QST
DEVOTED EXCLUSIVELY TO
AMATEUR RADIO
Published by The American Radio Relay League

MAY
1925
Sending Pictures by Amateur Radio

25¢
Since 1915—

Two Strikes
Three Balls!

The pitcher has completed that slow, leisurely, tantalizing wind-up. That long, lithe, million-dollar arm has flashed back. A moment... and the ball, a white, hissing streak, is catapulting toward the catcher's waiting mitt.

And the winning or losing of a World Series depends on whether or not the batter has his eye on the ball.

A Cunningham Tube always has its eye on the ball. It stands ready to transmute an electrical impulse, traveling at a speed which would make the speed of a baseball seem a snail's pace, into music, a President's message—what you will.

Since 1915—

Standard for All Sets

Types C-301A: C-299: C-300:
C-11: C-12, In the orange
and blue carton

Price $3.00 each

Cunningham
RADIO TUBES

Home Office:
182 Second Street
SAN FRANCISCO

Patent Notice: Cunningham tubes are covered by patents dated 2-18-08, 2-18-12, 12-30-15, 10-23-17, and others issued and pending.
The new Ultra-Lowloss condenser is the latest radio improved device designed by R. E. Lacault, formerly Associate Director of Radio News, the originator of Ultradyne Receivers and now Chief Engineer of Phoenix Radio Corporation.

LIKE every Lacault development, this new Ultra-Lowloss Condenser represents the pinnacle of ultra efficiency—overcomes losses usually experienced in other condensers.

Special design and cut of stator plates produces a straight line frequency curve, separates the stations of various wave lengths evenly over the dial range, making close tuning positive and easy.

With one station of known frequency located on the dial, other stations separated by the same number of kilocycles are the same number of degrees apart on the dial.

In the Lacault Ultra-Lowloss Condenser losses are reduced to a minimum by use of only one small strip of insulation, by the small amount of high resistance metal in the field and frame, and by a special monoblock mounting of fixed and movable plates.

At your dealer's, otherwise send purchase price and you will be supplied postpaid.

To Manufacturers Who Wish to Improve Their Sets.

The Ultra-Lowloss Condenser offers manufacturers the opportunity to greatly improve the present operation of their receiving sets.

Mr. Lacault will gladly consult with any manufacturer regarding the application of this condenser to his circuit for obtaining efficiency.
Acme Transmitting Condenser stands up under high voltage

A CME Apparatus Co. makes a condenser especially adapted for short wave transmission. Dielectric losses are so small that the condenser will stand up under high voltage and not get warm.

The dielectric is of the finest grade hard rubber so that there is no chance of a breakdown. The capacity is .0001, a low capacity very useful on short waves as more inductance can be used. It is of the same low loss construction as the standard .0005 Acme low loss condenser.

The Acme Transmitting Condenser has been tested in transmitting apparatus and users are enthusiastic about the satisfactory results.

If you have any difficulty in getting Acme transmitting Apparatus write either to the Acme Apparatus Company, New York Office, 1270 Broadway, or to the factory, Cambridge, Mass., and you will be taken care of promptly. Send for Booklet T, on Transmitting Apparatus.

ACME APPARATUS COMPANY

ACME
for transmission
<table>
<thead>
<tr>
<th>Division</th>
<th>Manager</th>
<th>Office Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATLANTIC DIVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E. R. Davis</td>
<td>2129 Rhode Island Ave.</td>
</tr>
<tr>
<td></td>
<td>A. B. Giacolli</td>
<td>1824 Inland Terra</td>
</tr>
<tr>
<td></td>
<td>D. L. Deegomann, Jr.</td>
<td>Chapel Gate Lane</td>
</tr>
<tr>
<td></td>
<td>H. W. Demarest</td>
<td>140 Washington St.</td>
</tr>
<tr>
<td></td>
<td>C. T. Taylor</td>
<td>506 Mastic St.</td>
</tr>
<tr>
<td></td>
<td>J. F. Ruiz</td>
<td>2089 E. Clinton St.</td>
</tr>
<tr>
<td></td>
<td>P. F. Winger</td>
<td>214 Johnson St.</td>
</tr>
<tr>
<td></td>
<td>H. B. Layton</td>
<td>283 Washington St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CENTRAL DIVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H. H. H. Matlins</td>
<td>1088 Eves Ave.</td>
</tr>
<tr>
<td></td>
<td>C. E. Dage</td>
<td>167 Hill Ave., Highland Pk.</td>
</tr>
<tr>
<td></td>
<td>C. N. Nichols</td>
<td>739 Wenhock Ave.</td>
</tr>
<tr>
<td></td>
<td>G. W. Beanman</td>
<td>210 Van Norden St.</td>
</tr>
<tr>
<td></td>
<td>C. N. Grage</td>
<td>530 E. Clinton St.</td>
</tr>
<tr>
<td></td>
<td>D. J. Angus</td>
<td>2160 N. Ellis St.</td>
</tr>
<tr>
<td></td>
<td>J. C. Anderson</td>
<td>835 Pennsylvania St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DAKOTA DIVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>D. C. Wallace</td>
<td>54 N. Penn Ave.</td>
</tr>
<tr>
<td></td>
<td>L. F. Berner</td>
<td>76 Radio Stn. U. of M.</td>
</tr>
<tr>
<td></td>
<td>W. A. Nelson</td>
<td>2074 University Post Office</td>
</tr>
<tr>
<td></td>
<td>Dr. L. M. Hunter</td>
<td>2074 Main St.</td>
</tr>
<tr>
<td></td>
<td>W. G. Matchenson</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DELTA DIVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>V. L. Hosco</td>
<td>415</td>
</tr>
<tr>
<td></td>
<td>W. L. Knowl</td>
<td>1609握住 Arbor</td>
</tr>
<tr>
<td></td>
<td>Dr. L. M. Hunter</td>
<td>267½ Main St.</td>
</tr>
<tr>
<td></td>
<td>W. C. Matteson</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HUDDSON DIVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E. M. Olzer</td>
<td>745 E. 13th St.</td>
</tr>
<tr>
<td></td>
<td>A. G. Wester, Jr.</td>
<td>1845 Chancellor St.</td>
</tr>
<tr>
<td></td>
<td>F. M. Marchan</td>
<td>3009 W. Parnes Rd.</td>
</tr>
<tr>
<td></td>
<td>R. A. S. K. Lawson</td>
<td>417 Faiee St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MIDWEST DIVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P. H. Quigley</td>
<td>7344A, 6th Ave.</td>
</tr>
<tr>
<td></td>
<td>D. E. Waters</td>
<td>11417 Hyland Ave.</td>
</tr>
<tr>
<td></td>
<td>L. H. Lafferty</td>
<td>10750 Mercury St., R. F. D., 1.</td>
</tr>
<tr>
<td></td>
<td>C. W. Lewis</td>
<td>2121 E. Rutledge St.</td>
</tr>
<tr>
<td></td>
<td>H. A. Nielsen</td>
<td>3708 N. 37th St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEW ENGLAND DIVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>J. Vernafulb</td>
<td>2941 Main St.</td>
</tr>
<tr>
<td></td>
<td>R. B. Fischer</td>
<td>36 Franklin St.</td>
</tr>
<tr>
<td></td>
<td>C. F. Sawyer</td>
<td>711 S. 22nd Ave.</td>
</tr>
<tr>
<td></td>
<td>W. M. Hall</td>
<td>601 S. Union St.</td>
</tr>
<tr>
<td></td>
<td>R. D. Chase</td>
<td>36 Chester Ave.</td>
</tr>
<tr>
<td></td>
<td>H. B. Olmet</td>
<td>718 College St.</td>
</tr>
<tr>
<td></td>
<td>R. E. Gannold</td>
<td>718 College St.</td>
</tr>
<tr>
<td></td>
<td>W. C. H. Conover</td>
<td>6012 Main St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NORTHWESTERN DIVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Everett Klick</td>
<td>2092 Broad Ave.</td>
</tr>
<tr>
<td></td>
<td>Martin Amierland</td>
<td>4045 North Ave.</td>
</tr>
<tr>
<td></td>
<td>L. C. O'Leary</td>
<td>1713 S. 7th Ave.</td>
</tr>
<tr>
<td></td>
<td>P. R. Hovse</td>
<td>1874 Williamette St.</td>
</tr>
<tr>
<td></td>
<td>R. J. Mcnear</td>
<td>1020 Main St.</td>
</tr>
<tr>
<td></td>
<td>Geo. S. Hager</td>
<td>712 Main St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PACIFIC DIVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M. E. McCrossey</td>
<td>2544 Crenshaw Blvd.</td>
</tr>
<tr>
<td></td>
<td>H. L. Uting</td>
<td>719 13th St.</td>
</tr>
<tr>
<td></td>
<td>M. E. Nussert</td>
<td>719 13th St.</td>
</tr>
<tr>
<td></td>
<td>H. C. Bruckwic</td>
<td>2544 Crenshaw Blvd.</td>
</tr>
<tr>
<td></td>
<td>P. W. Domm</td>
<td>719 13th St.</td>
</tr>
<tr>
<td></td>
<td>Stanley Hapay</td>
<td>719 13th St.</td>
</tr>
<tr>
<td></td>
<td>K. A. Mantini</td>
<td>719 13th St.</td>
</tr>
<tr>
<td></td>
<td>W. C. H. Conover</td>
<td>719 13th St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROANOKE DIVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W. T. Gravo</td>
<td>424 Main St., Box 245</td>
</tr>
<tr>
<td></td>
<td>J. L. Muzzy</td>
<td>424 Main St., Box 245</td>
</tr>
<tr>
<td></td>
<td>J. E. Walsby</td>
<td>424 Main St., Box 245</td>
</tr>
<tr>
<td></td>
<td>R. L. Morris</td>
<td>118 Cambridge Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROCKY MOUNTAIN DIVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N. B. Hood</td>
<td>1202 S. Ash St.</td>
</tr>
<tr>
<td></td>
<td>P. H. Segal</td>
<td>1040 30th Rd.</td>
</tr>
<tr>
<td></td>
<td>A. Johnson</td>
<td>217 7th St. Highway</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOUTHEASTERN DIVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>H. L. Reed</td>
<td>17 Shadow Lawn Ave.</td>
</tr>
<tr>
<td></td>
<td>A. D. Young</td>
<td>2940 Wofford Campus</td>
</tr>
<tr>
<td></td>
<td>H. S. Goodman</td>
<td>2940 Wofford Campus</td>
</tr>
<tr>
<td></td>
<td>C. F. Clark</td>
<td>2940 Wofford Campus</td>
</tr>
<tr>
<td></td>
<td>J. M. R. Thayer</td>
<td>2940 Wofford Campus</td>
</tr>
<tr>
<td></td>
<td>Luis Reyna</td>
<td>2940 Wofford Campus</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WEST GULF DIVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M. O. Oettle</td>
<td>2916 University Ave.</td>
</tr>
<tr>
<td></td>
<td>K. M. Ester</td>
<td>2916 University Ave.</td>
</tr>
<tr>
<td></td>
<td>F. A. Shinn</td>
<td>2916 University Ave.</td>
</tr>
<tr>
<td></td>
<td>W. H. Forrester</td>
<td>2916 University Ave.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MARITIME DIVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W. C. Berrett</td>
<td>14 Sinclair St.</td>
</tr>
<tr>
<td></td>
<td>W. M. Reyburn</td>
<td>606 N. 7th St.</td>
</tr>
<tr>
<td></td>
<td>R. K. Lacey</td>
<td>606 N. 7th St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ONTARIO DIVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wm. M. Sutton</td>
<td>1899 Beverley St.</td>
</tr>
<tr>
<td></td>
<td>W. C. Steen</td>
<td>1899 Beverley St.</td>
</tr>
<tr>
<td></td>
<td>J. H. Haye</td>
<td>1899 Beverley St.</td>
</tr>
<tr>
<td></td>
<td>F. A. A. Hassan</td>
<td>1899 Beverley St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QUEBEC DIVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>J. V. Arzla</td>
<td>803 Decarie Blvd.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VANCOUVER DIVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wm. J. Rosen</td>
<td>1899 Beverley St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WINNIPÉGE DIVISION</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wm. J. R. Rosen</td>
<td>1899 Beverley St.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The HORN
with the “WHY”

When you first hear Radio through the Jewett Superspeaker, you marvel at the amazing accuracy and volume of the reproduction.

Yet there is no mystery in Superspeaker performance; it is based on laws you yourself can easily understand.

One could never jam the massed harmony of a full brass band through the eye of a needle. So the Superspeaker horn is ample in size for the work it must do.

Also sound, as you know, moves in a direct line. The Superspeaker throat is therefore straight as an organ pipe, avoiding the bugling effect due to the crooks or curves. And its inner surface is smooth and glossy, never tripping or confusing the waves of music or voice.

Just listen to The Superspeaker! Compare its performance with that of any other loud speaker in the world! The difference will amaze you.

No extra batteries—Exclusive air-gap adjustment to modify results from nearby stations, and increase strength of those from far away—A true musical instrument, built and guaranteed by the million-dollar company whose name it bears. Sweep the ether with a Superspeaker!

JEWETT RADIO & PHONOGRAPH COMPANY
5674 TELEGRAPH RD., PONTIAC, MICH.
THE AMERICAN RADIO RELAY LEAGUE

The American Radio Relay League, Inc., is a non-commercial association of radio amateurs, bonded for the promotion of interest in amateur radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is non-commercial 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 world and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisites. Correspondence should be addressed to the Secretary.

OFFICERS

President
HIRAM PERCY MAXIM
Hartford, Conn.

Vice-President
CHAS. H. STEWART
St. David's, Pa.

Traffic Manager
F. H. SCHNELL
1045 Main St.
Hartford, Conn.

Canadian Gen. Manager
A. H. K. RUSSELL
6 Mail Bldg.,
Toronto, Ont.

Treasurer
A. A. HEBERT
Hartford, Conn.

Secretary
K. B. WARNER
Hartford, Conn.

DIRECTORS

President
HIRAM PERCY MAXIM
Drawer 4,
Hartford, Conn.

Vice-President
CHAS. H. STEWART
St. David's Pa.

Canada
A. H. K. RUSSELL
6 Mail Bldg.,
Toronto, Ont.

Atlantic Division
GEO. L. HIDWELL
1245 Evars St., N. E.,
Washington, D. C.

Central Division
CLYDE E. DARR
137 Hill Ave., Highland Park,
Detroit, Mich.

Delta Division
REYN. P. PAINTER
424 Hamilton Nat'l Bank Bldg.,
Chattanooga, Tenn.

Hudson Division
DR. LAWRENCE J. DUNN
480 East 19th St.,
Brooklyn, N. Y.

Midwest Division
L. ROYD LAIZURE
80th & Mercei Sts., R. F. D. 1,
Kansas City, Mo.

New England Division
DR. ELLIOT A. WHITE
Apt. E, The Parker, N. Park St.,
Hanover, N. H.

Northwestern Division
K. W. WEINGARTEN
3210 No. 34th St.,
Tacoma, Wash.

Pacific Division
ALLEN H. BABCOCK
65 Market St.,
San Francisco

Roanoke Division
W. TREDWAY GRAVELY
508 Main St.,
Danville, Va.

Rocky Mountain Division
PAUL M. SEGAL
404 Equitable Bldg.,
Denver, Colo.

Southeastern Division
HARRY F. DOBBS
c/o Dobbs & Wey Co.,
Atlanta, Ga.

Southwestern Division
FRANK M. CORLETT
2515 Catherine St.,
Dallas, Tex.

Address General Correspondence to Executive Headquarters, Hartford, Conn.
Local Vigilance Committee

In the preceding two issues of QST we have discussed on this page what we conceive to be the burning question of the day in amateur radio—the relations of transmitting amateur and listener in the matter of local interference. We have said that this situation was a critical one, that it demanded nice co-operation, and that it was only by the amateur taking the initiative in his locality that it could be remedied.

There is still time to prevent any permanent embarrassment of amateur radio if we act promptly. Our Executive Committee has met and considered the subject. The problem was to find a system to insure the inauguration of local co-operation and to provide for its maintenance to the point where misunderstandings were dissipated. As a result there is coming into being the scheme of A.R.R.L. Local Vigilance Committees, announced in the traffic section of our last number.

These Local Vigilance Committees are being formed by the Traffic Department in every city where there is trouble. They have five members: three transmitting amateurs who are members of the League, a representative local broadcast listener, and a member of the Publicity Department or a press representative. It will be the purpose of these committees to arrange for local co-operation between amateurs and listeners, to the end that understanding and harmony may prevail. Through the press they will announce their existence and solicit interference reports from the public; they will endeavor to identify the causes of the interferences experienced and cure them, and, when the causes are beyond their control, explain to the aggrieved parties what they are. If reports are received of interference by actual amateur operation, the committee will act as a clearing house to pass these reports to the amateur concerned, in order that he may do what is necessary to minimize the interference, either by correcting the adjustment of his transmitter or by visiting and endeavoring to assist the listeners who have been inconvenienced. The committee will also be able to exercise the necessary influence upon violators of law or flagrant interference, should any be encountered.

It will be seen that this idea of local committees is but an extension of the ideas we have advanced in our preceding two issues. We now establish local machinery to put into effect these plans for co-operation which have proved good. A.R.R.L. Headquarters asks that every League member give the fullest measure of co-operation to his local Vigilance Committee and do his best to accomplish the ends for which these committees were created.

The I.A.R.U. Congress

As this issue of QST goes on the press there will be convening in Paris a congress of delegates from the national radio societies of the world, meeting in accordance with a proposal made by the A.R.R.L. a year ago, to form an International Amateur Radio Union.

It is too early to predict the results. We do not know how representative the attendance actually will be, nor how well the various countries will pull together. Our A.R.R.L. representative, our president, has been instructed by our Board of Directors to work in the I.A.R.U. for those same principles for which our A.R.R.L. exists—the advancement of two-way amateur radio communication and amateur experimentation. We hope that the representatives of every country will be possessed of the same idea, for to us there seems to be no useful end to be attained by the international organization of such classes of radio users as concert listeners, etc., who really have no international relations.

On the other hand the time has arrived when the two-way telegraphers and experimenters actually need organization and coordination. We need international headquarters to co-ordinate international operating, handling such matters as intermediates, callbooks, wave lengths, traffic procedure, etc.; we need an international bureau to undertake the encouragement and growth of amateur radio in every country of the world, the dissemination of technical information, the removal of restrictions upon amateur operating. For the true purpose of an international amateur union should be to hasten that day when there will be large numbers of privately-owned stations in every country of the world, all freely communicating with each other.

When Amateur Radio can accomplish this thing it will have made a magnificent contribution to the progress of world understanding. It is towards this that the A.R.R.L. delegation will be working.

--- Kenneth Bryant Warner,
Pioneer Short-Wave Work
By Frank C. Jones*

Three of us started out last fall to find out something about short waves. The three were Messrs. L. D. Grignon, S. M. Hudd and myself. None of us knew anything about wavelengths below 3 meters and we had to start blindly. For example, when we started to make a reflector for the sending set we did not know how long to make the wires, how many of them to use or what focal length to give the reflector. We just went ahead and started cutting wire until we got things approximately right.

We tried various oscillator circuits until, in December, we got down to 1.2 meters, and then went back up to 3 meters where we made sending tests, using the station call 6XM. Since that we have worked at a variety of waves between 1 and 20 meters and that is our story.

The 5-Watt Sending Sets
Several 3-meter oscillators and one 1.2-meter oscillator were built. The 3-meter oscillators are shown in the photographs. All 3 sets used the circuits shown in Figs. 1 and 2. These sets used 5-watt tubes with the bases removed. The filament and plate supply for the portable set (Fig. 1) were both obtained from the same portable 12-volt storage battery.

The fixed set was used with a special antenna system which will be described later. It is shown in Figs. 2 and 4 and the photograph.

The Receivers
Two portable receivers were made using the same circuit as the sending set. The complete receiving circuit is shown in Fig. 3.

Field Antenna
The portable field sets were used with single-wire antennas. For best results these antennas had to have a length equal to 1, 3, 5 or more wavelengths, minus a small amount that had to be determined by experiment.¹

¹ A single reflector wire would want to have a length of almost exactly ¼ wavelength, minus a very small amount because the earth is nearby. As more wires are added they tend to load each other because of capacity effect and hence have to be made a little shorter.

In addition to this there is another effect—waves travel a bit slower in wire than in ether, therefore the wavelength measured on a wire is less than the wavelength in the ether. It is doubtful if this effect can be measured.
When working at 3 meters it was convenient to use a wire almost 2 wavelengths long. Since the wavelength did not need to be exactly 3 meters it was easiest to make the wire 6 meters long and then tune the sending set to it.

The single-wire field antenna was put up at any place by the simple process of tossing a cord over a tree limb and hoisting up the insulator and wire until the latter was stretched fairly tight.

Reflector-Antenna at 6XM

The sending set at 6XM was provided with a reflector system to make it more effective. The idea is just the same as that of putting a reflector behind an automobile lamp—far more energy goes to the place where it is wanted and less goes scattering around.

The best shape for the reflector (just as in the case of the auto headlamp) is a parabola and a solid sheet of metal bent to that shape is what one would think of first. However that is hardly practical and the next thing is to try a reflector made of vertical wires. The arrangement of these reflector wires can be seen from the photo of the equipment at 6XM and Fig. 2.

The reflector is in the shape of a parabola with the vertical aerial at the focus of the parabola. The antenna and reflector wires are all held by a wooden frame light enough to be moved around by two men. The photograph shows 5 reflector-wires in place with the antenna at the focus and a receiving set coupled to the antenna with the aid of an R.F. transmission line.

The reflector system is about 4 feet above the lower end of the frame because it is used on a tin roof and we were anxious to keep the radiating system away from this grounded metal.

The reflector wires are \( \frac{1}{2} \) wavelength long, minus an inch or so to compensate for the loading effect of nearby wires and other equipment. For 3 meters wavelength the wires could be 1.5 meters, 3 meters or 4.5 meters long and it was most convenient to make them 1.5 meters long. The antenna was of approximately the same overall length with a single 3' turn at the center to permit coupling to the R.F. transmission line.

The lower end of the R.F. line was coupled to the sending or receiving set, depending on which we were using.

Design of the Reflector

The parabola could be designed with the focus \( \frac{1}{4} \) or \( \frac{1}{3} \) wavelength from the vertex. (See Fig. 1.) \( \frac{1}{4} \) wavelength is probably best so as to give correct phase relation between the waves reflected from all the wires.

The number of wires to be used in the reflector and their exact length had to be found by experiment and this was the first thing undertaken.

Reflector Tests

The 5-watt sending set of Fig. 2 was put into operation at 6XM and a field measurement set was taken out to determine the effect of different changes in the reflector system.

It was necessary to have some way of determining the field strength and after several other plans had been tried we settled on the equipment shown in Fig. 5. We used a single-wire vertical antenna with a thermo-couple at the center. A pair of R.F. chokes, a two-wire line and a portable galvanometer completed the layout.

This receiving equipment was set up at a fixed point and the reflector at 6XM was equipped with 14 wires, each 4' 8" long. Then by turning the reflector to different positions and taking reading on the receiv-
ing galvanometer we could obtain a curve proportional to received energy. The first curve is shown in Fig. 6 and has a “back loop” that was not expected.

The reason for this loop was as follows. When the reflector was turned with its open side away from the receiving station it happened to be pointed toward a damp stone wall. This wall reflected some of the energy which then went toward the receiving set.

Without changing anything else all of the reflector wires were made 1” shorter. This gave stronger signals as is shown by Fig. 7 but the back-loop was still there because the stone wall was still there.

Without changing anything else all of the reflector wires were made 1” shorter. This gave stronger signals as is shown by Fig. 7 but the back-loop was still there because the stone wall was still there.

The wires were then cut off another inch (now 4’ 6”) and the whole reflector moved away from the wall. Fig. 8 shows that the reflection was not quite so good but that the back loop was almost gone. Since wires 4’ 7” long appeared to give the best results, this kind was tried again while the reflector was distant from the stone wall. Fig. 9 shows that this gave good reflection with practically no back loop.

The Number of Wires

We next tried changing the number of wires. Figures 10, 11 and 12 show that the back loop became smaller and smaller but that the “beam” became wider as the number of wires was cut down. Also—as the number of wires became less the wavelength of the reflector system dropped a little so that better results were had with a wave somewhat below 8 meters. In the final reflector of Fig. 13, 5 wires were used and these were lengthened to 4’ 9¼” to make up for the lesser capacity between wires.
Discussion of the Curves

The polar curves show pretty well the results obtained with the reflector which had an aperture of one wavelength. These curves (Figs. 6-13) were taken with the T.C. and galvanometer already described. The reflector at 6XM was turned through 20 degrees for each reading and about 18 curves were taken. The deflections of the galvanometer were plotted and since a T.C. was used the curves are not really field-intensity because the galvanometer gives current-squared readings. Actually the field would be better than these curves would show—that is the beam would be much sharper. However, they do show which reflector is the best and they give a good idea of the field shape, so that it can be predicted with a good deal of accuracy.

A reflector with a larger aperture and with the sides extended would give a much sharper beam and also less back leakage. By using a reflector with a very large aperture (5 to 10 wavelengths) and a wire-spacing of \( \frac{1}{4} \) wavelength or even \( \frac{1}{8} \) wavelength, we would get an excellent beam with practically no back leakage.

The curves show that the closer the wires the sharper the beam, also the greater the back leakage.

Advantage of Reflector

With only 3 wires used the gain in received power was about 10/1. This is compared with a simple sending antenna without a reflector. By using such reflectors at BOTH the sending and receiving ends the received energy should go up in a ratio of 100/1, and with better design of the reflectors the ratio would be even higher and might approach 1000/1.

The use of a reflector at the receiving end was well brought out in one of our experiments where we were using a milliam­meter at the center of a vertical receiving wire 1.5 meters long. By merely walking up to the antenna from the rear or sides one person could increase the current in the receiving antenna from 40 milliamperes to 80 milliamperes. As he got closer to the antenna the current went down again. His body acted as a reflector when he was the proper distance away, the waves hitting his body and bouncing back to the antenna. When the person comes still closer the reflected waves are out of phase or else the antenna resistance is increased.

These effects were the reasons why we had to use an R.F. transmission line so that the observer could read the galvanometer without upsetting things. With the transmission line we could keep the galvanometer and the observer out of the beam.

Wavemeters

To make all this work possible it was necessary to have some wavemeters. Wavemeters going down to 1.5 meters were constructed and are shown in the photograph. They were calibrated by the use of Lecher wires. The parallel wires were about 3" apart, and the nodes were located by means of a thermo-galvanometer suspended from a straight piece of No. 14 bare wire which went through the gal­vanometer binding posts and hooked across the parallel Lecher wires. This method is quite accurate, much more so than when using a Neon tube at the voltage antinode.

See page 16 of October, 1924, QST. In Mr. Jones' improved method the thermo-galvanometer is hung from the bridge B in Fig. 3F of the article above mentioned.
Fig. 6. 14 reflector wires 4' 8" long, spacing 1'. Wavelength 3 meters. Back loop mainly due to reflection from moist stone wall.

Fig. 7. 14 reflector wires 4' 4" long, spacing 1'. Wavelength 3 meters. Back loop mainly due to reflection from moist stone wall.

Fig. 8. 14 reflector wires 4' 6" long, spacing 1'. Wavelength 3 meters. Back loop smaller since reflector further from wall.

Fig. 9. 14 reflector wires 4' 7" long, spacing 1'. Wavelength 2.94 meters.

Fig. 10. 14 reflector wires 4' 7" long, spacing 1'. Wavelength 3 meters. (Compare with Figs. 8 and 9.)

Fig. 11. 8 reflector wires 4' 7" long, spacing 2'. Wavelength 2.96 meters. (Compare with Figs. 8, 9, 10.)

Fig. 12. 3 reflector wires, 4' 9.5" long, spacing ½ wavelength. Wavelength 3 meters.

Fig. 13. 5 reflector wires, 4' 9.5" long, spacing ⅜ wavelength. Wavelength 3 meters.
Other Effects

The signals from the transmitter are quite strong at a receiving set right under the tin roof on which the sending set is located. This does not seem reasonable.

Field Tests

The portable sending and receiving sets were taken into the field and two-way communication established easily at 1 1/4 mile, then at 3 1/2 miles. The sets at 6XM used the reflector-antenna. The portable sending set (with the spark-coil supply) used a single wire coupled to the set through wavelengths long the other day and found that worked very well. No receiving antenna at all was used at the field receiving set, but the signals were strong at 3 1/2 miles.

In these tests the field set was operating with a plate current of about 20 milliamperes from the spark coil. The signal was smooth and easily read at 6XM. On the other hand, the signal from the set at 6XM was somewhat rough and the wavelength gradually went up after the set was started. A final wave was reached after a while. This was probably due to the generator, as it took some time to heat up, and a change in voltage changes the tube-frequency considerably. However, the tube may have had something to do with it.

Longer Distances

The distance was then gradually increased and at 14 miles the signals were still fairly strong but very hard to copy because of the poor tone of the transmitter, overly fast sending by the operator at 6XM, and also because of a peculiar sort of fading. It is hard to say if the poor tone of 6XM was caused by something at the sending station or by audio-frequency fading.

The signal strength was enough so that it seemed likely that even with such low power the signal should have been easily audible at 25 miles. Lack of time prevented trying these distances at that time.

In these tests the receiver was a detector-one-step affair working on a one-wire antenna 3 wavelengths (9 meters) long. An open-ended coil at the bottom of this antenna was loosely coupled to the receiving set.

Effect of Hills

At the 14-mile point the single wire antenna was hoisted up by throwing a string over a guy wire (between 2 'phone
poles) and pulling the antenna up within a foot of the guy wire. The signals were picked up on schedule.

However, when another point only 10 miles from 6XM was tried no signals were heard. This spot was located at "O" in Fig. 14. The tip of the antenna was just about level with the top of the hill but nothing came through. By moving only 200 yards to the top of the hill at "X" we at once received strong signals, although we were still behind the higher hills.

Tube Troubles

During all these tests with 5-watt tubes much trouble was had with the tube bases. One afternoon two 5-watt oscillators were being operated. The plate current of one stayed steady but the other gradually took more and more current until a hot-spot developed on the stem and burned through, becoming a flashover. The glass warms up and becomes conducting more readily on these short waves than on the longer waves—although we used only 400 volts.

Long-Range Tests

Tests are now being made with 8XC, the station of Dawson Bliley at Erie, Pa. For this long-distance work a 50-watt oscillator was constructed and first tried on 20 meters. At this wavelength daylight transcontinental work was done easily. The circuit of this set is shown in Fig. 15. The antenna was of the same sort as has been described before.

The wave was then dropped to 13 meters, and 9APE at 1500 miles (J. G. Lotter, St. Paul, Minn.) worked easily.

Next a Sunday schedule with 8XC was arranged and special equipment put in for it. This equipment will be described in more detail.

The 8XC-6XM Tests

In the tests it was decided to operate 8XC at 6 meters and 6XM at 5.03 to 5.05 meters. The sending set at 6XM is the 50-watt oscillator that has just been described. It operates with a vertical copper-tube antenna 2 wavelengths, or ten meters, long. Very good output is obtained.

The receiving set is an improved one with both the plate and the grid circuits tuned. It is shown in one of the photographs. This set tunes from 4.3 to 120 meters by simply changing the coils, and is a great relief from other 5-meter re-

* Tube manufacturers please take notice. We have been asking for "double-ended" tubes for years—now we must have them.
Visible Radio Communication

By Dan C. Wilkerson

It is a rare thing that anybody does anything for the transmitting branch of the American radio amateur fraternity. The transmitting man has had a hard row to hoe. He has met everything from the complaints of his younger brother and the broadcast listener to the complete dismantling of his station during the war.

But he is not kicking. On the contrary he is solving the problems of the radio industry two years ahead of the industry itself.

A notable example of this is in the matter of short waves. Before the commercial interests had gone very far in this direction many amateurs were—and are—doing pioneer work.

This brings us to our subject—somebody is going to do something for the transmitting branch of the house. That somebody is C. Francis Jenkins and what he proposes is to add visible radio to our old friend audible radio. This is how he proposes to do it.

He plans to build small compact automatic send-and-receive picture machines to be sold at a price within the reach of the average amateur's pocketbook. He does not expect to make a big profit—in fact he will be surprised if he accidentally makes any at all. He does want to get the sending radio amateur to experiment with the operation of photo-transmission machinery.

To make the purpose of the machines perfectly clear they will be issued with the restriction that they cannot be used for profit and that they must not be used to compete with any commercial company which will handle radio photo news.

The Visible Radio Transmitters

Mr. Jenkins has worked out four or five different models of his automatic facsimile machine. The cheapest one will sell for $45 according to present plans. It will consist of a framework below which projects a shaft carrying a friction roller. The whole machine can be set on any phonograph of the disc variety with the friction roller against the turntable of the phonograph. The Jenkins machine is then driven by the friction roller and shaft. Since the photograph has an excellent governor this will provide a good steady drive. The Jenkins machine is both a sending and a receiving device.

A somewhat better model will be equipped with an electric motor. This will permit very easy adjustment of the speed to agree exactly with that of a distant machine of the same sort. This machine will probably sell for about $160.

The Jenkins Duplex Photogram Machine

Which simultaneously sends and receives, by radio or by wire, photographic copies of messages, letters, sketches, maps, pictures, etc.

The models we have been talking about are of the drum variety, the picture to be sent being wrapped around the drum at the sending end and the reproduction at the receiving end being made on a similar drum.

In the higher types a continuous strip of photographic paper is fed into the receiving machine and it will reproduce press dispatches at high speed until the paper runs out. This model will be more costly than the two described above because the continuous-strip method of operation requires an optical method of light-intensity reproducing.
tion. This optical method has been attempted in many ways but the most satisfactory and speediest is that of the double rotating prism devised by Jenkins. These large glass prisms are expensive and must be carefully ground by expert optical hands. Mr. Jenkins stated to the writer that he

sage traffic is not as high as it was.

Something new is needed and Mr. Jenkins has presented his proposition at an opportune moment. The transmission of handwriting, line drawings and typewritten pages will certainly add greatly to the zest of amateur transmission.

Can you picture the new enthusiasm of a President-Governors' relay in which the message went in the handwriting of the Governors? Would there not be a great thrill in delivering at Washington a message in the hand of the Governor of California?

The Jenkins machine will automatically send and receive at the same time. The speed at which traffic can be forwarded depends only on the skill of the operator.

Operation

The greatest problem to face the amateur who is equipped with one of these machines is that of synchronization. Mr. Jenkins has built one type of machine which gets its driving action from the turntable of the ordinary talking machine. There is a talking machine in practically every home today. Nearly all of the better class of talking machines have a means for regulating

Where We Come In

What has all this to do with the sending amateur?

Here is the real point. The American amateur is an expert at short-wave transmission. He has had a running start on the large industrial and research laboratories. This has been partly a matter of necessity because he has been assigned wavebands within which he must work—even though these bands were picked out at his own suggestion.

Now radio photographs lend themselves readily to short-wave transmission by dark or daylight. They can be sent with transmitters using C.W., modulated C.W., I.C.W. and with modified spark and arc.

Right now the amateur transmitter is up against it for something to send. Most of the clan are now working on short-wave apparatus because they have been told to outlaw the usual routine of “Hope you are well, sgs FB 73 OM CU AGN”. The development work has its advantages but mes-

---

1 Let’s see: “C.W.” means 9EK, “modulated C.W.” means all the rest of us, “ICW” would be 9VQ; but where, oh where, is the old-fashioned hardshell that still has a SPARK?

2 We can then send out “No. 2” while “No. 3” is arriving. It is just one step further until we can make the whole thing purely automatic.
speed, and some of them have visible-reading dial pointers which tell the speed of the turntable in revolutions per minute.

If there be a need for sending the first facsimile on to another station, Parks at Washington can take his received facsimile message, and place it on the transmitting drum, and send it along while he is getting another facsimile from Hartford.

This dual transmission and reception will require a separation of transmission and reception equipment so that the radiated impulses from the transmitter will not interfere with the reception.

The beam transmitter idea coupled with the short wave will prove a fruitful field for experiment here.

One proposition now being finally worked out by Mr. Jenkins is the matter of methods of reproduction. He has one machine set up with an electrical stylus, and his paper coated with an electro-sensitive paper. When the current impulse varies, the stylus inscribes a variable continuous line, thicker, thinner, open white or heavy black, in keeping with the character of the received signal.

Examples of the work of the Jenkins System

It will not be difficult for amateurs to synchronize their talking machine motors at an even speed by ordinary code, and no doubt a constant speed of 78 or 72 per minute will be adopted for this work.

Stopping to visualize for a moment just how the amateur will handle this equipment—here goes. Let's say that Kruse of the Hartford office wishes to send a facsimile letter to Parks at Washington. Kruse gets into communication with Washington and he asks Parks what his turntable speed is. Parks will signal back 78 or whatever it is. Kruse will verify his own turntable speed and after checking it over for several moments, he will signal Parks OK.

The next job will be to get both machines in step. A small contact stud placed in the drum of the transmitter will serve to give a constant-speed impulse. This can also be done by an original vertical guide line which will be repeated as a dot coming at even intervals. This will show the receiver at once whether or not he is properly synchronized.

With synchronism established the facsimile reproduction is begun.

Jenkins duplex machine for home use, driven by table of ordinary phonograph.
giving a variable current from the resistance of the pencil line, which is carbon; and the other, a simple photo-electric means where the emitted pencil of light, varied by the light and dark spots on the transmission negative, is projected on a light-sensitive cell which in turn is put into the modulator or control circuit of the radio transmitter.

The giving of this idea to the amateur at low cost will open the field of experiment for the radio amateur immeasurably. It will without question hasten the arrival of the day of the perfect radio transmission of vision. Mr. Jenkins already has given laboratory demonstrations of radio-vision transmission, and he stated in a recent interview that he proposed to stage a large public demonstration just as soon as the equipment now being built in his laboratory is completed.

It is unusual to find an inventor of the degree of success of Mr. Jenkins willing to donate a part of his wonderful work to the much-maligned sending amateur.

The present radio transmission patent situation would seem to preclude any immediate commercial development in radio photo transmission, unless a more generous policy is developed by the firms holding essential equipment and patents. The art of radio-photography is yet in its infancy, and the amateur thus far hasn't done a great deal with it, if anything at all.

Mr. Jenkins has asked this writer what he thought of the proposition to place these picture transmitters in the hands of the amateur and this writer is passing the query along to the amateur himself for answer. Does the amateur want it? Will it add to our radio knowledge and interest? Will it make radio more worthwhile for the amateur? Will it be the means of further discovery and enlarging of the amateur field of activity?

I leave the answer in more capable hands.

---

Award Announcement for Radio Suggestions

By C. Francis Jenkins

RECOGNIZING that it was the amateur who developed audible radio, and desiring to see radio pictures developed in the same quick order, I am offering cash prizes for suggestions (1) for a medium in which pictures, handwriting, sketches, etc., can be put on cylinders from which to send them by radio or by wire; and (2) for a medium to be put on a similar cylinder on which to receive these pictures, handwriting, etc.

There is a first prize of $100; a second prize of $50; and a third prize of $25, to be awarded every sixty days, for the best three suggestions submitted during the respective periods, and to be repeated until the offer is withdrawn.

The gentlemen who have consented to act as judges are Mr. Kenneth B. Warner, Secretary, American Radio Relay League; Dr. A. Hoyt Taylor, Physicist, Bellevue Naval Research Laboratories; and Major J. O. Mauborgne, Signal Corps, U. S. Army. Their decision will be accepted by me as binding.

Equal weight will be given the following: (1) simplicity of preparation; (2) availability of materials; (3) low materials cost; (4) simplicity of operation; and (5) simplicity of mechanism to be used therewith.

