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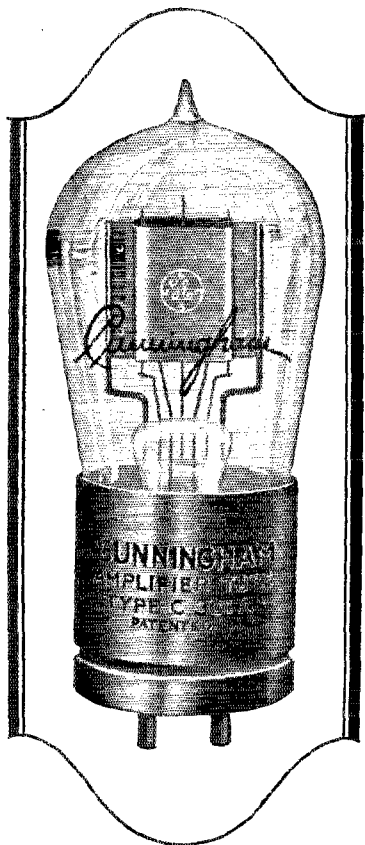
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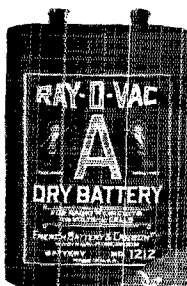
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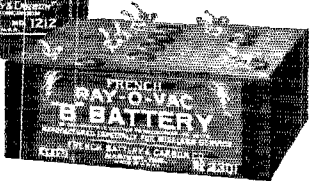
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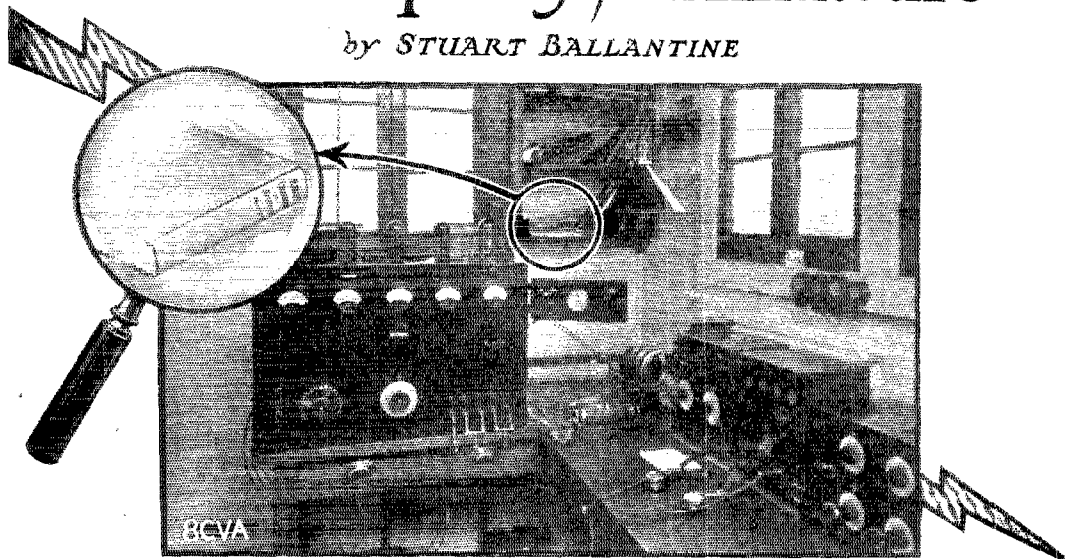


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The Official Organ of the A.R.R.L.

VOLUME VI

APRIL, 1923

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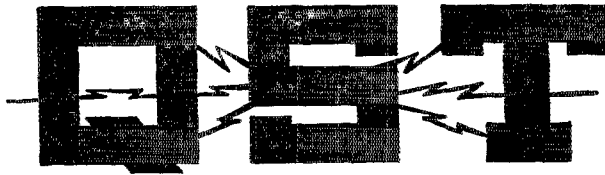
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A Magazine Devoted Exclusively to the Radio Amateur

Tuned Radio-Frequency Amplification with Neutralization of Capacity Coupling

By L. A. Hazeltine

Professor of Electrical Engineering, Stevens Institute of Technology

(A paper presented before the Radio Club of America, March 2, 1923.)

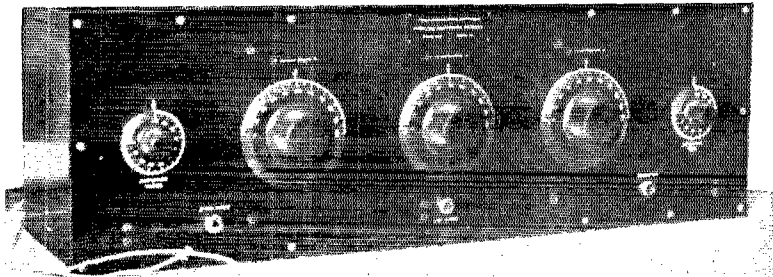
In this paper is described what we consider the greatest contribution yet made to the successful operation of R.F. amplification on 200 meters. In fact, we believe it completely solves the problem. In this paper Prof. Hazeltine shows how tuned R.F. amplification may be used, with all the benefits of resonant circuits, yet with complete elimination of the tendency to oscillate, the bugbear of every experimenter. Regeneration or oscillation may be utilized in the detector, with no effect upon the preceding amplifiers. This is a contribution of particular application to the work of the telegraphing amateur—Editor.

1. Principle of Neutralization of Capacity Coupling—The specific subject of this paper, "tuned radio-frequency amplification," is but one of a number of practical applications of a general principle: that electrostatic or capacity coupling between two circuits behaves like electromagnetic coupling in that it may be reversed in sense and in particular may be reduced to zero. This is accomplished by balancing one capacity against another. To attain the balance condition, it is generally necessary to reverse the phase of a voltage; and this involves the use of a transformer in addition to the capacities.

Any system of circuits coupled through capacities may be resolved into elements

such as indicated in Fig. 1, where the two circuits A and B are coupled through the direct connection at the bottom and through the capacity C_1 . To neutralize this coupling, two closely coupled coils L_1 and L_2 and a neutralizing capacity C_2 are arranged as shown, L_1 being connected between one terminal of C_1 and the common connection, and L_2 being connected in series with C_2 between the other terminal of C_1 and the common connection. The terminals of L_1 and L_2 which are connected together are of unlike polarity.

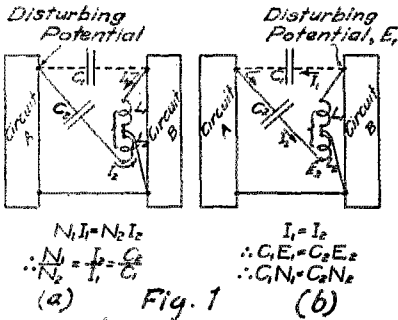
If we regard circuit A as having the source of alternating current, the alternating potential of its upper terminal (marked "disturbing potential," Fig. 1a)



A HAZELTINE NEUTRODYNE RECEIVER

Front view, showing simplicity of controls. The small left-hand knob is the rheostat controlling all the amplifier filaments, the right-hand the detector filament. The first large dial controls antenna tuning, the center dial tunes the first radio transformer, and the next dial the second radio transformer. (Photo courtesy Freed-Eisemann Corpn.)

would send a current through C_1 to circuit B, which current in flowing through the impedance of B would set up a voltage between the terminals. Thus, in the absence of neutralization, power would be transferred from A to B. Now if the neutraliza-



(a) Fig. 1

(b)

ing circuit L_1, L_2, C_1 be introduced and be so adjusted that the current I_1 through L_1 magnetically balances the current I_2 through L_2 , no voltage will exist across either of these coils nor across B, which is in parallel with L_1 . The condition of magnetic balance is

$$N_1 I_1 = N_2 I_2 \text{ ampere-turns,} \quad (1)$$

where the N 's are the respective numbers of turns of the coils. If no voltage exists across B, no current will flow through it; so all of the current through C_1 will be the current I_1 of coil L_1 . Also the current through C_2 is the current I_2 of coil L_2 . Since no voltage exists across the coils, the two condensers have equal voltages and their currents are therefore in the ratio of their capacities:

$$\frac{I_1}{I_2} = \frac{C_2}{C_1} \quad (2)$$

Combining these relations,

$$\frac{N_1}{N_2} = \frac{C_2}{C_1} \quad (3)$$

which is therefore the condition for neutralization of capacity coupling.

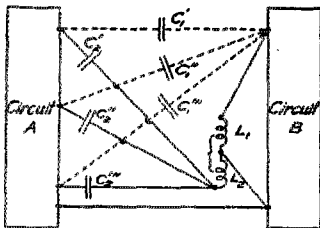


Fig. 2

The general reciprocal relation of electric circuits proves that if a source in A

does not affect B (as described above), then a source in B will not affect A. However, it seems worth while to examine the details of this case, which is illustrated in Fig. 1b. The "disturbing potential" at the upper terminal of B will send a current I_2 through C_2 . If adjustments are so made that the current I_2 through C_2 is equal to I_1 , then no current flows into A and no voltage is set up in A. Since the current through a capacity is proportional to the capacity and to the voltage, we then have

$$C_1 E_1 = C_2 E_2 \quad (4)$$

where E_1 and E_2 are the voltages across C_1 and C_2 respectively. There being no voltage across A, the junction of the L 's is at the same potential as the junction of the C 's; so E_1 and E_2 are also the voltages of coils L_1 and L_2 and are proportional to the respective numbers of turns:

$$\frac{E_1}{E_2} = \frac{N_1}{N_2} \quad (5)$$

Hence, combining, we must have

$$\frac{N_1}{N_2} = \frac{C_2}{C_1} \quad (6)$$

as before.

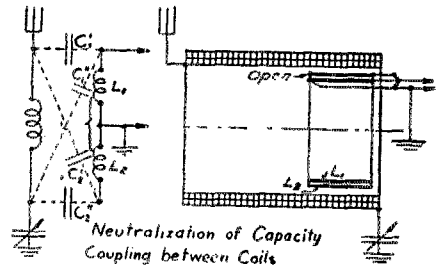


Fig. 3

If C_2 is smaller than given by (3), C_1 will be under-neutralized, and the circuits will be so coupled in the same sense as if there were no neutralization. If C_2 is larger than given by (3), C_1 will be over-neutralized, and the circuits will be coupled in the opposite sense, by which we mean that the phases of all currents and voltages produced in one circuit by a source in this other will be opposite to what they would have been without neutralization. The adjustment of C_1 is thus analogous to the adjustment of magnetic coupling by the rotation of a coil through the position of zero mutual inductance.

Sometimes it happens that two circuits will be coupled by a number of capacities extending from a single point of one circuit to various points of the other, as indicated by C_1', C_1'' and C_1''' , Fig. 2. In this case a single transformer L_1, L_2 suffices, but each coupling capacity must be

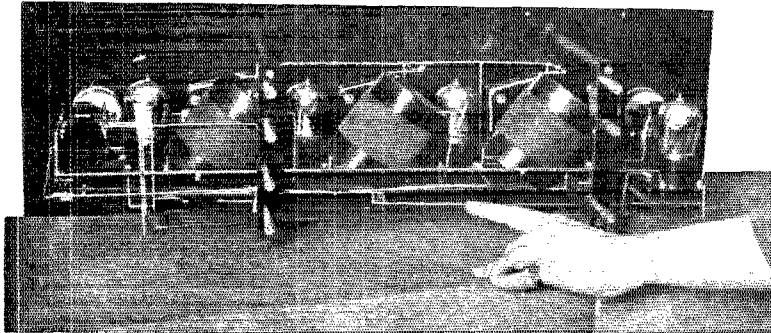
separately balanced by a neutralizing capacity, as C_2' , C_2'' , C_2''' . The relations for a balance are, as previously,

$$\frac{N_1}{N_2} = \frac{C_2'}{C_1'} = \frac{C_2''}{C_1''} = \frac{C_2'''}{C_1'''} \quad (7)$$

2. Miscellaneous Application of Capacity Coupling Neutralization.—Historically the first application of the principle described above was in eliminating capacity coupling between the primary and secondary circuits of a radio receiver (SE-1420) designed by the author for the U. S. Navy and developed in the Washington Navy Yard in 1918. This receiver was to have a wide range in wavelength (about 250 to 7500 M.) and emphasis was laid on the necessity of preventing interference from short wavelengths when receiving signals

to its exposure to the primary coil; and thus the idea of employing the current to more effectively eliminate capacity coupling led at once to the method now being discussed.

The arrangement adopted in the SE-1420 (and in fact the only arrangement tried) is illustrated in Fig. 3. The large coil is the primary tuning coil; L_1 is the coupling coil; and L_2 , wound outside of L_1 , is the neutralizing coil. The inherent capacities from the high-potential end of L_1 to various parts of the primary coil are represented by C_1' and C_1'' ; the corresponding neutralizing capacities are C_2' and C_2'' . These various capacities have a constant ratio, on account of the similar exposure of L_1 and L_2 to the primary coil. Hence it is necessary only to give L_2 the proper number of turns relative to L_1 in order to satisfy (7).



REAR VIEW OF A HAZELTINE NEUTRODYNE

Each of the coils shown is in reality a tightly-coupled two-winding transformer, a litz primary being wound on a tube just small enough to slip inside the winding shown, which is the secondary. The turns-ratio is 1:4. Note the peculiar angle at which the coils are set to avoid any electromagnetic coupling.

Two of these transformers are used as R.F. transformers, with a 11-plate tuning condenser across the secondary. The coupling is so tight that the effect is the same as tuning the primary circuit. The third transformer, with a similar tuning condenser, is used between the antenna and the first R.F. tube, giving single-control tuning, with the antenna acting almost purely as a collector.

The neutralizing capacity, indicated by the operator's hand, consists of a small piece of brass tubing sliding over the ends of two insulated wires. When the proper adjustment is attained, as described in the accompanying text, the capacity is fixed by sealing the tube in place.

(Photo courtesy Freed-Eisemann Corp.)

of long wavelength, such interference frequently taking place through capacity coupling. The first steps were the more obvious ones of arranging the circuits so that exposed parts were at or near ground potential and of enclosing the primary and secondary apparatus in separate metal compartments. However, the primary tuning coil and the secondary coupling coil had to be electrostatically exposed to one another in order to obtain the necessary magnetic coupling.

The first thought in eliminating this residual capacity coupling was to wrap a grounded wire around the coupling coil. In considering the most practical way of arranging such a wire screen, the author realized that it would carry a current due

Since L_2 is outside of L_1 , it also has a direct screening action, making C_1' , C_1'' , smaller than they would otherwise be, and smaller than C_2' , C_2'' . Hence L_2 requires fewer turns than L_1 . The proper number of turns N_2 was determined experimentally by putting the coils at right angles (so as to eliminate magnetic coupling) and adjusting N_2 until no signal was transmitted.

An application of the method under discussion, which is similar in several respects to that of the receiver just described, is to an alternating current Wheatstone bridge, as illustrated in Fig. 4. Here it is desirable to ground both the supply circuit and the detector circuit. This requires an insulating transformer in the detecting circuit and the absence of capacity coupling

between windings. The theory of the arrangement shown is the same as that just given; so separate discussion is unnecessary.

3. Capacity Coupling Neutralization in Amplifiers—While studying the theoretical limitations of amplifier circuits in 1918, the author realized that a most serious limi-

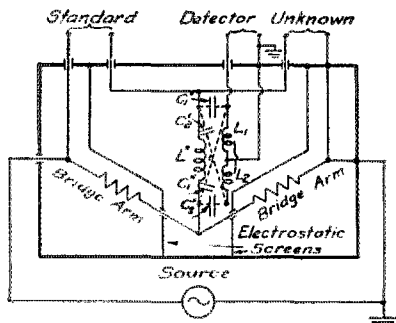
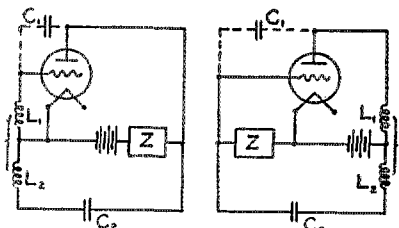


Fig. 4

tion was the tendency to oscillate by reason of regeneration through the coupling capacity between the grid and the plate. The higher the amplification attempted, as by reducing capacities and losses and by increasing the secondary turns, the greater would be the regenerative effect. It then occurred to him that the principle of capacity coupling neutralization previously worked out for the SE-1420 receiver would be applicable.

The two converse modes of applying the neutralization principle to triode vacuum tubes are illustrated in Fig. 5. In both



Neutralization of Capacity Coupling in Triode Vacuum Tubes

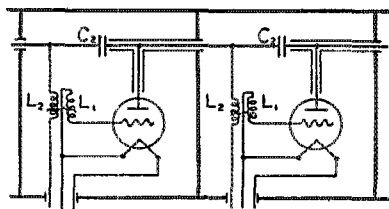
(a) Fig. 5 (b)

parts of this figure Z represents any impedance, as a transformer winding; the coils L_1 , L_2 are closely coupled as before and have a ratio of turns N_1/N_2 equal to C_2/C_1 , the ratio of the neutralizing capacity C_2 to the inherent coupling capacity C_1 , as in equation (3).

In practically applying the arrangements of Fig. 5 to amplifiers, the coil L_2 may of course be used wholly for neutralization purposes; but it is convenient to use it also as one winding of an amplifying transformer, thus making a third coil unnecessary. Fig. 6 and 7 show how this may be accomplished. As the ratio of transformation will usually be fixed by other considerations, C_2 will be used for the balancing adjustment. These figures also show how all coupling capacities except those inside the tubes may be eliminated by enclosing the circuits in metal compartments and certain of the leads in metal tubes.

The name *neutrodyne* has been given by the author to the method of neutralizing capacity coupling in triode amplifiers. It suggests the neutralization of a "force," the tendency of the triode to oscillate, and contrasts with "heterodyne," which employs oscillation.

Three classes of amplifier are of importance: audio-frequency, untuned radio-frequency and tuned radio-frequency. All are in a sense tuned, but the two former are designed to cover a broad band of fre-



Multistage Amplifier with Capacity Coupling Neutralization

Fig. 6

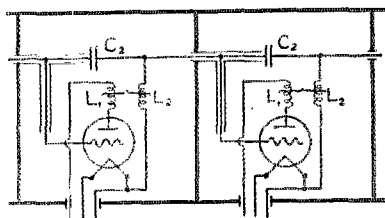
quencies, while the last is sharply tuned for the purpose of giving high selectivity. Sharp tuning of the plate circuit, or of a circuit closely coupled to the plate circuit, is especially conducive to regeneration, being in fact one of the most common methods for securing regeneration in detector circuits. Neutralization of capacity coupling, while useful in all classes of amplifier, is therefore particularly necessary in tuned radio-frequency amplifiers. The previous lack of such a method of preventing undesirable regeneration has prevented radio-frequency amplifiers from going into general use.

Fig. 8 shows a tuned two-stage radio-frequency amplifier and detector with capacity coupling neutralization of the form of Fig. 5b. The neutralizing capacities are in part inherent, existing between the coils and condensers of adjacent stages, and in part added by condensers. These condensers are of very small capacity and are conveniently made in the form of an in-

sulated wire inside a metal tube. The secondary coils of the transformers are preferably wound outside the primaries and so screen away some of the coupling capacity otherwise existing between the primary coil of one stage and the secondary circuit of the preceding stage. This screening effect is just like that of Fig. 3 and is advantageous, as it reduces the capacity to be neutralized. The coils of different transformers are, of course, arranged to have no magnetic coupling.

The adjustment of each neutralizing capacity is made experimentally by tuning in some strong signal and then turning out the filament of the tube whose capacity is to be adjusted, but leaving the tube in its socket. If the neutralizing capacity is not correct, the circuits on each side of the tube will have capacity coupling, which will transmit the signal. The neutralizing capacity is then adjusted until the signal disappears. This method of adjustment clearly illustrates that the neutrodyne circuit operates to eliminate capacity coupling and is not a method for counteracting the effects of regeneration; for the adjustment is made with the filament cold and therefore under conditions when the tube can have no regenerative action. This ingenious method of adjustment was devised by Mr. Harold A. Wheeler, who has done independent work along the lines of the neutrodyne circuit.

The neutrodyne principle is not inconsistent with regeneration; for it may be applied both to regenerative and to non-regenerative receivers. When applied to

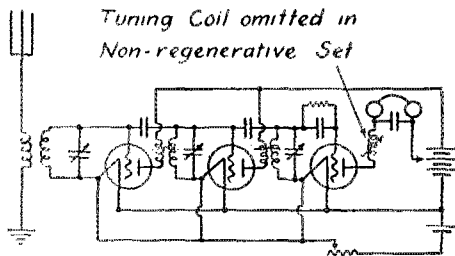


Multistage Amplifier with
Capacity Coupling Neutralization

Fig. 7

non-regenerative receivers it eliminates any inherent means whereby regeneration might occur, and so contrasts with devices such as "stabilizers" which do not remove regeneration but merely weaken its effect. When applied to regenerative receivers, the neutrodyne principle serves to eliminate undesirable regeneration, such as might interfere with proper tuning and might cause radiation from receiving antenna. Fig. 8 shows a suitable way to add regeneration to a neutrodyne circuit—by applying it to the detector tube, as by tuning the plate

circuit. Such a receiver may be operated oscillating; the frequency of oscillation is then determined by the tuning of the detector tube circuits, while the other tuning adjustments serve only to vary the signal strength, as with non-regenerative receivers. This is well illustrated in the practical operation of the receiver by the fact that adjustment of the tuning of an amplifier tube may be made over the entire



Regenerative Neutrodyne Receiver

Fig. 8

scale without causing a beat note to disappear, the intensity varying rather than the pitch.

Whether regeneration is or is not desirable in a neutrodyne receiver is not, in the author's opinion, a question with a single answer. It is well known that in radio telephone reception by unskilled operators regeneration has frequently been found objectionable on account of distortion, beat notes and squeals. Regeneration also introduces another adjustment and makes tuning more difficult. Such objections apply to neutrodyne receivers as well as to other types; while in addition regeneration adds relatively little to the signal strength in a properly designed neutrodyne set at wavelengths from 360 meters up. On the other hand, at 200 meters the increase in signal strength due to regeneration is decided and is well worth while to amateurs who are accustomed to careful operation of receivers. Of course, regeneration for heterodyne purposes is essential to continuous-wave telegraph reception, to which the neutrodyne receiver is well suited.

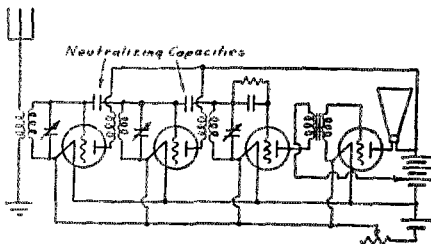
Audio-frequency amplification may be combined with the neutrodyne radio-frequency amplification in the usual ways. Fig. 9 shows two stages of radio-frequency, detector and one stage of audio-frequency. Fig. 10 shows a reflex arrangement in which the first radio-frequency tube is used also as an audio-frequency amplifier. In either of these forms, more stages of audio-frequency amplification may be added and jacks may be readily arranged so as to cut out some or all of the audio-frequency am-

plication, without upsetting the neutrodyne balance.

4. Practical Results obtained with Neutrodyne Receivers—While study of the neutrodyne receiver is by no means concluded, it may be of interest to record some of the results and conclusions so far obtained. The work described was conducted in the Electrical Engineering Laboratory of Stevens Institute of Technology, Hoboken, N. J. Using a 60-foot antenna, a three tube non-regenerative receiver consisting of two stages of radio-frequency amplification and a detector has regularly brought in on head telephones broadcasting from Fort Worth (Texas), Kansas City, St. Louis and Minneapolis. A four-tube reflex set, as in Fig. 10, brings in Atlanta on a loud speaker when no antenna is used.

Broadcasting from Los Angeles has been received in Newark, N. J., on a four-tube non-regenerative neutrodyne set. The author lent his first model to two of his amateur friends, and each brought back the same story—that they had heard every district in the United States on the same night. This was with regeneration by means of tuning the plate circuit of the detector tube, as in Fig. 8.

As an example of selectivity, the author has heard Fort Worth, Texas, and has been able to distinguish music from speech, during interference from WEA F, the American Telephone and Telegraph Company's station in New York City, directly across the Hudson River and about a mile



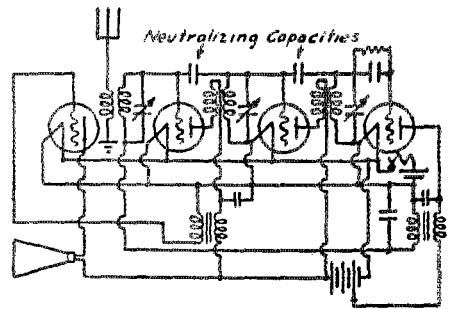
Non-Regenerative Neutrodyne Receiver with One Stage Audio-Frequency Amplifier
Fig. 9

from the Laboratory. The difference in wavelength was about 15 meters in 400. This also was with two stages of radio-frequency amplification.

The adjustment of the neutralizing capacities (which is made once for all when the receiver is first tested) is independent of the frequency, within ordinary practical limitations. Tubes of the same type may be substituted without upsetting the bal-

ance, and even tubes of different types, provided the grid-plate capacity does not differ greatly.

A radio-frequency voltage amplification per stage of about 10 is readily attained for the usual broadcasting wave-lengths. This is equivalent to an audio-frequency amplification equal to the square of this value, 100, or a power amplification of 10,000, per stage. Thus the two tuned radio-frequency stages give a power amplification at the telephone receiver of the order of one hundred million.



Reflex Neutrodyne Receiver
Fig. 10

In non-regenerative neutrodyne receivers, all adjustments are independent of one another, thus greatly facilitating operation. The tuning of each stage is sharp but not extremely critical; these adjustments are only those demanded by the degree of selectivity attained. The choice of battery voltage differs in no way from that for ordinary forms of receivers. The absence of regeneration makes the received music or speech conspicuously clear and free from distortion, with no local noises.

Both regenerative and non-regenerative neutrodyne receivers obviate the serious objection commonly raised against regenerative receivers, interference with nearby receiving sets due to oscillations set up in the antenna. No oscillations are present in the non-regenerative form; while in the regenerative form they exist only in the detector circuit, being confined thereto by the absence of coupling between stages except the unilateral mutually conductive coupling of the tubes.

Summing up, the neutrodyne circuit in effect is a simplification of previous circuits, not an elaboration. It eliminates a previously existing disturbing feature and so gives pure relay amplification.

Receiver Plate Supply from A.C.

By S. T. Woodhull*

THERE are two common sources of anode potential for receivers; namely, dry cells and storage batteries. Both batteries are entirely satisfactory when charged. However, they require care and attention to keep them in service.

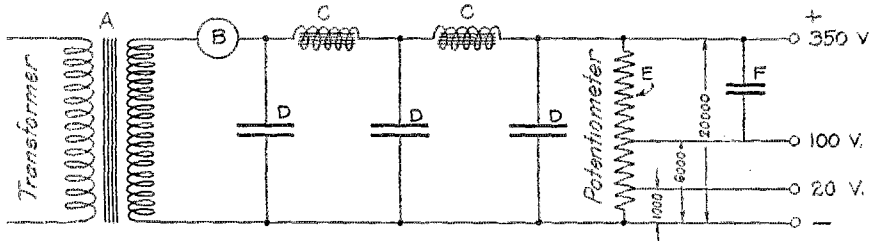
The object of this paper is to describe a method of supplying this potential from the 60-cycle 110-volt lighting circuit—a method which will operate over a considerable period of time without any attention whatever. The device will deliver 20 volts for the detector tube, 100 volts for the first

the negative half of the wave, allowing only pulsating direct current to pass. This pulsating current is smoothed out by the inductance and capacity "C" and "D" into steady direct current. The resistance "E" furnishes a constant load to the circuit and also provides a means for tapping off the voltages required for the detector and amplifiers.

The design of the various units follows:—

Transformer

Core, $\frac{3}{4}$ " cross section; outside dimensions, $3\frac{1}{4}$ " x $3\frac{3}{4}$ ".



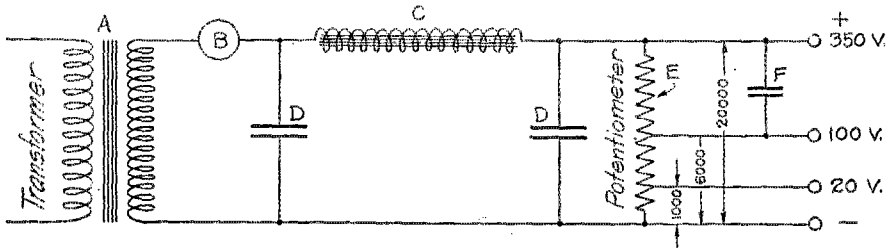
— FIG. 1 —

stage of audio amplification and 350 volts for a 5-watt amplifier on the second stage to operate a loud speaker. Two circuits are shown, the first of which will to all practical extents completely eliminate the A.C. hum. The second will reduce the hum to the point where it is not noticeable in the signal, although it may be heard in the loud speaker when the signal stops.

Insulation, $\frac{1}{8}$ " paper between primary and core; $\frac{1}{16}$ " paper between primary and secondary; .002" paper between layers, both primary and secondary.

Primary, layer-wound, 450 turns No. 24 S.C.C. on each leg.

Secondary, layer-wound, 2300 turns No. 30 S.S.C. on each leg, over primary.



— FIG. 2 —

In Fig. 1, "A" is a 110 to 500 volt, 60-cycle transformer, "B" an S-Tube Rectifier, "C" are each 3-henry choke coils, "D" thirty-microfarad electrolytic condensers, "E" a twenty thousand ohm resistance, and "F" a one-microfarad condenser. The voltage is stepped up to the required amount by the transformer. The S-Tube intercepts

Chokes

Wind 4000 turns No. 36 S.S.C. wire on any audio-frequency transformer core.

Resistance

The resistance should have a total of 20,000 ohms, tapped at 1000 ohms for the detector, and at 6000 for the first amplifier stage. In order to provide an adjustment for varying line voltage and also

*American Radio & Research Corpn.

proper operating voltage for the detector, the resistance may be tapped at 900, 1000, 1200 and 1400 ohms, these taps giving a range in voltage from 16 to 22 volts for the detector. The resistance block can best be made up of Ward Leonard tube resistance units of appropriate valves.

Condensers

The condensers "D" are thirty-microfarad Amrad Electrolytic Condensers. Condenser "F" is a one microfarad paper condenser.

Rectifier

The rectifier is the Amrad S-Tube Rectifier.

The second circuit (Fig. 2) eliminates one of the electrolytic condensers and one choke coil. In this circuit the various units are the same as described for Fig. 1 with the exception of the choke coil. This

coil should be wound with 6000 turns instead of 4000 turns of No. 36 S.S.C. wire, on a core having 50% greater cross sectional area.

In either circuit the transformer should be shielded or leads provided to keep it at least six feet from the receiver to eliminate induction noises from the 60-cycle supply. The connections to the receiver are the same as when a battery is used: the negative side is connected to the negative leg of the detector filament, the 20-volt tap to the detector plate circuit apparatus, the 100-volt tap to the amplifier plate circuit, and the 350-volt tap to the power amplifier plate circuit. When but one storage battery is used, the negative side of the line for all the amplifiers is connected through the battery. In the power amplifier only 5-watt or similar tubes should be used.

A Study of Filter Systems for Transmitter Tube Plate Supply

By M. G. Goldberg, 9APW

THE object of the tests described in this paper is to illustrate in a graphic manner just what conditions obtain in a circuit when rectified alternating current waves are deliberately displaced and distorted by the use of inductance-and-capacity filters so as to produce nearly constant voltage and current. The utter unsuitability of the most widely used filters is strikingly shown. The curves also show that a comparatively simple circuit, if properly designed, is much better than an incorrectly designed network of complex form.

For these tests there was built a 12-jar electrolytic rectifier, consisting of lead and aluminum plates spaced one inch apart in glass tumblers and immersed in a saturated borax solution to a depth of 2 inches. Each element was 1 inch wide. On no load the A.C. voltage was 580 and the R.A.C. (rectified A.C.) voltage was 520. With a load of 0.4 ampere the A.C. voltage was 570 and the R.A.C. voltage was 480. Reducing the area of the plates in contact with the solution had very little effect on the rectified wave form or the output voltage but it tended to heat the liquid rapidly. With the rectifier as described a run of 12 solid hours made the solution barely lukewarm. The jars were connected in the "bridge" or "square" hook-up as shown in Figure 1.

The output of the rectifier was fed into a Hartley oscillator as plate supply for a 50-watt Signal Corps transmitting tube, which was loaded with a phantom antenna

containing a resistance of 12 ohms. The circuit was adjusted for maximum output and while operating at 200 meters with a plate voltage of 480 it put into the phantom antenna a current of 1.35 amperes. To

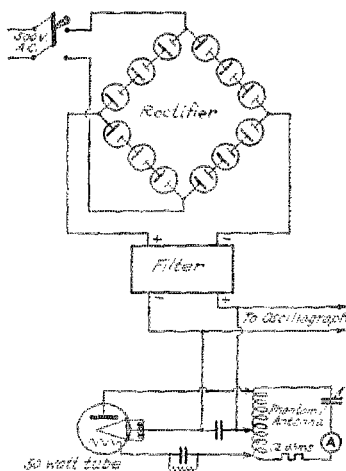


FIG. 1

find out exactly what was going on in the circuit, an oscillograph was connected across the output of the rectifier in parallel with the tube set. The current drawn by the oscillograph was about equal

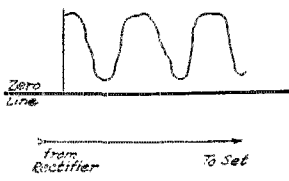


FIG. 2

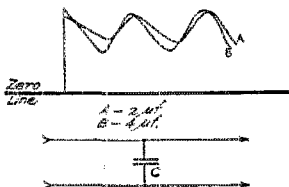


FIG. 3

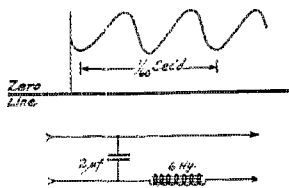


FIG. 4

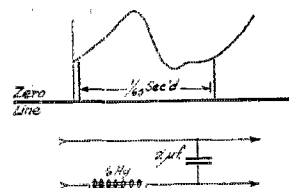


FIG. 5

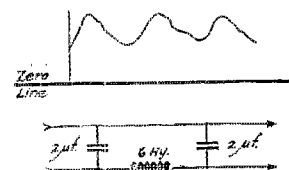


FIG. 6

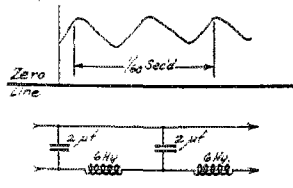


FIG. 7

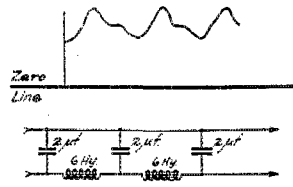


FIG. 8

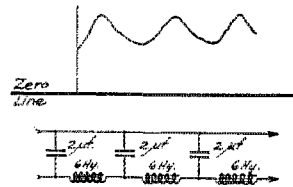


FIG. 9

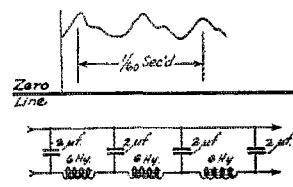


FIG. 10

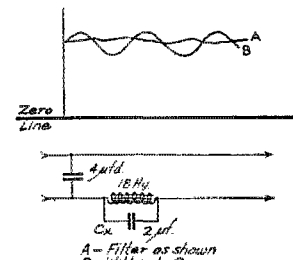
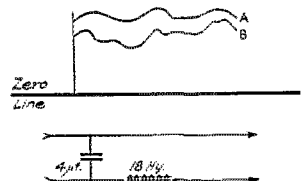


FIG. 11



A - Without Cx
B - Filter as shown
(Cx not large enough)

FIG. 12

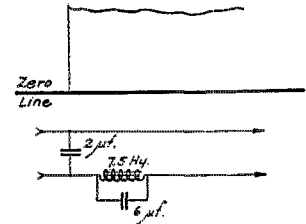


FIG. 13

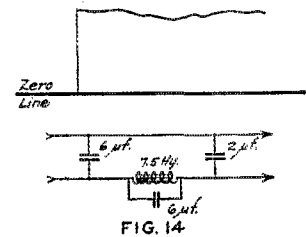


FIG. 14

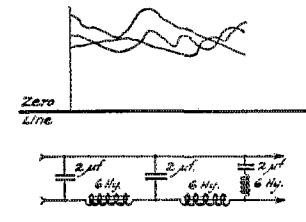


FIG. 15

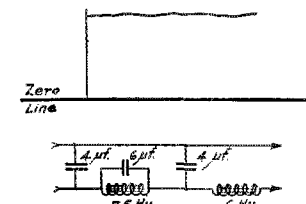


FIG. 16

to that taken by the tube. Two elements of the oscillograph were used and the prismatic reflectors were adjusted so their light spots coincided on the screen when no current was flowing. One element was left unconnected and served to draw the zero-voltage line; the other element carried the current and drew the voltage curves.

When all was ready the switch in the primary of the step-up transformer was closed and the output voltage watched on the oscillograph screen. After but a one-cycle surge the A.C. component disappeared and pulsating D.C. voltage took its place, proving once and for all that the plates form instantly as far as rectification is concerned. The charging current does not drop off as rapidly. It is quite great at first but finally goes down to a negligible value. The rectified (but unfiltered) wave is shown in Figure 2.

Various combinations of inductance and capacity were then tried to smooth out the pulsating wave form. It was thought best to show at first the uselessness of the ordinary amateur filter which consists of any shunt condenser and any series inductance that are available. The results are shown in Figure 3 to 6 inclusive.

The next thought is usually to add more sections of filter; accordingly there was built up step by step a net work as shown in Figure 10. As it was being built there were made the tests shown in Figure 7 to 10 inclusive. It will be seen at once that no improvement resulted, so far as the filtering effect was concerned. There was, however, a slight gain in another direction as the average voltage (and the output of the tube) rose with each addition to the network. This is shown by the fact that there is greater area under each curve as we go from Figures 7 to 10. It must be insisted, however, that the filter *did not filter*, as the curve of Figure 10 is almost exactly that of Figure 3 where nothing but a 2-microfarad condenser was used.

This does not mean that a filter of this type can not be made to do good work; it simply means that one cannot make a successful filter simply by connecting a long string of condensers and chokes. A good filter must be arranged intelligently and such a good filter may have very few parts. About the most economical arrangement is that which includes "trap" circuits—combinations of a condenser and inductance in series *across* the line or else a condenser and inductance in shunt and the whole thing in *series* with the line.

The next move accordingly was to test various "trap" circuits. The circuits and curves are shown in Figures 11 to 14, inclusive. It will be seen at once that it is possible with these quite simple circuits to obtain results superior to the previous complex ones. Furthermore most of the condensers are not across the line and

do not need to be of the high-voltage type; they are merely across the choke coil and are required to stand only a few hundred volts. Ordinary paper telephone condensers have been found to serve admirably.

In testing a more complex circuit involving a trap circuit there was obtained the curious triple curve shown in Figure 15. All three of these curves were traced by a single oscillograph element, impossible as that may seem, and all three of them moved continuously across the screen like garter snakes. The author would appreciate an explanation. Still another circuit of the same general type was tested with the results shown in Figure 16, possibly the best obtained with any of the circuits shown.

One can summarize the results in a few words as follows—

- 1—A filter is not made better merely by adding chokes and condensers; they must be properly placed.
- 2—Good filtering may be obtained from quite a simple filter such as that shown in Figures 11a, 13, 14 and 16.
- 3—The "trap" circuits are cheaper, as most of the condensers may be of low-voltage type.
- 4—The addition of condensers does not lower the voltage but raises it and raises the output of the set. The only exception is that your transformer may have a high-resistance secondary.
- 5—The rectifier is formed completely within two seconds. It is true that at first there is a considerable charging current for some time but the rectification is perfect after the first surge—everything that gets thru the rectifier is in the proper direction; the voltage curve never gets anywhere near zero.
- 6—The set itself tends to intensify any harmonics which are present. The only way to prevent this is to filter the supply quite perfectly before it reaches the set. The effect was proven by watching the curve on the oscillograph screen while the set was switched off and on.

Filters of the "low-pass" type here shown have a cut-off frequency which may be made to have any value by proper design. Anything below the cut-off will pass thru the filter, anything above will be partly filtered out. To show *why* some of them did not operate Mr. Goldberg's filters have been analyzed for us by Mr. F. S. Dellenbaugh of the Department of Electrical Engineering at Massachusetts Institute of Technology.

Figure No.	Cut-off cycles	Greatest Filtering effect, cycles
6-10	65 (Approx).	—
11a	40	—
12	—	53
14	12	24
16	12	24

Any of the filters shown would have done fairly well if the rectifier had been connected in the usual center-tap fashion as the lowest frequency present would then have been 120 cycles. With the bridge con-

nection used by Mr. Goldberg there is present quite a lot of 60 cycle component and this was able to "sneak thru" because it was too near the cut-off of all the filters except those of Fig. 11, 13, 14, & 16.—Ed.

Second District Convention Big Success

THE amateurs comprising the Second District Executive Radio Council, and that means almost everybody with a 2-call, reverted to type the first three days in March and pulled off a rip-snorting ham convention. In the greatest city in the world, where professional exhibitions radio and otherwise are a regular thing, where commercial radio is supposed to dominate, where the B.C.L. is "thickest," it was a joy to see a real amateur affair. From start to finish this was of, by, and for the ham, and those who attended will never forget it.

There was a show, in the Roof Garden of

members from the visitors. The best examples of amateur apparatus construction were exhibited by the clubs, and some beautiful jobs they were. Valuable prizes were offered by the manufacturers in various contests. For the best club booth, the Bronx Radio Club was awarded a General Radio wavemeter which anybody would give a leg to own; the Hudson Radio Club copped second prize. Awards in the C.W. transmitter contest were made in the following order: 2BHY, 2AUZ, 2BRB, 2BH, 2KV; in the R.F.A. receivers, 2KV, 2BH, 2d and 3d, 2BTM; in the A.F.A. receivers, 2ADR, 2QK, 2SE, 2CNK.



the Hotel Pennsylvania, but it was different. It was confined to manufacturers, and these were actually hand-picked and limited to 30 in number, selected for the probable interest of their products to the amateurs who would attend. Admission was by card-tickets, which were sold to club members and their friends by the clubs affiliated with and making up the Council. In the Butterfly Room, adjoining the Roof Garden, the booths were taken by the various local radio clubs, which vied with one another in the originality and interest of their exhibits and in the business of getting new

On the night of March 3d the gang assembled in the beautiful grand ballroom of the Pennsylvania for their Third Annual Banquet. Believe us, fellers, it was some time, and any 2-spot that wasn't present can never know what he missed. Over 800 were present, and almost everybody was a brass-pounder or a brass-pounder's sweetie. Last year at the record-breaking banquet 1130 were present but a heavy percentage were brand-new novices. Only those novices with a distinct ham trend were out this time, so that it was probably the largest truly-amateur bunch ever got

together at a feed. Bill Crosby, editor of the *Modulator*, had made the fatal mistake of suggesting in his columns that everybody bring a whistle, and say! 200 meters was never like that place. Horns, whistles, duck-calls, klaxons, flutes, even some buzzers working into loud speakers. Sync notes, cat-calling imitations of flivver coils, all kinds of QRM. The bunch certainly had a good time. During the feed Paul Godley tuned in some sweet music on a huge six-foot tuner set up on a gallery under a spot-light, at the end of which, happening to open up the lid of the set, it was discovered that the pretty little lady was part of the works of the set. (This accessory exclusive with Godley's tuners—patent applied for.) Songs were sung by the crowd too, the big hit of the evening being a take-off on "Mister Gallagher and Mister Shean," written by A. G. Clark of 2CNT, which was a screaming comedy about a novice listener and an amateur who interfered. We only wish that space would permit more than a brief mention of it.

Capt. George T. Droste, vice-president of the council, presided as toastmaster in the absence of President A. A. Hebert, who

unfortunately was detained in Cuba by business affairs. Finally securing comparative quiet by the strenuous use of a big gravel, Capt. Droste opened the speaking, introduced his committees, called the roll by districts (9AWM of the record-breaking Hawaiian relay was there, by the way), and introduced the various clubs. Addresses were made by Hiram Percy Maxim, president of our A.R.R.L., Radio Inspector Arthur Batcheller, Paul F. Godley of T A fame, George Clark of the Radiocorp, who told of the wonders of the Order of Fle (hi!), Wm. F. Crosby, editor of the *Modulator*, and K. B. Warner, A.R.R.L. secretary and editor of *QST*. The latter caused a young riot by the first U. S. exhibition of the English top-hat won from W. W. Burnham of London on a wager in the 1921 Transatlantics. Somewhere along around midnight the affair broke up, as some of the hotel people seemed insistent that they ought to be allowed to clear off the tables, but there were little groups standing around chewing the sock until finally the lights went out and there was no place to go but home.

Well done, OMs!

K.B.W.

6ZH Graduates by Radio

THE following story from the *San Diego Tribune* is so well told that we quote it without change. It is a story from a page in the life of an amateur, with its joy as well as its sorrow. Lester Picker, 6ZH, is A.R.R.L. Superintendent for District No. 1 of the Pacific Division, and his station is one of the best known on the Coast.

"For the first time in history, a student has been graduated from his school by radio.

"Lester Picker of San Ysidro was present, through the air, at the graduation exercises of his class, held in the Roosevelt Memorial high school in Balboa park, and delivered a short talk to the class from his bedside, through 15 miles of frosty air.

"Some time ago Picker, one of the leading radio experimenters of southern California, sustained a broken back while installing a new mast at his station. One of the guy wires broke, and he fell 55 feet, breaking his back. Since that time he has been confined to his bed, but he has not given up his radio work, and his voice is as familiar in San Francisco as it is here, while on telegraph transmission he is known up and down the Atlantic coast.

Were it not for his accident, Picker would have been graduated with the present class of the high school. However, neither his friends nor the school authorities were willing to let his injury stand

in the way of his graduation, and while it was out of the question to bring him to the school personally, his diploma was taken to him by Principal T. A. Russell, and fellow radio operators installed a receiving station and "loud speaker" in the auditorium of the school, so that he might talk to his classmates on their last night together.

"Everything in connection with the novel graduation worked perfectly. As the time set for his talk approached, the auditorium became quiet, and then his voice, clear and distinct, came from the horn of the receiver. It was plainly audible in all parts of the auditorium. He spoke of the pleasure which it gave him to be able to graduate with his class, and expressed the hope that the class of '23 might gather again, in the near future, to talk over their school experiences.

"I wish to extend my thanks to Principal T. A. Russell and the members of the faculty in my behalf," he said, in closing, "and my family joins me in sending my regards. Good night, Station 6ZH."

This accomplishment was made possible by the help of 6ZB, Dr. A. E. Banks, of San Diego, who was in the telephone communication with the high school and kept Picker informed over the radio as to when to G.A. 6ZH, by the way, will appreciate cards and letters from the gang.

Building a Super-Heterodyne and Making it Work

By O. A. Kimball, 9RY

I WILL try to describe the building and adjustment of a super-heterodyne but will not describe more than 10% of the trouble I experienced in getting satisfactory performance from this most wonderful of all receivers.

I started with the customary resistance-coupled radio-amplifier. Altho this amplifier was built in accordance with instructions that have been widely recommended I was very much dissatisfied with the results. The resistances simply would not stay constant in our climate. I decided to abandon them entirely and try transformer coupling.

The first five tubes in my set are hard Moorehead tubes, the audio frequency tubes are Western Electric "J" or "VT-1" tubes. The radio-frequency transformers are carried by the glass rod just back of the radio tubes. This rod mounting is $\frac{1}{8}$ of an inch in diameter and 24 inches long, just back of the radio tubes (see Figure 1). This method of mounting the transformers gives results, especially much greater sensitivity than was obtained with other mountings.

The Heterodyne

The separate heterodyne is connected as

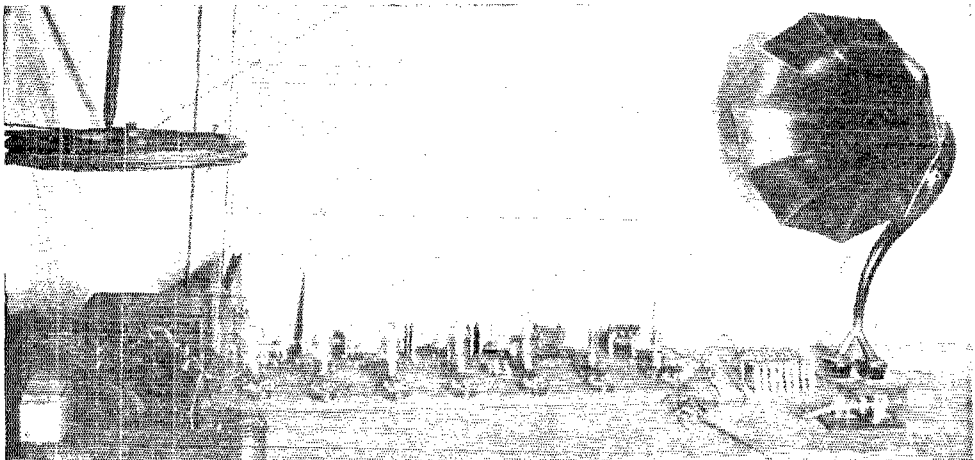


Fig. 1. The Complete Set.

Altho the transformer-coupled amplifier eventually was much better than the best of the resistance-coupled amplifiers it must be admitted that it took nearly eight months of spare-time work to produce a really good one. Trouble of every kind was encountered: howls, squawks, whistles, rattles and explosions came from the amplifier. Finally after everything else had been tried it was discovered that accurate tuning of the transformers would do more than any other thing to cure all these noises and the tendency to internal oscillations as well.

Let us get at the finished receiver.

The set is mounted on a base 40" x 12" with the tubes spaced 6 inches between centers. Seven tubes are used, four as tuned-transformer-coupled radio amplifiers, one as a detector, and two as audio amplifiers with the usual transformer coupling.

shown in Figure 2. The position of the grid coil is changed until the heterodyne will oscillate steadily while the tuning condenser is moved over the range of 180 to

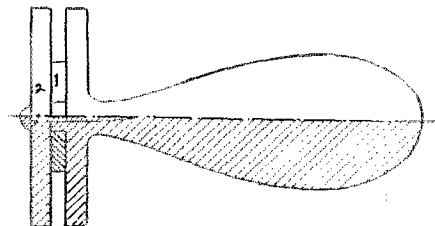


Fig. 4. The Coil Former.

450 meters. The best oscillators were found to be the Western Electric "J" or

"VT-1" tube and the Radiotron UV-200. The arrangement of the heterodyne coils and the pick-up coils is shown in Figure 3.

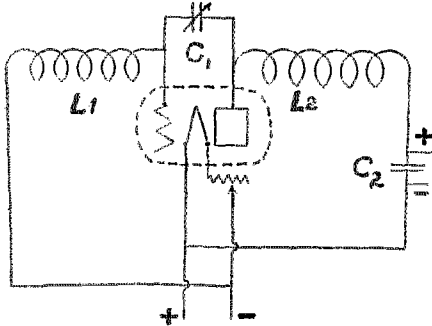


Fig. 2. The Heterodyne Circuit

- L_1 —2 $\frac{3}{8}$ " diameter, 18 turns No. 20 S.C.C.
- L_2 —2 $\frac{3}{8}$ " diameter, 23 turns No. 20 S.C.C.
- C_1 —.0005 microfarad
- C_2 —.001 microfarad

The Radio Transformers

When the rest of the set is done we are ready for the winding and tuning of the radio transformers. On the care with which this is done depend the results that will be obtained. If it is not done well the set will be a complete failure—if it is done well the results are beyond what may be gotten from any other circuit.

The coils for the radio transformers are wound on the former shown in Figure 4. The part of the former labeled "1" is a removable wooden disc on which the coil is

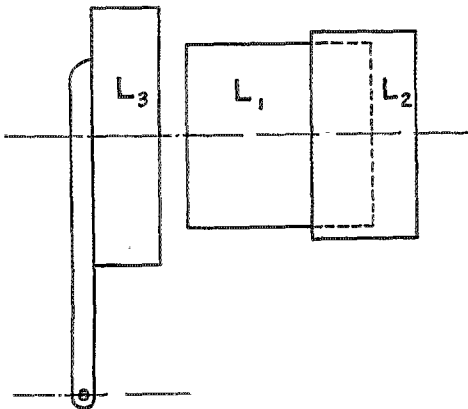


Fig. 3. Arrangement of Heterodyne and Pick-up Coils.

wound and which is removed with the finished coil. For the grid coils these discs are $\frac{1}{8}$ inches thick and 1 inch in diameter; for the plate coils they are only $\frac{1}{8}$ inch thick but are an inch in diameter, the

same as the grid coil cores. The coils are wound with No. 33 A.W.G. (B&S) double-cotton-covered wire, 400 turns for the plate coils, 750 turns for the grid coils. Then the screw is removed from the center of the winding device and the top disc carefully lifted off. The coil is now "doped" with celluloid dissolved in amyl-acetate and placed in a warm (not hot) oven for 30 minutes. This is done three times.

Tuning the Transformers

It was found convenient to tune the transformer coils in the manner shown in Figure 5. The grid coils are in the position in which they will be used (that is, in the grid circuit), hence are tuned to the working wave, which is 1600 meters in my set. All of the grid coils must be very carefully tuned to this wave by removing turns until the point of best response in the phones has moved down to 1600 meters.

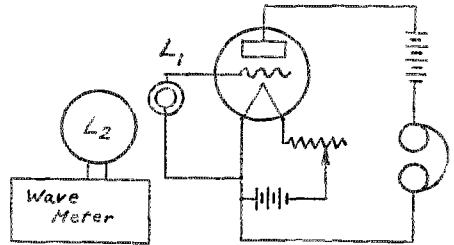


Fig. 5. Tuning the R.F. Coils

- L_1 —R.F. Coil that is being tuned.
- L_2 —Wave meter inductance
- Note—Keep distance between coil the same while coil is being tuned.

CAUTION—The detector tube used and the socket used absolutely *must* be the same type that will be used in the set. It is also absolutely essential that all coils be tuned with the outer end connected to the grid. It was found by experiment that coils which will respond to 1600 meters in the plate circuit will respond to 810 meters in the grid circuit, hence the 400-turn coils are also tuned by the method of Figure 5, but to 810 meters.

The coils are now slipped on the glass rod and the rod is set into place. Care must be taken to connect the coils the same way as when tuning them, that is with the outer end of the grid coil to the grid and the inner end to the negative bus, also the outer end of the plate coil to the plate and the inner end to the positive bus. The rest of the set is connected as shown in Figure 6. The buzzer-driven wave meter is then set up about 25 feet from the loop and final adjustment made by sliding the transformers back and forth, also by changing coupling between the coils of each transformer. This should be done from the input end of the set on down to the detector and

when a rough adjustment is obtained the whole thing is to be done over again from the beginning. It is impossible to do this adjusting too perfectly—the adjustments are very critical and many hours will be required.

The Results Obtained

As has been said, eight months were spent on the set. The results were, how-

Amateurs from both coasts were read every night. The signal intensity was such that the headset was only used for adjustments, and all actual reception done with a large Edison phonograph horn and a single Baldwin type C receiver. Signals from stations 1200 miles away were easily recorded on an Ediphone (dictating machine) and it was possible to hear many signals 50 feet

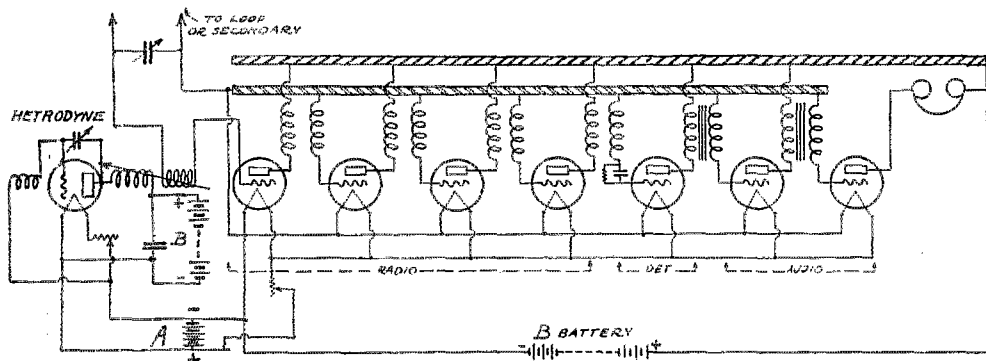


Fig. 6. The Circuit of the Superheterodyne.

ever, worth the work and time required. During the past winter the set was installed in a basement in Topeka, Kansas; everything, including the loop, being entirely below the ground level. The loop frame was four feet square and wound with four turns of number 18 A.W.G. (B&S) wire.

from the phones when neither loop nor antenna was being used. The phone stations at Denver (400 miles) and at Pittsburgh (750 miles), were heard two city blocks from the horn.

I am much indebted to Mr. S. Kruse for information given me while I was experimenting with this receiver.

How to Make a 5-watt Tube Reach Out

By L. W. Hatry, 5XV

Filament Voltage

The first investment any ham who starts to put in a transmitter should make is a filament voltmeter. It is really an investment; it will save its first cost inside of a month's use simply because it is cheaper than one five-watt tube. It is better to operate on one tube with a voltmeter than to operate on two without, and your finances will keep in much better state. I'm speaking from quite heartbreaking, bankrupting experience, for it is truly amazing how rapidly tubes cease to be of use when the filament current gets to where it hadn't ought. The manufacturers tell you quite candidly that increase of filament voltage 3% will cut the tube life in half, and I will also tell you quite candidly that that statement is, if anything, underestimated. They will tell you that decreasing the filament voltage 3% will double the tube life. If you decrease the tube filament that much your antenna current

will hardly decrease noticeably and if you have a good transmitter that is performing DX regularly, a mere tenth ampere of lost antenna current will not show in the work accomplished, whereas the financial advantage gained is enormous. On the other hand you cannot make a poor station reach out by forcing the filament; the only gain will be to the company making the new tube you will soon have to buy.

Rule 1 is to buy a voltmeter and use it to see that the voltage is below normal. The filament may operate from a battery or from a step-down transformer but in either case use a voltmeter.

Plate Voltage

In the operation of the standard (i.e., C.302 or U.V.202) tube there are two things to be kept in mind; that the filament voltage must be kept at (or below) normal, if reasonable life is expected, but that the plate voltage can be increased surprisingly

over normal rating without decreasing the life of the tube appreciably. Operation of 5-watt tubes above 750 volts is not very safe due to the danger of sparking between the leads at the "mash" (flat part of the seal); the tube could be used constantly at 1000 volts if it were not for this. Care has to be taken at the higher voltages to avoid taking off the load of the aerial while the plate power is on, but by taking care I have found it possible to operate a 5-watt tube with 1300 volts on the plate without undue heating.

The Circuit

Referring to the figures, the antenna-plate coil (helix) may be of No. 14 B. & S. gauge D.C.C. wire wound on a 4" pasteboard tube and tapped every 2 or 3 turns by twisting a short loop. With a single 5-watt tube the plate turns are not critical; with 2 or more tubes taps should be taken at every turn. That the use of D.C.C.

higher voltages the grid-leak and condenser are necessary and when they are used the grid coil should be decreased by 5 or 10 turns.

The key is always placed in the common lead to the filament whether that be the negative (as in the case where D.C. filament is used) or in the lead to the transformer center-tap when using A.C. filament.

In operation the plate of the five watt tube will just glow red with a voltage of 500. In fact the heating will not show until the filament is turned off so that its glare does not obscure the slight glow of the plate. If your V.T. does heat so that the red is decidedly visible then you may be sure that things are *not* at their maximum efficiency. When they are the aerial takes so much energy that there is not enough in the tube to cause heating. Heating may be due to one of several things; incorrect grid coil adjustment, plate tap

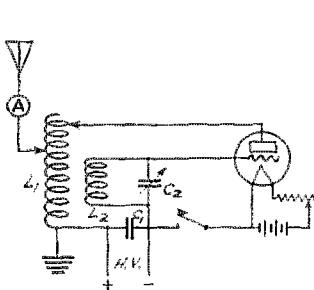


FIG. 1 FOR LOW PLATE VOLTAGES—NOT SAFE WITH HIGH VOLTAGES AS KEY IS "HOT"

- L_1 —20 turns No. 14 B. & S. D.C.C. on 4" tube.
- L_2 —30 turns No. 22 B. & S. D.C.C. on 3" tube or ball—40 turns if C_2 not used.
- L_3 —Tuned choke—20 turns No. 22 B. & S. D.C.C.
- L_4 —Secondary of filament step-down transformer.
- L_5 —Untuned choke.

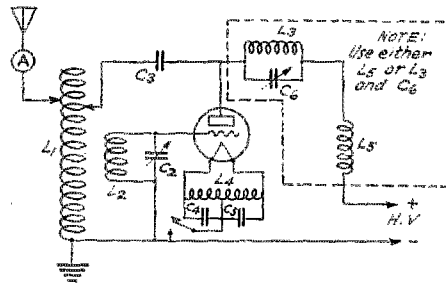


FIG. 2 FOR HIGHER PLATE VOLTAGES, ESPECIALLY WHEN LIGHTING FILAMENT ON TRANSFORMER.

- C_1 —Any condenser that will stand the voltage provided capacity is .01 microfarad or greater.
- C_2 —Variable condenser .0005 microfarad.
- C_3 —Fixed mica or glass condenser, .002 microfarad; U.C.1014 suggested.
- C_4 — C_5 —Any paper condensers—.01 microfarad or larger.
- C_6 —Variable condenser .001 microfarad.

wire is successful I can state from experience, but it is advisable to paraffine the coil to keep the cotton from becoming damp. Another method is to wind on a bare wire with a string to separate the turns. The string is then paraffined.

The grid coil form may be a regular variocoupler ball or else on a 3" tube and is to be wound with No. 20 or 22 B. & S. gauge D.C.C. wire. The coupling method is up to you and may be the regular separation method or the conventional variocoupler way of rotation. Either way is efficient and sufficient. At low voltages (up to 500) nothing was gained by using a grid-leak and condenser—no matter whether 1, 2, or 4 tubes were used. On

at wrong point, wrong size of antenna, too high filament current, and the final and most usual cause, an inefficient and high-resistance aerial-ground system.

The remedy for all but the last is evident and easily accomplished but the last will require more ground or else better insulation and may be some soldering of connections—it may be mentioned here that you may as well solder at first as you will have to sooner or later—and perhaps the addition of a counterpoise.

In regard to counterpoises. Make them cover territory. The higher the aerial the more territory the counterpoise should cover. I think, decidedly, that a counterpoise no larger than the aerial is wholly

inadequate. I can hear a dozen say their results were very good this way and can say the same as they, but on top of that I can say considerably more to the effect that your results get better and better as your counterpoise increases in width and length. The ground-counterpoise combination is a great deal better than the ground or counterpoise alone. I have used counterpoises from two- to five-wire, from 50 to 30 feet long, and from 5 to 20 feet wide and can say that the maximum of all three dimensions gave maximum results. Counterpoise heights greater than 3 to 6 or so feet above the ground are detrimental, I think. Your counterpoise must be insulated well. My counterpoise stands at present, 20 feet wide, 90 long and 5 wires 4 feet above the ground. The aerial it is used for is 70 feet long; I think the counterpoise is still too small.

In any case, if your tubes run hot something is wrong; possibly it is not the antenna system but probably it is.

Aerials

Here's where I step on ground that is very nearly unexplored from what I have seen to date and while what I say here was only tested on local conditions and stations yet I can't help but think it will prove of some benefit to all, as it is practical data. I'm going to give some dope on the aerials I used.

No. 1.—4-wire aerial of the inverted-L type, 60' long, 50' high one end and 30' at the other. This was a good aerial, as a 1000-mile range was obtained on 3 watts. QSS was relatively bad according to reports and considerable calling proved necessary.

No. 2.—A 4-wire cage of the L type 60' long, 50' high one end and 30' at the other. Cage lead-in. The top cage used 7' cross spreaders that gave a wire separation of 5 feet. Better results all around in regards to reports of steadiness, signal strength, and so on. Calling still wasted some time but most work was easier to do. No increase in range was noticed.

No. 3.—A 2-wire 50' inverted L support 50-40. A whiz sure enough. Compliment after compliment came on my signal strength and steadiness and some guessed at my power, but none came near the true power of 5 watts. I did very little superfluous calling and worked whom I did with ease. Yet I will have to admit that no increase in the range was noticed altho this was bad radio weather, it being summer still.

No. 4.—A 2-wire L aerial 75' long, 50' and 35' high. Results not so good. It might have been due to the higher wave I had to use but I worked with ease still. The 50' one seemed the better, tho. More calling necessary. Reports not so good.

