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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 prerequisite. Correspondence should be addressed to the Secretary.

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The Problem of Regulation

If there is any more bedeviled an art than radio we want to know what it is. For eight unhappy years there has been an unceasing effort to secure a modification of the admittedly inadequate radio act of 1912 but still "ND". There is a fine mess of fish now created by the Government's test case against Zenith, with the implications of the admittedly inadequate radio act of 1912 but still something can happen now. But, judging the legislative future by the past, it isn't likely that anything will happen, at least not very soon.

The Court's decision in the Zenith case disclosed a large and husky Senegambian that anything could be applied to the Department and some of the more intelligent radio people like ourselves (ahem!) didn't know that he was there, but never before had the wood been neatly stripped away to leave him blinking in the sunlight before the gaze of the whole radio public. This mysterious personage was disclosed by the decision of Judge Wilkerson that it manifestly had been the intent of Congress, in framing the 1912 radio law, to specify in the regulations in Section 4 all of the regulations that could be applied to radio administration, and that, except in the few cases of specific discretionary power given the Secretary of Commerce, he is not authorized to apply and enforce the numerous other restrictions and regulations governing power, wave lengths, operating hours, and so on, with which we have become so familiar in recent years.

But is all now lost save honor, is chaos now upon us? Not by several picofarads! Fortunately the nature of the few cases of specific discretionary power given the Secretary is sufficient to preserve control of 98% of the broadcasting of the country, and that is where it was feared the bad boys of radio might be found. Let us look into this Zenith case a bit more. The thing revolved around Regulation Fifteen of Section 4, which says that no private or commercial station not engaged in commercial radio communication or in experimentation in connection with the development and manufacture of radio apparatus for commercial purposes shall use a wavelength over 200 meters except by special authority of the Secretary. The Zenith company held that they were engaged in the kind of experimentation mentioned, and therefore were exempt from the necessity of having the Secretary's permission to use a certain wavelength, and that they therefore were entitled to follow the provisions of Regulation One which requires every such station to designate its normal sending wave, which shall not exceed 600 meters or shall exceed 1500 meters. The Court upheld their contention, and Zenith is thus free to select any wave it wants except between 600 and 1600 meters. However, this does not mean that all the applicants are upset. By far the great majority of the broadcast stations, 98% of them it is said, are not engaged either in commercial radio communication or in the type of experimentation mentioned, and therefore get to operate in the present broadcast band only by the discretionary special authority of the Secretary, and thus remain in his control as much as ever.

But some of the implications of this decision are somewhat disconcerting to the amateur. For instance, it is emphasized that the garden variety of broadcasting station falls within that class of stations whose normal sphere of operation is the waves below 200 meters, and that any such station is entitled without more ado to invade the short waves, provided in the process it can avoid running afoul of some other regulation or technicality. It is also made clear that the Department of Commerce has no legal right to impose on the stations eligible to operate below 200 meters any additional regulations not expressly written into Section 4 of the 1912 law or provided for therein. Thus wavelength assignments in narrow bands, quiet hours, limitations on types of apparatus—all may be held to be without legal standing. This applies not only to us amateurs but to every other class of station found entitled to operate on waves below 200 meters.

This situation has been no secret to the officers and the Legislative Committee of the A.R.R.L. They have known of it for years. In common with other radio interests, however, they have realized that the art has far outstripped the 1912 law, that the demand for radio channels is so pressing that no one interest has a right to more than it needs, and that as long as adequate legislation is withheld by the procrastination of politicians it is necessary to govern the art by extra-legal agreements arrived at in a spirit of mutual consideration and good-will. The national radio conferences of Secretary Hoover have provided that opportunity.
Now that it has been thoroughly aired that the regulations applied to amateur radio at present are extra-legal, it seems necessary to do some very plain talking in these columns. We want to say that, law or no law, the American Radio Relay League stands four-square and solidly for the "gentlemen's agreements" of the Fourth National Radio Conference to which it is a party. It believes that the progress of the art and the changes in it in recent years have been so great as to indicate clearly the necessity for applying to radio administration some regulations that are in extension of the powers given the Secretary of Commerce under the 1912 law, and it subscribes to Secretary Hoover's plan of annual unofficial agreements within the art for that purpose so long as we have a hopeless radio law. All hands must admit that there is no other way out. The League believes that the agreements made at those annual conferences have a greater moral weight than would a claim to wholesale privileges invoked under the technicality that the 1912 law is still on the books. The amateur has fared well at those conferences; we have all the territory in the radio spectrum which we need, and about all to which we are morally entitled. Any amateur, therefore, who might be so foolish as to think that he can get away with operation on a wavelength outside of the presently-authorized amateur bands is just begging for trouble—and it is very certain to hit him in the neck with a strength of R9.

Meanwhile there's a grand racket on in Congress about new legislation. In addition to the White and Dill bills, Senator Borah presented a somewhat similar bill providing for regulation by an independent commission and containing very strong anti-monopoly provisions, so strong in fact that it is doubtful if the bill will find many friends. Then Senator Dill revamped his bill and now, instead of providing an advisory committee as proposed by Congressman White and in his own original bill, he has switched over to the idea of a governing commission, similar to the Interstate Commerce Commission, which would take radio control from the Department of Commerce and run it independently, reporting direct to the President. Nobody knows what is going to happen to all these bills. The Coolidge Administration wants the White Bill, with radio remaining under the Secretary of Commerce, with the commission and advisory one to the Secretary; the other bills are anti-administration. Politics is now controlling the situation. It will control both the choice of a bill and the decision whether there will be any action at all or not before Congress adjourns. This is election year and the boys are hot to get home and pass out the cigars. The fight over whether radio administration shall remain with the Secretary of Commerce or shall go to an independent commission promises to be a bitter one, and the best observers in Washington are of the opinion that nothing will eventuate before adjournment about early June. The League is studying the situation carefully to determine its action. It is sincerely to be hoped that matters have gone far enough now to impress upon the Fathers on the Hill the extreme desirability of early but well-thought radio legislation—but we doubt it.

—K. B. W.

WWV May Suspend Transmissions

W e are advised that the standard frequency transmissions from WWV may be suspended on the ground that the Radio Section of the Bureau of Standards feels that the work is no longer necessary. The Bureau feels that enough calibration services are now available so that WWV's work is less valuable than formerly, also that the coming of the crystal oscillator has reduced the need for WWV's work.

In view of the great enthusiasm with which 1XM's short-wave transmissions have been met this seems doubtful, especially as there has just begun a movement to take greater care in the exact location of amateur transmitting wavelengths. The Technical Editor of QST feels that the loss of WWV would be serious. Furthermore, most of our sources of Piezo quartz crystals have just been closed, and very few laboratories are able to furnish accurate calibrations on our shorter wavelengths.

In view of these things it seems imperative that all A.R.R.L. members using the service from WWV notify the Bureau at once, sending a copy of the letter to the Technical Editor of QST. The Bureau may be addressed as, "Radio Section, Bureau of Standards, Washington, D. C."

—R. S. K.
The title of this paper, after the fashion of titles, is not exact for it suggests that ordinary radio transmission is not polarized. For the purpose of this paper, however, it is convenient to think of all radio transmission as being polarized, horizontally, vertically or otherwise.

As soon as that is said one automatically asks for the meaning of these terms; what does a vertically polarized radio wave look like—how does it differ from a horizontally polarized radio wave? Unfortunately it is practically impossible to draw pictures that will show the thing understandably, although one could make wire models to show it tolerably well. The best way of getting straight on the matter is to start with some familiar thing and work that to the polarized waves we are talking about.

Suppose that we consider the ordinary vertical antennas shown in Fig. 1a and 1b. At 1a we have a vertical Hertzian antenna suspended some distance above the earth. This antenna is supposed to have gone through several oscillations and is at this instant in the condition of having the greatest current at its center (at B). The shells surrounding it represents the electrical field.

At the same time there is present a system of magnetic whirls about the antenna and these are shown at 1b. We will begin by calling this sort of thing a vertically polarized radiation, remembering that both the electrical field of 1a and the magnetic field of 1b are present at the same time, also that both are spreading in all directions, the diameter of the fields increasing with enormous speed. For instance the right hand edge of the magnetic field is rushing to the right at a speed of 300,000,000 meters per second.

The Electrical and Magnetic Fields

This point must be thoroughly straightened out before we proceed—we can investigate either the R. F. electrical field or the R. F. magnetic field but neither can exist without the other. The electrical field is sometimes mis-called the “static field” but that term is entirely incorrect for it means “stationary field” and is certainly not correct to speak of “static” fields when things are moving with the speed of light.

If that point is straight we can proceed to the reasonably plain statement that such a combined field can be received (which means noticed) by means of either a loop or a Hertzian antenna. This point was considered in the paper on Dr. Pickard’s experiments in horizontal reception. For convenience we can consider the loop as working on the magnetic part of the field and the Hertzian (straight rod) collector as working from the electrical field. This is shown in Fig. 2 which also shows the positions the two devices will assume for best reception near the sending station.

Marconi Antennas

Now we have fairly clearly in mind the thing we call a “vertically polarized radiation,” but we have been thinking of a

* Consulting Engineer, General Electric Company and Chief Consulting Engineer, Radio Corporation of America.

2. At a considerable distance from the sending station these results are modified as explained in Dr. Picard’s article referred to above.—Tech. Ed.
Hertzian sending antenna such as that shown in Fig 3a, neither end of the system being near the earth. When we use a Marconi antenna like that of Fig. 3b the lower half of the electrical field (the part dotted in Fig 1a) will be missing, because it is cut off by the earth. This may be thought of as meaning that the advancing wave “denys its feet on the ground,” thereby wasting energy and slowing itself down a trifle. More of that later.

Effective Height

For years we have been using antennas that were grounded or else that had counterpoises rather close to the ground. These antennas were worked with more or less loading and under these circumstances (at least if wavelengths of 300 meters or more were used) it was mainly the height of the antenna that mattered. Radio texts accordingly fell into the habit of stating that the vertical part of the antenna radiated while the horizontal part (if there was one) did nothing but act as a loading capacity.

Very probably some of my readers have tried to understand this sort of statement and have wondered why it should be possible for a vertical wire with R.F. current in it to lose energy to the ether but the same wire placed horizontally (with the same sort of ether around it and the same sort of R.F. current in it) should suddenly be unable to lose energy to the ether. The explanation is simple—it isn’t so. The texts did not state an untruth, they were merely careless in the way that they put their statement. What they meant to say was that with the sort of wavelengths we were then using and with the sort of antennas we were then using it was the vertical part of the antenna that produced the “distance effect.” The horizontal part of
the antenna lost energy to the ether (radiated) also, but not in such a fashion as to have much useful effect at the receiver—in other words the horizontal wire did not contribute to the “distance effect” except by reason of the effect it had in causing more current to flow in the vertical wires—which is the capacity loading effect previously referred to.

**Horizontal Radiation**

Now it is not pretended that all texts were guilty of the statements just referred to but many were—and for that matter the statement fitted our old conditions—of

A—Loaded antennas.
B—Fairly long waves
C—Ground connection or fairly high-capacity counterpoise.

However as we went down as to wavelength a variety of peculiar effects began to be noticed. Some of us found, in tests with NSF, that some wavelengths could not be heard well close to the station but could be heard well at a distance. 1XAO at Silver Lane, Conn., could not be heard at 1XAM, at S. Manchester, Conn., but got into Washington D. C. in good shape. We also found that wavelengths below 50 meters were quite likely to be better by daylight than by night. We began to notice all sorts of irregular effects. One of the newer of these effects has been that of receiving 40-meter signals better with a horizontal antenna than with the regular vertical antenna—as was explained in the article on Dr. Pickard’s work. Here was reception with an antenna having NO “effective height at all”—a thing which should not work if the waves were traveling as shown in Fig. 1. As was explained in that paper, with horizontal Hertzian antennas (instead of the usual vertical or bent ones) and had been getting very decent results—which again was not in line with our notions on the ways radio waves act.

**Dr. Alexanderson’s Experiments**

These facts seem to hitch together plainly enough now, but at the time everyone seems to have overlooked what was going on—namely that we were actually able to carry on 40-meter radio transmission and reception with sending and receiving antennas having zero “effective height,” showing rather plainly that the waves were not traveling in the fashion suggested by Fig. 1.

Dr. Alexanderson’s attention was called to these things by some effects which were noticed near the double loop antenna shown in one of our photographs. (Page 13) This antenna system was being operated for another purpose when it was noticed that the electrical field near the antenna was apparently of a “horizontally polarized” nature—that is it was possible to receive the signal with a loop laid down flat, in which position the loop will not pick up ordinary signals at all.

Work at different distances showed some additional peculiar effects and it was thought
worth while to put up an antenna system which would give out radiations almost entirely "horizontally polarized."

The Horizontal Loop

A special horizontal loop was built and tuned to 50 meters wavelength. This special loop is shown in the photograph on page 15. It will be seen that this is a very large loop for 50 meters. The size was made possible by the construction shown in Fig. 4. The series condensers are shown in the photograph (Page 13). The condensers are made of a pair of copper "cymbals" placed on a rod of treated wood or "mycalex" with a spacing of \(\frac{3}{8}\) " between the flanges, giving a capacity of about .00055 microfarad (550 micromicrofarad).

Transmission Methods

With this antenna—or loop—a variety of peculiar effects was observed. To investigate these things still further a horizontal half-wave antenna was erected at the South Schenectady test station where it was occasionally used to transmit at 380 meters, using the regular WGY programs and getting reports on reception from broadcast listeners. In addition to this, various horizontal Hertzian half-wave antennas were put up in different places, these antennas being fed by 2-wire R.F. lines to make sure that only the elevated horizontal part radiated. At present there is also in operation a commercial station with a horizontal elevated Hertzian half-wave antenna fed by a 2-wire R.F. line. This station operates at approximately 16 meters wavelength and seemingly contradicts the skip-distance conclusions with regard to that wavelength. This station is located at "Radio Central", on Long Island, New York and with a power of about 10 K.W. handles commercial traffic to Monte Grande in Argentina, about 18 hours per day. It can also be heard at some points where there should be silence according to the skip-distance figures usually accepted.

The various effects referred to above need some explanation and that explanation can be given most easily by considering one example—namely the special 50-meter loop shown in the photograph and in Fig. 4. This loop was operated during the writer's visit to Schenectady and Dr. Alexanderson was kind enough to give more than a day and a half to some field demonstrations of the things that had been found out. The field near the antenna was explored with "exploring antennas" somewhat like those shown in the photograph with the same caption. Being of later type these "exploring antennas" used improved connections as shown in Fig. 5. The scheme of using these things is simple enough. One tunes the circuit at the center to the operating wavelength and then maneuvers the "exploring antenna" around until the meter shows the greatest deflection, at which time the length of the exploring antenna lies along the lines of the electrical field at that point. If the antenna field is quite powerful this operation does not distort it too much. On the day at which we explored the space near the horizontal loop the electrical field showed an inclination of 45 degrees to the right of the vertical as one faced the transmitting station. This can also be stated in another way—namely that there was a vertical radiation and a horizontal radiation of about the same strength and that the two were in phase.

Corkscrew Waves

The next thing was to show what happens when one goes away from the antenna. Of course the exploring antennas will not work very far away from the station, even though there are several kilowatts of antenna energy. Therefore a loop receiver was used for explorations at greater distances. This set, operated by Messrs. Rockwood and Snyder is of sufficiently unusual construction so that it deserves description in a later issue of QST. For the present it is enough to say that it is a thoroughly shielded 4-tube job with one stage of R.F. amplification and interchangeable tuning systems—and so built that it can readily be calibrated and therefore used to give field strengths in microvolts-per-meter. Dr. Alexanderson now turned his car into a radio exploration car and took us to various points where the set could be used a little ways off the ground. Some of these points were on bridges, others at the edge of sharp drops in the surface of the state of New York—places where the waves probably would not be especially deformed by objects near them, before reaching the receiving set.

Quoting from a paper by Dr. Alexanderson—"The composite picture which was ob-
tained from this test was a continuously twisting plane of polarization with alternate points of plane and circular polarization.

**DOUBLE LOOP ANTENNA**

The existence of horizontal radiation was first suspected when this signal put strong signals into "Radio Central" on Long Island although ordinary receivers near the station showed no response.

The plane polarization was indicated by sharp direction bearings while circular polarization was indicated by equal intensity from all directions. The observations indicating plane polarization sometimes gave bearings toward the transmitting station and sometimes at right angles. Besides these measurements around the vertical axis other observations were made with the loop in the horizontal plane. On flat fields the horizontal position gave nearly zero response. At the top of a steep hill and a high bridge the response in the horizontal plane was equal to the vertical. These results indicate the presence of a horizontal and a vertical wave component WITH DIFFERENT VELOCITY OF PROPAGATION.

Whenever the two waves (H & V) are in phase, they give plane polarization. When they are 90 degrees out of phase they give circular polarization. The observation with

**TUNING COILS AND CONDENSERS**

The tuning coils are used in the downleads of the multiple-tuned antenna shown in another picture. The condensers are used in the multiple tuned antenna, also in the special horizontal loop and other special antennas.

the loop in the horizontal position on the top of the hill and the bridge show that even a moderate elevation is sufficient with short waves to reach the point where the horizontal electromotive forces are not short-circuited by the ground.

**Making the Corkscrew Wave Visible**

Again we have arrived at a point where we would like to have a picture of the thing we are talking about. This time the thing is possible—the picture can be shown. The newspapers have made familiar the apparatus shown in our photograph, "Dr. Alexanderson Operating the Polarized Wave Model" but have not furnished much of an explanation of its action. Unfortunately the photograph shows very little of the apparatus which is therefore shown in the sketch Fig. 6. Here the weights W W W W W W represent small portions of the "ether" we transmit through. Now these particles are supposed to hang in space but to be free to oscillate to some extent in any fashion, always being drawn back to their normal positions as if they were suspended in a rubber sponge or a jelly. It is therefore necessary to make the brass weights have inertia—which they naturally have—but to keep them from falling. Each weight is accordingly hung by a string from a light wooden yoke on the other end of which is hung an exactly similar weight C C C C C which is merely a counterpoise or gravity neutralizer. Thus each of the weights W can oscillate up and
down by rocking its yolk or can swing back and forth in any direction (because it is hung on a string). We have now made the weights free to oscillate in any fashion, just as can our theoretical particles of "ether". A screen is set up so as to hide the counterweights and avoid confusion in observing the wave motion. To complete the model it is only necessary to imitate the elastic connection between the particles of "ether" and this is done by connecting the weights W W W W by means of rubber bands, R R R R R. There are 22 weights altogether, making a series long enough to observe the effects that have been tested in actual transmission by radio.

Dr. Alexanderson demonstrated the action of the model to the writer and explains it as follows.

"We will assume that the medium through which the radio waves pass has such characteristics that the velocity of propagation for a vertically polarized wave differs slightly from the velocity of the propagation for a horizontally polarized wave. It is not necessary for the present purpose to try to explain the reason for this difference in velocity. We may assume that the reason for it is the electro-static or magnetic earth-effect or a retarding effect due to the closeness of the earth. Whatever the cause may be we may assume that such a difference of velocity exists and the mechanical model has been constructed so as to reproduce such conditions. The weights on both sides are tied together with rubber bands. Wave motion in the horizontal or vertical planes can thus be studied independently and these two wave motions may be adjusted for different velocities. A wave started in the vertical plane maintains itself vertically and a wave started horizontally maintains itself horizontally.—(See Fig. 7.) If, however, a wave is started in a plane 45 degrees between the V. and H. it is found that the wave motion proceeding therefrom assumes the shape of a spiral. (See photo of model.) The straight-line oscillation of the first weight is passed along as an elliptical motion which gradually (as it passes successive weights) widens into a circle. Then this circle narrows down again (as it passes still more weights) to an ellipse and finally a straight line at right angles to the original line of oscillation. (See Fig. 7.) This is exactly in accordance with the theory. The point where the wave has shifted its plane of polarization 90 degrees, is the point where the faster of the two waves is half a wavelength ahead of the slower wave. From this point on the wave proceeds, repeating this peculiar spiral motion. The fact that the twisting of the waves is due to different velocities in the two planes of polarization can also be demonstrated by this model. For this purpose rubber bands are added to the counterweights. The effect of this is to change the velocity of propagation in the vertical plane whereas the velocity in the horizontal plane has not been effected because only the vertical motion is transmitted to the counterweights by the suspension yokes. The system can thus be adjusted so that the velocities in the horizontal and the vertical planes are exactly equal. After this has been done it is found that the tendency to spiral motion disappears and the wave remains strictly in the plane in which it has started.

While this mechanical experiment does not bring out any facts that were not known from the classical theory of wave motion it helps us to visualize the main phenomena in the radio wave propagation which we are trying to explain. The phenomenon of constantly shifting plane of polarization which we discovered experimentally in the tests between Schenectady and Long Island can thus easily be explained. This conception of the wave motion is also a help in explaining the phenomena of fading. There is much experimental evidence that fading is a phenomenon of wave interference. In other words the fading is due to the fact that the radio waves arrive at a certain point through two paths. The waves will sometimes add to each other and sometimes neutralize each other (more or less completely). If we keep in mind the observations on the mechanical model to the effect that the waves in two planes can be traced through separately and distinctly we may
conclude that the two paths of the radio wave which produce fading are not necessarily two separate physical paths but may be the two paths in the horizontal and the vertical plane of polarization. It is not hereby suggested that his mechanical equivalent is sufficient to explain the fading in actual radio transmission. It is offered for whatever it may be worth as a help to interpret the many observations in actual radio transmission which are being accumulated."

The Practical Effect

There are some things in radio that need explanation but which do not have such explanation at present. Dr. Alexanderson suggests that the irregularities of radio compasses (especially at sunset and sunrise), the failure to obtain a proper line of direction on an airplane which is sending with a trailing antenna and flying at a direction other than straight to or from the compass, the failure of these resulting errors of direction to show up when receiving with a Beverage wire—that all these things can be recognized as being the characteristics of waves partially polarized in a horizontal sense. "The observation that the wave seems to come straight down from above (compass

FIG. 8
THE CONNECTIONS OF THE MULTIPLE-TUNED ANTENNA SHOWN IN THE PHOTOGRAPH

\[ C \quad C \quad C \quad L \quad L \quad L \quad L \quad L \ \text{Tuning coils for adjusting the sections to operate in phase.} \]

Note that the system acts as if it consisted of a number of T antennas end to end, each one having an inverted T counterpoise. The end section in this case is of L form, though it may be of T form. The currents in all downleads are in phase and practically equal although energy is fed to only one.

The question is: what really does happen? This is a problem on which the experiment with the mechanical model can throw some light. We must for this purpose return to the idea that the radio wave is a mechanical wave motion in the elastic medium ("ether"). In the model the weights represent the mass and the rubber bands the elasticity of this medium and the vertical as well as horizontally polarized wave can easily be reproduced, but when we are to imitate a wave motion over the surface of the earth, we must also in some way imitate the presence of the earth. The earth is a conductor and therefore the elastic strains represented by the rubber bands cannot exist in the earth. Displacement currents in the electrical medium can, on the other hand, induce conduction currents in the earth. These currents are electrons in motion which can be represented by weights which are not tied together by rubber bands in the horizontal plane, whereas they are electrically associated with the electric medium above. To imitate this condition, additional weights may be hung from the weights W W by vertical rubber bands so that they are elastically associated by the wave medium but are not connected to each other. If now a horizontally polarized wave is sent through this system it is found that the wave motion is propagated to the vertically suspended weights producing elastic strains in the vertical rubber bands. We must now re-
member that the elastic strains represent E.M.F.s. and these strains so produced are of the same character as if they were a part of a vertically propagated wave motion. Actually no such wave motion exists and these strains are only the electromotive forces which produce currents in the ground. A receiving loop set broadside to the advancing wave will not collect energy but the ground currents produced by the wave will put energy into the loop. The test for horizontally polarized transmission near the earth then becomes the ability to receive with a loop set broadside to the advancing wave—at right angles to the direction of the station. If this theory is correct the effect should disappear at some distance above earth and the horizontally polarized wave should show a line of direction if observed—for instance—from an airplane. Using short waves the necessary distance from the earth can be gotten with apparatus as simple as a 60-foot wooden telegraph pole and this sort of test has been made at Schenectady. The results seem to confirm the suggestion just made. It is hoped that it will be possible to make airplane tests.

Concerning Long Waves

"Direct observation of horizontal polarization at long waves could be made only at great heights but indirect observations through the effect of ground currents can be made by ordinary direction finders at any wavelength. If this theory is correct it means that the irregularities of direction finder indications recorded on long waves can be explained by the presence of horizontally polarized wave components."

The Various Velocities

Some of my readers will doubtless be troubled by the suggestion that there are several speeds of travel for radio waves. We have become used to thinking of a fixed speed of 300,000,000 meters per second—or more correctly 299,820,000 meters per second. We know, however, that there are such effects as reduced wave velocities on wires, as is seen in the familiar Beverage wire where the advancing wave is able to build up the energy in the wire for only a certain distance and then gets ahead of the "wired wave" so that a longer wire is of no further use and a great increase in the wire length will actually result in a decreased signal. The reverse thing happens in the Alexanderson "Multiple-Tuned Antenna", such as shown in one of our photographs and also in Figure 8. Here the energy is fed into one of the downleads yet the currents in all the downleads are in phase if proper adjustment is made. Another way of looking at this is that an electrical wave motion has been sent through the system instantly so that it is at all downleads at once.

In this way one can see that the speed of waves in free space is one thing, while their speed when associated with a conductor is another thing entirely. This makes it seem quite plausible that horizontal and vertical polarization may produce different wave-speeds since they are not associated with the earth in the same degree.
Of, By and For the Beginner

By J. T. McCormick

THIS article is meant for beginners and is written by a beginner. Old Timers who need a good laugh are welcome. Come on in!

The writer (the beginner of the first part) has had poor luck in securing advice from old timers. They have tried hard enough, goodness knows! The difficulty lies in their not getting the beginner's point of view. Beginner's problems simply are not problems to the old timer—and there you are!

I recently began to "get out" with my first little "peep peep" station. I believe that an account of my experience in "getting on the air" will prove rather helpful to the fellow who is just a jump or two behind me.

My first crystal set worked "right off the bat" but my first transmitter has, er—taken some of the conceit out of me. Before receiving my license, I knew everything—yes, everything! I had built a neat little outfit, transmitter and receiver combined, somewhat as it appears in the photographs, but not quite! Changes have been made.

Trouble Begins

The original transmitting hookup was a master-oscillator power-amplifier affair, using a 90-volt storage B-battery for power supply. 201-A tubes were used. I fondly hoped to neutralize this thing on forty meters! I suppose it could have been done by using enough shielding, time and, possibly, separate batteries for each tube. I did not have sufficient patience, however. Neutralization not being entirely necessary, it remained unneutralized.

My license finally arrived and I set out to "knock 'em dead" with low power. I had no meters and so was using the usual flashlight bulb to indicate resonance in the antenna circuit. I had no difficulty in tuning the plate circuit of the power amplifier to resonance with the master oscillator. A flashlight bulb shunted across the antenna pick-up coil did the trick. When I tried to tune the antenna to resonance, however, I ran into difficulties. I did not have enough antenna current to light the bulb. I had forgotten the radiation resistance!

I finally conceived the idea of placing the bulb in the tuned plate circuit of the power amplifier. The bulb, by the way should be inserted in the lead going from the variable condenser to the plate of the tube. If it is placed in the other condenser lead, the current is too great and it will burn out. When the antenna circuit was then tuned more or less to resonance the bulb went out.

Simple! The bulb was then short-circuited by means of a switch provided for that purpose. Fine! I now knew, at least, that I was radiating some energy.

Next, I wanted to know what my station sounded like on the air. I tuned my receiver to forty meters. There was nothing but a "swish" to indicate that my transmitter was oscillating. I had expected this, however. The transmitter oscillations being comparatively strong, the receiver was drawn into unison with the transmitter. I next tune the receiver to twenty meters. Ye gads! the wave was afflicted with St. Vitus dance! I loosened the antenna coupling. Much better! I loosened it still more.

I next made a discovery. I listened on eighty meters and found that the wave seemed much steadier than when I listened on twenty. A little thought solved this mystery. For every change in frequency made by the transmitter its second harmonic goes through a change of frequency twice as great. When I listen on twenty meters I was listening to the second harmonic of my receiver. All this sounds as if I had been holding the key down for hours. Not so. I believe that a fellow ought to have some sort of an idea as to what he is trying to find out before he starts to test. If I do not hear what I want to hear within a minute or two, it is time to "shut er off" and think it over again.

I next tried working the key. Another problem! My note had a terrible "tweet". By "tweet" I mean that the wave "skidded" every time I pressed the key, so that I heard only the dots and the beginning of the dashes or else heard only the tail end of the dashes—depending upon how I tuned
the receiver. I knew, in a general manner, the cause of this, but try, as I might, I could not eliminate that "tweet". It seemed that the tube impedance began to change the instant the plate current started to flow and continued to change for a considerable fraction of a second. While the tube impedance was changing, the frequency was also changing. I did not try to "work" anybody. No one could have read such a note—though lots of folks never seem to think of that.

A Simpler Set
I suppose I should have "stuck to my bush", but I did not. I decided to work with something simpler and so discarded the whole master oscillator scheme.

I had been using a C-battery in the old hook-up and continued to use it in the new one.

Grief and more grief! The same old "tweet" persisted. Moreover, I now had no means of tuning my antenna to resonance. I decided to light up that antenna "ammeter" or go broke. I went to the nearest radio store and spent thirty dollars for another 96-volt storage B-battery and twenty dollars for a Bradleyhm to serve as a grid leak.

Glory be! My "ammeter" lit! The variable leak eliminated the "tweet". When the leak was properly adjusted, my note began to "toot", as it should, instead of "tweeting". If you do not understand what I am trying to say about "tweeting" and "tooting", listen to the crystal control stations—they "toot".

I was now nearer than ever before to having a real station, but was still far from the goal. The wave was swinging much worse than had been the case when using the master-oscillator power-amplifier arrangement. I loosened the coupling until it looked

![Transmitter-Receiver Diagram of Connections]

**THE TRANSMITTER-RECEIVER DIAGRAM OF CONNECTIONS**

C1 Tuning condenser for receiver secondary.
C2 Feedback or regeneration condenser of receiver.
C3 and 4 transmitter primary tuning condensers. These really should be the two halves of a double condenser.
C5 Antenna-tuning condenser of the transmitter.
C1, C2, C3, C4 and C5 are all receiving-type condensers with plates of a shape to give an approximate straight-line of setting against frequency. Their capacity is about 250 micromicrofarads each, though that can be changed to suit one's personal notions as to proper tuner range.
L1 Receiving tuner coil—in this case having 18 turns on a 3-inch diameter with a filament tap at the 13th turn and an antenna tap at the 12th turn. Other coils can be used for other wavelength ranges.
L2 The split sending helix, best described by the photo.
L3 The antenna helix, 5 turns of No. 14 cotton-enameled wire.
S1 and S2 The two blades of the send-receive switch, which may be seen on the top of the cabinet in the photographs. The blade marked S1 transfers the antenna while the blade marked S2 cuts off the receiving filaments whenever the switch is on the sending side.
S3 Antenna-lamp shorting-switch, to be seen on the top of the set in the photographs.
S4 Switch to short out small fixed condenser in series with the antenna. Opening or closing this switch shifts the antenna tune and avoids difficulty in making the receiver oscillate. This switch can be seen on the cabinet near the receiving coil.
The condenser C6 may have a capacity of 250 micromicrofarads (.00025 microfarads) or thereabout.
All the other small fixed condensers marked C7 may have any capacity above 300 micromicrofarads (.0003 microfarads).
K—Key.
RFC Conventional R. F. chokes of 1" diameter with single-layer winding of finest wire available—no bigger than No. 20.
C1 Variable gridleak—a fixed one may be used.
actually foolish. The swinging was improved by this, but not nearly enough. My next act was to give the neighboring BCLs a treat. I went out and guyed my aerial and counterpoise at short intervals with cotton string. (If you laugh, it shows that you don't know anything about "forty meters", so there!)

I tested again. Eureka! The wave was not entirely steady, but was good enough to try. Now to work someone! Anyone! I was really not very confident of the result. An interval of two months or so had elapsed by this time since receiving my license. Little things—such as continuous failure—have a way of undermining a fellow's faith.

I spent the remainder of the afternoon and evening trying to "raise" somebody. I called CQ (properly); I answered other fellows' CQ's, but without response. It was finally time to go to work (I work at night) and failure was still mine. (No sleep that day, of course.)

All night long, while at work, I pondered over the problem. I remember what the old-timers have told us so often—that the amount of antenna current is no indication of how well we are getting out. I had noticed, while adjusting the set, that oscillation did not seem to be very strong at the high frequency end of the forty meter band. I had supposed this to be due to the peculiarities of the choke coil—or some such thing. I now viewed the matter in a different light. "Perhaps," I thought, "oscillation is just as strong at this end of the band as at the other, but the antenna current is less because of increased radiation resistance!"

The following day I tuned the set as near to the short wave end of the forty meter band as I dared. It was necessary to couple the antenna coil closely in order to find resonance, afterward loosening the coupling until the wave was sufficiently steady.

**Success at Last!**

9CFN was on the air. I called him with as much outward confidence as if I was in the habit of working the antipodes daily, but I had an inward conviction that my signals were having a struggle to cross the county line. I threw the switch to the receiving side—expecting nothing.

I want to tell you, fellows, that the sound of my own call letters zipping through my phones was the sweetest music I had ever heard in my life! I shall never forget it during the rest of my days. The music in Heaven will doubtless prove to be a distinct disappoiment to me, provided, of course, that I—

Habit kept my pencil going, but my thoughts danced about in chaotic ecstasy. (I am getting poetic, but dang it! I have to express myself, don't I?) 9CFN had finished and was waiting for my answer. I grasped the key. Something was wrong! It had turned into a "bug" key! I sent a string of dots at about sixty per. Perhaps I was nervous. I tried using both hands. This only made it twice as bad.

Horrors! I could not answer him! I wept and overturned my chair in excitement. My wife came running—convinced that lightning had struck the shack at last! She found me leaning weakly against the wall, gasping for breath. I grinned an idiotic grin. "Gosh! Mom", I sputtered, "I worked a fellow!"

Sure, go ahead and laugh, but see what happens when you work your first station. I was working too near to the edge of the forty meter band to be absolutely sure that I really was inside of it. Therefore, I went out and added a few feet of wire to my antenna for the purpose of increasing the radiation resistance in the middle of the band. I intend to stick right there—in the middle of the band until I know my "stuff" better.

After working a few stations, I made another discovery. I found, while testing for "swinging", that a goodly portion of the unsteadiness was caused by my wife walking under the electric light fixtures. Experiment showed that the signal disappeared completely when the fixture was actually touched with the hand. This was true of any fixture in the house—and I lived in an apartment house! I solved the difficulty by establishing a local "ground" for the lighting circuit by grounding it through a condenser taken from a Ford Coil. This is as good as an actual ground so far as radio frequencies
are concerned and it will not blow your fuses if a plug happens to get turned around.

I worked more stations. By the time I had worked an "8", nearly a thousand miles distant, I was growing more and more proud of my outfit and more and more ashamed of my operating ability. Learning the code and the Q signals does not make an operator. My station has been "off the air" for some time. At present, I am just listening to the other fellows while I try to learn something about good operating-practice. Try to learn something about operating while you learn the code, fellows, it will save you time and embarrassment.

The Transmitter-Receiver Combination

My outfit, taken as a whole, probably will not appeal to many of you. It contains some ideas, though, that are worth passing along. The most outstanding feature is the "top-panel" idea.

I had never liked cabinet sets. Parts are usually too crowded and many things which should be accessible are far from being so. Bread-board sets have the disadvantage of being hard to keep clean—variable condensers especially.

The "top-panel" arrangement solves these difficulties. Condensers are under cover, out of the dust, an there is no danger of their adjustment being spoiled by accidentally striking the rotor plates. The top panel provides a place to anchor your variable condensers when setting them back from the front panel—and they should be set back. Merely grounding the rotor plates is not sufficient on the short waves. Condensers should be set back and provided with an extension shaft made of some insulating material. I use celluloid knitting needles. (They call 'em "amber"). These needles are sufficiently flexible to take care of any slight misalignment. The metal dials shown are not grounded. They are allowed to "float free".

Coils, tubes and sockets are out in the open where you can get to them. Necessary controls, such as switches, grid leaks etc., are accessible and yet are not on the front panel where they would cause body capacity effects.

The bulk of the wiring is out of the way beneath the panel so that the set is easily kept dusted by means of a soft paint brush which is kept on hand for that purpose.

All parts are held high above the table and are fastened to the rubber panel—a good dielectric. Rubber panels are O. K. if care is taken to so locate the set that the sun never shines directly upon it.

Square wooden end pieces and wooden strips to re-enforce the panel edges form all the "cabinet" that is necessary.

The combination of both transmitter and receiver in one unit may be considered to be a poor idea by some, but I like it. My old short-wave receiver being a makeshift affair, it was necessary that I build a new receiver when I built my transmitter. By combining the two, I saved time and expense. Be matter what kind of transmitter I eventually keep for regular use, this outfit will always serve for emergency use. Since it operates from the same batteries as the receiver, it is always ready.

One of the little "kinks" in the set is the use of glass eye-cups to support the inductances. These cups may be purchased at the corner drug store. They are fastened to the panel by means of three brass machine screws placed in a circle about the base of the cup. The receiving inductance merely rests in the hollow of the cup, four leads being carried to four binding posts on the panel. A plug-in arrangement would be handier. The primary transmitting inductance is lashed to its cup with cotton thread. The secondary (antenna coil) supported by the primary, being held in place by rubber bands.