If no “best” of both sending and receiving medium is sent in by the same party, the awards will be equally divided between the best suggested sending and the best suggested receiving medium.

There is but one condition, namely, the scheme proposed must be one not disclosed in my book, “Radio Vision and Radio Pictures”. (I would hardly want to pay for my own suggestions.) The book mentions picture transparencies, etched zincs, swelled gelatine, etc., for sending mediums; and photo paper, electrolytic paper, inked surfaces, etc., for receiving mediums.
The Sacred Angle
By A. L. Budlong*

Once upon a time a man named Hazeltine built a set called the Neutrodyne. In it he had a nice lot of coils, and in order for the set to work, it was necessary that there be no coupling between the coils. So, either by mathematics, or the hunt-until-you-find-it method, he adjusted the coils until they were at such an angle that there was no coupling between them.

Shortly after this some manufacturers took up the Neutrodyne and, since they also wanted to have sets in which no coupling would take place, they carefully measured the angle of the coils on the original Neutrodyne, and made their coils at this same angle. And this angle was 54.7 Degrees, and no other angle could possibly be correct.

It is just a little wearying to see follow-the-leader played so much in radio. Our own QST once published a series of articles on low-loss receivers. A little more than a year later, “low loss” is everywhere, and practically none of it is any improvement over the original information. Cardwell brought out a low-loss condenser. It took months for any other manufacturer to get up sufficient ambition and originality to develop a low-loss condenser that wasn't almost an exact copy of either the Cardwell or the original General Radio Precision condenser.

The same comments apply to the “Sacred Angle” in the neutrodyne. Simply because the angle of the original set happened to be 54.7 degrees, manufacturers, “radio engineers” and others confidently assure the prospective builder that the correct angle for all coils and any set is the same 54.7 degrees. It has even got to the point where some enterprising firm put out a little protractor device adjusted to 54.7 degrees, to be used in coil adjustment!

54.7° Not Necessarily Correct
The nice part about it all is this: 54.7 degrees is not necessarily the correct angle.

* Experimenters' Section A. R. R. L.
Referring to Fig. 4, suppose we take a coil “A” and pass a current through it. A field will be set up, this field being shown by the dotted lines. Now, if we mount another coil at such an angle that the field passes through it at right angles to the axis, we will not get any coupling between the two. In Fig. 4, for instance, there is no coupling between coils, “C”, “D”, “E” and the main coil “A”. A little inspection will show that in each of the three coils mentioned, the lines of force from “A” cut through at right angles to the axes of coils “C”, “D” and “E”. No coupling exists.

If we wish to get coupling, all we have to do is to shift the positions of the coils until the lines of force in the field from “A” cut through the axes at any angle other than a right angle. The best coupling value is secured when the lines of force in the field from “A” are parallel to the axes of the coils. In the positions “B” and “D-1”, therefore, we get good coupling to coil “A.”

FIG. 5

How the Shape of the Coils Changes the “No-Coupling Angle”

In Fig. 5 we show three neutrodyne transformers so placed that the coupling between them is zero, because the lines of force cut through at right angles to the axes. Now, if we mount these coils on a panel, as indicated, we will find that the coils make angles (A) with the base of the panel, and it is this angle which is usually referred to as the 54.7-degree angle.

In Fig. 6 (a) we have two transformers mounted at the correct no-coupling angle, the lines of force from one cutting through the other at right angles to the axis. Now, in Fig. 6 (b) we have the same size panel, the same distance between the coils, and the same angle “A”; but we have changed the length-diameter ratio of the coil, with a long skinny coil instead of the short, nearly square winding in (a). Note that the lines of force from the left-hand coil in (b) no longer cut through the other coil at right angles. In other words, although we have used the “sacred angle,” it is not correct, because, due to the change in shape of the coils, we have changed the shape of the field, and are now getting coupling where before we had none. The angle was correct for the short coils in (a), but it is not correct for the long coils in (b).

By tilting the long coils in (b) to the more acute angle shown in (c), we can again arrive at a point of no coupling, however.

From this it can be seen that the no-coupling angle changes with the shape of the coils.

Read that again, because it is the main point of this article. The no-coupling angle—which is the “Sacred Angle”—changes with the shape of the coils. This means that 54.7 degrees is correct only for certain shapes of coils; if we change the shape, the angle will also change.

FIG. 6

Other Methods

There are two other ways in which the coupling can be reduced, one of which is by moving the coils some distance apart. In Fig. 7 we have coil “A” with a field around it. This field is very strong near the coil, but gets weaker and weaker as you get further from “A.” If we put another coil “B” near “A” we will have close coupling, i.e., very strong coupling. However, if we take “B” and put it out at “C” for instance,
we would still have coupling, but it would be so weak that very little of the current in “A” would circulate in “C.” For safe operation, the distance should be several feet, so it can be seen that this method is not the most practicable to use.

The other method is to use shielding between the adjacent stages, and perhaps this is the best of all.

Well, anyway, we’ve had a nice time destroying the “Sacred Angle” superstition, haven’t we?

Official Wavelength Stations

THE A.R.R.L. Official Wavelength Stations that have been appointed by Messrs. D. C. Wallace and C. M. Jansky, Jr., are as follows:

1. NKF 20
2. 1XAM 21
3. 3GBQ 22
4. 7BK 23
5. 5MN 24
6. 9AAL 25
7. 2AC 26
8. 7WG 27
9. 9ZT-9XAX 28
10. 1MK 29
11. 8GU-8XG 30
12. 9XI 31
13. 1CK 32
14. 1AWW 33
15. 3BE-3XW 34
16. 8AA 35
17. 8CG 36
18. 3APY 37
19. 4XE

The number is now so large that everyone can use these O.W.L. stations to spot calibration points on wavemeters and tuners. As we have explained before—there will be no schedules, the stations will simply carry on their regular work on the 5, 20, 40, 80 and 150 meter bands, announcing the wave they are using at the close of each sending. For instance, 9ZT will finish up “u 9ZT 76” or “u 9ZT 180” or “u 9ZT 42”

This is not the same thing as the Bureau of Standards system, since there are no regular schedules and there is no attempt to secure the extreme accuracy that is provided by WWV, 9XI and 6XBM. The O.W.L.S. can be depended on to 1% however in most cases and 9ZT-9XAX checks them up regularly to see that their waves are correct.

All correspondence regarding O.W.L.S. should go to D. C. Wallace, 54 Penn. Ave., Minneapolis, Minn.

WWV and 6XBM Schedules

THE standard frequency signals from WWV, Washington, D. C., and 6XBM Stanford University, California, are as follows. For further information regarding these signals see page 34 of the March issue of QST and Bureau of Standards Letter Circular No. 92. The former can be obtained from QST Circulation Manager, Hartford, and the latter from the Bureau of Standards.

Schedule of Frequencies in Kilocycles

(Approximate wavelengths in meters in parentheses)

<table>
<thead>
<tr>
<th>Time</th>
<th>Apr. 6</th>
<th>Apr. 20</th>
<th>May 5</th>
<th>May 20</th>
<th>June 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:00 to 10:08 p.m.</td>
<td>1560 (475)</td>
<td>3600</td>
<td>125</td>
<td>300</td>
<td>550</td>
</tr>
<tr>
<td>10:12 to 10:20 p.m.</td>
<td>1560 (475)</td>
<td>3300</td>
<td>150</td>
<td>315</td>
<td>530</td>
</tr>
<tr>
<td>10:24 to 10:32 p.m.</td>
<td>1560 (475)</td>
<td>500</td>
<td>144</td>
<td>345</td>
<td>720</td>
</tr>
<tr>
<td>10:36 to 10:44 p.m.</td>
<td>2000 (750)</td>
<td>4000</td>
<td>135</td>
<td>325</td>
<td>630</td>
</tr>
<tr>
<td>10:48 to 10:56 p.m.</td>
<td>2000 (750)</td>
<td>4400</td>
<td>140</td>
<td>325</td>
<td>650</td>
</tr>
<tr>
<td>11:00 to 11:08 p.m.</td>
<td>2000 (750)</td>
<td>4400</td>
<td>140</td>
<td>325</td>
<td>650</td>
</tr>
<tr>
<td>11:12 to 11:20 p.m.</td>
<td>2000 (750)</td>
<td>500</td>
<td>144</td>
<td>345</td>
<td>720</td>
</tr>
<tr>
<td>11:24 to 11:32 p.m.</td>
<td>2000 (750)</td>
<td>500</td>
<td>144</td>
<td>345</td>
<td>720</td>
</tr>
</tbody>
</table>

*Eastern standard time for WWV, Washington, D. C., Pacific standard time for 6XBM, California.

Recently the New York Herald-Tribune raised a large fund by popular subscription for the purpose of providing 2000 complete broadcast receiving installations in homes of the needy blind throughout the country, under the auspices of the American Foundation for the Blind. The Adams-Morgan Co. is supplying the equipment at cost. The A.R.R.L., thru its members, is installing the sets in the homes of the blind people. Just another little chance for amateur radio to serve the community.
STATION 1ARE is located in a perfectly impossible place. The counterpoise crouches down between a pair of tall brick houses and the antenna lives on top of one of these—an arrangement that would worry any of us. Just the same 1ARE turns out the wickedest signals with no visible cause except one ordinary UV-202.

We have asked Everest to explain but he just laughs and says—"it was designed partly on purpose and partly by accident." Therefore we are going to get even by telling about his "No. 11 Airbrake Receiver"—mainly quoting from his letters.

But wait—we must first tell about the wavy mast. It is 40 feet long but only 37 feet high. This can't be true but it is just the same, the mast being 1" square and curved in a variety of ways. Lots and lots of broom-wire guys keep it from lying down but the curves change daily. The mast and guys cost 21c.

The Airbrake Receiver

The No. 11 Airbrake receiver was naturally preceded by 10 others, which lasted about 7 days apiece. It is not a wonder that No. 11 is nervous all the time and was scared badly when taken out to be photographed. Everest had to pat it on the back and speak kindly to it, after which it chirked up and the camera caught it smiling.

There is not a socket, binding post or telephone jack on the set, thereby eliminating several losses, vis. 50c, 4c and 25c.

First of all—notice the socketless socket. It causes no losses at all except to the rubber bath sponge which must furnish two little scraps of sponge rubber to put under the tube tips. The tubes stand on their heads with their feet in the air. This keeps the R. F. wiring up out of the slush.

The wiring is arranged like the piping on a battleship, each circuit is color coded so the different current will know where to go. This is partly to make the set look prettier and partly because there wasn't enough of one kind of wire.

The condenser is a 17-plate Cardwell with the plates cut back fan-fashion so that nobody will know for sure what the capacity is and can't kick because we called it a "17-plate" condenser. Incidentally this opens out the lower end of the tuning scale and pries NKF off of KDKA's wave.

The grid condenser is soldered to the detector grid-contact-pin but you can't see the gridleak which is a pencil mark. The bypass condenser around the primary of the amplifying transformer hangs from the wiring between the two tubes, not in-
tran, distinguished from the 3/1 by having the coils painted maroon.

Now then—we can't get out of talking about coils. We are afraid of this part of the subject because the Lorenz coil is supposed to be out of style and the spaced helix is the latest fashion. Well—Maybe No. 11 has that kind of coils now—the fotos are several weeks old.

For the benefit of those who cannot multiply 3 by 6 we will say that the secondary has 18 turns of No. 16 B & S gage wire wound to an average diameter of 41". The primary required to tune the 1ARE antenna to 235 meters has 9 turns of the same wire on the same form. The tickler has 15 turns on a 3¾" form carried by a small hunk of wood driven onto a shaft which projects through the panel and has a control-knob. Ordinarily no respectable tuner needs over 12 turns on the tickler but 1ARE has to use a lot of wave traps and such like to get rid of one of these birds that spends the evening talking to CQ. This extra machinery increases the resistance of the antenna system and calls for the extra 3 turns on the tickler.

The coil-mounting was given birth to by 1CLN. It was made of pipe-organ parts but meat-skewers or lollypop handles will do. The grand idea is to set the primary-secondary coupling when you have to but not to have an extra control-knob staring at you all the time. This gets the set down to 2 controls so that it can be handled by a two-handed man. Therefore one needs no help from Neutrodyne Newt, the 3-handed fellow for whom the broadcast tuners are built.

Other equipment not shown includes a cardboard cabinet and a pencil. The pencil must have an eraser so that it can be used to adjust the grid leak.

The circuit? Great cat and little kittens—haven't you guessed that yet? Of course it is the usual thing, fix-tune primary, condenser-tuned secondary, tickler regeneration control plus one step of audio. You know the circuit—it's the one that all woozydynes and super-nixies have been trying to lick for the past 5 years.

Funny how the good old "three circuit tuner" keeps on top isn't it?

P. S.—The blob of solder on the secondary is a tap for shorter waves. The switch is moved with soldering copper.

Connected ahead of an ordinary receiver it greatly reduces noises from power lines and completely eliminates some of them. We are not taking the maker's word for it—we gave it a thorough trial at several stations.

The device is shown "exploded" in our photograph. At the right is the base, then the metal shell and finally the "works". These works consist of an air-core choke coil and a fixed condenser of the proper size to give the desired action. The choke is connected between antenna and ground and most of the noises drain to ground through it. The ground post of the receiving set is connected as usual but the antenna post is connected to the top of the choke coil through the small condenser in the noise filter. Thus the noises can go to ground through the choke while the signals go through the small condenser and the primary of the receiving set.

Of course nobody claims that such a device will get rid of the rackets caused by leaking line-insulators or arcing grounds—such things are radio and will go through the set. However it will get rid of 60-cycle hums, will decrease trolley-line noises and telephone-line induction, provided these things are really coming in from the antenna and are not being dumped into the set itself by the wiring in the house wall right behind it.

It is a good little device.

An Interference Trap

The Baldwin-Pacific Noise filter, made by Baldwin-Pacific & Co., didn't sound convincing when we first saw it—but the device works, doing more than is claimed for it.

Several French amateurs are getting across to this country on 40 meters in the middle of the afternoon and through into twilight. fSBF is one of the most consistent. A few listeners for this sort of thing could do some excellent daylight DX reception.

Belgian W2 is Rudolph C. A. Couppey, 23 Rue Elise XL, Brussels, Belgium.

The Editor of The Wireless World and Radio Review is very desirous of obtaining lists of British amateur calls heard in the United States from time to time; British amateurs will be glad to see these lists published in their country. Reports of this nature will be welcome at the offices of the above-mentioned magazine at 139 Fleet Street, London, E. C. 4.
The word Isofarad (pronounced "ice-o-farad") is used for the particular circuit about to be explained as being descriptive of the principle involved. This coined word is made up of "iso" meaning equal or balanced and "farad" which conveys the meaning of capacity; and the circuit so named is one employing a balanced impedance bridge, all four arms of which are capacities. While, strictly speaking, the word "farad" refers to a unit of capacity, and not to capacity itself, yet its use is justified on the ground of euphony, as is the case with such words as neutrodyne in which "dyne" is the unit of force, and not force itself.

What Was Wanted

The qualifications which, it was felt, a circuit for broadcast reception should possess were: 1st, that it be capable of being balanced against regeneration for all frequencies without the necessity of adjusting this balance during operation; 2nd, that it be absolutely incapable of radiating; 3rd, that it be capable of great amplification per stage; 4th, that it be selective enough to meet the demands of our present congestion in the broadcast spectrum; and 5th, that it work effectively on an extremely short antenna. It is well known that circuits using simply a regenerative detector, not preceded by R.F. amplification, require a rather long antenna for long-distance reception. The introduction of such receivers as the Neutrodyne made it advisable to reduce antenna length to perhaps one-half the customary figure. The advantage in shortening the antenna lies in the higher ratio of signal to static obtainable and the limit is determined in a large degree by sensitivity. Following the idea to its logical conclusion, the greater the sensitivity of the receiver, the smaller can be the energy-collecting device; and the less troublesome will be the interference from static and local stations. Qualifications 1 and 2 are, in a sense, inter-dependent, since any receiver that requires adjustment of its anti-regenerative control will most certainly radiate at times. This applies also to circuits using a regenerative detector following one or more R.F. stages which are not in themselves completely balanced for, while as pointed out by Dr. Hull, the R.F. stage following the antenna may not break into self oscillation, it will, nevertheless, pass back to the antenna oscillations originating either in the detector or in a R.F. stage between the detector and itself.

Development

Before describing the Isofarad circuit, the writer would like first to explain a few of the developments leading up to its conception. Shortly after the beginning of the present-day popularity of broadcast reception a series of tests was carried out to determine the relative efficiency of various tuned and untuned R.F. interstage transformers.

In a tuned R.F. stage, the number of secondary turns is (neglecting the mutual inductance between primary and secondary) determined by the capacity range of the secondary tuning condenser and the frequency band to be covered.

Now if one were to believe the literature describing most of the commercial types of receivers employing R.F. amplification, the maximum gain in voltage per stage would be attained when the number of primary turns is a minimum.\(^1\) Erroneous inferences such as this are the result of considering only one of a number of factors and, in this particular case the effect of capacity coupling, percentage of flux leakage, and voltage developed across the effective primary impedance are equally important.

Figure 1 shows a standard type of tuned R.F., in which the voltage amplification is due to one tube and one transformer. It is obvious that as \(L_p\) is reduced the voltage developed across it and transferred to the secondary will diminish; so that, when \(L_p = 0\), although the turn ratio is infinitely high, the transfer of energy will be zero. In the same way, the other factors mentioned above, and the resistance of circuit \(L_C\), will affect the voltage applied to the succeeding tube. It must be remembered that we are working with very high frequencies, that we are employing air-core transformers with high flux leakages, and that the effects depend to a great extent upon resonance as contrasted with transformers of the commercial-frequency, power type employing iron cores and carefully avoiding resonance effects.

Figure 2 shows the voltage amplification obtained under certain standardized conditions from one 201A tube and its associated coupling transformer "T" in Figure 1. The transformer used was a standard type of tuned R.F. transformer and curves were run at various frequencies both with primary turns wound in contact with each other, and spaced as is usual in such transformers. Curve "A" is for spaced primary windings and "B" is for primaries wound in the form of a solenoid with adjacent turns touching each other. Both these curves are for 600 K.C. (500 meters) and are characteristic. It will be noticed that "A" rises much more quickly than "B," but that above 22 turns (which gave a primary of about the same length as the secondary) the amplification falls off rapidly. "B" rises more gradually and also attains a maximum at about the point where its length equals that of the secondary winding. It is to be understood, of course, that these exact values are open to question, as are practically all measurements of voltages and currents at radio frequencies. Admitting the possibility of such error, however, does not lessen the value of these measurements in giving comparative figures and in drawing conclusions therefrom.\(^2\)

Now if the number of primary turns be reduced to, say, 5 or less, two R.F. stages will be found perfectly stable over the entire broadcast band. Unfortunately reduc-

---

\(^1\) It certainly seems to be hard to make manufacturers of sets and parts believe this. The subject was thoroughly covered by the work of Browning and Drake; also on page 21 of April QST, but apparently it still needs to be harped on.

\(^2\) For the particular transformers used in the Isofarad, it has been found that the primary turns should be spaced about 1-16 inch. When the spacing is increased beyond ¼ inch, the energy transfer has been found to fall off rapidly.

---

In the Synchrophase, in the Synchrophase transformers a primary with a fairly large number of turns is used, these turns being spaced along the secondary. In order to reduce the capacity coupling still further, the primary is wound with a very small wire.

The market swarms with such things, most of which are worthless above 500 meters and of precious little use above 450.

---

\(^\) For the particular transformers used in the Isofarad, it has been found that the primary turns should be spaced about 1-16 inch. When the spacing is increased beyond ¼ inch, the energy transfer has been found to fall off rapidly.

So far two points have been brought out. (a) Large primaries are better than small ones. This confirms the pioneer work of Browning and Drake in their experiments at Harvard. (b) The primary turns can, under certain circumstances, be spaced to advantage. This agrees with the practice in the Grebe Synchrophase. In the Synchrophase transformers a primary with a fairly large number of turns is used, these turns being spaced along the secondary. In order to reduce the capacity coupling still further, the primary is wound with a very small wire.

The market swarms with such things, most of which are worthless above 500 meters and of precious little use above 450.
Selling Nonsense

The same effect can, of course, be obtained by introducing sufficient losses into the circuits either by the use of positive grid bias, or of series or shunt grid or plate resistance; or of resistances purposely or unintentionally introduced in condensers or coils themselves or through improper or insufficient spacing of these elements. Obviously all circuits of the "self-balanced" or "self-neutralized" type fall into this group, as do also those for which the claim is made that regeneration or oscillation is prevented by avoiding "clashing" and "distortion" of fields. Such ideas are not founded on fact and can be promulgated only because the average purchaser of a broadcast receiver is willing to believe whatever apparently explains something that he does not understand.

Much of this has already been explained elsewhere, notably by Dr. Lewis Hull, but is being incorporated here for the purpose of making this discussion as complete as possible.

If tuned circuits are so arranged (either by increasing $L_p$, or by lowering the resistance of the tuned circuit, or both) that an amplification considerably higher than 3, (as measured by our set up) per stage is obtained, a two stage amplifier will be found to be a persistent oscillator. Means other than control of filament temperature (which is common practice even in many of the so-called neutralized types of receivers) must be resorted to in order to secure stability as an amplifier. It is generally known that the greater the number of stages employed, the less gain can be had per stage without reaching the point of oscillation. As a matter of fact, when no special attempt is made to produce anti-regenerative amplification it will be found that three stages can do very little more in the way of amplification than two, so greatly must the effectiveness per stage be reduced. There is, however, one outstanding advantage incident to increasing the number of tuned stages: that is, the resultant increase in over-all selectivity. From the standpoint of practicability, however, the increased number of controls or the difficulty in controlling more than one stage by a single dial definitely limits the number of stages.

It should be understood, of course, that when the form of winding is changed to another type of coil the figures given will be affected, due to changes in magnetic and capacity coupling between windings. An example of this is to be found in the Browning-Drake R.F. transformer in which the primary consists of a concentrated inductance wound in a narrow slot under one end of the secondary. Since the magnetic flux from the primary is not spread out so as to cut as much of the secondary as is ordinarily the case, the self-inductance of the primary must be increased in order to obtain the same energy transfer. In other words the self-inductance of $L_p$ and the degree of coupling between it and $L_a$ are both factors in determining the efficacy of the device in energy transference and the results we have obtained point to the conclusion that the particular combination used has very little to do with the inherent stability of the system—that being determined chiefly by voltage step-up obtained.

Testing Neutralizing Circuits

Having determined the optimum value of primary turns for maximum energy transfer and having also found that some means must be used to stabilize circuits utilizing the resultant high amplification, this in- ding-Drake R.F. transformer in which the formation was applied to R.F. circuits utilized in the various commercial types of receivers. While most of the anti-regenerative appliances were found to function well enough with interstage transformers giving a voltage amplification per stage of 3 or less as measured by our particular apparatus, all were found to fall down when using R.F. transformers capable of giving considerably greater amplification. This rather broad statement applies to all circuits investigated which depend for reversal of phase upon attempted UNITY magnetic and zero static coupling between two coils (plate and grid). All were found to require adjustment of the regeneration-limiting-device for various settings of the tuning dials. When it is desired to leave this adjustment fixed, it is necessary to reduce the amplification to the point where the tendency to oscillate is only slight.

To put this in another way, most of the well known methods of preventing self-oscillation in R.F. amplifiers (and many others not in commercial use) will work without adjustment as long as the amplifier, without them has only a comparatively slight tendency to oscillate; but when the amplifier is pushed sufficiently to make its oscillations persistent, they either require adjustment for different wavelengths, or else are totally incapable of suppressing oscillations.

Bridge type circuits of various kinds were

* A one-step neutrodyne with a tickler on the detector. See page 21 of April QST.
tried but none was found to be satisfactory except, as stated before, when the voltage amplification per stage was kept comparatively low.

FIGURE 5

One of the first methods tried for preventing regeneration consisted in the use of an auxiliary tube. This method was discarded before being completely solved because it was found to complicate operation. Many other circuits were also worked out on paper and investigated, many of which have subsequently been disclosed by other (and apparently contemporary) experimenters.

Among them was a variation in Nichols parallel-resonant grid-plate circuit in which an auxiliary condenser mounted on but insulated from the same shaft as the main tuning condenser, maintained a neutralized condition independent of frequency. This was successful insofar as its main purpose was concerned but it broadened the tuning of the secondary circuits to such an extent that its use was abandoned. I mention this scheme because the use of twin condensers on a common shaft, suggested later, the final form of the Isofarad circuit.

Next several other bridge circuits were laid out and tried but none could be made to remain balanced for all frequencies when a high value of amplification per stage was used until the circuit shown in Figure 2 was built up. This circuit, however, possesses the previously mentioned disadvantages of bridge circuits except that balance can be easily maintained at all frequencies without adjustment. It has, however, apparently one additional disadvantage, in that the grid has no D.C. return path to the filament. This is, actually, not a disadvantage because it has been found in practice that when the circuit is balanced, "blocking" of the tube does not occur; and measurements of plate current show that the normal free grid potential is somewhat more negative than the greatest negative bias obtainable through a grid return wire to the negative "A" battery lead. Furthermore the use of a grid leak to negative "A" made no appreciable change even on the weakest signals.

Figure 4 shows the impedance bridges on which this circuit is built and it will be noticed that all four arms are capacities.

The discarded modification of the Nichols anti-regenerative scheme suggested another change in this circuit. This is shown in Figure 5 in which the rotor shafts of C1 and C2, are common and are at ground potential insofar as A.C. is concerned. This scheme does away with the effect of body capacity which is present in circuits in which the condenser rotor is not at ground potential.

This circuit has another incidental (but none the less real) advantage. When two variable condensers are connected in series as shown, the minimum capacity due to condensers and associated wiring, etc. becomes very low. So great is this effect that, whereas an inductance of about 300 micro-

FIGURE 6

henrys is ordinarily employed in the secondary circuit to cover from (actually) 230 to 560 meters, with this arrangement, the inductance is increased somewhat more than twice to cover from 190 to 560 meters (more than the present broadcast range)—this with a maximum effect capacity of 150 µfds.

There are several important details which should be observed in the construction of a set of this type. One is that the R.F. coupling transformers should be so wound and connected as to produce an approximate reversal of phase, thus keeping corresponding points on all stages in the same phase (since 180 degrees change of phase is produced by each tube and if the trans-
formers cause another 180 degree change, approximately, the net result is phase similarity.) Observance of this rule appreciably reduced static coupling between stages.

Care must be taken to avoid stray capacities which will affect the balance of the bridge when the tuning condensers are rotated. Such parasitic capacities are produced by improper orientation and spacing of parts.

It is interesting to note that all the so-called neutralizing condensers on the market have neither sufficient capacity range nor sufficiently accurate means for easily balancing the circuit. For this purpose a condenser having the correct range of capacity, and allowing micrometer adjustment, has been developed. This adjustment is extremely critical, but once made, is permanent for the tube on which it is made for all positions of the tuning dials.

The regeneration of the Isofarad circuit can be controlled by unbalancing the capacity-bridge slightly. In general the tendency toward oscillation is less at the higher wavelengths and therefore the bridge may be unbalanced more at these higher waves.

Since it would be a great nuisance to adjust such an unbalanced-device constantly this adjustment is made automatic by giving a somewhat special form to one of the stationary plates of one-half of the double variable condensers. The two halves of this double condenser then do not have exactly the same capacity curves but differ by the amount which is needed to give the desired unbalance. The shape of this one special plate is shown in Fig. 6.

Perhaps some of the results obtained with the Isofarad circuit might be of interest. The set was tried in a residence located about six or seven blocks from the antenna of WEBH, the Edgewater Beach Hotel Station, Chicago. An antenna of about 35 feet of rubber insulated telephone wire lying on the floor was used. Investigation showed that every Chicago station was operating on its usual schedule. The test was run between the hours of ten and twelve.
The weather conditions were only fair. Another set using an outside aerial showed a great deal of static. It was possible to bring in the three California stations of prominence, namely KGO, Oakland, KFI and KHJ Los Angeles. Trying for the east coast it was possible to bring in WEAF and WJZ New York, WSB, Atlanta, WBZ, Springfield, and, while WEBH was operating, to bring in WGY at Schenectady, which in observation of several types of sets operated at the same location it was never possible to do. A dozen or more nearer stations were received with exceptional clarity and volume and the short aerial practically eliminated the static interference.

Maritime Division Convention

By Can. 1-EB

March 21st saw the beginning of the Second Annual Convention of the Maritime Division in Halifax, Nova Scotia. A large number of New Brunswick hams turned up, as well as some from the different sections of Nova Scotia. A very welcome guest was A. A. Hebert, A.R.R.L. Treasurer, from Hartford, who made a great hit with the gang. Most of the gang arrived Friday night, March 20th, and everybody had a good rag-chew.

On Saturday morning two automobiles were obtained and the visitors were driven around Halifax on a sight-seeing tour. At 2:30 P.M. a technical meeting was held at Dalhousie University, where three short lectures were very kindly given by the Physics Department of Dalhousie in conjunction with the Nova Scotia Institute of Science. Profs. H. L. Bronson and J. H. L. Johnson of Dalhousie gave practical demonstrations, and explained the nature of waves and wave motion, leading up to electro-magnetic waves and their propagation and reception. A. Greig, 1BQ, then gave a practical demonstration of a five-meter transmitter and measured the standing waves on an antenna stretched across the room.

A speed contest in receiving, resulted in a tight race between 1BQ and 1DD; 1BQ winning the prize by a letter. A silver medal was given to the winner of this contest.

Everybody then assembled at the Green Room of the Queen Hotel where the grand banquet was held at 7 P.M. Fifty-four delegates and guests were present, and judging by the noise, they enjoyed it to the full. A small transmitter, composed of parts from different Halifax stations was used to broadcast the entire proceedings of the banquet. An excellent musical program was prepared by Dr. Ritchie, President of the N. S. Institute of Science, which was much appreciated by the hams as well as the listeners.

The speeches were opened with an address by the D.M., Maj. W. C. Borrett, 1DD, who reviewed the activities of the Division during the past year. Mayor Murphy of Halifax was present and presented his silver cup for 1924-25 to "Old Joe" Fassett of 1AR, for having accomplished the most for Amateur Radio during the year. Addresses were given by Prof. H. L. Bronson of Dalhousie and Dr. Ritchie, as well as an excellent talk by Mr. Hebert.

The "Old Man" appeared on the scene of festivities and after taking a few cracks at some of the Halifax gang, conducted the initiation of four fellows into the Royal Order of Trans-Atlantic Brasspounders. A number of stunts and contests were also held during the banquet.

On Sunday morning a visit was made to the Transatlantic Press station in Dartmouth, and then a visit paid to the cableship "John W. Mackay", where the excellent cable-testing and wireless apparatus was seen. The afternoon was spent in visiting the different amateur stations in Halifax.

The convention was a great success, particularly considering that it was undertaken by only a few of the Halifax fellows.

Hudson Division 2nd District Convention

The Fifth Annual Radio Show and Executive Radio Council and the Convention of the Second District first Hudson Division A.R.R.L. Convention combined was opened in due form by President Walter J. Howell, 2II, at two o'clock March 2nd, in the grand ball room of the Hotel Pennsylvania, New York City.

The week was really devoted more to
the education of our B.C.L. friends, considering the very fine exhibits of the radio manufacturers, and must have been satisfactory to them when one thinks that nearly 20,000 people passed through the convention hall; but the last three days will be remembered by all the Amateurs—they were their days. The small banquet hall adjoining the balcony was given over to the affiliated clubs, and the extent of the hard work to which some of the fellows went in fixing their booths can only be appreciated by having seen this exhibit.

The blue ribbon went to the Bronx Radio Club for the most interesting booth we have ever seen anywhere in our travels. The exhibit in question consisted of four scenes done in very accurate miniature and with great care for details. The scene in the center was a typical suburban Ham residence and station. On the left was a scale model of the Shenandoah moored to her mast at Lakewood, together with her Hangar. In the back center was depicted the conditions surrounding the Rice Expedition in Brazil. Their call is WJS, and their work with 2AG and several other amateurs has become familiar to us up north. On the right was a scene in replica of the situation at Moosehead, where the amateurs did such good work in establishing the QRT routes in the face of heavy snow storms and wild winds. And there was the other fine exhibit of Fink's transmitting set, which was the envy of all the amateurs, and one or two remarks were heard to the effect that it must be a Western Electric Broadcasting outfit. Hi!

There were several humorous exhibits, but space prevents mentioning any more. Let us mention here, however, that this sort of work graphically demonstrates to the outsider just what amateur radio stands for.

Every day from 12:30 P.M. to 11 P.M. there was something going on in the lecture room with public speakers, movies and special features interesting to both the B.C.L. and the Amateur.

Friday at 3:30 P.M. the big traffic meeting took place with Ed. Glaser, 2BRB, in charge. Practically all the district superintendents were present, and addresses were made by F. E. Handy, the acting traffic manager; K. B. Warner, secretary; and A. A. Hebert. Fieldman, all of A.R.R.L. Headquarters.

Visiting amateurs, we understand, visited some of the best stations in Greater New York, and all wondered how it was possible to handle traffic in such a congested section. There was a British as well as a Netherland amateur present, who thoroughly enjoyed their first "Hamfest".

The biggest thing of all is always the Banquet on the last day, and this year it eclipsed those of previous years in point of attendance,—(gang, can you imagine what 800 "hams" can do at such a time?)—and for once it can be said that Toastmaster Geo. Droste was quite successful in keeping the horns and whistles toned down considerably. Thank to the Signal Corps' wonderful cooperation, a fine system of loud-speakers was installed so that the voices of the speakers could be heard in every part of the banquet hall. Addresses were made by so many prominent speakers, among whom were noted Mr. Hiram Percy Maxim, our president; Capt. de A. Donisthorpe of the Marconi International Marine Co., and our Radio Supervisor Arthur Batcheller gave us some statistics that made us sit up and take notice. The Navy and Army were well represented by Lt. Com. Lewis and Capt. Arnold respectively. Dr. L. J. Dunn, Director of the Hudson Division, again showed us that the members did not make a mistake in electing him to represent them on the Board.

And say, who ever started that joke about Philadelphia being slow? When a "gang" of 50 fellows will hire a Pierce-Arrow bus and drive from Philadelphia to New York, I say, three cheers for them.

Great praise is due those two big giants, Doscher and Morris, and that little fellow Fink, and not to mention Frimmerman, Barrows and Droste, for the hard work in putting over what we consider the best convention ever held in the 2nd District, and, of course, will have to say the Hudson Division, too.

-P.C.O. jr. + A.A.H.

"DOES SHE "PERQ" — WELL, YES 'LISTN TA TH' SIXES COMIN' BACK."

"BET WE'RE IN CALLS HEARD NEXT MONTH."

The radio laws in Brazil are better than in most foreign countries. Mr. L. Y. Jones of Sao Paulo, Brazil, advises that five wavebands have been reserved; 100 to 150, 75 to 80, 40 to 45, 18 to 24 and 4 to 6 meters. The power limit is 500 watts input.
Homemade Transmitter Parts
By L. W. Hatry, Department Editor, QST

If more economy were displayed in the construction of the transmitter parts it would be possible for many of us to have more meters than we now do. And meters mean more to a set than most nice looking purchased parts. Also it seems that many do not realize to what extent they can save money and yet have an effective transmitter by making every bit that they can. In fact, some amateurs now without could have a transmitter if they only realized how much of it requires only small expense. It is hoped that this and an article to follow will stimulate the home-brewed transmitter, and help the fellow who can't get at the pretty manufactured parts easily because of location or finances.

The Helix

Something has made the amateur be determined to have nothing but a round helix. Perhaps it was a biblical command. At any rate the idea must be sacred, to judge from the way some stick to it. This in the face of the fact that it is easy to make transmitting inductances not round, and very difficult to construct those with perfectly circular windings. Nor is there such a terrible need for having helices 8 inches in diameter. More often the need is for diameters of 4 inches or less, for use on the short wave bands.

Consider Fig. 1 which shows a simple frame for winding the helix in square form. The insulation is wood with its edge notched, the notches to space the wire. Or you can use short brass brads and a taper on the frame with the brads placed to catch the wire on the down-grade as 1D indicates with exaggeration. In any case the wood should be baked in a fairly warm oven for a while to dry it, and then soaked in some hot paraffine to waterproof it; although such a small amount of insulation touches the wire that this may not be necessary. A simpler method than using angles is that of 1C for assembling the frame. No. 12 solid copper wire should be used for a five-watt set, and larger wire, No. 8 say, for a 50-watt set. And don't take these specified sizes as rules from heaven. If you happen to have size 10, 14 or some other reasonable size, use it.

It is easier to approximate the round coil by making a six or eight vane form as Fig. 2 shows. And 2B shows an ingenious way of using an old piece of tubing and a piece of wood or bakelite to make a hexagonal helix form with relatively low losses. The tubing is cut into halves and the piece of board or bakelite panel fastened in between, while the wire is wound on in the usual fashion.

The porcelain knobs used by the telephone companies serve well as helix insulators and turn spacers. They have several ridges as Fig. 5A shows, and can be assembled on a frame with rods through their centers so that wire can be wound on them. The rods can be run through the end pieces (of wood or insulating material) and fastened by nuts, or they can be run only part way through and the two ends held in place by string binding as Fig. 5B shows. Or, if the ends are solid circles, a couple of holes in either end with a wire loop through, which is tightened by twist-

*From the Radio News for April, 1924
ing one end, 5C, will hold the rods in place and the helix together without the need of threading or nuts. Tie the loop center together with wire and solder to prevent its accidentally adding resistance.

Edgewise wound strip-brass is excellent for round helices only if used properly. The spacing between turns should be at least the same as the width of the strip for minimum resistance. And as the spacing must increase as the width does, the practical limit is about \( \frac{1}{8} \) inch strip.

While we are speaking of strip-brass, an excellent helix can be made of the flat strip wound according to Fig. 3 provided it is not wound on tubing but on a skeleton form, such as in Fig. 1 or 2. Contact to such a flat strip is best made by soldering on small angles of brass that can be made of the same material as 3B shows.

Fig. 4 shows how 4XE makes up his strip-brass helices which are also illustrated in the photograph. Ordinary window glass is cut into strips and used double thickness between turns. A rubber band on either end of the strips binds them together, and two strips at right angles to the rest serve to fix the coupling distance between the two coils, as well as keep the strips in line. This provides excellent insulation and is easy to construct.

A spiral can be made with wire and wood strips by drilling holes in wood arms, Fig. 6A. This makes a nice job if done properly, but takes lots of time. A simpler way is to use brass tacks with small heads against which the wire is wound, 6B. If brass strip is used it should be spaced its width. The frame for strip has been described dozens of times, as it consists merely of wood cross pieces with saw cuts into which the strip fits.

For the 75-80-meter band, with a 4-inch diameter helix, the primary coil will need to have at least 15 turns. In fact, this number of turns will just about hold true up to 8 inches diameter, and it can't matter much if there is only a turn or two extra. Many unused turns must be avoided, as they can, through dead end effect, cause quite high losses. For the 40-meter band you won't need more than 10 turns, and for the 20-meter band from 5 to 8. Spirals will require about the same number of turns, keeping their average diameter at about 5½ inches; i.e., 3 inches inside and 8 inches outside. The antenna coil need generally not have more than about 10 turns when a series condenser is needed.

Fixed Condensers

The grid condenser on the transmitter need not be of a very high capacity nor be insulated against very high voltages. With a set consisting of one or two five-watt tubes the ordinary mica receiving fixed condenser is perfectly satisfactory. On the wavelength bands from 85 down anything from 100 \( \mu \text{fd.} \), up is generally sufficient. On the 160-200 meter band you can't use much less than 500 \( \mu \text{fd.} \).