With the preceding four a ground consisting of a bunch of driven pipes and rods,

and water pipe connection was used. The ground lead was 25 feet long of about 20 wires.

No. 5.—The cage of No. 2 supported 50-30 with a 70' counterpoise and tuned-in ground. Counterpoise 5' high. This system was decidedly superior to any of the above in reports, DX, and actual correspondence. I would lay the credit on the counterpoise-tuned-ground combination. In fact I know the counterpoise did the work, for I tested without it.

No. 6.—A single wire 75' long only 30-30 high. 1400 miles range but irregular. Not particularly good working, as might be guessed. Counterpoise used as before.

No. 7.—Aerial of No. 6 but supported 35-40. Results immediately better. Good results on 5 watts. 20 watts reported 2100 miles several times. Work done with comparative ease. Reports good. Same counterpoise.

No. 8.—A 4-wire cage 4" diameter 70' long. Very good worker and seems easily as good an aerial as any put up for 5 watts but was unconditionally the best for the higher powers. Steadiness, signal strength, and ease of working considered. Reports judged, of course. Same counterpoise used. Reported 1500 miles to New England consistently and by QSA and ditto to northwest, 2100 miles, in Washington, regularly. Those are the limits practically of any work I can do in the U. S. from my location.

For the benefit of those that can't find Port Arthur on the map I must say that you will find us located 10 miles due north of Sabine and 20 miles southeast of Beaumont.

My final conclusion is this: The best aerial regardless of cost is a double cage, each one being about 3 or 4 inches in diameter, separated 10 feet or more, with a cage lead-in. This is a combination of my two best types, the miniature cage and the two-wire flat-top with well-separated wires. But to the five-watt ham I would say, stick to the 2-wire L as it is easy to put up and is inexpensive. And, finally, I still view the vertical cage as the best in aerials.

I always found my best working wave to be about 30 meters higher than the fundamental of the aerial. In other words, for 200 meters a fundamental of about 170 is not too big. I have tried working as close to the fundamental as possible and the result was unsteadiness, less signal strength, and trouble all around. (Note—This could probably have been avoided if more turns and a smaller series antenna condenser had been used. See Ballantine.—Ed.) I have worked on the fundamental with a series condenser but my only reward was QSS bad and few reports, with a maximum of calling considering work accomplished.

Getting the Transmitter Down to 100 Meters

[By S. Kruse, Technical Editor

THE sending circuits used by 9ZN, 3ALN and 1QP in the 100-meter tests (described in the March issue, in the article entitled "Exploring 100 Meters") are not ideal in all respects. Nevertheless they represent something to start from and are presented with that in view.

The circuit of 9ZN is shown in Figure 1. It will be seen to consist of a plain Hartley circuit with series feed in the plate lead and with a series condenser in the ground lead. Altho the fundamental wave length of the antenna at 9ZN is about 225 meters,

counterpoise consists of three plates of 4" x 5" photographic glass. When down to 100 meters these plates are all connected in series and as higher wave lengths are used they are shorted out. By juggling the value of the series condenser in the antenna and counterpoise, and the position of the corresponding clips, it is possible to keep the center of the helix at ground voltage so that nothing violent happens to the filament circuit. If carefully handled this circuit would seem to have advantages over the 9ZN circuit. The glass series condensers in the ground lead have made a

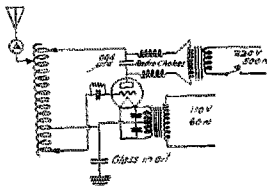


FIG. 1 The Circuit at 9ZN

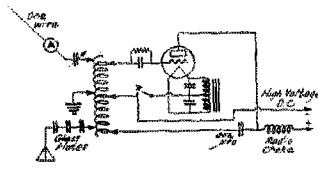


FIG. 2 The Circuit at 3ALN

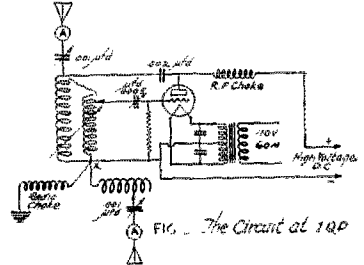


FIG. 3 The Circuit at 1QP

this circuit works down to 70 meters quite readily. The reason for this is not at all clear. However, the fact has been checked up with several good wave meters, including that of the 9th district radio inspection office, and cannot be denied. In other respects the circuit is far from good; it puts practically every bit of apparatus in the station at a high radio voltage above ground. This has repeatedly caused fire-works in the filament transformer and in the plate transformer. The obvious thing would seem to be to move the series condenser to the antenna lead; unfortunately that has been found to work down only as far as 175 meters. The antenna currents at 9ZN with two U.V.204 tubes are as follows:

Wave length	Antenna Current
200	13
150	10
100	7
50	5.5

The circuit at 3ALN was a compromise between the idea of cutting down the length of the antenna to fit the wave length and the idea of putting in series condensers to reduce the wave length. The circuit is shown in Figure 2. The series condenser in the antenna is a well spaced variable condenser. The series condenser in the

good bit of trouble. Ordinary photographic plates become so hot as to blister the fingers. The antenna currents obtained at 3ALN with a single 50-watt tube operating on 1000 volts rectified and filtered plate supply (tube remaining entirely cool) are as follows:

Wave length	Antenna Current
200	5.5
180	5
150	4
100	3

The circuit used at 1QP, which is shown in Figure 3, is probably the safest of the three. The lower helix is not a part of the upper one, nor is it directly coupled to the upper one; its purpose is to act as a loading coil in the counterpoise lead so as to put the point of zero voltage at the center of the system, at the point X. To make sure that no accidental voltages exist at this point, it is grounded thru a radio frequency choke as shown. When properly adjusted no current passes thru this choke; it is only a safety device. The peculiar series-tuned grid circuit has the advantage that a comparatively large number of turns can be used in the grid coil while still tuning that circuit to a short wave length. The antenna current obtained at 1QP with this circuit and a single U.V.203 50-watt tube

operating on 1400 volts rectified and partially filtered plate supply are as follows:

Wave length	Antenna Current
200	4
180	3.4
150	3.1
100	1.4

Plate input growing smaller as wave length went down. Tube operating entirely cool at all times.

Efficiency of the set at 100 meters

Even as simple a test as the temperature at which the tubes operated showed that at all three stations the tube efficiency did not become noticeably worse as the wave length was reduced. It would be a great benefit to the A.R.R.L. if this simple little fact could be pounded home; we will repeat it—the efficiency of the tubes did not decrease particularly as the wave went down. Somehow it seems most awfully hard to get that over. Even at the present day there exist some fellows who have not changed their ideas since 1920 and insist that “you can’t work a set much below 200 meters.” How does this illusion manage to survive?

Why is it not discarded in the face of the fact that transcontinental work has been on 180 meters, that all sorts of traffic is being handled on extremely short waves, that 9ZN and 3ALN and 1QP and a lot of others put thru *better* signals at 100 meters than at 200? The answer is probably in the newness of 100 meter work and the utter unsuitability of most of our tuners. Before you conclude that you “can’t raise anyone” on a short wave get the other fellow to put his sending set away down—then both of you take a lot of the excess wire off the tuner and a lot of the excess plates out of the condenser and try it on schedule. If it does not work, junk the old tuner entirely and build one of the short-wave tuners described in the March QST on page 13.

Like all new things this will go slowly at first, but what’s the fun of the game if we don’t try something difficult? And if you begin to lose faith in the possibilities, dig out the March QST again and read page 12 with special attention to the sentence which says—“In every single test, with one exception, the *best* signals were heard at some wave length below 170 meters.”

20M Wins Hoover Cup for 1922

JUST as we go to press the Committee of Judges from our A.R.R.L. Board of Direction announce their award of the Department of Commerce Cup for 1922 to Station 20M, F. B. Ostman, Ridgewood, N. J. We tender 20M our cordial congratulations. Further details, and a description of this station, will appear in our next issue. Following is the

Report of Contest Judges

The January 1922 and 1923 issues of QST announced the contest for the award of the second Hoover Cup, to go to America’s best all-around amateur station for the year 1922. The conditions of the contest were the same as in the previous year, the entries to be judged not alone on station arrangement or equipment, but on nine factors which our Board of Direction considered as vital in the make-up of the ideal amateur station. Accordingly the contest judges, appointed by the President of the League, gave an equal value to each of these nine points, totalled the scores and picked the winner in the most careful and conscientious manner possible.

Following is a brief resume of the nine essential points:

- A. Extent to which apparatus is home-made.
- B. Ingenuity in design, construction and arrangement.

- C. Efficiency of transmitter.
- D. Consistent transmitter range.
- E. Efficiency of receiver.
- F. Obedience to U. S. Laws and local co-operative regulations.
- G. Quality of operator’s sending.
- H. Amount of traffic handled.
- I. Accuracy, completeness and neatness of station log.

No distinction was made between spark and C.W.; while the latter is admittedly the more efficient and popular, other points common to both were considered and it was due to these the award went to a spark station. A number of entries were eliminated early in the judging for one reason or another and the competition finally narrowed down to 20M (spark), 2FZ (C.W.) and 5ZA (C.W.), all of which showed certain distinctive outstanding features, different from the others—as well as certain well defined weaknesses. Most careful consideration was given each point by the judges in this last analysis, and several times it looked as tho substitutes would have to be sent in to replace injured and breathless judges, arguments and counter arguments waxed so keen.

Out of a possible 100 points for each, the final score stood

First:	2OM (spark)	72 points
Second: (tie)	2FZ (C.W.)	54 points
	5ZA (C.W.)	54 points

Certain points of excellence in each entry are of interest.

2OM. High in excellence of design and operation of receiving equipment, consistent transmitting range throughout the preceding year, observance of U.S. Radio Laws and local agreements, the quality of sending of the operators, and the amount of traffic handled.

2FZ. High in ingenuity of transmitter arrangement and general appearance of the whole station; most of apparatus home-made; observance of Radio Laws and local agreements.

5ZA. All apparatus home made, showing great ingenuity of design and arrangement; the quality of the operator's sending; and transmitting range throughout the year consistent.

To the C.W. amateur world it may seem strange the award should go to a spark station, the highest honor that can be won

by any amateur in the United States, but two considerations must be taken into account in each of which there lies a moral. First, that the award is not based on the relative efficiency of spark vs. C.W. alone, but on eight other factors, each of equal weight in the eyes of the judges and of the Board of Direction, by whom they were promulgated. Moral: beauty is only skin deep. Your station must have more than brightwork to get anywhere in the contest. Second, the total number of entries in the contest was exceedingly small in comparison with the large number of excellent amateur stations throughout the country which could have entered and received favorable consideration. It's a shame, gang, that more of you didn't come in and put up a better fight for the highest award in amateur radio. Moral: it's the early bird gets next year's cup. Start to begin to commence *now!*

C. A. Service, Jr., *Chairman*
S. Kruse
F. H. Schnell

Judges.

Our A.R.R.L. Board of Direction

THIS photograph shows our A.R.R.L. Board of Direction at its annual meeting, which was held at the Old Colony Club at Chicago on Feb. 17th.

At this central meeting our directors gathered from all over the country and discussed the important questions confronting the amateur today.

In this view we see, left to right, standing, Canadian Director W. C. C. Duncan of Toronto; A.R.R.L. Publicity Manager J. K. Bolles, of Hartford, and next to him the A.R.R.L. attorney, Irving Herriott, of Chicago, neither of whom are directors; Directors V. F. Camp of New York, M. B. West of Chicago, S. Kruse of Lawrence,



Kan., and Assistant Secretary C. A. Service, Jr., of Hartford. Seated, left to right, Director Frank M. Corlett of Dallas; Vice President Chas. H. Stewart of St. David's, Pa.; hiding behind Mr. Stewart is Director H. A. Beale, Jr., of Parksburg, Pa.; next is Secretary K. B. Warner, of the headquarters office; Director A. H. Babcock, of San Francisco; President Hiram Percy Maxim, of Hartford; and Director C. E. Darr, of Detroit.

Traffic Manager Schnell was ill at the time of the annual meeting and Directors Anthony and Kennelly were unable to attend, these three not appearing in the photograph. At this meeting the resignation of Dr. Kennelly was accepted with

regret, and Lt. Comdr. Stanley M. Mathes, of Bremerton, Wash., was appointed to the Board for the remainder of the present term. The new office of Canadian General Manager was created at this meeting and Director Duncan elected to the position, as reported elsewhere in this issue.

Financial Statement

In accordance with action taken by the Board at this meeting there is given below a statement of the revenue and disbursements of the League for the quarter from Nov. 1, 1921, to Jan. 31, 1923, which is presented for the information of the membership. Similar statements will appear quarterly hereafter.

Condensed Statement of Revenue and Expenses, Nov. 1, 1922, to Jan. 31, 1923...

REVENUE		
Advertising sales	\$18,990.42	
Newsdealer sales	8,309.45	
Dues and subscription	7,920.81	
Back numbers, etc.	159.81	
Emblems	277.00	
Interest on bank deposits	61.63	
Bad debts recovered	8.80	
		\$35,727.92
DEDUCTIONS		
Returns and allowances	963.36	
Exchange and collection charges	9.18	
Discount 2% for cash	253.10	
		\$1,225.64
		\$34,502.28
EXPENSES		
Publication expenses	13,001.66	
Salaries and commissions	9,756.85	
Forwarding expenses	767.29	
Telegraph, telephone and postage	1,017.85	
Office supplies and general expense	2,320.00	
Rent, light and heat	339.16	
Traveling expenses	1,095.71	
Depreciation of furniture and equipment	74.35	
Bad debts written off	1,967.61	
		\$30,340.48
<i>Net Gain from Operations</i>		\$4,161.80

The A.R.R.L. is an association without capital stock and none of its surplus insures to the benefit of individuals. Such surplus

as it accumulates is available and is expended for matters of interest and protection to the amateurs who form the League.

Annual Report of the Traffic Manager

For the fiscal year ending Feb. 17, 1923

THE Operating Department has enjoyed its most successful year in amateur radio. Its personnel now numbers 1197 active men and stations, as compared to 244 a year ago, representing an increase of about 400%. More offices in the Operating De-

partment have been made available through the broadening of its policy in bringing about a greater subdivision of territory in each division.

Heretofore, each division may or may not have had an assistant division manager. At present we have an assistant division

manager for each state, in some of the larger states there are two assistant division managers, each having entire jurisdiction over a state or that part of a state assigned to him by the division manager.

Each state is divided into districts, as determined by the assistant division manager and the division manager, to give equal representation to all amateurs. Each district is in charge of a district superintendent who is responsible to the assistant division manager in charge of the state. The district superintendent is responsible for the conduct of official relay stations in his district. It is his duty to see that all worthy amateurs are given appointments as official relay stations; that reports are

forthcoming each month from his stations; that information on tests and relays is properly dispatched throughout his district. Similar to the duties of the district superintendent are those of the city manager, who has jurisdiction over all League members in cities having a population of 25,000 or over, or where, in the judgment of the division manager, a city manager is necessary. Some of the larger cities may have two or more city managers, each in charge of a particular section of a city, co-operating to the best interests of all concerned.

Next in line comes the official relay station. To qualify for a League certificate as official relay station, an amateur must
(Concluded on page 30)

TABLE 1—PERSONNEL OF THE OPERATING DEPARTMENT FOR THE MONTH ENDING JANUARY 31st, 1922

Division	Div. Mgr.	Asst.		City Mgr.	Off. Relay Stn.	Total
		Div. Mgr.	Dist. Supt.			
Atlantic	1	9	26	58	193	287
Central	1	7	25	24	192	189
Dakota	1	3	4	13	26	47
Delta	1	3	3	3	25	35
East Gulf	1	3	5	3	23	35
Midwest	1	4	9	7	91	112
New England	1	7	7	4	62	81
Northwestern	1	3	26	4	34	68
Ontario	1	—	5	4	27	37
Pacific	1	3	8	5	53	70
Roanoke	1	4	20	—	42	67
Rocky Mtn.	1	3	7	2	33	46
Vancouver	1	—	1	3	6	11
West Gulf	1	4	19	10	66	100
Winnipeg	1	—	2	—	6	9
Maritime	1	—	—	—	—	1
Quebec	1	—	—	—	—	1
Alaskan	1	—	—	—	—	1
Total	18	53	167	140	819	1197

TABLE 2—REPORT OF C.W. MESSAGES BY DIVISION AND MONTH February, 1922—January, 1923

Division	February, 1922—January, 1923												Total
	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	
Atlantic	2529	1886	—	—	410	401	844	1774	3037	7101	14026	12706	44714
Central	—	1387	609	367	680	597	1101	2522	5175	7869	10210	15798	46345
Dakota	269	345	580	548	183	183	257	721	1514	2027	2988	4547	14132
Delta	297	70	—	169	—	11	58	92	—	705	1332	414	3148
East Gulf	616	1619	1233	410	—	24	256	826	1668	1970	441	1263	10326
Hawaiian	—	—	—	—	—	—	—	—	24	133	171	—	323
Midwest	362	459	—	—	—	151	469	1040	2621	5034	6390	10180	26706
New England	92	295	456	437	1073	650	1216	1989	2314	4998	6142	9534	29196
Northwestern	41	50	60	75	25	61	51	195	336	1400	1861	2405	6560
Ontario	24	35	79	115	47	72	50	113	295	694	304	1574	3902
Pacific	332	43	540	599	372	136	323	207	627	1565	2769	2946	10479
Roanoke	349	261	420	490	552	1092	1510	2179	2158	2829	2830	2903	17573
Rocky Mountain	—	659	348	—	—	140	30	391	667	1633	2135	2654	8657
Vancouver	—	—	22	—	12	16	19	18	36	32	253	563	971
West Gulf	94	282	23	—	100	340	220	441	826	2708	3948	4549	13531
Winnipeg	—	27	47	3	6	—	—	50	38	225	—	219	615
Total	5005	7418	4417	3213	3460	3844	6404	12558	21336	40973	56300	72255	237183

TABLE 3—REPORT OF SPARK MESSAGES BY DIVISION AND MONTH
February, 1922—January, 1923

Division	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Total
Atlantic	1643	770	—	—	22	6	499	1108	1472	2230	2439	2092	12281
Central	—	5488	1693	1174	617	793	1418	1530	1469	2248	3349	3001	22780
Dakota	2443	1321	1044	409	264	66	16	21	89	222	434	215	6544
Delta	1253	264	—	119	—	—	21	154	779	248	151	40	3029
East Gulf	542	518	296	145	—	150	56	130	—	653	210	599	3299
Hawaiian	—	—	—	—	—	—	—	—	6	—	—	—	6
Midwest	940	1393	—	—	—	133	24	255	862	1481	867	1974	7929
New England	956	959	1007	553	584	482	106	235	515	886	1250	672	8206
Northwestern	1006	702	504	544	525	477	216	419	282	282	135	152	5244
Ontario	99	85	—	—	28	—	—	8	46	47	67	123	603
Pacific	1572	695	1278	1036	505	480	822	106	572	705	767	464	9002
Roanoke	222	334	180	120	69	85	105	258	356	399	270	467	2866
Rocky Mountain	—	490	281	—	—	12	5	64	40	27	40	55	1014
Vancouver	—	—	62	—	67	55	101	85	91	36	16	36	551
West Gulf	3080	1040	483	209	180	693	433	186	40	388	590	231	7553
Winnipeg	—	—	—	—	—	—	2	2	8	4	—	—	16
Total	13756	14059	6828	4309	2861	3433	3824	4561	6627	9956	10685	10123	90922

TABLE 4—REPORT OF MESSAGES BY MONTHS SHOWING DIVISION OF TRAFFIC AS C.W. VERSUS SPARK
February, 1922—January, 1923

MONTH	C.W.			SPARK			TOTAL
	Stns.	Mgs.	Pct. Tfc.	Stns.	Mgs.	Pct. Tfc.	
February	110	5005	26	173	13756	74	18761
March	134	7418	34	192	14059	66	21477
April	92	4417	39	116	6828	61	11245
May	102	3213	43	84	4309	57	7522
June	96	3460	45	80	2861	55	6321
July	126	3844	47	99	3433	53	7277
August	186	6404	63	97	3824	37	10228
September	329	12558	76	134	4561	24	17119
October	424	21336	76	186	6627	24	27963
November	593	40973	88	213	9956	12	50929
December	704	56300	84	189	10585	16	66885
January	867	72461	88	182	10127	12	82588
	3763	237389	72	1745	90926	28	328315

TABLE 5—SPARK STATIONS REPORTING TRAFFIC, BY DIVISION AND MONTH
February, 1922—January, 1923

Division	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
Atlantic	25	14	—	—	1	1	7	23	46	40	41	39
Central	—	54	16	10	14	13	23	29	37	44	45	48
Dakota	26	13	15	10	9	6	3	2	5	13	10	4
Delta	10	5	—	3	—	—	2	6	—	3	3	3
East Gulf	11	13	7	4	—	5	3	5	13	9	5	6
Hawaiian	—	—	—	—	—	—	—	—	1	—	—	—
Midwest	12	13	—	—	—	5	2	10	19	21	18	31
New England	10	12	11	9	11	10	3	7	11	16	18	9
Northwestern	18	17	18	13	13	7	9	15	10	12	9	8
Ontario	3	5	—	—	2	—	—	1	2	4	4	2
Pacific	11	7	17	20	16	10	20	7	23	24	18	13
Roanoke	11	22	8	7	6	7	2	4	3	4	4	3
Rocky Mountain	—	9	9	—	—	1	2	5	3	1	2	2
Vancouver	—	—	5	—	4	4	5	6	5	1	2	2
West Gulf	36	8	10	8	4	30	15	13	5	20	12	10
Winnipeg	—	—	—	—	—	—	1	1	3	1	—	—
Total	173	192	116	84	80	89	97	134	186	213	189	182

TABLE 6—C.W. STATIONS REPORTING TRAFFIC, BY DIVISION AND MONTH
February, 1922—January, 1923

Division	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
Atlantic	49	29	—	—	11	10	27	46	99	95	166	175
Central	—	26	11	13	8	18	27	42	72	111	120	171
Dakota	8	9	14	15	15	8	7	17	23	29	28	56
Delta	6	3	—	6	—	1	3	6	—	16	14	7
East Gulf	9	18	10	10	—	3	11	20	31	30	8	18
Hawaiian	—	—	—	—	—	—	—	—	1	2	2	—
Midwest	8	7	—	—	—	4	11	21	46	69	67	107
New England	2	3	9	12	18	16	25	22	28	49	68	90
Northwestern	2	2	3	5	3	3	3	10	13	26	37	43
Ontario	1	2	3	5	3	3	4	7	17	23	29	36
Pacific	6	3	14	11	13	11	19	12	31	38	56	26
Roanoke	12	20	16	24	21	29	33	38	36	45	42	43
Rocky Mountain	—	8	7	—	—	5	2	8	11	17	17	24
Vancouver	—	—	3	—	1	2	3	2	2	3	7	11
West Gulf	7	3	1	—	2	13	11	22	12	37	43	50
Winnipeg	—	1	1	—	1	—	—	2	2	3	—	5
Total	110	134	92	101	96	126	186	275	424	593	704	862

TABLE 7—REPORT OF MESSAGES HANDLED IN EACH DIVISION DIVIDED INTO C.W. AND SPARK, SHOWING PERCENTAGE OF MESSAGES HANDLED BY C.W. AND BY SPARK, AND PERCENTAGE OF INCREASE IN TRAFFIC OVER THE YEAR 1921
February, 1922—January, 1923

Division	C.W.		SPARK		TOTAL Msgs.	Pct. Increase Over 1921
	Msgs.	Pct. Tfc.	Msgs.	Pct. Tfc.		
Atlantic	44714	80%	12281	20%	56995	143%
Central	46345	64%	22780	36%	69125	131%
Dakota	14132	68%	6544	32%	20676	389%
Delta	3148	51%	3029	49%	6177	10%
East Gulf	10326	76%	3299	24%	13625	270%
Hawaiian	328	98%	6	2%	334	—
Midwest	26706	77%	7929	23%	34635	209%
New England	29196	78%	8205	22%	37401	181%
Northwestern	6560	56%	5244	44%	11804	110%
Ontario	3902	87%	603	13%	4505	309%
Pacific	10479	54%	9002	46%	19481	613%
Roanoke	17573	86%	2866	14%	20439	486%
Rocky Mountain	8657	89%	1014	11%	9671	412%
Vancouver	971	65%	551	35%	1522	1349%
West Gulf	13531	64%	7553	36%	21084	53%
Winnipeg	615	94%	16	6%	631	1047%
Total	237183	72%	90922	28%	328105	173%

(Concluded from page 28)

own and operate a transmitter licensed by the government, show a spirit of co-operation with all other interests, and he must keep within the law and abide by the rules and regulations of the Operating Department for the best interests of amateur radio.

The foregoing is a brief resume of what has taken place in the Operating Department since the last annual meeting of this Board, during which time the entire personnel has been reorganized, with the result that our message traffic shows an increase over and above 1921 of 173%.

Our Operating Department may be likened to a railroad organization. The railroad hauls passengers and freight; we haul messages—the C.W. being passengers and the spark freight. Figures for the past year seem to indicate that we will abandon freight almost entirely before the year is out and confine ourselves to passengers, or C.W. traffic.

Since all events of the Operating Department have been duly chronicled in QST for the benefit of League members, no repetition is necessary here. The figures contained in the following pages are self-explanatory.

F. H. Schnell.

EDITORIALS

de AMERICAN RADIO RELAY LEAGUE



Unscrambling the Eggs

WITH the ending of the 67th Congress the White-Kellogg radio bill died un-honored and unsung. After having passed the House the bill automatically expired in the Senate Committee on interstate Commerce when the Congress terminated. A canvass was made of the Senate immediately after the bill's passage by the House and it was found that there would be considerable opposition to it. It seems reasonable to believe that it could have passed if there had been more time before the close of the session, but in the short time remaining it would have been impossible to pass the bill in the face of the opposition known to exist, and for that reason it was never taken up by the Committee and reported out. Thus ended the greatest effort ever made in this country—and there have been many—to patch up the radio law and bring order out of chaos in the air. The amount of human effort represented in this endeavor was stupendous, and it is most unfortunate that a thing so sorely needed should fall a victim to a mere time schedule.

The hopes of most radio folks for a plan that would settle things were pinned on this bill. Nothing can be done with the law now—not until the new Congress assembles in the fall—so a year has been lost and the whole story, the conferences and debates and hearings, the time and money and effort, will have to be gone thru again. Meanwhile Secretary Hoover has called his Radio Telephony Conference members of last spring to convene again at Washington on March 20th to consider what may be done from an administrative point of view, under the present law, to patch up the situation. There seems a reasonable hope that much can be accomplished, and we understand the Department has suggestions to lay before the conference. It is possible that a way can be found to open up more wave length channels to broadcasting, and that, after all, is the need that is keenest. If arrangements can be made for that alone, most of the trouble will have been cured and comparative peace will reign in radio circles.

As its own contribution to improvement, our A.R.R.L. Board of Direction gave long and careful consideration to the problem of amateur-novice QRM at its recent an-

nual meeting, and as a result we have an important announcement to make. Heretofore we have had as a working basis the "Rochester Plan," which contemplates that in communities where QRM is considerable there should be a get-together between the amateurs and the listeners to arrive at an understanding based on mutual concessions, we amateurs agreeing to preserve quiet during the early evening hours and the listeners recognizing our unrestricted right to transmit thereafter. The hours generally observed in the adoption of the Rochester Plan have been from 7 P.M. to 10:30 P.M. local time, and these hours have served more or less as a guide to other amateurs even where there is no local agreement. It has not been a fixed policy, however; there are some towns in which the agreed hour is 10 P.M., and in fact this is true of the entire West Coast; again the early transmissions of some of us fortunate enough to live where we can transmit all evening without interference have served as a temptation to others of us to open up in disregard of local understandings; and even more discontent has been created by the attempt to define what types of transmitter can be operated without local interference. This urge to operate is easy to understand, for it is only human to want to do what the other fellow can do. Yet practically all of us will be willing to forego what everybody else foregoes, especially when our present practices are only getting us into trouble, and along this line of thought our Board has worked out what is believed to be a satisfactory solution. Briefly it is that *all* of us ought to keep *all* our transmitters *silent* during a portion of *every* night. Then nobody will be dissatisfied with his lot, for all of us will be in the same boat. So hear ye:

The Board of Direction of the American Radio Relay League hereby earnestly calls upon each and every amateur to refrain from transmission of any kind, for the good of our game, between the hours of 7:30 o'clock and 10 o'clock, local standard time, every night of the week, whether located in a town having a local agreement or in the open country; these hours to be extended to embrace the period from 7 P.M. to 10:30 P.M. whenever such hours are the subject of a definite local agreement.

Most of us are already doing substantially that; now we think the time has come when all of us should. That is our idea, fellows, of the way to assure the novice listener the reasonable use and enjoyment of his apparatus the same as we want the reasonable use and enjoyment of our two-way stations. Heretofore the time has hardly been ripe for a definite nationwide plan, but in these months just passed our drifting has not been altogether satisfactory to contemplate. The only solution seems to be the adoption of a uniform practice throught our entire ranks—the observance of definite quiet hours during which all amateur transmission shall cease, so that nobody will feel that he is a victim of circumstances. When it gets down to the point where there is nobody on the air to work should one of our number open up, the solution will be complete and it will have taken care of itself.

Now we have a scheme with a handle to it, men. Let us use it. Let us give expression to our intention to share with the novice listeners by keeping the power off our transmitters during whatever hours have been agreed to in our various communities, if we have a local agreement, and from 7:30 to 10 o'clock in all other places, regardless of where we may live. Let us set our own house in order by taking up this matter vigorously everywhere, getting the co-operation of all our fellows, so that by our self-imposed and voluntary "lid" we uniformly demonstrate our desire to play fair with the listener, until finally the co-operation is perfect and all amateur transmission ceases during the middle evening hours. And then let us show the listeners what we have done as our contribution to the business of unscrambling the radio mess left by the failure of the White-Kellogg bill to pass the Congress.

And while we think about it, there seems to be quite a bit of illegal transmission cropping up again to need our attention—initial-call spark-coil sets and such things. If we're to police our amateur band and want to avoid unjust criticism, we must keep a watch for these uninformed operators and steer them along the straight and narrow.

Now take another look at SZZ's drawing on our cover this month, O.M. Ten o'clock is the time for action, but quiet up till then.

City Ordinances

IN something like a dozen towns and cities of our country agitation has been started to pass a local ordinance prohibiting amateur transmission within the city limits, and in the town of Atchison, Kansas, such an ordinance actually has been enacted. Lawrence and Leavenworth, Kansas, have

the matter pending now, a similar bill is in a committee of the Kansas City council, and petitions are being circulated in Seattle and Wichita at this writing.

We are firmly convinced that such laws if enacted would be unconstitutional, but it does us no good to say "there ain't no sech animal" when "there she be!" It is much better that we should give these matters our attention as they come up, one by one. In fact that's the only way they can be handled, and the handling must be done by the local clubs and local amateurs. The A.R.R.L. will help all it can but the job primarily is one for handling by you men on the ground.

The facts in the matter are simple. Cities have power under their state constitution to take all proper police measures for preserving the peace and safeguarding the health, morals, and general prosperity of their inhabitants. Their authority there ceases. Even if a law which would restrict one form of radio user in favor of another would not be discriminatory and inequitable, neither a city nor state can legislate in a matter concerning interstate traffic, such as our amateur message traffic is. Only the Federal Government can do that, and our government has granted us amateurs licenses to transmit. Except in maintaining the peace and watching over the welfare of her inhabitants, a city has no constitutional authority to circumvent a federal radio license of any sort. The idea of "abating a nuisance" is confined to genuine nuisances which endanger health, morals, or prosperity; an amateur transmitter isn't a nuisance because it happens to interfere occasionally with an influential city dweller who has a single-circuit tuner. But the big point is that it is unconstitutional for any body to attempt regulation in a regulatory field occupied by Congress, and surely the Congress has demonstrated that it is the body which is regulating radio! All municipal attempts are therefore out of order.

So much for the purely legal aspects. It is deplorable that such situations should arise. They denote an awful selfishness, and utter failure to appreciate the value and importance of the amateur as well as his own right to exist. Without exception these attempts of course have been fostered by novice listeners who want the air quiet for their concert reception all the time, who prate of the curbing of the few for the good of the many, but who in the same breath think that all government and ship radio should be stopped too, so that "the radio" may fulfill its glorious purpose of uplifting and regenerating the population socially and economically, but primarily so that the backers of the attempt can be amused, like the famous Mr. McWilliams, whenever they might want to listen.

Affiliated Clubs and individual members

in towns where such attempts are made should take action promptly. Get up a committee and wait upon your mayor and councilmen and explain to them what they are about to attempt—the chances are they know but little about the real facts of the matter. Get a hearing before your city council outlined in the preceding paragraphs. Let them know that the telegraphing amateur is not a little boy playing with a toy nor is he a scheming devil with horns, but an American citizen with the rest of them, advancing communication, really perfecting himself in a difficult art, and forming himself and his fellows into an invaluable branch of the national defense. The facts, both legal and moral, are so overwhelmingly in favor of the amateur that we do not believe any difficulty will be experienced anywhere in showing the City Fathers the absolute injustice of an anti-amateur ordinance.

But how much better it is to prevent such things from arising! As a general proposition, cultivating a novice listener and trying to help him is a thankless task; but it is always worth while to let the other fellow know that you are a human too, particularly in a case like this. And finally, brethren, consider carefully our A.R.R.L. Board's quiet-hours plan outlined in the leading editorial this month, which more than anything else we think will, by its observance, prevent such occurrences by demonstrating our willingness to share voluntarily.

The Canadian Manager

A STEP of far-reaching consequence was taken by our Board of Direction at its annual meeting when a new office was created known as Canadian General Manager, and Director Duncan, 9AW of Toronto, elected to the post.

Trivial as it may seem at the moment, it testifies to the rapid growth amateur radio has experienced in Canada in the last two years, and is a first step in the direction of a division of Canadian and United States amateur activities, looking forward to the day, still some time off, when our Canadian cousins will want their own national organization. By this first step the A.R.R.L. is making no change whatever in its activities and affiliations in Canada, but is placing those activities under the general management of the Canadian member of its Board, Mr. Duncan, in order that they may be more truly of, by, and for the Canadian amateur.

It is inspiring to contemplate the growth in Canada this winter. A large number of first-rate relay stations attest the ability of our Canuck friends to pound brass with anybody, and lately there have been enough of them to create good chances for the success of the Trans-Canada Relay, which

occurs late in the month of March. Now they need to "whoop things up" a little more, establish contact with each other, and build up the spirit of amateur radio. This is the big job that Mr. Duncan has tackled as manager of the League's affairs in the Dominion. A.R.R.L. members in both countries will contribute their bit to the advancement of amateur radio in North America by lending their best aid to Mr. Duncan at every opportunity.

What's The Idear?

OUR lunca today having sat pretty well, and feeling more or less invigorated and our radiation up a few divisions, we feel sufficiently emboldened to open up discussion on a thing which has been sticking in our rectifier for quite a while. It's about useless messages.

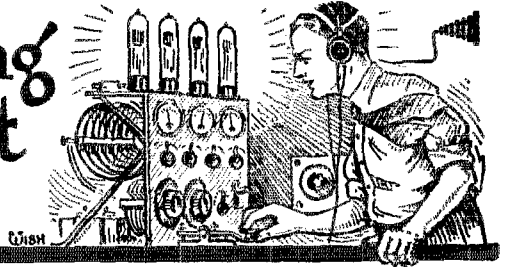
A couple of years ago the bane of our existence was a message which certified that the sender was thereby conveying one (1) set of new and unused radio greetings to the addressee. By dint of much hard work and forcible discouragement this sort of thing was reduced until today it is practically absent from our traffic. But now we have another pest, if anything worse. You all know what we mean. You guessed it: "*Tnx fr crd OM w/ rite sn 72.*" The idea and the spirit are fine, but that thing isn't a message. Why, we heard a station the other night give a fellow what purported to be ten messages, telling him text and sig same on all, addresses as follows, and blamed if the whole string weren't exactly like our sample. Every night we all hear it, and it must form a considerable portion of our message traffic. Cards ought to be acknowledged, surely, but not to the extent of stuffing our traffic totals. We seem to be getting some gentle razzing about the uselessness of our traffic anyway. Wholesale radio QSL-ing of report cards seems to us to be more or less laziness.

Of course radio is our hobby, fellows. With all of us it's our fun in life, the thing we hold above all others. It's game, and we refuse to make hard work out of it all the time. We amateurs are not reformers, we're not out to save the world, or to uplift the whole continent. There is no enjoyment in that sort of thing and we are in amateur radio for the instruction and pleasure we can get out of it. One of the things we have been working towards is the upbuilding of our traffic figures, and certainly it is a joy to hear a relay message slipping down the route from station to station until it reaches its destination; and theoretically it doesn't matter what kind of a message it is. But we ought to pride ourselves upon the nature of our

(Concluded on page 50)

The Operating Department

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



After digging around the tomb of Pharaoh Tutankhamen for years and years and upon finding no wires, it was established that "King Tut" had wireless even in his day. The most astonishing discovery was made when the innermost chamber of the famous old tomb was opened. What do you suppose was found? Well sir, several thousand of undelivered A.R.R.L. messages, some dating as far back as 1428 B.C. were the prizes. While many messages could not be deciphered because of their age (hanging on the hook for a couple of thousand years) some of them bore this

yards and yards of tape, further revealing the fact that we have been asleep so long that our bodies have become mummified. Let's make it a rule to stop sending messages of the order mentioned above. Rather than tell a man you received his card and will QSL later, QSL with your own card and save the ether for messages of more importance. Why clutter up the air with those things that mean nothing?

It hardly seems possible that in the short space of time in which we pass from one month to the next that the figure of 121,592 represents our message traffic for February.

Message Traffic Report By Divisions

F E B R U A R Y

Division	C.W.			SPARK			TOTALS		
	Stns.	Msgs.	M.P.S.	Stns.	Msgs.	M.P.S.	Stns.	Msgs.	M.P.S.
Atlantic	206	22985	112	29	2694	93	235	25679	109
Central	210	25652	122	52	3759	72	262	29411	112
Dakota	59	5945	101	10	330	33	69	6275	90
East Gulf	32	2316	91	7	720	103	39	3636	93
Midwest	101	13149	130	21	2132	102	122	15281	126
New England	97	14136	145	11	894	81	108	15030	140
Northwestern	46	2860	62	7	249	36	53	3099	58
Ontario	38	1661	45	3	16	5	41	1677	41
Quebec	6	214	36	—	—	—	6	214	36
Pacific	54	4576	85	16	1067	67	70	5643	81
Roanoke	45	4430	98	4	605	151	49	5035	103
Rocky Mountain	26	3156	121	2	268	134	28	3424	122
Vancouver	9	573	81	1	20	20	10	593	59
West Gulf	52	6255	120	8	135	18	60	6390	106
Winnipeg	3	205	68	—	—	—	3	205	68
Total	984	108713	111	171	12879	75	1155	121592	106

C.W. Messages, 108,713—89%

Spark Messages, 12,879—11%

Total, 121,592

text—"greetings by radio" "ur erd reed wi QSL itr." This was most shocking because it just dawned on us that some of us are doing this very same thing today—3300 years later—sending unimportant messages and failing to deliver them.

Therefore it behooves us to awaken from the slumber, make our messages of greater importance, and to DELIVER them promptly. Unless this step from 1428 B. C. to 1923 A.D. is taken by a few of us, some adventurer will come along and remove

Why, the echo of the whisper of last month hadn't died away when the gang pulls together and simply smashed every known record for one month with this big total.

Evidently 3ZO got good and tired of the many threats to smash his individual traffic record and so hung up a new one; 1,761 messages for the rest to shoot at. 3XM will be as glad to see this as will 8BDA who also smashed a record by ringing up a total of 1,330 messages, 783 on C.W. and 547 on spark.

 H. A. Beale, Jr. (3ZO)
 Parkesburgh, Pa.
 Atlantic Division
 1,761 messages

Two changes in the offices of division managers becomes necessary. Howard F. Mason, 7BK, resigned as manager of the Northwestern Division when he came to Hartford taking up duties on QST. If he does as much for QST as he did for the gang in the Northwestern Division, it will come out ten days before the first of the month. Until his successor is elected and appointed R. Waskey, 7213 28th Ave., N. W., Seattle Wash., will handle the division as executive assistant. B. W. Benning resigned as manager of the East Gulf Division because of other business which takes up more of his time. Another good man who did things for the East Gulf! New managers will be announced next month.

Quite a few stations have joined the ranks of the "brass pounders" during the past month. There is plenty of room for more. Last month we overlooked 9YU by mistake. 9YU with 335 messages became a member in the December traffic report.

**TRAFFIC REPORTS FROM A.R.R.L.
 OFFICIAL RELAY STATIONS**

PACIFIC DIVISION—C.W.: (California) 6ZH, 335; 6ZB, 66; 6ANH, 25; 6BJY, 25; 6AVR, 25; 6BH, 64; 6XAS, 39; 6AMN, 26; 6GD, 21; 6BQE, 75; 6APW, 74; 6AAK, 41; 6BQG, 10; 6BFW, 55; 6BNH, 171; 6BUN, 99; 6XK, 29; 6BJC, 54; 6BWE, 40; 6CU, 27; 6BRG, 6; 6BVE, 2; 6BVS, 8; 6BVW, 15; 6APV, 53; 6BRF, 60; 6ZR, 15; 6OM, 47; 6AVD, 5; 6KA, 48; 6EN, 216; 6EA, 147; 6UW, 46; 6AME, 20; 6BRU, 32; 6HIQ, 200; 6ZK, 66; 6AK, 39; 6SU, 40; 6AOL, 36; 6FH, 215; 6JN, 67; 6AOR, 78; 6HP, 6; 6TL, 56; 6IK, 27; 6CC, 294; 6TC, 50; 6LU, 30. (Nevada) 6ZO, 193; 6AJR, 20; 6HIP, 37. (Arizona) 6ZZ, 906; 6BSQ, 40. Spark: (California) 6BJU, 44; 6AVR, 2; 6OD, 214; 6BAJ, 41; 6BRA, 44; 6BAE, 20; 6OL, 16; 6BRD, 6; 6AWX, 116; 6AMK, 49; 6AOA, 160; 6BOS, 42; 6AQU, 48; 6ATU, 33; 6AKT, 114. (Nevada) 6QR, 118.

NORTHWESTERN DIVISION—C.W.: 7DC, 23; 7NG, 32; 7OE, 30; 7WS, 32; 7NF, 26; 7AFO, 23; 7JG, 20; 7OM, 21; 7FD, 17; 7SH, 15; 7GG, 12; 7ADF, 15; 7RI, 10; 7AIC, 20; 7Y, 8; 7AK, 11; 7JS, 8; 7TO, 10; 7TT, 8; 7ACA, 6; 7ZN, 341; 7GE, 227; 7ABB, 215; 7LN, 152; 7SC, 126; 7LR, 238; 7AIF, 140; 7TQ, 110; 7BJ, 106; 7ADP, 118; 7WX, 96; 7BA, 71; 7AFH, 63; 7BK, 58; 7QT, 41; 7MC, 30; 7AEL, 36; 7GP, 39; 7DU, 30. Spark: 7AHL, 5; 7ABW, 4; 7QN, 3; 7CU, 5; 7KJ, 72; 7TW, 41; 7AFO, 29; 7AIO, 32; 7BG, 7; 7WD, 3; 7AGF, 55; 7ZU, 130; 7HM, 26; 7ZL, 73. Spark: 7EX, 55.

WEST GULF DIVISION—C.W.: (Texas) 5AAF, 23; 5SF, 279; 5AL, 8; 5RD, 15; 5TC, 956; 5QL, 325; 5DI, 103; 5AHT, 50; 5BE, 150; 5AIB, 15; 5SK, 100; 5VA, 160; 5IX, 645; 5JL, 72; 5EL, 107; 5UN, 16; 5ZADA, 44; 5UO, 131; 5CY, 10; 5ZH, 174; 5TM, 122; 5GR, 104; 5KP, 433; 5YK, 30; 5XT, 100; 5ZAT, 75; 5ZG, 10; 5VM, 15; 5BM, 25; 5ZM, 30. (Oklahoma) 5ZM, 30; 5AQ, 50; 5SG, 11; 5AE, 22; 5ZX, 25; 5NN, 57; 5NK, 222; 5PB, 38; 5ACE, 25; 5PO, 64; 5HZ, 124; 5XAA, 2; 5XV, 345; 5XB, 778; 5ZAE, 35; 5AEW, 6; 5KG, 6; 5ZAK, 72; 5SS, 53; 5ADB, 63; 5JZ (ex 5FA) 26; 5BO, 2; 5DE, 5. Spark: 5LC, 25; 5QU, 15; 5ZC, 8; 5WA, 5; 5HY, 10; 5CT, 40; 5RA, 30; 5HC, 2.

ROANOKE DIVISION—C.W.: 3BLE, 248; 3BOF, 129; 3TJ, 107; 3CA, 98; 3RF, 74; 3AUF, 70; 3BUY, 63; 3BVC, 60; 3ASP, 56; 3CDY, 30; 3AFW, 25; 3ZZ, 26; 3ATB, 17; 3BIY, 17; 3ZAA, 10; 3BMN, 8; 3HL, 8; 3BZ, 8; 3APR, 30; 4OL, 187; 4JE, 4; 4GW, 24; 4KC, 75; 4MI, 2; 8ATC, 35; 8CQH, 45; 8AIF, 52; 8BIC, 3; 8TH, 8; 8BDA, 788; 8AFD, 289; 8AQU, 78; 8AUE, 247; 8SP, 91; 8BPU, 134; 8AMX, 75; 8CHO, 5; 8ZW, 124; 4FT,

BRASS POUNDER'S LEAGUE

Call	Msgs.	Call	Msgs.
3ZO	1761	9DTA	404
*8BDA	1330	2CQZ	401
3XM	1042	9BHD	401
1BAN	1101	*9EFC	401
5TC	956	9BKK	380
8IJ	947	8AJX	368
6ZZ	906	8BOZ	367
8CYT	857	3AQR	362
1BKQ	830	1BYN	360
5XB	778	8AGR	353
1MY	770	8BJV	353
8BVR	650	9BRK	353
8VQ	624	8DAE	352
*1CNI	620	*8AXN	348
9OX	601	9AVC	347
8BNH	572	5XV	345
4YA	560	7ZN	341
9DQU	552	1BOQ	340
5IX	545	2AWS	339
8CWP	530	6ZH	335
4HW	526	9DSD	335
9DTM	524	9YU	335
1CMK	516	1CIT	333
9BXT	510	8BUX	328
*2OM	507	9CEH	328
3SU	506	1BVB	327
1QP	502	5QI	325
8CXW	502	8BXX	325
9CBA	482	9CCS	320
9BVY	479	2BBB	318
3CCU	473	9ASE	318
*8EB	458	8ZD	317
*2BEG	453	8TT	316
8GX	440	7LU	313
9DKY	439	9CZY	311
9AOG	438	9MC	311
4FT	436	9CTE	309
5KP	433	*9BLU	306
1PM	429	3BJ	305
9AMB	422	9BBF	305
9APS	417	9BKK	304
4LJ	412	1II	301
9BGH	410	*9AHQ	301
9CTG	408	1AJU	300
4HS	406	8ALF	300

(**) Spark and C.W.
 (*) Spark.

436; 4BX, 117; 4DC, 52; 4LJ, 412; 4NV, 52; 4DQ, 17; 4EN, 5. Spark: 4BJ, 2; 4MV, 23; 8BDA, 547; 8TH, 33.

NEW ENGLAND DIVISION—C.W.: 1CCT, 52; 1ASJ, 53; 1LL, 234; 1LK, 67; 1CMP, 72; 1BNT, 203; 1COT, 140; 1AAC, 37; 1BDU, 73; 1CPN, 251; 1BVH, 224; 1PM, 429; 1CJH, 185; 1BCN,

5: 1AJD, 3: 1BSJ, 108: 1BBM, 18: 1CTT, 18: 1CBJ, 31: 1BYN, 360: 1GV, 271: 1OW, 50 1IL, 301: 1AWE, 72: 1BSD, 68: 1CSW, 91: 1ABC, 20: 1BQD, 378: 1BGD, 5: 1CBP, 169: 1BVE, 327: 1CPI, 338: 1ARY, 60: 1PCO, 51: 1AIQ, 1: 1AXB, 7: 1BKQ, 880: 1MY, 770: 1UJ, 37: 1BM, 8: 1IV, 2: 1EX, 6: 1VK, 71: 1BOQ, 540: 1AWB, 113: 1CKL, 12: 1AYQ, 50: 1AJP, 108: 1CRS, 55: 1OJZ, 180: 1BAG, 41: 1BFE, 233: 1TL, 52: 1ZE, 184: 1AJU, 300: 1BMS, 51: 1QPP, 502: 1CPI, 200: 1BAN, 1101: 1WC, 95: 1CJR, 158: 1FY, 45: 1ALZ, 80: 1SK, 108: 1SN, 67: 1RV, 52: 1CMK, 516: 1AWW, 394: 1IL, 168: 1BSJ, 108: 1BUR, 135: 1CGR, 109: 1CKP, 60: 1AAC, 37: 1VC, 76: 1AOJ, 35: 1CQZ, 105: 1AP, 31: 1BLN, 25: 1AFP, 6: 1AOT, 40: 1BDI, 142: 1BAS, 193: 1BGL, 146: 1CRU, 35: 1IT, 55: 1BHR, 70: 1AW, 188: 1BRQ, 277: 1CJD, 187: 1BNP, 40: 1BZP, 8: 1GL, 48: 1ATJ, 23: 1MC, 208: 1CQJ, 138: 1IX, 7: 1CM, 3: Spark: 1BNT, 40: 1AED, 10: 1ARY, 14: 1QO, 30: 1GNI, 620: 1RV, 24: 1LZ, 13: 1CIB, 71: 1FM, 30: 1BRO, 18: 1CM, 24.

VANCOUVER DIVISION—C.W.: 5BQ, 24: 5GO, 176: 5AC, 21: 5EJ, 30: 5CN, 69: 9BP, 51: 5CT, 87: 5DX, 46: 4DQ, 69. Spark: 3EC, 20.

ONTARIO DIVISION—C.W.: 9BS 95: 3OJ, 1: 3ACV, 1: 3ADN, 3: 3XN, 99: 3MN, 18: 3BY, 77: 3DH, 30: 3KO, 35: 3BO, 95: 3DS, 20: 3YH, 7: 3JL, 42: 3OY, 4: 3IF, 1: 3KP, 76: 3TL, 48: 3AL, 102: 3BS, 38: 3XX, 36: 3TA, 51: 3NL, 70: 3IL, 54: 3HE, 48: 3NF, 7: 3OH, 31: 3JT, 56: 3IN, 12: 3SX, 33: 3SI, 6: 9BV, 105: 3FO, 80: 3JJ, 74: 3CO, 20: 9BJ, 48: 9CD, 11: 9HA, 18: 3CK, 14 Spark: 3GN, 3: 3DU, 8: 9CD, 10.

DAKOTA DIVISION—C.W.: (Minnesota) 9HAV, 34: 9BAF, 213: 9ABB, 25: 9ADF, 68: 9DUQ, 6: 9CW, 22: 9ZC, 28: 9IG, 142: 9IQ, 1: 9ZT, 230: 9AUL, 5: 9AWS, 175: 9BJV, 5: 9BKW, 101: 9BLY, 26: 9BQQ, 43: 9BTL, 57: 9BTT, 52: 9CRW, 29: 9DAW, 144: 9DGE, 174: 9DGM, 11: 9APW, 246: 9BKJ, 130: 9ASN, 60: 9CIP, 57: 9MO, 50: 9DPX, 23: 9ASK, 20: 9BVC, 479: 9CEH, 323: 9BBF, 305: 9BKX, 304: 9DMA, 142: 9BKP, 130: 9CIT, 120: 9DSW, 32: 9QF, 85: 9CAJ, 54: 9EGG, 39: 9CAL, 36: 9CDR, 35: 9CDP, 38: 9CBW, 26: 9CPQ, 6. (North Dakota) 9UH, 206: 9EBT, 144: 9ABU, 160: 9DLI, 76. (South Dakota) 9AIG, 147: 9DKQ, 127: 9YW, 120: 9BRI, 120: 9CXV, 102: 9ASF, 38: 9BOF, 88: 9AVZ, 78: 9CGA, 49: 9DDP, 34. Spark: (Minnesota) 9ZC, 51: 9EAU, 4: 9EGF, 2: 9FH, 2: 9DGV, 97: 9DAG, 94: 9DOT, 17: 9DYZ, 10: 9XT, 21: 9BPY, 32.

EAST GULF DIVISION—C.W.: 4HZ, 95: 4MT, 47: 4KK, 50: 4FS, 38: 4DL, 5: 4EB, 257: 4JK, 37: 4LH, 4: 4AR, 55: 4JZ, 101: 4YA, 560: 4HW, 526: 4CG, 250: 4BL, 152: 4KL, 150: 5KU, 125: 4GZ, 125: 4MB, 75: 4EQ, 45: 4FH, 40: 4RG, 35: 4JM, 38: 4IK, 30: 4FJ, 25: 4CY, 25: 4DN, 22: 4LE, 17: 4DO, 17: 4KE, 10: 4JL, 5. Spark: 4BC, 30: 4EG, 15: 4HS, 406: 4DF, 155: 4BL, 64.

MIDWEST DIVISION—C.W.: (Nebraska) AD7, 75: 9CPB, 250: 9AQC, 30: 9CMK, 48: 9DSM, 96: 9AVC, 347: 9BXT, 510: 9AEC, 12: 9BDU, 20: 9ANF, 9AVC, 347: 9BXT, 510: 9AEC, 12: 9BDU, 20: 9ANF, 66: 9DTU, 3. (Iowa) 9DKY, 439: 9BGH, 410: 9BRS, 253: 9AMI, 163: 9ARZ, 155: 9BZI, 152: 9DAH, 177: 9DXC, 127: 9BSZ, 129: 9DGF, 158: 9CHN, 111: 9BFG, 107: 9DJJ, 102: 9BWN, 105: 9ATN, 99: 9BIK, 87: 9BIF, 34: 9AMU, 35: 9UL, 84: 9BCF, 72: 9EDB, 71: 9CXP, 71: 9BYC, 90: 9CIG, 70: 9BVL, 70: 9BXC, 56: 9BZE, 47: 9BDR, 43: 9BXJ, 40: 9BLT, 31: 9AHH, 30: 9BAL, 24: 9EER, 12. (Kansas) 9CCS, 320: 9CAC, 111: 9BOA, 36: 9DPP, 28: 9DSD, 335: 9ABZ, 241: 9BZZ, 170: 9DTA, 404: 9CFL, 201: 9CCV, 216: 9DEF, 19: 9CLW, 20: 9AEY, 190: 9CVT, 41: 9CKM, 61: 9BHN, 143: 9AOD, 214: 9AOG, 438. (Missouri) 9CTG, 408: 9DLT, 185: 9ANO, 75: 9EX, 37: 9YM, 62: 9AON, 206: 9FM, 170: 9RR, 31: 9AQR, 31: 9AYL, 208: 9BDZ, 17: 9BJC, 83: 9BKK, 330: 9BOZ, 50: 9DJB, 153: 9BDN, 56: 9BLW, 26: 9BZH, 2: 9CAO, 117: 9CKS, 112: 9DWK, 136: 9BDS, 75: 9DZY, 15: 9AAU, 17: 9DXN, 101: 9CEE, 109: 9BHL, 65: 9AZH, 26: 9BIG, 261: 9DMJ, 155: 9EFK, 55: 9CFY, 67: 9CVO, 48: 9AQZ, 41: 9BED, 234. Spark: (Nebraska) 9DNC, 209: 9AIK, 102: 9ASO, 470: (Iowa) 9DXU, 5: (Kansas) 9EFA, 293. (Missouri) 9DMJ, 6: 9AQZ, 8: 9DNY, 123: 9BMN, 98: 9BZH, 5: 9DAE, 28: 9EFB, 31: 9AUK, 24: 9DCW,

64: 9AWT, 13: 9DCJ, 192: 9AOJ, 250: 9EFC, 401: 9DWK, 3: 9ACB, 19: 9DZY, 82. WINNIPEG DIVISION—C.W.: 9BX, 67: 4HH, 97: 4BV, 41.

ROCKY MOUNTAIN DIVISION—C.W.: (Colorado) 5DTM, 524: 9AMB, 422: 9CAA, 158: 9FV, 147: 9BJL, 145: 9DHL, 100: 9BXA, 85: 9BVO, 62: 9BUN, 59: 9XAK, 50: 9BTO, 19: 9CJY, 12: 9CFY, 187: (Utah) 6RM, 125: 6ZT, 204: 5BOE, 135: 6RE, 65: 6ZA, 14: 6ZM, 40: 6BKE, 76. (Wyoming) C.W.: 7DH, 43: 7ZV, 41: 7AFW, 140: 7LU, 318: 7ZO, 60. Spark: (Utah) 6APL, 243 (Wyoming) 7AIZ, 25.

CENTRAL DIVISION—C.W.: (Illinois) 9DQU, 552: 9BHD, 401: 9MC, 311: 9CFK, 270: 9VM, 244: 9DCR, 211: 9AHL, 201: 9AFN, 186: 9BUH, 182: 9BTA, 181: 9CLZ, 181: 9OB, 166: 9BJT, 166: 9AKU, 154: 9DVC, 139: 9BBE, 139: 9WX, 136: 9DXL, 122: 9CDB, 111: 9BGC, 100: 9BIC, 100: 9LZ, 97: 9EBN, 92: 9DLR, 90: 9PQ, 96: 9BYN, 85: 9DRN, 84: 9CEB, 79: 9ALW, 73: 9BQW, 68: 9ASD, 64: 9BJJ, 62: 9BIZ, 58: 9CMN, 50: 9DJO, 48: 9BXD, 46: 9BAW, 45: 9BRO, 45: 9CDU, 43: 9CHF, 31: 9CKP, 27: 9EJH, 24: 9AQA, 19: 9CED, 14: 9FW, 9: 9CMC, 8: 9AWQ, 8: 9AHL, 3: 9EGN, 4: 9EAC, 2: 9DKK, 125: 9US, 67: 9VK, 44: 9DWQ, 29: 9DEF, 12: 9AZP, 11: 9CBS, 5. (Michigan) 8BGT, 293: 8JJ, 245: 8CF, 202: 8CED, 197: 8YN, 194: 8ADZ, 150: 8BVC, 155: 8CCA, 126: 8ZF, 102: 8ZZ, 94: 9CEZ, 27: 8BWS, 79: 8DAT, 55: 8BGJ, 52: 8NZ, 50: 8ATX, 44: 8CPY, 43: 8CBO, 40: 8AND, 36: 8AGG, 28: 8BBJ, 25: 8BYF, 22: 8FC, 15: 9BOE, 15: 8BT, 14: 9DRR, 12: 8KL, 9: 9DWR, 7: 9ARN, 4. (Ohio) 8IJ, 947: 8BRV, 650: 8BNH, 572: 8CWP, 530: 8CKW, 502: 8GZ, 440: 8AJX, 368: 8BOZ, 367: 8DAE, 352: 8BXX, 325: 8TL, 316: 8DE, 287: 8CXT, 857: 8AIM, 256: 8BEN, 250: 8BYO, 220: 8JZ, 218: 8CJM, 213: 9ANB, 209: 8BEK, 207: 8FT, 199: 8QK, 151: 8SM, 147: 8BVA, 136: 8AVT, 132: 8CMY, 130: 8RR, 130: 8CKV, 129: 8AET, 116: 8CBX, 112: 8BJN, 109: 8BDO, 100: 8CMI, 93: 8AXT, 81: 8BKN, 73: 8CMY, 75: 8AIZ, 75: 8AA, 73: 8HN, 65: 8CVL, 52: 9CZM, 52: 8CWC, 51: 8CXP, 48: 8CLD, 46: 8BZQ, 40: 8AJK, 38: 8CZM, 28: 8BMF, 37: 8RFB, 36: 8DAG, 32: 8ALK, 27: 8BNZ, 30: 8CAB, 30: 8BIU, 28: 8AZH, 27: 8AWX, 24: 8TJ, 24: 8ES, 23: 8CXX, 23: 8BBH, 16: 8WV, 13: 8PD, 12: 8AZN, 11: 8CWR, 11: 8DAM, 6: 8ABE, 6: 8ZV, 5: 8DBM, 3: 8BPP, 1. (Wisconsin) 9CY, 311: 9CT, 252: 9AZA, 247: 9AZN, 215: 9ATO, 193: 9ATM, 190: 9AMQ, 180: 9ZY, 150: 9AKY, 117: 9AFK, 97: 9BCH, 74: 9CWR, 65: 9CJL, 64: 9AAP, 58: 9CVL, 50: 9EEY, 49: 9DCT, 42: 9CKW, 30: 9EAR, 18: 9BHQ, 12: 9XM, 12: 9AHO, 10: 9BKC, 10: 9PN, 10: 9ALE, 10. (Kentucky) 9OX, 601: 9APS, 417: 9ASE, 318: 9EL, 156: 9AWF, 127: 9AME, 113: 9EP, 110: 9LH, 44: 9ARU, 43: 9BRI, 22: 9BRY, 6: (So. Indiana) 9BRK, 353: 9BVZ, 62: 9AMO, 53: 9BGW, 35: 9DXE, 28: 9BCT, 22: 9FF, 12: 9DKA, 10: 9ALP, 9: 9ARP, 8: 9DWM, 6: 9CZS, 3. (No. Indiana) 9CBA, 482: 9CTE, 309: 9ACE, 179: 9YB, 171: 9BOP, 126: 9DGC, 64: 9EHL, 25. Spark: (Illinois) 9BLU, 806: 9AHQ, 801: 9DWF, 192: 9DHD, 156: 9CA, 142: 9DHZ, 101: 9DAY, 84: 9AZF, 82: 9LH, 49: 9ASL, 28: 9NQ, 26: 9BHR, 16: 9BJL, 14: 9VV, 9: 9CVC, 5: 9AAW, 240: 9APK, 120: 9BAG, 120: 9DWC, 62: 9BEF, 60: 9ABM, 56: 9AOV, 53: 9AES, 20: 9AYM, 16: 9US, 4: 9AMZ, 7: 9IV, 7: 9VK, 5: (Ohio) 8EB, 458: 8CVD, 105: 8BYO, 84: 8CNR, 30: 8CKY, 53: 8BDM, 43: 8AHY, 35: 8CNL, 62: 8CGX, 13: 8CMI, 11: 8CXX, 5: 8CWR, 3. (Wisconsin) 9DGH, 73: 9FL, 57: 9DMG, 50: 9BQG, 30: 9CCF, 10: 9YCA, 5: 9DXT, 5: 9CVL, 2. (Kentucky) 9BOD, 108. (No. Indiana) 9DXK, 27. (So. Indiana) 9PD, 102: 9YJ, 32: 9DKA, 30.

