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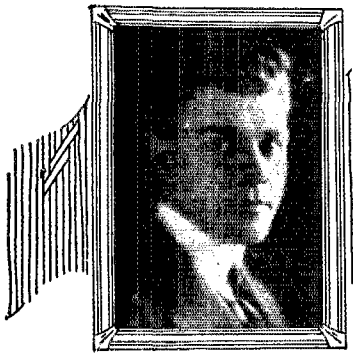

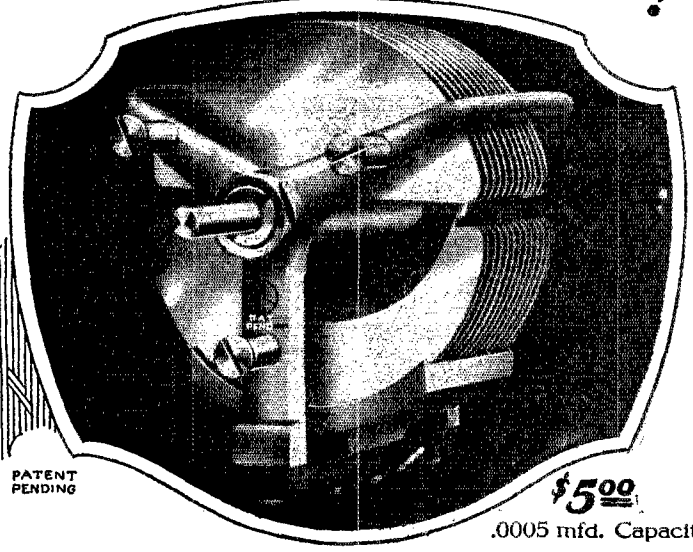


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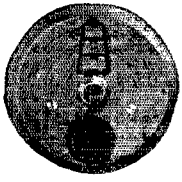

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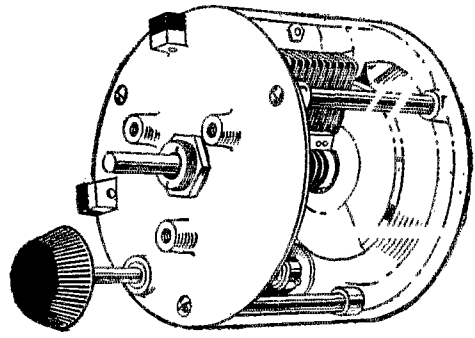

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# QST

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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 prerequisites. Correspondence should be addressed to the Secretary.

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# EDITORIALS

## Local Vigilance Committee

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

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

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

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

## The I. A. R. U. Congress

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

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

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

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

*—Kenneth Bryant Warner.*

# Pioneer Short-Wave Work

By Frank C. Jones*

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

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

## The 5-Watt Sending Sets

Several 3-meter oscillators and one 1.2-meter oscillator were built. The 3-meter

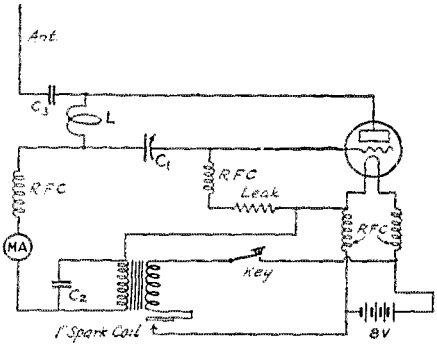



FIG. 1 CIRCUIT OF 5 WATT PORTABLE SENDING SET

C1—6-plate variable condenser made from ordinary receiving condenser with plates spaced 1/4".
C2—Old Murdock .0017 microfarad transmitting condenser, used here to lower voltage of spark coil.
C3—Very small capacity, for instance two pieces of wire run parallel for an inch.
L—One or two turns, depending on wavelength.
R.F.C.—Radio frequency chokes. Either 20 turns No. 26 d.c.c. on thin 1" paper tube or else small Lorenz coils. Latter seem to be better.
C1 is varied to secure resonance with antenna. Antenna may be one or two wavelengths long (less a small amount) but should not have lengths between these figures.

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

The fixed set was used with a special

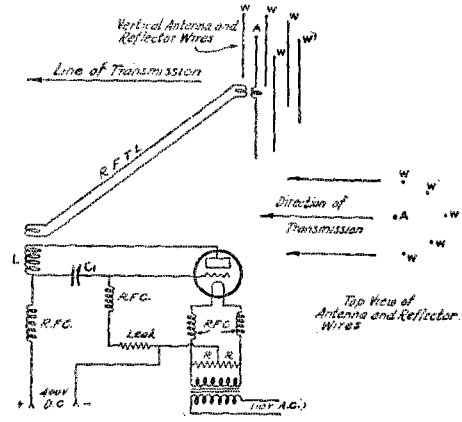



FIG. 2—THE 5 WATT SET WITH R.F. TRANSMISSION LINE AND SYSTEM OF REFLECTING WIRES.

C1 and L—Same as in Fig. 1.
RFC—Same as in Fig. 1.
RTFL—Radio frequency transmission line. Two No. 18 wires spaced several inches apart and having a single 3" turn at each end. Lower end is coupled to oscillator while upper end is coupled to the vertical antenna. This keeps sending set clear of the reflector system.
RR—Resistance used to provide center tap because transformer secondary did not have one.

antenna system which will be described later. It is shown in Figs. 2 and 4 and the photograph.

## The Receivers

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

## Field Antenna

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

* 6AJF-6XM—1822 Hearst Avenue, Berkeley, Cal.

[1] A single reflector wire would want to have a length of almost exactly 1/2 wavelength, minus a very small amount because the earth is nearby. As more wires are added they tend to load each other because of capacity effect and hence have to be made a little shorter.

In addition to this there is another effect—waves travel a bit slower in wires than in ether, therefore the wavelength measured on a wire is less than the wavelength in the ether. It is doubtful if this effect can be measured.

When working at 3 meters it was convenient to use a wire almost 2 wavelengths long. Since the wavelength did not need to be exactly 3 meters it was easiest to make the wire 6 meters long and then tune the sending set to it.

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

### Reflector-Antenna at 6XM

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

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

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

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

The reflector wires are ½-wavelength long, minus an inch or so to compensate for the loading effect of nearby wires and other equipment. For 3 meters wavelength the wires could be 1.5 meters, 3 meters or 4.5 meters long and it was most convenient to make them 1.5 meters long. The antenna was of approximately the same overall length with a single 3″ turn at the center to permit coupling to the R.F. transmission line.

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

### Design of the Reflector

The parabola could be designed with the focus ¼ or ¾ wavelenth from the vertex. (See Fig. 4.) ¼ wavelength is probably best so as to give correct phase relation between the waves reflected from all the wires.

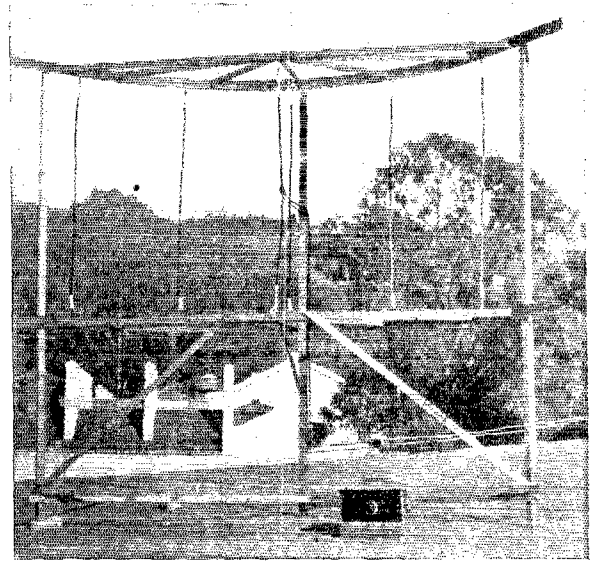
The number of wires to be used in the reflector and their exact length had to be found by experiment and this was the first thing undertaken.

### Reflector Tests

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

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

This receiving equipment was set up at a fixed point and the reflector at 6XM was equipped with 14 wires, each 4′ 8″ long. Then by turning the reflector to different positions and taking reading on the receiv-



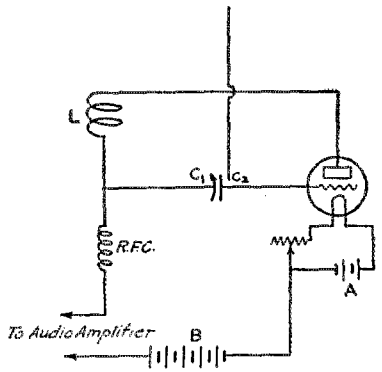
THE REFLECTOR AT 6XM

**The receiving set standing at the foot of the reflector is there by accident—it was not used in that position. The R.F. transmission line to the station can be seen running from the center of the antenna down the middle upright of the frame and then along the roof to the right. The far end is in the operating room where it can be coupled to a sending or receiving set.**

ing galvanometer we could obtain a curve proportional to received energy. The first curve is shown in Fig. 6 and has a "back loop" that was not expected.

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

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




FIRST RECEIVING CIRCUIT
FIG. 3

L—2 turns, 2½" diameter.
C1—11-plate Cardwell variable condenser with extension handle. Tuning range is about ½ meter.
C2—Coupling capacity provided by bringing an inch of the antenna wire close to the end stationary plate of the condenser C1.
R.F.C.—Same as described on Fig. 1.

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

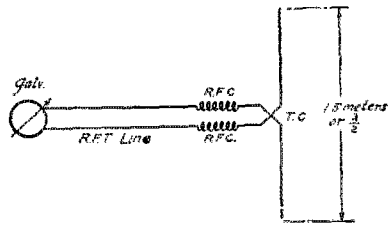

THEORETICAL SCHEME PRACTICAL ARRANGEMENT

A—is the vertical antenna. W—are the vertical reflecting wires

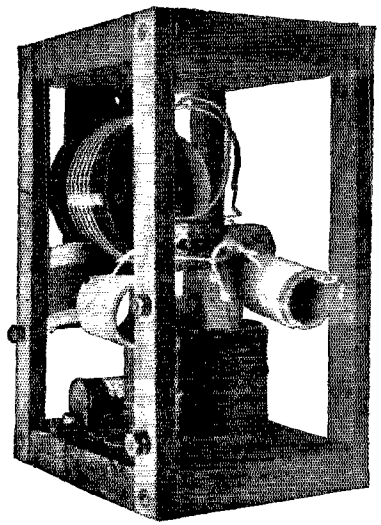
FIG. 4. REFLECTOR SYSTEM SEEN FROM ABOVE

### The Number of Wires

We next tried changing the number of wires. Figures 10, 11 and 12 show that the back loop became smaller and smaller but that the "beam" became wider as the number of wires was cut down. Also—as the number of wires became less the wavelength of the reflector system dropped a little so that better results were had with a wave somewhat below 3 meters. In the final reflector of Fig. 13, 5 wires were used and these were lengthened to 4' 9½" to make up for the lesser capacity between wires.




FIELD MEASUREMENT SET
FIG. 5

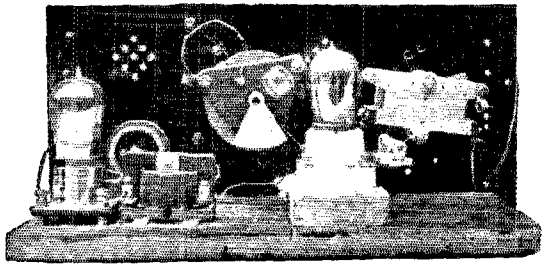


FIVE-WATT THREE METER TRANSMITTER AT 6XM

This transmitter is used with the vertical antenna and reflector system. No photograph of the new 50-watt oscillator is available.

### Discussion of the Curves

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



TUNED PLATE RECEIVER

**With coils shown this set tunes from 4 to 6 meters. With larger coils wavelengths up to 120 meters can be received.**

A reflector with a larger aperture and with the sides extended would give a much sharper beam and also less back leakage. By using a reflector with a very large aperture (5 to 10 wavelengths) and a wire-spacing of ½ wavelength or even ¼ wavelength, we would get an excellent beam with practically no back leakage.

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

### Advantage of Reflector

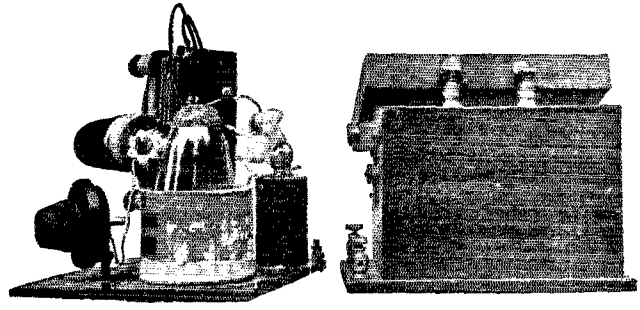
With only 3 wires used the gain in received power was about 10/1. This is compared with a simple sending antenna without a reflector. By using such reflectors at BOTH the sending and receiving ends the received energy should go up in a ratio of 100/1, and with better design of the reflectors the ratio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

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

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

### Wavemeters

To make all this work possible it was necessary to have some wavemeters. Wavemeters going down to 1.5 meters were constructed and are shown in the photograph. They were calibrated by the use of Lecher wires.[2] The parallel wires were about 3" apart, and the nodes were located by means of a thermo-galvanometer suspended from a straight piece of No. 14 bare wire which went through the galvanometer binding posts and hooked across the parallel Lecher wires. This method is quite accurate, much more so than when using a Neon tube at the voltage antinode.



PORTABLE TRANSMITTER WITH SPARK-COIL PLATE SUPPLY

[2] See page 16 of October, 1924, *QST*. In Mr. Jones' improved method the thermo-galvanometer is hung from the bridge B in Fig. 3F of the article above mentioned.

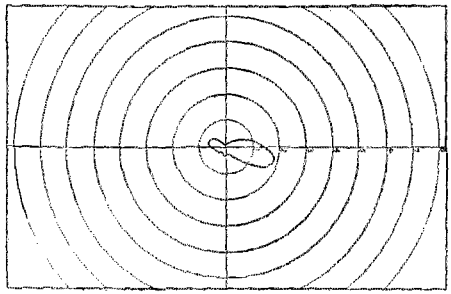


Fig. 6. 14 reflector wires 4' 8" long, spacing 1'. Wavelength 3 meters. Back loop mainly due to reflection from moist stone wall.

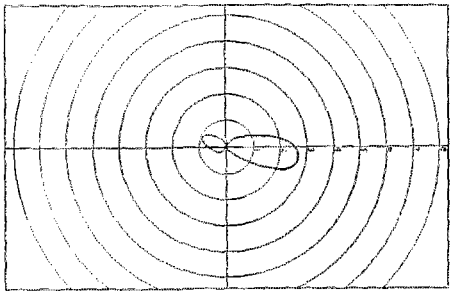


Fig. 7. 14 reflector wires 4' 4" long, spacing 1'. Wavelength 3 meters. Back loop mainly due to reflection from moist stone wall.

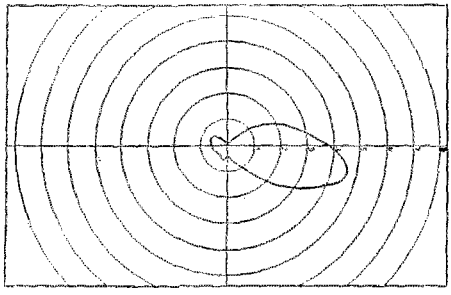


Fig. 8. 14 reflector wires 4' 6" long, spacing 1'. Wavelength 3 meters. Back loop smaller since reflector further from wall.

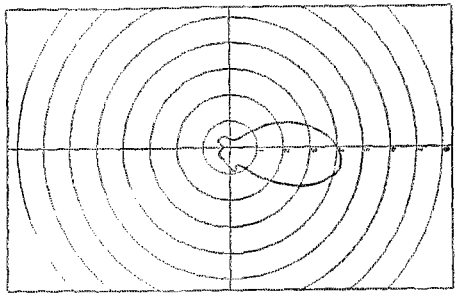


Fig. 9. 14 reflector wires 4' 7" long, spacing 1'. Wavelength 2.94 meters.

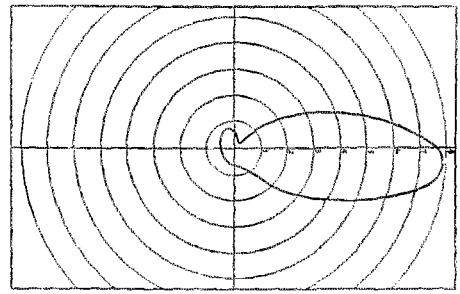


Fig. 10. 14 reflector wires 4' 7" long, spacing 1'. Wavelength 3 meters. (Compare with Figs. 8 and 9.)

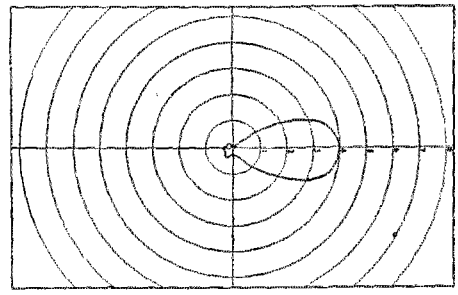


Fig. 11. 8 reflector wires 4' 7" long, spacing 2'. Wavelength 2.96 meters. (Compare with Figs. 8, 9, 10.)

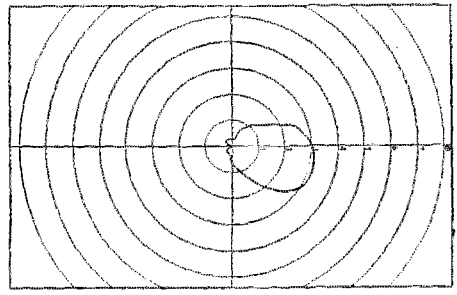


Fig. 12. 3 reflector wires, 4' 9.5" long, spacing ½ wavelength. Wavelength 3 meters.

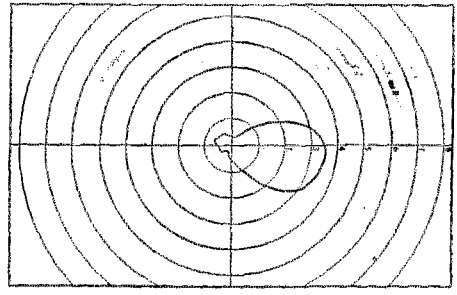


Fig. 13. 5 reflector wires, 4' 9.5" long, spacing ¼ wavelength. Wavelength 3 meters.

### Other Effects

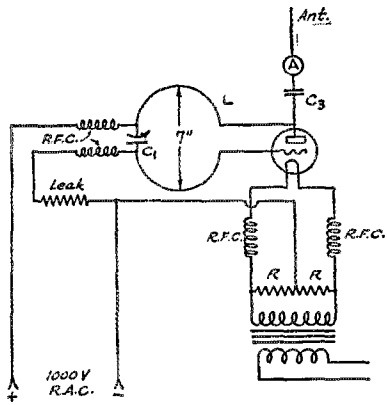
The signals from the transmitter are quite strong at a receiving set right under the tin roof on which the sending set is located. This does not seem reasonable.


FIG. 14 EFFECT OF HILLS

Trees and buildings seem to have some effect on the beam, but not nearly as much as was expected at such a short wave as 3 meters.

### Field Tests

The portable sending and receiving sets were taken into the field and two-way communication established easily at ¼ mile, then at 3½ miles. The sets at 6XM used the reflector-antenna. The portable sending set (with the spark-coil supply) used a single wire coupled to the set through



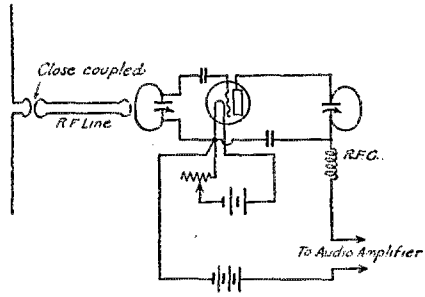

THE 50-WATT SET WHICH WORKS AT 3 TO 20 METERS

FIG. 15

L—Single turn, 7" diameter, split at each side.
C1—23-plate variable condenser with ⅛" spacing. (Our guess is that many plates have been removed so that the remaining plates are spaced ⅛".—Tech. Ed.)
RFC—Radio Freq. chokes made of 20 turns No. 16 wound Lorenz style to 1" diameter.
C3—3-plate coupling condenser with very wide spacing.
RR—Resistances used to get center-tap on transformer secondary. These would not be necessary if center-tap and bypass condensers were used in the customary fashion.
Antenna is vertical copper tube and is described in text.

a very small capacity. This single wire has a length that is some multiple of half a wavelength. We used an antenna two wavelengths long the other day and found that worked very well. *No receiving antenna at all* was used at the field receiving set, but the signals were strong at 3½ miles.

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




TUNED-PLATE RECEIVING CIRCUIT

FIG. 16

**No details needed as they can be made out easily from the photograph and the other diagrams. No gridleak is shown but we believe that this is accidental and that one should be used, returning to the positive filament or positive A battery.**

tube-frequency considerably. However, the tube may have had something to do with it.

### Longer Distances

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

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

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

### Effect of Hills

At the 14-mile point the single wire antenna was hoisted up by throwing a string over a guy wire (between 2 'phone

poles) and pulling the antenna up within a foot of the guy wire. The signals were picked up on schedule.

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

### Tube Troubles

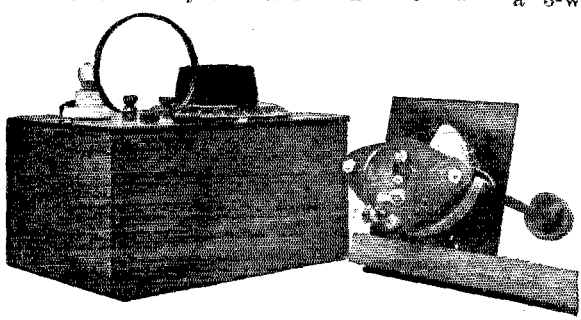
During all these tests with 5-watt tubes much trouble was had with the tube bases.[3] One afternoon two 5-watt oscillators were being operated. The plate current of one stayed steady but the other gradually took more and more current until a hot-spot developed on the stem and burned through, becoming a flashover. The glass warms up and becomes conducting more readily on these short waves than on the longer waves —although we used only 400 volts.

### Long-Range Tests

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

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

Next a Sunday schedule with 8XC was



WAVEMETERS

**The one at the left runs from 4 to 17 meters and the one at the right from 1.5 to 5 meters.**

arranged and special equipment put in for it. This equipment will be described in more detail.

### The 8XC-6XM Tests

In the tests it was decided to operate 8XC at 6 meters and 6XM at 5.03 to 5.05 meters.

[3] Tube manufacturers please take notice. We have been asking for "double-ended" tubes for years—now we must have them.

The sending set at 6XM is the 50-watt oscillator that has just been described. It operates with a vertical copper-tube antenna 2 wavelengths, or ten meters, long. Very good output is obtained.

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

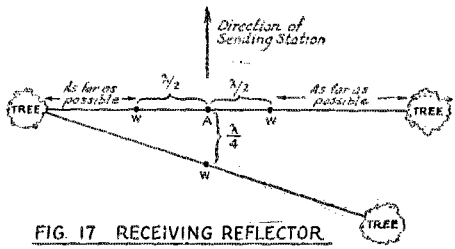



FIG. 17 RECEIVING REFLECTOR

**The antenna and the reflecting wires are all suspended by ropes stretched between trees.**
**A—Vertical antenna.**
**WWW—Vertical reflecting wires.**

ceivers that have been tried. The circuit is given in Fig. 16.

### Special Listening Tests

Because power-leaks and auto ignition noises are very severe in Berkeley we went to the top of the Berkeley hills and built a 3-wire reflector around a vertical antenna. The arrangement is shown in Fig. 17.

Since 8XC was sending at 6 meters we used an antenna with an overall length of 3 meters and reflector wires of the same length. A 3-wire reflector of this sort will increase the receiving range many times. There was a power-line about a half-mile away and using the reflector the power-buzz was quite loud.

At this writing (March 28) 8XC has not been heard, but this is not surprising, as the distance is 2000 miles. Schedules are being continued each Sunday. We send and listen during the first 20 minutes of each hour from noon until 4 P.M. Pacific Standard Time.

(Much interesting information on beam transmission at 10 meters may be found in Scientific Paper No. 469 of the Bureau of Standards. It may be obtained for ten cents from the Superintendent of Documents at Washington, D. C.—Tech. Sd.)

# Visible Radio Communication

By Dan C. Wilkerson*

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

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

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

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

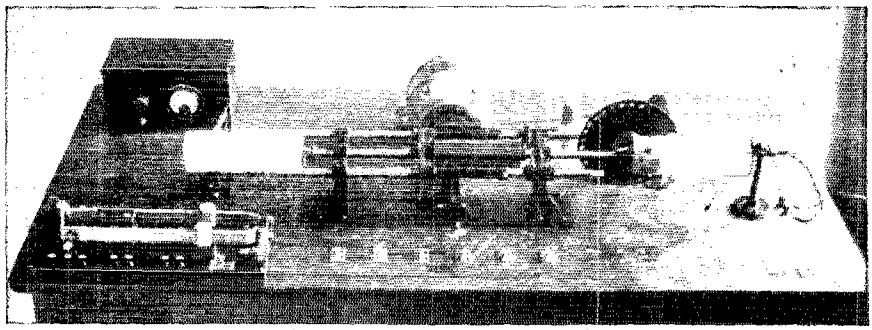
He plans to build small compact automatic send-and-receive picture machines to be sold at a price within the reach of the average amateur's pocketbook. He does not expect to make a big profit—in fact he will be surprised if he accidentally makes any at all. He *does* want to get the sending radio amateur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

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

### The Visible Radio Transmitters

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

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



**THE JENKINS DUPLEX PHOTOGRAM MACHINE**

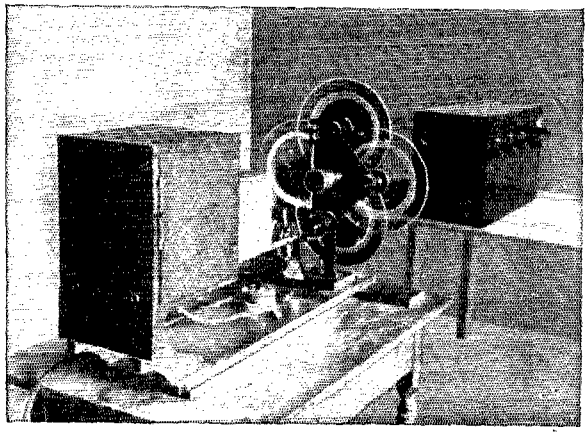
**Which simultaneously sends and receives, by radio or by wire, photographic copies of messages, letters, sketches, maps, pictures, etc.**

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

In the higher types a continuous strip of photo paper is fed into the receiving machine and it will reproduce press dispatches at high speed until the paper runs out. This model will be more costly than the two described above because the continuous-strip method of operation requires an optical method of light-intensity reproduc-

* Jenkins Laboratories, Washington, D. C.

tion. This optical method has been attempted in many ways but the most satisfactory and speediest is that of the double rotating prism devised by Jenkins. These large glass prisms are expensive and must be carefully ground by expert optical hands. Mr. Jenkins stated to the writer that he thought this type of machine could be sold for about $250.



**The Jenkins high-speed photo-transmitting machine. Lamphouse at left illuminates picture. The four rotating prismatic discs move the picture over the light-sensitive cell in the box at the right. This cell modulates the out-going energy. Time for picture, 3 minutes.**

### Where We Come In

What has all this to do with the sending amateur?

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

Now radio photographs lend themselves readily to short-wave transmission by dark or daylight. They can be sent with transmitters using C.W., modulated C.W., I.C.W. and with modified spark and arc.[1]

Right now the amateur transmitter is up against it for something to send. Most of the clan are now working on short-wave apparatus because they have been told to outlaw the usual routine of "Hope you are well, sigs FB 73 OM CU AGN". The development work has its advantages but message traffic is not as high as it was.

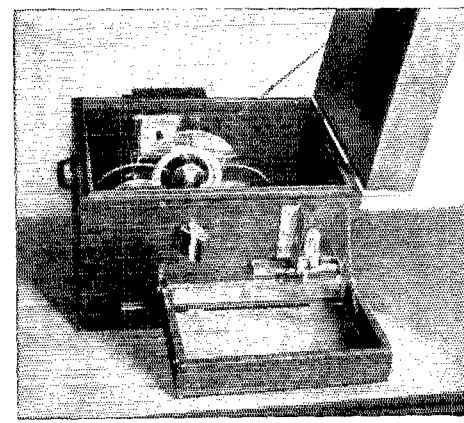
Something new is needed and Mr. Jenkins has presented his proposition at an opportune moment. The transmission of handwriting, line drawings and typewritten pages will certainly add greatly to the zest of amateur transmission.

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

The Jenkins machine will automatically send and receive at the same time.[2] The speed at which traffic can be forwarded depends only on the skill of the operator.

### Operation

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



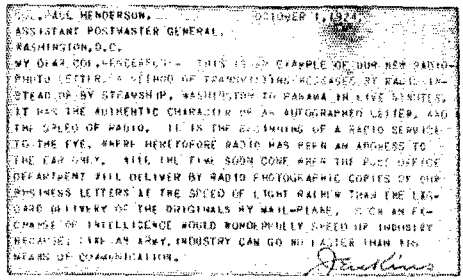
**HIGH-SPEED RECEIVING CAMERA**

**Light from the lamp in front, which is controlled by received energy, passes thru the prismatic discs to plate-holder at rear.**

[1] Let's see: "C.W." means 9EK, "modulated C.W." means all the rest of us, "ICW" would be 8VQ; but where, oh where, is the old-fashioned hardshell that still has a SPARK?

[2] We can then send out "No. 2" while "No. 3" is arriving. It is just one step further until we can make the whole thing purely automatic.

speed, and some of them have visible-reading dial pointers which tell the speed of the turntable in revolutions per minute.


HON. PAUL HENDERSON, OCTOBER 1, 1924.
ASSISTANT POSTMASTER GENERAL,
WASHINGTON, D.C.
MY DEAR COL. HENDERSON:- THIS IS AN EXAMPLE OF OUR NEW RADIO-PHOTO LETTER, A METHOD OF TRANSMITTING MESSAGES BY RADIO INSTEAD OF BY STEAMSHIP, WASHINGTON TO PANAMA IN FIVE MINUTES. IT HAS THE AUTHENTIC CHARACTER OF AN AUTOGRAPHED LETTER, AND THE SPEED OF RADIO. IT IS THE BEGINNING OF A RADIO SERVICE TO THE EYE, WHERE HERETOFORE RADIO HAS BEEN AN APPEAL TO THE EAR ONLY. SEE THE TIME SOON COME WHEN THE POST OFFICE DEPARTMENT WILL DELIVER BY RADIO PHOTOGRAPHIC COPIES OF OUR BUSINESS LETTERS AT THE SPEED OF LIGHT RATHER THAN THE LEISURE DELIVERY OF THE ORIGINALS BY MAIL-PLANE, SUCH AN EXCHANGE OF INTELLIGENCE WOULD ENORMOUSLY SPEED UP INDUSTRY BECAUSE, LIKE AN ARMY, INDUSTRY CAN GO NO FASTER THAN ITS MEANS OF COMMUNICATION.
Jenkins

**Examples of the work of the Jenkins System**

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

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

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

With synchronism established the facsimile reproduction is begun.

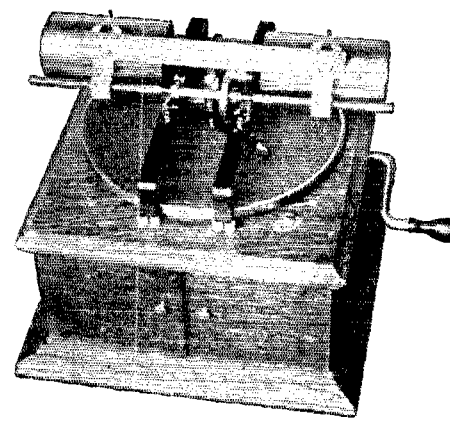
If there be a need for sending the first facsimile on to another station, Parks at Washington can take his received facsimile message, and place it on the transmitting drum, and send it along while he is getting another facsimile from Hartford.

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

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

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

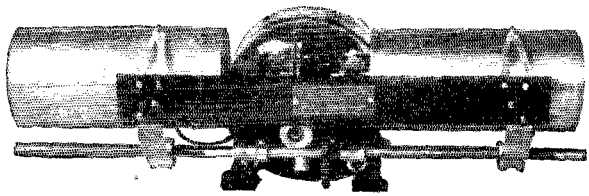
Another machine uses a dark box, a tiny slit through through which the light beam falls on sensitive paper, and a shutter action. This is not such a rough-and-ready method as the stylus system.



**Jenkins duplex machine for home use, driven by table of ordinary phonograph.**

There are two transmission ideas involved here also. One is the direct contact stylus

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



Jenkins Motor-driven duplex machine

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

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

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

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

I leave the answer in more capable hands.

# Award Announcement for Radio Suggestions

By C. Francis Jenkins

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

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

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

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

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

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

# The Sacred Angle

By A. L. Budlong*

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

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

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

The same comments apply to the "Sacred Angle" in the neutrodyne. Simply because

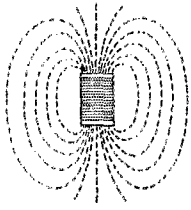


FIG. 1

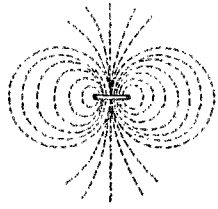


FIG. 2

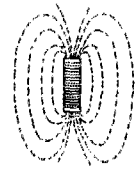


FIG. 3

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

### 54.7° Not Necessarily Correct

The nice part about it all is this: *54.7 degrees is not necessarily the correct angle.* It is just as foolish to say that it is for all coils as it is to say that on a regenerative set a certain fixed angle of the tickler will be correct for all wavelengths and all other regenerative receivers.

### What Can Change The Angle?

In a set where the correct angle might be 54.7 degrees, the angle would become incorrect if you used coils that were either longer or shorter than the originals!

### Shape of Field Changes With Shape of Coil

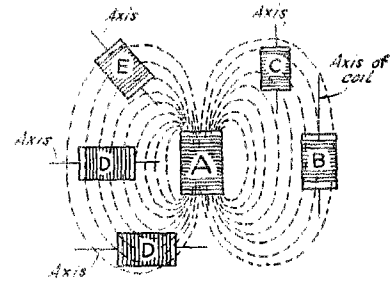



FIG. 4

First of all, any coil with current flowing through the winding sets up an electromagnetic field around itself, this field being shown by the dotted lines in Fig. 1. Note that in this particular case the field is slightly eliptical in shape. This is because the coil is longer than it is wide.

If for this coil, we substituted one that was shorter and fatter, the field would tend to become more nearly circular. In Fig. 2 we have a very short coil—only one turn long—and it will be seen that the field is nearly a perfect circle.

On the other hand, if we should substitute a long skinny coil, the field would become still more eliptical. In Fig. 3 we have a coil that is very long compared to its width, and the field is quite a bit more eliptical than that in Fig. 1.

From this, we believe it is now plain that the shape of the field around a coil will change as the dimensions of the coil change.

### Coupling Between Coils

We are going to show how to get *no coupling* between coils first, and will then tell how coupling *can* be obtained.

* Experimenters' Section A. R. R. L.

Referring to Fig. 4, suppose we take a coil "A" and pass a current through it. A field will be set up, this field being shown by the dotted lines. Now, if we mount another coil at such an angle that the field passes through it at *right angles to the axis*, we will not get any coupling between the two. In Fig. 4, for instance, there is no coupling

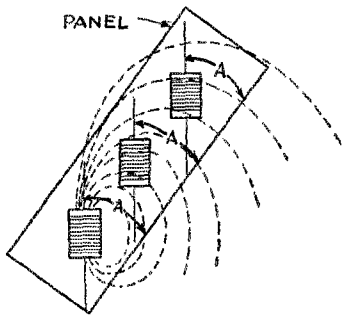



FIG. 5

between coils, "C", "D", "E" and the main coil "A". A little inspection will show that in each of the three coils mentioned, the lines of force from "A" cut through *at right angles to the axes* of coils "C" "D" and "E." *No coupling exists.*

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

**How the Shape of the Coils Changes the "No-Coupling Angle"**

In Fig. 5 we show three neutrodyne trans-

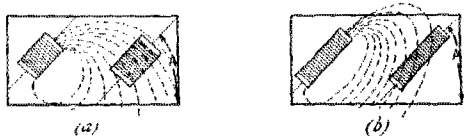
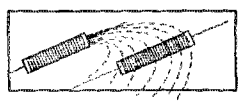



FIG. 6




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

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

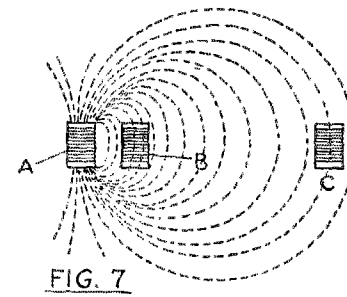



FIG. 7

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

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

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

**Other Methods**

There are two other ways in which the coupling can be reduced, one of which is by moving the coils some distance apart. In Fig. 7 we have coil "A" with a field around it. This field is very strong near the coil, but gets weaker and weaker as you get further from "A." If we put another coil "B" near "A" we will have close coupling, i. e., very strong coupling. However, if we take "B" and put it out at "C" for instance,

we would still have coupling, but it would be so weak that very little of the current in "A" would circulate in "C." For safe operation, the distance should be several


NEUTRODYNE NEWT
THE THREE ARMED WONDER

feet, so it can be seen that this method is not the most practicable to use.

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

Well, anyway, we've had a nice time destroying the "Sacred Angle" superstition, haven't we?

## Official Wavelength Stations

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

| | | | |
|---|---|---|---|
| 1 | NKF | 20 | 5ZAV |
| 2 | 1XAM | 21 | 9DXN |
| 3 | 6BQB | 22 | 9EGU |
| 4 | 7BK | 23 | 6ZH |
| 5 | 5MN | 24 | 5AKN-5XBH |
| 6 | 9AAL | 25 | 2MU |
| 7 | 2AC | 26 | 4BY |
| 8 | 2WC | 27 | 9ZA |
| 9 | 9ZT-9XAX | 28 | 7GE-7ZX |
| 10 | 1MK | 29 | 1IV |
| 11 | 8GU-8XC | 30 | 9EIB |
| 12 | 9XI | 31 | 7GQ |
| 13 | 1CK | 32 | 2DS |
| 14 | 1AWW | 33 | 1BZQ |
| 15 | 3BE-3ZW | 34 | 6BGM-6CVO |
| 16 | 8AA | 35 | 2XI |
| 17 | 8CCI | 36 | 9IG |
| 18 | 3APV | 37 | 7ACI |
| 19 | 4XE | | |

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

"u 9ZT 76" or "u 9ZT 180" or "u 9ZT 42"

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

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

## WWV and 6XBM Schedules

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

**Schedule of Frequencies in Kilocycles**
(Approximate wavelengths in meters in parentheses)

| Time* | Apr. 6 | Apr. 20 | May 5 | May 20 | June 5 |
|---|---|---|---|---|---|
| 10:00 to 10:08 p.m. | 1500 (200) | 3000 (100) | 125 (2400) | 300 (1000) | 550 (545) |
| 10:12 to 10:20 p.m. | 1650 (182) | 3300 ( 91) | 133 (2254) | 315 ( 952) | 630 (476) |
| 10:24 to 10:32 p.m. | 1800 (167) | 3600 ( 83) | 143 (2097) | 345 ( 869) | 730 (411) |
| 10:36 to 10:44 p.m. | 2000 (150) | 4000 ( 75) | 155 (1934) | 375 (800) | 850 (353) |
| 10:48 to 10:56 p.m. | 2200 (136) | 4400 ( 68) | 168.5 (1800) | 425 (705) | 980 (306) |
| 11:00 to 11:08 p.m. | 2450 (122) | 4900 ( 61) | 205 (1463) | 500 (600) | 1130 (265) |
| 11:12 to 11:20 p.m. | 2700 (111) | 5400 ( 55) | 260 (1153) | 600 (500) | 1300 (231) |
| 11:24 to 11:32 p.m. | 3000 (100) | 6000 ( 50) | 315 (952) | 666 (450) | 1500 (200) |

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

Recently the *New York Herald-Tribune* raised a large fund by popular subscription for the purpose of providing 2000 complete broadcast receiving installations in homes of the needy blind thruout the country, under the auspices of the American Foundation for the Blind. The Adams-Morgan Co. is supplying the equipment at cost. The A.R.R.L., thru its members, is installing the sets in the homes of the blind people. Just another little chance for amateur radio to serve the community.

# The Wavy Mast and the Airbrake Receiver

Partly by and partly on, A. W. Everest of 1ARE

STATION 1ARE is located in a perfectly impossible place. The counterpoise crouches down between a pair of tall brick houses and the antenna lives on top of one of these—an arrangement that would worry any of us. Just

The Airbrake Receiver being posed—

the same 1ARE turns out the wickedest signals with no visible cause except one ordinary UV-202.

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

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

### The Airbrake Receiver

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

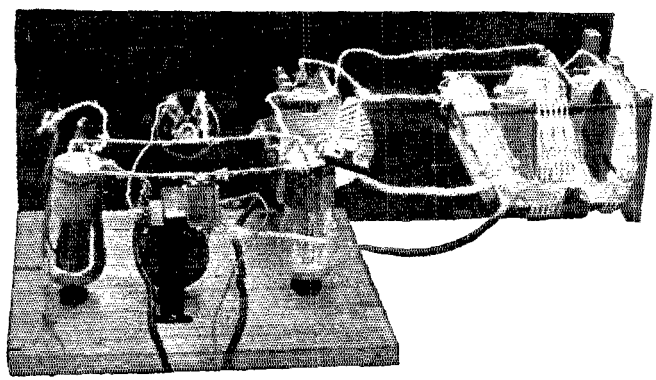
There is not a socket, binding post or telephone jack on the set, thereby eliminating several losses, vis. 50c, 4c and 25c.

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

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

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

The grid condenser is soldered to the detector grid-contact-pin but you can't see the gridleak which is a pencil mark. The bypass condenser around the primary of the amplifying transformer hangs from the wiring between the two tubes, not introducing a millimeter of extra wiring. We don't know for sure but the rheostat looks as if it were made by DeForest.



—and the picture that resulted.

The audio transformer is a 6/1 Amer-

tran, distinguished from the 3/1 by having the coils painted maroon.

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

For the benefit of those who cannot multiply 3 by 6 we will say that the secondary has 18 turns of No. 16 B & S gage wire wound to an average diameter of 4¼". The primary required to tune the 1ARE antenna to 235 meters has 9 turns of the same wire on the same form. The tickler has 15 turns on a 3½" form carried by a small hunk of wood driven onto a shaft which projects through the panel and has a control-knob. Ordinarily no respectable tuner needs over 12 turns on the tickler but 1ARE has to use a lot of wave traps and such like to get rid of one of these birds that spends the evening talking to CQ. This extra machinery increases the resistance of the antenna system and calls for the extra 3 turns on the tickler.

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

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

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

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

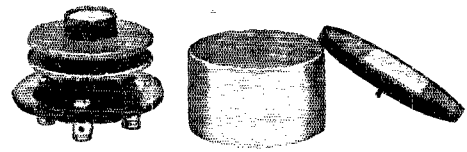
P. S.—The blob of solder on the secondary is a tap for shorter waves. The switch is moved with soldering copper.

## An Interference Trap

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

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

The device is shown "exploded" in our photograph. At the right is the base, then the metal shell and finally the "works". These works consist of an air-core choke



coil and a fixed condenser of the proper size to give the desired action. The choke is connected between antenna and ground and most of the noises drain to ground through it. The ground post of the receiving set is connected as usual but the antenna post is connected to the top of the choke coil through the small condenser in the noise filter. Thus the noises can go to ground through the choke while the signals go through the small condenser and the primary of the receiving set.

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

It is a good little device.

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Several French amateurs are getting across to this country on 40 meters in the middle of the afternoon and through into twilight. f8BF is one of the most consistent. A few listeners for this sort of thing could do some excellent daylight DX reception.

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

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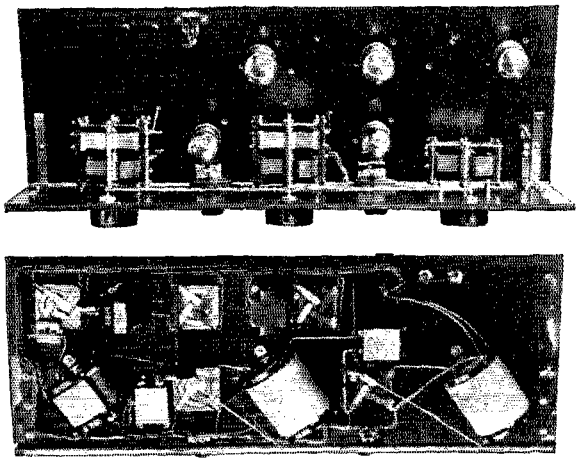
The Editor of *The Wireless World and Radio Review* is very desirous of obtaining lists of British amateur calls heard in the United States from time to time; British amateurs will be glad to see these lists published in their country. Reports of this nature will be welcome at the offices of the above-mentioned magazine at 139 Fleet Street, London, E. C. 4.

# The Isofarad Receiver

By Byron B. Minnium*

THE word Isofarad (pronounced "ice-o-farad") is used for the particular circuit about to be explained as being descriptive of the principle involved. This coined word is made up of "iso" meaning equal or balanced and "farad" which conveys the meaning of capacity; and the circuit so named is one employing a balanced impedance bridge, all four arms of which are capacities. While, strictly speaking, the word "farad" refers to a unit of capacity, and not to capacity itself, yet its use is justified on the ground of euphony, as is the case with such words as neutrodyne in which "dyne" is the unit of force, and not force itself.



Top and bottom views of the Isofarad Receiver

## What Was Wanted

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

## Development

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

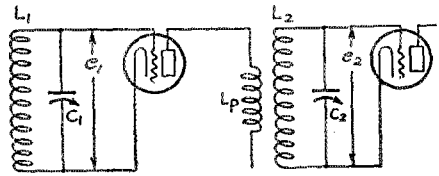
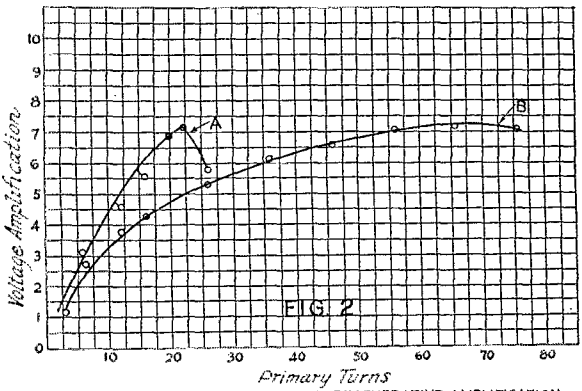



FIGURE 1

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

* Walbert Mfg. Company, Chicago, Illinois.

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




EFFECT OF PRIMARY TURNS UPON ANTI-REGENERATIVE AMPLIFICATION. STANDARD TUNED R.F TRANSFORMER AND 201-A TUBE, AT 600 K.C. (500 METERS) "A"—TURNS SPACED. "B"—TURNS IN CONTACT.