You can easily make your own fixed condensers with air insulation as Fig. 6 shows. However, the job is ticklish, as it takes, with \( 1/16 \)th inch spacing between plates, an active dielectric area of 24 square inches to get a capacity approximating to 100 \( \mu \text{fd.} \). With double the spacing you get half the capacity, and with twice the area you obtain double the capacity, etc. In figuring the capacity of such an air condenser, the area to consider is only that portion of the metal strips directly opposite
each other. The dotted lines in Fig. 7 show what is the active area of that condenser. And as there are four active dielectric spaces between the five plates in the condenser of Fig. 7, there would be four times the active area indicated by the dotted lines. In making such a condenser the spacers should be of metal or fiber, as wood splits easily when used in such small sizes. Also the metal sheet used should be fairly heavy so that the surface will tend to remain flat.

The plate stopping condenser must have enough insulation to stand about three times the plate voltage on account of voltage surges and the R.F. voltage generated. As most towns have a photographer and a florist or tobacco shop, its parts are easy to obtain. Go to the photographer to get some glass plates and to the florist or tobacco shop to get some tinfoil. Assemble the two as in Fig. 8. A rubber sponge is placed between the wood binding strip on top and the glass plate to keep from cracking the glass. A similar sponge would not be amiss at the bottom of the condenser assembly, although it can be left out. The sponge at the top must not be left out, however. The tinfoil can be within a half-inch of the edge of the glass, or even closer, as the area of the tinfoil is what is figured from. .002 µfd. is the capacity of condenser usually used. It requires about 80 square inches of tinfoil if the plates are the thickness ordinarily met with, a fraction under a sixteenth inch. However, on the waves from 85 down .001 µfd. is generally as satisfactory, which cuts the required area in half. Glass insulated condensers of this type will often work satisfactorily with a 250-watt tube. Contact to the tinfoil should be made clamp fashion as Fig. 8 shows. The important thing about this clamp is that it should have plenty of surface so that its grip on the foil will be broad enough not to tear it and at the same time tight enough to maintain a good contact.

Antenna Series Condensers

Antenna series condensers of the commercial models cost rather heavily to a fellow short on funds but long on time. He can often get by with some receiving variable condenser that is of fairly low loss construction, if his set uses five-watt tubes. But higher powers or even the small tubes with high plate voltages require a condenser with a greater spacing between the plates to stand the voltage, and often one with better insulation. These are easy to make in the capacities required in the present day transmitters for the short waves. Look at Fig. 11. A couple of pie-plates and some scrap lumber do the trick, or a couple of pieces of almost any handy metal sheet will serve as well. Such a condenser has a well spread out field, and for that reason should be supported at least six inches clear of other apparatus, walls and such.

By removing some of the plates of a good receiving variable condenser, such as the Cardwell or similar, it will serve very well as a series antenna condenser. The one illustrated in the photograph has had two plates removed between those left and will stand quite high voltages without jumping over. The rubber insulation is in no danger of breakdown, being plenty for the spacing of the plates obtained. It was...
necessary, in addition to the three spacers between plates on the rotor, to have washers to replace the thickness of a single plate, and two will be needed between the plates left. The capacity of such a condenser is in the vicinity of 30 ufd. maximum.

A Cardwell transmitting condenser has

more capacity than is ever needed, whereas it would be better were the voltage at which it sparks between plates higher. This breakdown voltage can be doubled in a very simple fashion. Fig. 12. The stator has a couple of sections cut out of the sides which leaves the stator in two parts. A couple of plates are removed from the rotor and the two stators connected as shown. This makes the condenser equivalent to one with double spacing and with about 100 µfd. maximum capacity, which is ample.

Filament By-pass Condensers

Somebody started the exciting idea that the by-pass condensers in the filament circuit should be of one-microfarad size. The same person gave the impression that these condensers should be able to stand high voltages. Both ideas are wrong. The condenser need be no larger than .002 µfd., nor need have to stand a very high voltage. However, a larger capacity makes it easier to get a smooth note where D.C. plate supply is used, but even at that the capacity seldom need be greater than .005 µfd. unless you so desire. For this purpose any pair of fixed condensers handy will serve; receiving paper or mica condensers, or a pair of condensers taken from a couple of old flivver spark coils that are otherwise worthless. Using 750, 1000, or 1750-volt-test filter condensers for this purpose is very poor economy.

The Grid Leak

Here's a pretty problem. Many of us find the standard grid-leak units somewhat expensive; particularly since a single 202 tube transmitter requires 15,000 ohms, which means three of them. Of course one can use one of the 25 or 50-thousand ohm variable resistances made by Bradley and known as the "Bradleyohm", but they also cost a little. Fig. 9 shows a water grid leak which British 6LJ uses and recommends highly. The wire V can be raised or lowered to decrease or increase resistance. However, even this is a little elaborate. The writer has used a leak made in a fairly wide mouth bottle as in Fig. 10. In this the cork should be paraffined, although it will work without that provided it is kept dry or is of rubber. One of the two wires is pulled up and down to get the necessary variation. The water is used just as it comes from the tap. Such water leaks work satisfactorily on powers up to a couple of fifty-watt tubes, and on even greater if built more generously.
The Tube Socket

In spite of the paragraph heading we want to ask "why the socket?" Everybody seems to think that he must purchase a socket and at the same time that he must economize. As a result losses are incurred and the fellow is out both the money for the cheap socket and some wasted power. Nor is it necessary to go to the trouble of removing the base. Solder leads directly to the prongs of the base. Mounting the tube for this is a cinch. The tube has a groove where the tube proper is attached to the base and the base has a groove at the bottom. Nail a small wood upright in place, notch to avoid having the binding wire slip and use a couple of lengths of scrap wire to hold the tube in place, Fig. 13. The tube must be mounted upright, as turning it upside down causes the heat to rise to the seal of the tube, and either melting or breakdown is the probable result. In 13B is a simple way to mount the tube if the base has been removed. The bottom is bound by small wire or string, and a heavy wire loop supports the upper portion. This heavy wire loop should be kept from touching the tube by some scrap asbestos wool, as otherwise the tube will very likely crack, due to the cool wire being in contact with the heated glass. The base may as well be on the tube, except for 5 meter work, where it is an advantage to have it off.

R.F. Chokes

R.F. chokes do not demand 4 inch in diameter tubing nor any particular dimension. The larger diameters are more effective and require less turns, but use what you have. Any size tubing from 2 inches to 5 inches diameter will be all right for the 150-200 band if wound with 250 or 300 turns of some nice magnet wire. The wire should be insulated with double silk, double cotton or double cotton and enameled; the insulation increasing in effectiveness in the order named. Single cotton or single silk covering are both sel- dom effective, barring, of course, extremely low power. For the 75-85 meter band and lower 150 turns of wire will be enough.

The usefulness of the choke is affected if it gets in the field of the helix or has too much insulation in its own field. It is a mistake to put it very close to transformers or other apparatus; treat it with the respect you would any coil. In any case it is a good idea to mount the choke at right angles to the helix. And when mounting the R.F. choke you should remember that the end connected to the plate is at the same high R.F. voltage that the plate is and needs careful insulation to avoid wastage of power. The end of the choke that is connected to the positive of the high voltage should have no R.F. dif-
boiled in paraffine. The wire size should be no larger than necessary to carry the plate current; 34 to 28 for one or two 203's, 30 to 24 for the 203's and larger for greater powers. It hurts nothing to use a skeleton form and make such a choke low-loss.

An untuned choke is wound to have a fundamental wavelength greater than any wave on which you expect the set itself to operate. For this reason the number of turns in it are not critical. It is only necessary to have plenty. An untuned choke is fairly useless on waves above its fundamental wavelength. Thus it is a mistake to tune such a fine wire choke to your transmitting wavelength by using just sufficient turns to fit. This will often result in overheating and certainly inefficiency. In fact, untuned chokes sometimes heat sufficiently to burn the insulation when the fundamental or some harmonic of it is accidentally run into. Because a tuned choke has heavy currents it should be wound with heavy wire, few turns and tuned with a good condenser. The same thing applied to tuned chokes as to other tuned circuits, they must be low-loss in construction. A tuned choke must be protected by an untuned one, as it is only good on the wave to which it is tuned and your transmitter would stop oscillating should the wave shift. For the 75-85 meter band a 500 µfd, variable and a 10 turn coil are OK; for the 150-200 band the coil will need to have 30 turns. Fig. 14 shows the circuits of the tuned-untuned combination.

It is bad practice to dope the wire on an R.F. choke heavily. You can get by with a thin coat of collodion or just enough paraffine to waterproof the job.

A New Amateur Band at ¾ Meter

Acting upon the request of the A.R.R.L. Board of Directors, recently reported in QST, the Bureau of Navigation of the Department of Commerce has assigned for general amateur use a band of ultra-short waves in the immediate vicinity of ¾ meter, suitable for amateur reflection development. This was announced on March 17th in General Letter No. 209, the text of which read as follows:

"Amateur radio operators are authorized to use experimentally for beam transmission a band of wave lengths 1000 kilocycles wide from 400,000 kilocycles (equaling .7496 meters) to 401,000 kilocycles (equaling .7477 meters). The above assignment is at approximately three-fourths of a meter.

"Authority to use this band of wave lengths should be incorporated in the existing license of an amateur if he holds one at present. Otherwise a regular license can be issued."

Now we're all set to try beam transmission at a frequency where the physical dimensions of the reflector apparatus will fit the average amateur's static-room. QST will present suggestions for this kind of work as quickly as possible. In the meanwhile correspondence and reports of experiments are solicited.

-K. B. W.

The best time to listen for the Australians and New Zealanders is about 4:30 A. M. C. S. T. until daylight.

It isn't always the power hog that hops the gap. 50V works z1AL using a single five-watter. And z1AAP worked z1AC using a couple of the 202's, while 2CPO worked 3AL using the same power.

LR is an advance or field station of W.TS, the station of the Rice Expedition.

J. Rocha Saraiva says that transmitting stations are not licensed in Macao. Receiving sets are allowed, however, and are taxed two dollars yearly. There is no private licensing of radio sets at all in Portugal. Macao, China, is a Portuguese protectorate and colony.

The Argentine radio laws permit transmission on any wavelength below 250 meters. AFl and AF4 of that country are on the air.
Sending Licenses Suspended

Well up toward 100 amateur transmitting licenses have been suspended for violation of the new rules of the Bureau of Navigation, Department of Commerce.

We have no sympathy for them, they were warned fairly that the new rules had gone into effect. Worse than that—some of them even violated rules that have been in force for over a year.

Read again the “Fair Warning” on page 39 of the April issue of QST. Then read the regulations themselves on page 29 of the March issue.

Have you done it? Very well; let’s go over it in detail.

Circuits

Take a good hard look at the illustration and then do something about it.

Spark Sets

If you use a spark you are in wrong. The Department will let you use the thing

The Above Circuits Are Forbidden

For circuits that may be used see references on page 40 of April QST
between 170 and 180 meters if you can get the decrement down to .1, an almost impossible thing at 200 meters. However they will not agree to like it.

Phone and I.C.W.

Phones and I.C.W. are classed with sparks—work them between 170 and 180 meters and keep them still during the quiet hours—or else get rid of them.

By the way—"I.C.W." means "Interrupted Continuous Waves". In other words it means anything that uses a chopper. (We hope this includes unfiltered generators but we are afraid it doesn't).

Rectified Supply and D.C. Supply

Full-wave rectified supply and D.C. may be used during the quiet hours at waves below 150 meters—provided there are no complaints about interference. If there are such complaints and the sending station can't cure them, then it will be required to keep quiet hours.

"Full-wave rectified" may mean either one of two things—A. A full-wave rectifier with or without a filter. B. A "self rectified" set with "one tube on each side of the cycle."

Quiet Hours

If you jam your neighbor, the receiving amateur, then you can be called upon to keep quiet hours. Don't wait for the Supervisor to shut you down—ask the neighbors now and see if you jam them. If you do—fix your sending set. In any case, if you are in the 150-200 meter band you must observe silent periods from 8-10.30 P.M. each day and during church services on Sunday.

Wavelengths

The wavebands are being very careless-ly observed—stations "slop over" into the territory that belongs to other services. Many stations seem to think that does not matter; that's why the Traffic Department has arranged "Vigilance Committees."

Conclusion

Closer observation of the regulations is necessary immediately. Any station not absolutely sure of its circuit, power supply, key thump, wavelength and hours is instructed to stop sending until these things can be found out.

There is no other way of playing fair with the Department of Commerce.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, OF QST, published monthly at Hartford, Conn., for April 1, 1926.

State of Connecticut

City of Hartford

Before me, a Notary Public in and for the State and county aforesaid, personally appeared K. B. Warner, who, having been duly sworn according to law, deposes and says that he is the business manager of QST and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 433, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, The American Radio Relay League, Inc., Hartford, Conn.; Editor, Kenneth B. Warner, Hartford, Conn.; Managing Editor, none; Business Manager, Kenneth B. Warner, Hartford, Conn.

2. That the owners are: (Give names and addresses of the individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent. or more of the total amount of stock.) The American Radio Relay League, Inc., an association without capital stock, incorporated under the laws of the State of Connecticut. President, Hiram Percy Maxim, Hartford, Conn.; Vice-President, Chas. H. Stewart, St. David's, Pa.; Treasurer, A. A. Hebert, Hartford, Conn.; Traffic Manager, F. H. Schnell, Hartford, Conn.; Secretary, K. B. Warner, Hartford, Conn.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent. or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders as they appear on the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is ______. (This information is required from daily publication only.) K. B. Warner.

Sworn to and subscribed before me this 6th day of March, 1926.

Henrietta L. Hugins, Notary Public.

(My commission expires February 1, 1926.)
The Governors’-President Relay

By E. B. Duvall, 3DW-3EM

Whether the Governors’-President Message Relay of March 4th, 1925, was a complete failure or not I will leave to the readers of this report. As twenty-two, of a known twenty-four messages, reached the White House, it was not altogether a failure, nor was it a complete success.

As usual, the Washington Radio Club, wide-awake to write its name in radio history, got on the job bright and early, and through its Chief Operator, A. B. Goodall, 3AB, formed a barrage of stations to handle the messages from the forty-eight states of the Union. A group of stations was selected to operate on the 75-85 meter band, and as this band was regarded as most important, five stations operated in this group. Two stations were selected for the 150-175 meter band, while 3APV, one of the 75-85 meter stations, kept an ear open for 40 meter traffic and did some good work.

The stations and their respective wavelengths were as follows:

<table>
<thead>
<tr>
<th>Wavelength</th>
<th>Station</th>
<th>Waveband</th>
</tr>
</thead>
<tbody>
<tr>
<td>37.5 to 42.3 M.</td>
<td>3APV</td>
<td>42 Meters using RAC</td>
</tr>
<tr>
<td>75 to 85.7 M.</td>
<td>3APV</td>
<td>75 &quot; &quot; RAC</td>
</tr>
<tr>
<td>3BWT</td>
<td>77½ &quot; &quot; RAC</td>
<td></td>
</tr>
<tr>
<td>3AB</td>
<td>80 &quot; &quot; RAC</td>
<td></td>
</tr>
<tr>
<td>3LR</td>
<td>85 &quot; &quot; RAC</td>
<td></td>
</tr>
<tr>
<td>3ZW</td>
<td>82½ &quot; &quot; AC</td>
<td></td>
</tr>
<tr>
<td>150 to 175 M.</td>
<td>3BPP</td>
<td>150 &quot; &quot; RAC</td>
</tr>
<tr>
<td>3BWT</td>
<td>188 &quot; &quot; RAC</td>
<td></td>
</tr>
</tbody>
</table>

Tests were conducted between these stations several times previous to the Relay to ascertain the amount of QRM between any of the stations selected. In some cases complete changes in equipment were made to assure perfect working order during the relay. Both 3APV and 3BPP erected new counterpoises. 3BPP sprained an arm, which nearly put him out of commission. All the stations that were without phone connection to the radio shack put in temporary telephones so contact between Washington amateurs could be made as conveniently as possible. At 3APV four operators were on duty, 3ABJ, ex-3OK, 4DX, who happened to be in town for the Inauguration, and 3APV himself. 3CHC, 3WU, 3BHV, 3IO, 3DK and 3JJ worked shifts with 3BWT at 3BWT. Two separate watches were held. One watch used a 77 meter transmitter and the other used a transmitter on 188 meters. Suitable receivers covered both wave bands. 3HS and 3AB operated at 3AB. 3JJ held down most of the watch at 3ZW. 3ND helped at 3LR. All stations were primed for a big time and kept a continuous watch from noon of the fourth to afternoon of the fifth. 3APV and 3AB were in continuous operation until eight o’clock on the morning of the fifth. 3ZW stuck it out until 4:30 A.M. and went back on the job at daybreak for possible strays. 3BPP stuck to the job eleven hours, while 3BWT closed shop at 3 A.M. on account of heavy QRM. Heavy QRM came on about midnight, increasing in volume until 4 A.M. of the 5th. The stations working after midnight deserve a great deal of credit.

Other Washington stations deserving much credit were 3AHP, who got the South Dakota message at 10:15 A.M. the morning of the fourth two hours ahead of schedule, and 3IM, who copied the Georgia messages one hour before they came through 3BWT. 3AHP got his message while working 3QI in Baltimore, and 3IM intercepted the Georgia message in transit between 8AAL and 2LD at 10:25 P.M. It is not necessary to give the full text of each message. A few messages got slightly mixed, while others traveled around some before arriving in Washington. The fact that only a known 24 messages were started is very likely due to the little interest taken in the Relay by stations outside Washington. Those who were aware of the Relay, however, forgot all about it until the last minute and did not wake up until Washington stations stirred them. One western station wanted to know all about the Government Press messages when asked for the Governors’-President message, while others came back with a batch of ???? Of 22 messages received, nine were relayed to Washington and twelve were copied direct from the Capitols in which they originated. 8PL in Ohio started the ball rolling about noon of the 4th. He sent QST’S regarding the Washington stations on duty who were QRV the messages.

Detailed reports by states giving message routings, etc., will be found in the Traffic Department Section.

The receiving logs of all the Washington stations seem to show several facts in connection with the relay.

1. More than half of the stations worked did not know what it was all about. 2. QRM was very, very bad from after midnight of March 4th to daylight of the 5th. 3. The air was fairly free from stations after midnight of the 4th. This was perhaps due to the QRM. 4. Most of the important stations who were not CQing were calling foreign stations. CQ’s were tried by the Washington stations to dig up Governors’-President Relay messages.
Many complaints were received from neighboring B.C.L.'s during quiet hours by the 75-85 meter stations. No Washington station on these waves shut down during these tests. C. Washington stations count the Relay a failure, but not due to any fault of theirs. They certainly were on the job.

Delivery

After holding the messages for some time, hoping that more messages would arrive from other stations, 3AB delivered the messages to the White House early Friday morning, the 6th, with the following note:

Hon, Calvin Coolidge
President of the United States
The White House, Washington

Dear Sir:

It affords the Radio Amateurs of Washington, D.C., great pleasure to submit to you messages of Congratulation from many of the State Governors upon the event of your inauguration to the Presidency. The accompanying messages were transmitted the afternoon and night of March 4th from the respective State Capitols exclusively by Amateur Radio Stations under the auspices and direction of the American Radio Relay League. The Amateurs, through the League, are desirous of being of service to you in every possible way.

Yours very respectfully,
The Washington Radio Club
(Affiliated A.R.R.L.)
Per (Signed) A. B. Goodall
Chief Operator

The next day the following reply was received:
The White House
Washington, D.C. March 6th, 1925

My dear Mr. Goodall:

The President wishes me to thank you, and through you, the Radio Amateurs of Washington and the American Radio Relay League for their activities and cooperation in bringing to him the messages of good will and congratulations that have come by radio from the Governors of the states.

Most sincerely yours,
(Signed) Everett Sanders
Secretary to the President
Mr. A. B. Goodall
Washington Radio Club, Washington, D.C.

Acknowledgments

Thanks and congratulations are extended to all the participating stations throughout the country, and particularly to those who sent in reports and logs of their work. The writer is also indebted to 3APV, 3BWT and 3ZW, who furnished the complete data in the form of their logs and written reports, and to the Chief Operator of the Washington Radio Club, A. B. Goodall, 3AB, who gave much assistance in the preparation of this report.

Australian regulations limit the power of amateur stations to 10 watts input and the wavelengths between 125 and 250 meters. However, it is not difficult to obtain permission to use other powers and wavelengths. As a result there are a number on the 75-85 meter band.

2BW and 2CXY report H2AS on the air. The station is located at 8 Cer Orias Uteca 37, Budapest, Hungary. 2CLG worked him on March 5th, adding another country to the worked list.

NRL is being used as the call of a Russian station located at Radio Laboratorium, Nijni, Novgorod, Russia. This station should not be confused with NRRL, the call under which F. J. Schnell operates while the U. S. fleet on its summer cruise. Both stations are on the short waves.

SAH advises us that there is such a station as JUPU. It is operated by the Japanese government. Communications may be addressed to Mr. T. Hamaque, 9 Conyacho South, Kyobasliku, Tokyo, Nippon.

Two mysterious stations have been reported, n5HC, and MZ. We should like the QRA of both if it is obtainable.

A number have wanted the QRA of SJ who was heard and worked by amateurs in almost every part of this country. QSLs may be addressed to Frederico Gonzalez, P. O. Box 384, San Jose, Costa Rica. He will be on the air again soon with a couple of five watt tubes.

Third National Convention at Chicago August 18th, 19th, 20th, 21st, 1925.

Prepare to come to Chicago to the biggest Convention to be held under the auspices of the Chicago Radio Traffic Association.

Watch for future announcements.
Improving the R. F. Amplifier
By Elmer E. Burns

Most neutralized R. F. amplifiers use some sort of Wheatstone-bridge circuit, though their builders usually refuse to admit it. Perhaps it is about time for someone to discuss the bridge-circuit business without applying any "trick" names to the finished circuit.

In experimenting on the application of the Wheatstone bridge to radio receiving circuits (of the tuned R.F. amplifier sort) it occurred to me that the logical thing is an all-condenser bridge. Such a circuit can be made to remain neutralized over a frequency range.

Before presenting the circuit it is interesting to discuss the general requirements of bridge-neutralized circuits. The purpose of neutralizing is to isolate (electrically) the tuning element of the grid circuit from the tuned plate-impedance of the same tube. If this is done by means of a Wheatstone-bridge circuit, then the four arms of the bridge must have a relation such that the balance is not disturbed by change in frequency.

If two arms of the bridge are capacities and two are inductances, at least one of the inductances is necessarily in parallel with a capacity. One arm of the bridge is the plate-grid capacity of the tube. Another is a condenser between the plate terminal of the tube and the filament side of the tuning element in the grid circuit. The third arm of the bridge, whether coil or condenser, must necessarily be shunted across the grid-filament capacity. The fourth arm may be part of the tuning coil or it may be a condenser. If the fourth arm is a coil its inductance is necessarily in parallel with the distributed capacity of the coil. If inductances are used, then, as the third and fourth arms of the bridge each is in parallel with a capacity.

The balance obtained in a Wheatstone bridge in an A.C. circuit is a balance between impedances. If the resistances are very small the impedance of each arm of the bridge practically equals its reactance. Capacity reactance, as is well known, varies inversely as the frequency, while inductive reactance varies directly as the frequency. If we have a capacity and inductance in parallel and the frequency is increased, the inductive reactance is increased and the capacity reactance is reduced. This changes the impedance. Impedance, in a parallel circuit, is rather a complex quantity. The admittance, which is of the reciprocal of the impedance and corresponds to conductance in a D.C. circuit, is the vector sum of the admittances of the branches of the circuit. It can be shown mathematically that the impedance of a capacity and an inductance in parallel is changed with a change in frequency. This is done by taking the algebraic expression for the vector sum of the admittances and working back to the impedance of the parallel circuit. We get an expression which contains the product of the two reactances in the numerator and their algebraic sum in the denominator.

It can be shown also that with a change in frequency the impedances of the condenser arms of the bridge will be changed in a different ratio from that of the arms containing inductances. It follows, then, that the way to construct a Wheatstone bridge whose balance will obtain for all frequencies is to have all the arms of the same kind, either all inductances or all capacities, and since one of the arms must be a capacity the only way is to make all of them capacities.

I have not discussed resistances as arms of the bridge, for it is best to have all resistances (even those in the arms of the bridge) as small as possible. I did, however, experiment with resistances but without any satisfactory result.

With the all-condenser bridge I obtained very satisfactory results. I was able to balance out the effect of the plate-grid capacity as completely as is done in the neutrodyne and more easily. Reception with the all-condenser bridge is particularly smooth and pleasing. Signals come in unannounced by any howl or squeal. Of course a beat note whistle may be heard, but that comes from outside the set.

Now for the objection that I expect to hear at once. The only possible return...
from grid to filament is by way of a condenser, the dielectric of which has a resistance of perhaps some hundreds of megohms. How can there be a grid current? How can the electrons that are picked up by the grid find their way around to the filament? The answer is, why have any grid current? We are better off without one. Make the grid sufficiently negative and there is no grid current practically.

A negative potential can be put on the grid even though it is not in a closed circuit. Sufficient proof of this is the simple experiment of connecting the two plates of a condenser to the terminals of a battery when one of the plates becomes positively charged and the other negatively charged.

The grid potential should be sufficiently negative to throw the action of the tube entirely below zero grid voltage. This means a high negative potential. A high negative grid potential would throw the action of the tube on the wrong part of the characteristic curve unless we have a high positive potential on the plate. The high plate potential moves the curve over to the left so that even with a strongly negative grid the action is on the straight portion of the curve as is necessary for amplifying. It follows that a highly negative grid and a high positive potential on the plate are essential to the successful operation of the all-condenser bridge. In themselves such potentials are a help rather than a hindrance to the quality of the reception, and quality of reception is the purpose of the all-condenser bridge.

In the diagrams, $C_1$ is the plate-grid capacity, $C_2$ and $C_3$ are fixed condensers, and $C_4$ a variable. $C_2$ may be of 0.00025 ufd., $C_3$ of 0.001 ufd. capacity, and $C_4$ a three plate condenser. For the sake of comparison the corresponding points in the two diagrams are given the same letters.

**FIG. 2. ALL CONDENSER BRIDGE CIRCUIT.**

Amateur Radio at Floyd Collins' Cave

**M A T E U R R A D I O** played an important part in getting the news to a breathless public during those stirring days recently when the entire nation was watching the gallant fight being made in Kentucky to rescue Floyd Collins, entombed in Sand Cave.

Sand Cave is some miles from Cave City, Ky., the nearest telegraph point. Some form of communication between these points was necessary for the military authorities and the correspondents to have contact between the scene of operations and the outside world. This situation was met by an amateur station installed by Mr. H. E. Ogden, 9BRK of Jeffersonville, Ind., A.R.R.L. District Superintendent for District No. 3 of Indiana, and Mr. D. B. Rauth, operator of 9BRK and 9CHG. The Sutcliffe Company of Louisville, Ky., furnished equipment, and a transmitter was installed in a tent which housed the small lighting plant, right at the entrance to the rescue shaft which was being sunk. With the permission of Supervisor Beane, the call 9BRK was used. The receiving set at Cave City was a Croxley-5A receiver equipped with dry-cell tubes. Ogden operated the transmitter and Rauth the receiver. Rauth had access to long distance telephone and direct telegraph connections to Louisville, so that news on important events occurring at the cave was in the press-rooms of papers all over the country a few minutes after the press reports were handed to the transmitting operator in the tent. The transmitter used two 5-watters in a Hartley circuit, supplied with 500 volts from Burgess "B" batteries. An antenna current of 1½ amps. was secured in a 60-foot 1-wire aerial. During the climax of Sand Cave developments these two amateur operators maintained a continuous watch for four days without sleep, as there were no other operators available. All credit to them! It is jobs like these that emphasize the value of amateur radio.

— K. B. W.
Experimenters Section Report

Important Announcement—Centimeter Wavelengths

The Department of Commerce has just allocated to our use a "sub-one-meter" band of wavelengths. To be more exact, the band is from 74.77 centimeters to 74.96 centimeters. The Department has certainly decided to use accuracy here—imagine an allocation with FOUR significant figures!

We now need information as to the way of "getting down" to \( \frac{1}{10} \) of a meter. A scheme tried at 1XAO has been to operate an oscillator at a higher wave and amplify one of its harmonics; this has not been a complete success by any means but can be done. The use of a Hertzian oscillator with spark excitation will occur to everyone and this sort of set is discussed in Fleming's various books.

Any suggestion will be heartily welcomed. Please send them to the attention of the Experimenters Section—not to some other Department or to a person.

Our Regular Work

Because of the 5-meter report from 9ZT we must dispense with the usual details this month. Those concerned with particular problems are asked to write, addressing "Experimenters Section, American Radio Relay League, 1045 Main Street, Hartford, Conn."

The 5 Meter Set at 9ZT

In the past all of our new wavelengths have first been made successful by the use of fairly high power. This was the case when we began to use 200 meters and it has, held right on thru—the latest example being the 6TS-1XAM work at 20 meters which was done with UV-204 tubes at both ends.

That is why our reports have been harping on the need for MORE POWER on the 5 meter tests. Let's get the thing to work first and then lower the input.

Proceeding on that basis our friend Don Wallace of 9ZT has just installed a 5-meter set with 1000 watts input. This set operates with an automatic key each day from 7 to 7:45 A. M. and from 6:15 to 7 P. M., Central Standard Time. The set also runs for considerable periods on Sundays. Right now (April 2nd) it is at the upper edge of the 5-meter band but it will be dropped a bit later. The Omnigraph is run at slow speed during the sending periods and sends continuously "V Pse QSL TEST U 9XAX 9XAX 9XAX."

The Details

Wallace writes as follows:

"The entire set is independent of all other apparatus and the regular 20, 40, 80 meter
style with lots of air circulation and lots of input. Am sorry did not wait one day more oscillating when I get within 5 feet of it. Believe I will use a ground connection to steady it in this regard. Putting the wire in BX helped somewhat.

“The plate transformer is an old pole line transformer. The grid and plate chokes are wound on a pencil and then strung out. To be safe another 1” choke was put in the plate lead. The input is 1000 watts with the tube running fairly cool, estimated output 700 watts. The antenna current is 1 ampere at 5.75 meters and 4 amperes at 7 meters.

“The plate milliammeter is hidden by the tube but the rest of the meters can be seen in the photo. Normal operation is with plate current of 400-500 mills at 2200 to 2000 volts (1000 watts input), filament voltage 11, grid current 35-40 mills. The Bremer-Tully condenser (used in the grid circuit) has been replaced by a copper-sheet condenser like the one in the plate circuit but with thumb-nut adjustment. The spacing of the plate condenser is \( \frac{3}{8} \)’. The \( \frac{1}{2} \) ampere plate fuse blew once when the brush at the plate condenser developed into an arc.

The Midwest division is publishing a dandy amateur sheet called Midwest Radio. It is interesting and full of live “ham” chat. Carl Klenk, 9ZK, is the Editor and “Bill Schoening,” 9DXN, the Technical Editor. Both have lots of friends in the League and are good A.R.R.L. men. Single copies of the magazine are ten cents, and a year’s subscription is a dollar. Address them at 3148 Halliday Ave., St. Louis, Mo.

According to Amateur Radio of February the General Radio superhet was “introduced for the first time” at the recent get-together held by the second district council at Newark on Jan. 24th. Stunni—scores of these same sets have been built from the description printed in QST on pages 13, 14, 15 and 16 of our issue for August, 1924.

The Burgess Battery Company has prepared an unusually complete map of the U. S. which will be mailed to any amateur who desires one but has not received a copy. Address your request to the Burgess Battery Co., Chicago, Ill.

---

**DIAGRAM OF THE LOOSE-COUPLED HARTLEY-CIRCUIT TRANSMITTER**

- C1—2 copper plates, see photo.
- C2—Bremer-Tully “7 plate” condenser set almost at zero, capacity probably about 30 micro-microfarads.
- C3—500 micro-microfarad receiving condenser (make unknown) set near zero.
- C4—National 250 micro-microfarad condenser set near zero, capacity near 30 micro-microfarads.
- C5 and C6—Filament bypass condensers, any capacity above 500 micro-microfarads will do.
- L1—Two-turn primary of No. 14 wire, diameter 1”.
- L2—Four-turn secondary, 5” diameter, No. 10 wire.
- RFC1—Radio freq. choke wound on 1” tube with turns spaced by thread.
- RFC2 and RFC3—Radio freq. chokes wound on a pencil and then stripped off.
- Ant.—Antenna of copper tubing, 8’ long.
- C.P.—Counterpoise of No. 10 copper wire, 5’ long.

The receiving variable condensers were used because they were handy. The capacities are far too large and it would be possible to replace each of them with a simple condenser such as the one used for the plate, stopping condenser. These might not be as handy to adjust however.

for the photo as I have put all feed wires in BX and the hi-voltage leads in cable, also solidified the entire set. I’d better describe the set as it is in the photo.

“The Wavemeter is self-explanatory. Reinartz’s QST article carried out further and re-checked at 15 meters at the University of Minnesota. It goes to 4 meters with the \( \frac{1}{2} \) turn coil shown on the condenser.

“The clockwork (at the center of the foto) served as the original automatic key, sending “u 9XAX” tickety split. It ran 4 minutes at a time and served to give me a start. The Omnigraph runs longer and therefore is much better. Am making a keying relay as the set can’t be hand-keyed—it stops os-
For about two years we have been struggling with various insurance companies, local inspectors and with the Underwriters Laboratory at Chicago trying to get some kind of a satisfactory explanation as to the insurance companies' requirements of radio transmitting stations. We had gotten the impression that nobody in the insurance game understood the thing.

Just when we were most thoroughly and heartily discouraged there came to us the following clean-cut letter which makes the whole thing understandable from front to finish. Every solitary transmitting amateur in the United States ought to read every word of it.

At last we are able to understand why it is that the insurance companies insist that we use “Approved” devices while the Underwriters Laboratory says they don’t approve things. Does that sound dizzy? All right. Mr. Pember can explain it and now we will give him the chance.

Why couldn’t we find somebody in the insurance game who could say this thing two years ago?

Editor, QST:

On talking with your Mr. Kruse recently, he indicated that the interpretation of the National Electrical Code was causing considerable trouble and worry on the part of the members of the A.R.R.L.

This is probably due to the fact that the members of the A.R.R.L. do not have occasion to become thoroughly familiar with the code and learn where to find answers to the questions that arise.

The specific rules covering Radio Equipment (article No. 37) are apparently entirely clear with the exception of the use of the word “Approved” used in connection with devices employed.

The general impression is that the word “Approved” refers to devices inspected and tested by the Underwriters Laboratories, Inc., but this is incorrect as there are many devices used, especially in radio apparatus, that are not presented to the Laboratories for tests. The word “Approved” in such a case would refer to a device designed for the purpose intended and used in accordance with recognized practice.

If one will turn to Article No. 1 of the National Electrical Code, under definitions, there it will be found that the word “Approved” means a device or installation that is acceptable to the Inspection Dept. having jurisdiction.

“The Inspection Dept. having jurisdiction” may be a State Electrical Inspector, in addition to the Insurance Rating or Inspection Bureau.

A device listed by the Underwriters Laboratories Inc. is acceptable to nearly all Inspection Depts., if installed in the proper manner. Some cities and a few insurance organizations issue their own lists of approved devices but usually you will be referred to the “List of Inspected Electrical Appliances” issued by the Underwriters Laboratories. There are, however, many radio instruments and devices that are not used in any other art, and therefore the approval of such a device rests upon the Inspection Dept. having jurisdiction.

There are some states that have incorporated the National Electrical Code into the Statutes and the enforcement of the rules are brought about by State Inspectors. There are also numerous cities and municipalities in the United States that have passed ordinances providing that all electrical wiring in such cities shall be made in accordance with the National Electrical Code, or their own codes (which are in almost every case more strict than the National Electrical Code) and employ a City Electrical inspector to enforce the ordinance.

Therefore, before making an installation, any member should ascertain whether the installation is subject to approval by a City Inspector, or State Inspector, as well as by the Insurance interests.

The following states have statutes controlling the installation of electrical wiring and under the jurisdiction of a state inspector; District of Columbia, Maryland, Louisiana, Tennessee, Ohio, Minnesota and North Carolina. (There may be others that are not listed but these are the ones that the writer knows of at the present time).

The following cities have adopted wiring codes of their own and, therefore, installations in these cities should be made in accordance with their special rules, New York City, Chicago, St. Louis, Denver, Portland, Ore., Memphis, Tenn., Macon, Georgia, Kansas City, Mo., Jamestown, N. Y., Newark, N. J., Camden, N. J., Sioux City, Iowa, San Diego, Cal., Little Rock, Ark., Hot Springs, Ark., San Francisco, Cal., Gary, Ind., Atlanta, Ga., New Haven, Conn., Chattanooga, Tenn., Madison, Wis., Wilkes Barre, Pa., Moline, Ill., Rock Island, Ill., Peoria, Ill., Detroit, Mich., and Louisville, Ky. (There may be some others that have been added to this list since this information was secured by the writer.) Where the enforcement of standards for electrical installations is not under the supervision of a State or City Inspector the inspection may be made by the Insurance interests through
Secretary Hoover. When this was asked for an additional sum of $125,000 be granted for this purpose in the Emergency Appropriation Bill, and the subject had the personal endorsement of President Coolidge and Secretary Hoover. When this was asked by the President and the Director of the Budget, in spite of the Administration's program of economy, its importance is indicated. But they did not get the money. The House appropriations committee threw out the item, the Senate restored it, and the Conference Committee again deleted it; and in the necessity for getting the remainder of the bill through Congress before adjournment it was lost.

We believe it can be said with all truthfulness that the man directly responsible for this state of affairs is Congressman Martin B. Madden, chairman of the House appropriations committee, who pursued a most unusual viewpoint. Discovering that the Bureau would use some of this money to improve radio conditions for receiving stations, which in the first place are not licensed and hence not government-recognized, and that in their work they would run down non-radio sources of interference where the Bureau was without authority and only cooperation could cure the trouble, Mr. Madden came to the conclusion that it was not legal for the Bureau to attempt assistance in these matters, and enough of his colleagues joined with him to secure the committee's refusal. Some of Mr. Madden's remarks are interesting:

"I do not believe you ought to be allowed to interfere with everybody's business......I want to know what business it is of your organization [the Department of Commerce] to ascertain the difficulties that may be found in receiving stations. What is it that leads you to conclude that you have the right to supply remedies to those people whom you do not license on account of the troubles that they encounter?......Why do you presume to say that you have the right to interfere with my business or somebody else's business, without regard to what the law is? You may think it is patriotic, and you may think that it is important to do this thing, but there are limits beyond which a government agency can not enter into the privacy of another man's business......

If you only have the right to do a certain thing, why do you want to ask money to do something else, and go beyond the law?......We do not want to appropriate any money that will permit you or anybody else to go beyond the law in interfering with other people's business."

We publish this so that all classes of radio users may see what fashion of argument it was that has resulted in the continued handicapping of the Inspection Service.

KDKA broadcasts NAA time signals on its 65 meter wave.
Emergency Power Supply

Amateurs Cooperate with Burgess Company to Test Dry-Cell Plate Supply

In the truest sense, an emergency radio transmitter should be one with an auxiliary source of power, so that the station would be enabled to operate even if all outside power were cut off—as sometimes happens.

The Burgess Battery Company has recently been considering this matter with a view to operating transmitters from banks of dry-cell "B" batteries, and is now cooperating with a number of amateur emergency stations in the Middle West to test the practicability of the idea. Officials of the League's Traffic Department in several States between Minnesota and Ohio were asked to recommend stations for the tests, with the results that there are now approximately 20 stations equipped with from 1000 to 1500 volts of dry-cell batteries for transmitter supply. Present plans contemplate having the stations operate on regular schedule, using the dry-cell plate supply for all transmission.

