85
AC-DC
Circuit Tester
(20,000 Ohms per Volt)
SELF-CONTAINED TO
6000 volts,
60 Megohms,
12 Amperes, +70DB

A compact, laboratory type, high sensitivity test set
independent for test and maintenance of modern amateur
communications equipment.
20,000 Ohms per Volt D.C. - 1000 Ohms per Volt A.C.
VOLTAGE RANGES: 0-3-15-60-300-1200-6000 A.C. & D.C.
CURRENT RANGES: 0-120 microamps; 0-1-2-12-120-MA;
0-1-2-12 Amps D.C.
RESISTANCE RANGES: 0-600-600k-6 Meg-60 Megohms.
DECIBEL RANGES: From -26 to +70DB.

Complete with batteries and test leads $395

PLUS superior physical features:
★ 4½”, 50 microamps, Easy Reading Meter.
★ Heavy duty bakelite case 3½ x 7½ x 3½”.
★ Deep etched, anodized aluminum panel.
★ Redressed 6000 volt safety jacks.
★ Only two pin jacks for all standard ranges.

LC-1 LEATHER CARRYING CASE—Custom designed, top-grain
cowhide case with tool and test lead compartment. $8.20
See Series 85 and other famous “Precision” instruments,
on display at leading radio parts and ham equipment
distributors. Write for latest catalog.

Precision Apparatus Co., Inc.
92-27 Horace Harding Blvd., Elmhurst 13, Y.

32. AQA 30, DLZ 26, DAP 23, HKT 22, COW 16, ZL2K
15, LF8 14, GJE 7, ACW 2. (Mary) W8YK 106,
USL 29, Y8A 24. (D. A.) GB 13, DV 12, JVR 11,
FEG 13, ENZ 6, EZX 4, IRX 2, NQ 2. (Apr.) W8PZK
SCM, Jack H. Boll, W8LX — SCM, Bob P. Rittenhouse, W8AE;
PAM: FUSE, RMs: DAE and PRM. The hot weather
really has gotten the lads and ladies this month. Save
for Field Day, activity was rather generally light. There
were no new APs or new announcements. Approximately 40
Field Day messages were received here. DAE and LBL are
working on some new equipment. The W8QW removes
from the traveling station list. VFO is fishing in Northern
Michigan. YGR has been burning a bit of wire to deliver
messages from services-

FAX 3 is doing a fine job. W6LX is donating some
funds to aid amateurs in
Clintondale to promote EC work. FUP is still trying to
to get the packages. It is suggested that he hire a few
packers or bring a couple of
up to help. W6LX is doing
 pretty well. He has been
understand the TV-viewers have chased DIZO out of
the country. Tejido J&W didn’t show up this week. Wonder
if they ran out of cotton? They seem to be interested
in states that RY and HW have new 32V-18s, and that
the GCA is finding it difficult to get morning breaks to
turn its members to turn up for AARL contests. You fellows should
alone in this because the West Park Radios of Cleveland
have the same difficulty. The A Bomb Test in Cleveland
on June 26th brought out more than 500 people. The Q&F
of Springfield relates that YFV and JN are new members.
BLN is burning up 6 meters with his new rig, and the
Club purchased a new (unamed handicap) test. The G&L
out of Columbus tells us that TO/S, Field Day station, made
558 contacts; the Tuesday night drills on 20,000 kc. are
well attended; and that the recent simulation experiments
included 20 Columbus stations. Yes, BLN still seeks a
Colonnus outlet. As we have run out of interesting
information, this column is being terminated for this month.
Let’s attempt to now and then use up our allotment
in each issue of QST by getting a lot more dope to your
SCM. Traffic: (June) W8AMR 452, FXY 203, DAE 66,
AL 47, YGR 48, AJW 27, Q15 21, CTZ 18, HOX 13,
PQ5 10, GB 9, REW 6, E01 4, DIZO 3, W8VE 3,
BUM 2, E 7, ET 1. (Mary) W8W8K 7, UNY 6.

HUDSON DIVISION

EASTERN NEW YORK — SCM, Stephen J. Neeson,
W2ELI — RMs: TYG, EK, PAM: LIG, JOL, K2O;
VDX is overseas with the Army, TVY is home from college for
the summer. Charlie is on 3.8 Mc. and expects to go
on 14 Mc. NOC, expected to be on 24 Mc. NOC expects to
be on 14 and 28 Mc. soon, courtesy of HUB. FED is Gen-
eral Class. ITK and his XYL were recent visitors at NOC;
we wish them a happy return to normal. New call
Van Van Winkle Club are WGE, pres.; ESL, vice-pres.; EYQ,
treas.; EWO, secy.; ITJ, activities chairman. XYE is mobile on
144 Mc. AWP is operating portable from campus in
Northern New York with WIK and your SCM as his guest.
On the same campus I find BW2, GTC, CZA, CAL, and be
are Extra Class licensees. ITQ is Advanced Class and
NOC expects to be Advanced Class by the end of this
year. NOC is soon. New Novices are KN2ACZ and KN2ALT.
Here are a Novel and interested in our section near
your city. Write UAK, the Net Manager, or your SCM and you
will receive full information, also the new directory. Many
appointments are now available. Why not investigate
NRD and JQK kept the RVRs on the air during the
night on Field Day. AARA reports a big turnout on Field
Day with plenty of ham from the XYLs, who had charge of the
kitchen. MHS was active from Duqueen.
Appointment: MHS was OO. Endorsements: HUM, FQL, and JIO AS EC.
Traffic: W2BNC 68, W8Q4M 178, W8GBT 117, LI 44,
PHO 26, BLO 10, HEI 2, APH 1.

NEW YORK CITY AND LONG ISLAND — SCM,
George W. Cocks, Jr., W20LM, Hamfest this Sat.
Dannals, 2TUK, SCR: KTF, RFI; PAM: YBT; JZX was
the headquarters station here for the Woman’s Information
Air Race from Santa Ana, Calif., to Boston, Mass.,
N. J., and with the assistance locally by YBT, CBG, VQ,
and others numbering about 50 across the country, beat
all wire services in reporting the race progress and main-
open wire contact with the race headquarters in N.Y.C.
during the entire race, keeping them informed of the posi-
tions nightly of the participants. More dope will be yet
held in this section, with more stations, clubs, and opera-
tors taking part. Higher scores were made despite the in-
clement weather, and their thanks go to the Mid-Hudson
Amateur Radio Society of Queens, Lake Success, Brooklyn,
Poly, Huntingdon, Levittown, Tu-Boro, Nassau, Wantagh,
and the various clubs for the fine cooperation. Write
him of the number of AREC members in their groups. TUK
has been taken over as EC for the Bethpage/Levittown Area
and QRB remains the W3ZQ. For the Hamfix and sector, W3ZQ
Tu-Boro Club offers an appropriate certificate to any

(Continued on page 80)
MEMO TO: Purchasing Agent -

In order to meet specs we must specify Hammarlund Capacitors. They're the Best!

CHIEF ENGINEER

Known for highest quality VARIABLE CAPACITORS

Hammarlund Capacitors, backed by 42 years of design, engineering and production experience, are today recognized by the military services, electronic manufacturers and research engineers, as the finest quality capacitors available. Millions of them are in use by almost every important manufacturer of electronic equipment.

See for yourself. Write today for the 1952 CAPACITOR CATALOG. It has the complete story.

HAMMARLUND
MORE THAN 40 YEARS EXPERIENCE COUNTS!
THE HAMMARLUND MANUFACTURING CO., INC.
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station contacting any five members of the Club on any band or frequency excepting the 75-meter band. The last to go back up to 1800 local time. The next Tu-Boro Club meeting will be held Sept. 27th at Rakers Hall, East New York. For tickets contact L.M. IAG or JSY. The Nassau State C.D. Headquarters station, with a cf on ‘radio, currently operating at K2AHN at Medford, and this YL now holds the position of the v.h.f. or mobile unit. K2ANF, now K2AHN at Medford, and this YL now holds the position of the v.h.f. or mobile unit. K2ANF, now K2AHN at Medford, and this YL now holds the position of the v.h.f. or mobile unit. K2ANF, now K2AHN at Medford, and this YL now holds the position of the v.h.f. or mobile unit. K2ANF, now K2AHN at Medford, and this YL now holds the position of the v.h.f. or mobile unit. K2ANF, now K2AHN at Medford, and this YL now holds the position of the v.h.f. or mobile unit. 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To You,
Belden's Golden Anniversary
Means
—product performance that
can come only from a "know-
how" that has grown through
actual service since the
inception of Radio.
—an ability to co-oper-
ate in pioneering new
wires to meet or antici-
pate industry's growing
needs.
In the years that
follow
This Belden
Program Is—
— TO BE
CONTINUED

Long Life—Low Maintenance
No Comebacks with the

New 300 OHM
TRANSMISSION CABLE
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COPPER-
SHEATHED
20-GAUGE
STRANDED STEEL WIRE
Brown Polyethylene-Resists Weather and Oxidation

The new Belden Weldohm, 300-ohm Transmission Cable is the
greatest advancement in television installation since television began.
Reducing TV lead-in conductor breakage to a minimum is easy.
The new Belden Weldohm Cable has overcome the breakage point by
162%, that's 1 1/2 times the strength of pure copper wire.
In actual test, Belden Weldohm Cable will withstand 254% more
whipping or severe flexing than the average installation of 300-ohm
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Replace with Belden Weldohm or make your next new installation
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Automotive WIRE
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- Lightweight—designed for comfortable wear
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- No transformer required
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Available from your local radio parts jobber in three styles: Double headband, Single headband and Lorgette style.

Brush Microphones—Superior Brush crystal microphones are available in five models. See them at your dealer.

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PIEZOELECTRIC CRYSTALS & CERAMICS MAGNETIC RECORDING EQUIPMENT ACOUSTIC DEVICES ULTRASONICS INDUSTRIAL & RESEARCH INSTRUMENTS

[Continued on page 64]
BABY your rig
with the BEST...

USE OHMITE
WHERE DEPENDABILITY COUNTS!

RHEOSTATS
Available in 10 sizes from 25 to 1000 watts. Ohmite rheostats can be relied upon for close control and long life. Ceramic and metal construction. Windings are locked in place by vitreous enamel, and the metal-graphite brush provides smooth gliding action.

DIVIDOHM
ADJUSTABLE RESISTORS
These wire-wound vitreous-enameded resistors, with one or more adjustable lugs, provide a convenient means of obtaining odd resistance values. Stock units made in 10, 25, 50, 75, 100, 160, and 200-watt sizes, in many resistance values.

BROWN DEVIL
RESISTORS
These wire-wound, vitreous-enameded units provide utmost dependability in a size small enough to fit most installations. Easily mounted by 1/4" tinned wire leads. Three sizes: 5, 10, and 20 watts. Tolerance ±10%.

R. F. CHOKE
RESISTORS
Single-layer-wound on low power-factor steatite or bakelite cores, with moistureproof coating. Seven stock sizes for all frequencies, 3 to 520 mc. Two units rated 600 ma. others rated 1000 ma. Used in plate circuits of many types of electronic equipment.

DUMMY ANTENNA
RESISTORS
For loading transmitters or other r.f. sources. New, rugged, vitreous-enameded units are practically non-reactive within their recommended frequency range. Available in 100 and 250-watt sizes, 50 to 600 ohms, ±5%.

LITTLE
DEVIL
COMPOSITION
RESISTORS
For quick, easy identification, resistance and wattage are clearly marked on every one of these tiny, rugged, insulated composition units. Three sizes: 1/2, 1, and 2-watts—in all RTMA resistances. Tolerances ±5% and ±10%.

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RHEOSTATS
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QOA highest making 380 contacts. IQE and LZE both have sons that have passed Novice Class exams, RMW is new for Norfolk, WN1VW is the President of Willimantic-MHFR and his brother, TLS, are both mobile, as is NJM. COB is still using cutoffs as a result of both legs being broken two years ago. Look for him on 40 meters. NBP is moving to Willimantic. NKB, in Niantic, also is WBO at his station. Sorry to hear that MFB is a Silent Key. SJO is trying 20 meters. ODW now is RCB and OTC. I seem to be having fun in Southern Jersey during the summer. June CN, RQY-30, LK-15, RRE, HYF-14, SBU is working on a new rig. VK and IMF both are active in Southern Jersey. There seems to be some Bristol stations to report on some time. LKF is busy getting ECs to have appointments. Gltzus is working on 3596 kc. at 1000 EST Mon. through Fri. VSN, MA, MA, MA, MA. Thurston of Greenville, the XYL of MB, has her new ticket and puts out a very nice signal on 24V-7. Heard EFR on 75 meters the other day for the first time and was quite surprised since he is an old s.w. man. Another fellow was there from parts of New England and the newest in mobile hunts was held. P8 operated the hidden transmitter, which was mobile controlled, was a motion, and it created a lot of discussion and a lot of fun. If those of you who did not see P8 in his get-up, which to me resembled a Martha Washington, could have seen something, the steaks were as advertised, thick and tender. Unfortunately, it rained during the day but that helped to keep the game together and in New Jersey there is plenty of fun. That is from Cape Elizabeth, sure is putting out a FB signal on 75 meters. BAD now is on 75 meters with his new Elmae. P1G is using a very successful trip to the north part of Maine, and from reports the boys and gals up there are having some fun. Roger and family, royal welcome. Traffic: WILKP 55, SKR 28, EFR 29, BXT 31.

EASTERN MASSACHUSETTS—SCM, Frank L. Bower Jr., W1ALP—New ECs this month: OLF Wallpole, LJI Plymouth, UHB Boston. Appointments endorsed from HUP as EC for Dover, BHI as EC for Manchester, HBI as SE for Eastern Mass., LUX as Ec for New Rochelle, EXH as OM, LMM as OOH and OES, AAI as RM, 4CU, ex-LXJ was visiting Quincy and has mobile rig on 28 Mc. in the car. VAN Norwood, is on 28 Mc. TIO has Class A and is on 3.9 and 50 Mc.; he is looking for a rig on the air. GCN is on 7 MC. JCC is on 28 Mc. mobile. G1E, ex-LXJ and ex-LXJ, visited with that new 24V-7. He has a rig on 44 Mc. in his car. AMO won a new receiver at Springfield. The South Shore Radio Club, IA, went down to Hull again on Field Day. New officers of the Eastern Club: S12QI, prez.; HOL, vice-pres.; W1IUPJ, secty.-treas.; QXJ, TOC, NBI, and AMO, board of directors. G9V, Cohasset EC, sent in his appointment for endorsement. UOH-KZ5LP writes that he is coming home on a vacation, DC1A and TUD are on 1.8 Mc. WNYV-5 is on Field Day at Bo, Sutton, H. H. GCN was on field on 28 and 50 Mc. KLF now is at Transducers, NXW is in the Navy, Congrats to BKH, who was on "Voices of America." BGI is busy with C.A.P. TVZ went out on Field Day with the Framingham Club. SD received a hand-painted plate from 29THP and 25OL at Springfield. AAL is very active on 144 Mc. W1L is on 3.9 Mc. K1E, on 50 Mc., is a Millen VFO for his TBS-50C. The Old Colony Radio Club, Eastern Mass. Club, Walhain Radio Club, and El Ray Radio Club were all out on Field Day. W1QD has Class A and is on all bands and mobile on 28 Mc. W1NVR is a new ham in Hull. Sorry to hear that QVP is leaving those parts and we all wish him the best of luck. STA, Haverhill, reports that his net is on each week. ODQ, RUU, and SHQ are on 50 Mc. SUR is on 28 Mc. KLT is in mobile on 144 Mc. B1/I was on Field Day from Harrison, U. TOY is working on mobile rig. The Gypsy Radio Club was well represented at the Springfield convention. OH1 HP, K6X, DOX, RYJ, QUY, PIY, KUA, HQO, KVT, TQK, UBB, HZQ, UPL, W. L. Tift, George Saunders, and many XLYs. LP1I is out of the Navy. The southeastern Mass. Radio club held its final meeting and a steak dinner attended by AVY, LAX, FXB, CTZ, QUE, PWF, KHY, W1M, MIN, and his XYL. WNIC is back with his XYL. LAX is secretary-treasurer of the Club, AVY, CTZ, SSS, and ABR worked NSS WAR on Armed Forces Day and have 680 cards. TQF is down in Providence and a member, UG has a 265 top flat top. LYN has new QTLE in Plymouth. LMM and PIW have mobile rig on 50 Mc. SXD will have 820 on 144 Mc. JOW is building Owl. FUR is rigging his beams. QMU is rebuilding. NBC is building VFO and converter for 144 Mc. UKR is on at Fort Devens on 3.5 Mc. FUR is on 144 Mc. and in MARS and has SIAR rig. Some is going to Japan. Sorry to have to report the death of A. of Danvers. BGI and W1NWTG are on 144 Mc. TQF has a beam going up for 144 Mc. The Eastern Mass. (Continued on page 80)
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Plate Dissipation (w.)..... 2 x 20

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PER UNIT
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Input ..................... 10.5 mmfd.
Output .................... 3.2 mmfd.