Figure 1 shows a standard type of tuned R.F. in which the voltage amplification is due to one tube and one transformer. It is obvious that as Lp is reduced the voltage developed across it and transferred to the secondary will diminish; so that, when Lp= O, although the turn ratio is infinitely high, the transfer of energy will be zero. In the same way, the other factors mentioned above, and the resistance of circuit $L_2C_2$, will affect the voltage applied to the succeeding tube. It must be remembered that we are working with very high frequencies, that we are employing air-core transformers with high flux leakages, and that the effects depend to a great extent upon resonance as contrasted with transformers of the commercial-frequency, power type employing iron cores and carefully avoiding resonance effects.

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

Now if the number of primary turns be reduced to, say, 5 or less, two R.F. stages will be found perfectly stable over the entire broadcast band. Unfortunately reducing Lp to a point where stability at 250 meters is attained results in very poor signal strength at the higher wavelengths.[3]

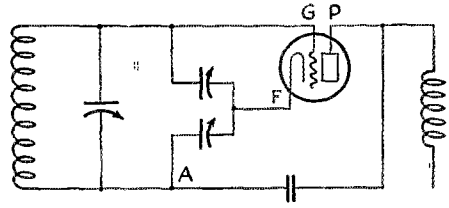



FIGURE 3

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

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

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

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

### Selling Nonsense

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

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

If tuned circuits are so arranged (either by increasing Lp, or by lowering the resistance of the tuned circuit, or both) that an amplification considerably higher than 3, (as measured by our set up) per stage is obtained, a two stage amplifier will be found to be a persistent oscillator. Means other than control of filament temperature (which is common practice even in many of the so-called neutralized types of receivers) must be resorted to in order to secure stability as an amplifier. It is generally known that the greater the number of stages employed, the less gain can be had per stage without reaching the point of oscillation. As a

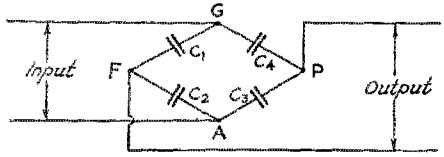



FIGURE 4

matter of fact, when no special attempt is made to produce anti-regenerative amplification it will be found that *three stages can do very little more in the way of amplification than two, so greatly must the effectiveness per stage be reduced.* There is, however, one outstanding advantage incident to increasing the number of tuned stages: that is, the resultant increase in over-all selectivity. From the standpoint of practicability, however, the increased number of controls or the difficulty in controlling more than one stage by a single dial definitely limits the number of stages.

It should be understood, of course, that when the form of winding is changed to another type of coil the figures given will be affected, due to changes in magnetic and capacity coupling between windings. An example of this is to be found in the Browning-Drake R.F. transformer[4] in which the primary consists of a concentrated inductance wound in a narrow slot under one end of the secondary. Since the magnetic flux from the primary is not spread out so as to cut as much of the secondary as is ordinarily the case, the self-inductance of the primary must be increased in order to obtain the same energy transfer. In other words the self-inductance of Lp and the degree of coupling between it and Ls are both factors in determining the efficacy of the device in energy transference and the results we have obtained point to the conclusion that the particular combination used has very little to do with the inherent stability of the system—that being determined chiefly by voltage step-up obtained.

### Testing Neutralizing Circuits

Having determined the optimum value of primary turns for maximum energy transfer and having also found that some means must be used to stabilize circuits utilizing the resultant high amplification, this ining-Drake R.F. transformer[5] in which the formation was applied to R.F. circuits utilized in the various commercial types of receivers. While most of the anti-regenerative appliances were found to function well enough with interstage transformers giving a voltage amplification per stage of 3 or less as measured by our particular apparatus, all were found to fall down when using R.F. transformers capable of giving considerably greater amplification. This rather broad statement applies to all circuits investigated which depend for reversal of phase upon attempted UNITY magnetic and zero static coupling between two coils (plate and grid). All were found to require adjustment of the regeneration-limiting-device for various settings of the tuning dials. When it is desired to leave this adjustment fixed, it is necessary to reduce the amplification to the point where the tendency to oscillate is only slight.

To put this in another way, most of the well known methods of preventing self-oscillation in R.F. amplifiers (and many others not in commercial use) will work without adjustment as long as the amplifier, without them has only a comparatively slight tendency to oscillate; but when the amplifier is pushed sufficiently to make its oscillations persistent, they either require adjustment for different wavelengths, or else are totally incapable of suppressing oscillations.[5]

Bridge type circuits of various kinds were

[4] A one-step neutrodyne with a tickler on the detector. See page 21 of April *QST*.

tried but none was found to be satisfactory except, as stated before, when the voltage amplification per stage was kept comparatively low.

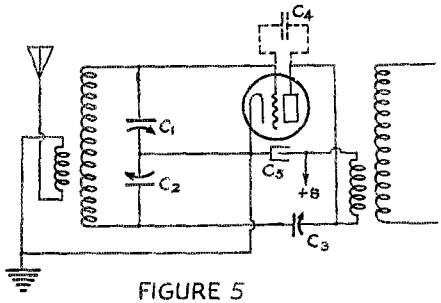



FIGURE 5

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

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

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

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

The discarded modification of the Nichols anti-regenerative scheme suggested another change in this circuit. This is shown in Figure 5 in which the rotor shafts of $C_1$ and $C_2$, are common and are at ground potential insofar as A. C. is concerned. This scheme does away with the effect of body capacity which is present in circuits in which the condenser rotor is not at ground potential.

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

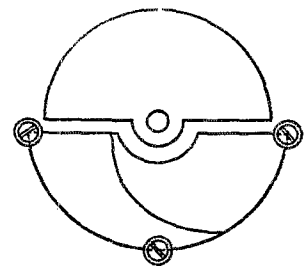


FIGURE 6

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

There are several important details which should be observed in the construction of a set of this type. One is that the R.F. coupling transformers should be so wound and connected as to produce an approximate reversal of phase, thus keeping corresponding points on all stages in the same phase (since 180 degrees change of phase is produced by each tube and if the trans-

[6] Several circuits will give stabilization over a wide band of waves without adjustment. For instance, Fig. 7 here given—in which M is the mutual inductance between L-1 and Lc, and N-1 and Nc are the numbers of turns, respectively, in coils L-1 and Lc. Thus, when the turn ratio is determined, the value of Cc will control the amount of regeneration present, i.e., the condition of stabilization, the exact value, of course, depending on the grid-plate capacity (Cm) of the tube.

The formula for a condition of compensation which in the above circuit will be independent of wavelength is as follows:

$$Cc/Cm = L1/M = \sqrt{\frac{L1}{Lc}} = \frac{N1}{Nc}$$

formers cause another 180 degree change, approximately, the net result is phase similarity.) Observance of this rule appreciably reduced static coupling between stages.

Care must be taken to avoid stray ca-

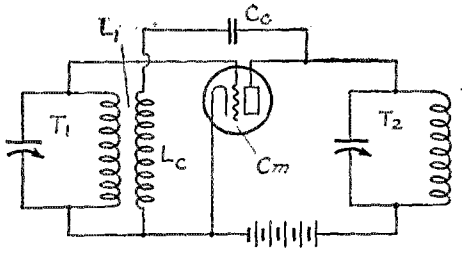


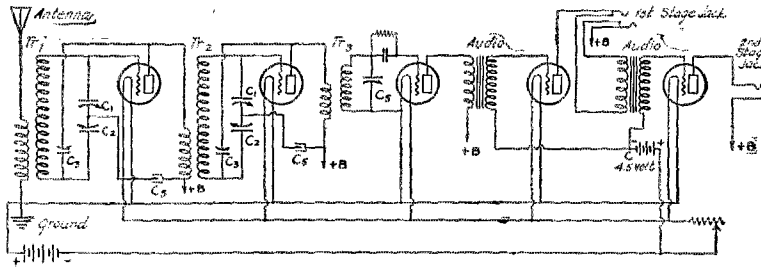

FIG. 7

pacities which will affect the balance of the bridge when the tuning condensers are rotated. Such parasitic capacities are produced by improper orientation and spacing of parts.

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

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

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




THE COMPLETE CIRCUIT

**CONSTRUCTIONAL DETAILS**

**Tuning condensers C1 and C2, 300 micro-microfarads for each section.**
**Neutralizing condensers C3, 10 micro-microfarads.**
**Tuning condenser for last R.F. transformer, C5, 350 micro-microfarad.**
**Bypass condensers, C6, one microfarad.**

**Antenna Input Transformer Tr1 and first R.F. Transformer Tr2 have secondaries with 102 turns No. 22 D.C.C. wire on a form 3" in diameter. This form is of the skeleton construction. The primary winding is slipped inside, being located at the plate end of the secondary. It consists of 20-22 turns of No. 22 D.C.C. wire wound on a form 2 13/16" in diameter and spaced so as to make the winding 1½" long.**

**The last transformer Tr3 does not have a split tuning condenser, therefore its secondary winding has but 52 turns and the primary 12-14 turns. In this case the primary is located at the filament end of the secondary.**

Each stage should be by-passed by a ½ or 1 microfarad condenser. After the plate current has passed through the plate coil and has transferred its energy to the secondary coil, the A. C. component should go directly to the filament of its own tube to prevent inter-stage coupling due to common B batteries and leads. Strictly speaking, it is possible to prevent such interaction completely only by the use of separate A and B batteries. For practical purposes this is unnecessary.

Perhaps some of the results obtained with the Isofarad circuit might be of interest. The set was tried in a residence located about six or seven blocks from the antenna of WEBH, the Edgewater Beach Hotel Station, Chicago. An antenna of about 35 feet of rubber insulated telephone wire lying on the floor was used. Investigation showed that every Chicago station was operating on its usual schedule. The test was run between the hours of ten and twelve.

The weather conditions were only fair. Another set using an outside aerial showed a great deal of static. It was possible to bring in the three California stations of prominence, namely KGO, Oakland, KFI and KHJ Los Angeles. Trying for the east coast it was possible to bring in WEAF and WJZ New York, WSB, Atlanta, WBZ, Springfield, and, while WEBH was operating, to bring in WGY at Schenectady, which in observation of several types of sets operated at the same location it was never possible to do. A dozen or more nearer stations were received with exceptional clarity and volume and the short aerial practically eliminated the static interference.


## Maritime Division Convention

By Can. 1-EB

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

On Saturday morning two automobiles were obtained and the visitors were driven around Halifax on a sight-seeing tour. At 2.30 P.M. a technical meeting was held at Dalhousie University, where three short lectures were very kindly given by the Physics Department of Dalhousie in conjunction with the Nova Scotia Institute of Science. Profs. H. L. Bronson and J. H. L. Johnson of Dalhousie gave practical demonstrations, and explained the nature of waves and wave motion, leading up to electro-magnetic waves and their propagation and reception. A. Greig, 1BQ, then gave a practical demonstration of a five-meter transmitter and measured the standing waves on an antenna stretched across the room.

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

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

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

The "Old Man" appeared on the scene of festivities and after taking a few cracks at some of the Halifax gang, conducted the initiation of four fellows into the Royal Order of Trans-Atlantic Brasspounders.

A number of stunts and contests were also held during the banquet.

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

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

## Hudson Division 2nd District Convention

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

The week was really devoted more to

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

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

Every day from 12.30 P.M. to 11 P.M. there was something going on in the lecture room with public speakers, movies and special features interesting to both the B.C.L. and the Amateur.

Friday at 3.30 P.M. the big traffic meeting took place with Ed. Glaser, 2BRB, in charge. Practically all the district superintendents were present, and addresses were made by F. E. Handy, the acting traffic manager; K. B. Warner, secretary; and A. A. Hebert, Fieldman, all of A.R.R.L. Headquarters.

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

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

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

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

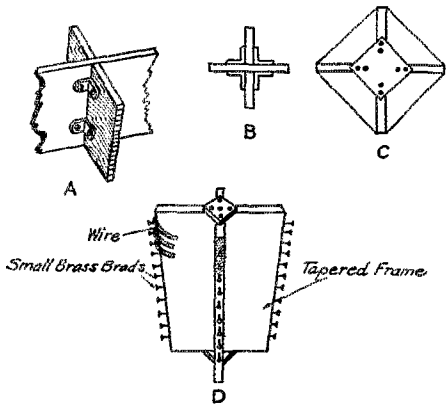
—*P.C.O. jr. + A.A.H.*


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

# Homemade Transmitter Parts

By L. W. Hatry, Department Editor, Q S T

IF more economy were displayed in the construction of the transmitter parts it would be possible for many of us to have more meters than we now do. And meters mean more to a set than most nice looking purchased parts. Also it seems that many do not realize to what




SQUARE FRAMES EASY TO MAKE

FIG. 1

extent they can save money and yet have an effective transmitter by making every bit that they can. In fact, some amateurs now without could have a transmitter if they only realized how much of it requires only small expense. It is hoped that this and an article to follow will stimulate the home-brewed transmitter, and help the fellow who can't get at the pretty manufactured parts easily because of location or finances.

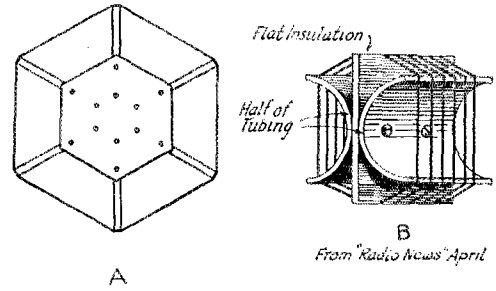
### The Helix

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

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

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

The porcelain knobs used by the telephone companies serve well as helix insulators and turn spacers. They have several ridges as Fig. 5A shows, and can be




OTHER SHAPES

FIG. 2

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

*From the Radio News for April, 1924

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

Edgewise wound strip-brass is excellent for round helices only if used properly. The spacing between turns should be at least the same as the width of the strip for minimum resistance. And as the spacing must increase as the width does, the practical limit is about ½ inch strip.

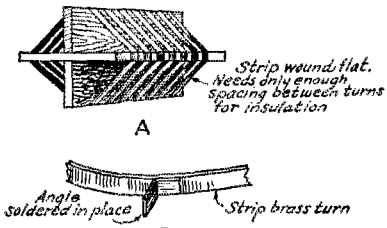



FIG. 3

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

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

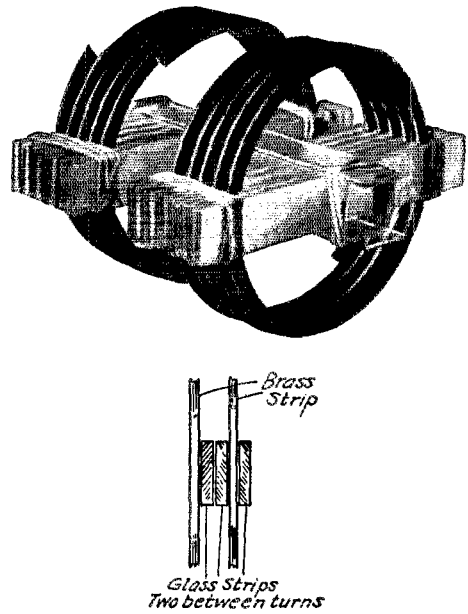
A spiral can be made with wire and wood strips by drilling holes in wood arms, Fig. 6A. This makes a nice job if done properly, but takes lots of time. A simpler way is to use brass tacks with small heads against which the wire is wound, 6B. If brass strip is used it should be spaced its width. The frame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

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

### Fixed Condensers

The grid condenser on the transmitter need not be of a very high capacity nor be insulated against very high voltages. With a set consisting of one or two five-watt tubes the ordinary mica receiving fixed condenser is perfectly satisfactory. On the wavelength bands from 85 down anything from 100 μμfd. up is generally sufficient. On the 150-200 meter band you can't use much less than 500 μμfd.

You can easily make your own fixed condensers with air insulation as Fig. 6 shows. However, the job is ticklish, as it takes, with 1/16th inch spacing between plates, an active dielectric area of 24 square inches to get a capacity approximating to 100 μμfd. With double the spacing you get




4XE HELIX ASSEMBLY

FIG. 4

half the capacity, and with twice the area you obtain double the capacity, etc. In figuring the capacity of such an air condenser, the area to consider is only that portion of the metal strips directly opposite

each other. The dotted lines in Fig. 7 show what is the active area of that condenser. And as there are four active dielectric spaces between the five plates in the condenser of Fig. 7, there would be four times the active area indicated by the dotted lines. In making such a condenser the spacers should be of metal or fiber, as wood splits easily when used in such small sizes. Also the metal sheet used should be fairly heavy so that the surface will tend to remain flat.

The plate stopping condenser must have enough insulation to stand about three times the plate voltage on account of voltage surges and the R.F. voltage generated. As most towns have a photographer and a florist or tobacco shop, its parts are easy to obtain. Go to the photographer to get some glass plates and to the florist or tobacco shop to get some tinfoil. Assemble the two as in Fig. 8. A rubber sponge is placed between the wood binding strip on top and the glass plate to keep from cracking the glass. A similar sponge would not be amiss at the bottom

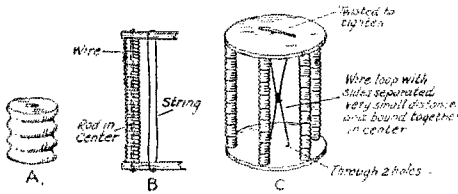



Fig. 5

of the condenser assembly, although it can be left out. The sponge at the top must not be left out, however. The tinfoil can be within a half-inch of the edge of the glass, or even closer, as the area of the tinfoil is what is figured from. .002 μfd. is the capacity of condenser usually used. It requires about 80 square inches of tinfoil if the plates are the thickness ordinarily met with, a fraction under a sixteenth inch. However, on the waves from 85 down .001 μfd. is generally as satisfactory, which cuts the required area in half. Glass insulated condensers of this type will often work satisfactorily with a 250-watt tube. Contact to the tinfoil should be made clamp fashion as Fig. 8 shows. The important thing about this clamp is that it should have plenty of surface so that its grip on the foil will be broad enough not to tear it and at the same time tight enough to maintain a good contact.

### Antenna Series Condensers

Antenna series condensers of the commercial models cost rather heavily to a fellow short on funds but long on time. He can often get by with some receiving variable condenser that is of fairly low-loss construction, if his set uses five-watt tubes. But higher powers or even the small tubes with high plate voltages require a condenser with a greater spacing

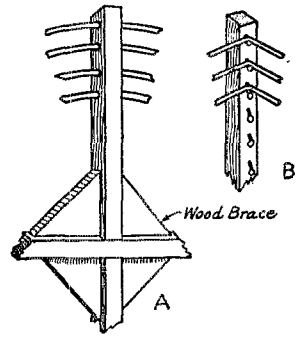
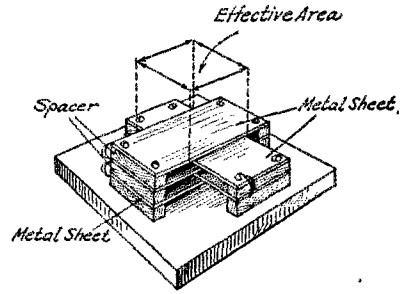



FIG. 6

between the plates to stand the voltage, and often one with better insulation. These are easy to make in the capacities required in the present day transmitters for the short waves. Look at Fig. 11. A couple of pie-plates and some scrap lumber do the trick, or a couple of pieces of almost any handy metal sheet will serve as well. Such a condenser has a well spread out field, and for that reason should be supported at least six inches clear of other apparatus, walls and such.

By removing some of the plates of a good receiving variable condenser, such as the Cardwell or similar, it will serve very




HOMEMADE FIXED CONDENSER

FIG. 7

well as a series antenna condenser. The one illustrated in the photograph has had two plates removed between those left and will stand quite high voltages without jumping over. The rubber insulation is in no danger of breakdown, being plenty for the spacing of the plates obtained. It was

necessary, in addition to the three spacers between plates on the rotor, to have washers to replace the thickness of a single plate, and two will be needed between the plates left. The capacity of such a condenser is in the vicinty of 30 μμf. maximum.

A Cardwell transmitting condenser has

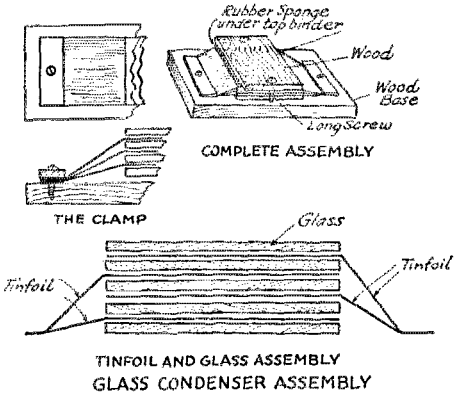
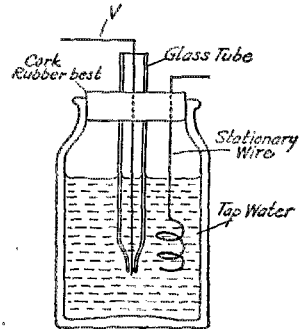



FIG. 8

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




WATER GRID LEAK

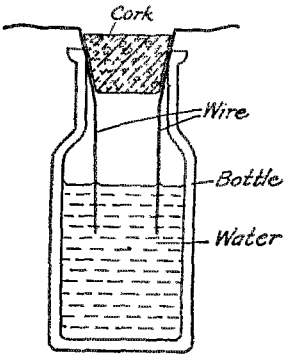
FIG. 9

### Filament By-pass Condensers

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

### The Grid Leak

Here's a pretty problem. Many of us find the standard grid-leak units somewhat expensive; particularly since a single 202



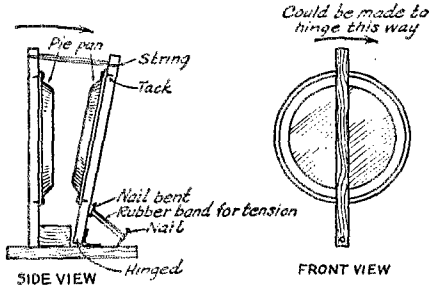

VARIABLE GRID LEAK

FIG. 10

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

### The Tube Socket

In spite of the paragraph heading we want to ask "why the socket?" Everybody seems to think that he must purchase a socket and at the same time that he must economize. As a result losses are incurred and the fellow is out both the money for the cheap socket and some wasted power. Nor is it necessary to go to the trouble of




ANTENNA SERIES CONDENSER
FIG. 11

removing the base. Solder leads directly to the prongs of the base. Mounting the tube for this is a cinch. The tube has a groove where the tube proper is attached to the base and the base has a groove at the bottom. Nail a small wood upright in place, notch to avoid having the binding wire slip and use a couple of lengths of scrap wire to hold the tube in place, Fig. 13. The tube must be mounted upright, as turning it upside down causes the heat to rise to the seal of the tube, and either melting or breakdown is the probable result. In 13B is a simple way to mount the tube if the base has been removed. The bottom is bound by small wire or string, and a heavy wire loop supports the upper portion. This heavy wire loop should be kept from touching the tube by some scrap asbestos wool, as otherwise the tube will very likely crack, due to the cool wire being in contact with the heated glass. The base may as well be on the tube, except for 5 meter work, where it is an advantage to have it off.

### R.F. Chokes

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

The usefulness of the choke is affected if it gets in the field of the helix or has too much insulation in its own field. It is a mistake to put it very close to transformers or other apparatus: treat it with the respect you would any coil. In any case it is a good idea to mount the choke at right angles to the helix. And when mounting the R.F. choke you should remember that the end connected to the plate is at the same high R.F. voltage that the plate is and needs careful insulation to avoid wastage of power. The end of the choke that is connected to the positive of the high voltage should have no R.F. dif-

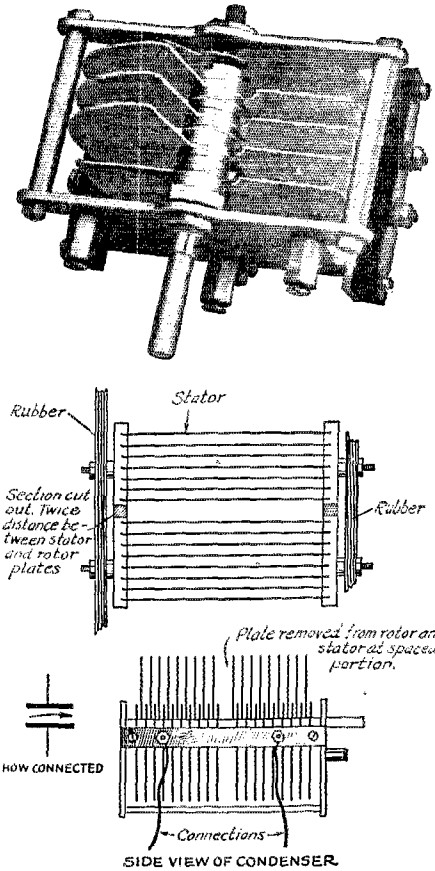
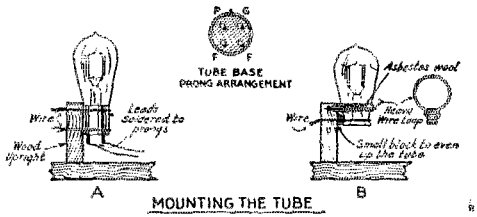



FIG. 12 DOUBLING THE BREAKDOWN VOLTAGE OF A TRANSMITTING VARIABLE

ference to ground although it would have the D.C. or whatever your plate voltage happened to be. Such a choke is best made on a thin cardboard form which has been

boiled in paraffine. The wire size should be no larger than necessary to carry the plate current; 34 to 28 for one or two 202's, 30 to 24 for the 203's and larger for greater powers It hurts nothing to use a skeleton form and make such a choke low-loss.

An untuned choke is wound to have a fundamental wavelength greater than any wave on which you expect the set itself to




MOUNTING THE TUBE
FIG. 13

operate. For this reason the number of turns in it are not critical. It is only necessary to have plenty. An untuned choke is fairly useless on waves above its fundamental wavelength. Thus it is a mistake to tune such a fine wire choke to your transmitting wavelength by using just sufficient turns to fit. This will often result in overheating and certainly inefficiency. In fact, untuned chokes sometimes

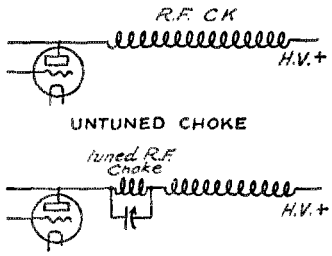



FIG. 14

heat sufficiently to burn the insulation when the fundamental or some harmonic of it is accidentally run into. Because a tuned choke has heavy currents it should be wound with heavy wire, few turns and tuned with a good condenser. The same thing applied to tuned chokes as to other tuned circuits, they must be low-loss in construction. A tuned choke must be protected by an untuned one, as it is only good on the wave to which it is tuned and your transmitter would stop oscillating should the wave shift. For the 75-85 meter band a 500 μfd. variable and a 10 turn coil are OK; for the 150-200 band the coil will need to have 30 turns. Fig. 14 shows the circuits of the tuned-untuned combination.

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

## A New Amateur Band at ¾ Meter

ACTING upon the request of the A.R.R.L. Board of Directors, recently reported in *QST*, the Bureau of Navigation of the Department of Commerce has assigned for general amateur use a band of ultra-short waves in the immediate vicinity of ¾ meter, suitable for amateur reflection development. This was announced on March 17th in General Letter No. 269, the text of which read as follows:

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

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

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

—*K. B. W.*

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

It isn't always the power hog that hops the gap. 5OV works a2YI using a single five-watter. And 1AAP worked z1AC using a couple of the 202's, while 2CPO worked a3AL using the same power.

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

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

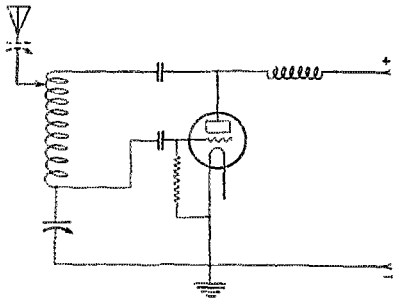
The Argentine radio laws permit transmission on any wavelength below 250 meters. AF1 and AF4 of that country are on the air.

# Sending Licenses Suspended

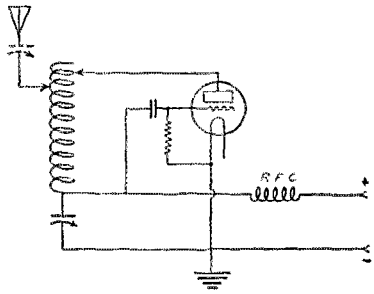
WELL up toward 100 amateur transmitting licenses have been suspended for violation of the new rules of the Bureau of Navigation, Department of Commerce.

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

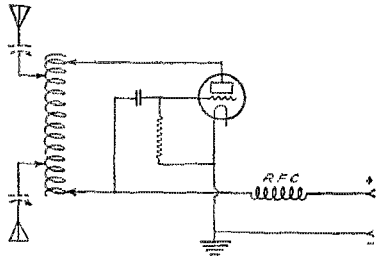
Read again the "Fair Warning" on page 39 of the April issue of *QST*. Then read the regulations themselves on page 29 of the March issue.



COLPITTS WITH SHUNT FEED




COLPITTS CIRCUIT WITH SHUNT-SERIES FEED




COLPITTS CIRCUIT USING COUNTERPOISE-GROUND CAPACITY AS THE FEEDBACK CONDENSER

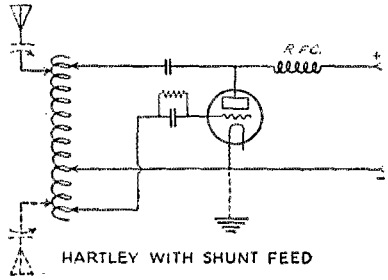
Have you done it? Very well; let's go over it in detail.

### Circuits

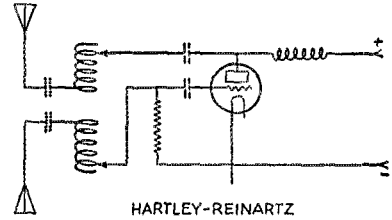
Take a good hard look at the illustration and then *do something about it.*

### Spark Sets

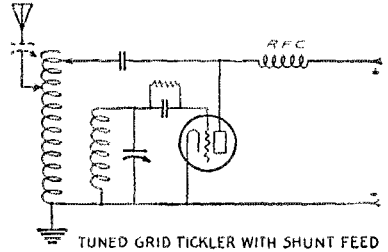
If you use a spark you are in wrong. The Department will let you use the thing



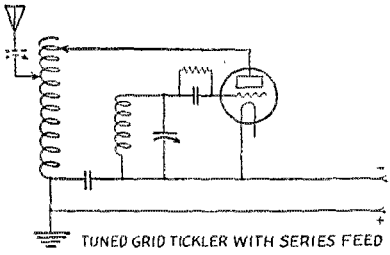

HARTLEY WITH SHUNT FEED



HARTLEY-REINARTZ




TUNED GRID TICKLER WITH SHUNT FEED
*(Also called "Reversed Feedback")*



TUNED GRID TICKLER WITH SERIES FEED
*Also called, "Stanley" "ISH" and "British Aircraft"*

## The Above Circuits Are Forbidden

**For circuits that may be used see references on page 40 of April QST**

between 170 and 180 meters *if you can get the decrement down to .1*, an almost impossible thing at 200 meters. However they will not agree to like it.

### Phone and I.C.W.

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

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

### Rectified Supply and D.C. Supply

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

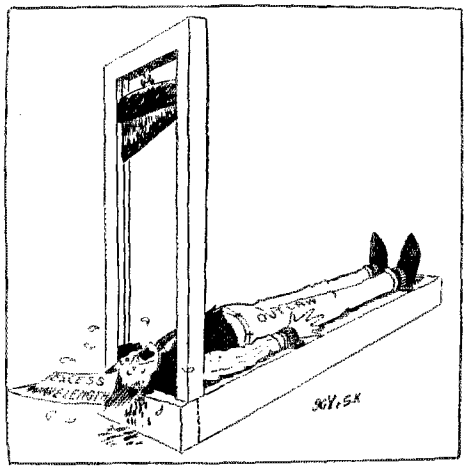
"Full-wave rectified" may mean either one of two things—A. A full-wave rectifier with or without a filter. B. A "self rectified" set with "one tube on each side of the cycle."

### Quiet Hours

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

### Wavelengths

The wavebands are being very carelessly observed—stations "slop over" into the




territory that belongs to other services. Many stations seem to think that does not matter: that's why the Traffic Department has arranged "Vigilance Committees."

### Conclusion

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

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

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**STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,**

Of *QST*, published monthly at Hartford, Conn., for April 1, 1925.

State of Connecticut } ss.
County of Hartford }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared K. B. Warner, who, having been duly sworn according to law, deposes and says that he is the business manager of *QST* and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

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

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

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

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

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

Sworn to and subscribed before me this 6th day of March, 1925.

Henrietta L. Hugins, Notary Public.
(My commission expires February 1, 1928.)

# The Governors'-President Relay

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

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

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

The stations and their respective wavelengths were as follows:

| | | | | | |
|---|---|---|---|---|---|
| 37.5 to 42.8 M. | 3APV | 42 | Meters | using | RAC |
| 75 to 85.7 M. | 3APV | 75 | " | " | RAC |
| | 3BWT | 77½ | " | " | RAC |
| | 3AB | 80 | " | " | RAC |
| | 3LR | 85 | " | " | RAC |
| | 3ZW | 82½ | " | " | AC |
| 150 to 175 M. | 3BPP | 150 | " | " | RAC |
| | 3BWT | 188 | " | " | RAC |

Tests were conducted between these stations several times previous to the Relay to ascertain the amount of QRM between any of the stations selected. In some cases complete changes in equipment were made to assure perfect working order dnring the relay. Both 3APV and 3BPP erected new counterpoises. 3BPP sprained an arm, which nearly put him out of commission for the relay. All the stations that were without phone connection to the radio shack put in temporary telephones so contact between Washington amateurs could be made as conveniently as possible. At 3APV four operators were on duty. 3ABJ, ex-3OK, 4DX, who happened to be in town for the Inauguration, and 3APV himself.

3CHC, 3WU, 3BHV, 3IO, 3DK and 3FJ worked shifts with 3BWT at 3BWT. Two separate watches were held. One watch used a 77 meter transmitter and the other used a transmitter on 188 meters. Suitable receivers covered both wave bands. 3HS and 3AB operated at 3AB. 3JJ held down most of the watch at 3ZW. 3ND helped at 3LR. All stations were primed for a big time and kept a continuous watch from noon of the fourth to afternoon of the fifth. 3APV and 3AB were in continuous operation until eight o'clock on the morning of the fifth. 3ZW stuck it out until 4.30 A.M. and went back on the job at daybreak for possible strays. 3BPP stuck to the job eleven hours, while 3BWT closed shop at 3 A.M. on account of heavy QRN. Heavy QRN came on about midnight, increasing in volume until 4 A.M. of the 5th. The stations working after midnight deserve a great deal of credit.

Other Washington stations deserving much credit were 3AHP, who got the South Dakota message at 10.15 A.M. the morning of the fourth two hours ahead of schedule, and 3IM, who copied the Georgia messages one hour before they came through 3BWT. 3AHP got his message while working 3QI in Baltimore, and 3IM intercepted the Georgia message in transit between 8AAL and 2LD at 10.25 P.M. It is not necessary to give the full text of each message. A few messages got slightly mixed, while others traveled around some before arriving in Washington. The fact that only a known 24 messages were started is very likely due to the little interest taken in the Relay by stations outside Washingon. Those who were aware of the Relay, however, forgot all about it until the last minute and did not wake up until Washington stations stirred them. One western station wanted to know all about the Government Press messages when asked for the Governors'-President message, while others came back with a batch of ???? Of 22 messages received, nine were relayed to Washington and twelve were copied direct from the Capitols in which they originated. 8PL in Ohio started the ball rolling about noon of the 4th. He sent QST's regarding the Washington stations on duty who were QRV the messages.

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

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

1. More than half of the stations worked did not know what it was all about. 2. QRN was very, very bad from after midnight of March 4th to daylight of the 5th. 3. The air was fairly free from stations after midnight of the 4th. This was perhaps due to the QRN. 4. Most of the important stations who were not CQing were calling foreign stations. CQ's were tried by the Washington stations to dig up Governors'-President Relay messages. 5.

Many complaints were received from neighboring B.C.L.'s during quiet hours by the 75-85 meter stations. No Washington station on these waves shut down during these tests. 6. Washington stations count the Relay a failure, but not due to any fault of theirs. They certainly were on the job.

### Delivery

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

Hon. Calvin Coolidge
President of the United States
The White House, Washington
Dear Sir:—

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

Yours very respectfully,

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

The next day the following reply was received:

The White House
Washington, D.C. March 6th, 1925
My dear Mr. Goodall:—

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

Most sincerely yours,
(Signed) Everett Sanders
Secretary to the President

Mr. A. B. Goodall
Washington Radio Club, Washington, D.C.

### Acknowledgments

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

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

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2BW and 2CXY report h2AS on the air. The station is located at 8 Cer Orias Utca 37, Budapest, Hungary. 2CLG worked him on March 5th, adding another country to the worked list.

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

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8AH advises us that there is such a station as JUPU. It is operated by the Japanese government. Communications may be addressed to Mr. T. Hamage, 9 Conyacho South, Kyobasliku, Tokyo, Nippon.

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

---

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

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THIRD
NATIONAL CONVENTION
at
CHICAGO
August 18th, 19th, 20th,
21st, 1925.

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

WATCH for future announcements.

# Improving the R. F. Amplifier

By Elmer E. Burns *

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

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

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

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

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

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

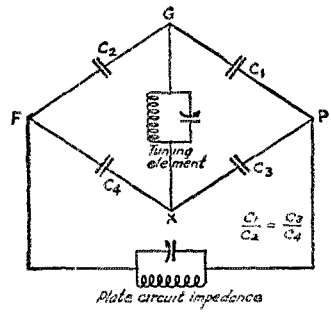



FIG. 1 PRACTICAL FORM OF ALL CONDENSER BRIDGE

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

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

Now for the objection that I expect to hear at once. The only possible return

*Physics Dept., Joseph Medill High School, Chicago.

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

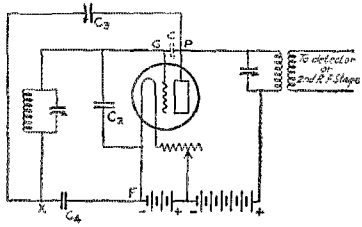



FIG. 2 ALL CONDENSER BRIDGE CIRCUIT

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

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

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

## Amateur Radio at Floyd Collins' Cave

AMATEUR RADIO played an important part in getting the news to a breathless public during those stirring days recently when the entire nation was watching the gallant fight being made in Kentucky to rescue Floyd Collins, entombed in Sand Cave.

Sand Cave is some miles from Cave City, Ky., the nearest telegraph point. Some form of communication between these points was necessary for the military authorities and the correspondents to have contact between the scene of operations and the outside world. This situation was met by an amateur station installed by Mr. H. E. Ogden, 9BRK of Jeffersonville, Ind., A.R.R.L. District Superintendent for District No. 3 of Indiana, and Mr. D. B. Rauth, operator of 9BRK and 9CHG. The Sutcliffe Company of Louisville, Ky., furnished equipment, and a transmitter was installed in a tent which housed the small lighting plant, right at the entrance to the rescue shaft which was being sunk. With the permission of Supervisor Beane, the call 9BRK was used. The receiving set at Cave City was a Crosley-52 receiver equipped with dry-cell tubes. Ogden operated the transmitter and Rauth the receiver. Rauth had access to long distance telephone and direct telegraph connections to Louisville, so that news on important events occurring at the cave was in the press-rooms of papers all over the country a few minutes after the press reports were handed to the transmitting

**9BRK AT SAND CAVE, KY., showing the hurriedly arranged 10-watt. transmitter supplied by dry batteries.**

operator in the tent. The transmitter used two 5-watters in a Hartley circuit, supplied with 500 volts from Burgess "B" batteries. An antenna current of 1¼ amps. was secured in a 60-foot 1-wire aerial.

During the climax of Sand Cave developments these two amateur operators maintained a continuous watch for four days without sleep, as there were no other operators available. All credit to them! It is jobs like these that emphasize the value of amateur radio.

—*K. B. W.*

# Experimenters Section Report

## Important Announcement—Centimeter Wavelengths

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

We now need information as to the way of "getting down" to ¾ of a meter. A scheme tried at 1XAQ has been to operate an oscillator at a higher wave and amplify one of its harmonics; this has not been a complete success by any means but can be done. The use of a Hertzian oscillator with spark excitation will occur to everyone and this sort of set is discussed in Fleming's various books.

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

### Our Regular Work

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

### The 5 Meter Set at 9ZT

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

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

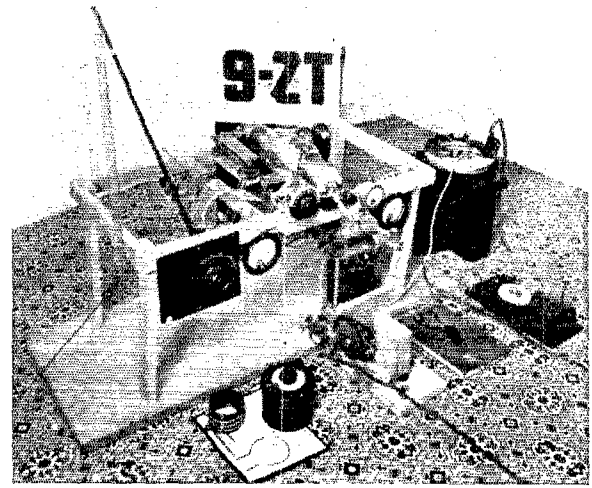
Proceeding on that basis our friend Don. Wallace of 9ZT has just installed a 5-meter set with 1000 watts input. This set operates with an automatic key each day from 7 to 7.45 A. M. and from 6.15 to 7 P. M., Central Standard Time. The set also runs for considerable periods on Sundays. Right now (April 2nd) it is at the upper edge of the 5-meter band but it will be dropped a bit later. The Omnigraph is run at slow speed during the sending periods and sends continuously "V Pse QSL TEST U 9XAX 9XAX 9XAX."

### The Details

Wallace writes as follows:

"The entire set is independent of all other apparatus and the regular 20, 40, 80 meter set is worked nightly with more hours of operation than ever before. The 5-meter set jams other operation and everything can't be run at once as had been hoped. The superheterodyne receiver used for BCL work objects to the 5-meter set altho it gets along beautifully with the 40 and 80 meter bands. How cum?

"The layout is in the usual 9ZT 'haywire'




THE 1-KILOWATT 5-METER SET

**At the front of the photo, from left to right, we have the wave-meter, 4-minute hurry-up clockwork key, the hand key, the Omnigraph now being used. To the right of the set is the plate supply transformer. On the "lower deck" of the set is the filament transformer, alongside of which are two control switches and a rheostat. On the front strip of the frame we have from left to right, the antenna series condenser, antenna meter, grid condenser, filament end of tube (showing bypass condensers and grid choke), then the grid milliammeter and filament voltmeter.**

**The copper-sheet plate condenser is on the upper deck alongside the plate end of the tube. The plate glass trip parallel to the tube carries the primary and secondary inductances while the counterpoise series condenser is seen under the end of the plate glass strip.**

**The copper-tube antenna and one-wire counterpoise are seen at the left.**

style with lots of air circulation and lots of input. Am sorry did not wait one day more

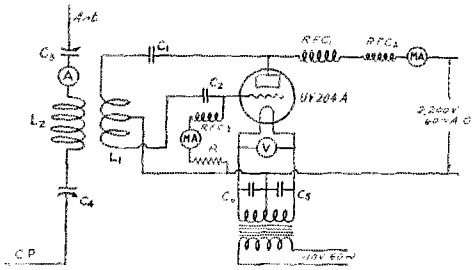
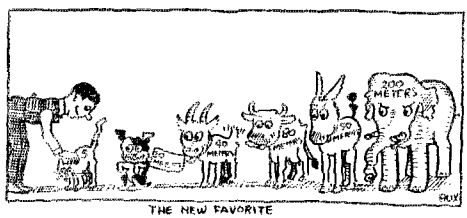



**DIAGRAM OF THE LOOSE-COUPLED HARTLEY-CIRCUIT TRANSMITTER**

**C1—2 copper plates, see photo.**
**C2—Bremer-Tully "7 plate" condenser set almost at zero, capacity probably about 30 micro-microfarads.**
**C3—500 micro-microfarad receiving condenser (make unknown) set near zero.**
**C4—National 250 micro-microfarad condenser set near zero, capacity near 30 micro-microfarads.**
**C5 and C6—Filament bypass condensers, any capacity above 500 micro-microfarads will do.**
**L1—Two-turn primary of No. 14 wire, diameter 4".**
**L2—Four-turn secondary, 5" diameter, No. 10 wire.**
**RFC1—Radio freq. choke wound on 1" tube with turns spaced by thread.**
**RFC2 and RFC3—Radio freq. chokes wound on a pencil and then stripped off.**
**Ant.—Antenna of copper tubing, 8' long.**
**C.P.—Counterpoise of No. 10 copper wire, 5' long.**
**The receiving variable condensers were used because they were handy. The capacities are far too large and it would be possible to replace each of them with a simple condenser such as the one used for the plate, stopping condenser. These might not be as handy to adjust however.**

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

"The Wavemeter is self-explanatory. Reinartz's *QST* article carried out further and re-checked at 15 meters at the University of Minnesota. It goes to 4 meters with the ¾ turn coil shown on the condenser.



THE NEW FAVORITE

"The clockwork (at the center of the foto) served as the original automatic key, sending "u 9XAX" lickety split. It ran 4 minutes at a time and served to give me a start. The Omnigraph runs longer and therefore is much better. Am making a keying relay as the set can't be hand-keyed—it stops oscillating when I get within 5 feet of it. Believe I will use a ground connection to steady it in this regard. Putting the wire in BX helped somewhat.

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

"The plate millammeter is hidden by the tube but the rest of the meters can be seen in the photo. Normal operation is with plate current of 400-500 mills at 2200 to 2000 volts (1000 watts input), filament voltage 11, grid current 35-40 mills. The Bremer-Tully condenser (used in the grid circuit) has been replaced by a copper-sheet condenser like the one in the plate circuit but with thumb-nut adjustment. The spacing of the plate condenser is ⅜". The ½ ampere plate fuse blew once when the brush at the plate condenser developed into an arc.

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

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According to *Amateur Radio* of February the General Radio superhet was "introduced for the first time" at the recent get-together held by the second district council at Newark on Jan. 24th.

Sfunni—scores of these same sets have been built from the description printed in *QST* on pages 13, 14, 15 and 16 of our issue for August, 1924.

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

# At Last!

FOR about two years we have been struggling with various insurance companies, local inspectors and with the Underwriters Laboratory at Chicago trying to get some kind of a satisfactory explanation as to the insurance companies' requirements of radio transmitting stations. We had gotten the impression that nobody in the insurance game understood the thing.

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

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

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

Editor, *QST:*

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

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

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

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

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

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

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

There are some states that have incorporated the National Electrical Code into the Statutes and the enforcement of the rules are brought about by State Inspectors.

There are also numerous cities and municipalities in the United States that have passed ordinances providing that all electrical wiring in such cities shall be made in accordance with the National Electrical Code, or their own codes (which are in almost every case more strict than the National Electrical Code) and employ a City Electrical inspector to enforce the ordinance.