It is planned to run tests and collect data on operation for several months before any conclusive information will be made available. So far, however, results have been encouraging, and the Burgess Company feels that there are possibilities for dry-cells as an emergency, portable, or low-power plate supply. We are promised full details of the tests when they are completed.

It is interesting to note that the Burgess station, 9EK-9XW, is using dry-cell supply exclusively for all regular and test transmission.

The photographs show the emergency transmitter of C. N. Crapo, 9VD, of Shorewood, Wis. Two transmitting wavelengths are provided, quick change from one to the other being provided by a D.P.D.T. switch and a condenser dial on the front of the panel. In the "up" position, the wave is 78 meters; the "down" position changes to 156. The correct settings of the variable condenser for the two waves are marked on the dial.

The set normally uses two fifty-watters in what appears to be a loose-coupled Hartley circuit. Regular power is supplied from a plate transformer operating through a chemical rectifier. Two five-watt sockets are mounted on the under side of the tube panel, in parallel with the 50-watt sockets. When it is desired to change to the emergency power supply, the 50-watters are taken out of the sockets and the five-watters put in.

In the photograph all four tubes are shown. In actual operation, of course, only one pair is used at any given time, the pair not used being taken out of the sockets.

—A. L. B.
A Constant Current Amplifier

By John R. Meagher

WHILE conducting some experiments last summer we chanced upon a rather novel and interesting form of amplifier that has for its main feature a plate current of constant value. Analysis shows that this type of amplifier has almost perfect reproducing qualities and, for equal conditions, gives greater amplification than is usual.¹

The plate section of a regular vacuum tube circuit is shown in Figure 1. Here R represents the external impedance which may be in the form of the primary of a coupling transformer, choke coil or resistance. The same circuit is shown in Figure 2. Here T represents the plate-filament resistance of the vacuum tube. The value of T varies, of course, with variation of grid voltage. R remains fixed so the total value of resistance and consequently the current through the circuit changes.

In the new form of amplifier the plate-filament resistance of a vacuum tube is substituted for the impedance R. This is shown in Figure 3, and again in simpler form in Figure 4. The idea is that T and R should be tubes having the same characteristics and adjusted to similar operating points, so that T will equal R for equal values of grid voltage. Then if the grid voltages are changed equally but in opposite phase the resistance of one plate-filament path will increase as the other decreases and vice versa. The total resistance will remain constant, and so naturally the current through the circuit will remain steady. But the voltage across the resistances will vary. The effect being similar to that produced by swinging the slider of a potentiometer from side to side; the voltage across the slider and any fixed point in the potentiometer circuit will vary as the slider is moved even though the current through the potentiometer resistance remains constant.

An application of the circuit is shown in Figure 5.

¹ That is to say, rather more than is obtained from a resistance-coupled amplifier. A little thought will show that the Meagher amplifier should stand between the transformer-coupling and the resistance-coupling with regard to the amount of amplification obtained, also that it is inherently likely to give good reproduction.
Top-Loading Antennas and Loops

By William H. Murphy*

It is well known that the effective height of an antenna is increased by increasing the capacity of the antenna top. The effective height increases because the current in the vertical part of the antenna is increased as shown in Figure 1. The effect at a distance is proportional to the shaded areas in Figure 1 so that it is evident that an improvement is obtained by adding (top) capacity.

It was believed that a further improvement could be obtained by inserting an inductance between the antenna top and the downlead as shown in Figure 2. It was with this in mind that the work to be described was carried out. Tests were made in February, 1923, by inserting top-loading inductances at the point indicated in Figure 2 and by observing the change of current distribution in the antenna. These tests indicated a considerable increase in the antenna current as far up as the top-loading inductance (keeping the wavelength and the antenna power input the same) and so made the continuation of the tests of interest. The steps taken were to determine the antenna resistance at various wavelengths and with different amounts of top and base loading in order to steady the component resistances of the antenna under observation. These figures were also necessary for the making of later tests with constant antenna power input. During these tests the input power of the set was also carefully noted and found to remain practically constant. It was therefore evident that differences in received energy (or in received signals) were due to changes in the effective height of the antenna.

Experiments with T Antenna

In August and September 1923 a further series of experiments was made with a T antenna 35 feet high with a span of 37 feet. This antenna was made up of cage sections used in previous work. A fan-shaped counterpoise was used. The natural wavelength of this antenna system was 134 meters. The inductance was .08 millihenry and the capacity was .00015 microfarads. These values were measured at the fundamental wavelength. The first step was to obtain accurate antenna resistance data at various wavelengths and with different amounts of top and base loading in order that comparative tests could be made with constant antenna input power.

A gradual reduction of antenna resistance and dielectric resistance was noted as the base loading was decreased and the top loading increased up to .05 millihenry. Further top loading again increased the resistance. The method of reception consisted of the use of a tuned loop placed 300 feet from the transmitter. This loop was used in combination with a Ferron crystal and a Paul galvanometer. The received current was measured by means of this galvanometer. The results obtained in this test are given in table 1. It will be noted

---

*Captain, Air Svc. U. S. A., McCook field, Dayton, Ohio.

1 Naturally the wave length of the antenna goes up when this is done. To bring the wavelength back down again it is necessary to cut down the number of turns in the base load L (Figure 1B) or else to use a series condenser (Figure 1C).

2 The author evidently means, "provided that the same antenna input power is used in both cases." Even then the statement is not exact; the distance effect is not proportional to the shaded area but to its root-mean-square value. The difference between the two statements is not large.

3 These tests are not first in the original work nor in the author's article as we received it. However, the editor has thought it best to place these tests first because everyone is familiar with the T antenna while few have used a single turn transmitting loop, such as is discussed next.

4 This is an important point. Notice that all of the tests were made well above the antenna fundamental. The antenna was loaded in every test and the experiments determined simply whether top-loading or base-loading was best if one was going to load.

5 The reader will at once object that the distance is too short. However, this is not an oversight as will be explained later in the article.
that the best top-loading inductance was close to .05 millihenry. Also, that the efficiency obtained with the helix is greater than that with a group of spiral (pancake) coils. This was probably due to the lower resultant dielectric loss of the single helical coil. The watts required to give equal deflection were determined by calculation from check curves and from actual tests, the results being given in table 2.

It was deemed of interest to obtain an approximation of the energy received at the different wavelengths in order that comparison could be made between the various degrees of top-loading. When the wavelength is the same, the antenna input power is the same and the only change is in the degree of top-loading and base-loading we can use received energy as a measure of the effectiveness of the sending antenna. The second part of table 2 contains this information while Figures 3 and 4 show the effect at the receiver. Where received energy is mentioned this is done in arbitrary units although the values were obtained from the loop resistance and the square of the loop current.

These tables and figures show that .05 millihenry is the best value of inductance to be used in connection with this particular antenna. It should be noted that the effect of moving a certain amount of loading coil from the base to the top is not the same at different wavelengths.

Experiments with Single Turn Sending Loop

A one turn square loop was built as shown in the photograph and in Fig. 5. This loop

Effect of Top-Loading a T Antenna, Constant power to Antenna.

<table>
<thead>
<tr>
<th>Millihenries</th>
<th>Wave-length meters</th>
<th>Wave-length meters</th>
<th>Wave-length meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>160</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td>.022</td>
<td>106</td>
<td>106</td>
<td></td>
</tr>
<tr>
<td>.047</td>
<td>116</td>
<td>111</td>
<td></td>
</tr>
<tr>
<td>.076</td>
<td>132</td>
<td>122</td>
<td></td>
</tr>
<tr>
<td>.100</td>
<td>150</td>
<td>138</td>
<td></td>
</tr>
</tbody>
</table>

Table 1.

Effect of Top-Loading a T Antenna, Watts to Antenna for some effect at receiving loop.

<table>
<thead>
<tr>
<th>Millihenries</th>
<th>Wave-length meters</th>
<th>Wave-length meters</th>
<th>Wave-length meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>160</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td>.022</td>
<td>106</td>
<td>106</td>
<td></td>
</tr>
<tr>
<td>.047</td>
<td>116</td>
<td>111</td>
<td></td>
</tr>
<tr>
<td>.076</td>
<td>132</td>
<td>122</td>
<td></td>
</tr>
<tr>
<td>.100</td>
<td>150</td>
<td>138</td>
<td></td>
</tr>
</tbody>
</table>

Table 2.

Effect of Top-Loading a single-turn sending loop with constant power input.

<table>
<thead>
<tr>
<th>Millihenries</th>
<th>Wave-length meters</th>
<th>Wave-length meters</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>.022</td>
<td>106</td>
<td></td>
</tr>
<tr>
<td>.047</td>
<td>116</td>
<td></td>
</tr>
<tr>
<td>.076</td>
<td>132</td>
<td></td>
</tr>
<tr>
<td>.100</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>.150</td>
<td>160</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.

Relative power received for the above cases.

(Arbitrary units, not watts)

<table>
<thead>
<tr>
<th>Watts to the sending loop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative power received</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Table 4.
had a width of 30 feet, a height of 20 feet, and a gap of 2 feet at the top. The lower side was 5 feet from the ground. The natural wavelength was 100 meters and when measured at this wavelength the inductance was .05 millihenry and the capacity .00014 microfarads. The sides of the loop were made of cages 4 inches in diameter composed of 8 No. 14 copper wires. Various inductances were made up for loading and it was found that a rather large helix gave better results than a group of smaller spiral inductances. Spiral inductances were however used in the majority of tests as a large number of them was on hand and it was a simple matter to use them in series to obtain combinations which would not occupy much space vertically and which could be repeated without much error. The greater dielectric loss in these inductances has already been indicated as the probable reason for their poorer performance. (A single large one used alone would not have given this effect but would have been inconvenient.) Antenna ammeters, which have been carefully checked, were inserted at A, B, E, F and G. The currents were noted at these points for various wavelengths. Inductances were then inserted at the points A and B while current readings were obtained at the points A, B, C, D, E, F and G.

Resistance Measurements of Loop

As stated above it was necessary to obtain accurate resistance measurement of the transmitting system at various wavelengths and with different amounts of top and base loading in order that accurate comparative tests at any given wavelength could be made. Incidentally, this work showed that the reduction of resistance was obtained between certain limits of wavelengths as the top-loading was increased and the base-loading decreased. However, a best top-loading was reached after which the antenna resistance due to dielectric losses in the coils (and for other causes) again increased. It was found, for instance, that an increase of top-loading above .06 millihenry on each side was of no value. With .06 millihenry the dielectric resistance became less (between 175 meters and 220 meters) than with any other loading. This same loading of .05 millihenry was in later tests found to give the best results in actual transmission. In any case the radiation resistance increased with top-loading (and less base-loading) and this is due to an effective increase in the height of the antenna.

It was realized that accurate data on the best wavelength would be difficult to obtain as the reception factor of the receiving system would enter into such a determination.
depends on the reception factor of this antenna or loop. When comparisons are being made at any given wavelength then this does not enter in and the relative results will be independent of the reception factor and will depend only on the relative amount of energy which is radiated or which is present in the electrostatic and electromagnetic fields of the sending antenna. Therefore, while the curves of received energy shown in this article can not be regarded as absolute they still show the relative performance satisfactorily. If one of these shows a greater height that curve is evidently obtained under a more favorable condition. By looking at Figures 4 and 7 it will be seen that the curves giving the results with a top-loading of .05 millihenry are entirely above the curves for the same antennas without top-loading. It was therefore only necessary to calibrate the measuring device in the receiving system for different multiples of a known antenna power in order to obtain accurate comparative data. A small vertical antenna was therefore set up at 2000 feet from the transmitting station. A tuning set with a carbon-undum crystal detector and Paul galvanometer was then connected to this antenna and the deflections of the galvanometer noted to be proportional to the square root of the power in the sending antenna, in other words they were directly proportional to the sending antenna current. This confirms the statement that the power at the receiver was true indication of the effectiveness with which the sending antenna was (at a given wavelength) using the power which was supplied to it by the sending set.

It was found that results obtained with a tuned loop in the induction field of the transmitting antenna gave similar results, the loop having a milliammeter inserted directly in its circuit. This greatly simplified the operation as no crystal adjustment had to be made and the results could be easily repeated on different occasions. Data were obtained in this manner with 66 watts antenna input at various wavelengths and with spiral coils except in the case of the .05 millihenry coil which was helical. As has been stated the efficiency of this coil was greater because of the lower electrostatic losses obtained with it. The results of this investigation are shown in Table 3, also in Figures 6 and 7.

In order to indicate the relative amount of power required in the sending antenna to give the same effect at the receiver, further tests were made and these are listed in Table 4. More tests were made than are indicated but it is evident from those which are shown that .06 millihenry gave best results at 200 meters. The best top-loading inductance is a function of the wavelength and increases with the same. In order to obtain an approximate knowledge of the relative results at different wavelengths and to determine which wavelength gave the greatest efficiency, careful measurements of the resistance of the receiving loop circuit were made at various wavelengths. The watts in the receiving loop were calculated for the various conditions given above and the results are presented in the second part of Table 4. These data again point out the best inductance for the wavelength in question and further point out that the greater increase in energy is obtained at 150 meters. Putting it differently this particular loop gains more advantage from top-loading at 150 meters than it would if we were working at a higher wavelength.

Transmission Tests with Loop

In order to determine to what extent such a top-loading effected reception at a distance, a preliminary test was made on the 24th of March with 40 watts antenna input at 140 meters. The receiving station, 3APV at Washington, D. C. reported perfect reception at 11:30 P. M. Eastern Standard Time. Further tests were then arranged with 3APV and with 8XK at Pittsburg, Pa., both of which stations were not over 15 degrees from the bearing of the loop. These tests were made at about 10:00 p. m. Eastern Standard Time on the 15th and 16th of May. When using 66 watts antenna input at 140 meters with CW transmission and a top-loading of .05 millihenry 3APV reported perfect reception while 8XK reported signals audible all over the room with loudspeaker. Working with

\*\*See note 6.
the same power and wavelength but without any top-loading, SAPV reported the signals very weak while 8XK received none at all.

Conclusion

This and similar tests indicated that the efficiency of the antennas used can be increased at wavelengths above the fundamental by proper top-loading. They further indicate that the greatest percentage increase can be expected from top-loading at a wavelength about 30% above the antenna system fundamental. No opportunity has been had to carry on tests of a similar nature with larger or smaller antennas but such tests would undoubtedly be of value in checking the above data and for adding information. No comparison has been made with antennas of the same sort but large enough so that their natural wavelength (unloaded) would come near that of our antennas when they were using top-loading only and no base-loading. Neither have any comparisons been made in which the antenna capacity had been increased in order to give such a natural wavelength. It is believed however that if certain limitations in height and span are necessary then top-loading will prove to be of considerable value.

6 By no means overlook this point. The average transmitting amateur has simply got to fit his antenna into the space. Just what makes the best antenna does not concern him very much. He is interested in "What makes the best antenna within my space."

BOOK REVIEWS


We took occasion some time ago to say that radio books are getting better. Henley's "Workable Radio Receivers" gives another piece of evidence along this line. We wish the name had been chosen a little more carefully so as to include the word "amateur" because no receivers are given for the commercial wavelengths. However, beyond the somewhat misleading title very little criticism can be made of this book.

The receivers throughout are same in design and employ fundamental circuits, consistently avoiding the various insane modifications which so many people have been "inventing" simply to be different and not because there was any real virtue in them. We do not know who unhappy idea it was to label chapter 10 "The Ultimate Receiver", because this gives to the book a touch of hokum which the text matter does not deserve at all since it is perfect good material. The "ultimate" receiver will never come until the end of radio development has been reached, in other words just when we are abandoning radio. All of which is parenthetical and is not supposed to detract from the fact that it is a good book showing good circuits for amateur work.

The Myers Tube

The Myers tube is distinctly not getting the attention that it deserves. It is mechanically very rugged and it has the virtue that the plate and grid come out of opposite ends, although both adjacent to a filament lead. The mounting is such as to make it especially easy to run leads without getting them too close to each other.

For short-wave reception, especially radio-frequency amplification, they seem attractive. Will not our readers make some comparisons and let us hear of the results?

...-

The short squib on page 42 of the Feb. QST calling attention to ice-cream containers was sent in by F. H. not S. H. Akers. Also, Mr. Akers says that these tubes contain considerable moisture in spite of being paraffined. They need to be baked and then recoated with paraffine before using.

...-

Here are some abbreviations that old-timers will remember:

4—Please start me, where?
13—Understand?
25—Am busy now.
30—No more.
77—Message for you.
92—Delivered.
99—Keep out.
Bartholomew Molinari of San Francisco and 6AWT—he has made the call synonymous with the city—has achieved through his love for the game the distinction of being owner of the “Best All-around American Amateur Station.” Don Wallace, 9ZT, winner of the 1923 cup, ran him a very close race.

6AWT was described in the January issue of QST but the transmitter, antenna system and receiver have been changed since then. It is a striking example of the progressiveness required in a successful amateur station.

The location of the station is apparently highly undesirable. Nevertheless, partly because Molinari has made the best of it and partly because appearances are deceiving, the station has been a consistent DXer. The first night the new antenna system was in use 6AWT’s signals were reported from India and the Philippine Islands. All states of this country have been worked and Canada, Alaska, Hawaii, Mexico, Porto Rico, New Zealand, Australia, Indo-China, Japan, Java, and Brazil. In addition, England, Argentina, Cuba, Panama, Tonga, Tahiti, Samoa, China, Pribiloff Islands, Tasmania, Korea, Malay Straights, boats off Cape Horn and the coasts of Guatemala, Honduras, Nicaragua, and Costa Rica have reported Molinari. To sum: 6AWT has been heard in all of Asia, Australasia, Oceania, Polynesia, Europe, Africa and in North, Central, South and Danish Americas.

Truly we can say that Molinari sits in his shack, taps a rubber knob and the world listens.
General Information

The station log dates back to Sept. 1922, and has been kept continuously to now. It is a loose-leaf affair with at least a page devoted to each day. All reports are checked against it before confirmation of reception is sent. Messages are kept on A.R.R.L. message forms and each month are filed away regularly. Those addressed for within 300 miles of San Francisco are sent by mail, while city messages are delivered without delay. An average of 40 per month were handled during 1924. GAWT holds an O.R.S. appointment.

Though GAWT is a one-man station, all cards are QSLed and will continue to be, even if a little late due to quantity. Cards are sent to those amateurs heard who are over 1000 miles from San Francisco.

The Transmitter

Due to having about 50 BCL's within a radius of about six blocks and not being able to run a 200 meter station without bothering them, 80 meters wavelength is being used because it causes less interference.

The transmitter has a wooden frame. A single 250-watt tube is used in the inductively coupled Hartley circuit and is shunt fed. The tube is mounted so that the air can circulate freely about it. The inductances were made from ⅛ by 1¼ Bakelite strips and 18 gauge, ⅛ inch wide brass ribbon. The primary has 8 turns and the secondary 4. Dead end is avoided because all of both coils is in use. The plate series condenser is mounted on the upper panel, making the plate lead very short, while the grid-condenser and leak are mounted on the lower panel, as is the filament voltmeter, so that the grid leak, too, is short. The filament by-pass condensers are mounted on the upper base board and are the proper size for the operating wavelength, having been ad-

denser and leak are mounted on the lower panel, as is the filament voltmeter, so that the grid lead, too, is short. The filament by-pass condensers are mounted on the upper base board and are the proper size for the operating wavelength, having been ad-

The antenna ammeter and the series antenna condenser are mounted near to the antenna change-over switch. This series condenser is made of two 5” x 8” brass plates separated ⅛” by Pyrex rods and so insulated.
The primary inductance is 17 inches maximum diameter and the outside turn is all that is included in the grid side. A Cardwell transmitting variable condenser tunes the set being shunted across a single turn on the plate side of the filament return.

The high-voltage condensers, synchronous rectifier and power transformer are mounted next to the table. Running normally with 3500 volts on the plate and a 750-watt input the antenna current is 5 amperes. Nine months life has been obtained from a 250-watt tube. The tubes are hardened for regular use by starting at 3000 volts and adding 500 every week until 7000 is reached. Then the voltage is dropped to the operating potential.

Power Supply

Power is derived from a 220-volt three-wire service that is connected to the main line switch on the power panel which is beside the receiver and from which everything in the station can be operated.

The filament supply is from a rewound pole-transformer which is capable of handling three 250-watt tubes. A rheostat in the primary controls the filament voltage.

The plate voltage is supplied by a 3 k.v.a. pole transformer fed so that the maximum voltage obtainable is at 7000. A rheostat in the primary makes it possible to obtain as low a potential as might be desirable. This transformer, too, is larger than needed, but it provides the convenience of being able to operate for hours with heating or danger of breakdown. 6AWT has not been known to go off the air because of transformer trouble.

The line is protected by kickback preventers. Most amateur stations seem to have forgotten this necessary thing although C.W, in Molinari's case, is worse than spark in illegal surges.

The high-voltage is rectified by a special Advance synchronous rectifier* that has a D.C. winding fed by the storage battery; which winding always makes the machine start right side up.

The Receiver

The receiver is the usual tickler circuit with one-step and careful low-loss construction. It has been put behind a panel specially engraved for it with controls from, and cabinet that formerly housed, a Grebe 13. It was found that the set properly built would operate satisfactorily cabinet-style as well as undressed; and the appearance and operating satisfaction were more in the former. The tuner proper is wound on glass rods set in Bakelite ends, and is tuned by glass insulated condensers. Baldwin phones are used. The detector tube is a 201-A without the base.

The Antenna System

The antenna is a semi-vertical, inverted cone cage with a cage ball in the top. The ball is illustrated rather well in the photographs. It is three feet in diameter and on its equator the other wires terminate. From the tip of the cone to the top of the ball is a length of 15 feet; the antenna having a total length of 85 feet. Plain copper wire painted with asphaltum was used. The mast supporting this impressive aerial is 90 feet high. The idea, of course, in this construction of the antenna, was to obtain maximum top capacity.

The counterpoise is a nine-wire, fan-shaped affair 40 feet long with a spread of 6 feet at the free end. It is strung between turn-buckles and is kept taut. It is 8 feet high and between it and the free end of the antenna is a distance of 72 feet. The insulation consists of Pyrex for the leads and antenna strain insulators, with Ohio Brass porcelain on the counterpoise. Approximately two feet of insulation is provided at the free ends of counterpoise and (Concluded on page 58)

* It may seem peculiar to find fault with a star station, but even the best has flaws. We want to particularly advise against the use of a "synk" rectifier without filter as is 6AWT's practice. We'd go further and say not to use a "synk" rectifier at all.—Ed.
STATION c2G is located in a bottom flat of a two-story house with no space behind it and with a grass plot in front, which cannot be covered with counterpoise wires. The antenna is supported by twenty-foot masts on the roof with a caged lead-in lead down to the cellar at the rear, the counterpoise being erected in the back yard between the clothesline poles.

To couple this antenna system to the closed primary circuit by the usual Hartley, Colpitts or Meissner methods necessitated leads to antenna and counterpoise forty feet each in length. This caused a large loss in radiated watts, and after much experimentation a capacity coupling method was adopted which has resulted in a great improvement due to the elimination of these long leads to antenna and counterpoise.

The capacity coupling scheme in use here is as shown in the sketch, there being nothing original in the idea at any place in the circuit.

The driver is the usual straight Hartley circuit using parallel supply.

The antenna is coupled to this driver by capacity coupling, thus keeping losses to an absolute minimum. A condenser of small capacity is connected to the same turn as the condenser tap nearest the plate tap. This condenser need have a maximum value no higher than .0001, and in practice the capacity in use will not be over .00003. Two pieces of metal 4" square, one fixed, the other movable, may be set at a distance from each other of 1" for the first tests. This is called the coupling condenser.

Various degrees of coupling may be obtained simply by varying the coupling condenser, which causes little change in wavelength. This cannot be said for inductive coupling. On the windiest day, the coupling condenser may be decreased sufficiently to prevent the antenna variations having any noticeable effect on transmitted wavelength; giving a much steadier note at the receiver than is generally possible.

Since the antenna loading inductance, series condenser and antenna ammeter are all small, they can be built into a small box and connected to the antenna in a position where it would be impossible to locate the whole transmitter. The driver can then be installed (as at 2CG) in the cellar or at any other place where a good ground connection can be made.

Adjustment

First disconnect the coupling lead and coupling condenser from the primary (driver) circuit.

Then adjust the plate tap of the driver so that the current circulating in the closed driver circuit is about as large as the
The antenna current we would expect from the same set. Do not try to get a large current in the primary circuit, as this will only increase the heat losses. Keep the efficiency of the primary circuit high. Cut down the grid turns until the tube will not oscillate, then add one or two turns. Use only about 4-6 turns across the primary variable condenser, and be sure this condenser has reasonably low resistance. The current in the closed primary circuit should be equal to that which the set will put into the antenna when working somewhat above the fundamental wavelength of the antenna.

The coupling condenser is then connected and set at zero. Attention is now turned to the antenna. All the antenna loading inductance is first used and the aerial condenser adjusted until the ammeter reading is at maximum. Probably, before maximum reading is obtained, the tube will tend to "bubble" and cease oscillating, this being the result of too tight coupling. It is remedied by decreasing the number of turns in the antenna loading inductance. When maximum antenna current is obtained, the coupling condenser capacity may be slowly increased until the tube again "bubbles", then again be decreased below this point so that there will be no possibility of its occurrence in operation.

It will be noticed that in the diagram the filament tap is shown midway between the two primary condenser taps. This is a good way to start things, but when some efficiency has been obtained in the closed circuit, then this tap should be moved a turn or so on either side of this mid-point until the current shown in an ammeter in the ground lead is at minimum. This ammeter may then be removed and used for its normal purpose. The ground must remain connected permanently. If this lead is over six feet long it should be caged to prevent the whole driver being at a high radio frequency potential above ground.

Chokes should be used in the power supply mains between the main switch and the transformer or motor generator. These are conveniently made by winding two hundred turns of No. 16 D.C.C. on 2½" cardboard tubing. One choke in each lead is correct.

The antenna loading inductance may be tapped at 2 or 3 points, corresponding to the wavelengths ordinarily used.

Wherever the antenna is far from the transmitter such a system has a good chance of improving the efficiency of the transmitter. At 2CG the distance between sending set and antenna is 40 feet.

The change to the system just described has raised the antenna current (at 85 meters) from .8 amperes to 1.3 amperes. The author will be glad to assist anyone who encounters trouble when utilizing this system.

6 The primary tuning condenser at 2CG is one having a maximum capacity of 250 micro-microfarads. The inductance is made of No. 12 bare copper wire wound to a diameter of 5" and spaced by. 6 or 6 turns are used between the clips connected to the condenser. This is at 85 meters.

The need for an antenna loading inductance is not usual; it just happens to be necessary at 2CG. Usually one can do away with the loading coil and simply run the R.F. feeder to the counterpoise directly. Sometimes the removal of the antenna loading coil also permits the removal of the antenna series condenser. That is a doubtful advantage the series condenser is a useful thing.

STATION DESCRIPTIONS
(Continued from page 56)

antenna.

The antenna system has proven effective, and well worth the time taken to install it.

To Note

We feel the necessity of calling your attention to the fact that although 6AWT is in a continual state of flux, it nevertheless is kept in neat operating condition. This is an ideal state from an operating viewpoint and certainly makes for the successful relay station. Convenience comes first in something one must use continually and Molinari has achieved that. But, every successful relay station incorporates that same quality.

Several persons have asked what capacities were used in the audio tuner in the McCaa Band Filter. Mr. McCaa advises that they should be variable capacities with a range of .02 to .04 µfd., variable in steps of .005 µfd.

For those who wish to know, the best time to listen for Europe is 11 P.M. to 5 A.M. C.S.T. and for Australia and New Zealand 4 A.M. to 8 A.M. C.S.T.

In the "Super DX" article in Jan. QST we stated that 3BWT worked CBS on Nov. 30th. This should have mentioned 3BWJ as the station doing this. Darned sorry, OM.
Frederick Thompson, g2AWK, 16, Stratford Grove, Heathen, Newcastle-upon-Tyne, England.


As the text is a part of a QST magazine, it contains various call signs of people along with their locations.

May, 1925 QST 59

F. Hueber, fSDP, 40 Boulevard du Roi, Versailles, France.
Underground Antennas

Dallas, Texas,
2500 Maple Ave.

Editor, QST:

And now I set down, take my typewriter in hand and write a few lines at yourself. Hoping they hit you easy, I go on.

Say, have you noticed the write-up the fellow got in the last issue of the “Radio News” concerning underground transmission?

Remember sometime ago what I wrote to you about underground receiving aerials? Well, anyway, you did the favor to me of publishing it. Immediately after that I started on the idea of underground transmission. Not thinking it very good I did not go to much expense; however, since I have noticed someone else besides myself has been working on the idea, I believe that I will.

About two months ago I had the receiving aerial I told you about before taken up, and laid down a more insulated aerial about 1 foot underground. Since then I have been working altogether on it and have had exceptionally good luck. I laid it down with the use of a compass, and pointed it directly at Hartford. It works! Since then I have received cards from many ones and twos. Have worked 2JL and a one, and have heard from New Hampshire, 1BFT. They all say I am very QSA and no fading. I have also received a card from Eng.; have worked Cuba and Canada on it; and I seldom do any transmitting at that. I am usually experimenting on the impossible, and the result is at some times disastrous. I have the cards to show for the above.

Now to tell more about it. I knew at first that the average amateur hasn’t enough to go to much expense. So simply bought 110 feet of ordinary rubber garden type hose, dug a small trench about 1 foot deep and laid the garden hose in it. The trench points at Hartford. Then took some No. 12 heavy rubber covered wire and ran on the INSIDE of the hose. The hose has a bottle over the far end that is filled with sealing wax. The end of the hose nearest the station sticks perpendicular one foot above the ground for insulation. The wire inside is 100 feet long. The ground was used instead of a counterpoise. The set was the ordinary Hartley, inductively coupled. The power was two so-called five watters using 500 volts rac, on the plates and drawing exactly 100 milamps. The antenna current was .2. The distance worked was about two thousand miles, I suppose, and was heard in England. The call used was 5BX on the regular 80 meter band, and the call of 5XAY on the bands of 50 and 40 meters. The thing that stands out in the tests was the steadiness reported.

Now! No one, no matter how small and confined the space they have is, has a right to say they would have a transmitter but trees etc. are in the way. The cost is negligible when the cost of good aerial wire, insulators, masts and so forth are counted, and the results are surprising.

Just dropped you this as I wanted you to know that the ARRL is also experimenting with the underground stuff as well as the big bugs. If more is wanted will try to accommodate you.

—W. H. M. Watson, 5RX-5XAY.

Some Thanks

Rogers Radio Research Laboratory
Hyattsville, Maryland.

Mr. Hiram P. Maxim:

Though I have been a constant reader of QST, and from time to time a member—and, if I remember correctly now, was a charter member—I never fully realized until lately the great credit due you and your associates for the foundation of this remarkable Association. What has impressed me so, is the generous response by the members in answering CQ calls. Heretofore I have only experimented with long waves, but recently have been transmitting on 180 meters using underground antennae in lengths of 100 feet with series condensers and 50 foot lengths without. I find the latter length best.

The enclosed list will give you the results so far obtained.* The greatest distance being 2,058 miles. I am now having another set made by Mr. D. S. Breitenbach and Mr. John Lunnaman, who have assisted in making these tests, so as to get down to 80 meters; as many are receiving me on 90 meters, harmonic of 180.

If you can spare space in QST I would ask you to extend my sincere thanks to all those who have shown me such consideration.

—J. Harris Rogers.

*See Calls Heard
QRN Storms

Editor, QST:

Have read the article by Mix in the November (1924) issue of QST and notice that he speaks of QRN storms. Particularly he mentions a sound like escaping steam which I too have noticed. In fact I make particular note in the ship's log of it.

It was while enroute from Madaug, New Guinea to Sabaug, Sumatra in the Dutch East Indies, that I experienced this queer static. There were three occasions and the whole night, also, after we left Sabaug. I never have heard anything like it before and I had never heard it before reaching the Dutch East Indies; nor have I heard it since leaving them. Certainly the Tropics in places also contains the kind of static that Mix speaks of.

It sounded just like escaping steam, was usually very loud and on all waves. No signals could be heard through it. It was just like a blanket although the intensity varied at times. It usually came on suddenly when it was going to rain or after it rained, and once while it rained. There is almost continuous lightning in these waters. Spasmodically the lightning would make a sizzling click while the steam was escaping and the queer static would stop entirely for half a minute or so, during which period 600 meter traffic could be heard as usual. Then the hiss would recommence. It always took a bolt of lightning to clear it up for a moment.

It would be interesting to know if this kind of QRN is heard elsewhere besides the North Pole and the D. E. I. I haven't heard it anywhere else in the Tropics, nor met anyone else who had.

—Chas. E. Biele, GDWQ-u2AOS

Check!

Editor, QST:

I think that nearly all the hams to-day are glad the old spark is practically eliminated in ham-dom; but why, I ask, stop at spark? What about that other nuisance known by the simple little phrase I.C.W.? Of what use is it except to QRM the other fellow who may be trying to get a message or some other important matter? I.C.W. is nearly as bad as spark, so why not put the skids under it too?

The Crescent Radio Assn. of Detroit, which owns and operates 8IK, has always been against the use of either spark or I.C.W. All the members have pledged to never use either of those nuisances.

I suppose this comment will draw a deal of criticism from some of the hams; but anyone who lives in a thickly ham-itated district, such as the location of 8IK, where within one square mile there are 10 other transmitters, knows how much of a nuisance it is to have two or more fellows working on I.C.W. I say again it is a pest!


It has been suggested that the R system of indicating audibility be used instead of the ineffective QSA-QRZ-QRK arrangement in practice now. This has been suggested by a number of correspondents and is undoubtedly an improvement so the list is given below.

Hang it up by your set and make use of it.
R1—Faint signals, just audible.
R2—Weak signals, barely readable.
R3—Weak signals, but readable.
R4—Fair signals, easily readable.
R5—Moderate strong signals.
R6—Strong signals.
R7—Good strong signals. Would be readable through heavy QRN and QRM.
R8—Very strong signals. Several feel from-phones stuff.
R9—Extremely strong signals.

The Spanish stations have been mentioned as EAR1, EAR2, and so on. This is not correct. The A.R.R.L. had assigned "s" as the intermediate for Spain but Spain is spelled in Spanish, "Espana." The result has been that the Spanish stations are using "e" for the intermediary and sending it before their calls to avoid error. The calls are AR1, AR2, etc.

WJS, the station of the Rice Expedition, and its various field stations, UR, UB, LW, are being heard all over the U.S. and Europe. It is also being worked by a great many.

WJS, the station of the Rice Expedition, and its various field stations, UR, UB, LW, are being heard all over the U.S. and Europe. It is also being worked by a great many.

NATIONAL DIALS

Radio experts as well as thousands of delighted users praise NATIONAL Dials for their velvety smoothness and for precise tuning. NATIONALS are the dials with the "Perfect Radio Touch" PRICES—4", $2.50; 3 3/8" $2.25

NATIONAL COMPANY, Inc.
110 Brookline St., Cambridge, Mass.

Sole Licenses for the Manufacture of the National Regenerators under the Browning-Drake patents.

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST
TONE CLARITY
That's What You Should
Demand and You Get It
In The

Radiodyne
"The Voice of the Nation"

Without Sacrifice of
Distance or Selectivity

It's the remarkable tone—that faithfulness to
the original that places the Radiodyne apart from
other sets—and remember, if you can get it with
any set, you can get it better with a Radiodyne.

A Few
Radiodyne

Type WC-12 Features
Tunes Sharply Thru
Local Stations
Uses 6 Dry Cell Tubes
Receives from Great Distances
Has Wonderful Volume
Exceptional Clarity
Batteries self contained in beautiful
two-toned Mahogany Cabinet

Models Priced from $65 to $250
Everyone a Radiodyne
Everyone Worth the Money

Write for Booklet

WESTERN COIL and ELECTRICAL CO.
305 Fifth Street, Racine, Wisconsin

Buy Direct and Save the
Middleman's Profit

RADIO $1.50
TUBES

Fully Guaranteed
All tubes tested on Laboratory Radio Tube
Testing Machine and Brand New
Mail Orders Promptly Filled
WE SHIP C. O. D.

Style 0199 .05 Amp. 3-4 Volts—Amplifier—Detector
Style 0201A 1/4 Amp. 5-6 Volts—Amplifier—Detector
Style 012 25 Amp. 11/2 Volts—Amplifier—Detector
Style 020A 1/4 Amp. 5-6 Volts—Detector
Style 0199A With Standard Base

RADIO TUBE MFG. CO.
154 Nassau St., Dept 22, New York City

DON'T FORGET
To send 50 cents for
A.R.R.L.
Auto Emblem

ENAMELED METAL — Just the Right
Size to Look Fine on Your Radiator

SAY YOU SAW IT IN Q S T—IT IDENTIFIES YOU AND HELPS Q S T
They're in the Wireless Room of the Leviathan

The World's Flyers Carried Burgess

The Adventures of Burgess Radio Batteries

Remarkable are the adventures of Burgess Radio Batteries. And where there's danger—upon, above, or below the earth, sky and sea, will be found Burgess Batteries—laboratory products.

"ASK ANY RADIO ENGINEER"

BURGESS BATTERY COMPANY

Engineers DRY BATTERIES Manufacturers
Flashlight · Radio · Ignition · Telephone
General Sales Office: Harris Trust Building, Chicago
Laboratories and Works: Madison, Wisconsin
In Canada: Niagara Falls and Winnipeg
Great Sensitivity

A SENSITIVE type of thermo-couple instrument for use in a wave meter circuit and for the detection and accurate measurement of small currents.

"Weston" means accuracy, economy, dependability and performance for any one of its great line of measuring instruments for all fields. Experts prefer Weston. Ask them why, then write for our Circular "J" for more complete information.

WESTON ELECTRICAL INSTRUMENT CORP., 158 Weston Ave., Newark, N.

STANDARD THE WORLD OVER
WESTON
Pioneers since 1888

RADIO SPARK TRANSMITTERS (75 WATT, PORTABLE)
Made for U. S. Army Aeroplanes

This is a tuned spark coil transmitter, with a wave length of 100-300 meters. The set is made of the finest of materials and the essential parts are the spiral tuning inductance, the induction coil, sending condenser and spark gap. Can easily be converted into spark coil CW set. Brand new, in original cartons.

ORIGINAL GOVERNMENT COST, $47 EACH
OUR PRICE $5.75 EACH
AMERICAN SALES COMPANY
21 Warren Street New York City

Used by U. S. Navy, Coast Guard, Lighthouse Service, etc.

PYREX is a material possessing distinct electrical and physical properties which distinguish it from other glasses and insulating materials.

Comparative values of PYREX and ordinary glass at 500 kilocycles are as follows.

<table>
<thead>
<tr>
<th></th>
<th>PYREX</th>
<th>Ordinary glass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dielectric</td>
<td>.45</td>
<td>6.8 to 8.0</td>
</tr>
<tr>
<td>Constant</td>
<td></td>
<td>.24</td>
</tr>
<tr>
<td>Phase Angle Difference</td>
<td>4.3</td>
<td>.4 to 1.0</td>
</tr>
</tbody>
</table>

To insure maximum efficiency in transmission work, buy antenna insulators, leads-ins, pillar supports, etc., bearing the PYREX trademark:

CORNING GLASS WORKS, Corning, N. Y.
Industrial & Equipment Division

SAY YOU SAW IT IN Q S T—IT IDENTIFIES YOU AND HELPS Q S T
Mr. C. Francis Jenkins, widely known for his research work in the transmission of pictures by radio, desiring to see this new radio service brought to a high state of development and wide use quickly, has arranged to make available to American Radio Experimenters various models of his machines, at low prices; machines which will both send and receive pictures, sketches, drawings, maps, messages, etc., and to pay cash for the best suggestions resulting from their concentration on the subject. With each machine is included accessories, and a book describing in detail not only the work of Mr. Jenkins, but that of most everyone else who has ever worked on the problem. Literature illustrating and describing the machines may be had for the asking.