ATLANTIC DIVISION—C.W. (Eastern New York) 2KE, 74: 2CFE, 19: 2CVR, 162: 2CCD, 150: 2BRB, 105: 2BD, 13: 2CSL, 66: 2BNL, 64: 2CPO, 47: 2CEG, 23: 2CHK, 17: 2BRO, 11: 2CNK, 6: 2AQL, 5: 2BNC, 4: 2AVE, 31: 2BWA, 153: 2CNH, 53: 2ASU, 37: 2BCK, 6: 2HW, 54: 2ANW, 115: 2AWS, 889: 2BRC, 38: 2BY, 68: 8ASL, 101: 8AVJ, 124: 2BXW, 45: 8AOL, 22: 8GK, 214: 2AUV, 44: 2BPK, 173: 2TT, 6: 2NZ, 118: 2IG, 8: 2CEV, 76: 2ACZ, 84: 2BQU, 85: 2CEL, 36: 2EV, 65: 2IN, 2: 2VH, 30: 2CIM, 11: 2CEB, 63: 2PQ, 5: 2MX, 15: 2AWF, 150: 2BQD, 64: 2CKN, 65: 2AIF, 123: 8TB, 71: 8AOT, 3. (Western New York) 8BUX, 328: 8BOE, 290: 8AXN, 264: 8YO, 252: 8BQA, 130:

8BQB, 90; 3AWP, 240; 8BUM, 84; 8BC, 35; 8COL, 104; 3BIN, 60; 8AQR, 362; 8BNY, 46; 8CQL, 14. (Northern New Jersey) 2BBB, 318; 2AJF, 171; 2AJA, 75; 2EX, 68; 2CQZ, 401; 2CTC, 42; 2ALY, 146; 2OF, 20; 2BJP, 20; 2AZY, 95; 2CMS, 50; 2ACD, 20; 2ARS, 96; 2BUY, 160; 2FC, 102; 2AWL, 38; 2AHM, 15; 2AFA, 100; 8ACY, 205; 2BVD, 56; 2BNZ, 104; 3CG, 100; 3XM, 1042; 3BLZ, 38; 2BMS, 5; 2LT, 4; 2AFC, 107; 2CQI, 62; 2KF, 24; 2AXP, 95; 2WR, 56; 2BMR, 231; 3FP, 76; 2CGS, 84; 2APP, 67; 2CKL, 40; 2LE, 35; 2BFE, 20; 2RZ, 38; 2SQ, 131; 2BJO, 121; 2AWH, 26; (Southern New Jersey) 3REL, 230; 3ARM, 25; 3CM, 50. (Eastern Penna.) 3AKR, 3; 3BLU, 105; 3ADX, 129; 3AWH, 18; 3CC, 110; 3ADP, 255; 3BSP, 21; 3CX, 40; 3ADQ, 108; 3RNU, 107; 3JG, 10; 3BLC, 15; 3LK, 92; 3BUV, 11; 3BLP, 15; 3BBV, 16; 3ALU, 51; 3ZQ, 96; 3BIQ, 48; 3BKA, 10; 3AJA, 4; 3ZO, 1761; 3AUV, 65; 3BJ, 305; 3MB, 48; 3AUW, 30; 3CCU, 373; 3AQD, 54; 3AAO, 180; 3AAY, 78; 3ARF, 278; 3EGG, 50; 3BUT, 12; 3HX, 3; 3OE, 104; 3QV, 72; 3AWA, 71; 3HD, 44; 3FS, 41; 3RF, 34. (Western Penna.) 3CDI, 13; 3XE, 246; 3BOY, 6; 3AIO, 125; 3AIG, 34; 3CKO, 214; 3CTP, 24; 3BRL, 36; 3ALT, 95; 3BUT, 30; 3CQX, 69; 3ASE, 4; 3VN, 122; 3BJV, 353; 3BDU, 26; 3BRM, 42; 3CI, 9; 3CJY, 32; 3CFB, 26; 3CEU, 250; 3OW, 6; 3CLE, 10; 3RP, 8; 3CVY, 18; 3VQ, 624; 3ZD, 17; 3ALP, 300; 3AXD, 26; 3CON, 197; 3QC, 200; 3VE, 6; 3AGR, 358. (Del.-Md. & Dist. of Col.) 3AFB, 12; 3AIS, 18; 3WF, 221; 3IF, 5; 3TF, 11; 3APT, 26; 3PH, 11; 3BKS, 3; 3GZ, 10; 3FG, 85; 3EM, 26; 3HS, 200; 3ARO, 237; 3NF, 40; 3SU, 508; 3KM, 33; 3JJ, 282; 3BEM, 63; 3PZ, 216; 3AB, 20; 3BSB, 171; 3ALN, 104; 3IL, 49. Spark: (Eastern New York) 2BEG, 453; 2DL, 208; 2ND, 90; 2BY, 45; (Western New York) 3AXN, 84. (Northern New Jersey) 2CJC, 150; 2CJX, 149; 2BQZ, 107; 2AJA, 10; 2OM, 507; 2BK, 123; 2ABE, 80; 2AWZ, 10; 2QC, 5; 2JG, 10; 3BLZ, 10; 2CDR, 16; 2CAD, 24; 3FP, 21; 3CS, 27; 2CJT, 111. (Southern New Jersey) 3BEL, 62; 3RW, 25. (Eastern Penna.) 3QW, 73; 3QN, 26; 3APL, 75. (Western Penna.) 3EW, 68; 3BRL, 40. (Del., Md. & Dist. of Col.) 3SP, 10.

QUEBEC DIVISION: 2AF, 37; 2EI, 8; 2BT, 7; 2BE, 21; 2BG, 20; 2AN, 114.

ATLANTIC DIVISION

Chas. H. Stewart, Mgr.

SUMMARY OF TRAFFIC BY STATES

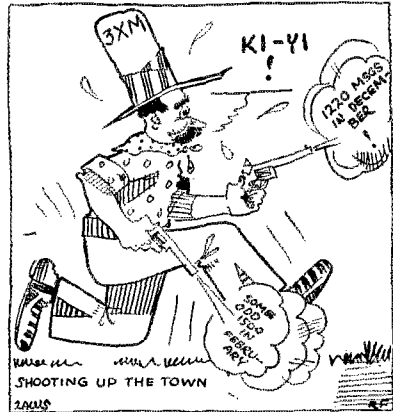
State	C.W. Msgs.	Spk. Msgs.	Total Msgs.
Eastern New York	3366	796	4162
Western New York	1886	84	1970
Northern New Jersey	5497	1435	6932
Southern New Jersey	305	87	392
Eastern Penna.	5786	174	5960
Western Penna.	3871	108	3979
Delaware	30	—	30
Maryland	453	10	463
Dist. of Col.	1791	—	1791

The division manager has decided that the work of the division cannot be held up by any operating department official, and as no reports have been received from the assistant division manager in charge of western New York, he has cancelled the appointment previously made, and has appointed Samuel Woodworth, 425 Brownell St., Syracuse, N. Y. assistant division manager for the western New York district. District superintendents and city managers in that section of New York state please take note of this change and forward their reports to Mr. Woodworth in the future.

Andrew J. Potter, (8BIP) superintendent of the 10th New York district, has re-

signed on account of his contemplated removal to the West Coast. Mr. A. R. Marcey, (8BUM), 113 West Raynor Ave., Syracuse, N. Y. has been appointed to take his place after March 1st. Official stations in that district will please forward their reports to Mr. Marcey in the future.

NORTHERN NEW JERSEY: A report from every district superintendent in Northern New Jersey was again received. We cannot compliment the various New Jersey district superintendents too strongly on this fine co-operation.



Antenna trouble developed among a lot of our good traffic stations in this section on account of heavy snows and sleet. 3XM, our prize relay station apologizes for a mere 1042 messages handled account midyear exams! Many C.W. stations have reduced their wave length to 200 meters flat, but have trouble raising stations and request others to listen on the proper wave length. Many stations, besides handling much traffic are being reported and worked by all districts, England, France, Cuba, Porto Rico, Mexico, and Hawaii.

EASTERN NEW YORK: 2BRD has been appointed city manager for Brooklyn to succeed 2RM who has failed to send in any reports for the past three months. It is hoped Brooklyn stations will co-operate with Mr. Gloser by getting their traffic reports to him on the 16th of each month. (Thanks fellows.)

WESTERN NEW YORK: As our report goes off we have received no word from Mr. Benzee regards western New York reports. This is the third time in four months this has happened!! There were 1387 messages from the 16th New York district, which reports were sent direct.

DELAWARE: H. H. Layton reports the handling of only 33 messages for the state. His brief remarks are to the effect that the Fire Dept. of Wilmington is considering the passing of a law forbidding antenna erection in the city.

MARYLAND: Deichmann reports a total of 427 messages for this month. Good DX work is done regularly and traffic is increasing each month. Among those doing the good work are 3WF, 3GZ, 3APT, 3UC, 3PH, and 3FQ. 3UC is now on with a 5-watt tube after trouble with a bad 50-watter. 3WF is increasing to two fiftys. 3AHK is now using both C.W. and spark.

DIST. OF COLUMBIA: 3SU again takes the lead for handling traffic through the D. C. giving a total of 1851 messages. All stations are showing a decided increase. 3KM is reaching out on a 50-watt tube. (F.B.) Burg has opened a new station, 3BGJ, and is getting fine results. NOF had antenna trouble but is back again with a better punch and is doing a great deal of work. 3LR has been off the air for a long rest but he is expected back shortly. 3BHM blew one fifty-watter, we hope he will be back with a new one. 3ARO is doing nice work with 3JJ and 3ALN as partners in crime.

EASTERN PENNA.: Dist. No. 1. 3ADX is back on the job with 20 watts C.W. (Welcome OM.) 3AWH is now located in Media and will open up with C.W. instead of spark. (Thanks.) Chester stations 3ADP, 3BSF, 3ADQ are reaching out in fine shape and handing in good reports.

Dist. No. 2. This is a "sure-fire" C.W. district, and the D.S. is working mighty hard. Appointment requests are being issued as promptly as possible—be patient.

Dist. No. 3. An increase in message traffic was noticed for this month. All stations active in relay work are requested to get in touch with the district superintendent for official appointment. We need your individual support.

Dist. No. 4. The message traffic totals of 3ZO have all the appearances of the numbers on a freight car. Take a good look at this month's total! 3ZO has schedules with 8ZZ and 3JJ. Reading stations are hitting the 300 mark. 3AHF is back with us again, but make it C.W. OM. 3LP was out of the race last month due to sickness. 3MB lost a perfectly good 50-watter which made him a little shy on the number of messages handled.

Dist. No. 5. 3AQR handled a good total for two weeks operating. 3CCU manages to be on over week-ends. C.W. is going F.B. at 3ACY, why open up with a spark set? Mighty sorry to lose W. L. Gardner, Jr. as city manager of Harrisburg. He is giving up the game for financial reasons. A successor has been named. Stations in New York are showing wonderful co-operation and turning in good reports.

Dist. No. 6. No report received from this district.

Philadelphia: Dist. No. 1. 3BUT and 3HX are the only stations reporting. Don't

fail us men, we need your reports every month.

Dist. No. 2. Nothing to report, and no message traffic.

Dist. No. 3. Owing to the resignation of the city manager, no report was received. Stations in this district will report to the assistant division manager until a new city manager is appointed.

Dist. No. 4. 3RB is working on a new set. 3AWA has increased to 50 watts. 3HD is on the job pulling down some DX work. 3FS reports QRM from B.C.L.s.

WESTERN PENNA.: A very decided increase in activities has been noted during the past thirty days, practically all stations showing 100% increase in the total messages handled and also 100% co-operation from all districts.

Dist. No. 7. The district superintendent, operating Radio 8XE, will be laid up for a few weeks as the Penna. State College station is being moved to another building.

Dist. No. 9. As expected, the message report for this month is double that of last month, with indications that next month's report will be even greater. The A.R.R.L. spirit is rapidly spreading and more relay stations are being added within the district each month.

8AIO is still living up to its reputation. This station was using two 50-watt tubes during the transatlantics but ordinarily uses four 5-watt tubes. OM. Dalzell reports he gets cards from the Pacific Coast every time he operates the set. 8CKM has nothing to report except that he is still building that new transmitter he started last year. 8AIG is one of the new stations added recently to the district and is doing well. It is almost impossible to erect a good counterpoise at this station and this has been a serious handicap. Receiving is exceptionally good, 6th district stations pound in all night long. 8CLE operates between 9 and 12 P.M. His message report this month is not very large but Mr. Riley promises a much better one for the next period. 8RP handled traffic this last period for 8AGY. Allison reports that either one 50-watter or a 250-watter will be installed at 8AGY. 8CI finds a little time to handle traffic. His signals have been reported on the Pacific Coast several times. This is very good considering that the station is only in operation over short periods. 8CJY is another one of our new reporters and is also using C.W. 8EW is still pounding the rock crusher although he faithfully promised us last month that a change was being made to C.W. 8EW's spark has been heard at 7IV, also in Canada and the Gulf of Mexico. 8BRL is operating both C.W. and spark equipment and reports that the quenched spark set is doing better than either of the C.W. sets. A new sink rectifier is being installed. As 8BRM blew up the whole works and

has had considerable trouble getting his new generator to work properly, the traffic reported is very light. 8BDU is doing good work with a $\frac{1}{2}$ K.W. tube, operating on 3000 volts furnished by a sink rectifier. Operating schedules at this station are 7 to 8 P.M. daily and Sunday mornings. 8BJV is still pounding away hard and has reported a total of 353 messages for the period. Mr. Scott reports that a new 24 inch cage antenna has been erected with the result that his signals are getting out much better. 8VN is another of the new stations and promises to be one of the best. 8ASE had very little to report for the past period. 8ALT spends a good deal of time on school work but operates one regular schedule Saturday from midnight to 7 A.M. 8WR has been off the air during the past month due to sickness. 8CTP is a new station reporting. The 100-watt D.C. tube set is doing very well. 8CKO is one of our high-mark stations, having handled 214 messages. This station has had tough luck having burnt out five 50-watt tubes during the last month. At present an emergency set consisting of one 5 watt tube is being used. Fixed schedule is from 4 to 6 A.M. daily. 8CFB has very little time to operate a set and has been unable to arrange any definite schedule. 8CEJ is doing better and better each month, and is now working on C.W. entirely. 8OW is still experimenting and doing very little along relay lines. This station is heard all over the country and if "Mag" would only take a few messages it would soon become a very good relay station. 8CQX is handling a fair amount of traffic with his 5-watt C.W. set and is trying to arrange schedules that will fit in between school work. A 50-watt set is now under construction in order to cover distance more consistently. 8ALF is still doing good work in spite of the fact that he only operates over the week-ends when at home from school. 8BUT is working hard to hold up his part of the business, and reports that two new operators will be put on shortly. 8VQ is one of the best stations in the district and has been overlooked up to this time by the district superintendent. This station has 500-watts, D.C. C.W. or 500-watts, 500 cycle I.C.W. and is capable of working 6XAD consistently. It takes first place in the district this month, having handled 624 messages. 8CVY has had hard luck getting a transmitter to poke out in the right way but is making another try at it with a new 50-watt set. Here we have one of the speediest operators in the game who can hear almost all of the DX with his receiver but has been unable to raise any of them with his transmitter. 8ZD has been handling its share of the traffic with P. E. Wiggin, F. B. Westerbelt and J. L. Leighner operating. When last QST was read at this station and the record hung up by 3XM noted, the oper-

ators at 8ZD resolved that they should break this record. The motto now at 8ZD is "1500 or bust," and "never say QRU." There are now four operators working at 8ZD and it looks as though at least 2000 messages will be handled during this next period. During the first 24 hours, 186 messages were handled. A confirmation from Manchester, England gives the operators at radio station 8ZD credit as having heard foreign amateur signals first of all in the United States. The station copied was that of the Manchester Wireless Society, Manchester, England, with call letters 5MS. According to last QST no other station reported having heard 5MS during the transatlantic tests. However, 5MS was copied on two consecutive days at 8ZD prior to the transatlantic tests.

Dist. No. 11. Shows a total of 223 messages. 8AXD has been an extremely busy man lately and has been unable to be on the air very much. 8BLT failed to mail in a report for the first time, but deserves mention, and we want the world to know that he has a good excuse—just married. A good portion of the traffic handled through district 11 is done during noons and Sunday afternoons. It might behoove a few others located nearer Pittsburgh to adopt the same plan.

Dist. No. 12. 8QC has been doing excellent work, having cleared 200 messages during the past thirty days, operating C.W. only.

CENTRAL DIVISION R. H. G. Mathews, Mgr.

Traffic during February has picked up to a surprising degree and the message total this month far exceeds our wildest expectations. Although we have done the unexpected let's see if we cannot beat even this remarkable record next month. All it requires is a one hundred per cent report from each station.

WISCONSIN: The state is progressing very nicely and if all the district superintendents work as they have in the past month we will continue our journey to the top of the list. *The A.D.M. has offered a Silver Cup* to the station handling the most traffic beginning with the month February 15th and trusts that this will be an added incentive to run the traffic report away on next month.

Dist. No. 1. There is still considerable unlicensed QRM but the licensed men are working hard to locate the offenders. 9ATO is going strong. 9AHO will also be on more regularly in the future.

Dist. No. 2. 9XM is on the job handling traffic again and will be on regularly from 11:30 Friday P.M. to 4:00 A.M. Saturday on 225 meters, both C.W. and I.C.W. 9EAR is doing fine on one 5-watter.

Dist. No. 3. This district still holds the lead for traffic handled and also has again

the highest individual, 9CZY pushing out 311 this month. (FB, OM.—A.D.M.)

The D.S. reports that the hams in the country won't regret working 9DTI if the second Op. is on. Miss Lillian Hume works with her brother at this station and is partly responsible for the quite heavy traffic report of the last month. At the key Miss Hume will be taken for the ordinary ham,



Miss Lillian Hume, 9DTI

and she wants to be. Green Bay is now represented by 9CSX on C.W. 9BHZ is installing 50 watts. 9DCT has added 10 watts and is moving traffic in fine shape. 9DHG is using a DeForest OT3 along with the Rock Crusher. 9DVY, and occasionally 9FQ, are the only ones heard on Route No. 1. 9ACM says the B.C.L.s put him out of business. 9CJI is doing good work on 10 watts. 9CZY seems to be the most likely one in this district to get his name carved on the Wisconsin Cup. (It's worth going after, OM.)

Dist. No. 4. The bulk of the traffic handled is being taken care of by La Crosse stations, although 9CM of Trempealeau is surely holding up his end. Two new stations were added to the La Crosse group—9CWR and 9BKC. 9AZN did proudly last month.

Dist. No. 5. The C.M., who operated 9YAC, has been out of town the greater part of the month. 9PN should handle about 500 more than he has.

OHIO: The handling of traffic has been steadily on the increase. If you are doing extra good work and report it faithfully to the D.S., or to the A.D.M., if your district has no superintendent, the D.S. or

the A.D.M. will be glad to give you credit. On the other hand he who disregards the requests of his superior officer deserves no credit.

Dist. No. 1. We have two new stations, 9BIU and 8BZQ. 8BEJ is temporarily out of commission because of the closing of all spark stations in Toledo. 8QK continues as leading station in the district, not only in the number of messages handled but also in the distance covered. 8QK reaches all states, as well as Canada, Alaska, Honolulu, Mexico, Panama and Porto Rico.

8IJ—947

Dist. No. 2. This district has made no increase in the number of stations that reported but the total number of messages reported has nearly doubled over last month. 8CMI continues to reach Hawaii. 8BXX and 8BOZ are working with 6th and 7th district stations. SAIK is with us for the first time. The state championship goes to this district and the lucky chap it 8LJ.

Dist. No. 3. This district is doing fine work. The leaders this month are 8TT, 8BNH, 8BWA, 8CYT, 8CAE, and 8AVT. Akron deserves special mention for good work, more than 1100 messages having been handled.

Dist. No. 4. More traffic than ever. The star is a spark station—8EB-SANB is heard nightly in Hawaii on 200 watts. 8AIZ has put in 10 watts with which he has worked every district. 8BYO is with us again with a fine report. He has bloomed forth with a 1-K.W. spark set with the addition of a 100-watt C.W. set, and a 10-watt C.W. set. Other leaders in the districts are 8ALM, 8BEN, 8CGX, and 8FT. 8CVA using 250 watts was heard in England. 8BFB, 8CWC, and 8CXP deserve mention for their reliability and promptness in sending in their reports. 8DAG has his 100-watt set working now and is with us for the first time this month. Springfield seems to be waking up and has adopted quiet hours between 6 and 10:30 P.M.

Dist. No. 5. Only ten stations reported from Dist. No. 5 this month, but only two of the ten report less than 100 messages. 8AJX is with us again this month with a fine report. The Radio Inspector has closed all spark stations in Columbus, which has driven these key pounders to C.W. 8GZ says he worked 6XAD three times on a 5-watter, and 8BYN has been heard several times on the west coast on his 10-watter.

Dist. No. 6. This district is doing good work but it is confined to a very few stations. 8VXW and 8BKN are handling the bulk of the traffic at present. 8ABE is a new station. 8ZV sent in his first report this month and although it is small, we are glad to hear from old 8ZV once again. This district is very much in need of a superintendent to wake it up.

ILLINOIS: Dist. No. 1. D.S. Burke increased his O.R.S.'s by six new stations this month.

Dist. No. 2. D.S. Bergman says his district is so full of star stations, continent wreckers, and notable achievements that he can mention only the high lights. 9DYN reports working every district on the 14th of February. 9DCR has worked 7AFW and has been reported in California five times this month, using two 5-watt bottles. 9DXL says he is just starting. 9BTA has finally worked 6XAD and is happy. (Better throw the 100-watt away and get some 5-watt bottles—D.S.) 9BGC, 9EBN, 9BJT are all "wrecking the continent" with C.W.

Dist. No. 3. D.S. Cain reports that the overhauling he gave his district brought results. This is the first month that district No. 3 has a 300 hitter and we cap it with two, (i.e., 9MC, C.W. and 9BLU, Spark). 9MC has taken over the job of city manager of Springfield. 9BLU, 9CLZ, and 9BYX deserve special mention for the way they have come forward.

Dist. No. 4. Apparently this district has been disrupted by the reorganization. Reports from C.M. Spies and C.M. Weeks give this district a total of 1374 messages, which is not so bad from 13 stations. 9DQU, the star of central Illinois, continues to hit better than 500 a month. This is the third straight month he has been over the 300 mark.

Dist. No. 5. D.S. Hicks says that he has unearthed material for a network of stations in EGYPT, ILL., (i.e., 9AMS, 9DMW, 9DLR, 9CED, 9ID) and expects to turn in a real total next month.

Dist. No. 6. D.S. Ridgway hands in a total for the rest to shoot at. 111 messages per station for C.W. and 156 messages per station for spark. This district boasts of one 300 hitter, (i.e., 9BHD, with 401 messages). 9BRO is back. 9DEL is starting to work again and 9AKU works 1QP (1000 miles in daylight) and 7ABB at night.

NORTHERN INDIANA: Dist. No. 1. 9CBA, 9EHI, and 9CTE are handling a large share of the traffic. 9ACE has been doing a lot of good short jump work, handling traffic with 9CBA at Winchester on a noon schedule. 9YB continues to do the long jump work for LaFayette under the able management of Prof. R. V. Achatz, C.M. P. Harmegnies, formerly of 9YW, is an addition to the operating staff at 9YB, which has been heard in Panama and Cuba recently.

Dist. No. 2. 9DTJ and 9AWZ are on the air frequently. 9ACE and 9AIU are also among those present. 9CP's spark and C.W. are still the same old reliables.

SOUTHERN INDIANA: Dist. No. 1. 9BRK is still high man in Southern Indiana and keeps hitting over 300. 9ALP is busy with school work so does not get much time to operate his set. A new station has been

located at Vincennes, 9DIS, and is surely needed. 9DYU is still burning up tubes instead of ether.

Dist. No. 2. 9BCT, newly appointed D.S. has not had time to get in anything but a local report. 9DXE is an Op. at 9YJ and has moved his C.W. set there for the rest of the winter. About half of the Indianapolis stations were out with breakdowns last month.

Dist. No. 3. 9PD has been appointed C.M. of Richmond and promises to get things to going on a 100% scale. 9AMO is still doing consistent work on his lone 5-watter.

MICHIGAN: We are now having daylight tests of all stations in Michigan to get a line on what stations to route messages through. Sundays will be set aside for state communication with the view of getting closer contact between Michigan stations.

Dist. No. 4. 9CE ranks as star station in this district with his 15 watts of C.W. 9BOH has been very busy trying to get his 10-watt to blast and to all appearances has succeeded. 9AEN is heard quite consistently but we seem to have trouble to connect. 9DRR has been trying out various circuits, he is going to be a reliable station. 9AJU is thinking deeply of installing a C.W. set. Let's hope so as the route might then be opened for business between here and Menominee. 9OL is still on but is never heard—spark doesn't seem to break through this iron country. 9AXN at Laurium regrets its inability to handle traffic.

Chicago: 9AAW, 9APK, 9ABN, 9BEF, 9AOY, 9DWX, and 9AES of the sparks; 9DKK, 9DWQ, and 9US of the C.W.'s have handled most of the February traffic, the spark traffic being over twice that of C.W. 9ZN has been on very little during the past month although both spark and I.C.W. are hitting on all six. A new organization has been formed under the leadership of the Chicago City Manager, J. E. Brennan, known as the Radio Traffic Association of Chicago. Its membership comprises all the



traffic handlers in Chicago, a representative from each broadcasting station, a representative from the Navy Department, the editors of all the local radio columns, and the Radio Inspector. The purpose of the organization is to promote better co-oper-

ation all around and from all appearances it will be extremely successful.

KENTUCKY: Kentucky shows a fine total this month with 90X, 9APS, and 9ASE all over 300, and 9EI, 9AWF, 9AMH, 9EP, and 9BOO all above 100. For a state that used to have about three stations, this is a real showing and in addition to these stations there are half a dozen more just below the hundred mark. (F.B.—D.M.)

DAKOTA DIVISION

N. H. Jensen, Mgr.

Each month this division is showing a steady increase in traffic, and for the month of February it has an increase of approximately 25% over January.

MINNESOTA: Dist. No. 1. A number of new stations have sprung up. In Eveleth 9EGF, 9EGR, and 9EJZ (formerly 9ACD of St. Paul) and 9EGU of Henning. "Old Reliable," 9ZC, says he is still on the job and that he now has a regular schedule with Canadian 9BX. This makes a good opening for west bound traffic. 9EAU is testing with 9BAV, 9ADF, and 9ZC and hopes to line up permanent routes through these stations soon. 9FH reports that he is in touch with 9EAU occasionally. 9ABB says he is handling some traffic but will be out of commission for a month while moving. City manager Hayes of Duluth reports traffic moving smoothly in all directions, and that Duluth is more free from local interference now than at any previous time. 9GW, 9ADF, and 9DUQ have been the most active in Duluth during the past month. City manager McQuillin of Brainerd reports considerable traffic through his city this month. 9BAF takes the traffic honors for the district.

Dist. No. 2. 9BVY leads the entire division this month with 479 messages. Canfield is on with 50 watts and says he didn't find it necessary to stay up all night in order to put across that number of messages. The Southern Minnesota Radio Association (affiliated) must be given credit for the splendid organization and the good work being done outside of the Twin Cities. City manager Smeby of Minneapolis reports traffic moving in fine shape. 9AUL, after bridging the Atlantic, has been cut to 250 watts for regular traffic. 9ZT has blossomed out with a 250-watt set and is setting the pace in traffic handling. He has a daily schedule with 1QP. 9BTL is on the air with 10 watts. 9AWS has a remarkable record for the antenna system used. The antenna is only 15 feet above the counterpoise. He worked both coasts with 50 watts. City manager Goldberg of St. Paul reports steady increases in traffic and that his city will turn in 100 messages each month hereafter. 9APW has worked 4OI in Porto Rico four times, this month's report includes seven

messages handled with that station. 9DAG is reported regularly on the west coast with his rock crusher. 9DGW is changing over to C.W. 9ASK has blossomed out with a 50-watter, getting four amps. (with the assistance of C.M.) Help! 9CIP has a 250-watt bottle. (Hope this is last one for St. Paul—C.M.)

NORTH DAKOTA: Fargo remains the center of activities in North Dakota. A.D.M. Bert Wick, reports that 9DOC of Minot recently invested in a generator and some large size bottles, and that he expects to be ready for business very soon. This is probably the best news for North Dakota stations that has appeared for some time, because it will mean that a western outlet will be assured. 9AEJ and 9AUU have been waiting for license renewals. 9UH continues the good work of pushing across a lot of traffic, as does 9EET also. With 9GK going again next month, North Dakota should pass the 1000 mark in traffic. Several routes are being maintained through Fargo, and the one to Winnipeg via 9ADZ and 9YAF is the most successful. Traffic to the west now moves regularly from Fargo station to 5ZA.

SOUTH DAKOTA: District superintendent Orville Wheelon, "YS," has apparently been very busy with his duties, judging from the short report as of Page in the South Dakota Legislature. He reports 9CGA going on C.W. now and that everybody is glad of the change. Homer Fitch of 9YAK has left the state and will take a whirl at commercial work out of New Orleans. (Good luck to you "HF.") Traffic is moving smoothly in this district.

EAST GULF DIVISION

B. W. Benning, Mgr.

FLORIDA: Dist. No. 1. 4HZ is still upholding this district but is being closely followed by 4MT and 4FS. 4HZ stands both early evening and the "Boiled Owl" watch. He also does considerable daylight work. He has worked Ohio on fone and copies sixes and sevens almost nightly. 4MT with 5 watts has worked Boston, and is QSO nightly with other northern points. He works a daylight schedule with 4HZ and is QSO continually with southern and central Florida. Recently he worked 4OI. 4FS has increased his power to 50 watts and is now QSO with stations up to 2000 miles. He works 4OI regularly now, and has a schedule with him.

Dist. No. 2. 4JZ is reaching out without limit and is complaining that he is being swamped with cards. We see no grounds for complaint OM. 4IZ gets out well and is handling messages. He works regularly with 4BC, 4EL, and many others in the north. With 10 watts C.W. he is QSA in Panama and Porto Rico. 4AR, a new C.W. station, has handled 55 messages during the first month of operation. 4HG on 5 watts

of C.W. gets out well but is not heard often.

Dist. No. 3. 4BC is doing excellent work with his spark set, maintaining schedules with 4MT and 4IZ, he is also QSO with many Northern points. 4DL gets out well with his 100-watt C.W. set and is doing fine work.

GEORGIA: Dist. No. 2. Nearly all stations of this district suffered during the recent sleet storm, and have had to rebuild their antennae. 4EB was forced to use a small temporary antenna for the greater part of the month. The Atlanta stations have been doing good work but as usual the D.M. can get nothing in the line of a report. 4KL, 4EH, 4HW, 4YA, and a few others have been heard on the air handling gobs of traffic.

Dist. No. 3. 4GN is still tearing the country up with his terrific spark and is handling the traffic. He has been reported 200 miles east of Porto Rico which is no mean DX for a spark. 4FD is also shoving the traffic through via the rock crusher route. These two spark stations are undoubtedly the best in the south and are blessed with a location that is comparatively free from B.C.L.s. 4EL is the outstanding station of this district for the month. His new 50-watt C.W. set is the "Cat's Paw," it is reaching out in every direction and bringing home the messages. 4BY's 500-watt C.W. set is reported by sixes and sevens nearly every time he opens up. 4GE is still plugging along and doing fine work with his small C.W. set.

ALABAMA: We have had no report from Alabama in the last two months. 5UP is doing excellent work and reports 67 messages for the first month of operation. (F.B.) 5ZAS reports that their stations handled 85 messages last month but was not reported to the D.M. This month they handled a total of 149 and reported direct. (F.B.)

SOUTH CAROLINA: 4JK has moved away. 4FQ and 4LA of Spartanburg have been unable to work their sets this month on account of other business. 4EG is still pounding away with spark and is moving some little traffic. He is going to install 10 watts of C.W.

The D.M. regrets that this will be his last report for the old EAST GULF Division. "I want to thank the men of the East Gulf who have stuck by me for their co-operation, and to assure them that I will do all I can in the future to make the East Gulf the BEST and MOST EFFICIENT TRAFFIC HANDLING DIVISION in the League."

HAWAIIAN DIVISION K. A. Cantin, Acting Mgr.

The Hawaiian Division had one active station during the past month. 6ZY has been reported QSA by a number of main-

land stations, and messages have been exchanged between Honolulu and the coast through 6ZY.

Owing to 6ZY leaving within a few weeks, the main station for the Hawaiian Division at present will be out of commission. "Rather than see this division go 'dead' I have purchased a 100 watt A.C., C.W. set which I hope to carry on with the relay business. My Station at present is located in a poor position for working the mainland owing to a mountain range which causes a dead spot. I have written to the Radio Inspector for permission to erect a new transmitting station in a very favorable location for working the coast, and I hope in my next report that I will be able to say that Hawaii is still QSO. 6ASR of Honolulu is also working on plans to work the mainland with C.W. and at present is testing out new locations for a favorable site to erect a station."

MIDWEST DIVISION G. S. Turner, Mgr.

Men, why do you not send your reports in early? Don't delay your A.D.M. and keep us all in misery worrying whether your report will be received in time for publication. Our reports are all of too much importance to take the chance. Set your calendar a day ahead, all of you.

I am pleased to announce the appointment of D. E. Watts of Clear Lake, Iowa, as A.D.M. of Iowa succeeding P. A. Stover who was forced to resign account of school duties. You all know Watts as 9ARZ. Help him to keep up the good work that Stover has so excellently started.

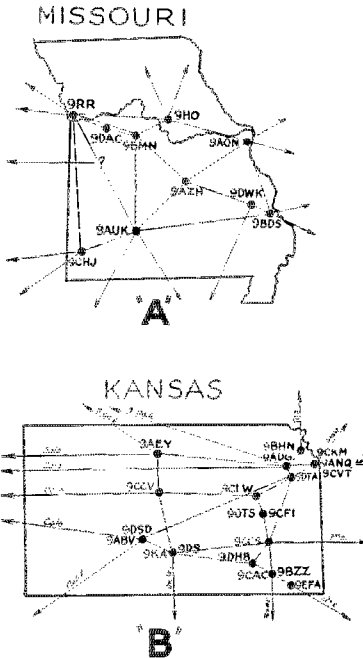
The following report by states is greatly curtailed due to the fact that we are now limited to so much space according to the number of A.R.R.L. men to a division. This is a great handicap to fair representation but we must be willing to share with the other departments of QST. In the past it seems, we have been exceeding our quota of space. Because of this, I request that all men making up reports in the future to be as brief and concise as possible.

MISSOURI: Relay work took another big jump this month, due largely to the persistent work of our splendid organization and the burning of midnight oil by our O.R.S.s. Over five thousand messages handled by Missouri alone! 'Atta Boy, gang, we are surely giving Iowa a run for her money now, eh? One more month left before Demon static arrives, can't we beat this new record? Remember, records are made to break.

Speaking of messages, 9CTG using only 20 watts, shoved through over 400 of 'em. And that is not all, 9EFC handled over 400 also—and on spark. 'Smatter, old timers, are you going to let these fellows

show you up this way? Come on everybody, a little more speed.

Relay routes are working perfectly, both daylight and night. New routes in the southern section are developing nicely. Radio 9AUK deserves much credit. The K.C. gang succeed in keeping the upper hold on the broadcast situation. Laizure and Moore are doing the work. St. Louis is F.B. as ever, thanks to the persistency of Doc Klenk. Mc of 9YM is back again.



A new C.M. for St. Louis is to be appointed. Lack of space prohibits mentioning other items of interest. Bear with us our brevity, please.

KANSAS: Hurray! The largest number of messages ever handled by Kansas is reported this month. We've reached our goal of 3500 and passed it. Now for 4000 men! Here's hoping we do it next time. Credit is due 9DTA, 9DSD, and 9AOG for being on the job and working hard at all times. 9CCS and 9ABV are doing excellent work. Ex-5SM is with us at Eldorado with the call 9XP. (Welcome OM.) Many stations passed the 200 mark. Gotta be in the swim. 9EFA handled 293 on spark. Special mention—Hi. New appointments this month as O.R.S. are, 9CIW, 9CAC, and 9DHB. 9AOG handles the largest message total this month with 438. Relay routes are very F.B. Broadcast situation fair and probably warmer. A.R.R.L. spirit has a Kansas corn kick.

IOWA: Relay traffic was almost as great as last month. (This is due to the chang-

ing of A.D.M. and under the circumstances Watts did exceedingly well.—D.M.) Over 3700 messages were handled with 9DKY heading the list. His 439 and 9BGH's 410 are F.B. Others are doing excellent work as can be seen in the messages per station report. 9BWN is a new station at Ft. Dodge. (Howdy OM.) 9BYC is making Perry a good relay point. 9AOU is getting better and better. He is contemplating 250 watts of C.W. now. 9ATN wishes all to note that he lives in Iowa and not Nebraska. 9AMU is busy operating two stations, one at Ames and one at home. (Lucky guy.) Iowa stations are now gauging their efficiency by working 4OI. Some stunt eh? A large number of new appointments will be published next month. We are still looking for good stations for O.R.S. appointments. All A.R. R.L. men in Iowa are requested to write D. E. Watts, 9ARZ, of Clear Lake, Iowa, and get lined up with him. He can not be of any service to you as A.D.M. for Iowa without your help. (Come on let us get acquainted—A.D.M.)

NEBRASKA: February is Nebraska's record month from the standpoint of messages handled. Almost 3000 messages is quite a total for 18 stations. Next month, however, we expect to make it 4000. South Nebraska continues to beat the Northern district. (Come on you Northerners.) 9BXT is the star station for Nebraska for this month having handled 510 messages. (This total is not the only record for Nebraska, but heads all other Midwest states. As a reward for his good work, we are appointing him as an ORS right off the bat.—D.M.)

9AVC and 9YU both handled over 300 messages so likewise deserve special mention. It is noted with interest that, of the 18 stations reporting this month, 15 of them are using C.W. This is quite unusual for Nebraska. All reports that have been received are very F.B. and if you men would only send them in a little earlier, I would be entirely satisfied. All the Nebraska relay routes, as previously outlined, are working in great shape. The same old stations are doing the work, with a few new ones each month to make things better. Getting better and better—hi. It is with regret that we learn the AD7 is to close down. Sgt. Stenbeck says that he will have a set of his own going soon as he is discharged though. That's a promise. Omaha is ably held intact despite the B.C.L.s by the C.M. of Omaha, Quinby, and the A.D.M. (Nebraska is again doing fine work, thanks to all. Keep 'er up.—D.M.)

NEW ENGLAND DIVISION

I. Vermilya, Mgr.

VERMONT: Vermont is showing a good increase of traffic, and we are still waiting

patiently for our "old stand-by," 1ARY, to get back in harness and handle as many as 3XM. We would like to see at least six 300 hitters in the Brass Pounders League.

MASSACHUSETTS: As usual, this state is going over the top each month as though there was nothing else to do but handle relay messages. Some of the fellows must give up their jobs to send messages, but nevertheless, that's what we want, and the more the merrier.

Those who put over more than three hundred deserve special mention and are as follows: 1BAN—1101, 1BYN—360, 1CIT—330, 1BKQ—830, 1CNI—620, 1CMK—516. We feel mighty proud of these stations and feel that they are setting a good pace for the rest of us. 1FB, Cummings, who has been assistant division manager for Eastern Massachusetts has resigned that office, and taken the city manager's job for Boston. Phillip F. Robinson has been appointed as assistant division manager for Eastern Massachusetts. Miss H. D. Daniels has been appointed executive assistant division manager for Western Massachusetts, assisting McLean at Springfield. We look for continued good work from these two live wires. Pictures later. Greenfield report is missing. 1BSZ apparently has forgotten the League.

CONNECTICUT: Reinartz's territory still bristles with activity. There are four 300 hitters or better in this state. 1MY—770, 1BOQ—340, 1AJU—300, 1QP—502. Reinartz says 3,000 next month. Hereafter every man in Hartford County will report to 1MY on the sixteenth of the month. Please! He has been appointed district superintendent. 1AW has a schedule with 4OI Monday, Wednesday, and Friday at 11:00 P.M.

(Will 1AWB and 1AYU please report reason for failing to be on the job? Watch you step!—D.M.)

RHODE ISLAND: Little old Rhode Island has a couple of 300 hitters also; namely: 1IH Huddy with 301, and 1BVB with 327. 1GV and 1BQD are right behind them and we know that next month there will be even better scores. Providence and Newport are the live wire sections of this state. Our old friend 1OW has come back on the air, and we extend a hearty welcome to him. 1GV stays up all night and works flocks of 4's and 5's. 1AHT got married February 5th and hasn't been heard from since.

MAINE: Now, along comes Maine with a better total than ever. Although there are no 300 hitters here, one man came near. 1BRQ with 277 and the total, 1085 is something to be proud of.

NEW HAMPSHIRE: Likewise, New Hampshire has come along strong. The improvement is very noticeable and 1MC carries the honors with 203. No report

from 1CSS, and this is something 1CSS wants to watch—D.M.

A total of 13,943 for New England is not a bad month's job.

NORTHWESTERN DIVISION R. Waskey, Acting Mgr.

WASHINGTON: Traffic over the state has been moving with about the usual regularity. Some confusion has resulted over the adoption of quiet hours. District No. 13 continues to be the best organized district, while 7ABB at Everett is the boy at the key getting traffic through.

Dist. No. 2. This district is there for QSRs. 7KJ will change to C.W. soon and 7SC is increasing power to 500 watts. 7RI and 7ADF are holding down the Montesano air. 7GP is still holding his own while the B.C.L.s. are after his scalp.

Dist. No. 5. 7BJ is leading with 7AIC and 7AJV, a new comer, helping out. 7QQ and 7ZJ have signed on the NRA for a year.

Dist. No. 6. 7BA and 7WM are showing the way. They only work in the early morning and report the QRM at a minimum at that time. 7AFO has changed over to C.W. and finds that it really gets out better than spark.

Dist. No. 7. 7ABB is the leading station in this district. 7ABB not only works 2s, 4s, 5s, 8s and 9s, but also handles more traffic than any other station in the district. There are others who would do well to follow his example. 7ADP is showing them how to do it in Seattle, and the rest of the gang are close behind him. 7OZ has moved to Seattle and will be on the job again soon.

Dist. No. 8. While this district does not handle a lot of traffic it has a superintendent who is on the job and guarantees that every incoming message is delivered. 7LS is on again and 7JS will have his C.W. perking one of these days.

Dist. No. 10. 7AK at Toppenish is getting out in good form, and 7OM is doing good work. Both stations are good for a QSR south.

Dist. No. 11. Maybee 7GE is alone on the job as 7TH has quit because of school work, QRM. 7TH's brother, 7ER, will soon be on and take up the work where 7TH left off. 7GE has joined the "Boiled Owls" and is QSO any direction. (I thought he got married a short time back—Ex. Asst.) Daylight communication with 7ZN is often possible from 7GE. Things are still dormant around Yakima and Spokane in the eastern part of the state.

Dist. No. 13. While not situated on main trunk line this district is right on the job; thanks to their able superintendent, Mr. Mathes, 7OE. It is gratifying to note that all messages originating from this district are in strict accordance with the

standards set forth by the League. 7ACZ has joined the Naval Reserve Force as a Radioman, and 7ABW the Coast Guard Service.

OREGON: Due to the fact that the A.R. R.L. organization in this state has gone rather "haywire," a complete reorganization is being undertaken. All appointments have been cancelled and new ones will be issued as soon as the correct men for the jobs are found. All stations in this state are urged to write in to the executive assistant, Mr. R. Waskey, 7213-28th Ave., N.W., Seattle, Washington, with all the dope on Oregon activities and with recommendations for district superintendents. The state will be re-divided as follows: Dist. No. 1. Counties of Clatsop, Columbia, Tillamook, Washington, and Yamhill. Dist. No. 2. Counties of Multnomah, Clackamas, Wasco, and Sherman. Dist. No. 3. Counties of Lincoln, Benton, Polk, Marion, and Linn. Dist. No. 4. Counties of Lane and Douglas. Dist. No. 5. Counties of Curry and Coos. Dist. No. 6. Counties of Josephine and Jackson. Dist. No. 7. Counties of Crook, Lake, and Klamath. Dist. No. 8. Counties of Gilliam, Morrow, Wheeler, Grant, Baker, Union, and Wallowa. Dist. No. 9. Counties of Harney and Malheur. In general, traffic has been moving fairly well through Oregon. In Portland 7VE and 7VF have buried the old stone crushers and have installed 50 watts of C.W. instead. 7TO and 7WQ are working out well with low powered C.W. 7DP and 7LW are on after the kids go to bed and appear to knock off lots of traffic. The R. I. paid an unexpected visit to Portland. 7TO had his license suspended for 15 days for calling more than three times. 7VE had his suspended for 30 days for calling CQ more than 50 times. He sure put a crimp in the pet habit of the CQ hounds in Portland for awhile. 7AFS had his license revoked for using profane language on his fone set; 7AIP and 7AJU and others not known at this time were revoked the privilege of using sparks. Might as well kiss the sparks good-bye boys. Too much damping sez the R.I. In Eugene, traffic has been moving fine. 7LR is the star station on C.W. 7NA and 7MF are also very consistent. 7IW is on with 5 watts and 7HF will soon be back again. In Corvallis, 7GT is still holding his own. 7TQ in Medford is heard very consistently. 7AAJ, a new station in Ashland will be on soon with C.W. 7KE and 7MC are on with 10 watts and doing fine work. They are looking for a route with the north. In Silverton 7AGP and 7CZ are both on with C.W. 7MU is reaching out from Salem.

IDAHO: Conditions good in this state.

Dist. No. 1. 7JF had the hard luck to burn out his tubes but will be on again very soon. He will have a schedule with 7ZU. 7FT will be second operator at 7JF.

Dist. No. 3. 7CG is now on with 10 watts. He started out with a bang, working better than 1000 miles the first night. 7IO will soon be on with 10 watts to help clear the traffic. 7LN is the star station of this district with his 1000-watt C.W.

Dist. No. 4. 7OT has got a special and is now 7ZN. His station is the star here this month. 7HJ is also keeping things open. 7PJ has a fine 10-watt set but can't seem to make her "perk."

MONTANA: Well, things are certainly looking up for Montana. 7ZC has been appointed acting district superintendent of district No. 10. Ash is a live wire and will make a real worker for the A.R.R.L. 7ZC and 7ABX will be on shortly with 50 watts. 7QV will soon have a 5-watter going, and 7OG will be on again as soon as he gets a replacement for a bulb that went west. 7ZF will act as superintendent of district No. 11. He has in operation at this time a 10-watt fone, a 5-watt C.W., a 100-watt C.W., a 50-watt fone, and is installing a single 250-watt tube for C.W. 7ZU continues to bust everyone's fone on the western hemisphere. He is reported in all districts on voice during the past month, and his DX for the month is 3YO worked, and messages handled. 7AJX says he has his transmitter going and is ready to do some real work. 7HM and 7NV swapped sets, 7NV taking the 10-watter that 7HM did such good work on. 7HM now boasts a 50-watter. Our only spark station 7EK, is pounding them out in great style and seems not to notice any remarks about the superiority of C.W. He has trouble in working west, but clears east and to Canada with ease. Daylight routes have been established and are in operation every Sunday to 9DOC and Canadian 4BC.

Dist. No. 9. Things are rolling along on well oiled wheels. The second Operator at 7ZL, is putting up a transmitter and will soon be on the air under his old call, 7HS, with 5 watts of rectified C.W. 7BO is about ready to deal with 100 watts of self-rectified C.W.

7AGF is having trouble working east. He works the coast F.B. but says that he has to turn down east traffic. Some tests are to be made to try and give him an outlet through 7ZL.

ONTARIO DIVISION

A. H. K. Russell, Mgr.

Subsequent to the excitement arising out of the transatlantic tests, there seems to have been a slight decrease in the traffic handled. However, this is counteracted by the fact that Ontario is now in practically continuous communication with Western Canada. The Western district is very busy, in fact, complains of lack of traffic. 3KO is in communication frequently with 3NI at Fort William. We are also advised that 3BG at the Soo is coming through on spark.

The opening up of 3NI at Fort William is the bright spot of this month's news. He has already handled several messages, which have gone through within a few hours, direct to the west coast, and is constantly QSO with 4BV. This station establishes the missing link in the Trans-Canada chain. From the late reports western Ontario stations particularly distinguished themselves in the transatlantics, getting across 3BV, 3GN, and 3XN. 3TA has graduated into the high power class with 100 watts and is loud in Toronto in daylight. 3GB in Leamington has another new and promising station. In the central district there is little to report. 3OY with 10 watts is working there. The Niagara Peninsula has broken out a first class bunch of traffic; in fact for messages per station, it leads the whole division. In the eastern district, Kingston stations seems to be the only ones doing any real work. It is most disappointing that no stations of any class are heard from Ottawa. Traffic for Quebec and eastern Ontario should be forwarded to Rochester or Watertown.

PACIFIC DIVISION

J. Vance Wise, Mgr.

CALIFORNIA: Dist. No. 1. No report from Riverside or Orange counties this month. 'Smatter fellows, where's your reports?'

6BJV announces that he will soon be on the air again with a C.W., I.C.W., and fone set. Very little spark traffic is being handled these days. Every one is turning to C.W., which is the only thing for efficient traffic work. 6ZH now has a new DX record, having been reported by the operator aboard S.S. Liberty when 975 and 850 miles east of New York City. 6IZ expects soon to have a small bottle set going. 6AKD is now on with 5 watts and gets quite a kick out of it. At present he and 6IZ are playing around with one tube super-regenerative circuits.

Dist. No. 6. A few new stations are opening up including both spark and C.W. 6VK, 6ABK, 6JN, and 6IK are coming on with new C.W. sets. 6IK is starting up with a 250 watt bottle. Among the C.W. stations handling the bulk of the traffic are: 6AOR, 6ASJ, 6TI, 6ARB, 6AJF, and 6AWT, the "old reliables." Several new sparks are stepping out in fine shape including 6AOX, 6AUU, 6BFF, 6ABH, 6BOS, and 6BOP. The spark stand-bys which are doing their share of the relay work are: 6AKT, 6ATU, 6ABU, 6BFU, 6ABV, 6AR, and 6AQU. Many eastern stations are being picked up by the fellows in this district. 6IK is hearing stations on the other coast regularly on one tube.

Dist. No. 8. Traffic is moving regularly through this district, principally being handled by 6CC, 6TC, and 6LU. 6KU also has been a help, during the latter part of

the month. Station 6KU has just been rebuilt and uses 8 five-watt tubes, 4 of them being on each side of the cycle. A few stations in Chicago have been on this month but they have handled little traffic. 6LU and 6BUA of Willows are on the job quite regularly with C.W. and fone. In Colusa 6CC and 6TC, on trunks A and B, are handling the bulk of the business. 6CC is now a 200-watter. 6TC still a 100-watter. Tests made by 6CC and 6ZY have proved successful, and we hope to have a circuit going to Hawaii at once to replace the old 6ZAC route. The new district superintendent, to fill the vacancy left by E. C. Garrette, will appear in the next issue of QST under the above heading. Mr. Garrette is assistant division manager of the state of California.

NEVADA: This state will be kept as a single district for some time. The officers are: assistant division manager of the state of Nevada, 6GR; district superintendent, 6ZO; Reno city manager, 6AJR.

ARIZONA: No reports from Phoenix or other Arizona stations this month, except 6BSQ, a new station starting at Nogales, Ariz. E. A. Nielsen has been appointed city manager of Phoenix. 6ZD has moved to Los Angeles. 6AAH has been on the air with his spark during the month. Traffic at 6ZZ has not been so spotted as last month, although 60 messages were received and 43 sent, a total of 103 for the evening of January 13th. 6ZZ works schedules with 5XB, 5ZH, 5GR, 5ZAE, 9WCC, 9CAA, 9DTE, 9CTG, 5ADB, 6ZB, and 6OD. Arizona stations QRX from 8 to 10 M.T. for concerts. Phoenix and El Paso each furnishing a program.

QUEBEC DIVISION

A. J. Lorimer, Mgr.

Traffic moved better during February than in any previous month.

Baily, 2BT, local publicity correspondent is working up the newspaper and we hope this will be the means of protecting the amateur and encouraging members for the A.R.R.L.

Traffic to Toronto is being consistently handled direct now. 2AN has been QSO with 3BG, Sault St. Marie, several times which improves prospects of the "All Canadian" route to the west.

2BG has been trying to put through some work to the eastern Provinces. (Good work OM, we need an eastern terminus to that Trans-Canadian and it ought to be six hundred miles east of Montreal.)

Norman of 2CQ is quitting on account of raising no DX. We think his call letters have become unpopular in this section. Hi. Jack Argyle, and old timer, has recently entered the realm of the brass pounders as 2CG. He has a 500-watt bottle and makes an awful hole in the atmosphere with it. Harries of 2AN has been the leading traffic

handler and has made the best DX of the month. He worked three stations in North Dakota and was heard at 4CB. By arrangement 2AN is handling the traffic of the Montreal Rotary Club. This is a good idea and certainly shows the public what service the amateur is giving.

ROANOKE DIVISION W. T. Gravely, Mgr.

Without any preliminary remarks we will go right into the reports. 8BDA walked off again with high honors, a high water mark for the division.

8BDA—C.W.—783

8BDA—Spk.—547

1330

PORTO RICO: A.D.M. Rexach has the following to say: "We are glad to report a better figure in traffic this month. 4OI has been going good all this time and this is the best we have been able to do with the mainland so far. Inland traffic is nil, as we have been unable to get anyone started outside of San Juan and Carolina. 4OI has a schedule with 1AW, Monday, Wednesday, and Friday at 11:00 P.M.

WEST VIRGINIA: No detailed report has been received as the fellows are doing traffic instead of talking. 8BDA had his license suspended for 30 days on account of transmitting on 245 meters. (?) This station has been doing wonderful work, and it is to be regretted that they are being hampered by the B.C.L.s. The other stations have been busy and sent in good traffic reports.

NORTH CAROLINA: A.D.M. Simpson is making serious complaint on account of the failure of various district superintendents to report the activities of their respective districts, and he wants all of the relay stations to understand that, if they do not receive proper credit for their traffic, it will be due to the lack of reports. ("The operating department isn't carrying dead timber—either function, or allow someone else to do so."—D.M.) 4BX, 4FT, 4LJ, 5NV, 4MV, 4DC, 4DQ, 4EN, and others are all doing consistent work, and at this writing it appears that Charlotte will soon be in the game. We will tell about it later. Now come on California, get behind your A.D.M. and give him your hearty co-operation.

VIRGINIA: Dist. No. 1. 3BVC, 3AAG, 3ATZ, (WOAQ), and 3ZZ, are all going.

Dist. No. 2. 3BMN has been appointed city manager of Petersburg. 3AUU and 3TJ are both doing good work.

Dist. No. 4. 3BLF is a good tube "shooter," but seems to work all over the country, regardless. 3ZP is now consolidated with 3BLF.

Dist. No. 5. More stations are being added monthly. 3IW has lost all of his tubes. 3BUY, a new one, beats out a

bunch of traffic on 10 watts. 3CDY, another new comer, sends in a report. 3BOF and 3AFW both going strong.

Dist. No. 7. 3ASP is on again. 3ZAA is percolating, but nothing doing at Lexington, except 3YK is heard now and then.

Dist. No. 8. 3APR and 3BZ haven't been at their normal stride, but will "hit the pace" before another month goes by.

Dist. No. 9. 3HL is making changes. 3FR and 3BIY keep moving traffic. Several new stations in this district, but they are slow movers.

Dist. No. 10. 3AOV has junked his spark—went down to Cuba to drown his sorrows, but he is an old timer, consistent, reliable and forever on the job. (He is an A.R.R.L. man worth while.—D.M.)

ROCKY MOUNTAIN DIVISION N. R. Hood, Mgr.

C.W.—524

W. L. Fick, 9DTM

Denver, Colo.

Spk.—243

Brigham Young U. 6APL
Provo, Utah.

COLORADO: 9DTM has a new antenna system and is using 100 watts of rectified A.C. on 195 meters. 9AMB has schedules with 9BGH, 9A00 east, 7LU and 7AFW north, but is having trouble shooting messages west. 9FV is still plugging away handling more messages than some larger stations with his little 5-watter. 9BJI is to be complimented on the neatness of his station. He is using rectified A.C., but it so clear locally that it sounds like a better operated set. 9CAA still raises a rumpus with his A.C. hum but moves traffic. 9DHI is to have another operator, in hopes that the station can be on duty more. J. F. Carpenter, 9DX, will be the other operator. 9BXA reports that having to stand-by for B.C.L.s cuts his totals down considerably. 9BUN blew his generator; junked it and now uses rectified A.C. Same trouble fell to 9XAQ but they expect to be on with 100 watts soon. 9BVO has 15 watts now and will be in the swim again. 9BXQ had his pole blown down but has a new 75-footer up now and has been QSA at 6ZY on 10 watts.

UTAH: Traffic figures took quite a jump in district No. 1, an increase of 250 over last month. The gang hit the key pretty regular in an effort to see who would take honors. It goes to Brigham Young University, and a spark at that. 6ZT gets first place in district No. 2 with 204 messages. 6BOE has a new 100-watt set going with Kenetron supply. Interest has begun to show in Odgen, 6RE handled 65 messages and says totals are growing nightly. Schedule is 8 to 9 and 10 to 11 P.M. daily. 6BUH sold his spark and is on with 5 watts of C.W. 6RM fell a little under last month. Altogether it seems as though the fellows

are getting together and taking more interest. More traffic was handled in Utah last month than any other previous. To prove that sparks are still in existence, 6APL moved 243 for the month. They have 4 operators and are on from 7 to 9 P.M. and 2 to 8 A.M. Election was held with the following results. H. C. Wilson, c/o Desert News, Salt Lake City, assistant division manager. Art Johnson is now district superintendent for district No. 2. Evan Seegmiller is district superintendent for district No. 1. Get in touch with your new officials and see if before the season is over Utah cannot be listed in first place.

WYOMING: 7LU takes honors for Wyoming with 313 messages. 7JQ, spark, sends in traffic for the first time. His call is now 7AIZ. (Welcome OM.) 7DH is finally going with 5 watts. 7AFW blew a tube but remains in operation with 5 watts. 7ZV has been working on fone and has succeeded in getting some great DX, but traffic has fallen off. 7ZO moves traffic a bit. 7GK says not much doing in the southern part of the state. 7LU and 7ZN have organized a route east and west that is giving excellent results. We are mighty glad to see 7DH on again and to see our old friend 7AIZ send in a traffic report. This month we have no reports from the following official relay stations: 9DTE, 9BXM, 9CDE, 9CFY, 9CCJ, 9WD, 9AWL, 9CIX, 9ZAF, 6ATQ, 6ATH, 6AEZ, and 6AFD, among which are several that have not reported for three months. These men know who they are and after investigation, if no satisfactory answer can be given, the appointment certificates will be cancelled. Let's not have such a list of non-reporters next time.—D.M.

WEST GULF DIVISION

F. M. Corlett, Mgr.

This report covers the period January 15th to February 15th, which is our operating month of February. A total of 60 stations have reported relaying 6,390 messages. Reports are missing from Oklahoma, from districts No. 2 and No. 4 of Northern Texas, and district No. 7 of Southern Texas. Stations holding official relay station appointments must report every month regardless of whether they have handled message traffic or not. Failure to report will be just cause for cancellation of appointment. Our star stations for the division this month are 5TC of Fort Worth—956 messages; 5XB, College Station—778 messages; 5IX, Dallas—545 messages; 5ZA, Roswell—388 messages; 5XB, Port Arthur—345 messages; and 5QI, Fort Worth—325 messages. 5TC and 5XB certainly deserve a fancy box. Messages per station for the entire division is 1169.

NEW MEXICO: 5ZA at Roswell seems

to be doing all the work in this section. However, traffic is going through in fine shape. How about some of the other A.R. R.L. transmitters, 5XD, 5ZJ, 5CX, 5FY, 5FZ at State College, 5DK at Silver City, 5UL at Tucumcari, 5IY, 5IT, 5TR, 5EH at Las Cruces, 5VG at Alamegordo, and 5AT in Albuquerque?? Come across fellows—Let us know what you are doing.

SOUTHERN TEXAS: Dist. No. 6. District No. 6 makes a splendid showing this month. 5XAD, we miss your report, though. Galveston deserves special recognition due to the lively interest down there. 5VY, 5KN, 5AHH, 5CQ, and 5IM are all splendid C.W. stations, and reliable relay stations. 5TT at Dickinson, between Houston and Galveston, is stepping out in the same class. They are on most all the time. (F.B. fellows, keep it up—A.D.M.) 5XB College Station, with "Doc" Tolson and Robt. Ergle as operators is on every night just after ten o'clock. They have handled traffic with every state in the Union, except three. 5XV and 5NK are due honorable mention for excellent work this month.

Dist. No. 7. District No. 7 failed to report. ('smatter Sahn???)

Dist. No. 8. San Antonio traffic has picked up since 5ZAK got back in the game. 5ZAE and 5SS are close seconds. Broadcasters and amateurs have gotten together around a table with a result of cooperation on the part of both. Wonderful progress is being made that is of great value. (That's the spirit, we need more of it—D.M.)

Dist. No. 9. Dist. Superintendent McCracken of El Paso reports satisfactory conditions in the relay game "out west" but nevertheless manages to handle almost a round hundred messages. 5ADB has just opened up on C.W. and is running rings around 'em. Some of El Paso's best stations are failing to report work done. A terribly rotten spark coil with an equally rotten fist, is messing up the air nightly in El Paso. (Needless to say, he will hang himself. Get the dope on him you amateurs and put him right if he is willing, if not, let the R.L. have the data.—D.M.)

NORTHERN TEXAS: Dist. No. 1. This district moved 2,864 messages this month. 'Tis reported that the city of Waxahachie, Texas, is considering prohibiting amateur stations from operating, but of course they are not going to be that selfish and short-sighted. 5KK and 5CT are handling message traffic in and out of Waxahachie. 5AAF advises that he is in Texarkana, Texas and not Arkansas. We are glad to have him in our relay game. 5SF at Fort Worth was on only 5 days this month and handled 279. Friday, Saturday, and Sunday nights is his regular operating schedule. "Zeke" of 5AL has been sick but is back with us. 5ADV

is a new 5 watt station at Nacogdoches, owned by Jack K. Reavley. It is ready for traffic. Fort Worth stations handled 2,090 messages; the Tarrant county total being 2,105 handled by 11 stations, 10 of them being Fort Worth stations. (All C.W. too—D.M.) 5QI was out of commission the first part of the month due to loss of top section of his 80 foot mast. Seven Dallas stations handled 815 messages. (Come on Dallas, you are going to be lost in the dust of "Cow Town" yet if you don't show some pep.) 5JL has lost one of its operators, Bert Gamble, who has gone to Alexandria, La. to operate a B.C. station. Dallas star station is 5IX with 545 messages, and the city manager's station 5VA is second with 160.

Dist. No. 3. 5UO is the star station for this district with a total of 308 messages, reported by five stations. Traffic is moving nicely in all directions. 5HQ is out of commission, his bottles "gave up the ghost." 5UN, 5UO, and 5CY have rebuilt their C.W. sets, and in every way are doing better and better. You A.R.R.L. stations in Stamford, Mineral Wells, and Weatherford, come across with your activities. (The D.M. wishes to remark that there are seven transmitting stations in Wichita Falls, and six of them are A.R.R.L. stations. 'Atta Boy!)

Dist. No. 5. 5ZH passed 174 along the line and seems to be the only station in this district that is doing anything and let it be known. 5ABJ, "Can't you answer for Lubbock?" There are four stations at Childress and one at Spur that can probably be induced to join in our relay work. (How about it fellows?—D.M.)

(That district No. 4 has quite a few live relay stations and the D.M. is disappointed in not hearing from the district superintendent. 'Smatter Baxter? Those fellows out there will be jumping on QST and the D.M. for not getting their reports in print, so just to save writing explanations I am telling 'em now.—D.M.) What's happened to our city manager at Waco?? 'Tinus you are supposed to be holding the bag of information down there, how about opening it up. There should be a lot to tell by now among those nine transmitters. The B.C.L.s haven't run you to the woods have they.—D.M.)

WINNIPEG DIVISION

P. Socolofsky, Mgr.

Mr. J. E. Bricketts is the new district superintendent for Saskatchewan. Come on fellows, let's have the reports.

SASKATOON: 4FN is doing all the relay work for the city. He says he is putting in a 50-watter for the transcons.

REGINA: Regina has gone to the dogs!!!

MORSE: 9BX is doing good reliable work every night from 10 to 12 P.M.

MOOSE JAW: 4HH is doing first-class relay work. He takes the prize.

LOREBURN: 4BV is shooting some traffic east via 4EZ.

At 4 A.M. February 20th, a message started by 5GO Vancouver relayed by 4BV to 3NI to 3DE, Toronto, made the return in 1:10.

This division is swamped with bad storms causing endless QRM.

On account of snowbound mail, no report was received from Winnipeg. However, 4DK and 4CO are real live hams.

VANCOUVER DIVISION

J. T. North, Jr., Mgr.

We are now getting definitely in shape for the Trans-Canadian on February 20th. Traffic was relayed to Toronto via 5GO, 4BV, 3NI, and 3DE. 5GO even heard 3NI during this period.

VANCOUVER: 5CN blew his tube but will have two more wattors going shortly and is using 5 watts in the meantime. 5BQ had the same trouble and 5AK's aerial came down, but he will be on with 15 watts very soon. 5GO, 3EC, and 5EJ are the only regular stations at present, but 5CN, 5AK, and 5AC will be back stronger than ever in the near future.

VANCOUVER ISLAND: 5CT is still going strong, although his rectifier froze in the cold weather. 5DX promises to have 50 watts going by March 1st.

PRINCE RUPERT: 9BP has been heard in New York and is handling traffic in fine shape. 5CX has 10 watts in operation and will soon be handling traffic. D.S. Barnsley calls for more observance of section 10 of the traffic regulations, regarding the intermediate sign "de" and "aa," etc.

ALBERTA: 4DQ hangs up a new record every week, the latest is 2500 miles on 5 watts. 4CL in Edmonton is QSA in Vancouver, but general activity is nil.

CLOVERDALE: D.S. Balfe is having a tough time but reports several stations fitting out.

WHAT'S THE IDEAR

(Concluded from page 33)

traffic as well as its volume, for surely there is as much opportunity for demonstrating efficiency and snappiness in the handling of a smaller number of messages of more importance as there is in increasing the total by some thousands of QSLs of report-cards with a resulting volume which may gum the wheels for more important traffic.

Let's kiss this "Tnx-fr-crd" stuff goodbye.