This secondary coil is wound with number 14 cotton-enamel wire over six celluloid strips. (Larger wire would be better.) The primary is wound with copper ribbon taken from a Ford magneto. The construction has been previously described in QST.

The same copper ribbon, slightly twisted, is used for flexible leads. It is also used for all the wiring in the radio frequency circuits of the transmitter.

Most of the parts used came from the "junk box." Two of the dials came from a "defunct" super-heterodyne; three from a neutrodyne. That is how the transmitter happens to be equipped with vernier dials. Straight-frequency-line condenser are, of course, unnecessary in a transmitter, but this type happened to fit best into the mounting scheme. A great deal of cheap apparatus has been used. Cheap parts are sometimes good, but it is always good policy to "work them over" because they are usually carelessly assembled.

The diagram shows the manner in which the same batteries are used for both transmitting and receiving. Placing the key in
the position shown eliminates much unnecessary switching. In fact, no switches at all are needed if a separate antenna is used for receiving—although you may find the clicking of the key in the ‘phones too annoying.

Two switches are necessary if the same antenna is used for both transmission and reception. These two switches are shown separately in the diagram for the sake of simplicity, but are in practice combined in the form of a D.P.D.T. switch. S2 prevents the receiver from howling when S1 is thrown to the transmitting side.

The filament current is left turned on in the transmitter at all times to keep the set from being off-wave when first starting transmission. When it is desired to have both transmitter and receiver operating simultaneously for testing, the switch is thrown to the transmitting side and S2 is short circuited by means of a spring filing clip, such as is used in office work.

I would take note of the switch which shunts the flashlight bulb in the antenna circuit. Even if the resistance of this bulb was constant, we would not want it in the circuit. The resistance, as you know, increases as the filament heats and this, alone, will put a serious ‘tweet’ in the note.

The conductive coupling used in the receiver is undesirable if you are bothered with local interference. Capacitive coupling can, of course, be used without adding additional coils, but I find that its use either gives diminished signal strength or else cuts down the tuning range of a given coil—depending upon the amount of capacity used. Loose inductive coupling is probably the best. In case you wish to use the conductive type, remember that a little goes a long way. One fourth of one turn is more than ample on forty meters; one turn is more than enough for eighty, etc.

I have but one antenna, a forty-meter affair (more horizontal than vertical), which is used for all wavelengths in receiving. This means that thirty turns of primary are necessary for broadcast reception—which is unsatisfactory, even then. A push-pull amplifier is plugged in in place of the ‘phones and a loud speaker added when the need for music is felt.

The two binding posts at the right on the front panel are used for attaching the key instead of using a jack. A jack sometimes provides an uncertain contact. In the key circuit, the loose connection is not instantly discernable, as is the case with a phone jack. The ‘phone jack, the way, would be better located if placed farther to the left. The ‘phone cord is eternally in my way when copying.

Battery leads should be cabled. A closed loop, formed by these leads, can absorb a lot of energy. If the A negative lead goes to a rheostat, carry the A positive right along with it and right past the rheostat. Long battery leads sometimes cause howling on the shorter wavelengths. The remedy is to shunt all leads with fixed condensers at the set.

Any conclusions that I may make should not be taken too seriously. They should be taken for what they are—the conclusions of a newcomer in the transmitting game.

I believe that a beginner should start with low battery-power, not because that happens to be what I am doing, but for real reasons. Such an outfit may be harder to get into action, but that only means that the beginner will learn things now which will have to be learned sooner or later, anyway.

A beginner starting with a lot of power and a raw AC note is going to spoil the fun for somebody. The power will provide plenty of key-clicks to annoy the BCLs and the rotten note is going to keep some other fellow from working DX or building his message total. We are green, fellows, and we may even get off of our legal wavelengths and interfere with some other service. That means trouble for everyone.

I think that the majority of the old-timers are glad to have us come into the game. Let us do everything possible to help them keep that attitude. We are going to be old timers ourselves some day.

When old Fred Schnell left Hartford we thought that the call, 1MO, would leave us too. Not so. Miss Dorothy Menk, formerly Fred’s “secretary,” and now Heavy Man to Handy, is a full-fledged ham operator, and she was tickled pink when the supervisor gave her 1MO as a station call.
High Adventure in the Northland

This Summer’s Arctic Expeditions Depend on Short-Wave Amateurs For Their Contact With Civilization

About the most interesting thing in short-wave radio this summer is the several Arctic expeditions racing to be the first to visit the Pole by air and the first to explore the vast unknown area which lies between Alaska and the Pole. Chief among these are the Detroit Arctic (Wilkins) Expedition, the Byrd Expedition, and the Amundsen-Ellsworth Expedition.

It takes so long between the time a story is written for a monthly magazine and the time it reaches the reader that it is almost hopeless to present an interesting account of developments, but there are things about the radio activities of these expeditions which are of the highest interest to us, so we shall try.

The Wilkins party has continued to have its share of thrills. Their overland party, with Waskey as radio operator, finally reached Point Barrow on April 26th after a heart-breaking trek of 600 miles, which took them seven weeks. Believe us, Bob Waskey will know he has been someplace when he gets home! The party ran short of grub and had to shoot some of their dogs, either because they could not feed them or, one report had it, because they had to eat the dogs for food. Finally they succeeded in killing enough game to revive both men and dogs (the dogs that were still alive, we mean) and pushed on. The gas-engine generator for the permanent set at Barrow (ex-NRRL) however was abandoned 160 miles out of Barrow, and a special fast party is being sent out from Barrow to retrieve it. Then there will be real communication down to the States, and something we can all listen for.

During the overland party's seven-weeks mush, Waskey was in communication almost every night with Mason, back in Fairbanks, using the little battery-operated set which Mason had built, on a portable aerial. This set has two 201-A tubes, supplied by Burgess batteries. It is certainly wonderful the way those batteries lasted, particularly in the temperature of -35 below. The marvel is not that Waskey occasionally failed to get thru but that his set did so well over a length of time much greater than planned on.

Meanwhile Wilkins has been freighting gasoline and supplies between Fairbanks and Barrow in the small Fokker, carrying the Hanson-built radio set. On his third trip the radio went out after three hours and nothing more was heard of Wilkins for two weeks, while an anxious world wondered about his fate. We learn that he burnt out his wind-driven generator and so was unable to communicate. He arrived at Barrow safely but that night the tent hangar burned down, damaging the propeller of the plane so badly that two weeks were required to repair it with the limited facilities available. When the overland party was known to be approaching, a fast sledge was sent out to get Waskey and his set and bring them into Barrow in advance of the main party, and it was through Waskey and his little set that the world first learned that Wilkins was safe!

At this writing the big 3-engined Fokker is ready to shove off from Fairbanks, and then Mason will move to Barrow too, contact thereafter being from the main station at Barrow either to Fairbanks and thence by cable, or, if conditions permit, direct with U. S. amateurs, particularly 9EK-9XH. For his communication with Waskey, Mason has been using the Burgess-built portable set described in our columns, and this set probably will be installed on the big Fokker when it leaves Fairbanks.

Mr. Malcolm P. Hanson, ex-9XM, has kindly supplied us with a description of the airplane set he built for the smaller Fokker, and which on the first two round-trips to Barrows provided constant contact with Fairbanks, 560 miles air-line. This is a 50-watt crystal-controlled set, operating on...
46 and 61 meters (6518 and 4915 Kc). A wind-driven generator supplies 10 volts for the filament of a UV-203-A and 400 volts for the plate. Low voltage must be used because of the limitation placed by the crystal, but a heavy plate current may be drawn and an output of 30 to 35 watts is obtained. A hand-driven gear arrangement with a speed ratio of 50-to-1 is also provided for emergency tuning of the same generator in the event of a forced landing and engine failure. However, it is all one man can do to supply the power for a 50-watter for one minute with this arrangement, and so for such emergency communication a UX-210 7.5-watter with a 50-watt base is carried. The set is keyed in the C-battery line of the grid circuit, and is inductively coupled through pancake inductances to the aerial circuit. When operating on the ground, on an aerial suspended from the wing-tip, an aerial condenser is used and the coupling is adjustable. In flight, however, the coupling is tightened and no condenser is used, the aerial being tuned by adjusting the length of the trailing-wire antenna. The antenna ammeter is located in the hollow center of the antenna reel. This set is 9½” high, 7½” wide, 6½” deep, and weighs but seven pounds with tube and crystal. The complete installation, with generator, emergency hand-gear and three spare antenna weights, weighs 58 pounds. Many very nifty constructional features are embodied in the set, which we regret space does not permit us to describe in more detail. We understand that Mr. Hanson has supplied an exact duplicate of this set, except that the shorter wave is 43 meters, (6973 Kc.) for the big Fokker plane of the Byrd Expedition as well.

The Byrd Expedition at this writing has just arrived at King’s Bay, Spitzbergen, and unloaded its airplane. KEGK, the “Chantier”, base ship of the expedition, continues to dump fine signals into the States. The receiver on the “Chantier” is one of the new Grebe short-wavers but the transmitter again is the work of Mr. Hanson, who is making quite a reputation for himself as the designer of short-wave apparatus for exploring parties. Mr. Hanson accompanied KEGK across the Atlantic, making final adjustments and tests of the equipment, and has now returned. KEGK has two 250-watters supplied with 500-cycle juice. On the 40-meter band the set uses a tuned-grid tuned-plate circuit after the fashion of KFUH, with the tubes in parallel, but for 20 and 15 meters it uses a radio-frequency push-pull (“back-to-back”) circuit with floating filament. The back-up ship’s antenna is used, operating at harmonics, against a variable single-wire counterpoise.

In addition to the airplane set for the Fokker which Hanson built, the expedition also has a combined transmitter and receiver donated by Robert D. Russell of Wellesley, Mass., which will be used either on the smaller plane, a Curtiss “Oriole”, or for the advanced base or for lifeboat use.

Many stations have worked KEGK, mostly on the 37.5-meter wave. Our description of the equipment is taken from a 300-word message Mr. Hanson sent to the Editor via 1AMD, Providence, as KEGK approached the shores of England.

**KEGK Schedules**

Now that the “Chantier” has reached Spitzbergen, regular operation is being undertaken on the shorter waves. The location of a powerful set at a respectable distance, anxious to communicate with this country, gives us short-wave amateurs an ideal opportunity to try some of the shorter waves. Several rather scrambled sets of advices have reached us from the “Chantier” but from which it seems that KEGK will now pursue daily the following schedule of short-wave operation: Experimental schedule daily on 12 meters (25000 Kc.) at 1720 G.M.T., or 12:20 p.m. E.S.T. Experimental schedules daily on 20 meters (15,000 Kc.) at 2020, 2220 and 0020 G.M.T., or 3:20 p.m., 5:20 p.m. and 7:20 p.m., E.S.T. In these 12- and 20-meter schedules, KEGK will call “CQ Test” for five minutes, then listen for five minutes, so on alternating for a half hour on each schedule. From 0220 G.M.T. on (from 9:20 p.m. E.S.T., on) KEGK will be on 25.7 meters (11,670 Kc.), presumably for regular traffic work. We have received no advice, however, of the abandonment of the normal wave of 37.5 meters (8000 Kc.). News bulletins for “The New York Times” are to be broadcast daily. League members receiving such messages are requested to wire the “Times” to that effect, whereupon if the message has not already been received from other sources the paper will be glad to arrange for its transmission to them at their expense.

Meanwhile the Amundsen expedition is ready at King’s Bay to receive its dirigible, the “Norge”, in which it is planned to fly across the Pole and the unexplored area to Pt. Barrow, Alaska. Unfortunately the “Norge” carries no short-wave radio, as far as we have been advised. Instead she is equipped for various commercial wavelengths which we seem to remember as fitting between 600 and 1600 meters. This is too bad, as such waves probably will prove useless during the time when they may be most needed. “The New York Times” is greatly interested in this expedition and has taken out a license for a station at Pt. Barrows, chiefly in this connection. The call is KDZ and the station is licensed for 21.4, 42.08, 74.77 and 149.2 meters (14,000, 7125, 4010 and 2010 Kc.). We understand that at this writing a cor-
respondent and an operator are mushing to Barrow to operate this station, still being two weeks out.
It looks like it's going to be a great summer for the folks on the top of the earth, and we may expect to get in on it. As usual, please report any contact or interception to Headquarters, so that we may keep the story up to date. —K. B. W.

The Grebe CR-18

The latest addition to the short wave family is the set manufactured by Grebe and called the CR-18. It is an addition we have been looking forward to and expecting for some time.

A glance at the photographs and the circuit will show you that the “18” is an old friend of ours; plug-in coils, throttle condenser, regeneration control, variable primary coupling, spacewound coils, low capacity grid condenser and correspondingly high grid leak resistance, a detector and a stage of audio amplification. In place of the usual R.F. choke in the primary of the amplifying transformer a 25,000 ohm “grid leak” resistance is used.

The secondary tuning condenser C has a maximum capacity of 130-µfd. It is shunted by a vernier condenser consisting of a single plate widely separated from another single rotor plate. The maximum capacity of the vernier condenser is about 3-µfd. The throttle condenser as well as the tuning condenser is of straight frequency line type, the Grebe condensers being quite small with correspondingly restricted fields. The grid condenser has a capacity of 40-µfd, and is shunted by a 7-megohm leak. The tube slides into oscillation smoothly with a barely perceptible “plop.” The regeneration control is remarkably smooth and free from dead spots.

The coils are of the Hammarlund spacewound type using No. 16 S.C.C. magnet wire, space wound on a transparent dielectric. The turns are spaced ten to the inch. Secondary and tickler coils are mounted on the same plug-in block fitted with G-R plugs. The primary coupling coil has eight turns. The coil is hinged so that the coupling can be varied. With the five coils available the tuning range is from 8.5 meters (35,000 K.C.) to 216 meters (1,380 K.C.).

By means of the very small vernier condenser quite accurate tuning can be accomplished with the minimum amount of distortion. We wish that the tickler coil had been made much smaller and that the antenna coupling coil had been placed at the same end of the secondary as the tickler.

The receiver operates entirely satisfactorily and the workmanship is of the usual Grebe excellence. —J. M. C.

Speaking of that low power transmitter, a nice form of plate supply with rectifiers can be obtained by using a Kenotron rectifier tube operating from a step-up transformer. The model 216 is available through the American Sales Company for $1.85. At this price one can afford to use this tube in a B-battery eliminator, as a rectifier for low power sets and even paralleled for higher power operation. Single tubes will safely handle up to 600 volts at 50 or 60 milliamperes.
In designing an amplifier, two things are to be considered; what goes in, and what it is desired to have come out. Barring set noises, no more can get out than went in. Lots that goes in does not come out. This is frequently a blessing. We have heard amplifiers that almost completely eliminated the saxophone from an orchestra. This was distortion, but the effect was most pleasant.

The broadcast listener, being a glutton for punishment, usually wants to hear the music just as it is produced at the studio, saxophone and all. That is, he is after "quality" (the term applies to the production, not the entertainment.) The amateur on the other hand is interested only in noise. Quality requires even production of all frequencies. In telegraph work, the received signal is at a single frequency. A transformer intended for this purpose only, should amplify only a narrow band of frequencies, so that interfering noises at other frequencies are cut out. A recent QST article dealt with this type of transformer.

An audio transformer may be reduced to the filter circuit of Fig. 1 which is a band pass filter. The inductances are the coil and leakage inductances. The capacities are coil capacities, tube capacities across the primary and secondary, and any condensers that may be added. By properly proportioning the constants of this circuit, a band as wide or as narrow as desired may be passed. This is not as easy as it looks, however, as the constants are not generally independently variable, and changing one in the direction you want to go usually sends all the others the opposite way. For broadcast work the band should extend roughly from 100 to 5000 cycles. For telegraph work, it should be from 800 to 1200 cycles approximately.

With the transformer design established, the characteristic may be changed a good deal by external tuning. This is generally ruinous to broadcast quality, but may be helpful in telegraphic work. This is discussed at greater length in the latter portion of this article.

The problem of "quality," by which is meant the accurate and faithful reproduction of the matter sent into the air at the broadcasting station, is three-fold; embracing tubes, transformers, and loudspeakers. As each phase of the subject is worthy of individual consideration only the second, that of transformers, will be considered here. The other two should not be forgotten, however, for the amplifier cannot be much better than its poorest element. Perfect transformers will not compensate for improperly biased, overloaded tubes or a squawky loudspeaker.

As magazines are printed, not broadcast, it is necessary to compare transformers on paper. The means of doing this is to reproduce the "amplification curve." The data for this curve is obtained by measuring the amplification at a number of frequencies. A curve is plotted of amplification against frequency, and as the principal source of transformer distortion is unequal amplification of different frequencies, a study of this curve shows even more definitely than the ear could, just what is the relative rating of two amplifiers. It is not necessary to have the curve a straight horizontal line, which would indicate the perfect amplifier. A variation of twenty-five
percent would not be perceptible to the average ear. The frequencies above five thousand may be lost without serious loss of quality. The curve should remain high for frequencies at least as low as one hundred cycles. Probably the most interesting part of the curve is that between one hundred and five hundred cycles. Most of the older transformers failed to amplify in this range, and its full amplification is essential to natural sounding music. In order to study this part of the curve, which is crowded at the lower end, a special method of plotting the curves has been resorted to. Instead of making the distance along the frequency scale proportional to frequency, it has been made proportional to the logarithm of the frequency. The effect is similar to that obtained with the "straight line frequency" condensers now so popular. The lower end of the curve is opened up, spread over more space.

Just how much transformers have improved during the last few years is apparent from the curves of Figure 2, which show the characteristics of four transformers of different vintages. Transformers A and B are of the older type, designed before the period of development of quality reproduction. No's. C and D are both "new era" transformers. The difference between the new and the old is very noticeable. A has a marked peak at about eight hundred cycles. This frequency would be amplified to a much greater extent than those above and below, resulting in bad distortion. B lets through practically nothing under one hundred cycles and has but half its maximum amplification at four hundred cycles. Many frequencies that go into this amplifier do not come out. The result of this type of distortion, the loss of the low frequencies, is to give music a harsh mechanical sound. The transformers of curves C and D are a vast improvement over these earlier types, and are typical of several transformers making their appearance during the past year. The deviation of the maximum and minimum from the average amplification over this range is so slight as to be barely noticeable to the ordinary ear. An interesting and important fact is discovered when the turns ratio of these four transformers is considered. A had 8.5:1, B 3:1, C 2:1, D 6:1. Note that the 8.5:1 transformer has a lower amplification than the 6:1 over practically the entire frequency range, and at both ends passes below even the 2:1. Another interesting point is that the 2:1 transformer distorts to a much greater extent than the 6:1, despite the popular idea that low ratio transformers necessarily have better characteristics than those of high ratio.

It was not entirely without reason that high ratio transformers have been viewed with some suspicion. Notice again the curve of the 8:1 transformer. This is typical of the older style high ratio transformers. The loss of the high frequencies is easy to understand. The coil capacity acts as a by-pass for these frequencies, short-circuiting them to the ground. The loss of the low notes is due to the fact that the

2. Or else in good distortion—depending on the viewpoint. This transformer was originally produced for reception from 500-cycle spark sets. Such sets produce a 1000-cycle tone, practically in the peak of the transformer.—Tech. Ed.
primary turns were kept low in order to get a high turns ratio with a small coil. The result of this practice may be explained with the assistance of the curves of Figs. 3 and 4.

In the audio amplifier, the transformer primary is connected in series with the plate impedance of the tube, which is about 15,000 ohms for the common types of receiving tubes. A considerable portion of the voltage supplied by the signal is used up in this impedance. The portion of the voltage left across the transformer primary depends upon the relation of transformer impedance to the total impedance of transformer and tube. Thus if the tube impedance is 15,000 ohms and the transformer impedance 30,000, two-thirds of the voltage will be impressed across the transformer primary. It will now be seen why a high ratio transformer sometimes gives less amplification than one of low ratio. Suppose a 5:1 transformer had 150,000 ohms impedance at a certain frequency. Another transformer with an 8:1 ratio has but 15,000 ohms impedance in the primary. Both are used with a 15,000-ohm tube, with 10 volts available. The 5:1 transformer will have 150,000/165,000 of 10 volts or 9.3 volts across the primary. Assuming no losses the secondary voltage would be 47 volts. Only 15,000/30,000 or 5 volts will be impressed across the primary of the 8:1 transformer, with a secondary voltage of 40.

As the transformer impedance varies with frequency, while the tube impedance remains constant, the input to the transformer varies over the frequency range. This, of course results in distortion (unequal output of different frequencies). Distortion due to this cause can be reduced by means of a high primary impedance. The input to the transformer cannot be greater at any frequency than the tube voltage. If at the lowest frequency it is intended to amplify, the transformer impedance is three times the tube impedance, the input will not be less at any frequency than 75% the tube voltage, that is, not more than 25% difference in amplification of different frequencies can occur. On the other hand, if the transformer has but half the tube impedance at this frequency, the difference will be 65%.

The curves of Figure 3 were taken on transformer A, using different values of plate resistance. If the plate resistance could be reduced to zero, even this transformer would give little distortion. The curve becomes more and more peaked as the value of Rp is increased, and the amplification per stage is greatly lessened. In Figure 4 is shown a similar group of curves for transformer D. This is a transformer of high primary impedance, 155,000 ohms at 1,000 cycles as compared to 15,000 for A. It will be seen that while the curve is better for the lower plate resistances the difference is much less marked than in the case of A. The advantage of a tube of low impedance is obvious. That is one of the advantages of the new R.C.A. tubes.

We have shown the essential requirement of equal amplification of all frequencies to be a high and nearly equal impedance of all frequencies. This is accomplished by the use of many turns of wire, with a large core of high permeability steel, and by proper coil design, avoiding capacity that acts as a by-pass for high frequency. This requirement may be met in a transformer of high ratio as well as one of low.

So far we have been dealing with the problem of the manufacturers. They have met it with surprising success, as several of the new transformers show. It is up to the builder to make the best use of the

Transformers C. and D.—Modern "flat curve" transformer used in making the C and D curves. C is general Radio Type 285L, having a turn ratio of 2:1 which D is type 285, having a turn ratio of 6:1.
manufacturers’ efforts and not spoil the result by touches of his own.

Many radio builders think it an advantage to shunt their transformers with condensers or grid leaks. While this practice sometimes helps to improve quality with the old type transformers, with a transformer of good design it generally ruins quality.

A condenser across the primary of the first audio transformer is usually advisable, and may be as large as .005 microfarads without affecting the faithfulness of reproduction. Devices across the secondary are particularly harmful. Fig. 5 shows the effect of several sizes of condensers and grid leaks across the secondary. The effect of the condensers on transformer A (shown in the upper half of the figure) is to make still more marked the peak in the central portion of the curve. The high frequencies are cut off with increasing effectiveness as the sizes of the condensers are increased. It is interesting to note that at some frequencies resonance effects carry the curves with shunting condensers above the normal curve. The use of grid leaks improves the quality with this poor transformer. With a leak of 1.5 megohms, a curve similar to B of Fig. 2 is obtained. This curve is poor but somewhat better than the normal one. When the shunting resistance is reduced to 200,000 ohms a very flat curve is obtained, but the 8:1 transformer gives less amplification than a 2:1.

The effect of shunting condensers across the transformer secondary of transformer D is similar to that observed in A. The amplification of high frequencies is greatly reduced, with the point at which the curve falls coming farther toward the low frequencies as the condenser size is increased. The improvement in quality gained by shunting the secondary with a resistance is not so marked as with the badly peaked transformer. A great loss of volume is caused by this practice. With the 200,000-ohm resistance across the secondary the amplification is cut approximately in half, with no great improvement in quality. The radio set can be made to reproduce music as faithfully as the average phonograph, or even more so. If this is to be accomplished the whole amplifying and reproducing system must be laid out with this purpose in view. Good transformers must be used, in the way the manufacturers intended them to be used. Tubes must be properly biased, and not overloaded, and finally, all other precautions are in vain unless a good reproducer is used.

Central Division, 3rd Annual Indiana State Convention, July, 30-31, 1926

At South Bend, Indiana, under the auspices of Old Timers Radio Club, this will be held. Take notice ye Hams of Indiana and neighboring States ye are cordially invited to attend this third A.R.R.L. Conclave to be held in Ye Hotel LaSalle. Special hotel rates of $1.50 to $2.50 have been offered by ye management.

Ye Committee desires to say it is planning a real hamfest full of A.R.R.L. spirit as it was and is. Sight-seeing tours, swim at nearby lake including a "feed" and good meetings are all a part of the program.

Send in your reservation to A. R. Kahn, 9-CCL, Convention Secretary, 1069 Riverside Drive, South Bend, Indiana.
A Multi-Stage Crystal-Controlled Transmitter

By John M. Wells* and E. D. Tillyer**

The authors explain the construction and adjustment of a crystal controlled transmitter in which a thick crystal is used to control a low-power tube. Amplification is carried on through two low power stages operating on harmonics of the crystal oscillator. Such a transmitter gets around a lot of difficulties which may be experienced when using a relatively thin crystal, and amplifier stages operating at the crystal frequency.—Asst. Tech. Ed.

Much has been said and written lately on the subject of crystal controlled transmitters. It might not be amiss, however, to review briefly the distinct advantages of this form of transmission before going into details of the transmitter herein described.

In the first place when using crystal control, the emitted frequency remains absolutely constant when the circuit is properly set up, irrespective of any changes in the antenna or tube circuits. The note in the receiver stays the same pitch, assuming of course, that the receiver stays constant. This means that the signals will be much more readable than is usually the case with the present day short-wave amateur transmitter.

In the second place, the use of crystal control is very helpful in obtaining a splendid note. It is common for an amateur to find that, on short waves, his note becomes very rough and hard to read in spite of the fact that a direct current generator is being used, or a source of well rectified and filtered A. C. is on hand. Such has been the case at 1CAK. Using filtered motor generators the note has been reported as being anything from "fair A. C." to "raw A. C." at the receiving end. With the advent of crystal control the note has always been reported as "pure D. C." In fact many amateurs have asked if storage battery plate supply was being used. Since crystal control has been used at this station there has been no change in the previous plate supply.

The answer to this phenomenon is probably found in the fact that the cause of most poor notes on short waves is not necessarily

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FIG. 1. THE THREE-STAGE POWER-AMPLIFIER CRYSTAL-CONTROLLED CIRCUIT

R1, R2 12,000 ohm Lavite units.
C1, C2 Piezo-electric crystal. About 320 meters for operation in 80-meter band: 160 meters for 40-meter operation. Using 2nd harmonics throughout.
L1 200 turns No. 24 D.C.C. wire on form 2½ inches in diameter. Coil tapped at 5 places.
L2 13 turns No. 18 bare wire on form 3 inches in diameter, spaced 12 turns per inch and tapped in the center and also 3 turns from one end.
L3 5 turns No. 28 D.S.C. wire wound over exact center of L4, Empire cloth insulation between. A tap is taken off at the center.
L4 5 turns No. 18 bare wire on 3 inch form, spaced 12 turns per inch with a tap at center.
L5 5 turns No. 28 D.S.C. wire wound over exact center of L6, Empire insulation and tapped in center.
L6 7 turns No. 16 bare wire 3 inch form, spaced 6 turns to the inch and tapped in center.
L7, L9 Antenna inductance for antenna you use.
C1 G-R 500-muf.
C2 ditto 250-muf. condenser.
C3 Cardwell 450-muf. transmitting condenser.
C4 Small antenna coupling condenser for Herzian antenna.
C6 Antenna series condenser, maximum of 100-muf.
NC1 Small neutralizing condenser.
NC2 Pyrex tube and brass rod condenser. Must stand oscillating voltage.
C4 Neutralizing condenser, maximum capacity around 70-muf. Use a G-R midget vernier immersed in automobile oil.
CH Radio frequency choke for parallel feed.
GI Varies with crystal. Usually around ½ megohm.
GL About 1 megohm.

Anyone who has heard NKF, 4BY, 2WC, 1AXA, 4FM, 4HK, 4XE as well as 1CAK will testify to the beautifullness of the crystal controlled note.—Asst. Tech. Ed.
in the poor plate supply but is due to changes in frequency in the transmitter. These changes take place for a number of reasons. Vibration of the building and the apparatus plays an important part. Any changes in the plate voltage tend to create variations in frequency. Probably irregular heating of the tube filaments by alternating current supply has an effect upon the constancy of the frequency. The use of crystal control obviates these effects. With crystal control and a moderately good source of plate supply, the note will be pure.

There are several difficulties encountered when one constructs a crystal controlled transmitter. Some of these have been eliminated in the present set. First of all it is difficult to obtain satisfactory crystals for transmission purposes. They are expensive to buy and if one attempts to cut and grind them the work is difficult and the certainty of good crystals is not sure. When one comes to crystals which oscillate in the 40-and 80-meter bands the problem becomes worse. Also at these frequencies the trouble of breakage becomes important. The trouble with thin crystals can be eliminated by the use of relatively thick ones even though the set is operated in the 80-40-and even 20-meter bands. For 40-and 20-meter work crystals oscillating around 160 meters are used, and for 80-meter transmission crystals having a wavelength near 320 meters are employed. As a matter of fact crystals oscillating around 320 meters or 240 meters can be used to work in the 40-meter band with slightly reduced outputs. Using a 320-meter crystal the writer has put 300 watts into a 250-watt tube on 40 meters.

Another trouble experienced by a great many transmitter builders is that it is difficult to control a large tube with a small master oscillator. In the case of a crystal-controlled transmitter this can be done if the circuits are designed and set up with care. As will be shown later the transmitter used here is controlled by a 7½-watt oscillator which feeds a 250-watt power-amplifier with normal plate voltage but somewhat increased plate current in the oscillator tube.

Due to the fact that each power-amplifier tube (except the last one) is tuned to a harmonic of the preceding tube self-oscillation troubles are eliminated to a large extent. This makes the set unusually stable for a power-amplifier type of transmitter. Contrary to expectations it was found to be quite simple to shift from one waveband to another.

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There are several difficulties encountered when one constructs a crystal controlled transmitter. Some of these have been eliminated in the present set. First of all it is difficult to obtain satisfactory crystals for transmission purposes. They are expensive to buy and if one attempts to cut and grind them the work is difficult and the certainty of good crystals is not sure. When one comes to crystals which oscillate in the 40-and 80-meter bands the problem becomes worse. Also at these frequencies the trouble of breakage becomes important. The trouble with thin crystals can be eliminated by the use of relatively thick ones even though the set is operated in the 80-40-and even 20-meter bands. For 40-and 20-meter work crystals oscillating around 160 meters are used, and for 80-meter transmission crystals having a wavelength near 320 meters are employed. As a matter of fact crystals oscillating around 320 meters or 240 meters can be used to work in the 40-meter band with slightly reduced outputs. Using a 320-meter crystal the writer has put 300 watts into a 250-watt tube on 40 meters.

Another trouble experienced by a great many transmitter builders is that it is difficult to control a large tube with a small master oscillator. In the case of a crystal-controlled transmitter this can be done if the circuits are designed and set up with care. As will be shown later the transmitter used here is controlled by a 7½-watt oscillator which feeds a 250-watt power-amplifier with normal plate voltage but somewhat increased plate current in the oscillator tube.

Due to the fact that each power-amplifier tube (except the last one) is tuned to a harmonic of the preceding tube self-oscillation troubles are eliminated to a large extent. This makes the set unusually stable for a power-amplifier type of transmitter. Contrary to expectations it was found to be quite simple to shift from one waveband to another. It merely being necessary to change the crystal and retune the circuits with the condensers. If content with slightly reduced output on 40 meters, the 320-meter crystal can be left in place and the shift from one band to another becomes even simpler. The only real difficulty in tuning is in the original set-up and proper adjustment of inductance and neutralizing condensers, which remain fixed (except in the last stage) when once properly tuned.

The Various Circuits

In order to set up a transmitter of this type there is only one way to proceed in order to get quick results. Take each tube circuit separately before starting to build the next one. Make the crystal oscillator work before you build any of the amplifiers, and after the C. O. is perking add a stage of amplification; after this is working put on another stage and so on. The photographs, diagrams and diagram explanations should be sufficient to give the constructional details. The complete circuit is shown in Fig. 1. The crystal oscillator is a UX-112 with 400-volt generator supplying plate voltage through a 12,000 ohm resistance. The second tube is also a UX-112.
with the same plate voltage. The third tube uses a UX-210 with 400 volts direct to the plate. These three tubes are shown in Fig. 2. These three tubes in the circuit shown make a very excellent low-power crystal-controlled transmitter—one that anyone can afford to build. The unit comprising the circuit this far described should be the start of almost any kind of crystal-controlled transmitter. Any additional stages of amplification one desires can be added to this original unit. As a low power set this unit makes an excellent 'breaking into crystal transmission' layout. A 50-watt can be added later on, and can be substituted for the 204 power amplifier to be described later on. The antenna is coupled to the inductance L5, as shown in the dotted lines.

Going back to the circuit, the inductance L1 may have to be tuned with a variable shunt condenser in some cases. The grid leak may have to be varied, also, with some crystals. The crystal holder consists of two parallel brass plates between which the crystal is placed. About one quarter of a millimeter spacing is left between the crystal and the top plate. The original crystal holder was mounted to hang from a hook, suspended by rubber bands, but later this was found to be unnecessary.

The inductance L2 is tuned by condenser C1 to a harmonic of the crystal. When working in the 80-meter band, using a 320-meter crystal, this coil is tuned to 160 meters. For 40-meter transmission, with a 160-meter crystal, this coil is tuned to 80 meters. It can also be tuned to 80 meters when using a 210-meter crystal for 40-meter transmission. If a 320-meter crystal is used for 40-meter transmission we have found in practice that it is much better to use the following set-up: oscillator tube tuned to 320 meters, first amplifier tuned to 160 meters, second amplifier tuned to 80 meters and the final stage to 40 meters. As a crystal oscillator tube it was found that the UX-112 provided greater stability than 201-A when using full power.

The first amplifier also employs a UX-112 tube. For best results it has been found necessary to neutralize this tube in spite of the fact that only harmonics are being used. The grid leak value is not critical. Keying is done in the negative lead of the first amplifier. The fact that there is a high resistance in series with the plate of this tube makes keying relatively easy, and also helps to eliminate key clicks.

The second amplifier tube is a UX-210. The same 400-volt generator is used here with full voltage on the tube. The neutralizing condenser is a Pyrex tube with a brass rod inside and a copper sleeve outside. The condenser must stand considerable electrical strain. The inductance L3 is tuned by condenser C2 to some harmonic (usually the 2nd) of the preceding tube.

When using the 250-watt power amplifier in the last stage the power from the UX-210 is fed to the big tube by means of inductance L5. The antenna may be coupled to L5 through C6 and L9 for operation directly from the UX-210 stage. The last stage is the most difficult to put into operation. Great care must be used in the proper placing of the coils and the neutralizing condenser adjustment is also very important. This condenser is subjected to very great strains. The one used here consists of a General Radio midget vernier condenser immersed in a sponge glass full of automobile engine oil. If content with outputs of about 125 watts, the 250-watt amplifier stage can be tuned to a harmonic of the UX-210 by means of condenser C3 and inductance L6. If this is done the adjustments are much less critical. For full power, however, the last stage must be tuned to the wavelength of the 210 tube. With care power inputs to the 250-watter have been as high as 600 watts.

It might be interesting to outline the adjustment of a transmitter of this type for 40-meter operation when using a 160-meter crystal. First make sure that the crystal tube is oscillating vigorously. This will be indicated by a sharp drop in plate current of this tube. Adjust L1 and the grid leak so that this drop will be as large as possible. Next tune the first amplifier to approximately 80 meters by means of condenser C1. Vary this condenser gradually until the plate current in this tube drops to a minimum with the condenser set to tune the coil to exactly half the wavelength of the crystal tube. This is with grid leak control of the grid bias.

Now tune the UX-210 circuit to approximately 40 meters by varying condenser C2. This condenser is also varied until the plate current in this tube is at a maximum with

3 We desire to point out again that complete shielding (when not operating on harmonics) is very desirable. More complete neutralization can be had, and the adjustments are much easier to make.—Asst. Tech. Ed.

4 See also QST for May, page 48.—Asst. Tech. Ed.
the condenser set to tune this circuit to 40 meters, or the 4th harmonic of the crystal. The grid bias in this stage is obtained from a C-battery.

Tune the 204 circuit in the same manner as the UX-210 was tuned. In this case, however, the antenna circuit should also be tuned at the same time as its tuning has some effect on the tuning of C3. After all of these adjustments have been made, return each of the circuits by means of C1, C2, C3 and C5, beginning with C1, to get maximum antenna current.

It must be understood that before any of the preceding tuning can be done, the neutralizing condensers must be adjusted and the correct location of the taps on coil L2 must be found. Once set, these controls do not have to be changed, with the possible exception of the neutralizing condenser C4 which is very critical.

This set is still in the experimental stage. It has not been operated very many times. During the few hours it has been on the air, however, very enthusiastic comments have been received from all amateurs worked. Two French stations have been worked on 40 meters. Their reports were "R7-R8, pure D.C. very steady". bz2AB has been worked and GVC was communicated with when he was 1,500 miles north of Ottawa. Numerous U. S. and Canadian amateurs have been worked also.

The time spent in building and adjusting a crystal controlled transmitter of this type will repay itself many many times over for there is a great satisfaction in knowing what your note will be like at the receiving end, and in knowing that if the signal is strong enough to copy at all, the receiving operator will have no trouble in reading you.