THE
JENKINS
LABORATORIES
1519 Connecticut Avenue
Washington, D.C.
In Matched Sets for Uniform Dial Settings

You know the impossibility of uniform dial settings on a Neutrodyne or other T.R.F. set unless condensers and coils are accurately matched. A set of three specially tested and matched DUPLEX Standard condensers, packed in a sealed carton and guaranteed uniform, takes care of your condenser worries. Then check up on your coils and go ahead and build, with the certainty that all three dials will read exactly alike. (Make sure that the carton you get bears the laboratory seal.)

Instructive literature sent on request.

Duplex Condenser & Radio Corp.,
32 Flatbush Avenue Extension,
Brooklyn, N. Y.
Most present radio receivers can now be made far more selective.

Exact response to tuning controls is now possible in most sets which have given only broadest reception.

"Pick-up" and scrambling of signals can now be avoided, along with intercoupling and power losses. Clarity and volume can now be amazingly increased, particularly on distant stations.

All this is done simply and quickly by going to the source of these difficulties with Thorola engineers. They sought and found the seat of most radio troubles. They cured them with Thorola Low-Loss Doughnut Coils.

This creation of Thorola laboratories so far betters radio as to rank with the vacuum tube itself as a radio fundamental.

You know what it means to have coils with the correct ratio of resistance to inductance. You will realize the advantage of the self-contained field which gives Isolated Power in Thorola Low-Loss Doughnut Coils. You will at last be able to operate with just one aerial!

The meaning of these exclusive Thorola Low-Loss Doughnut effects is fully described in Thorola literature now ready. It details the one simple step that will jump most radio sets far ahead of any previous performance. It brings you diagrams of new circuits which take full advantage of the new properties of Thorola Low-Loss Doughnut Coils. See the Thorola dealer or send the coupon.
Most Radio Editors and Engineers concede the superiority of

DAVEN GRID LEAKS

They know the exacting care used in every step of its manufacture. Daven Grid Leaks can be depended upon for accuracy and freedom from noise.

Sold by good Radio Dealers.

Obtain from your Dealer the Resistor Manual, our complete handbook on Resistance Coupled Amplification. Price 25c, Postpaid 35c.

DAVEN RADIO CORP.
"Resistor Specialists"
Newark, New Jersey

Have you looked here for the trouble?

Does your radio set howl? Is there a lack of volume? Or do "frying" sounds form a background to your otherwise clear reception?

Such troubles, in a majority of cases, are due to faulty Jack equipment. No matter how good the other parts in your set, their efficiency will be wasted by the use of poorly made, leaky jacks.

"Use good jacks" is one of the first principles of successful set building. And there is great significance in the fact that over twenty-five of the leading set manufacturers have chosen Pacent in preference to all others.

You, too, can have Pacent Jacks in your set—for your dealer carries them or can get them for you quickly. The ten different models are priced at 50c to 95c.

Our catalog describes Pacent Jacks—and over twenty other radio parts and accessories. Write for a copy.

PACENT ELECTRIC COMPANY, Inc. 91 Seventh Avenue, New York City

Chicago
Washington
San Francisco
Philadelphia
Jacksonville

Minneapolis
St. Louis
Boston
Birmingham
Buffalo
Detroit

"DON'T IMPROVISE—PACENTIZE"

SAY YOU SAW IT IN Q.S.T.—IT IDENTIFIES YOU AND HELPS Q.S.T.
What the Trirdyn gets where it's hotter than Summer!

Crosley Trirdyn — on the Sahara Desert at mid-day — brings in Radio·Paris on the loud-speaker!

Not only at mid-day, but in February — in Northern Africa and far hotter than any American summer.

The picture above, a post card snapshot sent from Tunis to Mr. Crosley, by D. F. Keith of Toronto, Ont., tells this story on the other side:—

Tunis, North Africa, March 3, 1925

Dear Mr. Crosley:

Fishing here is rotten but radio is fine. On the Sahara, using three tubes on the Trirdyn circuit, reception from Paris came through on the loud-speaker.

Along the south coast of the Mediterranean, using this set, six or eight high power European stations came in with good volume by daylight and all of them after dark. Can usually get a few American after 1 a.m. Can you fish with us this year?

Cordially,

(Signed) D. F. Keith

Further details on the margins of the picture:—

Sahara Desert, 250 miles south of Algiers, February, 1925.

Receiving noonday concert from Radio·Paris, Paris, using aerial and counterpoise.

Who said summer in America is a poor time for radio — if the receiver is a Crosley Trirdyn?

Every radio fan — actual and aspiring — is invited to think this over and then act.

On the Trirdyn is the beautiful new Crosley Mustone, radio's most startling development. The Mustone's abilities and its beauty are so superior that we expect it to replace half a million loud-speakers this year. $17.50.

The Crosley Radio Corporation, 518 Sassafras St.
Cincinnati
Powel Crosley, Jr., President

CROSLEY RADIO
Better—Costs Less
Low Leakage at high frequencies

"WHAT is your opinion of Radion Panels?" was the question asked a number of winners in recent set-building contests. The answer of one enthusiast was typical, "The best." And he added, "I used it because of its low leakage at high frequencies." Made to order especially for radio purposes. Radion Panels are noted for their low surface leakage and low dielectric absorption. They have a beautiful high-polished finish. They are easy to cut, drill and saw. They are strong, moisture-proof and resist warping. Eighteen stock sizes and two kinds, black and mahogany.

Send for booklet, "Building Your Own Set"

Our new booklet, "Building Your Own Set", gives wiring diagrams, front and rear views, shows new set with slanting panel, list of parts and directions for building the most popular circuits. Mailed for 10 cents. Send the coupon now.

AMERICAN HARD RUBBER COMPANY
Dept. L5, 11 Mercer St., New York City
Chicago Office: Conway Building
Pacific Coast Agent: Goodyear Rubber Co., San Francisco—Portland

RADION
The Supreme Insulation
PANELS
Dials, Sockets, Binding Post Panels, etc.

AMERICAN HARD RUBBER COMPANY,
Dept. L5, 11 Mercer St., New York City
Please send me your new booklet, "Building Your Own Set" for which I enclose 10 cents (stamps or coin).

This NEW Super-Horn
Brings Magic Clearness to Radio
The new Kellogg Symphony Reproducer is a new-type horn recently developed by our experts—based on the magnetic diaphragm principle. It brings to radio a marvelous tone-quality, a beauty you have never heard before. Attaches to any set and can be adjusted for the particular "volume" requirements of the set. At all radio dealers. Ask for it by name. See it, hear it—compare!

Kellogg Switchboard & Supply Co.
CHICAGO

Kellogg Symphony Reproducer $20

With Every Kellogg Radio Part, Use—is the Test
Every All-American transformer has stamped upon it a serial number which identifies the record of its individual test at the factory. The manufacturer stands behind it absolutely provided this serial number is not effaced. Look for the number, and for the famous red guarantee tag with the inspector's punch marks.

Of what importance is it to you as a user of radio transformers, to know that any particular brand, such as All-American, has held continuously for a number of years the position of proven leadership in quantity of sales?

Simply this: that such an achievement is the best possible proof of continued satisfaction given to other All-American users. The average purchaser of a transformer chooses, above all, an instrument which has been recommended to him by a person whose judgment he respects.

Only by the most thorough accuracy and care in manufacturing, and unusual care in testing, is it possible for All-American to maintain this position. Let it be your protection!

A new edition of the Radio Key Book, just off the press, illustrates an eight-tube set which is the sensation of the year. Send 10 cents for it now, coin or stamps.

ALL-AMERICAN RADIO CORPORATION, 2642 Coyne St., Chicago

E. N. Rauland, President

ALL-AMERICAN

Largest Selling Transformers in the World
Here we have the so-called "T" type of filter. It is essentially No. 5 B with an inductance placed in series with the plate. It would at first thought seem that the addition of this inductance would further reduce the voltage across the plate. It does reduce this voltage. It also increases the frequency of the cut off point. This, as already explained, is not desirable with a motor generator set. We would have had "more for our money" had the two inductances been put in series and used as in No. 5 B. It not only would lower the voltage across the condenser but would also lower the cut off frequency. This would make a more effective reduction in the moving contact disturbances than the arrangement as a "T" type.

ELECTRIC SPECIALTY COMPANY
TRADE "ESCO" MARK
225 South Street
Stamford, Conn., U. S. A.

With an "ESCO" motor generator you will need a globe for your records.

### ROICE Radio Tubes

The quality of Radio Tubes. A powerful and durable tube that will greatly improve reception, increase range and volume with a maximum of cleanness. Our direct sales plan enables you to buy "ROICE" at the lowest possible price.

- Type 200 - 5 Volts, 1 Ampere Detectors.
- Type 201A - 5 Volts, 25 Ampere Amplifier and Detector.
- Type 198 - 5-5 Volts, 0.5 Ampere Amplifier and Detector.
- Type 198A - 3-4 Volts, 0.6 Ampere with Standard Base Amplifier and Detector.
- Type 120-4-3 Volts, 25 Ampere Platinum Filament Amplifier and Detector.

All Standard Types $2.00.

All Tubes Guaranteed to work in Radio Frequency, especially adapted for Neutrodine, Reflex and Super-Heterodyne Sets.

When ordering mention type.

**ROICE TUBE CO.**
21 Norwood St., Dept. S Newark, N. J.

---

### 60 Ft. "HERCULES" Aerial Mast

- **$45** Freight Prepaid
- 20 Ft. Mast $10
- 40 Ft. Mast $25

All steel construction. Each Mast complete with guy wires and masthead pulley. Write for literature and FREE BLUEPRINT.

S. W. HULL & CO., Dept. C6
2048 E 79th St.
Cleveland, Ohio

---

### 15-A RADIO CATALOG

Every radio enthusiast should have a copy of this catalog showing the most complete line of radio instruments on the market. Order from Dealer.

JEWELL ELECTRICAL INSTRUMENT CO.
1650 Walnut St. Chicago

---

### RADIO TUBE EXCHANGE

WE REPAIR ALL STANDARD MAKES OF TUBES

- U.V. 202 Repaired, $3.00
- All tubes guaranteed to do the work

RADIO TUBE EXCHANGE, 200 BROADWAY, NEW YORK

All Mail Orders Given Prompt Attention. Orders Sent F. P. C. D.

SAY YOU SAW IT IN Q.S.T—IT IDENTIFIES YOU AND HELPS Q.S.T
Announcing

an accurate fixed condenser of Sangamo Quality

High accuracy, sustained in service, has been inseparably identiﬁed with the name Sangamo for over a quarter of a century. It has won world-wide renown for Sangamo Meters. Linked with a reputation for accuracy too great to be jeopardized by the least deviation from its high standards, the name "Sangamo" is synonymous with success.

Sangamo Mica Fixed Condensers are guaranteed to be accurate to within 10 per cent. under all temperature and humidity conditions. Neither the intense heat of soldering, nor the dampness of the rainy season will impair the accuracy of these condensers. Even at the seashore where the salt air creeps in to change the capacity of exposed condensers, the accuracy of the Sangamo is not affected in the least.

Sangamo Condensers are made in all standard capacities, and sold at very reasonable prices. Also supplied with grid leak clips.

Sangamo Electric Company
Springfield, Illinois

RADIO DIVISION, 50 Church Street, New York · Offices in all Principal Cities
SOMETHING WORTH KNOWING!

One reason that leading builders of fine sets use more Thordarsons than all competitive transformers combined is because EVERY Thordarson amplifies evenly over the entire musical scale. Thordarson run absolutely uniform; always "match up" perfectly. And why shouldn't they? Aren't they made and unconditionally guaranteed by the world's oldest and largest exclusive transformer makers—transformer specialists for 30 years! For the finest amplification to be had at any cost, follow the lead of the leaders—build or replace with Thordarson A.F.: 2-1, $5. 34-1, $4-1, $1.50. Power Amp. pair, $13. Interstage Power Amp., ea., $8. All dealers. Thordarson Electric Mfg. Co., Chicago.

TUNES-IN

Hard-to-get-stations

Those elusive distant stations so often missed when tuning with ordinary dials are quickly, easily and clearly tuned-in by means of the

WALBERT

WALBERT MFG. CO., CHICAGO

Globe

Low-Loss Tuners

Make the Perfect Radio Set

QUALITY—VOLUME—DISTANCE

No Metal

No Eddy Current Losses

Little Insulation

Low Distributed Capacity

Large Wire

Self Supporting

Anti-Capacity Windings

Low R F Resistance

GET ORIGINAL GLOBE COILS

PRICES:

Standard Tuner (Broadcast Range) ............................................ $7.00

Short Wave (35-135 Meters) ..................................................... $7.00

For Superdyne Circuit ......................................................... $8.50

R F Transformers ................................................................. $6.00

Circular on Request. Dealers and Jobbers Write.

Globe Radio Equipment Co.

217 West 125th St., N. Y.
How to fit storage batteries to your set

It pays to buy wisely—to select batteries that bring out the best in your set and are of the right capacity to give fine reception at charging intervals best suited to your convenience.

The new Prest-O-Lite Radio Chart tells you how to select such batteries. The part of the master chart shown here covers "A" Batteries for 5-volt tube sets. Use either of the two sizes recommended for your set, depending on the days of service you wish between chargings (based on the average use of your set of three hours a day). You will find the larger capacity battery more desirable unless facilities are provided for frequent and easy recharging. For "B" Batteries, and "A" Batteries for peanut tubes, see the complete chart at your dealer's.

Special structure plates, high porosity separators and scientific internal construction make Prest-O-Lite Batteries dependable sources of the even, unvarying current absolutely necessary for volume, clarity and distance.

Prest-O-Lite Batteries are made to give long, faithful service. They're easy to recharge—and offer you truly remarkable savings. Though standard in every respect, they are priced as low as $4.75 and up. See them at your dealer's—or write for "How to fit a storage battery to your set—and how to charge it."

THE PREST-O-LITE CO., INC.
INDIANAPOLIS, IND.

New York San Francisco

In Canada: Prest-O-Lite Company of Canada, Ltd.
Toronto, Ont.
HIGH SPOTS

A compact unit in a space of 3 x 5½".
Antenna, rotor and secondary designed for "Low Loss" and "Low Resistance".
A good "Low Loss" Condenser for Secondary only addition required for complete tuning outfit.
Secondary is a single layer multiple wound inductance.
Made in three types.
When used with a wave trap one of the most selective tuners.
Send for "Carco" Catalog

SELECTIVITY?

Replace your old coil with a "CARCO" "LOW LOSS" TUNER

40—125 Meters 75—200 Meters 175—600 Meters
$5.00 $6.00 $6.75

THE CARTER MANUFACTURING CO.
1728 Coit Ave., East Cleveland, O., U. S. A.

DURHAM

Grid Leaks

Used by Eagle, Howard, Thompson, Zenith and others. Fit all sets. Sold on guarantee.
50c Metallized Fixed Leaks 16 sizes; under 4 meg. 75c; over 4 meg., 50c.
Glass Sealed Variable Leaks 3 sizes fit all sets; 75c each for 1 10, 5 and 10 megas. . . . . . . . 75c

DURHAM & COMPANY, Inc.

A SET OF FIVE

HELIX CLIPS

$1.50

By

Parcel Post C.O.D.

DURHAM B COMPANY, Inc.

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST
RESISTANCE LOSSES are the losses which most seriously affect the efficiency of a condenser when at working radio frequencies. They arise from poor contacts between plates and from poor bearing contacts. Soldered plates and positive contact spring bearings reduce these losses to a minimum.

Eddy current losses occur in metal end plates and the condenser plates themselves. While not so serious as resistance losses, they increase with the frequency, and therefore should be kept as low as possible.

Dielectric losses are due to absorption of energy by the insulating material. Inasmuch as they vary inversely as the frequency, they have less effect upon the efficiency of a condenser at radio frequencies than any other set of losses. The use of metal end plates in short-wave reception to eliminate dielectric losses is never justified, because they introduce greater losses than well-designed end plates of good dielectric.

The design of General Radio Condensers is based on scientific facts and principles, not on style and fancies.

Specially shaped plates always in perfect alignment give the uniform wave-length variation which permits extremely sharp tuning.

Rotor plates are counterbalanced to make possible accurate dial settings.

In 1915 the General Radio Company introduced to this country the first Low Loss Condenser, and ever since has been the leader in condenser design.

Lower Losses and Lower Prices make General Radio Condensers the outstanding values of condenser design.

Licensed for multiple tuning under Hogan Patent No. 1,014,002

<table>
<thead>
<tr>
<th>Type</th>
<th>Capacity</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>247-H, with geared Vernier</td>
<td>500 MMF.</td>
<td>$5.00</td>
</tr>
<tr>
<td>247-F, without Vernier</td>
<td>500 MMF.</td>
<td>$3.25</td>
</tr>
</tbody>
</table>

GENERAL RADIO CO.
CAMBRIDGE, MASS.

Quality Parts
KIC-O “B” Multi-Power Unit—
the power behind better radio reception

How did the concert come in last night? Did you have to disappoint your guests because of poor reception due to an unsatisfactory “B” battery? Then let the new KIC-O Multi Power Unit end your radio troubles now.

This new unit combines one Multi-Polar recharger and one heavy capacity nickel-cadmium alkaline storage “H” battery into a compact, durable, well built power unit that will last for years.

Its ease of operation will please even the most exacting radio fan. Just attach to any electric light socket and forget it. When you desire to receive, throw the panel switch down. For recharging throw the switch up. No bother, no worry—a simple twist of the wrist.

Each unit bears a printed guarantee of protection against electrical and mechanical defects.

Write today for full description which tells why KIC-O Multi-Power units are better than dry cells, “B” eliminators 11 and acid batteries.

KIMLEY ELECTRIC COMPANY, Inc., 2666 Main St. Buffalo, N. Y.

KENOTRON RECTIFYING TUBES (Type TB-1)
Manufactured by the General Electric Co., new, in original cartons.

These tubes have a filament terminal voltage of 7.5 volts, operate on a filament source voltage of 10 volts and an A.C. input voltage of 550 volts. Their normal output is 20 watts at 350 volts D.C.

Eliminate your transmitting plate supply troubles with these tubes.

Make your own B-Battery eliminator with two of these Kenotrons and a suitable filter.

And the bargain price, OM, is only $1.50 Each.

AMERICAN SALES COMPANY 21 WARREN ST. New York City

Honeycomb Coils
Back and Front Panel Mountings
Plain or Geared Genuine Bakelite

The Universal all-wave inductance—accepted as standard in regard to superior construction and efficiency of all units of measurement. Ask your “Old Timer” radio friend why sets using honeycomb coils are better; they give closer tuning, greater penetrating power and range. No dead end looms, easy to operate. 14 sizes, mounted and unmounted. Interchangeable with all mountings.


CHAS. A. BRANSTON, Inc.
Dept. 3-815 Main St., Buffalo, N. Y.
In Canada—Chas. A. Branson, Ltd., Toronto

SAY YOU SAW IT IN Q S T—IT IDENTIFIES YOU AND HELPS Q S T
Schnell’s Tuner

Uses B-T Condensers

F. H. Schnell, Traffic Manager of the A.R.R.L., goes with the fleet in its much heralded maneuvers in Pacific waters. He is to conduct the Navy-Amateur experiments in short-wave communication. The special receiver that he will use is able to tune to twelve meters.

The enormous frequencies encountered at low wave lengths, 25 million per second at 12 meters, demands the utmost in condenser efficiency. It is significant that Schnell chose B-T Condensers for his set.

A.R.R.L. Men Use B-T Tuner

The B-T Tuner will be found in such stations as those of Kruse, Technical Editor of QST; Clayton, “Current Radio” Editor of the League; and Budlong, Assistant Traffic Manager.

When B-T parts are chosen by the men who know their quality cannot be denied.

Pioneers of “Better Tuning”

Bremer-Tully Mfg. Co.

532 S. Canal St., Chicago
U.S. ARMY SIGNAL CORPS
HETERODYNE WAVEMETERS
MADE BY GENERAL RADIO CO.
LIMITED QUANTITY—BRAND NEW
$30.00 EACH

WESTERN ELECTRIC and RADIO CORP. TRANSMITTING TUBES
IN ALL SIZES—PRICES ON APPLICATION
V. T. 1 and V. T. 2 $6.00 each
JEWEll METERS | WESTON METERS
WESTINGHOUSE DYNAMOTORS
Large Bakelite Panels | R.C.A. Inductances
NEW TYPE SHORT WAVE INDUCTANCES

PYREX INSULATORS—All Sizes
R. C. A. and Acme Plate and Filament Transformers
Cardwell Transmitting Condensers
General Radio Wave Meter Coils for Short Waves
AMRAD S TUBES

Write for Price List and Information Blank

Troy Radio Company
1254 St. Johns Place Brooklyn, New York

Martin's New and Improved VIBROPLEX
Reg. Trade Marks Vibroplex Bug Lightning Bug
Transmits perfect signals at any desired speed.
Easy to learn and operate. Saves the arm. Used
and recommended by more than 85,000 wireless
and commercial operators.

Special Large Contacted Vibroplex
Equipped with 3-16 inch contact points to
break high current without use of relay .... $25.
Sent on receipt of price
THE VIBROPLEX CO. Inc.
825 Broadway, New York Established 1890
Brooklyn: 796 Fulton St.

PATENTS
TRADE MARKS • DESIGNS
FOREIGN PATENTS
MUNN & CO.
PATENT ATTORNEYS
Associated since 1846 with the Scientific American
840 Woolworth Building, New York City
921 Scientific American Bldg., Washington, D.C.
410 Tower Building, Chicago, Ill.
365 Hobart Building, San Francisco, Cal.
218 Van Nus Building, Los Angeles, Cal.
Books and Information on Patents and Trademarks
by Request.

SAY YOU SAW IT IN Q S T—IT IDENTIFIES YOU AND HELPS Q S T
For amateur transmitting stations—the Dubilier Condenser No. 668. It may be used as a series antenna condenser; a plate blocking condenser or a grid coupling condenser in tube transmitters of 500 watts or lower.

Capacity .0001 to .075 Mfd. operating voltage 1000 to 3000 volts continuous at a current of 5 amperes—radio frequency of 750 to 1000 kilocycles.

Dubilier
CONDENSER AND RADIO CORPORATION
WHAT IS EVERY HAM LOOKING FOR?
A Reliable and Efficient Form of Rectification Found!

THE SUPER SYNC

The only synchronous rectifier giving pure D.C. tone with ordinary type filter.

At DX stations the tone of the Super is often mistaken for storage battery plate supply.

With the Super local interference common to other plate supplies is practically eliminated, thereby cancelling the main disadvantage of synchronic rectifiers heretofore in use.

Exhaustive tests made with the Super have found it to stand up under continuous hard usage, seldom if ever needing adjustment, giving 100% rectification at all times; no voltage drop. The only rectifier equally adapted to both high and low power sets, as this type Super easily handles up to 4000 V. filtered D.C.

MARLO ELECTRIC CO., 5241 Botanical Ave., St. Louis, Mo.

PAT. PENDING
PRICE $75.00 F. O. B.

FINDLAY Stand-Off Insulators
"For Perfect Reception"

Designed especially for radio purposes. Will hold lead-in wire six inches from building. Corrugated so that it will drain quickly. Will not deteriorate. Made entirely of porcelain, the dependable insulation. Easy to install. Packed in cartons with padded screws ready for installation.

Price, 50c

ON SALE at all leading radio stores. Mail orders accepted at factory when accompanied by cash or money orders.

All types of porcelain radio insulators and insulated screw hooks. Send for circular.

MANUFACTURED BY
The Findlay Electric Porcelain Co.
FINDLAY, OHIO

BESTONE RADIO TUBES
FOR

QUALITY, VOLUME and DISTANCE

200  $1.50  199
201A  12

STANDARD 199 BASE

Save Money, buy direct. Every Tube is guaranteed. Mail orders and C. O. D.
Discount to dealers.

All orders filled same day as received.

BRYANT RADIO TUBE COMPANY
453 Washington Street, Boston, Mass.
AMPERITE—the Self-Adjusting rheostat, takes care of tube current better than any expert operator could regulate it. No more hand rheostats or filament meters necessary. Brings the best out of each individual tube automatically. Simplifies wiring, doubles tube life, lowers set cost. Approved by all leading laboratories. Used in every popular construction circuit.

RADIALL COMPANY
Dept. 8176 50 Franklin St., New York City

Write for FREE Hook-ups

AMPERITE
"means right amperes"

LOPEZ Low Loss Tuner

GREAT FOR DX
Selectivity Unexcelled, ask the user
Broadcast and Amateur Tunes
Price $10
You should read its advantages in detail. Drop us a postcard today for "Tuner Facts".

Costs More—North more
A. C. LOPEZ & CO.
40 West 33rd St., New York City

Rauland-Lyric

Natural

Not only is Rauland-Lyric an instrument of superb amplification, but through skillful design it goes far in compensating for imperfections in the loudspeaker. Thus is reproduced in your home the beauty of actual tones as they are created in the broadcasting studio—pure, flawless, natural.

Rauland-Lyric is a laboratory-grade audio transformer designed especially for music lovers. The price is nine dollars. Descriptive circular with amplification curve will be mailed on request. All-American Radio Corporation, 2642 Coyne St., Chicago.

Rauland-Lyric

ALL-AMERICAN TRANSFORMER

The Choice of Noted Music Critics

SAY YOU SAW IT IN Q S T—IT IDENTIFIES YOU AND HELPS Q S T
To Our Readers Who Are Not A. R. R. L. Members

Wouldn't you like to become a member of the American Radio Relay League? We need you in this big organization of radio amateurs, the only amateur association that does things. From your reading of QST you have gained a knowledge of the nature of the League and what it does, and you have read its purposes as set forth on page 6 of every issue. We would like to have you become a full-fledged member and add your strength to ours in the things we are undertaking for Amateur Radio, and incidentally you will have the membership edition of QST delivered at your door each month. A convenient application form is printed below—clip it out and mail it today.

American Radio Relay League,
Hartford, Conn.

Being genuinely interested in Amateur Radio, I hereby apply for membership in the American Radio Relay League, and enclose $2 ($2.50 in foreign countries) in payment of one year's dues. This entitles me to receive QST for the same period. Please begin my subscription with the .....................•.....•........... issue. Mail my Certificate of Membership and send QST to the following name and address.

Station call, if any ........................................
Grade Operator's license, if any ..........................
Radio Clubs of which a member ..........................
Do you know a friend who is also interested in Amateur Radio, whose name you might give us so we may write him about the League? ..........................

Thanks?

PROFESSIONAL SET BUILDERS!
and dealers who build sets

WE will shortly begin a series of newspaper advertisements, featuring the work of individuals and dealers who build sets using Cardwell Condensers.

If you build to specification or from original design, it will be to your interest to communicate with us immediately. Ask for details of plan. Be sure to give name of your jobber.

ALLEN D. CARDWELL MANUFACTURING CORP.
81 Prospect Street, Brooklyn, N. Y.
A new type of startling efficiency and unusual simplicity. Embodying every point that tends to perfect tuning. Represents all that is needed under any conditions; yet it is low priced.

U.S. Tool Company, Inc.
Ampere, N.J.

You Must Protect Your Radio

The National Board of Fire Underwriters insists that an approved arrester be used on all radio aerials.

Your natural choice is the Brach Vacuum Arrester which has had the confidence of America's leading electrical engineers for 19 years.

Millions In Use
Throughout the World

Safety demands the
BRACH VACUUM ARRESTER
L. S. BRACH
NEWARK
MFG. CO.
BRACH
NEW JERSEY

Finer Selectivity
Equip your receiving set with Apex Vernier Dials. They will greatly increase the efficiency of any set. Make tuning positive—bring in distant stations. Your dealer has them. If not, send $2.00 for Royal Brass Finish—$2.50 for Silver Finish, or $3.50 for Deluxe Gold Plated (24K).

APEX SUPER 5
This highly efficient tuned radio frequency receiver is most advanced in design and construction. An instrument that meets every critical expectation of the radio enthusiast. Housed in a highly finished walnut cabinet, complete with Jones Multiplying Battery Cable. All settings highly gold plated. Sells for $9 complete excepting accessories.

At All Good Dealers
APEX ELECTRIC MFG. CO.
1410 W. 59th St. Chicago
Dept. 518

Meter Tested Radio Crystals

Full, clear rendition assured by newly developed audible laboratory meter-testing. Perfect for reflex. Price 60c at your dealer or direct.

Newman-Stern
1750 East 12th Street
Cleveland, Ohio

FRESHMAN SUPERIOR
You can depend upon them to remain accurate at all times Made of high resistance material impregnated throughout (not coated paper). Unaffected by climatic conditions. Will not deteriorate. Clamped between solid brass ferrules assuring rigid construction and firm contact at all times. At your dealer's, otherwise send purchase price and you will be supplied postpaid.

FRESHMAN INC., 240 W. 45 St., N. Y.

Noisless Grid Leak

40c each in any value from 1/2 to 10

FRESHMAN
You can depend upon them to remain accurate at all times Made of high resistance material impregnated throughout (not coated paper). Unaffected by climatic conditions. Will not deteriorate. Clamped between solid brass ferrules assuring rigid construction and firm contact at all times. At your dealer's, otherwise send purchase price and you will be supplied postpaid.

FRESHMAN INC., 240 W. 45 St., N. Y.
A. R. R. L. AUTOISTS ATTENTION!

Spring and the call of the open road are here! The old bus won’t be completely equipped this year unless its radiator sports the special automobile type League Emblem. 5 x 2\(\frac{1}{2}\)”, heavily enameled in gold and black on sheet steel base, holes top and bottom for easy attachment.

Tell the world who you are when you go motoring! You’ll meet hams along the way that you’d never know otherwise (and maybe the Traffic Cop’s a ham, too!)

The A.R.R.L. Auto Emblem will be sent to League Members only, for 50c, postpaid. There’ll be a rush, so order early.

The American Radio Relay League, Hartford, Conn.

PRECISE Laboratory Instruments At Commercial Prices

- Precise Audio Transformer, No. 285
  - Amazing Volume
  - Distortionless reproduction
  - $5.00

- Precise Super-Multiformer, No. 1700
  - Replaces all long-wave transformers
  - $20.00

- Precise Power Amplifying Transformers
  - For “push-pull” circuits
  - Perfectly balanced
  - Per pair $11.00

- Precise Filtoformer, No. 1900
  - Radio frequency choke
  - and by-pass condenser
  - $4.50

SOLD BY THE BETTER DEALERS

Precise Manufacturing Corp.
ROCHESTER NEW YORK

BLUEBIRD RADIO TUBES

- Quality tube at moderate price, made possible by our direct sales plan. "Bluebird" is sensitive and powerful—produces more volume with clearness.

WITH BAKELITE BASE
Type 200 ... 5 volts, 1 Ampere Detector Tube
Type 201A 5 Volts, .25 Ampere Amplifier and Detector
Type 195 3-4 Volts .06 Ampere Amplifier and Detector
Type 199A 3-4 Volts, .06 Ampere With Standard Base
Type 12 1¼ Volts, .25 Ampere Platinum Filament, Amplifier and Detector
All Standard $2.00

Type 202, 5 Watt Transmitter $3
ALL TUBES GUARANTEED to work in Radio Frequency. Especially adapted for Neutrodyne, Reflex and Super-Heterodyne Sets.

When Ordering Mention Type
BLUEBIRD TUBE CO.
200 Broadway, Dept. S.
New York City

PATENTS Secured
Radio Inventions a Specialty
Mason, Fenwick & Lawrence
Patent and Trade Mark Lawyers
Washington, D.C., New York, Chicago

Established over 60 years

SAY YOU SAW IT IN Q S T—IT IDENTIFIES YOU AND HELPS Q S T
HAM-ADS

IMPORTANT NOTICE!

NEW RATES
ADVANCED CLOSING DATE

Effective with May QST, the HAM-ADS Advertising Rates will be TENT CENT A WORD. Name and address to be counted, each initial counting as one word. These rates are shown on QST Rate Card No. 6, in force with the May issue.

The closing date for HAM-ADS is now THE TWENTY-FIFTH OF THE SECOND MONTH PRECEDING DATE OF ISSUE. For example, all HAM-ADS for the June issue must be in this office not later than April 25.

Hereafter no HAM-ADS will be accorded any particular or special position.

Rates for the QRA Section remain the same; 50c straight. See heading of that section for details.

Regenerative Receiver, each with two-step amplifiers, RCA Loop, Wave Meter, 560 volt Motor-Generator, and others. Western Electric speaker and amplifier wave-meter, omnigraph. F. L. Wilcox, 9AAL, 4502A Delmar Blvd., St. Louis, Mo.

FOR SALE — 2 UV-211-50 watters the latest type $20. each; 2 UV-203-50 watters slightly used, $12. each; 1 Jewel Thermo Couple 6-1 new, $4.00; 1 Jewell AC Voltmeter 6-15 new $4.00; 1 Roller-Smith Millampmeter 0-500 new $4.00. 1 new RCA 3000 volt 750 watt power transformer, $15.00; 1 RCA Oscillation Transformer, new $5.00; 2 RCA Choke coils new $2.50; 1 Kenotron No. 217 slightly used, $5.00; 2 UV-203 sockets, new $2.00. Send money orders or cash. E. Erdoss, 15 Linden St., Schenec- tady, N. Y.

"New Lamps for Old." CRL Paragon type PAR. Amplifier Type AGN-1. Amplifier Type AGN-3. Motor Boat Receiver. We will exchange for the first one of each of these offered us in good condition one Model 3R latest type Zenith four-tube, listing at $160.00. Write to R. H. G. Mathews, Zenith Radio Corp., 352 South Michigan Ave., Chicago, Ill.

FOR SALE — Complete 50 watt transmitter $80. Also have parts for 5 watt transmitters. Mark Moore, East Palestine, Ohio.


EDISON B BATTERY SUPPLIES. LARGEST SIZE TYPE A ELEMENTS 4¢ A PAIR, DRILLED 5¢ A PAIR, WIRED IN PAIRS PURE NICKEL WIRE 1¢ A FOOT. PERFORATED RECEPTOR SEPARATORS FOR BATTERIES 1¢ EACH OR CUT YOUR OWN SEPARATORS FROM SHEETS 5-3/16 x 5-7/8" 3¢ EACH CHEMICALS FOR 5 LBS. BATTERY SOLUTION, ENOUGH FOR 100 VOLTS 75¢. EDISON 300 AMPERES 4-6 VOLT A BATTERIES IN PERFECT CONDITION $55. BERNARD STOTT, 60 PALLISTER AVE., DETROIT, MICH.

SAY YOU SAW IT IN Q S T IT IDENTIFIES YOU AND HELPS Q S T

HAMS — Get our Samples and Prices on Printed Call Cards made to order as you want them. A P Y HINDS & EDGARTON 19 S. Wells St., Chicago, Ill.

STORAGE "B" batteries at dry cell prices. Purchase a rechargeable "HAWLEY" storage "B" battery. Non-sulphating or buckling of plates, which means cleaner enjoyable reception with unlimited life. Sold in complete knock-down units which requires no former experience to put together. These units contain everything for the actual construction of battery such as large size tested Edison chemical elements. Includes bottom glass cells (not ordinary test tubes), punched insulating fibre board for support of cells, pure, an- nes, solid nickel wire Rubber stoppers, perforated hard rubber separators, full strength chemical electrolyte. With all orders there is included free an 8 page illustrated folder showing simple putting together making of charger and charging. Prices of units as above—22 volt $2.95; 45 volt $5.75; 90 volt $8.95; 100 volt $9.95; 120 volt $11.65; 135 volt $15.00 and 150 volt $17.50. Special voltage units put up at no increase in price. Complete sample cell, 50c prepaid. Complete non-heating "B" battery charger $2.75. Extra special 100 volt white Wheat cabinet at $2.75 only. Also "A" batteries at attractive prices. Order direct or write for new literature, 30 days' trial offer, payment shipped same day received. No waiting. B. Q. Smith, 31 Washington Ave., Danbury, Conn.

MAKE $200 WEEKLY IN SPARE TIME. Sell what the public wants — long distance radio receiving sets. Two sales weekly pays $120 profit. No big investment, no unselling. Sharpe of Colorado made $55 in 21 day month. Representatives wanted at once. This plan is sweeping the country — write today before your county is gone. OZARRA, 363 Washington Blvd, Chicago.

For sale: 200 W 1,000 Y Eco m.g. in A No. 1 condition. Use thirty days. Almost 50 Henry Chokes. One old panel, almost same parts, but no Nightmare of Neutralization. Twenty-two feet of gold sheathed wire, with only extra part and simple, complete instructions $5.00, prepaid anywhere. Nothing more to buy. Over a thousand "converted" Neuts are daily bringing in clean reason- able volume from Coast To Coast. Details—10c. 48 pages mosty catalog of PARTS ONLY—10c. KDLAG RADIO LABORATORIES, KENT, OHIO.

TELEGRAPHY — Morse and Wireless — taught at home in half usual time and at trifling cost. Omnigraph Automatic Transmitter will send, on Sounder or Buzzer, un- limited messages, any speed, just as expert operator would. Adopted by U. S. Govt. for transaction of mail in Universities, Colleges, Technical and Telegraph Schools throughout U. S. Catalog free. Omnigraph Mfg. Co., 150 Hudson St., New York.

IF YOUR NEUT'S GOING BACK ON YOU—Rebuild it to this Kladag. Coast to Coast Circuit, using new large panel, almost same parts, but no Nightmare of Neutralization. Twenty-two feet of gold sheathed wire, with only extra part and simple, complete instructions $5.00, prepaid anywhere. Nothing more to buy. Over a thousand "converted" Neuts are daily bringing in clean reason- able volume from Coast To Coast. Details—10c. 48 pages mosty catalog of PARTS ONLY—10c. KDLAG RADIO LABORATORIES, KENT, OHIO.


WHILE THEY LAST — Reinartz's original short wave articles in September, October and November numbers of Amateur Radio. Sent postpaid with a subscription $2.00. Executive Radio Council, 156 Liberty St., New York, N. Y.

ESPERANTO! Learn Esperanto and communicate with Radio Fans all over the world. Our free sample lesson contains over hundred illustrations and demonstrates how easily this language can be learned. Send for it now. Benson School of Esperanto, Inc., 20 Mercer St., Newark, N. J.

EVEN THE BEST SET GIVES INFERIOR RESULTS UNLESS PROVIDED WITH A PERFECT PLATE SUPPLY AND THAT'S AN EDISON B (THE SMALL KIND). A JOINTLESS WELDED "B" FOR LOW RESISTANCE AND BREAKDOWN. PERFORATED FOR EVERY SET. 54 VOLT $8.25. 100 VOLT $15.00. 130 VOLT $18.75. 150 VOLT $21.50. COVERED
CABINET OF WAX FINISHED FUMED OAK. RUBBER MAT. LARGEST LIVE EDISON ELEMENTS ELECTRICALLY WELDED TO PURE SOLID NICKEL CONTACTS, PANES AND PANELS. EXCLUSIVE AMRAD TUBES. AT LAST WE HAVE SUCCEEDED IN THE FIFTH DISTRICT. FORT WORTH RADIO HAMS!!

$100.00, and a Grebe CR-3 cost $20.00, sell $40.00. All brand new never used. Cash. Reference QST. A. L. Barkey, 3776 Edison Avenue, Detroit, Michigan.