**NEXT MONTH
THE ANTENNA NUMBER OF QST
DON'T MISS IT!**



INTERNATIONAL Amateur Radio

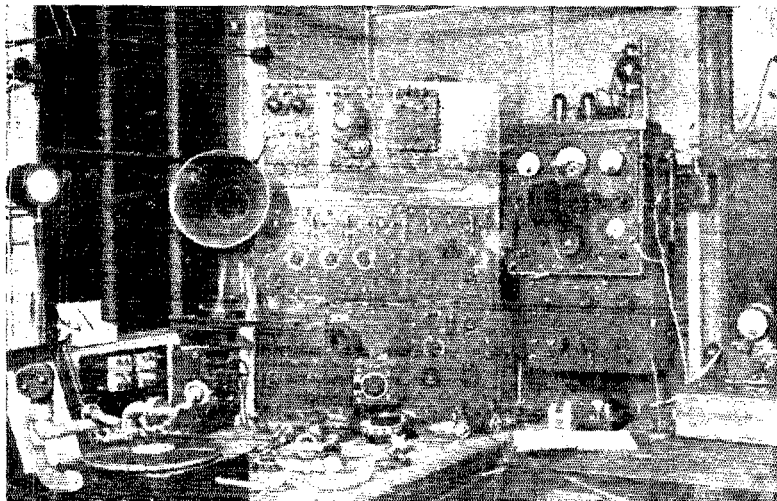
Listen for England

Mr. Phillip R. Coursey, of the Radio Society of Great Britain, has wired the Traffic Manager that British station 5AT would commence nightly transmission on 200 meters on Feb. 25th, using special code letters in an effort to connect up with American amateurs. Any stations hearing signals believed attributable to this station should advise A.R.R.L. Headquarters, with a complete log of matter copied, for verification.

This message entered the U. S. via 5QY at Orange, Tex., and reached Hartford via 1TS. "JH" uses 100 watts A.C.C.W. and is easily QRK at 5QY and 5ZAD. Any amateurs hearing Mexican stations are requested to advise the Traffic Manager.

More from New Zealand

An Associated Press dispatch from Los Angeles reports the recent reception at Invercargill, at the southern end of the South Island of New Zealand, of numer-



English Station 2AW, Wakefield

Mexican Amateurs Alive

There is commonly reputed to be no amateur radio in Mexico, and we understand it is not permitted officially. But that there are amateurs there nevertheless is attested by the following message to the Traffic Manager which came all the way from Mexico City to Hartford by amateur radio.

"JH" Mexico City

1AW, Hartford, Conn.

Stns "BX" in Guanajuato and "AX" and "JH" in Mexico will QSR traffic for both cities—Congrats on transatlantics OM 73s to the gang.

J H H

ous American amateurs. The reception was made by L. H. Steel, operator at the Awarua station, the distances ranging up to 9,300 statute miles. In the list reported are 2RP, Nassau, N. Y.; Canadian 4BV, Loreburn, Sask.; 5DI, Ft. Worth; 6JD, Los Angeles; 6EA, Los Angeles; 6AJF, Berkeley; 6ANH, San Diego; 6ARB, San Francisco; 8UE, Lancaster, N. Y.; 8ZW, Wheeling, W. Va.; and 9KP, Chicago. 9KP which is the station of A. G. Leonard, 4801 Woodlawn Ave., in Chicago, was also heard on phone while addressing the Michigan Radio Convention at Flint on the night of Feb. 9th. This is the greatest

distance ever reported to us for an amateur phone.

Interest High in Argentina

Of all the South American countries Argentina seems to be the most progressive in radio, and while amateurs are severely restricted in most countries in that continent, in the Argentine they are being encouraged, broadcasting is a regular feature, they have large radio clubs, a new magazine called "Electron," and we understand amateurs are permitted to transmit. On the night of Feb. 7th they report the reception of a U. S. station believed to be SCPD, of Kalamazoo, Mich. Investigation of the latter shows that the station was in operation and worked both coasts on the night in question, so it looks real. SCPD uses one 50-watt, with 3.8 amperes in the aerial.

This success has enthused the Argentine amateurs and they have invited all United States amateurs to call station "RA" at Buenos Aires after midnight. The newspaper *La Prensa* of Buenos Aires, perhaps the most influential on that continent, is fostering interest in the proposition, and we may reasonably hope that before long it will be possible to attempt a Pan-American relay.

About English 2AW

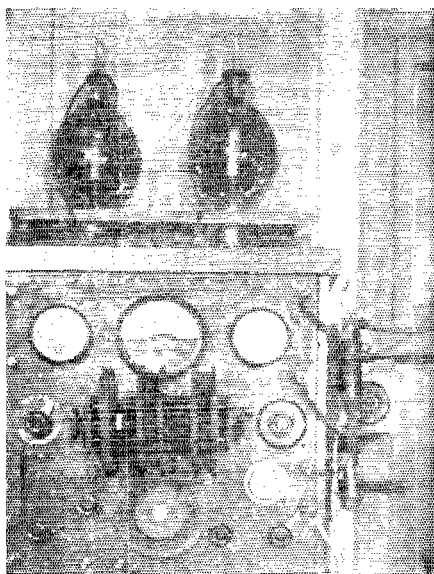
In the report of the Transatlantics in *QST* reference was made to the fact that a station 2AW heard in France on Dec. 16th was probably British; also a Dutch complaint of QRM during the eastbound tests from stations ONX and OMX working to 2AW. We are in receipt of a letter from the operator of English 2AW, H. H. Burbury, Lieutenant, R. N., (retired), advising that on Dec. 16th his station was out of commission awaiting tubes and emphatically denying that his station was in operation at any time during the hours when Europe was scheduled to listen for American amateurs. 2AW, Mr. Burbury says, is a call commonly heard in England, but the other station so signing apparently is unknown and at any rate English 2AW is to be considered free from any suspicion of QRM during the tests.

We are pleased to present a photograph of 2AW, also a close-up of the transmitter. This station has a permanent license for an input of 100 watts, any time of day, the largest strictly amateur transmitting license in the country. 2AW participated in the tests but was not heard in this country, altho it has covered an equivalent distance to a receiver using R.F. amplification. The receiver is what the British call a "super-sonic," otherwise an Armstrong super-heterodyne. Under normal conditions the transmitter has an input of 107 watts to the plate, putting 2 amperes into a 6-wire vertical cage 90 ft. high at 145 meters, the fundamental being 120 meters.

During the tests 500 watts plate input was used, with about 260 watts in the antenna on 200 meters.

More in Holland

Mr. John L. Leistra of Rotterdam, whose initials by the way were incorrectly given in our March issue as Y. L., has heard



Close-up of 2AW's transmitter

additional American signals and now reports 3BO, 3NO, 3ZO, 3TJ, 4AA, 9AAS, and a questionable 7 either 7MX or 7GX. It is probable that some of these at least are of United States origin.

This reception was accomplished on a Reinartz tuner equipped with one stage of tuned R.F. amplification, as reported on page 14 of *QST* for October last from an article in *Wireless World*, and he says that "it increases the range enormously." As the arrangement is very simple to construct, we urge that more of our members try it.

Czechoslovakian Notes

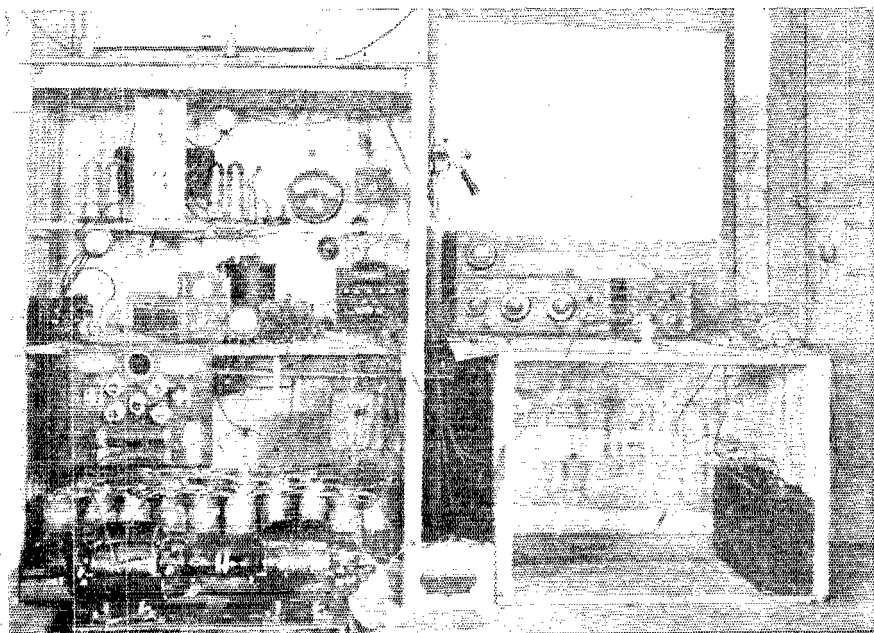
A student organization of amateurs has been formed at the Students' Home at the Electrotechnical University at Prague by Emil Hokes, under the patronage of the League of Inventors of that country. Altho handicapped financially these serious students typify the progressiveness of their country in the growth in knowledge they are making in radio. In the League's organ, *Work & Invention*, they have a radio section, they have a course of lectures arranged for, and have constructed several receivers of various types. Czech-made vacuum tubes are available at reasonable

prices and receiving is permitted, altho transmission is still barred. They are very desirous of hearing from American amateurs, and interested readers may address Mr. Hokes in care of the Student Home, Student Directory, Prague 11, Na Slupi, Czechoslovakia.

Another Message to England

Mr. Robt. S. Johnson, of 2AWL, Red Bank, N. J., succeeded in putting a message over the pond during the Transatlantics. On his test schedule on the night of Dec. 17th he transmitted the following: "English amateurs please be prepared to QSR message for my sister tomorrow night—will send message tomorrow night

steady and I could read you easily. I accordingly listened especially for you Tuesday morning and was pleased to drop on your code word about 4:03 A.M. and tuned frantically to get you louder and steadier. Unfortunately I couldn't get you anything like so steady as the previous night and had difficulty in reading you. Conditions had altered, considerably more QRM and static being present. I managed to copy the following: 'English amateurs please copy and QSR this message Nr 1 from Red --- NJ USA to Mrs. Harry Cox Stanley Park Road Liverpool—Christmas greetings from USA --- radio.' The sigs then faded and were mushed out and I couldn't copy any more."



Station 2AWL, Red Bank, N. J.

on tests." The next night he sent: "English amateurs please copy and QSR this message—Nr 1 fm Red Bank NJ USA—to Mrs. Harry Cox, Stanley Park Road, Liverpool—Christmas greetings from USA via radio."

Whereupon Johnson forgot all about the matter until the receipt of a letter from Mr. Herbert Chadwick, English 2WT, Lancaster, from which the following is abstracted:

"Last Monday, about 4:15 I think, I picked up 'Test de 2AWL FJZZS,' logged accordingly, and also copied request to prepare to QSR msg for your sister. Your sigs were loud and clear and perfectly

The message was delivered to Johnson's sister, who married an Englishman and lives in Liverpool. Mrs. Cox filled in the two blanks and was greatly pleased to get the message.

2AWL, shown in our illustration, uses four 50-watters for C.W. and "two-and-two" for phone, input 500 watts at 1000 volts, (either generator or transformer—rectified) 85-ft. cage antenna, counterpoise and ground. The set is a safe and sane one, the tubes having been in use over a year. It has been heard all over the U.S. and Canada, in France, Switzerland, England, the Azores, Cuba, Alaska, Hawaii, ships at sea, etc. The receiver is a Paragon RD-5 and two-step.

Who's Who in AMATEUR WIRELESS



CHAS. H. STEWART

The career of Mr. Charles H. Stewart, 3ZS and Vice-President of the A.R.R.L., began when at the age of 12 he strung up a telegraph line to the house of one of his pals. He blushing admits that he was born so long ago that he has forgotten the exact date.

But these are matters of minor consequence in view of the good work he has done in the interest of amateur radio. Mr. Stewart has been a member of the A.R.R.L. since 1912 and in February, 1922, was elected vice-president. He has given a great deal of time to this office, and has been most active as chairman of the League's legislative committee. In 1911 he appeared at Washington with three others in connection with the Robert's resolution while he was chairman of the Wireless Association of Pennsylvania, and since then he has been right in the thick
(Concluded on page 60)



A. A. HUDGINS

A. A. Hudgins, 6IZ, familiarly known as "Algie," is one of the "originals" in amateur radio in California, having operated an eight inch spark coil on a billion meters in 1906, long before the law prevented him from further increasing his power and wave length.

During the "period of the emergency" Uncle Sam "dressed him up like a horse" and sent him among other places to Scotland, to wit: the city of Glasgow. His job was radio operator aboard one of the mine transports. While in this port he took advantage of shore liberty and selected a Scotch lassie for importation to the United States. Mr. and Mrs. Hudgins are now doing their best to interest in radio a two year old junior operator.

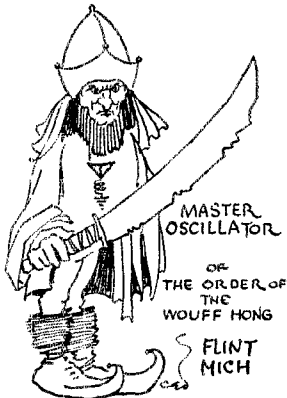
6IZ exhibits with some pride an honest-to-goodness diploma that Old King Neptune presented to him at the equator. Hudgins
(Concluded on page 60)



Michigan A.R.R.L. Convention. (Flint)
 Promptly at 2:30 in the afternoon of Feb. 9, F. D. Fallain opened the Second Michigan A.R.R.L. Convention welcoming the hams from all over the state, and introduced Traffic Manager F. H. Schnell who made the opening address. "Matty," 9ZN, was second in line, followed by C. E.

session and a more enthusiastic crowd could not be found. Every chair, window sill, and radiator was occupied by a ham with pencil and paper taking down the circuits described by Assistant Radio Inspector Dutton and Matty. This session left but a few minutes for A. F. Parkhurst, assistant radio inspector, to tell about his experience with receivers. Mr. Lathrop explained the functions of the various parts of radio equipment for the benefit of those unfamiliar with them.

Then came the banquet with Matty as toastmaster. Just as Matty was preparing to introduce the T.M. as first speaker, the door opened and in walked a police officer and three detectives. The officer came to the speakers' table and read a warrant for the arrest of Darr, Parkhurst, Dutton, Mathews, and Schnell. They were wanted for gambling in Rooms 320, 322, and 323 of the Hotel Durant. No amount of pleading on the part of the excellent convention committee could bend the officer

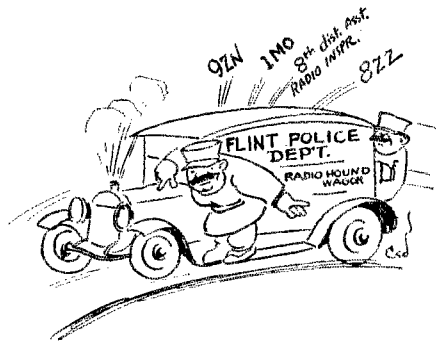


Darr, 8ZZ. The purpose of the convention were set forth and the keynote of better amateur radio sounded. Discussion then took place with respect to the part the amateur is to play with the BCL. The meeting was closed at six o'clock to give the members a chance to feed.

The evening session was opened by Mr. Lathrop who described the Detroit News station, WWJ, and his experiences as its operator. The birth and growth of the A.R.R.L. was described by the T.M., and a motion picture, "The Audion," was shown.

On Feb. 10th relay routes, reports, and message traffic were discussed until noon. A roll call showed that practically every A.R.R.L. man in Michigan, was in attendance. 100 meter transmission and reception was the topic for the first afternoon

from his duty. While reporters dodged about asking questions, the victims except Dutton were hustled thru the hotel lobby and into the wagon, which went roaring down the main street with the siren wailing to all pedestrians the news that Flint



The Gang at Flint

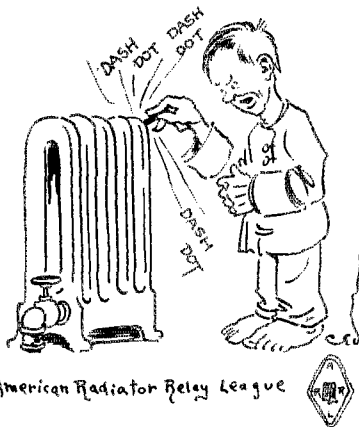
was being relieved of its crooks. The scene at the station was decidedly unpleasant—the ordinances of Flint are hard and all the judges were away over Lincoln's Birthday. It began to look very much like two days and nights in jail. Finally the tearful pleas of the convention committee prevailed and the wagon went screeching back to the hotel. When Dutton heard it he started out in someone's speedy car and ten minutes afterward it would have cost \$9 to mail him a postal card.

Usually a banquet ends things, but this was no ordinary convention and promptly at the stroke of midnight two hundred of the gang were initiated into the Royal Order of The Wouff Hong. It would be utterly impossible to describe these mysteries. Let it be said that initiations will take place often in the future and we urge you to make application at the very first opportunity. It is advised that some means of protection be made against split sides from laughing. The secret signs are known only by members and many will wonder at the meaning of the three letters O.D.O.

More real productive ideas were crowded into two days than we have seen at any convention and for the benefit of those who did not attend the following communication may be of interest.

Dear Eddy:

Am sending under same cover some stations heard and worked Feb. 9-10 by American Radiator Relay League, using the Durant (Hotel) circuit which was highly successful in recent tests at Flint. The circuit is not recommended before mid-



American Radiator Relay League

night as it absorbs and gives off heat which may prove injurious to the operator. The circuit works equally well on all floors. 9ZN - 8AM - 8LU - 8GA - 8TG - 8AND - 8BDL - 8BYF - 1MO have been worked while using it.

(Signed) 8BZY.

Houston Radio Club

The Third Annual Banquet and Hamfest of the H. R. C. was held on Feb. 17th with a good attendance. President Dupree made the address of welcome. A. P. Daniel acted as toastmaster, and made presentations of the "hand-made plotron" to Dupree, and the "little luck piece" donated by the "radio



club of the world inkoperated" to L. Peine. 5ZV responded with a saxophone solo. Gleen Wright showed some stereopticon slides caricaturing amateur radio stations. 5NK told how he got over the Atlantic with 100 watts. The affair ended with a dance after A. P. Daniel told of the purpose of the A.R.R.L.

This being the time of the year when new officers are elected, it is only proper that mention be made of the new officers of the following clubs.

Campus Radio Club

The Iowa State Radio Convention will be held at Iowa State College, Ames, on April 20 and 21. Arrangements are being made to take care of four hundred visitors, who will be both amateurs and BCL's. Meetings will be for both classes and will be arranged to meet the needs of each. QRM and legislation will be two of the topics up for discussion.

Roselle Park Radio Club

Officers for the ensuing year were recently elected. R. H. Horning, pres.; J. M. Scott, vice pres.; R. E. Timbrook, secy.; R. Roe, treas. This was one of the most enthusiastic meetings ever held and prospects for a big year are looked forward to in 1923.

Radio Club of Jamaica

Code classes for beginners and new members of the club were started on Jan. 30. Classes are held every Monday, Wednesday, and Friday nights, in charge of G. W. Wolf who is president of the club. All communications should be addressed to R. C. Greenberg, 420 Hillside Ave., Jamaica, N. Y.

Hotchkiss Radio Club

New officers of the H. R. C. are: A. Z. F. Wood, pres.; G. W. Battey, vice pres.; T. M. Banks, Jr., secy-treas. A vote was taken as to whether or not the club should go in for a program of BCL or stick to amateur radio. A unanimous vote was cast in favor of amateur radio. The club station, 1BOQ, consists of a one K.W. spark and a C.W. set using two 5-watt tubes. A 50-watt tube will go into service soon.

New Haven Radio Association

W. J. Doolittle was elected president, W. H. Wygan, vice pres.; P. E. Boyce, secy.; and F. M. Heberger, treas., of the N. H. R. A. for the coming year.

Univ. of Calif. Radio Club

New officers elected for the coming year are: S. F. Mattoon, pres.; L. J. Brundige, vice pres.; A. H. Brolly, sec'y.

Capital City Radio Club

Annual election of officers was held Feb. 3. J. M. Swigert was elected president; F. C. Crowell, Jr., sec'y-treas.; and L. A. Andrews, vice-president. A plan similar to the Pacific Plan was adopted whereby a QRX period is observed between seven and nine P.M.

Atlanta Radio Club

At a recent meeting W. E. Dobbins was elected president; H. L. Reid, vice pres.; F. F. Merriam, sec'y; and H. Cole, treas. The A. R. C. is composed of the foremost amateurs in the city and has begun to function in the interest of amateur radio. A quiet period from eight to nine thirty has been adopted and is observed every night for the benefit of the BCL's.

Second Ohio Amateur Convention

Columbus, Ohio
April 6th, 7th and 8th
Under Auspices of
Columbus Radio Club, affiliated
Make your plans now
Details in next QST

Electric City Radio Club

The E. C. R. C. of Scranton reorganized with an election of officers. F. Tarbox was elected president; J. F. Kelly, vice pres.; G. Travis, sec.; G. Mariner, treas.

Maryland Radio Association

First meeting in 1923 called for election and the following names head the club for the ensuing year: E. R. Bateman, pres.; D. P. Shafer, vice pres.; J. Haas, sec.; Miss Marion A. Garmhausen, treas. Special attention is invited to the fact that this organization boasts the only "OW" treasurer in the world. Any contenders?

Radio Club of Brooklyn

Meeting nights of the R. C. B. have been changed to the second and fourth Friday of each month. On January 12th the following officers were elected: L. Jacquet, pres.; M. Carter, vice pres.; D. Hirschick, sec.; K. Knudson, treas. Correspondence should be sent to the secretary at 409 Osborn St., Brooklyn, N. Y.

Radio Club of Rochester

January 9th was election date and the following were put in office: C. Dengler, pres.; A. K. Ross, vice pres.; S. H. Nelson, secy.; G. Hall, treas.

Kitchener & Waterloo Radio Club

On January 5th the following officers were elected: H. M. Linke, pres.; C. Robinson, vice pres.; H. S. Gowan, secy-treas. The Rochester Plan has been adopted by the club which has the enthusiastic support of CJCF, The Daily Record. A transmitter and receiver will be installed at the club in the near future.

Auburn Radio Club

Elected January 12th to serve for the year as officers of the A. R. C. are A. Jordon, pres.; C. Jordon, vice pres.; M. L. Towle, secy-treas.

Birmingham Wireless Association

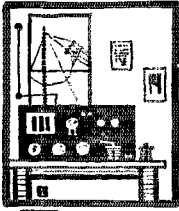
H. L. Ansley, pres.; F. W. Breedlove, vice pres.; W. W. Atkinson, secy-treas. were the officers elected for the ensuing year. The B. W. A. has adopted a policy of collecting a dollar in addition to the regular annual dues from members; who becomes a member of the A.R.R.L. and receives QST for 12 months.

YMCA Radio Club (Rome, N. Y.)

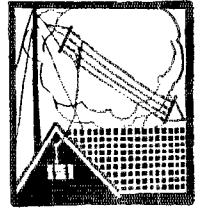
An annual meeting of the YMCA R. C. was held January 5th with an election of the following officers: T. M. Dickinson, pres.; J. A. Fitch, vice pres.; J. Carey, secy.; N. Williams, treas. The meeting was closed by a banquet at which several addresses were made by the various officers. During the two years, the club has constructed more than a dozen amateur transmitters and receivers. A number of receiving sets have been installed for BCL's thru the club. Meetings are held every Friday night at 8 o'clock, with code instruction between 7 and 8 o'clock.

The City of the Straits Radio Club

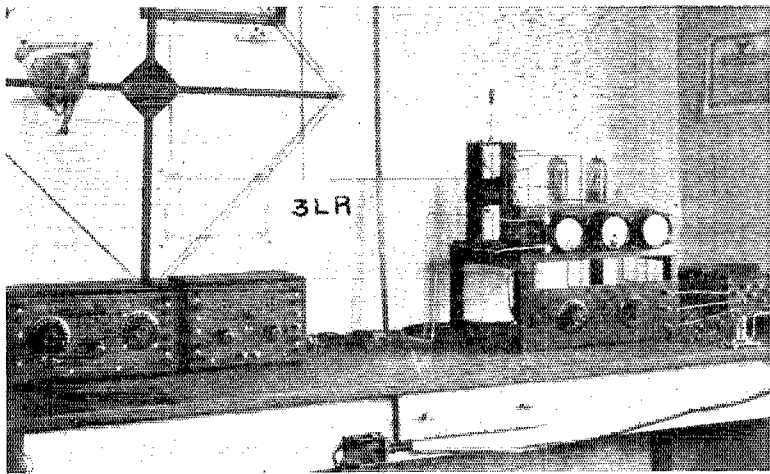
The annual meeting of the club on January 5th was election of officers. W. H. Volger was elected pres.; E. H. Koehn, vice pres.; N. Ballbach, secy.; A. Smith, treas. The "lid" has been put on by the club from 7 to 10:30 P.M. for the benefit of the BCL's. After appointing committees, the members started a discussion on "the effect of snow on the roof over an indoor aerial."



Amateur Radio Stations



3LR, Washington, D.C.



Bryan S. Flather, in building station 3LR has preserved an air of simplicity and efficiency that is usually overlooked by the majority of us in planning our stations. With no more apparatus on the table than is absolutely essential for the working of the set he can go ahead and get the maximum amount of enjoyment out of the radio game.

3LR's failing is loop reception so we will discuss the receiver first. The loop was put in primarily to work thru interference. In this capacity it has fulfilled its purpose very nicely. There is, however, nothing unusual about the receiver used. (The receiver had to be moved around in order to get it into the picture, hence no wires are shown on the binding posts. Hi!)

The loop is connected through the two upper left hand binding posts on the receiver to the terminals of the 13-plate condenser which is controlled by the left hand knob and dial. The condenser is connected as the ordinary secondary condenser would be: between the filament and one side of the grid condenser. It controls the received wave length. The dial at the right hand side of the detector and tuning unit con-

trols a variometer which is connected in the plate circuit for controlling the oscillations. To the right of the receiver is a two stage audio frequency amplifier. A special anti-capacity switch in the center of the panel controls the degree of amplification. The loop used with this receiver is two feet square and consists of ten turns spaced one quarter of an inch. Results using the loop receiver have been very satisfactory. Sixth district stations have been copied repeatedly on it and static and interference are much reduced.

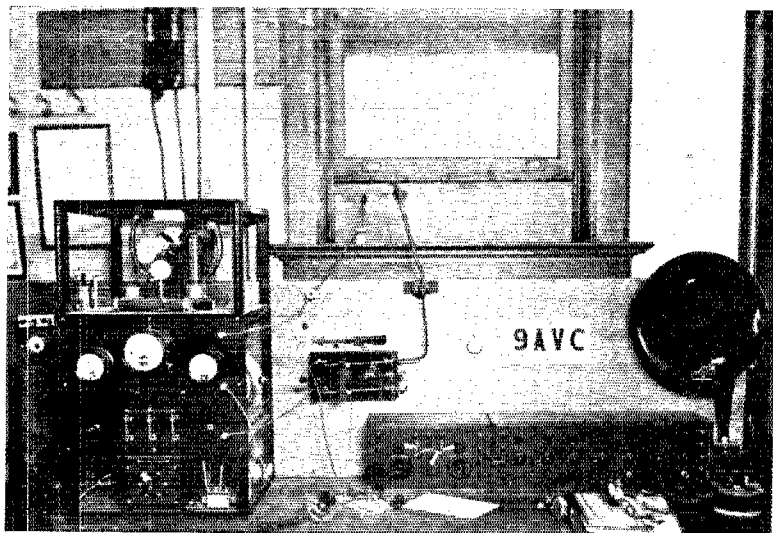
Turning to the transmitter, the well dotted map above it is evidence of its successful operation. The circuit used is the familiar 1DH "sure fire" with parallel plate supply. A 36-jar chemical rectifier using a borax solution is used. No filter system has been installed as yet. Referring to the picture, the meters from left to right give the values of antenna current, filament voltage, and plate current. The two 50-watt tubes are mounted just back of the meter panel. With this transmitter, which has been in operation for just a year, stations in every district with the exception of the seventh have been worked.

The antenna is a four-wire inverted L 65 feet long. It is 60 feet and 40 feet high at the ends, respectively. A cage lead-in from the lower end leads to the station. A tin roof

is used in lieu of a ground or counterpoise.

3LR is an official relay station of the League and is active in handling traffic to and from Washington.

9AVC, Hastings, Neb.



9AVC is operated by Robt. M. Stevens and is installed at the Y. M. C. A. at Hastings, Nebraska. It is typical of the average amateur station.

The transmitter is neatly arranged and uses one 50-watt tube in a straight Hartley circuit. The antenna current is 5 amperes on straight C.W. and 3.5 when modulated by voice. A chopper, not shown in the photograph, is sometimes used. The plate voltage is 1100, after passing through a 36-jar chemical rectifier which is mounted under the table. A filter system consisting of three one-microfarad condensers in parallel and a Radio Corp filter reactor is used.

The receiving equipment at 9AVC consists of a Reinartz tuner with three steps radio, detector, and two steps audio frequency amplification available. For aver-

age work, only detector and one step audio are used.

A 60-foot wood mast supports one end of the inverted L antenna while the other end leads to a 25-foot mast on top of the building. The lead-in is a six-wire cage nine inches in diameter. A counterpoise with six wires on twenty-foot spreaders placed thirty feet below the antenna completes the radiating system.

Although this station has only been in operation for three months, it has done some very good work. To date stations in 38 states including every district except the second and four Canadian districts have worked. 9AVC's signals have also been reported as heard in Santiago, Cuba, Alaska, and Honolulu; the latter being approximately 3500 miles distant.

6NX, San Jose, Calif.

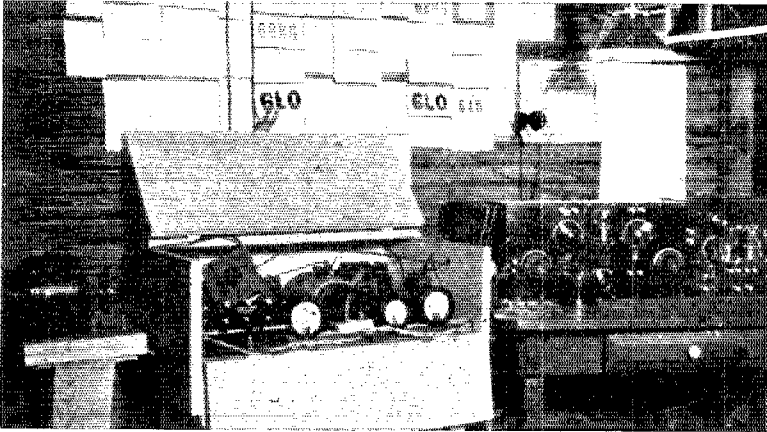
6NX, owned and operated by F. J. Quement at San Jose, Calif., is one of the low powered C.W. stations that is doing excellent work. Using four five-watt tubes, the signals of 6NX have been reported in New York, Alaska, and Hawaii. The best record of the station was made when parts

of two messages were intercepted off the coast of China, 6000 miles from San Jose, a couple of months ago. 300 miles per watt!!

Enclosed in a hinged box similar to the way we used to fix our old spark sets, the transmitter is built to work. A reversed-

feedback circuit is used and the antenna current varies from 2.5 to 3.0 amperes. Acme plate and filament transformers are used, and a 30-jar rectifier with proper filter completes the power supply system.

feet long is used. Both counterpoise and ground are employed, and separate clips are led to the main inductance. The counterpoise has six wires, nine feet above the ground, and the ground consists of copper



150 milliamperes is the normal plate current at about 800 volts. A Robertson-Detroit chopper is used for calling and short distance relay work.

A T-type antenna, well insulated, consisting of four wires 60 feet high and 45

tubing, buried four feet underground. The leads from both are made into small cages.

The receiving equipment includes a Reinartz tuner and two stages of audio frequency amplification.

CHAS. H. STEWART

(Concluded from page 54)

of every legislative move involving radio. Although his work in behalf of the recent White bill involved an expenditure of \$49.38 for cigars, amateur radio is exceedingly grateful to him for sponsoring its cause.

But to go back to his younger days when a few feet of bell wire was the end of the world as far as amateur transmission was concerned, his inborn ambition was to acquire all available information on telegraphy, particularly as applied to railroading. At that, it is a safe bet that he knew every switch combination for twenty-five miles around, and many times the nearest station operator threatened to give him the air for asking so blooming many questions. By 1918 his range was one half a mile. When the Navy Yard at Philadelphia started issuing "Certificates of Skill" long before the law of 1912 was enacted, Mr. Stewart was on hand to pass the examination and receive one of the first ones. Later on he qualified for and received a first grade commercial license. During the World War he was instructor in the radio branch of the Air Service.

Ever since we can remember he has held the call 3ZS. Between his business and League legislative matters he doesn't find

time to operate his station as much as he would like; but nevertheless, he has capably held down the office of Manager of the Atlantic Division since the first of 1921 and has been active in the organization of the amateurs in that part of the country.

A. A. HUDGINS

(Concluded from page 54)

was the man behind the spark at 6IZ, 845 B. Ave., Coronado, Calif., until it was junked some months ago. He now tells us that it is "more blessed to receive than to send" but threatens actually to open up on C.W. some day. He is noted in the Sixth District for transmitting at least once every six months and puts in most of his spare time experimenting with receiving apparatus.

Mr. Hudgins is president of the Sunset Radio Club, of San Diego, one of the most lively radio clubs in the country, and is responsible for some of the finest meetings the membership have enjoyed. Of course he is also an enthusiastic member of the "Round and Rounders." In public life he is a civil engineer for the Union Title and Trust Co., of San Diego. However, he admits that he would rather be a deck hand under his present skipper (Mrs. H.) than a C.P.O. with radio privileges in another war.

Strays



A. C. Tripp confidentially whispers in our ear that by moving a half pound tin of tobacco around on the top of his receiving set he can obtain an admirable vernier regeneration control. In fact he is so pleased with the results that he is going right out and buy a five pound tin.

With deep regret we have accepted the resignation of *BeeP*, otherwise Boyd Phelps, who as assistant editor has helped to pilot *QST* along its road of rapid progress during the last eleven months. He leaves to take charge of development and research work in the laboratory of the C. D. Tuska Co., of Hartford, but wishes to assure everyone that he is by no means completely forsaking the amateur game.

Howard F. Mason, 7BK, of Seattle, Wash., succeeds Mr. Phelps as *QST*'s department editor and ham correspondent. Mr. Mason is one of the best known and best informed amateurs in the Seventh District, and for several years has been A.R.R.L. Northwestern Division Manager, as well as secretary for the Seattle Section of the I. R. E. Both Mason and his station will be missed from the Northwest, but he is needed more at Headquarters, where by the way the presence of a West Coast man is particularly helpful.

As assistant editor in charge of production *QST* has secured Mr. Willard B. Cowles, of Hartford, pre-war 1DE, an operator of many years' experience, and assistant director of education at the Hartford Y.M.C.A., where incidentally he teaches a class for commercial tickets.

Now watch our smoke.

E. M. Doane of Orange, Tex., has been doing some tall daylight DX receiving recently on an RC set hitched to a lamp-plug antenna. As an example, one Sunday afternoon recently he copied a whole string of messages in broad daylight from 9DWK of Jackson, Mo. FB.

WARNING!

Watch out for one G. Gilman or G. Gilmer, representing himself as an authorized agent of *QST* to take subscriptions. He operates in Flint, Michigan; Fort Wayne, Indiana; Princeton, Indiana; Wichita Falls and Dallas, Texas; he claims he is an agent

of *QST*, taking \$2.00 subscriptions to *QST* and Boy's Life, official organ of the Boy Scouts of America, which he claims we publish.

Such claims are false. He does not remit nor is he our agent. He is wanted by the police departments in the above cities for obtaining money under false pretenses and if you run across him, please communicate these facts to your local police station and advise us.

SPECIAL!!! 3JJ's Audiotron has burned out after 6 years of service. He estimates it to have lasted 11,300 hours and to have detected 368,967,364,222 oscillations.

1AWI mounts his honeycomb and short wave coils on burned-out 30-amp. cartridge fuses. Then by clipping them into a mounting using fuse clips to match, he has an excellent arrangement, which obviously has many advantages.

Mr. F. V. Rankin says that the sensitivity of an Aeriola Sr. can be increased a great deal by connecting a .0005 condenser from one side of the tickler rotor to one side of the antenna series condenser. The best point to connect to the variometer and the antenna condenser is found by test. Stations are tuned in with the condenser at zero and the variometer operating as usual. Then the condenser is increased up to the point of maximum signal strength.

Didya see the recent ad in *QST* which read in part, "For Sale, immense Clapp-Eastham condenser, capacity one gallon.—K. B. Warner." K.B.W. must be turning in his resignation as secretary of the American Rum Runner's League.

9AAW, the silent wonder," has followed T. O. M.'s practice of using Nokorode for axle grease on his concrete mixer.

Brooke Sawyer, 6XAS, has sustained an accidental injury to his spine. He is laid up at 1707 Camden Court, South Pasadena, Calif., but is able to operate his set, and will enjoy calls and letters from the gang.

Sixth District Willie reports that the Italian steamship "Brento" has unfortunately been burdened with the call IOU.

This may sound rather radical, but it has been the experience of one of the editors that a set will work better without a cabinet around it than with one. A nicely finished and varnished box adds a very appreciable capacity to the set. For example, a Grebe CR3 was removed from its handsome case and supported on the edges of its variometers; the minimum wave length to which the set would now tune was 15 meters lower than before. *This is an actual fact!* While local signals were of about the same strength as usual, DX stations were heard with a decidedly noticeable increase in audibility. The same effect was had with several Reinartz tuners, capacity tuned model. It was interesting to note that an *unvarnished* cabinet gave no trouble, but when finished off with varnish, wax, etc., the wave length jumped immediately.

The increased distributed capacity of inductances that have been shellaced is an old story, but the influence of an apparently electrically "dead" wood cabinet certainly was astonishing.—*The Modulator*. What have our readers to say on this?

Ham, explaining radio to his beloved: "You see, when I turn this knob, it changes the wave from that of one station to another." She, "Really? And does that turn the big wheel at the top of the pole outside?" How did that strike your cage antenna?

One of the gang at Scranton, Pa., has at last discovered why it is so difficult to send and receive from that place.

When radio waves pass over high resistance soil they lean forward. Around Scranton the soil has a very high resistance indeed, and they are caused to lean forward very far. They are now traveling at a terrific speed, so they stumble, fall, and dig their noses violently into the soil. Flopping over on their backs, they lie stunned and senseless, unable to note.

They all loose their minds sooner or later. 8BTD kept on hearing C.W. signals after he had shut off his tubes for the night. In vain did he try copying the poor sending until suddenly the canary stopped for another breath.

A leaflet has just been received wherein Mr. E. Bucher states that a single circuit tuner may be made somewhat selective by connecting a .001 fixed condenser across the antenna and ground, or by using a very small antenna, 15 to 40 feet long, and not too high.

The "Night Hawks" and "Hoot Owls" have nothing on us. The "Kutta Kounterpoise Krew" and the "Kee Koo Kalling Klub" are insistently demanding affiliation with our A.R.R.L. Migosh! What'll we do about it, gang?

In connection with the method of charging a storage battery given in February "Strays" by 9AOQ, some additional information is at hand.

Unfortunately, the necessity of pulling the filament switch almost instantaneously when the tube is "started" from a six volt battery was not sufficiently emphasized, so a batch of burned-out tubes resulted. What's your score, 9AOQ? But cheer up, gang, and buy another crate of rectifier tubes; we all have to learn by experience. This time it teaches us that it would be very much better to take a tap off of the battery arranged so that the momentary filament current would be at a pressure of two volts, or possibly four. This would lessen the danger to the tube, as under ordinary conditions the five ampere tube takes about ten amperes at two volts.

Many different types of resistance can be used with success. An electric iron or cooking device is as good as any as it passes the correct amount of current. If a water resistance is used, it is best to make it a soda solution and use carbon electrodes. Salt water gives off poisonous chlorine gas and metal electrodes will eat away and deposit or else muddy up the solution. Mr. J. M. Temple suggests that a water resistance can also be made to act as an automatic cut-off by gauging the amount of liquid that will boil away in a given time. F. E. Watson, Alex. Darragh, and 5AL are also credited for the above information.

Taken as a whole, this means of charging your storage battery is very inefficient, as only about 5% of the energy taken from the line gets into the battery. It can not, therefore, be accepted as a profitable substitution for the usual charger.

To Indianapolis we take off our hats. One of her broadcast stations wound up its new year's program with the wish that the coming year might see the "total passing of the single circuit tuner."

The two stations 9CD and 9CD, Canadian and American respectively, have caused considerable confusion in traffic handling, one being in Chi and the other is 3GE in Toronto.

We are pleased to note that 5AE, Louis Peine, A.R.R.L. City Manager of Houston, Texas, has a new receiving set which was presented him as winner of the first prize in the Mesco Red Seal Battery "complete-the-sentence" contest.

Parks, 3ZW, shortly after installing a couple of "P" tubes for the Transatlantics, inquired of Judson, 3AFU, what power the latter used.

Judson: "A fifty watter."

Parks, sniffing: "Oh, so you have one of those low power sets."

Boy, page Mr. Beale.

—3AB

Charlie Stewart says that a spark is an individual, like a dog, while a C.W. set is an "it" like a cat. There's another difference, tho. A dog barks all night just under your window, while the cat stealthily roams the country. Of course these remarks refer to well bred cats and straight C.W.; not to back fence alley cats and 60-cycle C.W.

Keep the Commutator Clean!

Several of the fellows have called our attention to the fact that a lot of perfectly good plate supply generators are being cursed for having commutator whines when the difficulty is entirely with the operator. Commutators should be kept clean from both oil and dirt. A commutator in good condition is even and chocolate brown. The next best thing is a clean, shining copper color. In addition to this the brushes must ride absolutely free in their holders and the commutator must run true. Put the armature in the lathe and turn the commutator down if necessary. Sometimes a good job in truing up the commutator may be done with a file held solidly against the machine frame which acts as a tool rest, the brushes having first been removed. Finish with fine sandpaper.

The publishers of Ballantine's "Radio Telephony for Amateurs" inform us that at this writing about 175 copies are left of the first edition. The plates are now being revised. The new edition will be on sale at \$2.00 very soon. Those of us that have used the first edition agree that the second edition will certainly be worth the price.

CW: "I think 3HJ must have escaped from the penitentiary."

SPK: "What makes you think so?"

CW: "I don't hear his rock crusher any more."

Those of us who sneak up on long waves during the early evening hours and sometimes have trouble in making the long wave set oscillate properly should remember that a larger by-pass condenser is required across the primary of the first amplifying transformer, or phones. At short wave lengths, the frequency is so high that a very small capacity, or even the distributed capacity of the transformer primary or phones, is sufficient to by-pass enough radio-frequency energy to make the set oscillate. On long waves the situation is different because of the much lower frequency, and a condenser several times as large is sometimes required to by-pass sufficient energy.

An esteemed contemporary, in a description of 4AP, tells us that "the tuning and coupling of the O. T. is adjustable by the dials mounted on front, while the spark may be observed through ruby windows in front of the gap housing. Radiation is about $6\frac{1}{2}$ amps at 200 miles."

5WS, the successful transatlantic station of the Radio Society of Great Britain, unfortunately is no longer in existence, as only a temporary license was granted to this station by the Post Office. It is hoped, however, that it may be possible to obtain another license to enable a similar set to be re-erected for attempts at two-way amateur trans-ocean communication with American amateurs.

QRA of 3ZY wanted at Headquarters.

A couple of months ago we asked why it was that turning the amplifier filaments off caused a momentary increase in signal strength. H. A. DuChene and F. W. Osborn submit an explanation that sounds reasonable. It goes like this—If we have a detector-two-step set operating with some regeneration and suddenly turn off the amplifier filaments the effect is to make the detector filament a bit brighter because there is less load on the battery. Naturally this makes the detector feel like making louder signals, which it does. Of course a bit later it will start to hiss or perhaps to oscillate but by that time the amplifier filaments have begun to cool down and the phones are no longer in touch with what is going on in the detector. In other words the whole thing is momentary super-regeneration or super-detection. Now does someone with cast-iron eardrums want to "lope out a "super" with a chopper in the filament circuit?"

Joe Graybill of the U.S.S. "Delaware" writes for a new C.W. circuit and says he wants to install a "bottle machine."

There is a growing tendency among broadcast fans to regard the call of the phone station as the best part of the program.

4NT suggests that in addition to a "jin" pole in raising a mast, it is a great help with an iron pipe mast or any flexible mast to use a sling made from two or three pieces of stiff wood bound along and under the mast at the point where the hoisting tackle is attached. This little kink should eliminate kinks.

The BCL next door is trying to convince us that it is "spooky" to hear Caruso sing by radio after he has been dead over a year.

Power tubes that are gassy, overheat, or get blue inside, should be operated on lower voltages and will in time season up and get harder.

A certain Cincinnati ham describes his station as having two 250-watt modulators, two 250-watt oscillators, and a 50-watt speech *distorter*.

Calls Heard



HEARD DURING FEBRUARY Unless Otherwise Specified

On account of the vast quantity of calls reported we must ask your co-operation in the following or calls can not be published.

- (1) List the calls on a separate sheet of paper—do not embody them in a letter.
- (2) Arrange by districts from 1 to 9, and alphabetically thru each district; and run them across the page, not down a column.
- (3) Put parentheses around calls of stations also worked.
- (4) Omit initial or other unauthorized calls.
- (5) In order to distinguish between spark and C.W. stations, list C.W. stations from 1 to 9 in the usual manner, and then make a second paragraph in identical form listing the spark stations.

Carl G. Brown, P. O. Box 133, Ancon, Canal Zone
 C.W.: 1ABB, 1AGH, 1BAN, 1BKA, 1CJH, 1GPK, 1CMK, 1CWM, 1FD, 1XM, 1YK, 2AFP, 2AHZ, 2ATS, 2AWF, 2AWL, 2AYO, 2AYV, 2BPL, 2BMR, 2BQH, 2BRQ, 2BXP, 2CCD, 2CPD, 2CQZ, 2EL, 2FP, 2GK, 2HJ, 2XQ, 2XZ, 3AAO, 3ADT, 3AFP, 3AAJF, 3ALN, 3ANS, 3ARO, 3AUV, 3BGJ, 3BGT, 3BHM, 3BJ, 3BLZ, 3BNU, 3BVA, 3CBZ, 3HG, 3HK, 3IL, 3KM, 3DR, 3YV, 3XN, 3ZZ, 4AG, 4BI, 4BK, 4BY, 4CG, 4DR, 4DO, 4EL, 4FS, 4FT, 4HW, 4JZ, 4KD, 4ML, 4NV, 4OL, 4XJ, 4YL, 4ZC, 5AAM, 5ACF, 5AGG, 5AHD, 5AIB, 5BM, 5BP, 5EK, 5FT, 5GN, 5HO, 5IF, 5IG, 5JS, 5JT, 5KC, 5MB, 5MO, 5NZ, 5PF, 5QI, 5QM, 5RH, 5RN, 5TC, 5UR, 5VY, 5XAD, 5XAJ, 5ZA, 5ZAK, 5ZAS, 5ZAK, 5ZB, 5BIC, 5BJQ, 5FF, 5ZZ, 6AAF, 6AC, 6ADG, 6AFD, 6ALT, 6ALV, 6BFF, 6BK, 6BO, 6BQG, 6BXP, 6BXX, 6BYO, 6CAA, 6CEI, 6CF, 6CMI, 6ER, 6FQ, 6HJ, 6IJ, 6JY, 6JJ, 6PD, 6SC, 6UE, 6UF, 6WA, 6WX, 6XE, 6YV, 6ZW, 6AAW, 6AEG, 6AET, 6AET, 6AJH, 6AMI, 6API, 6AYA, 6AYU, 6BBF, 6RDB, 6BED, 6BIL, 6BKK, 6BP, 6BRK, 6BS (Canadian), 6BV, 6BZI, 6CBA, 6CDU, 6CPG, 6CPV, 6CR, 6DCR, 6DFB, 6DGE, 6DGV, 6DJB, 6DSM, 6DWF, 6DWK, 6EL, 6EP, 6ET, 6EZ, 6PQ, 6PS, 6QF, 6UK, 6UU, 6VM, 6YB.

E. Fensky, Ex 6WY, Cordova, Alaska. Mile 7
 C.W.: 5EK, 5RH, 5ZA, 5ZB, 5ZAK, 5ZE, 5AC, 5RX, 5AAK, 5AK, 5AW, 5BB, 5BH, 5BU, 5CA, 5CC, 5EA, 5EB, 5EY, 5FF, 5FI, 5IS, 5LU, 5NO, 5NX, 5RN, 5RM, 5TI, 5XK, 5XK, 5ZB, 5ZH, 5ZI, 5ZN, 5ZAH, 5AAG, 5AAK, 5ABX, 5AIC, 5AII, 5AJR, 5ANH, 5APD, 5APE, 5APK, 5APL, 5APT, 5ARB, 5ARC, 5ASJ, 5AWH, 5AWT, 5BAK, 5BIC, 5BVG, 5BQW, 5BUN, 5BOE, 5BPL, 5BK, 5LF, 5NA, 5SC, 5VF, 5WE, 5AGF, 5AB, 5IB, 5PV, 5AMM, 5BX, 5EK, 5XM, 5ANQ, 5BXM.

Heard aboard S.S. Easterner (1 tube)
 Jan. 10, 2100 E. Sydney: 5KC, 5XB, 5ZAK, 6BU, 6CC, 6KA, 6BK, 6DKQ. Jan. 13, 2300 E. Sydney: 2FP ICW, 3OT, 5PO, 6APW, 6CBI, 6CC, 6EA, 6FH, 6TI, 6TW, 6ZB, 6DO, 6BK, 6SK, 6UE, 6XE,

5YM, 5YN, 9AVZ, 9BRK, 9BTU, 9DIB, 9DSM, 9NOF ICW. Jan. 15, 1550 S.W. Panama: 2BQE, 5GR, 5UJ, 5XV, 5ZAK, 6AJF, 6AJH, 6AMD, 6AVR, 6TL, 6ZH, 7GP, 8BYO, 8JY, 8ZE, 9ASF, 9AXA, 9BK, 9BZI, 9CBA. Jan. 20, 3300S.W. Panama: 4EH, 5MO, 5XB, 5XV, 6ATV, 6CBI, 9BCF, 9BZI, QRN and QRM bad.

9BYP aboard KDQD (Reinartz and 1-step)
 Feb. 11, 2 to 6 A.M. S.S.T. (Off South coast Isle of Pines, Caribbean Sea). Spark: 5UP, 5XA, 5AS, 8BDA.

C.W.: 1BES, 1BY, 1BKQ, 1BRQ, 1CMK, 1FD, 1SD, 2AWL, 2BMR, 2CBW, 2GR, 3AQR, 3BAV, 3RJJ, 3RLZ, 3CX, 3HS, 3WF, 3XM, 4AG, 4CG, 4CL, 4PG, 4ZC, 5AIB, 5CS, 5IX, 5JB, 5JN, 5JT, 5KC, 5KN, 5ME, 5NK, 5NN, 5OK, 5PF, 5PO, 5PX, 5QY, 5KH, 5SZ, 5UK, 5WZ, 5XA, 5XAD, 5XB, 5ZAS, 5ZAT, 5ZAK, 5AAK, 6AVR, 6BES, 6BJ, 6BJQ, 6CU, 6IF, 6JD, 6ZG, 6ZH, 7LR, 7ZO, 8ADG, 8ALP, 8BDA, 8BEO, 8BYE, 8CAA, 8CJY, 8CMI, 8CYU, 8DV, 8LT, 8QK, 8WX, 8ZD, 9AOG, 9ASE, 9AUS, 9BED, 9BHD, 9BKK, 9BRK, 9BZE, 9BZI, 9CCS, 9CGK, 9CJT, 9CTV, 9CWR, 9CXP, 9DLF, 9DLR, 9DSD, 9EJB, 9OX, 9QF, 9YB, 9ZT.

Can. 3DU, London, Ont. (1 tube)
 C.W.: 1AP, 1AW, 1EE, 1FD, 1FJ, 1FX, 1FY, 1GV, 1II, 1MC, 1MY, 1ON, 1QP, 1XU, 1ZP, 1ABF, 1AFX, 1AJC, 1AJP, 1AJX, 1AMD, 1AOJ, 1ARY, 1ASF, 1ASJ, 1ATJ, 1AUN, 1AWR, 1AYZ, 1BAI, 1BET, 1BKQ, 1BKR, 1BNE, 1BRI, 1BWJ, 1BYG, 1BOQ, 1CAC, 1GGV, 1CMK, 1CNF, 1CPJ, 1CPK, 1CPN, 1CSX, 2BN, 2BY, 2CG, 2GL, 2IX, 2KE, 2OM, 2RM, 2SM, 2TB, 2TP, 2AE, 2AEB, 2AFP, 2AGD, 2AGH, 2AJW, 2ANM, 2AOG, 2ARS, 2ASF, 2ASU, 2ATB, 2AWZ, 2AZY, 2BBB, 2BCK, 2BFE, 2BGL, 2BLS, 2BMR, 2BNZ, 2BQK, 2BQU, 2BQZ, 2BRC, 2BUY, 2BVH, 2BXW, 2BZV, 2CBG, 2CBL, 2CCD, 2CCP, 2CEI, 2CHZ, 2CIM, 2CKD, 2CKJ, 2CKN, 2COH, 2CPA, 2CPD, 2CPJ, 2CPU, 2CVL, 2CVU, 2CWC, 2CXL, 2AS, 3BG, 3BB, 3BN, 3BZ, 3CA, 3CG, 3FP, 3FQ, 3GZ, 3HG, 3HS, 3HX, 3IL, 3IR, 3LP, 3NF, 3OE, 3OT, 3PZ, 3RF, 3TJ, 3TR, 3VR, 3WF, 3WX, 3ZB, 3ZT, 3ABJ, 3ACY, 3AFV, 3AGB, 3AHK, 3AKP, 3AHV, 3AJD, 3AJJ, 3ALJ, 3ALU, 3AMW, 3AOD, 3APT, 3AQR, 3ARI, 3ARM, 3ARO, 3ASP, 3ASY, 3AVA, 3AWE, 3BDZ, 3BFF, 3BGF, 3BHM, 3BIY, 3BJI, 3BJK, 3BLF, 3BLV, 3BMZ, 3BNU, 3BOB, 3BOF, 3BPP, 3BRL, 3BRV, 3BSS, 3BTL, 3BUV, 3BUV, 3BVA, 3BVC, 3BVE, 3BWT, 3BWX, 3CAH, 3CAN, 3CBM, 3CBZ, 3CCD, 3CCU, 3CEL, 3CER, 3AG, 4AB, 4BG, 4RI, 4BK, 4BQ, 4BW, 4BY, 4CG, 4CY, 4DB, 4DC, 4DK, 4DO, 4EA, 4FB, 4EL, 4EP, 4FA, 4FD, 4FE, 4PJ, 4FS, 4FT, 4GZ, 4HZ, 4JH, 4JK, 4JL, 4KL, 4KM, 4KU, 4KY, 4LJ, 4MB, 4ME, 4NT, 4NV, 4OD, 4OI, 4BM, 5BW, 5CY, 5DA, 5DI, 5DQ, 5DT, 5EK, 5ER, 5HH, 5HO, 5IG, 5JB, 5JS, 5JW, 5KC, 5LF, 5MB, 5MO, 5NZ, 5PV, 5PZ, 5QL, 5RH, 5SM, 5SP, 5SZ, 5TP, 5WJ, 5XB, 5XK, 5XT, 5ZB, 5ZG, 5AAG, 5ABH, 5ABY, 5ACQ, 5AER, 5AET, 5AHJ, 5AIR, 5XAB, 5ZAF, 5ZAQ, 5ZAS, 6XH, 7BH, 8's and 9's too numerous. Canadians: 3RQ, 3DH, 3GE, 3LP, (3LW), (3MN), 3NB, 3OY, 3TA, 3TB, (3UJ), (3XN), 3ZQ, 3ZS, (3ACY), 3ADN, (9BS), 9BV, 10AD, 3AD, 4CO. Fone: 1BKA, 2XB, 2AOG, 4FT, 5XB, 8ALT, 9CHE, 9AWK, 9YF. Can. 3GI, (3MN), (3XN), (9BS), (3ACY), (3LW). Spark: 1BOQ, 2OM, 2AER, 2ALE, 3QW, 3YK, 3API, 3BEI, 4FD, 4GN, 4HS, 5XA, 5EB, 5LQ, 5AUV, 5AYC, 7BDA, 8BPG, 8BRL 8BVR, 8BYO, 8CLR, 9OF, 9VZ, 9WY, 9AAW, 9ABW, 9AFL, 9AGG, 9AHQ, 9AUC, 9AVP, 9AZF, 9BCJ, 9BOD, 9BOP, 9CFI, 9CIC, 9CUP, 9DAG, 9DGV, 9DMJ, 9DWP, 9DXT, 9DXV, 9DZY, 9EBJ. Canadian: 3GN, 3RH, 3UJ.

1AAC, Framingham, Mass.

C.W.: Ones too numerous. 2BY 2FP, 2IG, 2JV, 2LE, 2MX, 2NE, 2PV, 2RM, (2RZ), (2GK), 2VH, 2XZ, 2AWS, 2AXK, 2AWV, 2AYV, (2BBB), 2BMR, 2BJO, 2BUA, 2BXP, 2CBT, 2CBX, 2CEL, 2CKA, 2CKK, 2COU, (2CPO), 2CPU, 2CQZ, 2CVU, 2AY, 2BA, 2BB, 2CC, 2CC, 2JJ, 2KM, 2CF, 2OT, 2SK, 2SU, 2WF, (2XM), 2YO, 2ZW, 2AAV, 2ACV, 2ADF, (2ADV), 2ADX, 2ADF, 2AGA, 2AJO, 2ALU, 2ASP, (2ARM), 2BRJ, 2BJV, 2BTL, 2BVA, 2CAN, 2CCU, 2CUS, 2EL, 2BY, 2K, 2X, 2EA, 2EB, 2EQ, 2FT, 2GL, 2HW, 2HZ, 2IK, 2IV, 2KM, 2LL, 2MB, 2OL, 2TE, 2YD, 2ZC, 2DL, 2EK, 2BM, 2HL, 2JB, 2JS, 2LF, 2MB, 2TC, 2UO, 2XK, 2XT, 2ZG, 2AEC, 2XAJ, 2ZAK, 2ZAM, 2ZAS, 2ZAV, 2ZABA, 2ZC, 2XAD, 2ZL, 2LN, 2ZV, 2ZO, 2ZU, 2ADT, 2AV, 2GC, 2QZ, 2UF, 2VY, 2ZD, (2ADG), (2AER), 2AEF, 2AFD, 2AJX, 2ALF, 2AQV, 2ASF, 2ATN, 2AVD, 2BAO, 2BDA, 2BFQ, 2BRY, 2BVE, 2BXX, 2CAA, 2CBI, 2CV, 2CKV, (2CMT), 2COO, 2COT, 2CVU, 2CWE, 2XAN, 2ZAE, 2UH, 2XM, 2XU, 2YN, 2YV, 2ZL, 2UR, 2AV, 2AAV, 2AVV, 2AMH, 2AFK, 2AGG, 2APS, 2APW, 2ARI, 2AVF, 2BAK, 2BED, 2ASN, 2BKJ, 2BLI, 2BVL, 2BVA, 2CBA, 2CBS, 2CSN, 2CUS, 2CVO, 2CTV, 2CUU, 2DBE, 2DGU, 2DIO, 2DQV, 2DRI, 2DSD, 2DSP, 2DSV, 2DTA, 2EAD, 2EBA, 2ECL, 2ECS, 2EGF, 2EHL, 2EJL, 2EK, 2EL, 2EG, 2EN, (2EDE), 2EP, 2CO, 2DH, 2CO, 2AL, 2RM.

1ARP, Loomis Raldo Club, Windsor, Conn.

C.W.: 1AAW, 1AZ, (1EO), 1FU, 1GS, 1GV, 1HN, (1IL), 1IV, 1KV, 1ON, 1OW, 1PR, 1PS, (1PY), (1QP), 1TL, (1TS), (1VK), (1WC), 1XM, 1XX, (1Z), 1ABE, 1ADP, (1AER), 1AES, (1AIG), (1AIN), (1AJJ), 1AJP, 1AKL, 1ALS, (1AMP), 1AP, 1AZW, (1BAG), 1BAN, 1BEF, 1BEP, 1BK, (1BY), 1BNT, (1BOQ), 1BRI, (1BSJ), 1BSY, 1BSZ, 1BUE, 1BUR, 1BV, 1BVH, 1BWJ, 1BXH, 1BY, 1CBI, 1CBS, (1CCR), 1CGV, 1CHJ, (1CHP), 1CIA, (1CKP), 1CMK, 1CMP, 1CNF, 1CSW, 1CTT, 2CG, 2EL, 2FC, 2GK, 2HJ, 2N, 2OH, 2PZ, 2AJA, 2AZZ, 2BBR, 2BGL, 2BJO, 2BMR, 2BMS, 2BQD, 2BQH, 2BUC, 2BEI, 2CFB, 2CGY, 2CKL, 2CLA, 2CQX, 2CQZ, 2CRV, 2CSO, 2CVU, 2BG, 2BZ, 2DH, 2FD, 2FG, 2FK, 2FO, 2FP, 2FQ, 2FS, 2GG, 2HH, 2HK, 2HS, 2IL, 2IL, 2KN, 2MF, 2OH, 2PG, 2PZ, 2RK, 2SN, 2SU, 2T, 2UD, 2VW, 2WF, 2XM, 2YO, 2ZO, 2ADE, 2ADG, 2AHK, 2AJT, 2AQ, 2AV, 2AW, 2AY, 2AZ, 2BA, 2BB, 2BC, 2BD, 2BE, 2BF, 2BG, 2BH, 2BI, 2BJ, 2BK, 2BL, 2BM, 2BN, 2BO, 2BP, 2BQ, 2BR, 2BS, 2BT, 2BU, 2BV, 2BW, 2BX, 2BY, 2BZ, 2CA, 2CB, 2CC, 2CD, 2CE, 2CF, 2CG, 2CH, 2CI, 2CJ, 2CK, 2CL, 2CM, 2CN, 2CO, 2CP, 2CQ, 2CR, 2CS, 2CT, 2CU, 2CV, 2CW, 2CX, 2CY, 2CZ, 2DA, 2DB, 2DC, 2DD, 2DE, 2DF, 2DG, 2DH, 2DI, 2DJ, 2DK, 2DL, 2DM, 2DN, 2DO, 2DP, 2DQ, 2DR, 2DS, 2DT, 2DU, 2DV, 2DW, 2DX, 2DY, 2DZ, 2EA, 2EB, 2EC, 2ED, 2EE, 2EF, 2EG, 2EH, 2EI, 2EJ, 2EK, 2EL, 2EM, 2EN, 2EO, 2EP, 2EQ, 2ER, 2ES, 2ET, 2EU, 2EV, 2EW, 2EX, 2EY, 2EZ, 2FA, 2FB, 2FC, 2FD, 2FE, 2FF, 2FG, 2FH, 2FI, 2FJ, 2FK, 2FL, 2FM, 2FN, 2FO, 2FP, 2FQ, 2FR, 2FS, 2FT, 2FU, 2FV, 2FW, 2FX, 2FY, 2FZ, 2GA, 2GB, 2GC, 2GD, 2GE, 2GF, 2GG, 2GH, 2GI, 2GJ, 2GK, 2GL, 2GM, 2GN, 2GO, 2GP, 2GQ, 2GR, 2GS, 2GT, 2GU, 2GV, 2GW, 2GX, 2GY, 2GZ, 2HA, 2HB, 2HC, 2HD, 2HE, 2HF, 2HG, 2HH, 2HI, 2HJ, 2HK, 2HL, 2HM, 2HN, 2HO, 2HP, 2HQ, 2HR, 2HS, 2HT, 2HU, 2HV, 2HW, 2HX, 2HY, 2HZ, 2IA, 2IB, 2IC, 2ID, 2IE, 2IF, 2IG, 2IH, 2II, 2IJ, 2IK, 2IL, 2IM, 2IN, 2IO, 2IP, 2IQ, 2IR, 2IS, 2IT, 2IU, 2IV, 2IW, 2IX, 2IY, 2IZ, 2JA, 2JB, 2JC, 2JD, 2JE, 2JF, 2JG, 2JH, 2JI, 2JJ, 2JK, 2JL, 2JM, 2JN, 2JO, 2JP, 2JQ, 2JR, 2JS, 2JT, 2JU, 2JV, 2JW, 2JX, 2JY, 2JZ, 2KA, 2KB, 2KC, 2KD, 2KE, 2KF, 2KG, 2KH, 2KI, 2KJ, 2KL, 2KM, 2KN, 2KO, 2KP, 2KQ, 2KR, 2KS, 2KT, 2KU, 2KV, 2KW, 2KX, 2KY, 2KZ, 2LA, 2LB, 2LC, 2LD, 2LE, 2LF, 2LG, 2LH, 2LI, 2LJ, 2LK, 2LL, 2LM, 2LN, 2LO, 2LP, 2LQ, 2LR, 2LS, 2LT, 2LU, 2LV, 2LW, 2LX, 2LY, 2LZ, 2MA, 2MB, 2MC, 2MD, 2ME, 2MF, 2MG, 2MH, 2MI, 2MJ, 2MK, 2ML, 2MN, 2MO, 2MP, 2MQ, 2MR, 2MS, 2MT, 2MU, 2MV, 2MW, 2MX, 2MY, 2MZ, 2NA, 2NB, 2NC, 2ND, 2NE, 2NF, 2NG, 2NH, 2NI, 2NJ, 2NK, 2NL, 2NM, 2NO, 2NP, 2NQ, 2NR, 2NS, 2NT, 2NU, 2NV, 2NW, 2NX, 2NY, 2NZ, 2OA, 2OB, 2OC, 2OD, 2OE, 2OF, 2OG, 2OH, 2OI, 2OJ, 2OK, 2OL, 2OM, 2ON, 2OO, 2OP, 2OQ, 2OR, 2OS, 2OT, 2OU, 2OV, 2OW, 2OX, 2OY, 2OZ, 2PA, 2PB, 2PC, 2PD, 2PE, 2PF, 2PG, 2PH, 2PI, 2PJ, 2PK, 2PL, 2PM, 2PN, 2PO, 2PP, 2PQ, 2PR, 2PS, 2PT, 2PU, 2PV, 2PW, 2PX, 2PY, 2PZ, 2QA, 2QB, 2QC, 2QD, 2QE, 2QF, 2QG, 2QH, 2QI, 2QJ, 2QK, 2QL, 2QM, 2QN, 2QO, 2QP, 2QQ, 2QR, 2QS, 2QT, 2QU, 2QV, 2QW, 2QX, 2QY, 2QZ, 2RA, 2RB, 2RC, 2RD, 2RE, 2RF, 2RG, 2RH, 2RI, 2RJ, 2RK, 2RL, 2RM, 2RN, 2RO, 2RP, 2RQ, 2RR, 2RS, 2RT, 2RU, 2RV, 2RW, 2RX, 2RY, 2RZ, 2SA, 2SB, 2SC, 2SD, 2SE, 2SF, 2SG, 2SH, 2SI, 2SJ, 2SK, 2SL, 2SM, 2SN, 2SO, 2SP, 2SQ, 2SR, 2SS, 2ST, 2SU, 2SV, 2SW, 2SX, 2SY, 2SZ, 2TA, 2TB, 2TC, 2TD, 2TE, 2TF, 2TG, 2TH, 2TI, 2TJ, 2TK, 2TL, 2TM, 2TN, 2TO, 2TP, 2TQ, 2TR, 2TS, 2TU, 2TV, 2TW, 2TX, 2TY, 2TZ, 2UA, 2UB, 2UC, 2UD, 2UE, 2UF, 2UG, 2UH, 2UI, 2UJ, 2UK, 2UL, 2UM, 2UN, 2UO, 2UP, 2UQ, 2UR, 2US, 2UT, 2UU, 2UV, 2UW, 2UX, 2UY, 2UZ, 2VA, 2VB, 2VC, 2VD, 2VE, 2VF, 2VG, 2VH, 2VI, 2VJ, 2VK, 2VL, 2VM, 2VN, 2VO, 2VP, 2VQ, 2VR, 2VS, 2VT, 2VU, 2VV, 2VW, 2VX, 2VY, 2VZ, 2WA, 2WB, 2WC, 2WD, 2WE, 2WF, 2WG, 2WH, 2WI, 2WJ, 2WK, 2WL, 2WM, 2WN, 2WO, 2WP, 2WQ, 2WR, 2WS, 2WT, 2WU, 2WV, 2WW, 2WX, 2WY, 2WZ, 2XA, 2XB, 2XC, 2XD, 2XE, 2XF, 2XG, 2XH, 2XI, 2XJ, 2XK, 2XL, 2XM, 2XN, 2XO, 2XP, 2XQ, 2XR, 2XS, 2XT, 2XU, 2XV, 2XW, 2XY, 2XZ, 2YA, 2YB, 2YC, 2YD, 2YE, 2YF, 2YG, 2YH, 2YI, 2YJ, 2YK, 2YL, 2YM, 2YN, 2YO, 2YP, 2YQ, 2YR, 2YS, 2YT, 2YU, 2YV, 2YW, 2YX, 2YZ, 2ZA, 2ZB, 2ZC, 2ZD, 2ZE, 2ZF, 2ZG, 2ZH, 2ZI, 2ZJ, 2ZK, 2ZL, 2ZM, 2ZN, 2ZO, 2ZP, 2ZQ, 2ZR, 2ZS, 2ZT, 2ZU, 2ZV, 2ZW, 2ZX, 2ZY, 2ZZ.