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

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

The following cities have adopted wiring codes of their own and, therefore, installations in these cities should be made in accordance with their special rules, New York City, Chicago, St. Louis, Denver, Portland, Ore., Memphis, Tenn., Macon, Georgia, Kansas City, Mo., Jamestown, N. Y., Newark, N. J., Camden, N. J., Sioux City, Iowa, San Diego, Cal., Little Rock, Ark., Hot Springs, Ark., San Francisco, Cal., Gary, Ind., Atlanta, Ga., New Haven, Conn., Chattanooga, Tenn., Madison, Wis., Wilkes Barre, Pa., Moline, Ill., Rock Island, Ill., Peoria, Ill., Detroit, Mich., and Louisville, Ky. (There may be some others that have been added to this list since this information was secured by the writer.) Where the enforcement of standards for electrical installations is not under the supervision of a State or City Inspector the inspection may be made by the Insurance interests through

their Rating Organizations or Inspection Bureaus. These Organizations cover the entire United States each having its own particular territory. I will not endeavor to list them, however your insurance Agent can advise you in whose territory you are located and you can then communicate with the proper authority.

If a member will confer with the Inspection Department before making an installation or an extensive change he may save himself considerable inconvenience and possibly added expense. All Inspection Departments are glad to furnish you with the necessary information and to co-operate with you in protecting your own interests and incidently that of your town, city, or state from a fire protection standpoint.

Trusting that this information will be of service, I remain

Yours very truly,
—*Harold N. Pember, Ex. 1VY*

## Schnell Sails on NRRL

BY the time this is printed our A.R.R.L. Tra c Manager will be somewhere in the vicinity of Hawaii with the Fleet on its summer cruise, as was outlined in last *QST*. As we go to press the Fleet is shoving off from San Francisco, and for six months there will be a short-wave ham station cruising the entire width of the Pacific, operated by one of our own gang, Lt. Schnell, and having lots of amateur communication as its only purpose. The main set will operate on about 54 and about 27 meters, but there will be other transmitters on the regular amateur bands as well. No schedules have been announced; "FS" will be "on" during most of his waking hours. Just keep a watch for the call NRRL. And see last *QST* for dope on the reports that are desired to go to Bellevue with copy to A.R.R.L. Hq.

## Why the Inspection Service Is Short of Funds

FROM time immemorial Congress has failed to give the Bureau of Navigation an appropriation adequate to employ sufficient inspectors to do a good job of administering the radio law. Since the advent of broadcasting the situation has become increasingly critical. This year it has been desperate. As a result, the Bureau of the Budget sent a request to Congress that an additional sum of $125,000 be granted for this purpose in the Emergency Appropriation Bill, and the subject had the personal endorsement of President Coolidge and Secretary Hoover. When this was asked by the President and the Director of the Budget, in spite of the Administration's program of economy, its importance is indicated. But they did not get the money! The House appropriations committee threw out the item, the Senate restored it, and the Conference Committee again deleted it; and in the necessity for getting the remainder of the bill through Congress before adjournment it was lost.

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

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

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

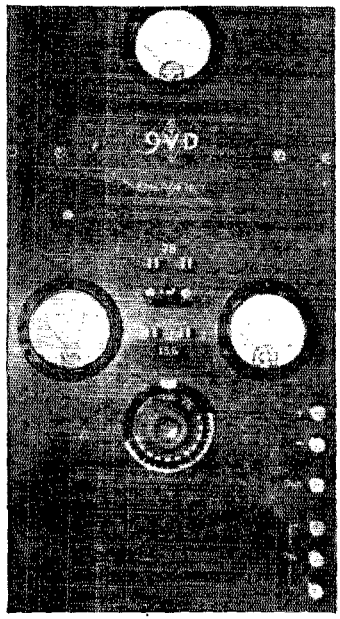
KDKA broadcasts NAA time signals on its 65 meter wave.

# Emergency Power Supply

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

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

The Burgess Battery Company has recently been considering this matter with a



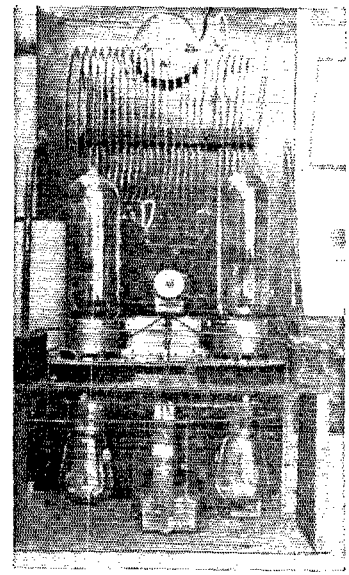

view to operating transmitters from banks of dry-cell "B" batteries, and is now cooperating with a number of amateur emergency stations in the Middle West to test the practicability of the idea. Officials of the League's Traffic Department in several States between Minnesota and Ohio were asked to recommend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

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

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

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

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



gency power supply, the 50-watters are taken out of the sockets and the five-watters put in.

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

—*A. L. B.*

# A Constant Current Amplifier

By John R. Meagher

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

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

In the new form of amplifier the plate-filament resistance of a vacuum tube is substituted for the impedance R. This is shown in Figure 3, and again in simpler form in Figure 4. The idea is that T and R should be tubes having the same characteristics and adjusted to similar operating

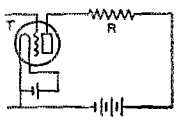



FIG. 1

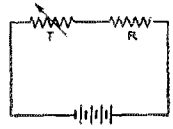



FIG. 2

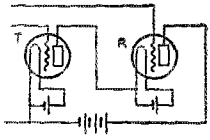



FIG. 3

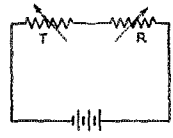



FIG. 4

points, so that T will equal R for equal values of grid voltage. Then if the grid voltages are changed equally but in opposite phase the resistance of one plate-filament path will increase as the other decreases and vice versa. The total resistance will remain constant, and so naturally the current through the circuit will remain steady. But the voltage across the resistances will

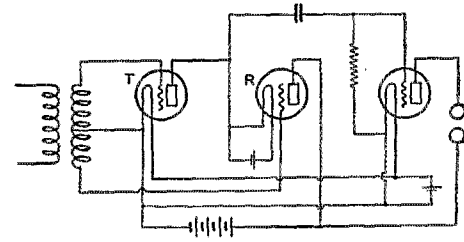
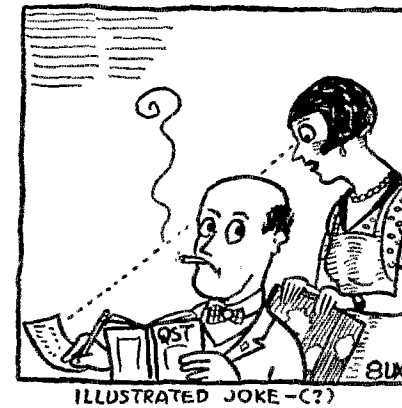



FIG. 5

vary. The effect being similar to that produced by swinging the slider of a potentiometer from side to side; the voltage across the slider and any fixed point in the potentiometer circuit will vary as the slider is moved even though the current through the potentiometer resistance remains constant.

An application of the circuit is shown in Figure 5.




ILLUSTRATED JOKE-(?)

WIFEY: NOW BEFORE YOU GO AND DO A LOT OF FIGURING ON HOW MUCH YOU COULD BUILD A NEW SHORT WAVE SET FOR JUST FIGURE HOW YOU CAN GET ME A NEW DINNER GOWN, TWO NEW HATS, A PAIR OF SHOES, A PAIR OF GLOVES AND SOME NEW LENOLEUM FOR THE KITCHEN!

HUBBY: ER-YES DEAR.

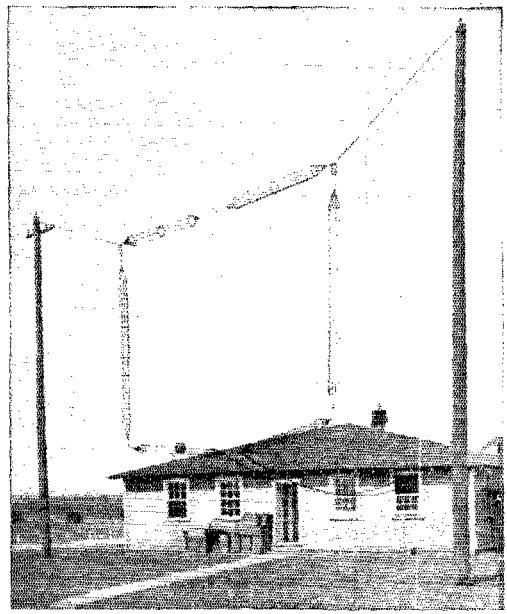
[1] That is to say, rather more than is obtained from a resistance-coupled amplifier. A little thought will show that the Meagher amplifier should stand between the transformer-coupling and the resistance-coupling with regard to the amount of amplification obtained, also that it is inherently likely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

# Top-Loading Antennas and Loops

By William H. Murphy*

IT is well known that the effective height of an antenna is increased by increasing the capacity of the antenna top.[1] The effective height increases because the current in the vertical part of the antenna is increased as shown in Figure 1. The effect at a distance is proportional to the shaded areas in Figure 1 so that it is evident that an improvement is obtained by adding (top) capacity.[2]

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



### Experiments with T Antenna

In August and September 1923 a further series of experiments was made with a T antenna 35 feet high with a span of 37 feet. This antenna was made up of cage sections used in previous work.[3] A fan-shaped counterpoise was used. The natural wavelength of this antenna system was 134 meters. The inductance was .08 millihenry and the capacity was .00015 microfarads. These values were measured at the fundamental wavelength. The first step was to obtain accurate antenna resistance data at various wavelengths and with different amounts of top and base loading in order that comparative tests could be made with constant antenna input power.[4]

A gradual reduction of antenna resistance and dielectric resistance was noted as the base loading was decreased and the top loading increased up to .05 millihenry. Further top loading again increased the resistance. The method of reception consisted of the use of a tuned loop placed 300 feet from the transmitter.[5] This loop was used in combination with a Ferron crystal and a Paul galvanometer. The received current was measured by means of this galvanometer. The results obtained in this test are given in table 1. It will be noted

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

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

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

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

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

[5] The reader will at once object that the distance is too short. However, this is *not* an oversight as will be explained later in the article.

that the best top-loading inductance was close to .05 millihenry. Also, that the efficiency obtained with the helix is greater than that with a group of spiral (pancake) coils. This was probably due to the lower

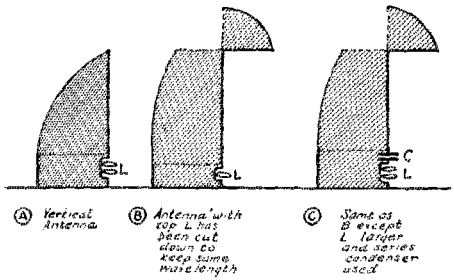



FIG. 1 CURRENT DISTRIBUTION

resultant dielectric loss of the single helical coil. The watts required to give equal deflection were determined by calculation from check curves and from actual tests, the results being given in table 2.

It was deemed of interest to obtain an approximation of the energy received at the different wavelengths in order that comparison could be made between the various degrees of top-loading. When the wavelength is the same, the antenna input power is the same and the only change is in the degree of top-loading and base-loading we can use received energy as a measure of the effectiveness of the sending antenna. The second part of table 2 contains this information while Figures 3 and 4 show the

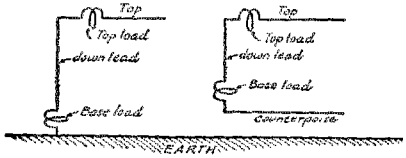



FIG. 2 TOPLOADING

effect at the receiver. Where received energy is mentioned this is done in arbitrary units although the values were obtained from the loop resistance and the square of the loop current.

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

## Experiments with Single Turn Sending Loop

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

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

| Top-loading Inductance in Millihenries | | Microamperes of Current in Receiving Loop. | | | | |
|---|---|---|---|---|---|---|
| | | Wavelength 170 meters | Wavelength 180 meters | Wavelength 200 meters | Wavelength 240 meters | Wavelength 280 meters |
| | | | 180 | | 240 | |
| 0 | | 93 | 90 | 84 | 71 | 60 |
| .022 | | 106 | 100 | 88 | 82 | 69 |
| .047 | spiral | 116 | 111 | 96 | 86 | 70 |
| .076 | | — | — | 84 | 72 | 66 |
| .050 | helix | 138 | 133 | 112 | 95 | 80 |

Table 1.

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

| Top-loading Inductance in Millihenries | | Watts to the sending Antenna | | | | |
|---|---|---|---|---|---|---|
| | | Wavelength 170 meters | Wavelength 180 meters | Wavelength 200 meters | Wavelength 240 meters | Wavelength 280 meters |
| 0 | | 50 | 50 | 50 | 50 | 50 |
| .022 | | 38.5 | 44.5 | 45.5 | 37 | 38 |
| .047 | spiral | 32. | 33 | 38.5 | 34 | 37 |
| .076 | | — | — | 50 | 48 | 41 |
| .050 | helix | 23 | 23 | 28 | 28 | 28 |
| Relative power received for above cases. (Arbitrary units, not watts) | | | | | | |
| | | 31 | 25 | 14.4 | 6 | 3.5 |
| | | 41 | 30 | 15.7 | 8 | 4.6 |
| | | 49 | 38 | 18.8 | 9 | 4.7 |
| | | — | — | 14.4 | 6.3 | 3.7 |
| | | 67 | 54 | 25 | 10.7 | 6.1 |

Table 2.

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

| Top-Loading at A & B in Millihenries | Microamperes in Receiving loop | | | |
|---|---|---|---|---|
| | Wavelength 140 meters | Wavelength 160 meters | Wavelength 180 meters | Wavelength 200 meters |
| 0 | 188 | 188 | 170 | 164 |
| .047 | 205 | 204 | 195 | 176 |
| .076 | — | 164 | 178 | 182 |
| .100 | — | — | 141 | 151 |
| .050 | 236 | 220 | 200 | 175 |

Table 3.

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

| Top-Loading at A & B in Millihenries | | Watts to the sending loop | | | |
|---|---|---|---|---|---|
| | | Wavelength 140 meters | Wavelength 160 meters | Wavelength 180 meters | Wavelength 200 meters |
| 0 | | 66 | 66 | 66 | 66 |
| .047 | | 56 | 56 | 50 | 57 |
| .076 | spiral | — | 86 | 61 | 54 |
| .100 | | — | — | 96 | 78 |
| .050 | helix | 42 | 49 | 48 | 58 |
| Relative power received for the above cases (Arbitrary units, not watts). | | | | | |
| | | 59 | 38 | 25 | 16 |
| | | 68 | 48 | 33 | 24 |
| | | — | 31 | 28 | 26 |
| | | — | 20 | 18 | 12 |
| | | 90 | 58 | 35 | 21 |

Table 4.

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

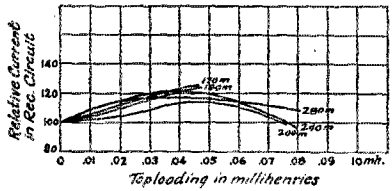



FIG. 3
"T" ANTENNA

### Resistance Measurements of Loop

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

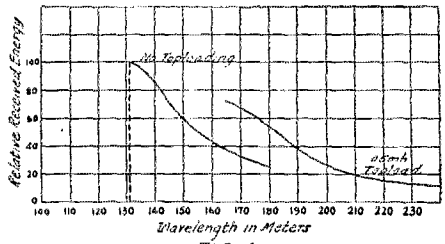



FIG. 4
"T" ANTENNA

and 230 meters) than with any other loading. This same loading of .05 millihenry was in later tests found to give the best results in actual transmission. In any case the radiation resistance increased with top-loading (and less base-loading) and this is due to an effective increase in the height of the antenna.

It was realized that accurate data on the best wavelength would be difficult to obtain as the reception factor of the receiving system would enter into such a determination.

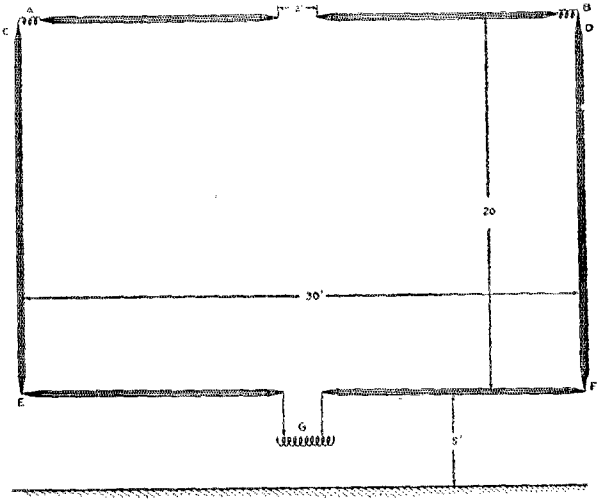



FIG. 5 SENDING LOOP

An approximate determination was made which will be described below.[6]

### Determination of Comparative Radiation Efficiency of Loop with Top-Loading and Without Top-Loading

The energy picked up by an antenna or a receiving loop (by radiation or induction)

[6]See note 5.

depends on the reception factor of this antenna or loop. When comparisons are being made at any given wavelength then this does not enter in and the relative results will be independent of the reception factor and will depend only on the relative amount of energy which is radiated or which is present in the electrostatic and electromagnetic fields of the sending antenna. Therefore, while the curves of received energy shown in this article can not be

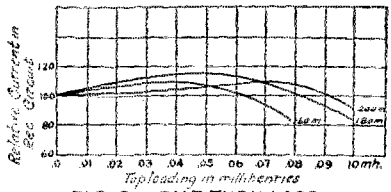



FIG. 6 ONE TURN LOOP

regarded as absolute they still show the relative performance satisfactorily. If one of these curves shows a greater height that curve is evidently obtained under a more favorable condition. By looking at Figures 4 and 7 it will be seen that the curves giving the results with a top-loading of .05 millihenry are entirely above the curves for the same antennas without top-loading. It was therefore only necessary to calibrate the measuring device in the receiving system for different multiples of a known antenna power in order to obtain accurate comparative data. A small vertical antenna was therefore set up at 2000 feet from the transmitting station.[4] A tuning set with a carborundum crystal detector and Paul galvanometer was then connected to this antenna and the deflections of the galvanometer noted to be proportional to the square root of the power in the sending antenna, in other words they were directly proportional to the sending antenna current. This confirms the statement that the power at the receiver was a true indication of the effectiveness with which the sending antenna was (at a given wavelength) using the power which was supplied to it by the sending set.

It was found that results obtained with a tuned loop in the induction field of the transmitting antenna gave similar results, the loop having a milliammeter inserted directly in its circuit. This greatly simplified the operation as no crystal adjustment had to be made and the results could be easily repeated on different occasions.[5] Data were obtained in this manner with 66 watts antenna input at various wavelengths and with spiral coils except in the case of the .05 millihenry coil which was helical. As has been stated the efficiency of this coil was greater because of the lower electrostatic losses obtained with it. The results of this investigation are shown in table 3, also in Figures 6 and 7.

[5]See note 5.

In order to indicate the relative amount of power required in the sending antenna to give the same effect at the receiver, further tests were made and these are listed in Table 4. More tests were made than are indicated but it is evident from those which are shown that .05 millihenry gave best results at 200 meters. The best top-loading inductance is a function of the wavelength and increases with the same.[7] In order to obtain an approximate knowledge of the relative results at different wavelengths and to determine which wavelength gave the greatest efficiency, careful measurements of the resistance of the receiving loop circuit were made at various wavelengths. The watts in the receiving loop were calculated for the various conditions given above and the results are presented in the second part of Table 4. These data again point out the best inductance for the wavelength in question and further point out that the greater increase in energy is obtained at 150 meters. Putting it differently this particular loop gains more advantage from top-loading at 150 meters than it would if we were working at a higher wavelength.

### Transmission Tests with Loop

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

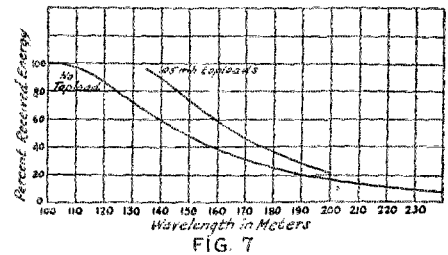



FIG. 7
ONE TURN LOOP

p. m. Eastern Standard Time on the 15th and 16th of May. When using 66 watts antenna input at 140 meters with 1CW transmission and a top-load of .05 millihenry 3APV reported perfect reception while 8XK reported signals audible all over the room with loudspeaker. Working with

[7] This is what one would expect. There will probably be a best ratio of top-loading against base-loading which will not change a great deal with wavelength. The two loads will both increase as the wave goes up.

the same power and wavelength but without any top-loading, 3APV reported the signals very weak while 8XK received none at all.

### Conclusion

This and similar tests indicated that the efficiency of the antennas used can be increased at wavelengths above the fundamental by proper top-loading. They further indicate that the greatest percentage increase can be expected from top-loading at a wavelength about 30% above the antenna system fundamental. No opportunity has been had to carry on tests of a similar nature with larger or smaller antennas but such tests would undoubtedly be of value in checking the above data and for adding information. No comparison has been made with antennas of the same sort but large enough so that their natural wavelength (unloaded) would come near that of our antennas when they were using top-loading only and no base-loading. Neither have any comparisons been made in which the antenna capacity had been increased in order to give such a natural wavelength. It is believed however that if certain limitations in height and span are necessary then top-loading will prove to be of considerable value.[5]

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

# BOOK REVIEWS

Henley's "Workable Radio Receivers" by John E. Anderson and Elmer H. Lewis. The Norman W. Henley Publishing Company, 2 West 45th Street, N. Y. Price $1.00.

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

The receivers throughout are sane in design and employ fundamental circuits, consistently avoiding the various insane modifications which so many people have been "inventing" simply to be different and not because there was any real virtue in them.

We do not know whose unhappy idea it was to label chapter 10 "The Ultimate Receiver", because this gives to the book a touch of hokum which the text matter does not deserve at all since it is perfectly good material. The "ultimate" receiver will never come until the end of radio development has been reached, in other words just when we are abandoning radio. All of which is parenthetical and is not supposed to detract from the fact that it is a good book showing good circuits for amateur work.

### The Myers Tube

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

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

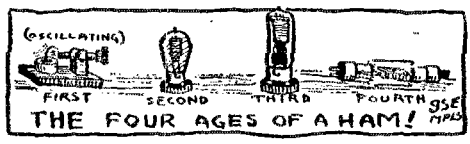
---

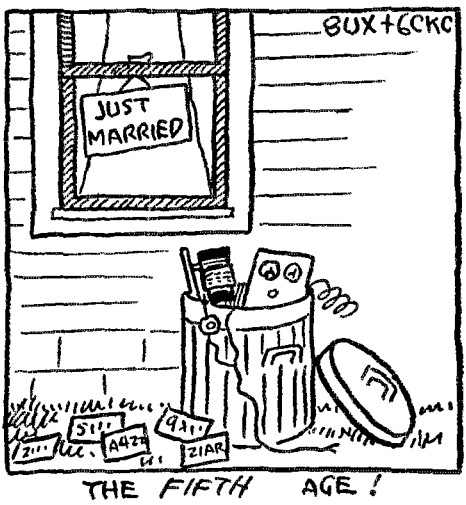
The short squib on page 42 of the Feb. *QST* calling attention to ice-cream containers was sent in by F. H. not S. H. Akers. Also, Mr. Akers says that these tubes contain considerable moisture in spite of being paraffined. They need to be baked and then recoated with paraffine before using.

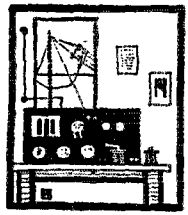
---

Here are some abbreviations that old-timers will remember:

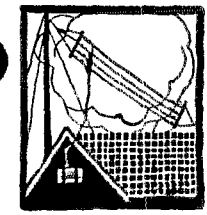
4—Please start me, where?
13—Understand?
25—Am busy now.
30—No more.
77—Message for you.
92—Delivered.
99—Keep out.



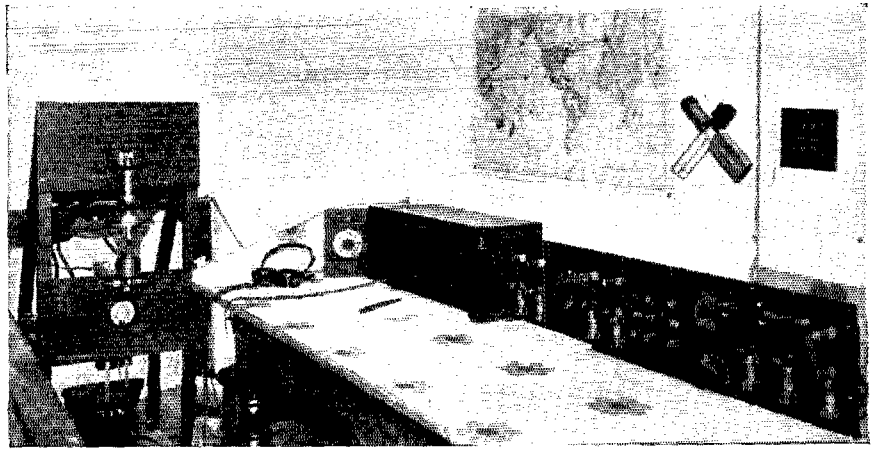





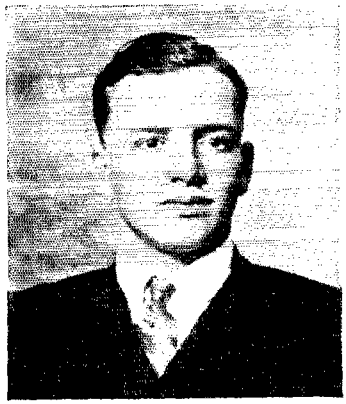
# Amateur Radio Stations



## 6AWT, Hoover Cup Winner 1924!



Bartholomew Molinari of San Francisco and 6AWT—he has made the call synonymous with the city—has achieved through his love for the game the distinction of be-



ing owner of the "Best All-around American Amateur Station." Don Wallace, 9ZT, winner of the 1923 cup, ran him a very close race.

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

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

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

### General Information

The station log dates back to Sept. 1922, and has been kept continuously to now. It is a loose-leaf affair with at least a page devoted to each day. All reports are checked against it before confirmation of reception is sent.

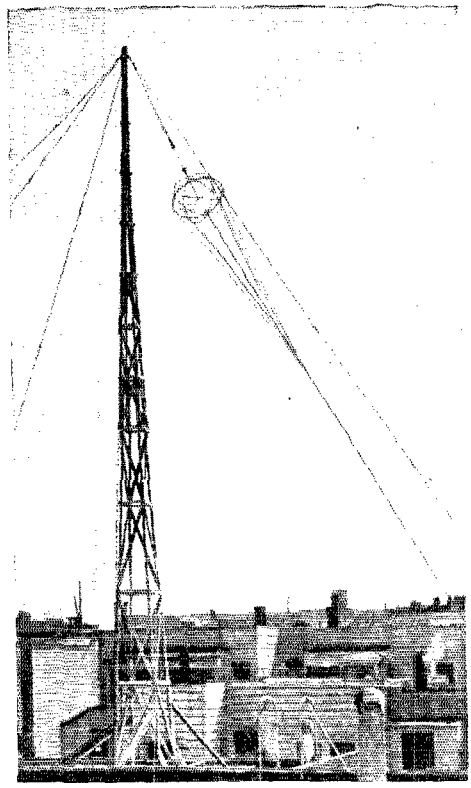
Messages are kept on A.R.R.L. message forms and each month are filed away regularly. Those addressed for within 300 miles of San Francisco are sent by mail, while city messages are delivered without delay. An average of 40 per month were handled during 1924. 6AWT holds an O. R. S. appointment.

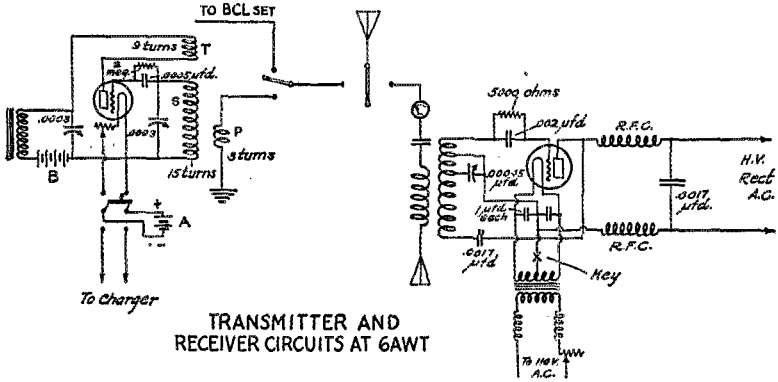
Though 6AWT is a one-man station, all cards are QSLed and will continue to be, even if a little late due to quantity. Cards are sent to those amateurs heard who are over 1000 miles from San Francisco.

### The Transmitter

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

The transmitter has a wooden frame. A single 250-watt tube is used in the inductively coupled Hartley circuit and is shunt fed. The tube is mounted so that the air can circulate freely about it. The inductances were made from ¼ by 1¼ Bakelite strips and 18 gauge, ½ inch wide brass ribbon. The primary has 8 turns and the secondary 4. Dead end is avoided because all of both coils is in use. The plate series condenser is mounted on the upper panel, making the plate lead very short, while the grid-condenser and leak are mounted on the lower panel, as is the filament voltmeter, so that the grid leak, too, is short. The filament by-pass condensers are mounted on the upper base board and are the proper size for the operating wavelength, having been adjusted thereto. These chokes consist of 100 turns of wire wound on three inch diameter tubing.






TRANSMITTER AND RECEIVER CIRCUITS AT 6AWT

The antenna ammeter and the series antenna condenser are mounted near to the antenna change-over switch. This series condenser is made of two 5" x 8" brass plates separated ¾" by Pyrex rods and so insulated.

The primary inductance is 17 inches maximum diameter and the outside turn is all that is included in the grid side. A Cardwell transmitting variable oendenser tunes the set being shunted across a single turn on the plate side of the filament return.

The high-voltage condensers, synchronous rectifier and power transformer are mounted next to the table.

Running normally with 3500 volts on the plate and a 750-watt input the antenna current is 5 amperes.

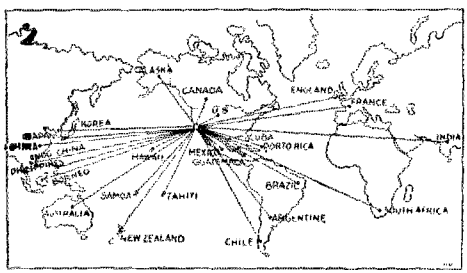
Nine months life has been obtained from a 250-watt tube. The tubes are hardened for regular use by starting at 3000 volts and adding 500 every week until 7000 is reached. Then the voltage is dropped to the operating potential.

### Power Supply

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

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

The plate voltage is supplied by a 3 k.v.a. pole transformer fed so that the maximum voltage obtainable is at 7000. A rheostat in the primary makes it possible to obtain




as low a potential as might be desirable. This transformer, too, is larger than needed, but it provides the convenience of being able to operate for hours with heating or danger of breakdown. 6AWT has not been known to go off the air because of transformer trouble.

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

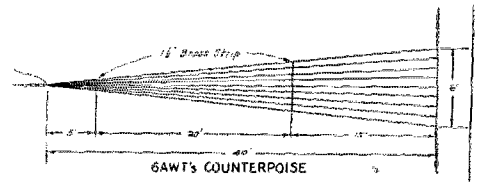
The high-voltage is rectified by a special Advance synchronous rectifier* that has a D.C. winding fed by the storage battery, which winding always makes the machine start right side up.

### The Receiver

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

### The Antenna System

The antenna is a semi-vertical, inverted cone cage with a cage ball in the top. The ball is illustrated rather well in the photographs. It is three feet in diameter and on

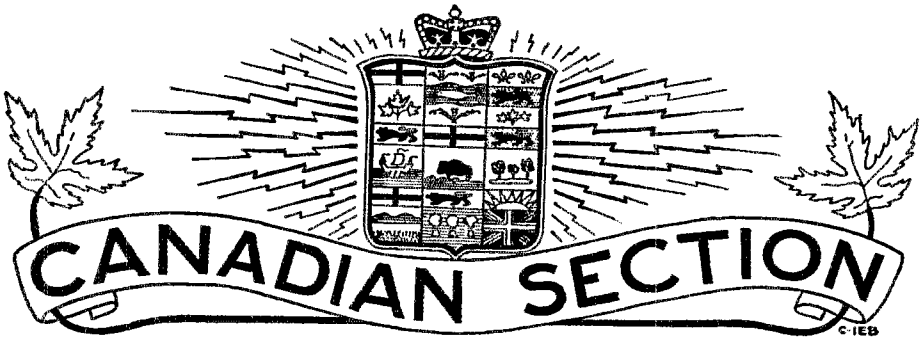



its equator the other wires terminate. From the tip of the cone to the top of the ball is a length of 15 feet: the antenna having a total length of 85 feet. Plain copper wire painted with asphaltum was used. The mast supporting this impressive aerial is 90 feet high. The idea, of course, in this construction of the antenna, was to obtain maximum top capacity.


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

*(Concluded on page 58)*

* It may seem peculiar to find fault with a star station, but even the best has flaws. We want to particularly advise against the use of a "synk" rectifier without filter as is 6AWT's practice. We'd go further and say not to use a "synk" rectifier at all.—Ed.




# c2CG's Capacity-Coupled Antenna

By J. V. Argyle*

STATION c2G is located in a bottom flat of a two-story house with no space behind it and with a grass plot in front, which cannot be covered with counterpoise wires. The antenna is supported by twenty-foot masts on the roof with a caged lead-in lead down to the cellar at the rear, the counterpoise being erected in the back yard between the clothesline poles.

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

The capacity coupling scheme in use here is as shown in the sketch, there being nothing original in the idea at any place in the circuit.[1]

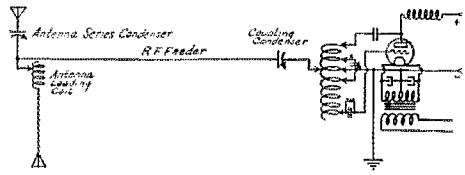
The driver is the usual straight Hartley circuit using parallel supply.

The antenna is coupled to this driver by capacity coupling, thus keeping losses to an absolute minimum.[2]

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

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

Since the antenna loading inductance, series condenser and antenna ammeter are all small, they can be built into a small box and connected to the antenna in a position where it would be impossible to locate the whole transmitter. The driver




can then be installed (as at 2CG) in the cellar or at any other place where a good ground connection can be made.

### Adjustment

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

Then adjust the plate tap of the driver so that the current circulating in the closed driver circuit is about as large as the

* J. V. Argyle, 493 Decarie Boulevard, Montreal, Quebec, Canada.

[1] As far as *QST* knows this scheme was originated by Frank Conrad, Asst. Chief Engineer of the Westinghouse Electric & Mfg. Co. The circuit was used at his station 8XK and described by V. D. and E. B. Landon on page 22 of *QST* for June, 1923.

[2] There is still a long lead but it operates a good power factor, therefore the current in it is small.

antenna current we would expect from the same set.[3]

Do not try to get a large current in the primary circuit, as this will only increase the heat losses. Keep the efficiency of the primary circuit high. Cut down the grid turns until the tube will not oscillate, then add one or two turns. Use only about 4-6 turns across the primary variable condenser, and be sure this condenser has reasonably low resistance.[4]

The current in the closed primary circuit should be equal to that which the set will put into the antenna when working somewhat above the fundamental wavelength of the antenna.[5]

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

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

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

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

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

The change to the system just described has raised the antenna current (at 85 meters) from .8 ampere to 1.3 ampere.[6]

The author will be glad to assist anyone who encounters trouble when utilizing this system.

[3] We are not sure of the author's meaning. Our guess is that he is measuring this current with an ammeter put at X, that is in series with the closed-circuit tuning condenser.

[4] Never use a mica-and-mercury variable condenser.

[5] Suppose that the antenna has a fundamental wavelength of 170 or 180 or 190 meters. Suppose that we have a set able to put into this antenna a current of 2 amperes at 200 meters. The circulating current in the primary should be set to this value, even tho we are intending to work at 70-80 meters.

[6] The primary tuning condenser at 2CG is one having a maximum capacity of 250 micro-microfarads. The inductance is made of No. 12 bare copper wire wound to a diameter of 5" and spaced ½". 5 or 6 turns are used between the clips connected to the condenser. This is at 85 meters.

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

## STATION DESCRIPTIONS

*(Continued from page 56)*

antenna.

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

### To Note

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

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

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

In the "Super DX" article in Jan. *QST* we stated that 3BWT worked CB8 on Nov. 30th. This should have mentioned 3BWJ as the station doing this. Darned sorry, OM.

# Calls Heard


**Frederick Thompson, g2AWK, 16, Stratford Grove, Heaton, Newcastle-upon-Tyne, England.**

1aid, 1alk, 1ary, 1atj, 1aww, 1axb, 1bdx, 1bes, 1bgd, 1bgq, 1bkr, 1blx, 1bv, 1cak, 1cmp, 1cru, 1dd, 1fd, 1fl, 1fp, 1gs, 1ii, 1kc, 1my, 1mw, 1pl, 1sf, 1sz, 1wl, 1xu, 1xz, 1ze, 1zt, 2ag, 2anm, 2aqq, 2ax, 2axf, 2azy, 2bq, 2bqh, 2bqu, 2br, 2brc, 2bum, 2buy, 2bw, 2by, 2cd, 2ce, 2cee, 2eu, 2evf, 2evj, 2wiu, 2exy, 2eym, 2ezr, 2dd, 2gk, 2ku, 2tp, 2tzy, 2zb, 3ab, 3ach, 3adb, 3bco, 3buy, 3bw, 3cc, 3cdg, 3chg, 3hs, 3mf, 3oq, 4bq, 4gw, 4sa, 4xe, 8adg, 8aly, 8aud, 8aul, nerk1, nsf, wgh, wgy, wjs, Canadian 1af, 1ar, 1eb.

**2ZB, L. F. Aldous, 48, Harpenden Road, London, S. E. 27, England.**

1 apb, 1 air, 1ajg, 1ajo, 1ajy, 1ams, 1apk, 1as, 1atq, 1awy, 1axn, 1azr, 1bkr, 1blu, 1bqk, 1cit, 1cx, 1js. 1pe, 1rr, 1sf, 1sk, 1te, 1wy, 1yd, 2abd, 2af, 2ale, 2ate, 2axf, 2bck, 2bgi, 2blm, 2xbb, 3as, 3eh, 3hs, 3jo, 3ju, 3jw, 3mh, 3oe, 3sm, 4bq, 4fz, 4gw, 4ig, 4ku, 4oa, 4tv, 5aax, 5ea, 8abm, 8abs, 8acy, 8agp, 8amr, 8baj, 8bbw, 8bcp, 8ben, 8blf, 8bzf, 8ef, 8es, 8jj, 8xaf, 9aen, 9bbj, 9hw, 9lz, Canadian 1ei, 1bq, 2fo.

**T. W. Higgs, g5KO, 24 Leazes Terrace, Newcastle-on-Tyne, England.**

1aaj, 1abp, 1alk, 1aqm, 1ary, 1asu, 1atj, 1awy, 1axa, 1bes, 1bfj, 1bhm, 1bko, 1bkr, 1bzp, 1cpc, 1cri, 1da, 1er, 1fd, 1ga, 1ii, 1kx, 1pl, 1sw, 1zs, 2bck, 2bkl, 2bm, 2box, 2cbg, 2cee, 2cj, 2cla, 2cpk, 2cvj, 2cxy, 2mk, 2pd, 2pk, 3brj, 3chg, 3go, 3hg, 3hj, 3lw, 3tj, 3xx, 4du, 4eg, 4jr, 4jy, 4sa, 4tv, 4xe, 5ahj, 5uk, 8bth, 8nz, 9aio, 9auc, 9bwu, 9csg, 9dmj, 9eji, nkf, kdka.

**Roy W. Galpin, g5NF, Bank House, Herne Bay, England.**

1aap, 1af, 1aid, 1ajx, 1ary, 1atj, 1auc, 1ayi, 1bbr, 1bcr, 1bhm, 1bjl, 1bkq, 1bsd, 1bwx, 1cak, 1cc, 1ccx, 1ckp, 1cmp, 1cx, 1er, 1fd, 1gs, 1hn, 1lw, 1my, 1pl, 1rb, 1rd, 1sw, 1xz, 1xu, 1yb, 1ze, 2abt, 2ag, 2al, 2anm, 2bqa, 2bqh, 2br, 2brb, 2by, 2cla, 2cjb, 2cbg, 2cee, 2cpd, 2cqo, 2evf, 2evj, 2cx, 2cxy, 2eb, 2gk, 2kx, 2rk, 2rm, 3apv, 3edv, 3cjn, 3hh, 3mf, 3ot, 4do, 4fz, 4kl, 4jr, 4sa, 4sb, 8acx, 8am, 8avd, 8avl, 8bcp, 8cwu, 8dme, 8doo, 8fm, 8tk, 8vq; Canadian, 1bq, 1dd, 1dq, 9ai; Australian, 2ds, 3bq; Argentine, cb8, 1px; Brazilian, wjs; African, ain; Iraq, ghh, ghh1.

**A. G. Wood, g5RZ, 93, Upper Tulse Hill, London, S. W. 2, England.**

1aea, 1af, 1anr, 1apk, 1arm, 1ary, 1awv, 1axz, 1bal, 1bbe, 1bcr, 1bdx, 1bes, 1bip, 1bkr, 1blx, 1bv, 1cak, 1cbg, 1cme, 1ckp, 1dd, 1fd, 1fp, 1ga, 1iry, 1lw, 1ml, 1ow, 1wl, 1wy, 1yb, 2ag, 2agw, 2bgi, 2bgs, 2blm, 2bmn, 2box, 2bqu, 2brc, 2bsc, 2bum, 2bw, 2by, 2cee, 2cei, 2cev, 2cjb, 2cjp, 2cla, 2cty, 2em, 2gbi, 2hq, 2jj, 2la, 2ld, 2le, 2rk, 2zb, 3ab, 3abq, 3adb, 3adq, 3aha, 3bmt, 3bng, 3bwt, 3cb, 3cbl, 3cc, 3cf, 3chg, 3cjn, 3hg, 3jo, 3mb, 3mbi, 3mf, 3oq, 4bq, 4eq, 4gw, 4iz, 4je, 4jn, 4jr, 4mb, 4xe, 5lu, 8adg, 8bww, 8uf, 8xb, 9ch, wsj, ub, nerk1.

**L. H. Thomas, g6QB, 33 Harpenden Rd, W. Norwood, London, S. E. 27, England.**

1aay, 1abp, 1abx, 1adn, 1af, 1afn, 1ags, 1all, 1asy, 1auc, 1avf, 1axz, 1bbe, 1bbx, 1beq, 1bcu, 1bep, 1bkr, 1bnc, 1boa, 1bpb, 1bv, 1bx, 1bzp, 1ca, 1cmi, 1cmx, 1cpc, 1cpv, 1cqm, 1da, 1ez, 1gs, 1qe, 1ra, 1rd, 1rr, 1uw, 1vd, 1wl, 1wy, 1xq, 1za, 2abf, 2ad, 2adx, 2ajq, 2aoy, 2avg, 2axf, 2bee, 2bgi, 2bi, 2bqb, 2bqc, 2brc, 2byw, 2bw, 2cee, 2cei, 2cgb, 2cgi, 2cjx, 2clg, 2cnk, 2cpa, 2cpd, 2cqo, 2cqu, 2ctt, 2ctx, 2cxw, 2cym, 2cyq, 2cyx, 2fb, 2kl, 2kx, 2mc, 2rk, 2ub, 2zl, 3adp, 3aew, 3aih, 3apv, 3awa, 3bau, 3bay, 3bdi, 3bei, 3bgi, 3bhv, 3bjp, 3bpp, 3bnu, 3bss, 3bva, 3cbp, 3cdv, 3chg, 3cis, 3ckj, 3ckl, 3hh, 3hj, 3mf, 3mv, 3oe, 3qt, 3rr, 3sd, 3sj, 3sm, 3wx, 4af, 4aw, 4bq, 4du, 4fm, 4gd, 4kk, 4kl, 4tw, 5asu, 5asz. 5ca, 5ka, 5ov, 5rh, 5se, 6bdx, 6bjj, 6zp (?), 8aal, 8abm, 8abs, 8acm, 8ajn, 8alf, 8ame, 8anb, 8apr, 8atr, 8bbw, 8bcg, 8bch, 8bdf, 8bfe, 8blc, 8byn, 8cdk, 8ces, 8cyd, 8dal, 8dcb, 8dgv, 8dme, 8dmp, 8dnf, 8ef, 8fm, 8iq, 8kc, 8mm, 8on, 8pt, 8rv, 8tr, 8uf, 8xb, 8xe, 8xk, 9aio, 9azj, 9bpb, 9blp, 9bpy, 9ejc, 9cui, 9cuo, 9dmj, 9dmx, 9efz, 9eji, nerk1, e2hv, e3nf, m1b.

**g6UV, G. L. Morrow, Pen Olver, Berkhamsted, Herte, England.**

1aap, 1aia, 1alk, 1arp, 1atj, 1bes, 1bcs, 1bdr, 1bdx, 1bgg, 1bhm, 1bjf, 1bl, 1bpp, 1bsd, 1bub, 1buy, 1by, 1bzp, 1emp, 1cre, 1cri, 1cru, 1cvj, 1cxy, 1fd, 1gb, 1ii, 1hb, 1kl, 1na, 1rd, 1sw, 1ya, 1yb, 1yo, 2aar, 2ag, 2bgi, 2by, 2cbg, 2cee, 2cep, 2cjb, 2cpo, 2cub, 2cxw, 2eg, 2eq, 2fm, 2xq, 2xy, 3ahp, 3adg, 3bco, 3bg, 3bns, 3bnu, 3cbl, 3ccv, *3cdv*, 3chg, 3csr, 3mf, 3og, 3oq, 3rw, 3vw, 4au, 4bn, 4cb, 4ch, 4jr, 5xh, 8bau, 8bep, 8ben, 8bhu, 8cdi, 8lmt, 8uf, 9bhx.