Motor Generator Bargains. General Electric Motor 110 Volt 60 cycles single phase Generator 760 Volt 400 Watt $50.00 Robbins & Myers 110 V. 60 cycles single phase generator 600 Volts 200 Watts $150.00. Esco Motor 110 Volt 60 cycles 3-phase 1760 R. P. M. Generator 400 Volts 150 Watts $35.00. Esco Motor 220 Volt Direct Current Generator 2200 Volts 550 Watts, Est. 2200 Volt 60 cycles single phase A. C. Generator 500 Volts 200 Watts $40.00, 1000 V. 400 Watt 1760 R. P. M. Generator only $60.00. Including motor generator set generator 176 Volt Direct Current 1 1/2 Amp. motor end Alternating current $37.50 each. 750 Volt 200 W. 3400 R. P. M. Generator only $50.00. All above machines are in the market for. Queen City Electric Co., 1734 W. Grand Ave., Chicago, Ill.

BUILD RADIO SETS for friends, spare time. Very profitable. We'll supply apparatus and expert advice. Write us. The Langbein-Kaufman Radio Co., (Dept. Q), 611 Chapel St., New Haven, Conn.

WRITE FOR SPECIAL, AMATEUR DISCOUNT, STATE RADIO COMPANY, 286 COLUMBIA RD., DORCHESTER, MASS.


FIRST WARM DAYS, GRAB THE CHANCE TO REVAMP THAT AERIAL. THINK OF THE DX VARIATION OF THE PRIMARY VOLTAGE. PRICE DAMAGE TO THE SET. CHARGE IT WITH A WILLARD COLLOID SUPPLY CO., 104 EAST 10th ST., FORT WORTH, TEXAS.

I have a CR-13 Amateur Special Grebe, cost $50.00, sell $25.00, and a Grebe CR-7 25000 Meter, cost $25.00, sell $40.00.

ALWAYS MENTION Q S T WHEN WRITING TO ADVERTISERS.
NO. 12 HARD DRAWN TIN COPPER 1c ft. NO. 12 ENAMEL SOLID COPPER 1c FT. $4.25 PER 500 FT., $7.50 PER 1000 FT. NO. 12 D.C.C. 5c LB. NO. 16 ENAMEL D.C.C. 90c LB. NO. 16 ENAMEL SOLID COPPER 1c FT. PYREX LEAD IN AND AMATEUR INSTALLATION, 18 D.A.C. 6c LB. ADVANCE SYNCHRONOUS RECTIFIERS $40.00 F. O. B. PITTSBURGH. LOW COILS AND TUNERS MADE TO ORDER. WRITE FOR QUOTATIONS.

SAM S. HIDDLE ARTHURS JR., 3606 CENTRE AVE., PITTSBURGH, PA.

"DON'T MISS IT!" Complete 100 Watt Set, $100. NEW, with 3 Jewell Meters, Trolley Wire & Pancake Coils, Tubes, etc. Tunes from 5 Meters up, Mtd. on 12X18 Formica Panel—all Firmly Supported. Information solidified. 390Y—S. Street, 2926 N. 6th St., Phila., Pa.

QSL CARDS, ENVELOPES, etc. Samples and prices for a stamp. Erwin Martens, Gresham, Neb.

AMRAD "S" TUBES NO. 4000-1. $3.00. Merbash Condensers, $8.85. Immediate shipment. George Voigt, Maspeth, N. Y.

EDISON ELEMENTS 5c per pair. Cooperative Merchandise Co., Chelsea, Mass.

SUPERHETS, EIS, ULTRADYNE, GENERAL RADIO, RCA, BRANSTON, other well known types. We pay the freight in U.S. Ask for big bargain list and save money on transmitting and receiving parts. R. P. BARR;

EDISON ELEMENTS 5c per pair. Cooperative Merchandise Co., Chelsea, Mass.

"HAMS"—Earn money during your spare time. Agents’ discounts on transmitting and receiving supplies for stamp. George Voigt, Maspeth, N. Y.


OMNIGRAPHS BOUGHT—SOLD—RENTED—SOLVED. THOS. J. INSALL RADIO LAH., 1208 GRANDVIEW AVE., PHILADELPHIA, PA.

SAP SELLING OUT. Write for list.

"HAMM"—Earn money during your spare time. Agents’ discounts on transmitting and receiving supplies for stamp. George Voigt, Maspeth, N. Y.


OMNIGRAPHS BOUGHT—SOLD—RENTED—SOLVED. THOS. J. INSALL RADIO LAH., 1208 GRANDVIEW AVE., PHILADELPHIA, PA.

DEALERS!!! Write for liberal discounts on standard transmitting and receiving supplies. George Voigt, Maspeth, N. Y.

200-200,000 METER receiver including radiotron $25.00; two tube amplifier $19.00. Smith, 3415 Market, Philadelphia, Pa.

Edgewide wound copper ribbon the only really satisfactory antenna inductance .560 ohm wide; 4 1/2" outside diam. 1 1/2" outside diameter 1c turn; 6 1/2" outside diameter 2c turn, prepaid any number turns in one piece. Geo. Schulz, Michet, Mich.

NO LOSS PRICES—WIRE NO. 12 ENAMELED SOLID COPPER $6.75 PER THOUSAND FEET—75c PER HUNDRED. FOR THAT RECTIFIER 90° AMPLIFIERS. ALL ELECTROLYTIC CHAMICAL PURE LEAD PER SQUARE FOOT 85c. HAVE PLENTY OF 800-.91A "S" TUBES AT $10 EACH. SPECIAL TUBES, DEFLATE 8000 $10. Roise 201A's $2.00; HARP 201A'S—THIS IS A GUARANTEED BARGAIN ON $2.50. JEWELL METER ANY RANGE MILLIAMMETER AT $5.26—VOLTOMETER AC 80c. CARDWELL LOLOSS.0025 $3.50—AND DON'T FORGET THE CARDWELL COUPLING CONDENSER. FOR A MORE COMPLETE LIST OF "NO LOSS PRICES" WRITE FOR THE "HAM LINT." CURTIS-GRiffith RADIO, 8AGC-8RV, 1199 EIGHTH AVENUE, PORT WORTH, TEXAS.

TRANSMITTERS AND MOTOR GENERATORS Bought, Sold, Exchanged. RYAN RADIO COMPANY, HANNIBAL, MISSOURI.

JOBSER & DEALER CLOSE-OUT PRICES on receiving sets as Crosleys, Mu-Rads, Atwater Kent, Radiola, Miraco, Freshmans, Freed-Eisemann, etc. Standard tubes, Batteries, etc. Write for list. HAKK, NORA SPRINGS, IOWA.

SELLING OUT. DeForest D-6 receiver with honeycomb coils from 28 to 25,000 meters, used less than 90 days, cost complete $200.00. Radiola Superhetradioyne with speaker and indoor aerial, perfect, cost $250.00 take $175.00. Radiola S-3 brand new in original package, cost $95.00 take $50.00. Western Electric 100 watt receiver with speaker and horn, cost $165.00 take $75.00 complete. New Frost, Brands, Dictaphone head set, Manhattan horns, other new equipment 50% off. All material guaranteed new. EARL BILLITER, Dell Rapids, South Dakota.

LOOK! Freshman .003 12ca .0005 ten cents, three for quarter; 40 kc Input Transformers $1.35; Federal and a few Filament Jacks 40c; Sylvania Valentines, set of three 40c. Amperites 90c; Original Packages, no used stuff. This only sample our big list bargains GENERAL RADIO, ULTRADYNE, RADIO CORP. OF AMERICA, EIS, RCA similar high grade.

THE BIGGEST LITTLE BOOKLET FOR AMATEURS IS 1000'S HAM BOOK. HERE'S A SAMPLE FROM IT. GET THE REST. GLAD TO SEND IT FREE. Everybody knows we sell the best enameled antenna wire at the least money. 90c per length one piece, 75c per 100" for less. No. 14 55 c per 100", 55c per 100'; Insulators, Sure Fire 20 inch porcelain are the best ever $1.15 or $1.00. Shorter ones 1/4 inches for 30c, 20 or more at 5c, excellent for guys: Westinghouse $5.00 lighting switches $1.50 while they last; COPPER INDUSTRIES 5c per ft. Edgewide wound 6" DIAMETER 12c per turn, 4" DIAME-
TER 10c. OUR OWN MAKE INDUCTANCE CLIPS 20c; UC-490 filter condensers 25c, 1 and 100 volt condensers $1.90; UC-181 variable antenna series condensers, nearly all gone, 25c; Ballantine's Radio Telephone for Amateurs will save you several times its cost, $2.00; Getting some transformer iron. Don't know price yet, but order it cut any size and we'll treat you right; $1.50 for three pieces. DON'T MISS THE PRICE OF A 50 WATTER IN ONE. JUST DEPOSIT THE AMOUNT WITH US, USE IT, RETURN IT, AND GET YOUR MONEY BACK LESS SMALL RENTAL. How do you get along without a General Radio wave meter? Costs only 95c here, 150-200 motors. Half and quarter wave coils extra, each 25c. Jewell motors too. 50 W. M. Derricks and DC milliammeters $1.15. tiny, m.ouple ammeters $1.40. 1.66th inch FURE rectifier aluminum tubes $0.20 each square foot, lead 90c; BIG STOCK OF RADIOSTATION FOR FILAMENT TRANSFORMER PRIMARY, $6.50. C-211 BRADLEYSTAT FOR 5 or 10 WATT SETS, $4.00. 5 watt and 20 watt grid leaks, $3.00; Milliamperes CW microphones $8.75; Newest CW block Cables with Amateur Section 95¢; JUST A FEW UP-106 POWER TRANSFORMERS FOR TWO 50 WATT SETS. LIST 51.50, ONLY $2.50, COMPLETE CW AND PHONE TRANS­MUTER, 20 WATTS, SLIGHTLY USED, AT SACRIFICE. WRITE FOR DETAILS; Just a sample here—be sure you get the HAMALOG, and while you're writing, let's have a sample of your orders. We ship C.O.D. if you wish, but please include postage if you send cash.

T. F. JOHNSON, Waseca, Minn.

SCHICKERLING TUBES ALL TYPES 25c. ANYTHING IN RADIO. WRITE FOR LIST. ANDERSON VICTOR, 1005-6 ACOBY STREET, JOHNSTOWN, PENNSYLVANIA.

Reciproc, Balkite, and Apeo chargers, 25¢ off list. George Voigt, Maspeth, N. Y.

HERE YOU ARE FELLOWS, a genuine Hubert vibrating charger for A and B batteries. QSL for particulars. 911B, Box 433, Streator, Ill.

PUREST VIRGIN ALUMINUM FOR SALE. PARTICULARS UPON REQUEST. 2EM.

FOR SALE—Parson RA-10 Receiver and DA-2 Amplifier, First Class condition, $5.00. C. E. Seabold, 841 W. DeWitt St., Fort Wayne, Ind.

NEW GUARANTEED RADIO TUBES. ALL VOLTAGERS 1.40. RYAN RADIO COMPANY, HANNIBAL,

WESTERN ELECTRIC 10A loudspeaking telephone outfit including 7A power amplifier, three 2BA tubes, $13.50 loudspeaker $8. Also 2A current supply set with tubes $45. Everything guaranteed. A. M. Elliott, Bayside, L. I., New York.

DID-JA-C MI BACK ADDS—SHOV.

Kennedy Universal 175 to 2000 meters with amplifier for sale $100.00 in excellent condition just the receiver for a commercial operator now aboard shiped C. O. D. R. Kroszner, c/o Dr. Barmanoff, 2 West 110 Street, New York City.

WAVEMETERS, 10 to 100 meters, two coils, individually calibrated, Accuracy guaranteed within one percent. Excellent construction and handy size, with flash lamp, $12.50 postpaid. We build real amateur equipment. Send for list today. Seattle Radio Laboratory, 3533 35rd Avenue South, Seattle, Washington.

RADIO CABINETS $1.50 Each. For portable sets, battery chargers, "B" batteries, "B" eliminators, etc. Takes panel 6" x 12". Full details upon request. Seekey Electrical & Mechanical Specialties, Meriden, Conn.

ARE YOU AMBITIOUS TO BECOME ORS—ASK FOR LATEST HONOR ROLL—Read reports from many students who by little effort won that certificate of proficiency. We send free, 25c list hesitation. Dodge Radio Shortcut, Mamaroneck, N. Y.

NEW 4 TUBE Ozarka complete with speaker A1 condition $25, or trade. Edison type A elements 3¢ each. No questions.

SEEING MI BACK ADDS? SHOV.

SAY YOU SAW IT IN Q S T—IT IDENTIFIES YOU AND HELPS Q S T.

FOR SALE—50 wattter panel mounted, also 500 volt dynamotor, 2C2D.

10% to 50% off all transmitting and receiving supplies Signed Voice, Maspeth, N. Y.

Sell Grobe CR-8, $65. Other apparatus. Fred A. Ellis, Jr., 2 Mott Ave., Norwich, Conn.


Sell—Telmaco Det. & 3 stage. 8 WJO, Lone Tree, Iowa.

WANTED—$2 to 40 volt 40 or 50 amp. D.C. generator, cheap—bright, clean, Type A Edison Elements 3 cents each, 40 or 5 cents drilled. How many do you want? Sherman O. Myers, Napavone, Ind.

NOTICE—A card from anyone hearing 3SD or 3XX will be appreciated by the owner of these stations. Special apparatus is being used. C. A. Johnson, 1252 Gainer Road, Wynnewfield, Philadelphia, Pa.

BARGAINS—LOOK UP MI BACK ADDS. 380V.

A.R.R.L. Sweater Emblems, yellow and black felt, 5 x 8"—$1.00. Pennants, 8 x 24"—$1.35, 9 x 27"—$1.60, Envelope M.O. or check. Eric Robinson, 136 Jefferson Road, Webster Groves, Mo.

INTRODUCING the new ELECTRIC WELDING PEN­NER OPERATES FROM LOW VOLTAGE BATTERY current (2 amps per hour) only when actually touching the article to be welded or soldered. Special introductory price $1.65. George Voigt, Maspeth, N. Y.

COMPLETE SET PARTS MC LAUGHLIN SUPER TUBES. LAST FEW DAYS IN EXPERIMENTAL SETUP SIXTY DOLLARS. TRIPLE SPECIAL, NEW FORTY DOLLARS. RADIO SHOP LIGNITE, N. DAK.


JUST GLANCE AT MI BACK ADDS and save now. SHOV.

CRED sites 14, four tube broadcast receiver works on ten foot antenna one-third list at sixty dollars, three circuit Leak in receiver, with two stages audio in next cabinet thirty dollars; one stage Cemo push-pull output mounted fifteen dollars; Sodion DB-6 set with new tube eight dollars; Western Electric 10-A complete ninety dollars; all like new and satisfactory to purchaser for money refunded. Lieutenant Weston, Fort Hays, Texas.

ARE YOU ANCHORED AT 10-15 PER—ON REQUEST WILL MAIL LATEST HONOR ROLL WITH REPORTS FROM MANY OF OUR BEST RIMS AND BUZZER HAMS WHO IN A FEW HOURS DOUBLED OUR METHOD 25.00. KILLS HESITATION. Dodge Radio Shortcut, Mamaroneck, N. Y.


We bought $10,000 worth United States Government Air­ craft Department Radio Transmitting, Receiving Sets and Parts, get our new and latest reduced price list. Send stamp for Mail orders answered all over the world. WEIL'S CURIOUSITY SHOP, 20 South 2nd St., Philadelphia, Pa.

Wanted 50 watt tube and socket, also sink rectifier. John E. Wright, Newarto, Ore.

MORE JUNK. I have two used Westphaline 20 watt transmitters with 110 volt AC motor generator, no tubes, mic or key, for $90.00 each. I also have two used sets with no motorgenerator, 220 volts, include sockets, filament and microphone transformers, key relay and other oscilating circuit accessories, no antenna ammeter, for $1.00 each. Also, Home 250, four Metro electric sol­dering irons at $1.25 each, five Metro phonograph units at $1.50 each and four Best headphones at $1.50 each. The only purchase is the bargains so snap into it. W. M. Derrick, 55 North 3rd St., New York, N. Y.
=$2.00 New United States Government Aviators' leather Helmet with headphones and microphones, cost 25.00.
Postage free. Send at once, limited supply; other government radio bargains. Send stamp for list,

QSL CARDS: Why not give us your next order to
$5,00 New Uniter (States Government Aviators' leather
THAT PATHETIC HALLAD ENTITLED "SOME-
THE NEXT SELECTION WILL BE, JOHNNY AM-
ham who promises u a "eeal" job. BJT Press, 701 Wal-
RING INSULATORS. NOTHING TAKES THE PLACE
COPPER RNAMELED WIRE..."THE BETTER KIND.
ORS. BETTER TEAM UP WITH THE "fWINS OF
COVERED WIRE AND 'l'HOSE SPONGY lNSULA-
RY YOU WON'T BEAR IT NOT WITH THA'l' RUST
PERE AND MARY WATT, "THE THERMO COUPLE"
nut Ave., Scottsdale, Pa.

OFF lNSULATOR $2.50. OHIO BRASS INSULATORS
G'', 76c, to", $1.50. "DYNEX" KEM RECTIFIER ELE-
OF GLASS f'l)R OUTDOOR INSULATION. HIGHEST
WHERE A VOICE IS CALLING." BUT DON'T WOR-
UTTLE MORE AND SAVE A LOT OF WORK. 1"
'.rHE ALUMINUM IS c.P. AND 1S BEING USED IN
lNSULATION PROPERTIES AND NON-ABSORBENT.
LARGE SIZE $L50. RECEIVING SIZE 45c. STAND-
4", (JC_ liJACii. 1u


Q R A SECTION
50c straight, with copy in following form only: CALL—NAME—ADDRESS. Any other form takes regular HAM-AD rates.


1K—I-F. C. Beckley, West Suffield, Conn. (half way be-
 tween Hartford, Conn., and Springfield, Mass.)

1C—Gerald Julian, 416 Park Road, W. Hartford, Con-
necticut.

2JE—A. J. Gironza, Larchmont, N. Y.

2KG—John T. Guymon, 2382 Chauncey St., Astoria, Long
Island, N. Y.

2NR, F. A. Holt, 2 North 20th St., Jackson Heights, L.
L. N. Y.

2AOH T. H. Thorn, Perry Place, Bronxville, New York.

2APN—Stacey W. Nichols, 156 14th St., Hoboken, N.
J. D. Low Watt Receiver.

3LW. A. Cohen, 126 Woolsey St., Astoria, Long
Island, N. Y.

3RE—Maurice W. Brink, 571 Rutherford Ave., Trenton,
New Jersey.

6APD—Chandler Brownell, 962 East 6th Street, Poma-
mona, Calif.

9DKA, Jack Piper, New Holstein, Wisconsin.
Submit your data.

9AMQ, M. A. Flaney, Bonnie Terre, Mo.

QSL CARDS: Samples and prices cheerfully furnished.

QSL CARDS: Why not give us your next order to

\[ \text{QSL CARDS: For neat clean-cut cards—BJT Press, 701 Walnut Ave., Scottsdale, Pa.} \]

\[ \text{FOR SALE: Knockdown twenty watt transmitter. Sixty dollars UP1016—415. 9D8S Milwaukee, Wisconsin.} \]

\[ \text{SELL: NEW 98 watt tubes and sockets chimp. Kenneth Bricker, Bippus, Indians.} \]

\[ \text{Q R A SECTION} \]

\[ \text{50c straight, with copy in following form only: CALL—NAME—ADDRESS. Any other form takes regular HAM-AD rates.} \]

\[ \text{1AAO—H. Hewitt Cooley, 460 Ward St., Newton Center, Mass.} \]

\[ \text{1K—I-F. C. Beckley, West Suffield, Conn. (half way between Hartford, Conn., and Springfield, Mass.)} \]

\[ \text{1C—Gerald Julian, 416 Park Road, W. Hartford, Connecticut.} \]

\[ \text{2JE—A. J. Gironza, Larchmont, N. Y.} \]

\[ \text{2KG—John T. Guymon, 2382 Chauncey St., Astoria, Long Island, N. Y.} \]

\[ \text{2NR, F. A. Holt, 2 North 20th St., Jackson Heights, L. L. N. Y.} \]

\[ \text{2AOH T. H. Thorn, Perry Place, Bronxville, New York.} \]

\[ \text{2APN—Stacey W. Nichols, 156 14th St., Hoboken, N. J.} \]

\[ \text{2LW. A. Cohen, 126 Woolsey St., Astoria, Long Island, N. Y.} \]

\[ \text{3RE—Maurice W. Brink, 571 Rutherford Ave., Trenton, New Jersey.} \]

\[ \text{6APD—Chandler Brownell, 962 East 6th Street, Pomona, Calif.} \]

\[ \text{9DKA, Jack Piper, New Holstein, Wisconsin.} \]

\[ \text{9AMQ, M. A. Flaney, Bonnie Terre, Mo.} \]

\[ \text{QSL CARDS: Samples and prices cheerfully furnished.} \]

\[ \text{Our Type a Wave Meter is Ready} \]

\[ \text{Send for Literature} \]

\[ \text{Other Real Ham Apparatus Under Way} \]

\[ \text{We are specialists in apparatus for the amateur and want every real ham's name on our permanent mailing list. Send 25 cents for registration and a copy of our illustrated loose leaf perpetual catalog, now in preparation.} \]

\[ \text{THE WIRELESS MFG. CO.} \]

\[ \text{Canton} \]

\[ \text{Ohio} \]

\[ \text{Our Type a Wave Meter is Ready} \]

\[ \text{Send for Literature} \]

\[ \text{Other Real Ham Apparatus Under Way} \]

\[ \text{We are specialists in apparatus for the amateur and want every real ham's name on our permanent mailing list. Send 25 cents for registration and a copy of our illustrated loose leaf perpetual catalog, now in preparation.} \]

\[ \text{THE WIRELESS MFG. CO.} \]

\[ \text{Canton} \]

\[ \text{Ohio} \]

\[ \text{Our Type a Wave Meter is Ready} \]

\[ \text{Send for Literature} \]

\[ \text{Other Real Ham Apparatus Under Way} \]

\[ \text{We are specialists in apparatus for the amateur and want every real ham's name on our permanent mailing list. Send 25 cents for registration and a copy of our illustrated loose leaf perpetual catalog, now in preparation.} \]

\[ \text{THE WIRELESS MFG. CO.} \]

\[ \text{Canton} \]

\[ \text{Ohio} \]

\[ \text{Our Type a Wave Meter is Ready} \]

\[ \text{Send for Literature} \]

\[ \text{Other Real Ham Apparatus Under Way} \]

\[ \text{We are specialists in apparatus for the amateur and want every real ham's name on our permanent mailing list. Send 25 cents for registration and a copy of our illustrated loose leaf perpetual catalog, now in preparation.} \]

\[ \text{THE WIRELESS MFG. CO.} \]

\[ \text{Canton} \]

\[ \text{Ohio} \]

\[ \text{Our Type a Wave Meter is Ready} \]

\[ \text{Send for Literature} \]

\[ \text{Other Real Ham Apparatus Under Way} \]

\[ \text{We are specialists in apparatus for the amateur and want every real ham's name on our permanent mailing list. Send 25 cents for registration and a copy of our illustrated loose leaf perpetual catalog, now in preparation.} \]

\[ \text{THE WIRELESS MFG. CO.} \]

\[ \text{Canton} \]

\[ \text{Ohio} \]
EVEREADY HOUR
EVERY TUESDAY AT 9 P.M.
(Eastern Standard Time)
For real radio enjoyment tune in the
"Eveready Group." Broadcast through
stations—
WEAF New York
WJAR Providence
WEEL Boston
WEAR Cleveland
WEJ Philadelphia
WEAF Pittsburgh
WCAE Pittsburgh
WOBD Davenport
WCCC St. Paul
WOC Joliet
WEAR Cleveland
WCCO Minneapolis
WWJ Philadelphia
WSAI Cincinnati

The proven
Dry Cell for all
Radio Dry Cell
Tubes

EVEREADY
Radio Batteries
they last longer

RECOMMEND
good batteries

In an effort to reduce the first cost
of a radio set, a newcomer in radio
often buys inferior batteries. You
know such "saving" is really wasteful.
Tell your friends who are about to
buy receivers that the best batteries
obtainable will prove to be the most
economical. Tell them to buy Ever­
ready Radio Batteries—they last
longer and, because they are greatly su­
perior, they give complete satisfaction.

Manufactured and guaranteed by
NATIONAL CARBON COMPANY, Inc.
New York San Francisco
Canadian National Carbon Co., Limited, Toronto, Ont.

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST
### QST’S INDEX OF ADVERTISERS IN THIS ISSUE

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acme Apparatus Co., The</td>
<td>2</td>
</tr>
<tr>
<td>All American Radio Corp.</td>
<td>85</td>
</tr>
<tr>
<td>Allen-Bradley Co., The</td>
<td>3rd Cover</td>
</tr>
<tr>
<td>American Hard Rubber Co.</td>
<td>72</td>
</tr>
<tr>
<td>American Sales Co.</td>
<td>66, 80</td>
</tr>
<tr>
<td>Apex Elec. Mfg. Co.</td>
<td>87</td>
</tr>
<tr>
<td>A.R.R.L. Application Blank</td>
<td>86</td>
</tr>
<tr>
<td>A.R.R.L. Emblem</td>
<td>88</td>
</tr>
<tr>
<td>A.R.R.L. Recommendation Blank</td>
<td>86</td>
</tr>
<tr>
<td>Garrett &amp; Paden</td>
<td>72</td>
</tr>
<tr>
<td>Bluebird Tube Co.</td>
<td>88</td>
</tr>
<tr>
<td>Branch Mfg. Co., L. S.</td>
<td>87</td>
</tr>
<tr>
<td>Branston, Inc., Chas. A.</td>
<td>89</td>
</tr>
<tr>
<td>Bremer-Tully Mfg. Co.</td>
<td>81</td>
</tr>
<tr>
<td>Bryant Radio Tube Co.</td>
<td>84</td>
</tr>
<tr>
<td>Burgess Battery Co.</td>
<td>65</td>
</tr>
<tr>
<td>Cardwell Corp., Allen D.</td>
<td>36-96</td>
</tr>
<tr>
<td>Carter Mfg. Co.</td>
<td>78</td>
</tr>
<tr>
<td>Corning Glass Works</td>
<td>66</td>
</tr>
<tr>
<td>Crescent Radio Supply Co.</td>
<td>74</td>
</tr>
<tr>
<td>Croxley Mfg. Co.</td>
<td>71</td>
</tr>
<tr>
<td>Cunningham, E. T., Inc</td>
<td>2nd Cover</td>
</tr>
<tr>
<td>Daven Radio Corp.</td>
<td>70</td>
</tr>
<tr>
<td>Deutschmann, Tube &amp; C.</td>
<td>78</td>
</tr>
<tr>
<td>Dubilier Condenser &amp; Radio Corp.</td>
<td>83</td>
</tr>
<tr>
<td>Duplex Cond. &amp; Radio Corp.</td>
<td>68</td>
</tr>
<tr>
<td>Durham &amp; Co., Inc.</td>
<td>78</td>
</tr>
<tr>
<td>Eagle Radio Co.</td>
<td>68</td>
</tr>
<tr>
<td>Electric Specialty Co.</td>
<td>74</td>
</tr>
<tr>
<td>Findlay Electric Porcelain Co., The</td>
<td>84</td>
</tr>
<tr>
<td>Freshman Co., Inc., Charles</td>
<td>80, 87</td>
</tr>
<tr>
<td>General Radio Co.</td>
<td>79</td>
</tr>
<tr>
<td>Globe Radio Equipment Co.</td>
<td>76</td>
</tr>
<tr>
<td>Gross &amp; Co., J.</td>
<td>64</td>
</tr>
<tr>
<td>HAM ADS</td>
<td>39-93</td>
</tr>
<tr>
<td>Hull &amp; Co., S. W.</td>
<td>74</td>
</tr>
<tr>
<td>International Correspondence Schools</td>
<td>35</td>
</tr>
<tr>
<td>Jenkins Lab., The</td>
<td>67</td>
</tr>
<tr>
<td>Jewell Elec. Instrument Co.</td>
<td>74</td>
</tr>
<tr>
<td>Jewett Radio &amp; Phonograph Co., The</td>
<td>4</td>
</tr>
<tr>
<td>Kellogg Switchboard &amp; Supply Co.</td>
<td>72</td>
</tr>
<tr>
<td>Kimley Electric Co.</td>
<td>80</td>
</tr>
<tr>
<td>Lopez &amp; Co., A. G.</td>
<td>86</td>
</tr>
<tr>
<td>Marlo Elec.</td>
<td>84</td>
</tr>
<tr>
<td>Mason, Fenwick &amp; Lawrence</td>
<td>83</td>
</tr>
<tr>
<td>Morse Twist Drill &amp; Machine Co.</td>
<td>78</td>
</tr>
<tr>
<td>Munn &amp; Co.</td>
<td>82</td>
</tr>
<tr>
<td>National Carbon Co., Inc.</td>
<td>94</td>
</tr>
<tr>
<td>National Co., Inc.</td>
<td>65</td>
</tr>
<tr>
<td>Newman-Stern Co., The</td>
<td>37</td>
</tr>
<tr>
<td>Pacent Electric Co.</td>
<td>70</td>
</tr>
<tr>
<td>Prandtl Radio Corp.</td>
<td>71</td>
</tr>
<tr>
<td>Precise Mfg. Corp.</td>
<td>88</td>
</tr>
<tr>
<td>Premier Elec. Co.</td>
<td>82</td>
</tr>
<tr>
<td>The Prest-O-Lite Co., Inc.</td>
<td>71</td>
</tr>
<tr>
<td>Radiall Co.</td>
<td>85</td>
</tr>
<tr>
<td>Radio Corp. of America</td>
<td>1</td>
</tr>
<tr>
<td>Radio Tube Exchange</td>
<td>74</td>
</tr>
<tr>
<td>Radio Tube Mfg. Co.</td>
<td>64</td>
</tr>
<tr>
<td>Reichmann Co.</td>
<td>69</td>
</tr>
<tr>
<td>Roice Tube Co.</td>
<td>74</td>
</tr>
<tr>
<td>Sangamo Elec. Co.</td>
<td>75</td>
</tr>
<tr>
<td>Stromberg-Carlson Telephone Mfg. Co.</td>
<td>70</td>
</tr>
<tr>
<td>Super-Insulated Wire Co.</td>
<td>88</td>
</tr>
<tr>
<td>Thordarson Elec. Mfg. Co.</td>
<td>76</td>
</tr>
<tr>
<td>Tox's Engineering &amp; Sales Co.</td>
<td>84</td>
</tr>
<tr>
<td>Troy Radio Co.</td>
<td>82</td>
</tr>
<tr>
<td>U. S. Tool Co.</td>
<td>87</td>
</tr>
<tr>
<td>Vibroplex Co.</td>
<td>82</td>
</tr>
<tr>
<td>Walbert Mfg. Co.</td>
<td>76</td>
</tr>
<tr>
<td>Werner Mfg. Co.</td>
<td>68</td>
</tr>
<tr>
<td>Western Coil &amp; Electrical Co.</td>
<td>64</td>
</tr>
<tr>
<td>Weston Elec. Inst. Corp.</td>
<td>66</td>
</tr>
<tr>
<td>Wireless Mfg. Co., The</td>
<td>93</td>
</tr>
</tbody>
</table>

**ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS!**
The Toro-Tran eliminates signal energy picked up by ordinary coils from nearby stations. It eliminates magnetic feed-back in multi-stage radio frequency circuits, thus removing the most active factor in causing howling and distortion, and thereby increasing selectivity and distance. It rejects almost entirely the interference effects caused by electrical power machinery, elevators, door-bells, arc stations, etc.

The Toro-Tran winding confines the field to a small area, and thus avoids one of the greatest causes of loss known to radio receivers—that of stray magnetic fields, which result in the absorption of signal energy and reduce the efficiency of the receiver tremendously.

Note these unusual advantages in assembly and operation

1. Compactness. The coils do not require spacing or angular mounting. They occupy less space than your condensers.
2. Permit exact nullification for tube and stray capacity without guesswork or tedious testing.
3. Closed magnetic field eliminates magnetic feed-back in tuned radio frequency amplifiers.
4. Low distributed capacity, due to air spacing of each winding and to low voltage-drop per turn of small diameter wire.
5. Maximum coupling and high ratio of voltage increase due to concentrated field with zero leakage.
6. Absence of all supporting insulation in the field of the coil. This is one of the greatest loss factors in the ordinary circuit and is not remedied by "skeleton" or so-called "low-loss" windings.
7. Ease of neutralizing oscillation due to tube capacity by means of rotating control, which anyone can "balance."
8. Low capacity between primary and secondary, affording maximum transfer of energy to succeeding grid circuit.

The Toro-Tran has a lower "circuit resistance" (i.e., effective resistance as assembled in a set and not as isolated in the laboratory for theoretical measurements) than any inter-stage tuned transformer made and has a correspondingly higher amplification factor, its ratio exceeding ten.

To appreciate the many remarkable advantages of the Toro-Tran, write for our two free booklets: "The Torodyne Circuit" and "The Most Interesting Radio Frequency Transformer Ever Invented."

Toro-Trans are ready to mount in any tuned radio frequency circuit. Replace your ordinary coils with Toro-Trans. You will be astonished with the results. Most .00035 mfd. variable condensers will tune them, but by using Cardwell Condensers you get maximum efficiency.

Order from your dealer or direct
CARDWELL TORO-TRAN WITH BALANCING POTENTIODON .......................................................... $ 4.00
Cardwell .00035 Condenser for tuning .................. 4.75
Cardwell .00035 Verter Condenser .................. 6.25
Cardwell .00035 Dual Condenser (two-in-one) ....... 8.00
Cardwell .00035 Triple Condenser (three-in-one) .... 12.00
Cardwell Audio-Trans (compound audio transformers) 10.00

The Allen D. Cardwell Manufacturing Corp.
81 Prospect Street, Brooklyn, N. Y.

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST
A distinctive series of radio units
for set builders who seek superlative results

EVERY amateur yearns for perfection in his radio receiver. Better quality, greater volume, and closer selectivity are the requirements of discriminating radio enthusiasts, and the circuits which meet these requirements are inevitable favorites.

The experienced set builder has learned the value of fine radio parts, and he knows the important part they play in getting maximum results from a selective circuit. Hence, it is not strange that the Allen-Bradley line has gained increasing popularity with the introduction of the super-selective hook-ups. In fact, for stepless, noiseless, perfect control, Allen-Bradley Radio Devices have no peers. Your set will be a better set if you use them. Let us send you an illustrated folder about the Allen-Bradley line.

Allen-Bradley Co.
Electric Controlling Apparatus
277 Greenfield Ave., Milwaukee, Wis.

Manufacturers of graphite disc rheostats for over twenty years
Small price for big performance — achieved in Radiola III

How the Radio Corporation of America is Meeting the Responsibility of Leadership

It has made America the radio center of the world, through the high-power radiotelegraph circuits that link our country, by direct radio communication, with seven countries of Europe, with Asia and with South America.

It has developed radio ship sets, and a ship-to-shore radio service that makes the high seas safer, and aids all marine commerce.

It has the technical resources of laboratories for research that not only carry on unceasing experiment for the perfecting of Radiolas and Radiotrons, but study the problems of high power commercial transmission, and conduct research into every phase of radio.

With its associates, the Radio Corporation of America maintains ten powerful broadcasting stations, whose programs serve the whole nation: WJZ, WJY, WGY, WBZ, WRK, KDKA, KOA, KFXK, KGO, KYW — from New York to California!

By its extensive research in the development of Radiotrons, the standard vacuum tubes of radio, it has made contributions of inestimable value to radio progress.

RADIO CORPORATION OF AMERICA
Sales Office: Suite No. 219
233 Broadway, New York
155 S. LaSalle St., Chicago, Ill.
283 Geary St., San Francisco, California
The Governor's—President Relay

Message Routings

ALABAMA—The Alabama message reached Washington, but not by radio. It left Montgomery, Ala., at 11:30 P.M. March 3rd. It traveled via 4OG to 3OP in Baltimore. 3OP was unable to raise anyone in Washington, so he mailed the message to the White House. 3OP copied the 58-word message intact.

ARIZONA—This message checked 86 words and it was intercepted by both 3AB and 3APV, while enroute from 4CSO to 5AG.

CONNECTICUT—1AW shot this one straight into Washington to 3ZW. It was one of the first to arrive at schedule time, arriving at 3ZW 1:06 P.M. March fourth.

FLORIDA—This message left 482S at Jacksonville 6:20 P.M. the fourth. It was intercepted by 3ZW at 7:30 P.M. as 482S was giving it to 3BU at Alexandria, Va., who turned it over to 3BW 11:00 P.M. the same night.

GEORGIA—The route of this message is in doubt. It left 3XM at Atlanta 11:30 P.M. going to 3BW. It was handled by 3LA. 3IM copied the message at 10:25 P.M. when it was enroute to 2LD. 4JR's log shows that he got it from 2LD at 11:15 P.M. We are wondering how 4JR got it (worse magic).

INDIANA—The Hood Bros. of 9BZV report that at 6:30 P.M., having heard that a message was wanted from the Governor of Indiana, they started out to get it, thinking the Governor could do no worse than throw them out. He gave them one, remarking that he bet it would never be delivered. He gave it to 3ZW at 11:30 A.M. and 9BZV sent it to 3ZI and 2KF, who failed to get it. The QRM. 9ZW finally took it and put it in.

IDAHO—This was another message that was intercepted by 3AB. It left 7ZN at Boise, going to 8XM at Princeton University. 3XM shot it down to 3ZW too late, as 3AB already had it from 7ZN. (Don't get the same credit as 3XM, but 3AB was taking no chances).

IOWA—The message went from 9BMI to 9DWZ by 1DX phone. 9DWZ gave it to 4JR and he gave it to 3APV, who gave it to 3AB already had it from 7ZN. (Don't get the same credit as 3XM, but 3AB was taking no chances).

MARYLAND—3HUR got the message almost a month in advance. On account of Naval Academy duties he turned it over to 8PA and he sent it to 3L, at 7 P.M. of the fourth. 3L got the message and in the meantime 3BW had notified the Chief of Staff that he had the S.D. message, having received it 3 or one signed "The Sunshine State" from 3BNU at Belhaven, Pa., which took it from 9AGL in S.D.

MAINE—This message made the goal in one relay. It went from 1APF at Portland to 3BLP at Bethesda, Pa. He sent it to 3AB at 5 P.M. the fourth.

MINNESOTA—A 99 word message went direct from Minneapolis through 9XI to 3APV 6:00 P.M. of the fourth.

MISSOURI—9BKE sent this message to 3QI in Baltimore, Md., on March 6th. 3QI sent it to 3ABH on the 8th, while 3BW received the message via 8EU on March seventh. Either this one hung up somewhere or it was intercepted by some other station, as 3QI has no further information from 3ABH.

NEBRASKA—This one was shot around a bit. It left 9AES, 2APR and 9DAC, all of Lincoln, in the late afternoon of March fourth. 9AES gave it to 3 AB at 9:00 A.M. 11:00 P.M. to 9DEB, where it probably got stuck. 9DFC at Chicago took it from 9AFR and gave it to 3AB at 6:30 A.M. the fifth. 9HUA at Indianapolis got it from 9DFC at 8:00 P.M. the fourth and he sat up all night trying to get it off. The message had a check of 48 words. 9DSE at Kalamazoo, Mich., gave it to 3BW on the seventh, although 3APV had it direct from 9DAC at 9:20 P.M. the fourth.

NEW YORK—3AFW at Albany shot this one right into Washington at 12:30 P.M. 3AB at 1:20 P.M. the fifth.

NORTH CAROLINA—3LB got this directly from 3EU at Raleigh, N.C., about the same time 3AB got the New York message.