Spark: 2JL, 2ANQ, 2CFG, 2COA, 2ZN, 2DWP.

1BAN-1AZL, Wellesley 81, Mass.

C.W.: 1's, 2's, and 3's too numerous. (4AG), 4BG, 4BI, 4BK, 4BY, 4DC, 4DX, 4EB, 4EH, 4FA, 4FG, 4FS, 4FT, 4HJ, 4IK, 4KL, (4KU), (4LJ), 4MB, 4NV, 4PE, 4QD, 4YA, 4KB, 5AG, 5AGK, 5CW, 5DI, 5EK, 5FV, (5JB), (5JS), 5KC, 5KI, 5MB, 5NS, 5NZ, 5PB, 5PN, 5QL, 5QM, 5QY, 5XAC, 5XAD, (5XAJ), (5XB), 5XV, 5ZA, 5ZAK, 5ZAS, 5ZAT,

5ZAZ, 5ZP, 6XH, 7ABB, 7SC, 7ZA. List of 8's looks too much like the call book. 9AAP, 9ACP, 9AEC, 9AFK, 9AFN, 9AFU, 9AIM, 9AKU, 9ALP, (9AMH), 9AMT, 9AOC, 9AOK, 9APE, (9APS), 9APU, 9APW, 9AQC, 9AQR, 9ARH, (9ARI), (9ARU), 9ASE, (9ATO), 9AUS, 9AUT, 9AWC, 9AWF, 9AYK, 9BAK, 9BBF, 9BCH, 9BED, 9BHG, (9BHD), 9BHI, 9BIL, (9BJC), 9BJI, 9BJK, 9BJN, (9BJK), 9BKK, 9BLC, 9BM, 9ROP, 9BP, 9BRK, 9BVC, 9BXC, 9BXT, 9BYA, 9CAJ, 9CBA, (9CBT), 9CCB, 9CCS, 9CCT, 9CEE, 9CGK, 9CHE, (9CJC), 9CJM, 9CLZ, 9CNS, 9CR7, 9CSN, 9CTB, 9CTE, (9CTV), 9CUC, 9CUI, (9CVO), 9CWC, 9CXP, (9CYM), 9DAT, 9DAW, (9DBF), 9DBC, (9DCR), 9DDY, (9DGE), 9DGN, 9DIO, (9DJB), 9DKK, 9DKP, 9DKQ, 9DLF, 9DLR, 9DQA, 9DRE, 9DRF, 9DRI, 9DSV, (9DTA), 9DTI, (9DUU), 9DXC, 9DXM, (9DYN), 9EAN, 9EBH, 9EHN, 9EKF, 9EP, 9FP, 9HN, 9KP, 9LH, 9OF, (9OX), 9PF, 9PS, 9QR, 9UC, 9UH, 9UK, 9UU, 9VZ, 9WU, 9XAC, 9XM, 9YB, 9WY, 9ZA, 9ZN, 9ZT, 9ZY, and other 9's not listed. Specials: (AD-7), NAH cw 200 meters home-st. (NOF), Canadians: 2AF, (2AN), 2BG, 2CG, 2EL, 2RQ, 2CO, 2DE, 2DH, 2HE, 2IN, 2OH, (2SX), 2TA, 2ZS, 9AJ, 9AL, (9BV), (9JN spk?).

1BPR, Cambridge, Mass. AH C.W.

C.W.: 4AG, 4BI, 4BK, 4BQ, 4BT, 4HW, 4IK, 4JK, 4KL, 4LJ, 4NV, 4YA, 4ZC, 4CS, 4DA, 4EK, 4FV, (4GW), 4LFC, 4JS, 4KC, 4MB, 4MO, 4NS, 4NZ, 4OZ, 4PB, 4PO, 4PV, 4PX, 4QM, 4SM, 4TA, 4TK, 4XA, 4XB, 4XK, 4ZA, 4ZAG, 4AEC, 4AGG, 4AGJ, 4AGY, 4AWS, 4XAC, 4ZAK, 4ZAT, 4ZAX, 4ZAZ, 4ZAX, 4CC, 4CXH, 4ZZ, 4BOE, 4AB, 4CF, 4CP, 4DV, 4EN, 4EO, 4ER, 4FT, 4FU, 4GZ, 4HG, 4HN, 4IB, 4IE, 4IT, 4IJ, 4IC, 4JJ, 4JY, 4KC, 4KG, 4KH, 4KJ, 4KY, 4LD, 4LE, 4LS, 4LT, 4LW, 4LK, 4MZ, 4NB, 4OF, 4OM, 4ON, 4PD, 4PV, 4PX, 4QK, 4RJ, 4SM, 4SP, 4SS, 4TT, 4UC, 4UP, 4UR, 4UT, 4VT, 4VN, 4VQ, 4VY, 4WA, 4WX, 4WY, 4XE, 4XY, 4YK, 4YN, 4ZD, 4ZO, 4ZW, 4ZY, 4ZZ, 4AAF, 4ADK, 4ADN, 4ADT, 4AEA, 4AFC, 4AEO, 4AFD, 4AFL, 4AGF, 4AHR, 4AIA, 4AIG, 4AIK, 4AIM, 4AIO, 4AJE, 4AJT, 4AJZ, 4ALC, 4ALE, 4ALO, 4ALP, 4ALT, 4AMX, 4ANB, 4ANL, 4AOS, 4AQP, 4ARL, 4ART, 4ASL, 4ASV, 4ATX, 4AHH, 4AQL, 4AVT, 4ARD, 4ASL, 4ASV, 4ATX, 4AXN, 4AVD, 4AVT, 4AWT, 4AWX, 4AWZ, 4AXA, 4AXN, 4BBF, 4BCH, 4BDA, 4BDB, 4BDC, 4BEB, 4BFC, 4BFD, 4BFX, 4BGL, 4BHF, 4BJC, 4BJV, 4BEO, 4BFC, 4BFX, 4BGL, 4BHF, 4BJC, 4BJV, 4BMK, 4BNH, 4BNY, 4BO, 4BOG, 4BPH, 4BPN, 4BPU, 4BVR, 4BRT, 4BRV, 4BSF, 4BSY, 4BT, 4BUT, 4BVM, 4BWA, 4BWB, 4BWS, 4BVS, 4BWZ, 4BXG, 4BKX, 4BXX, 4BY, 4CA, 4CAH, 4CAG, 4CAG, 4CBX, 4CCB, 4CCU, 4CDD, 4CDI, 4CDZ, 4CEI, 4CEJ, 4EJ, 4EP, 4CFQ, 4CGJ, 4CGU, 4CHB, 4CHU, 4CIV, 4CJY, 4CJZ, 4CKB, 4CKO, 4CLL, 4CLK, 4CLZ, 4CKN, 4CMP, 4MT, 4CMJ, 4COK, 4OON, 4COO, 4CPE, 4CPD, 4CPY, 4CQX, 4CRB, 4CRC, 4CRD, 4CRN, 4CTN, 4CPT, 4CTY, 4CUM, 4CUI, 4CVC, 4CVX, 4CWC, 4CXP, 4CXU, 4CVU, 4CZD, 4CZN, 4CZZ, 4DAE, 4DAG, 4DAK, 4DAT, 4DBS, 4XAP, 4ZAB, 4BP, 4EL, 4EP, 4ET, 4FM, 4FP, 4G, 4IO, 4IL, 4IW, 4IZ, 4OF, 4OT, 4OX, 4PC, 4PQ, 4QR, 4UC, 4UG, 4UR, 4US, 4UU, 4VK, 4VM, 4VZ, 4WC, 4YB, 4ZY, 9AAP, 9AAU, 9ACB, 9AEC, 9AFK, 9AFN, 9AJH, 9AKU, 9AMH, 9AMI, 9AMQ, 9AMU, 9ANF, 9APS, 9APW, 9AQR, 9ARK, 9ARZ, 9ASE, 9ATO, 9AUS, 9AWF, 9AZA, 9BAK, 9BCH, 9BED, 9BGB, 9BGH, 9BGI, 9BHD, 9BHW, 9BJI, 9BIL, 9BJR, 9BJY, 9BRI, 9BRY, 9BRY, 9BRY, 9BVZ, 9BWF, 9BZI, 9BZN, 9CAO, 9CBA, 9CBS, 9CBT, 9CCS, 9CDB, 9CDU, 9CEV, 9CFY, 9CFZ, 9CGD, 9CHE, 9CHK, 9CIP, 9CJ, 9CJL, 9MD, 9CMV, 9CPA, 9CPY, 9CTE, 9CTG, 9CTV, 9CUI, 9CWR, 9CXP, 9CYV, 9CYM, 9CYW, 9CZF, 9DBV, 9DCG, 9DCR, 9DDY, 9DGE, 9DGG, 9DGV, 9DHQ, 9DIO, 9DJM, 9DKK, 9DKQ, 9DQU, 9DRI, 9DRR, 9DS, 9DVI, 9DWW, 9DWK, 9DWQ, 9DXC, 9DXE, 9DYN, 9EAR, 9ECE, 9EDD, 9EGC, 9EGH, 9EHN, 9EHT, 9EHZ, 9EKF, 9XAC, AD-7, NOF.

1CBJ, Woburn, Mass. (1 tube)

C.W.: 2AFA, 2AGB, (2AIF), 2AJA, 2AJF, 2ANM 2API, 2ARY, 2AUJ, 2AWP, 2AWS, 2AYV, (2AZY), (2BBB), 2BFE, 2BFH, 2BGI, 2BJO, 2BKL, 2BLH, 2BMR, 2BQR, 2BQD, 2BQU, 2BRC, 2BUM, 2BVH, 2BY, 2BZV, 2CBW (2CFB), 2CG, 2CJL, 2CJR,

2CKA, 2CKN, 2CMS, 2COL, 2CPA, (2CPK), 2CPO, 2CPU, (2CQZ), 2CVI, (2CVU), 2CXF, 2CXL, 2EP, 2GK, 2HLL, 2HW, 2IG, 2KF, 2IE, (2OM), (2PV), 2RM, 2RY, 2XZ, 2AAO, 2ABW, 2ACY, (2ADX), 2AFB, (2AFW), 2AGA, 2AHY, 2AIC, 2AJB, 2AJO, 2ALU, 2APR, (2AQF), 2ARO, 2ARP, 2ATV, 2AVA, 2BA, 2BEI, 2BIY, (2BJJ), 2BKT, 2BLF, 2BLU, (2BNU), 2BOF, 2BP, 2BSF, 2BSP, 2BSS, 2BTL, 2BVA, 2BZ, 2CAN, 2CBM, 2CC, (2CCU), 2CW, 2CX, 2CEQ, 2FK, 2EM, 2GC, 2HD, 2HG, 2HS, 2JC, 2JH, 2KL, 2KM, 2LQ, 2MB, 2PZ, 2QR, 2RF, 2SK, (2SU), 2TB, 2TF, 2VW, 2WF, 2WZ, (2XM), 2YO, (2ZO), 2ZP, 2ZS, 2BQ, 4CO, 4EA, 4EB, 4FT, 4HW, 4IK, 4KL, 4LJ, 4LO, 4NV, 4BY, 5EK, 5FV, 5JL, 5JS, 5KC, 5KP, 5NN, 5OC, 5PV, 5PX, 5QL, 5RN, 5SF, 5UO, 5XA, 5XB, 5ZA, 5ZAS, 5ZAV, 5BOE, 6IF, 6JD, 6XAD, 6ZZ, 7LN, 7SC, 8AA, 8AAF, 8AAU, 8ABG, 8ADG, 8ADK, 8ADZ, 8AFD, 8AFI, 8AIG, 8AIZ, 8AJE, 8AJX, 8ALT, 8ALU, 8ANV, 8AOT, 8APN, 8APW, 8ARB, 8ATN, 8ATU, (8ATX), 8AVD, 8AVI, 8AWP, 8AWT, 8AWZ, 8AXN, 8AXT, 8AZ, 8AZQ, 8BCH, 8BDA, 8BDH, 8BDM, 8BDD, 8BDV, 8BEN, (8BEO), 8BFQ, 8BGL, 8BHF, (8BRV), 8BK, 8KA, 8BKE, 8BO, (8BOE), 8BOG, 8BOZ, 8BP, 8BQA, 8BRL, 8BRY, (8BSF), 8BSV, 8BY, 8BYX, 8BVR, 8BWK, 8BKH, 8BXX, 8BYN, 8YO, 8BYT, 8BZD, 8CA, 8CBC, 8CCB, 8CCU, 8CDD, 8CEF, 8CEI, 8CFL, 8CF, 8CG, 8CGI, (8CGU), 8CGX, 8CJH, 8CJV, 8CJY, 8CJZ, 8CKV, 8CLK, 8CLZ, 8CM, 8CMY, 8CK, 8CP, 8CPU, 8CPX, (8CQL), 8CQN, 8CQX, 8CRC, 8CRN, (8CEN), 8CTP, 8CTU, 8CWC, 8CWP, 8CKT, 8CXW, 8CXF, 8CYT, (8CZ), 8DAE, 8DAG, 8DAT, 8DV, 8FV, 8GF, 8GZ, 8HH, (8HJ), 8HN, 8IH, 8IJ, 8IQ, 8JY, 8JY, 8KC, 8KH, 8KJ, 8LH, 8LI, 8MZ, 8NR, 8OR, 8ON, 8PD, 8PP, 8QC, 8QK, 8QW, 8RJ, 8RR, 8SP, 8TE, 8UF, 8VN, 8VQ, 8WY, 8WV, 8WX, 8XAN, 8XAP, 8YV, 8ZAE, 8ZD, 8ZO, 8ZT, 8ZW, 9AA, 9AAV, 9ABV, 9ACE, 9ACP, 9ALP, 9APN, 9AHJ, 9AHQ, 9AIR, 9AJH, 9AMH, 9AMQ, 9AMU, 9ANF, 9AOR, 9APS, 9APW, 9AQA, 9AQZ, 9ARI, 9ARU, 9AS, 9ATH, 9ATO, 9AVA, 9AWF, 9AWS, 9AXU, 9BAK, 9BRD, 9BED, 9BFM, 9BGL, 9BGS, 9BJ, 9BKJ, 9BKK, 9BLT, 9BQB, 9BQQ, 9BRI, 9BRK, 9BRX, 9BTI, 9BTL, 9BUB, 9BUD, 9BUX, 9BXC, 9BXM, 9BXT, 9BYA, 9BZG, 9BZL, 9CCS, 9CDD, 9CDU, 9CFK, 9CFY, 9CFZ, 9CGK, 9CHO, 9CJA, 9CJC, 9CMV, 9CNS, 9CPA, 9CTE, 9CTG, 9CTV, 9CUL, 9CVS, 9CVT, 9CWA, 9CXF, 9CXH, 9CXW, 9CFZ, 9DAT, 9DAX, 9DBE, 9DCE, 9DCT, (9DFB), 9DGE, 4DGN, 9DGV, 9DHA, 9BHS, 9DIO, 9DJM, 9DKQ, 9DJM, 9DQA, 9DTA, 9DUQ, 9DVL, 9DVV, 9EER, 9EHN, 9EKF, 9IG, 9IO, 9LH, 9LZ, 9OF, 9OX, 9PQ, 9QE, 9UR, 9VK, 9VZ, 9WU, 9XJ, 9ZT.

Can.: 1DZ, 2AN, 2EI, 2BP, 3DH, (3OH), 3SL, 3AJ.

2BFH, Jamaica, L. I.

C.W.: 1ALZ, (1ANY), 1AOL, 1AOL, 1AOL, 1AYO, 1AYZ, (1BAS), 1BEN, (1BFT), 1BIY, 1BKR, 1BOE, 1BOM, 1BRQ, 1BSP, (1BWJ), 1CAB, 1CAC, 1CAY, 1CIK, 1CMK, 1COL, 1CPN, 1EZ, 1FD, 1FW, 1GS, 1GV, 1MC, 1UJ, 1UN, 1XG, 1XM, 1XX, 1ZE, 1ADQ, 2ADX, 2APW, 2AKR, 2ALU, 2API, 2APR, 2ARQ, 2ARO, 2ASP, 2ATE, 2BDM, 2BEI, (2BJG), 2BJY, 2BKS, 2BOB, 2BOF, 2BRE, 2BSS, (2BTL), 2BVI, 2BWT, 2CAN, 2CDY, 2CDZ, (2CEL), 2CCU, 2BJ, (2BZ), 2CA, 2CX, 2CH, 2DH, 2EG, 2HD, 2HG, 2IJ, 2JL, 2JT, 2IL, 2MO, 2MZ, 2OB, 2OH, (2PZ), 2RF, 2TI, 2WF, 2XM, 2YK, 2YO, 2ZO, 4BQ, 4BX, 4BI, 4EB, 4EP, 4FT, 4GN, 4HW, 4KL, 4LJ, 4YA, 4ZC, 5BW, 5EK, 5FK, 5MO, 5NS, 5NZ, 5AIG, 5AIIH, 5AIM, 5ALF, 5ALR, 5ALT, 5AMX, 5AMQ, 5ANB, (5AOL), 5AQO, 5AQF, 5ARB, 5ASV, 5ATC, 5ATX, 5AUE, 5AWZ, 5AXD, 5AXN, 5BDA, 5BDO, 5BDU, 5BEE, 5BEF, 5BEF, 5BEK, 5BEO, 5BFP, 5BGL, 5BIQ, 5BJS, 5BNH, 5BOG, 5BRY, 5BRT, 5BSY, 5BTO, 5BSF, 5BUX, 5BVA, 5BWS, 5BYF, 5CAU, (5CAY), 5CBA, 5CGU, 5CEF, 5CEI, 5CEJ, 5CGE, 5CGX, 5CJH, 5CJY, 5CJZ, 5CKY, 5CLD, 5CLK, (5CKO), 5CMF, 5CMT, 5COH, 5COO, 5CPD, 5CQX, 5CRB, 5CPY, (5CON), 5CTY, 5CTU, 5CWC, (5CX), 5CVU, 5EO, 5FT, 5FU, 5GZ, 5HJ, 5IJ, 5JL, 5LH, 5ON, 5OW, 5RT, 5RK, 5SF, 5SK, 5KG, 5UC, 5UF, 5UT, 5VI, 5VN, 5WA, 5XE, 5YU, 5ZO, 9AAP, 9AFK, 9ALP, 9AMT, 9AOU, 9APS, 9ASE, 9ATZ, 9AVN, 9AWF, 9BCH, 9BED, 9BHD, (9BIL), 9BGB, 9BRE, 9BRJ, 9BRY, 9BZI,

9CBA, 9CHE, 9CKW, 9CTB, 9CUO, 9CWR, 9CYQ, 9CYW, 9CZF, 9DCB, 9DGG, 9DRI, 9DWF, 9DWK, 9DWQ, 9DYN, 9FAD, 9EDB, 9EHN, 9EJE, 9RV, 9FU, 9EP, 9HJ, 9OF, 9OR, 9OX, 9PF, 9QP, 9UR, 9US, 9VK, 9VZ, 9YM.

Spark: 2BOQ, 2SCHV.

2CPK, 287 E. Tenth, New York, N. Y.

C.W.: 1ABN, 1ADZ, 1ADN, 1AJF, (1AJJP), 1ANR, (1AQL), 1ASF, (1BAN), (1BDI), (1BFT), 1BKA, 1BKD, 1BKQ, 1BQ, 1BQD, 1BQL, (1BQL), (1BQ), 1BRM, (1BSP), 1BSZ, 1BTU, 1BWJ, 1BZF, 1CAB, 1CAL, 1CD, 1CJA, 1CMK, (1CMP), 1CPF, 1CPO, 1CRW, 1CWM, (1FH), (1FW), 1GV, (1II), (1II), (1IV), 1KV, (1MC), 1MY, 1NO, 1ON, 1RY, (1TL), 2ACR, (2ACY), (2ADX), 2AFB, (2AJJ), 2AFM, 2ALV, 2ASL, 2BEI, (2BG), 2BJU, 2BJR, 2BSS, 2BUV, 2BWT, 2CC, 2CCU, 2CK, 2CM, 2FC, (2FQ), 2FR, 2HG, 2HK, 2IL, 2KH, 2MB, (2MO), 2OT, 2PC, (2PZ), 2RM, (2SU), (2XAL), (2XM), (2ZO), 4CN, 4DN, 4DU, 4KA, 4EB, 4FL, 4HW, 4HB, 4KC, (4LJ), 4MB, 4OL, 4OP, 4YO, 4ZC, 5AA, 5BN, 5EK, 5HK, 5JS, 5MB, 5MO, 5PS, 5VQ, 5XAJ, 5ZAC, 5ZAK, 5ZAT, 5ZAV, 5ZAX, 6EA, 6BJQ, 6KA, 6ZH, 6ACR, (6ADG), (6ANJ), 6AIA, 6AII, (6AIW), (6AJP), (6ALF), 6ALT, 6APT, (6ATN), (6ATX), 6AVO, 6AVT, 6BAE, 6BEF, (6BEO), 6BIN, (6BIQ), 6BJS, (6BOE), 6BSF, (6BVR), 6CD, 6CEL, (6CF), (6CGU), 6CJY, 6CRB, (6CRN), (6CQL), 6CTY, (6CTU), 6CVZ, 6DAA, 6FQ, 6IS, 6LS, 6IV, (6NB), 6ND, 6OZ, 6PY, 6SM, (6XG), 6YK, 6ZA, (6ZD), 6ZW, 9AL, 9AL, 9AAP, 9AAV, 9AAZ, 9ADP, 9AEY, 9AFK, 9AHT, 9AIX, 9AKU, (9AOG), 9AOO, 9APS, 9APW, 9ATO, (9ASE), 9AWF, 9AXG, 9AYD, 9BAK, 9BAL, 9BCT, 9BDF, 9BDS, 9BFD, 9BKK, 9BKG, 9BRA, 9BRS, 9BSZ, 9BTT, 9BZ, 9CAA, 9CB, 9CBA, 9CC, 9CCK, 9CDB, 9CFN, 9CEV, 9CGU, 9CJE, 9CM, 9CNV, 9CPA, 9CPX, 9CVI, 9CZE, 9DCH, 9DE, 9DGE, 9DGG, 9DQG, 9DHY, 9DIO, 9DPX, 9DSW, 9DWW, 9DVV, 9EER, 9EI, 9EP, 9HG, 9IL, 9IO, 9MD, 9QR, (9UH), 9XM, 9YF, 9YM, 9ZY, 9ZT.

Canucks: (2AN), 2CP, 2CQ, 3AN, 3DD, 3FC, (3IN), (3JL), 3OH, (3SI), 9BZ.

3AMJ, Philadelphia, Penna.

C.W.: 1ACH, 1AFK, 1AJB, 1AJX, 1AK, 1ANA, 1AOJ, 1AOK, 1AP, 1ARX, 1ARY, 1ASJ, 1ATC, 1ATJ, 1AWB, 1BAN, 1BAS, 1BDI, 1BES, 1BIS, 1BKR, 1BOM, 1BOQ, 1BQ, 1BQ, 1BRJ, 1BRQ, 1BVC, 1BVH, 1BWJ, 1BYN, 1CAB, 1CDO, 1CIK, 1CJH, 1CKP, 1CMP, 1CNF, 1CPN, 1CYK, 1EZ, 1GV, 1IL, (1IL), 1MC, 1MY, 1QP, 1UJ, 1XG, 1XM, 1XU, 1ZE, 2AWF, 2AYV, 2AZY, 2BJO, 2BMR, 2BRL, 2BXP, 2BY, 2COT, 2CCD, 2CDN, 2CFR, 2CQZ, 2FP, 2GI, 2GK, 2HJ, 2IG, 2NZ, 2OM, 2QX, 4HI, 4BX, 4BQ, 4BY, 4CG, 4DB, 4EA, 4EP, 4FT, 4HW, 4JK, 4KV, 4LJ, 4XH, 5AGY, 5BI, 5DA, 5GI, 5MB, 5NZ, 5PV, 5XA, 5XK, 5ZE, 5ZP, 6ZZ, 8AAF, 8ADG, 8ADK, 8AEA, 8AHY, 8AID, 8AJE, 8AKN, 8ALF, 8ALT, 8AMM, 8AMX, 8ANB, 8APT, 8ARB, 8ARN, 8ASL, 8AVT, 8AXN, 8BCH, 8BDA, 8BDU, 8BEK, 8BFQ, 8BJS, 8BJU, 8BOA, 8BNI, 8BUT, 8BUX, 8BXH, 8BXX, 8BZY, 8CF, 8EO, 8GZ, 8HN, 8IH, 8IJ, 8IO, 8JY, 8KH, 8LH, 8LS, 8LT, 8MZ, 8NB, 8ON, 8PU, 8QK, 8RU, 8SF, 8SP, 8WV, 8WX, 8UF, 8UL, 8VL, 8VN, 8VQ, 8YU, 8ZO, 8ZY, 8ZY, 9AFK, 9AMH, 9ANS, 9ANTU, 9ARG, 9ARJ, 9ASE, 9AWF, 9AZA, 9AZQ, 9BED, 9BFP, 9BHD, 9BIS, 9BJY, 9BK, 9BP, 9BZL, 9CBA, 9CDU, 9CFZ, 9CK, 9CA, 9CJC, 9CZO, 9CZF, 9DIO, 9DQG, 9DGV, 9DKK, 9DWK, 9DYN, 9DZY, 9EC, 9EFK, 9EH, 9HQ, 9IL, 9KR, 9OP, 9OX, 9QF, 9UH, 9UL, 9VK, 9VM, 9VZ, 9XM, 9ZL, 9ZY. Can.: 3DE, 3DH, 3IV, 3JK, 3JL, 3RV.

Spark: 1CNI, 8AFT, 8BDA, 8TK, 9AAW, 9ANM, 9DAG.

3BA, 40 S. Beaver St., York, Pa.

C.W.: 1GL, 1GV, 1IV, 1MC, 1MY, 1ON, 1OW, 1PL, 1RV, 1UJ, (1VC), 1WC, 1XU, 1YK, 1ZC, 1AJX, (1ANY), 1AOK, (1ARK), (1AUN), (1AWW), 1AXI, 1AYZ, 1BAN, 1BAS, 1BIY, 1BKQ, 1BKR, 1BOJ, 1BQD, 1BVR, (1BWJ), 1CAB, (1CGR), (1CIK), 1CMP, (1COT), (2ACP), (2AWF), (2AZY), (2BKL), (2BRO), (2CPO), (4AG), 4BI, 4BK, 4BG, 4BY, 4BW, 4CN, 4CG, 4CY, 4DC, (4EA), 4EB, (4EL), 4EP, 4EQ, 4FJ, (4FT), 4FS, 4GZ, 4HW, (4HZ), 4IR, 4JK, 4KL, 4KM, 4KY, 4L, 4MB, 4NV, 4NT, 4OH, 4OI,

(4XK), (4YA), 4ZC, 4FG, 5AA, 5RM, 5BW, 4CY, 5DI, 5EK, 5FV, 5IQ, 5IX, 5JB, 5JL, 5JS, 5JW, 5KC, 5KN, 5LO, 5MB, 5MO, 5MX, 5NL, 5NS, 5NZ, 5PB, 5PF, 5PV, 5QJ, 5QI, 5QM, 5RN, 5SF, 5SM, 5TK, 5UK, 5UJ, 5UU, 5XA, 5XB, 5XK, 5ZA, 5ZB, 5AA, 5AAR, 5ADE, 5AER, 5AGJ, 5XAB, 5XAD, 5XAJ, 5ZABA, 5ZAK, 5ZAT, 5ZAS, 5ZH, 5ZZ, 6BOE, (6XAD), 6CBL, 7SC, 7ZU, 7ZV, (8BF), (8EO), (8LS), (8QW), (8SM), (8TC), (8UC), (8UK), (8ZO), (8AGR), (8AJT), (8AOS), (8BDA), (8RDB), (8BNH), (8BPU), (8BRT), (8BW), (8CJZ), (8CKX), 9BV, 9DK, 9EL, 9IL, (9IG), (9LH), 9OX, 9PB, 9PC, 9QR, 9UR, (9UU), 9VM, 9VK, 9VZ, 9WX, 9YB, 9YU, (9ZY), 9ZT, 9AAP, (9AAV), 9ACE, 9ACF, 9AFK, 9AIE, 9APS, 9APW, 9ARI, 9ASD, 9AWF, 9AWG, 9AWZ, 9AZA, 9RAK, 9BEF, (9BCB), 9BDS, 9BED, (9BFM), (9BGI), (9BIJ), 9BIQ, 9BK, 9BK, 9BKJ, 9BLG, 9BR, 9BSZ, 9BT, 9RVZ, 9BWM, 9BXC, (9BXM), 9BXN, 9KZ, 9CBA, 9CGS, 9CDA, 9CDU, 9CEV, 9CGD, 9CGK, 9CHU, 9CIT, 9CJC, 9CJM, 9CPA, 9CPE, 9CUL, 9CVK, 9CXO, 9CYM, 9CZ, 9DAW, 9DAX, (9DBF), (9DDW), 9DGN, 9DGG, 9DHS, 9DIS, 9DPV, (9DRI), 9DRJ, (9DS), 9DSG, 9DTS, 9DUQ, 9DVV, (9DVL), 9DWF, 9DXC, (9DXN), 9DXY, 9DZF, 9DZ, 9EAR, 9EEY, 9EKR, 9ZAA, Canadian: 3BF, (3BV), 3DH, 3FO, 3JI, 3JT, 3OH, 3TA, 3TE, (3TL), 3XN, (9AJ), 9BJ, L.G.W.: ITS, 1CKP, 1CPN, 2FP, 2CCD, 3AQR, 4IK, 4KM, 5FV, 8FU, (8MZ), 8TJ, 8VQ, 8ZW, 8ZZ, 8AER, 8AWP, 9BSZ, 9CJC, NOF.

3RB, 1510 No. Grant, Phila., Pa.

C.W.: 1AP, 1AW, 1GN, 1FZ, 1GS, 1GV, 1IL, 1MC, 1MY, 1OW, 1PY, 1QP, 1SD, 1SN, 1XK, 1XM, 1YD, 1YK, 1X, 1AAW, 1ABB, 1AJ, 1AJX, 1AOJ, 1ARY, 1ATJ, 1AUN, 1AWB, 1BAN, 1BDI, 1BOE, 1BOQ, (1BQD), 1BRQ, 1BSP, 1BVH, 1BWJ, 1CAC, 1CDO, 1CIC, 1CIV, 1CJA, 1CKP, 1CMK, 1CMP, 1CNF, 1CPN, 1CSW, (2BXP), (2CKL), (3CDY), (NOF) 4BI, 4DC, 4EA, 4FT, 4GZ, 4IK, 4KL, 4MB, 4NV, 4YA, 4ZC, 5DA, 5FV, 5KC, 5MO, 5QM, 5SM, 5XA, 5AA, 5AAG, 5ZAS, 5ZZ, 7HD, (8APW), (8CXW), 9BP, 9EL, 9EP, 9FP, 9H, 9IL, 9OF, 9OR, 9OX, 9PC, 9PE, 9Q, 9UR, 9UU, 9VE, 9VK, 9VM, 9VZ, 9YB, 9ZC, 9ZT, 9AAP, 9AAS, 9AAU, 9AAV, 9ADF, 9AEN, 9AEG, 9AFK, 9AHO, 9AMH, 9AMI, 9ANE, 9ANQ, 9AOG, 9APS, 9ATN, 9AUS, 9AVC, 9AWF, 9BCH, 9BDS, 9BED, 9BED, 9BH, 9BJ, 9BRK, 9BUH, 9BXC, 9BZ, 9CBA, 9CBA, 9CRT, 9CCK, 9CDU, 9CEV, 9CJJ, 9CJM, 9CPA, 9CPE, 9CTV, 9CUL, 9CVO, 9CWC, 9CYW, 9CZF, 9DAX, 9DCR, 9DGG, 9DGV, 9DHS, 9DIO, 9DKK, 9DVM, 9DXE, 9DZY, 9ECE, 9ECO, 9XAC, 9ZAA, ADT (FG, QRA), FZ, NAPT, Canadian: 3BF, 3BQ, 3CO, 3DH, 3FG, 3GK, 3JI, 3SK, 3XN, 3ZS, 9AJ, 9AL, (9BJ), 9BS, two's, three's and eight's too numerous.

3VC, Salem, Va.

C.W.: 1ABB, 1AJ, 1AJT, 1AJX, 1ANA, 1ARY, 1ATJ, 1BOQ, 1BR, 1BRQ, 1CK, 1CK, 1CKP, 1GS, 1JV, 1QK, 1QP, 2BG, 2BMR, 2BZ, 2CCD, 2KE, 2LE, 2PZ, 2RM, 3AL, 3ALU, 3AP, 3BD, 3BIT, 3BY, 3BJ, 3BU, 3BS, 3BS, 3BU, 3BV, 3CA, 3GAG, 3GAN, 3CC, 3G, 3BK, 3OT, 3PH, 3PZ, 3RF, 3YO, 3ZO, 4AG, 4BG, 4BI, 4CO, 4DO, 4EA, 4EB, 4EL, 4FT, 4HW, 4JK, 4KL, 4ME, 5AA, 5AAH, 5AAT, 5AJ, 5BW, 5EK, 5IX, 5JS, 5KC, 5MB, 5NB, 5NM, 5NN, 5NZ, 5OU, 5PL, 5QI, 5QM, 5SQ, 5VQ, 6ZZ, 8AAF, 8AAL, 8AD, 8AGO, 8AIM, 8AJX, 8ALT, 8AMX, 8AN, 8ARD, 8ASV, 8AXA, 8AXN, 8BA, 8BBE, 8BH, 8BDA, 8BDM, 8BDU, 8BEK, 8BG, 8BGC, 8BRT, 8BY, 8SSY, 8BU, 8BYO, 8CAA, 8CD, 8CDK, 8CEI, 8CF, 8CG, 8CJ, 8CKN, 8CKU, 8CM, 8CMN, 8COO, 8CP, 8CPV, 8CR, 8CTN, 8CTY, 8CU, 8CV, 8CXP, 8DAG, 8DU, 8EB, 8FT, 8FQ, 8HG, 8IJ, 8JJ, 8KH, 8KO, 8MG, 8PO, 8FX, 8QK, 8QN, 8SM, 8UF, 8UQ, 8WA, 8AAL, 9AEC, 9AEY, 9AJ, 9AKF, 9AMH, 9AMO, 9ANU, 9ATA, 9ATN, 9BER, 9BBW, 9BDR, 9BHI, 9BHY, 9BJ, 9BJR, 9BK, 9BT, 9BY, 9BUH, 9BZ, 9BZI, 9CBA, 9CCX, 9DR, 9CED, 9CFH, 9CG, 9DAH, 9DAX, 9DGR, 9DK, 9DUQ, 9DSG, 9DSW, 9DWK, 9DX, 9DXC, 9DXR, 9EC, 9ER, 9FE, 9LH, 9LQ, 9OF, 9OR, 9PF, 9UC, 9UR, 9UU, 9VZ, 9VM, 9VZ.

4GN, Midville, Ga.

Spark: 1ARY, (1BCF), 1BOQ, 2AER, 2AHD,

2ALE, 2BJO, (2BK), (2BQZ), 2CMQ, (2CTD), 2DN, (2FP), 2JZ, 2ND, (2OM), (2OX), (3AHK), (3AMO), (3ARI), (3CCB), 3GN-Can., 3HJ, (3OK), (3QW), (3RW), (3SF), (3TA), (3YK), (4BC), 4OI, (4DF), (4FB), (4HS), (4IC), (4LI), (4MY), (4MY), (4SK), (5AA), 5AR, (5DH), 5FI, (5JD), 5MC, 5RO, 5RZ, 5TP, 5TU, 5UD, (5UP), (5XA), (5XAC), 5ZAB, 5ZI, (8AEO), 8AFG, 8AIT, 8AMS, (8ARS), (8AU), 8AX, (8AYC), (8BY), (8BCK), (8BDA), (8BFY), (8BYO), 8CLF, 8CNL, 8COA, (8CSD), 8CUG, 8DZU, (8EB), 8KE, (8MZ), (8OI), 8PU, (8RG), (8TC), (8TH), 9AAW, 9ABM, (9AVP), (9AWJ), 9AWT, (9AZF), 9BAG, (9BAH), 9BEB, 9BEC, 9BOF, (9BOO), 9CA, (9CIC), 9CP, (9CUF), 9CVL, 9DAY, (9DCW), 9DMJ, 9DMX, (9DTN), 9DWA, 9DWC, 9DWF, 9DWX, (9DXT), 9DZY, 9EJH, 9FI, (9LF), 9MC, (9NQ), (9OF), (9VZ), 9YJ.

C.W.: (1AW), (2AFP), (2FP), (2CCD), (3BG), (4MT), (4LJ), (4ZC), (4FT), (5FV), (5US), 5ZZ, (8VQ), (9EB), Fone: (2EL).

5ADB, 2117 Grant, El Paso, Tex.

C.W.: 1ARY, 1AMP, 1BAN, 1CKP, 1XM, 2AWL, 2AYV, 2BMR, 2BZV, 2CCD, 2CXL, 2DD, 2FP, 2HO, 2RN, 2RP, 2EZ, 2ZS, 3ARO, 3BGJ, 3BVC, 3GK, 3HG, 3OE, 3TL, 3ZO, 3ZS, 4AG, 4EA, 4FT, 4H (Can.), 4HW, 4IK, 4KU, 4YA, 4ZC, (5AHD), 5ADO, 5AAK, (5AEC), 5ADZ, 5AFQ, 5AAM, (5AAH), 5ABQ, 5ABH, 5AAT, 5AHT, 5ACQ, 5AIB, 5ABY, 5BM, 5BP, 5BW, 5CL, 5CS, 5CY, 5DN, 5EK, 5EN, 5FT, 5FU, 5GJ, 5GA, 5GE, 5GN, 5HH, 5HO, 5HZ, 5IM, 5IX, 5JB, 5JL, 5JM, 5KE, (5KC), 5KN, 5KP, (5ML), 5MO, 5MX, 5MZ, 5NS, 5NN, 5NV, (5NK), 5NZ, 5OK, 5OV, 5PB, 5PD, 5PF, 5PO, (5PX), 5PV, (5QI), 5QM, (5RN), 5RJ, 5RR, 5SP, (5SS), 5SF, (5SR), 5SM, 5TA, 5TC, 5TM, 5TL, 5UI, 5MO, 5UK, 5UJ, (5VA), 5VO, 5VY, 5WZ, (5XAJ) fone, 5XB, 5XD, 5XK, 5XAC, 5XT, 5XK, 5XAC, 5XT, 5Z, 5ZAK, 5ZAW, 5ZAS, 5ZAT, 5ZAF, 5ZAG, 5ZADA, 5ZAZ, 5ZAZ, 5ZH, 5ZU, 6AWZ, (6AWT), 6AFH, 6AAK, 6AVV, 6ATQ, 6ABX, (6AIB), 6AWX, 6ANH, 6AK, 6AAG, 6AA, 6BJY, 6BQD, 6BWP, 6BOE, 6BUR, (6BUN), 6BIC, 6BPF, (6BNV), (6BSQ), 6BVG, 6BBH, 6BVP, 6BPI, 6BQG, 6BRS, (6BH), 6BVF, 6BOD, 6BQC, 6BKO, 6BIX, 6BGH, (6BJJ), (6CAJ), 6CU, 6CDU, 6CDO, 6EF, 6EK, 6EB, 6KA, 6PN, 6RR, 6RM, 6SU, 6XK, 6XAD, 6XXA, 6XAW, (6ZZ), 6ZT, 6ZH, 7AFW, 7BRM, 7LU, 7LR, 7NV, 7SC, 7ZN, 7ZU, 8AFW, 8ABB, 8ALV, 8AZV, 8AOG, 8AB, 8AH, 8BLX, 8RYO, 8BJS, 8BSY, 8BOG, 8CAA, 8CF, 8CLV, 8CDD, 8CYU, 8CEI, 8DAT, 8IB, 8KG, 8UV, 8VE, 8VQ, 8WA, 8YQ, 8YV, 9ATN, 9ATZ, 9AZH, 9AIG, 9AYU, 9AMU, 9AEY, 9AWS, 9APW, (9AQZ), (9AOG), 9AUS, 9AMB, 9AV, 9AVC, 9AOD, 9ANB, 9AAU, 9AXU, 9ARJ, (9ABQ), 9AKY, 9AEC, 9BXM, 9BSG, 9BJ, 9BTG, 9BCF, 9BED, 9BHI, 9BKK, (9BXT), 9BY, 9BXC, 9BBF, 9BRI, 9BWE, 9BXY, (9BJK), 9BZI, (9BRK), 9BSZ, 9BDS, 9BHD, (9BUN), 9BFE, 9BVL, 9BYC, 9RIK, 9CT, 9CF, 9CPB, 9CLG, 9CIN, 9CNG, 9CUC, 9CNV, 9CCM, 9CVT, 9CFK, 9CNY, (9CFY), 9CCV, 9CVO, 9CKM, 9CLW, 9CDE, 9CXP, 9CTV, 9CBT, 9CJY, 9CWC, 9CCY, 9CDR, 9CUD, 9COC, 9CKI, 9CTU, 9DWF, 9DAH, 9DPI, 9DKY, 9DSM, 9DXN, 9DOF, 9DJE, 9DPD, 9DJM, 9DSD, 9DZY, 9DPE, 9DXE, 9DMJ, 9DGV, 9DQK, 9DVM, 9DQM, (9DTE), 9DKX, 9DKG, 9DGN, 9DYN, 9DIO, 9DGE, 9EBI, 9EKK, 9EW, 9EEA, 9EHT, 9EKF, 9EFA, 9FM, 9FV, 9EN, 9MO, 9OF, 9PS, 9UU, 9UH, 9UK, 9VM, 9VE, 9YB, 9ZC, 9ZT.

5AEG, Spur, Texas

C.W.: 1OW, 1XU, 1ZE, 2AWQ, 2AXK, 2CXD, 3ARO, 3TJ, 3XM, 3ZO, 4AG, 4AG, 4AZ, 4BK, 4BQ, 4CO, 4EB, 4EL, 4FT, 4FW, 4IN, 4GZ, 4HW, 4JH, 4KL, 4KU, 4OI, 5's too numerous, 6AAG, 6AFH, 6AJD, 6AQW, 6AVP, 6AVV, 6BAW, 6BCJ, 6BJR, 6BOB, 6BOD, 6BPD, 6BSQ, 6BVG, 6CAJ, 6CBG, 6CGQ, 6RM, 6XAD, 6XK, 6XR, 6ZT, 6ZZ, 7AFW, 7BH, 7DH, 7LN, 7LU, 7QN, 7ZL, 7ZU (tone), 8AB, 8AH, 8AIK, 8AIZ, 8AJE, 8AJX, 8ANB, 8APW, 8AQD, 8AQV, 8AVV, 8BHC (dalite), 8BDO, 8BEO, 8BRD, 8BUT, 8BYI, 8XX, 8BYT, 8CBK, 8CDZ, 8CF, 8CFQ, 8CJZ, 8CKV, 8CMF, 8CQH, 8CWC, 8CXP, 8EO, 8FU, 8QK (dalite), 8UC, 8XAN, 8BP, AD-7, BH-7, 9's too numerous, Canadian: 3AV, 3KO, 3XN, 4CN.

5HZ, Houston, Texas

C.W.: 1ARY, 1CWM, 2FP, 3ARO, 3TJ, 4BB, 4BI, 4BY, 4CG, 4DB, 4DN, 4EB, 4EH, 4FT, 4HH, (4HZ), 4JE, 4JK, 4KC, 4XK, (4ZC), 5AAH, (5AAR), (5AAT), 5ABH, 5ACQ, 5ADE, 5AEC, 5AEJ, 5AGY, 5AHD, 5BE, 5BP, 5BW, 5CI, 5CY, 5DI, 5DQ, 5EK, 5EN, 5FA, 5FV, 5GA, 5GJ, 5GR, (5HO), 5IA, (5IX), 5JB, 5JL, 5JS, (5JT), 5JW, 5JZ, 5KC, (5KP,) 5LJ tone, 5MB, 5MX, 5NH, 5NS, (5NV), (5NZ), (5PD), 5PN, (5PV), (5PX), (5QI), (5RH), 5RJ, (5RN), 5SF, 5SG, 5SM, 5SS, 5TC, 5TJ, (5TM), 5TP, 5UK, (5VA), 5VM, (5VO), 5WZ, (5XA), 5XAJ, (5XB), 5XT, (5XY), (5ZA), 5ZAE, (5ZAK), 5ZAS, (5ZAW), (5ZH), (5ZK), (5ZS), 6AWT, 6BSQ, 6EA, 6EN, 6KXA, 6ZN, (6ZZ), 8AAF, 8AB, 8ALF, 8AIO, 8ANB, 8ANJ, 8BDO, 8BFO, 8BYO, 8BXX, 8CF, 8CVE, 8DAG, 8ER, 8FT, 8FU, 8U, 8LT, 8PV, 8QK, 8VL, 8VQ, 8ZO, (8ZY), 9AAU, 9AAP, 9ARV, 9AEO, 9AEY, 9AFK, 9AHZ, 9AMI, 9AQA, 9ASN, 9ATN, 9AYL, 9BAK, 9BBF, 9BCF, 9BDZ, 9BGC, 9BGH, 9BGI, 9BHW, 9BIJ, 9BJI, 9BJK, 9BKK, 9BKW, 9BMN, 9BRK, 9BUH, 9BWE, 9BYZ, 9BZE, 9BZI, 9BZZ, 9CAC, 9CBT, 9CCS, (9CCV), (9CDR), 9CDU, 9CED, 9CIP, 9CKM, 9CKW, 9CLQ, 9CNG (9CNS), 9CPA, 9CPY, 9CR, 9CRA, 9CTE, 9CUZ, (9CVT), 9CWR, 9CXH, 9DCR, 9DJB, 9DJM, 9DLM, 9DMK, 9DPD, 9DQU, (9DSD), 9DSG, 9DTN, 9DVN, 9DXB tone, 9DXN, 9DZY, 9EER, 9EI, 9EFK, 9EKH, 9FV, 9KR, 9LW, 9MC, 9OF, 9OX, 9PF, 9PS, 9UR, 9UU, 9VE, (9VM), 9XAC, 9YB, 9ZN, 9ZT.

Spark: 4BC, 4FD, 4GN, 4HS, (5ACQ), 5ADI, (5AG), 5AGQ, 5AL, (5GD), 5JD, (5JN), 5NC, (5TU), 5UD, 5UP, (5XA), 5XAC, 5XAJ, 5ZAW, (9AAW), 9ABM, 9AHQ, (9AYW), 9BAG, 9BAH, (9BCJ), (9BOF), 9BTX, 9DAG, (9DHG), (9DHZ), (9DXV), 9DZY, (9EFA), (9EFC), 9NQ.

6ACM, 2130 Emerson, Palo Alto, Cal.

C.W.: 2FP, 3ARO, 4BV, 4BY, 4CQ, 4HW, 4KL, 4ME, 5AJ, 5AY, 5BE, 5CY, 5DI, 5EJ, 5FA, 5GS, 5GM, 5HL, 5JT, 5RN, 5UJ, 5VO, 5WB, 5AAH, 5ABV, 5ACR, 5ADB, 5ADO, 5AEC, 5XB, 5ZA, 5ZB, 5ZH. Sixes and Sevens too numerous. 8CK, 8CV, 8KG, 8IL, 8IJ, 8JJ, 8KG, 8LT, 8OE, 8OW, 8PV, 8QK, 8SL, 8UE, 8YD, 8YN, 8YU, 8AW, 8AQ, 8APY, 8AZD, 8BCH, 8BOQ, 8BOY, 8BRC, 8BXX, 8BYO, 8CCB, 8CMI, 8CBE, 8CUR, 8CUV, 8CXW, 8CYU, 8DAG, 8BX, 9CE, 9DS, 9FV, 9QL, 9IG, 9KP, 9LZ, 9PI, 9PM, 9PS, 9RC, 9UH, 9UK, 9VM, 9AD, 9AAV, 9AAP, 9ADF, 9AEO, 9AEY, 9AJH, 9ALY, 9AMB, 9AMU, 9ANF, 9AOG, 9APW, 9APS, 9ASF, 9ATN, 9AVP, 9AVZ, 9AYU, (daylitel), 9BAC, 9BAK, 9BBF, 9BIK, 9BJK, 9BKK, 9BCJ, 9BLG, 9RTT, 9RXX, 9RXC, 9BXM, 9BZI, 9CAI, 9CCY, 9CCS, 9CFY, 9CJC, 9CJY, 9CNS, 9CPY, 9CXH, 9DGI, 9DIO, 9DNH, 9DPD, 9DSM, 9EEA, 9GAH, 9XAC, 9YB, 9ZT, NOF, Canadians: 3CO, 3GK, 5BQ, 5CN, 5CT, 5EJ, 9BX.

6AJF, Berkeley, Calif.

C.W.: 1CX, 2FP, 3HJ, 3XM, 3ZO, 3ARO, 4BI, 4BQ, 4KX, 4OI, 4YA, 4OL, 4YA, 5DI, 5EK, 5ER, 5FV, 5GR, 5IY, 5JS, 5KN, 5MO, 5MY, 5NK, 5NN, 5NS, 5PQ, 5PX, 5QL, 5QY, 5TJ, 5UJ, 5SF, 5XD, 5XT, 5YN, 5ZB, 5ZH, 5ACF, 5ADO, 5AEC, 5AKO, 5AKT, 5XAJ, 5XAW, 5ZAK, 5ZAV, 5YAT, too many sixes and sevens, 8AA, 8BK, 8CF, 8FT, 8IB, 8IX, 8JY, 8LT, 8ML, 8OW, 8SB, 8UE, 8VQ, 8XE, 8YD, 8YU, 8YV, 8ZW, 8ZX, 8ZY, 8ZZ, 8ADZ, 8AGF, 8AFT, 8AIL, 8AIM, 8AJX, 8ANB, 8APY, 8ASV, 8AVZ, 8AWP, 8AXC, 8AZD, 8AZG, 8AZF, 8BCH, 8BEF, 8BFO, 8BGC, 8BVR, 8BXX, 8BXX, 8BYO, 8CAA, 8CEI, 8CFO, 8CGP, 8CGX, 8CMI, 8CNN, 8CTP, 8CUR, 8XEF, 8ZAG, 8BV, 8BG, 8BM, 9KP, 9CR, 9DZ, 9EC, 9EI, 9EQ, 9FM, 9GK, 9HK, 9HJ, 9HM, 9IG, 9KP, 9LW, 9LZ, 9MO, 9OX, 9PI, 9PN, 9PS, 9QF, 9QL, 9RC, 9UH, 9VM, 9WC, 9YB, 9YM, 9YW, 9ZT, 9AAP, 9ABU, 9AEY, 9AFK, 9AHH, 9AIG, 9AIM, 9AJH, 9AMB, 9AMI, 9ANF, 9ANQ, 9AOG, 9AOU, 9APS, 9APW, 9APY, 9ARZ, 9ASD, 9ASF, 9AUA, 9AUL, 9AUM, 9AVZ, 9AWM, 9AWV, 9AYS, 9AZA, 9AZD, 9AYU, 9BCE, 9BCE, 9BCH, 9BDS, 9BDZ, 9BED, 9BGH, 9BHD, 9BE, 9BIK, 9BII, 9BJV, 9BKK, 9BKH, 9BKP, 9BLG, 9BLY, 9BRN, 9BQW, 9BRI, 9BSG, 9BSQ, 9BTT, 9BTO, 9BTY, 9BUM, 9BUN, 9BXC, 9BVM, 9BZZ, 9CBA, 9CCM, 9CCV, 9CDE, 9CDU, 9CEE, 9CFY, 9CHY, 9CIP, 9CJC, 9CNG, 9CNS, 9CTG,

9CWR, 9CWC, 9CXP, 9DAS, 9DCR, 9DGE, 9DGN, 9DGV, 9DFB, 9DHI, 9DJX, 9DLG, 9DOF, 9DPL, 9DPV, 9DQM, 9DSM, 9DSM, 9DSW, 9DTE, 9DTI, 9DTM, 9DYG, 9DYA, 9DXE, 9DZW, 9EEA, 9EHT, 9EKH, 9XAC, 9XAQ, 9ZAA, 9ZAF, 9ZAG. Canadians: 3BV, 3NI, 4BV, 5CN, 5CT, 5EJ, 5GO, 9AC, 9AL, 9BP, 9BX.

6AUB, (1 WD-11)

C.W.: 1RES, 2DS, 2ZS, 3HG, 3HJ, 3OT, 3ARO, 3BLF, 4YA, 5EK, 5GR, 5IA, 5JL, 5JT, 5NK, 5NS, 5SS, 5TA, 5UJ, 5VO, 5AAH, 5AAR, 5ADB, 5ADO, 5AEC, 5XV, 5XAD, 5XAJ, 5ZA, 5ZB, 5ZAK, 5ZAT, 7BJ, 7DP, 7DU, 7EY, 7FG, 7GK, 7HJ, 7JM, 7KR, 7LC, 7LR, 7LU, 7MC, 7MF, 7NA, 7NC, 7NF, 7NY, 7OM, 7QT, 7RN, 7SC, 7SY, 7TQ, 7VF, 7ABB, 7ADM, 7AEM, 7AFS, 7AFW, 7AHW, 7XC, 7ZN, 7ZU, 8BK, 8CF, 8FU, 8KG, 8UK, 8BCH, 8BEO, 8BRM, 8BXX, 8BXX, 8BYO, 8CUR, 8XE, 8YD, 8ZD, 8ZW, 9BP, 9CP, 9DL, 9KP, 9LZ, 9OX, 9PS, 9ABV, 9ABY, 9AFK, 9AMB, 9ANS, 9ASF, 9AVC, 9AVZ, 9BBF, 9BED, 9BHD, 9BIK, 9BIZ, 9BII, 9BJK, 9BLY, 9BRI, 9BRK, 9BXA, 9BXM, 9BXT, 9BZI, 9BZZ, 9CAA, 9CCV, 9CDE, 9CDU, 9CFY, 9CJY, 9CNS, 9CUC, 9DHI, 9DIO, 9DKY, 9DLM, 9DPD, 9DSM, 9DTM, 9DXN, 9TGE, 9XAC, 9ZT, AD-7, NOF, Canadians: 3BP, 3BV, 3GK, 4BV, 5CN, 9BX.

Spark: 6GT, 6OD, 6OL, 6TU, 6ABW, 6ADL, 6AHU, 6AUI, 6AMD, 6AMK, 6ANL, 6ANP, 6AOA, 6AOX, 6AQU, 6ARK, 6ATF, 6AUI, 6AWG, 6AWH, 6AWX, 6BCN, 6BGS, 6BKE, 6BJG, 6BQT, 6BVD.

6BH, Pasadena, Calif.

C.W.: 2FP, 3HP, 3FI, 4BI, 4EB, 4HH, 4YA, 5AW, (5BE), 5DI, 5EK, 5FO, 5FV, 5GJ, 5HB, 5IR, (5IX), 5KE, 5LO, 5NK, (5NN), (5NS), 5NZ, 5PX, (5QI), (5SF), 5SK, (5SS), 5UD, 5UJ, 5UK, 5UN, 5UO, (5VO), 5AAH, (5ADB), (5ADO), 5XB, 5XD voice, 5XU, 5YQ, (5ZA), 5ZJ, 5ZO, 5ZK, 5ZAK, 5ZAM, 5ZAS, 6AH, (6AK), 6BM, (6BU), (6CC), 6CZ, 6DD, 6DT, 6EX, (6FH), (6FY), 6GR, (6GX), (6JN), 6KU, (6LU), (6LV), 6NH, 6NX, 6OH, 6OO, 6OT, (6HD), (6KE), 6RM, (6SU), (6TI), (6TU), 6UW, (6VF), 6VK, (6VM), (6AAK), 6AAN, 6ABX, (6ACM), 6AEH, 6AJF, (6AJR), 6AKL, (6ALV), (6ALX), (6ANB), (6ANH), (6ANP), (6AQF), 6ARB, (6ARF), (6ASJ), (6ATQ), (6ATU), 6AUL, (6AUN), (6AUY), (6AVV), (6AWT), (6BBH), 6BED, (6BEH), 6BEY, (6BGD), (6BII), (6BIQ), (6BJY), (6BMD), (6BMN), (6BMY), (6BNU), (6BOE), (6BPL), (6BQP), (6BQL), (6BSA), (6BSQ), (6BUA), 6BUM, (6BUY), (6CAJ), (6CAY), (6CHL), 6XD, 6XW, (6ZA), 6ZE, 6ZF, (6ZH), (6ZM), 6ZQ, 6ZY, (6ZZ), 6XAF, 6XAO, 6ZAC, 6ZAF, 6ZAM, 7AB, 7AD, 7AK, 7BA, (7BJ), 7ED, (7EQ), 7GA, (7GE), (7HJ), 7HM, 7JW, 7KE, 7LN, 7LR, (7MC), (7MF), 7NA, 7NF, 7OM, 7QT, (7SC), 7TO, (7TQ), 7TX, (7WX), 7ABB, (7AEM), (7AFF), 7AFW, 7AUI, 7ALU, 7BAG, 7QA?, (7ZN), 7ZU, (7ZV), 8AB, (8CF), 8IB, 8KP, 8QK, 8VQ, 8AFD, 8AGD, 8AIO, 8AOQ, 8APW, 8AQV, 8BCH, 8BDA, 8BDO, 8BDU, 8BEF, 8BFM, 8BKE, 8BWA, 8BXH, 8BXX, 8BYO, 8BZY, 8CAA, 8CGX, 8CKV, 8CRB, 8YB, 8YD, 8ZW, 8ZY, 8ZZ, 8XAE, 9BF, 9BM, 9BX, 9EI, (9FV), 9GK, 9GM, 9KP, (9LW), 9NX, 9OX, 9PI, 9PS, 9QL, 9RC, 9UH, 9UU, 9WD, 9ABU, 9ABV, 9AEQ, (9AEY), 9AIX, 9AJP, 9AKU, (9AMB), 9ANI, 9ANQ, 9ANS, 9AOG, 9APW, 9AQR, 9ARI, 9ARZ, 9ASF, 9ATN, 9AUL, 9AVC, 9AWM, 9AYU, 9BED, 9BFB, 9BHD, 9BIK, 9BIL, 9BII, 9BJK, 9BOR, 9BSG, 9BVM, 9BYV, 9BXA, (9BXH), 9BXM, 9BXQ, 9BYC, 9BZI, 9BZZ, 9CAC, 9CBA, 9CCK, 9CCV, (9CDE), (9CFY), 9CIP, (9DPD), (9DSD), 9DSM, (9DTA), 9DTE, 9DTM, 9DVA, 9DVX, 9DXM, 9TGE, 9QA?, 9ZT, 9XAQ, 9YAJ, 9CJJ, 9CKP, 9CLW, 9CNS, 9CJP, 9CJU, 9CPY, 9CTE, 9CFV, 9DFB, 9DGV, 9DHI, 9DIO, (9DKY), 9ZAF.

Sparks: (6GF), 6KC, 6KD, 6QR, (6ANP), (6AOA), (6APL), 6AUI, 6BBE, 6BJU, 6BKE, 7YA. Canadians: 5CN, (5GO), 9RP.

6BEK, Rt. 1, Box 76-A, Puente, Calif.