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Club is going to hold a session from 7 to 8 on meeting nights to help hams-to-be to get their license. Traffic (June) W1EGM 236, S5 101, UE 98, MM6 55, AYV 19, W1MG 14, TX5 12, BY 6, WU 7, TUI4. (May) W1DMX ES 10.

NEW HAMPSHIRE — SCM, Norm A. Chapman, WMJNC — RJF: CRW. This will be the last report from Norm truly. My sincerest thanks to each of you who has helped to make this an interesting column during the past two years. GMH will take over the reins as SCM. Let’s give Carl our full support by getting those reports to him monthly. I especially want to extend my thanks to CRW, our Traffic Manager. With the least number of stations on the air, he has rolled up the largest traffic total of any other section. TNO now is an Advanced Class licensee. WNIVAU is operating WIVAU under his new General Class Ticket. AJ received his Certificate of Merit, awarded to him for making perfect copy of the Secretary of Defense’s Armed Forces Day message. POK is rebuilding 2FZ, KKE, TBS, UON, and OUT on portable in Blue Moon Mountain on Field Day, reporting a score of 2960. The Great Bay Radio Assn., with 4 transmitters and 18 operators, worked Field Day from Mt. Agamenticus, The Concord Brasspounders worked OC1 from Oak Hill, Loudon, with 9 stations, 18 operators, Congrat to the newly-reopened Port City Radio Club, Portsmouth. UEB is acting secretary. CRW keeps regular skeds with 2M2D/MM, the old time Delfin. Want you at the New Hampshire ARRL Convention at Nashua. Traffic: (June) W1CRW 951, JNC 22, GMH 20, F5 3. (May) W1GMH 28, F5 14.

RHODE ISLAND — SCM, Roy B. Fuller, W1CUII — SEC: ML, RM: PTY, TAM: BFB. Summer schedule for RIN is Mon., Wed., and Fri. at 1900 through 2000. This was Rhode Island’s most active Field Day. Five clubs reported participation in this annual event: ARANS (AAG), Newport Field Day Radio Club (SYE), PROVIDENCE RADIO ASSN. (ONZ), Cranston Radio Asn., NAARO (SKT). Those active as reported by their clubs were: PRA, RCI, MII, LJO, and XOS, Newport — JBB, TXF, VIN, MIMX, TMX, BHN, ONZ, OMC, JFF, TXI, UGL, and ULS. NAARO, RCI, BTX, TXF, TMX, ONZ, OMC, JFF, ICE, NCX, MII, LJO, WAT, THG, and CJIH. Newport will start a new series of instructive movie dealing in electronics and narrated by JFF. High-frequency receivers and transmitters will be demonstrated by ULG. The newest ham reported this month is WBE. TXF has new TBS on 10 meters, a sure-groundwave contact every evening on 2600 kc. WBO has moved to a new home in Lakewood and will be active this coming fall. QXV made BPL for the month of May. Traffic: (June) W1CIW 19, TXR 12. (May) W1QUZ 202, OIK 20, TXR 17.

Vermont — SCM, Raymond N. Flood, W1FPS, SEC: JEN, TAM: AXN, TAM: RCD. Obtained a 25-kw generator for emergency use. BPK is busy working DX and giving g.w. practice. We were sorry to learn that RLS lost his XYL. Our sympathy. Art, XAL is trading for DXXC from all reports. Good luck, OM. Field Day was enjoyed by the Tri-County ARC. A good score for them was made in spite of the fact that their best operators were unable to participate. BARC members also enjoyed themselves at South Falls. Traffic: W1AVP 103, OAK 55, RIA 29, F5S 7.

NORTHERN WISCONSIN

AS A — SCM, Glen Jefferson, KL7NT — KL7BK, on a hurried trip to Fairbanks, was about to throw his mobile transmitter into the car when he discovered that no excitation was due to his carrying the 3802-kc. crystal in his pockets! NT is ready to raise a 60-foot vertical. OM is busy keeping Division of Forestry communications on the air and operating during the fire weather season. Call-letter license plates are a sure thing for KL7 operators and if specifications are followed the plates will be of the reflector variety — glass beads and everything but a center-loaded whip. A few of the gang are dusting off their rigging for a good fall and winter communications season.

Traffic: (May) KL7AHJ 1830.

IDAHO — SCM, Alan K. Ross, W71WU — Krehdick: NH2 writes a nice letter from Cheney, Wash. He is with the N. P. Railroad and travels around quite a bit. His father, AIIA, is active on the Island Empire Net, 1905 kc. N and view: WY was all set for a little trip but broke a connecting rod. A week later he contracted hunting fever. Boise: KJO vacationed through Yellow Bird and scored a 2nd place award at the 2nd annual Fish and Wildlife Club scheduled a picnic at Lowman, some 70 miles north. Among those present were NPO, NPI, ORJ, FOF, GHT, NPO, BBS, PRA, AIIA, UBB, OUB, CHA, and some others, with their families and fishing poles. W7UW is now on 20-meter mobile, 'phone or c.w. I'm afraid the Idaho QSO Party held last fall will have to be last fall, no contest. OM reports that one report was received. We'll try another one in the winter time when there will be better conditions and more interest. No traffic reports were received this month.

MONTANA — SCM, Edward G. Brown, W7KGG — The Capital City Radio Club has a new call, TCK. OIQ now is in KI6-L and is looking for the tailings gang on 14,280 kc. at KI6HAQ. JDZ has TBS-50 and Gosset (Continued on page 88)
Reconciling ham radio with the symbol of the American highway is a difficult problem since modern automobiles are seldom designed with amateur radio installations in mind. Here is a unique, universal installation that should prove acceptable to critical XYL’s across the land. The receiver and transmitter are mounted in an oblong box that pivots from a point under the dash. The equipment housing is reinforced with angle stock for rigidity. Dimensions are limited only by your own requirements. The pivot mechanism is a simple pipe stand held on top and bottom. The pipe should be threaded by a local plumber to permit nuts and washers to snugly hold the equipment case, yet permit it to pivot 90°. When not in use, the entire station is simply pushed under the dashboard. And, unlike the inconsiderate automotive designer, Electro-Voice has designed, specifically for mobile operation, the new Model 208, a handheld, light-weight carbon microphone. This remarkable unit is a single button, high output, carbon microphone designed for maximum intelligibility. A panel mounting bracket included with the microphone holds it face in on dashboard or side of transmitter . . . thus, when it is removed it is instantly ready for use. A differential noise-cancelling design (the first ever engineered at a popular price), to be operated close to your mouth, it has a high impact gray styrene case which is shock resistant and water proof. Press-to-talk switch actuates button and relay simultaneously. Amazingly enough, the amateur net is only $9.90. See your E-V distributor today!

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Tri-Band on 75, 20, and 10 meters in his car. Bob has returned from a trip along the Farm Net route. JS1 and PV4 are active in the Farm Net. The Gallatin Amateur Radio Club has a new call, ROX, and has just made 100 contacts. ARRL members need some energetic support from the Montana gang. Please write your SCM and offer suggestions in regard to possible frequency changes, change in days or times you would like for NCS, or if you would like to rotate the net control job, or anything you may have that might spark more interest and activity in the net. Don't forget to include your activities reports. Traffic: (June) W7KJG 42, JIZ 10 (May) W7JDZ 65.

OREGON — SCM, J. J. Reddon, W7MAQ - RWM is a new Novice licensed at Merrill. JRIU has been very busy setting up the civil defense communications in Klamath County, being director of communications. BDN is rebuilding his rig and revamping his ham shack once more. (July) TJN is plenty busy since taking over the OEN management, but is doing one swell job, ably assisted by BIZ, and SY. Publishing the monthly edition of the OEN NETTER is one of duties he also has assumed. (August) HS has another Round-the-State tour, visiting different EDCs and local AEC groups, AJN and EBS want more MARB checks-ins. Traffic: W700J 340, CDY 75, MQ 52, GJN 61, HDN 34, ML 27, FY 23, ILIU 22, EGU 8, BXU 5.

WASHINGTON — SCM, Laurine M. Sebring, W7CZY — BTV, RM, FIX, PAM, NRB, OE is back on the air working 80-, 40-, and 20-meter c.w., and 10-meter 'phone. Clark County Radio Club made a fine score in the Field Day test. KCIU wants a YL, MARL is working on 80 and 40 meters, W2RM had a new QSO with the air from QTH. He is using a new BAYMOBILE antenna on 2090 kc. with good results. ZFU found some of his electronic keyer trouble cured by use of crooked club contacts. ETO could use some of the same. He reports a fair Field Day score, from 3000-foot mountains.

JAC gives a report of an active Field Day from Melinmore Point with 2-meter ground wave to Ephrata, and Toppenish, also heard in Wenatchee. FIX and his XYL returned from their 6-week vacation trip. The North Seattle Club had 19 operators turn out for Field Day using the call CO, NFI, KWC, and the Bellingham gang operated from Neumans Beach on Field Day. NSI says it's 10 feet below sea level, RMD, RNF, and QMJ will like to start a Novice traffic net. (August) NHQ is having trouble with his converter on 10 meters, PHZ received "greetings" from Uncle Sam. OE8 and NDO worked 20 meters during Field Day and worked W1UA, ZE8UAE, ZG8DSC, YVOKX, ZG2GRO, and ZG7U. (September) WPH is in the Air Force in California. JIUJ is working in Olympia. METZ is servicing TV sets. MPH is home from the U.S. and working at the executive station. JIR is on the air from W6. IVJ returned from Korea and sold his gear, then panned up the XYL and left for Tokyo for two years. KNL is operating from a ship on the Far East run. NNQ moved to Aberdeen. NRK built a new workshop and operating position. JVE is working at KE1AC; he has a new MARC and a 75-meter mobile rig. OZG keeps in touch with his wife in Seattle via his mobile rig on his sales trips. BA has 'phone sick with his son in Philadelphia through K6DJP. BUR and JPH went camping in the rain on Hoods Canal and ended up with one dead battery and three cars stuck in the mud. The North Seattle Radio Club's new positions are HRC, pres.; HHJ, vice-pres.; FTR, secretary; CO, sgt., at arms. CO and his wife are flower experts; they won prizes at the Rose Show. KEB was on the air. EBS got married. EKK now is K8NG. Traffic: W7BA 366, CZX 162, E7K 133, EBY 133, EUG 97, KCU 66, TH 49, MI5 44, AQN 14, FW 24, APS 2, OEB 28, ZB 27, FY 21, AIB 18, ZB 16, ILIU 13, XBY 13, JWE 10, NTU 6, EBY 4, GVC 4, NRB 2.

PACIFIC DIVISION

HAWAII — SCM, John R. Sanders, K1GRO — The Maui Club operated RS near Holoku Park using one transmitter on Field Day. The Kapaa High School had fifteen operators and one transmitter near Lihue. The Honolulu Club had one transmitter set up at a fine camp on Holoku Field with twenty NE2 using a school at HCA Institute. N. C. 2WA1LS has joined the local FCC, CH is departing for duty in the Far East. C1 is working toward Extra Class license. Fifteen certificates have been issued so far by the local FCC office. Ex-PY visited Honolulu briefly en route to Guam. JS2 is rebuilding to a pair of S13A, RI has been appointed Assistant for this section of the Pacific Division. Your consideration is requested, fellows, in the selection of a candidate to replace me as SCM. I do not deem it proper to hold both offices. For Pacific Area: KB6AO is remaining at Canton after all. JABJ is active on two JIMs now, KG5FMA makes BPL again. Traffic: (June) KG6F1A 3006, K1JAC 3006, KJ2EX 700, KJ2KX 465.

NEVADA — SCM, Ray T. Whitting, W7WJ — SEC: HJ, EOC; JIM, JYV, KOA, MBQ, OXX, TV, YQ, LG, and ZT; RM: PST, OPS, JMO, 00; LGS; Nevada state frequencies are 3900, 7225, and 28,500 kc. JS2 is enjoying his new 7A2 receiver and is now working a new 160k job. OXX, MBQ, and DJF were active during Field Day in

(Continued on page 100)
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the Charleston Mountains near Las Vegas. dKJT, WJTVY, 68XX, and WHP are all sojourning there at East AFB near Reno, and all soon will be on towers. These calls will be much coveted with power leaks on 40 meters. NW4U now is on 10 meters. KX9F left Boulder City to live in Oregon. Good luck, AI, NRU, PSF, KIUH, JU, and JU enjoyed the Pacific Division Convention in San Francisco. Eastern stations having difficulty in working Nevada for WAS might write JU for addresses and same will be arranged. Traders on 7Z7UV.

SANTA CLARA VALLEY — SCM, Roy L. Conrail, W63LZ — It was gratifying to note the number of visitors and the number of operators who participated in the Field Day activities. At the SCCARA meeting Mr. R. H. Miller spoke of C. & G. Co. radio system. The Operators group and Radio Club, as well as NPEC and PAARA with San Mateo and SCCARA, made extensive and complete plans for a successful Field Day at their respective towers. The reports on making 6-meter tests are encouraging. Y6W is QRL studying trouble. R6P is preparing to open a radio-TV sales and service in San Carlos. WC reports the SCCARA mode 713 contest was a great success. Field Day. Y7TH reports he had loads of fun on Field Day with the gang from San Jose on Ant. Hamilton, MMG reports the NPEC held Field Day in the Burlingame area. In the Skyline Blvd, QAUX now is on 141 Mc, UAKT, ALL, QM8BG, and N6DWM will be on 141 Mc, all operating in South Sunnyvale. Y6W is getting ready for 75-meter mobile. MIXO now is living in Shelter Cove near Rookaway Beach. The Palo Alto Amateur Radio Assn. reports Field Day was attended by a total of 5875 points. Your wish is to thank all the friends in all parts of the section who sent cards, phoned, and visited while your SCM was in the hospital and while the repairs were recuperating at home after the operation. The illness hit very suddenly and the May activity report was not prepared, so my heartfelt thanks go to CID and his X6LW. Knowing I was worried about it, took up the task and did a swell job. Traders on 8WH7IM 117, HC 74, MMG 10, FY6K 8, FY6P 4, SWV 4.

SEAST BAY — SCM, Ray H. Cornell, W6VZ — Assd. SCM, Guy Black, 6R.L. and Julian Amato, WB6GME, SEC: HC 76. RNH, IPW, JOH, FA. Another Field Day Convention turned out to be a big success. It was amusing to see hams who had traveled several hundred miles and spent the time keying an audio oscillator to listening to their calls. Apparently something of this sort was done. The RN6 boys held their first meeting in years at a convenience store at 830 P.M. After fishing with ELA, HC, IPW, JOH, UT1, VC, L, EXH, HQR, and JZ, TI, T6, RLS, and JZ attended a pre-convention dinner for ARRL Section officers, National Committee, CIS, ATO, and RBQ. Field Day included all of the clubs out as usual. The Mt. Diablo Club separated the new and old men and used separate power supplies for each. In this manner no difficulty was encountered from key clicks or splatter. In recognition of FB work on HAM, Bob Weber, JOH, has received an RRM appointment. With RHO and IOCBob concentrating on improving BAN we can be assured of its continued growth. Geno says that Y6HM is spending more and more time on his BAN. I hope the rest of the fellows who report into RN6 from this area to realize their responsibility to the section net. BAN welcomes E.P.D., of San Diego, and new SCJ newcomers to the net and invites others anywhere in the Bay Area to participate. CCT reports as follows for the Northern California DX Club. New members are UZ9NC, M18G, and NIG, vice-pres.; K2K, 2nd. - treas.; RRG, board of directors; PY 1D4 was a recent visitor. OMIC gave a very fine lecture on-'+tetrodes and way they work as to do. Another member is CQZ. Bill says, "The boys still are in there knocking off such DX as crops up from time to time. Some of them still are fighting TV. Why not (except W6DWM, Course) ?" if IkP has received his BS in E.E. He submitted the only report from the section in the last Frequency Measuring Test. One reading was as close as 11.1 p.m. Carl Scott is W6QNF of Richmond. W6QIPB wants to start a Novice net on 3714 ke. interested parties, please write to me. NIG is constructing a new tower for 10-meter beam. KNY is now AREC member. WQM acts as EC for all of Sonoma County. The chairman of the NBARA exhibit at Solano County Fair because of the illness of BPC. WHA is enjoying vacation. LDW worked AE on 2 meters and supports the S.F. Morning Staff Net. LIL is moving to new QTH. YIQ is constructing new mobile receiver. Contra Costa County is providing 28.80 Mc. crystals for the emergency nets in the W.C./Martinez area and the Net will move there from 29.6 Mc. Traffic: W6LJTL 190, JZ 44. IPW 36.