FIG. 5. A CORNER OF THE OPERATING ROOM AT ICK. TRANSMITTER NOT SHOWN BUT IS AT EXTREME RIGHT ON TABLE

The UX-874 Regulator Tube

We present herewith photograph of the UX-874 regulator tube which was described in detail in the "new tubes" story appearing on page 53 of our May issue. The photographs were not available at that time.

As can be seen the tube contains a reinforced tubular plate supported from the glass stem by several wires. Attached to the lower rim of this plate is a sort of tiny frying pan which contains the chemical "getter" used to complete the exhaust, or perhaps some material which generates gas of a kind and amount suited to the requisite glow action of tube. In the samples that have been examined this frying pan has its lid firmly fastened except at the lower edge which is open somewhat so that gases could escape into the tube. At any rate phosphorus is seemingly used for a "getter" since a momentary phosphorus fire of tiny proportions occurred on the stem next the little pan when the glass of the tube was broken away. This accounts for the missing corner of the stem, which the little pin-point of flame managed to crack off. Don't be alarmed, though—the fireworks were almost too small to be seen and probably would not happen in most tubes—besides which one isn't in the habit of breaking tubes into a powder keg.

Looking at the top view of the tube we can see the central stem inside of which is the other electrode—a wire of small diameter. This wire is surrounded by an insulating sleeve of some such material as lavite but projects a quarter inch or more. Almost touching this projection is a wire from the plate, leaving only a small gap across which the glow discharge starts—shifting immediately to the plate and with increasing loads covering larger areas of the plate as described in the writeup previously referred to.

—R. S. K.

3LD fell from the top of his 80 foot mast without even scratching himself. He says he was wearing his light fall coat.
Experimenters' Section Report

Enrollments in this Section have been coming in steadily at a rate that has changed very little since the re-enrollment was begun. Our estimates as to the outlines which would be in greatest demand were wrong but all have been taken care of now — the first time in the history of the Section.

Outline Changes

The outlines that have been sent are meant to be changed. The only reason for the existence of the Experimenters' Section is to exchange ideas between the members. If no ideas come in there will be none to exchange — we do not generate much experimental information at 1711 Park street, since we have neither the time nor the equipment. Therefore, by all means, begin at once to give us your ideas as to useful changes in the "outlines." It will also be very useful to tell us what you are doing or planning to do on your particular subjects. Only if we are kept constantly in touch with your work can we be of the most use to this section.

Correspondence

One of the main reasons for the existence of a "Section" is to provide contact between the men enrolled in the same problem. For this reason we have issued lists of the members, classified by problems. In the past these lists were great 14-page affairs that included all men and all problems. This has been dropped in favor of a separate list for each problem, so as to make more frequent revision possible. By all means get into correspondence with the other men on your problem. If the list has not reached you, ask for it.

Laboratory Tests

The outlines that have been sent have tried to avoid suggesting laboratory methods in much detail, since we feel that it will be better to let each man devise his own methods and apparatus. Naturally we are willing to pass on any additional information that we may have or can get. It will also be helpful to write to the other men on the same problem — but most of all it will help to keep the Section constantly advised of anything that you may have found out. It is not necessary to wait until the job is altogether done and a finished engineering report made. Frequently it is a needless piece of labor to do that. Almost always the result will be to let the information die of old age.

Radio Surveys — Problem G-12

The weather — the barometer — the moon — the sun — any number of things are likely to have an effect on radio transmission. To study them takes time and patience, system and organization. Recording the received signals is only a very small part of the whole job. For that reason the men enrolled in this problem will be put in touch with such organized tests as the "April Tests" of the General Electric Company. In general we will take part in someone else's tests because A.R.R.L. Headquarters is not equipped to handle the big job of analyzing thousands of records of reception.

Several other tests are now being planned by the General Electric and others. The "G-12" men will be notified as soon as possible.

South Schenectady and the April Tests

Through the courtesy of Mr. W. T. Meenam of the Publicity Department of the General Electric Co. there follows a description of the radio test plant from which the April tests were sent for the A.R.R.L. observers. A portion of this material is from publicity releases, a portion from interviews with Mr. Meenam and the operating staff at South Schenectady, while that part relating to the 32-meter station was written for QST by one of the men at that building.
The Plant as a Whole

Reference to page 41 of our April issue will show that tests were sent at the same time at 15, 26.4, 32.79, 51.1 and 65.16 meters wavelength with powers from .6 to 10 kilowatt. If one happens to prefer larger numbers this corresponds to 20,000; 11,370; 9,150; 5775 and 4500 kilocycles. To carry on these transmissions at the same time calls for quite a radio plant, but South Schenectady not only did that, but in addition carried on high-power broadcasting at 380 and 1560 meters wavelength. By this time one begins to get some idea of the size and complexity of the test plant which occupies a 54-acre plot about 2 miles southwest of Schenectady at a place that seems to be called indifferently "South Schenectady" or "Mariaville."

On the plot is a main building 60 x 100 feet and a variety of small frame buildings housing various transmitters. The main building contains the power equipment, including the plate supply rectifiers and filters, also the big modulator which supplies modulated plate power to stations in the smaller buildings, so that these stations do not need either a modulator or an amplifier when telephony is to be used — the same matter can be sent on all wavelengths at once. At the same time it is possible to put the modulator out of commission and to send C.W. from the various transmitters. A few of the short-wave sets also have separate plate supply so that they can send CW, while most of the stations are being modulated. When telephony is being used it is usually sent down via an underground line which begins at the WGY studio on the G.E. grounds, or at some of the usual outside pickup points.

Plate and Filament Supply

There are three rectifiers, each being able to supply 150 K.W. at 15,000 volts. In addition there are generators operating at 2,500, 4,000 and 12,000 volts for the plate circuits of the various smaller tubes as well as the modulating tubes. Filament current is generated at 33 volts by a 300-ampere and a 1000-ampere generator, each constructed so as to reduce the commutator and slot ripples.

The "Superpower WGY"—2XAG

In the main building is the 50-kilowatt 379.5 meter (790.05 K.C.) transmitter which on certain days each week takes the place of the lower-powered (though still large) station WGY which is at the Schenectady plant. This set is shown in one of the photographs. The antenna slants to the top of one of the 300-foot towers.

The 1560-Meter Set—2XAH

2XAH resembles the Superpower WGY in all ways except that the output is 40 K.W., that the R.F. amplifiers are of the push-pull type and that the antenna is a larger affair. This antenna is unusual and must be described, as it cannot be seen in the general photograph. It looks like a single turn loop 300 feet high, hung be-
between two of the big towers. (See Fig. 2). Actually the downleads of the "loop" terminate in tuning houses and things are so adjusted that the two downleads operate in phase—i.e., the antenna is of the 2-downlead multiple-tuned variety. The power is fed into the system by means of a 2-wire R.F. transmission line which runs from the main building to one of the tuning houses, a distance of several hundred feet.

The 109.655-Meter Station—2XK

With 2XK we arrive at the stations that were concerned in our tests. The antenna of 2XK is a peculiar triple-T affair which can be understood from the photograph if the ropes and wires do not look too nearly alike when the cut is printed. A counterpoise is used here for the first time—the longer-wave stations working against ground. The general nature of the set at 2XK is very much like that of 2XAF, hence no details are given. At this point it is well to say that 2XK and all stations from this point on are licensed to work at a variety of wavelengths. They shift waves frequently, also changing antennas, power and circuits. For that reason the description given here fits the April tests—but is quite likely wrong at this moment.

2XAC—The 50-Meter Station

Unlike most of the other stations, 2XAC was on a wavelength of 51.9 meters (5775 K.C.) and was operated self-oscillating instead of crystal-controlled, partly because this wavelength was not to be used a great deal, partly because the time before the tests was short. Little is to be said that was not stated in the April schedule—the wavelength was approximately the same and since the plate supply was independent this station sent CW, using the hand key. The wavelength was shifted slightly during the test.

2XAF—The 32.79-Meter Station

Concerning 2XAF little will be said here—the complete description comes a bit later. This station has operated at various wavelengths in the 30-40 meter region, or if one prefers, in the 7500-10000 K.C. region.

2XAD—26.4 Meters

Of 2XAD not a great deal is known at this writing. This wavelength did not come down to Hartford during the tests (as far as the writer knows) and that leaves little to say except that in general this station resembles 2XAF, though the power is considerably lower.

2XAW—15 Meters

It was an open question whether we should pay the most attention to 2XAW or...
THE TRIPLE-T ANTENNA AT 2XK
Ropes from the three 80-foot masts are stretched toward a central point, the last 40 feet or so of each rope being replaced by a wire. These three wires meet at the center and are connected. From the center of each wire a down lead is dropped and these join a short way above the station roof.

PLATE-SUPPLY RECTIFIERS OPERATING AT 15,000 VOLTS
In each of the three units the filter chokes and transformers stand on the floor, the filter condensers stand on the top of the frame. The kenotrons are at the front of the frames in two sets of three for each frame. The lower trio is at the level of the man’s hands, the upper trio a bit above his head. They are rather hard to make out in the picture. At the right front is one of the filament supply machines.

2XAF in this story. Finally the decision was made in favor of 2XAF because it operates near an amateur band, and because it is crystal-controlled. 2XAW is self-excited, using one of the familiar push-pull oscillators and feeding a vertical antenna which is hung from a rope stretched from one of the 300 foot towers. This antenna seems to be operating in the same fashion as the one at 2XAF with the difference that the antenna is large enough so that it works at a harmonic.

Having run through the series of stations we can now return to 2XAF, the station that most nearly meets the conditions of amateur transmission. It will be described by one of the men associated with the station.—R. S. K.

Station 2XAF
By K. B. Austin *

The original transmitter at 2XAF was put into operation early in the summer of 1925. It was one of the master oscillator-power amplifier type operating on a wavelength of 40.5 meters and with a power output of approximately one kilowatt. During August, 1925, the transmitter was modified by adding a crystal oscillator and amplifier chain but still maintained the same output as before. The wavelength, 41.9 meters, was obtained by taking the fifth harmonic of a 1432 K. C. crystal and amplifying that harmonic through a chain of neutralized push-pull amplifiers until the desired output was obtained. In February, 1926, the power output was increased to between 10 and 20 kilowatts by the addi-

* Radio Department, General Electric Co., Schenectady, N. Y.
tion of a neutralized push-pull amplifier using two UV-207 (20-Kilowatt) water-cooled tubes. Recently the wave was changed to 32.79 meters using a system of obtaining the desired harmonic from a crystal that would be very suitable for amateur use. Following is a description of the transmitter.

The crystal oscillator tube is an SA-14 or high mu UX-210. The tank circuit of this tube is tuned to the fundamental of the crystal or 2287.5 K.C. The next tube is also an SA-14 and is capacity-coupled to the tank of the crystal oscillator. The tank of the second tube is tuned the second harmonic or double the crystal frequency. The second harmonic is accentuated by using a higher bias than normal on the grid of the tube in which the harmonic is taken. The third tube in the crystal control amplifier is a UV-211. It is also capacity coupled to the preceding tank and its tank is tuned to the second harmonic of the preceding stage or the fourth harmonic of the crystal oscillator. The output of this tube is the desired frequency, 2150 K.C. or 32.79 meters and is great enough to swing the grids of UV-204-A’s which are connected in push-pull and neutralized. These in turn excite two watercooled UV-207’s which are also connected in push-pull and neutralized. Plate modulation utilizing four UV-207’s is used on the last stage when telephony is wanted. Thus it is seen that for CW only seven tubes are required by this system to

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1. Meaning the tuned circuit connected to the plate of the tube—Tech. Editor.
2. The previous tubes in the series are "7-1/2 watt" tubes. This one is a "low mu" 30-watt tube very similar to the 203A. The next pair of tubes is of the 1/4 K.W. size while the last pair (UV207) is of 20 K.W. output rating.
obtain a crystal controlled output of 20 kilowatts and that only two neutralized stages are employed.

THE ANTENNA SYSTEM AT 2XAF
The dark spot half way up the antenna is a split tuning coil with the antenna ammeter between—Fig. 1. The ammeter is read by means of a surveyor's transit set out in the field—sometimes in 4 feet of snow.

CRYSTAL CONTROL OF THE 32.79 METER STATION 2XAF
A short time before the photo was taken there was being used a carefully shielded arrangement with some plain stages and some push-pull stages, all of which were neutralized. The much simpler device in the picture is now used. It is described in the text.

This is an ideal system for amateur use in that by the use of one 160-meter or one 80-meter crystal one can have a crystal controlled transmitter for use on 20, 30 and 80 meters with the minimum number of tubes and neutralized stages.

The antenna used at 2XAF is a halfwave vertical antenna, no ground or counterpoise being employed. The output of the trans-

INTERMEDIATE AND FINAL STAGES OF THE 2XAF TRANSMITTER
Behind the “barndoor” panel is the UV-204-A stage. Tuning condenser control discs project thru the slots in the panel while meters are located far enough behind the circular openings to be safe from accidental contacts. At the left is the final stage with a pair of 20—K. W. UV-207 tubes in push-pull arrangement. Note that the water-cooling jackets of these tubes are mounted on springs to absorb vibrations which would cause a “burr” on the outgoing signal. Such sounds are often heard on these short-wave Schenectady stations but they are caused by audio fading after the signal leaves.

2XAF has been rebroadcasted very successfully on several occasions in Johannesburg, South Africa and also in England. It has been heard with loud speaker volume in New Zealand in broad daylight.

A.R.R.L. Work in the Tests
Of the letters sent out by the Radio Engineering Department of the General Electric Co. about 22% secured observers for the “April tests.” This refers only to the

3. This is what we would call a Hertzian antenna working at its fundamental. The details are shown in our Photographic illustrations and Fig. 1.—Tech. Ed.
2000 letters sent to men whose names were suggested by the writer—that is to say, the Technical Editor of QST. This percentage is unusually good.

Needless to say the returns are not yet complete as this is being written on the 20th of April. Even after all reports have arrived there will be a huge amount of work ahead before any results can be announced. Only those who have taken part in such a job can understand fully what a terrifying amount of time is required to finish the job. Do not be too impatient for information—very probably months will pass before the analysis is complete.

The Rest of Our Report

Because of the space consumed by the station description the rest of the "X" report must be dropped out this month. It will appear in the next issue.

The complete list of the stations at South Schenectady is as follows, the list being thru the courtesy of Mr. Alan Rockwood we are able to present the complete list of the stations at South Schenectady.

<table>
<thead>
<tr>
<th>Station Call</th>
<th>Wavelength assigned</th>
<th>Wavelength April 27</th>
</tr>
</thead>
<tbody>
<tr>
<td>2XAD</td>
<td>10-50</td>
<td>25-60</td>
</tr>
<tr>
<td>2XAF</td>
<td>10-50</td>
<td>22-70</td>
</tr>
<tr>
<td>2XAG (Super WGY)</td>
<td>379.5</td>
<td>379.5</td>
</tr>
<tr>
<td>2XAH</td>
<td>100-400</td>
<td>1600*</td>
</tr>
<tr>
<td>2XAR</td>
<td>100-300</td>
<td>.....</td>
</tr>
<tr>
<td>2XAW</td>
<td>32-0</td>
<td>16</td>
</tr>
<tr>
<td>2XAZ</td>
<td>100-200</td>
<td>.....</td>
</tr>
<tr>
<td>2XH</td>
<td>60-160</td>
<td>.....</td>
</tr>
<tr>
<td>2XK</td>
<td>60-150</td>
<td>65*</td>
</tr>
<tr>
<td>2XO</td>
<td>10-50</td>
<td>****</td>
</tr>
</tbody>
</table>

At Schenectady

2XI Unlimited
Broadcast service to Oakland, Cal. 20.60
Propagation experiments 53.00
* Broadcasting the regular WGY programs.

The West Gulf Division Hamfest

THERE ain't no picture BUT—we got 'em told big boy, we got 'em told!
Down here in this neck of the woods, where you ride all day before you can see your nearest neighbor, radio hams are not as prolific as they are in the more densely populated sections of the North and East, and consequently such things as "hamfests" and Division Conventions cannot be had quite as often or quite as easily as elsewhere.

However, the germ of "get-together" has been silently leavening the radio mixture in and about Dallas for two years and spontaneous combustion took place and we blew most of the roof off of The Hilton, one of Dallas' leading hotels, March 27th.

The Dallas Radio Club sponsored the idea and worked hard for two months to pull the first Amateur Hamfest ever held in the West Gulf Division. Lots of 5-watt bottles had their bases melted off while somebody was being told about the affair and being urged to come.

5NW held a three day argument with 5ZA and finally 5ZA told him he was catching the last train out to Dallas with the OW under one arm and the baby under the other. When 5ZA was introduced as coming a long way to attend a good thing, as being a winner of the Hoover Cup and as being persuaded by 5NW, he brought down the house.

Inspector McCabe gave examinations all day and got more enjoyment out of the blow-out than a half dozen others. The Dallas Radio Club certainly appreciate the courtesy extended by the fifth district inspection department in arranging to have Inspector McCabe attend. While there was an arranged program, the meeting turned out to be more of a love feast than anything else and ham gossip thoroughly saturated the atmosphere between the splendid talks of Division Manager Corlett, Assistant Division Manager Forest, Inspector McCabe and several others that lack of space prohibits mentioning.

It is to be realized that great distances had to be covered by a portion of the two hundred who attended. There were amateurs from Beeville and Corpus Christi, Tex.; Magnolia, Arkansas; Norman, Oklahoma; Roswell, New Mexico, and possibly one or two other distant points and practically everybody that could get away from work or school within a hundred mile radius of Dallas. We were even favored with the presence of Senor R. A. Carranza, in charge of short wave communication in the Mexican Army.

5FC, operated by Whitaker and Lovelady, was represented by a glass-mouthed, silver-plated 40-meter transmitter of very excellent design. Part of the program was devoted to an explanation of transmitters in general by Mr. Lovelady. 5VF was represented also by a 40-meter silver-plated artistically arranged transmitter, which was also described by its owner, Mr. Hardy. There were so many more things crowded into the three or four hours following the banquet that they cannot be mentioned, but all served to make the meeting a success. A resolution was introduced and passed with great acclamation that Dallas make a bid for the National Convention next year. This resolution followed a very excellent talk by Z. E. Black, convention manager of the Dallas Chamber of Commerce.

The Dallas Radio Club thanks each and every one in attendance, individually, for the help and cooperation given.

The Hilton Hotel helped us very graciously and placed their every service at our disposal.

—"Rip" Bennett.
The Taurenwerfer Beam
By Morris Taurenwerfer, Associate Editor

Editors Note: Readers of QST will recall with pleasure the interesting article by Mr. Taurenwerfer in the January 1925 issue of QST. Shortly after we staged this scoop Mr. Taurenwerfer left our organization (not at our request) to enter the Research Department of the Chinese Telephone Company. It is indeed a great pleasure to have him back with us as an Associate Editor of QST after his eight successful months in China, where several revolutionary things were unearthed.

COUNTELESS hundreds of amateurs have written me for advice on transmitters. They assumed from the fact that I know a great deal about receiving circuits, I also must know the transmitting game equally as well. Frankly, my knowledge of amateur transmitters was extremely limited at the time I left here to go to China. While in China, however, I had a lot of time to investigate the mysteries of transmitters and transmitting circuits and, having an excellent basic knowledge of radio, it was but the work of a short while until I had mastered the transmitter. During the process of learning about transmitters I stumbled upon several new things, which other great minds, apparently, had overlooked.

One of the first problems I tackled was this business of beam transmission. Many people (notably Marconi, the R.C.A., Round and others) have gone at the problem in a perfectly normal and orthodox fashion. Not I. I do not do things in such fashion. I preferred to attack the beam transmitter from an entirely unlooked-at angle. And as is customary with me, I succeeded notoriously.

In the first place it is a well-established fact that the rays from an electric lamp or arc lamp when properly focussed in a parabolic reflector will be reflected into a beam of light which can be pointed in a particular direction.

Light will be transmitted in one direction only. Here is exactly what we want in a radio beam transmitter transmission in a particular direction; concentration of light energy.

Let us pause for a moment and see exactly what light is. There are two popular concepts of light. One, the emission theory, would cause us to believe that particles of the light-giving body actually travel out into space and are actually hurled from the light source to the receiver. To my mind this theory is absolutely and unmitigatedly the bunk. It is inconceivable to me that when I look at a Ford car particles of this car actually fly out at me. I take the Ford as an example because if any substance is in a condition in which it might fly out at anyone, the Ford product is in that shape better than anything else. Going a step further, assuming that this theory is the correct one, if I looked at the Ford long enough, the particles would continue to fly off from said "car" until it was no longer

where I first saw it but actually became a part of me. Admittedly impossible.

The other theory is called the undulatory theory. It assumes that the ether (which no one as ever seen, tasted, heard, measured or actually known of) is set into rapid and violent oscillation by the illuminating object (the sun is a shining example), and that the ether is filled with wavelets which travel from the light source to the observer. This is the logical light theory—the theory which I have accepted without reservation. I have gone a step further and have combined, in practice, the theories of light and wave propagation and have succeeded in establishing beam transmission from China to the United States when using a tube with a negative B-battery voltage of 8.61 volts.

FIG. 1
THE TAURENWERFER BEAM REFLECTOR AND TRANSMISSION POLE

Turn to Fig. 1. A few words will expose my simple beam transmission system which

* Radiotrician & Assoc. Member A.R.R.L.
I have called, out of respect to a great engineer and research worker, "The Taurenwerfer Beam". An ordinary D.C. arc lamp (A) is attached to the top side of a 42-foot steel pole P. To the arc lamp (A) the reflector R is clamped. The pole is hollow and is mounted on a revolving platform so that it, the arc and the reflector can be rotated through one complete revolution. Through the hollow portion of the pole the arc feeder wires are run. The arc is a series affair operated in series with the commutator of a 2,125 R.P.M. 500-volt D.C. machine. When the arc is turned on it is obvious that the reflector will emit a beam of light, and that the direction of this beam can be changed by rotating the pole.

I have previously shown that the light beam from the reflector is merely a vibration of the ether in that direction. In other words the ether is highly excited. If I now couple a radio transmitter to the light source, so that the radio frequency is applied to the center of the reflector, the radio frequency waves will set up vibrations along the light path, and as the ether along this path is already regenerative due to the light vibrations, the super-imposed R.F. will cause the ether to become highly conductive and the radio waves will travel readily and quite rapidly along this light beam.

The theory of the Taurenwerfer Beam was tested in the Laboratory at first and was found to be correct. I was worried for a while as to what would happen when the radio excitation reached the end of the light ray. I reviewed all available literature on the subject and found that the solution had been found years ago. The light beam allows the radio wave to get a good start and

FIG. 2

THE TAURENWERFER CIRCUIT

the radio wave travels on and on after it has left the end of the light, and still goes forward as a circularly polarized wave. Several novel things will be found in the diagram of my transmitter used in connection with the Taurenwerfer Beam. The circuit, at a casual glance, appears to be an ordinary directly coupled Hartley circuit, the coupling being accomplished by several gadgets in the lead-in. In order to suppress as many harmonics as possible, and at the same time eliminate key clicks, I had to resort to some new tricks. The primary inductance L1 is completely shielded from itself. I found that most of the B.C.L. interference was caused from direct pick-up from the primary. This was eliminated by winding L1 in the following fashion: The conductor itself is number 28 magnet wire. This wire has a much smaller external field than any other wire made. In order to make the No. 28 carry the enormous current I used, I enclosed it inside a three quarter inch brass pipe filled with oil. This pipe is insulated from the No. 28 wire which is the conductor by the oil. The pipe, in turn, is grounded through a non-inductive resistance tuned to twice the second harmonic of the working wave. All direct magnetic or static fields about coil L1 have been eliminated by this type of construction.

Interference, mush, sidebands, carrier waves, static, doubly suppressed carrier waves with no side bands and re-radiation in the antenna were all eliminated by that equipment shown in the dotted lines at the left. For the want of a better name I have called this a Taurenwerfer Suppressor. The condenser C is insulated to withstand ten thousand volts, and will carry two hundred amperes on 46 meters. The inductance L is a coil of number 24 D. C. C. magnet wire wound on an iron core made of .0002 mil audio-frequency brass, and the resistance R has a value of .01052 megohms. The capacity of C will vary according to the well-known Austin-Cohen formula (incidentally developed independently by the writer while at the BuStan). Its capacity will be found
to be between .002 µfd. and .00204 µfd. when the 46-meter wave is used.

It will be noted that I use a negative potential on the plate of the tube. This is made possible through the judicious use and choice of C3, C4 and L2. When these units are properly used and installed, regeneration in the tube is so strong that the tube takes full advantage of the negative resistance phenomenon, and operates with a negative voltage on its plate so long as the oscillations in C3-C4 and L2 circuit are 90 degrees in phase with the voltage of the A-battery, in which case the current lags by a phase difference of one hour and ten minutes.

As I have a patent application on this latter feature I would request that the amateurs do not experiment with this feature of the circuit. You can rest assured that there is no chance of your being able to improve upon the circuit as I have gone all through all the possible ideas for improvement and this is the circuit in its final form.

At a later date I hope to be able to explain to the waiting world several other things I discovered while in China. Although there only eight months I succeeded in doing a lot of new things which the radio press has not been advised of. You, as readers of QST are entitled to a first hand account of all of these discoveries as long as I am connected with this organization. They will be divulged later on.

Buying Inductances By the Inch

A NEW type of receiving inductance is now available. The coils are wound on a thin sheet of transparent dielectric .005 inch thick. Turns are spaced a distance equal to the diameter of the wire. At present two stock sizes are obtainable. For receiving coils the inductance is three inches in diameter and is wound ten turns to the inch with number 16 cotton-silk insulation. The coils are extremely strong, it being almost impossible to compress them out of shape. For R.F. chokes and ticklers in amateur short wave receivers inductance material of a different type can also be had. This inductance takes the form of a coil one and one-half inches in diameter, wound with number 36 single silk covered wire. The wire is wound ninety turns to the inch, the spacing being about equal to the diameter of the wire.

If you are an amateur and will give your call letters, either type of inductance may be purchased by the inch in lengths up to 20 inches. These coils should make excellent S.W. receiver material. They are made by and can be purchased from the Hammarlund Mfg. Co. of New York City.

In order to have as much short wave data on the products they make, Hammarlund is also offering a 25% discount to amateurs, on all of their receiving and transmitting condensers suitable for amateur work. When writing you must give them your call letters as they will sell only to bona fide amateurs.

—J. M. C.

The 300, 600, and 706 meter waves of Great Lakes land stations and ships have been replaced by a 715 and 376 meter wave. The gulf land stations have moved up to 750, 900 and 925 meters and the ships from 650 to 700.

If the owner of a station will go to the post office of his city and register his station call with his address, all mail addressed only with his call and city will come to him and the dead letter office will be robbed of a few morsels.
An Oscillator Without Battery or Transformer

By Allan T. Hanscom

THE writer has designed a convenient portable oscillator for laboratory work and receiving set testing. It can be operated from 110 volts A.C. without the use of any batteries.

Figure 1 represents the conventional Hartley transmitting circuit. By properly proportioning the inductances L1 and L2 and the condenser C, the tube may be made to oscillate throughout a 3 to 1 range of frequencies. For any given range the experimenter will know from experience what size of coil and condensers to use. It is usually satisfactory to center-tap the coil.

Figure 2. The same circuit with 110 volts A.C. applied to the plate circuit of the tube. In this case the tube will act as a rectifier although it will still continue to oscillate at a frequency governed by the constants above mentioned. Figure 3 shows a method of heating the filament of a tube with 110 volts A.C. which requires no transformer. By combining Fig. 2 and 3 we have Figure 4 in which the filament and plate supply are both from the same source. The resistance R, in the filament circuit consists of a 25-watt lamp and the voltage drop through this lamp is 105 volts when connected in series with a standard 201-A tube. It will be noticed that the grid return of the tube is connected to the opposite side of the 110-volt line from the plate return.

The rectified plate current is a series of impulses and because 60 cycles a second is an audible frequency, the frequency of oscillation is modulated so that an audible signal is produced in a receiving set placed within 50 feet of the oscillator. The reason for connecting the grid return as indicated is that the end of the filament to which it is connected is negative at the time that the plate of the tube is positive and this is the only time that plate current is flowing.

When a 201-A is used in this oscillator the total plate current, as measured by a D.C. milliammeter, is less than two milliamperes. Using a 6-tube Superhetrodyne on a loop, the signal of this little oscillator has been picked up at a distance of 500 feet, although the practice of using this tester as a transmitter is to be discouraged because the tone is that of "raw A.C."

Moreover, in the standard commercial form of the tester, the circuit constants are arranged so that the wavelength range is from 180 to 575 meters. If 110-v D.C. supply is available the tone will be good and a neat little transmitter of the "fractional watt" type results when one uses a condenser and coil proper for one of the amateur bands. Coupled to an antenna such a set should work around town fairly well—tho it would not be possible to operate an antenna meter—not even a thermo-galvanometer. One would need to use a plate meter (0-5 milliamperes)
and go by its readings. Of course, the reliable range of any set with an input of 2/10 of a watt is not likely to be astonishing but freaks are possible.

It will be noted from the diagram Figure 4 that the A.C. supply lines are connected at the low potential end of the system. Even though this is the case radio frequency currents seem to follow the lighting supply lines. For this reason it is sometimes better to test the receiving set with the ground disconnected, except in the case where the antenna and ground form a tuned circuit and one is obliged to put up with this uncertainty.

All radio repair men will welcome this device for its ability to provide a clear signal on any wavelength, and this wavelength can be varied to suit the operator by means of the tuning condenser.

The dial has wavelength indications on it and while the device is not intended for a wave meter, the readings are accurate enough to form a good indication of the wavelength range of a set.

In the Hartley circuit as indicated in

\[ \text{FIG. 4} \]

\[ \text{FIG. 5} \]

THE COMMERCIAL FORM OF THE OSCILLATOR

This device is called the "Superunit set tester" and has a wavelength range of 200-575 meters. The dial carries both a wavelength scale and a 1-0-100 scale.

Figure 1 there is a tendency for the oscillations to cease when C reaches a certain value. It is therefore to some advantage to use a circuit of Figure 5 in which a tuning condenser is placed across the grid coil only. The inductance of L1 should be sufficient to cover the wavelength band when used with an .0005 condenser and L2 should have sufficient turns to insure the oscillation of the tube at the high wavelength settings. The coupling between L1 and L2 can be extremely close. It is also possible to insert chokes in the supply line as indicated in Figure 5. In this case the radiated signal will be much less and the effect on the neighbors will be less in proportion.

Strays

The long awaited revision of Ballantine's hamible is not to be. In the meantime a reprint of the last edition is going on and once more "Ballantine" is available. The price is $2.00 and it is well worth ten times that much. Our Book Department will get it for you.

Starting at 8:50 p.m. E.S.T. 8ZU at Cornell University copied fifty-one CQ's from 9BDQ, all of them in a string and with no let-up. Honestly, gang, how long is this punk operating going to last?
A. R. R. L. Standard Frequency Station 1XM

By Killian V. R. Lansingh

XM is the experimental station of the Massachusetts Institute of Technology Radio Society.

The Radio Society has two main activities, technical meetings and its experimental station. This article will describe the latter. Technical meetings are addressed by members of the M. I. T. faculty, advanced students, and speakers from the outside, many of them nationally known in radio and allied fields. The present organization of the M. I. T. Radio Society was started shortly after the war by a group of students, many of whom had been in the Government signal service during the World War.

The Station and Location

The station is located in the second story of a three-story steel framework building. Next door is the M. I. T. power house, whose smokestack, only about seventy-five feet from the station window, makes a convenient mast upon which to fasten antennas. The presence of the power house, however, is thought at least partially to account for the rather poor receiving conditions that seem to exist. A railroad beside the building accounts for additional QRM.

Though the station has always possessed transmitters that were abreast of the times, it was in 1921 that the station first became well-known due to the installation of a 500-watt 500-cycle ICW transmitter, of the type which later became so well known at 2RK-2FP, 8AWP, 9ZN, and others. At this time transmission by the use of vacuum tubes was unknown to a large number of amateurs, and many inquiries were received asking how we obtained such an extremely sharp wave with our 500-cycle spark.

The majority of the apparatus of 1XM is owned by the Society or its individual members. Quarters (general views of which may be seen in Figures 1 and 2) and power are furnished by the Mechanical Engineering Department of the institute; the Electrical Engineering Department, the Communications Laboratory, and the Department of Military Science occasionally help just with the loan of some needed apparatus. The power is obtained from 110 and 220-volt, 60-cycle, alternating current mains of the institute; direct current is also available up to 10 P. M.

Due to the experimental nature of the station frequent changes in apparatus are made, and only the station as it happens to exist at present can be described here. No regular operating schedules are maintained and so the number of reports from distant points is not large, though in proportion to the amount the station is on the air the reports are very satisfactory.

The receivers in use at the station, one of which may be seen in the center of Figure 1, are similar to those in use at most good amateur stations and need not be described here. The particular one shown has plug-in coils and is arranged for the 15,000, 7,500 and 3,750—KC bands. One stage of audio amplification is generally used for amateur reception. The receiving antenna is one of about 30-foot length on the roof of the building, purposely short to minimize pick-up of the many kinds of QRM from the power house and the varied electrical ap-
apparatus in use at a great scientific institution.

The main transmitting antenna is suspended nearly vertical from the top of the powerhouse smokestack and consists of a single enameled copper wire. The counterpoise is a horizontal wire directly beneath the antenna, and about twenty feet above the ground. A smaller antenna is suspended from a point part way up the smokestack. The same counterpoise is used with both. The fundamental of the larger system is about 2800 KC, a series condenser being used for operation in the 3750-KC band; the third harmonic of the system is used for transmission in the 7500-KC band. The fundamental of the smaller system is about 6000 KC; its fundamental is used for the transmission of Standard Frequencies on the Canadian exclusive frequency of 5710 KC, and the third harmonic for the 15000-KC band.

Figure 1 is a general view of the operating bench with the Standard Frequency transmitter in the background. A duplicate operating position with another receiver and duplicate transmitter controls is located just to the left of the telephone.

The Power Panel and 100-watt Set

Figures 2 and 3 show the front and back views of the power panel and the 100-watt transmitter. The left hand panel in Figure 2 contains the power supply for the Standard Frequency transmitter which will be described later.

The right hand panel of Figure 2 contains the 100-watt transmitter. This transmitter uses the push-pull circuit shown in Figure 4. This should not be confused with the usual "back-to-back" scheme used in many amateur stations. The circuit is rather unusual in amateur stations, but is strongly recommended as very flexible and efficient. The single variable condenser shown will vary the frequency from about 9000 to 3000 KC; the only additional change necessary to QSY is the adjustment of the antenna circuit. The adjustment of the coupling will be found rather critical, but once adjusted the set will be found to function smoothly within the frequency limits indicated.

The two tubes are of Westinghouse make, rated at fifty watts output, and especially built with the plate leads coming out of the tops of the tubes.

The power supply for the 100-watt push-pull transmitter is obtained through an S-tube rectifier set and using full-wave rectification, located on the same panel as the transmitter. The voltage range is variable from 700 to 1500 volts.

The Standard Frequency Transmitter

Transmitter No. 2 was built especially for the Standard Frequency schedules. A very clear idea of this set may be gained from the photographs of Figures 5 and 6. The circuit employed is the familiar tuned-plate tuned-grid or Armstrong circuit, and is given in Figure 7. The tube is a General Electric type "P" photron, somewhat similar to the Radio Corporation UV-204, except for the heavy plate. Glass towel bars from a local five-and-ten-cent store make very convenient mountings for the coils which are made of % seamless copper tub-
ing. The plate-tuning condenser and the two grid-tuning condensers shown have \( \frac{3}{4} \)" spacing, and were especially designed and built for the Standard Frequency service by the National Company of Cambridge, Mass. Though normally rated at 250 watts output, the tube is generally operated at from 200 to 300 watts input. This seems to "get out" just as well and minimizes frequency changes. This set has proved very flexible over the frequency range included in the Standard Frequency transmissions though it has more controls than the push-pull transmitter. It holds its calibration extremely well as will be noted in text to follow.

The Mercury Arc

So many inquiries have been received regarding the Mercury arc that its essential circuit is reproduced in Figure 8. The "pi" section filter shown may be cut in or out at will. The filter is generally used with the 60 cycle supply, but is sometimes cut out when the output of the 500-cycle motor-generator is supplied to the arc in order to get a 1000-cycle "overtone."

The Standard Frequency Work

Since it is the Standard Frequency schedules that have recently brought the station into prominence again, some description of the method by which they are adjusted may be of interest. All Standard Frequency transmissions are referred directly to the Standard Frequency meter which is kept in the M.I.T. Communications Laboratory. A small receiving set is adjusted to the exact frequency which it is desired to transmit by tapping the box of the meter and varying the receiver controls until the sound is heard in the headphones. Once the receiver has been approximately calibrated this method proves faster than the common grid-reaction meter method, and fully as precise. The output of the receiver in addition to going into the headphones is sent over an ordinary telephone line to the transmitting station several hundred yards distant. The head-and-breast-set worn by the operator as he adjusts the transmitter controls and does the keying, may be seen on the hook in Figure 1. The Standard Frequency meter is shown in Figure 9. The coils, as may be seen, are made of very heavy copper tubing; the condenser is a General Radio Precision type with worm and gear drive for making close adjustments. The condenser is thoroughly shielded and grounded as is the entire heavy table to which the meter is permanently fastened. The transmitter having been adjusted to approximately the desired frequency by previous calibration, it is merely necessary for the operator to make vernier adjustments until he hears the signals coming back over the line. To avoid "broad" signals in the laboratory, the receiver uses neither antenna nor ground, and was especially constructed with a view to minimizing pick-up.