C.W.: 1QP, 2XP, 3BJ, 5KM, 3PZ, 3ARO, 3BLF, 4BI, 4BY, 4CG, 4EB, 4EH, 4FS, 4GH, 4KM, 4ME, 4OI (cuba), 4SB, 4YA, 5CY, 5DI, 5EK, 5EL, 5FU, 5FV, 6CJ, 5IR, 5IS, 5IX, 5JZ, 5KP, 5KC, 5NS,

50K, 5NZ, 5OV, 5PX, 5PV, 5QL, 5QY, 5RH, 5SF, 5SM, 5SS, 5TC, 5TJ, 5UO, 5UN, 5UJ, 5UK, 5XA, 5XB, 5XC, 5XK, 5XM, 5XV, 5XAD, 5XAJ, 5ZA, 5ZB, 5ZG, 5ZH, 5ZAS, 5ZAV, 5ZAK, 5AAH, 5AAR, 5ADO, 5AEC, 5AHD, 5AID, 5ANB, 5AGX, 5SZ, 5ATY, 5ABX, 5ALV, 5AME, 5AOL, 5AOR, 5ARF, 5ATC, (5ATQ), 5ATU, (5BBH), 5BCL, (5BIQ), 5BJT, 5BJY, (5BQL), (5BKK), (5BNU), (5CEE), (5ZA), (5ZT), 7AD, 7AW, (7BJ), 7CD, 7DP, 7EQ, 7EX, 7HI, 7IW, 7LN, 7LR, (7LU), 7LY, 7MF, (7NA), 7OM, 7OT, 7PF, 7QT, 7RI, 7SC, (7TQ), 7WM, 7ABY, (7AEM), 7AFW, 7ADP, 7AIG, 7AII, 7AII, 7ZN, 7ZO, 7ZU, 7ZV, 7YA, 8BK, 8CF, 8CP, 8ER, 8FT, 8IB, 8JJ, 8JU, 8KG, 8LD, 8LH, 8ML, 8MZ, 8PD, 8QK, 8RN, 8XE, 8YD, 8YN, 8ZD, 8ZY, 8ZZ, 8AAP, 8ACF, 8AGO, 8AID, 8AIM, 8AIO, 8ALV, 8AMU, 8ANB, 8ANV, 8ASV, 8AZD, 8AZF, 8AXC, 8BDO, 8BDU, 8BEL, 8BEF, 8BFM, 8BFQ, 8BSG, 8BVF, 8BWA, 8BXH, 8BZY, 8CAA, 8CHB, 8CEJ, 8CII, 8CMI, 8CRB, 8CUH, 8CQH, 8CUR, 8CYU, 8XAD, 8XAE, 8XAN, 8ZAF, 9BK, 9BM, 9CR, 9GK, 9FV, 9HK, 9EL, 9EW, 9EP, 9IG, 9LZ, 9OX, 9MC, 9PI, 9PW, 9UH, 9VM, 9ZM, 9ZT, 9ZY, 9AAP, 9ABU, 9ABV, 9AEY, 9AFK, 9AIN, 9AII, 9AIX, 9AIV, 9AJP, 9AMI, 9ANQ, 9APF, 9ARZ, 9ARZ, 9AON, 9AOU, 9APW, 9AQM, 9APF, 9ASV, 9AVE, 9AUW, 9AUL, 9AVU, 9AVZ, 9AWF, 9AWM, 9AYS, 9AZA, 9BBB, 9BDS, 9BGI, 9BHD, 9BED, 9BEL, 9BEK, 9BIE, 9BIK, 9BII, 9BJV, 9BKK, 9BLX, 9BRI, 9BSQ, 9BTZ, 9BUC, 9BUN, 9BUY, 9BXA, 9BTT, 9BXC, 9EXM, 9EXQ, 9BXI, 9BZI, 9CA, 9CAO, 9CBA, 9CCV, 9CCM, 9CDB, 9CCS, 9CFE, 9CJY, 9CMK, 9CNS, 9CTE, 9COW, 9CUI, 9CWR, 9CKX, 9DAH, 9DAE, 9DEF, 9DFE, 9DGT, 9DKG, 9DHY, 9DDP, 9DPW, 9DTE, 9DRF, 9DTM, 9DSM, 9DWE, 9KAC, 9ZAA, 9YAE, 9EGY, 9EKH. Canadians: 3DH, 3KO, 4BV, 4CB, 4CO, 4KN, 5CN, 9AL, 9BT, 9BX.

7NO, (1 tube)

C.W.: 3TJ, 4BV, 5AB, 5EJ, 5GN, 5IX, 5JT, 5LL, 5NK, 5NZ, 5QI, 5QM, 5RN, 5SS, 5VO, 5AJ, 5EA, 5EB, 5GR, 5LU, 5OH, 5OO, 5QF, 5QZ, 5RM, 5SU, 5TI, 5ZT, 6ZZ, 8AIB, 6AR, 6AKJ, 6ANB, 6ANG, 6AMK, 6APL, 6ATQ, 6AVM, 6BCL, 6BIQ, 6BJO, 6BJY, 6BKO, 6BMB, 6BOE, 6BQB, 6BRF, 6BRJ, 6BRU, 6BUC, 6CAN, 6CEB, 6CEK, 6CAY, 6CHL, 6IUR, 7AK, 7DC, 7EW, 7GE, 7LA, 7MC, 7MQ, 7NA, 7OZ, 7PE, 7SY, 7TG, 7WM, 7WX, 7ABO, 7AIL, 7XAW, 8CC, 8HN, 8KG, 9LF, 9LL, 9LK, 9QK, 9TJ, 9UE, 9VQ, 9ZD, 9ZW, 9AII, 9ALU, 9ARD, 9BBE, 9BOG, 9BSY, 9BXX, 9BYO, 9CJC, 9AX, 9EL, 9FH, 9LL, 9MO, 9OF, 9PE, 9UH, 9YB, 9ZN, 9ABJ, 9ADZ, 9AFK, 9AFM, 9AMI, 9AMU, 9APE, 9APW, 9ARZ, 9BCU, 9BED, 9BRI, 9BRY, 9BTE, 9BUN, 9BXM, 9CST, 9CCY, 9CFY, 9CTG, 9CPA, 9DGE, 9DQM, 9DRI, 9PFY.

7PN, Seattle, Wash.

C.W.: 1XM, 1XU, 1BES, 1CKP 2EL, 2XE, 2Y-? 2ZS, 2AFP, 2AJW, 2AYV, 2BHM, 2BKA, 2BMR, 2BQH, 2BQU, 2CBW, 2CCD, 2CKL, 3BB, 3FO, 3OT, 3RF, 3XM, 3BGJ, 4BK, 4BY, 4CO, 4DO, 4EH, 4GZ, 4HS, 4HW, 4HZ, 4KM, 4KU, 4YA, 5BD, 5BE, 5IX, 5JL, 5JS, 5KC, 5KL, 5KK, 5MO, 5NK, 5NZ, 5BR, 5BW, 5DI, 5EK, 5FV, 5FY, 5GR, 5HZ, 5IS, 5PB, 5PD, 5FF, 5PN, 5PV, 5QL, 5QY, 5RH, 5SM, 5SS, 5TC, 5TV, 5UD, 5UK, 5UO, 5US, 5VO, 5WZ, 5XA, 5XD, 5XE, 5XV, 5ZA, 5ZH, 5ZS, 5AAG, 5AAR, 5AAT, 5AEC, 5AGN, 5ANO, 5XAD, 8AA, 8AB, 8BE, 8BK, 8BO, 8CF, 8CY, 8EO, 8FU, 8IB, 8JJ, 8JU, 8JY, 8KG, 8MZ, 8OW, 8OK, 8SP, 8UE, 8UK, 8VL, 8VQ, 8WA, 8XJ, 8YD, 8ZV, 8ACL, 8AER, 8AFD, 8AGO, 8AIO, 8AIX, 8ANB, 8AOL, 8APT, 8AQC, 8ASV, 8ATO, 8ATU, 8AZQ, 8BCH, 8BFX, 8BLC, 8BMG, 8BME, 8BON, 8BRM, 8BRY, 8BWA, 8BSV, 8BXX, 8CAA, 8CCV, 8CDO, 8CGX, 8CIA, 8CLK, 8CMI, 8CRS, 8CYU, 8DAE, 8DAK, 9BM, 9BP, 9EQ, 9CN, 9CR, 9CY, 9EF, 9EP, 9FM, 9FP, 9FV, 9GK, 9HJ, 9KP, 9MO, 9OF, 9OX, 9PE, 9PF, 9PI, 9PN, 9PS, 9TN, 9US, 9UH, 9UR, 9UL, 9UU, 9YB, 9YF, 9YM, 9YW, 9ZU, 9ZT, 9AAG, 9AAH, 9AAP, 9AAU, 9ABE, 9ABU, 9ABV, 9ADF, 9AEC, 9AEL, 9AEO, 9AEG, 9AEB, 9AFK, 9AIG, 9AIV, 9AJH, 9AJP, 9AQZ, 9AMB, 9AMM, 9AMU, 9APN, 9APS, 9APW, 9ARA, 9ARJ, 9ARZ, 9ASF, 9ASN, 9ATN, 9ATT, 9AUA, 9AUR, 9AUS, 9AYC, 9AVC, 9AWC, 9AWK, 9AWP, 9AWS, 9AYU, 9BBF, 9BCF, 9BDZ, 9BCH, 9BED, 9BGI, 9BII, 9BJK,

9BJY, 9BKK, 9BKW, 9RMF, 9ROF, 9BPS, 9BQU, 9BRI, 9RSD, 9RSQ, 9BSX, 9BTL, 9BTV, 9BWE, 9BWF, 9BXC, 9BXE, 9BXM, 9BXQ, 9BXU, 9BXX, 9BYC, 9BYX, 9BZE, 9BZI, 9BZZ, 9CAO, 9CBA, 9CBT, 9CCO, 9CCS, 9CCV, 9CDU, 9CEE, 9CEH, 9CFY, 9CGT, 9CGV, 9CHO, 9CIX, 9CJC, 9CUI, 9CKP, 9CKR, 9CLQ, 9CPA, 9CQD, 9CUC, 9CUT, 9CWC, 9CWR, 9CXM, 9CVC, 9CZZ, 9DAW, 9DCG, 9DDS, 9DFB, 9DGE, 9DHB, 9DHL, 9DIO, 9DIS, 9DJF, 9DJM, 9DKY, 9DLM, 9DPD, 9DQM, 9DQU, 9DRI, 9DRV, 9DSD, 9DSM, 9DTE, 9DTM, 9DXE, 9DXM, 9DXN, 9DYN, 9DYW, 9ECE, 9ECR, 9EEA, 9EKH, 9EKK.

7AFH, Monroe, Wash. Detector only.

C.W.: 2WB, 2XQ, 4HH, 5AAR, 5ADO, 5AEC, 5EK, 5GR, 5IR, 5NK, 5TJ, 5KP, 5KZ, 5KAD, 5XD, 5XK, 5YQ, 5ZA, 5ZAK, 5ZAS, 5ZAV, 5ZS, 6's and 7's too numerous, 8AAF, 8AIC, 8AMI, 8ANU, 8ANW, 8ASV, 8ATU, 8AKB, 8AIX, 8AXC, 8AXW, 8AZF, 8BBT, 8BCH, 8BDA, 8BDE, 8BK, 8DO, 8BSY, 8BEF, 8BXX, 8CEB, 8CGV, 8CP, 8CRE, 8ER, 8FU, 8IB, 8IJ, 8II, 8JJ, 8JY, 8KG, 8OE, 8QK, 8UC, 8UE, 8XE, 8YD, 8ZAF, 8ZW, 8ZY, 9AAG, 9ABU, 9AEC, 9AEO, 9AEB, 9AHC, 9AHD, 9AII, 9AIX, 9AIP, 9AMI, 9ANI, 9ANQ, 9AOU, 9APW, 9ARZ, 9ASF, 9ASU, 9AUL, 9AVY, 9AVZ, 9AWM, 9AWS, 9AYU, 9BBF, 9BDS, 9BED, 9BEY, 9BIE, 9BIK, 9BII, 9BJV, 9BKP, 9BKW, 9BXT, 9BY, 9BM, 9BQH, 9BQV, 9BRI, 9BRK, 9BRS, 9BSG, 9BSZ, 9BTT, 9BVI, 9BXM, 9BXQ, 9BXT, 9BXX, 9BZI, 9CBA, 9CBI, 9CCY, 9CFY, 9CMI, 9CNS, 9CST, 9CUI, 9CWR, 9CKE, 9CVC, 9CZF, 9DDB, 9DFB, 9DGE, 9DKX, 9DKY, 9DCC, 9DDP, 9DPI, 9DQM, 9DSD, 9DWE, 9DYG, 9DYU, 9GK, 9II, 9KF, 9KM, 9KP, 9QK, 9PS, 9QE, 9RC, 9UL, 9UU, 9VE, 9YAJ, 9YB, 9YG, 9YW, 9ZAF, 9ZB, 9ZM, 9ZT, AD-7, AG-1. Canadians: 3XN, 4AB, 4BB, 4BY, 4CN, 4DQ, 4FT, 4HH, (5AC), 5CN, 5CQ, (5CT), 5DI, 5GO, 9AC, 9AL, (9BP), 9BX. Spark: 6AMK, 6AOA, 6AOC, 6QR, 6TU, 7ABH, 7ACN, 7AJP, 7EX, 7KJ, 7PJ, 7ER, 7TY, (7TW), 7VE. Fone: 7AFS, 7FC, 7NJ, 7RN. Canadians: 9AC, 9BX.

8ZD, Pittsburgh

C.W.: (1AF), 1AP, 1BQ, 1CN, (1GV), 1HK, 1JL, 1MC, 1MY, (1ON), (1OW), 1PM, 1QP, (1RV), 1UJ, (1VC), 1WC, (1XM), 1XZ, 1YK, 1ABF, 1ABQ, 1ADL, 1AOJ, (1AOK), (1APC), (1ARY), 1AWB, 1AYZ, 1AZW, 1BAI, (1BAS), 1BDI, 1BES, 1BET, (1BKQ), 1BKR, 1BLN, 1BOQ, (1BRQ), 1BSZ, 1BVH, 1BWJ, 1BYM, 1CAR, 1CAJ, 1CAK, 1CKK, 1CJA, 1CJH, (1CKP), 1CMK, 1CMP, (1CPN), (1CPO), 2BK, 2DD, 2FP, (2GK), (2HO), 2KF, 2NE, 2NZ, 2OM, 2OS, 2XQ, 2XZ, 2ZK, (2AEU), 2AFP, (2ANM), 2AOS, 2ARY, 2ASI, 2AWF, (2AWL), 2AZY, (2BBB), (2BGI), 2BHD, (2BJO), 2BLM, (2BLS), 2BMR, 2BMS, 2BQH, (2BRB), (2BTW), 2BUE, (2BUM), 2BWS, 2BXP, 2CBG, 2CCD, 2CEI, (2CFE), (2CGJ), (2CKL), 2CPA, 2CPA, 2CPD, (2CPK), 2CUI, 2CVJ, 2CVW, 2CXL, 3AS, 3AY, 3BB, 3BJ, 3BV, (3CA), 3CC, (3CM), 3DH, 3FP, 3FQ, 3FS, (3HD), 3HG, 3HJ, 3HK, 3HS, 3IL, (3JJ), (3KM), (3MB), 3MF, 3MK, (3MO), 3NF, 3OH, 3OT, 3OU, 3PZ, 3RF, (3SU), 3TJ, 3VW, (3XM), (3YO), (3ZO), (3ZP), 3ZZ, (3AAE), 3ACR, 3ACY, 3ADG, 3ADK, 3AFB, (3AFW), 3AHV, 3AIS, 3AJJ, 3ALN, 3AMS, 3APR, (3AQR), (3ARM), 3ARO, 3ASI, 3ATB, 3ATS, 3AUV, 3BEC, 3BER, 3BFU, (3BHL), 3BHM, (3BHO), 3BIF, (3BII), 3BJY, (3BIF), 3BMO, 3BNU, (3BSB), 3BSS, (3BUY), 3BVA, 3BVC, 3BVL, (3CAN, (3CBZ), (3CGD), (3CDY), 3CEI, 3CEL, 3XAL, 4AG, 4BG, 4BI, 4BQ, 4BY, (4CL), (4CY), (4EA), 4EB, 4FA, 4FE, 4FS, (4FT), 4GZ, (4HW), 4HZ, 4JK, 4JZ, (4KC), 4KL, 4KU, 4LE, 4LJ, 4LO, 4MB, (4NV), 4OI, 4PD, 4SC, (4YA), 4YD, (4ZC), 5AA, 5BK, 5BW, (5EK), 5EL, 5ER, 5FV, 5HO, 5JS, 5KC, (5LF), 5MB, 5MO, 5PN, 5SW, (5US), 5WB, 5XA, 5XB, 5ZA, 5ZB, (5AAB), 5AAG, 5AAM, 5AAR, 5ADE, 5AER, 5AMS, (5XAD), 5ZAK, 5ZAS, 5ZAV, 6KA, 6TI, 7SC, 7ZU, 9CP, 9CR, 9EL, 9EP, 9ET, (9FP), 9IG, 9II, 9KP, (9LH), (9OR), (9OX), (9PC), 9PD, 9PE, (9PF) 9PS, (9QP), 9QR, 9RC, 9UC, 9UH, (9UR), (9UU), 9VM, (9VZ), 9WC, 9YB, 9YF, 9ZN, 9ZY, 9AM, 9APS, (9ACE), 9ARZ, (Continued on page 75)

Radio Communications by the Amateurs

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



The Code's the Thing!

Wooster, Ohio,

Dear Eddy—

I don't know why I'm writing this—guess it's because I'm glad I'm an amateur—a real honest-to-goodness CODE guy!! There has never been a thing that gave me half the enjoyment that radio—called 'Wireless' by the BCL's—has. Gess, I've tried about everything, too, that I cud in the short time I've been knocking about. I suppose I would never have seen the light (of amateur radio) if it hadn't been for the atmosphere that I was in when I began going to the Radio Club's meetings. There I learned that there was something else in the air besides a bunch of squawling sopranos. 8BMF, 8BPP, and ex8LS were all pesticated with me until I left town this last June. It was because of their great patience that I was willing to listen to the REAL STUFF. Thanks, OM's!!!!

This is what I really want to say: YOU—the fellow with the transmitter grab the BCL just as soon as he hears his first concert. Take him to your joint—show him how easy it is to read code—and you'll find it easy to get him to take up the amateur cause. Now is the time to act—before they hear too many concerts.

Best 73's to all the GANG.
Sam Taggart, 8DBM

Yea Bo!

Eddy:
WOULDN'T IT BE GREAT
IF Maxim was Pres. of this U.S.A.
And K.B.W. was Sec. of Commerce
So we could all
Use 6 K.W.'s
And Schnell was Sec. of War
So we could borrow the Army
For a day, or so,
And suppress lizzy coils
And Godley was Sec. of foreign affairs
So we could have real class
To our Trans-atlantics
And Reinartz was Com. of Navigation
So we could all have
Special Licenses
And Langmuir ran a Dime Store
Selling 100 K.W. tubes
BUT
They aint
SO
We have rotten broadcast stations

And rottener broadcasts
And our traffic is marked:
"Subject to change without notice"
And every Damphool who is a
Broadcast listener
Starts a "Radio store"
With a binding post
And a tuning coil
And sends us "Price Lists"
And clutters up the mails
So our QSL cards
Have to wait.
OH MAN!
AIN'T IT H--L?

NYNE ALF

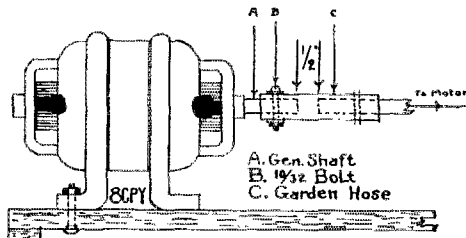
A Flexible Coupling

Kalamazoo, Michigan.

Editor, QST:

Here is a little wrinkle for the ham who buys his generator and motor separate and then wants a satisfactory coupling that will be flexible. I have been using this arrangement on two motor-generator sets and have had no trouble whatsoever with it. They have been in use for over a year. Also the beauty of this coupling is that it can be stretched to fit larger shafts. Hope this will be of some use to some of our A.R.R.L. family.

Best 73's,
Jas. A. Wilson, 8CPY.



Making the Filament Behave

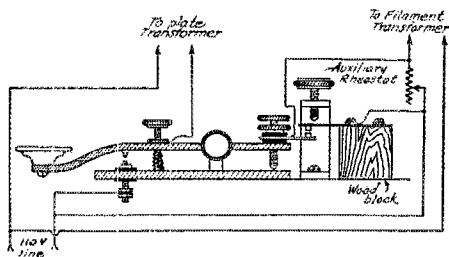
Oklahoma City, Oklahoma.

Editor, QST:

Am attaching a paragraph which I thought might be of some interest to some fellow ham who is having the same trouble that I had; namely, a drop in the voltage on the sending tube filament every time the key is closed. In my case, each time I hit the key the voltage dropped from seven and one half to seven volts and the only

way to keep the voltage up was to use eight volts when the key was up, which was rough on the filament. So I worked out the attached idea.

The auxiliary set of contacts are Ford coil vibrators, which can be bought cheaply anywhere. One of them is mounted on a wooden block of the proper height and the other has drilled in it a hole large enough so that it can be slipped over the rear adjusting screw of the key lever without touching. It is put on this screw between two mica or fibre washers and clamped in place by the locknut. The auxiliary contacts are adjusted so that they make contact an instant before the main contacts at the front of the key.



The variable resistance can be quite small; an ordinary receiving tube rheostat will handle a 150 watt transformer. One ten-ohm or two six-ohm rheostats will do the trick.

When first adjusting the arrangement the extra rheostat is set in the open position and the ordinary rheostat (in the filament circuit) is used to adjust the filament voltage to the correct value while the key is being held down. The key is then let up. The filament voltage will at once rise to an excessive value. It is then brought back down to the right value by adjusting the new, extra 110-volt rheostat. If the adjusting has been done carefully the filament voltage will remain steady.

Yours truly,
P. T. Crosby, 5TA.

Are We Fair to the Novice?

New York City, N.Y.

Editor, *QST*:

Not very long ago, during a conversation with some friends the topic of the present situation of the "novice" and the "dyed-in-the-wool amateur" was discussed. One of my friends, a novice budding into the amateur class, stepping towards me said, "To come to the final point do you truthfully believe the amateur is fair to the novice?" I answered, "Why of course, why not?" "Well I don't think you will believe that way after you here what I am about to say," was his reply. And this is what he said:

"For my first example I shall take a little incident that occurred the other day. Wish-

ing to become a 'real ham' I decided to visit a fellow around the corner who is a licensed amateur and who I thought would be kind enough to give me some advice. On arriving at his home I was admitted and shown to the wireless shack. On entering the room, an array of apparatus both for transmission and reception met my gaze together with a neat red sign bearing the call letters 2--- hanging above the instrument table. The next instant I was greeted and shown a seat. After that no more attention was paid me for about twenty minutes. Then Mr. M--- the amateur, removed the phones from his ears and sat down next to me. "Well, what do you think of my set?" he asked me. "Great," was my answer. "I suppose you hear my phone sometimes?" he questioned. "I sure do," I replied, "and you come in great, as clear as a bell." "I am glad to hear that, a great deal of my success being due to my filter system, you know." "No, I don't know," I should have liked to say but restrained myself. "What is the filter system, may I ask?" This question went unanswered as did a great many more. At last it came time for me to leave and I returned to my own radio room knowing little more than before I visited 2---'s station. A short time afterward I visited another licensed station owned by a Mr. E---. I was received very nicely here and much attention paid me until I told Mr. E--- that I did not own a transmitter, thereafter receiving little or no attention from my amateur 'friend.'

"I have had many experiences of this kind since then and I am starting to believe that the word "amateur" means nothing more than selfishness and unfairness. Now do you think the amateur is fair to the novice? I know all the amateurs are not this way and I myself am learning the code and in a short time hope to be operating a real amateur station, transmitter and all."

As this is the end of my friend's narration, it is time for me to sign off also. But before closing I regret to say that I think there is a great deal of truth in what my novice friend said. It is a sad state of things, fellows, and we ought to start in and put the novice on the right path—the path that leads to amateur radio.

Yours very truly,
Ellsworth J. Hedges.

Another Simple Tuner

New Orleans, La.

Editor, *QST*:

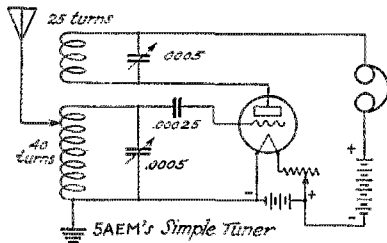
Am a member of the A.R.R.L. and an ardent reader of *QST*, the amateur radio magazine. I am using a very simple receiver that used no more apparatus than a single-circuit tuner, yet is more selective.

The tuner can be made from an ordinary variocoupler. It works, too—with a single tube I have heard 1AA, 2BRB,

3ARO, 4EH, 5ZA, 6KA, 7LU, 8BKA, 9ZN and also phones in California, Cuba and Canada. I have never used an amplifier.

Hope this hook-up helps someone, maybe "Paul G. himself."

Dean H. Wallis, 5AEM.



[Editor's Note: This circuit should not be confused with the common single circuit rig, over which it is a considerable improvement. The antenna circuit is only roughly tuned and is used as a collector circuit while the secondary circuit is capable of selective tuning by the secondary condenser.]

What Would You Suggest?

Dallas, Tex.

Dear Sir:

I have been advised that you are a pretty good authority on matters pertaining to radio reception and transmission and would like to ask your advice on several matters which have puzzled me for some time.

I have a 5-kw., double-barrel, seven-passenger, triple-valve, nonskip outfit, complete with U. S. safety appliances (standard) and Timpkin rear axle, which I use in connection with a 210-volt, hammerless, self-winding, automatic, 16-jewel, nickel-plated, Marconi antenna with pneumatic tires. Have had a great deal of trouble with my Galena at night since I started using vegetable compound, but get better results by painting it with iodine. I can get undamped waves all right with my regenerative vacuum sweeper in dry weather, but on Sundays I find that my rheostat keeps interfering with the differential so that it is necessary to cut in a small .0045 M.F. washboard between the piano and the kitchen sink.

Until recently I used a five-string, tenor, hardwood amplifier with 240 turns of No. 4½ barb wire around the front sight cover, but I found that with this arrangement the felicity of the heating element had a tendency to become impregnated with the pigment from the valve stem, so on advice from General John Pershing I removed the drift slide and substituted a duplex automatic stoker, which allows the left dorsal ulna bone to oscillate between the hydrometer and the upper sling swivel and prevents the choke coils from short-circuiting the permanent wave length.

I was wondering if by placing the blow-off cock in juxtaposition to the universal joint on the loop aerial and using an emergency application of air on the primary windings, would the cubic capacity of the variable condenser in any way effect the centrifugal dirt collector of the three-way switch of the microphone, and, if so, would this be a reversible reaction? Also do you think that by using more chalk and a little high English on the cue ball, would the pilot beam interfere with the insulation on the superheater pipes?

Any suggestions you have to make in regard to the foregoing matters will be greatly appreciated by me.

Yours very truly,
A. N. R. Novice.

A Better Way to Save Your Neck

Los Angeles, Calif.

Editor, QST:

I was quite interested in an article by Mr. Norman Hood in the December issue entitled "Saving Your Neck," because I had the same problem to solve away back in 1908.

While Mr. Hood's method probably is all right on short or medium height poles, I doubt very much if it could be used on poles 100 feet high.

A much better way to replace broken rope is herewith submitted. Construct a five foot tailless kite (known as the Malay Kite). These kites fly very steady in a light or medium breeze. Allow the kite to run out several hundred feet. Then attach a metal ring large enough to drop over the end of the pole, to the kite string by means of a light string or strong thread. Fasten the new pulley to the metal ring. Place a piece of very light rope or strong twine through the pulley. The rope should be long enough to reach to the top of the pole and back. Now allow the kite to lift the ring to the top of the pole. With a little patience the ring can be dropped over the top of the pole where the guy wires will hold it up. The light rope through the pulley is used to pull up the regular rope. The kite string can now be broken away from the ring because the holding thread will break first.

Yours truly,
H. W. Leighton.

Re Variable Condensers

S. S. Redondo,
San Diego, Cal.

Editor, QST:

I have read many excellent articles in QST on aerials, grounds, wave meters, power factor, etc., which have proven invaluable to me, and to many other QST readers. There is one piece of radio apparatus to which very little attention has been paid and that is the variable condenser.

In the article on wave meters by Mr. S. Kruse, a small part was devoted to vari-

able condensers, which was very interesting and also valuable but was only of a general nature. The Bureau of Standards "Circular No. 74" spares a few pages to the variable which gives quite a deal of information on variable condensers, yet leaves so much unsaid. The MB Sleeper publication No. 6 devotes some space to variables in which he says "A small insulating bushing set in metal end plates causes a concentration of the electro-static field resulting in large losses."

These publications are the only books I have read which give more than a slight notice to the variable condenser. I do not claim to have read all of the radio text books, but have used as much time as possible reading over those at the I.R.E. Library at 59th St., N. Y., and also many of the radio magazines.

Let us consider the catalogs of the large Radio Mail Order Houses, there we find the majority of the Variables illustrated, and your attention called to the excellent features, which aint, and the rotten ones are left unmentioned. Better yet, suppose you are in a large city, and you walk into a radio store and after looking over several condensers, you price them, and all that is left for you to do is to select one which appeals to the eye and then the pocket book and give some one else a chance to be served or served out. How much better we could be served if we selected a condenser which after a critical examination met the standard set by that excellent article on the very same piece of radio apparatus, which we read in "QST." Get my drift. Much more satisfactory than buying according to fancy. We have reached the stage where the fancy radio novelty is over for QST readers anyhow, because of the reliable articles it publishes. Remember the old Window Shade Variable.

Now that tube transmitters are here to stay it behooves us all to design our C.W. receivers for the highest efficiency possible. The same holds good for wave meters—we want the best we can get for our money and if we can improve at a slight cost it will be done. The matter before us is how to select and how to improve.

Let us compare some of the features of the most well known variable condensers for reception.

The Murdock and Chelsea condensers use the die cast type of plate mounting. Why? Does the die casting of condenser introduce any losses, or reduce any losses? Is it more efficient than a condenser using washers for separators.

Next let us compare insulation. The Clapp-Eastham and DeForest vernier use a bakelite bushing to insulate the rotary from the stationary plates. The Chelsea and Murdock use end plates of bakelite or moulded composition to separate the plates. The Illinois' uses small squares of bake-

lite to insulate the plates. The Coto Coil condenser uses three bakelite washers for insulating the plates and three for support and insulation. On considering these various methods we are confronted with the problem of deciding which of these various methods of insulation offer the highest efficiency. What are the losses caused by poor distribution of insulating material? What material has the best insulating qualities? What is considered the Ideal Method of insulating the plates?

Considering the plates, some are made of brass, others of aluminum which seems to be in the majority, and one concern has a variable condenser on the market, the plates of which seem to be made of zinc. What metal is considered the most efficient? Why? Regarding spacing of the plates, I may mention, I have a variable condenser which owing to the close spacing and the thinness of the plates, is effected by climatic changes by short circuiting. This problem is one the manufactures should pay more attention to.

Another problem is the method of contact with the moving plates. The condensers use a wiping contact in most cases, only a few use soldering pig-tail contact to the moving plate. One is at a lost to decide whether the manufactures are not aware of the fact that the pig tail contact will add to the efficiency of their product or do they cater to the army of dial twirlers?

Then again the bearings of the moveable plates should be constructed to prevent short circuiting by allowing a *substantial* adjustment of the spacing between the fixed and moveable plates. The question is, what is considered the most substantial design of bearing?

Next we have the mica condensers for reception as manufactured by the R.C.A., Crosley and Connecticut Co's. Very little data has been published on this type of variable. It would be interesting to know the efficiency of this type of condenser as compared with the metal plate variable condenser. What losses are introduced in a receiver using a mica variable condenser? What advantages has the mica condenser over the metal plate-air variable?

A question of importance in designing receiving apparatus, where more than one variable condenser is used is, what is the maximum distance of separation of the variable condensers to give the greatest efficiency? In what position should a variable be mounted in regard to the inductance? How should the plates of the variable condenser be connected to the inductance to reduce the capacity effect? How far do the electro-static lines of force extend beyond the edges of the plates? What is the effect of these lines of force on other apparatus in the set?

It would be of value to explain some

reliable method of testing the variable condenser by a millimeter or other instrument, where a comparative test could be made of over-all efficiency.

I am sure an article explaining the whys and wherefores of the variable condenser would be of much interest to the readers of *QST*, for it would let us know what to consider when selecting a variable condenser, and also what alterations to make on the condenser we now have, to gain the highest efficiency.

If such an article is not possible for a while yet, would you be so kind as to recommend any literature you know of which handles the subject in detail.

Cordially,

Ben. B. Skeete.

[Editor's Note: The above rather hits a sore spot and we have to admit that there is not a wonderful store of information on the practical importance of the various losses in condensers. Various manufacturers stress the importance of some of the details enumerated above and fall down miserably on others and we know they are important. Most of us cannot afford the laboratory type of condenser but want to know how near we can come to the ideal and what it will cost. We therefore back up Mr. Skeete in his request for a *good, practical, amateur* article on this subject.]

Just the Same Matty Is Putting Up a Gold-Plated Antenna on Porcelain Insulators at 9ZN A Super-Wuxtry Spark Transmitter Par Excellence

Lakewood, Ohio.

Dear Ed:

For some time I have been promising to tell you about our double-wuxtry Class XXXX spark station. A couple of years ago, Kid Crossely decided to clean up the world with C.W. We all told him it was the bunk (some of us have reformed since) but he went ahead and procured by some hook or crook a 250-watt tube and all the necessary accessories. I was there the night of the big doings. In one hour's time the following occurred: one 250-watt tube had burned out, one transformer, several small tubes and a flock of meters had also expired. Friend 8BCO swore for about two hours. After trying the works 57 times to be sure it was "out," he chucked the remains in a corner and "closed on C.W. forever."

This year four of us started to put up a real spark station. Crossely and Savage invested in a 2 k.w. 240-cycle motor-generator, also a brand new 3 h.p. motor to pull it, as the motor on the m.g. was D.C. The first trouble we found was that the machine was only 120 cycle so we had to re-pole the hack to get our 480 sparks. We mounted my "old Betsy," which is a 12" disc sur-

rounded by a 14" aluminum housing, on the m.g. to run synchronous. We were just pulling the spark into step when something exploded. The gap electrodes had heated up and come together. The disc was stepping 2500 r.p.m. when it collided and I guess all the parts haven't come down yet. The disc pulled one of the electrodes in and the condenser started after it but I grabbed it. Next we blew two sections of moulded condenser, then a glass one, then another. Now they're in series.

The log shows that on Dec. 4th six cops tried to take one of the ops to the hoosegow at 3 A.M. thinking he was robbing the place. After he told them his age, height, complexion, and what right he had to live, they partly believed him. They rang the door-bell on the Crossely residence and after a few minutes woke D.A.C. He saw the lights flickering and thot that kick-backs were ringing the bell, so he turned over and tried to sleep again. The bell persisted, so he got up and told the cops to go back where they belonged.

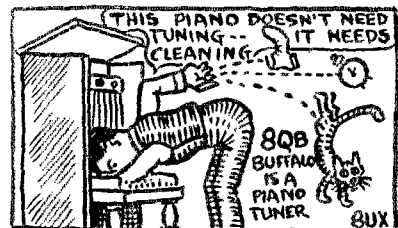
The next night we blew the primary fuses and put the whole street in darkness. Our line was still OK, tho, so we hooked the two next-door neighbors on our own circuit and they think we are wonderful. Two days later a kick-back set fire to a neighbors garage and burned the meter off the wall. Two of our ops work for the local power company, so the neighbors had a new meter in a jiffy and we are about ready to open up again.

A few points about the station. We have a 6-volt 1000-ampere-hour storage battery; we don't know what for but we've got it. A forty foot pole sits on top the operating room roof and everyone is afraid to come in. We are using the motor end of the m.g. as a generator to excite the alternator field and also to charge the 1000-a.h. battery at 35 amps whenever the machine runs.

If you think this isn't some station ask Mathews of 9ZN. He was here and gave it the once-over. Also if you are ever out this way, OM, bring along a suit of brass armor (steel would get magnetized) and we'll take you thru the institution.

Yours trooly,

P. A. Marshal,
A.R.R.L. Dist. Supt.
8FK, and "PM" at 8BCO.



CALLS HEARD

(Continued from page 69)

9ASE, 9ANQ, 9AHQ, 9AMH, (9AAP), (9APW), 9AEP, (9ATN), 9ATD, 9AIG, 9AFK, 9AUS, 9AOG, 9AVG, 9APM, 9AWF, 9AAU, 9BZI, (9EJR), (9BHD), 9BZE, (9BRK), 9BHI, 9BIK, 9BSZ, 9BOP, (9RKJ), 9BUK, 9BOH, 9BVY, 9BVZ, 9BJI, (9BED), 9BIO, 9BAK, 9BRY, 9BCJ, 9BDS, 9CBA, 9CXH, 9CUI, (9CFZ), 9CXP, 9CTG, (9CTE), 9CLQ, 9CCS, 9CEB, 9CXG, 9CUC, 9CCM, 9CPY, 9CIT, 9CTB, (9CCK), 9CTV, 9CYW, 9CGK, 9CBK, 9CBG, 9CKC, (9CEE), 9DYU, 9DQU, 9DFB, (9DSD), 9DVL, 9DKQ, 9DGR, (9DGV), 9DWK, (9DIO), 9DRK, 9DXN, 9DZY, 9DXM, (9DSM), 9DCK, 9DJF, (9DJB), (9DGN), 9DXC, 9DRI, 9DVW, (9DAX), 9DKY, 9ECE, 9EEY, 9EDB, 9EHN, 9KAC. Canadians: (2HG), (3BP), 3BQ, 3BV, 3DH, 3FC, 3FO, 3GE, 3GH, 3JT, 3NB, 3SI, 3SX, 3XN, (9AL), 9BJ, 9RV. British: 6MS.

8BFQ, Cleveland, Ohio

C.W.: (1AOK), (1BDI), (1BII), (1CPN), (1QP), (1RD), (1SN), (2BJO), (2BMR), (2BQU), (2BZV), (2CDB), (2CPA), (2CQZ), (2HG), (2PV), (2ADP), (2BJY), (3CA), (3HS), (3OK), (4BI), (4DO), (4HW), (4HX), (4LJ), (4OI), (5AEC), (6JS), (5RH), (5SF), (5SK), (5XA), (6ARB), (6ES, 6CU), 6EA, (6XAD), (6ZH), 6ZZ, (7SC), (9ACP), (9ABU), (9AOG), (9ARI), (9ATZ), (9AUS), (9BGI), (9BHW), (9BRQ), (9BTL), (9CHA), (9CBS), (9CIT), (9CMV), (9CTG), (9DAW), (9DHS), (9DKK), (9DQU), (9PS), (9UH), (9VK), Canadians: (3BQ), (3SX), (4CO).

8ATX, Pontiac, Mich.

C.W.: 1AP, 1GV, 1IL, 1IL, 1MC, 1ON, 1QP, 1RD, 1RV, (1SN), 1TS, (1PM), 1OW, (1WC), 1XM, 1XU, 1ZE, 1AB, 1AHZ, 1AJP, 1AJX, (1AKL), (1AOJ), 1APC, 1ARY, 1AWB, 1AWE, 1BAN, 1BAS, 1BES, 1BDI, 1BGC, 1BIV, 1BKK, 1BOM, (1BOQ), 1BQI, 1BRQ, 1BWY, (1CAK), (1CBJ), 1CBP, 1CFI, (1CGR), 1CHP, 1CIK, 1CJH, (1CKP), 1CMK, 1CMP, 1CNF, 1CPN, 2AN, 2BY, 2FP, 2GP, 2OM, (2NE), (2AP), 2AWL, 2AXF, 2AYV, (2BBL), 2BCB, 2BKL, 2BMR, 2BRB, 2BRC, 2BUN, 2BUY, 2BVH, 2BXV, 2CCD, 2CGI, 2CGT, 2CIM, 2CKA, 2CKK, 2CKM, 2COL, (2CPK), 2CPU, 2CQI, 2CQZ, 2CVU, (2CKL), 3AB, 3CG, 3DQ, 3EM, 3FQ, 3HK, 3HS, 3IL, 3IR, 3JJ, 3KM, 3LK, 3ME, 3MF, 3OE, 3OY, 3PZ, 3QZ, 3SU, 3TE, (3UC), (3VV), 3YJ, 3YO, 3ZO, 3ZP, 3AAO, 3ACR, (3ADB), 3AJD, 3ALN, 3ALU, 3AMW, (3APR), 3AQR, 3ARO, 3AUV, 3AUW, 3BCJ, 3BGI, 3BIF, 3BJY, 3BLE, 3BLZ, 3BSS, 3BUY, 3BVA, 3CAN, (3CBZ), 3CCU, 3CDG, 3CQE, 4AG, 4BY, 4CY, 4DC, 4DT, 4EB, 4EH, 4EL, (4BI), 4FJ, 4FT, 4HW, 4HX, 4IR, 4JL, 4JY, 4IK, 4KU, (4LJ), 4NV, 4OI, 4YA, 4ZC, 5CP, 5EK, (fone), 5FV, 5HO, 5IQ, 5JB, 5JS, 5KC, 5KW, 5LJ, 5LU, 5LZ, 5MB, 5MO, 5NH, 5NV, 5OU, (5PV), 5PX, 5PB, 5RH, 5SP, (5UK), 5US, 5XA, 5XT, 5ZB, (5AEC), (5AGI), 5AIB, 5XAB, 5XAC, 5ZAK, 5ZAS, 5ZAT, (5ZAV), 5ZAX, 5ZAV, 6EA, 6GF, 6JD, 6ZG, 6JD, 6ZH, 6ZZ, 6ANH, 6ARB, 6AVV, 6BOE, 6CGW, 6XAD, 7LU, 7PF, 7SC, 7ZU, 7ZV, 8's too numerous, 9's over 500 miles (9UH), (9ZT), (9AOG), (9AOR), (9ATN), (9AWS), (9BDS), (9BGI), (9BKJ), (9CHN), (9CKI), (9CLQ), (9CUC), (9DGE), (9RCZ), Canadians: (2AF), 3AD, 3BQ, 3BV, 3DE, 3DH, 3HE, 3IL, 3JL, 3KO, (3GB), 3NI, 3OE, 3OH, 3SI, 3TL, 4CO, 4CN, 9AJ, 9AL, 9BV, 9BS.

Stations worked Feb. 24 in 3 hours with 10 watt set: 1CBI, 2NE, 3VW, 4LJ, 5AEC, 5BHF, 9CKL.

8AUU, Canton, Ohio

Spark: 1BOQ, 1CNI, 2AVN, 2OM, 3YK, 4FD, 5FV, 5GD, 5HD, 5XA, 8AWG, 8BBK, 8CKV, 8CDV, 8CNR, 8EC, 9AOJ, 9AUN, 9ASO, 9AJP, 9AZE, 9AU, 9BEC, 9BPJ, 9BID, 9BAH, 9BP, 9CDA, 9IU, 9DHG, 9DWF, 9DAY, 9DQQ, 9DIG, 9HJ, 9CA, 9OF, 9PR, 9VZ, 9YAK. C.W.: 1AWB, 1AYZ, 1AAO, 1ALA, 1AJW, 1AF, 1BKQ, 1BVR, 1BES, 1BAN, 1BPD, 1BWJ, 1BFE, 1BEN, 1CME, 1CKP, 1CMP, 1CAB, 1CJH, 1CRW, 1CDR, 1GV, 1LL, 1MC, 1OW, 1QP, 1UJ, 1XM,

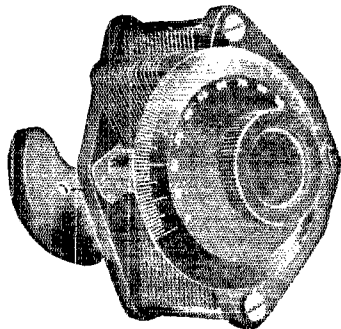
1XU, 1ZE, 2AFM, 2AXK, 2AYV, 2ANM, 2AER, 2AZY, 2AF, 2BJO, 2BFW, 2BWU, 2BUM, 2BLS, 2BMR, 2BK, 2CQZ, 2CPD, 2CQN, 2CCD, 2CBG, 2CGT, 2CKN, 2CPO, 2CVU, 2FP, 2HJ, 2HL, 2HO, 2JM, 2KF, 2MX, 2NZ, 2OE, 2RM, 2SE, 2SM, 2SQ, 2XO, 2XQ, 2XZ, 3AJJ, 3ADQ, 3AWA, 3ARO, 3ACY, 3ALN, 3AQR, 3ADT, 3AUW, 3ADT, 3ALU, 3AGA, 3ACR, 3BQX, 3BWT, 3BUY, 3BIJ, 3BG, 3BOB, 3BJY, 3BUC, 3BGJ, 3BEL, 3BCS, 3BVA, 3BOF, 3BDM, 3BPV, 3BPY, 3BGC, 3BK, 3CAN, 3CXD, 3CA, 3CC, 3CM, 3CP, 3CX, 3DV, 3FQ, 3GZ, 3HD, 3IF, 3IL, 3IL, 3JL, 3KM, 3IK, 3NI, 3OT, 3PZ, 3RF, 3TJ, 3UC, 3VW, 3WF, 3XM, 3YO, 3ZO, 4AA, 4AG, 4BI, 4BK, 4BX, 4BY, 4CG, 4CL, 4CY, 4DB, 4DN, 4EA, 4EB, 4EH, 4EL, 4FA, 4FD, 4FT, 4GZ, 4HW, 4KL, 4KU, 4LJ, 4NZ, 4OD, 4OI, 4OJ, 4YA, 4ZC, 5ACQ, 5AGJ, 5BE, 5BM, 5BW, 5BX, 5CO, 5CS, 5DN, 5DW, 5ED, 5EK, 5FV, 5GJ, 5IQ, 5IX, 5JB, 5KC, 5MB, 5MO, 5NZ, 5OH, 5OM, 5ON, 5OT, 5PF, 5QM, 5TJ, 5UF, 5UK, 5US, 5VA, 5VY, 5XAD, 5XA, 5XT, 5XV, 5ZAS, 5ZAT, 5ZAB, 5ZB, 5ZS, 6AFT, 6AWV, 6BVS, 6CAJ, 6EN, 6KA, 6PL, 6QT, 6ZZ, 7AFS, 7AIY, 7AD, 7AV, 7EH, 7VF, 7ZU, (8's too numerous) 9ARZ, 9APW, 9AAS, 9AMU, 9APS, 9AGV, 9ATO, 9AJH, 9AWL, 9ALW, 9AOG, 9AAP, 9AZA, 9ARG, 9AYY, 9AWK, 9AMH, 9AQA, 9ANF, 9AJS, 9ADP, 9AGS, 9ACB, 9AVN, 9AR, 9BVG, 9BRK, 9BES, 9BA, 9BHD, 9BLT, 9BSG, 9BSD, 9BCH, 9BZI, 9BAH, 9BST, 9BKC, 9BVI, 9BSQ, 9BJV, 9BKP, 9BQW, 9BXT, 9BZY, 9BEM, 9BYA, 9BGI, 9BFD, 9BRL, 9BTA, 9BKF, 9BHI, 9BDP, 9BGT, 9BXC, 9BRI, 9BJN, 9BEL, 9BJR, 9BED, 9BVK, 9BPA, 9BSN, 9BRX, 9BWF, 9BP, 9BX, 9CTG, 9CDU, 9CNV, 9CBA, 9CPB, 9CIN, 9CTE, 9CNS, 9CED, 9CAC, 9CPE, 9CDR, 9CXF, 9CPB, 9CJI, 9CHE, 9CUI, 9CWW, 9CRM, 9CEE, 9CHE, 9CWR, 9CGD, 9CTV, 9CWA, 9CDU, 9CFM, 9CTB, 9CCV, 9CP, 9CR, 9DJM, 9DVK, 9DGX, 9DGN, 9DKQ, 9DUM, 9DCB, 9DGE, 9DMF, 9DRI, 9DKY, 9DFB, 9DVW, 9DDY, 9DJI, 9DWF, 9DXO, 9DXD, 9DCR, 9DHB, 9DXC, 9DIT, 9DIS, 9DGG, 9DTI, 9DAT, 9DKK, 9DSW, 9DIO, 9DTJ, 9DJB, 9DMX, 9EAR, 9EDB, 9EDF, 9ESS, 9EJT, 9ECE, 9EHN, 9EBI, 9EP, 9FM, 9GX, 9IG, 9JW, 9KZ, 9LH, 9LR, 9LY, 9LZ, 9OF, 9OH, 9OK, 9PS, 9QR, 9UH, 9UK, 9UR, 9US, 9UU, 9VK, 9VN, 9VZ, 9WC, 9XAC, 9XB, 9ZAA, 9ZAF, 9ZJ, 9ZL, 9ZN, 9ZT, 9ZY, Canadians: 3BQ, 3DH, 3DS, 3GK, 3TA, 9BJ, 9BV, French: 8AB.

8CWC, Oxford, Ohio.

Spark: 4FD, (9BAH). C.W.: (1AJF), 1AP, 1AF, 1ASJ, 1AWB, 1AYZ, (1BAN), 1BEI, 1BES, 1BFT, 1BII, (1BIJ), 1BNF, 1BOM, 1BVR, 1BRI, 1BRQ, 1BSR, (1BWJ), 1CBW, 1CBG, 1CPB, 1CDO, 1CKP, (1CMP), 1CN, 1CRW, 1GP, 1MC, 1SD, 1WC, 1XM, 1YD, 2ABS, 2AER, 2AIF, 2ANM, 2BBB, 2BFH, 2BJG, 2BMS, 2BSB, 2BVH, 2BY, 2CBG, 2CEC, 2CEI, 2CJR, 2CKI, 2COL, (2COH), 2CPD, (2CPA), 2CQZ, 2CUI, 2CVJ, 2CVU, 2CXN, 2FP, 2GO, 2HG, 2HJ, 2HP, 2HW, 2NE, 2SK, 2SM, 2WR, 2ZS, 3ACR, (3ACY), 3ADQ, 3AFB, 3AJJ, 3ALJ, (3AR), 3AQR, 3ARM, 3ARP, 3BA, 3BEI, 3BHM, 3BJ, 3BLW, 3BMO, (3BUY), 3CAN, 3CCU, 3CEE, 3CEL, 3CO, 3CU, 3DH, 3FG, 3HH, 3FO, 3FS, 3H, 3IL, 3JG, 3JM, 3ME, 3MO, 3OE, (3PZ), 3RF, 3SK, 3TJ, 3TR, 3UD, 4AG, 4BK, 4HQ, 4DO, 4EB, 4EH, 4EL, 4EQ, 4FA, 4FT, 4GZ, 4JK, 4JL, 4KL, 4KM, 4KO, 4LJ, 4MB, 4ME, 4OD, 4OI, 4YA, 4ZC, 5ADO, 5ABQ, 5AFN, 5AGJ, 5AHJ, 5AUI, (5BM), 5BW, 5EK, 5FK, 5HO, 5IQ, 5JB, 5JV, 5KC, 5MB, 5NI, 5NN, 5NV, 5NZ, 5OV, 5PF, 5PU, (5PV), 5QI, 5RN, 5SM, 5SP, 5SS, 5SZ, 5TJ, 5UK, 5VA, 5XA, 5XB, (5XK), 5XV, 5ZAS, 5ZAV, 6AJH, 6BJG, 6CU, 6XAD, 6ZH, 6ZZ, 7VR, 7ZV, 8's too numerous, 9's selected: 9AAU, 9ACE, 9ACP, 9AEC, 9ADF, 9AFH, (9AFN), 9AHJ, 9AII, 9AKU, 9AMI, (9AMU), 9AOD, 9AOG, 9AOC, 9AOU, 9APW, 9AQU, 9ARZ, 9ATO, 9AVC, 9AUX, 9AYL, 9AZN, (9BDR), 9BEB, 9BEC, 9BEJ, (9BGC), (9BGI), 9BGT, 9BGX, 9BHI, 9BIC, 9BJG, 9BRI, 9BRV, (9BSZ), 9BTT, 9BUO, 9BVE, 9BVI, 9BWJ, 9BXM, 9BXJ, 9BYC, 9CBS, 9CDA, 9CDB, 9CES, 9CKW, 9CII, 9CLB, 9CLE, 9CLQ, 9CLW, 9CLZ, 9CPC, 9CPG, 9CPM, 9CPV, (9CSN), (9CSP), 9CVS, 9CWC, 9CXG, 9CKO, 9DAV, 9DBF, 9DCW, 9DGG, 9DIO, 9DLF, 9DJX, 9DKK, 9DLI, 9DXC, 9DXN, 9DYI, (9ECE), 9EGY, (9EKF), 9EKK, 9EL, 9EP, 9IG, (9OF), 9PG, 9QF, 9UR, 9YL, 9ZAA.

8PD, 8CTN, 8CXF, (8CXW), 8CYT, 8CYU, 8DAG, 8DAK, 8DAT, 8XAP, 8YB, (8YV), 8ZD, 8ZF, 8ZW, 9CM (9CRI), 9EP, 9IO, (9LZ), 9MP, 9OF, (9OR), 9QF, (9UH), 9UL, (9UR), (9VM), 9VZ, (9ABU), (9ACD), (9AIP), (9ANF), 9APS, (9APW), 9AQA, 9ASD, 9ASN, 9AZA, 9AZN, 9BIJ, (9BKJ), 9BRI, 9BRK, (9BWM), (9BXC), (9BXH), 9BXM, 9CFY, (9CFZ), 9CGD, 9CKP, (9CLQ), (9COC), 9CPR, 9CTE, 9CTN, (9CVO), (9CZF), (9DHS), (9DQM), (9DQV), (9DYY), (9EHN), (9EIB), (9EKF), 9YB, (9ZT). Canadians: 3JL, 3NI, 4CN, (9BX), 9LW.

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No. 3

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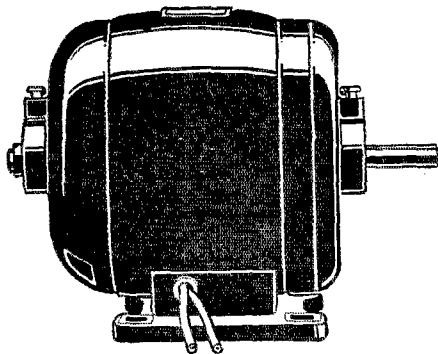
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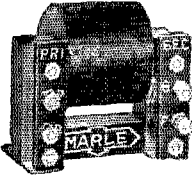


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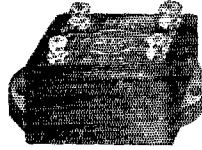
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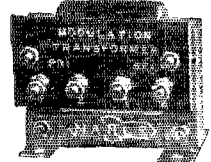
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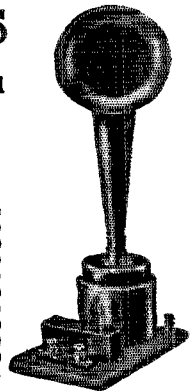
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November 29, 1928

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Burgess Battery Company,
Chicago, Illinois.

Dear Mr. Keith:

In reply to yours of the 21st of November,
I am always pleased to recommend a first-class article.

A year ago this month I received a shipment
of Burgess Batteries for use in conjunction with my re-
ception of American amateur signals in Scotland. These
batteries were taken to Scotland, used for ten days while
actually sitting in the main instrument on a rough table which
carried the apparatus. They gave entire satisfaction dur-
ing all this time. Some of them were brought back to the
United States and purposely left outside by nose all dur-
ing the winter in such a way. Last night I connected
two into circuit connection with the regenerative receiver
and two-stage amplifier. They functioned perfectly. I
am sending one of these batteries to you by parcel post
and should be glad to have you take it and place it in
your museum.

Knowing "B" batteries as I do, I consider this
as a very remarkable one.

I am,

Yours very truly,

Paul F. Godley

297:16

TWICE across the stormy At-
lantic, engulfed in oozing
mud, and exposed for months
to the destructive action of the ele-
ments, Paul Godley's set of BUR-
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swept, rain-drenched and sun-
scorched though they were, re-
sponded instantly and powerfully,
with the vital energy necessary to
the perfect operation of his deli-
cate receiving set.

While it is seldom that a radio bat-
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the stress of conditions a fraction
as difficult as these, Paul Godley's
experience stands out as a remark-
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tenacity of power and indestructible
construction of Burgess Batteries—en-
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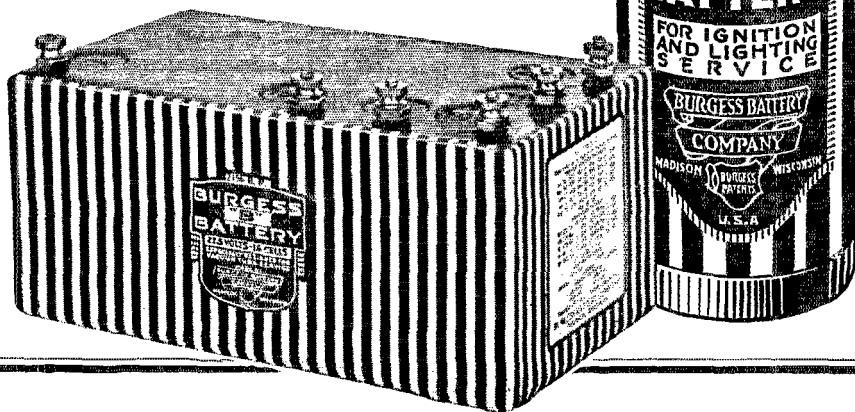
General Sales Office: Harris Trust Bldg., Chicago
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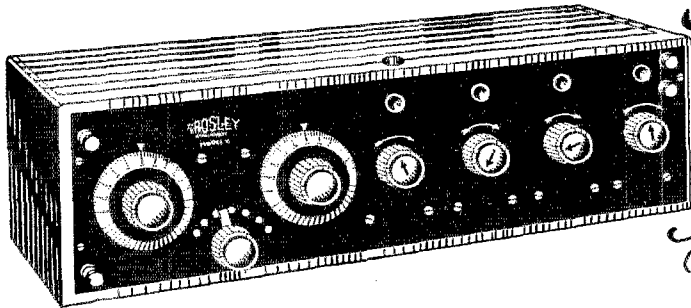
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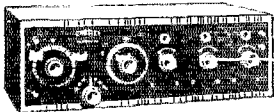
CROSLEY *Model* X

\$55



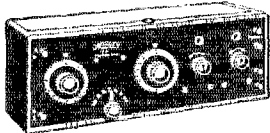
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We also manufacture a complete line of parts each one of which is guaranteed to perform perfectly. Among these are: Crosley Variable Condensers, Radio Frequency Amplifying Tuner, Sheltran Transformer, Cabinets, Vacuum Tube Socket, Rheostat, Vacuum Tube Adapter, Knob and Dial, Vario Coupler, Crystal Detector Stand, etc.

Write for Complete Catalog

The hit of the radio world. Not until you have listened in on a Crosley Model X can you appreciate the wonders of radio. Every day letters are received from satisfied customers telling of far distant stations clearly and distinctly heard.

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Listen In On a Crosley Model X and You Will Have No Other.

We invite correspondence from high-grade dealers concerning their handling these self-selling instruments.

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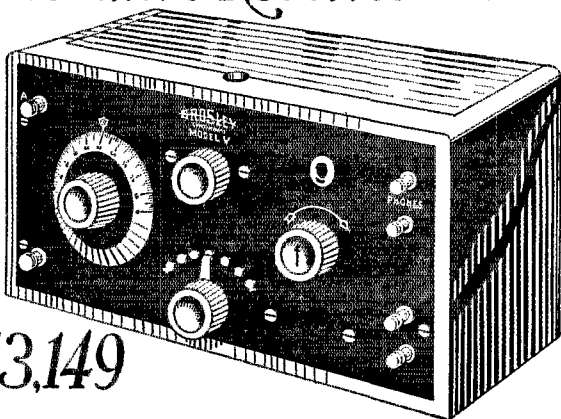
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CROSLEY *Model Vc*

\$20 *Regenerative Receiver Set*

*Licensed
under Armstrong
U.S. Patent No. 1,113,149*



There is no other one-tube set being manufactured today that will give better results than produced by the Crosley Model Vc Regenerative Radio Receiver. The proud owner of one of these instruments can bring in any powerful station in the United States. Stations more than 1000 miles away are being copied regularly on this set. Equal in every respect to the guaranteed performance of this instrument are its finish and appearance.

Model Vc with regular new style Adam Brown Mahogany Cabinet, panel engraved, \$20.00; with 2-stage amplifier, \$18.00.

Compare these prices with any set on the market.

The cabinets of both models are arranged so that the now popular $1\frac{1}{2}$ volt tubes may be used if desired. The trade name "Crosley" is used by permission of the Crosley Manufacturing Company.

For Sale By Good Dealers Everywhere.

The Model Vc, pictured above, is only one of many regenerative receivers made by The Precision Equipment Co. which have proven so tremendously popular. We also offer a complete line of parts.

Wide-awake dealers will find it to their advantage to get in touch with us in regard to handling this popular line.

THE PRECISION EQUIPMENT CO.

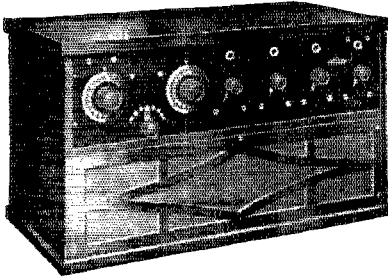
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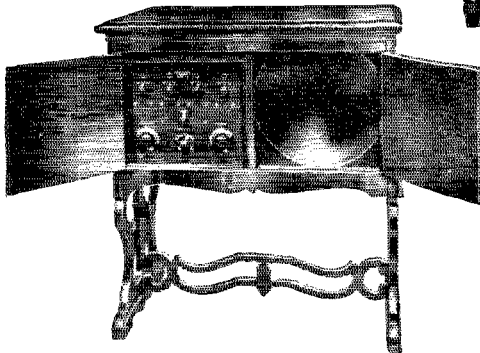


CROSLY MODEL XV
(Above)

The receiving apparatus in this model is the same as that in our cabinet model XX. The cabinet contains no place for the batteries, however, placed on a mahogany table or stand, it forms an attractive piece of furniture. Price without tubes, batteries or phones\$70.00

CROSLY MODEL XXV
(Below)

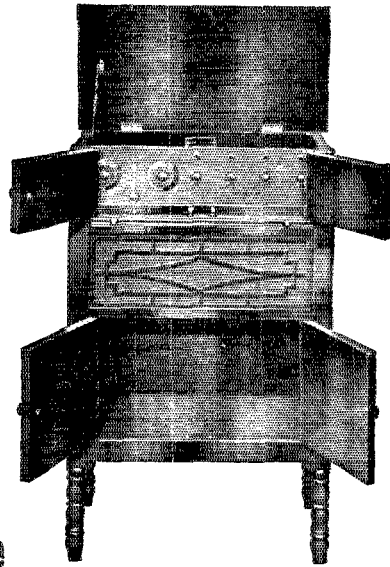
We can conscientiously recommend this console model as the most beautiful and efficient model offered today. The receiving apparatus contains the same units as our model X though differently arranged. The cabinet, of mahogany, exceptionally well finished, is arranged to take the Model R-3 Magnavox and also contains space for "A" battery, "B" battery and battery charger if desired. Guaranteed to bring in broadcasting stations 1000 miles or more distant so that they may be clearly heard all over the room. Price without tubes, batteries or phones\$150.00



CROSLY MANUFACTURING CO.
418 ALFRED ST., CINCINNATI, O.

CROSLY MODEL XX
(Below)

This attractive model is our Model X built into a highly polished mahogany cabinet. A hinged lid, when raised allows the operator access to every part of the receiving apparatus. A sliding board under the receiving apparatus for a desk for the operator when desired. The lower compartment is made to take care of the batteries and the middle compartment contains a loud speaker which makes it possible for music, speeches, etc. to be heard clearly by every one in the room. As a beautiful piece of furniture, this model is an addition to any room. Price without tubes, batteries or phones\$100.00



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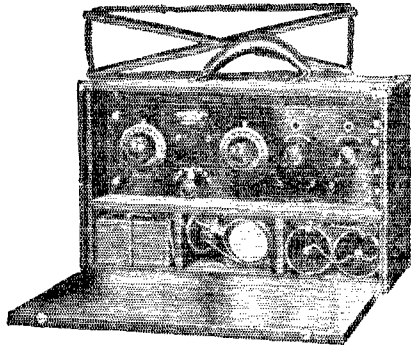
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No matter how far into the wilds you go on your vacation, you can keep in intimate touch with the outside world and enjoy its pleasures in the evening.

Crosley Portable Radio Outfits have made this possible. Absolutely complete in their compact cases, they may be easily carried and quickly set up.

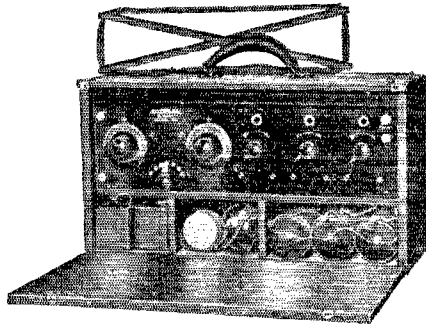
After a hard days motoring, fishing or canoeing what a pleasure to get out the old pipe, sit before the camp fire and listen to music, plays and innumerable other interesting things. Get a Crosley Portable and take it with you on your vacation. It will afford you the least expensive pleasure you have ever enjoyed.