SAN FRANCISCO — SCM, KF6G, 2nd. - treas.; W6ATO -- Phone JU 7-5561, SEC: NC; NI, phone PL 5-8457. With the Pacific Division Convention now history, a special word of commendation should be extended to SCM of all groups for their excellent and interesting operating displays. Ray and Bill were responsible for the code receiver and parade, and the code contests, as well as for the U. S. Navy displays. Bob operated his amateur TV camera into monitor TV receivers. These exhibits, as well as all others, were well attended and most interesting. It is impossible to go into detail as to the fine work of many members.

(Continue on page 102)
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bears of the committee, except to say "well done." Un-
fortunately, some of the talks bore out this sentiment and
a standing score in Field Day, most being dogged by bad
luck of one kind or another — but they all say, "Wait 'til next
year!" The SPRC Club used its new club call W3QGA for the
first time. The new meeting place of the SPARC is 51 Lake-
shore Plaza, opposite the intersection of 34th Ave. and
Shaler Blvd. and the temporary meeting night is the first
Friday. W3QGA spent three weeks operating /K7L at Nome
with 35 watts, but with not much success because of heavy
snow, he says. H7P is biased with only 101, which
was the Tamalpais Club, YME/6; the SPARC, GC5J/6
the HAMS, MLB/6; and IQN/5 at Healdsburg. Nears
active in San Francisco were WN6PHI and WN6PHT
Melvin and Cynthia DeLauney. Mel worked 51 stations and
operated for 57 hours during May working on the air mainly
and handling some traffic on 5725 kc. Reports from all
W60s are welcomed. News from Eureka shows that Betty
Wilson, 7FTC/6V, and D. D. "Foghorn" Heitz, 866G, are
members of the Humboldt Amateur Radio Club, swelling
the membership to more than 80. The HARC meets the
weekend, entrance on "500" St. The ten-meter nets meet
each Tuesday night at 1900 PST on 29,160 kc. Don Hilt
does the grid at 29,160 kc. The Grid Lab of the Pierson
and Emergency Coordinator, for Emergency Corps work. His
address is 3228 "S" St., Eureka. Television interference
helps are new in town for airmen. The Marin, and
Sonoma counties — so far your TV problems get to the
shortwave stage, look them up. The Sonoma County Radio
Amateur meet at the Top of the World, the "F" car of the
Brewery, 2nd St., west of the Freeway, on the first Wednes-
day of the month. The Tamalpais Club meet at the home of OGC in
Thompson on the third Friday. The Marin ARC meets at
the American Legion Hall, Larkspur, on the second
Friday. The HAMS meet on the second Friday at the Red
Cross Building, 1329 Van Ness Ave., San Francisco. From
Tran, WN6PHT, 866G, and WN6PHT I.

SACRAMENTO VALLEY — Acting SCM, Willie van de
camp, W4XYC. New additions to the Chico gang in
include WN6QV and WN6QJD, TGT, KME, and OY
provided radio communications for the race boats on the
Sacramento River. KPV is active again from Carmichael.
Elmer, KDR, claims to be the most northerly station in California.
JDK is busy with traffic and DL is on 5725 kc
on 60 MHz to raise antenna. Traffic: W6DNL 180, PV 47.
SAN JOAQUIN VALLEY — SCM, E. Howard Hale,
W6XMY — PIG, at Edcouch Crescent, Bakersfield. Calls
are likely at 29,160 kc. ARC officers are appointing. Very few reports were received this month, some
probably because of summer vacations, etc. SJYV is operating
all summer on 3925 kc. If you are interested in traffic handling
check in at 1900 any Monday through Friday. Many clubs in the section were active during Field
Day among them were Bakersfield, TAD, Del Mar, Turlock, Modesto, and Stockton. Traffic: W6FAJ 424,
W6PQI 217, L7I 110, GIW 18, NDF 18, FYM 3.

ROANOKE DIVISION

NORTH CAROLINA — SCM, John C. Geade, 2DLX. —
Well, fellows, it seems that quite a few of the clubs
were active in Field Day, W9G reports from Ashevile that
the club here had a big turnout. W9A reports that all the rigs on the c.w. and "phone bands. I took club
honor on c.w. and M2S on "phone. New General Class
tickets to a new member — W3VW. W3G and W3LA
are down to 20 meters. W3C’s and his XYL, JCR, ex-W8s from Ohio, are on a new mountain-top QTH. MIQ and DHI are active on 10-
meter mobile. Hams visiting Asheville stop at the Informal
Board in Pack Square for local ham information, VAR
is sporting a new tower with 10-20 beams. Both Charlotte
Clubs headed for the north. The Charlotte Amateur
Radio Club was on Mt. Mitchell with five rigs on all bands. The Mecklenburg Amateur Radio Society was on the
Blue Ridge Pike, at Elkin Ridge, 751 foot mountain, and
enjoyed a nice Field Day weekend at the Cove Recreation Club. This year the club was out for Field Day and was the only one to report a score of 2570 points. Bill F. of Elkin-Cove has been doing some high-pressure selling for ARR and
got a dozen new members. SWL has five-element 10-
meter beam. Novice U.L.Y., Franklin, has 22 states on 20
watts and keeps weeks asked with New Orleans at 3:00 A.M.
Fxe, Wilson, reports 4XN running throughout the summer if
delays are not needed for a traffic outlet. Traffic: W4RXW,
W4RAZ 209, RH 562, EXE 19, DLX 9, BFB 2.

SOUTHERN CAROLINA — SCM, T. Hunter Wood, W4-
ANR. — SWL is on 75-meter phone with 120 watts and
reports that the Rock Club operated from the Airport on Field
Day. UNO now is General Class on 40-meter c.w. and is
looking for a 10-meter CQ2P, or for 5000 kc. R9S has 40-
60 meters, and is back in Dillon, R9X has 40- and 80-
meter phone with 6 and 50 watts and is on CQ and
phone. GM reports that a new transformer has improved his
modulator. All DEC are requested to examine their recep-
tives and, if they have not been endorsed within the last
(Continued on page 104)
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VIRGINIA - SCM, H. Edgar Lindauer, W4FF - The Potomac Valley Radio Club took its chances on Field Day operations at the same location in Leesburg making 906 QSOs in the two-transmitter class. Among those present for the PB ordeal were CO, FF, KG, N2PL, K4PR, K2PF, P2K, and ESK. A surprise personal appearance of ANK of 4RN fame and recently-elected SCM of South Carolina, added zest to the Field Day effort but not as additional contacts via mobile en route. Final arrangements for applying for license plates of the full-size version have been negotiated. Send $3.00 by money order or certified check to NV, made payable to the Division of Motor Vehicles. To date applications have been received from 200 mobile installations. These tags will be issued only to those licensed operators who have mobile installations in operation at the time of attachment to their autos. Evidence of installation will be accomplished by certification of designated deputies after an actual QSO. No exceptions here. Applications may be obtained from NV. Under no circumstances should you write the Division of Motor Vehicles. Monitor 3835 kc. for current information. 2RJE/4 assures that PY will be reactivated at Williamsburg for a new towers and renewal of membership affiliation with ARRL, FF latched on to UHG ans Novice call, Jack says look for him on the nets this fall, Richmond Convention date is near. Don't forget to register early, see you there. Oct. 11th, KPCF and FF visited HQN for a glimpse of that fabulous do-it-yourself beam and came away with mouths wide open at the achievement of sturdy construction that withstands recent 90-mile winds. HQN proudly invites others to drool in person, MWH and LYY are sporting amateur Extra tickets. CC is proxy of PVRC. Traffic: W4SHJ 21, PWX 19, KB8 3, FF 7.

WEST VIRGINIA — SCM, John T. Steele, W8MCR — Sponsored by the Parkersburg Radio Club and members of the West Virginia Phone Net, a picnic was held in Parkersburg at City Park. Sun., June 6th. Fifty hams and their XYLs and YLs attended and all had a grand time. The highlight of the affair was AEN's waltz band. Another picnic is planned for the last Sunday in August. All hams and others interested in amateur radio are invited, come and bring your own grub. Appointments: ESB, as EGC, PUB as OBS. PQG is back with us and will be on 75 meters soon. Jim Sharp, of Huntington, tells us the name of the club there is the Tri-State Amateur Radio Association. It meets every Tue., at 7 p.m. Daylight Time. The members are very active on 29.000 Mc. with mobile rigs. Jim has a full callout gathering somewhere awaiting his ticket. New ham in Huntington is W7SKY. GEP is teaching summer radio school near Lewisburg and can be heard on 75 meters with a Johnson Viking.

ROCKY MOUNTAIN DIVISION
UTAH — SCM, Floyd L. Hinshaw, W7UTM — The Ogden Club secretary, UTA, advises that civil defense activities in the Ogden area are under the supervision of the GPN, assisted by MVD and NAY. Ogden Field Day saw twenty operators enjoying the outing in South Fork Canyon, reported by LQI, There is surprisingly much interest in outdoor activities to expect much traffic business, but any and all reports are welcomed. Traffic: W7LBAI 13, UFM 8.

SOUTHEASTERN DIVISION
LABAMA — SCM, Dr. Arthur W. Woods, W4CJW — President FOG announces the newly-organized club at Huntsville meets Friday nights at WFTUN and participated with great activity in the Field Day. The members are nearly ready to enter 2-meter activities with the rest of the section, and emergency AEs sets are ready. KPJ will return to the bands Sept. Ist. EJZ announces the formation of a club in the Op. Area. BFM regularly meets four nights, including Tennessee and MARS, DTT's entire family shared Field Day fun with him. FBG runs 500 watts at Flat Oak. D XB will air out with p.p. 883 in Class B final. Aens is skilling for lack of originating traffic desired for out of the section. KTX would welcome assistance in overcoming this situation. Mobile activities in Birmingham are at high level, but on 10 and 75 meters. Traffic: W4KX 14, KET 11, EJZ 28, HFP 19, BFM 14, LWJ 14, D XB 4.

EASTERN FLORIDA — SCM, Will Hollister, Jr., W4FWZ — Field Day in Florida went over big and many reports were received. FWZ, on business up North, dropped in for Field Day with LBD and five of the Headquarters gang known as the South Lame B. C. & F. Society. From reports reviewed the field day appeared to be a big success. Several DX reports were received, thanks. EYJ, for the information. Let us know if we miss a station or call. (Continued on page 105)
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[Continued on page 108]
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SOUTHWESTERN DIVISION

LOS ANGELES — SCM, Samuel A. Greenlow, W6ESR—

FRG: KSS, KAF, KFJ, KZM, 1936, 1937, 1938, 1939—Traffic Net: L.A. Section Net (LSN). Mon. through Fri., c.w., 3600 kc. at 2130, El Cajon Net (ECN), 3855 kc. at 1950. This month was made by W6, KTO, KXU, KYV, W6CXH, W6PFF. In addition to the scramble, traffic nets, the American Legion Net (9375 kc.) and the Mission Trail Net (9654 kc.) have gone on record as endorsement for SCM’s standards in “screening” the type of messages handled. It is believed that elimination of the “junk” type of message will do much to dignify our services in the estimation of the public. We take this occasion to thank these fine nets, our OSHS and OES, and the many SCMs who have pledged support of this movement. DTY, where the section is going strong, and gone and says that he, ALJ, and YRQ are handling radio for the Navy; AAI is on 40 meters (with sky-wire troubles); ZBI may say extra plates to his 812 to handle the load from his pole-pig and that the “mike vamit, who can’t read their kicks off code are disgusted.” (Amen to that.) Longfgell—there’s a lot of fun in both c.w. and “chasing.” Why not try both of ‘em for a swell feeling of being all around him? KFQ gave his mountain estate to Inskwood ARPC for its annual picnic. N6JF wonders, “Who happened to my 107 HZL is olling up his 44 to get the vamit who cuts his antenna down weekly. BLY says CEA’s XYL now is ERN on 76, ZPC and YVU get lost in the bill on Field Day (got back before, though the posse found ‘em); W6L is back in civies on 2-meter mobile with a new car; LVQ (Field Day beenard, on skis, etc.) says we’re a new home, 3000 watts, table top. Welcome to LJR (ex-AQ2L). BHE made Master Traffic Handler certificate; HOV forgot the California and Senate and Assemblymen re license plates. EBB is mobile 10 and 75 meters on vacation tour. FMQ is doing a wonderful job as Manager of LSN, NDR, the “vixen” beam “man writes: “Still handling traffic with ARIBD and 1CC at the North Pole—that ZPB and CMN worked on his next 50-meter beam. W6F and AND gave him a FB operator. GEB asks how to AM modulate a kw. at little cost (and) says that during Field Day the Inskwood Club worked the world on c.w. with 300 watts. FYW (RM) reports summer slump in ECN, W6FBF (19 yr. old) made Gen. Class, according to KOY. ORL wrote also in the traffic game on 1CC. OMB, G6X, VAF, made RCC, QW. DRS says DUS has a new daughter. KSS has a new receiver on 9 meters. GYH still is up there in traffic totals, KYV’s new kw. is east of the Sitka, 2, and SDV. Sweet rig, too! KSS notes per KSS: Neta seem to be holding up well this summer. HRS, former proxy of the 2-Meter Down Group, is now the LC, ECN and SDV. KLC (omitted and smooth-working V.H.F. Net. Also reporting: CFC, CLO, GIL, EBY, RNN, NPS, NCP, HFM, VRF, and WNN. Traffic: W6KZ 121, GIL 837, KFY 607, W6M 591, HOY 322, NCP 209, FMG 149, BHT 128, PFS 65, HIZZ 6Z, KOY 58, QW 49, WWO 46, WLY 56, GJP 25, GFR 25, ORL 15, KSS 14, GEB 8, KSS 7, GTE 6, GEB 8, FYV 4, LDR 2, COZ 1.

ARIZONA — SCM — Albert C. Steinhilber, W7LYR—Field Day saw six active groups around the state: JFT on Spruce Mountain, NJQ on Mingus Mountain. P6F at W7P, the Home Canyon, N7F at the Uphill on Mt. Lemmon. Monthly Arizona C.W. Parties will start again the 3rd Sunday in September: 8 c.w. 7:30 to 9:30 a.m. and 7:30 to 9:30 p.m. The time is early. To enter, call CQ ARIZ. OPC will be handled by John Reinartz, KB8J, of Eimac fame, with an FB demonstrator on the method of intermodulation. Between 15 per cent on peaks without carrier cut-off. PZF is getting close to DQOC with 112 worked, 96 confirmed. MDK is back from a trip to Vermont. UM is back on the air with 20 watts, UFR moved to El Paso and now is 5KIH. JGZ moved to Tucson permanently. QS worked Phoenix and Tucson on 10 meters, QW has acquired a 500 kw. but will be on 2 meters. L6K has 75-meter mobile rig. HUV reports 6 meters wide open and he worked 7 states at one sitting. RCE and RQF are in New York on 10 meters and Tucson and is on 20 meters. New Novice: RYQ, New Gen 1, CL: Q2D, Q2G, New Adv. CL: TYL. Arizona MARS Net on 40.6 kc. Toc, c.w., phone at W7U, needs more

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SAN DIEGO — SCM, Mrs. Helen White, WM5YX

— Asst. SCM's: Shelley E. Trotter, 6BA; Richard E. Hutchinson, 6DLN; Thomas H. Welko, 6RZ; Ray L. MEZ; 6EZ; ICK and DEY. BAM takes a little brother in traffic handling while WZR moves. ELQ made BPL for June traffic, as did ZGZ, and is following BAM's example of going vacationing, without a rig! IZQ reports BRAT certificates were awarded to TET, 7HSL, G3ZC, FCT, and MTHZ to IZQ. WSU and UKP spent two weeks in the north and worked fairly well on 75 meters with low power, CYT has dropped the "N" from his call, HJG's YXL is waiting for her Novice ticket, ZFR son is awaiting a WNB call, making three hams in the family. Jim's XYL plans to take the exam shortly. Your truly is proud to be in a "ham" family too — AFG, CYT, YAM, and YBN — 50-MHz activity is increasing in our area.