Precision

"The transmitter holds its calibration so well, and the method of setting the receiver is so precise, that, with rare exceptions, an audio frequency beat note between the transmitter and the receiver can be heard coming over the line the first time the key is closed. It is then merely necessary to adjust to approximately zero beat. It is planned in the near future to adjust the receiver to the proper harmonics of an approximately 250 KC quartz crystal oscillator which has been furnished through the courtesy of the General Radio Company, and may be seen in Figure 10. This method will probably be in operation by the time that this appears in print, so that the "announced frequency" may then be expected to have an accuracy of 0.01 or 0.02 of 1%, thus making these signals of use to the laboratories as well as amateurs.
Clapp, (1BYX) an M. I. T. instructor, for many practical suggestions in putting this service into operation; to Messrs. Snyder (9BNO), Dresser (1BOB-1VT), Hilton (ex-1BRQ) who, with the writer, have done the actual operating of the schedules; to Mr. Briggs (1BV1-1GW) who did a large portion of the construction of the Standard Frequency transmitter; to Mr. Snyder who built the power panel and did a large portion of the wiring; to Mr. Dyson who built the 100-watt transmitter; and to numerous others who have helped at times.

We have just been informed that the Pliotron has at last burned out. It has been replaced by a Mueller MS-1 tube rated at 500 watts output but operated at inputs of 100-400 watts depending upon the frequency that is being transmitted. This tube is available for this work thru the courtesy of the Tobe Deutschmann Co., Cornhill, Boston, Massachusetts.

The Maritime Division Convention

Another of those fine little conventions has been pulled off. The Canadian Maritime Division held its third convention in St. John N. B. on April 23rd and 24th. It was a convention typical of the kind we used to have in numbers, years ago; a collection of keen brass-pounders intent upon having a good time, transacting some business and enjoying an excellent banquet.

The convention was staged by "skipper" Atkinson, c1AK. Representatives from all the Maritime Sections save Labrador were present. Reid of cSAR came all the way from that distant Newfoundland country; Bill Borrett (need we say c1DD) and Campbell, c1DJ came from Halifax, Hyndman c1BZed represented Prince Edward Island and the gang from N. B. was both large and lively.

The first afternoon was taken up in getting acquainted. The banquet was held during the first night in the Admiral Beatty Hotel. Atkinson presided. Mayor Frink of St. John opened the fireworks by welcoming the gang to the city. Palmer of c1AM accepted the welcome. The Mayor then presented this years Murphy Cup award to Joe Fassett. As Joe was not with us Bill Borrett accepted. Then followed a series of talks, a wire untying contest, a nose key-punching contest, a diagram reading and correcting contest, a best Liars contest and several other prize winning features. Between, the gang ate a delicious meal. Reid gave a short talk advertising the wonders of Newfoundland and then the initiation into the Royal Orders of Transatlantic Brass-pounders was staged for the benefit of six novices who having previously crossed the Atlantic via Radio were taken across the burning desert partaking of the Sacred Worms enroute and finally emerging full-fledged ROTAB members.

The next morning the St. John street-car was chartered and the town was given the once-over.

That afternoon a business and technical session was held. Maritime Division business was transacted, Bill presiding. Two excellent technical papers by Prof. Ritchie were read by Borrett and a general hamfest followed. The night session took place in the hotel rooms, part of the gang listening on Bills S/W receiver, part trying to make his S/W low power transmitter transmit and the rest chewing the sock.

All in all this was the type of convention we love to attend. Enough fellows to make it most interesting and not so many fellows that personal contact with all was impossible. A most convivial and congenial gang of darn good sports, F.B. OM's. Long live Canada and QL, but especially Vive La Maritime!

—J. Mc.

Strays

The A.R.R.L. Communications Manager, Mr. F. E. Handy, and Miss Winifred G. Richardson, formerly of A.R.R.L. Headquarters, were married in Hartford on April 17th, and have been receiving congratulations from the gang.
This is the crystal-controlled station of J. E. Hodge, 143 Bull Street, Savannah, Georgia. 4BY is an old timer and has been described in QST previously. The former station used two 204's built in as compact a set as possible. The present 4BY is the reverse of the old one—there is plenty of room for a couple 1 K.W. tubes and still space for one to crawl into the set and not have to tear down the whole works to change a grid leak!

4BY was one of the first crystal-controlled stations in the country. The present set uses a UX-210 crystal oscillator and two 204 power amplifiers. The frame work and panels are of poplar boiled in paraffine for half an hour. The crystal and oscillator tube are located conveniently on the small shelf between the two panels. The crystal oscillator's filament voltmeter, high frequency ammeter and tuning condenser are directly beneath the UX-210. The crystal oscillator grid inductance (small picture) is directly to the right of the oscillator tube. This inductance is an 8 turn coil of No. 14 wire, spaced by means of knotted flax thread. The turns are spaced 1/16th inch and are 4 inches in diameter. Plate voltage is 400, with a grid bias of 22½ volts.

The power amplifier inductances are cut away R.C.A. helices spaced with glass heads and supported on glass rods. For 80-meter work 12 turns are used in both helices. For 40 meters the helix in the last power amplifier circuit has only 5 turns, the first power amplifier remaining on 80 meters. Normally 1,000 volts are used as plate...
voltage for the two power amplifier tubes. With a 90-volt grid bias the plate current is 125 milliamperes per tube.

Three separate filament heating transformers are used. With this arrangement, a master rheostat (on the front of the panel) can be used to adjust all filaments at the same time.

The change-over switch shown on the table is the only switch used. This, on the send side, connects the antenna and counterpoise to the transmitter, starts the M. G. set which is in the garage, turns on 220 volts to two of the filament transformers and 110 volts to the other transformer, and also sets the relays that are used for keying. Keying has been done in a variety of places. Keying the last power amplifier bias circuit and the antenna simultaneously gives no back-wave but gives rise to fierce key thumps. Keying in the center tap circuit of both power amplifiers results in less key thump and still keeps out the objectionable back-wave which is due to the crystal oscillator running all of the time.

As this is an experimental station the note varies directly as the crystal in use at the moment. At times the note is not good but invariably the wavelength stays put and the note steady.

Neutralizing of the power amplifier circuits has been tried with negligible success. This is probably due to the fact that the input to the power amplifiers is so far below normal rating that serious feedback rarely occurs. The circuit is more or less the standard one, with no shielding of the crystal oscillator grid coil.

c4GT, Calgary, Alberta, Canada

This very excellent station is the product of years of work on the part of A. H. Asmussen, owner and chief operator. The station started off with the two 250-watt DeForest tubes hanging on the wall. Due to a heavy overload they passed out of the picture soon, and were replaced with a single Northern Electric (W. E.) 250-watter. This latter tube has been used regularly for over two years and a half. Asmussen has made a careful study of low input into over-size tubes, and believes that the main trouble with amateur operation is overloading the tube in the transmitter. The input to the 250-watt tube has never exceeded 200 watts. Some of the stations very best DX has been done with an input of only 120 watts.

The transmitting circuit is the familiar Reinartz type. Six variable condensers are used. In fact the only fixed condensers in the transmitter are the filament and plate by-pass condensers. The inductances consist of twelve turns of 3/16 inch copper tubing wound to a diameter of six inches. The turns are spaced by glass beads threaded on a string. Plate voltage is supplied to the tube from a 1100 volt power transformer, via a synchronous rectifier. The filament transformer has a center tap to which grid and plate returns are connected. In addition there is a 300 ohm potentiometer
connected directly across the filament leads, the arm being connected to the filament center-tap. 4GT says that this helps materially in clearing up the note. The filament rheostat is a home-made carbon pile compression type.

There are five different aerials at the station. One of them is a thoroughly insulated wire buried in the ground. Three separate ground connections and two counterpoises are also provided. By means of the switches on the panel at the extreme right, any combination of antenna, counterpoise or ground can be picked up.

The receiver mostly used is a Reinartz-Weagant-Schnell-Austin-Young type rebuilt, remodeled and rehashed every now and then. Directly behind the receiver is a small A-and B-battery panel. By means of the Jones plugs and jacks on this panel any B-battery voltage from 2 to 200 can be readily plugged in and the A-battery (two 6-volt ones) can be put on the set or on charge. The Ultradyne superheterodyne on the shelf above the receiving tube rack is used for short wave work occasionally, although it is not as good as the standard short wave one on the table.

The DX at this station has been exceptional. Schnell on NRRL reported 4GT's signal as one of the most wicked, if not the strongest, he regularly heard. QSO with Australia and New Zealand goes on almost as regularly as clockwork. The station log is always kept up to the minute and is arranged so that the operator can tell in a short while exactly when a certain station was heard or worked and what the signal was like. A fine job, indeed, OM.

7AY, Eugene, Oregon

This station has been in operation for about one year. It is manned by W. E. Slauson, an old timer hailng originally from Monticello, Iowa in the pre-war spark days.

The transmitter consists of one 203-A tube operating in tuned-grid tuned-plate circuit. Parallel feed is used and the plate supply, 1000 volts of rectified A. C., is supplied by a transformer and two "S" tubes. Regulation of the input to the "S" tubes is provided for by a three way switch, a sixty watt, 110-volt lamp being connected in series with the primary of the power transformer to warm up the "S" tubes before the evenings operation starts. A filter of 4-µfd. by-pass condensers and a 50-henry choke are used. The note is reported as being almost pure D. C.

The transmitting inductances are made of copper tubing. Eight turns are used in the grid coil, nine turns in the plate coil and five and a third turns in the antenna coupling coil, for 40-meter operation. The coils can be interchanged almost instantly. Three turn coils can be substituted for the eight and nine turn ones for 20-meter work. Two 140-turn R. F. chokes are used, one in each high voltage supply line. The chokes are of number 30 wire on forms an inch and an eighth in diameter. The transmitter is operated a little below the fundamental for 40 meters and on the second harmonic for 20 meters.

The antenna and counterpoise lead-ins come in through the windowpane at the right of the transmitter. The antenna is a four wire vertical cage, 37 feet long. It is supported by a 57-foot self-supporting pole. The counterpoise is a "t" affair about 50 feet long. Plate glass insulation, and plenty
of it, is used in both antenna and counterpoint.

The receiving set is also a tuned-grid tuned-plate set, using 201-A tubes. It has one stage of audio frequency amplification. Plug-in coils are provided to cover all wavelengths between 10 and 90 meters. The National condenser on the right of the panel is trimmed down to 4 plates. This is the secondary tuning condenser. The regeneration condenser is a 250 μfd. Bremer-Tully, at the left of the panel.

The transmitter and receiver are mounted on shock-proof pads. Care has been taken in the choice and location of all insulation and in the arrangement of apparatus in order to get best results. A Seattle Radio Lab wavemeter is almost indispensable.

The New England Division Convention

BRIGHT and early Friday, April 9th, delegates from all sections of New England began to arrive and registration at the Hotel Biltmore, Providence, R. I., showed a total attendance of 250 by Saturday afternoon. The Hudson Division had ten members present and a few from other Divisions were in evidence.

Chairman Young welcomed the delegates at the first meeting and then turned the meeting over to A. A. Hebert from headquarters, who acted in the absence of Division Manager Cushing, who was late in arriving. A detailed explanation of the new Communications Department was given and discussions took place afterwards. A very good address was given by Mr. Roger Williams of the Ceco Co., of Providence on Vacuum Tubes.

The first evening was given entirely to entertainments and a number of worth-while stunts put on. The Boston fellows had a skit that provoked some mirth; the P.R.A. String Quartette, assisted by one of their Y.L's, played Hawaiian Dance music. "Dark Waves, or the Providence Radio Assn. in 1920," was well staged and Maney was F.B. in his "technical talk." The time-honored Cracker Eating contest produced as much fun as ever, and for the first time in our knowledge was participated in by the Y.L's; 1KY and 1A1D showed themselves real "ham's." The Liar's contest was pulled off, but the platform evidently made the competitors self-conscious and it was not until 2BW (Doc. Walsh) got started that competition became strong. All honors were carried by Doc. Walsh, and to quote from one of the newspapers, "such an exhibition should land him in the General Assembly."

Saturday was certainly a full day with examinations for licenses by Inspector Butterworth; a trip to WJAR and the afternoon lectures so well handled by the different speakers. Prof. C. W. Miller of Brown University spoke on "The Contribution of Radio Amateurs to Pure Science." Doctor Elliott White of Dartmouth College was interesting in his topic: "Transmitting Tube Adjustment." Mr. S. N. Read, ICRF, gave us something to think about on, "Radio Pictures," and if our experimenters will only get busy now it will not be long before we can see each other at our sets.

Both Johnny Reinartz and Fred Schnell made everyone feel envious of their respective trips so well described, and there is no doubt that future expeditions will have no trouble finding men to go along as radio operators.

The Banquet, with Director White as Toastmaster, was unusually good. Our President, Hiram Percy Maxim and Mrs. Maxim, both gave us two very fine talks. Other addresses were made by Treasurer Hebert, Radio Supervisor Kolster and D. A. O'Connor, President of the Providence Radio Association, under whose auspices the convention was held.

The Grand Finale was a 3-act play, "How It All Began," written by 9DIP, and well staged by the Radio Transmitter's Association of Hartford, who deserve a lot of credit for the hard work put into this play, and which was enjoyed by everybody. (F.B., Hartford Gang). It was agreed by all that this convention was the best ever held in New England and the thanks and appreciation of all delegates go to Messrs. Young, Kenyon, O'Connell and other members of the Providence Radio Association, under whose auspices the convention was held.

It was agreed by all that this convention was the best ever held in New England and the thanks and appreciation of all delegates to Messrs. Young, Kenyon, O'Connell and other members of the Providence Radio Association for making it such a success—and not forgetting all those loyal manufacturers and dealers, whose names appear on the programme, for the prizes contributed.

HARTFORD NEXT YEAR, fellows.

A. A. H.

Strays

The Southern California Radio Association have formed a sorority addition which is called "The She-W Club." Next! The line forms on the right of the one with the marcel.

4DZ and 4AW have organized the "Palm Beach Radio Co." and have a station at Palm Beach with the call WOE. This will be interesting to brother A.R.R.L.ers in the commercial game at sea. They have a 500-cycle kit, but they can also use a 60-cycle "sink" for those who want to hear that old familiar roar. WOE is located on a pier 500 feet from the shore.
 Amateur International Intermediates

A—Australia
AU—Alaska
B—Belgium
BE—Bermuda
BF—Brazil
C—Canada and Newfoundland
CH—Chile
CR—Costa Rica
D—Denmark
E—Spain
F—France
FL—French Indo-China
G—Great Britain
GI—Ireland
H—Helvetia (Switzerland)
HU—Hawaiian Islands
I—Italy
IC—Ireland
J—Japan
K—Germany
L—Luxembourg
LA—Norway
M—Mexico
N—Netherlands
O—South Africa
P—Portugal
PE—Palestine
Q—Cuba
R—Argentina
S—Scandinavia (Denmark, Finland, Sweden)
SR—Republic of Salvador
U—United States
Y—Uruguay
Z—New Zealand

*These intermediates have been self-assigned and are unofficial. They are in more or less general use, however.

A New One

On the morning of March 29th u60I connected with a new station o (zero) ISR at Salisbury, Rhodesia. Contact was held for forty-five minutes, a message of greeting to the ARRL being transmitted. ISR's wave was 31 meters. Following this initial work 60I and ISR connected several times more, working “both ways around.” F.B! 60I has a new transmitter using a 250-watt tube. A photo of the new set is shown herewith. On April 2nd Borden of u1CMX and o1SR were QSO. Their QSO was also for about forty-five minutes although contact was broken up by QRN and QRM. o1SRs full QRA is J. W. Davidson, Box 580, Salisbury, Rhodesia.

Java

This boy Wentworth is hard to keep up with. As fast as he works a new station or a new country he comes back the next night and does a better job of the next one. The latest (up till time of going to press) is ANDIR the Military Airdrome, Andir, Java. He and 60I connected on the morning of April 2nd. ADIR was on 37 meters with 500-cycle note.

Crystal Controlled

u1CAK and g2SZ, both crystal-controlled, connected on April 12th for the first transatlantic two-way crystal controlled work. g2SZ was on a wavelength of 50 meters with D. C. supply and u1CAK was on 425, also with D. C. supply.

Australia

V1S and u9ZT connected recently. V1S is First Squadron, Australian Air Force, Point Cook, Victoria, Australia. It is expected that several other Air Force stations will be QSO on short waves soon.

Austria

A number of S/W ham stations are in operation in Austria now. Their intermediate is the German O (---). The following are in operation: AF, AR, AW, BE, BR, CP, DA, FG, FH, FL, HF, HI, HR, JA, JL, KH, KK, LA, LM, LP, MH, NA, OA, OP, RF, RH, SF, SJ, SV, TA, TM, TO, TW, WA, WM. QSL’s should be sent to Oesterreichischer Versuchs sendeverband, Klubsaal des Hotel de France, Schottenring 3, Wein 1, Austria. We are indebted to 8DTO for much of the above information.

The WAC Club

Have you applied for your WAC Club certificate yet? A photo of the first certificate
The following stations have submitted applications and have been entered on the rolls of the WAC Club as full-fledged members: u6OI, u6HM, u1AAO, c4GT, pr4SA u8ZT-9XAX, b4YZ and gi5NJ.

The rules for applying for membership are few. You must have worked an amateur station in each of the six continents (see pg 54 of the May QST) and you must send QSL cards received from these stations to ARRL Headquarters addressed to the WAC Club. The cards will be returned promptly and if you have qualified for membership you will receive your certificate at the same time.

Major Raven Hart, ch9TC, one of the pioneer DX men in Chile has left that country and is now located in Barcelona, Spain. The Major says that a short wave receiver will be in operation in Spain very soon and he hopes he can get a transmitter going also. Good luck, OM es, CUL.

J. Gachelin will be in the States for several months and is anxious to meet as many of the U. S. gang as possible. He can be reached care Delco Light Company, at Dayton, Ohio.

The QRA of ch2RM-chG3AO is Rodolfo Mebus, Casilla 3208, Santiago, Chile. His QRH is around 37 meters and he is anxious to get QSO as many amateurs as possible. QSL cards addressed to the above address will receive prompt replies.

Several new contacts in China have been established. ch1TM, giving his QRA as Tangku, China (about 80 miles southeast of Peking) and 60I connected recently. 1TM was on a wavelength of 37 meters and 60I reported him RB. 8ATX worked a station HKZ which gave his QRA as Colonel Warren, Pekong Street, Hongkong, China, on April 25. 3Z's QRH was 30.7 meters. He was using a 5-watt tube at the time and u8ATX was using a 250 watter.

Due to business pressure M. G. Dixon has resigned as Secretary of the British Section of the I.A.R.U. and F. A. Mayer has been appointed in his place.

An error in call books is causing cards addressed to g5YI to wander all over England before reaching their destination. The QRA is A. L. Goodlife, 17 Malvern Road, Mapperley, Nottingham, England.

Another very excellent piece of DX work has been pulled off, hu6CCLJ Masayuki Misamoto, at Honolulu recently worked a3AB in Johannesburg, South Africa. hu6CCLJ was using a 50-watt tube with an input of 39.5 watts, operating on a wavelength of 38 meters. The distance is around 14,000 miles. The sun was shining brightly in South Africa while CCLJ was waiting to eat his supper! This boy CCLJ deserves a lot of watching. He is going to make a lot of the DX hounds look to their laurels. With only 2.5 watts input to a 202 he has been QSO ch3IJ, about 6,000 miles away and with either a 202 or a 201-A he has been QSO several times with rDB2. With the 50-watt transmitter at 6CCLJ has also been used to work HV in Indo-China. Hisamoto is a High School student, working after school as radio operator, receiving broadcast press news from JAA for the Nippu Jiji Publishing Company. We wish we had a photo of 6CCLJ. Maybe we will have one before long.

Amateurs in foreign countries will confer a great favor upon the hams in the States, who are doing their best to operate in the correct manner, by paying no attention to the U. S. amateurs who are operating off their correct wavelengths. If you hear any "U's" out of their band please disregard their calls.
Please let us know as soon as you are QSO 2JL.

u6OI has had a schedule for some time with GEFT, h.m.s. Concord, on a regular run from Singapore to Southampton. They have been swapping QSOs ever since GEFT left Singapore. If you want to QSL communication with GEFT address him Petty Officer Telegraphist McTaggart, h.m.s. Concord, G.P.O., London.

Ireland

"Licenses for transmission were only granted in June 1925, but since that time Irish stations have been in communication with amateurs in all parts of the world. 5NJ has worked Australia, New Zealand, North and South America, South Africa, India, French Indo-China, Phillipines, Egypt and many other countries, besides putting good speech into 6BQ. 2IT is also QSO many parts of the world. 6YW has worked USA on 2 watts input, a record for Irish DX. 6MU is often QSO Australia, USA, Brazil and most of Europe. Other active stations are 6TB, 2WK, 6SQ, 6QD."—5NJ.

5NJ was the first licensed station in North Ireland. Maximum power is 100 watts. Both an 8-tube superhet and a two-tube regenerative receiver are used for short wave reception. The transmitter operates in a Hartley circuit working into a Hertz antenna.

Japan

Good of u6AJM-6CJP worked 3JW, Tatabgawa, 4 Yamamoto St., Kobe, Japan, with a 210 tube. The actual input was 38 watts and 3JW reported him R6. 3WW's QRH was 38.6 meters at the time.

2ABR has been copying commercial JIRA handling traffic with JJC on 35 meters.

38JLP was QSO 2ABR whose QRH is Shunichi Taketa, Shimoshizu, Hikagakko Chiba, Japan.

Madeira

Madeira and Portugal use the same intermediate signal, P. The Madeira stations have calls beginning with 3, while all the Portuguese calls start with a 1. Madeira is an island off the coast of Morocco. There are three active stations we know of there, p3GB, G. de Bianchi, Quina da Paz, Funchal, Madeira; p3CD, A.C. de Oliveira, c/o The Western Telegraph Co., Funchal, and p3EZ, J. Ferraz, Rue Ste. Maria 263, Funchal. 6OI in common with a number of East Coast U. S. and Canadian Stations has been QSO p3GB who seems to be the best DX getter of the 3 Maderia stations.

Mexico

We are pleased to show a photograph of m9A one of the most prominent ham stations in Mexico. The transmitter uses a single 203-A obtaining plate supply from four "S" tubes. The antenna is a single vertical wire 38 feet long. A single wire counterpoise 30 feet long is used. The station operates regularly on 38 meters. A Reinartz receiver with one stage of audio frequency amplification and two BC Ultra­dyne receivers (not shown in the photo) comprise the receiving equipment. m9A has a splendid list of DX to his credit, although receiving conditions are usually pretty poor in his locality.

Morocco

A new station in Morocco was communicated with recently, and gents 1MK at the A.R.R.L. Headquarters station was the fellow to work him! He is fm8MB, L. Bensimhon, Box 19, Case Blanca, Morocco, Rodimon was at the transmitting lever at 1MK when this communication was pulled off. fm8MB has previously been reported as being heard by u3CHG but we believe this is his first U. S. contact.

New Zealand

Via radio from 5ZAI we received the following news bulletin from Z3AF: "The
Whaler Sir James Clark Ross, AQE, has left New Zealand regions QRD home, and by now should be in Europe. In a few months AQE will return again to the antarctic and no doubt will be glad to QSO hams in all parts of the world. Last winter did not seem to be very good for reception of American 40-meter signals, the summer (which is just ending) being much better as far as this part of the country is concerned. A month ago DX was good but lately fewer stations have been heard here. There is a new station open in this city this month. It is z2AC, The Radio Society of Christ church. A fifty watter with an input of 50 watts is being worked regularly, but very few Canadian stations are working regularly, but very few Canadian stations are being listed. — z2AF. 9ZT sends us this dope from z2AC: “z2AC was first station in New Zealand to be QSO p3GB and Russian NRL Also z2AC has a daily schedule with f8JN f8JN’s QRH is 33 meters and he can be heard every morning at 7 G.M.T. He is the loudest heard in nz and sometimes he is QRK R8! Some time ago z2AC was QSO f8CM in China. His QRA is Elecmecani Factory, nr 544, Route de Zikawei, Shanghai, China. His QRH is about 35 meters, pure D. C.”

Norway

The Norwegian amateurs have formed the NORSK Radioforbund, the central organization of all radio clubs in the country. It has about 35 members. QSL cards should be sent to Norsk Radioforbund, Oso, Norway. Transmitters are using 20 watts input on wavebands as follows: 2 to 5 meters; 29 to 35 meters; 69 to 81 meters and 100 to 120 meters. Both telegraphy and telephony are allowed in all bands. The intermediate is LA the calls being 1B, 1C etc.

Philippine Islands

Elser of p3AA has just pulled off some splendid DX reception. He has worked g5HA when the latter was using an input of only 5.4 watts! On March 19th at 7 a.m. he overheard u9AX calling 8EO and then a CQ for several minutes. The distance between u9AX and p3AA is about 14,600 miles! p3AA has been in operation since January 20th. Twenty fours after the station was in operation communication was held with Brazilian stations. Very shortly after that Elser left for Manila and has just gotten back to Baguio where 3AA is located. The transmitter at 3AA consists of two 50 watters in a coupled Hartley circuit. The usual operating wave is 38 meters. His power supply is obtained from a small hydroelectric plant and the 110-volt 60-cycle supply varies both up and down. Keep a watch for p3AA from now on!

“L. A. R. U. Press”

A number of the fellows have been sending in IARU News Press Bulletins via radio. This is splendid. Not only are several months delay avoided but also the messages so handled are of the best type there are going through the air today. u5ZAI, u9ZT, u9XI, z3XA, z2AC, z3AF, a2YI and several others are to be commended highly for their great help. In this connection we would like to point out that there is no way on earth in which we can find the QRA of the many new stations in new countries that you fellows have had QSO’s with unless you write us. The IARU News form closes on the 20th of each month. We would like to have a line of news from every country on the globe. If you cannot make it by radio, shoot it in through the mails. The news should contain data on new stations, new contacts between your country and other countries, any exceptional DX work, account of expeditions about to sail or under way, account of any exceptional traffic handling feats, dope on new laws and regulations in your country and any other ham dope which will be of interest to the rest of the ham world.

Ship to Land

The photo shown is an interior view of GDVB the motor liner Aorangi whose signals are familiar to all the hams on earth. A. E. Hay is the GDVB’s chief operator and holds experimental amateur license g2KG.
The first assistant operator is g2KC. GDVB is the largest motor liner in the world (23,000 tons) and is commodore ship of the fleet of seventy vessels comprising the stock of the Union Ship Company of New Zealand. The Aorangi runs regularly between the Antipodes and the American continent via Honolulu. Much experimental work has been done on the ship on wavelengths between 22 and 49 meters with power inputs ranging from 50 watts to 3 K.W. After exhaustive tests it has been found that the best short wave signals have been pumped out when the long and high T ships antenna, the receiver as there are over 2,000 having a fundamental of 435 meters, is used. The normal short wavelengths of GDVB are 38 and 38 meters. Ordinarily very bad induction trouble is caused when working on board for electrical power purposes. GDVB is also very busy on 600 and the normal short wavelengths of GDVB are 38 and 38 meters. Ordinarily very bad induction trouble is caused when working on board for electrical power purposes. GDVB is also very busy on 600 and the longer commercial wavelengths, which accounts for the fact that the short wave work is cut short at times. The operators will certainly appreciate any and all QSL's either of communications or receptions of GDVB's signals. They can be sent either to Sydney N.S.W. or Vancouver.

Volunteer Wanted for Standard Work

A VOLUNTEER station is wanted to send standard frequencies from some point in the central portion of the United States, distance north or south being a secondary consideration. The best location for such a station would be in the Midwest, Dakota or West Gulf divisions although the Rocky Mountain, Delta and Central divisions are not too far removed to be out of question. The requirements are somewhat as follows:

1--The transmitter should be controlled by an institution or individual widely and favorably known so as to inspire public confidence.

2--Accuracy better than 1/10 of 1% is necessary.

3--Ability to send standard frequency schedules one evening each week plus one schedule every third or fourth Sunday afternoon.

4--Ability to undertake the work for a considerable period of time, preferably in the summer as well as the winter.

5--Some sort of organization to insure that the schedules will be sent regularly; one man cannot do the job.

For further information see the various OWLS (SF) schedules of 1XM also the description of that station in this issue. The A.R.R.L. cannot furnish apparatus for this purpose but 1XM, thru the courtesy of Dr. G. W. Pierce of Crift Laboratory at Harvard University will arrange for the calibration of a quartz crystal submitted by the prospective SF station. The accuracy of calibration will be better than the ability of the crystal to retain the same excepting under absolutely constant conditions.


R. S. K.

Pacific Division, Southern Section, Hamfest

ONE of those jolly hamfests was again pulled off by the Southern Section, at the Elite Confectionery in Los Angeles on April 9th. With an attendance of seventy members present it really had the dignity of a real convention.

Director Babcock came over from Frisco and gave us a complete report of the annual board of directors meeting and explained the recent changes in the Communications Department and the reasons therefor. We now feel that better contact will exist between the ORS' and those interested in traffic, and Headquarters.

Mr. R. B. Ashbrook of the Southern California Edison Co., who is in charge of power-line-QRM-elimination, gave us a short talk in which he expressed the willingness of the company to co-operate to the fullest extent in clearing up such interference.

Miss Flora Turner, 6BXA, the only "YL" present, received a hearty welcome. It is always a pleasure to have the "YL's" at our meetings; their presence has a benign influence upon us. "May their tribe increase!"

Another visitor was Mr. B. T. Withers, 23AM, who told us of amateur radio conditions in New Zealand. Ben McGlashan, 6PI, also of KFWB, made the pleasing announcement about the Warner Studios' program, which is to be carried out under their auspices with the assistance of the A.R.R.L. Southern Section. More will be reported on this later.

At the conclusion of the Banquet, 6CNL rendered a few selections on his "uke," and 6CHZ played a $25,000 (?) composition of his on the piano. After the "gang" heard that, they all went home, but not before L. Elden Smith, Section Manager, said that this was the most successful meeting held in some time, and it was a "loud speaking" evidence that we are all pulling together, and let's hope we will continue to do this.

6CHZ—A.A.H.
Correspondence

Greeting to the High Schools

(The following radiogram from Honolulu has been received at Headquarters via 7AFO, R. G. Olson, Tacoma, Wash., originating at 6CLJ, the station of Masayuki Hismato, Honolulu. Incidentally, this is quite a message to come over that distance.—Ed.)

McKinley High School, Honolulu, Hawaii.

Greetings to all mainland high school students via the American Radio Relay League, Inc., Hartford, Conn.: On behalf of the two thousand students of McKinley High School, Honolulu, Hawaii, I send greetings to high schools in all parts of the United States.

We feel very near to you all, right now, in spite of the more than two thousand miles of water separating us from the mainland. In spite of our location and the great diversity of races, we are progressing in our student body. We are Americans both by birth and choice. The races represented in our student body are: Anglo-Saxon, Spanish, Portuguese, Japanese, Hawaiian, Chinese, Porto Rican, Korean and others.

Our high school has now four splendid new buildings, with an auditorium seating approximately two thousand students, to be built this year. Our courses and subjects are much the same as those taught all over the United States. Just now we are re-organizing our student body government. We take part in all kinds of athletics and support our teams with as much loyalty as that shown by any other high school. Our high school paper, the “Pinion,” goes to all parts of the U. S.

We extend a warm Aloha to you all.

Miles E. Cary, Principal, McKinley High School.

Sulphur Insulation

1311 Spring Road, N. W., Washington, D. C.

Editor, QST:

Sulphur is a useful insulator for many purposes. It has its weak points, however. Sulphur exposed at summer temperature in a laboratory where mercury is present will acquire an invisible and conducting coating of a sulphide of mercury. This impairs the insulation. The coating can be removed with sandpaper. This effect was called to the writers attention several years ago in a course on radium by Dr. Herman Schlundt of the University of Missouri. It is not difficult to melt and cast sulphur. This can be accomplished with little or no odor if care is taken. Use a large tube or deep vessel. Do not heat too hot. Sulphur melts and runs freely, and at a higher temperature becomes stiffer and turns dark temporarily. There is considerable shrinkage in sulphur castings, pipes or holes forming in the interior. By pouring carefully and following up the shrinkage by additions of more melted sulphur, a more solid piece may be secured.

Sulphur is a good insulator for electrostatic charges, as for instance in electroscopes. It was interesting to learn from QST that it also has small dielectric losses. Melted sulphur has been poured under the bases of heavy machinery to set and hold it. Sulphur, however, will crack under some kinds of mechanical shock. Experience with it in radio should be carefully noted.

—C. A. Briggs, 3CAB

A Good Suggestion


Editor, QST:

I have just finished an hours watch listening to you fellows in the U. S. A. calling CQ and CQ Europe. It appears that much of the trouble in getting QSO is due to the fact that we are uncertain what wavelength you chaps are going over to listen on, with the result that we may be shooting perfectly good juice into the sky and you are listening many meters off our waves. The real trouble lies in the fact that whilst all you fellows are around about the same wavelength, the European amateurs vary widely, especially in the continent. Then there are the BZ’s and others on your side, some above and some below the sound wavelength, the European amateurs vary widely, especially in the continent. Then there are the BZ’s and others on your side, some above and some below your bands. I would put forward as a suggestion for the consideration of the hams that the wavelength or wavelengths on which you will listen be indicated during the CQ call, and a new QR signal be manufactured for this purpose. Thus: ‘QRHH 30 45’ would mean that when you finally get through CQing you will listen on the band between 30 and 45 meters.

The result, I am sure, would be more QSO’s. For instance, on one occasion I
heard a BZ on 35 meters calling a U whom I had heard just before. The BZ goes over and gets no reply, and I heard that he didn’t. On other occasions I have chanced calling him, wondering all the time whether this bird will be looking around at all, and if so whether on my wavelength, 45 meters. If I knew he would be listening around my wavelength I could call and be reasonably sure of a QSO. The above QRHH should be used only when calling or answering a CQ, and not otherwise. Hw, OM’s?

—R. Bloxam, g5LS—

Better Multiplex Work

At Sea,

—as West Jester, KUDG.

Editor, QST:

In connection with the article “Multiplex Reception” in March QST, the following might be of interest: Here aboard ship I am obliged to keep a fairly sharp watch on 600 meters while at sea, and at the same time I frequently want to copy long wave press or short wave ham stuff. The duplex stunt was originally accomplished with a plug and jack transfer scheme as shown in Fig. 1. Four jacks were mounted at the corners of a square on a piece of bakelite, and two plugs were tied together so that they fitted the jacks, either across or up and down. With the double plug in position 1 a separate phone is connected to each receiver. Turning the plugs upside down in the same pair of jacks “change ears”. In position 2 both phones are in series on receiver A only, and in position 3 both receivers are in series on receiver B.

Later on I substituted two 4 pole double throw anti-capacity switches for the plug and jack arrangement. The hookup is shown in Fig. 2. With both switches up both phones are in series on receiver A, while when both switches are down the two phones are in series on receiver B. With the left switch up and the right one down the duplex arrangement with one phone on each receiver is secured. Remember that the switch handles move in a direction opposite to the blades on the anti-capacity switches, though.

—L. O. Doran, KUDG

Rotten QSR

1476 Broadway, New York City.

Editor, QST:

Sometime ago we decided that if we could get a shack on top of a prominent hotel we could accomplish a lot of DX and relay work. It was intended to use the shack as a station and also as a meeting place for hams. We put the proposition up to the management of the hotel. Their verdict was sure and exact. If we could prove the value of amateur radio in relaying some of the guest’s messages to distant points then the hotel was ready to allow us to use their roof and even provide a shack for it. We solicited messages. We received messages for Germany, France, British Columbia and other DX points. Not having sufficient power ourselves we relayed them to 2FK whose records show they were sent on their way.

Days passed. We sent out tracers. More days went by. Still no answers. These messages are on the hook or in the wastebasket in some ham station, and are staying there. Our shack is no more a possibility. Amateur radio has received a serious setback in the eyes of over 300 B.C.L.’s who had been to think that brass pounding was done by really serious thinking men. Evidently we can relay over pre-advertised, prearranged schedules at prearranged times but otherwise our efforts are wasted and we become mere tinkerers with our “Hws the note, OM?” “Wts my QRH, OM?” “Pse send card, OM” and other such stuff which we term doing relay work.

Something has to be done. This sort of stuff simply has to stop, or amateur radio will always be the nervewrecking muddle of mere nothing that it is now. Send out your messages within 48 hours and not 48 days. Then and only then will amateur radio be on the footing it was in the good old days long past.

—L. M. Horowitz, 2AIA
—K. A. Kopetsky, 2AIA

June, 1926 QST 63
P. R. R.
Operating Department,
Pennsylvania Railroad System,
Philadelphia, Penna.

Mr. Hiram P. Maxim,
American Radio Relay League,
Hartford, Conn.

Dear Sir:—

The period of the A.R.R.L. emergency service for which we arranged with you is over for this season. Fortunately there were no emergencies which developed during this time that made it necessary to call on the League members for assistance, but from the tone of some of the correspondence, it is evident that some of the enthusiasts would have enjoyed handling some real messages just to prove that they were equal to the occasion; and we believe that they could have done it from the results of the tests toward the latter part of the period.

The League organization and the members who participated in these tests, also those who stood by in readiness to bridge a gap or handle such messages as might be assigned to them, are to be commended for the excellent results in handling the test messages, and for their loyalty in standing by the League, doubtless sacrificing their own pleasure for the sake of carrying on.