**G. Perroux, f8BV, 96 Boulevard Montparnasse, Paris**

1aac, 1aaj, 1aap, 1aay, 1aea, 1aed, 1afl, 1ahf, 1aid, 1aja, 1ajg, 1ajj, 1aki, 1alk, 1air, 1ana, 1anr, 1are, 1atj, 1ats, 1at, 1auc, 1aus, 1awj, 1aww, 1bbe, 1bcc, 1bcr, 1bda, 1bdx, 1bgi, 1bgq, 1boa, 1boe, 1bsd, 1bvb, 1bvl, 1bv, 1bzp, 1bz, 1caz, 1chk, 1ci, 1ckp, 1cme, 1cm, 1cmp, 1cri, 1cru, 1ctb, 1cvf, 1da, 1dl, 1ef, 1fg, 1ii, 1if, 1kc, 1kcm, 1kmw, 1ld, 1lw, 1my, 1nd, 1ok, 1pl, 1pr, 1py, 1ra, 1sw, 1tad, 1vk, 1vj, 1war, 1wl, 1wwt, 1xam, 1xaw, 1xcr, 1xu, 1xw, 1yb, 1yd, 1yp, 1zab, 1ze, 1zg, 1zs, 1zt, 1zx, 2aan, 2ad, 2adj, 2agb, 2ag, 2agi, 2bcu, 2beg, 2brr, 2bgg, 2bgi, 2bku, 2blm, 2bm, 2bn, 2bq, 2bqu, 2brb, 2br, 2bsf, 2bst, 2bw, 2by, 2cda, 2cee, 2cgb, 2cjx, 2cn, 2eqo, 2eth, 2cty, 2evf, 2evj, 2evs, 2evu, 2eyw, 2ge, 2gk, 2eq, 2lcq, 2mk, 2wa, 2wb, 2tp, 3ab, 3abq, 3abw, 3ad, 3ahp, 3aih, 3ajd, 3apy, 3auu, 3bco, 3bd, 3bdu, 3bg, 3bhu, 3bjp, 3bof, 3bmm, 3bq, 3bqr, 3bre, 3bss, 3bta, 3btu, 3buy, 3bva, 3bvs, 3ca, 3cbl, 3cbs, 3ccu, 3cew, 3cf, 3chc, 3chg, 3chq, 3fy, 3hg, 3hh, 3hj, 3hq, 3hs, 3io, 3jh, 3hq, 3lg, 3mf, 3ncc, 3oe, 3oq, 3ot, 3vs, 3ta, 3tf, 3tuw, 3xnt, 3xh, 4as, 4at, 4bc, 4cp, 4eb, 4eq, 4er, 4fm, 4gm, 4gw, 4je, 4jr, 4mb, 4ns, 4ok, 4qv, 4sa, 4sh, 4si, 4sx, 4uk, 4xe, 5ac, 5apy, 5ap, 5aue, 5nj, 5se, 5uk, 5vn, 6ceu, 6qi, 6xa, 7ajy, 7bn, 7bg, 8acm, 8add, 8adg, 8adt, 8agp, 8alc, 8aly, 8aul, 8bau, 8be, 8bmr, 8bkf, 8bkh, 8bga, 8bvd, 8ced, 8cpy, 8cse, 8dac, 8dgt, 8die, 8dme, 8due, 8kc, 8kw, 8lw, 8ly, 8nap, 8ol, 8pl, 8ry, 8rqz, 8uf, 8xk, 8ztg, 9aad. 9ado, 9axx, 9bht, 9ccj, 9cip, 9ckb, 9ckw, 9cix, 9cnd, 9cpi, 9csn, 9dar, 9diw, 9dlw, 9dmj, 9dwx, 9dyz, 9ehp, 9fj, 9hn, 9zw, 9zy; Canadian, 1af, 1ar, 1gu; Mexican, bx; Argentine, cb8.

**f8DE, E. L. LeBlanc, 87 rue Reinard, Marseilles, France.**

1af, 1air, 1alk, 1ams. 1bdx, 1bes, 1bhm, 1brc, 1bv, 1bzp, 1ccx, 1ckp, 1czr, 1dd, 1gs, 1pl, 1rr, 1se, 1sw, 1xz, 2aay, 2ag, 2auy, 2bco, 2bgi, 2by, 2cbg, 2cpd, 2evf, 2evj, 2eb, 2sz, 3bg, 3btq, 3bwt, 3cc, 3chg, 3cjn, 3ot, 3sg, 4bq, 4sa, 4tj, 8adg, 8aly, 8ced, 8xe.

**F. Hueber, f8DP, 40 Boulevard du Roi, Versailles, France.**

1af, 1alk, 1apc, 1ary, 1bcf, 1bdx, 1bep, 1bes, 1bgq, 1bhm, 1boa, 1bqd, 1cab, 1cak, 1cmp, 1cns, 1da, 1er,

1gs, 1iv, 1kc, 1nd, 1pl, 1py, 1rd, 1se, 2adm, 2ajp, 2amo, 2ana, 2axf, 2blm, 2bsc, 2buy, 2by, 2cla, 2cns, 2cvf, 2cu, 2eb, 2gk, 2kx, 2rk, 2sz, 2tp, 3ach, 3adq, 3apv, 3avk, 3chg, 3hh, 3hs, 3lw, 3mf, 3ot, 4fg, *4fz*, 4io, 4kl, 4ku, 4oa, 5lu, 8aul, 8bau, 8bch, 8bit, 8bk, 8bt, 8cyd, 8dfk, 8er, 8jq, 8tt, 8vq, 8coc, 9vc, wiz, c2cg.

### b4ALS, Louvain, Belgium.

1aao, 1af, 1afp, 1are, 1auk, 1awy, 1bc, 1bk, 1bpb, 1chg, 1cmp, 1cre, 1er, 1dd, 1ga, 1pl, 1my, 1nd, 1xam, 1wr, 2af, 2agb, 2ajp, 2ale, 2ana, 2azy, 2blm, 2bm, 2bq, 2br, 2buy, 2bw, 2cla, 2cgb, 2cvj, 2cxy, 2dfg, 2xi, 3beo, 3blp, 3chg, 3cjn, 3lp, 3mf, 3mv, 3ot, 3rk, 4du, 4id, 4kk, 5hl, 5ox, 5uv, 5uq, 6edn, 8alq, 8aul, 8ccq, 8cjg, 8dcb, 8dgl, 8pk, 9bdu, 9eld.

### J. Rocha Saraiva, Macao, China.

3xi, 5sd, 6afg, 6agk, 6ase, 6at, 6bkl. 6bpf, 6ccy, 6ctc, 6cgw, 6enl, 6eqo, 6ew, 7lr, 9bhi.

### n-PCTT, R. Tappenbeck, Villa Margaretha, Noordwijk aan Zee, Holland.

1aaj, 1aao, 1aar, 1acf, 1ad, 1aer, 1af, 1agk, 1ajg, 1ajy, 1alk, 1amf, 1ana, 1anh, 1ary, 1at, 1atj, 1aur, 1av, 1avj, 1avx, 1axn, 1ayn, 1bal, 1bcr, 1bdx, 1bes, 1bf, 1bgp, 1bhm, 1bi, 1bkr, 1blx, 1bpb, 1bv, 1bvl, 1bwj, 1bwx, 1bzp, 1cab, 1cer, 1ccx, 1ckp, 1cpv, 1cre, 1cru, 1cu, 1da, 1dl, 1er, 1fd, 1fn, 1gs, 1ii, 1kx, 1my, 1nw, 1pl, 1rd, 1sf, 1sw, 1vj, 1wl, 1xam, 1xu, 1xnl, 1yd, 1yz, 1za, 1ze, 2aay, 2ad, 2ag, 2auf, 2awf, 2bco, 2btb, 2bgg, 2bqa, 2bqu, 2brb, 2brc, 2bsc, 2buy, 2bw, 2by, 2cc, 2cee, 2cgb, 2cjb, 2cjx, 2cla, 2clt, 2cn, 2cre, 2cu, 2cui, 2cvf, 2cvj, 2cxi, 2cxw, 2cxy, 2cyu, 2czf, 2eb, 2eq, 2fc, 2gk, 2mc, 2mu, 2rk, 2tp, 2xam, 2xbf, 2zv, 3ab, 3adb, 3afs, 3ajd, 3apz, 3as, 3bei, 3bg, 3bjp, 3bms, 3bn, 3btq, 3bwt, 3cb, 3cbl, 3cc, 3cdv, 3chc, 3chg, 3cjn, 3cta, 3dc, 3dj, 3hh, 3hj, 3idt, 3mb, 3mf, 3mv, 3oq, 3rhh, 3sf, 3tp, 3vw, 4hq, 4ch, 4du, 4gw, 4jy, 4sa, 4tj, 4tv, 4uk, 4xe, 8add, 8adg, 8ajd, 8aly, 8aol, 8avl, 8bau, 8bb, 8bcp, 8bww, 8ceo, 8cxp, 8mf, 8xk, 9xz.

### 1IER, Milano, Italy.

1abf, 1afn, 1alf, 1alm, 1ajw, 1aua, 1avf, 1axn, 1bal, 1bcc, 1bcf, 1bep, 1bhm, 1brk, 1can, 1ck, 1ef, 1ga, 1hn, 1kl, 1le, 1lw, 1ow, 1uw, 1xu, 1zab, 1zn, 1zv, 2aam, 2aan, 2aaq, 2ag, 2agb, 2apf, 2arf?, 2awf, 2bco, 2blm, 2bnu, 2bqa, 2bqw, 2bsc, 2bw, 2by, 2cbg, 2cei, 2cej, 2chg, 2clg, 2cnk, 2cns, 2cpb, 2cpk, 2cvj, 2cvu, 2ds, 2kf, 2ld, 2tg, 2wi, 3ach, 3af, 3bl, 3blu, 3bnu, 3bof, 3bss, 3bwt, 3cjn, 3hq, 3jo, 3ot, 3ad, 3te, 3zw, 4du, 4gw, 4jr, 4pk, 4sa, 4sb, 4uk, 4xe, 5aef, 5lf, 5acm, 8ada, 8adr?, 8aly, 8aq, 8bcq, 8ben, 8cnw, 8dgl, 8dgv, 8xk, 9bqu, 9bxq; Canadian, 1dq, 2bn, 2be; Mex., 5i; Argentine, af2.

### eAR-2, Fernando Castano, 25, Fernandez de los Rios, Madrid, Spain.

1ams, 1arc, 1ary, 1axa, 1wl, 1bgq, 1bhm, 1boa, 1bzg, 1cmp, 1rla, 1tia, 1xav, 2ag, 2aho, 2ann, 2auc, 2avg, 2avy, 2awc, 2bsc, 2by, 2cec, 2cei, 2egb, 2cjx, 2cxy, 2cx, 2cy, 2tp, 3adq, 3bco, 3by, 3btq, 3bqz, 3cdv, 3hh, 3fz, 3hg, 3hj, 3ot, 4fm, 4sa, 4sb, 4gw, 4tj, 4jr, 4xe, 5sd, 5uk, 5hl, 8adg, 8aly, 8arn, 8dgv, 8dkq, 8uf, 9nfv; Aust., 3bd, 3bg; N. Z., 4ag, 4ak.

### Harry Kidder, Naval Radio Station, Los Banos, Laguna, Philippine Islands.

2ag, 5ca, 5ew, 5akn, 5nw, 5zai, 6afg, 6ahp, 6akw, 6alv, 6ame, 6ase, 6ao, 6awt, 6bcl, 6bhw, 6bjx, 6bpf, 6bpr, 6bql, 6bra, 6cet, 6cfi, 6cgw, 6cj, 6cmg, 6cmu, 6cnl, 6eque, 6cso, 6cto, 6ew, 6fy, 6gb, 6of, 6oi, 6rn, 6ti, 6vc, 6wp, 6wt, 6zh, 7adf, 7adm, 7aip, 7fq, 7ku, 7lr, 7qd, 9bko; Aus, 3bd; N. Z. 4ak, 2ac; Hva, ghh.

### SS. West Jester on Homeward Voyage, Orient to San Francisco.

8,000 to 7,000 miles west of San Francisco. U. S. 6arb, 6awt, 6cgw.

7,000 to 6,000 miles west of San Francisco. Arg. cb8; Aust, 2yg, 2yi, 3bd, 3bq, Can. 5ba, 5gf; N. Z. 2ac; U. S. 5ac, 5aci. 5aiu, 5ak, 5ca, 5ew, 6abx, 6ac, 6adb, 6age, 6ahp, 6aib, 6aji, 6akw, 6alv, 6ame, 6arb, 6awt, 6bcl, 6bhw, 6bjx, 6blh, 6blw, 6bni, 6bpf, 6bph, 6cc, 6cej, 6cgc, 6cgo, 6cgw, 6cjb, 6cip, 6cmu, 6cnl, 6eqe, 6crs, 6cso, 6cto. 6cvf, 6ew, 6fy, 6jp, 6of, 6oi, 6rf, 6rn, 6ti, 6vf, 7afo, 7aip, 7ao, 7df, 7fq, 7fy, 7gb, 7ho, 7lr, 7ls, 9cfi, 9dyi, 9zt.

6,000 to 5,000 miles west of San Francisco. Aust, 2yg, 3bd; Brit, 2nm, 2od, 5nn; N. Z. 2ac; Turk. ghh; U. S. 5afu, 5cv, 6agk, 6ahp, 6apw, 6ar, 6arb, 6arf 6ary, 6awt, 6bb, 6bpf, 6cbb, 6cgc, 6chl, 6cms, 6cmu, 6eqe, 6cto, 6cw, 6ea, 6eb, 6ew, 6no, 6oi, 6vw, 6wp, 6zh, 7df, 7gq, 7lr, 7wm, 9cjo, 9dmj.

5,000 to 4,000 miles west of San Francisco. Aust. 2yg, 2yi, 3bd; Can. 5an, 5et; Mex. 1b; N. Z. 1aa, 2ac, 4ak; U. S. 4iq, 5acl, 5afu, 5agq. 5ahd, 5amg, 5atf, 5et, 5in, 5lu, 5se, 5uk, 5ur, 5vf, 5zai, 6abx. 6afg, 6afh, 6agk, 6ahp, 6akw, 6alg. 6aiv, 6alw, 6ame, 6anw, 6apw, 6ar, 6arb, 6aws, 6awt. 6bcl, 6bhw, 6bin, 6bjx, 6bni, 6bur, 6bve, 6cbb, 6cc, 6ccy, 6cdn, 6cej, 6cgc, 6cgw, 6chl, 6chx, 6ckf, 6cmg, 6cni, 6cso, 6css, 6ctt, 6cw, 6cwi, 6ew, 6fy, 6no. 6of, 6pl, 6ql, 6rn, 6vw, 6zh, 7afo, 7df, 7fq, 7ho, 7ku, 7lg, 7lq, 7ly, 7qd, 7uj. 7uq, 8pz, 9axs, 9axx, 9bej, 8bdf. 9bdr, 9bfi, 9bhx, 9byv, 9cgn, 9cip, 9czo, 9dat, 9dng, 9dqu, 9eak, 9eas, 9eht, 9oa, 9on, 9rt, 9xi, 9zt.

4,000 to 3,000 miles west of San Francisco. Aust. 2bk, 2yi, 3ju; Can. 5ba, 5hc; Mex. 1aa; N. Z. 1ao. 2ac, 2ap, 4aa; HVA; U. S. ket, nkf, nqg, wgh, 1aao. 1ajo, 1bes, 1crf, 1cru. 2acs, 2adm, 2ae, 2brb, 2bsc, 2by, 2cjx, 2cvf, 2cxw, 2kx, 3bnu, 4ig, 4oa, 4sa, 5aaj, 5acz, 5apv, 5atf, 5cv, 5in, 5ov, 5qy, 5ty, 5wo, 6aib, 6alf, 6ano, 6anw, 6aoi, 6apw, 6auy, 6awt. 6bni, 6bpf, 6bqr, 6bve, 6cc, 6ccy. 6ceg. 6cgo, 6chx, 6cpf, 6cso, 6css. 6cwi, 6cwv, 6ea, 6ew. 6of, 6ua. 6vw, 6xad, 7adm, 7aip, 7df, 7fq, 7gb, 7gq, 7lr, 7nx, 7zz, 8avd, 8bau, 8btl, 8cva, 8dae, 8doo, 8fy, 8nb, 8ze, 9aeh, 9agl, 9axs. 9beu, 9bje, 9bjl, 9bkk, 9blk, 9bmv, 9bvz, 9cfi, 9cgh, 9cjs, 9cjt, 9eld, 9czo, 9dbz, 9dng, 9dun, 9eas, 9egh, 9tw, 9xi.

### J. A. Jackson, Power Plant, Ret. Mountain Mine, Sardis, B. C., Canada.

1xav, 2avg, 2bqa, 2brb, 5bg, 5ox, 6afg, 6agk, 6agn, 6apw, 6avb, 6awt, 6bas, 6bcn, 6bir, 6bmw, 6bts, 6bur, 6bvg, 6cae, 6cbb, 6cgo, 6cgw, 6cso, 6czx, 6sb, 6vs, 6xi, 8byn, 8cbx, 8wl, 8wo. 9adg, 9awa, 9cbz, 9cxx, 9ded, 9dhf, 9dqu, 9dwx, 9egh, 9ego, 9eig, 9ek, 9eli, 9he, 9mf, 9sr, 9xax; Can. 1af, 4dq, 4fz, 5hh.

### 1UV at U. S. N. A., Annapolis, Md.

4ai, 4bf, 4bl, 4bw, 4ch, 4cu, 4dm, 4du, 4dv, 4eb, 4eq, 4fm, 4jj, 4jy, 4kk, 4kl, 4ku. 4ne, 1rm, 4sa, 4se, 4si, 4st, 4tk, 4tr, 4ya, 5acf, 5aeq, 5agy, 5aic, 5ajj, 5ajn, 5ajt, 5akn, 5apu, 5asb, 5bp, 5ew, 5hs, 5in, 5ka, 5li, 5im, 5rg, 5qy, 5sk, 5uk, 5uq, 6bbj, 6bbq, 6bdv, 6bhz, 6bnw, 6cso, 6cxa, 6eb, 6ew, 6pv, 6yc, 7adl, 7cy, 7ho, 9aao, 9abw, 9acq, 9ado. 9afo, 9afs, 9age, 9aha, 9aif, 9aim, 9amj, 9and, 9apy, 9aud, 9avj, 9avs, 9azn, 9azr, 9bbi, 9bbk, 9bbw, 9bce, 9bcj, 9bcv, 9be, 9beu, 9bfh, 9bhq, 9bht, 9bhx, 9bib, 9biz, 9bjl, 9bjo, 9bmv, 9bna, 9boe, 9bol, 9bpb, 9bph, 9bpl, 9bqe, 9brx, 9bvz, 9bwf, 9bwh, 9bxb, 9byg, 9byl, 9bzx, 9che, 9cbj, 9cbz, 9cci, 9cdk, 9cdv, 9cil, 9ckd, 9cko, 9clg, 9cof, 9coy, 9cpm, 9cpo, 9cqg, 9ctf, 9ctu, 9cvf, 9cuc, 9cxx, 9cyr, 9dat, 9dbj, 9dbp, 9dbr, 9ddv, 9ded, 9del, 9dhf, 9dhq, 9djv, 9dks, 9dlj, 9dll, 9dlw, 9dms, 9dpc, 9dpf, 9dpl, 9dps, 9dpx, 9dq, 9dqu, 9dqy, 9dr, 9dsk, 9dsq, 9dtk, 9dtt, 9duc, 9duj, 9duq, 9dwh, 9dwx, 9dyt, 9eas, 9ebt, 9eed, 9efz, 9egg, 9eht, 9ehv, 9ein. 9eji, 9ejt, 9ekx, 9elh, 9eli, 9elq, 9esi, 9esf, 9ev, 9he, 9hp, 9ig, 9lq, 9mc, 9mn, 9mv, 9od, 9af, 9sg, 9sr, 9vc, 9uu, 9zk, 9zt.

### Richard H. Davis, 2CTQ, 36 E. Gouverneur Ave., Rutherford, N.J.

4bq, 4cl, 4eg, 4eh. 4it, 4iz, 4kl, 4ku, 4mb, 4mi, 4si. 4tw, 4xe, 5aaq, 5ac, 5adb, 5aez, 5afu, 5ahd, 5ajj. 5ame, 5act, 5apy, 5aqa, 5aql, 5asb, 5ash, 5asj, 5atf, 5bj, 5ck, 5cn, 5hp, 5in, 5lh, 5nj, 5ot, 5rw, 5sd, 5se, 5ty, 5uk, 6aao, 6alw, 6ath, 6bjj, 6bui, 6bur, 6buw, 6cig, 6cmu, 6cto, 6css, 6ea, 6kr, 6pl, 6vd, 6xby, 6xi, 6zh, 7gl, 7qd, 7zn, 9akn, 9aqr, 9aqu, 9ash. 9auw, 9ayb, 9bcd, 9bhy, 9bpd, 9bph, 9bsh, 9bwe, 9byv, 9bzk, 9ces, 9cea, 9cfi. 9ck, 9cpo. 9cvl, 9dbz, 9ddk, 9dev, 9dhb, 9dmj, 9dnd. 9dtl, 9dwh, 9ejt, 9ell, 9fm, 9mn, 9qd, 9dc, 9xe, 9zd. Canadian: 1af, 1ar, 1dd, 1eb, 2au, 2be, 2cg, 2hz, 3qs, 3tf, 3vh, 3zb. South America: wjs. British: 6nf. Swedish: sm-tf.

### 3BMS, 133 E. Gorgas St., Philadelphia, Pa.

U. S. 6afh, 6age, 6agn, 6ahp, 6ajh, 6ajq, 6alc, 6ame, 6aoi, 6apw, 6avn, 6awt, 6bcp, 6bdw, 6blw, 6bui, 6bur, 6buw, 6cae, 6cek, 6ceu, 6cga, 6cgs, 6chx, 6cjb, 6cms, 6cmu, 6cqe, 6crx, 6cso, 6css, 6cto, 6cuq, 6cu, 6eb, 6fh, 6no, 6nx, 6oi, 6pl, 6si, 6tw, 6ua, 6vc, 6wp, 6xad, 7ao, 7abb, 7aib, 7aif, 7df, 7fq, 7mb, 7ti, 7zn, 7zo, 7zu; Cuban, 2lc, 2mk; Dutch, onl, ore, orr; England, 2kz, 2nm, 2od, 2sz, 5nn, 6fh, 6nf, 6ng, 6nn; France, *8ab*, 8ba, 8go, 8sm, 8vaa; Brazil, wjs; Argentine, ior, lr, cb8; Mexico, 1aa, 1af, 1b, 1k, 9a, 9b, bx-1ei; Canada, 5go, 5ba; Austral., 2cm, 3bq; Misc., pkc (?), nam, nev, nkf, ket, npl, ll, lk.

### 5AJH, Box 715, Abilene, Tex.

U. S., 1aao, 1abf, 1alw, 1aqm, 1ayn, 1bcr, 1bk, 1bpb, 1cab, 1qm, 1wl, 1yd, 2ag, 2avh, 2cgb, 2cpd, 2cpk, 2cyu, 2czr 2fa, 2le, 2rk, 2xi, 2zw, 3apv, 3avk, 3awa, 3cjn, 3in, 3te, 3ud, 3wa, 3xm, 4ay, 4bk, 4dv, 4fm, 4jh, 4pk, 4sa, 4ux, 6afn, 6akw, 6ano, 6aoc, 6bdv, 6bur, 6cbb, 6cgo, 6clv, 6css, 6oi, 6qe, 6rw, 6ua, 7af, 7ahs, 7dj, 7fq, 7gj, 7gs, 7ku, 7lj, 7nd, 7pz, 7uj, 7us, 7zn, 8aal, 8aie, 8alf, 8chk, 8dcb, 8ded, 8dgv, 8fm, 8gz, 8ve, 8xhi, 8ze; Mex., 1n, 1af; Can., (1ei) 2am, 2cx, 2fo, 3co, 3gb, 3ia, 3mv, 3tf, 3xi, 5go, 9bj; Cuban, 2by, 2mk; Chile, 9tc; Argentina, cb8; British, 2nm; N. Z., 2ac, 4aa, 4ag; Australia, 2cm, 3bd, 5bg; Misc., uft, 1px, nkf, ane.

### 6ADB, Turlock, Calif.

1aao, 1af, 1aid, 1ajg, 1ajo, 1ajx, 1ajz, 1all, 1atj, 1awe, 1bbe, 1bcb, 1bes, 1bcr, 1bio, 1bv, *1cab*, 1cc, 1c,i 1ckp, 1cme, 1cmp, 1cpv, 1er, 1my, 1rd, 1wl, 1xz, 1yb, 2acs, 2ana, 2aqh, 2avu, 2bgi, 2bm, 2brb, 2bsc, 2by, 2cgi, 2cla, 2csl, 2ctq, 2cty, 2cvj, 2cxw, 2dd, 2dn, 2kx, 2qs, 2mc, 2mu, 2rk, 2wc, 2xam, 3adp, 3adv, 3alx, 3aoj, 3bg, 3bhv, 3bjp, 3bmn, 3bva, 3cdo, 3cf, 3ckj, 3cjn, 3hh, 3hs, 3ot, 3qt, 3sf, 3wx, 3xm, 3yo, 4bq, 4do, 4eq, 4fq, 4fz, 4hs, 4jy, 4my, 4rr, 4si, 4tj, 4ua, 4uk, 4xe, 5aaq, 5ac, 5acl, 5acz, 5ada, 5adz, 5aec, 5aew, 5aex, 5afn, 5afu, 5agj, 5aiy, 5ajq, 5aky, 5apy, 5aqw, 5aqy, 5arl, 5asb, 5atx, 5bn, 5dm, 5dw, 5ew, 5gk, 5hc, 6hh, 5hl, 5hy, 5ik, 5kc, 5lh, 5lr, 5ls, 5lu, 5nw, 5uq, 5ot, 5ov, 5ox, 5qy, 5sd, 5se, 5uk, 5vf, 5xau, 6's too numerous. 7abb, 7adm, 7afn, 7afo, 7agi, 7aha, 7ahi, 7aib, 7aip, 7akk, 7ald, 7ao, 7av, 7cy, 7dc, 7di, 7dj, 7fq, 7fm, 7fr, 7gb, 7gj, 7gm, 7gv, 7gy, 7ho, 7ij, 7iu, 7jm, 7js, 7ku, 7lg, 7lj, 7lr, 7ly, 7mb, 7nd, 7nh, 7rh, 7rl, 7sy, 7uj, 7uq, 7us, 8aal, 8ada, 8afn, 8ago, 8aly, 8apr, 8aub, 8aul, 8baj, 8bau, 8bdk, 8bgg, 8chk, 8bit, 8bjy, 8bkh, 8blb, 8blc, 8bpa, 8bnc, 8btl, 8byn, 8bxh, 8ced, 8emt, 8cp, 8cyi, 8cys, 8dgp, 8doo, 8er, 8es, 8fu, 8gz, 8nb, 8rj, 8rv, 8uf, 8vq, 8wa, 9aby, 9adk, 9ady, 9aed, 9aeo, 9afo, 9afu, 9agl, 9agy, 9akn, 9and, 9apm, 9aqs, 9azr, 9axs, 9bcy, 9bdw, 9beu, 9bfi, 9bfx, 9bis, 9bji, 9bht, 9bkk, 9bpm, 9bmo, 9bnk, 9bol, 9bru, 9buh, 9bwb, 9bwr, 9bwx, 9bvz, 9byv, 9caa, 9cak, 9cap, 9cbz, 9cea, 9cej, 9cfi, 9cgh, 9cgn, 9cig, 9cii, 9cjc, 9cid, 9co, 9cri, 9csa, 9ctg, 9cul, 9cuo, 9cvf, 9cvl, 9cvo, 9cvr, 9cyk, 9czo, 9dad, 9daw, 9dbz, 9ded, 9del, 9dev, 9dfz, 9dim, 9dlt, 9dmi, 9dmj, 9dnd, 9doj, 9dps, 9dpx, 9dqh, 9dtk, 9duj, 9dun, 9duo, 9dwp, 9dyi, 9eak, 9eam, 9eas, 9efz, 9ego, 9ei, 9eji, 9ek, 9ekq, 9eky, 9ell, 9en, 9fj, 9hn, 9mm, 9na, 9on, 9qw, 9ry, 9th, 9vc, 9wu, 9za, 9zt, 9zy, 9xe, 9xi, 9xy. Canadian: 2cg, 2bs, 3ly, 3tf, 3vh, 4dq, 4bb, 4fn, 4cv, 5af, 5ef, 5go, 5bf, 5ba, 5hk. Mex: BX. Aus: 2YI. N.Z.: 2AC. NERK, NKF, NQG.

### 7ACY, K. D. Ullberg, 919 20th Ave., North, Seattle, Wash.

1abp, 1afy, 1aqm, 1aty, *1avx*, 1awy, 1bgw, 1cmx, 1af, 1da, 1dd, 1er, 1py, 1rd, 1rr, 1yd, 2adm, 2avg, 2cgs, 2cns, 2cub, 2bm, 2by, 2dd, 2ku, 2kx, 2ky, 3aew, 3apv, 3bcco, 3bms, 3cdg, 3cjn, 3ckj, 3cnu, 3kq, 3ll, 3lw, 3qt, 3sn, 3te, 3ue, 3xm, 4dv, 4fq, 4jr, 4kl, 4ot, 4qt, 4rm, 4sx, 4tj, 5abm, 5ado, 5ajt, 5aur, 5aut, 5aw 5hu, 5jb, 5jv, 5nj, 5oq, 5ox, 5ps, 5qy, 5rg, 5rz, 5uk, 5vf, 5zai, 8acm, 8bcp, 8bpl, 8brm, 8bvt, 8bxe, 8cbx, 8chk, 8cnw, 8czy, 8dae, 8dcb, 8dia, 8dgp, 8dgv, 8dki, 8dse, 8ab, 8bf, 8ci, 8cu, 8ev, 8fy, 8gz, 8jq, 8kc, 8lb, 8mt. 8ar, 8uu, 8abz, 9ach, 9agl, 9avj, 9bbl, 9bcy, 9beu, 9bfx, 9bnf, 9bpn, 9bxy, 9caa, 9cbs, 9cek, 9cfs, 9csg, 9cur, 9cuv, 9cvf, 9cxx, 9czq, 9dad, 9dbb, 9dbf, 9dbz, 9ded, 9dge, 9dib, 9dkv, 9dmz, 9dpr, 9drs, 9dwz, 9eam, 9eih, 9eji, 9ar, 9ck, 9cu, 9lc, 9on, 9sr, 9wg, 9wo, 9wv. Can: 3qs, 4dq, mlb, nal, nqw. All crds. answered.

### 8CNX, Syracuse, N. Y.

4af, 4aj, 4bq, 4bw, 4ce, 4db, 4du, 4dv, 4eh, 4eq, 4fa, 4fq, 4ft, 4fz, 4gw, 4hw, 4io, 4jk, 4jr, 4ke, 4kk, 4kl, 4ku, 4mb, 4mi, 4my, 4ne, 4nj, 4oa, 4pd, 4qw, 4rm, 4sa, 4si, 4tj, 4tn, 4tw, 4ua, 4uk, 4vj, 4wr, 4xe, 4yz, 5aad, 5aat, 5abn, 5ac, 5acl, 5acm, 5ads, 5adw, 5aek, 5aeq, 5agj, 5agl, 5ags, 5agv, 5ahj, 5aih, 5ail, 5aiu, 5aiy, 5ajb, 5ajn, 5ajt, 5akn, 5akp, 5alz, 5ani, 5ame, 5aom, 5aot, 5ap, 5api, 5apq, 5aqp, 5ari, 5asg, 5ash, 5atx, 5aur, 5be, 5ca, 5cv, 5dm, 5ek, 5ew, 5hl, 5if, 5ii, 5ij, 5kc, 5ka, 5jf, 5lu, 5ov, 5ph, 5qf, 5qk, 5qy, 5qq, 5ry, 5se, 5sd, 5sl, 5uk, 5vm, 5xa, 5zas, 5zao, 5bp, 6aam, 6aao, 6ab, 6abs, 6ac, 6adc, 6adt, 6agn, 6afq, 6afh, 6agk, 6aiv, 6aji. 6ajh, 6ajq, 6akw, 6alm, 6ame, 6apw, 6arb, 6ase, 6asv, 6ats, 6auf, 6awt. 6baz, 6bcl, 6bdh, 6bdt. 6bgc, 6bhz, 6bik, 6bir. 6bjj, 6bjx, 6bka, 6blw, 6bni. 6bpf, 6bq, 6bqa, 6buh, 6bur, 6can. 6cc, 6cfs, 6cft, 6cgc, 6cgo, 6cgw, 6chl, 6cig, 6cjb, 6cek. 6cmi, cnl, 6cnn, 6crs, 6crx, 6css, 6ctc, 6ctn, 6cto, 6ctg, 6cvm, 6cwi. 6czx, 6ea, 6eb. 6ew, 6ji, 6kr, 6kt, 6lj, 6ms, 6of, 6oi, 6pl. 6rn, 6ts. 6uw, 6vc, 6vd, 6wl, 6wt, 6xad, 6xi, 6zh, 6no, 6nx, 7au, 7abb, 7cf, 7co, 7cy, 7df, 7dj, 7dd, 7dc, 7ga, 7gb, 7lj. 7ku, 7lg, 7ls, 7mf, 7mg, 7ok, 7pp, 7qd, 7mp, 7pd, 7uj, 7vn, 7sy, 7zq. Canada. 1ar, 1dq, 1dj, 2au, 2be, 2bn, 2cn, 2ct, 3dz, 3nf, 3nj, 3wf, 3wv, 4cr, 4db, 4gt, 5ba. England. 2kf, 2kz, 2nm, 2od, 2ol, 2sz, 5nf. 5nn, 6lj, 5bv. France: 8ab, 8bo, 8sm, 8fj. Spain: ear2. Holland: Oba, odb, Obq, Onl, Oll. Belgium: 4yz. Bermuda: ber. Argentine cb8. Mexico: 1b, bx, 1aa, Z4aa, 4ag, 2ac, 2yg, a2ds, a8bq.

### 9DNG, Univ. Heights, Lawrence, Kans.

1aap, 1aac, 1aaw. 1adb, 1ack, 1afc, 1ana. 1ary. 1ams, 1atj, 1asu, 1aur, 1are, 1ams, 1ask, 1atg, 1afx, 1axn, 1awy, 1afc, 1agl, 1air, 1aqm, 1arr, 1beo, 1bkn, 1bz, 1bef, 1bqe, 1bgt. 1bc, 1bdx, 1bg, 1bm, 1bq, 1blt. 1bub, 1bzp, 1bie, 1bkl, 1jo, 1bv, 1cab, 1cpq, 1cu, 1cak, 1cme, 1cmx, 1cpu, 1cru, 1cre, 1coi, 1dd, 1ef, 1da, 1ga, 1fm, 1fd, 1hn, 1eb, 1fn, 1kx, 1kl, 1ku. 1mk, 1om, 1js. 1jt, 1ajh, 1ajt, 1pe, 1kw. 1ac, 1pc, 1tv, 1tc, 1rd, 1vc, 1wl, 1sf, 1sw, 1xw, 1xu, 1sy, 1rr. 1rt, 1lwp, 1rd, 1yb, 1yd, 1zz, 1xam, 6apw, 6akw, 6afh, 6aji, 6aph, 6ano, 6ahq, 6anw. 6agk, 6awt, 6aib. 6alb, 6ahp, 6aan, 6ar, 6aju, 6bmw, 6anb, 6bav. 6hur, 6bgc, 6baa, 6bge, 6bnr, 6bwi, 6bdx, 6bng, 6bwd, 6bjj. 6bjx, 6bbq, 6bmo, 6bs, 6bra. 6cmg, 6cae, 6cva. 6cmq, 6ctd, 6cto, 6cgo, 6cgw, 6csk. 6cso, 6clp, 6cix. 6css, 6csw, 6cc. 6ceo, 6cdg, 6cdq. 6csn, 6clh, 6bcb. 6bpf, 6cfs, 6cmd, 6cwj, 6ccy, 6cwv. 6ctg, 6cue. 6cvj. 6aot, 6caq, 6cqd. 6rn, 6rw, 6rm. 6qd, 6qi. 6rj. 6wt. 6qg, 6ta, 6xi, 6ji. 6jp, 6lj. 6aaq, 6aao, 6ha. 6om, 6oi, 6ti. 6ts, 6ea, 6vc. 6nx, 6gg, 6gt. 6ih, 6im, 6daf, 6hu. 6ua. 6uf, 6zh, 6iw, 6fx. 7ald. 7abb, 7gq, 7gy, 7cv, 7qg, 7dd. 7lv, 7mb, 7sp. 7sf, 7gs, 7ls, 7mf, 7df, 7mx, 7kc, 7ku, 7vs, 7mp, 7lj, 7ij, 7uj, 7qd. 7nh, 7vu, 7zf, 7zz, wyej, pNPO, nqg, npg, prg, piu. Q2ww. Mex: bx, lk, lb, laf, in, laa. P. R.: 4SA, nkf, nfv, wgh, neg. Can.: 1dq, 2bv, 3gb, 3nf, 3ws, 5hc. 5ct, 5ba.

### KKP, Anvik, Alaska.

6adm, 6ajj, 6ao. 6aoa, 6asv. 6avj, 6bcl, 6bcn, 6bis. 6bku, 6bmw, 6can, 6cgw, 6chl, 6cp, 6gur, 6oo, 6uf, 6ur, 7aib, 7ais, 7ak, 7akh, 7alk, 7ar. 7au, 7av, 7bj, 7ca, 7cw, 7fg, 7ge. 7gj, 7gv, 7io, 7ku, 7no, 7nx, 7un, 7uo, 7uv.

### Percy A. Field, Canadian 4CL, S.S. "Vancolite".

Night of November 11th. Anchored at Cabo Blanco, Peru. Latitude 4° 24′ South. Longitude 81° 05′ West. 3te. 4eq, 4uk, 5ail, 6cto, 6xi, kdka, wgh.

Night of December 15th, anchored at Lobos Island, Mexico. Lat. 21° 25′ North. Long. 97° 18′ West. 1alw, 1akz, 1bv, 1bkq, 1bjo, 1cme, 1cme, 1ez. 11d, 1yb, 2by, 2cee. 2ku, 3bnq. 3bss, 3bum, 3chc, 3hg. 4gw, 4mb, 4oa, 5adz, 5ail, 5anl, 5api, 5dw, 5ei, 5kc. 5lu, 5uk. 5xau, 6alv. 6cns, 6csg, 6xi, 7ls, 8anb, 8apr, 8apz. 8avd, 8bqa, 8bpv, 8cse, 8dbo, 8dgt, 8dhn, 8er, 8xe, 8ze. 9abf, 9afw, 9aot, 9bay, 9bdf, 9bdw. 9bof. 9bqj, 9brq, 9bwp, 9bxg, 9cjc, 9cto, 9cvn, 9cyk. 9ddt. 9ded. 9dhs, 9dmz, 9dwx, 9ep, 9efm. 9eky, 9of, 9tg. British: 2jf, 5lf. Mexican: 1b, 6b.

# Communications

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

## Underground Antennas

Dallas, Texas.
2500 Maple Ave.

Editor, *QST:*

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

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

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

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

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

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

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

—*W. H. M. Watson, 5RX-5XAY.*

## Some Thanks

Rogers Radio Research Laboratory
Hyattsville, Maryland.

Mr. Hiram P. Maxim:

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

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

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

—*J. Harris Rogers.*

*See Calls Heard

## QRN Storms

Editor, *QST:*

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

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

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

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

—*Chas. E. Biele, GDWQ-u2AOS*

## Check!

Editor, *QST:*

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

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

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

—*Geo. Descamps,* Pres. Crescent Radio Assn.

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

Hang it up by your set and make use of it.

R1—Faint signals, just audible.
R2—Weak signals, barely readable.
R3—Weak signals, but readable.
R4—Fair signals, easily readable.
R5—Moderately strong signals.
R6—Strong signals.
R7—Good strong signals. Would be readable through heavy QRN and QRM.
R8—Very strong signals. Several feel-from-phones stuff.
R9—Extremely strong signals.

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

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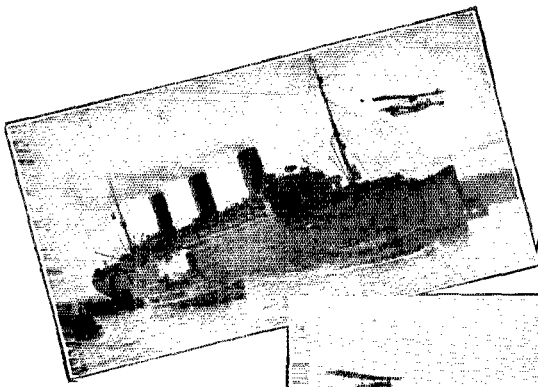
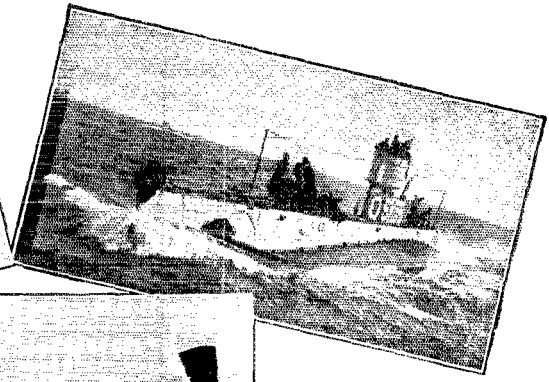
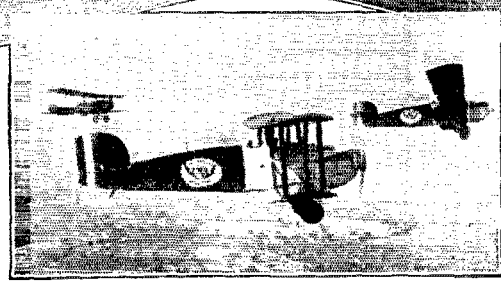
WJS, the station of the Rice Expedition, and its various field stations, UR, UB, LW, are being heard all over the U.S. and Europe. It is also being worked by a great many.



*They're in the Wireless Room of the Leviathan*



*Standard Equipment of United States Submarines*



U. & U. Photos

*The World's Flyers Carried Burgess*

# *The Adventures of* BURGESS RADIO BATTERIES

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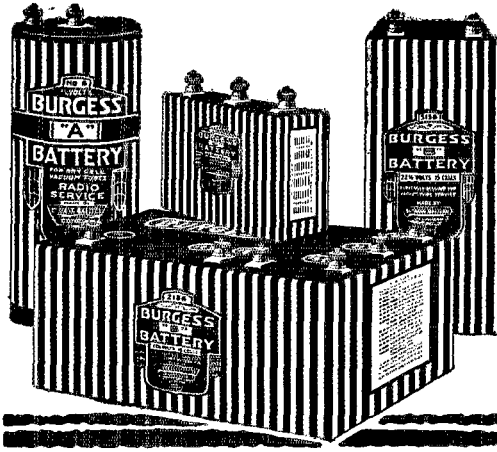
"ASK ANY RADIO ENGINEER"

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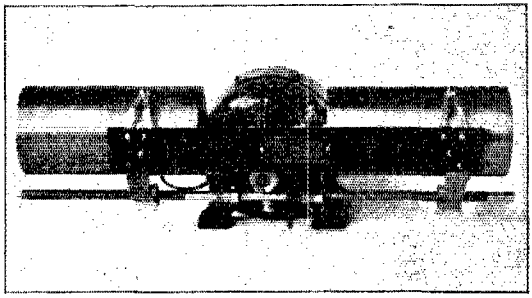
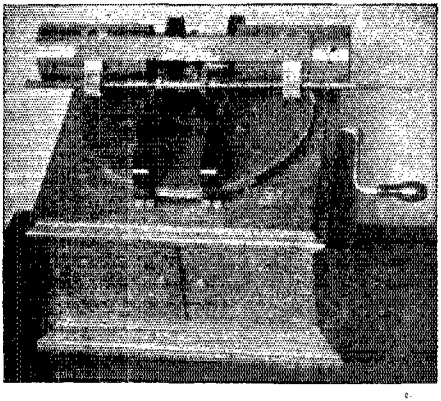
# PICTURES BY RADIO

## *Announcement*



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



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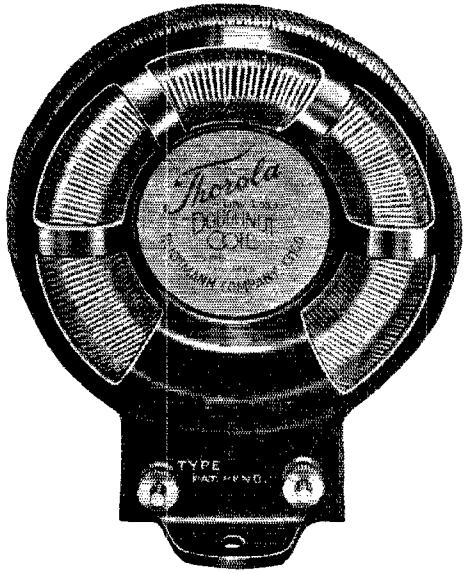
Washington, D.C.

# Thorola LOW-LOSS DOUGHNUT COILS




# The true basis *of* Selectivity, Clarity, Power

Most present radio receivers can now be made far more selective.

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

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

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

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

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

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

REICHMANN CO.
1725-39 W. 74th St., Chicago

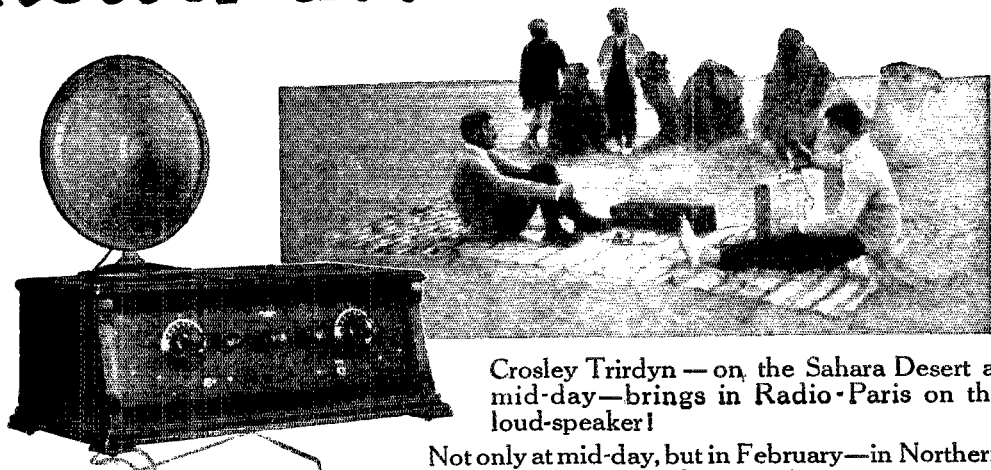
Please send me complete description of your new discovery, Thorola Low-Loss Doughnut Coils, together with circuit diagrams illustrating the most effective use of these coils.

*Name*.....

*Street and Number*.....

*Town*.....

# What the Tirdyn gets where it's hotter than Summer!



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

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

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

Tunis, North Africa, March 3, 1925

Dear Mr. Crosley:

Fishing here is rotten but radio is fine. On the Sahara, using three tubes on the Trirdyn circuit, reception from Paris came through on the loud-speaker. Along the south coast of the Mediterranean, using this set, six or eight high power European stations came in with good volume by day-light and all of them after dark. Can usually get a few American after 1 a. m. Can you fish with us this year?

Cordially,
(Signed) D. F. Keith

Further details on the margins of the picture:—

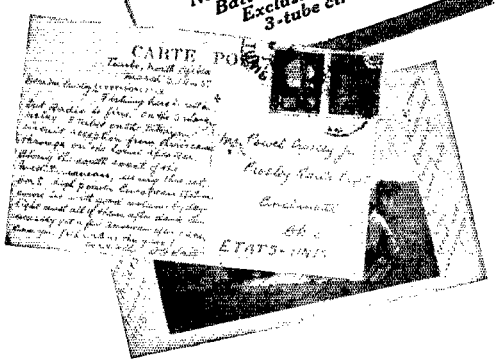
Sahara Desert, 250 miles south of Algiers, February, 1925. Receiving noonday concert from "Radio-Paris," Paris, using aerial and counterpoise.