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Crosley Model VI Portable

Consists of detector and one stage of tuned radio frequency amplification. Compact compartments are built into this set for batteries, phones, etc. Thousands of users have testified as to its satisfactory performance. Price, without tubes, batteries or phones\$40.00



Crosley Model VIII Portable

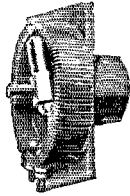
Consists of one stage of tuned radio frequency amplification, detector and one stage of audio frequency amplification. This set has the same general construction as Model VI Portable, but performs even more efficiently. Price, without tubes, batteries or phones\$60.00

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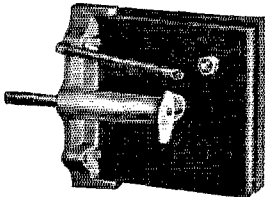
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Crosley Radio Parts

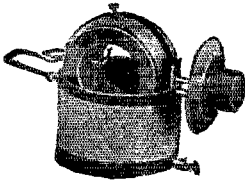
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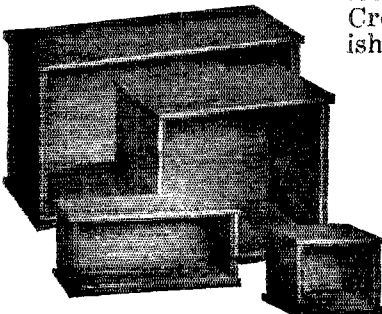
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In addition to the great number of radio receivers that we manufacture, we make a complete line of parts for those who wish to build their own outfits or make repairs no matter what the make of their instrument. These units are the same as those used in our various radio outfits and have therefore been tested in innumerable instances and proven to be of exceptional worth.

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Crosley Cabinets of beautiful finish may be had in various sizes.

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Crosley Radio Parts

Popularity Proves Their Worth

The fact that innumerable favorable comments are received daily from people everywhere who have used Crosley parts with entire satisfaction leads us to believe that you too will find that they will fill your every requirement.

The Crosley V-T Socket has been pronounced by many radio engineers as the best socket on the market. Its popularity is based chiefly on its high quality, efficiency, service and practical unbreakability combined with its very low cost.

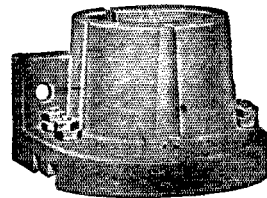
The Crosley Radio Frequency Amplifying Tuner consists of an inductance coil and a Crosley book type variable condenser. It can be tuned to any wave length between 200 and 600 meters. When used with non-regenerative sets it will increase the range many times.

The Crosley Sheltran is a completely shielded transformer. Embodied in it are all the characteristics so essential to obtain maximum amplification from the modern vacuum tubes used in radio work. Tests have proven the design to be correct to insure maximum efficiency.

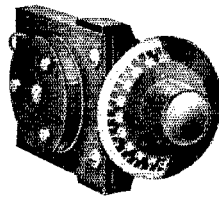
For Sale By Good Dealers Everywhere.

CROSLEY
BETTER · COST LESS
RADIO

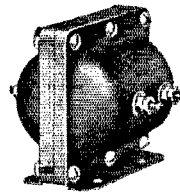
CROSLEY MANUFACTURING CO.
418 ALFRED ST.,



CROSLEY V-T SOCKET
Made of porcelain for base
or panel mounting.
Price40¢



**CROSLEY AMPLIFYING
TUNER**
Price\$4.00

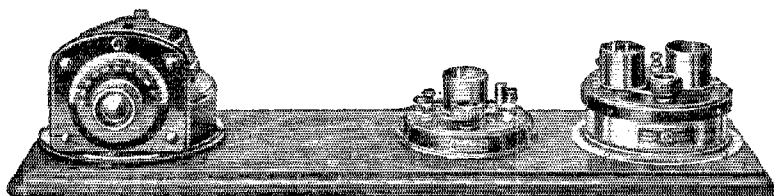


**CROSLEY SHELTRAN
TRANSFORMER**
Price\$4.00

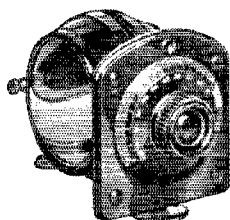
CINCINNATI, O.

ATWATER KENT

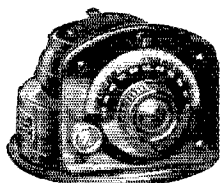
Receiving Sets and Parts



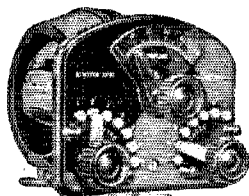
Complete Set consisting of Coupled Circuit Tuner, Detector Unit and 2-stage Amplifier. Other sets shown in circular



Mounted Variometer



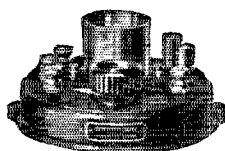
Type 11 Tuner



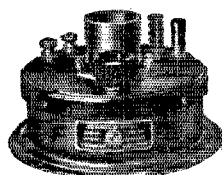
Mounted Variocoupler

ATWATER KENT Receiving Sets and Parts are built with the most particular care. From the moulding of the condensite forms and winding of the various coils, through the assembling and finishing of the units to the final mounting and wiring, every step is subjected to the most rigid inspection. It must be "just so." This is the reason why ATWATER KENT radio equipment has that "different" look that makes it instantly noticeable in any surrounding.

Atwater Kent products would sell on appearance.



Detector Unit



1-stage Amplifier

ATWATER KENT MANUFACTURING COMPANY

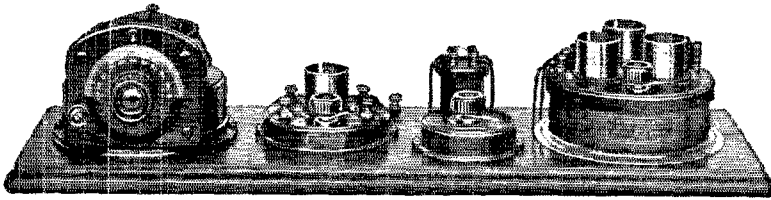
4945 STENTON AVE.

Radio Dept.

PHILADELPHIA, PA.

ATWATER KENT

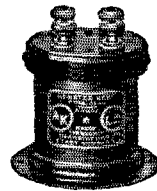
Receiving Sets and Parts



Complete Set consisting of Type 11 Tuner, one stage of Radio Frequency Amplification, and Detector 2-stage Audio Frequency Amplifier

BUT appearance is not the only feature that is watched. Even though the factory is pushed to its utmost capacity by the extraordinary demand for ATWATER KENT sets and parts, every unit is carefully tested to make certain that its performance is right. By this means, the radio fan is sure of getting a part or set that is not only strikingly handsome in appearance, but works perfectly, and gives the utmost satisfaction.

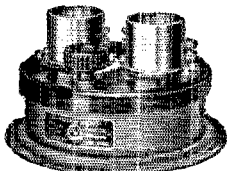
They stay sold on quality of performance.



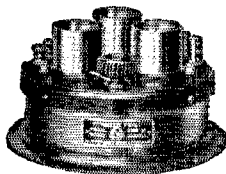
R. F. Transformer



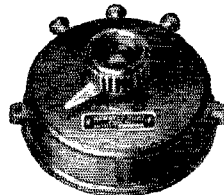
Standard Vac. Tube Unit



*Detector 1-stage Amplifier
A similar unit is furnished
in a 2-stage Amplifier*



Detector 2-stage Amplifier



Potentiometer

ATWATER KENT MANUFACTURING COMPANY

4945 STENTON AVE.

Radio Dept.

PHILADELPHIA, PA.

DO YOU?

Do you want to save 20 to 40 per cent on all your purchases of standard radio apparatus?

Do you want the personal advice and counsel of the greatest radio authorities in the country in solving your problems?

Do you want to receive free of charge a quarterly publication giving you a digest of the latest findings of radio science, telling you how to construct and operate both simple and advanced radio receivers and transmitters, together with a fund of other useful information?

Of Course You Do!

Then send us a post-card immediately, asking for Booklet T1, describing our Co-operative Service Plan.

The Radio Guild, Inc.
Co-operative Service Bureau
256 WEST 34th STREET
New York City

FREE CATALOGUE

Make DX Records
With DX Supplies

This Catalogue should be called "Recipes for Long Distance." It was written to help amateurs pull in the most distant stations.

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Write Department 203

D-X-Radio Company
123 Liberty St., New York City

SILENT NILES

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Pat. Pend.

THE BATTERY CHARGER SUPREME

Keeps your battery in prime condition and your receiving set always in service by charging at home from electric light socket.

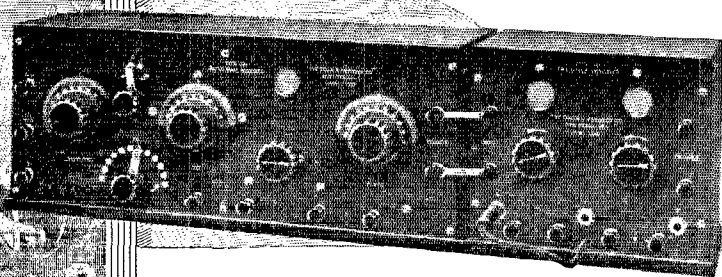
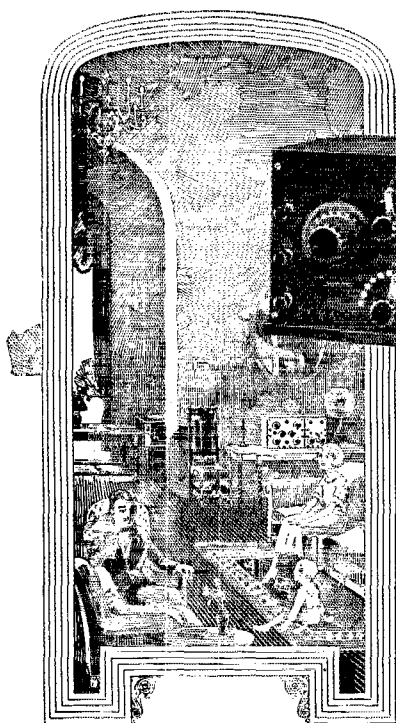
AN ASSET TO EVERY RADIO BATTERY OWNER—PAYS FOR ITSELF.

Price, \$17.50—\$19.50 West of Rockies

RADIO PRODUCTS CORPORATION

Manufacturers
8928 Clarendon Ave.,

Distributors
Detroit, Mich.



Elegance and Scientific Precision Combined!

YOU will welcome a Kennedy Receiving Set in your home. Its distinguished appearance lends itself to the most refined surroundings and outwardly reflects the accuracy and precision exercised in its manufacture.

In a cabinet of beautifully finished hardwood and mounted behind a richly polished panel you will find a series of precision instruments—each correctly designed in itself and each exactly co-ordinated with the balance of the set.

Ease of control, long distance reception, elimination of interference and the utmost pleasure and satisfaction in its use are assured with a Kennedy receiver.

Arrange with your Kennedy Dealer for a demonstration. Or write us direct for further information.

THE COLIN B. KENNEDY COMPANY
SAN FRANCISCO SAINT LOUIS



The Kennedy Variometer

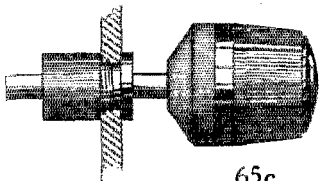
This, as well as all other parts, is scientifically constructed by Kennedy artisans. The minute clearance between rotor and stator, the firm windings and positive contact eliminate dielectric losses and increase sharpness of tuning.

K E N N E D Y

The Royalty  *of Radio*

FLERON VERNIER ADJUSTER

PATENTS PENDING



65c.

An absolute necessity for close, sharp tuning. One should be with every tuning dial on your set.

Easily mounted by drilling only one 5/16" hole. Normal position of Vernier is away from the dial. A slight pressure causes beveled soft rubber of Vernier to make contact with bevel of dial. Vernier is then turned for accurate tuning.

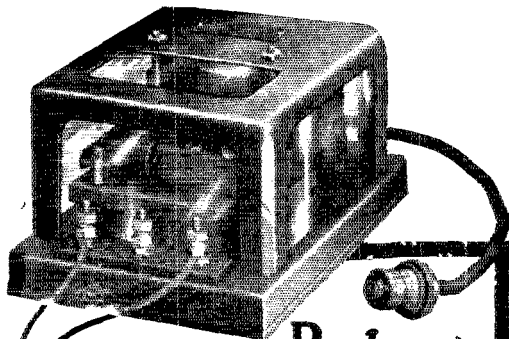
FLERON PORCELAIN INSULATORS



No deterioration in the weather with Fleron Porcelain Insulators. These insulators are made with a heavy Black Glaze without kiln marks or white spots. Each one packed in a separate Carton. FIVE SIZES.

#0—1 1/8 x 3	long..	\$0.20
#1—1 5/8 x 4	long..	.30
#2—2 1/8 x 3 3/4 (Ball)		.35
#3—1 5/8 x 5	long..	.40
#4—1 5/8 x 8	long..	.60

M. M. Fleron & Son, Inc.
MANUFACTURERS
TRENTON, N. J. U. S. A.



Recharge Your Battery at Home

Charges both A and B Radio Batteries

Don't be without the use of your Radio Receiving Set while your battery is being charged. Get a Valley Charger and charge your battery right at home.

Attach the Charger to your home lamp socket—attach the clips to the battery terminals and you will get a quick, tapering charge which just exactly charges your battery, but cannot overcharge it or harm it in any way.

Will charge the A 6 volt battery at a 5 ampere rate, and the B 22 1/2 volt battery at the required 1/2 ampere rate. 45 volt B batteries may be connected in parallel so that they can also be charged.

SATISFACTION GUARANTEED

If your local distributor cannot supply you, write direct to

VALLEY ELECTRIC COMPANY
Department Q, ST. LOUIS

- - - Mail the Coupon - - -

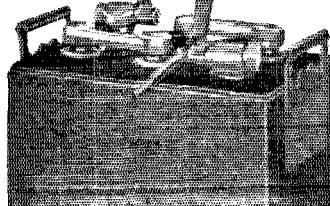
Valley Electric Co., Dept. Q, St. Louis, Mo.
Gentlemen: I am enclosing money order (or check) for \$18.00, for which send me a Valley Battery Charger with five-panel glass display case and indicator. If not satisfactory I will return it and get my money

Name _____

Address _____

\$18.00

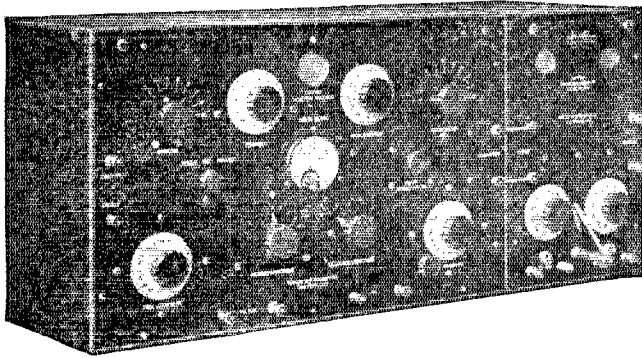
F.O.B. St. Louis



KENNEDY

uses

KENNEDY
EQUIPMENT



KENNEDY
EQUIPMENT

Formica Panels and Insulation

THE Colin B. Kennedy Company uses Formica exclusively for its panels, tubes and other insulating parts in its entire line of Receiving Sets.

The handsome appearance of Formica, its high dielectric strength and wonderful uniformity meet the exacting Kennedy standards and have contributed to the creation of the splendid Kennedy reputation.

A list of the companies who use Formica Insulation reads almost like a directory of the leading independent radio manufacturers.

This patronage of men who know radio insulation establishes Formica's claim to leadership in its line.

DEALERS: Formica advertising and sales support is the most aggressive and effective in the industry. The Formica Insulation Company treats you right.

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FORMICA

Made from Anhydrous Redmanol Resins
SHEETS TUBES RODS



Federal Standard Head Sets

Increase the Receiver's Efficiency

The high efficiency, wide distance-range and perfect clearness of Federal Standard Head Sets are the logical result of 22 years' experience in the making of precision communication apparatus.

Federal Standard Head Sets are nationally endorsed by experts. Use them and get professional efficiency from your radio.

Made with 2200 Ohms and 3200 Ohms resistance.

Federal makes a complete line of radio apparatus. Write for descriptive literature and prices.

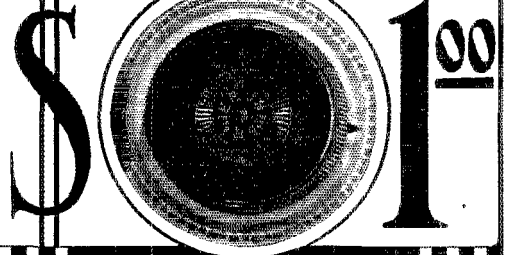
For Sale by Leading Dealers

Federal Telephone & Telegraph Company

Buffalo,

New York

SOMETHING



NEW

SELECTIVITY AT LAST!

The UNIVERNIER provides ultra-fine vernier adjustment for ordinary Variable Condensers, Variometers, Variocouplers, Potentiometers and Rheostats.

EASY TO INSTALL

The UNIVERNIER takes the place of the ordinary knob, and is applied in a few minutes without disturbing the set.

DISTINCTIVE

The UNIVERNIER will add to the appearance of any radio set. It is an instrument of precision and has that appearance. It consists of a well designed knob inside of which is a simple gear mechanism so arranged that the knob rotates nearly 12 times to one revolution of the shaft. By pressing lightly towards the panel, it functions as an ordinary knob, thus combining vernier and coarse adjustment in a single unit. DX results are surprising.

THE UNIVERNIER . . . \$1.00
360 degree finely graduated silver plated dial for use with UNIVERNIER 25¢ extra—
Complete, \$1.25

SEND NO MONEY—Mail us your order today for one or enough to equip your set—and pay the postman for each when delivered. Made in two sizes.

#251 for $\frac{1}{4}$ inch shaft

#188 for $\frac{3}{16}$ inch shaft

DEALERS AND JOBBERS WRITE FOR DISCOUNTS

WALBERT

MANUFACTURING CO.

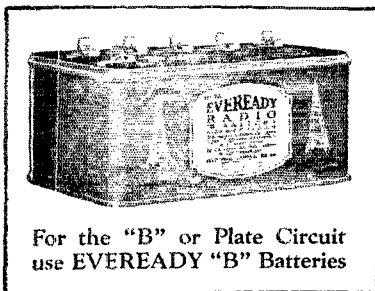
929 Wrightwood Ave., Chicago, Ill.

UNIVERNIER



New Radio ^{DRY CELL} "A" Battery for WD-11 Tubes

The Dry Cells in this 1½ volt, 4-cell, steel case, New EVEREADY "A" BATTERY were developed especially for use with WD-11 Vacuum Tubes. Last longer than Dry Cells made for other purposes. Longer Service Hours Means Economy. Only two connections.

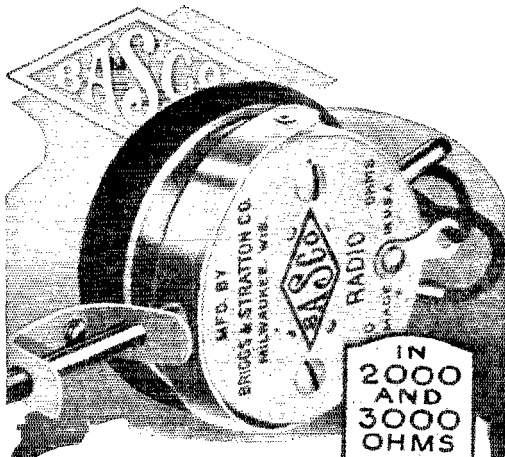


Also made in two other sizes: 2-cell, 1½ volt, No. 7211 and 1-cell, 1½ volt No. 7111.

FOR BETTER RESULTS USE

EVEREADY Radio Batteries

NO ACID • NO NOISE • SAFE
CLEAN ECONOMICAL



Designed! Not just "made"

THE market is over-run with head phones. Some are "made to sell" — others "designed" to perform a service—a service measured in terms of sensitiveness, tone quality, clarity—phone efficiency.

Such is the **BASCO Radio Head Phone**—built first for service. *Designed*—not just "made". One year on the market—and a phenomenal sales success. Why? Examine one.

They are tuned to a deep, natural-voiced pitch — and keenly sensitive. Perfectly balanced—clear, scratchless reproduction. Coils encased in aluminum shell — light weight easy on the head. Employ solid horseshoe magnet — no laminations. Compare this construction with the highest priced phones on the market. The diaphragm is extra light—set to thousands-of-an-inch accuracy from magnet poles. Basco Head Phones are clean-cut—ruggedly designed throughout. See them before you buy.

\$6.00

2000 Ohms

\$7.50

3000 Ohms



Jobbers and Dealers!
Write for our exceptional discount proposition on our complete line of parts and name of our nearest representative.

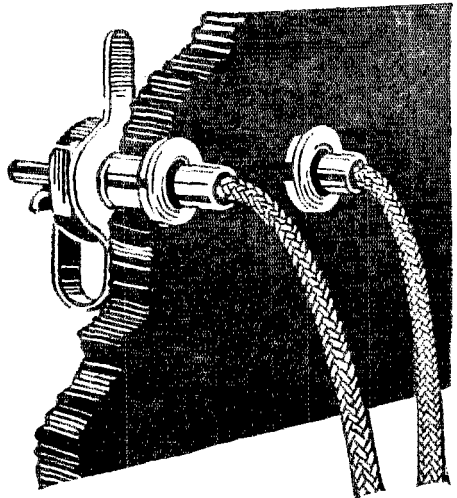
Briggs & Stratton Co.
MILWAUKEE, WISCONSIN
THE BASCO PRODUCT

TRY THEM TODAY

QUICK CONNECTING UNION RADIO PHONE TIP JACKS

(Pat. Applied For)

25c A PAIR



These Phone Tip Jacks are now recognized as the greatest small Radio Electrical Device of the age. They replace unsatisfactory binding posts. Easy adaption, quick operation, positive contact. Attractive in appearance. Soldering lug incorporated but use optional.

Accommodates any standard round phone tip and several sizes of bare wire. Ideal for W D 11 connections and coil mountings. These Union Radio Jacks **SAVE BUYING EXPENSIVE TELEPHONE PLUGS AND JACKS**. Made to live up to Union Radio Standard of Quality. Only 25c a pair.

FOR ASSURED RESULTS

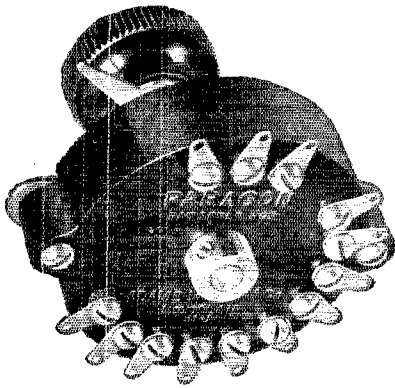
you should "try out" Union Radio Tip Jacks, Variable Condensers, Rheostats, Vacuum Tube Sockets, Condensate Dials, Complete Receiving Sets and Two Step Amplifiers.

Union Radio Apparatus and Accessories are sold by most good dealers. If you can't obtain them from your local store mail your order to us. Write for a copy of our Catalogue D Radio Apparatus.

WHOLESALE AND RETAILERS:

Write for our liberal proposition. Dealers Catalogue D and Price List, also samples sent on request.

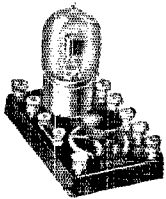
UNION RADIO CORPORATION
200-MT PLEASANT AVENUE, NEWARK, N.J.
NEW YORK OFFICE 116-WEST-32ND STREET
0000



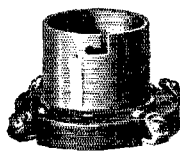
New Paragon Stage Control Switch—\$3.00

Plugs and jacks are now obsolete. The new Paragon Stage Control Switch combines the functions of three multi-circuit jacks and the telephone plug. It controls, automatically and progressively, all the filament circuits, plate battery circuits and input and output circuits of the detector-two-stage amplifier.

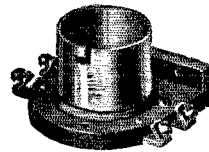
Switching from stage to stage is instantaneous, positive, noiseless. This switch may also be used for an unlimited combination of vacuum tube circuits. 2 1/4 inches in diameter, 3/4 inch in thickness. No. 90.



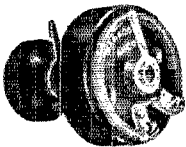
Paragon V. T. Control No. 70
Attractive — compact —
efficient
\$4.50



Paragon V. T. Sockets
Perfect contacts — heatproof — mirror finish — non-breakable
Standard
No. 30, \$1.00



Paragon V. T. Sockets
Universal Mounting
No. 32, \$1.25



Paragon Rheostat No. 25
Panel or Table
Rugged — dependable —
smooth action
\$1.50



Paragon Audio-Frequency
Amplifier Transformer
No. 81, \$5.00



Paragon Potentiometer No. 35
300 ohms — economical —
rugged
\$1.75

An illustrated Catalog of Paragon Radio Products is yours for the asking.

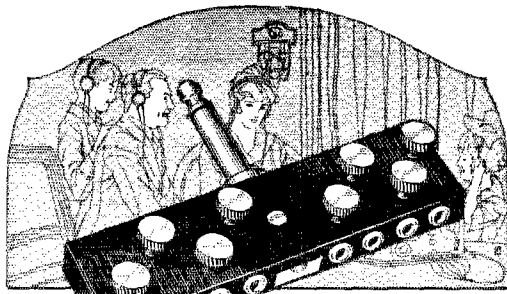
DEALERS—The Adams-Morgan Company has an interesting proposition to make to reputable radio dealers who believe in quality merchandise. Details on request.

ADAMS-MORGAN CO., 4 Alvin Ave., Upper Montclair, N. J.

PARAGON

Reg. U. S. Pat. Off.

RADIO PRODUCTS



Price
\$2.50

*A Frost Multiphone Plug
Lets the Family Listen In*

FROST-RADIO

NOW the family can listen in, thanks to the Frost Multi-Phone Plug. Each member of the family may have his or her own Frost-Fones, enjoying the broadcasting program with no loss of clearness or efficiency in reception.

Made with engineering precision, like all Frost Radio Products. May be used with any number of Frost-Fones up to and including four. This superior plug connects the Fones in series. Our tests have shown this to provide best results.

Go to your dealer today. Ask him for a Frost Multi-Phone Plug. The price is low for a product of such high quality. At the same time secure a set of Frost-Fones for every member of your family. You then will have obtained radio enjoyment for all, at a surprisingly small outlay.

FROST-FONES



Frost-Fones — "like postage stamps, used everywhere" — are today the world's fastest-selling head-fones. Their high quality, clear, sweet tone, and low price have made them so. Order several sets for use with Frost Multi-Phone Plug.

No. 162
2000 Ohm Set
\$5.00

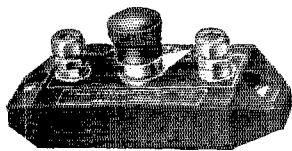
No. 163
3000 Ohm Set
\$6.00



HERBERT H. FROST, Inc.
154 WEST LAKE STREET, CHICAGO, ILLINOIS.

FRESHMAN PRODUCTS

Accurate and Dependable



VARIABLE RESISTANCE LEAK

With .00025 mfd. Micon Condenser Combined **\$1.00** Without Condenser **75c**

Unbroken range—Zero to 5 Megohms, Clarifies signals, lowers filament current, increases battery life, eliminates hissing.



"MICON"

TESTED MICA CONDENSERS

Size	Price
.00025	\$.35
.0005	.35
.001	.40
.002	.40
.0025	.50
.005	.75
.006	1.00
.01	1.50

Assure absolute noiseless, clarity of tone, accuracy, constant fixed capacity

.006 Micons and Variable Resistance Leaks, especially adaptable for New Flewelling Super-Circuit.



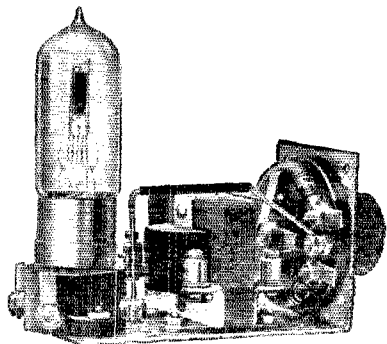
ANTENELLA

No antenna or aerial needed. Eliminates all the inconveniences in radio. Operates from any light socket. Price only—**\$2.00**

At your dealers—otherwise send purchase price and you will be supplied without further charge.

CHAS. FRESHMAN CO., Inc.
106 Seventh Ave., New York

when you amplify ---simplify

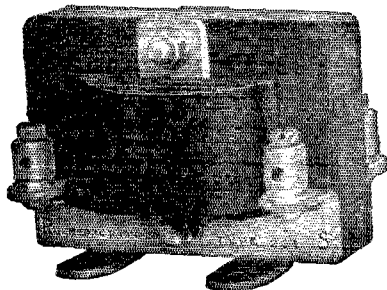


Put a General Radio Type 300 Amplifier Unit along with your detector set. Works equally well with crystal or tube detectors. Can be used for either table or panel mounting. No storage battery required. A compact unit, wired ready for external connections. Two or more units may be used together to obtain multi-stage amplification.

Type 300-A Amplifier Unit for WD-11 Tube is built around our 231-A amplifying transformer. Mounted on a nickel finish brass bracket. Price.....\$7.50
Type 300-B Amplifier Unit, for use with standard 6 volt Tubes. Price.....\$8.00

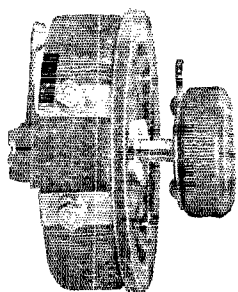
Ask for Bulletin 914Q

General Radio type 231-A Amplifying Transformer gives the maximum amplification possible without distortion. Faint signals, high-pitched and low-pitched notes alike, are delivered undistorted to the grid of the Amplifying tube. "Howling" in the audio frequency circuit is never caused by a Type 231-A. Design, material and construction are in keeping with the General Radio Company's standard—



a standard established by eight years of designing and building the highest grade of laboratory radio apparatus for leading Universities and Technical Schools. Every General Radio Amplifying Transformer is guaranteed and will be replaced if winding defects ever develop. Send for Bulletin 914Q.

Type 214 Rheostat for the regulation of filament currents is wound to 7 ohms resistance. Type 214 Potentiometer is wound to 400 ohms resistance, allows optimum adjustment on detector tube and permits



control of regeneration in a radio frequency amplifier. Both Rheostat and Potentiometer are furnished complete, including screws for attaching either back or in front of panel.

Type 214 Rheostat, 7 ohms resistance, Price.....\$2.25
Type 214 Potentiometer, 400 ohms resistance, Price.....\$3.00

Ask for Bulletin 914Q.

SPECIAL

Type 214 Rheostats for use with the new tube, UV-199, 50 ohms, and for the UV-201A, 20 ohms (specify resistance) Price, \$2.25
Potentiometer 400 ohms resistance Price, \$3.00

GENERAL RADIO COMPANY

MASSACHUSETTS AVENUE AND WINDSOR STREET

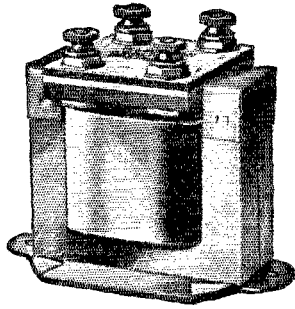
CAMBRIDGE 39

MASSACHUSETTS

Standardize on General Radio Equipment Throughout

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5120



NEW IMPROVEMENTS

in the characteristics of our audio frequency transformers render them adaptable for use with the standard and low voltage tubes. Volume and quality of tone are the prerequisites of proper amplification. Our correct winding and liberal core design guarantees this at all audible frequencies. Correct amplification requires the combination of a 6 to 1 amplifying transformer on the first stage and a 3½ to 1 on the second stage.

Our prices are right.

Black label—3½ to 1....\$4.50

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Our Radio folder, describing filament and plate supply transmitting transformers, variable air condensers and rheostats, sent on request.

We invite inquiries from

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THORDARSON
Electric Mfg. Co.
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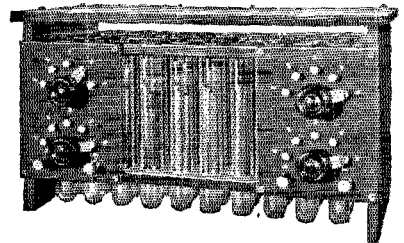


"B" Battery with Panel Control

Storage Batteries

designed for

RADIO



KICO Storage "B" batteries are used by thousands of amateurs who understand radio and consequently buy nothing but the most efficient equipment.

A FEW REASONS

1. Alkaline type. Unlimited Life.
2. They eliminate noises caused from "Bs" that are rapidly deteriorating.
3. The switch control allows single cell variations from 12 volts up. (A critical plate adjustment is essential on your detector bulb for C.W. and Radiophone reception.)
4. Rechargeable from your 110 Volt A.C. line in connection with the rectifier supplied with each battery.
5. Will last from three to six months on a single charge while in the detector plate circuit.
6. NOT an experiment. All batteries sold with the privilege of receiving your money back if unsatisfied within a 90 day trial.
7. Neat, Efficient and Compact.

		(Plain)	(With Panels)
16 cell	22 volts	\$6.50	
24 cell	32 volts	8.00	\$12.00
36 cell	48 volts	10.00	14.00
50 cell	68 volts	12.00	17.00
78 cell	100 volts	16.00	21.00
108 cell	145 volts	21.00	26.00

F.O.B. Buffalo, N. Y.

Literature gladly furnished

We distribute KING Chargers

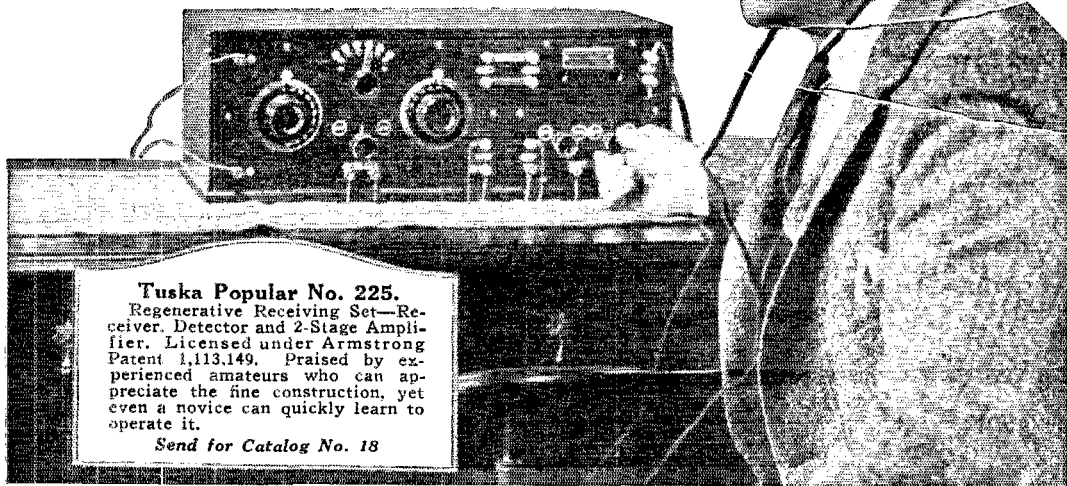
KIMLEY ELECTRIC CO.
1355 Fillmore Ave., Buffalo, N. Y.

Twelve years is long experience in building radio apparatus!

THAT is the experience C. D. Tuska brings to the building of Tuska sets. A dozen years of heart and soul radio enthusiasm! C. D. Tuska was one of the founders of the A. R. R. L. and its first secretary. He was the founder and first editor of Q. S. T. As a war-time officer in the U. S. Air Service, he had abundant opportunity to improve his broad knowledge of wireless. As a member of the Radio Club of America and an associate member of the Institute of Radio Engineers, he has followed closely every step in radio progress.

For twelve years Mr. Tuska has been a manufacturer of radio instruments. There is a complete line of Tuska sets, ranging from sets suitable for modest purses and inexperienced fingers, to the expert tuner sets that have trans-Atlantic range—also parts for experimental work. All of these are shown in our catalog, sent on request.

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Tuska Popular No. 225.
Regenerative Receiving Set—Receiver, Detector and 2-Stage Amplifier. Licensed under Armstrong Patent 1,113,149. Praised by experienced amateurs who can appreciate the fine construction, yet even a novice can quickly learn to operate it.

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TUSKA RADIO





The Radio Frequency Amplifying Transformer

200-600 Meters—Air Core

Developed for
Long Distance Work

In the Famous
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THIS extraordinary transformer is the heart of Mu-Rad sets and one of the secrets of their extraordinary long distance work. How better could you be certain of maximum distance, absolute clarity and unfailing efficiency of reception than by using a Mu-Rad Transformer in that set you are building!!

Three Types

Type T-11 for the first stage \$6.00

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The Radio Specialty Company—RASCO for short—specializes in small orders; in fact, 50% of our orders are less than one dollar. 24-hour service guaranteed.

This Company specializes in small parts for radio, selling only the highest class of materials. This Company is aware of the fact that very high prices prevail in radio now. By buying material from us you not only save anywhere from 50 to 75% on the cost of the instruments, but you have the fun and instruction of making them yourself.

Our quick, 24-hour service means satisfied customers. We have no Complaint Department. Hundreds of letters such as the following, unsolicited, are in our files:

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Dear Sirs:

Enclosed you will find one (1) dollar for which please send me 1 dozen binding posts No. 201 at \$1.00 per dozen and oblige.

Geo. B. Ingraham P.S.—Rasco Service is sure all it is cracked up to be. I have received three different orders from Rasco and I am still waiting for an order from another Company which was sent in before the first Rasco order.

Yours truly, 64 page catalog
G. B. L.

Our prices are low and all goods are shipped prepaid. You deal with the oldest and only Company exclusively manufacturing the small parts in their own two big factories. Our big 64-page catalog, No. 7, containing over 300 illustrations will save you money. This catalog also contains

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not to be found in any catalog, only found in expensive text books. This catalog sent only upon receipt of 15¢. Once you have tried the RASCO service you are a customer for life. 85% of our customers always come back.



Detector 50c

Radio Specialty Co.

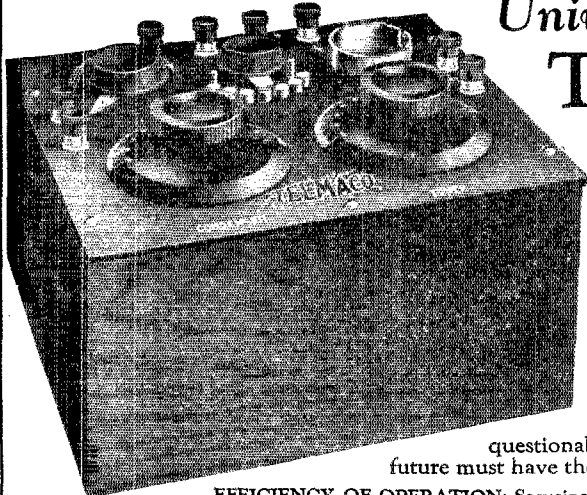
98-100 PARK PLAGE, NEW YORK CITY

The Receiver

which has met with
Universal Favor

Telmaco

Type B-R Receiver



Manufactured exclusively for us by the Tri-City Radio Electric Supply Co., licensed under Armstrong U. S. Patent No. 1113149, Oct. 6th, 1914, for use in amateur stations and for radio experimental work.

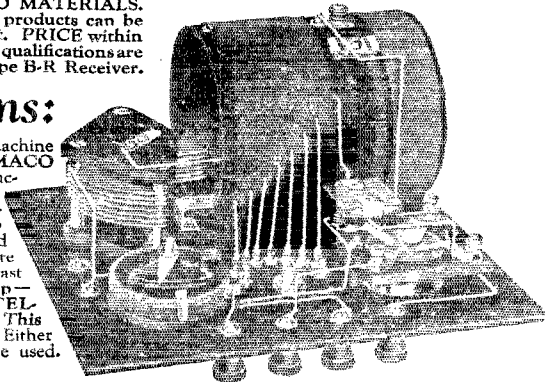
A careful analysis of the past two revolutionary years in Radio shows un-

questionably that the receiver of the future must have the following qualifications:

EFFICIENCY OF OPERATION: Securing distance, volume, selectivity. **EASE OF OPERATION** enabling the novice to secure satisfactory results. **HIGHEST QUALITY OF WORKMANSHIP AND MATERIALS.** The time when inferior radio products can be successfully merchandised is past. **PRICE** within the reach of everybody. All these qualifications are combined in the **TELMACO Type B-R Receiver.**

Specifications:

Panel—Formica, grained and machine engraved. **Varico-Coupler**—TELMACO special silk wound with loading inductance in series with primary. **Condenser**—Special 13-plate with Bakelite ends. **Rheostat**—Single knob control. **Sockets**—Highly nickeled shell, Bakelite base. **Dials**—are polished, presenting pleasing contrast with dull panel. **Workmanship**—manufactured according to **TELMACO'S** rigid specifications. This guarantees your satisfaction. Either 6 volt or 1½ volt tube may be used.



Telmaco Type B-A Two Stage A. F. Amplifier

Matches the above in size and construction. The greatest Amplifier value on the market. Price \$20.00.

Price \$25

The ultimate in value.

TELMACO

Quality Radio Exclusively
Bona Fide Jobbers—If our salesmen have not reached you with our proposition, write or wire for it today.

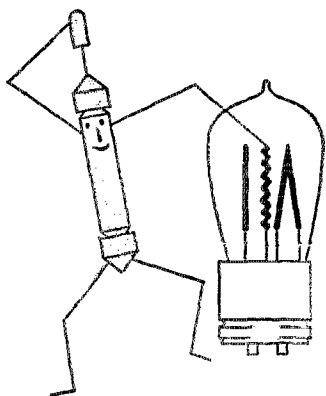
RADIO DIVISION

TELEPHONE MAINTENANCE CO.

20 S. Wells Street

Dept. D

:: Chicago, Illinois



Only two sizes—
but they suit
all tubes

No. 100—Variable from
1,000 ohms to 100,000 ohms

No. 101—Variable up
to 5 megohms

Let me regulate your Grid circuits

I'm Omega Durham, the little high resistance expert with a plunger that makes your grids behave as they should. For, I can be adjusted to exactly fit the temperament of each and every tube. Mr. Flewelling says I'm good.

DURHAM Variables High Resistance

Should be used wherever ohms become "megs"—and need frequent adjusting. Just the thing for resistance coupling, too. Fit standard bases and clips.

Price 75c at your dealers

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Radio Engineers

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I Ship All Over the United States

"Everything Worth While In Radio"

AT

THE RADIO STORE

OF

PAUL FRANKLIN JOHNSON

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I will pay \$1.00 in Radio Apparatus for each of the following numbers of QST:

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Vol. II Nos. 1, 2, 3, 10
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I have the following for sale:

Vol. I No. 11

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What do you mean, wire-less?



THERE are a million miles of magnet wire in the wireless outfits of the world.

For the youngster who winds his own, and for the manufacturer of great apparatus whose impulses carry clear across the earth, *magnet wire* is the first and fundamental requisite in radio.

The Acme Wire Co. make magnet wire especially adapted for radio equipment. Long before the universal application of wireless was considered practical, Acme Wire had become recognized as a product of known quality and performance in the manufacture of standard electrical equipment.

Acme has pioneered in the development of the finer sizes of enameled magnet wire for radio use

Our engineers will gladly confer with you on your specific requirements. Let us place our wire and coil-winding experience at your disposal. You will be under no obligation.

—and, in winding *hundreds of thousands* of transformer coils in the Acme plant, has gained the practical experience in this field that is of such inestimable value in improving the quality of Acme Wire and maintaining the Acme Service in radio work.

Acme Magnet Wire not only is of the highest quality as to raw material and manufacture, but it possesses another quality—intangible, but of the utmost importance to the user—in its capacity for winding smoothly, rapidly, and economically.

No words of ours can describe this peculiar property so accurately as the phrase of an operator, who, when asked why he preferred to work with Acme Wire, replied,

“It goes in the space.”

THE ACME WIRE CO., New Haven, Conn.

NEW YORK

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“It goes in the space”

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Acme Wire Products

“Enamelite,” plain enameled Magnet Wire; “Cottonite,” Cotton-covered Enamelite; “Silkenite,” Silk-covered Enamelite; Single and Double Cotton Magnet Wire; Single and Double Silk Magnet Wire. We also have a complete organization for the winding of coils in large production quantities.

Acme Electrical Insulations

Flexible varnished tubing in all sizes and colors; standard or special.

Acme Radio Specialties

Audio Transformer windings.
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Enameled wire—especially the finest sizes, 40-44 B & S gauge, Silk- and cotton-covered magnet wire.
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Illustrated Catalog will be sent upon request to Purchasing Agents and Engineers.



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OUR COMMERCIAL RADIO COURSE COVERS AND DEMONSTRATES ALL THE LATEST AND MOST IMPORTANT DEVELOPMENTS IN RADIO.—SPARK, ARC AND VACUUM TUBE SYSTEMS.

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*"That's
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He
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**"Davenport, I-o-w-a
where the West begins."**

Instantly recognized. Distinct, clear as a bell the voices and music, within the radius of your outfit, come to you if your radio is equipped with the

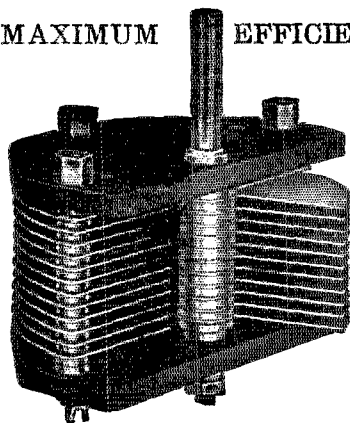
STROMBERG-CARLSON RADIO HEADSET

This Standard Headset has unexcelled tonal qualities. Reproduces accurately faint long distance signals; fits comfortably and is quickly adjustable to any size head. The forked cord permits separation of the receivers for use by two observers simultaneously.

Order Stromberg-Carlson Apparatus from your electrical merchandise dealer or send for Bulletin #1029-Q

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MAXEFF VARIABLE CONDENSER

Its Adjustable Rotor Shaft bearing and accurately machined parts make it most efficient and durable. Maxeff evenness of operation is unequalled.

At Dealers, \$2 to \$4.50 or Write



THE HIGGY-AVERY CO.
Manufacturers Radio
Parts and Equipment
COLUMBUS OHIO



How much do you expect your battery to do?

TURNING the dials with a battery that is a constant offender is not much fun. You cannot thoroughly enjoy radio broadcastings unless your battery is up to the job.

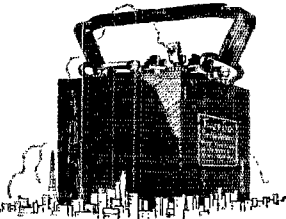
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Exide Batteries play a leading role in the industrial world. They propel trucks, mine locomotives, and submerged submarines; they operate the fire alarm system and send your voice over the telephone. Most of the government and wireless commercial stations are equipped with Exide Batteries.

Your radio dealer will show you an Exide Radio Battery, or you can get one at any Exide Service Station.

THE ELECTRIC STORAGE BATTERY CO.
Philadelphia, Pa.

Service Stations Everywhere.
Branches in Seventeen Cities.



Exide
BATTERIES



Holtzer-Cabot No. 2 Universal

The Latest Achievement in Radio Head Sets

After exhaustive experiments and actual manufacturing experiences we have produced a receiver which, for tone quality, has no equal.

It is tested, not by "listening-in," but by a specially designed scientific instrument which gives its true tone quality by actual sound measurement.

Our new head bands are covered with flexible rubber, making them comfortable and sanitary.

Weight, only twelve ounces

Price \$12.00.

The Holtzer-Cabot Electric Co.

Boston and Chicago

"ILLINOIS" THE RELIABLE CONDENSER THAT IS MADE RIGHT AND STAYS RIGHT

Size	Panel	Cased
67 Plates...	\$7.00	\$8.50
43 Plates...	3.50	4.75
23 Plates...	2.75	4.00
13 Plates...	2.25	3.50

Vernier with single movable plate applied to 13, 23 or 48 sizes, \$2.00 extra. Send for Bulletin.

This list is for our Regular Style with Knob, Pointer and Scale. We also furnish the Condenser with smooth 3-16 inch staff suitable for Dial at 15c off list. For a Fine Black Dial with Condenser, add 50c to list.

Fully Assembled and Tested. IMMEDIATE SHIPMENT.

Money back if not satisfied. Just return within 10 days by insured Parcel Post.

Sent Prepaid on Receipt of Price, Except: Pacific States, Alaska, Hawaii, Philippines and Canal Zone, add 10c. Canada, add 25c.

No Discounts except 5 per cent on orders of 6 or more.

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Why Not Have Your Own Personal Radio Stationery showing station Call number, district, name and address?

RADIO CLUB SET DE LUXE

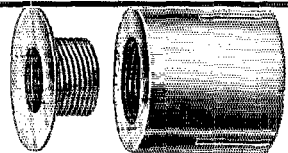
200 Sheets 5 1/4 x 6 1/4 Hammermill Bond
100 Envelopes to match **\$2.00**
(100 sheets stamped, 100 sheets plain)

Post Paid

Paper and envelopes attractively stamped with your name, address, call letters, district and if desired, time of broadcasting and program.

Choice of white or buff paper. Merely slip \$2.00 into envelope with instructions for printing and in 3 days this wonderful Club Set "with money back guarantee if not satisfied" will be sent you.

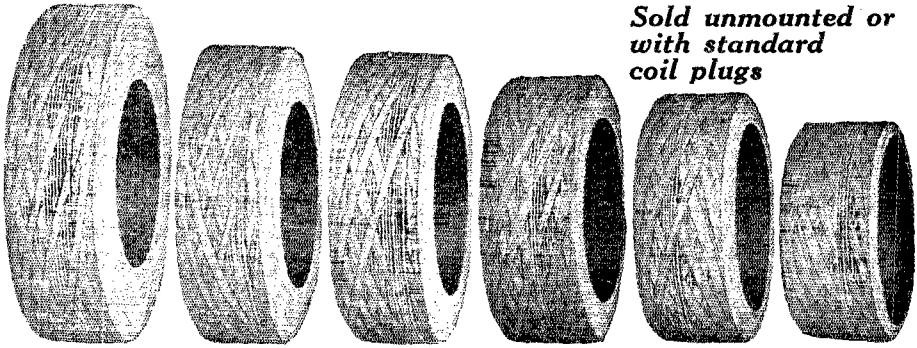
A. J. M. Co., Stationery Dept.
Box 247, Troy, New York



IF YOU USE AMPLIFYING TUBES you can make your Victor talking machine a RADIO LOUD SPEAKER, with a "BEEKO" Radio-Phone attachment. Sample by mail, 40c.

Liberal discount in quantities
Send stamp for our new '45-Q Catalog

J. H. BUNNELL & CO.
32 Park Place, Department Q New York



*Sold unmounted or
with standard
coil plugs*

Seventeen sizes between 20 and 1500 turns. Sold unmounted or mounted on Remler coil plugs which fit any standard coil mounting.

Use GIBLIN-REMLER INDUCTANCE COILS

For Maximum Signal Strength With Minimum Interference

DUE to their special features of construction, GIBLIN-REMLER INDUCTANCE COILS have MORE INDUCTANCE, less DISTRIBUTED CAPACITY, and a LOWER HIGH-FREQUENCY RESISTANCE than any other coil, of an equal number of turns, on the market. These are the three features essential in order to obtain MAXIMUM SIGNAL STRENGTH, and MINIMUM INTERFERENCE.

In any receiving set it is always necessary to tune one or more circuits to the frequency of the incoming wave. This is done by adjusting the inductance and capacity of the circuit so that it will have no impedance to an alternating current of that particular frequency. Then, the only resistance to the incoming signal is the high-frequency resistance of the coil. This high-frequency resistance, which depends on the direct current resistance and type of winding, is lower in the GIBLIN-REMLER COIL than in coils employing any other form of winding.

This is explained largely by the fact that resistance is directly proportional to the length of the wire. In the GIBLIN-REMLER COIL all of the turns are parallel and the turns in each layer are wound close together, hence it requires fewer turns, less wire, and lower resistance to obtain a given inductance than with any other type of winding.

The LOW DISTRIBUTED CAPACITY of the GIBLIN-REMLER COIL is a big factor in obtaining MAXIMUM SIGNAL STRENGTH and MINIMUM INTERFERENCE. In a vacuum tube detector circuit the signal strength depends on the potential difference between the grid and filament of the tube. In a coupled circuit receiver the secondary coil is connected to the grid and filament of the detector tube and literally supplies this potential difference. Its distributed capacity, that is capacity between layers of the coils, tends to short-circuit the coil

and reduce the potential difference at the terminals. This is particularly true in the case of the very high-frequency current encountered when receiving the short wave lengths, that is, wave lengths between 200 and 600 meters. The amount of this loss depends upon the amount of capacity and potential across it. Capacity always decreases with an increase in the distance between two conductors. In the GIBLIN-REMLER winding the layers are spaced with a cotton yarn of high dielectric strength in such a manner as to not only reduce the total distributed capacity but also to make it a minimum at the point of greatest potential difference between layers.

A sharply tuned circuit is one that has an extremely low resistance to a current of the particular frequency to which it is tuned, and a high resistance to currents of all other frequency. In any receiving circuit there are two kinds of resistance—one, the straight high frequency of the coil, and the other, the resistance caused by the impedance of the coil and the condenser used with it. The first remains fairly constant over a small range of wave lengths. The second resistance is zero at one particular wave length and increased as the wave length varies in either direction; hence, it is easily seen that when the inductance of the coil is extremely high in proportion to the high-frequency resistance, which is the case in the GIBLIN-REMLER COIL, the circuit in which it is used may be made to have practically no resistance to signals on one particular wave length, and yet have a proportionally high resistance to signals on all other wave lengths. This condition, which is always obtained in circuits using the GIBLIN-REMLER COIL results in a SHARPLY TUNED CIRCUIT, that is, one giving MAXIMUM SIGNAL STRENGTH on the desired wave length, with a MINIMUM OF INTERFERENCE from signals on any other wave length.

Write for price list and table of constants and complete information regarding these coils

Send 10c for new 40-page Remler Catalogue containing circuit diagrams for Remler Apparatus and other useful information, including a table of inductance, capacity and wave length.

The Remler Technical Bureau is at your Service. Address your problems to Dept. Q.

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The Superlative Inductance

Four years of careful attention to the details of manufacture of this type of inductance unit has yielded a product of unquestioned superiority. And with increased efficiency in manufacturing methods, moderate prices prevail for all sizes

Ask Your Dealer

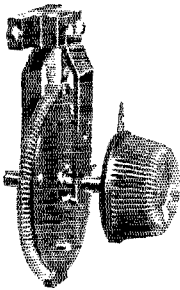
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"Built First to Last"

COTO-COIL CO. PROVIDENCE

Kellogg Radio Equipment for Better Results

RHEOSTAT



No. 502

The Kellogg rheostat is simple in design, having but one movable part. The resistance wire is carried on a rotor of high grade insulating material and the contact arms are so placed that a slight movement brings in the one-half turn of the wire, giving a vernier effect.

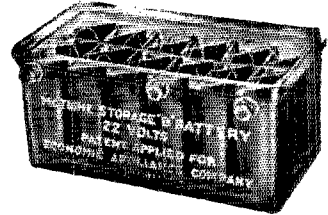
The knob is the same type as the one on the Kellogg dial.

No. 501 Rheostat.....\$1.50

Use, Is the Test

Kellogg Switchboard & Supply Company
Chicago

McTighe Alkaline Storage "B" Battery FOR RADIO OUTFITS



The McTighe Storage "B" Battery is now furnished in two sizes, the original 22 volt and a new 28 volt battery, having 30% more plate capacity. McTighe Batteries are absolutely noiseless, can be charged from any light socket, and are proof against damage by short circuit, overcharging or standing unused. They are furnished in oblong glass cases which nest neatly, each with its own size.

The McTighe Chemical Rectifier will charge one, two or three "B" Batteries at one time. Our Combination Magnetic Rectifier will charge 6 volt "A" Batteries or "B" Batteries up to 120 volts.

22 Volt Battery	\$5.00
28 Volt Battery	6.00
Chemical Rectifier	1.50
Magnetic Rectifier	20.00

F. O. B. Irwin, Pa.

ECONOMIC APPLIANCE CO.
IRWIN, PENNA.



What matters bad weather when Radio entertains?



R2-18 Magnavox Radio with 18-inch horn: this instrument is intended for those who wish the utmost in amplifying power; for large audiences, dance halls, etc. \$60.00.

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Model C Magnavox Power Amplifier insures getting the largest possible power input for your Magnavox Radio. 2 stage -- \$55.00
3 stage -- 75.00

When you purchase a Magnavox product you possess an instrument of the highest quality and service.

RADIO'S broadcast schedules deserve the finest reproduction which science can provide.

The construction and quality of Magnavox Radio products make them supreme—and their prices bring them within the reach of every serious radio user.

Magnavox Radio products can be had of good dealers everywhere. Write us for copy of new illustrated booklet.

The Magnavox Co., Oakland, Calif.
New York: 370 Seventh Avenue

"ESCO" BATTERY CHARGERS

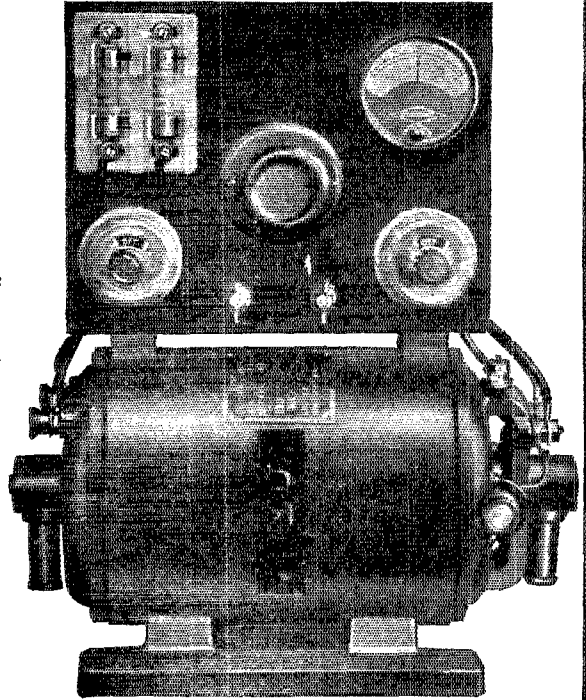
To meet an insistent demand for
**RUGGED—RELIABLE
NEVER-FAILING
MOTOR-GENERATORS**
For charging Batteries
Used in Wireless Operation
We have developed a complete line of
MANY SIZES.

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"ESCO" QUALITY thruout. You KNOW
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Pioneers in developing
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JUST OUT—THE RADIO LOG

The Book You Need to Get the Best From Your
Radio

A DIARY—LOG—CALL—DATA AND TEXT
BOOK COMBINED

Contents

LOG portion (75 pages) ruled with headings for
recording stations heard and worked—wave length
—static and weather conditions, etc.

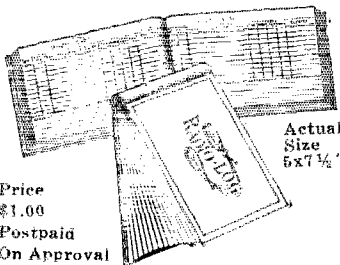
Two color map (24x36) with all Broadcasting stations in
U. S. and Canada, each district marked—charts, templates,
instructions for building crystal, honeycomb and regenerative
sets. Special diagram for getting long distance with crystal
sets. List of Broadcasting stations with programs and sending
time. Morse, International and Convention abbreviation
codes. Wave length data—Arlington Time Signal, etc., etc.

Price

\$1.00

Postpaid

On Approval

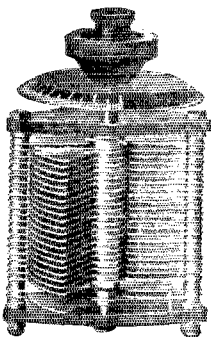


Actual
Size
5x7 1/4"

Don't fail to get the RADIO LOG, newest, latest and most useful book on Radio. Improves your
service, eliminates trouble. Sent on approval, money order, check or cash. Price \$1.00.

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NOTICE SPECIAL FOR THIS MONTH VERNIER CONDENSERS

11 PLATE . . . \$2.25
23 PLATE . . . 3.00
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PRICE INCLUDES
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ALUMINUM PLATES
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CRYSTAL RECTIFIER.

MULTIPOINT (Patent Pending)

A Synthetic CRYSTAL DETECTOR,
sensitive over its entire surface

Eliminates all detector troubles. Extraordinary
clearness and volume. Endorsed by Radio experts
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Price, Postpaid, mounted 50c
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RUSONITE CATWHISKER
14 Karat Gold Multiple 25c
Contact, Super-sensitive

Order from your dealer or direct from us.
RUSONITE PRODUCTS CORP.

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Try the Bradleystat on Your Radio Set, to-night

A New Thrill Awaits You!

Pull in those distant stations that you lose with Wire Rheostats

Does your receiving range enable you to pick up concerts over great distances? If not, try the Bradleystat.

Read this interesting letter from Chas. H. M. White of Massachusetts Institute of Technology at Cambridge, Massachusetts:

"I have tried the Bradleystat on my radio set. The improvement is really remarkable and beyond all my expectations. Previously I only picked up local stations and WJZ, but on my first trial with the Bradleystat I heard KYW (Chicago), WOC (Davenport) and many other stations."

Get the Bradleystat, today, from your nearest radio dealer and get more enjoyment from your radio set. Insist on the genuine Bradleystat.

Allen-Bradley Co.
Electric Controlling Apparatus

277 Greenfield Avenue · Milwaukee, Wisconsin
Member of the National Radio Chamber of Commerce



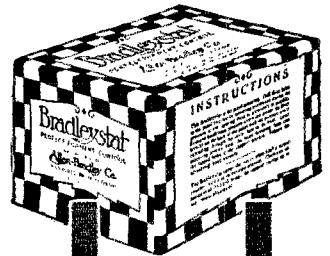
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P.P. 10c extra

Other Radio Products

The Bradleyometer, a perfect potentiometer and the Bradley-adaptor for the WD-11 tubes are two new radio products equal in quality to the Bradleystat.



Bradleystat

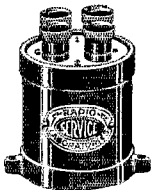
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THE NEW RT-8 RADIO FREQUENCY TRANSFORMERS

on the market March 1st, 1923 are specially designed by the *Radio Service Laboratories* for maximum efficiency when used with any low filament current consumption and low voltage tubes on the market.

For Audio Frequency the new RT-A2 will give you 100% Tone Quality and High Amplification without distortion. For best results on both tone and distance, use *Radio Service Laboratories* Radio Frequency R T-8 (for all stages) in the black case, retail price \$6.00 and Audio Frequency R T-A2 in brown case, retail price \$6.50. For sale at all reliable electrical or Radio Stores. If your dealer cannot supply you, order direct. Order by type number, accept no substitute, and remember that all *Radio Service Laboratories* Transformers are individually triple tested and unconditionally guaranteed.



Send ten cents for new booklet on Radio Frequency with schematic diagrams—a most valuable and helpful publication for the radio amateur and expert.

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Sterling

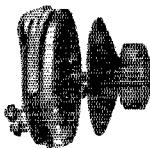
RADIO DEVICES

THE MORE YOU HAVE OF THEM THE BETTER YOUR OUTFIT

STERLING

Portable Rectifiers Filament Meters
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 12 Point Rotary Switches
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Smooth running contact arm giving fine regulation of current. Attractive design



Adaptable to either panel or table mounting. List Price

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STERLING FILAMENT RHEOSTATS

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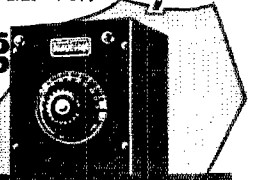
CLEVELAND, OHIO

Over 3 Million Sterling Devices in Use Today

Wave Trap

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The Missing Link in RADIO



Stops Interference!

Get that elusive DX station thru heavy QRM. With the "WAVE TRAP" you can do it and greatly increase your range.

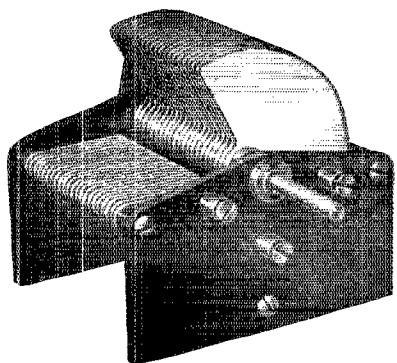
It is installed in a minute by changing only one connection and is indispensable on any receiving set, with any type of antenna. It is mounted on a Formica panel in a handsome mahogany finished cabinet 6x5x6, and is a high-grade instrument throughout.