This service is in the nature of insurance against interruptions to our communication system caused by severe storm conditions which usually may be expected to hit us somewhere during the winter months. Prompt and accurate communication is essential in transportation work, especially during emergencies when assistance is necessary for the relief of passengers or the prompt handling of perishable freight, etc. This kind of communication, handled promptly and with accuracy is what the tests were intended for, and there was a noticeable improvement in the later tests.

It is hoped that the pleasant relations established through the medium of this emergency work will have proved beneficial from every standpoint and that they may continue in the future, also that arrangements may be made this fall for a resumption of these activities.

With kind personal regards and best wishes to you and all the members of your organization who participated in any way in this emergency work.

—J. J. Johnson,
General Superintendent Telegraph.

Shut In?—Not with a S. W. Set

208 N. Jackson Ave.,
Kansas City, Mo.

Editor, QST:

For three or four months I have been one of the many who have been causing QRM on 40 meters. I am what is generally known as a “shut-in”, but I do not feel shut-in any more. I have to lay flat on my back all of the time, and can use only my left arm. Last November 9ADR made and installed a 5-watt transmitter for me. He also made a change-over switch to be operated by means of two strings. He put a six foot extension cord on the key and put a switch in the primary of the power transformer. I can work the set very easily and I can usually get back on the air as quickly as the other fellow, 9BMP gave me the tube for my transmitter and 8EQ made my receiver.

The first station I worked was 6ATX and when I heard him calling me I got so excited I didn’t get a single word he was sending. I asked him to repeat and he did, but I didn’t do any better the second time. 6BQ was the second station I worked. Since then I have worked many stations. I usually operate in the morning or in the afternoon and find no trouble in connecting with a lot of fellows who will “chew the rag” with me.

9ADR is the call of Ray Scrivener. He is a regular “ray of sunshine”, too. Whenever anything goes wrong with the transmitter or receiver he always comes over and fixes me up. You hams are a mighty fine bunch of fellows and I am mighty proud to join your ranks.

—Max J. Colvin, 9WV

An Italian Contest

Viale Maino 9,
Milan, Italy.

Editor, QST:

The National Radio Club of Italy has organized a contest for Italian hams. This contest will occupy the period of April 1st to December 31st 1926. A prize is to be awarded for each of the following accomplishments: (1) Greatest distance for communication on wavelengths below 5 meters; (2) Greatest distance obtained in 10 radiotelephonic communications; (3) Shortest wavelength produced and received in a radius of 200 km; (4) Greatest number of two way communications with stations over 5000 Km. away. In all cases the power input must not exceed 200 watts.

All foreign amateurs are kindly requested to send their QSL directly to the amateurs in the contest or to Ernesto Montu Sec’y General, R.C.N.I., Viale Majno 9, Milan, Italy. We would especially draw the at-
attention of the foreign amateurs to the fact that QSL to the radiotelephonic transmissions will only count when the speech was received perfectly clear and was perfectly comprehensible. The QSL card should be so worded that this will be apparent.

—Ernesto Montu, i1RG

The Tone Meter

20 Duryea St., Springfield, Mass.

Editor, QST:

With reference to my article in the January issue of QST, "The Tone Meter", the following has been called to my attention. With the rectifier and filter system on no load, the tone meter should read zero. This is because the filter condensers build up to the peak rectified voltage value and the voltage remains constant there. However, if the meter does give a reading, it is an indication of leakage current, either back-current through the rectifier or leakage through the filter condensers. Therefore if the meter reads other than zero on no load, a very bad condition exists as leakage or back-current tends to destroy filtering action. A small back current with chemical rectification has to be tolerated.

Perhaps this information will be helpful to readers of QST.

—L. J. Wolf, 9DKT

NOTE

The cuts reproduced below were omitted from Mr. Tannat's letter which we printed in this Department last month.

YES SIR, ERETRIA, WHEN I CALLED BABYLONIAN ZAS ON MY UV.199 HE CAME RIGHT BACK AT ME.

Famous BH Transformers
Transmitting Transformers

We manufacture a complete line. Our transformers are ideal for international transmission.

Write for Our Catalogue

Benjamin Hughes Electric Company
206 Laguacheliers St., West, Montreal, Can.
Transformer Builders Since 1890

ADVANCE "SYNC" RECTIFIER

is preferred by amateurs all over the world

1. The ADVANCE Sine Rectifier actually does what any other rectifier claims to do.
2. Can be easily and quickly filtered.
3. Meets all requirements for heaviest duty.
4. Speedy starting because of Advance Bakelite wheel.
5. Requires no attention—always ready.

Its prevailing use in international transmitting is evidence that, although lower in price, the advance Sine Rectifier is superior in quality.

Revolving disk is moulded bakelite six inches in diameter. Nickel plated brush holders with adjustable gauge copper brushes. Convenient control handle. Disk, aluminum brush arm support and brush holders perfectly insulated.

$40 Rectifying wheel with complete brush assembly and mounting ring to fit your own motor ....... $15

We Pay All Transportation Charges in U. S. A.

ADVANCE ELECTRIC COMPANY
1260-1262 West Second St., Los Angeles, Calif.
THE SUPER-SYNC
The Synchronous Rectifier That Can Be Filtered

The Super Sync is the only synchronous rectifier that can be filtered using ordinary type of filter circuit. Tests prove that the Super will stand up under constant use without giving the least trouble. The only attention required is an occasional oiling of the motor bearings.

The Super is rated at 4000 volts 250 M. A. This is usually sufficient to supply the average amateur transmitter.

The commutator on the Super is eight inches in diameter and is turned at a synchronous speed by a ¼ H. P. Synchronous Motor. This motor can be supplied for either 110 or 220 Volts 50 or 60 Cy.

PAT. PENDING

PRICE $75.00 F. O. B. ST. LOUIS

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

BREMER-TULLY will soon offer

A New Non-Microphonic Tube Socket

The new B-T socket is a further development of the B-T Silent Socket which many fans welcome as the best remedy for microphonic tube noises.

Look for further announcements on B-T.

B Battery Eliminators Complete
B " " Parts
New models of factory-built receivers.
Circulars ready about July 1st.

Bremer-Tully Mfg. Co.
532 So. Canal St. Chicago, Ill.

Powel Crosley, Jr., has developed in the CRESCENDON a device that gives this 4 TUBE RADIO performance $29 expected in sets of much greater cost --------

4-29

CROSLEY RADIO

Write Dept. 18 for Booklet
THE CROSLEY RADIO CORP.
CINCINNATI, OHIO
Prices slightly higher west of the Rockies.
Dealers sell Crosley Radios from $9.75 to $75, and the Musicone Loudspeaker at $14.75

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST
Short-Wave Apparatus

The Very Best in Receiving and Transmitting Inductances

RECEIVING
Basket-wound with heavy triple-cotton-covered paraffined wire.

Electrically efficient and mechanically rugged.

Each coil rigidly secured to Radion strip on which nickel-plated bronze plugs are mounted.

Adapted to any circuit. Complete set of five coils and mounting strip has wave-length range of 12 to 120 meters with 100 µf condenser. Price, complete set, $4.50.

Calibration—Each coil of each wavemeter is separately calibrated. This means that each instrument is accurate. A wavemeter that is not accurate is a very useless piece of apparatus.

Calibration Curve—Three curves drawn in different colors give the readings for the three coils. The chart is neatly covered with a transparent material and bound with black tape. This makes it dirt-proof.

The wavelength ranges of the coils are:
- Coil No. 1—
  - Black Curve,
    - 20 to 80 meters.
- Coil No. 2—
  - Red Curve,
    - 74 to 250 meters.
- Coil No. 3—
  - Green Curve,
    - 200 to 550 meters.

TRANSMITTING
Unquestionably the finest short-wave transmitting inductance on the market.

Flatwise-wound nickel-plated copper strip on moulded glass separators.

Made in two sizes: type L, 5 inches diameter, for 40-, 80- and 150-meter bands and type S, 2½" diameter, for 20-meter band and lower.

Price. single unit with three clips, $3.50; double unit (pri. and sec.) with glass coupling rods and six clips, $11.00.

The REL Type “A” Wavemeter will be found satisfactory for all general purposes. It has a range of 20 to 550 meters with an accuracy within 1%. The design of the inductance and capacity is such that the high-frequency resistance is as low as possible, so that the losses in the wavemeter circuit are small. By thus keeping these losses small the Wavemeter is more sensitive, the sharper its tuning to resonance and the lower its decrement.

The Coils are of “basket weave” design with heavy brown triple-cotton-covered paraffined wire. Each coil is specially treated after winding and then permanently mounted on an insulating strip which holds the mounting plugs. The coils are easily interchangeable by means of the REL Plug-In Method.

Type “A” Wavemeter With Neon Tube Indicator
Price Complete With Calibration Curve $22.00

Radio Engineering Laboratories
27 Thames St., New York, N.Y.
Mica Condensers in intermediate sizes

IT is accuracy, not luck, that makes one receiver sweeter and more powerful than another that is almost its twin. Especially condenser accuracy, for the closer you come to absolute accuracy at these critical parts, the more wonderful your receiver will be. The cost of accurate condensers is small — the effect is immense.

Now you can get Sangamo Mica Condensers in capacities in between the usual stock sizes so you can build with greater accuracy than ever before. They are guaranteed to be accurate, and they always stay accurate, being solidly molded in bakelite. Neither heat, cold, moisture, pressure nor acid fumes will affect their capacity, because bakelite seals the delicate parts against all outside influences.

Capacities in microfarads and prices

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<th>Capacitance (in microfarads)</th>
<th>Price</th>
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<td>0.0008</td>
<td>0.15</td>
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With Resistor clips, 10c. extra

Also Sangamo By-Pass Condensers

<table>
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<th>Capacitance (in millifarads)</th>
<th>Price</th>
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<tr>
<td>1/4 mfd.</td>
<td>90c.</td>
</tr>
<tr>
<td>1 mfd.</td>
<td>$1.25</td>
</tr>
</tbody>
</table>

Sangamo Electric Company
Springfield, Illinois

This is the new TOBE MS IV — 8 Watt Transmitting Tube.

OPERATING DATA
Filament volts—6
Filament current—2 amps.
Maximum plate volts—300.
Plate current—40 M.A.

1. This tube is characterized by extreme hardness.
2. Careful and rugged internal construction.

Price—$6.00
At your dealers, or send check or money order to
The Tobe-Mueller transmitting tubes were used in the tests at WUN, East. of Tech., described in this issue.

Tobe Deutschmann Co.
Cornhill, Boston, Mass.
We sell transmitting-condensers, too.
Send for literature.

V.T.14 Transmitting Tubes
Rated at 5 Watts

(MF'D BY GENERAL ELECTRIC CO.)
NEW, IN ORIGINAL CARTONS

Filament voltage 11/2 Volts.
Filament current 1 1/2 Amps.
Normal Plate voltage 350 Volts.
Plate current 40 milli-amps.

Also Used as Power Amplifier Tube
STANDARD BASE

PRICE ONLY $1.50 EA

American Sales Co.,
21 Warren St.,
N. Y. C.

A Laboratory Product

CRESCENT LAVITE RESISTANCES
for Distortionless Amplification.

TRANSMITTING GRID LEAKS

Use Crescent Lavite resistances, noiseless, compact, non-inductive. Each unit will dissipate 4 watts, parallel for higher wattage.

5000 Ohm grid leak as specified by JOHN M. CLAYTON $2.50 each.

Dual Resistance for DeForest "H" Tube $3.5
Dual resistance consists of two units mounted on bakelite and connected in parallel.

Please specify if your "H" tube requires 60,000 ohms or 20,000 ohms.

All amateur apparatus in stock. Let us drill and engrave your panels.

CRESCENT RADIO SUPPLY CO.
1 Liberty St., Jamaica, N. Y.

FOR 30 YEARS, WE HAVE BEEN THE LEADING MANUFACTURERS OF EXPLORER EXTRACTORS FOR INDOOR USE.
G. I. VARIABLE AUDIO TRANSFORMER

For the first time—a transformer that really matches the characteristics of the tube. For use in any set—in detector circuit and any or all stages of amplification. Easily adjustable—merely turn the knob until reception is clearest and sharpest. No squeals, no howls: just perfect reproduction.

Write for complete literature on all G. I. Products

General Instrument Corporation
Manufacturers of Laboratory Equipment
477 Broadway New York City

G. I. SHIELDED UNITS

Are single stage T. R. F. Amplifiers which can be used interchangeably as detector or amplifier—increasing the selectivity and sensitivity of any set.

Can Be Used—
As complete sets using from 1 to 8 tubes
To replace old tuning units
To add R.F. Amplification to any set.

G. I. Shielded Units cover the entire Broadcast band with absolute stability and increase amplification.
Each unit a complete receiver in itself—with dial, UX socket and S.F.L. condenser in a mahogany crystallined aluminum “can”.

Say you saw it in QST—it identifies you and helps QST
Item 37  2 unit four bearing set, delivering 1000 volts, 600 watts for plate and 12 volts, 300 watts for filament. The “ESCO” Set is shown here furnishing Power Supply for 4—50 watters in a phone or telegraph set. This is the Item used by CB8 in pioneer achievement of the first two way amateur wireless communication between North and South America.

ELECTRIC SPECIALTY COMPANY
Manufacturers of Motors, Generators, Motor-Generator Sets, Dynamos and Rotary Converters for all radio purposes. Have you got your copy of Bulletin 237B and ESCO Filter facts? If not write for them.

TRADE “ESCO” MARK
225 South Street  Stamford, Conn., U. S. A.

“ESCO” Engineers will help you solve that Generator problem

Hoyt
Switchboard Meters

HOYT has made Precision Switchboard Meters since 1904, in all sizes, from 3” to 8” case diameter, both for A.C. and D.C. They all have hand-calibrated scales and are recommended for all transmitting station and amateur uses.

A new catalogue on HOYT Switchboard Meters is ready for distribution and will be gladly sent you free on your request.

BURTON-ROGERS CO.
National Distributors

CARTER
“HI-OHM” Universal Volume Control
For All Circuits

500,000 OHMS  HALF SIZE  $2

A non-inductive, variable, wire wound resistance 1½” dia. Projects ½” back of panel. The contact arm slides on protecting wires covering the special moisture proof resistance element, eliminating wear and assuring long life and unvarying electrical characteristics.

“HI-POT” same size with third terminal, $2.25. Write for illustrated folder of full description and circuit diagrams.

Any dealer can supply
in Canada — Carter Radio Co., Limited, Toronto

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST
For Experimenters who prefer Impedance Coupled Amplification

Type 369 Coupling Impedance

Price $5.00

The General Radio Company has endeavored to make it possible for the experimenter to obtain its products with a minimum of effort. A careful selection of distributors and dealers has been made. They are best fitted to serve you. If, however, you are unable to obtain our products in your particular locality they will be delivered to you, postpaid, direct from the factory upon receipt of list price.

In search for a perfect amplifier experimenters are now giving much attention to coupling impedances.

While transformer coupled amplification produces more amplification per stage than any other method under some conditions slightly better quality may be obtained by the use of impedances and resistances.

By using chokes of sufficiently high inductance, a quality of reproduction may be obtained equivalent to that produced by resistances.

The use of chokes has the added advantage of requiring considerable less plate voltage thus reducing operating costs of the set, and also giving greater amplification per stage.

A three stage amplifier using three General Radio Type 369 coupling impedances will give a combination of generous volume with exceptional purity of tone.

Write for our circular showing wiring diagram for a 3 Stage Impedance Coupled Amplifier and our latest parts catalog 924-A.

GENERAL RADIO CO., Cambridge, Mass.
A reputation for fine transformers a quarter-century old! Today this high standard is more apparent than ever—for Radio recognizes Amer'Tran products as dependable leaders.

The new Amer'Tran De-Luxe Audio Transformer actually puts the development of the "audio side" ahead of existing acoustical devices. Faithful amplification with natural quality over the entire audible range is consistently obtained. This Audio Transformer sets a new standard of audio amplification.

As the receiving set of the future will be power-operated, the American Transformer Company is now offering two units of the finest type—especially adapted to the use of the new 7½ volt power tubes in the last audio stage. These are the Amer'Tran Power Transformer and the Amer'Choke. The Power Transformer also has filament supply windings for the power tube in the last stage and for the rectifying tube, and supplies sufficient plate current after rectification, for the operation of the set.

Write today for interesting free booklet—"Improving the Audio Amplifier"—and price list.

Amer'Tran Products Are Sold Only at Authorized Amer'Tran Dealers

AMERICAN TRANSFORMER CO.
178 Emmer Street Newark, N. J.

Transformer Builders for Over Twenty-Five Years
This is Mr. William H. Priess, President of the Priess Radio Corporation, with one of the batteries he uses in his new "Priess Straight Nine" circuits, which employ six stages of radio frequency amplification, with a detector tube and two stages of audio frequency amplification. Mr. Priess is sponsor of radio frequency amplification and the reflex principle in America and the latter owes its name to him.

PRIESS RADIO CORPORATION
693 Broadway  New York, N. Y.

Mr. G. Charter Harrison, March 29, 1926
French Battery Company,
Madison, Wisconsin

Dear Mr. Harrison:

I have been using RAY-O-VAC "B" Batteries for the past two years and have found them very satisfactory in receiver circuits. The batteries have a low initial resistance and a consistent long life. They also have a very small battery noise.

You will appreciate, of course, the importance of this last-mentioned factor, especially in the detector tube circuit. I have found many cases in my experience where noises have been ascribed to static, whereas the noises have been merely due to noisy batteries. This destruction of reception quality caused by battery noises can be cured by utilizing batteries such as the RAY-O-VAC.

Very truly yours,

PRIESS RADIO CORPORATION

WHIP:MN

President.

FRENCH BATTERY COMPANY
Madison, Wisconsin

Also makers of Ray-O-Lite Flashlight Batteries and Ray-O-Lite Flashlight Cases

Ray-O-Vac "B" batteries in all standard sizes, both flat and upright.

Ray-O-Vac "A" batteries recuperate during rest periods, lasting longer and giving excellent reception.

Ray-O-Vac 4½ volt "C" batteries with 3 variable terminals give voltage adjustments of 1½, 3 and 4½ volts.

"Bill" Priess approves these batteries

. . . because of their "low internal resistance and consistent long life" . . .

FEW hams, anxious as they may be to pick up and amplify weak DX signals, ever put radio batteries to as severe tests as they have received in the laboratories of the Priess Radio Corporation.

When you get to working with both radio and audio frequency in the same tube, as "Bill" Priess does, you are asking a lot of your batteries. The slightest battery noise, the slightest multiplication of battery internal resistance, spoils the whole works.

So there is no wonder that Mr. Priess employs Ray-O-Vac batteries in his experimental work. No other batteries have such low internal resistance or such staying power under trying conditions.

Give your apparatus the same chance to work at its best, as Bill Priess gives his. Install Ray-O-Vac batteries and increase the range of your set for both transmission and reception. Ray-O-Vac batteries cost no more than ordinary batteries.

Your regular radio dealer can furnish you with Ray-O-Vac batteries. Ask for them by name. If you have any trouble getting them, write us for the name and address of a nearby dealer who can supply you.

FRENCH BATTERY COMPANY

Madison, Wisconsin

Also makers of Ray-O-Lite Flashlight Batteries and Ray-O-Lite Flashlight Cases

Ray-O-Vac "B" batteries in all standard sizes, both flat and upright.

Ray-O-Vac "A" batteries recuperate during rest periods, lasting longer and giving excellent reception.

Ray-O-Vac 4½ volt "C" batteries with 3 variable terminals give voltage adjustments of 1½, 3 and 4½ volts.
Build that Set so as to Deserve Rauland-Lyrics

Gone is the day of the jerry-built radio. Whether you build for use or for profit—one set or a hundred thousand—skimping on quality does not pay.

For the radio frequency stages, choose any good circuit and any type of coils you like—opinions differ. But, having chosen your circuit, be fair to it—let is show what it really can do—give it the benefit of Rauland-Lyrics.

\[\text{Rauland-Lyric} \]
\[\text{ALL-AMERICAN TRANSFORMER FOR THE MUSIC LOVER} \]

The Choice of Noted Music Critics

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 Corp., 4205 Belmont Ave., Chicago, U. S. A.

PYREX


1 BD Plainfield, Vermont, went on the air for the first time March 29th and on April 4th from 6:00 to 6:30 A. M. worked 6BIL California and was reported R.5. The input power was not over 25 Watts.

1 BD uses Pyrex amateur type insulators.

The MacMillan Arctic Expedition of 1925 used Pyrex and the Byrd Arctic Expedition of 1926 is using Pyrex.

The Coast Guard Ice Patrol, the Navy, the Air Mail Service, the Lighthouse Service all use Pyrex Insulators.

PYREX GIVES RESULTS

CORNING GLASS WORKS
Industrial and Equipment Division
Corning New York

THREE "E" STRAIGHT LINE RHEOSTAT

Perfect Control of Filament Temperature

Given you a fine, smooth, dependable variation of filament temperature. Runs smoothly, is absolutely NOISELESS, and once set, "stays put." Controls volume smoothly, and without distortion, over the entire range. Equally efficient for short and long wire sets. Designed to serve the generation instrument at once. Ask your dealer or order direct. Price $2.50. Postpaid.

ELECTRICAL ENGINEERS EQUIPMENT CO.
Radio Division
708 W. Madison St., Dept. 2 Chicago, Ill.
Information on Request

AEROVAX

"Built Better"

RESISTOFORMERS

Truly Approved by M. I. T., Yale, Radio News, Popular Science, etc.

AEROVAC WIRELESS CORP.
409-411 Remsen Bldg., New York

ALL-AMERICAN

Radio Built for Years to Come

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST
NO Radio Unit is any better than its Coil! Every Engineer and Manufacturer realizes this. While it is true of all Electrical Apparatus it is more true of Radio.

The performance of Battery Eliminators, Audio Transformers, Loud Speakers, and all other Radio Units is in exact ratio to the efficiency of their windings. \textit{It's the coil that does the work!}

The great DUDLO Plants at Fort Wayne, Indiana, have specialized on fine Magnet Wire and Windings for many years, and DUDLO is today the chief source of supply to manufacturers in the Radio Industry.

DUDLO Engineers and Manufacturing Facilities provide you with the widest experience and knowledge and the finest methods of production. The DUDLO plants, the largest of their kind in the world, and equipped with miles of special machinery and an immense organization of trained specialists, produce better coils and windings for your product than any other source of supply—and do it more efficiently from your standpoint.

It is probable that you already are using DUDLO Coils and Magnet Wire. If not, we will promptly make up samples and quote on your requirements. No obligation—it is part of DUDLO Service. Correspondence invited.

\textbf{DUDLO MAGNET WIRE AND WINDINGS}

\textit{SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST}
DON'T MISS IT, FELLOWS—EVERYBODY'S COMING!

The First Annual

ATLANTIC DIVISION

A.R.R.L. CONVENTION

HOTEL LAFAYETTE

BUFFALO, N. Y.

JUNE 24, 25, 26, 1926

Technical Talks—Contests
Government Exams—Real
Short-Wave Dope

SEND IN YOUR RESERVATION TO

The Radio Association of Western N. Y.
598 Masten Street, Buffalo, N. Y.

RADIO OPERATORS WANTED
Radio Operators are needed on board ships sailing for
Europe, the Orient, Africa, South America, etc.
The EASTERN RADIO INSTITUTE can train you
quickly and thoroughly because:
MODERN and EFFICIENT METHODS
THOROUGH and SIMPLE INSTRUCTION
New and UP-TO-DATE APPARATUS
THIRTEEN Years a RADIO SCHOOL
The OLDEST, LARGEST, and MOST SUCCESSFUL
school in New England. RECOMMENDED BY THE
A. R. R. L.
Day or Evening Classes Start Every Monday.
Write for Illustrated Prospectus

EASTERN RADIO INSTITUTE
899 BOYLSTON STREET
BOSTON, MASS.

ACME

~ for amplification

LEARN THE CODE—
with SIGNAL
a High Pitch Buzzer and
Key Set

Built complete with key, true
tone adjustable high pitch buzzer and code plate. Write us today.

Signal Electric Mfg. Co.
Menominee, Mich.
KRUSE SAYS:

“If we had an audio amplifier that amplified one pitch only, and did not amplify the line leaks and static and off-tune signals, we would be able to use one stage to better advantage and often could use two stages, bringing in signals that cannot be read with one stage. In other words, we would be able to make the signal stand out from the noisy background. . . . The best known example (of this peaked audio amplifier) is the OLEI General Electric Transformer sold by the Radio Corporation as the UV-712. This had a 9/1 ratio; in other words, there was not a great deal of primary. It was meant to amplify 500-cycle spark signals (1000-cycle tone) and it did that in beautiful shape because resonance occurred in the neighborhood of 1000 cycles, but not sharply enough to result in ringing or “dragging”.

WE HAVE THOUSANDS OF

RCA UV-712 (9/1 ratio) TO SELL AT ONLY $1.60

BLUEBIRD (Gem) 202 TYPE 5-watt TRANSMITTING TUBE. $3.25.

CARDWELL CONDENSERS. Genuine Allen B. Cardwell .0005 Condenser, $1.50. King-Cardwell Dual, 16-16 plates, $1.95. 11-11 plates, $1.50. King-Cardwell 11-plate, $1.25. King-Cardwell 41-plate. Easily made into a transmitting condenser by double spacing, $1.55.

P H I L I P S TUBES. Imported; manufactured in Holland. Be ahead of the times! UV-200 type, drawing 1/4 amperes; ideal detector tube for that short-wave set. $1.95. UV-199 type, drawing .06 amperes, and with a filament to operate on 1 dry cell. $1.95. 201-A type, drawing 1/10 amperes, $1.95. WD-11, WD-12, 201-A, and 199 types, all at $1.95.

CUTLIER-HAMMER PLAIN 4-Ohm RHEOSTATS, for the control of 202’s. List, $1.25. Our Price, 25c.

REPUBLIC OF GERMANY 5-watt TRANSMITTERS. Designed for radio telephony and continuous wave telegraphy, a switch in the front of the panel permitting the use of either at will. Employs a simple but effective circuit, easily converted for the short waves. SPECIALY PRICED AT $75.00.

RADIO SURPLUS CORPORATION

11-19 STUART ST.

BOSTON, MASS.

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST
Radio Operated Automobile

Use The Improved Martin

VIBRÖPLEX
The World's Greatest Sending Device

Reg. Trade Marks
Vibroplex
Bug
Lightning Bug

For Continental,
Morse or
Navy Codes

Japanned Base,  $17
Nickel-Plated,  .  19

Adjustable
To Any
Desired
Speed

Over 100,000 Morse and Wireless operators use the Vibroplex because it is EASIER, QUICKER and MORE ACCURATE than the old key.

It transmits with amazing case CLEAR, CLEAN-CUT signals at any desired speed. Saves the arm. Prevents cramp, and enables anyone to send with the skill of an expert.

Special Radio Model
Equipped with Large Specially Constructed Contact Points. Requires no relay

Every amateur and licensed operator should know how to send with a Vibroplex. Easy to learn. Sent anywhere on receipt of price. Money order or registered mail. ORDER YOURS NOW!

THE VIBRÖPLEX CO., Inc., 825 Broadway, New York

FROST-RADIO
Here is the new FROST-RADIO
Metal Frame
Rheostat

Not only new and radically different but infinitely better! Sturdy one piece nicked plated frame insures precision operation and smooth, non-wearing action. Frame cannot warp or bend, shaft alignment is permanent. Bakelite pointer knob; tinned soldering lug, 2, 4, 6, 10, 15, 20, 25, 30 and 35 ohm types 50c. 200-400 ohm potentiometer, 65c. A remarkable achievement. Ask your dealer about the new FROST-RADIO Bakelite Rheostat.

HERBERT H. FROST, Inc.
314-224 West Superior St., Chicago, Ill.

New York City  Cleveland  Kansas City

Los Angeles

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST
Play Safe With Karas

Karas Orthometric

Short Wave Condensers

<table>
<thead>
<tr>
<th>Plate</th>
<th>Price</th>
</tr>
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<tbody>
<tr>
<td>6 plate</td>
<td>$6.50</td>
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<tr>
<td>7 plate</td>
<td>$6.50</td>
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<td>11 plate</td>
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Broadcast Condensers

<table>
<thead>
<tr>
<th>Plate</th>
<th>Price</th>
</tr>
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<tbody>
<tr>
<td>17 plate</td>
<td>$6.75</td>
</tr>
<tr>
<td>23 plate</td>
<td>$7.00</td>
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</tbody>
</table>

Harmonik the Favorite—Why

The Harmonik was the original audio transformer with a sufficiently large primary and core to pass the entire range of musical frequencies. With the introduction of Karas Harmonik, radio listeners heard perfect reproduction for the first time. That larger primary and large core section core give tone quality and freedom from lost notes. It is this principle of design, evolved by Karas, that other makers of better grade transformers are trying to incorporate.

"High voltage amplification per stage" may be something you know little about, but its presence means volume plus. This higher amplification per stage without distortion, is one of the exclusive features that makes the Harmonik the most popular transformer in the country.

Now that we have power tubes for the last stage of audio frequency amplification, with characteristics such that this output stage can handle all the energy impressed on it by one preceding tube and two Harmoniks, you can obtain full, round volume every time. Low notes and high notes, vital overtones and rich harmonics at all frequencies, pass through such a system without that slighting of some and over-emphasizing of others, which so long gave to Radio reproduction that "canned" effect.

Order Through Dealer or, Direct on This Coupon

Karas Condensers in the 23, 17 and 11 plate sizes are sold by good Radio Parts Dealers in most cities. The 8 and 5 plate sizes are not so widely stocked by dealers. Orders will be filled direct, or may be placed through your dealer and his jobber. If you prefer to order direct, use this coupon. Send no money, just pay the postman the price plus a few cents postage.

KARAS ELECTRIC CO.
Manufacturing Plant: 11070 Rockwell St.
Offices: 1070 Association Building
Chicago, Ill.

Play Safe With Karas

Karas Electric Co., 1070 Association Bldg., Chicago.

Please send me Karas Harmonik Transformers and Karas Orthometrics.

Karas Condensers in the 23, 17 and 11 plate sizes are sold by good Radio Parts Dealers in most cities. The 8 and 5 plate sizes are not so widely stocked by dealers. Orders will be filled direct, or may be placed through your dealer and his jobber. If you prefer to order direct, use this coupon. Send no money, just pay the postman the price plus a few cents postage.

KARAS ELECTRIC CO.
Manufacturing Plant: 11070 Rockwell St.
Offices: 1070 Association Building
Chicago, Ill.

When you undertake the construction of a multi-tube receiver (such as is necessary today), you are investing a sum of money in parts. Also many hours of drilling, assembling and wiring—and your reputation as a set builder.

It's a temptation to save a little on certain items—too often condensers. But can you tell by looking at a condenser, whether it is efficient, whether it will lose much of the picked up energy in leakage and absorption? Hardly!

Lieutenant Schnell of the A.R.R.L. has tested many condensers—and he uses Karas Orthometrics. Milton B. Sleeper of Radio Engineering has tested them—and he recommends Karas. Scores of other well-known leaders in Radio, with facilities to test, are enthusiastic about Karas Orthometrics.

Because every Karas condenser is as electrically and mechanically perfect as such equipment can be today, you know there will be minimum possible losses when Orthometrics are used. The higher cost of a Karas condenser is "the price of perfection"—made necessary by quality materials, finest possible workmanship and most rigid inspection.

The Orthometric condenser has an exceptional minimum to maximum capacity range. It turns smoothly and evenly throughout that range. The skeletonized end plates are far from the stator plates. The active plates themselves are made entirely of brass. And with the proper coil, an Orthometric gives an absolutely equal 10 kilocycle separation of broadcast channels between 200 and 550 meters.

Karas Harmonik Transformer $7.00

Say you saw it in QST—it identifies you and helps QST

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST

79
Gross Short-Wave Plug-in Coils

General Radio Jacks and Plugs used. Most efficient plug-in arrangement on the market.

Can be handled freely without fear of injuring coils, also making possible permanent calibration of set.

Minimum amount of dielectric insures lower losses resulting in stronger signals and sharper tuning.

Without question the most rugged receiving coil on the market.

Spaced winding insuring minimum distributed capacity.

Price for 80 Meter Band complete with Base (38 to 115 meters) $5.50.
Price for 40 Meter Band (30 to 60 meters) $5.50. Complete with Base.
Separate coils only for 20, 40, or 80 meters $3.00.

GROSS WAVEMETER
Built into neat cabinet. Range 20 to 200 meters. Low loss inductances and condensers insure a low resistance wavemeter. Accurate calibration checked against crystals. Can be used with both receiving and transmitting sets.

PRICE WITH FLASH LAMP $18.75

The original short wave Panake inductance Transmitting 20, 40 or 80 meters $6.00. Quartz Crystals $6.75.

J. GROSS & CO.
Laboratory, 30 Park Place
907 Fox Street, Bronx, N. Y. City

SUPERUNIT
SET TESTER

An A. C. driver with the dial calibrated in meters. Wavelength range 175 to 575. Indispensable for radio service men and experimenters.
Ideal for neutralizing.

Sold By Dealers Everywhere
PRICE $10.00
HANSCOM RADIO DEVICES
Woonsocket, R. I., U. S. A.

TYPE SM

AUDIO TRANSFORMER

This new SM 220 Audio Transformer gives more perfect reproduction than resistance, impedance or other transformer audio amplifiers. No loud speaker on the market will reproduce the low notes it delivers. Guarantees greater amplification and less distortion than any other ever manufactured. Try out a pair—you'll find them the greatest $12 worth of radio equipment you ever purchased. If they're not just twice as good as any audio transformer you've ever used—return them and get your money back.

LIST PRICE $6 each

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST

SILVER-MARSHALL, Inc.
858 W. Jackson Blvd., Chicago

HANDLE S-M PARTS AT YOUR DEALERS. FIND OUT FOR YOURSELF EXACTLY WHY THEY ARE SELECTED BY EXPERTS AND ENGINEERS.
SIX Advantages of TOTAL SHIELDING

Tone quality, volume, range, selectivity, and non-radiation—all these desirable features are perfected in the Stromberg-Carlson Receiver by the total shielding of the radio frequency circuits.

Total shielding permits employing three stages of radio frequency amplification without interstage coupling instead of two stages,—the limit in an unshielded receiver. This third stage adds not only 8 times more amplification to the detector but also approximately 50% more selectivity.

Total shielding, further, prevents any signal entering the receiver except through the antenna, and permits total neutralization of each radio frequency amplification stage independent of the other stages. This perfect neutralization means non-radiation.

Stromberg-Carlson Telephone Mfg. Co.
Rochester, N. Y.

Stromberg-Carlson
Makers of voice transmission and voice reception apparatus for more than thirty years

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST
Ward Leonard
VITROHM
Resistor Unit Kit

Wire wound. No carbon or graphite. Vitreous enameled. Hard to break but easy to use. Soldering lugs. Values assorted to give all desired resistances for B eliminators or radio experimental work. Eight resistors in kit.

1. Resistor 750 Ohms
2. Resistors 1500 Ohms each
3. Resistor 3000 Ohms
4. Resistor 5000 Ohms

Total 21,750 Ohms

Sold by
R. H. McMann & Co., Inc., 122 Chambers Street
Morison Electrical Supply Co., 15 East 40th Street
NEW YORK
20th Century Radio Co., 102 Flatbush Avenue
BROOKLYN

QST Oscillating Crystals

Let us grind your quartz crystals to your specified frequency. We grind them accurate to one-tenth of one Per-cent, and all crystals guaranteed. We are specialists in this kind of work, and can give prompt deliveries.

If you do not have the quartz plate for us to grind, we will purchase one for you upon request. We will be glad to quote you on your requirements.

Scientific Radio Service
Box 86, Dept. A, Mount Rainier, Maryland

The A. R. S. Co.

Short Wave Receiver
A notable achievement in short wave receiver design. Absolutely LOW-LOSS THRUOUT. Designed and built EXPRESSLY for EFFICIENT, DEPENDABLE reception on the high frequencies.

Price (Complete in cabinet less accessories) $38.
R.E.L. COILS $18.50
Receiver with Aero Plug-in Coils (as above) $48.50

The A. R. S. Co.

No Loss Inductance

Wound with heavy brass on specially treated KILN dried maple. Highest Insulating Qualities. Adjustable Coupling. Maximum Energy Transfer. Q.S.T. RECOMMENDS IT

Special Price
20 and 40 meter size $4.95
30 meter size $5.45

Cardwell Receiving Condensers
Rebuilt for Transmitting Purposes

Ideal for primary or antenna and counterpoise series. 2,000 Volt, Flashover Test Capacity 10,000 MFD.

Special Price
$3.95

See Our Ham-Ad for Summer D X Specials

AMATEUR RADIO SPECIALTY CO.
77 CORTLAND STREET, NEW YORK

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST
WHEREVER tone quality, timbre, and perfect reproduction are paramount, Thordarson amplifying transformers predominate. The better receiving sets of today are musical instruments of the highest order. More than fifty of these leading set makers specify Thordarson transformers as standard equipment. The R-200 is used in sets costing up to $2500.00. A superlative transformer giving good bass note reproduction. Ideal for use with cone type speakers.

THORDARSON
ELECTRIC MFG. CO.
Transformer Specialists Since 1895
World's Oldest and Largest Exclusive Transformer Makers
CHICAGO, U. S. A.
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., U. S. A.