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

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

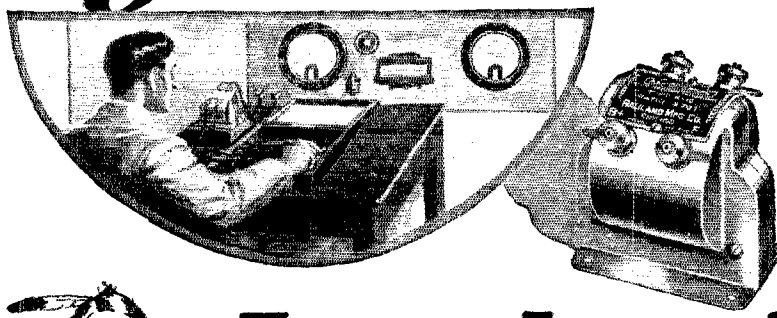
*On the Trirdyn is the beautiful new Crosley Musicone, radio's most startling development. The Musicone's abilities and its beauty are so superior that we expect it to replace half a million loud-speakers this year. $17.50.*

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

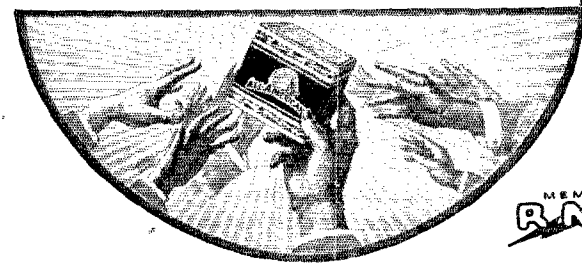




CROSLEY
RADIO
*Better~Costs Less*

# Vigilance



# Leadership



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

MEMBER RMA

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

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

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

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

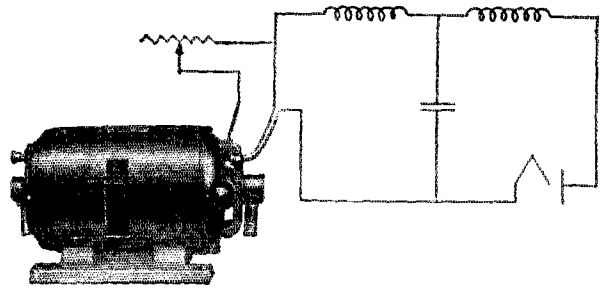
ALL-AMERICAN RADIO CORPORATION, 2642 Coyne St., Chicago

E. N. Rauland, President

# ALL-AMERICAN

## *Largest Selling Transformers in the World*

*No 6 of a series of 10*
*"FILTER FACTS"*
*Follow them thru monthly*



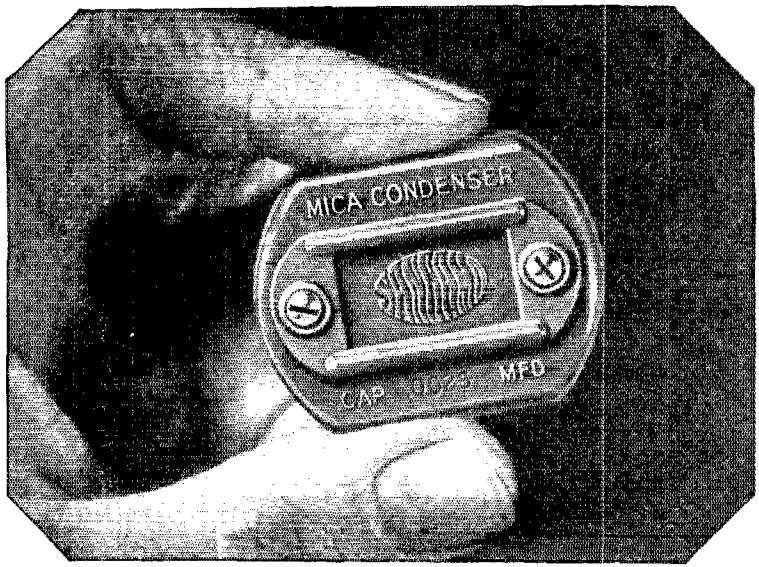
Here we have the so called "T" type of filter. It is essentially No. 5 B with an inductance placed in series with the plate. It would at first thought seem that the addition of this inductance would further reduce the voltage across the plate. It does reduce this voltage. It also increases the frequency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

## ELECTRIC SPECIALTY COMPANY

TRADE **"ESCO"** MARK

225 South Street — Stamford, Conn., U. S. A.

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




The new Sangamo Mica Condenser, actual size; accuracy guaranteed within 10 per cent. of marked capacity, and guaranteed to sustain thataccuracy.Solidly molded in smooth brown bakelite, this condenser sets a new standard of neat compactness.

Announcing

# an accurate fixed condenser of Sangamo Quality

SANGAMO *Accurate* Radio Parts

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

SANGAMO

FIXED condensers are important units in a radio receiver, and should be carefully chosen for *sustained accuracy*. A poorly made fixed condenser varies with every temperature and humidity change. In reflex and other circuits where capacity is a critical factor, accuracy in the fixed condenser may make the great difference between a set that performs perfectly, and one that is as uncertain as the weather.

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

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

## Sangamo Electric Company

*Springfield, Illinois*

1310-B

RADIO DIVISION, 50 Church Street, New York · *Offices in all Principal Cities*

Prest-O-Lite

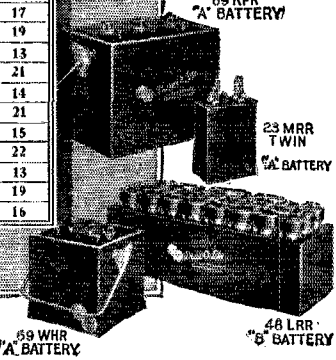
RADIO CHART

| Voltage of Tubes | No. of Tubes | Type of Tubes (see foot-note) | Total Rated Ampere Drain | Recommended Prest-O-Lite "A" Batteries: Order by Following Types | Recommended Prest-O-Lite "A" Batteries: Days between Chargings |
|---|---|---|---|---|---|
| 5-Volt Tubes | 1 | UV-200 | 1 | 69 WHR | 22 |
| | | | | or 67 WHR | 16 |
| | 2 | UV-201A | ½ | 67 WHR | 33 |
| | 2 | 1 UV-200 1 UV-201A | 1¼ | 611 WHR | 22 |
| | | | | or 69 WHR | 17 |
| | 3 | UV-201A | ¾ | 69 WHR | 29 |
| | | | | or 67 WHR | 22 |
| | 3 | 1 UV-200 2 UV-201A | 1½ | 611 RHR | 21 |
| | | | | or 69 WHR | 14 |
| | 4 | UV-201A | 1 | 69 WHR | 22 |
| | | | | or 67 WHR | 16 |
| | 4 | 1 UV-200 3 UV-201A | 1¾ | 613 RHR | 22 |
| | | | | or 611 WHR | 15 |
| | 5 | UV-201A | 1¼ | 611 WHR | 22 |
| | | | | or 69 WHR | 17 |
| | 5 | 1 UV-200 4 UV-201A | 2 | 613 RHR | 19 |
| | | | | or 611 WHR | 13 |
| | 6 | UV-201A | 1½ | 611 RHR | 21 |
| | | | | or 69 WHR | 14 |
| | 8 | UV-201A | 2 | 69 KPR | 21 |
| | | | | or 67 KPR | 15 |
| | For sets using current at a rate higher than 2 amperes. | | 2¼ | 69 KRL | 22 |
| | | | | or 67 KPR | 13 |
| | | | 2½ | 69 KRL | 19 |
| | | | | or 69 KPR | 16 |

C-300 and UV-200 are interchangeable

C-301A, DV-2 and UV-201A are interchangeable






# How to fit storage batteries to your set

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

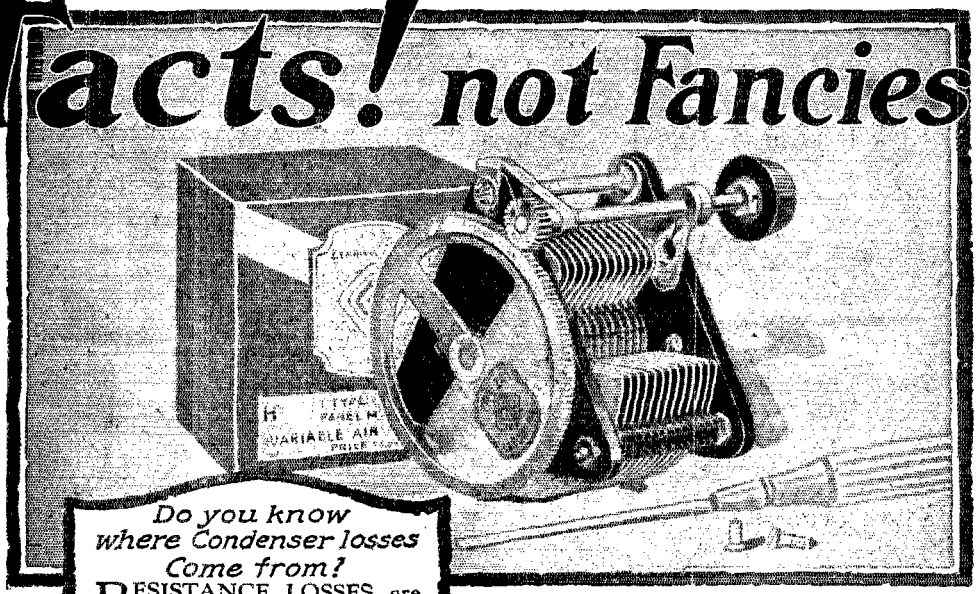
The new Prest-O-Lite Radio Chart tells you how to select such batteries. The part of the master chart shown here covers "A" Batteries for 5-volt tube sets. Use either of the two sizes recommended for your set, depending on the days of service you wish between chargings (based on the average use of your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

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

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

THE PREST-O-LITE CO., INC.
INDIANAPOLIS, IND.
New York San Francisco
In Canada: Prest-O-Lite Company of Canada, Ltd.
Toronto, Ont.

# Facts! not Fancies!



*Do you know where Condenser losses Come from?*

RESISTANCE LOSSES are the losses which most seriously affect the efficiency of a condenser when at working radio frequencies. They arise from poor contacts between plates and from poor bearing contacts. Soldered plates and positive contact spring bearings reduce these losses to a minimum.

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

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

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

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

Rotor plates are counterbalanced to make possible accurate dial settings.

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

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

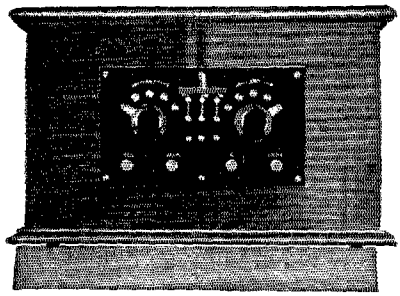
*Licensed for multiple tuning under Hogan Patent No. 1,014,002*

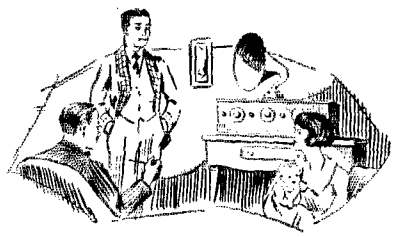
Type 247-H, with geared Vernier
Capacity, 500 MMF. *Price* $5.00

Type 247-F, without Vernier
Capacity, 500 MMF. *Price* $3.25

GENERAL RADIO CO.
CAMBRIDGE, MASS.

**GENERAL RADIO**
**Quality Parts**





# KIC-O "B" Multi-Power Unit—

## *the power behind better radio reception*

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

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

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

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

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

**PRICES**

PZ indicates panel type with switches.
CZ is plain type without switches.

| Voltage | M.A.H. | Type PZ | Type CZ |
|---|---|---|---|
| 130 | 2500 | $38.00 | $33.00 |
| 100 | 2500 | 27.50 | 24.50 |
| 70 | 2500 | 21.50 | 18.50 |
| 45 | 2500 | 16.00 | 14.50 |
| 22½ | 2500 | | 7.50 |

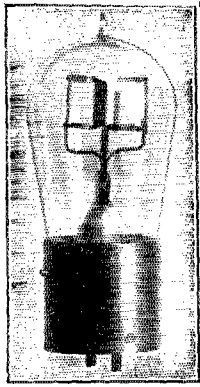
**MULTI-POWER UNITS**
(No recharger required)

| | | |
|---|---|---|
| 130 | volts | $43.50 |
| 100 | " | 35.00 |

**KIC-O CHARGERS**

| | |
|---|---|
| Type K-1 Single Unmounted | $1.50 |
| Type K-2 Single Mounted | 3.50 |
| Type K-3 Multi-Polar Mounted | 5.00 |
| KIC-O Special Charger Chemicals (one Cell) | .50 |

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



# KENOTRON RECTIFYING TUBES (Type TB-1)

***Manufactured by the General Electric Co., new, in original cartons.***

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

Eliminate your transmitting plate supply troubles with these tubes.

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

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

**AMERICAN SALES COMPANY** 21 WARREN ST. New York City

DeForest License


## Honeycomb Coils

**Back and Front Panel Mountings**
**Plain or Geared**
**Genuine Bakelite**

The Universal all-wave inductance — accepted as standard in regard to superior construction and electrical units of measurement. Ask your "Old Timer" radio friend why sets using honeycomb coils are better; they give closer tuning, greater selectivity and range. No dead end losses, easy to operate. 16 sizes, mounted and unmounted. Interchangeable with all mountings.

Send 25c for Super Heterodyne, Radio Frequency and Honeycomb Coil Circuits and Complete Catalog.

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

# Best for Reflex

and Crystal Sets

## FRESHMAN

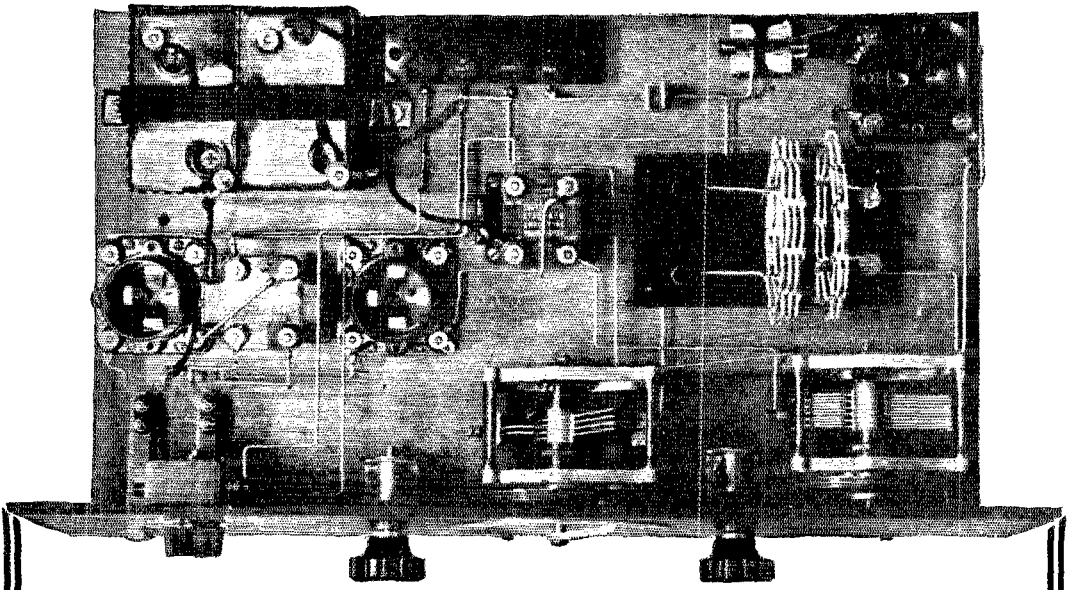
**Double Adjustable Crystal Detector**

No more searching for the sensitive spot. Merely turn the knob as you would a dial. *For base or panel mounting complete with Freshman Super-Crystal* **$1.50**

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

CHAS. FRESHMAN CO. Inc.
240 West 40th St., New York

# Schnell's Tuner



## Uses B-T Condensers

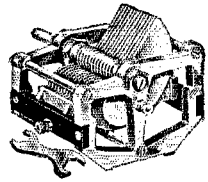
F. H. Schnell, Traffic Manager of the A.R.R.L., goes with the fleet in its much heralded maneuvers in Pacific waters. He is to conduct the Navy-Amateur experiments in short-wave communication. The special receiver that he will use is able to tune to twelve meters.

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

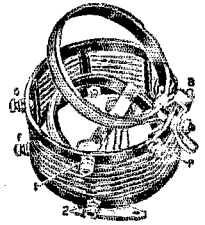
**A.R.R.L. Men Use B-T Tuner**

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

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



B-T Type L Condenser



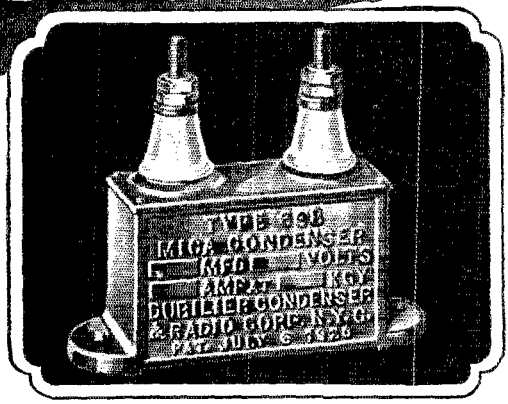
B-T Short Wave Tuner

**Pioneers of "Better Tuning"**

# Bremer-Tully Mfg. Co.

**532 S. Canal St., Chicago**

# amateur transmitting condenser




For amateur transmitting stations—the Dubilier Condenser No. 668. It may be used as a series antenna condenser; a plate blocking condenser or a grid coupling condenser in tube transmitters of 500 watts or lower.

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

# Dubilier

**CONDENSER AND RADIO CORPORATION**

## *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.

.....1925

American Radio Relay League,
Hartford, Conn.

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

.....

.....

.....

Station call, if any .....

Grade Operator's license, if any .....

Radio Clubs of which a member .....

Do you know a friend who is also interested in Amateur Radio, whose name you might give us so we may write him about the League? .....

..... Thanks?

# HAM-ADS

## *IMPORTANT NOTICE! NEW RATES ADVANCED CLOSING DATE*

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

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

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

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

---

Regenerative Receiver, each with two-step amplifiers. RCA Loop. Wave Meter. 550 volt Motor-Generator, and others. Western Electric speaker and amplifier wavemeter, omnigraph. F. L. Wilcox, 9AAL, 4602A Delmar Blvd., St. Louis, Mo.

---

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

---

"New Lamps for Old." CRL Paragon type PAR. Amplifigon Type AGN-1. Amplifigon Type AGN-3. Motor Boat Receiver. We will exchange for the first one of each of these offered us in good condition one Model 3R latest type Zenith four-tube, listing at $160.00. Write to R. H. G. Mathews, Zenith Radio Corp., 332 South Michigan Ave., Chicago, Ill.

---

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

---

Mastertone Radio tubes all standard sizes, $1.55 postpaid, send for literature. Nangle Radio, 601B Washington Boul., Oak Park, Ill.

---

AMRAD LIGHTNING SWITCHES. Postpaid $1.50. State Radio Co., 286 Columbia Rd., Dorchester, Mass.

---

EDISON B BATTERY SUPPLIES. LARGEST SIZE TYPE A ELEMENTS 4c A PAIR, DRILLED 5c A PAIR, WIRED IN PAIRS 8c. PURE NICKEL WIRE 1c A FOOT. PERFORATED RUBBER SEPARATORS FOR BATTERIES 1/3c EACH OR CUT YOUR OWN SEPARATORS FROM SHEETS 5-3/16 x 5-7/8" 3c EACH. CHEMICALS FOR 5 LBS. BATTERY SOLUTION, ENOUGH FOR 100 VOLTS 75c. EDISON 300 AMPERE, 6-8 VOLT A BATTERIES IN PERFECT CONDITION $58. BERNARD STOTT, 60 PALLISTER AVE., DETROIT, MICH.

---

HAMS — Get our Samples and Prices on Printed Call Cards made to order as YOU want them. 9 A P Y HINDS & EDGARTON 19 S. Wells St., Chicago, Ill.

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STORAGE "B" batteries at dry cell prices. Purchase a rechargeable "HAWLEY" storage "B" battery. Non-sulphating or buckling of plates, which means clearer enjoyable reception with unlimited life. Sold in complete knock-down units which requires no former experience to put together. These units contain everything for the actual construction of battery such as large size tested Edison elements, special molded flat bottom glass cells (not ordinary test tubes), punched insulating fibre board for support of cells, pure, annealed solid nickel wire Rubber stoppers, perforated hard rubber separators, full strength chemical electrolyte. With all orders there is included free an 8 page illustrated folder showing simple putting together making of charger and charging. Prices of units as above—22 volt $2.95; 45 volt $5.75; 90 volt $8.95; 100 volt $9.95; 120 volt $11.60; 135 volt $12.75. 150 volt $13.90; 200 volt $17.50. Special voltage units put up at no increase in price. Complete sample cell, 35c prepaid. Complete non-heating "B" battery charger $2.75. Extra special 100 volt whitewood cabinet at $2.75 only. Also "A" batteries at attractive prices. Order direct or write for my literature, 30 days' trial offer and guarantee. Orders shipped same day received. No waiting. B. Q. Smith, 31 Washington Ave., Danbury, Conn.

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MAKE $120 WEEKLY IN SPARE TIME. Sell what the public wants — long distance radio receiving sets. Two sales weekly pays $120 profit. No big investment, no canvassing. Sharpe of Colorado made $955 in one month. Representatives wanted at once. This plan is sweeping the country — write today before your county is gone. OZARKA, 853 Washington Blvd, Chicago.

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For sale: 200 W 1,000 V Esco m.g. in A No. 1 condition. Use thirty days. Also 50 Henry Choke. Will sell very reasonable or trade for other apparatus. Make cash offer or trade, address Radio Department, Finke Furniture Co., 307 S. Seventh St., Evansville, Indiana.

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WRITE US ABOUT NEW "S" TUBE DELIVERY, STATE RADIO CO., 286 COLUMBIA RD., DORCHESTER, MASS.

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

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TELEGRAPHY — Morse and Wireless — taught at home in half usual time and at trifling cost. Omnigraph Automatic Transmitter will send, on Sounder or Buzzer, unlimited messages, any speed, just as expert operator would. Adopted by U. S. Govt. and used by leading Universities, Colleges, Technical and Telegraph Schools throughout U. S. Catalog free. Omnigraph Mfg. Co., 13M Hudson St., New York.

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UP 414 R.C.A. microphone transformer. $3.75 postpaid. Acme power rheostat .75c Roller-Smith 0-5 Rad. meter, $3.75. State Radio Co., 286 Columbia Rd., Dorchester, Mass.

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WHILE THEY LAST — Reinartz's original short wave articles in September, October and November numbers of Amateur Radio. Sent postpaid for 50 cents or free with a subscription $2.00. Executive Radio Council, 136 Liberty St., New York, N. Y.

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

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EVEN THE BEST SET GIVES INFERIOR RESULTS UNLESS PROVIDED WITH A PERFECT PLATE SUPPLY AND THAT'S AN EDISON B (THE 8ML KIND). A JOINTLESS WELDED B FOR LOW RESISTANCE AND ABSOLUTE QUIET. A SIZE FOR EVERY SET. 54 VOLTS $8.25. 100 VOLTS $15.00. 130 VOLTS $18.75. 150 VOLTS $21.50. COVERED

CABINET OF WAX FINISHED FUMED OAK. RUBBER MAT. LARGEST LIVE EDISON ELEMENTS ELECTRICALLY WELDED TO PURE SOLID NICKEL CONNECTORS. GENUINE EDISON ELECTROLYTE (THAT'S NO LYE). PACKED TO REACH YOU SAFELY. SINGLE CELLS 15c. FOR THAT BIG SET YOU NEED A B TO MATCH ITS APPETITE. A 2,000 MILIAMP HOUR DOUBLE CAPACITY B IN HEAVY FLAT BOTTOMED GLASS JARS. 105 VOLTS $24.00. SINGLE CELLS 17c PARTS, 19c READY TO WIRE, 24c ASSEMBLED (WELDED CELLS) 21c CONNECTORS WELDED ON. DISCOUNTS 500 VOLTS UP. 8ML PARTS TO MAKE A REAL B. LARGEST PEPPY EDISON ELEMENTS PAIR 5c, DRILLED 6c, WELDED TO PURE SOLID NICKEL 7½c. G ELEMENTS 3c PAIR, 2 POSITIVES 1 NEGATIVE 4c. 1500 MILIAMP HOUR G CELLS 15c PARTS, 17c READY TO WIRE. 22c WELDED AND ASSEMBLED. 3000 MILIAMP HOUR SUPERCELL FOR THE MAN-EATING SUPERHETS 27c CELL PARTS READY TO WIRE, 33c WELDED AND ASSEMBLED. ANNEALED GLASS TEST TUBES INDIVIDUALLY WRAPPED ¾ x 6" 3c, 1 x 6" 4c. SHOCKPROOF ⅛" THICK HEAVY GLASS JARS, FLAT BOTTOMED 1 x 6" 4c, 1¼" x 6½" 5c. PUREST SOLID (NOT PLATED OR ALLOY) SOFT NICKEL .032 WIRE 1c FT. .034 1¼c FT. PERFORATED HARD RUBBER SEPARATORS ½c EACH. NOTHING BUT REAL EDISON ELECTROLYTE (CHEMICALLY CORRECT COMBINATION OF LITHIUM AND POTASSIUM) WILL ENABLE YOU TO REALIZE THE FULL CAPACITY OF YOUR EDISON ELEMENTS. $1.25 TO MAKE 5 LBS. SOLUTION. DON'T STARVE IT. CHARGE IT — WITH A WILLARD COLLOID RECTIFIER. 50 VOLT SIZE $2, JUMBO $3. 100 VOLT FULL WAVE COLLOID $4, JUMBO SIZE $6. HANDLES 100 VOLT B ALL IN ONE BITE. UTILIZES BOTH HALVES OF CYCLE. HIVOLTAGE TUNGAR CHARGER SHEET 50c. EVERYTHING FOR THAT EDISON. B. FRANK MURPHY, 8ML, 4837 ROCKWOOD ROAD, CLEVELAND, OHIO.

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In addition to our regular stock of motor generator sets we have on hand at all times new and slightly used motors and generators in all sizes, both alternating and direct current. Write us for prices on anything you are in the market for. Queen City Electric Co., 1734 W. Grand Ave., Chicago, Ill.

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Murdock Molded Variocoupler P-P $1.00. State Radio Co., 286 Columbia Rd., Dorchester, Mass.

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NEW IDEAS WANTED. Well known Radio Manufacturer whose products are nationally advertised and sold everywhere wants new Radio device to sell. Will pay outright or royalty for idea or invention which is really new and saleable. Address: Mr. R. F. Devine, Room 1101, 116 West 32nd St., New York, N. Y.

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UC 1831 Radio Corp. 4000v. variable transmitting cond. with dial. Postpaid $2.00. State Radio Co., 286 Dorchester Road, Dorchester, Mass.

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AMRAD S TUBES. AT LAST WE HAVE SUCCEEDED IN GETTING A SMALL STOCK OF THESE TUBES TYPE 4000-1 MOGUL BASE. PRICE IS $10.00 EACH AND BASES TO MATCH .85c EACH. IF U WANT IN ON THIS LOT, BETTER GET UR ORDERS IN AT ONCE. FACTORY STILL MONTHS BEHIND WITH THEIR ORDERS. IF YOU ARE NOT FAMILIAR WITH THIS EXCELLENT PRODUCT, WRITE US AND WE WILL BE GLAD TO MAIL YOU BULLETIN J-3 SHOWING HOOK-UP, SUGGESTED FILTER SYSTEM ETC. THEY ARE EQUALLY EFFECTIVE AS CHARGERS FOR STORAGE B BATTERIES. OBEY THAT IMPULSE, AND SHOOT US UR ORDER. IS UR FILAMENT CONTROL SATISFACTORY? IF NOT, BETTER LET US SEND YOU A BRADLEY RADIOSTAT. CONTROLS THE FILAMENT BY VARIATION OF THE PRIMARY VOLTAGE. PRICE $6.50 PLUS POSTAGE. NEED ANY METERS? WE CARRY THE FULL JEWELL LINE. ANY INSTRUMENT YOU CAN USE, WE HAVE IT. AND ENAMELLED NO. 12 COPPER ANTENNA WIRE IS OUR MIDDLE NAME. 1.00 PER HUNDRED FEET, POSTAGE ALLOWED TO THE THIRD ZONE. WE GIVE FULL WEIGHT AND LENGTH. ORDER UR HAM SUPPLIES FROM THE ONLY HAM STORE IN THE FIFTH DISTRICT. FORT WORTH RADIO SUPPLY CO., 104 EAST 10th ST.. FORT WORTH, TEXAS.

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I have a CR-13 Amateur Special Grebe, cost $95.00, sell $43.00, a Grebe CR-7 25000 Meter, cost $210.00, sell $100.00, and a Grebe CR-8 cost $80.00, sell $40.00. All brand new never used. Cash. Reference QST. A. L. Barkey, 3776 Edison Avenue, Detroit, Michigan.

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Motor Generator Bargains General Electric Motor 110 Volt 60 cycles single phase Generator 750 Volt 400 Watt $60.00 Robbins & Myers 110 V. 60 cycles single phase generator 500 Volts 200 Watts $45.00 G. E. Motor 220 Volt 60 cycles 3 phase 1750 R. P. M. Generator 400 Vts 150 Watts $35.00. Esco Motor 220 Volt Direct Current Generator 500 V. 200 Watts. $35.00. Esco Motor 220 V. 60 cycles single phase A. C. Generator 500 Volts 200 Watts $40.00. 1000 V. 400 Watt 1750 R. P. M. Generator only $60.00. Esco B Battery charging motor generator sets generator 175 Volts Direct Current 1½ Amp. motor end Alternating current $37.50 each. 750 Volt 200 W. 3400 R. P. M. Generator only $30.00. All above machines are ring oiled and prices include field rheostat. Queen City Electric Co., 1734 W. Grand Ave., Chicago, Ill.

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BUILD RADIO SETS for friends, spare time. Very profitable. We'll supply apparatus and expert advice. Write us. The Langbein-Kaufman Radio Co., (Dept. Q), 511 Chapel St., New Haven, Conn.

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

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MOTORS—New G.E. ¼HP $12.50 ½HP $28.50 1HP $45. GENERATORS Radio Transmission 500V $28.50 Battery Chargers — Farm Lighting generators all sizes. Lathes, Drill Presses, Air Pumps other Garage and Shop equipment. Wholesale Prices. New Catalog. MOTOR SPECIALTIES Co., Crafton, Penna.

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FIRST WARM DAYS. GRAB THE CHANCE TO REVAMP THAT AERIAL. THINK OF THE DX YOU MISSED FOR WANT OF NO. 12 ENAMELED COPPER, QST'S CHOICE FOR THE PERFECT AERIAL. DOESN'T KINK AND STAYS NEW. NOW 75c 100 FT. CAN'T MATCH OHIO BRASS CO. PORCELAINS. 5" 75c, 10" $1.50 PREPAID 3rd ZONE. FLUX DISTRIBUTING SHIELDS HOLD THE BIGGEST TUBES, $1 ATTACHED. A REAL FIND IN WET PROCESS BROWN-GLAZED PORCELAIN X INSULATORS, 5" 75c PAIR, 10 $2.50. 9" $1 PAIR, 10 $4. LOCAPACITY GUY EGGS 25 $2. LOLOSS TUNER WIRE NO. 12 DOUBLE COTTON 100 ft $1.25 PREPAID. No. 16 60c. A REAL LOWAVE AIR CORE HAM TUNER 50-150 METERS $5. STRAIGHTLINE LOLOSS 7 PLATE CONDENSER $4.25. L & U SHAPED SILICON STEEL LAMINATIONS FOR THAT CHOKE AND TRANSFORMER 15c lb. BUILT TO QST'S SPECIFICATIONS. A REAL LEAD-IN OF PYREX GLASS, METAL CLAMPING RING, $3.75. CW INDUCTANCES SAME AS RADIO CORP LESS THE HIRESIS. NICKEL, $7.50. LET'S HEAR WHAT YOU NEED OM. JEWELL AND WESTON METERS. U SED IT. GET IT FROM 8ML, FRANK MURPHY, 4837 ROCKWOOD ROAD, CLEVELAND, OHIO.

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Send for our bargain list of transmitting and receiving parts and sets. Nangle Radio, 601B Washington Boul., Oak Park, Ill.

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MASTER CODE IN FIFTEEN MINUTES — 10 WORD SPEED in three hours. These world records made by our students. New 1924 Honor Roll tells code learning story as reported by TWO HUNDRED students all now licensed; some in each radio district; copy free on request; method $2.50; kills hesitation; Dodge Radio Shortkut, Mamaroneck, N. Y.

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REAL STUFF! JEWELL 0-3 THERMO AMMETER $6.50. JEWELL 0-500 MILLIAMETER $4.50, ACME 150 MILL. 1½ HEN. DOUBLE CORE CHOKE $3.00, 2—MESCO NO. 8 C.W. KEYS $2.50 EACH, ALL NEW. FIRST CASH GETS IMMEDIATE DELIVERY. A. PFLEGER, 2525 ARTHUR AVE., CHICAGO, ILL.

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IT WILL ONLY COST YOU ONE CENT TO FIND OUT ABOUT MY NEW TRANSMITTING INSTRUMENT. DROP ME A POSTAL. 2EM.

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ATTENTION HAMS!! If you haven't time to build that receiving set you were planning on, send the parts and panel layout to me. I'll build it reasonably. Earl Deakins, Macedonia, Iowa.

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Vibroplexes. All types. Reasonable. Send for prices. George Voigt, Maspeth, N. Y.

NO. 12 HARD DRAWN TIN COPPER 1c FT. NO. 12 ENAMEL SOLID COPPER 1c FT., $4.25 PER 500 FT., $7.50 PER 1000 FT. NO. 12 D.C.C. 55c LB. NO. 16 ENAMEL D.C.C. 90c LB. NO. 16 ENAMEL SOLID COPPER ½c FT. PYREX LEAD IN AND AMATEUR INSULATORS $1.50 EACH. NO. 16 D.C.C. 65c LB. ADVANCE SYNCHRONOUS RECTIFIERS $40.00 F. O.B. PITTSBURGH. LOW LOSS COILS AND TUNERS MADE TO ORDER. WRITE FOR QUOTATIONS. 8AGO, BIDDLE ARTHURS JR., 3046 CENTRE AVE,. PITTSBURGH, PA.

"DON'T MISS IT" Complete 100 Watt Set, $100. NEW, with 3 Jewell Meters, Trolley Wire & Pancake Coils, Tubes, etc. Tunes from 5 Meters up, Mtd. on 12X18 Formica Panel — all Firmly Supported. Information solicited. 3BOV—S. Strobel, 3923 N. 6th St., Phila, Pa.

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

AMRAD "S" TUBES NO. 4000-1, $9.00. Mershon Condensers, $6.85. Immediate shipment. George Voigt, Maspeth, N. Y.

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

SUPERHETS. EIS, ULTRADYNE, GENERAL RADIO, RCA, BRANSTON, other well known types. We pay the freight in U.S. Ask for big bargain list and save money. Only first class guaranteed parts. R. P. BARROWS, Columbia Road, Portland, Me.

9AP SELLING OUT. Write for list.

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

SPOKEN ESPERANTO FOR BEGINNERS—Class textbook, 92 p.—56c. 2, $1.00. Norman Frost, 12 Ash Place, Cambridge, 38, Mass.

OMNIGRAPHS BOUGHT — SOLD — RENTED — EXCHANGED. RYAN RADIO CO., HANNIBAL, MO.

CODE MADE EASY and interesting. Alphabet in 15 minutes. Original. New Rhythmic Memory system. Copyright, $1.00. Cheques $1.10. Dept. Q, Kwikkode, 724 Beresford Ave., Winnipeg, Man., Canada.

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

200-20,000 METER receiver including radiotron $25.00; two step amplifier $18.00. Smith, 4416 Market, Philadelphia, Pa.

Edgewise wound copper ribbon the only really satisfactory antenna inductance .350" wide; 4¼" outside diam. 13c turn; 5¼" outside diameter 15c turn. 6¼" outside diameter 17c turn; 7¼" outside diameter 20c turn, prepaid any number turns in one piece. Geo. Schulz, Calumet, Mich.

NO LOSS PRICES—WIRE NO. 12 ENAMELED SOLID COPPER $6.75 PER THOUSAND FEET — 75c PER HUNDRED. FOR THAT RECTIFIER 99% ALUMINUM PER SQUARE FOOT 85c; CHEMICAL PURE LEAD PER SQUARE FOOT 85c. HAVE PLENTY OF 4000-1A "S" TUBES AT $10 EACH, SPECIAL "S" TUBE SOCKET $1.25. ROICE 5-WATT DX BOTTLE $3.00; ROICE 201A's $2.00; HARP 201A's—THIS IS A GUARANTEED BARGAIN OM—$1.59. JEWELL METERS ANY RANGE — MILLIAMMETER $6.95— VOLTMETER AC $6.95. CARDWELL LOLOSS .00025 $3.85 — AND DON'T FORGET THE CARDWELL TRANSFORMER AT $4.00 IS AS GOOD AS THE CONDENSER. FOR A MORE COMPLETE LIST OF "NO LOSS PRICES" WRITE FOR "THE HAM LIST." CURTIS-GRIFFITH RADIO, 5AQC—5RV, 1109 EIGHTH AVENUE, FORT WORTH, TEXAS.

TRANSMITTERS AND MOTOR GENERATORS BOUGHT, SOLD, EXCHANGED. RYAN RADIO COMPANY, HANNIBAL, MISSOURI.

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

CARDWELLS, 3—17 Plate $3 each. 2—21 Plate $3.25 each. 1—Hammarlund, 11 Plate $3. LOOP, 4 foot, cost ten, sell $4. H. Greenman, So. Haven, Mich.

DID YOU KNOW THE CODE BUT SOMEHOW FAIL TO PASS? Latest Honor Roll with reports from many Previous Failures who quickly and easily obtained Amateur License mailed on request. Method $2.50, Kills Hesitation. Dodge Radio Shortkut, Mamaroneck, N. Y.

SETTLE YOUR MIND ON THE BEST PARTS FIRST AND SAVE THE COST THAT FOLLOWS THE CHEAPER PARTS. HAM EXCLUSIVELY ON SUCH PARTS CARDWELL TRANSMITTING CONDENSERS, PYREX SOCKETS. INSULATORS, ESCO MOTOR GENERATOR SETS, ACME POWER TRANSFORMERS, CHOKES, THORDARSON POWER TRANSFORMERS. 5 WATT SIZE, $7.50. UV-203-A POWER TUBES AT $37.00 GENERAL RADIO EQUIPMENT. JEWELL AND WESTON METERS. ANY TYPE ANY RANGE. FILTER EQUIPMENT. WE ALSO MAKE TO ORDER WAVEMETERS TO CHECK YOUR WAVE ON THE LOWER WAVES. RECEIVERS THAT GET DOWN TO 10 METERS AND COPY THEM ACROSS THE COUNTRY. GOING TO BUILD OR REBUILD THAT TRANSMITTER? WE BUILD THEM FROM 5 WATTERS UP. IF YOU HAVE PARTS FOR A SET, RECEIVER OR TRANSMITTER, GET OUR PRICE ON WIRING IT FOR YOU. IF YOU HAVE A RECEIVER THAT WON'T GET THE LOWER WAVES WE CAN CHANGE IT FOR YOU. FOR THE POWER SUPPLY THE "S" TUBE WILL HELP TO SOLVE THE PROBLEM. WE ARE THE ONLY HAMS PUSHING "S" TUBES IN COMPLETE UNITS. ORDER YOUR TUBES FROM US. DIRECT TO YOU THE DAY WE RECEIVE THEM FROM AMRAD. IF ON STOCK WE SHIP IMMEDIATELY. DON'T WASTE TIME LOOKING FOR THEM. WE CAN GIVE YOU THE BEST SERVICE ON "S" TUBES. FOR FONE WORK A GOOD SPEECH AMPLIFIER WILL HELP OUT. AND ALSO A GOOD MICK WILL PUT YOU ACROSS. DON'T FORGET A PANEL TYPE CHANGEOVER SWITCH LOOKS BETTER ON YOUR SET, FEDERAL. WE ALSO MAKE ANY TYPE INDUCTANCE. INDUCTANCE MOUNTINGS, ETC., COUPLED INDUCTANCES, $11.50. IF IT'S HAM LET'S HAVE THE DOPE. WE BUILD TO ORDER AND ALSO SUPPLY NEARLY ANYTHING THAT IS HAM. SEND US YOUR INQUIRIES. ESTIMATES GLADLY GIVEN. QSO. THOS. ENSALL (ENSALL RADIO LAB.,) 1208 GRANDVIEW AVE., WARREN, OHIO.

SELLING OUT. DeForest D-6 receiver with honey comb coils from 25 to 1500 turns will get all waves 150 to 25,000 meters, used less than 90 days, cost complete $160.00 will take half. Kennedy Universal detector and tuner number 110, brand new, cost $370.00 will take $200.00. Radiola Superhetrodyne with speaker and indoor aerial, perfect, cost $285.00 take $175.00. Radiola 3-A brand new in original package, cost $65.00 take $42.00. Western Electric three tube power amplifier and horn, cost $165.00 take $75.00 complete. New Frost, Brandes, Dictaphone head set, Manhattan horns, other new equipment 30% off list. All material guaranteed new. EARL BILLITER, Dell Rapids, South Dakota.

LOOK! Freshman .003 12c ea; .0005 ten cents, three for quarter; 40 KC Input Transformers $1.25; Federal and Marco Filament Jacks 49c; Stevens Spintites, set of three 40c. Amperites 90c; Original Packages, no used stuff. This only sample our big list bargains GENERAL RADIO, ULTRADYNE, EIS, RCA similar high grade stock. WE PAY THE FREIGHT. R. P. Barrows, 4 Columbia Road, Portland, Maine.

THE BIGGEST LITTLE BOOKLET FOR AMATEURS IS 9ALD'S HAMALOG. HERE'S A SAMPLE FROM IT — GET THE REST. GLAD TO SEND IT FREE. Everybody knows we sell the best enameled antenna wire for the least money. No. 12 is only $6.90 per 1000, any length one piece, 75c per 100' for less. No. 14 $5.00 per 1000', 55c per 100'; Insulators, Sure Fire 20 inch porcelains are the best ever at $1.15 or $1.00 each for 4 or more. Shorter ones 5¼ inches for 30c. 20 or more at 25c, excellent for guys; Westinghouse $5.00 lightning switches $1.50 while they last; COPPER STRIP FOR INDUCTANCES, 3/8 by 1/16 6c per ft. EDGEWISE WOUND 6" DIAMETER .12c PER TURN, 4" DIAME-

TER 10c. OUR OWN MAKE INDUCTANCE CLIPS 20c; UC-490 filter condensers $2.50. 1 mfd. 100 volt condensers $1.90; UC-1831 variable antenna series condensers, nearly all gone, $2.25; Ballantine's Radio Telephony for Amateurs will save you several times its cost, $2.00; Getting some transformer iron. Don't know price yet, but order it cut any size and we'll treat you right; SAY, RENT AN OMNIGRAPH! DON'T SINK THE PRICE OF A 50 WATTER IN ONE. JUST DEPOSIT THE AMOUNT WITH US, USE IT, RETURN IT, AND GET YOUR MONEY BACK LESS SMALL RENTAL; How do you get along without a General Radio wavemeter? Costs only $9.50 here, 150-500 meters. Half and quarter wave coils extra, each $2.85. Jewell meters too, AC voltmeters and DC milliammeters $7.15. Thermocouple ammeters $11.40. 1/16th inch PURE rectifier aluminum 75c per square foot, lead 90c; BIG STOCK OF RADIOSTATS FOR FILAMENT TRANSFORMER PRIMARY, $6.50. E-2111 BRADLEYSTAT FOR 5 or 10 WATT SETS, $4.00: 5 watt and 50 watt grid leaks, $1.10 and $1.65: Signal CW keys $2.50; 284-W microphones $8.75; Newest Spring Call Books with Amateur Section 75c; JUST A FEW UP-1016 POWER TRANSFORMERS FOR TWO 50 WATTERS. LIST $38.50, ONLY $22.50; COMPLETE CW AND PHONE TRANSMITTER, 20 WATTS, SLIGHTLY USED, AT SACRIFICE. WRITE FOR DETAILS; Just a sample here — be sure you get the HAMALOG, and while you're writing, let's have a sample of your orders. We ship C.O.D. if you wish, but please include postage if you send cash. E. F. JOHNSON, Waseca, Minn.

SCHICKERLING TUBES ALL TYPES $2.25. ANYTHING IN RADIO. WRITE FOR LIST. ANDERSON WERTZ, 1007 JACOBY STREET, JOHNSTOWN, PENNSYLVANIA.

Rectigon, Balkite, and Apco chargers, 25% off list. George Voigt, Maspeth, N. Y.

HERE YOU ARE FELLOWS, a genuine Hulbert vibrating charger for A and B batteries. QSL for particulars. 9HB, Box 438, Streator, Ill.

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

FOR SALE—Paragon RA-10 Receiver and DA-2 Amplifier. First Class condition. $65.00. C. E. Seabold, 841 W. DeWald St., Fort Wayne, Ind.

NEW GUARANTEED RADIO TUBES. ALL VOLTAGES $1.40. RYAN RADIO COMPANY, HANNIBAL, MO.

WESTERN ELECTRIC 10A loudspeaking telephone outfit including 7A power amplifier, three 216A tubes, 518W loudspeaker $85. Also 2A current supply set with tubes $45. Everything guaranteed. A. M. Elliott, Bayside, L. I., New York.

DID-JA-C MI BACK ADDS — 3BOV.

Kennedy Universal 175 to 26000 meters with amplifier for sale $100.00 in excellent condition just the receiver for a commercial operator now ashore shipped C. O. D. R. Kreisinger, c/o Dr Baranoff, 9 West 110 Street, New York City.

WAVEMETERS, 10 to 100 meters, two coils, individually calibrated. Accuracy guaranteed within one percent. Excellent construction and handy size, with flash lamp. $12.50 postpaid. We build real amateur equipment. Send for list today. Seattle Radio Laboratory, 3335 33rd Avenue South, Seattle, Washington.

RADIO CABINETS $1.59 Each. For portable sets, battery chargers, "B" batteries, "B" eliminators, etc. Takes panel 6" x 12". Full details upon request. Seekay Electrical & Mechanical Specialties, Meriden, Conn.

ARE YOU AMBITIOUS TO BECOME ORS—ASK FOR LATEST HONOR ROLL — Read reports from many students who by little effort won that certificate of proficiency. Method $2.50 Kills hesitation. Dodge Radio Shortkut, Mamaroneck, N. Y.

NEW 4 TUBE Ozarka complete with speaker A1 condition $35, or trade. Edison type A elements 3c pair. 9DIC, Nappanee, Ind.

SEEING MI BACK ADDS? 3BOV.

FOR SALE — 50 watter panel mounted, also 500 vol dynamotor, 2CZD.

10% to 50% off all transmitting and receiving supplies George Voigt, Maspeth, N. Y.

Sell Grebe CR-8, $45. Other apparatus. Fred A. Ells, Jr., 2 Mott Ave., Norwalk, Conn.

CHEMICALLY PURE ALUMINUM 1/8 inch $1.90, 1/16 inch $1.00; sheet lead $1.00 per sq. foot, postage paid. Geo. Schulz, Calumet, Mich.

Sell—Telmaco Det. & 2 stage. 9 BJO, Lone Tree, Iowa.

WANTED—32 to 40 volt 40 or 50 amp. D.C. generator, cheap.—Bright, clean, Type A Edison Elements 3 cents pair, 4 cents drilled. How many do you want? Sherman O. Myers, Nappanee, Ind.

NOTICE—A card from anyone hearing 3SD or 3XX will be appreciated by the owner of these stations. Special apparatus is being used. C. A. Johnson, 5332 Gainor Road, Wynnefield, Philadelphia, Pa.

BARGAINS—LOOK UP MI BACK ADDS. 3BOV.

A.R.R.L. Sweater Emblems, yellow and black felt, 5 x 8"—$1.00. Pennants, 8 x 24"—$1.35, 9 x 27"—$1.60. Enclose M.O. or check. Eric Robinson, 135 Jefferson Road, Webster Groves, Mo.