The new SDRSC president is ZUR, who also is giving fine r.f. amplifier design talks at the club meetings these days! The Solroc Club took a first premium with the silver ribbon for its booth at the San Diego County Fair. Much interesting news has been received by your SCM on Field Day, QSOZ and FRA operated together on the Peak in Orange and worked 293 stations on one transmitter! ELQ went out and worked 230 contacts with the help of ELQF and ELQG. All thru the John with the Helix and Solroc Clubs and made 646 contacts, doing especially well on 10 and 40 meters, which made 646 contacts each — exactly! Good Work. The Helix group, MGJ/6, made 670 contacts, reports HDT. Solroc, QG9/6, made 672 contacts with 7 transmitters. Traffic: W6QJ 5G6 TET 202, IZG 199, BAM 152, GTC 21 FCT 19, DEY 2.

WEST GULF DIVISION

NORTHERN TEXAS — SCM, William A. Green, W5-BKD — Asst. SCM, MER, KDR, QRM; RM: QHL, PAM: IWQ. Midsummer states and vacation activities have caused some drop in activities. However, the emergency and traffic nets continue to function. The SCM and Asst. SCM attended the West Gulf Division Convention. RIP is still hanging out with WLT as NCS of NETSG, NTEN elected CQG and JOC as NCS and ARCS respectively. The ARCS are working together with BCI, the state director, participating in ARCS liaison meetings and IWQ, QDQ, and LEB are holding regular meetings and conducting activities. ASA and KPB are giving the destinations of NTS and NTX, the latter now having 25 consecutive states. Permian Elected ULX, pres.; IDZ, vice-pres.; UTG, secretary, and POG, sat. mgr.; and also helped in the licensing of WJF, WPR, WPL, WLM, and WLMQ. All members held its Field Day on the Kemper Ranch with San Angelo ARC at Lake Naosworthy. Benham ARC hammed visitors JQH and IZO. LKU reports AEG is on 144 and 269 MHz. After showing signs of life around the middle of the month 50 MHz. has become very poor. SBF, the son of QRD and RRT, now is Adv. Class. WMZ is in the Pacific Ocean on USS Monte Carlo. LGY has a new transmitter and scanner. Benham new calls are VYV and POG. KPU has an XLYL. Greenville new calls are VYQ and VLY. WBQ and VLY are licensed. After 30 minutes, the Traffic: WSBK 176, VRX 118, PAK 55, TFB 53, KPB 24, CWS 21, ASA 18, AFG 16, TNO 18, TGF 8, WSS 8, WQY 6, RAF 3, BQG 6, SDQ 5, UDQ 1, IBT 1, PYQ 2.

OKLAHOMA — SCM, Jesse H. Langford, W0GYV

— SEC: AGM, RM: OGD, PAM: G22 and AYQ. The Tulsa Radio Club combined Field Day with a simulated emergency in which the civil defense, Red Cross, and CAP were called out to assist shortly after midnight on a recent Saturday. According to all reports the cooperation was wonderful and the results very satisfactory. UYX, the club station of the Southwest ARC, Okla. Radio Club, was very active during Field Day. IFP has purchased a new QTH and soon will be on the air. Site is a new 14-Mc, sixteen-element beam and OZK is putting up a 14-Mc old five-over-five, RST, EHB, and GZK, along with BKH and GUD of the Texas bunch, handled the Huddlebury Puff Derby. HYX now has a new portable rig, the receiver and transmitter complete on a 14 x 17 x 18 classic plate modulated. TME is operating on all Sea Shack now is called SS Balore. The Ardmore Radio Club has changed the date of its hamfest to October. SLC is in Canada on vacation. TXC built 10-watt 10-meter rig also is on vacation. UGF has moved to Washington, D.C. UZG has a new 14-Mc, vertical antenna. EHC is adding a new room to his home to be used as a ham shack. FKH and TME are preparing for the convention at Corpus. KYG is in school at the Philco plant. The Lawton-Ft. Sill Club annual barbecue will be held Sept. 7th. Traffic: WBBQ 1, WBBQ 1, WBBQ 1, WBBQ 1, MFX 55, HZB 41, ESB 38, SWJ 31, CRW 21, KV 20, GYY 10, EIC 18, ODD 13, SLH 12, OFG 10, FKL 5, TV 2, TFG 1.

SOUTHERN TEXAS — SCM, Dr. Charles Fornito, W5FJF — All of us who went to the West Gulf Division Convention in Corpus Christi will agree that it was an FB meeting. The boys of the Gulfside Radio Club, W5FJF program; QKF, adv.; AQQ, secy.; NHV, treas.; HIF, reg.; NHV, publicity & publications; GEL, prizes; LOW, (Continued on page 118).
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contests; LRO, display; GMT, pre-convention party; went all out. Plan now to attend the 1953 National Convention in Houston, July 9-10-11-12, Shamrock Hotel, W5FJP, Box 907, general chairman. The 220-Mc. DX record is 288 miles, made by ONS and AGC. June 6, 0629 CST. FEK won a prize for outstanding achievements on amateur frequencies above 144 Mc. in the West Gulf Division. JQ was active on 7-Mc. c.w. during the month, 100 watts to a kg-wave vertical. 4RZU/4 is trying to build a "beer can" vertical on 160 meters. Wonder who is paying for the beer. W5NTO was the first to report in to the SCM from Field Day. 809S, the West Texas Tequila Sippers Assn., had a gallon of fun on Field Day with 5 stations, 18 operators. 9 AECX members. RIU still is enjoying himself with 21 batteries. ABQ is going mobile and reports: JBZ is rebuilding to cure TVL; AFZ will have a new kw. on soon, NFX reports that W5WQM passed away. W5NTYY, LUI, and NFX are heard by 144 Mc. and are looking for out-of-town stations. EJF is active in Texas State Guard and is on 78., 40., 20-, and 15-meter mobile. Any time you hear us, call me and ask for "the lowdown." QFA held an FB time at the Convention. The Texas State Guard radio did excellent work in the recent Corpus Christi Flood. Many fixed and mobile units were dispatched and handled traffic. ALC soon will be back on with a m.w. station. MN says that his first convention was Corpus in 1955; his second convention was Corpus in 1960. He enjoyed them both very much. We hope his third will be in Houston in 1963. He still is making BFL every month. STEN is going to town and streamlining roll calls. JC is busy with government installations. EJT and his XYL are making BFL progress on a new home. Follows, send me some dope on yourselves and the interesting things you do each month.

Traffic: W5M5 558, W4RZU/5 63, W5RHH 54, W4VZP 49, QF3 87, ABQ 17, N1YK 31.

NEW MEXICO — SCM, Robert W. Freeman, W5NXE — SEC: PLK; RM: NKG, PAM; HM: PAM, v.h.f.; F4L 9388 kc, Yus. and Thurl, at 6:30 a.m., Sun., at 7:00 a.m., 16363 kc, Mon., Wed., and Fri. at 6:30 p.m. W4, XFY, RMH, RNU, UY, and ZU attended the West Gulf Division Convention at Corpus Christi. ZJ and RNU went on mobile with Elmar. XSKN is now at FRROZ in Kennon County. Ariz. QST left for sea duty. The MARIS picnic in Cimarron was attended by 18 hams and their families. RPL left for active duty with the Air Force. LLG has a new Viking. PLB has new homeless with 250TH final. 100TH had 200 new ones on 75-meter mobile. W5WQM is out with his new transceiver. Stations heard on Field Day: GGO, MPZ, NUN, P7D, DAI, and SKW. PLK has lengthened long wire to 1000 ft. HHS expects to extend from Santa Fe to El Paso next month. NKG, JST, and RLL are holding the fort on 9383 kc. UYA is active on 75-meter mobile. NJH has new harmonic and is building another N7T. W5MM is teaching another course at Highlands U. His son, now 9PV, recently married an Indiana YL. The final count on the attendance at Captain Peak no longer is unreported. About 155. Traffic: W5NKG 98, NXX 34, ZJ 14, RMI 3.

CANADA

MARITIME — SCM, A. M. Crowell, VE1DQ — SEC: FQ, BC: EC; RM: OM, Field Day messages were received from CK1/0, AAM/7, LQ/B1, H/1F/5, ZRC/1, and RC/1, and the reports indicate the usual FB time. BB from VC and FQ/m paid advance visit to the Field Day site at FC/0 and the latter also received an EFX type report; AR/F/1, and "talked him in." VE3DJR/nil has been heard QSO some of the local boys on 3.5-Mc. mobile 'phone. Glad to hear NO is home from the hospital. Several of the Halifax mobile crew are thinking of trying out 160 meters for short-haul work. HC handled some emergency traffic from Sable Island when one of the JR operators there suffered a broken leg. BC and AW continue to provide some interesting TV DX for the local gang when conditions permit. Both have very formidable antennas for this type DX. DQ and SI have been camping out at their summer QTTs week ends. XE put up new antenna at his summer home where it is located. AB continues to QSO all mobiles on 3.5 Mc. High traffic man this month is AKR. Traffic: VE1MK 139, FQ 125, HNC 70, A3J 28, VV 21, AAK 13, and ABA 16.

ONTARIO DIVISION

ONTARIO — SCM, G. Eric Fanqhar, VESIA — The summer hill apparently is upon us. The report is scanty this month because no news was forwarded to the section. Please let's have some information, guys. AUV now is a member of BCJ. AVS came south for his vacation, stopping en route at North Bay for the hamfest held there. Later he visited Niagara Falls and dropped into the QTH of LA for an evening's show. JF headed north to the Skull and was the oldest boy. DKI was the outlying traffic from Mount Hope during Air Force Day. Sorry there was no report from him or anyone who took part. With no information on the picnics sponsored by the Ontario Ham Club or on the North Bay hamfest it is very difficult to give these outings the publicity they deserve. Please realize the (Continued on page 114)
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Quebec Division

Quebec — SCM, Gordon A. Lynn, VE2GL, — Sec: BR, AQN is ex-VE2EL, and is on 40 and 20 meters with a 9AG7/ALG9 rig and is planning a high-power rig. BK reports into LON on 10 meters each Thursday and he, BR, and GH are all mobile at summer QTH near Lachine. All worked KD mobile, also mobile in Montreal on 10 meters, a distance of 60 miles. CEU reports daily skeds with KEM and APC and says that he is always on 75-meter c.w. and VFO gets on occasionally with his high-power on 75 meters. CA reports that 20 meters continues dead to the North Country, his usual stamping ground, with DX and sporadic E. FK is working 10 and 75 meters. CA has been enjoying the short skip on 20 meters lately. AO took part in the Frequency Measuring Tests on May 22-24 and on two measurements showed an error of 10.9 parts per million, or 0.001 per cent! The Verdun Amateur Radio Club held elections recently and their choice of a new president was ANE. The father of ANE recently was discharged from the hospital after receiving several blood transfusions, donated by members of the Montreal Amateur Radio Club. ARK is the XYL of AIO and is to be heard on 40- and 80-meter c.w. Traffic: VE2GL H. EC 10, BK 3.

Vanaltla Division

British Columbia — SCM, Wlf Moorhouse, VE1US — May reports were received from AOB, YE, and TT. AMF QSYed to Newton again and is active. A report was received from YM, DJ7 in Vancouver with A7L, QC, etc., on an AFARS visit. Vancouver Area c.d. is gradually taking shape. There are 32 mobiles in the section with 28 in Vancouver, most of them registered with A4EC, plus 3 AEC A7L mobiles, A1A for 10 meters, and AC for 40 meters in the Vancouver section. US has given uu his traveling job for an easier pursuit. AOU and AILW are heard on 75 meters. TM is on with Rothman system. Field Day gangs were active on 15. Little Mt., Burnaby Mt., and Hill districts. Some W7s visited Vancouver at JT7's QTH, on July 4th. Y1 hides behind trees. JT7's mobile was heard on 75 meters. To repeat, JT7's QRRR frequency and A4EC sets it uses from 6-7 P.M. daily. Civil defense of Vancouver sent its No, 1 message via A4EC to Victoria. This means c.d. used 3 links so far through A4EC. Otherwise local c.d. head is using amateurs "willy-nilly." Certain amateurs are forgetting that on joining A4EC they accepted the rules of the organization and are part of a team — not the whole team. An appointment under A4EC is FOR A4EC ONLY. C.d. AFARS, agreed to recognize A4EC in Canada under the condition that VE5/5/51, Traffic: VE7QC 61, DJ7 17, AOB 12, YM 4.

Prairie Division

Saskatchewan — SCM, Harold R. Horn, VE5HR — The Regina Club is to be congratulated on the fine hamfest they put on. Those attending enjoyed a good time and many took some very good prizes. About 15 mobiles took to the road on Field Day and the transmitter hunt proved to be quite a hunt. DG finally was successful in locating JW and his XYL operating from the grounds of the jail. WS6LC came from the farthest point and won a dandy soldering iron. Your SCM is vacationing in VE7-Land so this report will be rather sketchy. QSL mobile VE67 and worked back to VE5 with a good signal that QRMed HQ mobile. The Saskatoon Club took an active part in the Annual ARRL Field Day with three transmitters in operation and plenty of operators for the 24-hour swing. A good score was made, and conditions were good. Next year's see more clubs and others taking part, fellows. It's a lot of fun. Traffic: VE5HR 194, GI 16, QL 5, LY 4, MQ 4, MG 2.

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Easy to assemble — Easy to operate! 2 Bands: 3.7-3.25 Mc and 26.90-27.21 Mc. All necessary parts, tubes, legal plug-in cells, pictorial diagrams, included. See this terrific new hit at your local jobber or write for literature to:

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Of the death of Jack Q. Dotage;
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When keying the high voltage.
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"Dear Leo,
I am very satisfied with my Globe King Transmitter; it was the best money I ever spent on radio. The Globe King surprised me, and also my friends who visited me, with its good modulation and clear quality. One of my friends, KF4MQ, ordered a Globe King from you and he is very happy with it. Now there are many Globe Kings in this country. I recommend the Globe King to any ham. It is compact and its modulation is perfectly clear and very good quality. I have had no trouble with my Globe King Transmitter; although I have had it for a long time and use it every day.

Cordially yours,
Signed/ L. ESPASAS SIMO KF4BA
Hato Rey, Puerto Rico"

NEW WRL 400B GLOBE KING XMTR $475.00 $495.00

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<thead>
<tr>
<th>KIT FORM</th>
<th>WIRED-TESTED</th>
</tr>
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<tbody>
<tr>
<td>WRL 165 WATT GLOBE CHAMPION XMTR (less accessories)</td>
<td></td>
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<tr>
<td>KIT FORM</td>
<td>WIRED</td>
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<tr>
<td>$329.50</td>
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NEW WRL 40 WATT TROTTER XMTR
More Watts Per Dollar

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<td>$89.50</td>
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NEW ELMAC-A54 UNDER DASH XMTR
Mobile

VFO or Crystal control. Direct-reading. VFO on all bands—75, 20, 11, 10. • Placed modulation. • Completely hand-switching, tone or CW. • 50 Watts max. input. Power required: 300-500 V.D.C, at 250 ma., 0.3 V AC or DC at 4.5 A, • Uses 3-6AG2, 6A5, 6C4, 12AU7, 2-6L6G, 807, (Included). • Only 7 1/2" x 7 1/2" x 12", 14½ lbs.

For carbon mike input ...............$139.00
For dynamic or crystal mike......$149.00
Power Supply, 110 Volt AC...$39.50

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☐ ELMAC-A54 Info
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1952 WRL CATALOG

160 METER CRYSTALS
1800-2000 K.C.
$1.50 each while they last

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3500-3340 K.C.
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40 METER CRYSTALS
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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. Buy now!