Being genuinely interested in Amateur Radio, I hereby apply for membership in the American Radio Relay League, and enclose $2.50 ($3 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?

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A BETTER AND DIFFERENT PLUG-IN COIL

Note its advantages listed below—and try and do without it!

1. Positive contact is secured through General Radio plugs and jacks.
2. With 3 Coils, continuous, gapless range is secured from 140 to 16 meters. One of the 20-40-80 meters amateur bands is located in the middle of the tuning range of each of the 3 coils. (For this a SFL Condenser, 120 mmfd. max. cap. is essential.)
3. Operation of regeneration condenser has no effect on the tuning; the 2 controls are completely independent.
4. Antenna coupling is adjustable; by a primary coil and not through a condenser. Secondary coils are specially constructed so that setting of primary coil does not need to be changed when secondaries are exchanged.
5. Coils are space-wound solenoids on skeleton frames.
6. Both tickler and antenna coil are at filament end of the secondary.
7. These coils cover the 3 U. S. Amateur Bands, all European Amateur Bands, Short-Wave Broadcast, U. S. Naval and Commercial Short-Wave Stations, etc.

The Kit Illustrated Covering 15 to 133 Meters Complete $12.50
Coll No. 4, 125-250 M
Price $4.00
Coll No. 5, 200-350 M
Price $4.00

These coils are essential to the most efficient operation of your station. Order your TODAY.
AERO PRODUCTS INCORPORATED, Dept. 16, 1768-1772 Wilson Ave., Chicago, Ill.

ROBISON’S MANUAL OF RADIO TELEGRAPHY and TELEPHONY 6th EDITION

This book, written for the U. S. Navy, first appeared in 1907, the author being Lieutenant (now Admiral in command of the U. S. Fleet) S. S. Robison, U. S. Navy. This edition has been revised and brought up to date by Commander S. C. Hooper, U. S. Navy, Radio Officer of the U. S. Fleet during the past year. A review of this book appeared in the December issue of QST, in which it was stated that “The Best Radio Book that Ever Came to This Desk.”

“The Best Radio Book That Ever Came To This Desk”

The review was as follows:

“The famous ‘manual’ has, in its 6th edition, risen to entirely new heights. This last edition ranks with the very best of all published radio matter and adds to its usefulness the excellent printing and binding that has marked the earlier issues.

Never have we seen a book that so well followed out the plan of starting with simple theory but always keeping in mind that the reader was interested in the application of the theory, and cared nothing about the theory itself. Therefore the text progresses rapidly to the actual apparatus and discusses the modern types clearly, rapidly and usefully.

This book is so universal that it deserves unusual treatment and shall have it—here are the chapter headings in full:
1—General Theory
2—Elementary theory of electricity
3—A.C. Theory
4—A.C. Theory applied to radio
5—Damped oscillations
6—Wave propagation
7—Radio Instruments
8—Radio Transmission
9—Radio Reception
10—Theory of vacuum tubes
11—Vacuum-tube transmitters
Part 2—Practical application of apparatus and measurements
1—Practical application of apparatus
2—Radio measurements
Part 3—Useful Information
1—Tables and formulas
2—Mathematics (Arithmetic, Algebra, Geometry, trigonometry)
3—Radio Laws
4—Miscellaneous
Part 4—Index
That is a tremendous territory to cover in a single volume, and it takes almost 900 pages to do the job. However, the job is done and the result is a book that is not only worth $8 which it costs but is perhaps the best radio book that ever came to this desk.”

PRICE, $8.00 POSTPAID

Send checks or money orders to Secretary-Treasurer, U. S. NAVAL INSTITUTE, ANnapolis, Maryland, U. S. A.


SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST
The NEW 4-TUBE RECEIVER
Sponsored by Popular Radio, endorsed and described by Radio publications and Newspapers from coast to coast. Perfected Single Control—Unlimited wavelength range—Volume equal to 6-tube receivers—Quality unsurpassed and hair-line selectivity. Easily assembled by even a beginner with just a screwdriver and pliers.

REPRESENTED MANUFACTURERS:
Central Radio Laboratories—Centralized Resistance.
Foster & Co. — Drilled and Pressed Front Panel and Drilled Sub-Panel.
Vauxley Mfg. Co.—Receivers, Jacks, Switch.

Send for FREE Building Instructions today or see your dealer.
S-C MERCHANDISING CO.
288 S. Peoria St.
Chicago

MODEL T All-Metal-Mica Condensers
For Receiving Sets
Also Faradon For
BY-PASS, FILTER, BLOCKING
and Interference elimination applications
Complete data and quotations furnished promptly upon receipt of advice as to requirements.
19 Years Specialization in the Radio Field
Wireless Specialty Apparatus Co.
JAMAICA PLAIN, BOSTON, MASS., U. S. A.

A. R. R. L. Members -- What about your friends?
You must have a friend or two who ought to be members of our A.R.R.L., but aren’t. Will you give us their names, so that we may write to them and tell them about the League and bring them in with the rest of us? The A.R.R.L. needs every eligible radio enthusiast within its ranks, and you will be doing your part to help bring this about by recommending some friends to us. Many thanks.

American Radio Relay League,
Hartford, Conn.

I wish to propose

Mr. ..................................................
of..................................................

Mr. ..................................................
of..................................................

Street & No. Place State

for membership in the A.R.R.L. I believe they would make good members. Please tell them the story.

............................................................ 1926

American Radio Relay League, Hartford, Conn.

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for membership in the A.R.R.L. I believe they would make good members. Please tell them the story.

............................................................ 1926

American Radio Relay League, Hartford, Conn.
Deforest 20 Watt
Transmitting Tubes

| Fil. Volts | 10. |
| Fil. Amps | 2.35 |
| Plate Volts | 750-1000 |
| Plate Current | 40-50MA |

Price $12.00 Parcel Post Prepaid

RADIOPHONE SALES CO.
216 West 58th St., New York City, N. Y.

Exclusive Sales Rights—Deforest Specialists

WESTON
506 Voltmeter and
Universal Bi Polar Switch

GIVE economy and positive Set control. A twist of the switch... quick check on all voltage conditions on the double scale (140/7 volts) voltmeter. Adaptable to all makes and models of receiving sets. Made by the Weston Craftsmen of Quality Radio Instruments, and makers of the leading models of measurement device in every field of electrical work. Its use insures operation of tubes at proper filament voltages and economical use of batteries. For further information request circular.

Weston Electrical Instrument Corporation
158 Weston Avenue Newark, N. J.

STANDARD THE WORLD OVER

WESTON
Pioneers since 1888
A crew duty, ad. lwb an X-L in crowded places.

X-L VARIO DENSER

Results in easier tuning, more distance, volume and clarity — greater stability endorsed by leading radio authorities.

Model "N":
A slight turn obtains correct tube oscillation on all tuned radio frequency circuits. Neotrode, Robey two tube, Browning-Drahn, McBride Silver's Knockout, etc., capacity range 1.8 to 20 micro-microfarads. Price $1.00

Model "G":
With grid clips obtains proper grid capacity on Colloley circuits, filter and intermediate frequency tuning in heterodyne and positive grid bias in all sets. Capacity range .0016 to .00055 and .000 to .001 microfarads. Price $1.50

X-L Push Post:
Push it down with your thumb, insert wire, remove pressure and wire is firmly held. Price 15c.

X-L RADIO LABORATORIES
2428 Lincoln Avenue N.
Chicago, Ill.

What Size Grid and Plate Blocking Condensers?

You have always used .002 mfd. for blocking condensers but who knows that it is the best size for short waves? The builders of KFUI believe .000086 mfd. better for their tuned grid 'n plate circuit. Our UC 1015 condenser gives eleven different capacities between .0002 mfd. and .001 mfd. so you can select the best size for your set. Why not try them?

Price $1.25 postpaid

General Electric Gridleaks

Brand new enameled porcelain G. E. Gridleaks in 5000 ohm and 10,000 ohm sizes for all tubes.

PRICES, 5000 ohm $1.25, 10,000 ohm $1.75. Postpaid.

Utility Radio Co., 80 Leslie St., East Orange, N. J.

RARE GAS AND HIGH VACUUM PRODUCTS

Neon, Helium, Argon, etc.

We specialize in the construction and development of all types of special thermionic valves, Neon glow lamps, Neon arc lamps, Mercury arc lamps, hot cathode and gas filled rectifiers, tubes utilizing the alkali and alkaline earth metals, and photo sensitive apparatus.

Also, high vacuum pumps, manifolds, etc., made of lead, lime pyrex or quartz glass. Special high frequency apparatus for electronic bombardment.

Flashlamps
1. Neon flash lamps for oscillographs, wave meters, etc. Price $1.50.
2. We are the makers of Hyvo—the really safe high voltage indicator.

Complete equipment for high vacuum work installed.

GENUINE Kenotron Rectifying Tubes

Model UV-216

These Tubes are the Genuine R.C.A. Kenotron Rectifying tubes.

Filament voltage 7½ volts and will safely stand A.C. input of 750 volts. Four of these tubes will run a 60 watt.

These Rectifying tubes will pass plenty of current and voltage for your TRANSMITTER and also are very efficient for use in "H" ELIMINATORS.

STANDARD BASE, EVERY TUBE BRAND NEW AND PACKED IN ORIGINAL CARTONS.

List price $7.50 ea.—Extra Special $1.85 ea.

AMERICAN SALES CO., 21 Warren Street, N. Y. C.

Toaz DUBBELUGS

May now be had in highest quality tinned stock in nominal lengths of 1, 2, 3, 4, 5 and 6 inches, corresponding to 5/16, 1/2, 5/8, 3/4, 5 and 6 between holes.

Let's You Build Without Solder

Price $7.50 Per M
Nominal Inches
SPECIAL PACKAGE
Nominal 125 Inches Any Assortment

$1.00 Net

Toaz Engineering and Sales Co.,
11703 Robertson Ave., Cleveland, Ohio.

ARE YOU BUILDING A NEW SET?

If so—you will need instruments. Tell us your story and we will recommend the best instrument to use.

Ask for Circulars

JEWELL ELECTRICAL INSTRUMENT CO.
1650 Walnut St., Chicago
"28 Years Making Good Instruments"

RADIO ELECTRICAL WORKS

Research Division, 23 Union Sq., New York, N.Y.

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST
HAM-ADS

Effective with the July, 1926 issue of QST the policy of the "Ham Ad" Department will be altered to conform more nearly to what it was originally intended that this department should be. It will be conducted strictly as a service to the members of the American Radio Relay League, and advertisements will be accepted under the following conditions.

(1) "Ham Ad" advertising will be accepted only from members of the American Radio Relay League.

(2) The signature of the advertisement must be the name of the individual member or his officially assigned call.

(3) Only one advertisement from an individual can be accepted for any issue of QST, and the advertisement must not exceed 100 words.

(4) Advertising shall be of a nature of interest to radio amateurs or experimenters in their pursuance of the art.

(5) No display of any character will be accepted, nor can any typographical arrangement, such as all capital letters, be used which would tend to make one advertisement stand out from the others.

(6) Contracts for "Ham Ad" advertising which are now in force, and which have until later than July, 1926, to run, will be completed in accordance with the understanding under which they were made, but cannot be renewed.

(7) No new contracts will be made for "Ham Ad" advertising after March 20, 1926.

(8) The "Ham Ad" rate will be 7c per word, and remittance for full amount must accompany copy.

(9) Closing date remains as heretofore; the 25th of second month preceding date of publication.

(10) This notice will be published in the May and June, 1926 issues of QST.

HAMS. A PENNY FOR YOUR THOUGHTS. IS A TRITE EXPRESSION, "BUT" TWO PENNIES ON A POSTAL CARD ASKING FOR PRICE LIST OF TRANSMITTING PARTS. WILL PROVE TO BE A MONEY SAVER. FOR INSTANCE, PLUG IN COILS ARE QUITE TROUBLEsome TO BUILD, UNLESS YOU SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HAVE SOME GENERAL RADIO COIL MOUNTING ACCESSORIES. THEY ARE ADAPTABLE TO ANY TYPE OF COIL, SEND YOUR REQUEST TO THE ONLY OTHER HAM STORE IN THE FIFTH DISTRICT. FORT WORTH RADIO SUPPLY CO. FORT WORTH, TEXAS.

REAL BARGAINS—New and perfect UP-1616, 750 watt Power Transformers, 3000v with midtap; Filament winding 10v with midtap, $10.00; UP-1658, Filament Transformers 75 watt, 7.5v with midtap, $4.00; UP-1600 115v Audio Transformers 9/1, $1.00. UC-1891 Variable Transmitting Condensers, $1.50; UC-1803 Antenna Coupling Condensers, $1.50; Genuine Holtszr-Cabot No. 3 Headphones, 2200 ohms, double pole, high grade, $3.00; Genuine Cardwell Type 123-B Variable Condensers, .0005 $2.50; Signal R-48 Telegraph Keys $2.25; Jewelco for immediate delivery, send for catalog; UC-1501 Wire Condenser, $2.00; UC-1014 Grid Condensers, $2.50; UC-1005 Mica Condensers, .001 mfd. Bakelite mounted, 25c. Bakelite Navy Key Knobs, 25c. Cutler-Hammer Variable Condensers, $1.50; AMRAD No. 3706 Lightning Switches mounted on 5" porcelain posts. $1.50. Day-Fan Balanced Verner Condensers, 3 or 18 plates may be used. Bakelite ends, $1.50—F.F. Battery Chargers 9 amps, 110v AC 60 cyc. $9.00. Send for discount sheet and keep in touch with bargains. 25% deposit on C. O. D. orders. All items under 4 Lb.s. postpaid.

STATE RADIO CO., 236 Columbia Road, Rochester, Mass.

EVERYTHING IN RECEIVING apparatus. 25% discount "ham". Over 2 pounds, etc.—prepaid—85c. Klador Laboratories, Kent, Ohio.


NEW Western Electric Power Amplifier, complete with horns and tubes, $55.00. Box 1450, Springfield, Mass.

PERMANENT PLATE POWER. A LIFE-TIME STEEL ALKALINE EDISON BATTERY. (THE SML KIND). ELECTRICALLY WELDED FOR ABSOLUTE STABILITY. 64 VOLTS $8.00, 100 VOLTS $15.00, IN FUMED OAK POLISHED CABINET. REAL EDISON SOLUTION. THAT BIG SET NEEDS A POWER HOUSE. HERE IT IS—MILLAMP HOURS, 105 VOLTS $24.00 SAMPLE CELL 30c. GIANT SUPERCELLS 4000 MILLAMP HOUR 40c CELL, SAMPLE 3c, 3 RINS YOUR 100. PEppy ELEMENTS—WELDED PAIRS 75c. SEPARATORS 1c. 8 x 6" TUBES 3c, 1"—1.4c. BATTERY OR RECTIFIER SHOCKPROOF JARS 1" x 6 ½". 10½" x 4½". 6X 4½" 5c. PURE COPPER 100 NICS OR WITH 1500 (HEAVY) 1½c. RT. FRED EDISON ELECTROLYTE THAT'S NO LYE LITHIUM COMPOUND $1.25 MAKES 5 lbs. COLLOID B CHARGER $2.00 SMALL. $3.50 LARGE. CHARGED PERMANENTLY PERFECT AERIAL No. 12 SOLID COPPER ENAMELED 75c—100 ft. MINIMUM RESISTANCE—MAXIMUM RECEPTION. IN REX BOWL, LEAD IN FROM PLENUM IMPREGNATED OAK STRAIN 20—$1.00. WHITE IN. GANG. RADIO SML.

FRANK M. J. MURPHY. 4837 ROCKWOD RD., CLEVELAND, OHIO.

NEW GENERATORS. rated at 275 volts 120 watts will give 120 volts 50watts 84c. UC1581 variable 4000 volt condensers $1.50. Bakelite 3 coil honeycomb, geared mountings $1.50. Western Electric microphones $1. VT2s $4. VT1s 25. Used generators, 30 volt direct current input, output 110v, 500 cycle 200 watt $10. ½ KW $15. SEND STAMP for list. R. Wood, 38 Way Ave. Corona, New York.

EDGewise wound copper ribbon, the only really satisfactory antenna inductance; 3½" outside diameter 10c turn; 4½" 15c turn; 5½" 15c turn; 6½" 20c turn; 7½" 30c turn. $1.50. Bakelite 3 coil honeycomb, geared mountings $1.50. Western Electric microphones $1. VT2s $4. VT1s 25. Used generators, 30 volt direct current input, output 110v, 500 cycle 200 watt $10. ½ KW $15. SEND STAMP for list. R. Wood, 38 Way Ave. Corona, New York.

MUELLER 150-WATT INPUT POWER TUBES $15.00 socket FREE. CURTIS-GRYFFITH, FORT WORTH.

HEADQUARTERS FOR HAM STUFF: ASK FOR OUR CATALOGUE A-2. WE SPECIALIZE IN AMATEUR TRANSMITTING AND RECEIVING APPARATUS. NO. 12 "DYNEV" SOLID COPPER ENAMELED AERIAL WIRE. 1c FT. NO. 10 (FOR HEAVY DUTY), 1½ FT. NO. 14, 5½ FT. PYREX GLASS TRANSMITTING IN-Helps QST.
DOUBLE spaced transmitting variable condensers completely assembled with 3/4" Bakelite Dials, hard rubber end plates, nickel plated brass parts, aluminum plates, calibrated spacers, 13 plates $3.00, 17 plates $5.00, 23 plates $4.00—can be immersed in oil for extra high voltages. Prepaid cash with order—satisfaction or money back. Geo. Schultz, Calumet, Michigan.

WRITE for list of bargains in used equipment. Want high voltage generator. R. Lewis, Princeton, Illinois.

BARGAINS. Synchronous motor, $10; UV 211 tube, new, $25; UV 204 tube, used, $40; UV 203A tube, new, $25; 500 volt S tubes, two, $6 each; 0-1 Roller Smith hotwire ammeter, $3; 0-1 GE thermometer, $5; UP165S Transformer, $6; UP1665 Oscillation choke, $6; UP1608 oscillation transformer, $1; 0-250 GE milliammeter, $4; 0-5 GE thermometer, $5; RCA 5 watt sockets, 75c each; UP1683 10 volt 150 watt filament transformer, $1.50; WRD 10 watt filament transformer with 80 volt dc motor, $15; 110 volt AC chopper motor, $5; Western Electric TA Cabinet power loudspeaker low loss tubes, $15; Deforest hand microphone, $2. Bruno shortwave coupler, $2; Bremer Tully short wave coupler, $2.50; Stromberg Carlson loudspeaker, $8; Ward Leonard 5000 ohm grid leak, $1.50; Bakelite panels 14 x 12 x 3 x 1, $1.50; W. M. Derrick, 90 Leslie Street, East Orange, N. J.

Building a B eliminator? Best make full wave transmitter, tapped primary and secondary $4.95. Chokes fine job fully mounted $3.35. Block of condensers 2, 2, 8, and 18 MFD $8.10, 2, 1, 1, in series $4.40. Satinized 2 MFD Condensers 75c net. UP 1616 transformer $12.95. Write us for anything hard to get.

WHAP—the RADIO CLUB INC., La Porte, Ind.

FOR SALE—1/2 KW Navy Holzter-Cabot 500 cycle motor generator—perfect condition—complete with spares. Crocker-Wheeler 24,1600 volt 1500 watt 3450 RPM dynamotor—never used—$30. 1 Acme 300 watt power transformer—perfect—$40. All kinds of transmitting and receiving equipment accumulated at JBV and JFB since 1917—am moving—all inquiries QSL'd. Cumming, 58 Marboro St., Boston, Mass.

CURRI-GRGIGH 5-WATT DX BAJIIES $1.15 postpaid. (Dealers wanted.) CURTIS-GRIFTH, FORT WORTH, TEX.

AN UX cartoon for your DX cards $1. No two alike. Don Hoffman, 34 Kirkwood, Akron, Ohio.

MOTOR BARGAINS. 1/4 horsepower 110 volts $8.00. 5 watt transmitting tubes $1.00. Receiving tubes 0.6 volt batteries $2.75. 324 North Fifth, Philadelphia, Pennsylvania.

SELL 50 WATT EQUIPMENT (NEW). Send for prices. I.P.P.


Bids wanted on all or part ONE THOUSAND VOLTS three or four ampere hour separate STORAGE CELLS. Masts to be willing to pay or prepay before payment. Arrive Seattle not later August. Reference Colonel Hartman, Signal Corps, Arcade Building, Seattle. Address Paul Estle, Bethel, Alaska.

500 cycle alternators for plate excitation and other army air service equipment.

Radio Service Shop, San Antonio, Tex.

SUPER using J. K. Long Wave Air Core Transformers and standard parts. Eight tube set which cuts down interference, selectivity tone rich and clear. Long range on local sounds new principle in heterodyne receiving. Ask for literature blue prints 50 cents. We can furnish all parts to build at special discount. Davisco, 39-E Buclid Arcade, Cleveland, Ohio.

SILICON Transformer Steel cut to order .014". 10 lbs. 25 cents, 5 lbs. 30 cents, less than 5 lbs. 35 cents per lb., 4 cubic inches to the lb. .97 for radio frequency transformers, .46 cubic inch DC package cost $1.05. 5 watt 6.5 volts, 4 watt 8.5 volts, 2 watt 11 volts in stock with order—balance C. O. D. Geo. Schultz, Calumet, Michigan.

Special motor generator bargains. New motor generators at less than second hand price. We have in stock

SAY YOU SAW IT IN QST IT IDENTIFIES YOU AND HELPS QST
A few New Westinghouse double commutator 750 V, 200 W. D. C. generators direct connected to 110 V, 60 cycle A. C. motors $40.00 each. Field rheostat extra $4.50 each. 250 cycle transformers approved for use. Subject to prior sale. QUEEN CITY ELECTRIC CO., 1734 GRAND AV., CHICAGO, ILL.

100 WATT power transformers 350 each side, complete. Room for filament winding, $7.50. GEES Frank Greben, 1927 S. Peoria St., Chicago, Illinois.

SAMPLE REPORTS.

9B5 CRESENT, IOWA. THOUGHT WAS STUNG AND DECIDED TO STUDY AND GIVE UP. AT THIS TIME MY SPEED LIMIT WAS EIGHT PER, AND AFTER 3 EVENINGS WITH THE SHORTKUT I COULD DO 15 AND CAN NOW DO 20 EASILY.

9QY FORT MYERS, Fla. WAS LICENSED AND HAD RUMBLER LOOKED LIKE STUCK BUT AGAIN IT AND DOUBLED RECEIVING SPEED IN FIVE HOURS—HI. PUT SHORTKUT INTO EVERY HAMS DEN.

9CMB YORK, KY. WHEN GOT RIGHT SLANT ON YOUR RAISED MY RECEIVING SPEED FROM 15 TO 25 IN 3 EVENINGS.

Reports from 6000 others. Coupon to 25 cents. Reports from all Dista. Other information on request. SHORTKUT with Appendix and Better Key Work $5.00 to CAN. Elsewhere $4: Reg. Mail: None COD: Send P.O. Order.

DODGE RADIO SHORTKUT, MADAMONECK, N.Y.

Trade mark BKMA YRLSBUG Registered.

AMATEUR RADIO EQUIPMENT THAT IS GUARANTEED TO WORK! ENSALL RADIO LAB., EQUIPMENT DIRECT FROM FACTORY TO THE LARGEST JOB IN THE RADIO LINE WE WOULD BE PLEASED TO QUOTE ON THE PARTS ARE THE GENERAL RADIO EQUIPMENT, THEORDORSON, TRANSFORMERS, ALL TYPES OF CHOKE COILS, etc., PRICES ON REQUEST. WE SUPPLY GENERAL RADIO EQUIPMENT, THORDARSON, ACME, NATIONAL, PYREX, ESCO, JEWEL, WESTON, ESCO, ETC., WE BUILD TO ORDER. ALSO ON A NUMEROUS PARTS WE CARRY. IF IT'S RADIO EQUIPMENT FOR AMATEUR OR BROADCAST STATION, RECEIVERS, TRANSFORMERS, ALL TYPES OF CHOKE COILS, etc., WRITE FOR QUOTATIONS GLADLY.

THAT PHONE OUTFIT. THE SHORT WAVE RECEIVERS WILL WORK IN ALL RADIO LAB., EQUIPMENT FOR AMATEUR OR BROADCAST STATION.

THE LARGEST JOB IN THE RADIO LINE WE WOULD BE PLEASED TO QUOTE ON THE PARTS ARE THE GENERAL RADIO EQUIPMENT, THEORDORSON, TRANSFORMERS, ALL TYPES OF CHOKE COILS, etc., PRICES ON REQUEST. WE SUPPLY GENERAL RADIO EQUIPMENT, THORDARSON, ACME, NATIONAL, PYREX, ESCO, JEWEL, WESTON, ESCO, ETC., WE BUILD TO ORDER. ALSO ON A NUMEROUS PARTS WE CARRY. IF IT'S RADIO EQUIPMENT FOR AMATEUR OR BROADCAST STATION, RECEIVERS, TRANSFORMERS, ALL TYPES OF CHOKE COILS, etc., WRITE FOR QUOTATIONS GLADLY.

SHORTWAVE WITH APPENDIX AND BETTER KEY WORK $3.50 TO US-CAN. ELSEWHERE $4: REG.

NO BUNK. New tubes UV203s $21.00. TV203A's $21.50. Lead $1.00 square foot all prepaid. GEO, SCHULZ, Calumet, Michigan.

LISTEN TO 5EH. Sounds like an Omigraph. It isn't. It's the Cricket Key. No bum fias. No "glass arms"!

ESCO 500 volt 100 watt motor-generator. 120 volt DC drive. Practically new, $20. 9UE, Milwaukee.

HAVE UP-TO-DATE power transformer 1500 v each side, mid and two "S" tubes. Want MG. Let's QSO. Roger Hill, East Liverpool, Ohio.


AMATEUR RADIO PANEL is a pure white grained Ivory, the most beautiful radio panel of today. Any size 3/16" thick, sent anywhere prepaid or COD. Also dials and knobs. Write for FREE sample. Ivorylite Radio Panel Company, Dept. G, 9652 Ave. F, Fort Worth, Texas.

750-WATT TRANSFORMERS 1500 each side. FOR SALE CHEAP, two used 260 watt DeForest 2-Q-15 tubes. WCAJ.

BUY UP-TO-DATE power transformer 1500 v each side, mid and two "S" tubes. Want MG. Let's QSO. Roger Hill, East Liverpool, Ohio.

SOLD. RYAN RADIO COMPANY, HANNIBAL, MISSOURI.

FORE SALE-20 watt transmitter complete. Tubes, Rectifier Filter, Transformers, Meters. All in one cabinet 65.00. Edwin Carlson, Waterman, Illinois.

CERTAINLY! We have all the parts you need for that Raytheon eliminator. Also have few full wave eliminators using two 291A tubes. Bargain while they last. $9.95.

WRAP THE RADIO CLUB INC., LaPorte, Ind.

Have you received your copy of the new HAMALOGO, the Official Ham Catalog, yet? If not, ask for it and we will be glad to send you a free copy. This catalog contains the most complete stock of Amateur transmitting and receiving equipment in the country, some good circuit diagrams and dope on transmitters, receivers, rectifiers, chokes, transformers, B-eliminators, information on getting started in this great game of Amateur transmitting, and an operation of Radiotron's at short waves. You can't afford...
METHOD IS EASIEST, QUICKEST. PATENTED. Send orders answered all over the world.

WELL'S CURIOUSITY
chokes, Transformers, and condensers. Thoradson transformers, Eisco transformers, Pyrex insulators. An \( \text{4e} \) coil for complete method to Crayton Snyder, 1423 Forman, Providence, R.I.

TR.1ST\S.\S.\S. TRANSMITTER. Free list of miscellaneous parts for sale. \( \text{5} \) each, \( \text{99e} \) per 100. \( \text{50} \) each, \( \text{99e} \) per 1000. \( \text{10} \) each, \( \text{99e} \) per 10000. \( \text{15} \) each, \( \text{99e} \) per 100000. \( \text{25} \) each, \( \text{99e} \) per 1000000. \( \text{50} \) each, \( \text{99e} \) per 10000000. \( \text{100} \) each, \( \text{99e} \) per 100000000.

RADIO ELECTRIC CO., West Winfield, N.Y.

AMATEURS! DEALERS! Write today for details of UNITROLA EXCLUSIVE DEALER FRANCHISE for the state of New York at \$90.00.

DO YOU WANT TO MEMORIZE THE WIRELESS TELEGRAPH CODE? THE CRAYTON SNYDER METHOD IS EASIEST, QUICKEST. PATENTED. Send 25c coin for complete method to Crayton Snyder, 1423 Elm Dale Avenue, Chicago, Illinois.

TRANSFORMERS—CHOKES—Built to your specifications. Write for estimate. O.K. Battery Service, Carthage, Illinois.

THORDARSON 650-VOLT POWER-FILAMENT TRANSFORMERS for 5-wat. \$6.00. CURTIS-CRUSHER, FORT WORTH.

Fifty Watt Broadcasting Station, with key equipment, three fifty watt tubes, thousand volt ESCO, etc. Used less than three months. $125.00, \( \text{95} \) per week.

BRASS ribbon for pancake Helices for 20-40-80 meters: \( \frac{5}{16} \) wide, \( \frac{3}{16} \) thick, \( \frac{1}{4} \) foot long, \( \frac{1}{4} \) foot for less, Prepaid to 5th zone. Geo. Schulz, Calumet, Michigan.

GENERATORS—350w 500v O.K. \$12.50, 200w 500v Rewind 5.50. 0-100 radian meter new \$7.50. \( \frac{1}{2} \) KW cycle generator \$18.00. Amplifier and 2 tubes \$5.00, 6LC.

ENGRAND-BRANCH TOOL COMPANY, WASHINGTON, D.C. SELL \$1200 SILVERMARSHALL SUPERHETERODYNE STATION and \$25000000 RADIO LABORATORIES, 1083 AILEEN STREET, OAKLAND, CALIFORNIA.

THE LATEST. The Cricket Key. Pie for old homies. Birdcallers perfect flat in one tenth time. Call or \$5.00.

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS Q51
A PIONEER RADIO SCHOOL
With a Record of Successful Graduates

This school was started back in the days of the ten inch spark coil. Radio has advanced and so have we. Completely equipped with Spark-Arc-Vacuum Tube Transmitters, and Automatic Code Machines. Send for booklet, "Opportunities in Radio.

Y. M. C. A. RADIO INSTITUTE
159 East 86th Street, New York, N. Y.

HERCULES AERIAL MAST

Mail the Coupon

WE PAY FREIGHT

20FT.$10. 40FT.$25. 60FT.$45.

Complete with guy-wires etc.

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST


They are obsolete after 30 days. Tell us what you want and we will send manufacturer's latest descriptive and illustrative literature with list prices and discounts. We allow discounts to A. R. R. L. members and dealers only. Give your call letters. Write us when you need anything. We carry it in stock.


THERMO Galvanometers (6) model 555 Weston 1-15 M A cost $15.50. As good as new for $9.00 each while they last. F. P. 1220 Longacre Bldg., 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, $150.00 Postpaid. SHORT WAVE WAVES, set of four. celluloid supported space-wound plug-in coils with mounting for that new receiver, 18 to 250 meters, $4.00. We build real amateur equipment and carry the supplies you need. Send for list. Seattle Radio Laboratory, 3885 83rd Ave., South, Seattle, Washington.

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

1BV—L. G. Cumming, 83 Marlboro St., Boston, Massachusetts.

1CIO—Philip T. Brown, 15 Bramhall St., Portland, Maine.

1CKM—C. D. Moir, Box 121, Shrewsbury, Mass.

1FB—L. G. Cumming, Prout's Neck, Maine.


1RD—J. Raymond Decker, 212 Winslow Road, Waban, Mass.

1ZA—C. F. Jeffrey, Jr., 725 Commonwealth Ave., Newton Center, Massachusetts.

2ATM—John B. Trevor, Jr., 11 East 91st St., New York City.

2ATX—E. Dillmeier, Jr., 2408 114th St., Richmond Hill, Long Island, N. Y.

2AVP—Ex 2AH, Maurice Grayle Suffer, 607 West Beach Street, Long Beach, L. I., N. Y.

2AWN—E. Dillmeier, Jr., 123 S. Clinton Ave., Barshore, Long Island, N. Y.

2AXS—Paul R. Leonard, 8 Worrall Ave., Poughkeepsie, N. Y.

2CHK—Harold Sacks, 161 West 75th Street, New York City.


2FX—V. P. Brondy, 55 Wagner Ave., Schenectady, N. Y.

2OF—John M. Avery, 131 South 29th St., Plashing, N. Y.

2AIR—Fernand Causse, Box 81, Lester, Penna.

2AKD—Roger Causse, Box 81, Lester, Penna.

2CZ—Clarence L. Durham, Box 550 Hendersonville, N. C.

2GO—R. Painter, 736 Lillian Ave., W., Atlanta, Georgia.

2AQ—H. H. Green, 6119 Bryan Parkway, Dallas, Texas.

6ASS—Garland Swain, Rivera, California.

6ALU—J. A. Carney, M.D., 811 Plum St., Massillon, Ohio.


6DOY—H. C. Morrison, 333 Rohrer St., Greensburg, Pennsylvania.

6DSQ—C. A. Gillilan, Box 83, Carbondale, Ohio.


6ARA—Robert Henry, Butler, Missouri.

6AVM—Leslie F. Jaecke, Junction City, Kansas, R. 1.

6BCQ—Ben Plunkett, Butler, Missouri.

6BGL—L. C. Campbell, Miller, So. Dakota.


6CDF—Heber King, Butler, Missouri.

6COR—Howard Lowen, 210 So. Chatauqua, Wichita, Kansas.


6CVY—Walter Henry, Jr., Butler, Missouri.

6CWZ—John McNay, Butler, Missouri.

6DCG—Roland B. Cooper, 326 Nicholas St., Vincennes, Indiana.


6EBY—C. C. Rhodes, Butler, Missouri.

6Z6QA (ex 7AA)—A. A. Santos, Box 53, Maranhao, Brazil, S. A.

The following stations belong to members of the A.R.R.L. Headquarters gang. Mail for them should be addressed care A.R.R.L., Hartford, Conn.

1MK—Headquarters

1AL H. P. Westman

1BQ R. S. Kruse

1BDI F. E. Handy

1BHW K. B. Warner

1DQ John M. Clayton

1ARA—Robert Henry, Butler, Missouri.

1BGO—Paul R. Leonard, 8 Worrall Ave., Poughkeepsie, N. Y.

1CHK—Harold Sachs, 161 West 75th Street, New York City.

1MK—E. F. Raymonds, Central Valley, Orange Co., New York.

1FX—V. P. Brondy, 55 Wagner Ave., Schenectady, N. Y.

1OF—John M. Avery, 131 South 29th St., Plashing, N. Y.

1AIR—Fernand Causse, Box 81, Lester, Penna.

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1CZ—Clarence L. Durham, Box 550 Hendersonville, N. C.

1GO—R. Painter, 736 Lillian Ave., W., Atlanta, Georgia.

1AQ—H. H. Green, 6119 Bryan Parkway, Dallas, Texas.

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST
Prize contest
$25 for five words

First Prize:
Magnavox R3 or M3 Loud Speaker; value $25.00.

Second Prize:
Set of 5 Magnavox Tubes; value $12.50.

We want a slogan to sum up the superiorities of the new Magnavox non-microphonic tubes. Perhaps you have used these tubes and have found some unusual feature. If so, put it in words and you may win a prize. If you don't know the Magnavox Tube, borrow one from a friend, read the following, ask the Magnavox dealer or write to us for full information.

The Magnavox Tube is ideal for short wave reception as its internal capacity is only 4.5 MMF. It oscillates freely on low wave lengths without unbasing. Its amplification constant is very high, with low impedance. It is equally dependable for detecting or amplifying. It is backed by 15 years of radio manufacturing experience.

Rules of Contest:
1. Slogan must be non-technical—easy for laymen to grasp.
2. Must not be more than three to five words.
3. Contest closes June 15th. Announcement of winners will be made in QST, August issue.
4. The Magnavox Company will be sole judges.

Start right now to win one of these prizes. Address entries "Magnavox Contest.

THE MAGNAVOX COMPANY
OAKLAND, CALIFORNIA

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"I've just had a lesson in radio economy, and, believe me, it's illuminating."

"I went into my radio dealer's this noon for a couple of 'B' batteries and said, 'Tom, give me a pair of Eveready 45-volt 'B' Batteries, No. 772's.'

"How many tubes in your set, Jim?' he asked.

"'Five,' I answered.

"'Then what you want is a pair of Heavy Duty Evereadys—the Layerbilt No. 486's.'

"'Why?' I asked.

"'Because the Eveready 772's are meant for one to three tubes. With average use of two hours a day, and used with a "C" battery*, they should last a year or longer. But on a five-tube set, with average use and with a "C" battery, they will only last about four months. Anyone with a four or five tube set should buy a pair of Eveready Layerbilts No. 486. Used two hours a day and with a "C" battery they should last eight months or longer.'

"'Yes, but the 772's cost only $3.75 each,' I said, 'and the Layerbilt $5.50.'

"'Well, figure it out,' said Tom. 'Two sets of 772's should last you about eight months, and will cost you $15.00. One set of Eveready Layerbilts should last about eight months, and will cost you only $11.00.'"

The simple rules for this satisfaction and economy are:

- **On 1 to 3 tubes**—Use Eveready No. 772.
- **On 4 or more tubes**—Use the Heavy Duty "B" Batteries, either No. 770, or the even longer-lived Eveready Layerbilt No. 486.
- **On all but single tube sets**—Use a "C" battery.