INTRODUCING the new ELECTRIC WELDING PENCILS. Operates from your storage battery. Uses current (2 amps per hour) only when actually touching the article to be welded or soldered. Special introductory price $1.65. George Voigt, Maspeth, N. Y.

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

FOR SALE: Crocker-Wheeler ½ K.W. 500 cycle generator $40. ¼ K.W., 110 V. 60 cycle Induction motor $30. 2CUI.

JUST GLANCE AT MI BACK ADDS and save now. 3BOV.

GREBE CR-12 four tube broadcast receiver works on ten foot antenna one-third list at sixty dollars, three circuit broadcast regenerator with two stages audio in neat cabinet thirty dollars; one stage Como push-pull cabinet mounted fifteen dollars; Sodion DR-6 set with new tube eight dollars; Western Electric 10-A complete ninety dollars; all like new and satisfactory to purchaser or money refunded. Lieutenant Wenstrom, Fort Bliss, Texas.

ARE YOU ANCHORED AT 10-15 PER — ON REQUEST WILL MAIL LATEST HONOR ROLL WITH REPORTS FROM MANY OLD METHOD KEY AND BUZZER HAMS WHO IN A FEW HOURS DOUBLED SPEED. METHOD $2.50. KILLS HESITATION. Dodge Radio Shortkut, Mamaroneck, N. Y.

GENUINE SILICON Transformer steel cut to order 25 cents lb. 10 lbs. and over, 4 cubic inches, weight 1 lb. postage extra. Geo. Schulz, Calumet, Mich.

FOR SALE—25 Cycle, 1600 V. transformer also new 5 watter. John Collins, 226 Dufferin Brantford, Ont.

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

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

MORE JUNK. I have two used Westinghouse 20 watt transmitters with 110 volt AC motor generator, no tubes, mik or key, for $90.00 each. I also have two used sets without motorgenerator, just the box with OT, sockets, filament and microphone transformers, key relay and other oscillating circuit accessories, no antenna ammeter, for $35. each. Also, BRAND NEW, four Metro electric soldering irons at $1.25 each, six Metro phonograph units at $1.50 each and four Best headphones at $1.50 each. The early purchaser catches the bargains so snap into it. W. M. Derrick, 58 North 6th St., Newark, N. J.

$5.00 New United States Government Aviators' leather Helmet with headphones and microphones, cost $25.00. Postage free. Send at once, limited supply; other Government Radio bargains. Send stamp for list. WEIL'S CURIOSITY SHOP, 20 S. 2nd St., Philadelphia, Pa.

QSL CARDS: Why not give ur next order to a "regular" ham who promises u a "real" job. 8BJT Press, 701 Walnut Ave., Scottdale, Pa.

THE NEXT SELECTION WILL BE. JOHNNY AMPERE AND MARY WATT, "THE THERMO COUPLE" WHO TAKE PLEASURE IN PRESENTING TO YOU THAT PATHETIC BALLAD ENTITLED "SOMEWHERE A VOICE IS CALLING." BUT DON'T WORRY YOU WON'T HEAR IT NOT WITH THAT RUST COVERED WIRE AND THOSE SPONGY INSULATORS. BETTER TEAM UP WITH THE "TWINS OF POWER." DYNEX AND PYREX. DYNEX SOLID COPPER ENAMELED WIRE "THE BETTER KIND." NO. 12 1c FT. 500' ,$4.50. 1000' $8.75. NO. 10 (FOR HEAVY DUTY) 1½c FT. PYREX GLASS TRANSMITTING INSULATORS. NOTHING TAKES THE PLACE OF GLASS FOR OUTDOOR INSULATION. HIGHEST INSULATION PROPERTIES AND NON-ABSORBENT. LARGE SIZE $1.50. RECEIVING SIZE 45c. STAND-OFF INSULATOR $2.50. OHIO BRASS INSULATORS 5", 75c, 10", $1.50. "DYNEX" KEM RECTIFIER ELEMENTS, READY CUT AND DRILLED. COST BUT LITTLE MORE AND SAVE A LOT OF WORK. 1" x 4", 6c EACH. 1" x 6" 7c EACH. 1½" x 6" 8c EACH. THE ALUMINUM IS C.P. AND IS BEING USED IN A NUMBER OF LEADING STATIONS. FOR THE HAM WHO PREFERS TO CUT HIS OWN. 1/16" LEAD & ALUMINUM 90c SQ. FT. "DYNEX" HOOPS FOR THAT CAGE AERIAL. MADE OF COPPER BUS BAR. STRONG AND LIGHT. 8", $2.50. 18", $3.00. 30", $3.50. CARDWELL TRANSMITTING CONDENSER, $15.00. RCA "BIRD CAGES" $11.00. PYREX—GAROD GLASS SOCKETS. FB FOR THAT 5 WATTER. $1.50. THE ALLEN-BRADLEY RADIOSTAT. FOR THE FILAMENT OF THE PRIMARY TRANSFORMER. KEEPS THE CENTER TAP IN THE CENTER. PROVIDES SMOOTH CONTROL. CAPACITY FOR A 500 WATT TRANSFORMER. $6.50. GENERAL RADIO WAVEMETER TYPE 174C, 75 to 1500 METERS. $68.00. AMRAD "S" TUBES, THE ULTIMATE SOURCE OF DC SUPPLY. NO MESS, NO NOISE. SIMPLE AND EFFICIENT. NEW TYPE WITH SOCKETS $10.00 IMMEDIATE DELIVERIES ON THE SAME. MERSHON CONDENSERS $8.00. NO.16 D.C.C. WIRE, FOR THE LOW LOSS TUNER. THE BEST SIZE TO USE. 75c LB. NO.16 COTE-NAMEL 75c LB. BASELESS TUBES. THE ONLY THING TO USE FOR THE SHORT WAVES. ALL NEW RCA TUBES WITH BASES REMOVED. ANY RECEIVING SIZE $4.00. 5 WATTERS $9.00. DO YOU WANT A TUNER THAT WILL REACH UP TO 1500 METERS AND THAT WILL RECEIVE BCL STUFF AND 600 METER STUFF. HAVE A NEW GREBE CR-3 FOR 35 BERRIES THAT IS A BUY. AND WHEN YOU THINK OF TRANSMITTING PARTS REMEMBER "DYNEX FOR DX." SEND FOR OUR PRICE LIST OM. E. J. NICHOLSON, 8BIN (THE EIGHT THAT PAYS THE FREIGHT) 1407 FIRST NORTH ST., SYRACUSE, N. Y.

AIRWAY MOTOR generator 300v. motor 110-$22, also other parts. Chas. Rohner, 209 So. Albany Ave., Chicago, Ill.

WILL TRADE WESTERN ELECTRIC CW-936 TRANSMITTER AND RECEIVER FOR A GOOD MAKE BROADCASTING RECEIVER. WRITE 3-UW.

QSL CARDS: Samples and prices cheerfully furnished. 8BJT Press.

RADIO BARGAINS—ACME 200 Watt FILAMENT Plate Transformer. 14.75. Two new Jewell T.C. Ammeter 0-5amps each. $8.75. Many other RADIO BARGAINS. Write for complete list. Elmer R. Phillips, 601 Linden Ave., Newport, Ky.

WAVEMETERS: The real sort, rigidly built the way QST says to build them, on Radion panels, in handsome Adam Brown finish hardwood cabinets, bulb indicators, four inch dials, each one calibrated separately and curve chart furnished, accuracy GUARANTEED within one percent. Can be used on transmitters or receivers, also to find antenna fundamentals. Postpaid prices: 75 to 220 meters $8.00; 20 to 50 meters $9.00; 20 to 200 meters $14.00. Edward Bromley, Jr., Whitewater, Wis. 9 CSM.

QSL CARDS: For neat clean-cut cards—8BJT Press, 701 Walnut Ave., Scottdale, Pa.

FOR SALE: Knockdown twenty watt transmitter. Sixty dollars UP1016—$15. 9DDS Milwaukee, Wisconsin.

SELL: NEW 96 volt storage B batteries $5. New Burns loud speaker $8. New 5 watt tubes and sockets cheap. Kenneth Bricker, Bippus, Indiana.

# Q R A SECTION

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1AAO—H. Hewitt Cooley, 460 Ward St., Newton Center, Mass.

1KP—F. C. Beekley, West Suffield, Conn. (half way between Hartford, Conn., and Springfield, Mass.)

1CHQ—Gerald Julian, 416 Park Road, W. Hartford, Connecticut.

2JE—A. J. Gironda, Larchmont, N. Y.

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

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

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

2APN—Stacy W. Nichols, 158 14th St., Hoboken, N. J.

2JL W. A. Cohen, 126 Woolsey St., Astoria, Long Island, N. Y.

8RE—Maurice W. Brink, 571 Rutherford Ave., Trenton, New Jersey.

6APD—Chandler Brownell, 862 East 6th Street, Pomona, Calif.

9DKA, Jack Piper, New Holstein, Wisconsin.

9AMO, M. A. Flanery, Bonne Terre, Mo.

9CVC A. Palmer Baker, 1865 Fairmount Ave., St. Paul, Minnesota.

—FOR YOUR CONVENIENCE—

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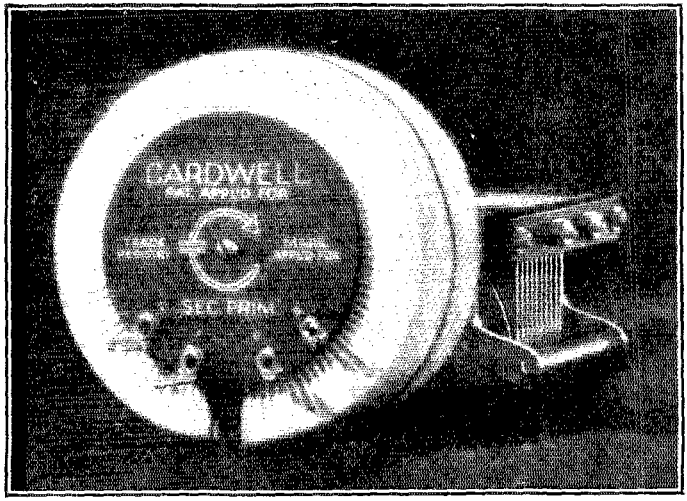


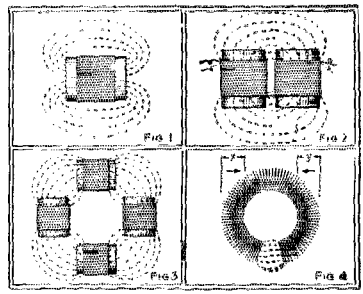


**General Theory of the Toro-Tran**

Figure 1 shows how the field of the ordinary coil extends into space and increases losses due to stray field. Figure 2 shows a "double series" winding, which restricts the field somewhat. Figure 3 shows a "four series" winding and the field almost enclosed. In Figure 4 (the Toro-Tran) the field is entirely enclosed and the losses due to stray fields are eliminated.

Note that a stray signal passing through the coil at "X"—not introduced from the aerial or the tube—is balanced out at "Y" by the reversed polarity of the winding. This rejects undesirable signals, while the concentrated internal field builds up the tuned signal. Hence maximum distance and selectivity.

# —and now the TORO-TRAN!

## CARDWELL, whose pioneer "low-loss" condenser established new standards of radio efficiency, is now introducing the Toro-Tran*—the ideal *balanced* coupling inductance for all radio frequency work.

*TRADE MARK
Registry applied for

The Toro-Tran eliminates signal energy picked up by ordinary coils from nearby stations. It eliminates magnetic feed-back in multi-stage radio frequency circuits, thus removing the most active factor in causing howling and distortion, and thereby increasing selectivity and distance. It rejects almost entirely the interference effects caused by electrical power machinery, elevators, door-bells, arc stations, etc.

The Toro-Tran winding confines the field to the inside of the coil, a small area, and thus avoids one of the greatest causes of loss known to radio receivers—that of stray magnetic fields, which result in the absorption of signal energy and reduce the efficiency of the receiver tremendously.

### *Note these unusual advantages in assembly and operation*

1. Compactness. The coils do not require spacing or angular mounting. They occupy less space than your condensers.
2. Permit exact nullification for tube and stray capacity without guesswork or tedious testing.
3. Closed magnetic field eliminates magnetic feed-back in tuned radio frequency amplifiers.
4. Low distributed capacity, due to air spacing of each winding and to low voltage-drop per turn of small diameter wire.
5. Maximum coupling and high ratio of voltage increase due to concentrated field with zero leakage.
6. Absence of all supporting insulation in the field of the coil. This is one of the greatest loss factors in the ordinary circuit and is not remedied by "skeleton" or so-called "low-loss" windings.
7. Ease of neutralizing oscillation due to tube capacity by means of rotating control, which anyone can "balance."
8. Low capacity between primary and secondary, affording maximum transfer of energy to succeeding grid circuit.

The Toro-Tran has a lower "circuit resistance" (i.e., effective resistance as assembled in a set and not as isolated in the laboratory for theoretical measurements) than any inter-stage tuned transformer made and has a correspondingly higher amplification factor, its ratio exceeding ten.

To appreciate the many remarkable advantages of the Toro-Tran, write for our two free booklets: "The Torodyne Circuit" and "The Most Interesting Radio Frequency Transformer Ever Invented."

Toro-Trans are ready to mount in any tuned radio frequency circuit. Replace your ordinary coils with Toro-Trans. You will be astonished with the results. Most .00035 mfd. variable condensers will tune them, but by using Cardwell Condensers you get maximum efficiency.

**Order from your dealer or direct**

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| CARDWELL TORO-TRAN WITH BALANCING POTENTIODON | $ 4.00 |
| Cardwell .00035 Condenser for tuning | 4.75 |
| Cardwell .00035 Vernier Condenser | 6.25 |
| Cardwell .00035 Dual Condenser (two-in-one) | 8.00 |
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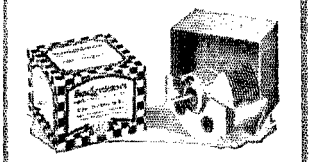
| Cardwell Audio-Trans (compound audio transformers) | 10.00 |

**The Allen D. Cardwell Manufacturing Corp.**
81 Prospect Street, Brooklyn, N. Y.

# The Allen-Bradley Line of Perfect Radio Devices



BRADLEYDENSER

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BRADLEYLEAK

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NIER

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## A distinctive series of radio units

*for set builders who seek superlative results*

EVERY amateur yearns for perfection in his radio receiver. Better quality, greater volume, and closer selectivity are the requirements of discriminating radio enthusiasts, and the circuits which meet these requirements are inevitable favorites.

The experienced set builder has learned the value of fine radio parts, and he knows the important part they play in getting maximum results from a selective circuit. Hence, it is not strange that the Allen-Bradley line has gained increasing popularity with the introduction of the super-selective hook-ups. In fact, for stepless, noiseless, perfect control, Allen-Bradley Radio Devices have no peers. Your set will be a better set if you use them. Let us send you an illustrated folder about the Allen-Bradley line.

**Allen-Bradley Co.**

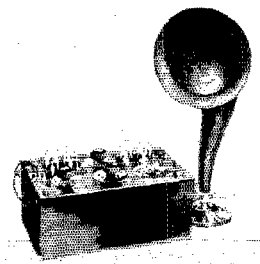
**Electric Controlling Apparatus**

277 Greenfield Ave., Milwaukee, Wis.

*Manufacturers of graphite disc rheostats for over twenty years*


*Radiola III*, that gets far stations on the headphones, and nearby stations on a loudspeaker. With two Radiotrons WD-11, and headphones. $35

# Small price for big performance — achieved in Radiola III



*Radiola III-a*, for distance on a loudspeaker. With four Radiotrons WD-11, headphones and Radiola Loudspeaker. $83

# Radiola

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# The Governors'--President Relay*

## Message Routings

ALABAMA—The Alabama message reached Washington, but not by radio. It left Montgomery, Ala., at 11.30 P.M. March 3rd It traveled via 4OG to 3OP in Baltimore 3OP was unable to raise anyone in Washington, so he mailed the message to the White House. 3OP copied the 58-word message intact.

ARIZONA—This message checked 85 words and it was intercepted by both 3AB and 3APV, while enroute from 6CSO to 8JG.

CONNECTICUT—1AW shot this one straight into Washington to 3ZW. It was one of the first to arrive on schedule time, arriving at 3ZW 1.06 P.M. March fourth.

FLORIDA—This message left 4EZ at Jacksonville 6.20 P.M. the fourth. It was intercepted by 3ZW at 7.22 PM as 4MI was giving it to 3BUY at Alexandria, Va, who turned it over to 3BWT at 11.00 P.M. the same night.

GEORGIA—The route of this message is in doubt. It left 4JR at Atlanta at 11.30 P.M. going to 3BWT. It was handled by 8AAL. 3IM copied the message at 10.25 P.M. when it was enroute to 2LD. 4JR's log shows he took it from 2LD at 11.15 P.M. We are wondering how 2LD got hold of a Georgia msg.

INDIANA—The Hood Bros. of 9BVZ report that at 6.30 P.M., having heard that a message was wanted from the Governor of Indiana, they started out to get it, thinking the Governor could do no worse than throw them out. He gave them one, remarking that he bet it would never be delivered. He was wrong, for 9ZW gave it to 3ZW at 11.30 P.M. 9BVZ sent it to 3ZI and 2KF, who failed to get it through the QRM. 9ZW finally took it and put it in.

IDAHO—This was another message that was intercepted by 3AB. It left 7ZN at Boise, going to 3XM at Princeton University. 3XM shot it down to 3ZW too late, as 3AB already had it from 7ZN. (3ZW gets the same credit as 3XM, but 3AB was taking no chances).

IOWA—The message went from 9BMH to 9DWZ by DX phone. 9DWZ gave it to 4JR and he gave it to 3APV in the early afternoon of March fourth.

MARYLAND — 3BUR got the message almost a month in advance. On account of Naval Academy duties he turned it over to 8PA and he sent it to 3LR at 7 P.M. of the fourth.

MAINE—This message made the goal in one relay. It went from 1APF at Portland to 3BLP at Bethlehem, Pa. He sent it to 3AB at 5 P.M. the fourth.

MINNESOTA — A 99 word message went direct from Minneapolis through 9XI to 3APV 6.00 P.M. of the fourth.

MISSOURI—9BKK sent this message to 3QI in Baltimore, Md., on March 6th. He shot it to 3AHP on the 8th, while 3BWT received the message via 8EU on March seventh. Either this one hung up somewhere or it was late in getting started.

NEBRASKA—This one was shot around a bit. It left 9AKS, 9AFR and 9DAC, all of Lincoln, in the late afternoon of March fourth. 9AKS gave it to 9CZC and 8AOR. 9CZC gave it to 9BEW, where it probably got stuck. 9DPC at Chicago took it from 9AFR and gave it to 3AB at 6.30 A.M. the fifth. 9UT at Indianapolis got it from 9AEF 8.00 P.M. the fourth and he sat up all night trying to get it off. The message had a check of 48 words. 8DSE at Kalamazoo, Mich., gave it to 3BWT on the seventh, although 3APV had it direct from 9DAC at 9.20 P.M. the fourth.

NEW YORK—2AWF at Albany shot this one right into Washington to 3AB at 1.20 P.M.

NORTH CAROLINA—3LR got this directly from 4RU at Raleigh, N. C., about the same time 3AB got the New York message.

NORTH DAKOTA—8FU, at Defiance, Ohio, had this one. He gave it to 3BWT at 1.30 A.M. of the fifth.

OHIO—This message was one of the bunch handled on 40 meters. 3APV got it at 2.40 P.M. of the 4th, from 8GZ at Columbus, Ohio, on 40 meters.

OKLAHOMA—A regular book of 131 words has quite a story to it. On account of the length of the message, it was decided to send it from 5AGN on 152 meters and from 5AIU-5ZAV on 84 meters. 5AGN raised 3OP at Baltimore and gave him the message, but failed to get an ok through QRN. This was 11.28 P.M. March third. He got 3OP again at 11.50, who gave an ok. 3OP could not get out of Baltimore on the fourth and so mailed it to the White House. In the meantime 5AIU got in touch with 3AB, who was begging for a message. 5AIU got 3AB and called 5AGN over DX land phone advising that Washington had not yet received the message, and that he (5AIU) had not received it through the mail. 5AGN read off the message to 5AIU and it got to 3AB at 12.23 A.M., E.S.T. March 5th.

PENNSYLVANIA—"To Hon. CALVIN COOLIDGE, WASH., D. C. The Governor of Penna. was too busy to send a Penna. message by amateur radio. Congratulations from the amateurs of Pennsylvania. Sig. Hoch. 3CCX." This was received by 3BWT direct from 3CCX at Harrisburg, Pa.

RHODE ISLAND—This message evidently started at Providence 1II and went thru 2CVL, New York City to 3BLP at Bethlehem, Pa. 3LG at Baltimore got it somehow and shot it down to 3BMN at Petersburg, Va. It traveled back to Washington 3AB. 3BLP's log shows that he gave it to 4EA while 3BMN shows he got it from 3LG. 3LG either received it garbled or else it got that way enroute to 3BMN. The text of the original read, "God will help you to gloriously lead this nation" and it got into Washington that way. 3LG and 3BMN had it, "God will help you to glorify his name this month." 3AB undoubtedly copied it correctly in an interception while going from 3BLP to 4EA.

SOUTH DAKOTA—Which of the messages received was the right one is not known. One signed by the Governor of S. D. was sent by 9DZI to 9AYB. 9AYB gave it to 8BOY. 8BOY gave it to 3XM. He in turn gave it to 3XW and was advised by 3ZW that the S. D. message had already been received. The same message was picked up by 3QI in Baltimore from 1BUB. 3QI gave it to 3AHP in Washington and in the meantime 3BWT had notified the Chief Opr. that he had the S. D. message, having received 3 or one signed "The Sunshine State" from 3BNU at Bethlehem, Pa., who took it from 9AGL in S. D.

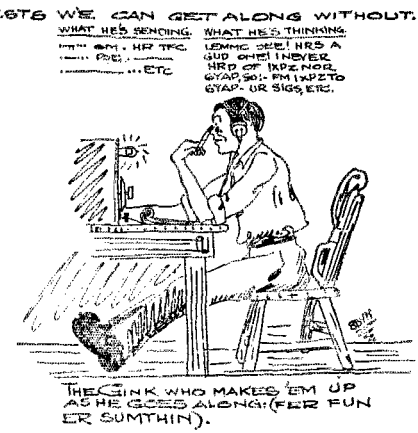
VIRGINIA—This came thru to 8AB in fine shape direct from 3BNM at Petersburg.

WEST VIRGINIA—This message was copied with difficulty by 3APV, who got half and found that 3AB had the rest ok. They compared notes and 3APV gave 8DSN at Charlestown, W. Va., the ok.

WISCONSIN—9EGH at Madison personally tried to get a message from Governor Blaine, but failed. The Governor was "too tired" so a message went thru from 9EGH to 9AAW reading, "Blaine declines to send message" addressed to Headquarters at Hartford. It traveled from 9EK to 8BF to 2BR from New York to 1ZT and Hartford.

UTAH—Was the only state that did not come in at all, out of the known 23. It was placed on the unknown list nutil the writing of this report. However, it left 6CJB and traveled thru 9BDF, 9ASB, 9EIB, 9NV and 8DAL.

There are perhaps many other messages that got started but never came thru.




* See page 39 for story of the relay.

# Something For Station Owners To Consider

TWO factors are important in determining the working range of given apparatus. Upon the *station*, and upon the *operation* of the station, depends the traffic report and the DX record, both the electrical performance and the keying having weight in determining the amount of traffic moved and the range. The possibility of establishing communication depends on the judgment of the operators as well as on the strength and character of the signals.

In the first place let us consider the influence of electrical circuits and performance in working DX. The transmitter itself and the signal which it puts out determines the readability of the signals. The note must be good, and the signal must be steady, to give the receiving operator a fair chance to do his stuff. Any of the fundamental circuits may be modified to give satisfactory performance on most of the wave-lengths which amateurs can use. However, any old keying arrangement cannot be used to best advantage. The type of plate supply also influences the readability of the signals. Steadiness is another quality our signals must have.

Keying in the primary of the plate transformer, when using a rectifier and a large filter gives a peculiar drag-over on the note which makes it almost impossible to copy. A smaller filter or a partly filtered plate supply, simply gives a modified condition without remedying the condition at fault. A master oscillator circuit can be used to prevent swinging signals but proper attention to antenna supports when the antenna is erected is a worth while substitute when we cannot afford the extra tube. The old argument of an A.C. vs. a D.C. plate supply cannot be thrashed out here. A non-swinging D.C. note gives the cleanest cut signal but this is tiresome to copy for long periods of time. The interference caused by an A.C. modulated plate supply and the broadening of the transmitter wave band by use of such a supply must be considered. Brute plate power encourages harmonics and wobbly signals. Sudden application of power by keying causes key clicks.

The matter of the best wave-length for DX working is now becoming better understood. For daylight traffic the shorter waves have been proven best for the maximum distances to be found in this country. For efficient traffic handling have the transmitter adjusted for maximum efficiency on two or three known lawful wave-lengths. MARKED or TAGGED points on the inductance and condensers with known settings for definite wave-lengths will enable a QSY quickly at any time. And schedules on these known wave-lengths will move traffic quickly and efficiently. (Look for a new system of relay traffic handling in an article by 6PS in the June issue). There is no excuse for transmitting on unlawful wave-lengths. Foreign stations look for us on our assigned wave bands. Dope on wavemeters for all ranges has been printed in past issues of *QST*. Tune your transmitter to the band where the least number of other stations are operating if you want to work without QRM. Picking up a given station is simplified if you know what wave-length the station is working on and if your receiver is calibrated.

The receiver should be built with the design principles mentioned on page 47 of July 1924 *QST* so that the tickler or feedback control has negligible tuning effect—otherwise calibration will be impossible. Hand capacity must be kept low and a method of feedback adjustment used where the plate circuit adjustment doesn't effect the tuning. A good receiver is just as important as a good transmitter. Both are necessary to the worth while station.

Now let us consider the operator and see what he has to do with limiting the range of the station. The operator must have a good "fist", he must have patience and judgment, and he must develop systematic methods of working. Engineering or applied common sense is as essential to the radio operator as to the experimenter. Don't make several changes in the set hoping for better results. Make one change at a time until the basic trouble is found.

An operator with a clean-cut, slow, steady method of sending has a big advantage over a poor operator. Good sending is partly a matter of practice. Patience and judgment, however, are just as important as a good "fist". There are still a few operators who CQ for five minutes, listen for a half minute, and CQ again. CQ should be sent three times, then you should sign three times, for a total of three times. Listen at least a minute, turning the dial slowly and listening for a possible answer to your CQ. Then you can move traffic. Why not try the method proposed by C3MR last month instead of using "CQ"?

—*F. E. H.*

NOTE: Another call for material for these columns is in order. We want to print an interesting and educational traffic article each month. If we get enough material we can make room for more than one article. Please take note, everyone. Sit down now and write us whatever you think will be helpful in the best way you can.

# Washington Birthday Daylight Transcon Report

THE results of this relay can be truthfully stated as *unsatisfactory. The value of the relay* lies in the value of any failure. We can profit from the experience in daylight work and we can plan another relay more carefully and put it across next time.

These messages were coded in a manner similar to that of the previous daylight relay in order that we might check on the accuracy with which messages could be passed over our routes. Twelve official messages were started. Six were distributed for starting on each coast and the plans were carried out just as mentioned in February *QST*. Also a special Transcon was started by Major Borrett from c1DD with the text, "Rotabs nulli secundus." This fared no better than the other messages.

Most of the messages were sent in just as they were handled with comments on a separate sheet. This much simplified the work of tracing the routes. The time when the message was acknowledged by the operators handling it was in most cases fairly accurate. A considerable improvement over the previous relay was shown in this respect.

Each message carried a number for identification. The messages are distinguished by this number in the report of routing.

East-bound messages:

0221.—This message was not started.

0222.—7GB started this one. It moved via 7FT-6BLH-6CJB-6CVA-6AED-9DED to 9CJS. The coded text was hopelessly garbled. Starting at 8.45 a.m. it arrived at 9CJS at 4.30 p.m., local time. 6CJB gave the message to 7GW but he refused it as this routing moved it west instead of east.

0223.—7LR sent this one to c5BM in Vancouver at 7.53 a.m. and no further reports of its travels were received.

0224.—At 7.51 a.m., P.S.T., this message left 6AFG. It passed via 6BUI to 6RV who acknowledged it at 10.33 M.S.T. No further routing is available, and we assume that it died here.

0225.—6ZH sent this one to 5LG who almost succeeded in passing it to 9DED. The jump into the ninth district was a little too long to make under daylight conditions but 5LG and 9DED deserve credit for the attempt.

0226.—This message went via 6LJ-6CSO-9DED to 9CJS. It started at 8 a.m., P.S.T., and died at 9CJS at 4.50 p.m. with but one error in transmission.

West-bound messages:

1251.—Starting at 11.50 a.m., Atlantic Time, Nr. 1251 traveled via c1DD-1SF-8ZK-9ZT to 9DBR. Another route was 9DQU-9BZE to 9EAK where it died. 9DOA copied it from 9DQU and passed it to 9RT. He gave it to 9AEY and we have no further knowledge of its routing. The text of the message was correct as sent in by 9DBR.

1252.—Leaving 1KX at 10.04 E.S.T. it went via 8-UF-8AY-8BBW-9AZJ to ??. Also 2CTH picked it up from 8UF's QST and it went by way of 8AVJ-8BEN and 8ATR to 8NB. Another route developed was ??-8XE-9AUC-9AOO-9CBA-9BZE.

1253.—1BVB-2AZY-8AGO-8DSE-8CQG-9BIB-9CTF-9DUP-9DCX-9BNF was the route taken by this message. 8DSE-9AIO-9CWZ and 9BZE also formed a branch route. 9BTD and 9AZN got the message from 8DSE and 9CWZ respectively.

1254.—4XE-4EZ-4DU-4IO-5DI-?? is one route taken by the message. It arrived at 4IO partly garbled but 4IO checked back with 4XE and the text was correct at the end of the route. The message went from 4XE via 5UK-4KU-5AKN-??. The text from 5AKN was scarcely recognizable.

1255.—This message was correct because it passed through fewer stations. It traveled 4BX-4TJ-5AOT and was 100% correct. 5AOT could have moved this message in any direction but west. It stopped here only because he could hear no western stations.

1256.—This message made the best showing of all the messages started. It went via 2BRB-3APV-8ATZ-8DSE-8CQG-9BIB-9CTF-9DUP-9DCX-9ZT-9BNF to 9DBR. The text was in good shape at 9ZT, having passed through ten stations. Several other routes developed and are as follows: 2BRB-8ATR-8AGO-9GZ-9DQU-??. 2BRB-3BWT-8AUL-8AAL-9BQE-9EIB-9AOO-9CUL-9DND. ??-9CFI-9AIM-5ASB-5AME. 8DSE-9AIO-9CWZ-9AZN-9BZE. 2DD-2CTH-8AVJ-8BEN-8CSX. 3APV-8CEO-8BPA-9COC. 2DD-3BAQ-8EU. 3APV-8RY. It was caught by darkness halfway across and suffered the same fate as the other messages.

Nr. 56 Extra.—c1DD-1CCX-3APV-8VX-8RY-9BQE and 9GT handled this message. It made fairly good time and was still wandering around the eighth district on February twenty-third.

The changing of message texts between stations points to poor communication and poor operating. In one or two instances extra words appeared in messages in such a fashion that it was evident the transmitting operator was sending words twice PART of the time only and sending so poorly that the receiving operator copied two code combinations instead of one.

Many of the gang in the west were in too much of a hurry to transmit their messages and got rattled. It must be remembered that slow, even sending can be easily and correctly copied and that the rate of moving traffic depends more on using this sort of sending than it does on the speed of transmission by individual operators.

Some stations were working on forty meters instead of on the 75-80 meter band specified. A lot of time was lost in message handling by stations CQing without giving any specified direction. Both stations wanting messages and stations having messages used CQ without effect. The use of this signal should be limited to stations having traffic or else something we want to be sure of sufficient interest is wanted.

Even the weather comes in for its share of blame. 9BZE complained that there was something resembling a signal-proof wall west of his station. He did his best but got stuck with four messages. QRN was reported severe in most parts of the country.

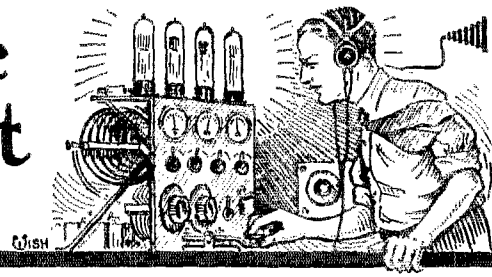
A lot of credit goes to the stations that took part in this relay. Not enough stations were active in some sections of the country. Next time we start something we want to besure of sufficient interest to carry it through with flying colors.

Each division manager has been carrying on daylight tests week-ends. When the time is ripe we expect to see some transcontinental messages going over in good shape in full daylight. Do your bit every week to perfect routes in your locality. And let's be more careful in handling the messages that come our way. Read the articles on traffic handling which are printed every month. Then put the ideas into practice at your station every day in the year. You will be surprised at the results I am sure.

—*F. E. H.*

# The Traffic Department

F. E. Handy, Acting Traffic Manager
1045 Main St., Hartford, Conn.



THE first thing that you will notice this month is that a new man is in line for the Traffic Department Trophy. 1KV didn't carry it off after all. Some questions have been asked regarding the Trophy and everyone does not yet understand how the award will be made.

Complete information regarding the valuable prize was given in the Traffic Department columns of February *QST*. The Trophy will be given to the A.R.R.L. Member who shows the highest degree of operating ability by handling the most bona fide messages for three consecutive months. The contest is between operators and not between stations. The operator who wins this prize must have a definite purpose. He must not only show the ability to pile up a message total by good operation but he must also show the persistence and stick-to-it-ive-ness that will keep him busy at the key and busy getting local traffic to put HIS station over three months in succession. All messages handled must be of a high grade. To make certain that the operator winning the trophy deserves the v uable prize that he will get we are making the rule that all operators trying for the prize forward their traffic through the local traffic officials to the division manager of their division. It will be the division manager's duty to see that the traffic was handled promptly in accordance with A.R.R.L rules. Only good messages will count. Each month Headquarters will communicate with the high men as soon as the reports have been compiled. The D.M. will receive instructions to check the next month's traffic HANDLED BY the high men. In the case of traffic handled by club stations where two or more operators are responsible for the traffic it will be necessary that the operator submit his messages to the D.M. with an affidavit.

R. F. Allen — 9CTF
Mendota, Ill.
Midwest Division
558 Messages

The month 9CTF takes his place in the starred rectangle. If he is there twice more the Trophy will be his. One of these days when some of us decide that a $200 prize would be a good thing for *OUR* shack that prize will get ready to move. Consistent work is what will count. There is still an opportunity for everyone.

We want to compliment 8ARS and 8CTJ for doing some good work at the Cincinnati Radio Show. They put themselves in the Brass Pounders' League and if the several operators had kept track of the traffic each handled we suspect 9CTF would have had to work harder for his laurels.

Just a word about the short wave tests for this summer. A lot of interest has been shown and next month we will announce definitely just how and when they will be held. Get your stations ready for 40, 20, and 5 meter tests in the last part of July. We have a lot to learn about the shorter waves and the quicker you can get your station down the sooner we can learn it. The fellows in England have now gotten permission to make some short wave tests and it will not be long before twenty meter daylight work will be as common as the present work on the 75-85 meter band. July will tell who is who. Atmospheric disturbances are not going to bother us much on the lower wavelengths so it is logical that we use the shorter wavebands for our summer work. Make use of schedules and clear traffic quickly and surely. In the spare moments get ready for those tests.

*BRASS POUNDERS' LEAGUE*

| Call | Msgs. | Calls | Msgs. |
|---|---|---|---|
| 8ARS-8CTJ | 1272 | 30U | 215 |
| 9CTF | 558 | 3BMN | 202 |
| 5XA | 352 | 9ZCL | 196 |
| 9DTK | 352 | 4JR | 188 |
| 8BAU | 345 | 5ACZ | 179 |
| 8BYN | 270 | 9BVN | 172 |
| 9CDV | 269 | 3BLP | 170 |
| 9AZN | 240 | 8CPY | 151 |
| | | 8GZ | 151 |
| 6CHS | 225 | | |

## A Challenge

CQ CQ CQ! Contrary to reports, the situation seems to be growing worse in most sections.

We, of Florida, claim to be more nearly 100% strong in observance of the League's CQ regulations than any other state in the Union. This is a challenge!

One of the requirements of an O.R.S. in Florida is that he observe the League's CQ regulations. This is not all. Thinking it may be of value to others, we wish to tell what is being done in Florida to regulate the CQ situation.

There have been many station contests. But we have something different in the way of contests.

Our aim is to have Florida hams known throughout the world as being the most courteous, law-abiding, and gentlemanly operators in the United States. Foremost under the head of courtesy, comes the proper use of CQ. Is is not most discourteous to send a long CQ?

The contest in Florida is based on these principles. The station having best "deportment" for the month is the winner of the contest. "Deportment" includes observance of CQ regulations, radio laws and all-round courtesy and gentlemanly operating. If a station is active the required number of days and handles the required minimum number of messages it is eligible. The A.D.M. and District Superintendents are on the air and in a position to know how each and every station in the state is being conducted.

Dr. Burgess, of the Burgess Laboratories, interested in anything which may better amateur radio, has kindly offered to furnish prizes each month to be awarded to the winners of the contest. Dr. Burgess and his entire staff at 4DM are co-operating with the Florida men through 4QY, who is responsible for the plan just described.

Remember the challenge—do we get away with it? Then give us some competition.

(Signed) C. F. Clarke
A.D.M. Florida.

## ATLANTIC DIVISION
**E. B. Duvall, Mgr.**

THE division shows increased activity. O.R.S. are earnestly requested to cooperate by mailing their reports to the officers right after the 15th of the month. The D.M. has mailed a circular to each O.R.S. giving the name of the traffic officer to whom reports should be mailed. If a report is absent from *QST*, it is because the A.D.M. has not mailed his report in time to reach this office by the 28th of the month.

Reports are given in the order in which they were received.

DELAWARE — The D.M. visited Wilmington in March. While there was not time to visit many stations, keen interest was evident everywhere. 3WJ is on 77 meters with two UV202 tubes. 3AIS gets out well with two W.E. VT2 tubes. 3SL is after laurels on the 160 meter band. 3AUN has an able operator at the key occasionally. He is QSO England. 3AIS has a schedule with the D.M. Sundays. This should boost Delaware's traffic reports. Other A.D.M's will do well to note this and follow suit.

MARYLAND — 3LG and 3CGC report for their territory for the first time. 3CGC, R. L. Kelley, the new appointed C.M. for West Baltimore. When a C.M. for Eastern Baltimore has been secured, it is hoped that complete data on station activities will be available each month. 3OU justifies its recent O.R.S. appointment by turning in a fine report of *real* messages. 3DU operating on 40 meters has been QSO every district. 3BUR and 8PA have been active. 3PA handled his Governors'-President message for Maryland very well. 3LG reports fine results on 40 meters. 3LL worked 11MT using 40 meters. He is arranging a schedule with 3AB. 3AJD is moving. We hope he will be even more successful in his new location, if such a thing is possible. 3AOJ, 3CGC, 3HG, 3AHA and 3AE are on 80 meters. 3AHA worked many foreign stations and was heard in N.Z. 3AE is on with a "fiver." He uses a M.G. set with excellent results. 3OP is QRV traffic on 160 meters. 3TE-XAQ has worked WJS and many other foreign stations. 3MF and 3SF are QSO Europe on 75 meters. 3SF worked the west coast on an indoor antenna. 3WF's phone has been heard in England. 3PH, 3QI, 3AAM and 3HU are active on 160 meters. 3HG keeps a Sunday schedule with the D.M. 3KU and 3APV are on 40 meters. 3KU blew a "fiver" and now uses a 201A. 3APV's twenty meter sigs were heard by g2NB and g5F in daylight. On forty meters he was heard at u7FQ and g2DF in daylight. 3BML is on the job regularly and gets out fine. 3DW operates Sundays. The D.M. is busy working schedules with the A.D.M's.

Traffic: 3KU, 12; 3APV, 70; 3OU, 215; 3OP, 18; 3LG, 17; 3LL, 31; 3QI, 16; 3BUR, 8; 3PA, 6. 3DU, 4; 3AAM, 4; 3AEA, 8; 3HG, 12. 3DW, 2.

DISTRICT OF COLUMBIA—A definite revival of traffic handling in the District of Columbia is evident. Maybe increasing QRN makes long dstance working difficult. Anyway, the A.D.M. is glad to see the renewed interest. 3BPP says traffic is hard to get on any wavelength. 3BHV says he is off for the summer. 3LR dropped from sight — this time it's a saxofone. 3CKG, 3KM and 3JJ have been experimenting below 5 meters. "Big Hearted Al" of 3ZW evidently took the razz in the last report seriously. He says "I tried mercury arc retafication with unfavorable results. Music has ruined radio development at this station. Even the janitor service has succumbed." (Signed) H. A. Wadsworth, Chief. Operating Dept.

Washington operators were on the job during the Governors'-President Relay. They delivered 22 messages to the White House. Interest along technical lines is now in Quartz crystals, five meter transmitters and wavemeters for the very short waves.

Traffic: 3BWT, 66; 3AB, 15. 3BPP, 5; 3JO, 4.

SOUTHERN NEW JERSEY — 3XM is the star station. 3XM has six operators and works on 80 meters. The fellows are real traffic hounds. They worked 40 west coast stations, took part in a speed relay from Holland to Java, did their bit in the daylight transcons and the Governors'-President Relay, and they are active in the Inter-Collegiate Radio Association. 3BTQ is in line for an O.R.S. appointment. 3BTQ has worked England and France on 75 meters. 3RE is a new station at Trenton. 3CBX is back with a new QRA, a new antenna and a new tube. 3ZI has handled traffic with stations in Nebraska and Colorado. 3KT has a fifty watter and a powerful kick. 3BGT has come to life again. 3BKH is on 80 meters. 3UT handles considerable traffic. 3CJJ has a consistent range of 1000 miles. 3NL continues to wreck five watt tubes. 3ARI threatens to open up again. 3TH was heard in England. 3OQ worked six European countries and WJS. Luxenbourg OAA was worked Jan. 30th. Has anyone beat 3OQ to that? 3BWJ worked z4AA. He heard 1XAM on a loud speaker with detector only. 3CHH worked Italy. 3BEI lost his sixty foot mast, after which he worked 6PI and was heard in N.Z. 3VX has been handling traffic like an O.R.S. 3AIH is getting out well. 3ACQ works while we sleep. 3BAV is busy with school work.

Traffic: 3ZQ, 16; 3XAN, 5; 3CBX, 3; 3BTQ, 29; 3XM, 94; 3OQ, 41; 3ACQ, 4; 3AIH, 4; 3BAY, 14; 3BEI, 3; 3BWJ, 2; 3CHH, 9; 3WB, 18; 3AS, 35; 3BCO, 24. 3CB, 5.

WESTERN NEW YORK—Reorganization has been going on in this section. New officials and O.R.S. have been appointed. Reliable new statons should get in touch with traffic officials at once if they desire O.R.S. appointments. 8BXP is a reliable station doing good work. Miller, 8AVJ, wants to get in touch with new stations desiring to become O.R.S. 8DDV reports good progress. 8CGU is a new O.R.S. who has two 50 watters. 8CFV is back again. 8UF is heard everywhere as usual. 8DFI worked N.Z. 8DDV requests stations in Lewis, Jefferson and St. Lawrence counties to report to him. 8ADG worked 34 European stations. 8DSM is getting out fine. 8PT is on 80 meters. 8AOZ, 8DHN and 8BZU are planning a hamfest. 8ADD has fallen for Jazz (Flaming Youth, or B.C.L.?—D.M.) 8BXF, the YL at Rome, is leaving. 8BZU is busy collecting data on stations. 8DME handled a bunch of messages on 40 and 80 meters. 8ACM has lined up four new O.R.S. Bill Bostwick wants good A.R.R.L. O.R.S. in his district. Give him your cooperation, gang. 8QM and 8VW are working a lot now. 8HJ works days on 40 and 80 meters. 8KS has not been on much. Make an "op" out of her, OM. 8BCP has worked NZ. He leads the Brass Pounders for his district this month. 8ALY worked Europe about forty times this month. 8AFN has a lot of European cards to his credit. 8ACI worked California many times this month. 8NR is now on 40 meters. He has worked every district using this wavelength. 8BZA is Chief Op. at WHEC. 8INB worked Europe. 8CYI has been building sets for the B.C.L's.

8CYI and 8TR are Rochester City Managers. 8NB is now D.S. 8BAJ worked England and France. He was heard in Australia. 8BSF expects to make some new appointments. 8RV has a Y.L. operator on duty. 8QB is active but has interests elsewhere. 8ADE does good work. 8AY, 8NT and 8PJ are good stations, reporting regularly and handling a good bit of traffic. 8BOE lost his tubes and is temporarily out of commission. 8BZE, 8AXN and 8BQA are on the job.

Traffic: 8ADM, 12; 8ACM, 48; 8ADE, 12; 8AY, 28; 8ADG, 7; 8BCW, 5; 8BSF, 12; 8AXN, 11; 8BZF, 9; 8GQA, 20. 8DDV, 10; 8DFI, 24; 8DME, 19; 8HJ, 22; 8NT, 10; 8QB, 11; 8PJ, 14;; 8RV, 7; 8VW, 14; 8UF, 56. 8ZU, 5; 8COO, 33; 8KS, 8; 8BCP, 110; 8ALY, 30; 8AFN, 10; 8ACI, 3; 8NB, 18; 8AVJ, 7.

EASTERN PENNSYLVANIA—Unless traffic officers in this section report on time there will soon be quite a few vacant offices. Fine work is being done but reports fail to reach the A.D.M. (This seems to be the general kick from all quarters and unless some promptness is shown in the future, a few cancellations will be made without notice.—D.M.) 3ZM is studying French. 3BAU works many west coast stations. 3BNU is QSO England, Mexico and the Argentine. 3YO reports traffic figures improving. 8AVL does fine work on .41 meters. All that he hears on 5.4 meters is automobiles. 5BLP was copied in Scotland in daylight. 3CDN does not seem to connect with 80 meters. 3BUV is on 80 meters. 3BCL is acting C.M. for Bethlehem. 3LK is back and 3UE has his 50 watter working. 8AOL is handling traffic with Europe. 8AUV is heard in Mexico, Porto Rico, Canal Zone, New Zealand, Australia and all U.S. districts. 8CCQ works England and France with one five watt tube. 8BFE is busy with PRR work. 8BQ has a "fifty" working. 3BTU, 3HD, 3AWA, 3FS and 3BCT are the only consistent Philadelphia stations.

Traffic: 8AOL, 8; 3ZM, 8; 3BAU, 25; 3BNU, 96. 3YO, 17; 8AVL, 9; 3TS, 31; 3AVM, 9; 3CTZ, 1; 3LK, 8; 3BLP, 170. 3CDN, 3; 3BUV, 14; 3BLC, 10; 3BAQ, 2; 3CJN, 6; 3MQ, 20; 3TP, 43; 3UE, 5; 3AUV, 7; 3QT, 58; 3ZO, 88; 3BRF, 7. 8EU, 17; 8CCQ, 1; 8CFT, 1; 8BFE, 14; 3BTU, 2; 3HD, 11; 2AWA, 48; 3FS, 7; 3BCT, 28.