RADIO REFERENCE MAP

25c HANDY WALL SIZE

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☐ Globe King Info
☐ Globe Champion Info
☐ Used Equipment List

Name ____________________________
Address _____________________________________________
City _____________________________ State __________

115
Miniature Mobile

(Continued from page 18)

R₁ are connected together at the strip which is mounted just to the right of the crystal sockets. The oscillator plate inductor, L₁, is connected directly between the tube socket and prong No. 3 of J₇.

Belden type 8885 shielded wire was used for the connections that go to the microphone jack. No. 16 tinned wire was used between the crystal sockets and S₁A.

Testing

Plate power requirement for the transmitter is 300 volts at 100 ma. and the heaters draw 2.1 amp. at 6 volts. A 6.3-volt a.c. transformer may be used to furnish heater power during the bench testing of the rig.

It is advisable to disconnect the modulation transformer lead that terminates at R₅ and R₈ before testing of the transmitter is started. This will remove high voltage from the final while the oscillator circuit is being checked. If a milliammeter is then plugged across R₄, it should show an amplifier grid current of approximately 4 ma. when the power supply is turned on. Should there be a wide difference in grid-current readings as the crystal switch is alternated between the 3.5- and the 7-Mc. positions, it is an indication that L₄ is not resonated at the proper frequency. Making the inductance smaller will increase the 7-Mc. output of the oscillator and, of course, increasing the inductance will boost the 3.8-Mc. drive to the final.

The plate-voltage lead for the final should now be connected in place and the test meter should be transferred to jacks J₅ and J₇. If a low-wattage lamp—one rated at something less than 15 watts is best—is connected to J₅, the amplifier should load to approximately 25 ma. when the final and the coupling are resonated by means of C₇ and C₆, respectively. The tuning of C₆ will be extremely broad at 3.8 Mc. because it is connected in parallel with C₇ at this frequency.

The audio circuit is tested by plugging a carbon microphone into J₅ and by watching for a pronounced increase in load-lamp brilliance as speech is applied to the microphone. At a later

(Continued on page 118)
NOVICE TRANSMITTER and POWER SUPPLY KIT

The newest of Philmore's famous kits. 25 watts input, 2-bands, 80, 11 meters, Pierce exc. 6V6, 6H6 output, in-network to match any antenna. Power supply delivers 350 volts @ 100 Ma. All parts and tubes included except crystal, solder and hook-up wire. Key furnished. Very simple and complete instructions. Finest components throughout. A wonderful investment at only... $29.40

Viking 1 kit, with 4D32...
Viking 1 wired, with 4D32...
Collins 32V3 Transmitter...

$229.95
$269.45
$775.00

CONDENSER SPECIAL

75 mfd. 4250 peak voltage, ceramic button insulation, adjustable spacing, straight-line capacity, precision construction, 3 1/4" long, 1 1/4" wide, shaft 1/8" x 1 1/4", adjustable tension double-bearing... $89¢

8/8/8 MFD.
500 V. D.C.

Triple 8 mfd. 500 working volt D.C. all-filled condenser, common negative, solder terminals, hermetically sealed, 5" x 3 1/4" x 2 1/4". A one-time buy... $1.95

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- Single point tuning: high image rejection, birdies negligible
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- 1-Microwatt Sensitivity - All Bands
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- Accuracy 1%
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- LP Amplifier with 4 Tuned Circuits, Output 1525 Kc.
- Complete with Mounting Hardware, Manual
- Case - Height 4 1/4", Width 5 1/4", Length 6 1/2"

$64.95

Hi-Q. 75 coil to base load 96" whip...
Hi-Q. 75 coil to base load 96" whip...
12" RG8/U coax, male plug each end...

$8.95
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$7.00

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125 ft. of the finest aerial wire obtainable. 42-strand phosphor-bronze with liner center. Will not stretch, very high tensile strength, diameter approximately same as No. 14 copper, very flexible, Excellent for transmitting or receiving antennas, control cable, guy wire.

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Send 20% deposit with COD orders. Please include sufficient postage or instruct us to ship by Express Collect. Overpayment will be refunded by check.

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Your order will receive my personal attention and will be shipped the same day order is received. We distribute all top-flight amateur lines... let us know what you need.

73, Julie Burnett, WB8WHE
date, when the transmitter has been placed on the air, the correct percentage of modulation is determined by regulating the volume of the speaking voice.

At this point it may be desirable to check all measurable currents and voltages of the transmitter. Values that may be expected at various points throughout the rig are listed in the accompanying chart.

It is entirely possible that the value of inductance specified for \( L_3 \) of the coupler will not be absolutely correct for all mobile antennas. However, if the coil is not cemented in place until the installation is completed, it will be a simple matter to make any necessary alterations.

---

**Transmitting Loops**

(Continued from page 14)

The small loop illustrated in this article showed narrow-band characteristics. It was not found advisable to use it more than 20 kc. either side of the frequency for which it was originally tuned. If the loop is located within easy reach of the operating position, or furnished with a remote control system, this is not a serious handicap. However, we got very tired of running up two flights of stairs to adjust the W4LW version!

An unexpected by-product of this antenna system is freedom from TVI. Although the loop was located about ten feet from a TV antenna, a transmitter with 100 watts input had no effect on TV. This effect was double-checked by trying the loop as a receiving antenna. There was a marked reduction in local QRN, and interference from the horizontal sweep oscillator of a neighbor's TV set disappeared entirely.

With a transmitter output of about 40 watts, reliable contacts have been made with this antenna system up to 1000 miles. Three contacts have been over 2500 miles.

The possibilities of this antenna system have not been explored fully. However, two facts have been established: it works, and it is a wonderful subject for conversation during QSOs!

---

**W/VE Operation**

(Continued from page 81)

70 per cent. In Canada, no operation by amateurs is permitted in airplanes.

In general terms the technical requirements for amateurs of both countries are about the same, except they may be a bit more strict in the U.S. and certainly are spelled out in considerable detail. VEs headed south should obtain a copy of the ARRL License Manual and familiarize themselves generally with U.S. regs.

Finally, don't forget your automobile driver's license and registration (if a motor trip), your ham ticket and your endorsement for operation in the other country.

And now — good luck!

— J.H.
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Matching Coax Line

(Continued from page 19)

of the radial ground-plane rods.

The required stub reactance is given by

\[ X_s = \frac{Z_1}{S} \text{ ohms,} \quad (7) \]

where \( X_s \) is inductive reactance of stub.

The length of the shorted stub is

\[ L_s = \frac{32.8 T L}{V} \text{ inches,} \quad (8) \]

where \( L_s \) is stub length,

\( V \) = velocity factor of line used in stub,

\( L \) = length of stub in electrical degrees having required \( X_s \).

\( L \) is equal to the angle whose tangent is \( X_s / Z_e \)

where \( Z_e \) is the characteristic impedance of the stub.

The length of each radial is given by

\[ L_r = \frac{2953 K_a}{V} \text{ inches,} \quad (9) \]

the length being measured from the center line of the radiator to the tip of the radial.

If the radials have a different diameter than the radiator (a common practice) the \( M \) and \( K_a \) for radials and antenna must be considered separately.

Sample Calculation

The use of the curves and formulas can be illustrated by a practical example. Assume a ground-plane antenna to be constructed from 5/8-inch tubing for a frequency of 146 Mc., to be matched to 72-ohm RG-11/U coaxial line by using a stub of the same line material. Then

\[ F = 146 \text{ Mc.,} \]

\[ D = 0.625 \text{ inch,} \]

\[ Z_1 = 72 \text{ ohms,} \]

\[ Z_e = 72 \text{ ohms,} \]

\[ V = 0.66. \]

From (1), \[ M = \frac{5006}{146 \times 0.625} = 65. \]

From Figs. 2, 3 and 4, it is found that

\[ M = 65, \]

\[ K_a = 0.959, \]

\[ K_e = 3.8, \]

\[ R_e = 28.3. \]

From (2), \[ R_o = 28.3 - \frac{72}{4 \times 28.3} = 27.7 \text{ ohms.} \]

The factor \( S \), as given by (4), is

\[ S = \frac{72}{\sqrt{27.7}} - 1 = 1.265. \]

(Continued on page 128)
Are You a “Watt-Waster?”

Are you letting your rig really do its best to give you

...More DX... Better QSO's... Maximum Pleasure?

One mobile operator made a 3 db improvement in his signal strength (equivalent to doubling the transmitter power) while reducing final input by 25% — just by tuning-up with a field strength indicator.

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Ideal instrument for hams. Use as a field strength indicator to determine radiation pattern and as a direct reading percentage modulation indicator. Provision for headphones to permit station monitoring and quality control. Separate plug-in coils for 10, 20, 40 and 80 meter bands. Dual sensitivity, 0-100 mc. meter. With colls, 2 ft. antenna and instruction manual.

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*Modernize Your Shack with New B & W DIP METER*
Covers 1.75 to 260 Mc in Five Calibrated Overlapping Bands

Invaluable for TVI chasing, antenna tuning, parasitic elimination, neutralizing, trap peaking, receiver aligning, beam adjusting, as a signal generator, frequency meter, CW and phone monitor, Q indicator, absorption wavemeter, etc. Measures resonant frequency of non-energized tuned circuits in transmitters, receivers, etc. For 110V, 60 cycles AC. With tube and instructions. Small size, light weight.

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**MILLEN GDO**
Compact, completely self-contained, has built-in transformer type AC power supply and internal terminal board to provide connections for battery operation. Range 1.7 to 300 mc on 7 direct reading bands. For 110V, 60 cycles AC. With tube, coils and rack for spare coils.

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Plug into your 50 or 75 ohm coaxial cable at any point, connect 0-1 DC MA and measure SWR. One of the best ways to tune antenna systems for maximum efficiency, interstage linkage, etc. Accurate over 1 to 150 mc.

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**MicroMatch**

Merely insert this instrument in your coaxial transmission cable and read the SWR. If it is more than 1.5 to 1, your antenna is rejecting too much of your precious output! Adjust your beam (or trim antenna length), get a better impedance match for the transmission line... and the MicroMatch will tell you when you are radiating at maximum efficiency. Also reads RF power output up to 500 watts. Accurate over 3 to 102 mc.

MM2 (For 52 Ohm Cable) $41.25
MM3 (For 72 Ohm Cable) $49.50

MODEL MM1. For 10-1000 watt transmitters using open wire transmission lines. Single unit case. Range 3 to 90 mc. Line impedance 70 to 300 ohms $32.50

**ELDICO Antennascope**

Takes the guesswork out of adjusting and impedance matching to any beam or mobile antenna. Measures actual radiation resistance, transmission line impedance, frequency and impedance of matching sections and stubs, feed line SWR, receiver input impedance. Works with any GDO (or suitable source of low power RF). Complete kit including sensitive 100 microamp meter, cabinet and easy instructions KIT $24.95 Factory wired & tested $29.95

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20,000 Ohms/Volt DC!

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LETTINE MODEL 240
TRANSMITTER WITH MOBILE CONNECTIONS AND
A.C. POWER SUPPLY

This outstanding transmitter has been acclaimed a great performer throughout the world. It is excellent for fixed station, portable or mobile operation. Even if you have a transmitter of your own, you can't afford to miss this wonderful buy, direct from our factory, ready to operate.

The 240 is a 40 watt Phone CW rig for 160 to 10 meters, complete with 16 x 14 x 6" cabinet, solid contained A.C. power supply, MOBILE connections, meter, tubes, crystal and coils for 40 meters, tubes 6V6 exc., 587 final, 6S7 crystal mike amp., 6N7 phase inverter, 2 of 6J6's mod., 7UG rect. Weight 18 lbs. TVI instructions included. 90 day guarantee. Price $79.95. $25 deposit with order — balance C.O.D.

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Now, in 1½ minutes or less make perfect "Key" or "D" holes for sockets and other equipment. Simply insert GREENLEE Punch and turn with an ordinary wrench . . . get a "clean" opening in a hurry! Write today for details on these as well as GREENLEE Radio Chassis Punches for round and square openings. GREENLEE Tool Co., 1857 Columbia Ave., Rockford, Ill.

From (3),

\[ X_a = 1.265 \times 27.7 = 35.0 \text{ ohms} \]

From (6),

\[ K_h = 1 - \frac{35}{380} = 0.908 \]

and from (5), the antenna length is

\[ L_n = \frac{2953 \times 0.959 \times 0.908}{146} = 17.6 \text{ inches} \]

To find the stub dimensions, the required reactance from (7) is

\[ X_s = \frac{72}{1.265} = 56.9 \text{ ohms} \]

The electrical length for this reactance is given by the angle whose tangent is \( X_s/Z_n = 56.9/72 = 0.79 \). From a table of tangents the angle is found to be 38.4 degrees. Then from (8)

\[ L_s = \frac{32.8 \times 0.65 \times 38.4}{146} = 5.7 \text{ inches} \]

The length of each radial is given by (9),

\[ L_r = \frac{2053 \times 0.959}{146} = 19.4 \text{ inches} \]

Bandswitching Exciter

(Continued from page 25)

output terminal. From there on it takes some form of transmission line filter, and probably an antenna coupler, too, to complete the job with certainty.

Take Channel 8 reception at W1HDQ as an example. The exciter unit that the new rig replaces runs on the same power supplies and cabling, uses the same crystals, and delivers the same power output, on 28 or 50 Mc. When used anywhere in the 10-meter band other than the high end, it knocks TV reception completely out with its third harmonic. When the new rig is used with a suitable antenna coupler there is faint interference at the low end of the band, and with the transmitter operating anywhere in the 'phone assignment TV reception is clear. Addition of a low-pass filter would probably clear even the low-end trouble.

On 50-Mc, the old exciter knocks out Channel 6 when 8-Mc crystals are used, as the result of the 10th harmonic falling in the channel. The new job (when used with an antenna coupler) shows no interference whatever. Feeding the antenna systems directly from the output terminal, \( J_3 \), shows plenty of interference with the new rig. There is only this one hole through which the harmonics can get out, however, and thus a low-pass filter or an antenna coupler can do the rest of the job effectively.
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FOR HAMS WHO INSIST

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**97F040. NET.............. $189.95**

**97F041. Model 600RS.** As above, rack mounted ........................................ $189.95

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**Mobile Transmasters for 10-11, 20 and 75 Meters.** Series of compact mobile transmitters featuring 25 watts power, clamp type audio for 100% AM modulation, and built-in antenna relays for push-to-talk operation. All controls and crystal sockets on front panels. Have cork output for 50-ohm line. Require 600 volts DC at 125 ma and 6.3 volts at 1.35 amps. Black wrinkle-finished case, 8x4x6". Available with tube lineup of 3-6AQ5 or 3-6V6GT. Supplied with tubes or less tubes—see listing below. Shpg. wt., 8 lbs.

<table>
<thead>
<tr>
<th>Band</th>
<th>Type</th>
<th>WITH TUBES</th>
<th>LESS TUBES</th>
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<td>10-11 Meters</td>
<td>A120T</td>
<td>97F050</td>
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<td>20 Meters</td>
<td>A114T</td>
<td>97F046</td>
<td>A114</td>
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<tr>
<td>75 Meters</td>
<td>A175T</td>
<td>97F054</td>
<td>A175</td>
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**Using 3-6V6GT's**

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<th>Band</th>
<th>Type</th>
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<th>LESS TUBES</th>
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<td>Type No.</td>
</tr>
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<td>B120T</td>
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<td>B114T</td>
<td>97F048</td>
<td>B114</td>
</tr>
<tr>
<td>75 Meters</td>
<td>B175T</td>
<td>97F056</td>
<td>B175</td>
</tr>
</tbody>
</table>

**NET EACH** 33.55 29.95

**Model D11 Grid Dip Meter.** Extremely versatile instrument that can be used as a grid dip meter, an absorption wave meter, a CW or phone monitor, a signal generator, or a field strength meter. Frequency range when used as grid dip meter, 3.4-160 mc; as signal generator, 3.4-360 mc. Includes 5 plug-in coils. Uses 955 tube. Size, 3x9x3 3/4". Ready to operate, with meter, tube and power supply. For operation from 115 volts DC, or 110-120 volts, 60 cycles AC. Shpg. wt., 4 lbs.

**97F043. NET.............. $39.95**

**Model 30 Noise Limiter.** Fully adjustable peak noise limiter for use with any superhet receiver. Power requirements, 6.3 volts at 150 ma AC or DC; 100 volts at 6 ma DC. Uses 6AL5 tube. Size: 1 1/2x3x1/4". Wired and tested with tube. Shpg. wt., 1 lb.