When following these rules, the No. 772, on 1 to 3 tube sets, will last for a year or more; and the Heavy Duties, on sets of 4 or more tubes, for eight months or longer.

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*NOTE—A "C" battery greatly increases the life of your "B" batteries and gives a quality of reception unobtainable without it. Radio sets may easily be changed by any competent radio servicing man to permit the use of a "C" Battery.


Tuesday night means Eveready Hour—8 P. M., Eastern Standard Time, through the following stations:

- WFAN—New York
- WCAE—Cincinnati
- WFNJ—Providence
- WWHI—Boston
- WXYZ—Detroit
- WTVN—Worcester
- WYPR—Chicago
- WJZ—Philadelphia
- WOR—Boston
- WJZ—Philadelphia
- WOAM—Pittsburgh
- WNOQ—Minneapolis
- WQOQ—St. Paul
- WQAI—St. Louis

SAY YOU SAW IT IN QST—IT IDENTIFIES YOU AND HELPS QST
THERE doesn’t seem to be much to a Micadon when you look at it. The infinite care that is given to every detail in the manufacture of Dubilier Micadons is your assurance that they will always do their job.

Micadons are a small item in the cost of any radio set. But the difference between clear and poor reception, and the change from noise to natural tones may often depend upon their use.

Send 10c for our booklet which shows fourteen ways in which you can improve your set by simple application of fixed condensers.

4377 Bronx Blvd., New York
Here's Your Wavemeter!

And it won’t cost you a cent

THE LEAGUE needs 5000 new members and QST needs 5000 new subscribers. We believe that there are at least 500 loyal members at present who will be willing to put a little effort into doing a big service for their League—and at the same time they can profit by an extraordinary offer we are able to make for the next two months.

The Wavemeter: An accurate instrument, well made and designed to be convenient and easy to handle. It is equipped with a handle which makes it possible to hold it in one hand while you twist the dial with the other hand. Coils mounted on G-R plugs so that additional coils may be used in color various ranges. Wavelength range with coil supplied, is approximately 4 to 50 meters, thus covering the 40- and 20-meter bands. Each meter is individually hand-calibrated as only in this way can accuracy be insured. Chart furnished with each meter, from which you can easily dress your own ear.

Mounting is a genuine mahogany case and face of polished and lacquered nos. Coils are all German and Made by Böhm. The meter is a modified Volpi made by the Marconi Co. and is light in weight and most accurate. A metal case is very attractive. Alkaline batteries are used. Alkaline batteries are used.

How to get it: Do your own neighborhood, there are at least a score of people who are selling informal and short-wave stuff. Every one should be a subscriber to QST and a member of the League.

Show them how to tell them what they can learn from it and how much the League is doing for short-wave work.

Show them you that their two WST cannot be better spent than for a subscription to QST.

Send in their names and address as you insult them and send your name along with each one, mentioning that you are working for the wavemeter.

With the tenth one you send in, tell us to ship the wavemeter.

Please be sure to give in your full name and address, just like your call.

After you’ve sold your first ten, go out and sell ten more. Then sell the other wavemeter to some rich fellow.

Remember that the subscribers’ contest is due to close this month. Remember that the League needs your help, the League needs your help, the League needs your help.

This copy needs Bay 31, 1921.

All right, gang—send ’em in!

Address
QST, Circulation Department, 1711 Park St., Hartford, Conn.
Contributors to your radio entertainment

Very probably hidden away in the cabinet of your receiving set, the batteries you use are nevertheless surrendering their power unseen and unheard.

And to be able to contribute their energy and to add to the complete efficiency of your receiving equipment, those batteries must combine every desirable factor and formula known in the electro-chemical field.

Such Batteries are Burgess—products of the Burgess Laboratories—products which have been used by practically every famous explorer, the majority of amateurs and the leading radio engineers.

That's why when you use Burgess Radio 'A,' 'B' and 'C' Batteries you are using batteries which assure the utmost dependability, longer life and complete satisfaction.

Burgess Battery Company
General Sales Office: Chicago
Canadian Factories and Offices: Niagara Falls and Winnipeg

Burgess Radio Batteries
Communications

F. E. Handy, Communications Manager

1711 Park St., Hartford, Conn.

Notice!

ALL A.R.R.L. members of the Northwestern, Dakota, Hudson, and Maritime Divisions!

The Sectionalizing of territory in the Divisions is as follows:


Dakota Division (four sections): North Dakota, South Dakota, Northern Minnesota (including all counties north of the Minnesota River and north and east of that part of the Mississippi River between the mouths of the Minnesota and St. Croix rivers), Southern Minnesota (including all counties south of the Minnesota River and south of that section of the Mississippi River between the mouths of the Minnesota and St. Croix rivers and in addition the county of Hennepin).

Hudson Division (three sections): Northern New Jersey (all of New Jersey within the Second Federal Inspection District), New York City and all of Long Island, Eastern New York (all of New York state within the Second Federal Inspection District excepting Long Island and New York City).

Maritime Division (four sections): Province of New Brunswick, Prince Edward Island, Nova Scotia, and the Dominion of Newfoundland.

Nominating petitions are hereby solicited. Five or more A.R.R.L. members in good standing have the privilege of nominating any League member in their Section as candidate for Section Communications Manager. The election will take place in July and August on ballots which will be mailed from League Headquarters.

A form for nomination was shown on page 35 of April 1926 QST. Such petitions must be filed at A. R. L. Headquarters, Hartford, Conn. by noon of the 15th day of July, 1926. There is no limit to the number of petitions that may be filed but no member shall sign more than one such petition. April QST fully explains the change in organization which will continue in force until the Section Communications Managers have been elected. Members are urged to take the initiative and file nominating petitions immediately.

—F. E. Handy, Communications Manager

Further Notes on Checking Messages by Cable Count

Correct your May QST at the top of the second column, page 40, to read, "1MK counts as three words in the signature or text of a message."

The name of a state that has two parts is always counted as one in the address. It is usually counted as two in the text but may count as either one or two depending entirely on how it is written and transmitted. Example: If written, "NEW YORK", in the text, it is counted as two words. If written, "NEW YORK" it is counted as one word.

It is customary at shore stations handling General Public Service Messages to omit the count of the name of a state in the check when it is included in parenthesis in the address. If New Jersey is transmitted with a parenthesis, N.J. — putting it before and after it, it indicates that the word has not been counted in the check.

In code messages, no word containing more than two characters is accepted.

When messages are written in plain language, code, and cipher, the passages in plain language and code are counted as code ten letter count and the passages in cipher take the five letter count.

When messages are written in plain language and cipher, the passages in plain language take the fifteen letter count and the passages in cipher take the five letter count.

When messages are written in plain language and code, the entire message takes the ten letter count.

In artificial words the combination is counted as two letters.

Don't forget that in checking messages using Cable Count, the words in address, text, and signature are counted.

C. O. S. of WFK-8LA + F. E. H.

The Atlantic Coast QSR Line

By "MP" of 8DHX

It will be of great interest to the traffic men of the A.R.R.L. to learn of the existence of a complete "sure fire" relay system covering the entire Atlantic Coast. It includes, at present, no less than twenty-nine traffic moving stations. Its completeness can be seen at a glance at the accompanying map.

This "sure fire" network has been, with some modifications, in actual nightly operation for a half year's time. Included in it are some of the biggest and fastest Official Relay Stations on the East. No message, when once started in the net, ever gets stale. Delivery is guaranteed for any city within the net.

Supplying traffic for Maine and foreign traffic is routed to 1ATJ who ties the Atlantic Coast Line and the Maine Message Pusher's Club* net together. Traffic for Canada is routed via SIEU and 8GI. Far West messages go via 8SCNX. 8DHX clears all New York State traffic including a great deal of that to New York City. The "hub" of the system, 8BWT, clears all south bound messages via 8JX and 4MT.

The amount of traffic handled can be judged by noting the brass pounders included, some of whom are runners up for the Traffic Trophy—namely SIEU, 8DHX and 1ATJ.

There is room for real traffic stations and schedules are needed in several places yet. A number of the members of the Atlantic Coast Traffic system are lining up nets of stations in their states to efficiently dispose of the North-South state traffic which is handled over the trunk route. More dope

"This is "A New Idea"—page V, Communications Dept., May 1926 QST, Vol. X, No. 6."

QST FOR JUNE, 1926
is available from either 3BWT or 8DHX for anyone wishing to join the system. It seems to the writer that a system for Trans-Continental Relaying and for work along the West Coast can be developed along similar lines and be of great value to the A.R.R.L. Then "Chuck" of 8CNX wouldn't be jammed every night with a score of west coast messages.

What say, gang? Shall we have a Trans-Continental net to join to the present Atlantic Coast net? Stations and operators who can keep schedules, who want real traffic and who know how to handle a key efficiently are needed. If you are one such, join the chain without delay! QST will follow the progress of the work and give credit where it belongs. A.R.R.L. men everywhere are behind the idea.

**Army-Amateur Notes**

**2ND CORPS AREA**—Radio Nets have been organized for the New Jersey National Guard, 77th, 78th and 90th Divisions, Organized Reserves. These nets are functioning, but not complete. From time to time additional amateurs will be assigned. The work in this Area is progressing very satisfactorily. The only trouble encountered to date is the lack of coordination between each amateur and the officer of the unit to which he must report for traffic. The officers of various military units have not had opportunity to become familiar with the plan, or to proceed with Army traffic handling, but progress in these matters is being made. It is suggested that all Army amateurs be well versed in this plan and the possibilities for handling that traffic and offer suggestions or advice to their units when called upon.

The National Guard net for Delaware has not been organized, lacking amateurs in the proper localities. 6 amateurs are needed for Wilmington, 2 for Delaware City and 2 for Laurel.

The organization of the National Guard of New York State is held up pending information from that organization. The following amateurs have been appointed and certificates mailed: 3Jw 20cf 3aza 3aeo 3ka 3an 2sc 5sc 670 70 3kx 2do 85 2ks 2et 25d 2et 3uk 3ha 3za 3f 2at 33an 8su 8pm 3k 38d 3sc 69 2sc 6et 3d 26 87w 88w 2pr 2sw 29w.

**3RD CORPS AREA**—Tests were conducted throughout April with the amateurs of the Third Corps Area taking part in the Army-Amateur plan, Signal Corps Station 8am at Fort Howard, Md., is the station designated for the purpose.

Each amateur has been assigned a time and wavelength on which to call 8am. Tests have been arranged in mornings, afternoons, and late at nights. 8am transmits on 3945 Kc's at all times so that stations worked have no difficulty due to a shifting wavelength. The amateurs are all enthusiastic and cooperate to the fullest extent possible.

At the conclusion of the tests, the stations needed will be designated, and certificates will be issued by the Signal Officer. 3rd Corps Area. When the net begins functioning, only those amateurs who have demonstrated their ability to Signal Corps officials will be found operating stations throughout the net. Reserves are open to other amateurs within Pennsylvania, Maryland, Virginia and the District of Columbia, who may wish to affiliate with the Signal Corps. Application, the Signal Officer, Hq, Third Corps Area, Baltimore, Md., will be glad to arrange tests.

**4TH CORPS AREA**—The Net has been on a regular schedule for two months, working every Saturday at 2:00 pm, Eastern Standard Time, on 40 meters. Traffic has been handled in a prompt and satisfactory manner. The 83rd, 84th and 100th Divisions, Organized Reserves, are rapidly filling up their Divisional Nets. Certificates have been mailed to the following stations: 3sm 3cbt 8aw 3scf 3byv 3ese 9dhj 3bw 9haf 9dji 9jggv 9jggg 9jggk.

**6TH CORPS AREA**—Considerable progress has been made this month. The Corps net is nearly completed. The Organized Reserve is being set up as quickly as possible. Reserves as relays are being used whenever possible. Reserves as relays are being used whenever possible. More amateurs are needed. The work in the net is progressing very satisfactorily. The officers and operators of various military units have not had opportunity to become familiar with the plan, or to proceed with Army traffic handling. Messages are now being handled over that much of the net already organized and those doing the work find it interesting and instructive.

**7TH CORPS AREA**—The Governor's net in Minnesota having been completed, a test was conducted by the Signal Officer, on April 11th, message originating at Omaha addressed to the Governor of National Guard organizations at Dawson (9edf); Luverne (9hbn); Eau Claire (9egk); Crookston (9hik); New Ulm (9bxc); St. Cloud (9cif); St. Paul (9df); Redwood Falls (9fl); Ottonville (9jdw); Mankato (9glv); Stillwater (9ge). The message was sent by Mr. Diehl, Assistant to the Manager, Midwest Division, A.R.R.L. at the Corps Headquarters control station, Omaha, Nebraska, Saturday, April 10, 10:35 AM. This test message was sent to the Governor's control station 9by, St. Paul, and promptly relayed by Mr. McCord to destination on Sunday, April 11 at 3:30 PM. While replies from addresses were not received with expected promptness, the test was highly satisfactory, as far as the net itself is concerned. The test demonstrated that the Minnesota net is thoroughly organized, and that traffic can be handled with speed and accuracy.

**8TH CORPS AREA**—The Governor's net in Texas is shown by the diagram. It operates on 40 meters between 6:30 and 7:30 pm, daily except Sunday. Sixty-four operators have been issued certificates of appointment and assigned to various National Guard Units in 29 cities and towns. Test messages have been exchanged between net control station 8am at Fort Sam Houston, and all stations in the net. The enthusiasm is all that could be asked.

**COPPER NETS OF TEXAS**

When three broadcasts were sent recently, over 80% of the antennas were tested.

A similar net in Oklahoma is now in the process of organization. It is expected to become operative...
May last after which nets in Colorado, Arizona and New Mexico will be organized.

9TH CORPS AREA-A number of assignments of amateur stations were made by the A.R.R.L. representative during the month. Certificates will be issued during April. Considerable difficulty is being experienced in securing stations at some points where important National Guard units are located. As an example, it has been found that there are no licensed amateur stations at Cheyenne, Wyoming, and the whole state of Wyoming is practically without a station.

Army-Amateur Notes follow the progress of this important amateur work from month to month. The general plan was given on page 22 of October 1925 QST. Appointment certificates are being issued to the amateurs selected just as fast as the applications and information from Army units can be put together. Stations that offer their services must first be designated by the appropriate National Guard or Organized Reserve units.

Some interesting things have been planned for the work of the coming season. You will want to get a chance to take part in it. Better send in your application today, OM. Get lined up while the opportunity still holds good and there are some blank positions to be filled.

A.R.R.L. Representatives in the Army-Amateur Communication system have been appointed for each Corps Area. Applications from amateurs residing in the different Corps Areas are referred to the proper Representative. If you do not know in what Corps Area you are located, write A.R.R.L. Headquarters and we will send you the proper office of the A.R.R.L. Representative in your Corps Area.

Corps Area Call Name Address
First 1WZ P. K. Baldwin 899 Boylston St.,
Boston, Mass.
Second 2PF David Talley 2222 Avenue O,
Brooklyn, N. Y.
Third 3WF Chas. A. seventh Avenue 405 N. Curley St.,
E. Baltimore, Md.
Fourth 410 J. Morris 58 Frederick St.,
Atlanta, Ga.
Fifth 8BY H. C. Storck 689 Carpenter St.,
Columbus, Ohio
Sixth 9AAW W. E. Schweitzer 2074 Havel Ave.,
Chicago, Ill.
(Aacting 9AFF W. W. Bingham 2324 West Monroe St.,
Chicago, Ill.)
Seventh 9DXY P. H. Quinby Box 184A, R. t.,
Omaha, Nebr.
Eighth 5ZAE L. D. Wall 318 Colahan Ave.,
San Antonio, Tex.
Ninth cZD A. H. Babcock 65 Market St.,
San Francisco, Calif.

OFFICIAL BROADCASTING STATIONS

<table>
<thead>
<tr>
<th>Call</th>
<th>Local Standard Time</th>
<th>Start and End of Day of Transmission</th>
<th>Days of Week</th>
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<tbody>
<tr>
<td>6AH</td>
<td>49-49</td>
<td>7:00 pm to 5:00 pm</td>
<td>Mon. Wed. Fri.</td>
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<tr>
<td>6AN</td>
<td>40</td>
<td>7:00 pm to 5:00 pm</td>
<td>Mon. Wed. Fri.</td>
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<tr>
<td>6AZ</td>
<td>46-46</td>
<td>12:30 pm to 10:30 pm</td>
<td>Mon. Wed. Fri.</td>
</tr>
<tr>
<td>6AX</td>
<td>39</td>
<td>7:00 pm to 5:00 pm</td>
<td>Mon. Wed. Fri.</td>
</tr>
<tr>
<td>6BU</td>
<td>39</td>
<td>1:00 pm to 9:00 pm</td>
<td>Mon. Wed. Fri.</td>
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<tr>
<td>7GZ</td>
<td>39</td>
<td>12:00 pm to 8:00 pm</td>
<td>Mon. Wed. Fri.</td>
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<tr>
<td>7SM</td>
<td>52.5</td>
<td>7:00 pm to 5:00 pm</td>
<td>Mon. Wed. Fri.</td>
</tr>
<tr>
<td>7SM</td>
<td>52.5</td>
<td>1:00 pm to 9:00 pm</td>
<td>Mon. Wed. Fri.</td>
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<tr>
<td>8AAR</td>
<td>52.5</td>
<td>7:00 pm to 5:00 pm</td>
<td>Mon. Wed. Fri.</td>
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<td><strong>7:30 pm to 5:30 pm.</strong></td>
<td><strong>66.5 meters. 6:30 pm.</strong></td>
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<td><strong>66.5 meters. 6:30 pm.</strong></td>
<td><strong>66.5 meters. 6:30 pm.</strong></td>
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<td><strong>8:00 pm to 8:30 pm.</strong></td>
<td><strong>8:00 pm to 8:30 pm.</strong></td>
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<td><strong>9:00 pm to 9:30 pm.</strong></td>
<td><strong>9:00 pm to 9:30 pm.</strong></td>
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Traffic Briefs

THE Chicago Daily News—C.T.A. message service is rounding out nicely. The traffic committee has had no signs of work only in coming on the air. The problem of better relaying is also receiving proper attention. The arrangement of schedules and strict use of A.R.R.L. standard practice helps in this. The traffic committee has undertaken to give a special message to each hotel and hospital in the Chicago district. Thanks is due to the Chicago Daily News for preparing two kinds of message blanks for collecting and delivering the messages.

The membership of the Maine Message Pushers Club is now as follows: 1ATV, 1AUJ, 1ALQ-L, 1UU, 1BFZ, 1BPT, 1AWQ, 1AYJ, 1ADI, 1AAV, 1ISO, 1CGY, 1BNL, 1CIB, 1BUB, 1AIH and 1BHG.

S.A.H. is going ahead with the organization of a message-publishing network in Western New York. 1KY intends to form a club of traffic handlers in Eastern Massachusetts. Look at the Maine fellows who raised the Brass Founders' League this month! Then start something with your local gang.

5WK has the right idea. His QSL card tells the usual things about transmitter and receiver and in addition it is a get-acquainted card. It tells a lot about himself. 1ATV uses some station cards along similar lines. If your cards don’t seem to bring replies it may be that they lack a personal friendly touch. When you make up some new ones for the printer bear 5WK’s suggestion in mind.

Mr. Leon C. Grove writes from Ninema, Alaska, that he keeps a daily schedule with 6H7. He requests that all traffic for interior Alaska be routed through 6H7. 7GZ and 7SM have been in regular touch with the Wilkins Arctic Expedition ever since the last from Ninema. 7GZ assisted materially in maintaining contact with KFZH. 7SM (Mr. Grove) handled a bunch of messages during April.

6CK has a bunch of schedules with Canadian stations on 62,51 meters. He reports that during a big storm the last of March, several Canadian stations were kept busy handling the emergency traffic that resulted as the result of the storm. Official messages were handled for the Marconi Company and also for the Ontario Hydroelectric Company. 6CK sent a lot of press to Ottawa and Fort Arthur and was in constant touch with Toronto. Besides this there were many messages for private individuals transmitted. Everyone made good use of our A.R.R.L. service.

KFUH and 6HV bat them out in fine style. 200 word messages are not uncommon. All the San Jose boys can hold up their end with the key. Listen to ‘em!

5AKT suggests using mimeographed government postal cards for temporary or portable stations. He says this procedure cuts down excessive printing rates on small lots.

6SV, the Santa Clara County Radio Association, has just concluded a five-day test at Lick Observatory. The results were wonderful. One of the features of the tests was just an ordinary thing to the amateurs concerned but made a great impression on the Director of the Lick Observatories all over the world could make good use of amateur radio, if they got in touch with their “hams.”

NKF still has a transmitter right on 8100 KC's—(slightly below 37.5 meters)—marking the lower edge of the amateur 40-meter band. SDAJ operates squarely in the upper edge of the same band. 8FW on 7189 KC's is also near the upper edge of the band. Any of these stations can be logged on the receiver and used in checking the wavemeter. There is no excuse for operating off-wave and amateurs who find their licenses suspended or revoked by the Department of Commerce have only themselves to blame.

9ZA casually mentions working KFUH and 41AO. Yes, it was two-way break-in, at 30 words per minute! That’s real sport!

SZG, 8PL, 9ZA, 32O and 3AU have worked five-wa-way break-in many times. All are right on zero-beat talking in order. There are no unnecessary calls. The operators are a fine thing, the cooperation, and perfect contact. 9ZA gets on about 5:30, says, “dah-h-h, 9za.” 8GZ comes back with, "ge FJ hr Windy" and they’re off! What think of
that, you chaps who say its necessary to call thirty times to raise 'em? .......

After trying to handle messages with some "punk" who repeated each word four times after calling you fifty times and giving you 9, it is a pleasure to work with a "regular". AAV writes in to point out the value of 'bravery' to the traffic-handler. He is one of the MMMC officers responsible for message handling. "R K" or "57 R" in all is that it is necessary to acknowledge a message when there is no QSL and the due's are low; it is necessary consideration to good operating form and accuracy. A sizeable amount of traffic can be handled in a very short time if the man at the sending end is brief and the receiver doesn't have to strain to follow him.

Try to make your operating snappy and brief. OMs. Don't get a "bug" thinking that will solve the problem; study it. Find in a place with a buzzer or audio oscillator a bit, and then try the standard abbreviated procedures on the air.

In the Fifth Corps Area the Army-Amateur Stations are using AA in a similar way to that in which PRK has been used for railroad emergency work. If you hear a "CQ AA" it is simply the general call for Army-Amateur work.

2ADH always listens for at least 5 minutes following a general CQ. Every other good station should follow the same policy (we were surprised on logging a number that didn't). There is no excuse for calling a foreign station just because one happens to be heard while listening for answers to a CQ. A suitable number of calls should be occupied with an earnest hunt for signals over the whole dial.

Let's try to cultivate the same courtesy shown by our foreign amateur friends. We shall be richly repaid.

**Club Activities**

**CONNECTICUT**—The Grid and Plate Association of Stamford, held their first annual banquet and general meeting. The ADM and many amateurs from neighboring cities attended. The affair was most successful and the enthusiasm shown bespeaks a bright future for the club. 1BM, 1BV, 1DR, 1CTZ, 1BWM, 1ABN, 1BGQ, 1BEZ, 1AXN, 1AJ0, 1CJ, and 1IVY were among those present. 1BEZ was toast-master. ADM Nichols was the principal speaker.

**ILLINOIS**—The LaGrange Radio Club had a hamfest Sunday, April 11. The guests were 9DDS, 9BNQ, 9DRZ, 9EC-29, 9EGQ, 9HGQ, 9HCD, 9JQT, 9VFQ, 9KQ, 9MWE, 9Q8H, 9HC, and 9Q9K, and 9AVZ were among those present. 9MWE was toast-master. ADM Nichols was the principal speaker.

**NEW JERSEY**—The Amateur Radio Association of Essex County have over 30 licensed "ops" as members. The club has four message boxes in various hotels in Newark and have alternate collectors every other night so each operator gets his share of traffic. 9ZB, and 9KS are Army-amateur stations. All the operators follow ARRL standard practice in respect to Commemorative Amateur Stations. The station operator in this live club is 14 years old, the oldest 57.

The 1A type Radio Club organized about one year ago, has progressed well. The Club Headquarters were obtained through SSU (now 2QD). A "shack" was purchased ten miles from its present site and brought to its location. The building was carried out by club members. A few months ago, the first anniversary dinner was held and Treasurer A. H. Smith gave a very enlightening talk that was enjoyed by all.

**OHIO**—The Ashtabula Radio Club are busy with the usual activities. They are trying to post some illegal transmitters in the city and bring them to justice.

The Cleveland Amateur Radio Association had an interesting talk by Mr. Herbst of A.R.R.L. Headquarters who stopped off on his way to the Kalamazoo Convention.

2QDQ, the station of the Norwalk Amateur Radio Association, continues to operate with a slight falling off in message handling due to the warmer weather.

The Findlay Radio Club has started the erection of a Club House where the club station will be located next winter (8FT).

The Mahoning Valley Amateur Radio Club of McKinley Heights has just received a 50 watt MO-FA set with 1000 volt B-battery supply will be used. The station is half way between the two cities on the Youngstown-Pittsburg line.

**PENNSYLVANIA**—The regular monthly meeting of the Lehigh Valley ORS Club was held in the shack of 2ZB, Palmerton, Pa., April 12. 100% attendance from Dist. No. 2, Pennsylvania. Routine business was handled and better operating practice was discussed.

The Amateur Transmitters' Association of Western Pennsylvania has a fine turnout at their hamfest March 12. We are reproducing the excellent prospectus that the Association distributed before the meeting was held. It is a good example for any club and the folks who got it up are to be congratulated. There were talks by A.D.M. Wiggins, MacAulay, Young, and Buzzard. Then Coleman spent the rest of the evening with a talk on Hertz antennas and quartz crystals. With the good feed and raw-chew, the meeting was a tremendous success from every standpoint.

**Regional Notes**

**NORTHEASTERN**—The A.R.R.L. Headquarters at Newington, Connecticut, have over 300 licensed operators, some of whom are members of the Western Union and New England Telephone companies. The ARRL Headquarters are located in a building used by the New York Telephone Company for a number of years.

**LZ**—The all-time favorite among hams is the ARRL standard practice of handling traffic. Every ham knows how to handle traffic messages. ARRL Headquarters at Newington, Connecticut, have over 300 licensed operators, some of whom are members of the Western Union and New England Telephone companies.
A number of Vigilance Committees are clearing up interference cases in the Pittsburgh area. The Pittsburgh Chronical-Telegraph and A. D. M. Wiggin are responsible for the good work that is being done. VIRGINIA—The Richmond Short Wave Club was organized formally April 24. The early work will be on 40 meters 2SMN, 3CEL, 3NG, 3AJE, 3AEV, 5AIL, 59IL, 59ZL, 6WZL, etc. Other ‘ops’ were present. Mr. Gordon Hammond was elected President and Mr. R. N. Eubank, Secretary-Treas. The Club meets twice each month at the Y. M. C. A. and interesting meetings are planned for the coming season.

WISCONSIN—The Milwaukee Radio Amateurs’ Club have a new stunt that is useful in boosting attendance. Every member who arrives on time is given a chance at a raffle. The prizes are receiving tubes handled by the EA.EH section are included in the win. Burton F. Miller, chief operator of 9XM-9DW at the University also spoke on crystal control and short wave radiophones.

TRAFFIC SUMMARY BY STATES

During March-April, there was a slight increase in the total amount of traffic handled, probably due to the increasing number of traffic networks in different parts of the country. Delivery figures remained the same as before.

The percentage of all the Official Relay Stations under each officer and the percent of total messages handled by each section are included in the summary of this month’s work. By comparing each column showing these percentage figures the standing of each section is shown on a message-handling and reporting basis. If the percentage shown opposite your name under “ORS” is greater than shown under “MSGS” it means that some of the following things need to be done: (1) Dead O. R. S. need to be cancelled. More live stations needed to be added. (2) Message lanes need to be formed covering your territory. More schedules may help. Perhaps the forwarding needs to be urged to originate more messages. (3) Maybe the messages are being handled all right after all but the reports are not coming in as they should which means that some letters need to be written.

The different Assistant Division Managers are listed below. Are you doing your part to keep your State and Division a leader? How will you stand next month?

If every station owner who reads these words will see that every message he handles is delivered or passed along promptly and report his good work, we will be able to show 100% delivery in the National scene of things in a short time.

The messages of RELAYING and DELIVERY must get some serious attention if our general service is to be one of which we are proud. The figures show that going over already established routes get through with the desired speed and 100% accuracy. The figures show that there is plenty of traffic to be handled. More individual responsibility regarding prompt relaying and delivery will bring the results we want.

Messages received should always be delivered immediately (a) by telephone, (b) in person, or (c) by mail if no other means of effecting delivery are available.

Never accept messages which cannot be handled or delivered without informing the chap filing the message of the circumstances.

Keep the hook clear by handling traffic on schedule daily.

| State or Division | ATLANTIC DIVISION | DELTA DIVISION | HUDSON DIVISION | MIDWEST DIVISION | NEW ENGLAND DIVISION | PACIFIC DIVISION | ROANOKE DIVISION | SOUTHEASTERN DIVISION | WEST GULF DIVISION | PRAIRIE DIVISION | ONTARIO DIVISION | QUEBEC DIVISION | TOTAL FOR COUNTRY |
|-------------------|------------------|----------------|----------------|------------------|-------------------|----------------|-------------------|------------------|------------------|---------------|----------------|----------------|
| State or Division |                  |                |                |                  |                  |                |                   |                  |                  |               |                |               |
DIVISIONAL REPORTS

ATLANTIC DIVISION

MARYLAND—SPS, operated by Midshipmen Fenton and Knight, is on 37 meters and is reported from the west coast as the loudest east coast station. 3H2R is QRV from studies at the N. A. SWA's 50 west and he is carrying on with VI.

Québec, 14 North St., White Haven, DON'T FORGET ST FOR JUNE,

DISTRICT 1—4— 385, RFA 3, 3BFO 25, 3KU 17, 3CJN 7, 3AHH 18, 3FS 5.

WESTERN PENNA.—Dist 3—SAXD is now working on both 40 and 80 meters. 3BFO sent a QSL but 8BO was too busy to work.

Dist 4—SBQ moved to 572 N. James St., Hazelton, where room is now at his disposal for an NSS antenna.

Dist 5—SAXD sees his callsign go strong after a period of idleness.

Dist 6—SDQ is still working on 80 and 176 meters. 3EYV is QSO west coast R7 on 80.

TRAFFIC: Traffic 3VT 1, 3AEN 2, 3ZM 5, 3FY 3, 3BLC 5, SBO 16, 3BDP 29, 3CDN 11, 3BTC 12, 3AVM 4, 3AUT 19, 3BBO 6, 3BVA 44, 3NP 5.

**E. L. Maneval—SEU**

1474 W. Eighth St.,

Williamson, Pa.

Orig., 31; Del'd, 39; Ref'y'd, 462; Total 513.
active. SGU and 8BVK have been experimenting with loop transmitters. Dist. 9—SGU is still the undisputed leader at this end of the state when it comes to handling traffic. 8BVB has a reputation for being a difficult operator but he is trying hard to turn in a higher traffic total than 8GI. 8CEO was third best in the way of traffic. 8BWT handled his share of traffic, but 8KV has just given him a lot of work to keep him overhauling and is on the air again. 8DNO blew the old fiver again~ SARO is a newcomer and has done well with 8BBL is un the job handling his share of traffic. 8BRB is living up to his station's schedules. 8FP, another checking station with a rapidly changing outfit. 8BJV is back on the air experimenting with B battery plate supply and a quick wave change outfit. 8DNO handled a very large amount of PRR traffic this month. 8FL, another checking station with a new outfit, will be on soon. 8AKJ is checking station with a large amount of B. Duvall will be the guest at one of their club meetings. 8AOM to their list of stations worked. 8DKS has been experimenting with self rectification and has some H tubes, 8CTL is experimenting and 8AXJ has been experimenting with self rectification and has some H tubes, 8CTL is experimenting and 8AXJ is back after a long vacation. 8BHJ is now in Hornell and will be on soon. 8RF is attending R.P.I. 8WT works 7s, 6s and ch's. 8UL handles messages with N.V.E.

at Guantanamo Bay, Cuba. 8DPL has joined the USNRF, SCAN is also in USNRF pounding out well. 8DJX gets PBI credit this month, 8CNX as close second. 8DHC has been on the 80 meter band for the past seven months.

Traffic: 8NT 13, 8BCZ 4, 8EJ 8, 8DFK 7, 8BSF 5, 8PL 13, 8ADE 4, 8QB 6, 8CTN 26, 8PJ 15, 8ABX 2, 8AXA 7, 8CTL 15, 8AJ 1, 8FO 4, 8CVJ 12, 8ADM 11, 8ZU 40, 8CNH 38, 8AIL 4, 8DKN 16, 8BKQ 40, 8AKS 25, 8BRJ 21, 8DA 2, 8DHL 56, 8DX 2, 8UL 55, 8CNX 211, 8AVJ 4

DISTRICT OF COLUMBIA—The most encouraging observation made this month is with respect to new stations and new outfits. There have been several such cases where the operator has not yet a station license but has received the operator's license and has been experimenting with ham radio at last. Here's hoping this will keep up. 8BTW and 8JO report the installation of phone sets on 7800 meters. 8DWT blew his 14th 80 meter this month. The 180 meter transmitter at 8ZWT as in addition to the two regular ones on 40 and 80 meters. 8ASO handles practically all of the messages going through his station by phone.

Traffic: 8BW T 226, 8AB 34, 8ASA 24, 8ACM 18, 8JO 2, 8HKT 7.

CENTRAL DIVISION
C. E. Darr, Manager

OHIO—Dist. 1—8DN D has rebuilt his transmitter, using a UX210, 8EQ has been unable to keep up with the present lack of crystal for his outfit. 8WE finally got his stuff going but is still having trouble with the 250 watt. 8CAE reports a slight decrease in activity due to the QRN and school activities. 8EJ finally came on on 40 meters and seems to be stepping out PB. 8AZU, 8SF, 8DAE as well as several others are doing very good DX. 8ADA deserves much credit for sticking through to the finish on the PRR tests. The Cleveland boys have been busy getting 8ALZ and 8SAE back on the air. 8AQH has brought in some of the boys cold feet. 8DFK is taking a new out license and will be back on the air soon on 40. 8ZD is on the air again experimenting with schedules on 75, now back on the air and not much traffic. 8DAE has been appointed an Army station and has been doing fine work on 40. 8BF has been handling traffic and attending school at same time, 8ARQ and 8FO are operating separate stations now. 8DPI handled traffic. 8DFP is traffic chief of Radio association of Western New York and desires a new title for his office. 8ACE has moved out into the wilderness where he can have quiet hours without disturbing the neighbors. Can not wait till this month's end. 8BSI is still on the air after switching to 8BF, another checking station with a real wave method and a good set of DX. 8SUL still has the traffic sizzling through his station in great style, 8QD is still working hard on the PRR tests at 8CN. 8AAU, the Superintendent of the Pittsburgh Unit of the U.S.N.R.F. 8AKU is still using portable and still handles messages. 8DCB has now started up again. 8ABD is a new one in the W. 8ZQ here to work on 40. 8DKN is a new one in Ilion, N. Y. 8AFO reports Getting a Crystals. 8REP has had too much noise lately so no report. The Findlay Radio Club is building a new shack and will be ready for business in about 2 weeks.

Dist. 2—8DDQ has two schedules daily. 8AGS is operating at Valpariso, Ind., under the call 9BEF. He is using the Hartley method and a home built 80 meter transmitter. 8TBW and 8TPX are handling traffic on 250 watts. 8SUH is still using the old tower on 250 watts. 8AVH 10, 8AOX 9, 8AZU 11, 8KC 2, 8CVM 47, 8BY 5, 8AVE 11, 8SO 70. 8AGS is working PRR tests. 8WAH reports his installation to the boys and new operators. There have been several such cases where the operator has not yet a station license but has received the operator's license and has been experimenting with ham radio at last. Here's hoping this will keep up. 8BTW and 8JO report the installation of phone sets on 7800 meters. 8DWT blew his 14th 80 meter this month. The 180 meter transmitter at 8ZWT as in addition to the two regular ones on 40 and 80 meters. 8ASO handles practically all of the messages going through his station by phone.

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VIII

QST FOR JUNE, 1926
9BOW was QSO an Aussie and 2 Hu's. QSS is still doing good work on 80 meters. QCTD is trying to get set on 60 meters for the ham contest. QCB will have a crystal set going soon. QAZF is again experimenting with a "S" antenna. QATO says not much traffic through the "S" antenna. QAXY received a signal from g5AX on 40 meter transmission. QKU did good work on 40 meters until his R ever went west. QELD will soon be on the Lakes again. QHF is out from Madison. QHEM's transmitter is being rebuilt. QHTK is operating on both 40 and 80 meters. QBEK is attending the U. of W. and only operates when he has free time.

Dist. 2 -- QKX-EK is on every Mon. Wed. and Fri. night from 8 to 12 p.m. QCM is KRW school. QRTT's antenna took his down in a storm so he will not be using for some time. QIRH has thrown out his crystal set to work. QEGW is using a Deforest R tube. QCOI has an entirely new station now. QSBE reports not much luck on 40 meters. QEAR is working break-in with fair success. QDDL is working on 40, 80 and 176 meters.