NORTH DAKOTA—3EU at Detroit, Ohio, had this one. He gave it to 3BW at 1:30 A.M. of the fifth.

OHIO—This message was one of the bunch handled on 40 meters. 3APV got it at 2:40 P.M. of the 4th, from 8CZ at Columbus, Ohio, on 40 meters.

RHODE ISLAND—This message evidently started at Providence 11P and went thru 3CVL. New York City to 3HLP at Bethlehem, Pa. 3L at Baltimore got it somehow and shot it down to 3BMN at Petersburg, Va. It traveled back to Washington 3AB. 3HLP's log shows that he gave it to 4SA while 3BMN shows he got it from 3L. 3L either received it garbled or else it got that way enroute to 3BMN. The text of stage form 3SAO, "I don't think you can help us to "gloriously load this nation" and it got into Washington that way. 3L and 3BMN had it, "God will help you to gloriously load this nation" this month," 3AB up-doubtly copied it correctly in an interception while going from 3HLP to 4SA.

SOUTH DAKOTA—Which of the messages received was the right one is not known. One signed by the Governor of S.D. was sent by 3ZI to 9AR. 9AR gave it to 3BOY. 3BOY gave it to 3XM. He in turn gave it to 3XW and was advised by 3ZW that the S.D. message had already been received. The same message was picked up by 3QI in Baltimore from 1BUB. 3QI gave it to 3AHP in Washington and in the meantime 3BW had notified the Governor that he had the S.D. message, having received it somewhere or 1 or one signed "The Sunshine State" from 3BNU at Belhaven, Pa., which took it from 9AGL in S.D.

VIRGINIA—This came thru to 3AB in fine shape direct from 3BMN at Petersburg, Va.

WEST VIRGINIA—This message was signed with difficulty by 3APV, who got half and found that 3AB had the rest ok. They compared notes and 3APV gave 3BDM at Charleston, W. Va., the ok.

WISCONSIN—9OGH at Madison personally tried to get a message from 3BZC or 3BZD as his messages had failed. The Governor was "too tired" so a message went thru from 9OGH to 9AAR reading, "Blaine declines to send message" addressed to Headquarters at Hartford, Conn. It traveled from 9HG to 8BR to 58K from New York to 12T and Hartford.

UTAH—Was the only state that did not come in at all, out of the known 23. It was placed on the known list only upon the writing of this report. However, it left 4MAT on the 5th of the month and traveled thru 9BDF, 9AAB, 9BE and 9AL.

There are perhaps many other messages that got started but never came thru.
Something For Station Owners To Consider

Two factors are important in determining the working range of given apparatus. Upon the station, and upon the operation of the station, depends the traffic report and the DX record, both the electrical performance and the keying having weight in determining the amount of traffic moved and the range. The possibility of establishing communication depends on the judgment of the operators as well as on the strength and character of the signals.

In the first place let us consider the influence of electrical circuits and performance in working DX. The transmitter itself and the signal which it puts out determines the readability of the signals. The note must be good, and the signal must be steady, to give the receiving operator a fair chance to do his stuff. Any of the fundamental circuits may be modified to give satisfactory performance on most of the wave-lengths which amateurs can use. However, any old keying arrangement cannot be used to best advantage. The type of plate supply also influences the readability of the signals. Steadiness is another quality our signals must have.

Keying in the primary of the plate transformer, when using a rectifier and a large filter gives a peculiar drag-over on the note which makes it almost impossible to copy. A smaller filter or a partly filtered plate supply, simply gives a modified condition without remedying the condition at fault. A master oscillator circuit can be used to prevent swinging signals but proper attention to antenna supports when the antenna is erected is a worth while substitute when we cannot afford the extra tube. The old argument of an A.C. vs. a D.C. plate supply cannot be thrashed out here. A non-swinging D.C. note gives the cleanest cut signal but this is tiresome to copy for long periods of time. The interference caused by an A.C. modulated plate supply and the broadening of the transmitter wave band by use of such a supply must be considered. Brute plate power encourages harmonics and wobbly signals. Sudden application of power by keying causes key clicks.

The matter of the best wave-length for DX working is now becoming better understood. For daylight traffic the shorter waves have been proven best for the maximum distances to be found in this country. For efficient traffic handling have the transmitter adjusted for maximum efficiency on two or three known lawful wave-lengths. MARKED or TAGGED points on the inductance and condensers with known settings for definite wave-lengths will enable a QSY quickly at any time. And schedules on these known wave-lengths will move traffic quickly and efficiently. (Look for a new system of relay traffic handling in an article by 6PS in the June issue). There is no excuse for transmitting on unlawful wave-lengths. Foreign stations look for us on our assigned wave bands. Dope on wave-meters for all ranges has been printed in past issues of QST. Tune your transmitter to the band where the least number of other stations are operating if you want to work without QR. Picking up a given station is simplified if you know what wave-length the station is working on and if your receiver is calibrated.

The receiver should be built with the design principles mentioned on page 47 of July 1924 QST so that the tickler or feedback control has negligible tuning effect—otherwise calibration will be impossible. Hand capacity must be kept low and a method of feedback adjustment used where the plate circuit adjustment doesn't affect the tuning. A good receiver is just as important as a good transmitter. Both are necessary to the worth while station.

Now let us consider the operator and see what he has to do with limiting the range of the station. The operator must have a good "fist"; he must have patience and judgment, and he must develop systematic methods of working. Engineering or applied common sense is as essential to the radio operator as to the experimenter. Don't make several changes in the set hoping for better results. Make one change at a time until the basic trouble is found.

An operator with a clean-cut, slow, steady method of sending has a big advantage over a poor operator. Good sending is partly a matter of practice. Patience and judgment, however, are just as important as a good "fist". There are still a few operators who CQ for five minutes, listen for a half minute, and CQ again. CQ should be sent three times, then you should sign three times, for a total of three times. Listen at least a minute, turning the dial slowly and listening for a possible answer to your CQ. Then you can move traffic. Why not try the method proposed by 3CMR last month instead of using "CQ"?

—F. E. H.

NOTE: Another call for material for these columns is in order. We want to print an interesting and educational traffic article each month. If we get enough material we can make room for more than one article. Please take note, everyone. Sit down now and write us whatever you think will be helpful in the best way you can.
WASHINGTON BIRTHDAY Daylight Transcon Report

THE results of this relay can be truthfully stated as unsatisfactory. The value of the relay lies in the value of any future. We can profit from the experience in daylight work and we can plan another relay more carefully and put it into effect this time.

These messages were coded in a manner similar to that of the previous daylight relay in order that we might check on the accuracy with which messages could be passed over our routes. All messages were started. Six were distributed for starting on each coast and the plans were carried out just as mentioned in the Transcon Report. Also a special signal was started by Major Borrett from 1DDD with the text, "Rotabull nullii secundus." This fared no better than the other messages.

Many were sent in just as they were handled with comments on a separate sheet. This much simplified the work of tracing the routes. The time when the message was acknowledged by the operator and in most cases fairly accurate. A considerable improvement over the previous relay was shown in this respect.

Each message carried a number for identification. The messages are distinguished by this number in the report of routing.

East-bound messages:

0221.—This message was not started.

0222.—7GB started this one. It moved via 7FT-6BUI-6CJS-6CVA-6AED-9DED to 9CJS. The coded text was hopelessly garbled. Starting at 8:45 a.m., it arrived at 9CJS at 9:53 p.m., local time. 9CJS gave the message to 7GW but he refused it as this routing moved it west instead of east.

0223.—4LR sent this one to 8BM in Vancouver at 7:58 a.m. and no further reports of its travels were received.

0224.—At 7:51 a.m., P.S.T., this message left 6AFQ. It passed via 6HUI to 6XV who acknowledged it at 10:53 a.m. No further routing is available, and we assume that it died here.

0225.—6ZH sent this one to 5LG who almost succeeded in passing it to 9DED. The jump into the ninth district was a little too long to make under daylight conditions but 9BG and 9DED deserve credit for the attempt.

0226.—This message went via 4LJ-5CGO-9DED to 9CJS. It started at a.m., P.S.T., and died at 9CJS at 4:50 p.m. with but one error in transmission.

West-bound messages:

1251.—Starting at 11:40 a.m., Atlantic Time, Nr. 1251 started via 1DDD-18E-8JEB-8BQF to 9DBR. Another route was 9DUQ-9BHE to 9BAK where it died. 9DOA copied it from 9DUQ and passed it to 9RT. He gave it to 9AEY and we have further knowledge of its routing. The text of the message was correct as sent in by 9DBR.

1252.—Leaving 1KX at 10:04 E.S.T. it went via 8AEY with the message to 7GW. Also 2CTH picked it up from 8UP's QST and it went by way of 8AVJ-8BEN and 8ATR to 8NB. Another route developed was 7X8E-8AUG-9AOG-9DND-9BET. Another route was 9DUQ-9BHE to 9BAK where it died. 9DOA copied it from 9DUQ and passed it to 9RT. He gave it to 9AEY and we have further knowledge of its routing. The text of the message was correct as sent in by 9DBR.

1253.—Leaving 1KX at 10:04 E.S.T. it went via 8AEY with the message to 7GW. Also 2CTH picked it up from 8UP's QST and it went by way of 8AVJ-8BEN and 8ATR to 8NB. Another route developed was 7X8E-8AUG-9AOG-9DND-9BET. Another route was 9DUQ-9BHE to 9BAK where it died. 9DOA copied it from 9DUQ and passed it to 9RT. He gave it to 9AEY and we have further knowledge of its routing. The text of the message was correct as sent in by 9DBR.

1255.—This message was correct because it passed through a signal-proof wall west of his station. He did his best but got stuck with four messages. 9DN was reported severe in most parts of the country. 9DOA was scarcely recognizable.

1256.—This message was caught by darkness half way across and suffered the same fate as the other messages.

Many of the gang in the west were in too much of a hurry to transmit their messages and got rattled. It must be understood that slow, even sending can be easily and correctly copied and that the rate of moving traffic depends more on using this sort of sending than it does in the speed of transmission by individual operators.

Some stations were working on forty meters instead of on the 75–80 meter band specified. A lot of time was lost in message handling by stations CQing without giving any specified direction. Both stations wanting messages and stations having messages used QO without effect. The use of this signal should be limited to stations having traffic or else something we want to be sure of sufficient interest is wanted.

The weather comes in for its share of blame. 9BZB complained that there was something resembling a signal-proof wall west of his station. He did his best but got stuck with four messages. QRN was reported severe in most parts of the country.

A lot of credit goes to the stations that took part in this relay. Not enough stations were active in some sections of the country. Next time we start something we want to be sure of sufficient interest to carry it through with flying colors.

Each division manager has been carrying on daylight tests week-ends. When the time is ripe we expect to see some transcontinental messages going over in good shape in full daylight. Do your bit every week to perfect routes in your locality. And let's be more careful in handling the messages that come our way. Read the articles on traffic handling which are printed every month. Then put the ideas into practice at your station every day in the year.

You will be surprised at the results 1 I T H.

F. E. H.
The first thing that you will notice this month is that a new man is in line for the Traffic Department Trophy. 1KV didn't carry it off after all. Some questions have been asked regarding the Trophy and everyone does not yet understand how the award will be made.

Complete information regarding the valuable prize was given in the Traffic Department columns of February QST. The Trophy will be given to the A.R.R.L. Member who shows the highest degree of operating ability by handling the most bona fide messages for three consecutive months. The contest is between operators and not between stations. The operator who wins this prize must have a definite purpose. He must not only show the ability to pile up a message total by good operation but he must also show the persistence and stick-to-it-iveness that will keep him busy at the key and busy getting local traffic to put his station over three months in succession. All messages handled must be of a high grade. To make certain that the operator winning the trophy deserves the valuable prize that he will get we are making the rule that all operators trying for the prize forward their traffic through the local traffic officials to the division manager of their division. It will be the division manager's duty to see that the traffic was handled promptly in accordance with A.R.R.L. rules. Only good messages will count. Each month Headquarters will communicate with the high men as soon as the reports have been compiled. The D.M. will receive instructions to check the next month's traffic handled by the high men. In the case of traffic handled by club stations where two or more operators are responsible for the traffic it will be necessary that the operator submit his messages to the D.M. with an affidavit.

BRASS FOUNDERS' LEAGUE

R. F. Allen — SCTF
Mendota, Ill.
Midwest Division
552 Messages

The month 2CTF takes his place in the starred rectangle. If he is there twice more the Trophy will be his. One of these days when some of us decide that a $200 prize would be a good thing for OUR shack that prize will get ready to move. Consistent work is what will count. There is still an opportunity for everyone.

We want to compliment 8ARS and 8CTF for doing some good work at the Cincinnati Radio Show. They put themselves in the Brass Founders' League and if the several operators had kept track of the traffic each handled we suspect 9CTF would have had to work harder for his laurels.

Just a word about the short wave tests for this summer. A lot of interest has been shown and next month we will announce definitely just how and when they will be held. Get your stations ready for 40, 20, and 5 meter tests in the last part of July. We have a lot to learn about the shorter waves and the quicker you can get your station down the sooner we can learn it. The fellows in England have now gotten permission to make some short wave tests and it will not be long before twenty meter daylight work will be as common as the present work on the 75-85 meter band. July will tell who is who. Atmospheric disturbances are not going to bother us much on the lower wavelengths so it is logical that we use the shorter wavebands for our summer work. Make use of schedules and clear traffic quickly and surely. In the spare moments get ready for those tests.

A Challenge

CQ CQ CQ! Contrary to reports, the situation seems to be growing worse in most sections.

We, of Florida, claim to be more nearly 100% strong in observance of the League's CQ regulations than any other state in the Union. This is a challenge!

One of the requirements of an O.R.S. in Florida is that he observe the League's CQ regulations. This is not all. Thinking it may be of value to others, we wish to tell what is being done in Florida to regulate the CQ situation.
There have been many station contests. But we have something different in the way of contests.

Our aim is to have Florida hams known throughout the world as being the most courteous, law-abiding, and gentlemanly operators in the United States. Foremost under the head of courtesy, comes the proper use of CQ. Is it not most discourteous to send a long CQ?

The contest in Florida is based on these principles. The station having best "department" for the month is the winner of the contest. "Department" includes observance of CQ regulations, radio laws and all-round courtesy and gentlemanly operating. If a station is active the required number of days and handles the required minimum number of messages it is eligible. The A.D.M. and District Superintendents are on the watch and in a position to know how each and every station in the state is being conducted.

Dr. Burgess, of the Burgess Laboratories, interested in anything which may better amateur radio, has kindly offered to furnish prizes each month to the winners of the contest. Dr. Burgess and his entire staff at 4DM are operating with the Florida men through 4QY, who is responsible for the plan just described.

Remember the challenge—do we get away with it? Then give us some competition.

(Signed) C. F. Clarke
A.D.M. Florida.

ATLANTIC DIVISION
E. B. Duvall, Mgr.

The division shows increased activity. O.R.S. are earnestly requested to cooperate by mailing their reports in time for the 25th of each month. The D.M. has mailed a circular to each O.R.S. giving the name of the traffic officer to whom reports should be mailed. If a report is absent from QST, the D.M. has sent his report in time to reach this office by the 25th of the month.

Reports are given in the order in which they were received.

DELAWARE—The D.M. visited Wilmington in March. He was not in the field stations, keen interest was evident everywhere. 2WJ is on 77 meters with two UV202 tubes. 3AIS got out well with two W.E. VT2 tubes. SSL is after laurels on the 160 meter band. 3SAU has an able operator at the key occasionally. He is GSO England. 3AIS has a schedule with the D.M. Sundays. This should boost Delaware and $.2WJ in the Dayton transcons. The Governor-President Relay, and they are active in the Inter-Collegiate Radio Association. O. R. S. giving the name of the traffic officer to whom reports are received. For an O.R.S. appointment, 3BTQ has worked England and France on 75 meters. 3RE is a new station at Trenton. 3CBX is back with a new QRA, a new antenna, and a new truck. HПА worked many foreign stations in Nebraska and Colorado. 3KT has a fifty watt and a powerful push. 3BGT has come to his senses.

SOUTHERN NEW JERSEY—5XM is the star station. 5XM has six operators with the proper equipment. The following are real traffic sources. They worked 40 west coast stations, took part in the speed relay from Holland to West Point. 5XM worked 40 meters in the daylight transcons and the Governor-President Relay, and they are active in the Inter-Collegiate Radio Association. They worked 125,000 meters. 3ZV evidently took the razz in the last report seriously. He says "I tried mercury are retafication with unfavorable results. This month. Music has ruined radio life. The A.D.M. is glad to hear this and follow up.

3DFA is Chief Oper. at WHEC. SINB worked European stations. 3BZA is Chief Op. at WHEC. SNB worked European stations. 3SW is Chief Oper. at WHEC. SCYI has been building sets for the B.C.L.'s.

DISTRICT OF COLUMBIA—A definite revival of traffic handling in the District of Columbia is evident. The D.M. has increased QRM makes long distance working difficult. Anyway, the A.D.M. is glad to see the renewed interest. 3BBP says traffic is hard to get on any wavelength. He says ultra short waves are going to be the summer. 3LR dropped from sight—this time it's a saxophone. 3CGK, 3KM and 3DJ have been experimenting below 5 meters. 3KM, 3DJ, 3CGK and 3LR evidently took the razz in the last report seriously. He says "I tried mercury are retafication with unfavorable results. This month. Music has ruined radio life. The A.D.M. is glad to hear this and follow up.

3DFA is Chief Oper. at WHEC. SINB worked European stations. 3SW is Chief Oper. at WHEC. SCYI has been building sets for the B.C.L.'s.

DISTRICT OF COLUMBIA—A definite revival of traffic handling in the District of Columbia is evident. The D.M. has increased QRM makes long distance working difficult. Anyway, the A.D.M. is glad to see the renewed interest. 3BBP says traffic is hard to get on any wavelength. He says ultra short waves are going to be the summer. 3LR dropped from sight—this time it's a saxophone. 3CGK, 3KM and 3DJ have been experimenting below 5 meters. 3KM, 3DJ, 3CGK and 3LR evidently took the razz in the last report seriously. He says "I tried mercury are retafication with unfavorable results. This month. Music has ruined radio life. The A.D.M. is glad to hear this and follow up.

3DFA is Chief Oper. at WHEC. SINB worked European stations. 3SW is Chief Oper. at WHEC. SCYI has been building sets for the B.C.L.'s.
VLY and STR are Rochester City Managers. S8N is now D.S. S8AJ worked England and France. He will be a H.F. amateur and expects to make new appointments. SRV has a Y.L. operator on duty. SRV is active but has interests elsewhere. S8JU does good work. S8X, S8NT and S88 who are all trying to handle a good bit of traffic. S8HO lost his tubes and is temporarily out of commission. S8JZ, S8XN and S8DQA are on the lookout.

Traffic: S8AID, 12; S8ACM, 45; S8ADE, 12; S8AY, 25; S8A9G, 3; S8OW, 6; S8BFE, 12; S8AXN, 11; S8BED, 7; S8DST, 21; 19; S8DJ, 22; S8NT, 19; S8QB, 11; S8JF, 14; S8YV, 7; S8W, 11; S8UF, 56; S8ZU, 5; S8GOO, 33; S8ES, 3; S8CF, 3; S8ALY, 39; S8AFN, 19; S8A5, 12; S8AVJ, 7.

EASTERN PENNSYLVANIA—Unless traffic official duties are handled in time there will be quite a few vacant spots. Fine work is being done but reports fail to reach the A.D.M. (This seems to be the general kick from all quarters and unless it is cleared up a great show is in the future, a few cancellations will be made without notice—D.M.) S83M is studying French. S3BAU works many west coast stations. S3HNU is QSO England, Mexico and the Argentine. S3YQ reports traffic figures improving. S3AVL does fine work on 41 meters. All that he hears on 4.4 meters is automobiles. Sugar was copied in Scotland in daylight. S3CDN does not seem to connect with 80 meters. S3BVU is on 80 meters during C.M.T. in Bethlehem. S3HEG is back and S3UE has his 80 watt working. S3OL is handling traffic with Europe. S3AVU is heard in Mexico, Porto Rico, Canal Zone, New Zealand, Australia and England. S3CCG works England and France with one five watt tube. S3BEF is busy with P.R.E. work. S3BUU has a “fifty” working. S3BUU, S3EWE, S3AGS and 8BCT are the only consistent Philadelphia stations.

Traffic: S3AOL, 8; S3ZM, 3; S3BAU, 25; S3HNU, 96; S3YQ, 17; S3AVL, 9; S3DI, 2; S3AY, 9; S3CZT, 4; S3LK, 8; S8BLP, 170; S3CDN, 3; S3BVU, 14; S3BLC, 10; S3BAQ, 2; 8CDJ, 6; S3MQ, 29; S9TP, 43; S3UE, 5; S3AYV, 7; S3Q7, 28; S3BBR, 7; S3ST, 17; S3QU, 1; S3FT, 1; S3BEF, 14; S3BUU, 2; S8D, 11; S3AWA, 45; S3FS, 7; S3BCT, 27.

A Western Pennsylvania report was not received on this report. Another report will be made to find the reason for the delay. Certain traffic department officials will be changed if this happens again.

New appointment certificates are being mailed as rapidly as possible. Complaints and criticism are welcomed by the D.M. and any trouble will receive prompt attention. Information regarding date and number of the following O.R.S. certificates will help the traffic station when sending C.M.T. material. Please write the D.M. and give full particulars. S32S, No. 4; 83CDN, No. 8; S3LL, No. 18; S3HNU, No. 15; S3YQ, No. 11; S3ZM, No. 51; S3AIH, No. 52; S3CTF, No. 63; S3AKI, No. 85; S3BK, No. 84; S3XM, No. 85; S3XE, No. 86; S3ABS, No. 87; 83BBV, No. 89; S3BQ, No. 91; S3HE, No. 92; S8BMS, No. 93. Have any of the numbers, regardless of call letters, been through your locality? List any of the numbers, regardless of call letters. a8BUL is acting C.M. for Bethlehem.

CENTRAL DIVISION

R. H. G. Mathews, Mgr.

ILLINOIS—Dist. No. 1: S9EB1 is a new O.R.S. certificate. No further clutter. S9NQ is here but always reports. 9DGA sends in a good report. S9BET is another new O.R.S. who handles traffic well. S9REW has replaced his old 50 watt by a new 80 watt tube.

Dist. No. 2: S9CTF is a "Burgess" emergency station. He planned to handle 600 messages and almost all the messages are in and out on 78 meters. He has a twenty and a fifty meter set. (We expect the Y.L.'s will get the best DX now and report their successes. For his also has a 150 watt transmitter. 9DQF has a new counterpoise. Dist. No. 3: S9A9W is off. He is in training for the S9MAG. S9DAGC tried to use some brass. S9AQF broadcast a description of an impostor selling magazine subscriptions who has been using the operator's name. S9A9Q finished his poster and turned him over to the police of Chillicothe. (Fine work, OM1—A.D.M.—A.D.M.—A.T.M.) S9ATT rebuilt his set. He is sick now and working imaginary DX with it. 9CDL has been off since the recent storm. S9CSW has worked his first six using eighteen meters.

Dist. No. 4: S9CA wrote a special delivery registred letter to the Governor. Requested information on the names of patients in Springfield. The Governor was instructed to send the message to 8DQU in December. S9DKU telephoned for the message but he wasn't able to get any closer than a 34th assistant after working all day. We are sorry that Illinois fell down on the job but will do better next time. 8D9F and 8D9L are on the air. French and English stations. S9GCR is working at the local telephone exchange. S9DZK is now on 80 meters.

Dist. No. 5: The D.S. is busy with "Forward" work. 8BLO was the first to supply the news of the disaster to the Chicago Tribune through S9AAW. This is verified by a newspaper clipping from the St. Louis Post.

Dist. No. 6: S9DVW has rebuilt his transmitter. S9DKR tried the short waves with little success and returned to the higher waves. S9EGC was less active due to "DFF" and S8SA are on the air. S9AKW promises increased activity in Elgin. S9BBR reports that he operates on 80 meters. New stations in Waukegan will be on the short waves soon.

Dist. No. 7: S9AIO has a 100 foot vertical antenna. He gets out well. S9BTA is now located in Chicago. S9BTA heard 8G2NM on his tuner. S9A is on Saturday and Sunday afternoons on 40 meters.

Traffic: S9CTF, 555; S9ZL, 196; S9NW, 82; S9AWU, 82; S9BNJ, 55; S9BRRX, 54; S9EB, 19; S9BE, 48; S9AI0, 9; S9WDF, 42; 8D9X, 89; 8D9Z, 89; 8D9R, 17; E1F, 15; 8B9X, 13; 8MC, 11; S8ATT, 7; 8B9X, 7; 9B9X, 7; 9AH9, 7; 8D9Z, 6; 8D9L, 4; 8C9C, 9; 8B9Z, 3; 8AEL, 2; 8D9V, 2; 8D9L, 1.

KENTUCKY—Activities have been increasing on 80 meters. Nearly all the amateurs are on the wavelength. 8D9T, 8D9M and S8HP have received their O.R.S. certificates. S9WU needs a 50 watt. S8ELL and S9MN are on 40 meters and reaching Britshers regularly. S9HP has moved to 80 meters and left his troubles with the B.C.L.'s behind. Louisville handled a trip to the Governor and to a Hebert of Headquarters, who made an interesting talk on the history of the A.R.R.L. and general league activities.

Traffic: S8ELL, 29; S8MN, 8; S8OK, 8; S8D9T, 6; 8D9P, 3; 8D9C, 1.

OHIO—Dist. No. 1: S8BCF has been sick. S8GP gets good DX from chemical rectifiers. S8AOA is on low power and is having some trouble installing "light equipment." S8CQA is working out well with 80 meters. S8BLU is building a new home. S8DID has been heard in Italy, Scotland, England, Sweden, Holland, Panama and Porto Rico. S8CRN is building a new home. S8APR is constructing a new mast. S8JCT has a new radio show in Cincinnati and the dealers had a display and the amateurs had a booth with a complete transmitter. S8BAU, S8AVJ, S8ZM, S8EY, S8AI0, S8CRN, S8EY, S8AI0.

QST FOR MAY, 1925
Traffic report resulted and a lot of real traffic went 9DB, 2; 9ABZ, fine. 9DPR is on 79 meters. His traffic handling is dependable. 9BTH was busy at WEBC. 9ELI works from new stations in his district. 9DCT is on the QST FOR 9DKC, 28. 9ALA, 25: 9BMV, 24; 9BVA, 22: 9AFZ, 9DCX is a new station that is coming to the front. grid-leak, OM, and notice the improvement. 9EMD 21; 9AKY, 20; 9BBY, 19; 9PJ, 16; 9BKU, 12; 9VD, a new station to cut down QRM. 9CIU reports traffic good. 9BSO is on 77 meters. 9DPR, 69.

Traffic: 8ARS-8CTJ, 1272; SBAU, 345; SBYN, 80 meter band. There is little QRN on 80 meters. 8ZF is on twenty and forty meter work. 80% of the time. The weather is fine and the tubes are new comers. Welcome! 9AUC uses 80 meters up throughout the summer. New men who can qualify for an O.R.S. certificate should write the D.S. Microphone. 9AZN kept his transceiver. He has applied for an O.R.S. appointment. 9CWI hands in his first one KW spark set fourteen years ago. The D.S. must have traffic reports in by the 10th of each month. B.C.L’s, Y.L’s and B.B.’s keep 9BV A oft in place of uB.” We appreciate the fine work you are doing, nevertheless. Official welcome to 8CMD, the new Benton Harbor station. 8AL-DPS is on most all the time lately. Glad to see your message total jump, OM. 8AQ A is in Chicago pounding brass at 9NV now. “Never mind your loans? 8BLI is operating now. 8AZW hands in a good traffic report. 8DFF is giving the B.C.L’s a rest. The Grand Rapids gang meet once a month. It reports good relay work on short waves. 8AUB burned out a grid in the middle of the night. 8DMA has a new 100 watt station. Glad to see that 8DJH, SAKX, 8DCM and 8CNY are now handling traffic. We want you to welcome to the Kazoo Radio Club’s monthly banquet. Bring the YL’s and OW’s.

Traffic: 8CPY, 151; 8AZW, 107; 8DSF, 89; 8DOO, 84. 8CCG, 57; 8JG, 41; 8AUB, 36; 8DCW, 36; 9CE, 34; 8Z, 28; 8NX, 28; 9AAK, 26; 8DKB, 26; 8CGL, 20; 8SRI, 8DF, 16; 8ARO, 15; 8AUC, 12; 8BOK, 11; 8CRI, 10; 8DEB, 9; 8DJH, 8; 8BR, 8; 8CWP, 8; 8MM, 6; 8CF, 5; 8AOU, 5; 8DCM, 4; 8SKX, 4; 8AUK, 4; 9APR, 3; 9EF, 3; 8CWK, 2; 8AEN, 1.

INDIANA — Dist. No. 1: 9BYI says he has no success on any 80 meters but that things are fine now on 150 meters. 9APB is on 80 meters. 9DZD works consistently on 150 meters. 9CEM is experimenting on 80 meters. 9DHD is off on account of a certain YL. 9ABE is our only successful 80 meter station. 9XCG works both coasts regularly. 9BTS and 9AYD are new comers. Welcome! 9AUC uses 80 meters and works all districts with a “fiver.”

Traffic: 9AUC, 52; 9BY, 34. 9XE, 25; 9BOE, 24; 9AEF, 23; 9SXG, 18; 9DZD, 12; 9ABP, 8; 9AXL, 8; 9CEM, 3; 9DVE, 3; 9ABL, 2.
DIVISION reports this month are very gratifying. The Governor-President message was sent from each state and reached Washington in good order.

Vigilance committees are being formed in each state and complaints are being handled by some of these in a most satisfactory manner. The D.M. is extremely fortunate at the present time in having three A.D.M.'s who give their complete and intelligent support.

A new plan was inaugurated several weeks back, whereby the division manager works at regular intervals of once a week, each A.D.M. in the division. The first tests were very satisfactory and will be repeated in the near future each Wednesday night form 6:00 until 6:30 on forty meters. A number of twenty and five meter wave lengths have been built recently and the Dakota Division is now among the leaders in work with the higher frequencies.

9XAX is making good progress. 9DPM is transmitting daily from 7 until 7:45 a.m., C.S.T. and on Saturday and Sunday afternoons. This set is controlled by much activity. The call 9XAX is repeated hourly. Fellow builders five meter receiving sets are urged to listen for 9XAX.

Dakota Division
D.C. Wallace, Mgr.

IN CALIFORNIA—Regular meetings of the Chicago Radio Traffic Assn. were held. Many things were discussed, among them the poor condition of Amateur phone transmitters. A committee was appointed to look into the matter and to help amateurs with questions. The situation should be improved before public opinion is biased against the amateur. A contest was started to determine who can get the best wave-meter. A valuable prize, offered the winner. 9IX offers a candy cup to the station who handles most bona fide messages for two successive months. The copies must be sent to the Division. The contest started midnight, March 15th. The C.M. and D.S. are to be the judges.

MINNESOTA—The Anishaba Radio Club is preparing for their annual sugar social at 88TC's residence. Pictures of all local stations will be published in the local papers. Several good speakers are featured.

The 20 meter Radio Club Cleveland has not completed their new station yet. The Columbus Radio Club held open house during the radio show. They got thirty members and over 400 prospects. The Mahoning Valley Amateur Club of Warren are planning to build a club station equidistant from Warren, Youngstown and Niles.

WISCONSIN—The Madison Club reports that Mr. Austin has been succeeded as secretary by Mr. Zurling. The radio sticks at the Burgess Laboratories, 1316 Drake St., Madison, Wis.

Dakota Division
D. C. Wallace, Mgr.

DIVISION reports this month are very gratifying. The Governor-President message was sent from each state and reached Washington in good order.

Vigilance committees are being formed in each state and complaints are being handled by some of these in a most satisfactory manner. The D.M. is extremely fortunate at the present time in having three A.D.M.'s who give their complete and intelligent support.

A new plan was inaugurated several weeks back, whereby the division manager works at regular intervals of once a week, each A.D.M. in the division. The first tests were very satisfactory and will be repeated in the near future each Wednesday night from 6:00 until 6:30 on forty meters. A number of twenty and five meter wave lengths have been built recently and the Dakota Division is now among the leaders in work with the higher frequencies.

9XAX is making good progress. 9DPM is transmitting daily from 7 until 7:45 a.m., C.S.T. and on Saturday and Sunday afternoons. This set is controlled by much activity. The call 9XAX is repeated hourly. Fellow builders five meter receiving sets are urged to listen for 9XAX.

North Dakota Division
D.C. Wallace, Mgr.
DELTA DIVISION  
B. F. Painter, Mgr.

TENNESSEE—There were 35 licensed stations in Memphis. A few weeks ago there was not a single member in Memphis. Remember! 5NH is doing some low wave commercial testing using 5MO's, 5LY's, and 5BC's. He lost his equipment in a barn fire, but he has been reporting on 5BBW, 40 meters and a 250 watt. 5ASH and 5AXU are new stations. 5SK uses a 60 watt and handles traffic as usual. 5AAJ is in Memphis G.M. The 5LYs are active. 5JW handles traffic on 80 meters. 5AK works anywhere. 5NT has changed owners, and uses two special GB 50 watt tubes. He is using 5AJV. 5AHJ, 5AIY are rebuilding. 5AAP still uses a 1DI circuit. 5SJH is on the large working a spark set. 5GD was surprised with his new set. 5SY is ready for traffic. 5PH handled spurious traffic. 5IN is a new station.

ARKANSAS—Free has worked mlAA and mlAF. 5WY and 5ANN are active. 5GL reports QRM from the YL half of the oscillation. 5APC, 5JF are active. 5AQD is doing some low wave commercial testing and 5AG in Mississippi A & M. 5AXU and 5SAK handled traffic, each using one "flver." 5MO, 5NN, 5JWF, 5AJY and 5AAP are rebuilding. 5AAP still uses a 1DI circuit. 5DJH is on the large working a spark set. 5GD was surprised with his new set. 5SY is ready for traffic. 5PH handled spurious traffic. 5IN is a new station.

MISSISSIPPI—Kennon has resigned and recommended for a new A.D.M. are in order. 5OZ reports traffic moving well. He handled most traffic in the Delta Division this month. 5AGS will be at a B.S.A. camp during June, July and August. He will look for traffic and sign 5AGM. 5KR is interested in certain YLs. 5AJM and 5AJV cultivate a new daughter. 5LU has gone to Florida. 5AXT has no tubes. 5AXQ is a new station.

EASTERN NEW YORK—Dist. No. 1: Everyone is busy experimenting on the waves below 50 meters or handling traffic on 80 meters. 5BP worked a bit on 40 meters. 5KM did more "DX" than we have space to mention. He worked a bunch of west coast and foreign stations.

Dist. No. 2: Traffic handling on 75-80 meters is more popular. 5CNS is the Old Man of the district. He is 50 years young and a master of B.S.A. procedures, O.R.S. 2AP and 2TB are back. They should apply for an O.R.S. soon. 2AJQ is rebuilding. He is making a panel transmitter like 2ADH's. 2AAC is heard in Eastern New York. 2AKK has a new spark set. 2AVWH 2AOG and 2CWH are coming back. 2ADG worked a lot of "sixes." 2AJE, 2WT, 2KG, 2CFI and 2CXP are coming back. 2BG is working lots of DX. 2AVTH worked 250 miles to his D.S. and A.D.P.M. jobs. He operates at 2DD. 2AM increased power. He works foreigners regularly now and handles quite some traffic. 2AOQ gets out well with a "river." 2AG has a nightly schedule with WJS, 2APY is rebuilding and increasing power. He is able to work the entire district outside Yonkers. He has some publicity work and gets out fine. 2ULC has a Telefunken 75 watt. 2DD operates weekends and moves traffic with 2AOG. He heard Saturday night schedules with St. Louis and Washington stations. He has a schedule with 2CPS. 2C0V and 2AKK are active. 2C0G and 2C06 are recommended for QSL. The Yonkers Radio Club is the liveliest club outside New York.

Dist. No. 3: 2BM worked England and was heard in Italy, Denmark, Hong Kong and Macao. He modestly does his stuff. 2AGM went to N.Y.C. He got his first grade license and is now on 75 meters. 2CCH changed to 40 meters and worked the coast once. 2CCH continues to reach out well. He has been working on 40, 80 and 150 meters. 2CUL was QSO the coast and England.

Dist. No. 4: 2CXX, 2CNP, 2QP, 2BSF and 2AQG attended the Hudson Division convention. 2CXX sent in a fine report this month. 2QP and 2AQG did some good work. 2NP found that a one wire antenna worked well for transmitting. 2CMZ has a new license. 2AGO and 2BSL have new 203A buck. 2AAE and 2AQG relayed a play by play description of the High School basketball game at 2CXX. They both used 2CXX at the same time. People got the returns at the Newburgh Y.M.C.A. FB1

Dist. No. 5: Every O.R.S. reported. Most of the gang are going to stick to the key this spring and summer. 2CCH is handling his traffic. 2BWX exhibits the Naval Reserve. 2AIF is busy at college with 2XQ. 2OHX has a new single wire antenna. He worked African "DX" fairly well. The "ops" like their beds too well so he hasn't worked Australia yet. 2BY has worked N.Z. and Australia many times the past month. 2AGS handled a lot of distress traffic. 2NZL tried 40 meters and 5BGK. A new copper ribbon antenna has been hoisted. 2CPA received a report from Argentina. 2BH is 520 meters. 2BMT is a new station. 2CTB has worked 40 meters. 2PV and 2AWP kept Albany on the map. 2BSB refined his pocket book enough to rebuild his set by wiring himself at night. 2PV worked Iowa in daylight and all districts at night.

Hudson Division
E. M. Glaser, Mgr.

The first traffic meeting of the division was held at the convention March 7th. The Division manager presided. All officials of the division presided with truant. He was a head-in-the-water for- ner and A. A. Hiebert, of Headquarters, gave the principal talk. The main topic was "Vigilance Committees." We are glad to see so many out of-town officials present. FB, fellows!

There is a good part of the division on 20 and 40 meters. (Glad to see you down there, gang. FB-D.M) 5AJM asked for a special license, but his D.M. wants to hear from all members on these subjects.

Traffic: 5BBW, 10; 5ASB, 7; 5EK, 20; 5JV, 1; 5KA, 50; 6NT, 2; 5ER, 5; 5AAE, 5; 5AQD, 5; 5PV, 5; 5DN, 14; 52C, 127; 5AGS, 19; 5KJ, 4; 5ANX, 17.

QST FOR MAY, 1925  
IX
NORTHERN NEW JERSEY—All O.R.S. are requested by the A.D.M. to make themselves acquainted with the work of the various committees and render full cooperation at all times. Make sure your transmitter is not interfering with B.C.L.’s and help on to get rid of key clicks and A.C. hums.

Dist. No. 1: 2CTC, 2AT, 2ADU and 2AGT are on hand promptly with reports as always. 2CTC kept a regular watch and handled a bunch of messages this month, and his spark has disappeared. 2CGS and 2HLM are new stations.

Dist. No. 2: 2WR has been busy experimenting with antennas. 2AXF reports that there is less QRM on 40 meters. 2BAX has the largest traffic report. 2BW has worked every country. 2AFJ may increase power. 2AGF telephoned his report to the D.S. Another old timer, 2APC, is with us again. 2EY put his set in the collar. He reports greater DX. All stations in Bayonne except 2CRP are on 160 meters. 2DIF worked his first ‘six’ after three years of failures. 2QCTQ kept a regular watch and handled a bunch of messages. 2DWK is installing a new 40 foot mast.