**97F042. NET.............. $6.95**

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Write DEPT. T-9 for NEWARK'S FREE CATALOG

223 WEST MADISON STREET, CHICAGO 6, ILLINOIS
Identifying Harmonics

(Continued from page 124)

the addition of many harmonic lines. However, the frequency can be determined quite easily and more accurately using simple algebra.

We know that the unknown frequency, \( f_x \), is some multiple, \( n_1 \), of some fundamental frequency, \( f_1 \). Similarly, we know that \( f_2 \) is also some multiple, \( n_2 \), of another fundamental frequency, \( f_2 \). So, we write

\[
f_x = n_1 f_1, \quad \text{and also } f_x = n_2 f_2.
\]

Since we are working with adjacent harmonics, we know that \( n_2 = n_1 + 1 \). Substituting this value of \( n_2 \) in the above equation, we get

\[
f_x = n_1 f_1 = (n_1 + 1) f_1 \\
f_1 f_2 = f_2 + f_3 \\
f_1 f_2 = f_2 \\
f_1 (f_1 - f_2) = f_2 \\
1 = \frac{f_2}{f_1 - f_2}.
\]

In the preceding example, \( f_1 = 3600 \text{ kc} \), and \( f_2 = 2400 \text{ kc} \). Therefore,

\[
n_1 = \frac{2400}{3600 - 2400} = 2.
\]

So the unknown frequency is the second harmonic of \( f_1 \), or \( 7200 \text{ kc} \). As a check, we note that \( 7200 \text{ kc} \) is also the next-higher (third) harmonic of \( f_2 \).

By substituting \( \frac{f_2}{f_1 - f_2} \) for \( n_1 \) in the original equation for \( f_x \), we get

\[
f_x = \frac{f_2}{f_1 - f_2} \times f_1 = \frac{f_1 f_2}{f_1 - f_2}.
\]

This gives \( f_x \) directly without the need for first determining \( n_1 \). Note that \( f_1 \) is always the higher of the two fundamental frequencies and \( f_2 \) is the lower.

In cases where the frequency-meter range is sufficient, it is well to check three or four adjacent pairs of fundamentals. This prevents overlooking a beat and averages out errors in dial readings. As an example, suppose beats are checked at \( 3973.684 \), \( 3775 \) and \( 3595.238 \). Taking the first pair,

\[
f_x = 3973.684 \times 3775 = 75,500 \text{ kc}.
\]

Using the second pair,

\[
f_x = 3775 \times 3595.238 = 75,500 \text{ kc}.
\]

If a beat is overlooked, the results will not check out.

The formula is an easy one to remember because it is similar to those for resistances in parallel or condensers in series, except that the sign in the denominator is minus instead of plus. Any two adjacent beats can be used, of course, for the calculations. The accuracy is limited only by the accuracy of the readings at the fundamental.

(Continued on page 128)
J.F.D. Zoom-up Mast
Zinc-plated seamless, 16 gauge steel, telescoping antenna mast. Supplied with guy rings, clamps and insulation hardware (less guy wire).
ZU12-20 20 ft. mast  $7.35
ZU123-30 30 ft. mast  12.98
ZU1234-40 40 ft. mast  20.41
ZU12345-50 50 ft. mast  33.38

NEW! JOHNSON VIKING II
The Johnson Viking II transmitter kit incorporates all the desirable features of its predecessor plus those required for effective TVI suppression. 100 watts output on phone and 150 watts on CW on all bands 80 thru 10 meters. New final amplifier uses parallel 6146 tubes. All parts supplied, including copper plated steel cabinets, chassis, wiring harness, all hardware and tubes. Complete construction test and operation manual are supplied. Viking II Transmitter Kit........... $27.80

Eldico Novice Course
Complete course  $25.00
Records only  17.00
Theory course only  10.00

Novice Transmitter Kit
Now Philmore, one of the pioneers in designing radio kits, has just introduced this new novice transmitter kit. It is a complete kit, including power supply and key. Transmitter uses Pierce type crystal oscillator, Pi type tuning amplifier. 4A5 tube is used in the oscillator and a 6G6 in the amplifier. The power supply uses a type 5V3 rectifier and supplies 370 volts DC at 100 milliamperes. All parts needed are supplied except hook-up wire, solder, crystals and antenna. Instruction manual supplied to simplify work of constructing the kit. Priced right for that novice budget.

Philmore novice transmitter kit  $29.40

LAFAYETTE — HEADQUARTERS FOR COMMUNICATIONS RECEIVERS

Lafayette has been the headquarters for fine communications receivers for 32 years. All the latest models are available as soon as released by the manufacturers. Be sure to check Lafayette before you buy your new receiver.

HALLCRAFTERS  NATIONAL
S-38C  49.50  SW 54  49.95
S-40B  99.35  NC 125  145.50
S-53A  79.35  NC183D  335.50
SX-62  289.50  NC187D  485.50
SX-71  199.50  HIF  60  142.00
SX-73  975.00  HAMMERLUND
SX-76  169.50  HQ-190X  298.50

JOHNSON MOBILE TRANSMITTER KIT
New Johnson mobile transmitter kit, a bandswitching 4 band rig, 60 watts input, 100% modulated (30 watts on 300 volt supply) 807 final, microphone input—dynamic, crystal or carbon. Crystal or VFO control. Viking Mobile Transmitter Kit (less tubes)........... 99.50 (less tubes) $99.50

Lafayette TWO-WAY INTERCOM
Complete 2-way system with tubes (5085, 35W4, 12AT6), cord plug and 50 feet of hookup wire. For 110V, AC or DC operation, P244999...... 17.95

Lafayette Radio
Radio Wire Television Inc.

NEW YORK 13, N. Y.
100 SIXTH AVENUE
REctor 2-8600

BOSTON 10, MASS.
110 FEDERAL STREET
Hubbard 2-7850

NEWARK 2, N. J.
24 CENTRAL AVENUE
MARKET 2-1661

BRONX 58, N. Y.
542 E. FORDHAM RD.
FOrdham 7-0813
WANTED:

Young men interested in operation and maintenance of electronic equipment.

Comprehensive training given in basic and advanced electronics as applied to geophysical exploration.

Paid vacations, insurance benefits, excellent advancement opportunities.

Address letter with your qualifications to

United Geophysical Company, Inc.
P.O. BOX M
PASADENA, CALIFORNIA

This method is restricted, of course, to the checking of frequencies where the fundamental range of the signal generator is appropriate to produce at least two adjacent beats with the unknown. In the example of Fig. 1, it is seen that the minimum frequency at which at least two beats will be obtained is 6 Mc., where the second- and third-harmonic lines first start to overlap. This minimum frequency is equal to the sum of the minimum and maximum fundamental frequencies of the signal generator. In this case, the fundamental range is 2 to 4 Mc. Therefore, the minimum frequency is $2 + 4 = 6$ Mc. If the 125-to-250-ke range of the BC-221 is used, the minimum frequency will be $125 + 250 = 375$ ke.

As with any heterodyne method of frequency measurement, care must be exercised in distinguishing between spurious responses caused by harmonics generated in the device being checked and in the detecting system, and the real beats developed by harmonics of the frequency meter. One thing that helps, particularly when using a receiver as the detector, is to keep the input to the receiver as small as possible so that the spurious responses will be weak in comparison with the signal you want to hear.

**Styx-Strays**

So far as Miami Ws are concerned, Seattle Ws represent better DX (distance) than 43 DXCC countries.

A sharp beam aimed due south from Jacksonville, Fla., would miss all of South America.

Those interested in the dimensions of VQ4-ERR’s operating layout as pictured on page 68 will find the data in the diagram below.

**Two Station Intercom System**

BRAND NEW NOW ONLY $17.95

Station equipment and accessories indicated are A, transmitter control panel; B, receiver; C, VFO; D, beam indicator; E, beam control panel; F, a.c. power-plug strips; G, speakers; H, frequency meter; and I, band markers.
RECEIVERS

Collins 75A2 with speaker ........................................ $440.00
National HRO60 with speaker ................................... 499.50
National NC720 with speaker ................................... 385.00
National HFS with power supply ............................... 164.43
National S254 .................................................. 47.95
National NC125 with speaker ................................... 160.50
Hammond HG-129X with speaker ................................. 214.00
RM-50 with speaker ............................................. 213.50
Hallicrafters S-54, less speaker ................................. 249.50
Hallicrafters S-62, less speaker ................................. 289.50
Hallicrafters SX-57, less speaker ............................... 199.50
Hallicrafters SX-77, less speaker ............................... 218.50
Hallicrafters SX-71, less battery ............................... 119.95
Battery for above ............................................. 16.57
Hallicrafters S-772 speaker .................................... 169.50
Hallicrafters S-408 ............................................. 99.95
Hallicrafters S-403 ............................................. 99.50
Hallicrafters R-45 speaker for model SX62, SX71, S76 .... 19.95

TRANSMITTERS

Collins 33V3, less crystal or mikes ................................ $775.00
Johnson Vicing, less tubes, mikes or crystal ............... 209.50
Johnson Vicing, wired and tested ......................... 259.50
Full kit of tubes for above including 4D32 tube ........ 39.00
Johnson TVI kit above ...................................... 27.50
Johnson VFO kit, less tubes .................................. 42.50
wired and tested ............................................ 52.75
kit of tubes ................................................ 52.75
Elmac A54, less crystal or power supply .................... 139.00
Elmac A54H, less crystal mikes or power supply ......... 149.00
Harvey-Wells TBS50A Bandmaster Senior .................. 111.50
Harvey-Wells TBS50G Bandmaster Deluxe ................. 375.00
Eldico 2-meter transmitter ................................... 74.95
kit form ..................................................... 49.95
Lyco B129 transmitter, less tubes, 10 meter ............... 29.95
Lyco A175 transmitter, less tubes, 10 meter .............. 29.95
Lyco A140 transmitter, less tubes, CAP band .......... 29.95
Sona M826 transmitter——specify band required ....... 72.45

MISCELLANEOUS

Web Jr. Ten-meter transmitter, 30-50 Watt on peak .......... $39.95
Lyco 381 VFO .............................................. 24.50
Lyco 401 modulator ......................................... 19.95
Lyco 600 transmitter ........................................ 149.50
Eldico antenna scope—$25.00 ea. ............................ 21.95
Eldico antenna scope, wired and tested ................. 29.95
Eldico grid dip oscillator kit ............................... 29.50
Eldico Grid dip oscillator, wired and tested ........... 43.00
4D32 tubes—— immediate delivery ....................... 22.40
We stock many types of tubes, antennas, and antenna rotators. Write us for quotations.

BARGAIN SPECIALS

73 Ohm one-kilowatt twin polyethylene insulation 0.9 ft ............................ Per $ 1.95
300 ohm twin lead. Per ft ................................ 0.03
RGBU cable coax, 2 ohm. Per ft ............................ 2.50
RG11U cable coax, 73 ohm. Per ft .......................... 1.16
RG-58U cable coax, 52 ohm. Per ft .......................... 0.77
RG-59U cable coax, 75 ohm. Per ft .......................... 0.57
4 5- and 6-prong ceramic tube sockets by Johnson, Each .. 0.20
J-38 hand-transmitting key .................................. 1.29
GE Plote Circuit relay, 8000 ohm DPDT contacts close 688ma. Each ... 1.95
Carbon mikes, single button, with push-to-talk button switch similar to T-17-8, Made in England, Each ... 3.65
Pyrex Insulators, 7" heavy-duty type, Each ................. 1.40
Acorn tube sockets, made by Johnson for 954, 955, etc. Each ... 2.20
Cleartex 50-watt rheostats, 250 ohm. Each .......... 1.35
Lots of 10, Each ........................................ 1.25
DeJur 50-watt rheostats, 30 ohm. Each .................. 0.99
Lots of 10, Each ........................................ 0.99
DeJur 50-watt rheostats, dual 2000 ohm. Each .......... 2.50
Lots of 10, Each ........................................ 2.25
Two meter 4-element beam antennas, Each ............. 7.95
Two meter 4-element beam antennas stacked, Each .... 16.50
2 mfd., 1000v pyradox cond. Each .......................... 2.95
2 mfd., 2000v pyradox cond. Each .......................... 3.95
4 mfd., 3000v pyradox cond. Each .......................... 9.95
25 mfd., 1000v oil cond. 23F159GE Each ........................................ 5.00
120-watt non-inductive resistor, 2500, 5700, 10000, 25000 ohm. Each .......................... 2.50
or 30000 ohm——either value .............................. 1.95
Bias or isolation trans., 40, ma Prm. 110VAC, Sec. 120V tapped at 12, 24, 32, 42, 56, 74, 86, 111, Each ... 1.95

USED EQUIPMENT

Hallicrafters SX28 with speaker .................................. $175.00
Hallicrafters S72 portable, like new ...................... 85.00
Gansev two meter converters, like new ................. 90.00
BME-59 receiver with added clipper and speaker ........ 75.00
Hammond SP-200X with power supply and speaker .... 225.00
MC122 receiver 110V AC .................................. 65.00
2 Webster Model 80 Wire recorders, Each ............ 50.00
Hallicrafters KT-9 transmitter with crystals .......... 300.00
National HRO-5 with speaker and power supply ....... 215.00
Melson 150-B transmitter with full set of coils ... 315.00
Including buffer doubler stage and exciter— Factory converted to 10 meter .......................... 150.00
Hallicrafters S-38 receiver .................................. 39.95
National NC-33 ............................................. 49.95
Wire for more complete list of used equipment. This list changes daily. Contact us if you are looking for something or wish to swap. Generous trade-in allowances.
Happenings
(Continued from page 87)

2. AMEND SECTION 12.156 TO READ AS FOLLOWS: § 12.156 Operation in emergencies. In the event of an emergency disrupting normally available communication facilities in any wide-spread area or areas, the Commission, in its discretion, may declare that a general state of communications emergency exists, designate the area or areas concerned, and specify the amateur frequency bands, or segments of such bands, in addition to those provided by this section for use only by amateurs primarily engaged in emergency communication within or with such affected area or areas. Amateurs desiring to request the declaration of such a state of emergency should communicate with the Commission’s Regional Manager of the area concerned. Whenever such declaration has been made, operation of and with amateur stations in the area concerned, using frequencies in the emergency communications bands, shall be only in accordance with the requirements set forth in this section, and such requirements shall in no wise affect other normal amateur communication in the affected area when conducted on frequencies not designated for emergency operation.

(a) The following segments of authorized amateur frequency bands, together with such authorized amateur frequency bands or segments of such bands as may be additionally specified by the Commission in its declaration of a general state of communications emergency shall be used by amateur emergency communications bands and shall be available only for use by amateur stations actually engaged in communications essential to the protection of life and property, or the alleviation of human suffering and need:

<table>
<thead>
<tr>
<th>Authorized Amateur Frequency Bands</th>
<th>Amateur Emergency Communications Bands</th>
</tr>
</thead>
<tbody>
<tr>
<td>1860-2000 kc</td>
<td>1800-1925 kc</td>
</tr>
<tr>
<td>1875-1000 kc</td>
<td>1900-1925 kc</td>
</tr>
<tr>
<td>3500-4000 kc</td>
<td>3500-3550 kc</td>
</tr>
<tr>
<td>3950-4000 kc</td>
<td>3950-4000 kc</td>
</tr>
<tr>
<td>7075-7125 kc</td>
<td>7075-7125 kc</td>
</tr>
<tr>
<td>7275-7300 kc</td>
<td>7275-7300 kc</td>
</tr>
<tr>
<td>14000-14500 kc</td>
<td>14000-14500 kc</td>
</tr>
<tr>
<td>14200-14250 kc</td>
<td>14200-14250 kc</td>
</tr>
<tr>
<td>28.5-29.7 Me</td>
<td>28.5-29.7 Me</td>
</tr>
<tr>
<td>29.4-29.7 Me</td>
<td>29.4-29.7 Me</td>
</tr>
<tr>
<td>50.0-58.0 Me</td>
<td>50.0-58.0 Me</td>
</tr>
<tr>
<td>63.2-64.0 Me</td>
<td>63.2-64.0 Me</td>
</tr>
<tr>
<td>144-148 Me</td>
<td>145.0-146.0 Me</td>
</tr>
<tr>
<td>146.5-147.5 Me</td>
<td>146.5-147.5 Me</td>
</tr>
<tr>
<td>220-225 Me</td>
<td>220.0-225.0 Me</td>
</tr>
</tbody>
</table>

(b) All transmissions within all specified amateur emergency communication bands other than communications relating directly to relief work, emergency service, or the establishment and maintenance of efficient amateur radio networks for the handling of such communications, shall be suspended. Incidental calling, answering, testing or working (including casual conversation, remarks or messages) not pertinent to constructive handling of the emergency situation shall be prohibited within those bands.