Dist. 3 -- QIAK is going to pull his 1½" tube antenna to prevent swizzling. QANE compliments QDKA for his reliability as an ORS. QCGL seems to be the only active station in Sheboygan. QVFA has his station in good working order. QAZY makes his first report. QCXX sent in his report on the station he has with the South Round Clade. QEMD is re-building for a 50 watt station. QAQK is looking forward to vacation when he can get on the air. QFZM is on the 40 band. QCAV reports from QJCDQ is in the shack for operating. QEIL has a new job operating a broadcasting station at Eau Claire.

Dist. 4 -- QPWF has no reporting. QDPR has joined the ranks of the benefactors. Traffic: 9DTK 256, QDOL 132, QKRX 50, Q9R 25, Q9RS 20, Q9RT 17. QATO 5, Q9NY 5, Q9CU 1, Q9LD 1, Q9TE 75, Q9VD 9, Q9X-EK 82, 9OM 25, Q9BI 2, Q9EGW 12, Q9COI 2, Q9AEZ 1, Q9AXQ 3, Q9XF 175, Q9FLD 8, Q9ELI 67, Q9AZN 2, Q9CAV 2, Q9DKS 58, Q9GL 17, 9BYA 6, 9AZY 4, 9CXX 4, 9EMD 2.

INDIANA -- Dist. 1 -- QAAE must be still QRV on Superhet. QEDK is using a 500 watt plate. QCMA has his open house and is busy carrying the morning papers. QECI handled some nice traffic. QKJY kept the Detroit gang busy with reports on comming 60 meter sections. QSM and Q9R were heard in England. QII was installed at the radio show and stirred up quite some excitement. QMUF is working on 40 meters with his old C. A. plate supply. Still saving his money for that $204. QJET has sold out and is going to set. 9ZJU works alone on 177 meters with fine results. A BCL in Muncie has a five tube low-wave receiver that brings in the foreign bands on a loud-speaker. QHRG is with us again. QCAP has a new flyover and going after the YL stations. QJAR is giving 40 meters a try again. QBUQ is working 40 with a new M. G. plate supply. Q9CYG is still at radio school. Q9KJW is keeping a regular schedule with QCFC. QDXX is working on 40 and 80 but has trouble from QRM power leaks. QBK reports too much business for his set. QCUR is married and on the move. QBMT, the youngest youth, is going good on 80 with a 5. 9BVV and QBX are new men on 80. Q9QV is starting up with a 7½ watt. QA1L is forever through with YLs and is coming back on the air. Q9EF is still on. 9BO is using 7½ watt and B battery plate supply successfully. 9BVH is using a 6 volt battery and has no messages. QCLL is on account of YLs day and night. QA1L blew his ancient filter. QB9J found the trouble in his set of transmitters. Q9EUX is doing a dandy card. QB9M blocking of demensers. blown grid leak, and blown milliammeter. otherwise his set is FR. 9BYI reports traffic good on 40 and 80. QBAA is on the army radio route with his rebuilding QEDK. Q5EM is working all the time with his new set. QBUZ is fairly successful with low power on 20 meters. Q9EX is broadasting and another 40 meterer worked AXU, a station of 5000 miles on 21 meters. Q9AEU is using 5 a watt and working the es. QC6P is doing some unusually good work on 20 and 40 meters. 9BVJ just installed a third watt. QBYT is trying out a Hertz antenna. Q9DQ's set perks ok on 80 meters.

Dist. 2 -- Q9BC has worked all continents except Africa. Q9BE is working 50 watt on DO and going after Q9BQ out FB. 9NG is using all of his power (5) worked 6TS at noon. Q9BE is getting out fine on 40. Q9DIE has a new key to call--he sold his old one. Q9HAE is going strong as usual. Q9BC is building a 250 watt crystal controlled set so plug your ears. Dist. 4 -- QCNC uses two 201As and 5 batteries on 40 and 80 meters. Q9BZ is using a 204A and 339

9RAC, operating on 175 meters. Q9DI uses 3 201As in DH circuit, 200 volts dc on plate. Q9BNF uses an H tube with 1100 on plate. Q9AFP is just starting up. Q9RCM is going strong on 40 meters.

TENNESSEE DISTRICT -- Q9EEJ with his 810 watt is Q9EEQ's transmitter in being rebuilt. Q9DKS is operating on both 40 and 80 meters. Q9BEK is attending the U. of W. and only operates when he has free time.

Dist. 2 -- Q9ELF is back on the air. Q9JW is acting as DS for Dist. 5. Q9AC is Q97. 5 meters regularly. Q9CM has had transmitter trouble. Q9QW has been handling a lot of traffic for his dad relating to the auto business he is in. Q9 ME is going strong on 40 meters.

DISTRICT 5 -- Q9EMJ has a new key. Q9HTK 29, Q9AI 26, Q9BUQ 17, Q9CXG 14, Q9DRS 13, Q9AVB 8, Q9EGZ 5, Q9B9G 4, Q9EU 1, Q9DHE 11, 9D4E 1, 9BEK 6, 9K6F 11, 9AEH 4. Q9EHM is going strong on 40 meters.

THE LUMBERJACK DISTRICT -- Q9EME's transmitter is being rebuilt. Q9HTK is operating on both 40 and 80 meters. Q9BEK is attending the U. of W. and only operates when he has free time.

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DISTRICT 6 -- Q9STT has a new key. Q9HTK 29, Q9AI 26, Q9BUQ 17, Q9CXG 14, Q9DRS 13, Q9AVB 8, Q9EGZ 5, Q9B9G 4, Q9EU 1, Q9DHE 11, 9D4E 1, 9BEK 6, 9K6F 11, 9AEH 4. Q9EHM is going strong on 40 meters.
traffic by the means of schedules. 9CJS has again completely rebuilt. 9NM wishes the gang to know that schedules cannot be kept on account of the work at the time of the year. 9KBR is cutting an H tube and has an ex AXC 20 watt set for future YL QRM work. 9KBJ is experimenting with antennae and turret systems with destroyed by fire. 9COS is having trouble with his currenta.

9JW 9DBB will be changeable coil for 20, 80 and 176 meters c.w. and continues to work DX besides. 9EBC works on 80 a trip to the west coast regularly and does fairly well with traffic. 9DBW handled several important Army messages. 9KF has trouble with his rectifier. 9CUM keeps schedules with 9ANE on Saturdays. A New England Division Convention was held with 2 BW and 2 APF attended. 2 BW won the liar’s contest. 2PF wasn’t there on time.

2BW and 2APF attended. We’re 2CZR has at last worked Europe and his sigs were excellent. 2CYX is on the road again and will make his yearly visit to the 3rd, 9th, 4th and 5th districts. Manhattan—2PK reports the gang have to study again. 2AKK is going strong on 40 and 80 meters. 2APV is still doing great work on 40. 2CHK is still keeping schedules with 2CJE. 2HJ has started up again amidst the experimenting in the college laboratories. 2BRB and 2AOF are at the key.

2BPB has been experimenting with other wires. 2BNL 2. 2LD 6. 2LM 14, 2EV n, 2ALS 17, 2APJ 11, 2AKK 39, 2AYH 1, 2ATQ 1, 2ALK is still working his 50 watt set. 6AEN continues to kick out and has worked Australia with his 5 watt. 5APA is a new kid doing good DX work. 5AJ has a new 260 watt set. 5ML have installed 35 foot guttrepipes and are doing DX on 40 and 80 meters.

Traffic: 5ML 7, 5EN 6, 5KC 16, 5UK 6.

MISSISSIPPI—This state reports a very great deal of QRM from County and State field meets and High School meets. 5FM is looking for a director for QSM on aid for a report. 5AKP’s transmitter is on the blink again for no apparent reason.

Traffic: 5AGS 13, 5AGP 15, 5FS 6.

ARKANSAS AND TENNESSEE—5WK reports that he has moved to Monette, Arkansas. 4HL and 4J visited 5AK and 5ML last month. 5AJ has started sending in reports again as he has not been on the air for three weeks on 40 meters. 4MM converted into a 250 watt master oscillator, crystal controlled.

Traffic: 4AJ 27, 4HL 9, 4FP 7, 5WK 9, 5ACY 25.

HUDSON DIVISION

E. M. Glasser, Mgr.

2PF has taken over the Army-Amateur work in the Second Corps Area acting as A.R.L. representative because of heavy college and outside work taking up all his available time. Appointments are being made as rapidly as the army is asking for them. ORS are again urged to report on time. These appointments will be cancelled. The Division was well represented at the New England Division Convention. 2 CYP 30 and 2CG 10 are coming back on the strong soon as 2CBR is making from Brooklyn for the summer. 2PF is too busy with theConvention to be on. 2BO is active on 176 meters. 2ID is still on the air for three weeks on account of heavy school plays. 6QZ is always to be depended on for good DX on 40 and 80 meters.

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LOUISIANA—9CJZ is stepping out in good style. 9CDH is completely rebuilt. 9NM wishes the gang to know that schedules cannot be kept on account of the work at the time of the year. 9KBR is cutting an H tube and has an ex AXC 20 watt set for future YL QRM work. 9KBJ is experimenting with antennae and turret systems with destroyed by fire. 9COS is having trouble with his currenta.

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Traffic: 5ML 7, 5EN 6, 5KC 16, 5UK 6.
is still doing good work in spite of being busy with his baby chicks. 2AGM worked Hawaii and Brazil. 2CTH is doing the same good DX as usual. 2EAM is working on 40 some but is QRW. 2MK is rushing out as well as ever but 2BSF is on again on 80 meters and his new CW has made him the envy of many a DXer out west. 2AIJ, who has been sick for a long time, expects to have a receiver and a low power transmitter going soon. 2AJQ is working out of town so is not able to be on the air much. 2AGQ is still stepping out as well as ever.

2CTF has rebuilt the transmitter. 2AJQ is using a 250 A and is also using an acc. 40 with a Hertz antenna and has worked NZ, Morocco and Tegucigalpa in Central America with 165 watts input. 2CHD has a crystal controlled transmitter working on 80 meters. 2DD changed to the old Armstrong circuit and likes it better than the Hartley for ease of adjustment. 2ADH has a 240 meter crystal and intends to get on with it soon. His 600 cycle note sounds too good on 40 to leave that band yet. 2ALC is back on 80 with his generator and five watts for 2AE8 is getting AMT well on 40 and handles a batch of messages. The Yonkers Radio Club has three more new operators under way and points with 2AKZ and 2APW are guaranteeing who have gotten licenses. 2CLI is operating YZH bound for Naples, Italy, and is listing for the gang on the way across. 2CHG has joined the club and will send in reports in the future. 2CVS is QSH and his traffic direct instead of relaying to distant points on 40. 2AEZ is on 80 again with a D.C. note with less than the usual filter and new to-the-district convention in Providence and hasn't been on much due to school qrm.

2AIJ and 2AIK should report to the DS, whose QRA is Box 113, Yonkers, N. Y. 2LA is rebuilding his transmitter at 2BHY. 2APT wants an appointment as Army-Amateur net station. He has two hours per day and his schedule tends to report regularly and wants an ORS appointment. 2AFX is on 40 meters for a change with a filter and looks good work Hammond's away on 40 and 80 when he gets a chance.

Traffic: 2AV 67, 2AUL 18, 2AIU 71, 2AWX 10, 2ANN 16, 2ARW 13, 2BGI 18, 2CHG 4, 2CDM 5, 2CDH 70, 2CYH 11, 2ANV 11, 2AOI 23, 2AKH 29, 2CMY 4, 2AGQ 15, 2APW 148, 2ASE 36, 2AAZ 25, 2AKH 11, 12, 2ABC 2, 2CAL 8, 8CMS 8, 2LA 7, 2CTF 6, 2AJQ 6, 2DD 5, 2AHK 6.

NORTHERN NEW JERSEY — We all offer our deepest sympathy to 2CJX, who had the misfortune to lose his father. 9JAB wishes to extend to 2CJX his deepest sympathy and wishes schedules. 2AFI has been out of town. 2BQZ has a new antenna in Honolulu with his 210. 9BGK and 9CJT have been married and is happy in his new wife. 9DAU reports his QRH as 38 and using the 600 cycle note for 40. 9DBH reports he is back on 80 meters. 9DAD reports best DX on 100 watts this month as Porto Rico. 9CS reports his work is going well and is also helping the RCA by making observations of the signals sent out by 2XK, etc. 9AXD is a new station in Clinton.
Portland — Four hams from Port­land are going to carry on their DF work outside of the regular QRM hours. Four hams from Portland are going to carry on their DF work outside of the regular QRM hours.
LYC 88, 1OU 6, 1BHM 2, 1AWB 27, 1AHL 1, INT 10, 1ACT 20, 1AIR 6, 1RF 5, 1BVIL 6, 1BAT 1, 1ALP 10, 1ABA 12, 15L 23, 1RR 1, 1GA 19, 1ADM 3.

WESTERN MASSACHUSETTS—Dist. 5—J. ARE is doing without the old heater for summer activities with some of the expeditions. 1AMZ has daily schedules with stations in all directions. 1AAE has installed a new station at 1BGV, 1GR, 1DD is on 80 meters every night. The BCLs like 1AJSU’s antenna wire very well and remove it from his stiek frequently. 1AQM is quite busy and finds himself on 25, 40, 75, 10 meters, one on 45 meters and the other on 80 meters, 1ANP and 1ANE are new stations in Worcester. 1AVK is still cutting 1C1L. 1TNI finds ether on 1L8A and 1YK are working Australia. 1IAB is using one on 170 meters and is working 1600 miles. 1BHP, 1AJM, 1BAL are all on.

Traffic: 1AWW 8, 1AIL 6, 1EO 20, 1AMZ 149, 1AEE 57, 1AJK 1, 1AAL 6, 1XZ 1, 1DB 7, 1AKZ 46, 1ASU 16.

NORTHERN DIVISION

Eveckt Kirk, Mgr.

"TEK was QSO with South African O-A6N some 11,000 miles, which is believed to be the first communication from this district.

Traffic: 7PD 7, ADM—Spring evidently turns a young man’s thoughts to something other than radio from reports for last month. 7LB heads the Division for traffic on 7FFC works 1A and 1Z on schedules. 7FFC, 7GR, 7TG, 7DQ and 7AW are giving good traffic work. 7TBF and 7BY have shipped out as commercial ops. 7TP and 7AD, ex7AAX are coming in on the old places as ciphers. 7IAF will be on the air soon. 7GQ will later his third H tube. 7AIM, 7RL, 7UL and 7WQ are increasing power. 7AQV is on a 125 watt. 7AHL using an H tube on 80, reports good DX. 7NHN works 1A and 1Z on a 7½ watt, 7DK is rehashing his rectifier. 7UQ is on a 75 Watt and 7QA reports 125 watts and 40 watt. 7AD will be back with us soon. 7TJ is a new station at Opportunity.

Traffic: 7TRB 148, 7TEK 97, 7AYO 82, 7GE 53, 7GO 32, 7DF 27, 7GB 25, 16, 7AW 16, 7ABP 10, 7NH 8, 7RL 6, 7BO 6, 7OY 5.

OREGON—7IT, ADM—Traffic took quite a slump this month. 7TJ will be on steady sure. 7ABN on account of poor health, is at the Open Air Sanitorium at Portland. 7AA added Chile. Tasmania and 7GL’s QSL is setting out years. 7TH and 7OZ use KFCH circuit with H tube. 7OK says if he hits their tube doesn’t show some men, he’s going to try a new one. 7AKE uses a detector tube. 7AQV is on 5000 kilowatts. 7TQD reports very good DX and 7OKU has a portable set on Santa Barbara. 7ABP received the belated replacement on his 80-watt and of course is pleased.

Traffic: 7TO 38, 7ACD 8, 6CCY 5, 6BYY 2, 6CLP 26, 6ADB 2, 6FX 2, 6AAM 8, 6OLI 17, 6BMM 21, 6APS 26, 6ALW 4, 6AH 2.

Southern Section

L. E. Smith, Manager

This month the gang held the biggest of any of the A.R.R.L. banquets yet held in the Section. Mr. Bakock journeyed down from New York to see us. The coming change in the traffic department was discussed and explained so that all might understand. A good time was had by all.

Dist. 1—6EU reports working BAM at Pasco, Tahiti. 6AXU and 6AOY are new stations in Santa Ana. 6ACF made a trip to the West Coast. 6CGO and 6OD. 6EC said that U. S. mail is the only traffic route into Los Angeles. 6CBS has just reported for a new job in怪哈。 6JCP reports as a 31.00 watt on a tank of water. 6JCP is now one of the best on the West Coast. 6CNK, 6GEC, 6BAS all threaten to get on the air soon.

Dist. 2—4RQN is getting so heavy on 80 meters that most of the stations are being forced to use 60 meter circuits. 6EAs set doesn’t suit him. 6AFG is QSO hu often. 6BBV works with all from his new GBA and is putting in a 00-ton cycle MG. 6CBS has a portable set on Santa

Hertz antenna with extra good results. 7ZN is on some when he can’t see to play tennis.

Traffic: 7YA 90, 7TF 41.

MONTANA—7TJ, ADM—The ADM is making a business as well as pleasure trip through the East and reports having a wonderful time. 7TU is the top-notch this month. He is told that DX couldn’t be worked from Montana. 7ACI is inactive on account of deceased bottles. 7DD has a low-loss transmitter in construction. 7TU still reports heavy school traffic. 7TU will be gone soon as he gets a new aerial working. 7TU is studying hard for he is expecting to graduate. 7TU would like a schedule for you to send him for code practice. 7TX uses a UX210 on 83 meters.

Traffic: 7PU 43, 7JX 29, 7DD 8, 7RI 1.

PACIFIC DIVISION

P. W. Dann, Manager Northern Section

This is the last report that the present A.T. Communications Manager for the Northern Section, Pacific Division, will forward to Headquarters as my appointment expires April 30. I wish to take this opportunity of expressing my thanks and appreciation to ALL of you who have made the Northern Section what it is today. If you give my successor the same unbidded support that you have given me in the past two years, the N. S. will be one of the largest in the Pacific Division.

Probably the most interesting last month was the five day tests at Mt. Hamilton, conducted by the Santa Clara County Amateur Radio Asso. A message for 6AXU to go to Jaya, as the gang is working DX stations at 65V. The answer to this was received by 6CKV last month. 6APS, 6ALW and 6OY are on the job every day. 6NX spent most of the month checking waves of amateurs and sending out cards to those who had the right. 6HAI is bothered by bad power leaks. 6CKV is handling traffic with Chile for the Lick Observatory. 6AMM has schedules every morning. 6OUL put in a 250-watt and worked 0-18R in Phoenix, S. 6VW worked Chilian 33J and NGY-NOY in China. 6APS is another Meller man and putting a terrific signal into Australia and NZ. 6OY reports that it is on a ticket and is back home pounding again. 6ALW is one ham that hasn’t let Super DX get the best of him. 6AIH is QRV school. 6CLP is second high. 6AVY is a new traffic man. 6BYV has schedules with 7AY, this being a Naval Reservist and Army Relay Station. 6CIS has moved his set to Yosemite for the summer. 6STL has changed from a fifty to a fifteen watt.

Dist. 6—Adams advises things are slow around Bureka, as 6AS is off the air on account of remodeling his set. 6BWR is also remodeling and 6OY is going to use copper tube inductances. 6BAP received the belated replacement on his 80-watt and of course is pleased.

Traffic: 6TO 38, 6CDJ 8, 6CIS 14, 6CCY 5, 6BYY 2, 6CLP 26, 6ADB 2, 6FX 2, 6AAM 8, 6OLI 17, 6BMM 21, 6APS 26, 6ALW 4, 6AH 2.
ROANOKE DIVISION
W. T. Gravely, Mgr.

WEST VIRGINIA -- 8ALG got R-9 report from New Zealand. 8AUL worked 5EZ0 and 6BEX several times. 5CDV is handling nine-tenths of the messages and getting them through. 6BSU is experimenting for QRP on 80. 6DOH is a new station in Wheeling. 6BJG worked 7RU and 7OK, using one 8U200 with 4 watts, and 8YR are very active. 8ALG is contemplating big tubes now. 8AMD says he has a 2 amperes YL! The Huntington Transmitting Amateurs Club claim the call 8BGW. 8AMD is experimenting with crystal sets. 8SV has 394475 with 8GZ. 8IT is operating on a steamer on the Lake for the summer. 8SP and his partner 8CSR are using 8GZ. 8CSR and SAGZ are new ops. 8CSR is visiting Wheeling. 8ZW will probably be on the air soon. 8ZV is in Florida overhauling his stuff.

Traffic: 8SF 14, 8AUL 17, 5CDV 37, 8BSU 8, 8DOH 2, 8BJG 21, 8BPX 8, 8CBR 68, 8AMD 13, 8YR 51, 8AP 29, 8DIR 82. 8BSK is coming back on the air with 8AKZ. 8BSK is coming back on the air.

ROCKY MOUNTAIN DIVISION
N. H. Hood, Mgr.

COLORADO -- 9CLL has been working hard. 9CAW reports he is setting through to NZ and Australia regularly now. 9AW has a brand new 500-watt set that was once a perfectly good high voltage transformer. 9CA reports that things have improved as to QSR west on 80 meters which is his normal wave. 9CDW

QST FOR JUNE, 1926

ROANOKE DIVISION

MISS FLORA TURNER 6BXA

YLs and radio at the same time. pi-1CW is going strong with a flock of schedules. 6CGK is reporting to have sent out schedules. Capt. Adams is reported to have gone certain WI at sea. 6CAE has been QSO all continents but Europe, with his 60. 6AJJ is getting better after getting rid of his stick and a flock of stray wires. 6BN worked pi and Japan. 6ML is now 6BXD. As a result of his training, his YL now has a license and will soon be on the air. 6DLS has a message at the local American Legion post. 6CQA has finished his new transmitter and is doing good work. 6AHF is taking traffic from pi and 6BUH can't keep on the air. A new station in our area is 6BHJ. 6CQA 10, 6AHP 38, 6CSS 2, GBUR 18, 6BQ 175, 6BJJ 121, 6SB 9, 6BAS 5. 6CGC 3, 6NW 9, 6HU R, 6CAE 27, 6US 10, 6BVO 16, 6ANI 27, 6RN 40, 6ML 40, 6CTO reports trying to work KSMR now. 6CTO reports trying to work KSMR now.

ARIZONA -- The ADM, 6ANO, is now busy on a cattle ranch but keeping the traffic. 6CBG 29, 6BGV 8, 6BHJ 20, 6BJJ 52, 6BIX 365, 6CAE 11, 6CGK 12, 6CQA 8, 6CQA 10, 6CQA 91, 6CQA 176, 6CAE 121, 6SB 9, 6BAS 5, 6CGC 3, 6NW 9, 6HU 8, 6APP 5, 6EOC 8, 6BVM 7. 6BUR is taking traffic from pi-SAA and 6AHP is taking traffic from pi. 6BUR can't keep on the air. 6CQA and 6RN worked pi and Japan. 6ML is now 6BXD. As a result of his training, his YL now has a license and will soon be on the air. A new station in our area is 6BHJ.

HAWAIIAN SECTION

K. A. Cantin, Manager

Due to an epidemic of BCLitis local amateurs are being accused of causing considerable interference to the broadcasting fans. The matter is being handled by an informal committee but it is hard to convince the BCL that the amateurs are willing to cooperate and eliminate interference -- providing they are causing it.

Message delivery from Hawaii to the mainland is very disappointing due to the lack of delivery. Please, fellows, make an effort to relay or deliver messages from the Hawaiian Islands.

6BUC broke all local records for traffic handling, and is voluntarily observing the quiet hours. 6AFF had trouble with his 250 watt tube. Established contact with pi-CDS and 1BR. 6C1J with a power input of 84.5 watts worked South Africa O-AAB. 6CFN is working with 800 watts input -- contact was established with G-6KU. This is the first time that local stations have communicated with England. 6RDL, another new station in our ranks, has established communication with pi-3AA and 2AKM.

6CST using 500-cycle is putting out an excellent signal. 6TQ confines his work to the 6th district. Australia and NZ. 6CGF is working with 4 watts. 6AHP is taking traffic from pi. 6AHP is taking traffic from pi and Japan. 6ML is now 6BXD. As a result of his training, his YL now has a license and will soon be on the air. A new station in our area is 6BHJ. 6CQA 10, 6AHP 38, 6CSS 2, GBUR 18, 6BQ 175, 6BJJ 121, 6SB 9, 6BAS 5. 6CGC 3, 6NW 9, 6HU R, 6CAE 27, 6US 10, 6BVO 16, 6ANI 27, 6RN 40, 6ML 40, 6CTO reports trying to work KSMR now. 6CTO reports trying to work KSMR now.

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works out good now with his 7½ watter. 9EAM is still hitting high with the traffic. 9AJQ discovered it was the YL who had got him wrong. He took the YL home but when he decided to go himself, the cars had quit running out when he was within 4 miles, in search of a storm to get home. 9DQG is busy running a broadcasting station. 9OO gets his report in just as this is being written.

Dist. 2—The D.S. reports that the gang are not reporting regularly. 9OCD says that the thrill is over. In its first few weeks, working DX must have affected its heart, as it died very suddenly. 9DZY will probably leave the state in the near future. 9AOI is rebuilding.

... produced a fine effect. The ears had quit running out and two sets of transmitters are in use. 9DDY is rebuilding. 9AOI is doing it all by himself, and is learning along with a couple of other Denver hams that it costs money to ride in a taxi.

Traffic: 9ADJ 60, 9DFE 8, 9CDE 49, 9CHD 1, 9BB 15, 9EAM 7, 9WO 16, 9CAW 7, 9QL 2, 9OO G, 9CWA 99, 9AA 119.

UTAH—6CVA is a very active station. 6PM reports that his transmitter, to a new rack and shelf and is building an additional phone set. 5AX keeps schedules with 5CWA and 5QF two weeks a week. 6BUH and 6ZT have been too busy with other work to handle any of 5QD's traffic, but he is doing good work on 42.3 meters. 6BV heads the list for traffic handling this month.

Traffic: 6BXT 7, 6CRS 8, 6PM 7, 6RM 6, 6BV 4.

SOUTHEASTERN DIVISION

A. D. Trum, Mgr.

PORTO Rican hams are doing splendid work with foreigners. Florida hams are coming back with stamina and vigor never heard of before. Georgia is the high spot of the state. DX conditions are good. Carolina is doing its share. Alabama hams are using their whistles. Alabama lost one of her best amateurs in 5AO, who was aboard ship for a while. PORTO RICO—Atmosphere conditions in the present month have not been of the best and our gang is having difficulty at steady communication with Europe. 5BMM has done fine work handling most of the U. S. Traffic. 5ISA has done most of the South American and European message handling. 5JE, 5BJ and 5UR have all been doing their bit to boost our traffic total.

Traffic: 5RT 18, 5SA 16, 5FE 10, 4UR 9, 4BJ 3, 4FL 2.

GEORGIA—Georgia Tech Radio Club is going strong and is now an ORS. 4AV has 6 good ops ready for traffic all the time. 4AAD works France, England and Germany. 4AEE is playing a long list of DX on a 7.5er. 4CC, portable of 4RM, worked c9GG on a 201-A with 2 watts input. 4PC is now with the Power Co. 4RD has done fine for the P&W. 4DP is the fone and low power station of 4AAE. 4HW is still expounding theory for "Dad" Walters at the Power Co. 4GO has been sick but is back at the job. 4HR is on fone on SSB and 4MX on FB signs. 4MC, portable of 4AAD, is making a good record. 4KW is burrowing holes in the ether with a 100. 4OA is heard occasionally but is about out of the game. 4PX is a new station. 4RM is about the same as usual. 4SI is the most consistent station in town doing good DX. 4XJ is the new station of the Georgia Ry & Power Co.

FLORIDA—Our new ADM is just getting acquainted with the boys and says he is going after good operating. Fine traffic handling and rag ch什么样. He is planning to make Florida the best state in the S. E. Div. 4DM did fine work this month. 4BL has been on more often than 4AO and 4JY just made a long distance phone for a new B-T receiver. The following are on regular: 4DD, 4WB, 4BL, 4DF and 4UA. On account of the change in ADMs in the past few months, quite a few good ops are being added. All amateurs in Florida are requested to send their reports to Mr. Grogan of 4FY. 40B is working fine. 4TV is still with us when things are slow. 4BO is 75D. 4TV 1, 4DM 70, 4BL 82, 4QY 54.

ALABAMA—The ADM has been exceedingly busy with this month. 5AX is QQV with 4FY 9D and 5QF has been pretty good lately due to manipulation of some of the wires. 5AIW works out on fone FB. 5ACM seems to have lost interest. 5GP will be away from his own shack this summer and 5AWF is rebuilding. 5AX is the most consistent station in Birmingham. You can hear 5YW calling and chewing the rag most any time. 5AMH and 5UP are heard once in a while. 5AC was on the air the same time as 5QF, offered a prize to the station handling the most traffic this month. 5DLP won it. 5DL shot his H-tube and was only on one week. 5QF shot his plate transformer and reports ND. 5QF is still on with his fiver. 5QF also handled a message this month. 5QK was not on much on account of his OM having to keep a room and can't stand the clicking of a relay. 5AC-4P has erected a portable set on 40 meters under the auspices of the AJAX Athletic Club. 5AAD took 5GQ 12, 5BGP 12, 5AWF 10, 5DIL 21, 5F1 4, 5QK 10, 5VY 14.

WEST GULF DIVISION

F. M. Corlett, Manager

NORTHERN TEXAS—The report for this section was lost!

SOUTHERN TEXAS—Activity has not been so great this last month. Traffic figures seem to decline. 5MS reports that he has had to build a new shack and take over the traffic handling duties. 5EVA has rebuilt his set using a tuned plate and grid. 5APM has also been moving his shack. 5RJ has made a good find on his end of the wire. 5ABJ, 5SPG, 5AWP, 5DL 21, 5F1 4, 5QK 10. 5VY 14.

Traffic: 5AC 18, 5AD 4, 5ADA 20, 5APF 20, 5AX 51, 5AWF 10, 5DIL 21, 5F1 4, 5QK 10, 5VY 14.

[lncomplete text]
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QUEBEC DIVISION
Alex Reid, Manager

THE Old Ham fever seems to be spreading, there will be four new notes on the air shortly. Spring seems to have lulled the old game somewhat, but 20G, 2AL, 2AX, 2GB, 2IV and 2IE are still working hard for traffic and DX. 2GC has a schedule with 2ACG Wednesday and Saturday nights and carries on tests on various wavelengths. 2BG worked a BZ and Z station. The Westend Gang have formed a new club and are collecting funds for the erection of an up-to-date technical shack, where they will be able to secure lots of traffic and handled information for the Press. 2CB and 2AX have been carrying on some fine experiments with a portable transmitter and receiver and have interested the Gang to such an extent that we understand most of the boys who own flwers will equip them with portable sets this summer. 2CN is going cut of the game and is selling his valuable equipment. 2BG is moving so we will miss old Tommy's flat for at least a month. The OM would have applied for OBS certificates and applications for two OBS stations.

PRAIRIE DIVISION
F. E. Rutland Manager

ASKATCHewan—Some fellows in this district can't seem to learn to write or else have paralysis. 4AJ is putting 850 volts into a Myers dry-cell tube and is QSO Toronto again. 4AV is also putting a fine signal in the air and was QSO Toronto every night for a week. These two stations are working schedule with 2AO and 3DJ, and applications for 2AO and 3DJ have been made. 4AQ is working PB on 30 meters with 4AQ. Both of them with 201A's and 200 volts on plates. 4AQ is working 1000 and 1600 miles consistently. He worked 1BZ in one night. He has taken in a new box and is changing to a 199 tube. 4FE got a QSL card from 2CI and his hat no longer fits his head. "Dad" Maynard of 4CB has worked 2AC and 2EL and is trying 20 meters. 4AV is married. 4AO is on occasionally on 52.51 meters and is gradually getting his 2DU set in shape. 4HH is on consistently with 2DU watts. 4AF has a mouth. The fellows in this district have applications for two OBS stations. 4DF has at last got his 2DU set in shape and will miss old Tommy's fist for at least a mouth. The gang are showing much more pep but still lack a station on 52.51 meters. Several fellows continue to support this month, and are warned that two such failures can mean cancellation of their OBS certificates. 4DB has been experimenting with various types of antennae and has little traffic to report, 4DY has failed to get his schedule with 2ACF. 4EA's traffic is small. An old-timer 4DU has opened up again and is on 40 meters and works consistent DX. 4DF has at last got his 10 watter to perk with a good note on 40 meters. 4AW is working with a UX210 and S tubes and is looking for some more DX. 4AX has been working with a UX210 and S tubes and is looking for some DX. 4AW has a fiver on 40, and a fifty on 80. 3GK is ex 3JX of British Guiana fame. New live-wire ham club in London. 3GK hanging away on 20 and 40. 3GK is another ham, but can't hold his own. 3MP is also working DX with an H-bottle. BCLs are on the air and they are carrying on a fine reception. Suggest they have a mouth. The fellows in this district have applications for two OBS stations. 4DY has built his set and has erected a new antenna. 4DW works on four wavelengths with very good results. He handled a third wave from the Mayor of Chatham. 4DY will carry on with the OBS while 4DU rebuilds. 4DU will carry on with the OBS while 4DU rebuilds.

VANALTA DIVISION
A. H. Asmussen, Manager

The DS for Vancouver district complains of insufficient operating time in his district but 54NT manages to keep schedules and therefore has the best traffic report in the Vancouver district. 54NT reports 52 meters PB, 3DU attempts to get back to 50. 5G0 is stepping out PB, having landed on the third harmonic and should be the next appli-
cent for WAC honors. We hope to have two more stations reporting next month—old 5HG and a newcomer. 5HK, having been laid up with a burnt arm, is again going strong on 40. 5AW is stepping out for 24, with help from the QC, who has beenPicker's getting his family PHORD in resonance. 4AH is going strong and sends in a fair message total. 4AK paid the GM a visit and expects to get out better soon. We have a new member in Mr. Henry T. Miller who should be stepping out by the time this gets into print. 4AF tops the division in traffic handled working on both 40 and 20. 4AL's traffic suffered due to the loss of a stick. The OW at 4DQ keeps the OM busy charging batts and hands in a fine message total. 4GT got his WAC certificate but hasn't been on much due to OIL. 4IO managed to run up a better traffic total this month and keeps a schedule with the coast twice a week. 4CC and 4CG are moving a little traffic on 40 meters, and 4IF finds time to do a little operating on the key and the call. The AREA gang have novel QSL cards—have you received one?

Late Reports

5DW is on 20 meters. 50T will be on about June 1. 8A0R is on 80 meters. 8BQA worked G0C several times. 8BYN is experimenting with filter and keying systems. 9BO is inactive. 1B8E, 8KY and 1A7C hopes to have a new coil cw set soon. 8CAY has been sick. 9HP was heard in Mauritius Islands. 9HBM is on again.

5IYFN 5, 6, 79BO, 51UY 8, 79KY, 9CL and the Campus Radio Club, was an able toastmaster. He kept everyone busy, too.

Saturday’s functions commenced with Fred Schnell’s very interesting description of his trip with the Navy. The writer takes liberty to represent the whole Midwest gang in thanking Fred for coming to Ames and lending us his spirit in Amateur Radio. It is hoped that the ideals and spirit shown by him will incorporate themselves in all those who were present, to champion and perpetuate our A.R.R.L.

Arthur Collins, 9CXX, of Cedar Rapids, the next speaker, described a transmitting and receiving circuit, such as two tubes, the transmitting circuit generating equally both halves of the R.F. cycle, and the receiver rectifying both halves of the R.F. cycle.

The afternoon was spent on the subject of brassounding. Schnell and Quinby gave very good talks, assisted by others.

Thanks are due the Campus Radio Club and the Alpha Sigma Delta frat for the splendid program arranged. All meetings were presided over by Mr. Don E. Watts, ADM of Iowa, who handled the program in a very creditable manner.

-Louis R. Huber 9DOA-9AEJ

Midwest Division Convention

ROUNDLY one hundred hams from at least six states assembled at the Campus of Iowa State College at Ames for the annual Midwest Convention and Radio Short Course, on Friday, April 16th. In the afternoon 9DNQ, Fergus Mckeever, of Lawrence, Kansas, started the ball rolling with his talk on International Communication. Upon the conclusion of this, Mr. Porter H. Quinby, Midwest Division Director-Manager, took the stand and told all about the general condition of the A.R.R.L., the significance of our worthy organization, and the recent changes made by the last Director’s meeting. Our DM and Director is an enthusiastic and sincere supporter of the League and deserves a great deal of credit for the sacrifices he has made and is making in this regard. Next Mr. E. W. Phillips, 9BGK, of Omaha, told us about filters, their construction and usage. The manner in which he presented his subject made it clearly understandable to all present, even the young squirts.

The banquet was held at the Cranford Banquet Hall over in “Campus Town.” There was not a single empty chair at this festivity. Between courses elections were held on the “most popular ham,” “best brassounder,” etc. 9CCS capped the former distinction, while Fred Schnell and Quinby tied for the latter. A tie would not do, so two pieces of pie, exactly alike, were obtained, the contestants blind folded, and set to work. Quinby finished a little over a mouthful ahead of Schnell. After the dinner moving pictures were shown of Trans-Pacific and Oceanic Radio. The prizes were then awarded. Some very fine pieces of ham and BCL apparatus were given away by courtesy of the manufacturers, all of whom are consistent advertisers in QST. 9BSL snaffled first, with 9DEX, 9CCS and 9BOS coming along as 2nd, 3rd and 4th. Many other prizes were given, their numbers prohibiting mention. C. T. Norton, 9CL and the Campus Radio Club, was an able toastmaster. He kept us busy, too.