The Western Pennsylvania report was not received on time. An investigation will be made to find the reason for the delay. Certain traffic department officials will be changed if this happens again.

New appointment certificates are being mailed as rapidly as possible. Complaints and criticism are welcomed by the D.M. and any trouble will receive prompt attention. Information regarding date and number of the following O.R.S. certificates will help the D.M. Will station owners holding licenses for these calls please write the D.M. and give full particulars. 3ZS, No. 4; 3CDN, No. 8; 8LL, No. 13; 8KQ, No. 14; 3CJN, No. 15; 8CON, No. 23; 3CHH, No. 51; 3AIH, No. 52; 8CTF, No. 63. 8AKI, No. 83; 8BKY, No. 84; 3XM, No. 85; 8XE, No. 86; 8ABS, No. 87; 8CDG, No. 88; 8BBV, No. 89; 8BQ, No. 91; 3HH, No. 92. 3BMS, No. 93. Holders of certificates having any of the numbers, regardless of call letters, are requested to communicate with this office. This is to clear up a possibility of a duplication of numbers issued and to correct this file.

## CENTRAL DIVISION
### R. H. G. Mathews, Mgr.

ILLINOIS — Dist. No. 1: 9EIB is a new O.R.S. He reports Peoria amateurs quiet. 9NQ is busy but always reports. 9DGA sends in a good report. 9BHT is another new O.R.S. who handles traffic well. 9AWU has replaced his old 50 watter by a new W.E. tube.

Dist. No. 2: 9CTF is a "Burgess" emergency station. He planned to handle 600 messages and almost made the grade. 9BRX is doing good work on 78 meters. He has a twenty and a five meter set. (We expect the YL's will get the best DX now and radio will take a back seat for he also has a new car—A.D.M.—D.M.) 9RQ has a new counterpoise.

Dist. No. 3. 9AWQ is off. He is in training for the track team. 9DJG visited 9MC and pounded some brass. 9AFQ broadcast a description of an imposter selling magazine subscriptions who has been through his locality. 9EBQ spotted the imposter and turned him over to the police of Coulterville. (Fine work, OMs!—A.D.M.—D.M.—A.T.M.) 9ATT rebuilt his set. He is sick now and working imaginary DX with it. 9CLZ has been off since the sleet storm. 9CSW has worked his first six using eighty meters.

Dist. No. 4: 9CA wrote a special delivery registered letter to the Governor of Illinois with return receipt requested. As there are no stations in Springfield, the Governor was instructed to give the message to 9DQU in Decatur. 9DQU telephoned for the massage but he wasn't able to get any closer than a 47th assistant after working all day. We are sorry that Illinois fell down on the job but we will do better next time. 9CZL hears numerous French and English stations. 9DCR is working at the local telephone exchange. 9DHZ is now on 80 meters.

Dist. No. 5: The D.S. is busy with "Tornado" work. 9BLO was the first to supply the news of the disaster to the Chicago Tribune through 9AAW. This is verified by a newspaper clipping from the St. Louis Globe Democrat.

Dist. No. 6: DVW has rebuilt his transmitter. 9DQR tried the short waves with little success and returned to the higher waves. 9CEC was less active due to bad weather. 9ALW is busy with school work. 9AGW promises increased activity in Elgin. 9BBR reports that he operates on 80 meters. New stations in Waukegan will be on the short waves soon.

Dist. No. 7: 9AIO has a 100 foot vertical antenna. He gets out well. 9BTA is now located in Chicago. 9BE heard g2NM on his tuner. 9ZA is on Saturday and Sunday afternoons on 40 meters.

Traffic: 9CTF, 558; 9cZL, 196; 9NV, 82; 9AWU, 82; 9BNA, 55; 9BRX, 54; 9EIB, 49; 9BE, 48. 9AIO, 44; 9DWH, 42; 9DXL, 41; 9DWX, 41; 9AYB, 39; 9BHT, 36. 9DGA, 36; 9DPC, 36; 9AVH, 31; 9CSK, 28; 9DQU, 27; 9AAW, 26; 9DHZ, 24; 9CYR, 21; 9ZA, 20; 9ELR, 20; 9AWQ, 19; 9DJG, 17; 9AFQ, 17. ELF, 15; 9BHX, 13; 9MC, 11; 9ATT, 7; 9BUX, 7; 9IX, 7; 9AHD, 7; 9DZR, 6; 9BLO, 4; 9CEC, 3; 9BIZ, 3; 9ALW, 2; 9DVW, 2; 9CLZ, 1.

KENTUCKY—Activities have been increasing on 80 meters. Nearly all local stations are on that wavelength. 9DTT, 9MN and 9HP have received their O.R.S. certificates. 9WU needs a 50 watter. 9ELL and 9MN are on 40 meters. 9ELL has been reaching Britishers regularly. 9HP has moved to 80 meters and left his troubles with the B.C.L's behind. Louisville hams enjoyed a visit by A. A. Hebert of Headquarters, who made an interesting talk on the history of the A.R.R.L. and general League activities.

Traffic: 9ELL, 20. 9MN, 8; 9OX, 8; 9DTT, 6; 9HP, 5; 9DYC, 1.

OHIO—Dist. No. 1: 8BCF has been sick. 8AGP gets good DC from chemical rectifier. 8AOA is on low waves. He threatens to install "radiophone equipment." 8CQA is working out well with 80 meters. 8AA has worked 200 miles with .56 watt and Burgess dry batteries. 8ER is not on much. 8GD and 8CCI are getting out fine and using the 150-200 meter band. Findlay is troubled with interference that no one has yet located. 8DCB and 8BQI on 80 meters. 8ANN blew his ancient 50 watter. 8DHS is waiting for the Tel. Co. to erect his pole. 8AOE has worked the west coast with one "fiver." 8DFF and 8ARO are on little but 8ARO does fine work. 8FU can't hear any foreigners to work. 8DND operates at WHBD. 8BN is building a new counterpoise and will soon be on 80 meters. 8PU is trying to get down on 20 and 40 meters. 8BRU has good D.C. again and is looking for traffic.

Dist. No. 2. 8ZE leads in traffic handling. He is QSO Mexico and the west coast nightly. 8RY was reported by g2CC, g2ACZX and g2IC. 8BCE was reported at aJ2T. Using 40 meters he works 600 miles regularly at noon. 8AJZ has trouble getting going on 80 meters. 8WE is busy at school. 8AGS is off most of the time.

Dist. No. 3: The casualty list ran high for tubes in this district. Many a tube went to the "Land of eternal rest and low input," as 8BVR has so aptly put it. 8ADA and 8BKM lost tubes and can appreciate the full significance of these remarks.

Dist. No. 4: 8CVA does wonders on 80 meters. 8AIB and 8AWN are away at school. 8DPK is on occasionally. 8CWR is busy playing basketball. 8BGF has been heard in Italy, Scotland, England, Sweden, Holland, Panama and Porto Rico. 8CNR is building a new home. 8APR is constructing a new mast. 8ANB has a new generator. At the radio show in Cincinnati the dealers had a display and the amateurs had a booth with a complete transmitter. 8AUA, 8AYU, 8BDK, 8DSR, 8ALJ, 8CTA, 8BCJ, 8APR, 8COJ, 8ALW, 8ANB, 8AQE,

8CHB, 8BOS, 8FN, 8AXX, 9UZ, 9VZ, 9AWF, 9APS, 9DIA, 9BSR, 9AMJ and 9AWF helped make the amateur exhibit a success. 8CTJ was the special call assigned for the station at the show and 8ARS, the club station, worked with 8CTJ to clear the traffic.

Dist. No. 5: Message traffic is increasing. 8BAU is the banner station for traffic work. 8PI has a new 203A. He worked South America twice and New Zealand often. 8CBP worked g2CC and g2SZ. 8BBH is alive and kicking. Let's hear you again, OM. 8BAU has tough luck with S tubes but works England and NZ often. 8GZ complains that messages are scarce. He works N.Z. 8TJ still uses spark and ICW on the 150-200 meter band. He turns in a nice report. 8BYN rebuilt his transmitter. He works many foreigners and was heard in N.Z. 8BYN, 8GZ, 8DO, 8BAU and 8CBP are now equipped for twenty and forty meter work. 8CWP is busy. There is little QRN on 40 meters and the DX is good. Let's keep up the good work right through the summer. New men who can qualify for an O.R.S. certificate should write the D.S.

Dist. No. 6: 8ATZ has spring fever. 8AK and 8DFO, our consistent traffic men, are overhauling. They are planning to go after that traffic trophy. 8AJD works on twenty and forty meters.

Traffic: 8ARS-8CTJ, 1272; 8BAU, 345; 8BYN, 270; 8GZ, 151; 8DPN, 107; 8BWB, 78; 8CCI, 63; 8CBP, 62; 8BQI, 49. 8ACY, 45; 8CNL, 45; 8DAE, 44; 8DGP, 44; 8AOE, 42; 8ZE, 41; 8APR, 36; 8AVT, 36; 8DBM, 34; 8BN, 32; 8PI, 32. 8DO, 32; 8DCB, 30; 8DPK, 30; 8ANB, 30; 8RJ, 29; 8BPL, 23; 8FU, 28; 8TJ, 25. 8BBW, 24; 8BBW, 22; 8DRX, 21; 8BDK, 20; 8RY, 13; 8ATZ, 13; 8AA, 11; 8AWN, 11; 8AJZ, 10; 8KC, 10. 8CVA, 10; 8CTA, 10; 8DND, 9; 8ADA, 9; 8DGV, 9; 8AAM, 8; 8XAV, 5; 8DFF, 5; 8BKM, 5. 8DCF, 5; 8AWX, 5; 8ALW, 4; 8WE, 4; 8BCE, 4; 8TT, 4; 8BGF, 3; 8BTC, 3; 8BKW, 2; 8BOQ, 2; 8AIB, 2. 8CWR, 2; 8AJD, 2; 8BRU, 1.

WISCONSIN — Dist. No. 1: 9DTK is having trouble with his M.O. He has enlarged his chemical rectifier. 9ATO blew his fifty watter when working Cuban 2MK. 9CII has an emergency transmitter working FB, and his 20 meter set is nearly completed. 9DKC has a good message report. 9BMV is the first Wisconsin station to work z4AG.

Dist. No. 3: 9DKS, who operates at WLBL, has a 100 watt master oscillator set. 9AEU reports a new station, 9ANE, in his city. A new wide-awake club in the Twin Cities has assigned waves to each station to cut down QRM. 9CIU reports traffic good. He worked all districts in one night with a "fiver." 9ALI is locating in Marionette next month. 9ALA has been QSO all Canadian and U.S. districts but the sixth. B.C.L's, Y.L's and B.B.'s keep 9BVA off 90% of the time. The weather is fine and the tubes have good bad. Better try a rabbit's foot for a grid-leak, OM, and notice the improvement. 9EMD is going through the transitory period which precedes the blossoming out of a new short wave station. He has coherer-decoherer and an electrolytic detector that he will sell for a reasonable sum. Antiques are valuable these days, too! 9BYI is busy with school work. He has a schedule with 9BES in Indianapolis every night. 9DHG wants to hear from new stations in his district. 9DCT is on the job but busy with work. 9BYE's last tube has gone west. We expect an "ether buster" will sign 9BYE next. 9AGT built WHBB and wGBN recently. He will spend the summer at the key of one of the lake boats.

Dist. No. 4: 9AZN kept two schedules, one with 9DTK at noon and one with 9BSO at 4 P.M. A real traffic report resulted and a lot of real traffic went through. (Regular schedules are essential to good traffic handling — A.D.M.) 9ALI may move to the eastern part of the state. 9BSO is on 77 meters. 9DCX is a new station that is coming to the front.

Dist. No. 5. 9BKU says his U.V. 203 is working fine. 9DPR is on 79 meters. His traffic handling is dependable. 9BTH was busy at WEBC. 9ELI works all emergency stations and is the best station in the northern part of the state.

Traffic: 9DTK, 352; 9AZN, 240; 9ALI, 113; 9DKS, 100; 9ELI, 72; 9BSO, 71; 9AEU, 68; 9DPR, 59. 9ATO, 39; 9CIU, 37; 9DCX, 33; 9CII, 31; 9BLF, 28; 9DKC, 28. 9ALA, 25; 9BMV, 24; 9BVA, 22; 9AFZ, 21; 9AKY, 20; 9BBY, 19; 9PJ, 15; 9BKU, 12; 9VD, 12; 9BKR, 11; 9CVG, 9; 9BKC, 6; 9EMB, 6. 9BYJ, 5; 9DST, 5; 9NY, 5; 9BYJ, 5; 9DHG, 4; 9CRA, 4. 9DB, 2; 9ABZ, 1.

MICHIGAN—Dist. No. 1: 8DGT has enlisted in the Navy. 8BDR is with the Jewett Radio Co. 8DKA makes his first report this month. His traffic was mostly handled with "sixes." 8AHM is the most active station in Ypsilanti. 8ANP is getting out well. 8AOG and 8DIL are on the job. 8ZO is getting across the "pond." 8AMS is reducing his wavelength. 8BBI says traffic is getting better. He reports bad QRM on British waves. 8DOO says he is moving his station. 8ZT says things are quiet in Pontiac. 8BXA is reliable in reporting. 8ZH will handle anything but "rubber stamp" messages. He will check your wavelength and audibility at your request. 8MR is the 100% A.R.R.L. station of the Radio Research Club in Detroit.

Dist. No. 2: Traffic figures are still dropping. 8CED, 8LR, 8NX, 8DFB, 8ZF and 8BTF are on the 80 meter band. 8ZF is on twenty and forty meters. Let's all get on 40 meters before the summer season arrives. 8CED works Europe in spite of QRM from the Y.L. 8NX is installing a quarter KW tube. 8LR is a new O.R.S. but an old timer. He installed his first one KW spark set fourteen years ago. The Lansing gang plan a camping trip. With C.W. they hope even Hartford will hear the rumpus. 8BUL is working both his station and 8BTF. 8CLG and 8BNC have had hard luck with tubes this winter. A district meeting planned in May will probably be held in Ionia. 8DCW leads with traffic, and he has logged g2OD, gNM, zAA and z4AG. The D.S. must have traffic reports in by the 10th of each month. 8CAP blew two tubes. 8BWR is busy making superhets for B.C.L's. 8DFB with a "fiver" works the west coast now.

Dist. No. 3: The gang are handling traffic like good fellows now. Five (?) watt tubes seem to be in the majority owing to thin wallets and the greater DX possibilities of short waves.

Reports on the Michigan Tests are not all in yet so the prize winner cannot be announced. The gang had a great time at the Michigan Convention at Lansing. Thanks to the Lansing fellows for the good time. Kalamazoo was chosen as the city in which the Fifth Michigan State Convention will be held. 8BOK says he is going to blow up the whole A.R.R.L. if QST's type setter continues to use "D" in place of "B." We appreciate the fine work you are doing, nevertheless. Official welcome to 8CMD, the new Benton Harbor station. 8AAL-DFS is on most all the time lately. Glad to see your message total jump, OM. 8AQA is in Chicago pounding brass at 9NV nights. S'matter your fellows? 8BTL is operating now. 8AZW hands in a good traffic report. 8DDT is rebuilding. 8CPY, 8DSE and 8CQG have been burning the filaments a lot lately. 8AOR is working his "fiver" to death. 8DXF is giving the B.C.L's a rest. The Grand Rapids gang meet once a month. 8JG reports good relay work on short waves. 8AUB burned the midnight oil to get messages. 8DMA has a new 100 watt station. Glad to see that 8DJH, 8AKE, 8DMM and 8BCV are now handling traffic. We want more Michigan hams to come to the Kazoo Radio Club's monthly banquet. Bring the YL's and OW's.

Dist. No. 4: 9CE leads in traffic this month. 9CKU has applied for an O.R.S. appointment. 9CWI is overhauling.

Traffic: 8CPY, 151; 8AZW, 107; 8DSE, 89; 8DOO, 84. 8CQG, 57; 8JG, 41; 8AUB, 36; 8DCW, 36; 9CE, 34; 8ZZ, 28; 8NX, 28; 8AAL, 26; 8DKA, 24; 8BD, 22; 8CLG, 20; 8BBI, 16; 8DFS, 15; 8ZH, 14. 8WA, 13; 8AUC, 12; 8BOK, 11; 9CKU, 10; 8DEB, 9; 8DJH, 9. 8LR, 8; 8CEP, 8; 8MM, 6; 9 ZF, 5; 8AKE, 5; 8DMM, 4. 8BCV, 4; 8BUL, 4; 8BXA, 4; 8ADK, 3; 9EFP, 3; 8CWK, 2; 9AEN, 1.

INDIANA — Dist. No. 1: 9BYI says he has no success on 80 meters but that things are fine now on 150 meters. 9APB is on 80 meters. 9DDZ works consistently on 150 meters. 9CEM is experimenting on 80 meters. 9DHD is off on account of a certain YL. 9AEB is our only successful 80 meter station. 9CXG works both coasts regularly. 9DVE and 9AXR are new comers. Welcome! 9AUC uses 80 meters and works all districts with a "fiver."

Dist. No. 2: 9ABI is on low waves. 9XE, Purdue University, gets out in good shape. 9BQE has the "fiver" perking fine.

Traffic. 9AUC, 52; 9BYI, 34. 9XE, 25; 9BQE, 24; 9AEB, 23; 9CXG, 18; 9DDZ, 12; 9ABP, 8; 9AXR, 4; 9CEM. 3; 9DVE, 3; 9ABI, 2.

ILLINOIS — Regular meetings of the Chicago Radio Traffic Ass'n. were held. Many things were discussed, among them the poor modulation of Amateur phone transmitters. A committee was appointed to look into the matter and to help amateurs with poor phones. The situation should be improved before public opinion is biased against the amateur. A contest was started to determine who can build the best wavemeter. Valuable prizes are offered the winner. 9IX offers a dandy cup to the station who handles most bona fide messages for two successive months. Message copies must be sent to the C.M. for verification. The contest started midnight, March 15th. The C.M. and D.S. are to be the judges.

OHIO — The Ashtabula Radio Club is preparing for their annual sugar social at 8BTC's residence. Pictures of all local stations will be published in the local papers. Several good speakers are lined up.

The Heights Radio Club of Cleveland has not completed their new station yet. The Columbus Radio Club held "open house" during the radio show. They got thirty members and over 400 prospects. The Mahoning Valley Amateur Club of Warren are planning to build a club station equidistant from Warren, Youngstown and Niles.

WISCONSIN—The Madison Club reports that Mr. Austin has been succeeded as secretary by Mr. Zurian. The club meets at the Burgess Laboratories.

The Milwaukee Club reports that Catel has been succeeded as Secretary by John Meyer, who is making a drive for the cooperation of city hams in reporting traffic. The club is gathering apparatus for an exhibit in the Milwaukee Museum. A QRM committee has done well in eliminating interference in all parts of the city. The Technical Committee is doing fine work developing low-loss apparatus. The club is planning a QSO part for state hams. The C.M. is offering prizes to stations having a report of over 100 messages.

The Wisconsin A.R.R.L. Ass'n. has 35 members who represent all parts of the state. Meetings are called periodically by the president. The Association is desirous of assisting any local radio clubs in organizing or conducting meetings. Please address all communications to the Secretary, O. C. Austing, 1316 Drake St., Madison, Wis.

## DAKOTA DIVISION
D. C. Wallace, Mgr.

DIVISION reports this month are very gratifying. The Governors-President message was sent from each state and reached Washington in good order.

Vigilance committees are being formed in each state and complaints are being handled by some of these committees in a most satisfactory manner. The D.M. is extremely fortunate at the present time in having three A.D.M's who give their complete and intelligent support.

A new plan was inaugurated several weeks back, whereby the division manager works at regular intervals of once a week, each A.D.M. in the division. The first tests were very satisfactory and will be repeated in the near future each Wednesday night form 6.00 until 6.30 on forty meters. A number of twenty and five meter stations have been built recently and the Dakota Division is now among the leaders in work with the higher frequencies.

9XAX has a one kilowatt five meter transmitter sending daily from 7 until 7.45 a.m., C.S.T. and on Saturday and Sunday afternoons. This set is controlled by machine sending. The call 9XAX is sent repeatedly. Fellows building five meter receiving sets are urged to listen for 9XAX.

NORTH DAKOTA—Dist. No. 1. An open winter and good weather have reduced the traffic totals somewhat. Stations are being rebuilt for short wave work. 9CRG was successful in handling the Governors'-President message. 9EFN leads his district in traffic handling. 9AMP's generator burned out. He will be off until it has been repaired. (Too many amps?) 9TDQ is rebuilding his antenna. 9CSI has been sick.

Dist. No. 2: The fellows in this district are busy with school work. 9DBR is the most consistent station in this district. 9BZF is a new station. He sends in a good report.

Traffic: 9CRG, 1; 9EFN, 20; 9DBR. 27; 9BZF, 13; 9AFM, 6.

SOUTH DAKOTA—The convention produced some good results. Several new stations are active. Operating conditions are improving. The traffic meeting must have got over to the gang the advisability of canning the slipshod methods so common in the past. Several good stations are using the shorter waves. The summer months should show nearly as much activity as last winter. Reports must be sent in on time.

Dist. No. 2: 9CKT is operating on 80 meters. 9DIY is rejoicing over the arrival of a new and very young "op." FB. 9DXU is a new station in Madison. 9BXP is operating consistently and gets out well.

Dist. No. 1: 9CKT is operating on 80 meters, works many stations. 9CGA blew his "fiver" and has ordered that "fifty" at last. 9DGR has applied for an O.R.S. certificate. Traffic is growing and things are running smoothly in this district. 9BKB is a new 80 meter station. He is looking for traffic and works out well with two "fivers." 9DZI is on week days in the early morning with a "fiver." 9AGL has a "low-loss" rectifier. He worked Australia three times with 57 watts input. 9DXR has been hunting down power leaks. FB. 9CBF and 9TI work on forty meters. 9BDW says the R.C.A. has agreed to make good the 203A that went bad. 9DID has had telephone QRM. 9CKD has finally decided to try the short waves. He has a new enameled antenna. 9CJS operates from twenty to 200 meters. He is systematizing the station. 9BBF is working his phone. 9BBL is with 9CJS but thinks of getting started in Sioux Falls.

Traffic: 9CKT, 22; 9DXR, 18; 9TI, 46; 9CKD, 8; 9BKB, 14; 9AGL, 9. 9CJS, 2; 9DID, 2; 9CBF, 24; 9BDW, 19; 9DZI, 12.

MINNESOTA — Dist. No. 1: 9AYQ has changed to D.C. supply. 9BAV is back on 160 meters. He'd rather handle traffic than work DX. 9EGF gets out fine. He needs a schedule south. 9CDV leads in traffic this month. He blew a transformer and an S tube, shattering his hopes for a "HE" traffic report. 9EEP is a new O.R.S. and on regularly. 9CWN is QSO both coasts regularly with one "fiver." 9CMS is leaving Clarissa. 9DKR is getting out well with a new antenna. 9ADS is out for more and better traffic. 9BMR reports experiencing terrible QRM. 9ADF is acting. 9AND, doing fine work, is on 40 meters. 9AEI awaits a new license. 9EGU has his station working on all amateur bands. He keeps regular watches and wishes to stimulate experimentation. Write him if you want to test. The D.S. has encouraged a number to get started on 40 meters. The 20 meter stuff is next, gang, so be prepared. Let's use all the wave bands that our licenses call for and thus be prepared to handle the summer traffic with the least trouble. Don't forget to get reports in on time.

Dist. No. 2: Every station in the district is active. 9CAJ and 9CYX blew their "fivers" but are back stronger than ever. 9DDP has visited several Sioux Falls hams. 9EGG has his spark coil I.C.W. working on 40 meters. He worked 8APV in daylight. 9ACT has moved to Waseca. 9MB has a broadcasting station. 9CPO was QSO Mexico and Cuba. He is high traffic man this month and 9EBC is second. 9EFD is going down to 80 meters. 9SF gets reports from both coasts. 9BFU does well with his five watter. 9AXS has been busy. 9ANJ has a layout at Spring Grove which enables him to talk to the OW every day. 9BYY is on 80 meters. 9COF has a new antenna.

Dist. No. 3: The gang had better report this month. If you want your activities to get into *QST* let your C.M. or D.S. know of them. 9DAW deserves special mention. He worked Porto Rico, five Mexicans, and several Australians. 9XI has the high message total. 9XI is doing extensive research on the lower waves. 9IG is back with eighty watts. He is getting out fine and developing a real relay station. 9CPM worked many foreign stations. 9BNK has several operators who keep regular watches. 9SE is a real traffic handling station with a "fiver" and a one-wire antenna. 9APE has done successful work on twenty meters. 9BMX and 9APE are experimenting on the five meter band. 9ZT worked six districts one noon on twenty meters. He has reports from India, China and the Philippines.

Traffic. Dist. No. 1: 9CDV, 269; 9EGU, 74; 9CWN, 46; 9ADF, 36; 9BMR, 32; 9AND, 31; 9EEP, 21; 9AEI, 15. 9DKR, 15; 9EGF, 10; 9AYQ, 6; 9ADS, 5; 9BAV, 5. Dist. No. 2: 9CPO, 92; 9EBC, 25; 9DQM, 22; 9COF, 19; 9MF, 17; 9ANJ, 15; 9SW, 12; 9DCH, 12. 9CAJ, 10; 9BBV, 8; 9DDP, 6; 9BNF, 5; 9AXS, 5; 9MB, 4; 9EFD, 4; 9AWM, 4; 9BFU, 3; 9BTZ, 3; 9BYY, 2. Dist. No. 3: 9XI, 109; 9IG, 104; 9ABK, 82; 9SE, 81. 9DPX, 78; 9CPM, 67; 9DGE, 6; 9BPN, 52; 9DEV, 40; 9BNK, 26; 9DAW, 23; 9DYZ, 16; 9DEQ, 15; 9ZT, 14. 9BMX, 8; 9DQH, 8; 9DWO, 5; 9APE, 3.

## DELTA DIVISION
### B. F. Painter, Mgr.

TENNESSEE — There rae 35 licensed stations in Memphis. A few years ago there was not a single member in Memphis. Remember!

5BP is doing some low wave commercial testing using the call WYCJ. 5CN lost his equipment in a bad fire, but he is back reporting traffic. 5BW has a 250 watter. 5ASH and 5AUR are new stations. 5EK uses a 50 watter and handles traffic as usual. 5IK is busy with a YL. The Memphis C.M. signs 5JV. 5KA works anyone anywhere. 5NT has changed owners, and uses two special GE 50 watt tubes. 5ZB is away at school. 5ABA-5ZBA now signs 5AG at Mississippi A & M. 5AE, 5AUS and 5ER handled traffic, each using one "fiver." 5MO, 5NZ, 5AQF, 5AHJ and 5AIY are rebuilding. 5AQD still uses a 1DH circuit. 5DH is on the barge line working a spark set. 5GD was surprised with his new set. 5SY is ready for traffic. 5PV handled quite a bit of traffic. 5DQ blew his fifty watter.

5AKW has a new "op" at his home. He calls him "Harmonis". 5WO got married. We extend congratulations. 5UV oscillates about. He is now on the YL half of the oscillation. 5AVN and 5APC report light traffic. 5DA spent an evening with the D.M. 5HL has left the amateur ranks and is now broadcasting. 5ANT and 5AJM, YL's. 5ABD has a new daughter. 5LU has gone to Florida. 5XAT has no tubes. 5AQX is a new station.

ARKANSAS—Frese has worked m1AA and m1AF. 5AW and 5ANN are active. 5QH reports QRM from the YL's. Report that to the supervisor, OM. Doc Hunter is taking charge of the state and we expect things to happen.

MISSISSIPPI—Kennon has resigned and recommendations for a new A.D.M. are in order. 5QZ reports traffic moving well. He handled most traffic in the Delta Division this month. 5AGS will be at a B.S.A. camp during June, July and August. He will look for traffic and sign 5AGM. 5KR is interested in a certain YL. 5ANP is a new 40 watt station. 5AFV worked all districts in three hours. There is a general improvement in activity over last month. There is some talk of a new Delta Division Convention. What does the gang think? What about the Division Paper? Would it be worth while to start it over again? What should it contain? The D.M. wants to hear from all members on these subjects.

Traffic: 5BW, 10; 5ASH, 7; 5EK, 20; 5JV, 1; 5KA, 50; 5NT, 2; 5ER, 5; 5AEQ, 5; 5AQD, 5; 5PV, 5; 5CN, 14; 5GZ, 127; 5AGS, 19; 5KR, 45; 5ANN, 17;

## HUDSON DIVISION
### E. M. Glaser, Mgr.

THE first traffic meeting of the division was held at the convention March 7th. The division manager presided. All officials of the division present were introduced. F. E. Handy, K. B. Warner and A. A. Hebert, of Headquarters, gave the principal talks. The main topic was "Vigilance Committees." We are glad to see so many out-of-town officials present. FB, fellows!

There is a good part of the division on 20 and 40 meters. (Glad to see you down there, gang. FB—D.M.) Officials are asked to keep an accurate record of their O.R.S. Let your A.D.M. know when a station misses a report. A late report is the same as a miss because it cannot be included in the monthly report. Stations are always to report whether they have been on the air or not. Traffic is scarce but will pick up eventually. Not enough news has been coming in from New York City and New Jersey, although there is always plenty from Eastern N.Y. All C.M's and D.S's should send in news with the traffic report. 2CWR is busy getting the B.C.L's on the right track. (No easy job!) 2CYX is rebuilding. He will have three transmitters on 40, 80 and 150 meters with a central control panel. (What's the matter with 20, Marty?) 2BBX gets out fine. 2CVL and 2SM do good work. A third of 2CHY's O.R.S. failed to report. 'Smatter? You know the penalty. Two missing reports is enough for cancellation of your appointment. 2WC and 2AAY operate nightly on 41 meters. 2KU has a schedule with NFV. He uses a break-in system for speed. 2ABR likes the women too well. 2BO arranged several schedules with the west coast gang when he was there. 2CTY did a lot of DX work. 2WZ is not on much. 2CHK had such a good time at the convention that he hasn't fully recuperated yet. He has a daily schedule with c2BE. 2BR has been handling some real message traffic from wJS. 2CZR worked the west coast. 2LA had trouble with his storage batteries. 2BNL tried 40 meters. His "fifty" went west. Anyway, Ed is going to the National Convention in August with 2PF. 2XNA is working on 40 meters. 2KR is putting up a single wire antenna. 2CPK is busy changing something. 2CEP is putting Staten Island back on the map. 2BQU has been busy at College. 2CIS is a new O.R.S. 2AKK shows good interest. 2ACZ has been trying to make the set work on 40 meters. 2UPG, the Staten Island Radio Club, will be going soon with the help of 2CEP and 2CLF. 2BSL keeps Queens on the map.

Traffic: 2BBX, 56; 2CVL, 24; 2CWR, 1; 2CYX, 63; 3SM, 22; 2WC, 26; 2KU, 30; 2ABR, 5d1; 2BO, 4; 2CTY, 19; 2WZ, 23-d4; 2AAY, 21-d3. 2BRB, 10-d2; 2CHY, 3-d1; 2CHK, 16; 2AQL, 1; 2KR, 45; 2LA, 2; 2LD, 36. 2CPK, 4; 2BNL, 4; 2CZR, 20; 2TT, 6; 2ACZ, 28; 2AKK, 5; 2BQU, 9; 2CEP, 34-d3; 2CIS, 9-d1; 2BSL, 11.

EASTERN NEW YORK—Dist. No. 1: Everyone is busy experimenting on the waves below 50 meters or handling traffic on 80 meters. 2BPB worked France at 6 P.M. on 40 meters. 2KX did more "DX" than we have space to mention. He worked a bunch of west coast and foreign stations.

Dist. No. 2: Traffic handling on 75-80 meters is more popular. 2CNS is the Old Man of the district. He is 50 years young and has been recommended for O.R.S. 2AJP and 2CTB are back. They should apply for an O.R.S. soon. 2AJQ is rebuilding. He is making a panel transmitter like 2ADH's. 2AAC was heard in Europe on his "E" tube with 25 watts input. 2AQH worked a lot of "sixes." 2AJE, 2WT, 2KQ, 2CFI and 2CXF are coming back. 2CBG is working lots of DX. 2ADH is devoting all his time to his D.S. and A.D.P.M. jobs. He operates at 2DD. 2AAN increased power. He works foreigners regularly now and handles quite some traffic. 2AHB gets out well with a "fiver." 2AG has a nightly schedule with WJS. 2APY is rebuilding and increasing power. 2BQB is the livest O.R.S. in the district outside Yonkers. He does some publicity work and gets out fine. 2CIL has a Telefunken 75 watter. 2DD operates week-ends and moves traffic well. He heard z4AA. 2DD wants Saturday night schedules with St. Louis and Washington stations. He has a schedule with 9CFS. 2COV and 2AHK were recommended for O.R.S. 2COV did fine work. Yonkers Radio Club is the livest club outside New York.

Dist. No. 3: 2BM worked England and was heard in Italy, Denmark, Holland and France. 2CDH modestly does his stuff. 2AGM went to N.Y.C. He got his first grade license and is now on 75 meters. 2CTH changed to 40 meters and worked the coast at once. 2SZ continues to reach out well. 2ANM has been working on 40, 80 and 150 meters. 2CUL was QSO the coast and England.

Dist. No. 4: 2CXG, 2CNP, 2QP, 2BSE and 2AGQ attended the Hudson Division convention. 2CXG sent in a fine report this month. 2QP and 2AQR did some good work. 2CNP found that a one wire antenna worked well for transmitting. 2CYM has a new license. 2AGQ and 2BSE finally got their 203A back. 2AHK and 2AGQ relayed a play by play description of the High School basketball game to 2AQR and 2CXG at Newburgh. 200 people got the returns at the Newburgh Y.M.C.A. FB!

Dist. No. 5: Every O.R.S. reported. Most of the gang are going to stick to the key this spring and summer. 2CGH is handling his traffic on 150 meters. 2BXW expects to join the Naval Reserve. 2AIF is busy at college with 2XQ. 2GK-XAB has a new single wire antenna. He worked African AIN. The "ops" like their beds too well so he hasn't worked Australia yet. 2BY has worked N.Z. and Australia many times the past month. 2ACS handled a lot of traffic in daylight. He worked f8GK. A new copper ribbon antenna has been hoisted. 2CPA received a report from Argentina. 2ADM is a new O.R.S. He worked Europe using 40 meters. 2PV and 2AWF kept Albany on the map. 2BSB relined his pocket book enough to rebuild his set by wiring houses at night. 2PV worked Europe a few times. 2AWF is on 40 meters. He worked Iowa in daylight and all districts at night.

Traffic: 2AV, 31; 2KX, 11; 2AAN, 12. 2AHB, 14; 2AG, 51; 2BQB, 18; 2CIL, 2; 2DD, 55; 2AHK, 123; 2CNS, 23; 2COV, 22. 2CDH, 103; 2BM, 65; 2AGM, 35; 2SZ, 31; 2CTH, 6; 2ANM, 29; 2CXG, 45; 2AQR, 41; 2CNP, 35; 2AGQ, 104. 2QP, 31; 2CGH, 91; 2BXW, 9; 2CPA, 10; 2BY, 33; 2ACS, 94; 2ADM, 20; 2GK-XAB, 6; 2AIF, 1; 2AWF, 22; 2PV, 4.

NORTHERN NEW JERSEY—All O.R.S. are requested by the A.D.M. to make themselves acquainted with the work of the various Vigilance Committees and render full cooperation at all times. Make sure your transmitter is not interfering with B.C.L's and help 'em to get rid of key clicks and A.C. hums.

Dist. No. 1: 2CJX, 2CTQ, 2AT, 2ADU and 2ATE are on hand promptly with reports as always. FB! 2CTQ kept a regular watch and handled a bunch of messages. 2BMR and his spark have disappeared. 2CGS and 2BLM are new stations.

Dist. No. 2: 2WR has been busy experimenting with antennas. 2AXF reports that there is less QRM on 40 meters. 2BAW has the largest traffic report. 2BW has worked most every European country. 2AFJ may increase power. 2AGF telephoned his report to the D.S. Another old timer, 2AFC, is with us again. 2EY put his set in the cellar. He reports greater DX. All stations in Bayonne except 2CRP are on 150 meters. 2CDR worked his first "six" after three years of failures. 2ALY, the old spark hound, is building a C.W. transmitter.

Dist. No. 4: 2FC continues to work Europe with a 30 watter. 2BZJ is on 80 meters. 2BUY reports that traffic is increasing now DS is so common. 2BGI continues to work NZ. He has a new transmitter on 38 meters. 2CXY has worked 55 different European stations. FB, OM! 2CPD handles traffic in the daytime and does DX at night. 2CGK is in the B.C.L. business. 2AUH has installed a M.G.

Traffic. 2CXE, 103; 2WR, 18; 2AXF, 8; 2CTQ, 53; 2CJX, 18; 2ADU, 16. 2AT, 12; 2AJA, 11; 2CGB, 8; 2ARB, 6; 2ATE, 2; 2AJF, 1; 2AFP, 7; 2CRP, 24; 2EY, 4; 2BAW, 56. 2BW, 24; 2AFJ, 3; 2CDR, 3; 2AUH, 26; 2CGK, 1; 2CPD, 47; 2CXY, 76; 2BGI, 19; 2BUY, 33; 2BZJ, 29; 2ACO, 32; 2AMB, 5; 2AZY, 16; 2CQZ, 3; 2QS, 8; 2AEK, 10; 2AFC, 37; 2EG, 6; 2AFG, 17.

## MIDWEST DIVISION
### P. H. Quinby, Mgr.

MISSOURI—Dist. No. 1: Traffic has taken a slump again as many of the gang are trying the 40 and 20 meter bands. Many O.R.S. failed to report. (Where's that axe—D.M.) 9DLB is on consistently and has been boiling the owl quite a bit. 9ZK, ex-9AAU, is getting out in good shape. He has a new short wave transmitter and is planning some daylight schedules. 9DMJ handled his part of the traffic. He has a schedule with g2NM whom he has worked three times in a week. He has a report from Manila, P. I., too. 9DWK is installing a new antenna system. 9BDS will change his location soon. 9BSH lost his 66 foot mast in the last storm. An antenna for short wave work is being erected now.

Traffic: 9DMJ, 21; 9DIB, 30; 9ZK, 79; 9DXN, 10.

Dist. No. 2. Many fellows are using 201A tubes. 9RT has worked the east coast three times with 8¾ watts input. 9AOB says 9EGS has moved to Buffalo, N. Y. 9CUU lost part of his mast when linemen let a tree fall into the guy wires. 9DJI is stirring again. 9BUE reports bad QRN (sic semper vere!) 9BVK can't keep his aerial off the ground. 9DAE had no luck trying to get KFNJ for a ham transmitter. He is now working on a ground system. 9DZO is helping 9DAE. 9DNJ, using a plate supply, does good DX. 9CRM has a new "fiver." 9DIX is busy with school and he operates a movie projector until midnight each night. He says interference is bad on 80 meters. 9AYK says traffic is light. 9CYK replaced a 50 watter with a 201A. 9ELT is on early and late. 9ADR is heard early mornings. 9BKK, using two 201A's works the east coast often. 9FM, 9BKO, 9ZB and 9ZD are reducing wavelength. 9ZD worked the east coast with a loop. 9AHZ is at school. 9ACX needs a new five watter. 9RR handled too much A.R.R.L. correspondence to pound brass regularly.

Dist. No. 1 reported by radio. The regular report may have been lost in the cyclone. 9PW handled a bunch of traffic.

Traffic: 9AOB, 22; 9AYK, 7; 9BUE, 5; 9BVK, 8; 9CYK, 27; 9CRM, 34. 9DAE, 4; 9DIX, 12; 9DOO, 8; 9EAQ, 10; 9EGS, 5; 9ADR, 4; 9AYL, 6; 9BDZ, 2; 9BKK, 15; 9BOZ, 15. 9CDO, 3; 9DOJ, 5; 9ELT, 48; 9ELZ, 15; 9FL, 6; 9RR, 17; 9ST, 2; 9PW, 74.

IOWA—An amateur convention will be held at Ames April 17th and 18th. Prominent League members will be present. 9BRS-9CLG is back on low waves. 9CLQ has been busy with school work. 9DIP and 9BPF are other stations working in Des Moines. 9CHN worked both coasts with a "fiver." 9DAU wants a schedule. 9BZE is now working on 85 meters with five operators. 9AVJ worked all districts and mIX in an hour and ten minutes. 9ON gets out in fine shape. 9AXD is trying to get down on low waves. 9BCD does good work with UV201A. 9HK handled several messages then his M.G. blew up. 9CS handled four messages using C.W! 9AED will have a "fifty" watter soon. 9BEW handled most traffic this month. 9CGL did very well too. 9BKV worked all districts with a UV201A. 9CZC did good work. He is getting a new rectifier. 9CZO is busy at school. 9DRT had trouble with his rectifier. 9DMS consistently worked all districts. 9CGL is a new man but has a fine message report. 9DEX keeps a reliable schedule for traffic handling. 9CZC, 9DEX and 9BEW are finding schedules excellent for traffic handling. The Campus Radio Club at Ames has installed a "fiver." Three other sets will be operating on different wavebands in the near future. All sign 9LC. Several old timers are in charge of the stations.

Traffic: 9BEW, 125; 9CGL, 119; 9BKV, 82. 9BPF, 18; 9BRS, 24; 9CZC, 94; 9CZO, 46; 9DDK, 3; 9DIP, 10; 9DRT, 14; 9DMS, 27. 9DEX, 104; 9LC, 25; 9CHN, 20; 9DAU, 15; 9BZE, 15; 9AVJ, 97; 9ON, 73; 9AXD, 15; 9BCD, 15; 9HK, 12. 9CS, 14; 9DJA, 8.

NEBRASKA—Dist. No. 1: Every O.R.S. reported on time. 9AWS raised f8FQ. 9NL still does well on 150 meters, but he expects to increase the QRM on 80 meters soon. 9DUO has worked both coasts with a 201 tube. 9CIM operates transmitters on 5 and 150 meters. 9DPS is a new O.R.S. 9CJT reports traffic light. 9EB is QRX for repairs.

Dist. No. 2: DX is good but traffic is light. 9BDU was heard in N.Z. and England. 9BLK was heard in England also. 9AKS in on 80 meters. 9EEO is moving to a new location. 9DAC put our Governor's message right into Washington, on 40 meters. 9EHW is busy. 9EAK is on week-ends. 9DQC is a new O.R.S. Remember that though QRN is increasing, and we cannot pound brass quite as much, it is necessary that each O.R.S. report or cancellations will result.

A number of daylight tests are being planned. Keep your station in shape and get in on them.

Traffic: 9EGA, 23; 9AWS, 16; 9NL, 34; 9DUO, 31; 9CGS, 26; 9CHZ, 1; 9BNU, 19. 9AFR, 33; 9AIB, 39; 9AKS, 33; 9EEO, 2; 9BDU, 1; 9DAC, 69; 9EAK, 8; 9BOQ, 13. 9PN, 9; 9EHW, 18; 9DPS, 14; 9DXY, 29.

KANSAS—Spring weather is with us but the faithful few continue to move traffic.

9DVI is the only station handling traffic in Lawrence. 9DNG is installing a new 203A and S tubes. 9AOD lost the rope on his 80 foot mast. 9BGG is the "op" at KFKU. 9DMX is on 150 meters. 9BMZ works a thousand miles with a 201A. 9EHT hears both coasts at noon. 9BVN has the best traffic total and also a new first grade commercial license. 9ACQ operates in spite of work. 9AEY is moving to Beloit. 9CVL works the U.S., Canada, and Mexico. He put a death message from 9BGX through 9ADR to Kansas City ahead of the Western Union. He heard SJ in Porto Rico, WJS on the Amazon and z4AJ. 9QW is busy with school. 9CFI has been working on superheterodynes. He has new reports from England and France. Kansas lost out March fourth, as Governor lacked interest. 9CEA works foreign stations. 9BLB has been off because of blown bottles. 9AIM saw the gang at the Radio Show. 9CCS went to the show too. 9BRD and 9BIO have "YL-itis." 9BRD and 9DHW are on 200 meters. 9BIO logged eight countries. 9CCS has two new antennas.

Traffic: 9AIM, 25; 9CCS, 22; 9CEA, 12; 9AFP, 14; 9DHW, 25; 9BRD, 2; 9BIO, 1; 9RVN, 172; 9BXG, 131. 9CVL, 11; 9DLM, 50; 9ACQ, 10; 9QR, 4; 9CFI, 25; 9DVI, 22.

## NEW ENGLAND DIVISION
### I. Vermilya, Mgr.

MAINE—The Maine A.D.M. is issuing a "Brass-pounders League Certificate" to the station handling the largest number of messages each month. Another certificate for stations getting three or more monthly certificates in six months of operation, will be given.

Bangor has the only active Radio Club in Maine. The membership consists of old-timers.

Traffic handling is slowly taking the place of the DX craze in our activities and before long things ought to be back to normal.

Several O.R.S.'s are in the process of making. 1BHR takes 1IT's job in Dist. No. 6.

Dist. No. 1: 1AUR is working on both 40 and 80 meters. 1PD is experimenting.

Dist. No. 2: 1BNL is now mounring a "fiver." His fifty watter is on a trip to "The Fountain of Youth" and is expected back soon with a new supply of "pep". 1BTT has constructed a new set using S tubes. 1APM has been heard by 6UE. 1BUB holds the traffic honors for the state.

Dist. No. 3: 1BDH is on occasionally. 1CRU has blown his tubes but will be on again soon.

Dist. No. 4: 1CX is on 40 meters. 1EF is running WHBK. 1HB has worked mAIN, i1FP, g2SH and f8PL.

Dist. No. 6: 1BKK is putting up a new antenna. 1IT was operating on Sunday, the 15th. 1KL has his Telefuken tube perking ok.

Traffic: 1ALK, 21; 1APT, 35; 1APM, 8; 1AUC, 2; 1AUR, 15; 1BDB, 3; 1BDH, 2; 1BHR, 3; 1BNL, 90; 1BTT, 52; 1BUB, 114; 1CRU, 3; 1CX, 2; 1EF, 43; 1HB, 16; 1KL, 25; 1KX, 47; 1PD, 15; 1VF, 11.

NEW HAMPSHIRE—1AVL is high man this month. 1YB now operates three transmitters. Listen for them on 80, 40 and 20 meters. 1YB especially desires reports on the 20 meter signals. 1ATJ using a forty-meter wave-length, has worked 9BDW in South Dakota at 3 p.m., E.S.T. Under similar conditions 1YB has worked Europe.

Traffic: 1AVL, 95; 1YB, 80; 1BJF, 75; 1ATJ, 36; 1BTF, 14.

VERMONT—Conditions this month are unchanged. 1ARY has been working N.Z. and Australia as well as handling some South American traffic. 1BDX and 1AJG have done some European work. Things look good. Several new stations are with us in spite of the fact that spring has come. The Northern District has it all over the Southern District in traffic handling. The Poultney gang better get going. There must be several YL's in Poultney. 1FB uses the 40-meter waveband. 1ARY is on 40, 80 and 180 meters. There is truth in the old adage, "The higher the fewer," after all. Just now, everyone is getting ready to attend the Convention.

Traffic: 1ARY, 17; 1AC, 35; 1AJG, 14; 1FN, 11; 1YD, 64; 1BDX, 41.

EASTERN MASS.—Traffic totals are about the same as last month. The star station is 1AF-XJ.