(c) A 5-minute listening period for the first five minutes of each hour shall be observed, insofar as practicable, by all stations for the purpose of listening for initial calls of major importance or calls from isolated stations in the frequency band segments reserved in § 12.112 for initial calling and answering. During such listening period no transmissions shall be made on the designated calling and answering frequencies other than for initial calls and replies in connection with the emergency situation or for the handling of emergency communications of extreme importance.

(d) The Commission may designate amateur stations to assist in the promulgation of information relating to the declaration of a general state of communications emergency, to monitor the amateur emergency communications bands, and to warn noncomplying stations observed to be operating in those bands. Such stations, when so designated,

(Continued on page 180)
RME MC-54
MOBILE CONVERTER
for 2 Meters
6 and 10 Meters
Complete with Tubes & Cables
Amateur Net...........
$66.60
Converts any auto radio to
hi-fi, saves receiver! 1500 Watt out-
put. Covers 3 ranges: 26.5-
meter input connector. Reverses 200-250 V at 10 Mils. (avail-
able from car radio). AUTOMATIC NOISE CLIPPER.
(VC) INCORPORATED. Overall range: 5-15,000 Hz, 120 volts AC, 0.5 watt. Weight 4 lbs. Can be used with any com-

GONSET "COMMANDER"
NEW
35-55 Watt Multi-Band
Transmitter
Net...........
$124.50
FREQ. Range: 1.7 to 54 M Hz continuous. FLEX-5 Multiband "COMMANDER". Very
COMPACT; 5x5" high, 9x5" wide, 7-1/2 lbs. Complete for under $100. disgusted RF, 6AQ7, 6AG6, AR: 12AT7, 2-6AA5. Wired, tested, complete with all tubes. 2 hi-Q final tank coils.

MORROW MOBILE CONVERTER
10, 20 & 75 Meters
Low microvolt sensitivity, all bands. Full
width dual 1% accuracy. AUTOMATIC
NOISE LIMITER. BUILT IN 3-gang tuning cond. Tuned preselector, mixer, os. Separate loaded coils for each band and stage. 12 Amp with 4 tuned cir-
cuits, 1325 kHz output. All filters and trimmer on front panel. $64.95
Complete. Net...........

HALLIDAY MOBILE CONVERTERS
FOR 2 Meters
10 Meters
20 Meters
or 75 Meters
Semi-tuned, sensitive, stable. Plenty of bandspread, accurate calib-ation, large dial. Open connections, all plug-in Amate-
ur Net. EACH...........
$39.95
Mallard Hi-Q Bnc Leads Coils for 20, 75 M. White Hi-Q 23.....18.50
Hi-Q 75.....17.50

SPECIAL SCOOP!
ARC-5/R-28
2-Meter Receiver
One of the BEST 2-meter superhet you've ever seen! 100 to 156 MHz in 4 bands. Easily converted to con-
$249.50
FREE with each ARC-5/R-28 Receiver. Vol. 2, "Surplus Radio Conversion Manual" (reg. $2.50) contains circ. dia-
agram and full description of above receiver.

40 METER VFO
ARC-5/T22
TRANSMITTER
(Navy BC-459A)
Easily converts to hot VFO or 50 Watt CW Xmitter. 7 to 9.1 M Hz. Furnished with tubes, 8 M Xtal, writing diagram, and conversion suggestions. $145.00. NEW! Stock No. 15897. Net...........
$249.50

AC-5/T23 XMITTER
Famous aircraft 2 Meter Companion
Add to any. Stock No. 15086 BRAND NEW $49.50

JOHNSON VIKING 1
XMT KIT
Here's your dream transmitter! 100 watts
14, 166, 840, 40, 20,
15, and 10 meter bands. All switched
from front panel. Tubes: 4X2, 4X15, 6AU5 buffer doubler, 6AU6 occ., 2-807
6AU6 driver, 6AU5 power amp.,
modified. 6AU6 driver, 6AU6 power amp.,
modified. 6AU5 bias rect. Includes cabinet,
fully marked front panel, driven and punched chassis, wiring harness, less tubes. $295.00
For tubes (2298 Final)...........
$32.50

NEW VIKING 1 TVI
SUPPRESSION KIT
Comprises all shielding and filters needed for operat-
ing Viking 1 transmitter. Any location without TV inter-
ference Complete instructions furnished. Net each...........
$247.50

Johnson L-38 Filter...........
$16.50

VIKING VFO KIT
For maximum operation flexibility with Viking 1 or similar Xmitter. Two controls: Freq. control in the usual 3-dial calibration in freq. for 160, 80,
40, 20, 15, and 10 meter bands; and bandspread control for 40, 20, 15, and 10 meter bands. Test equipment and wiring harness, less tubes. $475.00
Wired, Tested Tubes. Net...........
$37.50

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CONCORD RADIO
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nated, may transmit for that purpose on any frequency or frequencies authorized to be used by that station, provided such transmissions do not interfere with essential emergency communications in progress; however, such transmissions shall preferably be made on authorized frequencies immediately adjacent to those segments of the amateur bands being cleared for the emergency. Individual transmissions for the purpose of advising other stations of the existence of the communications emergency shall refer to this section by number and shall specify, briefly and concisely, the date of the Commission's declaration, the area and nature of the emergency, and the amateur frequency bands or segments of such bands (other than those specified in this section) which constitute the amateur emergency communications bands at the time. The designated stations shall not enter into discussions with other stations beyond furnishing essential facts relative to the emergency, or acting as advisors to stations desiring to assist in the emergency, and the operators of such designated stations shall report fully to the Commission the identity of any stations failing to comply, after notice, with any of the pertinent provisions of this section.

(e) The special conditions imposed under the provisions of this section shall cease to apply only after the Commission, or its authorized representative, shall have declared such general state of communication emergency to be terminated; however, nothing in this paragraph shall be deemed to prevent the Commission from modifying the terms of its declaration from time to time as may be necessary during the period of a communications emergency, or from removing those conditions with respect to any amateur frequency band or segment of such band which no longer appears essential to the conduct of the emergency communications.

**What Price Precision?**

(Continued from page 44)

around $140.00, and is very portable. It behaved as follows:

1) The rock and circuit aged about 70 parts per million high — perfectly normal.

2) The oscillator was slightly affected by the load change between feeding the 100-kec. multivibrator and feeding the harmonic amplifier, and the output frequency changed 2 to 3 parts per million when going from the multivibrator to the crystal frequency. This was not considered too much of a drawback, because 1-Mc. points are normally used only for mileposts, fine settings being accomplished against 100-kec. or 10-kec. points, both of which held in good shape.

3) Changes in line voltage had relatively little effect on the frequency.

4) Since no temperature stabilization was provided, frequency changes of as much as 15 parts per million were experienced over an ambient temperature range of 17 to 30 degrees C.

5) The zero setter on this unit, as on the FS1385s, was relatively coarse, and built to be adjusted with a screwdriver. A dial would have been a big help.

6) The harmonic amplifier functioned very well, but 10-kec. multiples were pretty weak at 30 Mc.

7) The multivibrators were not too stable. As long as the 6SN7 tubes used in them were new, and temperature variations not too violent, all was well. However, as soon as the peak wore off the tubes the multivibrators took off and on their own, and could not be locked to the crystal with the adjustments provided. Investigation revealed that the time-constant condensers used in

(Continued on page 138)
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.

It’s easy and fun to build a Heathkit. All parts are furnished and are of highest quality for years of trouble-free, dependable operation.

Save money by constructing your own. All expensive wiring and assembly costs are completely eliminated.

Detailed construction manual shows clearly where each wire and part goes and tells exactly how to build the kit. Write for free catalog.

EVERYTHING AT YOUR FINGERTIPS

with SUBRACO MT-15 X

GO "DASHBOARD" MOBILE—

WITH TUBES

High Impedance
Input

$109.50

Low Impedance
Input

$99.55

DS-400A power supply
6V input
400VDC-200MA
$79.95 not

... with this high quality, compact, efficiently designed, 30 watt AM phone 10-11 meter transmitter, small enough to mount in most glove compartments or under any dash. For complete details write for catalog Q-528.

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NEW JERSEY
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or trade that Collins, Johnson, Hallicrafters or National piece of radio gear be sure to get our prices. Our service cannot be beat. Remember the name—

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32 Guy Park Avenue     Amsterdam, N. Y.
Ward J. Hinkle, W2FEU, Owner

Remember also — Our telephone number is 73
Our P. O. Box number is 88

ANTENNAS
by JOHN D. KRAUS
Prof. of Elec. Engr., Ohio State U.

Expert advice for the advanced amateur who wants to find out more about antennas for all frequency ranges. Points up applications, and gives essentials the antenna builder must know to meet varied problems.

533 pp. 395 illus. $8.50


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Stateside stations wishing to work DX — or stations desiring regular schedules with the Far East — will be glad to know that ADIGHQ, Headquarters Far East Command in Japan, is eager to work U. S. MARS or amateur stations.

ADIGHQ equipment consists of a kw. transmitter (c.w. only), a rhombic antenna oriented toward San Francisco, SP-600 receivers, an AN/FGC-9 teletypewriter bay, and a TG-7 printer. Normal operation is from 2300 to 1400 GCT but the station will arrange to meet any schedules. Correspondence should be addressed to: MARS ADIGHQ, 71st Signal Battalion, Headquarters, Far East Command, APO 500, v/o Postmaster, San Francisco, California.
TOP-NOTCHERS for medium-powered rigs

Look to the B&W BX Series when you need an inductor to handle more power and provide greater efficiency in that new rig or the modification of your old one using higher powered bottles. You cannot buy a better inductor at any price.

Available in either straight center tapped (Type BX) or center-linked, center tapped (Type BXL) models.

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AMAZING 2-FOR-1 OFFER

BE A LICENSED* TV TECHNICIAN

LICENSED TV MEN MAKE MORE MONEY

NEW YORK ROUND-TRIP—FARE FREE!

Yes, wherever you live in the U.S. or Canada, I pay your way to New York and return after you finish your home study course. I give you two free weeks of advanced instruction, 30 hours of shop training at famous Pierce School of Radio & TV. (Applied to complete Radio-TV course only.)

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Includes FCC License

The best jobs in TV & RADIO require an FCC LICENSE.

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ADVANCED Fin-TV TRAINING COURSE

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COMPLETE theory and practical training course—complete with 6 hrs. including large screen TV receiver. FCC License Coaching Course included FREE.

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A push to talk mike case that will fit the famous F1 Unit or a case to fit the new N6. Both cases come in either push to talk or switch to talk. State preference.

BEAHM ELECTRONIC COMPANY

A Push to Talk Mike Case

$3.95

One of the "first ten" Novicee to qualify for an award in the Hallcrafters WAS contest. Norma Jean Guille, now W1UBM, of Norwich, Conn., scores another YL first. Eighteen years old and a June graduate from high school, Norma passed her General Class exam two weeks after becoming a Novicee. Active in civil defense communications, she operates 80, 10, 20, and 10, is AEC, E for Norwich (her father, WIEBO, is E1). publicity agent for the Tri-City Radio Club, and NCS of the Club's net.

Club News

The YL Club of Los Angeles set up 1952 Field Day operations at Big Pines. Use the call W6GCL, W6A NAM (PD Chairman), CEE KZY LBO UHA and WRT operated 20, 10, 20, and 75; "phone as well as 20 and 40 e.w. The girls' OMs proudly stood by and assisted as technicals and baby-sitters.

Present at the June luncheon meeting of the N.Y.C. YLRL Club held at a Greenwich Village Restaurant were W6J EDD EUL UGP MVY OWL P2A QGQ KWE RAF DXC and WNZIG.

In this and subsequent issues, we'll introduce one of the District Chairmen of the YLRL for the 1952-53 term (ten W and one VE). As "keyneter" of YL activities in her area, a D.C. can do much to stimulate bigger and better YL things. This year we think an especially enthusiastic group of girls is at the helm, so we'll look for more YL "news and views" than ever before.

Numerically first is Esther Rohter, WHYJ, of Amesbury, Mass., chairman of the First District. After several years of listening to her OM's (WIDOX) e.w., curiosity prompted Esther to learn the code and she earned her own ticket three years ago. Now Class A, this popular New England YL operates 10, 20, 75 phone and 80 e.w.; she "loves 10 meters and DX." She holds Maritime Mobile Certificate No. 19 and has WAC and WAS on ten. Of the 96 countries she has worked, 82 are confirmed. Regular participation in the Deep Sea Drag Net of New England, membership in the Gypsy Radio Club, and activity in the amateur civilian defense program of her town round out Esther's busy schedule as an amateur.
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AN/APR-4 COMPONENTS WANTED

- 4 E 2 - - - - - - - - 19
  2 MTR-4 ELEMENT YAGI
- 8 E 2 - - - - - - - - 26
  2 MTR-TWO 4 ELEMENT YAGI
- PD 3 E 10 - - - - - 24
  PLUMBER'S DELIGHT
  INCLUDES T MATCH
  10 MTR-3 ELEMENT
  CLOSE SPACED
- 3 E 10F - - - - - - 42
  FOLDED DIPOLE
  10 MTR-5 ELEMENT
  CLOSE SPACED
- 3 E 10T - - - - - - 41
  INCLUDES T MATCH
  15 MTR-3 ELEMENT
  CLOSE SPACED
- 3 E 1ST - - - - - - 56
  INCLUDES T MATCH
  15 MTR-3 ELEMENT
- 2 E 20T - - - - - - 47
  INCLUDES T MATCH
  20 MTR-2 ELEMENT
- 6 E 10-20T - - - - - - 96
  STACKED 10-20
  3 ELEMENT
  INCLUDES 2 T MATCHES

Complete catalog on request. Dept. Q82

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Courses ranging in length from 7 to 12 months. Dormitory room and board on campus for $45.00 a month. The college owns KPAO, 5 kW broadcast station with studios located on campus. New students accepted monthly. If interested in radio training necessary to pass F.C.C. examinations for first-class telephone and second-class telegraph licenses. Write for details.

HY-LITE Antennae Co., Inc.
Makers of Fine Antennas for AMATEUR, FM, TELEVISION
242 EAST 137th ST., N.Y.C. 51, N.Y.
on Truk (he has over 70 worked now) before he puts full
time in working Ws. That's reasonable. With such a call, his
DXCC QSO-return percentage should be pretty solid. 
- W1ZA intends to put a T15 call on the air at some
ear-future date. - Ex-K06GCU is stationed in Little
Rhode Island and hopes to have a W1 call on the air by October.
His Guamanian QSL backlog is just about cleaned up. 
- HB0B was behind the key at HB4BFE during that
Swiss military amateur station's recent DX splurge. - JY1XY
says there is no JY1XY in Jordan. Les runs 260
watts to an 813 feeding either a vertical or a 3-element
rotary; T20s module. JY1XY is workable on 2, 6, 10,
15 and 30 meters. An 8X-28 and a BC318W-with-converter
do his receiving. - C41PBK is rejuvenating his rec
ceiver betwixt tries for W3AS. Henry informs us that
C41PBK is a new call down that way about to hit the air — 14.010,
14.020 and 14.030 kc. to be precise. - W6NZ is still
slaving over the VP7NZ logs. He's the lad to write concerning
your VP7NZ cartesios. - A "WPV" (Worked
Portuguese World) certificate award is now offered by
REP (Portugal) and may be earned by amateurs who
succeed in verifying contact with each of these DXCC
countries; CT4, CT5, CT9, CR4, CR5, CR6, CR7, CR8, CR9
and CR10. QSLs, which must confirm QSOs made since

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Weston Laboratories is pleased to announce to its
many friends the existence of a new policy in the
procurement of military electronic test equipment. It is well
known that we are constantly buying test equipment and
gear of surplus origin to be used to augment that of our
own manufacture in fulfilling current military demands.
Effective at once we offer amateurs either cash or the cash
value plus 15% in swapping standard brand amateur
goods for test equipment as listed below.