MIDWEST DIVISION

P. H. Quinby, Mgr.

MISSOURI—Dist. No. 1: Traffic has taken a slump again as many of the gang are trying the 40 and 20 meter bands. Many O.R.S. failed to report. (Where’s that axe—D.M.) 3DLB is on continuous watch and has been hitting the owl quite well. 9ZK, ex-9KAT, is getting out in good shape. He has a new short wave transmitter and is planning some schedules with 3DMJ handled part of the traffic. He is working with 92XM who has worked three times in a week. He has a report from Manila, P. I., too. 9DWK is installing a new antenna system. He intends to change his location soon. 9BSH lost his food mast in the last storm. An antenna for short wave work is being erected now.

Traffic: 9DQH, 21; 9DLY, 9; 9DNY, 10. The others are using 201 tubes. 9DT has worked the east coast three times with 75 watts input. 9ADB says 9EGS has moved to Buffalo, N. Y. 9CCT lost part of his mast when line men let a tree fall into the guy wires. 9DJI is stirring again. 9DUE reports bad QRN (sic semper 9!!) 9BVK can’t keep his aerial off the ground. 9DAE had no luck trying to get KF11M for a ham transmitter. He is now working on a ground system. 9DZQ is helping 9DAE. 9DNJ, using a plate antenna. 9DQY, 9DKW, and 9DKT are using 201A tubes.

Dist. No. 2: Many fellows are using 201A tubes. 9DR and 9DJN have a new 300A system. 9DKX is busy with school and he operates a movie projector until midnight each night. He says interference is bad on 80 meters. 9AYK says traffic is been handled very well replaced with a 300A. 9BELT is on early and late. 9ADR is heard early mornings. 9FKK, using two 201A’s works the east coast very well. 9DKO, 9DQF, and 9DQZ have interfering wavelength. 9DZ worked the east coast with a loop. 9AHZ is at school. 9AXX needs a new five watt. 9O0H handled too many A.R.R.L. correspondence to pound brass regularly.

Dist. No. 1: reported by radio. The regular report may have been lost in the Cyclone. 2PW handled a bunch of traffic.

Traffic: 9AOB, 22; 9AYK, 7; 9BUE, 5; 9BVK, 8; 9BYK, 27; 9CRM, 34; 9DAE, 4; 9DIX, 13; 9DJO, 9; 9EAC, 24; 9EGS, 19; 9FBK, 15; 9BOZ, 16; 9CDO, 3; 9DOJ, 5; 9EY, 28; 9FL, 6; 9GR, 19; 9GZ, 7; 9HJ, 29; 9PL, 74; 9PW, 74.

NEBRASKA—Dist. No. 1: Every O.R.S. reported on time. 9AWS raised 5EFQ. 9NL still does well over 150 meters, but he expects to increase the QRM on 40 meters. 9COP handled several messages with 92XM who has been busy experimenting with a 201 tube. 9CIM operates transmitters on 40 and 150 meters. 9DP5 is a new O.R.S. 9CRT reports traffic light. 9EB is QRX for repairs.

Dist. No. 2: DX is good but traffic is light. 9DDU will be heard in M. Z. and has been active and handled a lot of traffic in England also. 9ASK in on 80 meters. 9SEO is moving to a new location. 9DAC put our Governor’s message right into Washington, on 40 meters. 9EWH is busy. 9EAK is on a new O.R.S. Remember that though QRM is increasing, and we cannot pound brass quite as much, it is necessary that each O.R.S. report or cancellations will result.

A number of daylight tests are being planned. Keep your station in shape and get in on them.

Traffic: 9EGA, 28; 9AWS, 16; 9NL, 34; 9DUO, 31; 9EGS, 26; 9CHZ, 1; 9BNTU, 19; 9AFL, 8; 9AIB, 9; 9AKS, 23; 9BEO, 2; 9BDU, 1; 9DAC, 69; 9EAK, 8; 9BGJ, 13; 9PNN, 9; 9EWH, 15; 9DP5, 14; 9DXY, 29.

KANSAS—Spring weather is with us but the faithful few continue to move traffic.

9DVI is the only station handling traffic in Lawrence. 9DNG is installing a new 300A and 8 tubes. 9A0D lost the rope mast. 9BGG is the “pop” at KFEU. 9DMX is on 160 meters. 9BMZ works a thousand miles with a 201A. 9EIT heals both coasts at noon. 9BVN has the best traffic total and also has a new first class reflector. 9CVM operates in spite of work. 9AEY is moving to Beloit. 9CVL works the U.S., Canada, and Mexico. He put a death message from 9BUX through 9AJR to Kansas City and is handling traffic. He heard 9B6Z in Porto Rico. 9CVZ, 9B6Z, 9B6F, and 9B6W is busy with school. 9CWF has been working on superheterodynes. He has new reports from England and France. Kansas has lost March fourth, as Governor has relocated with a 300A. 9BERL has been off because of burned bottles. 9AIM saw the gang at the Radio Show. 9GCS went to the show too. 9BRD and 9HO have “YL-His.” 9BRD and 9BHD are on 200 meters. 9B4G is working eight countries. 9GCS has two new antennas.

Traffic: 9A1M, 25; 9CCS, 22; 9CEA, 12; 9AFP, 14; 9DHW, 25; 9BRD, 2; 9BIO, 1; 9TVN, 172; 9EGK, 131; 9CIV, 11; 9DLM, 50; 9ACQ, 10; 9QR, 4; 9CFT, 28; 9DVI, 22.

IOWA—An amateur convention will be held at Ames April 17th and 18th. Many members will be present. 9BSS-9CLG is busy on low waves. 9CLQ has been busy with school work. 9DOP and 9BKF are firing off un-interfering signals. 9CHN worked both coasts with a “fiver.” 9DAU wants a schedule. 9BE is now working on 68 meters. 9AVG has operated a five watt transmitter all districts and mix in an hour and ten minutes. 9QN gets out in fine shape. 9AXD is trying to get down on low waves. 9BCD does good work with UV201A. 9BK handled several messages. 9GDZ handled four messages using C.WI. 9AED will have a “fifty” matter soon. 9BSW handled most of the traffic this month. 9DOH has worked all districts with a UV201A. 9CIC did good work. He is getting a new rectifier. 9CZC is busy at school. 9DRT had trouble with his rectifier. 9DMS consistently worked all districts. 9CLG is a new man but has a fine message report. 9DEX keeps a reliable schedule for traffic handling. 9CZC, 9DEEX and 9DWE are finding schedules excellent for traffic handling. The Campus Radio Club at Ames has installed a “fiver.” Three other sets will be operating on different wavebands in the near future. All sign 9LC. Several old timers are in charge of the stations. 9PVG installed a new 201A and 5 tube transmitter that traffic is increasing now DS is so common. 2BGJ continues to work NZ. He has a new transmitter on 38 meters. 9IVY has worked 56 different European stations. 9OM4 C2PD handles traffic in the daytime and does DX at night. 2CKG is in the B.C.L. business. 2AAB has installed a M.G. 9QST for MAY, 1925.
MAINE—The Maine A.D.M. is issuing a "Trans-ponders League Certificate" to the station handling the largest number of messages each month. Also, the stations getting the highest during several monthly certificate in six months of operation, will be given.

DISTRICT REPORTS

NEW ENGLAND DIVISION

DISTRICT No. 2—Mr. Handy a cordial greeting, He is one of the operators at lMK. Our friend at lMK has been busy trying to improve the legal waves. He has one fine station and is expected back soon with a new signal. O.R.S. reports. O.R.S. must report on time or certificates will be cancelled.

DISTRICT No. 3—lTD is experimenting. His transmitter is on 78 meters. lBIJ has moved his transmitter from 40 to 80 meters. He has one fine station. The gang is making good DX reports. Good DX records. The gang is sending applause messages. lAYR has a loop antenna. More experimenting on 20 and 40 meter work is expected. lBIE knocks "em dead with a five-watter. lAWE continues to make a noise although he lost a tube.

DISTRICT No. 4—lBOM, our ski-jumping "Ham," reports that the jumping is still popular and finding traffic totals running higher than ever. lBCF is trying to reach New Zealand and Australia. lAWW has made some 40-meter tests but he is keeping very silent. We are wondering if they were successful. lBSJ expects that many tests with ultra-high frequencies and beam transmission will be made this summer.

DISTRICT No. 5—lIJC and lBIZ are heard now and then. lIZS is working good DX on 40 meters. lBQD says nothing stirring in Newport. lQIV's tube went out. lBDH must report on time or certificates will be cancelled.

DISTRICT No. 7—lAAI is with us again after a lengthy illness. lAQM is high man for the district. He has kept a schedule with a ship operator who last reports was in the English Channel. lAQQ is reaching out well. lBPW handled many Europeans using one "fiver." lBQW worked the west coast each morning. lBQK and lBBP are experimenting and using wave-lengths of 20 and 40 meters. lCPSN is on 40 meters regulating traffic. lAUP is frequently QSO Europe. lEK wants to know how to get QSO out of a D.C. generator. It was one fine month. The fellows are busy trying to make this convention the best ever. lAAJ, lAQM, lASU, lBP, lBQK, lJE and lXZ were QSO Europe during the month.

DISTRICT No. 8—lKX has kept a schedule with lNM, 1; lAEC, 18; lAWW, 39; lPSY, 9; lBLU, 4; lABF, 131; lAAI, 2; lAQQ, 25; lAQM, 43; lAUS, 27; lBBP, 5; lBPW, 18; lBQK, 17; lIFN, 34; lDB, 6; lJE, 25; lXZ, 10.

RHODE ISLAND—The Providence Radio Atnl. enjoyed a severe loss with the cancellation of the building in which the club is located. Most of the apparatus was broken or stolen. (Tough luck, OM!) lBCB is trying to reach New Zealand and Australia, lBCR intends to stay on 40 meters. lBTH is active again. lOW handles some South American traffic. lBDX and lAWE have done some European work. Things look good. Several new stations are working in the Southern District in traffic handling. The Portland gang better get going. There must be several YL's in Poultney. lF'B uses the fact that spring has come. Things look good. Several new stations are with us in spite of the legal waves. There m1ust be several YL's in Poultney. lF'B uses the fact that spring has come. Things look good. Several new stations are with us in spite of the legal waves.
much improved over bust month. We would like to improve our schedule with 60EU. 7GY is popular. How often would you fellows like to have a traffic. Letters from 7LO, 7KC, 7BI, and 7MU reported being heard. 7SJ is in operation again. 7IU works in daylight between classes. 7OL was away from home. The A.D. has been heard in the Philippines with only 36 watts output. 7AFQ uses a "bug" now. 7GW has a regular schedule with 60EU. 7GK is the PROUD daddy of Idaho's successor. 7IA is testing on 20 and 40 meters every day. 7TA is setting out well and just got a message from 62NB reporting him. 7QF is going on the stage. 7YRQ-FI is on with the same old punch. 7JF just called 7RM-FI.

Traffic: 7TU, 67; 7SI, 35; 7QC, 32; 7RC, 29; 7ID, 17; 7TA, 19; 7GW, 7; 7OL, 7; 7RM, 2.

Montana shows but the future looks bright. 7GKS holds traffic honors. He can be heard every day on 20 and 40 meters. 7KZ checked players over the air with 7SL. 7SI lost. 7H1 TAF is at实施细则. 7B has been heard on 40 and 80 meters. 7TD is in operation. 7MP does good work on 75 meters. 7MX, 7EL, 7DD and 7TN are also on the air. The newcomers 7CL and 7CT are moving to a better location in Hamilton.

Traffic: 7GS, 41; 7MP, 25; 7EZ, 29; 7NT, 5; 75F, 4; 7MX, 3; 7DD, 3; 7ACI, 2; 7EL, 2.

OREGON — Reports are interesting this month. There is more QRN than a month ago. Oregon has been consistently busy. We hear you do not know who your D.S. is, write the A.D.M. at Eugene. Traffic honors go to 7BY who leads the division. The newcomers in operation in Portland are 7OA, 7B, 7AF. 7TD, 7LQ and 7ND. 7FRA is looking forward to the Northwestern division convention which will be held at Portland, Oregon, May 14th to 16th. 7TM, 7ST and 7RR have been heard in the Philippines. 7LRK is D.S. for Dist. No. 1. He is doing consistent good work. 7TGQ is on 20 and 40 meters with great success. 7TW is on with a new 50 watt. 7SK is a new O.R.S. of Baker, Ore.

Traffic: 7SG, 70; 7TD, 40; 7QD, 30; 7AV, 29; 7LQ, 18; 7MP, 11; 7AD, 11; 7AL, 11; 7GJ, 10; 7AKK, 9; 7LJ, 9; 7AK, 6; 7ND, 5; 7VP, 1; 7ACM, 1; 7AKI, 3.

PACIFIC DIVISION

M. E. McCreery, Mgr.

ACTIVITY is decreasing, due to the coming summer months. 40-meter work is popular. How about a report. Ponce, OM? Maybe we need a new D.S. Can't you do something about it?
6CEU in Hawaii for a change. 6CLP is handling messages consistently. 6ADB handled a lot of traffic this month. 6LJU put up a new antenna for 40 meters. 6GBV is getting 40. 6ADV had rectifier trouble. 6AZJ and 6CFI have a new aerial. 6BCL was on 40 meters occasionally. 6NX was heard for this month. 6ILV put up a 5-watt antenna for 40. 6JEU in Hawaii for a change. 6BLP is handling conductance, to arrive. 6BFY, 6CSL and 6HAA are on in Argentina. 6AMM has rebuilt his set. 6HMW is still busy with an antenna on 80 meters. 6CMV is using 10 meters. 6ALW had 6AWO reporting things going nicely. 6HRM is a new 40-meter working. 6GRS, 6AGT, 6CLV, 48; 6AMS, 5; 6AWT, 5; 6AVJ, 15; 6CSO, 118; 6AMM, 15; 6BBH, 4; 6ANO, 46; 6ADF, 40.

6SAANIAN ISLANDS—6CEU is back again on about 50 meters. He has no trouble in working the east coast. 6CST is QSO the coast with a 5-watt. 6OA is getting good reports on his signals.

ROANOE DIVISION

W. T. Greavely, Mgr.

WEST VIRGINIA—9DNN is on the job weekends ready for traffic. 8APD and 8BJG have 8RJG is getting out FR. 8RLT is rebuilding. 8SNB, using a lone UV203, has been heard in N.Z. He can rave on the west coast at any time. 8DGW is on again. 8JZ, handled a few messages, using our upper waveband. 8DFM and 8BSU-8AZK are rebuilding. 8DFM is handling traffic on 15 meters. 8SN is moving to FR. 8BAG, and P.R.B. emergency traffic is handled by 8ASE, 8SHM and 8DFM. The Radio Inspector visited Huntington on the coast. The station owner is still waiting for his third visit and he had found no QRM caused by amateurs on any of his visits. (This certainly speaks well for the Huntington fellows. They deserve much credit for the work they are doing. Our Visiting Committees will probably find situations like this in many towns—D. M.) 8DOT is on 40 meters. 8AYT, 8CHR and 8DIN are active on 80 meters. 8AMD lost his pet WE 50-watter.

Traffic: 8ASE, 20; 8BSK, 3; 8BSM, 3; 8DFM, 3; 8DOL, 9; 8AMD, 14; 8JZ, 4.

NORTH CAROLINA—(This report was transmitted by wireless from 4JR to 3CA on 80 meters—D. M.) Things are here at a big pitch of enthusiasm than ever before. Several of the D.S. are getting their reports in by radio. The scheme works excellently. Many beginners are getting O.R.S. class. Get in touch with your D.S. fellows. Give him a report of your activities. By reporting you boost your chances of getting O.R.S. class. Let's have a meeting this summer, fellows, so that we can all get better acquainted.

Dist. No. 1: Reports are handled by radio from 4TW and 4TJ. 4MR is now operating 6DR. 4MR has been doing phone. He is increasing power soon. 4OG is star traffic man with a fiver on 150 meters. 4TW worked a six using 150 meters. New men in this district should report to 4WT.


Dist. No. 2: This is another live report sent by radio from 4MT to the A.D.M. 4NJ is on the job putting up a new 40-meter working. 4TS is installing on 40 and 80 meters. 4GW is QSO Spain this month. 4MI carried on business as usual with one UV202. 4JS is doing great work.

Traffic: 4MI, 79; 4GW, 18, 4NJ, 6; 4TS, 3.

Dist. No. 3: 4BR wants a motor-generator. 4RY is a new station in Charlotte. 4TJ has worked Spain, Italy and WJS. 4TJ and 4TS both attended Washington's Birthday Transcon. 4JR does the usual good traffic and DX work. He was on 11 hours during the Governor's President Relay. New stations should send reports of 4JR.

Traffic: 4JR, 186; 4TJ, 43; 4BR, 36.

Dist. No. 4: A 100% report from all stations looks 40 times better. 4RU and 4UN deserve credit for getting a message and building a station to put the message into Washington. They got the message there ahead of all others! 4JR 4NT-MA is on 80 meters with two fivers. Four big tubes they ordered were broken in shipment. 4NT has applied for permission in the Naval Reserve. 4GW is leading traffic man. He is on 150 meters with one tube. 4BY started the transcon message. Most of his work has been in the daytime.

Traffic: 4GW, 20; 4NT-4MA, 18; 4UN, 5; 4BX, 3; 4RU, 1.

VIRGINIA—Dist. No. 1: 3BS is getting good results using short waves. 3OL is busy changing circuits. 3MK has a new eight wire cage. He is ready for traffic. 3TU and 3SB are operating as usual. 3CJU gets out well.

Traffic: 3MK, 30; 3TU, 10; 3RS, 6; 3CJU, 3.

Dist. No. 2: 3TH and 3HP are working on a McCar static eliminator. 3ABS is erecting a 45 foot pole for short waves. 3ABT is rebuilding. 3SG is building a portable set. 3BSM uses a one wire antenna. About 60% of traffic handled by 3RMN has reached its destination so far this month. 3TM has a new antenna system and has applied for an O.R.S. 3BU worked on the west coast. 3APR worked 38MN in daylight with a short indoor antenna. 3APR has been heard in South Africa on 150 meters.

Traffic: 3BMN, 202; 3APR, 29.

Dist. No. 4: 3BZ gets out well using short waves. 3CLK is on Forty and eighty meters.

Traffic: 3BKZ, 3; 3CKL, 12.

Dist. No. 5: 3EP is a new station operated by 3RQ and 3YK. A master oscillator circuit is used on 180 meters. 3BGS is on 185 meters. 3FRE is going strong. 3CPW is a power supply. The D.S. wants to hear from new stations.

Traffic: 3KF, 11; 3BGs, 3.

ROCKY MOUNTAIN DIVISION

N. R. Hood, Mgr.

COLORADO—9ACA comes to the front this month. He handled more messages than the entire division for the past few months. 4FB! It looks as though there was still some traffic to be moved. All the traffic was put through using a crystal of six watts. 9ACA and 9DGG will soon consolidate. 9EAM and 9FED handled a good bunch of traffic also. 9DUN has been working a good many stations. His traffic dropped off this month due to school work. 9EAS handled most messages in Dist. No. 2. 9CDE has been doing a good work with a station in Minnesota. 9FE is a new O.R.S.
Traffic: 9CDA, 237; 9DCE, 21; 9EAE, 79; 9FE, 11; 9KAB, 89; 9DUN, 15; 9HH, 11; 9VA

UTAH—6B6L handles traffic in handling in this state. 6CJB does consistent work. The D.M. was out of the state for some time. The A.D.M. of Utah got a message from the Governor that this state came to grief later on, but was successfully started from 6CJB. 6B6L has a five-watt set working well on 80 meters. He measured the wire length of his transmitter. This mistake came to grief later on, but was successfully started from 6CJB. 6B6L has a five-watt set working well on 80 meters. He measured the wire length of his transmitter, and now has a five-meter wave. 6RM is out of commission with his set. Colonel Dillon gave radio examinations in Salt Lake City March 11th. About fifty amateurs and radio fans were present.

Traffic: 7N, 25; 5EHL, 84; 62V, 25.

WYOMING—had traffic that was handled this month. 7NKR and 7AJT report as usual.

Traffic: 7TX, 7.

SOUTHEASTERN DIVISION
H. L. Reid, Mgr.

GEORGIA—4IO has left for Europe to attend the I.A.R.U. as the official delegate of this division.

4AU is acting as traffic manager. He has a number of lists handled this month. 4BY is on his way to the L.A.R.U. He and Morris make a fine pair and the division is proud to know they are on their way. In Atlanta 4IO, 4EQ, 4EH, 4BF, and 4RZ worked foreign stations. 4IO has a number of interstate messages, regardless of the fierce QRN. 4EQ and 4HS worked HIOAS in Budapest, Hungary. 4KU added Australia to his list and is doing a first class job. Colonel Coolidge gives a battery license to 4RZ and handles a lot of traffic. 4CE keeps a steady schedule. He has a number of foreign messages and handles a lot of traffic. 4GZ and 4RE are struggling through Florida QRN with excellent reports. 4YQ has worked all the U.S. districts in daylight using two "rivers" on 40 meters. 4JY and 4TV are new O.R.S. 4TV is a new traffic man. He is QSO all U.S. districts and Europe. 4X, 4E, 4P, and 4J are doing good work. 4RZ does good work on 80 and 40 meters. 4UK and 4UX are new O.R.S. who have taken the reins and keep Jacksonville open. 4ARZ and 4BI are very active doers. 4SGB and 4PF are both QSO Europe.

Traffic: 4FY, 115; 4TV, 112; 4BL, 80; 4IZ, 76; 4QY, 56; 4XF, 41U, 58; 4P, 60; 4VS, 40, 4UX, 40; 4CH, 52; 4TF, 39; 4BI, 7; 4DG, 6; 4K, 5; 4PF, 5; 4PJ, 4; 4E, 3; 4FS, 4.

WEST GULF DIVISION
F. M. Corlett, Mgr.

T HE D.M. is going to do some "beefing" about those birds (don't like to call 'em Owls) who tactlessly make enemies of B.C.L.'s. Brethren, it can't be done! You are bringing closer the day when the sending amateur will be where the spark transmitter is now, along with the psittacul and the stegosaurus.

The gang has figured out by now that the D.M. is sore about something. That something is listening to an amateur (7) working between 8 and 10.35 p.m. on a wave above 175 meters.

OKLAHOMA—The first issue of the Oklahoma A.R.R.L. News has appeared. We hope it will be a permanent institution. Oklahoma hams are eager to get in on this, but have been delayed with the Traffic Department. They must send in their monthly traffic reports to their A.D.M. not later than the 20th of each month.

We naturally hate to toll our own Bazoo, but the way we put over our part of the Governors-First Relay mosaic is doing good. We have a few more pencils flying over the Dak.-S.D.—ne to the east of the spark Manuscripts for the November issue of the magazine are due Oct. 1st.

The full story appears in the Oklahoma A.R.R.L. News. Washington had to ask us for the message, cheating 4AB of the glory it so richly deserved.

The gang had a caller this month in the person of the R.I. Traffic was scarce as elephant's eggs. 5OU suggests that a convention be held in Oklahoma City during the State Fair.

Dist. No. 1: 5ARE reported no traffic. 5APZ is selling out. 5ANL wants schedules. 5ADO did some work on 20 meters. 5Au, 5AOH, 5APG, 5BN, 5AV, 5AGN and 5EU were on the air. 5OU is still building a 100 watt.

Dist. No. 2: 5OA, 5GJ and 6FS promised to exhibit their wilds against the laws.

Dist. No. 3: 5TW leads in handling traffic this month. 5JU is moving things in fine shape. 5CG has a new set under construction.

Dist. No. 4: 5ADS, 55; 5DAF, 16; 5AJP, 43; 5DL, 70; 5NL, 11; 5AOM, 119; 5OQ, 22; 5ABI, 18; 5ASU, 26; 5ATP, 35; 56V, 37; 5IXA, 38; 5KS, 53.

SOUTH CAROLINA—Only two O.R.S's were active this month. 4HW put up one wire antenna and gets out better. He has a number of stations, and 4HW is the only station on 175 meters.

Traffic: 4HW, 38; 4IT, 15.

FLORIDA—Bang! We thought Florida was buzzing with activity last month. If such was the case, the buzz has grown to a roar. A "Few Florida Fasts" 38 active stations; 22 O.R.S; 11 stations using the 20 or 40 meter bands, 10 stations QSO Europe; 100% of the gang on short waves; 100% report!

Contrary to custom, this report starts with Dist. No. 4 because they rate this month. Don Mix has the Burgess 4IO, 4FM, 4EQ.

Welcome! 4QY is injecting life into his gang through various contests. The Burgess Company has shown splendid enthusiasm in handling foreign traffic by valuable prizes each month, as awards. Miami has seven active stations. 4FM has two "fifties" on 40 meters. 4FM reports handling 40YQ with a 77T and handles a lot of traffic. 4CE keeps a schedule with 4YX and 4V and handles a lot of traffic. 4CH and 4QF are struggling through Florida QRN with excellent reports. 4YQ has worked all the U.S. districts in daylight. 4YQ and 4TV are new O.R.S. 4TV is a new traffic man. He is QSO all U.S. districts and Europe. 4X, 4E, 4P, and 4J are doing good work. 4RZ does good work on 80 and 40 meters. 4UK and 4UX are new O.R.S. who have taken the reins and keep Jacksonville open. 4ARZ and 4BI are very active doers. 4SGB and 4PF are both QSO Europe.

Traffic: 4FY, 115; 4TV, 112; 4BL, 80; 4IZ, 76; 4QY, 56; 4XF, 41U, 58; 4P, 60; 4VS, 40, 4UX, 40; 4CH, 52; 4TF, 39; 4BI, 7; 4DG, 6; 4K, 5; 4PF, 5; 4PJ, 4; 4E, 3; 4FS, 4.
Traffic. 5NW, 2; 5ADD, 25; 5JH, 10; 5AQL, 2; 5DW, 3; 5LL, 17; 5AJT, 34; 5FC, 20 5VU, 12; 5AXL, 7; 5LU, 1; 5MTH, 0; 5EJ, 14; 5AQL, 2; 5QO, 27; 5AKN, 17; 5TWF, 23; 5EJ, 41; 5AVJ, 25; 5ACL, 22; 5HY, 36; 5AKQ, 28; 5OT, 4; 5AZS, 52; 5AQG, 23; 5AFU, 46; 5AKZ, 67; 5SD, 1; 5ATX, 22; 5CV, 8.

SOUTHERN TEXAS — We are snapping out the intangible something that has held amateur radio in check. Our O.R.S. are doing good work. QRN is getting in its work now. New stations are fast qualifying in nearly all towns. The A.D.M. is thinking of working 2ZAC on a "198." Sherrod is working as hard as a nice Freshman. 5ZF reports that the 80 meter wave is getting popular. 5ACR is back. 5KN is the proud father of a little YL. 5OX worked 2ZFU, 2ZAC, 24AA and Chile 9TC. Mr. Sutphen, an assistant "operator," signs "PE." OEI is stepping out well using one "fiver." 5CA is a new station. Austin is represented by four stations. 5ZU, 5ALR, 5FT and 5PS. 5ALR has been heard in Europe and New Zealand. 5FS is on 80 meters.

5PM is getting out fine. 5ZAI handled a lot of traffic.

The Conroy Brothers ran up a fine message total. This sent in at the eleventh hour by Western Union. 5UX has been away on his boat. The D.S. of Dist. No. 8 the C.M. of San Antonio, and 5HC paid the A.D.M. a fine visit the fact that he was the postmaster’s place during his illness. 5EW sends in a nice message total.

The Texas A. M. Radio Club sent their report to the D.M. (Better get it to the A.D.M., gang, or it may not get printed!) The club has 30 dyed-in-the-wool Hams. It wants schedules with other stations. 5AKY says a few have started building themselves a real Club House, and are going to be on with all kinds of waves! 5ALR, 5SS, 5GU and 5ZAE sent in reports.

Traffic: 5ZAI, 24; 5ZF, 5; 5AHIH, 8; 5PS, 24; 5ACZ, 175; 5OX, 37; 5EL, 32; 5APM, 19; 5NN, 25. 5IS of MEXICO-M.G. State College, handled ten messages and delivered there, although only home three days! He heard OH 9TC, but could not connect. Better luck next time, OM.

CANADA

FEBRUARY and the early part of March have not proved particularly active from a radio point of view. Elections in the central divisions of Canada have slowed down activities. With the newly-elected men in office things should improve. We are expecting great things from the new Ontario division manager, Mr. W. M. Sutton.

A few words about Mr. Sutton will be in order. Bill has had a station at Fort William for some years. He is now operating the combined station at 3NI-WS at Port Arthur. This station uses two operators, Mr. Vigars being the second operator. Some enviable traffic and distance records have been made. Mr. Sutton is radio inspector at Fort William and district for the Dominion Government and he is in charge of the station of the Pacific Cable Board at that city.

In the Vancouver division, Mr. A. J. Ober, has been obliged to resign his position as it took too much time from his business. Mr. Wm. J. Rowan, 5GF, who has been A.D.M. for British Columbia, has been elected. Rowan will take office immediately and he may be depended on to do his part in maintaining the high prestige of the Vancouver division.

Included in the same ballot as the division managers’ was the request for a vote on the advisibility of changing the name of the Vancouver division to make it less local in character. The result of the vote was for

the name of the division’s name to Vancouver and Alberta. The matter of changing the name will be placed before the Directors at the next Board Meeting.

The Vancouver gang has been active in their local radio club and deserve a great deal of credit. That they might participate in the weekly Trans-Canadian 125 meter tests, they have changed the meeting night of their division to another night. That’s the spirit.

The response of the Canadian membership to the appeal for funds to send a dele-

gate to Paris to represent Canada at the I.A.R.U. conference was very disappointing. At the date of this writing a comparatively small amount has been contributed. But for assistance generously given by the League, the Canadians would have been without representation at this important meeting. The Vancouver division arranged to send a representative from that division. At the present time it is not known whether this will be managed or not. In the meantime the Canadian representative has been chosen in the person of Bill Borrett, 1DD. Bill has shown remarkable organization ability in his division and has raised it to a point where it is looking for more worlds to conquer. We suppose Bill thinks that he is going to conquer Paris next. Oo la la, c’est la vie!

By the time these words appear in print Canadian amateurs will know what their new wave-length apportionments are going to be. They are praying for the best and hope that the broadcast listeners will not be too greatly favored to their disadvantage.

Maritime Division

W. C. Borrett, Mgr.

The second annual convention has just been concluded at Halifax, N. S., and it was a great success. Over fifty hams gathered at the Queens Hotel and with the assistance of the Nova Scotia Institute of Science put on the best convention that any of the gang have ever attended. Mr. Robert represented HQ and 1AB, 1AW, 1ED, 1AJ, 1AB, 1DU, 1AF 1AN and Mr. Thompson of Liverpool were visitors. A report of the convention will be sent in by our 1PM, 1ED. The gang built ten tion 10-AR, from which we broadcast our whole convention. 1AR handled a lot of traffic with Europe. He was awarded the Mayor Murphy Cup for his DX work and to commemorate the fact that he was the first Canadian to QSO New Zealand, and at the farthest distance in North America. 1BG gave a pleasing demonstration of a 125 meter invention. He won the code speed contest for the best copy at 22% words a minute for a period of five minutes. 1DD was second in this contest. He will start for the IARU conference after finishing this report. The Maritime gang hope to work him while

QST FOR MAY, 1925
he is in Europe. 1EI worked all over the U.S.A. Four new ROTATS were initiated at the Convention. 1/PF and 1AN. No new A.M. now have formed. ROTATS in the district. Ask 'em how they liked the eggs and the "Spring Worms." 1DJ is on every night. We were glad to welcome 1AJ, 1AK, and 1AE. They are putting the "juice" to them also. Our weekly night "prayer meetings" are as popular as ever. The following are having a good time: 1AJ, 1AN, 1PI, 1/PF, 1AE, 1AJ, 1AB, 1DF, 1DD, 1IEB, 1IEA, 1IEC, and 1IEI. 1AK is back. He worked 1AL and 1DD and later fellows. 1DKT and 1CO are new. He now put PEI on the map. 1BE was not on much due to the fact that the most of his transmitter was incorporated in 10-AR.

Reports must be in the hands of the A.D.M. or D.M. by the 23rd of each month.
The D.M. asks the gang to cooperate with Campbell of 1DD. The Acting D.M. has had the measles. Reports must be in the hands of the A.D.M. or D.M.

Report must be in the hands of the A.D.M. or D.M. by the 23rd of each month.

The D. M. asks the gang to cooperate with Campbell of 1DD. The Acting D.M. has had the measles. Reports must be in the hands of the A.D.M. or D.M.

REPORTS must be in the hands of the A.D.M. or D.M.

The Wednesday night-Thursday morning "prayer meetings" relay from 11 a.m. to 12.30 p.m., due to the fact that the most of his transmitter was incorporated in 1()-AR.

Activities: 170 feet, 300 feet, and 500 meters are being worked on 40 meters. Pour active stations are working on 126 meters. However there seems to be some lack of activity in the west.

Vancouver Island—5GT is still on and he is now using battery plate supply for daylight work. The GW operates and is on the air from 8 to 5 p.m.

TRAFFIC: 410, 3.

EDMONTON—4JF is stepping out well. 4GP, a new low-power station, is on and he is now using a 50 watt bottle on 126 meters. Four active stations are ready for traffic.

TRAFFIC: 1IF, 3; 4GP, 4; 4HF, 7.

Vancouver Island—5GT has now worked all Canadian and U.S. districts. He keeps three traffic schedules a week with SACT. 5ER is rebuilding.

VANCOUVER—We are sorry not to have one station qualifying for the Brass Pounders' League. We guess the OM's are "dissing" us too often. They feel more secure for less year is past and gone.

O.K.S. will please mail reports to reach the D.S. before the seventh of the month. Reports received after the seventh will count as a month missed. Stations missing reports on two consecutive months will be automatically cancelled. Please follow A.R.R.L. procedure when handling traffic. Remember, gang, you are a picked bunch and your station must keep traffic route open always. 5FR is the star DX station. He was heard in India while working 20G. 5FR, OM! 500's big star has developed an open in the plate lead. 5FR reports that traffic is as good as usual, 5SA is DPM and very busy. He expects to combine with 7HK. 5DB has a small traffic report due to bad power reception. 5AN reports that 5SAZ says that every time he puts a tube in the socket it goes up. 5RI a 250 watt O.M. They are heavier than the little ones. 5FRF bought a 50 watt tube and gone. 5GT2 has worked 5SAH and 5SAZ, is using a 201A, and is on the seventh district. 5FRF is still on and he is now using battery plate supply for daylight work. The GW operates and is on the air from 8 to 5 p.m.

TRAFFIC: 410, 3.

CENTRAL ONTARIO—At 6:30 a.m., E.S.T., March 14th, 1/9 and 1/10 A.M. were up with 2AC Signals faded with the coming of daylight. 2AC reported c3AA ruzb but steady. 2AC was operating on 87 meters, and c3AA on both 80 and 12 meters. 2AC's input was 75 watts. Congratulations c3AA!

The Toronto gang is active. 3BR is on again. He has a beautiful tower. 3EG and 3JT are hanging away on 75 meters. 3BG and 3LK are suffering from too much school work. 3VF is still an O.B.S. 3CO has rebuilt. 3CK and 3ES are reaching out FB, 3AF is heard still. (QRA please, OM—A.D.M.) 3AZ is on the lower waves with good note. 3AEV has a bunch of a low-power set. He is doing daylight work on short waves with a 201A. 3BR has been heard in N.Z. and Spain. 3PH is on as usual. 3VF is O.M. for Toronto. 3WG has had the measles.

Western Ontario—3XX reports hearing Europeans.

Northern Ontario—3RG is on 190 meters. It's heard from there now that the antennas have been cut down to suit low waves coming down a little, OM? The same to you 3GG. He's hitting the key as long as he can without missing too much sleep. He blew his last diver and had to borrow one from 3HP in order to get in on the Wednesday night 126 meter work. He reports 3KA continuing to make these mentions.

Traffic: 3VF, 19; 3CK, 11; 3TF, 4; 3KQ, 14; 3AZ, 16; 3WG, 14; 3BJ, 18; 3AL, 30; 3XX, 36; 3NY, 39. Telephoned turbine perking ok.

Quebec Division

ACTIVITY has been at a low ebb. 2BE, 2BN, 2CG, 2BG and 2AZ have lost sleep doing DX and now they are recuperating. 2FO, 2AZ and 2GO have been working on 40 meters night and day. Communication over one mile has been effected using five watts each and 9 foot antennas. A 100-watt transmitter now has founded. It induce some others to try 40 meters but without success. 2AU is studying the effect of varying the plate condenser. 2BV and 2CN join with 2CM, 2DU, 2DG and 2BN in the STL on the phone chorus. 2CI has induced 2AX to install a transmitter. He has already worked most districts using 50 meters. 2PI suffer some trouble with his potentiometer. 2AM is on more frequently now. Nothing more has been heard from 2AG regarding the Quebec City Stata.

Few O.K.S's took the trouble to send in reports and several cancellations will shortly be made.

Vancouver Division

Wm. J. Rowan, Mgr.

The new D.M. wants to thank the members for electing him. He says he will do his best to make the division worthy of its name. Remember fellers to send in your reports. All appointments under the old D.M. have been cancelled. Many new appointments have been made. A.D.M.'s are appointed in the Division. Let us cooperate with your A.D.M. regarding new appointments. Application forms for A.R.S. appointments may be obtained from your O.M. or A.D.M. New O.R.S. are being appointed. They are on 40 meters in the early evening and send immediately before and after the quiet hours.

In follows on the Sunday noon-40 meter relay from 11 a.m. to 12:30 p.m., E.S.T. The Wednesday night-Thursday morning "prayer meetings" relay from 11 a.m. to 12:30 p.m. He expects to combine with 7HK. 5DB has a small traffic report due to bad power reception. 5AN reports that 5SAZ says that every time he puts a tube in the socket it goes up. 5RI a 250 watt O.M. They are heavier than the little ones. 5FRF bought a 50 watt tube and gone. 5GT2 has worked 5SAH and 5SAZ, is using a 201A, and is on the seventh district. 5FRF is still on and he is now using battery plate supply for daylight work. The GW operates and is on the air from 8 to 5 p.m.

TRAFFIC: 410, 3.

Edmonton—4JF is stepping out well. 4GP, a new low-power station, is on and he is now using a 50 watt bottle on 126 meters. Four active stations are ready for traffic.

TRAFFIC: 1IF, 3; 4GP, 4; 4HF, 7.

Vancouver Island—5GT has now worked all Canadian and U.S. districts. He keeps three traffic schedules a week with SACT. 5ER is rebuilding.

VANCOUVER—We are sorry not to have one station qualifying for the Brass Pounders' League. We guess the OM's are "dissing" us too often. They feel more secure for less year is past and gone.

O.K.S. will please mail reports to reach the D.S. before the eighth of the month. Reports received after the seventh will count as a month missed. Stations missing reports on two consecutive months will be automatically cancelled. Please follow A.R.R.L. procedure when handling traffic. Remember, gang, you are a picked bunch and your station must keep traffic route open always. 5FR is the star DX station. He was heard in India while working 20G. 5FR, OM! 500's big star has developed an open in the plate lead. 5FR reports that traffic is as good as usual, 5SA is DPM and very busy. He expects to combine with 7HK. 5DB has a small traffic report due to bad power reception. 5AN reports that 5SAZ says that every time he puts a tube in the socket it goes up. 5RI a 250 watt O.M. They are heavier than the little ones. 5FRF bought a 50 watt tube and gone. 5GT2 has worked 5SAH and 5SAZ, is using a 201A, and is on the seventh district. 5FRF is still on and he is now using battery plate supply for daylight work. The GW operates and is on the air from 8 to 5 p.m.

TRAFFIC: 410, 3.