1BV and 1BUO get out well. 1GA maintains his usual fine records. 1GS is too busy to operate. 1DA has worked two Italian stations. 1AIR handled some press reports at the time of the 'quake in New England. 1COT continues to work 3200 miles with his "five-watter". 1AVF handled more traffic than last month. 1AF-XJ is now on 49 meters. 1KY uses 40 and 76 meters. 1NV hears all there is to hear. 1AYN is using a master oscillator arrangement. 1ZE has a new junior "op." Congratulations! 1AXX is doing 100 miles in daylight with spark coil ICW. 1NT is doing fine work. 1AHL expects to put in more power soon. 1SE and 1UW are playing with 40 meters.

Traffic: 1CC, 5; 1SE, 11; 1UW, 2; 1NT, 21; 1CIT, 6; 1BS, 58; 1NV, 9; 1KY, 52; 1BZQ, 73; 1AF-XJ, 134; 1AQY, 2; 1LM, 51; 1AVF, 73; 1ACJ, 8; 1COT, 20; 1AYX, 21; 1FB-BX, 78; 1AIR, 12; 1DA, 24; 1GS, 19; 1GA, 98; 1BUO, 36; 1AYN, 11; 1BDU, 12; 1ZW, 1.

WESTERN MASS.—Dist. No. 3: 1VC is getting his transmitter down on 40 meters. 1CLN is rebuilding and using plenty of meters. FB! Knowledge is power, OM! 1ARE has been heard abroad in daylight on 40 meters.

Dist. No. 4: 1ABF is off the sick list. While convalescing he ran up the highest message total we have seen this winter. FB! 1BSJ is re-constructing his transmitter in a wooden frame. 1BLU has his batteries in the cellar. He is on 40 meters. 1EO finds some time for traffic handling experimenting. 1BCB is trying to reach New Zealand and Australia. 1AWW has made some 40-meter tests but he is keeping very silent. We are wondering if they were successful. 1BSJ expects that many tests with ultra-high frequencies and beam transmission will be made this summer.

Dist. No. 5: 1KC and 1BIZ are heard now and then.

Dist. No. 6: 1BOM, our ski-jumping "Ham," reports that he jumped 104 feet at the Brattleboro, Vt., Carnival. He sends along a photo to prove it! 1CCP is heard occasionally.

Dist. No. 7: 1AAL is with us again after a lengthy illness. 1AQM is high traffic man for the district. He has kept a schedule with a ship operator who at last reports was in the English Channel. 1AKZ is reaching out well. 1BIP worked many Europeans using one "fiver". 1BKQ works the west coast each morning. 1BQK and 1BBP are experimenting and using wave-lengths of 20 and 40 meters. 1CPN is on 40 meters regularly. 1JV is moving to a new location. 1JE is frequently QSO Europe. 1KR wants to know how to get D.C. out of a D.C. generator. He has one fine station! The fellows are busy trying to make this convention the best ever. 1AAL, 1AQM, 1ASU, 1BIP, 1BKQ, 1JE and 1XZ were QSO Europe during the month.

Traffic: 1ARE, 5; 1CLN, 1; 1VC, 9; 1EO, 18; 1AWW, 39; 1PY, 9; 1BLU, 4; 1ABF, 131; 1AAL, 2; 1AKZ, 25; 1AQM, 48; 1ASU, 27; 1BBP, 5; 1BIP, 18; 1BKQ, 17; 1CPN, 34; 1DB, 6; 1JE, 25; 1XZ, 10.

RHODE ISLAND—The Providence Radio Assn. suffered a severe loss when fire destroyed part of the building in which the club is located. Most of the apparatus was broken or stolen. (Tough luck, OM—A.D.M.) 1CAB has worked good DX this month. 1BCC is QSO Europe regularly. 1BCR intends to stay on 40 meters. 1BHN is active again. 1OW is doing good work on 40 meters. 1APB works g2CC often. 1BIE knocks 'em dead with a 5 watter. 1AWE continues to make a noise although he lost a UV-203A. 1AWV is rebuilding. Miss 1AID visited Hartford but managed to handle a bunch of traffic. 1II-1ZS is working good DX on 40 meters. 1BQD says nothing stirring in Newport. 1QV's tube went west and he is working hard ot get cash for another. 1AAP was recently QSO z1AC for 20 minutes. 1BVB has dismantled. He is busy building a new shack.

Traffic: 1CAB, 10; 1BCC, 43; 1BCR, 68; 1BHN, 2; 1OW, 5; 1ABP, 2; 1BIE, 12; 1AWE, 2; 1AWV, 3; 1AID, 68; 1II, 88; 1BVB, 71; 1AAP, 29.

CONNECTICUT—Spring fever has caught the boys. More experimenting on 20 and 40 meters results in making some new DX records. The gang look forward to the convention at Worcester and expect to have a great time. 1IV, 1AJP and 1ZL are at college. 1ZL has a new tuner for 40-meter work. 1BM hears too much "CQ Europe." He suggests that certain stations use their receivers more and their transmitters less. Good suggestion, OM! 1CTI is getting a new wavemeter. 1AVX and 1BFE have promised to live within the requirements of an O.R.S. certificate. 1AVX has, through his local newspaper, offered his station to the local B.C.L.'s for sending applause messages. 1AYR has a loop transmitter operating on 78 meters. 1BIJ has moved his set to the roof to get out of QRM! 1AJT is in the jewelry business. He may build an "inlaid" transmitter. 1ND is operating as usual. 1FD reported last month but we forgot to include it in the report. Sorry, OM. It won't happen again. 1FD has been on the sick list. 1AVJ has trouble getting reports. O.R.S. must report on time or certificates will be cancelled. 1MY has moved his set to the office, combining business with pleasure. He has a regular shack now. Visitors are always welcome. The set works just as well too. Hi! 1XW is with the Pacific Fleet. Handy, 1BDI-XAH, is Acting T.M. The O.R.S. men of Connecticut wish to extend to Mr. Handy a cordial greeting. He is one of the operators at 1MK.

Traffic: 1ND, 7; 1CPV, 62; 1MK, 44; 1AEA, 2; 1FD, 9; 1BGC, 10; 1AYT, 1; 1AH, 7; 1AWY, 10; 1AVJ, 4; 1ZL, 5; 1BFI, 2; 1MY, 46.

## NORTHWESTERN DIVISION
### Everett Kick, Mgr.

ANOTHER month rolls around, finding DX working still popular and finding traffic totals running higher than ever. FB! A few O.R.S' need to be careful; in several instances they are off the legal waves.

Are you forgetting the requirements of your certificate? If no heed is taken to this kindly tip calls will be mentioned and certificates will be cancelled. You know for yourself if you are an outlaw. Read over the clauses about the 48 hour relaying of messages and reporting each month. Do you live by the right standards?

WASHINGTON—DX weather continues with traffic much improved over last month. We would like to see more stations operating on REGULAR schedules, even if only once a week. We believe more traffic could be successfully handled. 7LH and 7AHA take the honors. Both are sticking to 200 meters. 7LH worked "LEP." QRA? 7AHA and 7DF worked good DX consistently. Our D.M. is on whenever he can spare time from his other duties. 7FN has been working. 7DC, 7OY, 7ADQ, 7GR and 7IJ find 40 meters FB for DX. 7RS and 7A1F are bound for the deep blue sea. 7GR has worked Australia. He has been heard in the Philippines with only 35 watts input. 7AFO uses a "bug" now. 7GB has a regular schedule with 6CEU. 7GY is QSO all districts with a lone UV202. 7AGI is busy selling seeds. 7AO works with a 5'er. 7MI is building involute coils for Super-Sinks—Hi! 7IX has a new antenna. 7RY is trying to make the tall trees around his aerial radiate—better get a sharp axe, OM. 7GE and "MD" keep 7GE on the air. 7KU still leads the Seattle Brass Pounders. 7MA, 7ADP, 7AHI, 7FD and 7NO have smaller traffic reports.

Traffic: 7LH, 71; 7AHA, 56; 7AFO, 53; 7DF, 41; 7KU, 37; 7GR, 33; 7GB, 24; 7GY, 20; 7IX, 18. 7DC, 17; 7ABB, 15; 7AX, 15; 7RY, 15; 7FN, 12; 7IJ, 12; 7GE-ZX, 11; 7OY, 9; 7ADP, 6; 7AO, 6; 7AGI, 5. 7VN, 4; 7MA, 4; 7AJY, 4; 7AFN, 3; 7NO, 3; 7FD, 1.

IDAHO—The past month was an improvement over the preceding one in all respects. More stations were on. The A.D.M. and stations of Boise were honored by the visits of 7OL, 7KC and 7MU. 7UH handled most traffic. He reports his fiver works better without a mate. 7SI, the YL, was second in traffic handling. 7QC is in operation again. 7IU works in daylight between college classes. 7OL was away from his station some. 7KC reaches out in great style using a UV202. 7GW is the PROUD daddy of Idaho's second YL. 7GX and 7GW live side by each and plan to use the same antenna. This should work out fine. 7QP of Kellogg has started a live paper called "Key Klicks." FB! 7FT and 7PJ both have landed operator's jobs. 7LO has also left for the coast. 7YA is getting out well and just got a message from G2NB reporting him. 7RQ is going on the stage. 7ZN-OT is on with the same old punch. 7OB just brewed a new low-loss receiver.

Traffic: 7UH, 67. 7SI, 35; 7QC, 32; 7KC, 32; 7IU, 17; 7YA, 10; 7GW, 7; 7OL, 7; 7RQ, 2.

MONTANA—Reports are slim but the future looks bright. 7GS holds traffic honors. He can be heard every day on 20 and 40 meters. 7KZ played checkers over the air with 7SI. 7SI lost. Hi! 7AGF is at school. His mother awaits a license and she will keep the station in operation. 7MP does good work on 75 meters. 7MX, 7EL, 7DD and 7NT are also on 75 meters. 7ACI is moving to a better location in Hamilton.

Traffic: 7GS, 41; 7MP, 25; 7KZ, 29; 7NT, 5; 7WP, 4; 7MX, 3. 7DD, 3; 7ACI, 2; 7EL, 2.

OREGON—Reports are interesting this month. There is more QRN than a month ago. Oregon has been redivided into districts. If you do not know who your D.S. is, write the A.D.M. at Engene. Traffic honors go to 7SY who leads the division. The consistent stations in Portland are 7GJ, 7ADM, 7QD, 7LQ, 7ND and 7LJ. Everyone is looking forward to the Northwestern division convention which will be held at Portland, Oregon, May 14th to 16th. 7MF, 7LS and 7ACM are on the air. 7ALD worked Australia and has been heard in the Philippines. 7LR is D.S. for Dist. No. 1. He is doing consistent long distance work. 7GQ works on 20 and 40 meters with great success. 7IW is on with a new 50 watter. 7OK is a new O.R.S. of Baker, Ore.

Traffic: 7SY, 78; 7ALD, 48; 7OK, 40; 7QD, 30; 7AV, 28; 7LQ, 18; 7MF, 11; 7ADM, 11; 7ALK, 11. 7GJ, 10; 7AKK, 9; 7LJ, 9; 7AKK, 6; 7ND, 5; 7VP, 5. 7IW, 4; 7ACM, 4; 7AKH, 3.

## PACIFIC DIVISION
M. E. McCreery, Mgr.

ACTIVITY is decreasing, due to the coming summer months. 40-meter work is popular. How about a report, Poage, OM? Maybe we need a new D.S. Can't you do something about it?

Honolulu is coming to the front again.

Arizona is also going ahead by leaps and bounds. FB, OM!

We did it! 6AWT dragged home the bacon. When the D.M. took this job he told Hartford that it would happen. We brought the Hoover Cup out to the Pacific Division. 'Atta boy Molly! The gang are proud of you.

Let's keep open house this summer and put the P. D. on the map. What say?

SOUTHERN CALIFORNIA—A big banquet and ham-fest was held March sixth. Seventy fellows were present. Of course the banquet was in Los Angeles. The Hollywood fellows had a cross-word puzzle pertaining to radio that was a big hit. The San Diego gang had a "liars" contest. The winning lie was told by our sober friend 6CMS. (Some lie.) The Whittier bunch pulled off a "skit" showing the life of a ham in his station. 6ZH has put things over big in San Diego. He has the "pep" of five ordinary fellows.

If things don't move right in your district write to your A.D.M. Let him know how you liked the banquet. How often would you fellows like to have one? Send in all your suggestions. Traffic has been moving in fine shape in all directions. YL's have led many a good ham astray.

Dist. No. 1: Traffic has been moving better this month. QRN is setting in and DX work is losing favor. 6CHS, a new O.R.S. leads the district in handling traffic. 6CGO is experimenting with sixty-million-cycle stuff. 6AIB is ready to QSR any night except Monday night. 6VD works good DX. 6BIK has some new tubes and a husky wallop. 6CHX was heard by Argentine CB8. 6ZH, 6AHQ and 6CGC are ready to handle traffic. 6BAS reports that his 75-meter set will soon be crystal controlled. 6SB is a new O.R.S. 6BAS is getting a big bottle.

Dist. No. 2: 6AFG continues to build his antennas. 6CBB is using a 250-watter. 6CSW has rebuilt his set so not to cause interference. 6IH "shot" both his tubes. 6CTO has a new bottle. 6BBV plays in a dance orchestra and arrives home just in time to work DX. He sleeps days. 6RF is QRW college and women. 6OF is busy with school though he turned in a fair report. 6BJX is one of the leaders in traffic handling. 6BQR is planning to build a new set. 6PL is off until he can get three more new W.E. 50's. We have learned that 6LJ's stenographer reads this nonsense. Therefore it would be unfair to put in the glowing words of praise, etc. (Mostly etc.) that so befit our D.M. He is so modest that he might have it taken out. It is a good thing that Mrs. McCreery didn't see him at the banquet. An "op" of 9EKY is visiting Hollywood. 6ALF hopes to go to Annapolis. His girl said GB without any 88's. 6AJI is getting in touch with the fellows in his territory. 6CIA is busy on his orange ranch. 6US is engaged in selling receiving sets that cannot hear his transmitter. 6BUR lost a stck in a fire. He will be on again soon. 6AHP made some new records. 6BUW is bothered with his income tax report. 6CIX gets out well. 6CSS worked NZ several times. 6CGK and 6TS use 40 meters and step out fine. 6AGK is testing on 20 and 40 meters every Sunday. 6CGW rebuilt his rectifier. 6CAE has been heard in Scotland. 6BCS handled a bunch of traffic. 6AKW and 6VC have a schedule with Louisiana.

Dist. No. 3: Conditions are slowly but surely improving. Traffic is increasing. 6AAN did the most connsistent work in this district. 6CMD has a new 50. 6ASV is on occasionally. 6AKZ hears WJS regularly. 6CDG works the east coast on schedule.

Traffic: 6CHS, 225; 6ZH, 75; 6CGC, 74; 6AIB, 58; 6CGO, 52; 6CHX, 17; 6BIK, 10; 6BAS, 9; 6AHQ, 10; 6OP, 6; 6SB, 5; 6CGV, 4. 6VD, 4; 6CNK, 2; 6CIA, 3; 6AJI, 21; 6AGK, 14; 6CGW, 47; 6CAE, 12; 6CGK, 2; 6BCS, 76. 6AKW, 18; 6AHP, 8; 6CSS, 10; 6BUW, 6; 6BUR, 17; 6AFG, 70; 6CTO, 23; 6BBV, 25; 6CSW, 31; 6OF, 12; 6RF, 4; 6BQR, 32; 6BJX, 54; 6PL, 8; 6ASV, 2; 6AAN, 44; 6AKZ, 11; 6CMD, 21; 6CDG, 32; 6RN, 32; 6CMQ, 18; 6LJ, 12.

CENTRAL CALIFORNIA—Dist. No. 4: Some stations in this district were logged in the Philippines. Some worked HVA in French Indo China, some were QSO Australia and practically every station reports DX working FB. 6CCY worked HVA with a fiver. 6FY worked a2YL and was heard in India. 6CEI, 6ACU and 6AOI handled the usual amount of traffic. 6AFQ is rebuilding. 6UW and 6CJJ are busy with school work. 6MP has a traffic schedule with two eastern stations. 6AME worked

6CEU in Hawaii for a change. 6CLP is handling messages consistently. 6ADB handled a lot of traffic this month. 6LV put up new antenna for 40-meter work. 6CJV is using 40 meters. 6ALW had rectifier trouble. 6AJZ and 6CFI have a new aerial. 6BCL was on 40 meters occasionally. 6NX was heard in Argentina. 6AMM has rebuilt his set. 6BMW got a letter from NKF complimenting him on his signals. FB! 6CKV is using a 50-watter with "S" tube rectification. 6BDT has been heard in South Africa and in France. 6OI handled most messages in his district. He sent "px" to KFUH who is in Papeete Tahiti. 6BON was heard in Australia. 6HC is making tubes.

Dist. No. 5: 6CLV is going to Alaska as a ship 6BIF is constructing a new set. 6AWW operates operator. 6AMS has received his S tubes at last. 6BIF is constructing a new set. 6AWW operates Friday and Saturday nights from 11 to 1 a.m. 6BNT is still busy with an arc on 80 meters. 6CSN's favorite tube went west. 6KW logged HVA. 6CPW can't make those red-haired mamas leave him alone. He must be some sheik. 6HJ is waiting for his inductances to arrive. 6BFY, 6CSL and 6BAA are on 80 meters. 6JP is getting a 250-watter. 6BUF and 6AWO report things going nicely. 6HH is a new O.R.S. 6ACZ is fairly active. 6CW has gotten some 20- and 40-meters signals into the Philippines and Japan. 6CHL is trying to make his station suit the UL. 6AWT is on 40 and 80 meters.

Dist. No. 6: 6BVM is busy with school work. 6ARH, 6CQG-BQR, 6CCT and 6CSP are rebuilding. 6BW is using call 6XM on 5 meters at the U. of C. 6XBY handled a message going to the King of Spain. 6AMO-BNR has worked HVA and the rest of the foreign gang.

Traffic: 6FY, 2; 6CCY, 8; 6AOI, 5; 6MP, 19; 6AME, 15; 6CLP, 24; 6ACU, 5; 6ADB, 22; 6cJV, 2; 6ALW, 5; 6BCL, 14; 6AMM, 4; 6BMW, 3; 6CKV, 5; 6OI, 65; 6NX, 12; 6CW, 20; 6ACZ, 5; 6DG, 2; 6AWO, 30; 6BUF, 10; 6HH, 5; 6AC, 6; 6JP, 8; 6BFY, 7; 6CSL, 10; 6BAA, 8; 6RW, 9; 6AWW, 24; 6CSN, 6; 6BIF, 1; 6CLV, 48; 6AMS, 5; 6AWT, 5; 6CHL, 13; 6BMV, 10; 6ARH, 1; 6CCT, 30; 6BW, 4; 6CQG, 23; 6CEJ, 7; 6UR, 5; 6AMO, 60; 6DD, 1; 6GR, 4; 6FH, 3.

NEVADA—Traffic: 6UO, 5.

ARIZONA—6DAP has settled in Nogales and is handling traffic in good shape. 6ANO and 6AAM have reliable DX stations. Rawls did good work on the Governors'-President Relay, getting his book thru despite the terrific QRN. 6BBH has a poor location. 6BDM has a nice M.G. set. 6ASA is trying to make tubes. 6CAR has the last DX spark station in Arizona. 6CSO was heard consistently in the Philippines. 6GS and 6CUW are still doing interstate work on C.W. 6ZZ is building a super station after months of experimenting.

Traffic: 6CUW, 27; 6ACN, 8; 6GV, 4; 6PZ, 8; 6CSO, 118; 6AAM, 15; 6BBH, 4; 6ANO, 46; 6ADP, 40.

HAWAIIAN ISLANDS—6CEU is back again on about 80 meters. He has no trouble in working the east coast. 6CST is QSO the coast with a 5-watter. 6OA is getting good reports on his signals.

## ROANOKE DIVISION
W. T. Gravely, Mgr.

WEST VIRGINIA—8DNN is on the job weekends *ready for traffic.* 8AIP and 8BJG have antennas.

8BJG is getting out FB. 8BLI is rebuilding. 8BSN, using a lone UV202, has been heard in N.Z. He can raise hams on the west coast any time. A new station, 8JZ, handled a few messages, using our upper waveband. 8DFM and 8BSU-8AKZ are rebuilding. 8DFM is handling traffic on 78 meters. 8ARN is moving to Florida. B.&O. and P.R.R. emergency traffic is handled by 8ASE, 8BSM and 8DFM. The Radio Inspector visited Huntington on the complaint of B. C. L's. One station owner using conductive coupling lost his license. The inspector found that the QRM was from British ships and not from hams. (It's ever thus.—D.M.) He said that this was his third visit and he had found no QRM caused by amateurs on any of his visits. (This certainly speaks well for the Huntington fellows. They deserve much credit for the work they are doing. Our Vigilance Committees will probably find situations like this in many towns—D.M.) 8DOI is on 40 meters. 8AYP, 8CBR and 8DJN are active on 80 meters. 8AMD lost his pet WE 50-watter.

Traffic: 8ASE, 20; 8BSK, 3; 8BSM, 3; 8DFM, 3; 8DOI, 9; 8AMD, 14; 8JZ, 4.

NORTH CAROLINA—(This report was transmitted by wireless from 4JR to 3CA on 80 meters—D.M.)

Things here are at a higher pitch of enthusiasm than ever before. Several of the D.S. are getting their reports in by radio. The scheme works excellently. Many beginners are working into the O.R.S. class. Get in touch with your D.S. fellows. Give him a report of your activities. By reporting now you boost your chances of getting an O.R.S. appointment later. Let's have a meeting this summer, fellows, so that we can all get better acquainted.

Dist. No. 1: Reports are handled by radio by 4TW and 4TJ. 4RF is now an O.R.S. 4QW has been using phone. He is increasing power soon. 4OG is *star traffic man with a fiver on 150 meters.* 4TW worked a six using 150 meters. New men in this district should report to 4TW.

Traffic: 4OG, 83; 4TW, 25; 4RT, 6.

Dist. No. 2: *This is another live report sent by* radio from 4MT to the A.D.M. 4NJ is on the job putting up a new steel tower. 4TS is installing on 40 and 80 meters. 4GW is QSO Spain this month. 4MI carried on business as usual with one UV202. 4SX is doing good work.

Traffic: 4MI, 79 4GW, 18. 4NJ, 6; 4TS, 3.

Dist. No. 3: 4HR wants a motor-generator. 4RY is a new station in Charlotte. 4TJ has worked Spain, Italy and WJS. 4TJ and 4JR both took part in the Washington's Birthday Transcon. 4JR does the usual good traffic and DX work. He was on 11 hours during the Governors'-President Relay. New stations *should send reports of 4JR.*

Traffic: 4JR, 188. 4TJ, 43; 4HR, 36.

Dist. No. 4: A 100% report from all stations looks like old times. 4RU and 4UN deserve credit for *getting a message and building a station to put the* message into Washington. They got the message there ahead of all others! FB! 4NT-MA is on 80 meters with two fivers. Four big tubes they ordered were broken in shipment. 4NT has applied for enrollment in the Naval Reserve. 4RW is leading traffic man. He is on 180 meters with one tube. 4BX started the transcon message. Most of his work has been in the daytime.

Traffic: 4RW, 29; 4NT-4MA, 18; 4UN, 5; 4BX, 3; 4RU, 1.

VIRGINIA—Dist. No. 1: 3BS is getting good results using short waves. 3OL is busy changing circuits. 3MK has a new eight wire cage. He is ready for traffic. 3TI and 3SB are operating as usual. 3CJU gets out well.

Traffic: 3MK, 30; 3TI, 10; 3BS, 6; 3CJU, 3.

Dist. No. 2: *3AUU and 3BID are working on a* McCaa static eliminator. 3ABS is erecting a 45 foot pole for short waves. 3ATB is rebuilding. 3SG is building a portable set. 3BMN uses a one wire antenna. About 50% of traffic handled by 3BMN has reached its destination so far this month. 3HM has a new antenna system and has applied for an O.R.S. 3UY worked the west coast on 80 meters. 3APR worked 3BMN in daylight with a short indoor antenna. 3APR has been heard in South Africa on 180 meters.

Traffic. 3BMN, 202; 3APR, 29.

Dist. No. 4: 3BZ gets out well using short waves. *3CKL is on forty and eighty meters.*

Traffic: 3BZ, 8; 3CKL, 12.

Dist. No. 3: 3KP is a new station operated by 3BQ and 8YK. A master oscillator circuit is used on 180 meters. 3BGS is on 155 meters. 3BFE is going strong. 3CFW awaits a power supply. The D.S. wants to hear from new stations.

Traffic: 3KP, 11; 3BGS, 3.

## ROCKY MOUNTAIN DIVISION
N. R. Hood, Mgr.

COLORADO—9CAA comes to the front this month. He handled more messages than the entire division for the past few months. FB! It looks as though there was still some traffic to be moved. All the traffic was put through using an input of six watts. 9CAA and 9DQG will soon consolidate. 9EAM and 9DED handled a good bunch of traffic also. 9DUN has been sick with the mumps. His traffic dropped some this month. 9CJY has been off this month due to school work.

9EAE handled most messages in Dist. No. 2. 9CDE has been doing good work with a station in Minnesota. 9FE is a new O.R.S..

Traffic: 9CAA, 237; 9CDE, 21; 9EAE. 79; 9FE, 11. 9EAM, 59; 9DUN, 15; 9DED, 48.

UTAH — 6BLH leads in traffic handling in this state. 6CJB does consistent work. The D.M. was out of the state for some time. The A.D.M. of Utah got a message from the Governor. This message came to grief later on, but was successfully started from 6CJB. 6BUH has a five-watt set working well on 6.3 meters. He measured the wave length with a ruler so there is no guess about it. He now wants a five-meter wave. 6RM is out of commission with his antenna down. Colonel Dillon gave radio examinations in Salt Lake City March 11th. About fifty amateurs and radio fans were present.

Traffic, 6CJB, 25; 6BLH, 84; 6RV, 22.

WYOMING—7HX handled all the traffic that was handled this month. 7NR and 7AJT report as usual.

Traffic: 7HX, 7.

## SOUTHEASTERN DIVISION
### H. L. Reid, Mgr.

GEORGIA—4IO has left for Europe to attend the I.A.R.U. as the official delegate of this division. 4AU is acting as A.D.M. and makes this report. 4BQ is on his way to the I.A.R.U. He and Morris make a fine pair and the division is proud to know they are on their way. In Atlanta 4IO, 4EQ, 4EH, 4RM, 4SI, 4KL, 4AU and 4KU are doing their bit regardless of the fierce QRN. 4EQ and 4HS worked HIOAS in Budapest, Hungary. 4KU added Australia, Spain, and Italy, making his total a baker's dozen. 4KL is busy trying new aerials. He now swears by the one wire combination. 4AU is the only station in town on 40 meters. Using a UV204A with second harmonic transmission, he has been able to work all districts with freedom from static. During a recent lightning storm, which put the 80 meter set out of the running, 40 meter communication was unaffected. 4DT and 4JD are on in LaGrange. 4JD is on 80 meters. 4DY took a trip to Porto Rico. He says he had one "peach" of a time. 4XX has sold out. 4BY is on 40 meters. 4BW has antenna troubles. 4JH worked Argentina. 4BK is with us again. 4FJ, with a "fiver," is doing some extraordinary work. 4FZ works Europe regularly. His latest victims are b-W2, i-1MT and s-EAR2.

Traffic: 4EQ, 73. 4EH, 4; 4KU, 22; 4JD, 6; 4DT, 7; 4BW, 25; 4BK, 45; 4FJ, 40; 4WJ, 5; 4JH, 5; 4FZ, 63.

ALABAMA—5XA steps to the front by handling most messages. Rush reports that there are several YL's and OW's in Mobile. Watch your step, gang, lest Mobile become too popular!

Dist. No. 1: Traffic increased this month. 5VV has another 50 watt bottle. 5ADS is doing mighty good work. 5ZAS has been active. He reports that traffic is light. 5ZAS is making quite a bit of progress experimenting on low waves. 5AEF and 5ARI report some activity for the month.

Dist. No. 2. 5AAD has an OW, and 5QF has a YL, operating their stations. 5AOM handled most messages in the district. 5AOM reports a prospective YL.

Dist. No. 3: 5AJP and 5ASU are doing good work. Trum and Powell, operating 5ASU on the night of March 3rd, handled the Alabama message to President Coolidge. The message went into Washington in two jumps and was promptly delivered. 5ADA handles traffic like a veteran. 5ATP is doing good work on the lower waves. 5NL is a very busy man. 5DI, a new O.R.S., handled a good bunch of traffic. Most of this work was done before breakfast or early in the evening.. Montgomery leads the state in activity. Trum is considered the liviest wire in Alabama.

Dist. No. 4: We hear little from 5XA except his mighty sigs and the usual good traffic report.

Traffic: 5AAD, 3; 5ADA, 37; 5ADS, 55; 5AEF, 16. 5AJP, 43; 5DI, 70; 5NL, 11; 5AOM, 113; 5QF, 22; 5ARI, 18; 5ASU, 26; 5ATP, 35; 5VV, 37; 5XA, 352; 5ZAS, 5.

SOUTH CAROLINA—Only two O.R.S's were active this month. 4HW put up a one wire antenna and gets out much better. He has frequently been heard in England. 4IT wants a schedule with someone.

Traffic: 4HW, 33; 4IT, 15.

FLORIDA—Bang! We thought Florida was buzzing with activity last month. If such was the case, the buzz has grown to a roar. A "Few Florida Fasts:' 38 active stations; 22 O.R.S; 11 stations using the 20 or 40 meter bands. 10 stations QSO Europe; 100% of the gang on short waves; 100% report!

Contrary to custom, this report starts with Dist. No. 4 because they rate first this month. Don Mix has the Burgess station, 4DM, on with a punch. Welcome! 4QY is injecting life into his gang through various contests. The Burgess Company has shown splendid cooperative spirit by furnishing 4QY with valuable prizes each month, as awards. Miami has seven active stations. 4FM has two "fifties" on 85 meters. He keeps an iron-clad 8 a.m. schedule with 4TI and handles a lot of traffic. 4CH keeps a schedule with 4XE three nights a week. This is a sure-fire and a valuable traffic route. 1CPO has a station in the Everglades. 4VS has a splendid report. 4IG and 4NE are struggling through Florida QRN without complaint. 4QY has worked all districts in daylight using two "fivers" on 40 meters.

4JY and 4TV are new O.R.S. 4TV is a new traffic man. He is QSO all U.S. districts and Europe. 4XE is our most versatile ham. He is active on all bands, and he maintains his position as a first-class traffic man. He was copied in England at noon! 4BL worked a flock of sixes and sevens using one five watter. 4IZ worked a "1" on 40 meters with 4.7 watts input. 4UA was copied in Argentina in daylight. 4TR and 4WK are consistent workers. 4QC does good work on 80 and 40 meters. 4UK and 4UX are new O.R.S. who have taken the reins and keep Jacksonville open. 4PK, 4KK and 4EZ are fairly active. 4SB and 4PI are both QSO Europe.

Traffic: 4JY, 115; 4TV, 112; 4BL, 80; 4IZ, 76; 4QY, 56; 4XE-4IU, 53; 4FM, 50; 4VS, 48. 4UX, 40; 4QC, 34; 4CH, 31; 4UA, 28; 4EZ, 15; 4UK, 12; 4NE, 7; 4IG, 7. 4KK, 6; 4PK, 5; 4PB, 4; 4PI, 5; 4FS, 4.

## WEST GULF DIVISION
### F. M. Corlett, Mgr.

THE D.M. is going to do some "beefing" about those birds (don't like to call 'em Owls!) who tactlessly make enemies of B.C.L's. Bretherin, it can't be done! You are bringing closer the day when the transmitting amateur will be where the spark transmitter is now, along with the pterodactyl and the stegosaurus.

The gang has figured out by now that the D.M. is sore about something. That something is listening to an amateur (?) working between 8 and 10.30 p.m. on a wave above 176 meters.

OKLAHOMA — The first issue of the Oklahoma A.R.R.L. News has appeared. We hope it will be a permanent institution. Oklahoma hams desiring to get in on this had better get in touch with the Traffic Department. They must send in their monthly traffic reports to their A.D.M. not later than the 20th of each month.

We naturally hate to toot our own Bazoo, but the way we put over our part of the Governors-President Relay makes us feel good. (Me, too!—D.M.) The full story appears in the Oklahoma A.R.R.L. News. Washington had to ask us for the message, cheating 3AB of the glory his work deserved.

The gang had a caller this month in the person of the R.I. Traffic was scarce as elephant's eggs. 5CU suggests that a convention be held in Oklahoma City during the State Fair.

Dist. No. 1: 5ARE reported no traffic. 5APZ is selling out. 5ANL wants schedules. 5ADO did some work on 20 meters. At Oklahoma City, 5AJB, 5QL, 5AHR, 5APG, 5BN, 5AAV, 5AGN and 5HU were on the air. 5CU is still building a 100 watter.

Dist. No. 2: 5GA, 5GJ and 5FS promised to exercise their wrists again.

Dist. No. 3: 5TW leads in handling traffic this month. 5JU is moving things in fine shape. 5CG has a new set under construction.

Dist. No. 4: 5AHD reports sand storms there. 5VM is publisher of the Oklahoma O.R.R.L. News. 5ZAV is suffering from a "glass are." Better leave the co-eds alone, OM. 5AIU did all the operating this month.

Traffic: 5APG, 15; 5APY, 3; 5ANL, 12. 5ADO 17; 5AJB, 8; 5AGN, 1; 5TW, 69; 5JU, 23; 5CG, 5; 5AIU-5ZAV. 12; 5VM, 14.

NORTH TEXAS — 5JH, 5MZ and 5CC are new O.R.S. March winds brought down antennas by the dozen. 5ACL and 5SD worked foreign stations during March. 5AKX, 5AMS, 5NY, 5AMB, 5AFH, 5ADV, 5AMZ 5PN, 5VD, 5ZH, 5VS, 5CT, 5RM, 5ACY, 5AEU, 5BE and 5AQC reported faithfully.

Traffic. 5NW, 2. 5ADD, 25; 5JH, 10; 5AQL, 2; 5DW, 3; 5LI, 17; 5AJT, 34; 5FC, 20 5VU, 12; 5ALJ, 18; 5ANU, 7; 5ATH, 10; 5UO, 14; 5AJH, 62; 5OQ 27. 5AKN, 13; 5VF, 24; 5RG, 41; 5AJJ, 26; 5ACL, 22; 5HY, 36; 5AKQ, 28; 5OT, 4; 5ASZ, 52; 5AGQ, 23; 5AFU, 46; 5AKZ, 67; 5SD, 1; 5ATX, 23. 5CV, 5.

SOUTHERN TEXAS — We are snapping out of the "intangible something" that has held amateur radio in check. Our O.R.S. are doing good work. QRN is getting in its work now. New stations are fast qualifying in nearly all towns. The A.D.M. is thinking of working z2AC on a "199." Sherrod is working as hard as a Rice Freshman. 5ZF reports that the 80 meter wave is getting popular. 5ACR is back. 5KN is the proud father of a little YL. 5OX worked g2FU, z2AC, z4AA and Chile 9TC. 5OX has an assistant "op," who signs "PE." 5EI is stepping out well using one "fiver." 5CA is a new station. Austin is represented by four stations, 5ZU, 5ALR, 5FT and 5PS. 5ALR has been heard in Europe and New Zealond. 5PS is on 80 meters. 5APM is getting out fine. 5ZAI handled a lot of traffic.

The Conroy Brothers ran up a fine message total. They sent it in at the eleventh hour by Western Union. 5UX has been away on his boat. The D.S. of Dist. No. 8 the C.M. of San Antonio, and 5HC paid the A.D.M. a fine visit. 5SS is taking the postmaster's place during his illness. 5EW sends in a nice message total.

The Texas A. & M. Radio Club sent their report to the D.M. (Better get it to the A.D.M., gang, or it may not get printed!) The club has 80 dyed-in-the-wool Hams. It wants schedules with other stations. 5AKY says about seven hams are building themselves a real Club House, and are going to be on with all kinds of waves! 5ALR, 5SS, 5GU and 5ZAE sent in reports.

Traffic: 5ZAI, 24; 5ZF, 5; 5AHH, 8; 5PS, 24; 5ACZ, 179; 5OX, 37; 5EI, 32; 5APM, 19; 5NN, 25.

NEW MEXICO—5LG, State College, handled ten messages and delivered there, although only home three days! He heard CH 9TC. but could not connect. Better luck nnext time, OM.

# CANADA

FEBRUARY and the early part of March have not proved particularly active from a radio point of view. Elections in the central divisions of Canada have slowed down activities. With the newly-elected men in office things should improve. We are expecting great things from the new Ontario division manager, Mr. W. M. Sutton.

A few words about Mr. Sutton will be in order. Bill has had a station at Fort William or Port Arthur for some years. He is now operating the combined station at 3NI-3WS at Port Arthur. This station uses two operators, Mr. Vigars being the second operator. Some enviable traffic and distance records have been made. Mr. Sutton is radio inspector at Fort William and district for the Dominion Government and he is in charge of the station of the Pacific Cable Board at that city.

In the Vancouver division, Mr. A. J. Ober, has been obliged to resign his position as it took too much time from his business. Mr. Wm. J. Rowan, c5GF, who has been A.D.M. for British Columbia, has been elected. Rowan will take office immediately and he may be depended on to do his part in maintaining the high prestige of the Vancouver division.

Included in the same ballot as the division managers' was the request for a vote on the advisability of changing the name of the Vancouver division to make it less local in character. The result of the vote was for changing the division's name to Vanalta, the word comprising a joining of the words Vancouver and Alberta. The matter of changing the name will be placed before the Directors at the next Board Meeting.

The Vancouver gang has been active in their local radio club and deserve a great deal of credit. That they might participate in the weekly Trans-Canadian 125 meter tests, they have changed the meeting night of their division to another night. That's the spirit.

The response of the Canadian membership to the appeal for funds to send a delegate to Paris to represent Canada at the I.A.R.U. conference was very disappointing. At the date of this writing a comparatively small amount has been contributed. But for assistance generously given by the League, the Canadians would have been without representation at this important meeting. The Vancouver division arranged to send a representative from that division. At the present time it is not known whether this will be managed or not. In the meantime the Canadian representative has been chosen in the person of Bill Borrett, 1DD. Bill has shown remarkable organization ability in his division and has raised it to a point where it is looking for more worlds to conquer. We suppose Bill thinks that he is going to conquer Paris next. Oo la la, c'est la vive!

By the time these words appear in print Canadian amateurs will know what their new wave-length apportionments are going to be. They are praying for the best and hope that the broadcast listeners will not be too greatly favored to their disadvantage. No hint has yet been given as to the intentions of the Department of Marine and Fisheries as regards new wave-length arrangements.

### MARITIME DIVISION
**W. C. Borrett, Mgr.**

THE second annual convention has just been concluded at Halifax, N. S., and it was a great success. Over fifty hams gathered at the Queens Hotel and with the assistance of the Nova Scotia Institute of Science put over the best convention that any of the gang have ever attended. Mr. Hebert represented HQ and time gang is the finest bunch ever. 1AI, 1AW, 1ED, 1AJ, 1AB, 1DU, 1AF 1AN and Mr. Thompson of Liverpool were visitors. A report of the convention will be sent in by our D.P.M., 1EB. The gang built station 10-AR, from which we broadcast our whole convention. 1AR handled a lot of traffic with Europe. He was awarded the Mayor Murphy Cup for his DX work and to commemorate the fact that he was the first Canadian to QSO New Zealand, and at the farthest distance in North America. 1BQ gave a pleasing demonstration of a 2½ meter transmitter in action. He won the code speed contest for the best copy at 22½ words a minute for a period of five minutes. 1DD was second in this contest. He will start for the 1ARU conference after finishing this report. The Maritime gang hope to work him while

he is in Europe. 1EI worked all over the U. S. A. Four new ROTABS were initiated at the Convention. 1AI, 1AF, 1AW and 1AN. We now have fourteen ROTABS in the division. Ask 'em how they liked the eggs and the "Spring Worms."

1DJ is on every night. We were glad to welcome 1AJ of Parrsboro. 1AO and 1AA are putting the "juice" to them also. Our weekly night "prayer meetings" are as popular as ever. The following are heard as a rule: 1AI, 1AN, 1AM, 1ED, 1AE, 1AW, 1AJ, 1AB, 1DU, 1AF, 1DD, 1DJ, 1EB, 1AR, 1CO, and 1EI. 9AK is back. He worked 9AL and 1DD as a starter. Good boy, Keith! You and 1CO should now put PEI on the map. 1EB was not on much due to the fact that the most of his transmitter was incorporated in 10-AR.

Reports must be in the hands of the A.D.M. or D.M. by the 23rd of each month.

The D.M. asks the gang to cooperate with Campbell of 1DJ, the Acting D.M. Help him to put over a banner month in all departments. Don't forget your reports.

(Well, gang, Cheerio and Au Revoir. Hope to work you from Europe.—D.M.)

Traffic: 1DD, 18; 1EI, 7; 1DJ, 8.

## ONTARIO DIVISION
### W. M. Sutton, Mgr.

THE new D.M. wants to thank the members for electing him. He says he will do his best to make the division worthy of its name. Remember fellows, he needs your cooperation.

All appointments under the old D.M. have been cancelled. Many new appointments have been made. A number of cities in the Western Division need C.M.'s. Please communicate with your A.D.M. regarding new appointments. Application forms for O.R.S. appointments may be obtained from your C.M. or A.D.M. New O.B.S.'s are being appointed. They are on 40 meters in the early evening and send immediately before and after the quiet hours.

Let's hear more fellows in on the Sunday noon-hour 40-meter relay from 11 a.m. to 12.30 p.m., E.S.T. The Wednesday night-Thursday morning "prayer meeting" still holds its own on 125 meters. However there seems to be some lack of activity in the west.

EASTERN ONTARIO—All stations wishing appointment as O.R.S. please write the A.D.M. at once. This certificate is worth having now. The A.D.M. would like to hear from some new stations. Reports must be in the hands of the A.D.M. by the tenth of the month.

CENTRAL ONTARIO—At 6.30 a.m., E.S.T. March 14th, c3AA hooked up with z2AC. Signals faded with the coming of daylight. z2AC reported c3AA ORZ but steady. z2AC was operating on 87 meters, and c3AA on 80, using two "fivers", with 75 watts input. Congratulations c3AA!

The Toronto gang is active. 3BR is on again. He has a beautiful tower. 3KQ and 3TT are banging away on 75 meters. 3GK and 3LY are suffering from too much school work. 3VH is still an O.B.S. 3CO has rebuilt. 3CK and 3IZ are reaching out FB. 3IJ is heard locally. (QRA? please, OM.—A.D.M.) 3AZ is on the lower waves with good note. 3AEV has a peach of a low-power set. He is doing daylight work on short waves with a 201A. 9BJ has been heard in N.Z. and Spain. 3PH is on as usual. 3VH is C.M. for Toronto. 3WG has had the measles.

WESTERN ONTARIO—3XX reports hearing Europeans.

NORTHERN ONTARIO—3BG is on 190 meters. It's hard to QSY up there now that the antennae have been cut down to suit the low waves. How about coming down a little, OM? The same to you 3GG. 3NI is hitting the key as long as he can without missing too much sleep. He blew his last fiver and had to borrow one from 3HP in order to get in on the Wednesday night 125 meter work. He reports z4AA coming in fine these mornings.

Traffic: 3VH, 10; 3CK, 11; 3TF, 4; 3KQ, 14; 3AZ, 10; 3WG, 14; 9BJ, 18; 9AL, 30; 3XX, 36; 3NI, 39. Telefuken turbe perking ok.

## QUEBEC DIVISION
### J. V. Argyle, Mgr.

ACTIVITY has been at a low ebb. 2BE, 2BN, 2CG, 2BG and 2AZ have lost sleep doing DX and now they are recuperating. 2FO, 2AZ and 2CG have been working on 40 meters night and day. Communication over one mile has been effected using five watts each and 9 foot antennas. A get-together was held at 2AU. The D.M. tried to induce some others to try 40 meters but without success. 2AU is studying the effect of varying the plate condenser. 2BV and 2CN join with 2CM, 2DO, 2BG and 2BN in the Sunday morning phone chorus. 2CI has induced 2AX to install a transmitter. He has already worked most districts using 80 meters. 2FI suffers from blackened tubes and a poor location. 2AM is on more frequently now. Nothing more has been heard from 2AG regarding the Quebec City Station.

Few O.R.S's took the trouble to send in reports and several cancellations will shortly be made.

## VANCOUVER DIVISION
### Wm. J. Rowan, Mgr.

MESSAGE traffic in this division is small in quantity. The D.M. had to resign to give more time to his business. He wishes to thank each D.S. for his cooperation, and the A.D.M. for his splendid support. Mr. Rowan, c5GF, is the new D.M. and will take office at once. When changing managers, appointments are automatically cancelled. They can only be renewed by writing for reappointment. Please get in touch with Mr. Rowan at once if you want to retain your standing.

ALBERTA—More life is apparent this month. Edmonton has gotten started. It looks as though we will have reliable contact with the Capitol. 4IO is on every night and does good DX, but he reports that there is little message traffic. 4IC visited the D.M. After putting beginners on the right track by marching them to the Post Office with two dollars for *QST*, he starts preaching to them about "five watters." 4GT has worked Mexico and Hawaii. 4IG is a new station at Retlaw, Alberta. He has a UV202 and has worked c9AL, c3FU and the seventh district. 4DQ is still on and he is now using battery plate supply for daylight work. The OW operates and is on the air from 3 to 5 p.m.

Traffic: 4IO, 3.

EDMONTON—4JF is stepping out well. 4GP, a new low-power station, is working well. 4AH is on consistently and QSO east and west. 4HF is using a 50 watt bottle on 125 meters. Four active stations are ready for traffic.

Traffic: 4JF, 3; 4GP, 4; 4HF, 7.

VANCOUVER ISLAND—5CT has now worked all Canadian and U.S. districts. He keeps three traffic schedules a week with 8ACY. 5HK is rebuilding.

VANCOUVER—We are sorry not to have one station qualifying for the Brass Pounders' League. We guess the OM's are taking the YL's out more often. They feel more secure for leap year is past and gone.

O.R.S. will please mail reports to reach the D.S. before the eighth of the month. Reports received after the seventh will count as a month missed. Stations missing reports for two months will be cancelled. Please follow A.R.R.L. procedure when handling traffic. Remember, gang, you are a picked bunch and your station must keep traffic routes open always. 5BA is the star DX station. He was heard in India while working a2DS. FB, OM! 5GO's big tube developed an open in the plate lead. 5HS reports that traffic is as good as ever. 5AH is DPM and very busy. He expects to combine with 7HK. 5DS has a small traffic report due to bad power leaks. 5AN reports that traffic is as usual with him. 5BZ says that every time he puts a tube in the socket it goes up. (Try a 250 watter, OM. They are heavier than the little ones—A.D.M.) 5GF had some trouble with the B.C.L's. Single circuit receivers and 80-meter transmitters don't go well together, so 5GF bought a ukulele to while away the quiet hours. Hi! 5HB is on 80 meters and working the east coast. 5BM is a new comer with a 201 tube. He is an old spark man and works good DX.

NEW WESTMINSTER—5BJ is on 125 meters regularly. He says QRN is bad. 5HP and 5AF say traffic is poor and DX worse.

The radio inspector paid a visit to the local club and answered some questions concerning interference. He expressed his satisfaction with the situation. He gave a fine talk, giving examples to show the practical value of amateur radio to the forest service.

Traffic: 5AN, 30; 5GO, 24; 5HS, 9; 5DS, 5; 5BA, 4; 5GF, 3; 5BJ, 5; 5HP, 3. 5AF, 3; 5CR, 1.