As an example if your test equipment was worth $100.00
to us we could offer you merchandise equal in value to
$110.00 at regular net prices. Among the items we seek are:
Spectrum Analyzers, TSX-45E, TS-45E etc.; TS-120,
TS-13, TS-14, TS-23, TS-35, TS-45, TS-146, TS-147,
TS-148, TS-173, TS-174, TS-175, TS-336, etc. Write, wire,
or phone for highest cash and trade offer.

Weston Laboratories
Weston 93, Massachusetts
Telephone Boston, Wellesley 5-4500

**How's DX?**

*Continued from page 68*

July 29, 1947, should be submitted to REP. Only amateurs
in countries having IARU-member societies are eligible; there
are no fees involved. Twenty-four Ws in all
call areas but the Seventh have qualified for the LABRE
(brazil) WAB award. KP4KD, KZ5WZ and V68AZ also
made the grade. C6XAI is the only non-PY/LU to garner
LABRE's WAB award. - Basking in VS, VU, KR0
and DU "local" QRM, WAVE drops a line from Hokkaido
where he soon hopes to put a new call on the air.
Fred has 50 watts ready to go and did a lot of listening
during our Field Day, looking for Potomac Valley Radio
Club signals. - VK9XX should now be back behind
the key at VK9XX, writes W6KIP. XK was in a last
minute rush to nab Vermont and Utah before pulling
Patanu stakes. - JA2MB's big sig is produced by
p.p. 304 Ts driven by a 32V and latched to a 7-element
constructor rotary 10 feet up, with a 6 wire measuring
and a 54J receiving. - W6ZZU needs help in
scraping together PZ3IQ, HLIU6, VK1PG, VP2AA,
VR5PL, CR4AH and ZP2EK confirmations. - W6BS1
not back on the DX bands after a 2-year layoff. Bill
observes that the signal-to-noise ratio on 20 is much
poorer now than in '49 or '50. Same number of key clicks
and typo notes, though! Old soldiers never die. -
One HLLA told W7OSB he was running 500 watts to a
long wire (14 Mf). Hamming in Korea is still taboo at this

(Continued on page 138)
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Whether it’s RACES, the Amateur Net in CD, a mobile job on 75 or 20, or a CAP or Marine fix, you’ll find Premax Low-Cost Antennas will give you more range and stronger signals. Convenient, easy to install—just what you need.

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WEST CHESTER, PA.
writing. Jeps and jogs from W5KUC's W6DGC DX Bulletin: F686 DA, AI, RG, F688 AE and AF took time out for visits to France. It's November rather than September for ZS6AW's Rio de Oro beachhead. H21MY's projected Near East itinerary proceeds according to plan. Z651X is phoning on Marion Island. FY may be V4A4F's next stop. F6665 and F9LQ are ZA3AZS nine times more. Twenty-five years ago this month you might have found chasing stuff like FMN1T, Tunis; FM35AB, Malay, FM51BB, Shanghai; M5J, Japan; 9S7C, Finland; and Z65, Canal Zone. All active on 20 meters in '77. ZB9U issues no special endorsements for 21-Mc, WACs. Applications already received have had to be returned. The old KA prefix rides again. W4VE notifies us that it superseded the JA label prior to occupation in Japan. Calls are unchanged in other respects; e.g., K8MD becomes K1MD. Fred's own call will be K1MD. We presume that J calls are by these means being reserved for the use of nationals.

Jeeves believes the first successful attempt to reach the top of Mt. Everest will be made by some enthusiastic club group scrounging about for a good v.h.f. location on Field Day. AC8PT/YU??

V.H.F. QSO Party
(Continued from page 4)

6) Scoring: 1 point for completed two-way section exchanges on 50 or 144 Mc.; 6 points for completed two-way section exchanges on the higher v.h.f. bands. The sum of these points will be multiplied by the number of different ARRL sections worked; i.e., those with which at least one point has been earned. Scoring sections on additional bands for extra section credits is permitted.

7) A contact per band may be counted for each different station worked. Example: W16SK (E. Mass.) works W16EO on 50, 144 and 220 Mc. for complete exchanges. This gives W16SK 7 points (1 + 1 + 5 + 7) and also 3 section-multiplier credits. (If more Maine stations are subsequently contacted on these bands they do not add to the multiplier but they do not add to the multiplier."

Each section multiplier requires actual completed exchanges with at least one station. The same section can provide another multiplier point only when contacted on a new v.h.f. band.

8) Award Committee decisions shall be accepted as final.

9) All reports must be postmarked no later than October 10, 1952, to be entered for awards. (A message to HQ, will bring a mimeographed blank for report on this contest.)

10) Reports must show bands used, dates and contact times, calls of stations worked, names of ARRL sections worked, and score computations.

Reporting

Submit contest logs to Headquarters immediately, even if your score is small, to help in cross-checking the claims of others.

F. E. H.

---

Answer to QUIST QUIZ on page 10---

Page 10 of the magazine contains a quiz on voice communications. The quiz asks about the importance of clear speech in radio communication. It also questions the reader about the impact of various radio frequencies on speech clarity. The quiz ends with a statement encouraging readers to participate in the next contest.
COMPACT – CONVENIENT – CAPABLE

THE TURNER 80

This is the new TURNER 80—a crystal microphone so tiny it hides in the palm of your hand, yet so strikingly designed it is the very picture of symmetry. Weighs less than five ounces, but its high output and unusually fine response characteristics make it a natural for amateur communications, home recording, dictating machines, portable recorders and dozens of other applications. Finished in beautiful satin chrome.

Level: Approximately 58 db below 1 volt/dyne/sq. cm. Response: 80-7000 c.p.s. 7 foot attached single conductor shielded cable. List Price............................. $15.95

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NEW and improved construction for amateur antennas

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HAM-ADS

(1) Advertising shall pertain to radio and shall be of such nature as to interest agents or experimenters in their pursuit of the art.

(2) The character shall be accepted, nor can any special typographical arrangement, such as all or part capital letters be used, to indicate that a single advertisement stand out from the others.

(3) Remittance in full must accompany copy. No cash payments will be made if remittance does not accompany copy. All remittances will be on postcard.

(4) The deadline for any issue of Ham-Ads is the 25th of the month preceding publication.

(5) Running 74 words per word will apply to advertising which, in our judgment, is obviously non-commercial or not in keeping with our policy and is considered by us as a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, if by a member of the American Radio Relay League, shall be accepted.

(a) An attempt to deal in apparatus in quantity, for profit, even if by an individual, is commercial and all advertising by him shall be rejected.

(b) Provisions of paragraphs (1) and (2) shall apply all advertising in this column regardless of which rate may apply.

(7) Because of non-commercial nature, it is requested that any advertising be printed in black type.

(8) You may use no more than 100 words in a single advertisement for any apparatus.

Having made no investigation of the advertisers in the classified columns, the members of QST are unable to vouch for their integrity or for the grade of the product or service advertised.

OSL/ SWLS? America's finest and largest variety super-gloss QST Samples 256, Rue Stackhouse, W6FJDL, Holland, Michigan.

FOR SALE: Hargraves SX-411, 1325.0, In good condition. J. Wilson, 77-72nd St., Brooklyn 9, N.Y.

FOR SALE: One T.C.S. transmitter and KBC 160-500 watts, 40-40, for $10.00. Converted for QRP, W6HKS, W6FJDL, Edenton, N.C.

W6GIW: Electric Modulation, $150.00, or 3 receivers for local civil defense. Write stating price and condition to D. Sauer, 148 E. Beechwood Ave., Dayton 7, Ohio.

TANNED: Pareador, state of the art, condition, and price, WITTK, 150 Rocky Hill Ave., New Britain, Conn.

OSLS/ SWLS, Super-gloss, 10 colors. Four card stock ads. Seven ad pages. Samples, W6FJDL, W6GIW, 104, Almar Park Ave., Las Vegas, Nev.

FOR SALE: S-40 receiver. Only 20 hours operation. Good as new. $75.00. W6VHF, 1604 Fairview Ave., Monroe, La.

W6GIW: Electric Modulation. $150.00, or 3 receivers for local civil defense. Write stating price and condition to: D. Sauer, 148 E. Beechwood Ave., Dayton 7, Ohio.

W7EL: Closed circuit TV and 3 receivers for local civil defense. Write stating price and condition to: D. Sauer, 148 E. Beechwood Ave., Dayton 7, Ohio.

W7EL: Wanted: Pair of 2-way transmitters and receivers on 460 to 470 Mc. Band. Must be manufactured by commercial firm and P.C.C. approved for the Civil Defense Band and in good working condition. Either portable or fixed units are O.K. State manufacturer, location, and price. George E. Clark, M.D., 107 11th St., Santa Monica, Calif.

SELL or swap: BC-221 frequency counter, complete. Dynamotor, 110 VDC in, 500V, 750V out; solar constant voltage transformer, 500VA; SCR-222, converted, in Bud cabinet; R-89/ARN-SA Glide Path receiver, complete; Gold Plated test oscillator; BC-158 and BC-459 in double arch; BC-455, 40 meter receiver; 35 watt transmitter with 60 and 40 meter coils. Need good VFO and 10 meter beam. All inquiries will be answered. Donald Lamb, 875 Bellevue Avenue, Trenton, N.J.

W5JL: With speech, TV test proof. $500.00. Trenton, N.J. HRO-117 one month old, $150.00. F.R. 300. Will trade. R. Lamb, 875 Bellevue Avenue, Trenton, N.J.

W6EL: Wanted: Armature for PE-101 Dynamotor or someone to rewind. Also need ART-13 modulation transformer. W. F. Anderson, 1808 Wake St., Raleigh, N.C.

SELL: Custom-built 300 watt phone now operating 75, De luxe complete and stability built. Commercial quality. 5000.00. Will not sell to others or to forces across at $725 or best offer. Orion Baker, 680 Beacon, Roxbury, F21NOA, Copley 6-5617, 100th Place S.E., Washington, D.C.

FOR SALE: RC045A, $10.00, RC457A, $8.00. BC459, $8.00, Comm. transmitters, like new. Dr. C. H. Scheibly, Mayo Clinic, Rochester, Minn.


SELL: RCA AVR-11 reel, new, $20. ARRA frequency monitor, $100; RLG-40, 30 watt transmitter, $150; RLG-60, 100 watt transmitter, $200. Not complete, but complete power supply, complete in enclosed cabinet, $30; Jannett rotary comparator, $200. 110 DC to 110 DC, $300; 110 DC to 120 VAC, $400; 120 DC to 110 DC, $100; 110 DC to 120 VAC, $300. Complete Pioneer Dynamotor 6VDC to 35VDC, 200 volts, $20. PAQ-20 recorder drive sales motor. type 3M17C/BA, $100.00. WJ2W, 994 Morgan Ave., Alpharetta, Ga.


FOR SALE: Tenoco JSGA transmitter, TVI-ed by Ray Seifert. Cables 60, 600, 15, 10, 7; Excellent condition. Will ship. $250.00, plus shipping.

FOR SALE: 150 watt magnetic core VT142 rotary mount, 24" high. $60.00. 35 watt xmitter/c.w./fme receiver, $30.00. Bert Croddie, 1990 Delmar Blvd., St. Louis, Mo.

FOR SALE: BC-23 transmitter and two tubes with two units $20 F.O.B. Code machine with tapes, $20. E. Biene, Roxbury, N.J.

NEW crystals for all commercial services at economical prices; also reconditioning or replacement crystals for broadcast, Link, Motorola, etc., and other commercial equipment. We offer the highest in quality and satisfaction and fast service. Edison Electronic Company, phone 3-PE, Temple, Texas.

NC-183 and sneaker, like new, $150.00. RME VHF 152A, $50. 60 ft. new RGD-17/4, $4.00; Vibrol pomp Champion, $7.50; Mallory vibrapack, $15.00; $5.00; Fred S. Saggars, W7FIL, 1181 Wisconsin, Denver 4, Mich.

FOR SALE: $125.00. Kiloherz, 62 Lake Avenue, Tuckahoe, N.Y.

SWAP: Gonet transistors, good condition. Want Gonet 10 meter converter, W5DRA, 679 66th St., Oakland, Calif.

REPAIR BC-23, BC-459, needs power supply. Stocked mounted base, $55.00. F.O.B. Kenmore, N.Y. W2SE6, 429 Southwood Drive, Kenmore 15, N.Y.

FOR SALE: Calligraphers SX-411, 1325.0, In good condition. W6FJDL, W6GIW, 104, Almar Park Ave., Las Vegas, Nev.

W6GIW: Compensator for 24-28 vdc power supply: at $15.00. Two c.t. 5/25 vdc, $15.00 ea. RFF13 DYN, w/ base, $25.00. A. Brocato, 104 Allen Place, Elmhurst, N.Y.

QSL/ FB samples, 104, Teek, Lakelhurst, New Jersey.

BARGAINS: Extra special Motorola P-69-13 mobile receivers, $29.50; Glove Antenna, 880-AM, $10.50; UTC, $79.00; HRO-7, $199.00; Collins 75A-2, $325.00; 75A-1, $275.00; HRO-25T, $130.00; SX-219, $325.00; SX-42, $199.50; HRO-25T, $119.50; RME 2-11, $90.50; RME-45 $90.00; Metemser EX Shifter, $59.00; S40A or SX-16, $69.00; VHF-155, $35.00; HF-10-20, $79.00; Glove Transformer, $79.50; Metemser Signal Calibrators, $24.00; MB811 mobile transmitters $19.95; 9000 exciter, $29.50; RCA Chameleon, $69.50; RX-10; $14.95; Legrand 12-11 convertor, $29.50, and many others. Large stock of trade-ins. Free trial. Terms financed by Leo, WBJGQ. Write for catalog and best deal to World Radio Laboratories, 740-44 West Broadway, Council Bluffs, Iowa.

SSELL: HT-17, all coils, meter, $30.00, WITTC, Millers Falls, Mass.

66A Kit, two tubes, sockets transformer, $6.98, Selenium rectifier and transformer kit 0-28 VDC 12 AMPS, $21.98. Sell your surplus tubes and equipment. Free Tabogram, "TAB", 109 Liberty St., New York, N. Y.

JOHNSON announces the new TVI-ed Viking II transmitter kits now available; your coast, complete with tubes, $279.50. We can sell you the transformer, or provide tape recorders $199.50. The Viking II companion unit works equally well with both transmitters. We supply them complete, wired and tested with tubes for $54.95. Write to Carl, W6BRT at Evans Radio, Concord, Calif. Also, James A. WHEELOCK, W9RR, Chicago, Illinois.

GOOD condition, complete run of QST's 1923-1952 except for June 1923 and October 1927. What is your offer? Wm. G. Davis, P. O. Box 253, Mitchellville, Iowa.

SSELL: SCR-522, clean, unconverted, with tubes. Best offer over $45.00. W3KRU, 234 Clampron Avenue, Wilmington 4, Delaware.

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The American Radio Relay League
West Hartford 7, Connecticut

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Complete—Convenient is the way to describe the ARL Log Book.

It helps make the job of record keeping a pleasant one. Fully ruled with proper headings for all necessary entries, the Log Book not only helps you to comply with FCC regulations but also provides a lasting record of many pleasant QSOs.

In Loose Leaf form (3-hole)
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Monitor any four frequencies anywhere between 25 mc and 175 mc, checking both frequency deviation and amount of modulation. Keeps the "beam" on allocation, guarantees more solid coverage, too!

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These RCA power rectifier tubes are built for round-the-clock duty in commercial services. You can count on them for steady, dependable power in your rig. The five types shown will satisfy any power requirements you are apt to have.

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RCA-3B28 is a xenon-filled, half-wave rectifier that provides exceptionally stable operation under wide variations in temperature. A pair in a full-wave circuit with choke input will deliver 500 ma at 3200 volts, or 1 ampere at 1600 volts.

RCA-872-A is a half-wave mercury-vapor rectifier with an edgewise-wound filament. A pair in a full-wave circuit with choke input will deliver 2.5 amperes at 3180 volts.

Free technical data bulletins on these rectifiers are available from your RCA Tube Distributor... or write RCA, Commercial Engineering, Section IM48, Harrison, N. J.

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The dependability of commercially proved RCA Tubes costs you no more. Buy genuine RCA Tubes and you buy the best. See your local RCA Tube Distributor.