850
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Ferbend Electric Co.
 23 E. SOUTH WATER ST.
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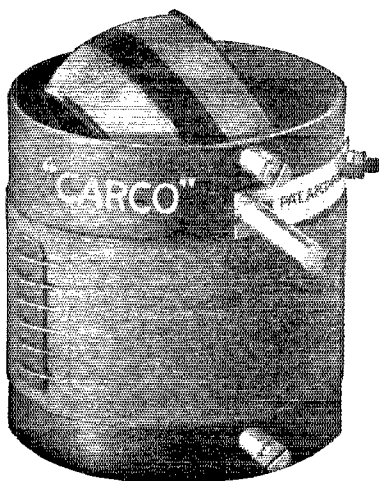
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THE WIMCO CONDENSER

Made to meet a demand for quality — highest efficiency, 3 plate, 23 plate and 43 plate sizes.

Very low resistance and very low zero capacity. The phase angle does not depart from 90° sufficiently far to be detectable. Highly recommended for the fine tuning necessary in amateur apparatus.



THE CARCO COUPLER

Just the thing for the popular receiving set. Bakelite tube and rotor, silk covered wire, perfect contacts. Designed and developed by an amateur for the amateur.

Guaranteed to produce superior results. Range 150 to 700 meters. Not just "a coupler" but the real coupler—peer of all, the Carco.

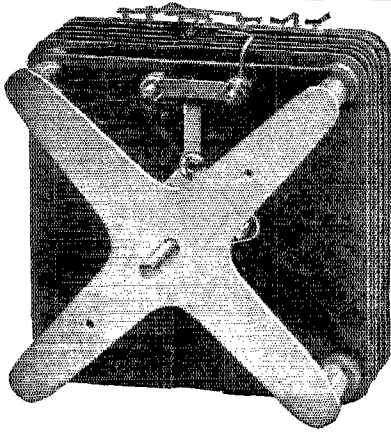
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**Send for literature and prices on the
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CANTON, OHIO

Manufacturers—Distributors



TELOS VARIO-TRANSFORMERS

for
Tuned Radio Frequency Amplification
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Grid circuit tuning variometers of the "Telos" interleaved double D coil type coupled to a fixed plate coil in such manner as to increase transformer coupling on the longer waves.

Telos Vario-Transformers tune and amplify between 160 and 480 meters with **more amplification per stage** than the best audio and with no distortion of tone.

Telos Vario-Transformers have **closed magnetic circuits** and can be symmetrically mounted next to each other with **no local oscillations** due to magnetic coupling. The **automatic change in coupling** minimizes local oscillations due to tube capacity. **Grounding the metal spider frame eliminates hand capacity disturbances.**

A tuned radio frequency amplifier using Telos Vario-Transformers will greatly increase the range and selectivity of any receiver.

Patents Pending

FREE Illustrated Booklet on Radio Frequency Amplification with circuit diagrams and operational characteristics.

BY LESTER L. JONES.
Formerly Expert Radio Aid, U.S.N.

SPECIFICATIONS: All types require space 5" x 5" back of panel.	TELOS	Depth back	Wave length	List
	TYPE	of panel	Range	Price
TA4 Vario-transformer		3 3/4"	160-480m.	\$3.50
TA6 Vario-transformer		4"	200-750m.	7.50
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A6 Variometer		3 3/8"	180-730m.	6.50

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Kindly give your dealers name.

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NEW YORK, N. Y.

Delicate Soldering

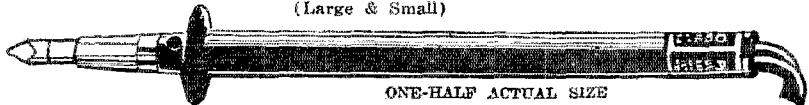
Both the manufacturers' and amateurs' problems on all fine work are readily solved by the instrument constructed for this particular purpose.

THE POST SOLDERING IRON

Platinum Heating Unit—Interchangeable Tips—Universal Current

(Large & Small)

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ONE-HALF ACTUAL SIZE

Awarded Certificate of Excellency, N. Y. Evening Mail Radio Institute
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O-B Radio Co.

Distributors for

Colin B. Kennedy Co.
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GIVE YOUR EARS A TREAT!—USE

RED-HEADS

Now \$6.50

3000 Ohms

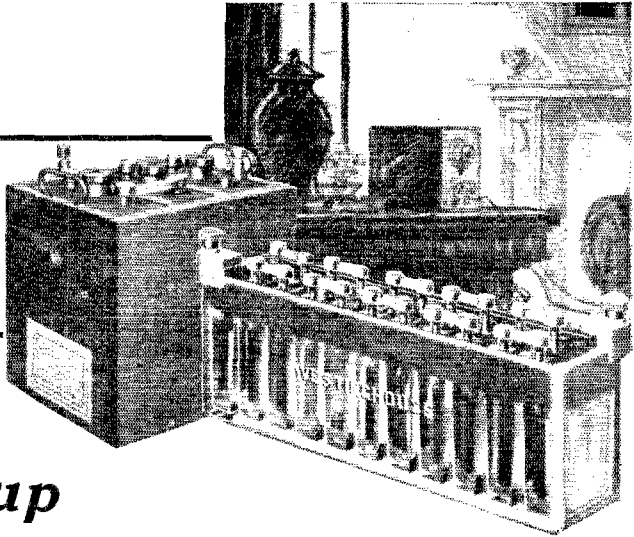
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At your dealers or direct on receipt of price.

A Triumph in Radio, Receiver Design

The **Newman-Stern** & Newman-Stern Building
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Hook up your radio to these

EVERY radio fan wants his set to deliver its utmost in radio satisfaction. Batteries. It's worth getting the very best. There's no uncertainty about their performance when they're Westinghouse. These batteries are built for *highest efficiency* in radio work. They're up to the latest advancements in radio science and embody the finest engineering, materials and workmanship Westinghouse can command. Can be easily and repeatedly recharged. No more battery replacements! No more discouraging results from run-down batteries!

Westinghouse "A" Batteries
are carefully constructed, full-capacity, slow-discharge, long-life batteries. Made in 4-, 6- and 8-volt sizes with 3, 5, 9 and 13 plates per cell, to meet various filament-battery requirements.

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The Westinghouse 22-M G-2 (22 volts) is a marvel for steady, noiseless, full-powered service. Glass case; visible interior; sealed-in tops. Larger types, too; also 2-volt single cells for "C" batteries.

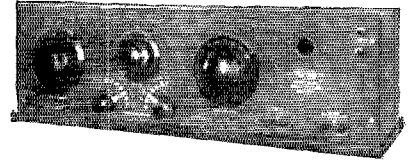
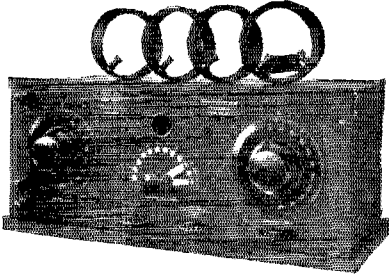
At radio dealers and Westinghouse Battery Service Stations everywhere. Write for illustrated folder, "Westinghouse Radio Storage Batteries."

WESTINGHOUSE UNION BATTERY CO.
Swissvale, Pa.

WESTINGHOUSE

RADIO "A," "B" and "C"

BATTERIES



RORN used with CR-8

—for DX work—can't be beat—very QSA.
Place your order now—write your nearest dealer. If he can't supply you, write us direct for immediate shipment.

“3PW”



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Formerly Philadelphia School of Wireless Telegraphy

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NEW Lynn radio catalog now ready. Real radio values on every page. Complete stocks of standard, nationally advertised radio products. Tubes, sockets, condensers, variometers, etc.

Order from “Radio Center”—we always have what you want in stock and can make immediate shipments. Everything sold on money back guarantee if you are not satisfied.

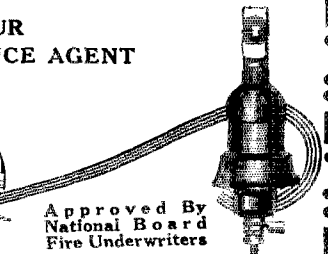
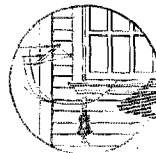
Write today for the new Lynn catalog. It is the national guide to dependable radio supplies. Address:

LYNN RADIO COMPANY

Sixth Floor Consumers Building
220 SOUTH STATE ST., CHICAGO
L. L. Lynn, Pres. Harrison 7293

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VACUUM
RADIO PROTECTOR

ASK YOUR
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Approved by
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*The Choice of the Foremost
Engineers for over 17 Years*

SOLDERALL

The Only Convenient Metal Solder.
Every Electrical Joint or Connection
Needs **SOLDERALL**
For Perfect Reception



SOLDERALL
SOLDER ALL AT JOBBERS
AND DEALERS OR BY MAIL
25¢ A TUBE
L.S. BRACH MFG. CO.
NEWARK, N. J.

3 Letters! and they will be interesting to every ~ radio user.

THE HIGHEST TONE

HUDSON MOTOR CAR COMPANY OF N.Y.
INCORPORATED
DIVISION OF
HUDSON AND EMSEX MOTOR CARS
1422 BROADWAY
BROOKLYN

November 23rd, 1922.

Acme Apparatus Company
 Cambridge, Mass.
 Dear Sir:—

It will possibly be of interest to you to know that with the aid of your radio Frequency Transformers R2, R3 and R4, I have built an ideal set. This set brings in PWX, Havana, as clear as a bell any time that I care to hear him. I have also reached other stations that I never knew existed. Last night I hooked up 3 UV 1714 Transformers in place of yours, and with the stations that I received there was enough howls and yells to make one think that all Hell was let loose at once, so put the old Acme's back and the loud speaker started to give out some real music. This set has given such satisfaction that I simply couldn't refrain from writing you to let you know that you have satisfied at least one Radio Bug. However, I might add that I am using a loop antenna and my tuner consists of only 2 Variable condensers, one 43 plate and one 3 plate hooked right across the loop outlet.

Please do not think that this is the first set I have ever seen and that my enthusiasm is running away with me. I have owned a a step and a C.R. 9 and have also built numerous other sets, but this Acme Radio Frequency Transformer sure has the world licked.

Very truly yours,
 Hudson Motor Car Company of N. Y. Inc.
 Service Manager

John M. Craig

ACME APPARATUS COMPANY
TRANSFORMER & RADIO ENGINEERS & MANUFACTURERS
160 MASSACHUSETTS AVENUE
CAMBRIDGE 26, MASS., U.S.A.

December 7th, 1922.

Mr. John M. Craig
 510 St. Marks Avenue
 Brooklyn, N. Y.
 Dear Sir:—

We wish to thank you for your letter of November 23rd and would like to know if you would be willing to allow us to use this as a testimonial either with or without your name.

We worked for practically nine months before putting a radio frequency amplifying transformer on the market and it is exceedingly gratifying to receive such letters as yours as a reward for this endeavor.

Yours very truly,
 ACME APPARATUS COMPANY
 Per Chief Engineer

J. M. Bertram

HUDSON MOTOR CAR COMPANY OF N.Y.
INCORPORATED
DIVISION OF
HUDSON AND EMSEX MOTOR CARS
1422 BROADWAY
BROOKLYN

December 8th, 1922.

Mr. G. E. M. Bertram
 186 Massachusetts Ave.,
 Cambridge, Mass.
 Dear Sir:—

Your letter of the 7th instant came to hand this morning and in reply would say that you are at liberty to use my letter of November 23rd, in any way you desire, with or without my name. I might add that I know of four sets copied from mine that are giving results equal to mine.

On Wednesday evening I had a transmission engineer from the New York Telephone Company out to my home and believe me he was the most surprised man I have seen in some time. Without having ever seen my set, in twenty minutes he tuned in PWX, WOC, WBAP, WSE and several near stations. What pleased him especially was that he could tune in the 200 meter stations as well as the 400 meter boys.

Very truly yours,
 Hudson Motor Car Company of N. Y. Inc.
 Service Manager

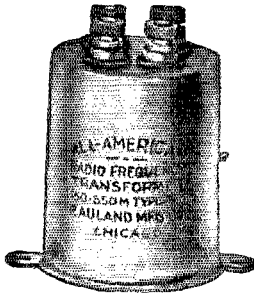
John M. Craig

You can purchase all Acme Transformers at radio stores. If your dealer does not carry them, we will see that you are taken care of. Leaflets describing hook-ups for various Acme Transformers will be sent on request.

THE ACME APPARATUS COMPANY
(Pioneer transformer and radio engineers and manufacturers.)
 CAMBRIDGE, MASS., U. S. A.

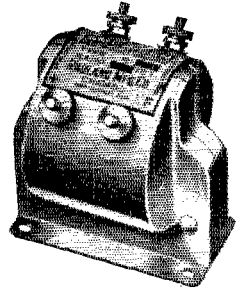
New York 1270 Broadway
 Chicago 184 W. Washington Street

ACME ~ for amplification



Tell Your Dealer "ALL-AMERICAN" or Nothing

when you buy Radio Transformers,
and *stick to it*—for your own protection.



"All-American" Amplifying Transformers

(Radio and Audio Frequency) have *proved their superiority* in every competitive test, and won the approval and adoption by leading makers of sets.

Electrically correct, splendid examples of high-class workmanship, from the best materials; built by experts; rigidly inspected and every one tested singly before leaving our factory.

- R10—Radio Frequency (150-550 meters)
- R12—Audio Frequency (Ratio 3 to 1)
- R13—Audio Frequency (Ratio 10 to 1)
- R21—Audio Frequency (Ratio 5 to 1)

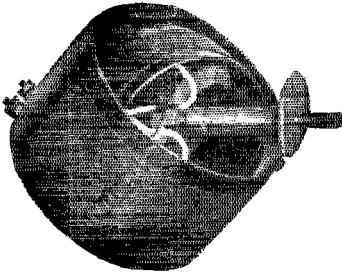
Send for circular "Cascading of Amplification."



RAULAND MFG. Co.
35 So. Dearborn St., Chicago, Ill.



THE LORAIN VARIOCOUPLER



THE PERFECT MOUNTING
Pat. Pend.

A COUPLER FOR EVERY PURPOSE

You can now get a coupler for use in any circuit—We will soon have a coupler for **MEDIUM WAVES**—at a reasonable price—and using the Perfect Mounting—Watch for it.

We are now in position to make prompt deliveries.

LORAIN RADIO SUPPLY CO.
LORAIN, OHIO

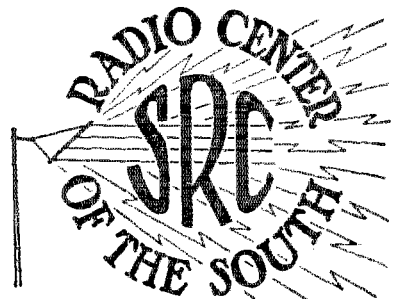
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2768 Eveready Variable B. Battery.....	\$1.25
2766 Eveready Variable B. Battery.....	2.25
2767 Eveready Variable B. Battery.....	4.25
Skinderviken Transmitter Buttons.....	.95
2000-Ohm Murdock 256 Head Set.....	4.49
3000-Ohm Murdock 256 Head Set.....	4.98
Federal 2200-Ohm Head Set.....	6.50
Western Electric Head Set.....	9.75

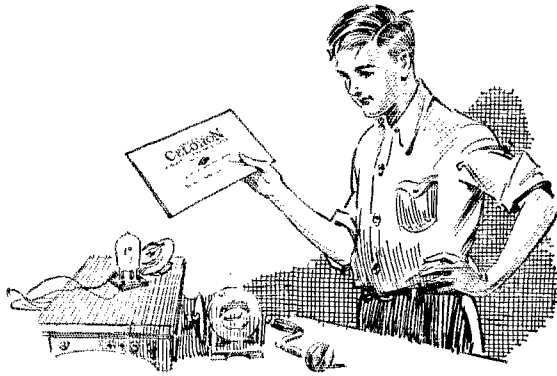
6 Volt 20 Amp. Marko Storage Batteries	8.95
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All orders must include Parcel Post charges.

Hygrade Electrical Novelty Co.
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SOUTHERN RADIO CORPORATION
Radio Engineers and Jobbers
905 Realty Building, Charlotte, N. C.



When every hour counts

BILL wanted to make his radio set as quickly as possible. But at the very beginning there was a delay in getting his panels. It wasn't a long delay, but he was impatient and wanted to make every hour count.

You, Bill, and every radio set-builder can avoid such a delay by getting Celoron Standard Radio Panels. You don't have to wait for your panel to be cut. There's no extra expense for cutting to your order. You go to your dealer and give him the size. He has a Celoron panel which you can carry home with you at once.

Each panel comes trimmed and

wrapped separately in glassine paper to protect the surface. On each one are full instructions for working and finishing.

Celoron makes an ideal panel. It is easily worked, machine drilled and tapped, and will engrave evenly without feathering. It has high surface and volume resistivity, high dielectric strength, and low dielectric losses.

Select from these sizes the one you need:

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Make every hour count in making your radio set. If your radio dealer has not yet stocked these panels, ask him to order for you. Or write direct to us. Be sure to designate by number the size you want.

Diamond State Fibre Company

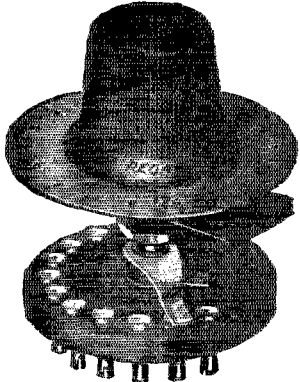
BRIDGEPORT (near Philadelphia) PENNSYLVANIA

BRANCH FACTORIES AND WAREHOUSES
 BOSTON CHICAGO SAN FRANCISCO
 Offices in Principal Cities

In Canada: Diamond State Fibre Company of Canada, Limited, 245 Carlaw Avenue, Toronto

CONDENSITE
CELORON
 STANDARD RADIO PANEL

REGAL NO. 164
INDUCTANCE SWITCH
(Complete with Knob
and Dial)

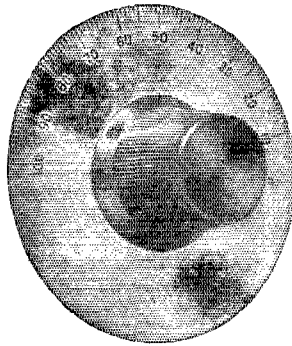


A 15-point switch complete in one unit. Requires but one hole to mount on panel. Smooth wiping contact over heads machined to same height on one piece contacts. Complete soldered assembly attached, or removed from panel's by means of one threaded shaft bushing. Gives inductance regulation by dial contact **\$2.00**

Radio's Biggest Hits This Season

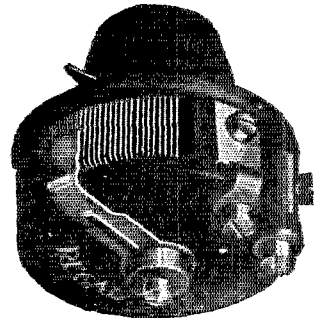
THREE OF 'EM

REGAL NO. 220
SILVERED KNOB AND DIAL



Handsome 3 inch Silvered Dial with new style Regal Knob. Not to be compared with the common moulded knob and dial. Gives rich appearance to receiving set **\$0.75**

REGAL NO. 140
FILAMENT RHEOSTAT

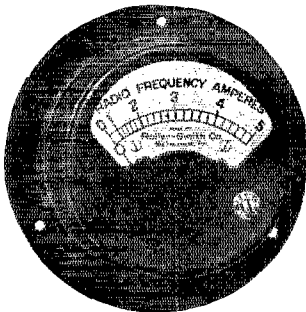


Has full exposed resistance wire, giving critical adjustment so necessary to the efficient operation of a vacuum tube. Fine, smooth working control. Handsome knob, heat resistance base and highly nickel-plated parts. 6 ohms resistance —2.2 amperes ... **\$1.00**

Condensers, Crystal Detectors, Binding Posts, Switch Points, Knobs, Tube Sockets, Vario-Coupler, Variometer, and Jacks.

If your dealer is not handling REGAL Products, send your orders direct.

THE AMERICAN SPECIALTY COMPANY, Bridgeport, Conn.



**Hot Wire
or
Thermo
Couple?**

For small size, small capacity radiation ammeters the hot wire mechanism is far superior to the thermo-couple type. That's why our small 3½" radiation ammeters are of the hot wire type.

The Roller-Smith Company being the only maker of both hot wire and thermo-couple types is in a position to know which is best—and it does.

Send for Bulletins No. AG-10 and No. AG-810.

ROLLER-SMITH COMPANY

MAIN OFFICE: 16 Park Place, NEW YORK
WORKS: BETHLEHEM, PA.

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Chi-Rad handbook for this Ad and 10¢

Because of the astonishing number of requests for Chi-Rad's latest Handbook-Catalog, we are forced from this date on to make a small wrapping and mailing charge. In this Chi-Rad Handbook are 48 pages of valuable information for every radio fan. It includes the following:

1. Technical discussions of standard radio apparatus and equipment.
2. Complete instructions, including diagrams, circuits, and illustrations on "How to Build a Reinartz Receiver."
3. Radio definitions, codes, wire tables, etc.

Just wrap a dime up in this ad and mail it to us today. Requests for books will be filled in the order in which we receive them.

Chicago Radio Apparatus Co.

415 S. Dearborn St.,
Chicago Q.S.T.



PROGRESS

NATURALLY, at this early stage, the Art of Radio Communication is not standing still. It is undergoing a normal evolution.

The low-hung, straight line automobile of today is unlike its cart-like predecessor of twenty years ago, although the principle of locomotion remains the same.

So, too, the design of Radio apparatus advances. Insulated panels and live shafts are supplanted by metal panels and completely insulated instruments—the obvious thing to do, making unnecessary the use of a shield. Un-sightly, protruding knobs are replaced by recessed dials and straight tuning bars, permitting fine adjusting without cramping the hand. The tap switch is removed entirely from the panel and becomes an integral part of the variocoupler, being placed *inside* the rotor, thus eliminating all soldering of primary leads.

It is significant that all these improvements have been developed in the Eisemann laboratories.

*Descriptive literature will
be sent upon request*

EISEMANN MAGNETO CORPORATION

WILLIAM N. SHAW, *President*

DETROIT

BROOKLYN

CHICAGO



POSACO

RADIO

QUALITY AND EFFICIENCY

The "POSACO" condenser has made for itself an enviable reputation. It is a real instrument. The single knob controlled vernier is an absolute necessity for efficient tuning in radio frequency, super-regenerative and regenerative circuits. The regular variable is unexcelled for use in circuits which do not require a vernier adjustment.

MATERIALS used in the manufacture of these instruments are the finest obtainable.

WORKMANSHIP, the best. CONSTRUCTION and DESIGN, electrically and mechanically correct. Absolutely rigid. Minimum of dielectric loss.

Each instrument is tested before leaving our factory.

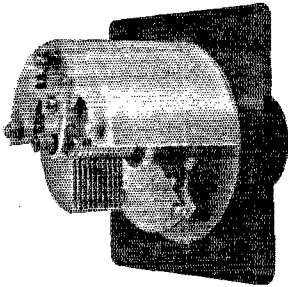
GUARANTEED to give satisfaction and to be free from any defect in materials or workmanship.

If your dealer or jobber cannot supply you, send us your order direct, together with his name and address.

Circular sent free upon request.

Manufactured by

THE C. D. POTTER CO.
STAMFORD, CONN., U. S. A.



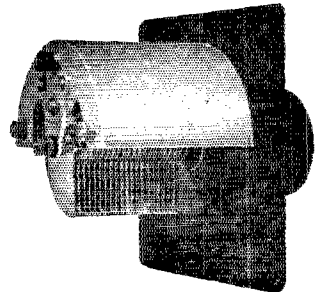
Patent applied for

ALDEN L. MCMURTRY, License

VERNIER

(Single Knob Control)

- B-1 Capacity .001045 Mfd. \$7.50
- B-2 " .000545 " 7.00
- B-3 " .000295 " 6.50
- D-2 Highest Grade 4" Dial. 1.00



Patent applied for

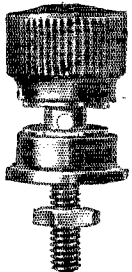
REGULAR

- A-1 Capacity .001 Mfd. \$4.50
- A-2 " .0005 " 4.00
- A-3 " .00025 " 3.50
- A-4 " .000045 " 3.00

POSACO

RADIO

7 REASONS WHY EBY POSTS SATISFY!



COMMANDER



ENSIGN

It's impossible to lose the parts.
Will not break or damage small wires.
Contact surfaces are unusually large.
Easily mounted on your set.
Design of base prevents turning.
Excel all others in quality.
They are surprisingly low in price.

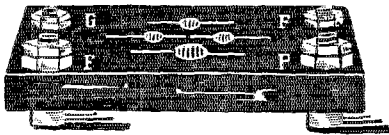


CORPORAL SERGEANT

THE H. H. EBY MANUFACTURING CO.,

PHILADELPHIA, PA.

FRANKLIN SOCKET



For W-D-11—DRY CELL TUBE

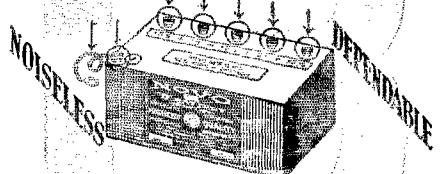
Holds tube firmly.
Makes Perfect Contact

PRICE \$0.50

We also make an Adapter that fits Standard Sockets, Price \$1.00.—Dealers Write for Discounts.

FRANKLIN RADIO MFG. CO.
711 Penn Avenue, Wilksburg, Pa.

NOVO "B" BATTERIES



NOTE THE INSULATED BINDING POSTS AND 7/16 IN. WIRE CONNECTOR

NOVO MFG. CO.
424 W. 33rd ST. NEW YORK
531 50 DEARBORN ST. CHICAGO

Why do you do it?



Do you lug your battery to have it charged?

Do you put off lugging it until it fails to give good results?

How many concerts do you miss or only half hear?

With Tungar—the go-between—from the house lighting circuit to storage battery—you are prepared for best results always.

Just turn it on and leave it. It charges your battery while you sleep. Its cost of operation is low. It makes convenient the necessary charging that prolongs battery life.

Tungar has no moving parts to cause trouble. It is *certain, clean, quiet.*

Good for the auto battery too—the same Tungar.

See it at any good electrical shop, or write for literature. Address Section Q-4.

Merchandise Department

General Electric Company
Bridgeport, Connecticut

Tungar Battery Charger operates on Alternating Current.

2 ampere outfit—\$18.00.

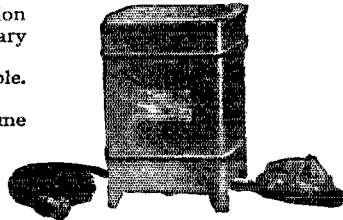
5 ampere outfit—\$28.00

(east of the Rockies)

Special attachment for charging 12 or 24 cell

"B" Storage Battery—\$3.00

—fits either size Tungar.



Charge 'em at Home, with

Tungar

BATTERY CHARGER

A GENERAL ELECTRIC PRODUCT

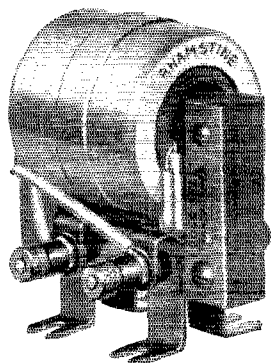
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RHAMSTINE*

"GOLD SEAL"

Amplifying Transformer

PRICE \$4.50



(Model C)

To be assured of the utmost value in selecting a Transformer—choose a Rhamstine*. You will be especially well satisfied with the new "Gold Seal," Model C.

It carries the pledge of highest quality from an organization that holds the unquestioned confidence of the radio public.

It stands for the accurate knowledge of transformer design and construction—it assures you the best both in material and workmanship and its handsome gold-finished frame and coil shield will immediately appeal to you.

The Rhamstine* Model A Transformer lists at \$3.50; the Model B with shielded coil, \$4.00; and the "Gold Seal" or Model C is \$4.50.

FOR AMPLIFICATION WITHOUT DISTORTION
CHOOSE RHAMSTINE*

Catalog upon request

Dealers: Write for attractive discounts.

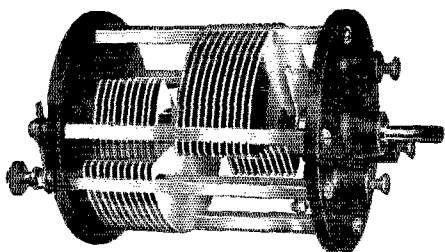
J. THOS. RHAMSTINE*

2152 E. LARNED STREET,

*Maker of Radio Products

DETROIT, MICH.

PRICES REDUCED!



Type 23BA—23 plate, Now.....\$6.00
Type 43BA—43 plate, Now..... 6.50

"PIGTAIL" CONNECTIONS REPLACE ALL SLIDING CONTACTS. TEMPLATES OF GUMMED PAPER ARE PROVIDED.

BALANCED MODELS ARE EQUIPPED WITH "HALF CAPACITANCE" SWITCH.

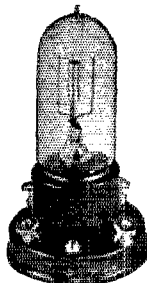
ALL SEXTON CONDENSER END-PLATES ARE OF MOTTLED RED AND BLACK BAKELITE.

Send for circular showing New Prices

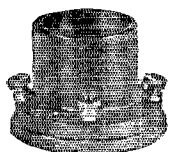
Manufactured by

THE HARTFORD INSTRUMENT CO., INC.

308 PEARL ST., HARTFORD, CONN.



Na-ald W. D. 11
No. 411



Na-ald De Luxe
No. 300

It's the contact that counts

The special phosphor bronze clips of the Na-ald W. D. 11 Socket maintain perfect contact regardless of any variation in tube prongs and base.

Moulded from genuine Condensite, these sockets are made for use with the famous W. D. 11 tubes, operated by a single cell battery.

The Na-ald De Luxe V. T. Socket is of highest quality throughout. Its laminated phosphor bronze strips press firmly with a side wing action on the contact pins, keeping surface clean and insuring perfect contact.

These sockets retail at 75c each

Send stamp for dial, small-space socket, condenser and R.F. transformer circulars.

ALDEN MFG. CO.

Formerly ALDEN-NAPIER CO.
Dept. M, 52 Willow St.
Springfield, Mass.

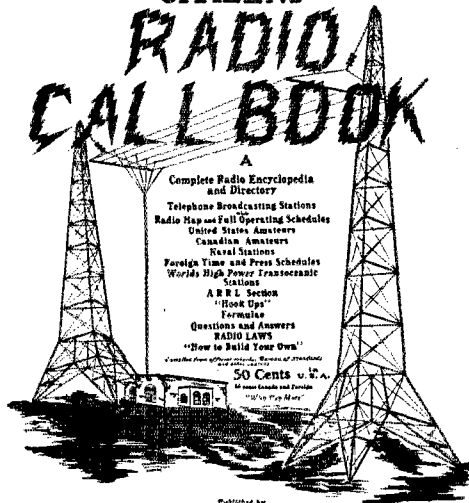
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Citizens Radio Call Book

— Just Off the Press —
200 PAGES

CITIZENS RADIO CALL BOOK

Complete New Book
Containing All
Changes in address.
Re-assigned Calls—
Right up-to-date—
All fresh lists from
Radio Inspectors off-
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Three Large Maps
A.R.R.L. Divisional
—World map with
all high-power sta-
tions marked,—also
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Broadcasting Map
showing all Broad-
cast Stations and
Locations.

Published by
CITIZEN'S RADIO SERVICE BUREAU
Four Sixteen South Dearborn Street, Chicago, Illinois
Who's Who and What's What in Radio Communication
ALL FOR FIFTY CENTS

CONTAINS

All American and Canadian Amateurs, Telephone Broadcasting Stations with Complete Schedules, High Power Stations of the World, with schedules, Wavelength, etc., Federal Market Broadcasting Schedules, Naval Stations, etc., etc.

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CONTAINS ALSO

“Hook Ups” Formulae—Amateur Radio Laws—Questions and Answers and other Valuable Information.

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A Brand New Book approximately 200 Pages Full of Valuable Information, Schematic Diagrams, Graphic Full Page Illustrations of Reinartz, Flewelling and all Circuits—We can't tell it all here—Only Fifty Cents—Why Pay More—If you order Direct from us, add 10 cents Parcel Postage

CITIZENS RADIO SERVICE BUREAU

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Chicago, Illinois

DEALERS AND JOBBERS NOT ALREADY HANDLING OUR PRODUCT WANTED TO WRITE FOR PROPOSITION

Lasts 5 Years

Without Replacing Any Part

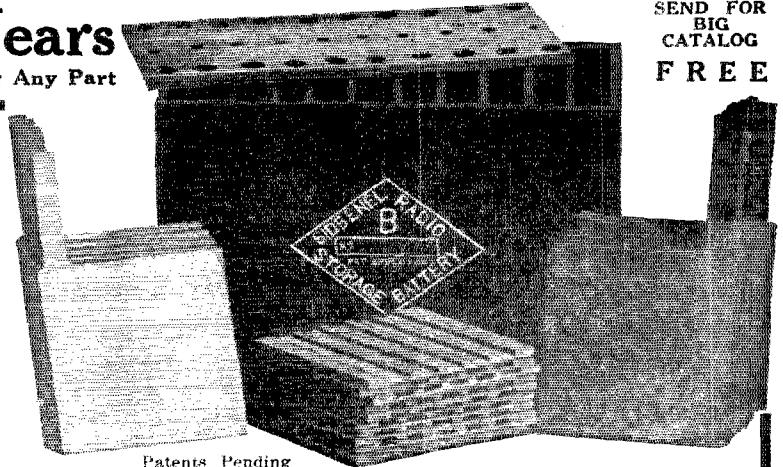
SEND FOR
BIG
CATALOG
FREE

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RADIO EQUIPMENT MFG. CO.

SINGLE UNIT

One\$4.25
Two8.10
Three11.75
Four15.25
Five18.50
Six22.25
Seven25.75
Rectifier for A.C.	
Current	35¢.
D.C. Current re-	
quires none.	



Patents Pending

THE invention is chiefly in the composition of the plates and construction of the battery boxes, which are of hard rubber moulded into ten compartments. Size $2\frac{1}{2} \times 3 \times 4\frac{1}{2}$ per unit. Illustration shows its very sound and rigid construction.

The plates are especially treated with a newly discovered chemical that eliminates howling and screeching, otherwise known as electrical static generated in every known type of dry "B" Battery. A single charge will last approximately six months. Recharged in a few hours to its original full capacity for less than $\frac{1}{2}\%$ the battery is thus ready for another six months use.

The enormous amount of energy in this battery enables the vacuum tube to make weak signals exceptionally loud and clear. You cannot appreciate the difference unless you have made a comparative test. Where used for high power for C.W. transmission no choke coils are required as there is no A.C. humming or motor generator noises.

ASSEMBLE IT YOURSELF

The battery is shipped to you partly assembled, all you have to do is to connect the plates together, which takes less than ten minutes. Any boy of ten years can do it. Instructions with each battery. Connect to any lamp socket or farm lighting generator as per directions and within a few hours you will have a battery that is superior to any on the market. Give it a trial.

SIBENEL RADIO EQUIPMENT MFG. CO.

1663 JEROME AVENUE, NEW YORK CITY.

RADIO

TRANSFORMERS

REAL MERIT is what you expect and what you receive when you use STANDARD Radio Transformers.

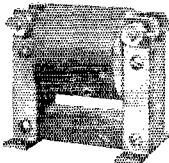
PERFECTLY SHIELDED by virtue of the design MAXIMUM AMPLIFICATION by proper impedance.

Silicon steel cores, insulation test on coils 1500 volts. Bakelite Terminal Board.

Type M—Ratio 9 to 1.....	\$5.00
Type MR—Ratio 4 to 1.....	4.50
Type FL—Filament Heating.....	3.00
Discount 10% for cash with order	

Designed by *Richard* engineers, a quality name in Radio.

THE
STANDARD TRANSFORMER COMPANY
WARREN, OHIO.



PANEL SERVICE

We offer to the amateur and dealer

REAL PANEL SERVICE

Our panels are cut to your order. Only genuine Condensite and Formica used.

1/8"	per square inch	\$0.02
3/16"	per square inch	.02 $\frac{1}{2}$
1/4"	per square inch	.03

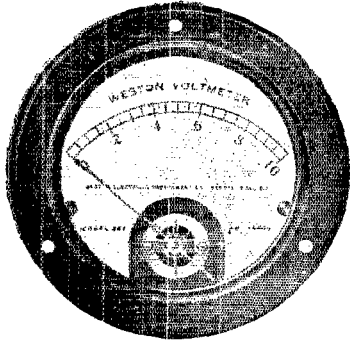
We also carry a complete line of radio essentials. Dealers will find it profitable to have our latest price list and discount sheet.

PITTSBURGH RADIO
AND
APPLIANCE CO., Inc.
"Pittsburgh's Radio Shop"
Desk B

112 Diamond St., Pittsburgh, Pa.



3 Reasons for a Weston Voltmeter



- 1.—It saves tubes. Properly used, it makes premature "burnouts" impossible. A Voltmeter has always been a tremendous convenience even with larger tubes where the filament light has roughly indicated the voltage. Today—with many of the smaller tubes showing none or little light—a voltmeter is absolutely imperative.
- 2.—It saves current, prolonging the life of your dry cells and making it unnecessary to recharge storage batteries so often.
- 3.—It improves your reception by greatly simplifying tuning and makes it possible to quickly duplicate results.

Tubes cost money—current costs money—better reception increases your pleasure. You can't afford to be without this handy, money-saving instrument another day.

Booklet J gives you full information on Weston Voltmeters, Ammeters, Milliammeters, Thermo-Ammeters and Thermo-Galvanometers for amateur, advanced experimenter or commercial station. FREE. Send for it.

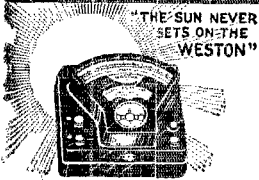
WESTON ELECTRICAL INSTRUMENT CO.

158 WESTON AVENUE,

NEWARK, N. J.

Electrical Indicating Instrument Authorities since 1888

WESTON



"STANDARD" The World Over
ELECTRICAL INSTRUMENTS

An Indicating Instrument for Every Individual Need and Industrial Purpose

CHARGE YOUR BATTERY WHILE YOU SLEEP

Hook the Leich NON TUNE Rectifier to your battery after the evenings entertainment and let it charge all night—no danger—you needn't watch it.

Its 2 ampere charging rate is sufficient for home use when three to four 5 watt tubes are operated.

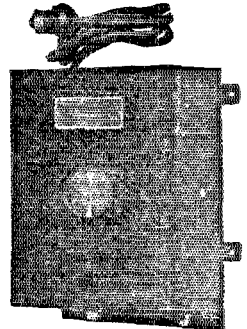
With the increased use of quarter ampere tubes the NON TUNE Rectifier will soon be in a class by itself; because of its high efficiency it uses less than 40 watts of current at full load.

NON TUNE FEATURE gives this charger flexibility in its operation, allowing for considerable voltage and frequency variation of the power circuit.

A PATENTED RELAY LOCK keeps the battery circuit open when the power current fails.

LEADING RAILROAD COMPANIES have used NON TUNE Rectifiers for years.

Try a NON TUNE. Ask your dealer or write for Bulletin 100-B.



LEICH ELECTRIC COMPANY Genoa, Ill.
Manufacturers
NON TUNE RECTIFIERS—LEICH COMFORTABLE HEADPHONES

KEEP TO THE RIGHT
Quality Apparatus

We stock all makes and types of complete Radio sets and parts

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Delivery same day order received

Pioneers in the Radio Field

Send 10¢ for Latest Catalog

ROSE RADIO AND ELECTRICAL SUPPLIES
129 Camp St., New Orleans, La.

**Amplification
perfection**

with all Standard Tubes

An audio transformer will give the same results with all tubes which are alike in A. C. Impedance and Amplification Factor.

WD-11	} These tubes all have nearly the same A. C. Impedance.
UV-201-A	
UV-201	
C-301	
C-301-A	

The AMERTRAN

—universally acknowledged the greatest of all amplifiers, gives the same wonderful amplification curve with WD-11 dry cell tubes as with UV-201 Radiotrons.

PRICE \$7.

American Transformer Company

Designers and builders of radio transformers for over 20 years.

176 Emmet St., Newark, N. J.

This is the Switch
that does the trick.
Turn it 'till you hear it click

**Four Way
Switch Plug**

ASK TO SEE IT

MANUFACTURED BY
THE FOUR WAY COMPANY
Springfield, Mass. U.S.A.

PRICE \$1.50  PRICE \$1.50

“QST”

“QST”

“QST”

FINAL NOTICE

Fourth Annual Convention of the Third Radio District to be held in Baltimore, Md., April 13th and 14th, 1923.

HOTEL EMERSON

Everything is now set for the home coming of the Third District.

Wonderful technical program definitely arranged.

Trip to Annapolis to visit “NSS” assured.

Radio exhibits and displays by manufacturers and dealers will be in abundance.

You will have a chance to see the latest development in radio science and invention.

A banquet that will be, not only a feast for the eyes, but where you, will get full and plenty.

Mayor Wm. F. Broening, will make an opening address, turning the keys of Baltimore over to the Amateurs in the Third District.

Mr. Hiram Percy Maxim and Third District Radio Inspector, R. Y. Cadmus, will make welcoming addresses to the visiting amateurs.

On arriving in Baltimore look for the welcoming committee at Stations, who will gladly direct you to convention hall.

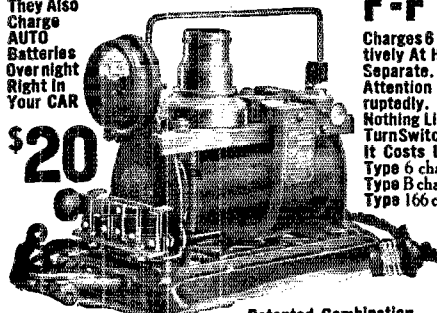
Don't forget that the \$5.00 coupon ticket covers “EVERYTHING.”

Don't delay any longer for ticket reservations, as there are only a limited number now on hand, For ticket apply to Charles G. Henderson, 2008 Bolton St., Baltimore, Maryland.

RADIO “A” & “B” STORAGE Batteries CHARGED at Home For a Few Cents Overnight with “The PATENTED FULL WAVE” 100-130 Volts 60 Cycle A. C. Magnetic Taper Charge Design

They Also Charge AUTO Batteries Overnight Right In Your CAR

\$20



F-F RADIO RECTIFIER

Eventually You Will Buy An F-F RECTIFIER. Why Not Now? The Sooner You Buy It, The More You Save. It

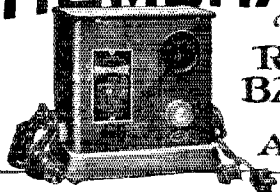
Charges 6 Volt “A” & Auto: & up to 120 Volts Of “B” & Loud Speaker Storage Batteries in Series Inductively At Home Overnight; Disconnecting & Multiple Connections Unnecessary. Charging Circuits Separate. No Chance For Grounds Or Short Circuits. Nothing To Slip Over, Be Filled, Burn Out, Need Attention Or Cause Trouble. Infusible Rectifying Brushes Maintain Constant Efficiency Uninterruptedly. Complete Portable Automatic. No Skill Required. AMMETER Eliminates Guess Work. Nothing Like It Made. Lasts Lifetime. Screw Plug In Lamp Socket; Snap CLIPS On Battery Terminals; Turn Switch & Battery Is Charged In Morning. Charged Batteries Mean Fewer Expensive Replacements. It Costs Less To Buy An F-F RECTIFIER Than To Be Without ONE. 7 Types. POPULAR PRICES. Type 6 charges “A” 6 Volt Battery At 6 amperes \$15 Type 12 charges 12 Volt Battery At 5 amperes \$15 Type B charges Radio “B” Batteries Up to 120 Volts \$15 Type A-B is Combination Of Types 6 & B \$20 Type 166 charges 6 Volt Battery At 12 amperes \$20 Type 1612 charges 12 Volt Battery At 7 amperes \$20 Type 1626 is a Combination of Types 166 & 1612 and Charges Both 6 & 12 Volt Batteries \$28 The 3 Lower Types are recommended for heavy Batteries, or where time is limited. SHIPPING WEIGHTS Complete with AMMETER & BATTERY CLIPS 11 to 15 lbs. Purchase from DEALER, or Mail Check for Prompt Shipment. Include Postage and Insurance Charges for P. P. Shipment, or Write us to Ship Type desired C. O. D. Order Now, or WRITE Immediately for FREE Descriptive BOOSTER Bulletins 31 & 31-A. THE FRANCE MFG. CO., CLEVELAND, OHIO, U. S. A. Canadian Distributor THE JACK V. ELLIOT COMPANY Hamilton, Ontario, Canada.

Patented Combination.

CHARGES “A&B” RADIO & AUTO BATTERIES.

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS.

HOMCHARGE



Your
**RADIO
BATTERY**
for
A NICKEL

Enjoyable concerts and maximum receiving range are obtained only when your battery is fully charged.

THE HOMCHARGER

charges your "A" or "B" battery over night for a nickel without removing it from your living room. No muss—no trouble—no dirt—requires no watching.

After the concert connect to any lamp socket, snap the clips on your battery and "turn in." While you sleep the HOMCHARGER is silently charging your battery, the charging rate being governed automatically. In the morning it is fully charged. No OTHER battery charger can boast of such QUICK and ECONOMICAL performance.

The HOMCHARGER is the only battery charger combining all of these NECESSARY HOMCHARGING features—SELF-POLARIZING—FIVE to EIGHT AMPERE charging rate—UNDERWRITERS APPROVAL—beautifully finished in mahogany and old gold—UNQUALIFIEDLY GUARANTEED. OVER 90,000 NOW IN USE.

Sold complete with ammeter, etc. by all good radio and electrical dealers for \$18.50. (\$25.00 IN CANADA.)

See the Radio HOMCHARGER DELUXE at your dealer's or write for our FREE circular showing why the HOMCHARGER is the BEST battery charger at any price.

MOTORISTS

The HOMCHARGER will also charge your AUTO Battery

THE AUTOMATIC ELECTRICAL DEVICES CO.

127 West Third St., Cincinnati, Ohio

Largest Manufacturers of Vibrating Rectifiers
in the World.

Getting Astounding Results

Amateurs in every state and many abroad as well have worked or heard 2ZL. His station is known from coast to coast. Many wonder how he does it. He has told the tale partly over the air, and partly to those who have been fortunate enough to visit him at Valley Stream, Long Island. Now for the first time the whole story has been put into print for anybody to read. J. O. Smith (2ZL) has written the book of the year:

MODERN RADIO OPERATION

By J. O. Smith

No theory, no mathematics, no formulas, just a straight account of how it is done by C.W., not only at 2ZL, but also at other famous stations such as 1ZE, 8ZG and 9ZG which were installed by Mr. Smith. Also, the story of broadcasting from WDY, WGY, and WJZ.

Receiving too—by all types of sets, including the Armstrong super-regenerative circuit.

DO YOU KNOW?—The proper proportion of grid and plate current in transmitters? The relative merits of D.C. on transmitter tube plates; of A.C. with half-wave rectification; of A.C. with full wave rectification; of Kenotron-rectified A.C.? How much you can gain by adding more tubes to your transmitter? How and why C.W. beats spark in purity, damping and economy? All these and many other vital questions answered.

"Modern Radio Operation" . . . \$1.75

By J. O. Smith

"The Wireless Age" for one year . . 2.50

SPECIAL OFFER \$4.25

BOTH for \$3.75 (foreign postage, 50¢ extra)

WIRELESS PRESS, INC

328 Broadway New York City

FOR SALE

CW-986 Sub Chaser Telephone Transmitting and Receiving Set including—Remote Control System, Power Amplifier, Loud Speakers, Tubes, Spare Microphone, etc. Can be tuned down to 200 meters.

KLEIN'S

RADIO AND ELECTRIC SUPPLY CO.
34 PARK PLACE AND
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MANUFACTURER TO CONSUMER

VARIABLE CONDENSERS APPROVED BY THE
"EVENING RADIO MAIL INSTITUTE"

3 Plate \$0.90	23 Plate \$1.45
13 Plate 1.10	31 Plate 1.55
17 Plate 1.35	43 Plate 1.95

Send P. O. M. O. or Express Order—Or We Will Ship C.O.D.—We Pay Postage.

THE STAR RADIO SPECIALTY CO.
4354 Main Avenue, Norwood, Ohio

ELWOOD ELECTRIC CO. INC.

Bridgeport, Conn., U.S.A.

Manufacturer of

Radio and Telephone Equipment

A.R.R.L. LOG SHEETS

The Operating Department has devised a standard Log Sheet for A.R.R.L. relay stations, which is now available for distribution. It is an 8½x11" sheet, good grade of white bond paper to take either ink or pencil, and punched on left-hand margin for standard three-ring loose-leaf binder. Provision is made in the heading for necessary station data, and columns are provided for time, station called, station calling, and remarks.

For convenience in ordering, a package of 125 forms will be sent postpaid anywhere upon receipt of \$1.00; 500 for \$3.50 postpaid. An accurate station log is a necessity in these days of super-DX. **Keep a log!**

American Radio Relay League
Hartford, Conn.

LOUD SPEAKER FOR ANY CRYSTAL SET

By using the STEINMETZ amplifier you can fill the whole room with music and can increase your range up to 1000 miles. \$8.50, remit by check or money order.

Specials for limited time only
Radiotron UV200 Detector tube.....\$3.75
Amplifying tubes 4.75
1½ volt dry cell tubes..... 4.75
Sockets for standard tubes 50¢, Sockets for 1½ volt dry cell tubes 50¢. Standard 2000 ohm phones \$3.90, 3000 ohm \$4.90. SUPERIOR crystal sets \$3.90, EVEREADY 22½ volt "B" Batteries \$1.50, Rheostats 50¢, Vac. Tube detector sets \$5.50, Amplifier sets \$3.50.

This add must accompany order
Complete instructive catalog 5¢ at your dealers or
STEINMETZ WIRELESS MFG. CO.
5705 Penn. Avenue, Pittsburgh, Pa.

HEAD SETS

\$3.20 in dozen lots

Compare them.
Why Pay More?

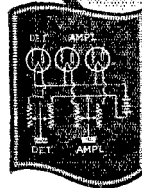
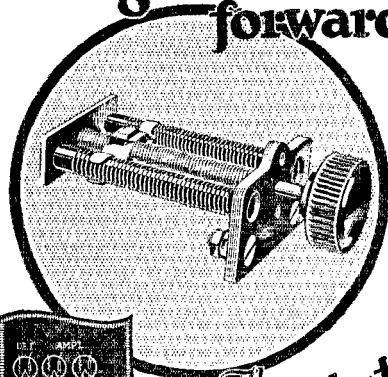
C. M. FRENCH MFG. CO.
Seymour, Conn.

RADIO GENERATORS

500 volts, 125 watts, equipped with ball bearings, \$30.00 each. Parts only, \$14.00 each.

The Electric Motor & Engineering Co.
CANTON, OHIO

A Big Stride forward



The
Autostat
A
Super Rheostat

Can be used with 6-Volt or WD11 Detector Tubes, two Amplifying Bulbs, or one 5-Watt Power Tube.

THE AUTOSTAT presents an entirely new principle in filament rheostat construction and radio takes another BIG step forward.

No longer is it necessary to turn a "hair's breadth" to tune in that elusive station, for with the AUTOSTAT you can give the knob a substantial turn and get a superfine adjustment. No other rheostat to date possesses the necessary "fineness" of adjustment to eliminate interference and "tube howls" under all conditions. But the AUTOSTAT, with its micrometer adjustment, will positively give these much-sought-for results.

How It Works

Two parallel mounted resistance tubes are connected in series by a "micrometer-operated" slider—the length of wire in circuit depending upon the location of this movable slider. Forty turns of the AUTOSTAT knob are required to complete the variation from minimum to maximum resistance—against one-half to three turns on others.

This exclusive patented construction means:

1. One full turn of AUTOSTAT knob produces finer tuning than a "hair's-breadth" turn on any other.
2. Economical—only two AUTOSTATS required for a three-bulb set.
3. Greatly increased receiving range and clearness of signals.
4. A uniform change in resistance with each turn of the AUTOSTAT knob.
5. Indestructible wire-wound fireproof lava resistance element.
6. Unqualifiedly guaranteed.

Popularly priced, **\$1.35**

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Builders of Precision Rheostats Since 1914

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FOR SALE: Grebe CR-6 Three Circuit Regenerative with Detector and Two Stage Audio Amplifier. In perfect condition. Range 150 to 680 meters. Cost \$210.00. Will sell for \$130.00. A. S. Bachtel, 65 East Mill St., Akron, Ohio.

LOOK! Few Klosser Vernier Rheostats each 60c. High grade switch points and Stop-pins, complete with 6/32 shank and nut. 20c a dozen or \$1.50 a gross. Small 6/32 brass nuts 35c a gross. One Step Amplifier Unit with Radiotron 201, \$12. E. G. Baier, 253 Ninth St., Brooklyn, N. Y.

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SELL 1 KILOWATT Spark Transmitter cheap. Write William Baxter, Seven Mile, Ohio.

WANTED—Radio Engineer to travel extensively. Must be capable of highest type of sales and service work in demonstrating and introducing line of patented radio equipment for well known manufacturer of thirty years standing. Write stating experience, education, age and salary desired. Box B, c/o QST.

QRA 8-AAJ Howard Brokate, Port Clinton, Ohio. QSL by card.

A REAL BUY—Clapp-Eastham, HR Tuners, HZ Amplifiers Mahogany Cabinets Regular Price, \$40.00 Per Unit. While They Last. \$20.00 per unit. The Buckeye Radio Service Co., 65 East Mill St., Akron, Ohio.

RUBBER STAMP with large call letters 50c; Radiogram and Relay Radiogram blanks 25c per hundred. Post Cards 60c hundred. Send us your orders. Carolina Printing & Stamp Co., Wilmington, North Carolina.

FOR SALE—C.W. Power transformers for 5 watt tubes. 110v primary, 1100v secondary with center tap, 2 7.5v filament windings with center taps \$18.00. R-3 Magnavox and one large Burgess "B" \$38.00. With each UV-200 or UV-201 at \$5.00 and \$6.50 ea. we give free one Fada rheostat or one Stromberg-Carlson Universal Plug. Chesaning Electric Co., Chesaning, Mich.

SELL: 2 UV-217 Kenotrons, little used, both for \$15; \$80 500 volt 200 watt Robbins-Meyer Gen. for \$50; 4 button Magnavox Hand Transmitter \$15; New Hall Relay & Tape Recorder Complete \$75. Robt. Compton, Carthage, Ill. 9EJ.

ELASTIC rubber adaptors for attaching horn to regular receiver 25 cents. Hale Cottrell, Thirteenth St., Owensboro, Ky.

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FOR SALE: RADIOPHONE TRANSMITTER. 1500 watt, 2000 volt motor generator set and following Radio Corporation products—2-250 watt and 2-50 watt tubes and mountings, filament lighting transformer, modulation transformer, microphone control panel with Weston meters, 15000 volt one KW transformer, send-receive switch, transmitting key, DeForest honey-comb coil set with all coils, detector and amplifier—other parts. Write for list to S. W. Place, 622 Stanbridge St., Norristown, Penna.

FOR SALE: 5JB's 50 Watt CW Panel Mounted all

standard parts \$100. Paragon 10 Watt CW and Fone set \$50, Reinartz Receiver \$15. R. Disheroon, 893 Park Ave., Hot Springs, Ark.

SELL: two fifty watt sockets, \$1.50; eleven hundred volt potential transformers, \$10; Radio frequency transformers, \$4.00; chopper wheel, \$5. Other receiving and transmitting apparatus. Everything guaranteed. Morris Decker, Baldwinville, N. Y.

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9BYX's 5 w C.W. complete with used tube \$85. Wrked 1900 miles—9BYX.

FOR SALE: 1/2 K.W. Thordarson Transformer \$10. Super Benwood Gap \$9. Used but shortly. Am installing 1K.W.. A. C. Ellsworth, 2904 Warrington Rd., Cleveland, Ohio. Radio 8BBY.

50 WATT burnt out bottles wanted—203—A.P. and W.E. or others. Eveland, Box 295, Newark, N.J.

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BUILD YOUR OWN "B" Storage Battery from twenty to one hundred volts. Elements, container, & instructions fifteen cents per cell complete. Each cell is 1.2 volts. Cooperative Merchandise Co., 63 Chestnut St., Chelsea, Mass.

WANTED 6 OR 8 inch spark coil. Good condition. Reasonable price. Andrew Fiske, Warren, R. I.

3HU HAS been reassigned to Harlow D. Gaines, Phi Sigma Kappa House, University, Va. Please QSL cards if heard.

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FOR SALE: 1KW Thordarson Type "T" immersed in oil. Harington, 212 East Twentieth, Little Rock, Ark.

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STE has been assigned to Harold Harvey, 2935 St. Paul Street, Baltimore, Md. Please QSL cards if heard.

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STOP, LOOK; Special. Must sell cheap. A complete radio receiver. Write Lee Kelso, Sutherland, Nebr.

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FOR SALE: One Reinartz Tuner Detector, Two Step in Cabinet \$45.00. One glass McTighe "B" Battery and Rectifier \$4.75. One Homcharger \$12.50. Albert W. Krug, Gardner, Ill.

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FOR SALE: Radio Corporation twenty watt power transformer, transmitting condensers, 5 watt tube, receiving tubes, transmitting grid leak, Weston 0-500 milliammeter, Jewell 0-10 filament voltmeter, U. S. L. 120 ampere hour 6 volt radio battery. All practically new. Write D. A. Lewis, 819 Hays Park Court, Kalamazoo, Michigan.

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8ABX FOR SALE: 2300 mile "dx" record, am putting in 50 watt. Write for particulars, address 8CSI.

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FOR SALE: 2 AMRAD Variometers One AMRAD Variocoupler \$4.50 Each. 2 REMLER Variometers One REMLER Variocoupler \$4.50 Each. 4 New Federal Audio Transformers \$6.00 Each. Terms C.O.D. H. J. McClain, Dana, Indiana.

ZCWR has been assigned to Herbert Mardon, 1309 West Farms Road, Bronx, N. Y. ten watt CW.

ALWAYS MENTION QST WHEN WRITING TO ADVERTISERS

9DWX's SPARK set for sale, complete. Has excellent DX record. \$80. All inquiries answered. W. F. Marquard, Jr., 2624 Potwyne Pl. Chicago, Ill.

CODE PRACTICE set for sale including 15 dial Omnigraph, 2 sets of dials, key, buzzers, transformer and single phone on wood base with terminals, \$20.00. W. A. Mason, 304 Delaware, Lorain, O.

PURE NICKEL WIRE for Edison B Battery Connectors 1 1/2 foot. Hard Rubber Separators half cent. Test tubes fifty cents dozen. SML, Cleveland.

MUST SELL: Three stage radio amplifier, detector, two stage audio in walnut cabinet with bakelite panel. \$125.00 F.O.B. with seven tubes and tuner. N. E. Middleton, 409 W. Main St., Waynesboro, Penna.

WANTED: Omnigraph or will trade two Amrad variometers (basket ball) as part payment. W. F. Moody, Thrall, Texas.

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QRA 7AGE 575 Center St., Salem, Oregon.

BARGAIN: Homemade honeycomb coil reflex set. Two stages radio detector and two stages audio with three tubes! Also antipacity switches changing it to common detector-two-step. Complete with tubes, B batteries, phones and coils, \$100. Storage battery and Rectigon charger \$25. Make offer. Perry Nichols, Rochester, Vermont.

\$12 TAKE new Acme 200 transformer. 9BFV.

FOR SALE: DeForest DT-700 Receiver \$25.00; Remler Type 333 Amplifier \$6.00; Homcharger, (extra vibrator), \$15.00; Western Electric 10-A Loud Speaker complete \$130.00. All practically new. Thomas D. Price, Owatonna, Minnesota.

FOR SALE: 10-watt fone and CW Set. Formerly used as WCAW Broadcasting set. Modulation pronounced loud and perfect at 1200 miles distant. 10-watt oscillator, 10-watt modulator, and 10-watt Speech Amplifier. Complete, only \$235.00. For further particulars write Quincy Electric Supply Company, 1033-35 Maine St., Quincy, Illinois.

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RADIO REPAIRING—anything but tubes. Send us your apparatus that won't work. We'll make it "percolate" or charge you nothing. Prices quoted for your approval before we begin work. Rates reasonable and satisfaction guaranteed. Only shop in the

U. S. doing guaranteed general radio repairing and wiring. Repair Dept., Radio Panel Shop, Junction City, Kansas.

SACRIFICE: 10 watt CW complete \$100; 1KW spark complete \$60; two step amplifier \$15. Write for descriptions. H. J. Riley, 7238 Standish St., Pittsburgh, Pa.

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WILL TRADE Clapp-Eastham HR tuner & det. and HZ two stage amp. and WE phones slightly used but in first class condition. Want 100 watt motor-generator. Radio 9CJI, Berlin, Wis.

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WIRE YOUR SET WITH COPPER BRAID instead of solid wire. Has extremely low resistance at radio frequencies. Makes "cushion" contacts that never work loose. Never breaks, easy to work with, does not require soldering. Air dielectric has no distributed capacity. No. 16 contains 96 No. 36 bare copper wires. Six feet for 25c. Radio Panel Shop, Junction City, Kansas.

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FOR SALE: Four tube receiving outfit. One Radio two steps audio. F. Schoenwolf, 1917 Warner Ave., Chicago.

THORDARSON PLATE transformer, Filament transformer, Jewell Thermocouple, Jewell voltmeter, other parts, used six weeks. Guaranteed like new. Send for list, cut prices. Victor Schleuder, New Ulm, Minn.

EDGEWISE WOUND COPPER Ribbon 3/8" x 1/8" x 8 1/2" also 9 1/2" for Oscillation Transformers 14 and 15 cents per turn any number of turns in one piece. 7 turns of each \$2.00. George Schulz, Calumet, Mich.

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MUST SELL: Three tubes, universal wave-length receiver. \$50. Victor Vogel, Glenrock, Wyoming.

FOR SALE: New 5 watt transmitter, Panel type Kenotron rectified plate supply. Consists of 12x16 panel 0-2.5 Hot wire meter, 1 variable condenser, 2 filter condensers, 2 chokes, 2 sockets, 1 transformer, 2 rheostats, 1 grid leak, 1 grid condenser, 1 inductance, all assembled and wired ready to connect to 110v supply, \$72.00 less bulbs and microphone. A. L. Walser, Chesaning, Mich.

9AAL has been assigned to F. L. Wilcox, 4602a Delmar Blvd., St. Louis. Please QSL cards if heard. Will reply.

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UNUSED APPARATUS at 30-50% DISCOUNT. Weston 7 inch type 400 switchboard R.F. millimeter 0-500 mils. \$25.00; Radiocorp 750 watt UP1016 Filament-and-plate transformer \$20.00; Thordarson 500 watt 1500-1000-0-1000-1500 plate transformer \$15.00; Four French army standard receiving tubes, all together \$12.00; UV-203 tube \$20.00; 24"x7"x1 1/2" blank Condensite-celoron panel finished square \$1.00. Also used but A-1 condition, Weston 6 1/2" switchboard 10-0-10 millimeter (DC) \$20.00. Send postal Money Order or check. L Q—American Radio Relay League, Hartford, Connecticut.

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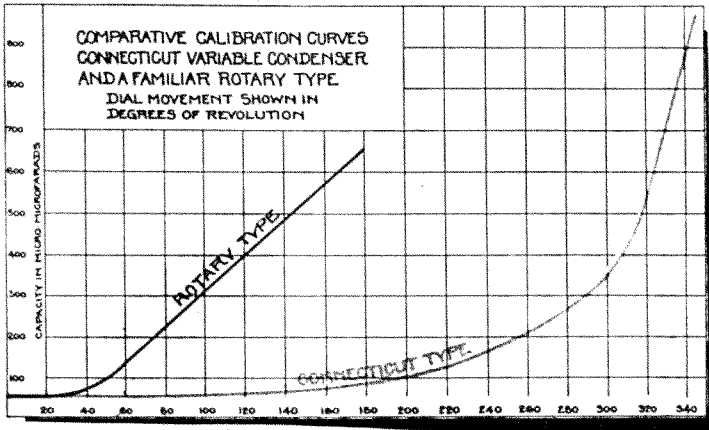
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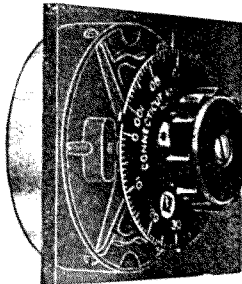


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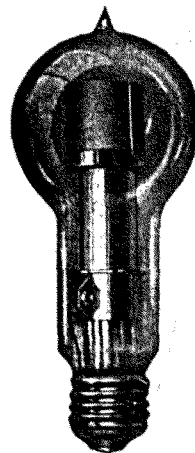
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